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RADIO AGE, 1941-1952

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234	Making People Shockproof by Clarence L. Menser [April]	1942
235	Man and Science by David Sarnoff [July]	1949
236	Marconi Anniversary [January]	1952
237	Marek—Great Voices Brought To Life [April]	1951
238	Marek—Nostalgia and Old Records [January]	1952
239	McConnell—Address to North Carolina Bar Association [July]	1952
240	McConnell—Address to South Carolina Broadcasters Association [October]	1950
241	McConnell Elected RCA Executive Vice President, J. H. [July]	1949
242	McConnell—Year-End Statement 1951 [January]	1952
243	Messengers: Fast, Reliable, Colorful [October]	1945
244	Metal Detector: Hidden Particles Detected [April]	1946
245	Metal Detectors in Industry by W. H. Bohlke [October]	1947
246	Metal Detectors—Lost Coins [October]	1950
247	Metal Detectors—Utility Series [October]	1951
248	Metal Kinescope, Praises 16-Inch (L. W. Teegarden statement) [April]	1949
249	Mexicana, Victor S. A. [October]	1949
250	Mexican TV Station Planned [January]	1952
251	Microphone "Starmaker" [October]	1950
252	Microphones—1920 to 1948 by T. A. Smith [July]	1948
253	"Microstick" TV Ruler [July]	1950
254	Military Preparedness by W. W. Watts (October)	1950
255	Monroe: Sings at 300 Rallies [January]	1943
256	Monroe Starts New Rally Series, Lucy [October]	1943
257	Morgenthau, Praise from [July]	1943
258	Mossman, Donald P., Jr., Cited for Contributions to Defense [April]	1952
258a.	"Mothball Fleet", Radio Technicians Go to Work on the, by Forrest H. Flanders [July]	1951
259	Movies As You Ride [April]	1947
260	Multiplex: 8 Messages—1 Transmitter [July]	1945
261	Multiplier Phototube (1P21) Aids Atomic Research [April]	1950
262	Multiplier Phototube Scintillation Counter [January]	1950
263	Music America Loves Best, RCA Presents [April]	1944
264	Music Critics Circle in Symphony Award [July]	1944
265	Music in Industry [April]	1942
266	Music Is a War Weapon by William R. Seth, Jr. [July]	1945
267	Music, Mood . . . Selecting for TV Programs [April]	1952

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268	NARDA—Address by J. B. Elliott [January]	1951
269	N.C.A.C. Formed: Sell Service (Niles Trammell statement) [January]	1942
270	Navy "E" Won by RCAM [April]	1942
271	Navy "Whips" at RCA Victor [April]	1943
272	NBC: Adult Educational Series [April]	1951
273	Appointments—Niles Trammell and Joseph H. McConnell [October]	1949
274	Awards & Fellowships by Dr. James Rowland Angell [July]	1944
275	Barrymore and Shakespeare [October]	1950
276	Boca Raton Convention [January]	1952
277	Boca Raton UHF Demonstration [January]	1952
278	Box-Offices, . . . Operates One of World's Biggest by Peter M. Tintle [April]	1952
279	Builds Its Audience by Jean E. Harstone [October]	1943
280	"CHIMES" Official [April]	1950
281	Design for TV by Sylvester L. Weaver, Jr. [January]	1951
282	Diary of a TV Set Designer by Tom Jewett [January]	1952
283	Documentaries Extended [April]	1949
284	Dramatizes Home Life [January]	1945
285	Election Coverage—1952 [January]	1952
286	First TV Opera [January]	1952
287	"Great Escape, The"—TV Production—by Robert J. Wade [July]	1951
288	Heads Visit Fronts by Niles Trammell [January]	1944
289	in Teaching Project [July]	1944
290	Invasion Reports Win Acclaim by William F. Brooks [July]	1944
291	Makes Changes in Executive Staff [October]	1947
292	Network Policies Revised (Niles Trammell statement) [April]	1945
293	New Studios [January]	1942
293a.	Opera Telecast Announced [October]	1952
294	Outlines New Policies (William F. Brooks statement) [July]	1945
295	Prepares for Conventions [April]	1948
296	Production Facilities Department by Robert J. Wade [July]	1950
297	Program Quality Citations [July]	1950
298	Recording Studio Produces Army Series [July]	1944
299	Reporters Cover the War by Clarence L. Menser [October]	1942
300	San Francisco: Opens New Radio City by Sidney N. Strotz [July]	1942
301	Sets Up Planning Group by William S. Hedges [January]	1946
302	Silver Jubilee [July]	1951
303	Stations Lead in Listening Habits Poll [January]	1945
304	Students in NBC Competition by Dr. James R. Angell [April]	1947
305	Studio 8-H Rebuilt [January]	1951
306	Studio 8-H Rebuilt by NBC [April]	1942
307	Three Universities Plan Radio Institutes [April]	1944
308	Tours, 25,000 Servicemen Take Free [October]	1942
309	Trains Employees for Careers by Ernest de la Ossa [July]	1949
310	TV "Armed Forces" Program [October]	1949
311	TV Expansion—5 New Studios [October]	1950
312	TV Expansion Plans—White Sulphur Springs Convention [October]	1950
313	TV Network Additions [October]	1949
314	TV Network Additions [January]	1950

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315	TV Network Additions [October]	1950
316	University of the Air Opens by Dr. James R. Angell and Sterling Fisher [July]	1942
317	U. N. Project [October]	1949
317a.	West Coast TV Center [October]	1952
318	Year-End Statement (Joseph H. McConnell) [January]	1950
319	Netherlands TEX Inaugurated [July]	1950
320	New Era in Radio Communications by David Sarnoff [January]	1945
321	New Role Seen for Radio (David Sarnoff statement) [July]	1943
322	"Nipper" Listens In by J. W. Murray [October]	1944
323	Nuclear Radiation Counter—Multiplier Phototube [January]	1950
324	Nuclear Radiation—Tube Type 1P21 [April]	1950

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325	Occupied Nations Hear NBC [October]	1943
326	"One World" Honor (David Sarnoff) [April]	1945
327	Opera, First TV [January]	1952
327a.	Opera Telecasts Announced [October]	1952
328	Orchestras of the Nation [January]	1945
329	Outlook for the Radio Industry by David Sarnoff [July]	1947
330	OWI Uses Recording Units [October]	1943

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331	Pack Transmitters Grow Smaller [October]	1948
332	Pandora, Training for by J. F. Rigby [October]	1946
333	Pandora Plan, The by Thompson H. Mitchell [July]	1946
334	Paris: Ceremonies Open New Broadcast Facilities [January]	1948
335	Pasteurizing Milk by Radio [October]	1947
336	Patent Law Association (address by E. C. Anderson) [April]	1951
337	Peace in a Changing World by David Sarnoff (Phi Beta Kappa) [January]	1949
338	Penicillin, New System for [January]	1945
339	Penicillin Production, Aids [July]	1944
340	"Personal" Receiver—New Portable [July]	1952
341	Personnel Aims Outlined by Forrest H. Kirkpatrick [October]	1943
342	Phonograph Comes Back by Frank B. Walker [January]	1942
342a.	Phonograph Comes of Age [April]	1950
343	Phonograph Records Make Strong Comeback in 1951 by L. W. Kanaga [April]	1952
344	Phonograph with three speeds [July]	1952
345	Phosphors Brighten Radio Picture by H. W. Leverenz [October]	1943
346	Photometer: Measures Light of Faintest Stars [October]	1947
347	Photophone at War by Barton Kreuzer [April]	1941
348	Pipe Line Project by H. C. Edgar [January]	1952
349	Plane-to-Shore Message Service Opened [July]	1947
350	Plastics, Electronics Expand Horizon for [January]	1944
351	Plastics, Radio and Television Use by J. A. Milling [April]	1947
352	Pocket Ear, The [January]	1947
353	Police Radio, Richmond, Va. Installs 2-Way [October]	1948
354	Portugal: RFE Station Transmitters Supplied by RCA [July]	1952
355	Pottsville, Pa. Installs Community Antennaplex System for TV [July]	1951
356	Production Feat, RCA [April]	1943
357	Production Ideas, 50,000 [July]	1944

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358	Production, Radio Sets in by Frank M. Folsom [October]	1945
359	Production Wins 3 Awards [October]	1943
359a.	Products and People, Moving, by Richard C. Colton [July]	1950
360	Programs by Documentation [April]	1948
361	Programs Possible", "Finest (NBC—15th Anniversary) [January]	1942
362	Purchase Agreement, Post-War [April]	1943

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362a.	Quality Testing Laboratory at Browns Mills, N. J. by William J. Zaun [October]	1952
363	"Quick And The Dead"—Recorded Radio Drama [April]	1951

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364	Radar in Aviation by H. M. Hucke (Altimeters-Loran) [January]	1946
365	Radar, Map-Making by [July]	1947
366	Radar, New . . . Has 200-Mile Range [July]	1952
367	Radar, Praise for [July]	1948
368	Radar, School for [October]	1947
369	Radar, Ship . . . Tested by Charles J. Pannill [January]	1947
370	Radar, The Story of by Dr. Irving Wolf [October]	1945
371	Radar, Tugboat [October]	1948
372	Radar—Wartime Miracle of Radio [July]	1943
373	Radiation Counter Safeguards Workers [January]	1950
374	Radio Across the Atlantic by George H. Clark [October]	1941
375	Radio at Sea [October]	1941
376	Radio at the Ready: 1941-42 by David Sarnoff [January]	1942
377	Radio Communications and its Import in International Relations by David Sarnoff [October]	1946
378	Radio Communications and Weather Analysis [April]	1950
379	Radio Executives Club—Marconi Anniversary [January]	1952
380	Radio Free Europe Station at Portugal [July]	1952
381	Radio Heat Seals Plastics by Wiley D. Wenger [October]	1946
382	Radio in 1945-46 (David Sarnoff statement) [January]	1946
383	Radio in 1946-47 by David Sarnoff [January]	1947
384	Radio in 1948-49 by David Sarnoff [January]	1949
385	Radio Links All Nations by Thompson H. Mitchell [October]	1944
386	Radio on the High Seas by Charles J. Pannill [October]	1944
387	Radio on the "Rack" [July]	1943
388	Radio, New Advances in . . . Foreseen (C. B. Jolliffe statement) [April]	1945
389	Radio Relays Surmount Storms [April]	1948
390	Radio Reports the War by William F. Brooks [October]	1943
391	Radio Review and a 1948 Preview by David Sarnoff [January]	1948
392	Radio 'Round the Earth by Jay D. Cook [October]	1944
393	Radio "7 Miles Up", Testing [July]	1943
394	Radio, Social Aspects of by Frank E. Mullen [October]	1944
395	Radio Vital to Victory by James G. Harbord [January]	1944
396	Radio Wins High Tribute [April]	1943
396a.	Radio Workshop Begins Tenth Year by Thomas C. McCray [October]	1952
397	Radiomarine Awarded "M" [April]	1943

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398	<i>Radiomarine: "INDEPENDENCE" Equipped</i> [April]	1951	446	<i>Institutes TV Home Study Course</i> [April]	1951
399	<i>Radiomarine: "LIBERTY" Ships Reactivated</i> [July]	1951	447	<i>Institutes, 1,500 Students in . . .</i> by George L. Van Deusen [April]	1948
400	<i>Radiomarine: New Luxury Liner is RCA- Equipped</i> [April]	1948	448	<i>Institutes Holds Graduation</i> (David Sarnoff address) [July]	1949
401	<i>Radiomarine: New Marine Radio Devices</i> [July]	1946	449	<i>Institutes: 600 Enroll</i> [October]	1941
402	<i>Radiomarine Orders Rise</i> [April]	1942	450	<i>Institutes Training Navy, Marine Corps Men</i> [October]	1942
403	<i>Radiomarine Wins Army-Navy "E"</i> [Janu- ary]	1943	451	<i>Institutes, Training Technicians at</i> (photo layout) [October]	1948
404	<i>Radiophone, River Pilots Land</i> [April]	1948	452	<i>International Division Moves</i> [October]...	1950
405	<i>Radiophoto in Advertising</i> [January]	1945	453	<i>Laboratories Cornerstone Laid</i> [January].	1942
406	<i>Radiophoto Service with Stockholm</i> [April].	1943	454	<i>Laboratories, Dedicate New</i> [October]....	1942
407	<i>Radiophoto Standards</i> by S. H. Simpson, Jr., and R. E. Hammond [January]	1948	455	<i>Laboratories Groups, Names</i> [April]	1943
408	<i>Radiophoto Use Expands</i> by S. H. Simpson, Jr. [July]	1946	456	<i>Laboratories, Scenes from</i> (photo layout) [April]	1945
409	<i>Radiophotoed, Music . . . from Moscow</i> [April]	1945	457	<i>Laboratories—Visit of Shah of Iran</i> [Janu- ary]	1950
410	<i>Radiophotos from Cairo</i> [July]	1942	458	<i>Laboratories Win "E" Award</i> [July]	1943
411	<i>Radiophotos from Russia</i> [October]	1941	459	<i>Laboratories, Work Begins at Princeton</i> by Ralph R. Beal [October]	1941
412	<i>Radio's Great Role in the War</i> by James G. Harbord [October]	1944	460	<i>Man Back from Japan</i> by J. Francis Harris [January]	1944
413	<i>Radio's New Services</i> by E. W. Engstrom [October]	1944	461	<i>Management, Changes in</i> [January]	1949
414	<i>Radio's War Role Praised</i> [July]	1942	462	<i>Manufacturing Employees in New Victory Campaign</i> [January]	1942
415	<i>Radiotelegraph Traffic Doubled</i> by Thompson H. Mitchell [January]	1947	463	<i>Manufacturing Grows</i> by Frank M. Folsom [October]	1944
416	<i>Radiotelephone, New 6-Way</i> by I. F. Byrnes [April]	1946	464	<i>Manufacturing Rally, 60,000 at</i> by J. M. Smith [October]	1942
417	<i>Radiotelephony on Pleasure Boat</i> [October].	1949	465	<i>Materials' Conservation</i> (Folsom letter to manufacturers) [April]	1951
418	<i>Radiothermics Speeds Industry</i> by I. R. Baker [January]	1943	466	<i>Men Aid Government Groups</i> by Dr. C. B. Jolliffe [January]	1942
418a.	<i>Railroad Field, Usefulness of Television in</i> [October]	1952	467	<i>Men Rove War Fronts</i> by W. L. Jones [January]	1944
419	<i>RCA:</i> <i>Alert Goes to Camden</i> [October]	1941	468	<i>Patent Policy</i> [July]	1950
420	<i>and the war</i> (David Sarnoff statement) [July]	1942	470	<i>Plants and Laboratories, Scenes in</i> (photo layout) [April]	1947
421	<i>Cadettes Learn about Radio</i> (photo layout) [July]	1943	471	<i>Review Ends 2nd Year</i> [April]	1948
422	<i>Cadettes on Job</i> by Dr. C. B. Jolliffe [April]	1944	472	<i>Royalty Rates Reduced</i> [July]	1950
423	<i>Communications Circuits Aid U. S. in War</i> by William A. Winterbottom [April]....	1942	473	<i>Salesmen Attend Training Course</i> by W. Boyce Dominick [July]	1945
424	<i>Communications—Direct circuits opened with Syria, Thailand & Guam</i> [January]	1952	474	<i>Service Company: New RCA Subsidiary</i> [April]	1943
425	<i>Communications: Initiates Rate Reductions</i> [April]	1942	474a.	<i>Service Company: Tactful Technicians</i> [October]	1952
426	<i>Communications—TEX Inaugurated with Netherlands</i> [July]	1950	475	<i>Service Company—Trainee Course</i> [Octo- ber]	1950
427	<i>Communications Training Operators</i> [July]	1942	476	<i>Servicing Military Equipment</i> by P. B. Reed [January]	1951
428	<i>Communications—UN Branch</i> [January]..	1951	477	<i>Sign Blocked Out</i> [January]	1942
429	<i>Dividend Declaration</i> [October]	1951	478	<i>Standardization of Products</i> by D. F. Schmit [October]	1949
430	<i>Earnings Increased in 1945</i> [April]	1946	479	<i>Stations on Long Island, Scenes from Transoceanic</i> (photo layout) [July]....	1946
431	<i>Executives Promoted</i> [January]	1946	480	<i>Stockholders Meet</i> (James G. Harbord ad- dress) [July]	1944
432	<i>Exhibition Hall</i> [July]	1947	481	<i>Stockholders Meet</i> (David Sarnoff address) [July]	1945
433	<i>Exhibition Hall, Scenes from</i> (photo lay- out) [July]	1947	482	<i>Stockholders Meet May 5th</i> (April)	1942
434	<i>Exhibition Hall, The</i> [July]	1949	483	<i>Stockholders Meeting</i> (David Sarnoff ad- dress) [July]	1946
435	<i>Expands Communications</i> [January]	1946	484	<i>Stockholders Meeting</i> (David Sarnoff ad- dress) [July]	1947
436	<i>Fellowships, . . . Awards</i> by Forrest H. Kirkpatrick [January]	1948	485	<i>Stockholders Meeting</i> (David Sarnoff ad- dress) [July]	1948
437	<i>Financial Results for First Half of 1951</i> [July]	1951	486	<i>Stockholders Report, . . . Makes Annual</i> (David Sarnoff and James G. Harbord statement) [April]	1947
438	<i>Frequency Bureau</i> by Philip F. Siling [Janu- ary]	1949	487	<i>Stockholders Meeting</i> [July]	1950
439	<i>Income Increased in 1943</i> [April]	1944	488	<i>Stockholders Meeting</i> [July]	1951
440	<i>Income Rose in 1942, Gross</i> [April]	1943	489	<i>Stockholders Meeting</i> [July]	1952
441	<i>In Service to the Nation</i> (map) [July]....	1949	490	<i>Suppliers</i> by Vincent de P. Goubeau [April]	1950
442	<i>Institutes Award Scholarships</i> [July]	1951			
443	<i>Institutes Graduate 198</i> [January]	1950			
444	<i>Institutes, History of . . .</i> by C. E. Tomson [October]	1951			
445	<i>Institutes Placement Record</i> [January]...	1952			

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491	Victor—Cincinnati Tube Plant [July]	1951
492	Victor Division Plants Expansion [July]	1950
493	Victor Division Formed [January]	1943
494	Victor Division Plants Win "E" Stars, Two [April]	1943
495	Victor Home Instruments, Latest Models (photo layout) [July]	1947
496	Victor Mexicana S.A. [October]	1949
497	Victor Traffic Division [July]	1950
498	Workers, Hero Lauds [April]	1943
499	Workers Launch Ship [October]	1943
500	Reading Aids, Electronic [January]	1949
501	Reading by Sounds [October]	1946
502	Record Manufacture, Pact Ends Year-Old Ban on (David Sarnoff and James Petrillo statements) [January]	1949
503	Record, New Phonograph and (45-rpm) [January]	1949
504	Record Salesmen, Radio's [July]	1947
505	Recording Resumes, Music [January]	1945
506	Recordings Revived by George R. Marek [April]	1951
507	Recordings Revived by George R. Marek [January]	1952
508	Records and Record Players Acclaimed by Industry, New 45-rpm by J. B. Elliott [April]	1949
509	Records and Record Players, Making New 45-rpm (photo layout) [April]	1949
510	Records are Made, How by W. T. Warrender (photo layout) [April]	1947
511	Records, Phonograph ... Make Strong Comeback in 1951 by L. W. Kanaga [April]	1952
512	Records—45-rpm Sales [October]	1949
513	Records—Policy on (Frank M. Folsom) [January]	1950
514	Records, Unbreakable [October]	1945
515	"Red Network" Out as NBC Designation [October]	1942
516	Relaying by Radio by C. W. Hansell [April]	1945
517	Religion, Radio Adds to Story of by Dr. Max Jordan [April]	1943
518	"Rendezvous with Destiny" (F. D. Roosevelt speeches) [July]	1946
519	Reporting by Radio by George H. Clark [January]	1943
520	Research Aims, RCA by Otto S. Schairer [April]	1944
521	Research Opens the Way by Otto S. Schairer [October]	1944
522	Research Points to Future, Radio by E. W. Engstrom [April]	1943
523	Results of Pioneering by Meade Brunet [October]	1944
524	Retirement Plan, RCA Inaugurates [January]	1945
525	Rome Station, RCA Communications Opens [July]	1944
526	Royal Wedding Films on Air in Record Time [January]	1948
527	Russia, Engineers Visit [January]	1946

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528	Safety and Health by E. M. Tuft [October]	1948
529	Sailors Broadcast in 1908 by George H. Clark [April]	1942
530	Sarnoff: Address to American Society of Naval Engineers [July]	1950
531	Sarnoff: Address to John Carroll University [July]	1950
532	Sarnoff: Address to Pennsylvania Military School [July]	1952
533	Sarnoff: Address to Veterans of Foreign Wars, Chicago [October]	1950

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534	Sarnoff: Anniversary Address [October]	1951
535	Sarnoff Becomes a General [January]	1945
536	Sarnoff: Boston Jubilee Award [July]	1950
537	Sarnoff, France Honors (Legion of Honor) [October]	1947
538	Sarnoff Honored: Peter Cooper Medal and U. N. Scroll [January]	1950
539	Sarnoff Lauds Radio's War Role by David Sarnoff [January]	1943
540	Sarnoff Looks Ahead by David Sarnoff [January]	1944
541	Sarnoff Meets RCA Cadettes in Indiana [October]	1943
542	Sarnoff: Patent 2571386 granted [January]	1952
543	Sarnoff, President Honors (Medal for Merit) [April]	1946
544	Sarnoff Receives Medal of Honor from RTMA [July]	1952
545	Sarnoff Receives Top TBA Award [January]	1945
546	Sarnoff Speaks at Eisenhower Ceremony [October]	1948
547	Sarnoff: University of Louisville Award [October]	1950
548	Sarnoff Urges Charter for Business [April]	1943
548a	Sarnoff: Weizmann Institute Address in Rehovoth, Israel [October]	1952
549	Sarnoff: World Brotherhood Award [April]	1951
550	Sarnoff: Year-End Statement (for 1949) [January]	1950
551	Sarnoff: Year-End Statement (for 1950) [January]	1951
552	Sarnoff: Year-End Statement (for 1951) [January]	1952
553	Scanning Microscope [July]	1942
554	Scholarship Plan Extended [July]	1952
555	Science at New Altitudes by David Sarnoff [April]	1947
556	Science at New Crossroads by David Sarnoff [April]	1948
557	Science in Democracy by David Sarnoff [October]	1945
558	Science Seen in New Role (Arthur F. Van Dyke statement) [July]	1942
559	Science Urged as Aid to Peace (Ralph R. Beal address) [October]	1944
560	"Scientific Method" Can Solve Social Problems by Dr. C. B. Jolliffe [July]	1947
561	Scientists Honored, Three [October]	1948
562	Screen for TV Backgrounds [January]	1950
563	Screen, New Theatre [January]	1952
564	Screens, Making Fine Mesh by Dr. Harold B. Law [October]	1948
565	Script, Story of a Radio by Richard McDonagh [July]	1945
566	Sealing Glass to Metal [January]	1947
567	Seeley, I.R.E. Award to [January]	1948
568	Seidel, Robert A.—Address to NRDGA on Color TV [January]	1951
569	Service is the Keynote by W. L. Jones [October]	1944
570	"Sewing" by Radio Shown [July]	1943
571	Shared-Work Plan Succeeds [July]	1945
572	Shipboard, New ... Radio Set by I. F. Byrnes [July]	1945
573	Shoran in Korea [April]	1951
574	Short Wave: Destination: Orient by Raymond Guy [July]	1945
575	Short Wave: Gateway to the Hemisphere by John Elwood [October]	1941
576	Short Wave: "Invasion" by Radio [April]	1945
577	Shortwave Station: at Bound Brook [July]	1952
578	Short Waves, U. S. Leases [January]	1943
579	Sicily Fight, RCA Sets Aid [October]	1943

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580	<i>Signals Minimized by New Transmitter System, Fading Radio</i> by Grant E. Hansell [April]	1952
581	<i>Small Businesses Essential to Progress</i> (Statement by Vincent deP. Goubeau) [July]	1952
582	<i>Sniperscope-Snooperscope: Seeing in the Dark</i> (C. B. Jolliffe statement) [July]....	1946
583	<i>Sonar: U-Boat Nemesis</i> [July]	1946
584	<i>Sound Absorbers ("Cones of Silence")</i> [October]	1949
585	<i>Sound, Anniversary in</i> by M. C. Batsel [October]	1946
585a.	<i>Sound: Listening Tastes Tested</i> (Dr. Harry F. Olson address) [July]	1947
586	<i>Sound Speeds the War Effort</i> by George R. Ewald [October]	1942
587	<i>Sound, Studies in</i> by Dr. Harry F. Olson [April]	1945
588	<i>Sound, The Story of 16mm.</i> by W. W. Watts [July]	1947
589	<i>Sounds of Progress</i> by Edward C. Cahill [October]	1944
590	<i>Speakers' Bureau</i> [January]	1950
591	<i>Splitting Light Beams</i> by R. H. Heacock [October]	1945
591a.	<i>Standard Pressed Steel: Two-Way Radio System Speeds Flow of Materials in Steel Plant</i> [October]	1952
592	<i>Stations Built for Allies</i> [July]	1943
593	<i>Stethoscope, RCA Develops</i> [July]	1943
594	<i>Storms, Can . . . be Controlled?</i> (Dr. V. K. Zworykin address) [April]	1947
595	<i>Stratosphere Chamber</i> [October]	1951
596	<i>Styling Sells Sets</i> by H. M. Rundle [January]	1948
597	<i>Subminiaturization in Tubes</i> [July]	1952
598	<i>Sunspots: Engineers Predict Radio Weather</i> by Henry E. Hallborg [October]	1943
599	<i>Sunspots: Solar Storms Forecast</i> [July] ...	1948
600	<i>Superheterodyne Radio Receiver, Smallest</i> [April]	1950
601	<i>Swarthout: Concert Artist Makes Own Records for Study</i> [October]	1947
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602	<i>Tangier By-Passes Magnetic Storms, New Station at</i> [July]	1946
603	<i>Tape Relay System, Approve</i> (Sidney Sparks address) [July]	1948
604	<i>Tapline Project</i> [January]	1952
604a.	<i>Technicians, Tactful</i> [October]	1952
605	<i>Teleran Demonstrated</i> [July]	1947
606	<i>Teleran—New Air Traffic Aid</i> [October] ...	1946
607	<i>Teleran, The Story of</i> by Loren F. Jones [January]	1946
<i>Television:</i>		
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ROBERT MONTGOMERY LEANS THE SCENE AND DIRECTING TALENTS TO THE PRODUCTION OF "YOUR LUCKY STRIKE TO FIRE", ONE OF NBC'S OUTSTANDING TELEVISION PROGRAM SERIES

Injunction Sought by RCA-NBC on FCC Color Television Order

Complaint Declares Irreparable Injury will be Caused to Public, Manufacturers and Broadcasters by Standardizing on Incompatible System — FCC Order Called Illegal, Arbitrary and Capricious.

A TEMPORARY injunction to restrain the Federal Communications Commission immediately from enforcing its order for the adoption of incompatible color television standards, pending a hearing for a permanent injunction, was sought in Federal Court on October 17, 1950, by the Radio Corporation of America, National Broadcasting Company and RCA Victor Distributing Corporation, a wholly-owned subsidiary of RCA.

In a complaint filed in United States District Court in Chicago, RCA, NBC and the RCA Victor Distributing Corporation declared that the FCC order of October 10 adopting the color television method promoted by the Columbia Broadcasting System will result in irreparable injury and damage to the public, which has more than two billion dollars invested in television sets, to the nation's television broadcasters with their huge investments, and to the television manufacturing and distributing industry.

The complaint charged that the Order is contrary to the public interest, is arbitrary and capricious, exceeds the legal authority of the Commission and is not supported by the evidence.

"The effect of the Order," said the complaint, "is to authorize the commercial broadcasting of color programs upon CBS standards to the exclusion of the commercial broadcasting of color programs on any other color television standards. Thus, commercial broadcasting in accordance with the RCA system is prohibited, although it, unlike the CBS system, is compatible and can be received on existing receivers without modification and without degradation of picture quality, and which can be broadcast by all television broadcasters without dilution of their audience.

"Although the Commission has no jurisdiction over television set manufacturers, the Commission sought to require that such manufacturers agree with the Commission to build all their black-and-white television receivers according to specifications laid down by the Commission. These specifications required extensive alterations in present production model receivers. The Commission stated to the television set manufacturers that if they did not agree so to build their sets the Commission would forthwith and finally adopt the CBS color system.

"The Order adopting the incompatible CBS color system impairs the advantages of compatibility now possessed by the RCA system. If the Order standardizing upon the CBS color system remains in effect and receivers capable of operating on those standards are sold, the existence of those receivers in the hands of the public will operate as a deterrent to the adoption of the RCA system by the Commission at some future date."

Injury to the public, broadcasters and manufacturers, as a result of the FCC order, was emphasized in the complaint.

"Ten years having elapsed since the adoption of commercial television standards during which the public has invested approximately two billion dollars in television receivers," the complaint stated, "the Commission cannot consistently with its obligation to protect the public interest adopt a color system which is incompatible with the black-and-white system on which more than 30,000,000 of the public depend for their television service.

"The broadcasting of television programs on the CBS standards will deprive broadcasters of the television audience that has been grad-

nally built up over a period of four years, to the irreparable injury of the television broadcast service, and will deprive the existing television audience of a part of the television broadcast service, to the irreparable injury of the public interest."

Declaring that the Order cannot be sustained, the Court was informed that the Commission's staff engineer, who took the most active role throughout the hearing on behalf of the Commission's technical staff and who is in charge of the Commission's laboratory which tested the various color systems, invented a device usable only in the CBS system and applied for a patent thereon.

"On disclosure of this fact," the complaint asserted, "objection by RCA was overruled and the staff engineer continued in the proceedings as theretofore.

"On information and belief the Commission relied on this staff engineer's advice because the majority of the Commission have no engineering training and the decision of the Commission is stated to be based entirely upon engineering considerations.

"Although the engineer fore-swore any financial interest in his device he did have professional prestige and reputation at stake which could be furthered only if the CBS system were adopted. On information and belief he advised the Commission in the absence of the parties and participated in the formulation and preparation of its Reports and the Order herein complained of."

The complaint pointed out that RCA and NBC have a present investment of approximately \$100,000,000 in television. It was not until 1941, however, that the Commission first set standards for commercial operation of black-and-

white television as a service to the public.

"The total present investment of the television manufacturing industry is estimated at not less than \$300,000,000," the complaint stated. "The total investment of the television broadcasting industry is estimated at \$50,000,000.

"The adoption of the incompatible CBS color television system will impede the future growth of the television industry upon which RCA and NBC, with all other television manufacturers and broadcasters, depend. It will as well imperil the employment of the more than 30,000 people RCA and NBC employ in television manufacture, but also the hundreds of thousands employed throughout the television industry."

The complaint reminded the Court that the Commission's "First Report on Color Television," issued on September 1, shows that the Commission was not satisfied with the incompatible CBS system. There are many instances, it pointed out, in which the Commission stated that it desired more information with respect to defects of the incompatible system and the Commission's description of this system is in terms of "adequacy" rather than in terms of "high-quality performance."

"With minor exceptions," the complaint continued, "those of the television manufacturing industry who submitted comments with respect to said Second Notice stated that to change their production of black-and-white receivers so as to accept the proposed standards was impractical, unnecessarily costly to the public, and could not be done in accordance with the time schedule set forth in the Second Notice."

RCA comments submitted to the FCC pointed out the fact that the Commission's proposal to adopt an incompatible system was based on scientifically incorrect conclusions, was at variance with the evidence submitted at the hearings, and was contrary to the public interest, convenience and necessity, the complaint affirmed, adding:

"In addition, the comments directed the Commission's attention to certain readily available infor-

mation of controlling significance which the Commission failed to consider although it had the duty to do so before reaching a final decision. This is particularly true in view of the fact that the Commission's Report showed that it did not understand various aspects of the RCA system."

The complaint declared the FCC's Order to be "illegal, void and beyond the power, authority and jurisdiction of the Commission," for the following reasons:

The Order is contrary to the public interest, convenience and necessity, the basic statutory standard contained in the Communications Act of 1934.

The Order violates Section 303 (g) of the Communications Act of 1934 (which generally encour-

ages larger and more effective use of radio in the public interest).

The Order is unsupported by substantial evidence, is arbitrary and capricious, and is an abuse of discretion.

The Order was adopted before the Commission had discharged its statutory duty to inform itself adequately before issuing a final order in a rule-making proceeding. The Commission wrongfully refused to consider additional evidence of determinative significance to its decision and wrongfully denied the RCA Petition.

The Order is based upon the rejection by the television industry of the two illegal conditions set forth in the First Report

MESSAGE TO RCA VICTOR DISTRIBUTORS

Walter A. Buck, Vice President and General Manager, RCA Victor Division, sent the following letter regarding color television to all RCA Victor distributors on October 20:

Regarding the color television situation, here's the outlook:

Black-and-white television will remain the backbone of the industry for some years to come, with continued expansion and improvement of black-and-white program service. Regardless of outcome of current controversy and type of television broadcasting finally adopted, substantial color broadcasting is at least two years away for following reasons:

First, Public will be hesitant to install cumbersome, gadgety converters and adapters because of expense involved, limited number programs broadcast, and limited size and degraded quality of picture received. Color pictures can be no larger than 12½ inches and definition is reduced from 525 lines to 405 lines. Same thing applies to new sets. Leading manufacturers have indicated reluctance to risk resources, reputations, by rush production of high-priced receivers for questionable broadcasting system that will not give satisfaction in the home and will probably soon be obsolete.

Second, Sponsors will be slow to incur heavy expense of color broadcasts for limited audience.

In the meantime, RCA is working intensively toward perfection of all-electronic color broadcasting system compatible with present sets, with demonstrations of progress scheduled for early December.

RCA believes incompatible system of color broadcasting ordered by FCC is scientifically unsound and not good enough for American public.

It all adds up to this. Customers can buy black-and-white sets today with complete confidence that they will get years of satisfactory service and improved entertainment from them; that perfection of all-electronic color broadcasting system will not make their sets obsolete.

which, in effect, compel the industry to include bracket standards in the manufacture of television sets and which orders this done without a hearing.

The Order is contrary to the terms of the Commission's Notice of July 11, 1949, pursuant to which the hearings on which the Order purports to be based were held.

On the facts disclosed, the staff engineer should not have been permitted to continue in the proceeding.

The Order deprives the plaintiffs of property without due process of law, contrary to the Fifth Amendment to the Constitution of the United States.

Besides its move to restrain enforcement of the FCC Order, the complaint asked the Court, after final hearing, to order and decree that the FCC Order adopting the incompatible color system "is, and has at all times been, beyond the lawful authority of the Commission, in violation of the legal rights of plaintiffs, and is wholly void, arbitrary and unreasonable, and that the Order be perpetually vacated, set aside, suspended and annulled, and the promulgation, operation and execution thereof perpetually restrained and enjoined."

RCA to Show Latest Advances in Color Television System

Improvements in Receivers, Picture Tube and Converters to be Revealed in Washington, D.C., Beginning December 5.

PLANS of the Radio Corporation of America to show the latest improvements in its compatible all-electronic, high-definition color television system in a series of demonstrations beginning December 5, 1950, in Washington, D. C., were disclosed October 17 in telegrams sent to the radio-television manufacturing industry.

The telegrams, signed by E. C. Anderson, Vice President in Charge of the Commercial Department, RCA Laboratories Division, read:

"Reference Color Television Situation. The last demonstration of our color television system was made by RCA to its licensees in Washington on March 30, 1950. Since then, we have made substantial improvements along the lines set forth in our progress report of July 31, 1950, previously mailed to you.

"We are preparing to give our licensees another demonstration which will incorporate the improvements we have made to date in the set and tri-color tube. At this dem-

onstration, we will also show a color converter for the RCA system.

"We expect to be ready to give this demonstration in Washington, D. C., on December 5, 1950. Details of exact time and place will follow. Hope you and your engineers will be present.

"At this demonstration, we will supply you with information about our latest simplified circuits, the converter and the tri-color tube. We shall continue to give you further demonstrations periodically so that you may see the successive steps in our progress.

"In our petition of October 4 to the Federal Communications Commission, we said:

"By June 30, 1951, we will show that the laboratory apparatus which RCA has heretofore demonstrated has been brought to fruition in a commercial, fully-compatible, all-electronic, high-definition system of color television available for immediate adoption of final standards."

NBC to Expand Present Lead in TV

NBC's commanding lead in all facets of television broadcasting will be vastly expanded in the coming year, representatives of the network's affiliated television stations were told at the fourth annual convention in White Sulphur Springs, West Virginia, on October 19.

When present construction plans are completed, Joseph H. McConnell, President of the National Broadcasting Company, revealed to the meeting, NBC's plant investment in television will be between \$35,000,000 and \$40,000,000. Plans are in the making, he added, for the acquisition of still more top talent and for expansion into morn-

ing network programming as soon as the current afternoon schedule is sold.

"In our general sales strategy," McConnell said, "we're devoting particular attention to advertisers who are spending their budgets in visual media. We have in television the greatest selling medium for the eye, and we're proving to the visual advertiser that television can do more for him than the printed media he is using and do it more economically when you take sales effectiveness into account. We'll set television to these advertisers in place of the magazines and supplements they are buying, and we'll

sell them radio as the economic mass medium to reach the people they aren't reaching by television."

The program strategy at NBC television, Sylvester L. Weaver, vice president in charge of Television explained, "is to attract all sets to our great entertainment, to give the all-set circulation exposure to cultural and informational currents in which the people have only slight interest, and stimulate that interest until it becomes a special interest." The result, he added, "will be the most important single influence in the American scene on the minds and opinions of the people, and our influence will be positive."

America is Challenged

America Is Challenged by Greatest Threat Ever Faced by Free Men, Head of RCA Tells Veterans of Foreign Wars at Chicago—He Urges National Policies and Plans to Meet Political, Military and Industrial Requirements of Menacing Situation That May Compel America to Wage Global War—Russian and Satellite People Must Be Told The Big Truth About The Big Lie, He Declares.

IN a scathing denunciation of international Communist tactics, Brig. General David Sarnoff, Chairman of the Board of the Radio Corporation of America, declared that this country must take steps in time to meet the challenge of present Soviet leaders who, he charged, represent "the greatest threat ever faced by free men".

General Sarnoff, speaking before Veterans of Foreign Wars of the United States at their 51st Encampment in Chicago on August 28, outlined 12 basic points of appraisal and suggested action. He told the men who had served in one, or both, of the two World Wars that "the days of diplomatic pussy-footing are over," and that the time for "positive action" has arrived.

Points outlined by General Sarnoff follow:

1. Communism is spreading its insidious propaganda relentlessly over many parts of an anxious world. Red Fascism threatens destruction to life and liberty, and an end to human progress. The present Soviet leaders represent the greatest threat ever faced by free men.

2. We must formulate sound national policies and prepare practical plans to meet the political, military and industrial requirements of a menacing situation that may compel us to wage war on a global scale.

3. We must concentrate and not scatter our military and material resources, our man-power and our strength. This is precisely the trap that Russia has set for us and this is the trap we should avoid.

4. We must speed up our program of all-out national preparedness and bring to bear upon this effort the full weight of Ameri-



BRIG. GENERAL DAVID SARNOFF RECEIVES THE GOLD CITIZENSHIP MEDAL OF THE VETERANS OF FOREIGN WARS FROM COMMANDER-IN-CHIEF CLYDE LEWIS. THE PRESENTATION TOOK PLACE AT THE 51ST NATIONAL ENCAMPMENT OF THE V.F.W., IN CHICAGO. SEATED IN LEFT FOREGROUND IS COMMANDER-ELECT CHARLES C. RALLS.

can skill and ingenuity. American industry and labor will cooperate patriotically.

5. Declare a moratorium on national politics and thus help to close the ranks against the common enemy. Accelerate national unity by using the best brains in our country to help solve the critical problems before us and the world-wide political commitments we have assumed.

6. Establish immediately, universal military training in the United States.

7. Put high on the list of priorities, a thorough protection against sabotage — which could prove worse than a battle lost.

8. Subject to suitable controls and practical safeguards, permit and assist Japan and West Germany to rearm, to the extent that these two countries fit into the over-all plan of resisting Russian aggression.

9. Develop a comprehensive system of Civilian Defense. Public knowledge that such protection exists, will allay fear and keep us fit to do our job.

10. Communist propaganda makes false promises to suffering masses and stirs them to hatred and revolt. Once under their control they rob the masses of their freedom and substitute the terrors of the police state for de-

gency and justice. Through radio and television, through the motion picture and the printed word, and with every means at our command, it is our duty to tell the world the Big Truth about the Big Lie. We must expose the lies and spike the false propaganda that come from behind the Iron Curtain.

11. Americans want to know the facts and are not afraid to learn the truth. Americans expect their Government to lead the Nation and the world in this time of peril.

12. The vast resources of the United States, if handled wisely, should be capable of meeting the Russian challenge. Americans, now as always, will respond to the Nation's call. When its freedom is endangered, America, springing to action, is unbeatable.

Scattered Effort Ineffective

General Sarnoff reminded the Veterans of Foreign Wars that day by day, since the end of World War II, Americans have witnessed events which, in their bold and devastating aims, have made it clear that the time has come for the concerted development of this nation's resources — spiritual, industrial and military. Scattered and unplanned effort will not be effective enough to meet the challenge, he declared, and added:

"The leaders of the Kremlin have left no doubt that they intend to impose their will on all mankind: not through peaceful persuasion, but by lying, intrigue, infiltration, sabotage and force.

"In such a crisis, it is foolish to parry the thrusts of the aggressor with our fingers. Thus we only injure our fingers and do not hurt the enemy. Should it later become necessary to fight with our fists, the injured fingers would make our fists impotent. We must courageously formulate and pursue bold policies on a global scale. In psychological, as in military warfare, defensive strategy alone rarely leads to victory."

Tactics of the Kremlin, he asserted, are clearly based on the old slogan, "divide and conquer". By diverting our forces first to one

pressure point and then to another, they hope to scatter our strength into ineffectiveness, he charged, and said:

"The major question is: What next?"

"Some seem to believe the answer can come only from the Kremlin. I do not believe that. We have picked up the challenge in Korea, and while you and I deplore the loss of life and the general destruction that is now taking place in that unfortunate country, we may thank Providence for a timely awakening to the imminent danger. The stark realism of the Communist aggression has stirred us from an almost suicidal complacency."

Accusing the Communists of smothering the truth with their falsehoods, General Sarnoff pointed out that through radio and television, the motion picture and the printed word, Americans have a great opportunity to reveal the truth to the rest of the world.

"We must expose the lies and spike the false propaganda that come from behind the Iron Curtain," he affirmed. "We have worked out a new formula against the Big Lie invented by Hitler, practiced by Goebbels, and now employed by Stalin and Malik. Our formula is the Big Truth. As I said the other day at the University of Chicago Round Table Conference, we must tell the Big Truth about the Big Lie.

"If truth is incapable of overtaking the lie, then there is something seriously wrong with our whole structure of life. But we can reassure ourselves: the truth will prevail. It is the foundation of democracy, and it is the basis of our belief."

General Sarnoff expressed the opinion that America's policies and plans must be made and remade to fit the fluid situation. This calls for national unity at home if we are to reflect it abroad, he asserted, declaring: "Now is the time for a moratorium on politics. I do not mean that we should stop constructive criticism, for it is a necessary element in any free society. It can aid our Government and our leaders in all fields of endeavor. It can aid the whole world.

"What we need is a closer and a stronger link between the Brains of America and the Brawn of America. The best brains in our country, regardless of political affiliations, are needed to help solve the pressing problems in this time of trouble and to defeat the cunning of the enemy in a 'cold war' or a 'hot war'. Today, as you are well aware, the cold war is rapidly warming up.

"Let us not worry at this crucial moment about the dangers of a 'Brain Trust'. A democracy can deal with it when necessary. But it cannot cope with the perils to

VETERANS FROM ALL PARTS OF THE NATION MEET IN THE CHICAGO ARENA FOR THE 51ST ENCAMPMENT OF THE VETERANS OF FOREIGN WARS





V.F.W. PARADE ON CHICAGO'S MICHIGAN BOULEVARD.



the Nation that can come from a 'Brain Rust', or a 'Brain Bust'.

In an appraisal of Soviet resources, General Sarnoff said that the history of Russia is marked by political, agricultural and industrial ineptitude. Until lately, the industrial development of Russia was almost negligible, compared with that of England, France, Germany and the United States, he opined, asserting that most of the Soviet Union's major industries have been built up largely through the help of experts from other na-

tions. He reminded the Veterans that "the world knows how Russia obtained the secrets of the atom bomb!"

Nevertheless, it would be hazardous to underestimate the Soviet military potential, General Sarnoff continued, adding:

"It is believed that Russia is presently able to put about 200 divisions on the field of battle. Since the end of World War II, her ability to equip and supply these divisions has been greatly increased by control of the satellite industrial na-

tions of Eastern Europe. Moreover, there is no reason to doubt that Russia is producing the atom bomb.

"When you add to these factors their devilish cunning in the political arena, their disregard for International Law, their distortion and disavowal of agreements, and the likelihood of striking the first blow when they are ready to do so, the present Soviet leaders represent the greatest threat ever faced by free men."

Americans Can Take Courage

General Sarnoff said that Americans can take courage, however, when we appraise our own strength—both as a great agricultural and industrial power and as a people imbued with the spirit of democracy and individual human dignity.

"The vast resources of the United States, if handled wisely, should be capable of meeting the challenge we face," he declared.

His appraisal of American resources follows:

The agricultural economy of the United States has been developed to a point where we can meet the requirements of our own population and help our friends abroad. From this agrarian activity has sprung the largest food processing industry in the world.

The country's output of goods and services is now running at the staggering rate of 270 billion dollars a year—an all-time record for America's industrial supremacy.

The electrical industry has reached a generating capacity of 68,000,000 kilowatts — nearly twice the total we had only ten years ago.

Our steel production is greater today than that of all the rest of the world combined, including Russia.

In the automotive field, no other country approaches our capacity to produce nine million motor vehicles a year.

Substantially the same story can be told about radio, aviation, rubber, textiles, chemicals and other major components of our industrial economy.

Aligned with these vast enterprises are unmatched systems of

transportation and communication.

The American industrial machine, already huge, underwent enormous expansion during World War II. Existing plants were enlarged and new ones built. To such war implements as ships, airplanes, tanks and guns, the United States applied the techniques of mass production. Never before were such tremendous quantities of equipment manufactured in so short a time. We supplied not only our own armed forces, but those of our allies as well.

Industrial Capacity Expands

In the five years since that war, our industrial capacity has continued to expand. At the same time, scientific research has been widely extended and new laboratory facilities have been provided.

We learned during World War II that no nation can remain strong if it slackens even for an instant its interest in science. Progress in this field has put America at the forefront and has tremendously strengthened our national defense.

General Sarnoff said the electronics industry is an outstanding example of the part research plays in our national security. He recalled that American scientists have pioneered in this field for more than 30 years, and told his listeners that the expansion of radio and electronic activities during and since the war has been phenomenal. He disclosed these figures: number of manufacturers in this industry in 1940, 425; today, 1,200; value of the industry's peacetime products was a half billion dollars in 1939; today's rate, two and one half billion dollars. This is an increase in production of 500%.

Most of the electronic industry's postwar expansion has occurred under the impetus of television's remarkable growth, he said, estimating that by the end of this year, there will be approximately 10,000,000 television receivers in as many American homes. This means a potential daily audience of between

35,000,000 and 40,000,000 persons. "Most of these people live in the great population centers of the nation," General Sarnoff stated. "Through television, they form a powerful nucleus for concerted action in time of emergency; for television is one of our greatest mediums for the dissemination of information, instruction and training.

"If we had international television today and I believe we shall have it within the next five years—the Voice of America would be the Voice and Vision of America. What a powerful weapon of propaganda that would give us! For then the whole world would see what millions of American viewers saw—the wonder of the UN sessions at Lake Success—and the arrogant filibuster of President Malik would have been its own most effective antidote for the Russian propaganda."

Should war come, television will be a vital factor in communications on land, sea and in the air, he asserted, adding: "No matter where a battle is waged, it can be under the eyes of television and may be viewed by the military strategists even across the seas. It is within the range of possibility that the public will watch the action on battlefields while sitting at home in front of television sets."

General Sarnoff assured his audience that American industry of which radio and electronics are a part—represents a great force for peace and a mighty power in war.

"At this moment our Nation is being alerted," he continued. "Should the need arise for full-scale war production, you may be sure that our industries know how to convert their products into the necessary weapons of war. American industry and labor will respond in the future as they have in the past—with patriotism and skill.

"The story I have been telling you is a part of the Big Truth about America. It is the story of unmatched agricultural, scientific and industrial achievement; of opportunities for individual initiative that develop under the free enterprise system; of national teamwork; of social and economic progress.

"But this is not the whole story. The spiritual part of America is even more important. Our freedoms to worship as we please, to think and to speak, to listen and to look, to work and to live where we choose, are precious privileges of our peaceful way of life. All these now are threatened by the enemies of freedom."

TELEVISION ENABLES MILLIONS TO VIEW UN SESSIONS AT LAKE SUCCESS.





RADIO CITY'S FAMOUS CENTER THEATRE DURING CONVERSION INTO WORLD'S LARGEST TELEVISION STUDIO.

Five New TV Studios For NBC

In a Major Expansion Program, the Network has Converted Two Large Theatres and Three Broadcast Studios for TV Use.

THE National Broadcasting Company's lavish fall line-up of television programs, which will be produced at the rate of 100 a week, necessitates production wizardry unequalled in the legitimate theatre. Moreover, many of these individual productions require facilities comparable in scope to anything ever attempted on Broadway. To make this possible, NBC, during the summer months, has been carrying on a gigantic project of TV studio expansion. This has involved converting three large radio broadcasting studios and two sizable theatres into television studios.

The mammoth task included the leasing and transforming of the world-famous Center Theatre, rebuilding the Hudson Theatre, revamping studios 3-A and 3-B in Radio City, and reconstructing the famous 8-H, largest broadcasting studio in the world, and home of the NBC Symphony. The accomplishment is remarkable less for the amount of materials used than for the difficulty of the operation, which, in many cases, had to be carried on at night, under adverse conditions. Problems were posed by the necessity of maintaining quiet for normal broadcasting activities, and by the structural obstacles of major construction in build-

ings already completed.

Conversion of the Center Theatre, the world's largest legitimate theatre with a seating capacity of 3,000, into the world's largest television studio was a considerable feat. The stage of the theatre, which for many years had been used for ice shows, had to be completely rebuilt, a vast network of pipes removed, and a 30-foot extension to the stage replaced with 130 orchestra seats. A ramp for camera dollies and two side-stage extensions were added in front of the proscenium to accommodate musicians on one side and commercial presentations on the other.

New Studio Made Fireproof

To comply with New York City fire laws all material in front of the proscenium had to be made fireproof with gypsum plank and concrete covering. A light bridge 65 feet long and 15 feet wide was installed over the forestage, hung from the ceiling and operated by a motor. Ordinary theatre spotlights are not strong enough to light a TV show; they cause shadows which the cameras readily pick up. For the benefit of the studio audience eight small loudspeakers were installed. To have used one large speaker would have created a feed-

back howl in the broadcast microphone.

A temporary control booth now set up on stage right will eventually be replaced by a permanent booth at the back of the orchestra. In addition, NBC has reactivated the famous turntable and three-elevator stage system originally built into the theatre, but which was inactive during presentation of the ice shows. The stage system, a duplicate of that used at Radio City Music Hall, will allow for a wide variety of effects not possible in other television theatres.

Conversion of the mammoth playhouse has given NBC an additional 4,200 square feet of television stage which will permit the network to do productions comparable to the most lavish on Broadway. The elaborate technical stage equipment, as well as the special storage and dressing room facilities, make the NBC Television Center Theatre the best-equipped auditorium studio in the world.

The theater opened officially on September 25, with a simulcast of "The Voice of Firestone". The program was chosen for the honor because of its distinction in being the oldest coast-to-coast musical show on NBC.

Revamping of the network's famous concert studio 8-H presented a different problem. All of the structure inside the studio had to be removed and a new overhead construction, using over 30 tons of steel, was erected. The difficulty of



IN REVAMPING NBC'S FAMOUS CONCERT STUDIO 8-H, WORKMEN REMOVE CEILING BEAMS TO MAKE WAY FOR A STEEL OVERHEAD CONSTRUCTION.

bringing 32-foot-long, 16-inch eye-beams into a building was solved by hoisting the beams up NBC freight-elevator shafts in 16-foot sections and splicing them together in the studio.

The balcony of the studio is being rebuilt as control, observation and dressing rooms. The studio, which is 76 feet wide, 130 feet long, and 31 feet high, will provide 10,000 square feet of working space.

Rebuilding of studio 8-H recalls many of the radio triumphs which emanated from that hall. It was there that Eddie Cantor broadcast his great variety shows, setting new patterns in radio entertainment. From its stage Arturo Toscanini first conducted the newly-formed NBC Symphony Orchestra in 1937.

The noise and confusion of demolition have caused NBC engineers considerable concern. In studio 3-A,

originally designed for recording, the whole wall and ceiling treatment (with acoustical elements adjustable for music or speech) had to be ripped out. Demolition had to be done quietly, so as not to interfere with broadcasting in other parts of the building. Since heavy hammering reverberations can be carried along the steel members of the building and cause audible vibrations, noisy work was done after midnight.

Studios 3-A and 3-B have been re-treated acoustically on both walls and ceilings. Control booths have been rebuilt so that they can be used for audio operations, video operations — separately or simultaneously. In each studio, NBC engineers built a separate lighting-control booth, with switchboards and dimmer boards controlling all ceiling lights.

A stupendous job was done on the Hudson Theatre. More than half the orchestra was floored over at stage level, leaving 174 orchestra seats for the studio audience. The stage extension is to be used for bands, equipment for TV commercials, camera dollies, yet the audience's view of the stage will not be blocked. From a glass-partitioned box behind the control booth the sponsor can watch the stage and observe the activities of the director and engineers in the control booth without interfering with operations.

RCA Pledges Full Cooperation to President Truman

A pledge of fullest cooperation in the national effort by the Radio Corporation of America, its subsidiaries, officers and employees at home and abroad, was telegraphed to President Truman at the White House by General Sarnoff on July 20.

The full text of General Sarnoff's telegram follows:

"Please accept my congratulations on your illuminating messages to the Congress and the people of the United States which set forth frankly and clearly the seriousness of the situation we face and the efforts of our Nation to resist aggression and help preserve world peace.

"Speaking for the Radio Corporation of America and its subsidiaries which include the National Broadcasting Company and the RCA Communications, Inc., and for our officers and employees at home and abroad I pledge you our fullest cooperation in the national effort. We are at your service."

New Electron Microscope Advances Tissue Research

Study of structural details of relatively thick specimens of biological and plant tissues will be made possible by a new high-resolution electron microscope, designed for operation at 50 to 100 kilovolts, which was described by RCA engineers at a recent meeting of the Electron Microscope Society of America in Detroit. The new instrument makes possible useful direct magnifications of 1,000 to 20,000 diameters and is greatly simplified for easier operation and maintenance, according to Dr. John H. Reisner, of RCA's Scientific Instruments Engineering Group.

Barrymore and Shakespeare

A Lucky Discovery Revealed Discarded Recordings of Noted Actor, which Became Nucleus of Widely Acclaimed NBC Programs.

EIGHT years after his death, John Barrymore's magic as an interpreter of Shakespeare was brought to NBC's nation-wide audience through the ingenuity of Program Director James Fleming and staff engineers, who transformed four scratchy, discarded transcriptions into clean, clear reproductions of the bard's immortal classics. The series of programs entitled "John Barrymore and Shakespeare", for which the network won wide acclaim, consisted of Barrymore's selected passages from "Hamlet", "Macbeth", "Richard III", and "Twelfth Night".

If Fleming, editor of NBC's "Voices and Events" program, had not decided last May to broadcast a dramatic flashback to the week of John Barrymore's death in 1942, the rare transcriptions probably would have lain unused in the NBC record warehouse.

The transcriptions—old, rough, dusty—were made during a series of broadcasts from Hollywood in 1937 for reference, not for rebroadcast. Taken off the NBC network line in New York, they were marred by countless clicks, ticks, and other surface noises engendered by the 3,000-mile connection. The "Hamlet" transcription was particularly noisy because the broadcast had occurred during a violent electrical storm, which peppered the reception with sharp cracks every time the lines were hit by lightning.

Listeners Acclaim Program

In spite of the poor quality of the discs, Fleming decided to dramatize his "Voices and Events" program with Barrymore's version of Hamlet's speech to the players. The response was extraordinary. Letters, telegrams and telephone calls asking for more Barrymore poured into the NBC News and Special Events Department from all over the United States.

Two officials of the Shakespeare Festival at Stratford-on-Avon, England, learned about the Barrymore transcriptions and suggested to

William F. Brooks, NBC vice-president in charge of News and International Relations, that the programs be rebroadcast in connection with this Summer's festival.

In preparing the series for rebroadcast Fleming marshalled all the mechanical and electronic resources which have been developed since the original broadcasts thirteen years ago. With the help of NBC's audio-engineering and sound-effects departments he was able to "clean up" the old transcriptions, making them clear, audible, and virtually like new.

A major problem was to eliminate various surface noises. In re-recording the old transcriptions on tape, engineers first chose, by microscopic examination, the cleanest copies of the records. Then the sound was filtered, electronically, to eliminate excessive low frequencies.

One purely mechanical method of eliminating undesirable noise was to cut out that portion of tape—usually an inch or two—which represented a crackle or a click, and substitute a quiet piece of tape on which were recorded only normal background (or room) noises. This kind of manipulation was possible because the disturbances usually occurred during pauses between words.

Fleming did, however, have to cope with a more subtle problem, caused in the 1937 broadcasts by Barrymore's tendency to creep up on the microphone. Realizing that Barrymore had done very little Shakespeare on the air, NBC studio engineers in Hollywood built a small fence, or corral, around his microphone to keep him at the desired distance. At times, however, he became so transported by emotion that he leaned over the fence, bellowed into the mike, and his words came over the air in a muffled roar.

Fleming had to choose between clarifying Barrymore's words, thereby distorting his voice and raising surface noises, or preserving the original, muffled version.



EVEN A STURDY GUARD-FENCE COULD NOT ALWAYS KEEP JOHN BARRYMORE AT PROPER DISTANCE FROM THE MICROPHONE DURING HIS SHAKESPEAREAN DISCOURSES.

He compromised by making the words somewhat more intelligible without distorting Barrymore.

"I knew that the listener was going to have to work hard in one or two places," Fleming said, "but I preferred to keep Barrymore as he was."

On the positive side of the ledger Fleming added music and sound effects. He substituted a stark, peremptory kettle drum for the original transition music. He implemented the cries of the Ghost of Hamlet's father (produced by a musical saw) with a wild, unearthly wind.

During the final tragedy of the duel scene Fleming added a note of realism with the sound of clashing rapiers. And he gave perspective to both of those outdoor scenes by recording the original disc through an echo chamber. In 1937 Barrymore spoke into a microphone in a broadcasting studio, and there was no impression of space or depth.



TELEVISION TRANSMITTER OF KRON-TV WHICH COMBINES WITH MODERN ANTENNA TO RADIATE PICTURE SIGNAL TO VIEWERS IN BAY CITIES.

KNBC'S 550-FOOT TOWER IS PINCHED IN AT BASE AND NEAR TOP TO IMPROVE THE RADIO SIGNAL RECEIVED IN HOMES OF THE SAN FRANCISCO AREA.

TV-FM on the West Coast

Latest Developments in Antennas and Transmitters Provide Extended Service in San Francisco Area.

ON the marsh flats bordering San Francisco bay stands an unusual landmark, a 90-ton, 550-foot steel tower resting on a 10-inch cone, giving the monument a soaring and spectacular appearance, like a slim pencil balanced delicately on its point.

This impressive structure, designed by RCA, serves as the AM broadcasting antenna for station KNBC, San Francisco. In operation since October 21, 1949, the antenna, which embodies features never before used in broadcasting, greatly increases KNBC's effective radiated power and adds 10,000 square miles to the station's primary coverage area.

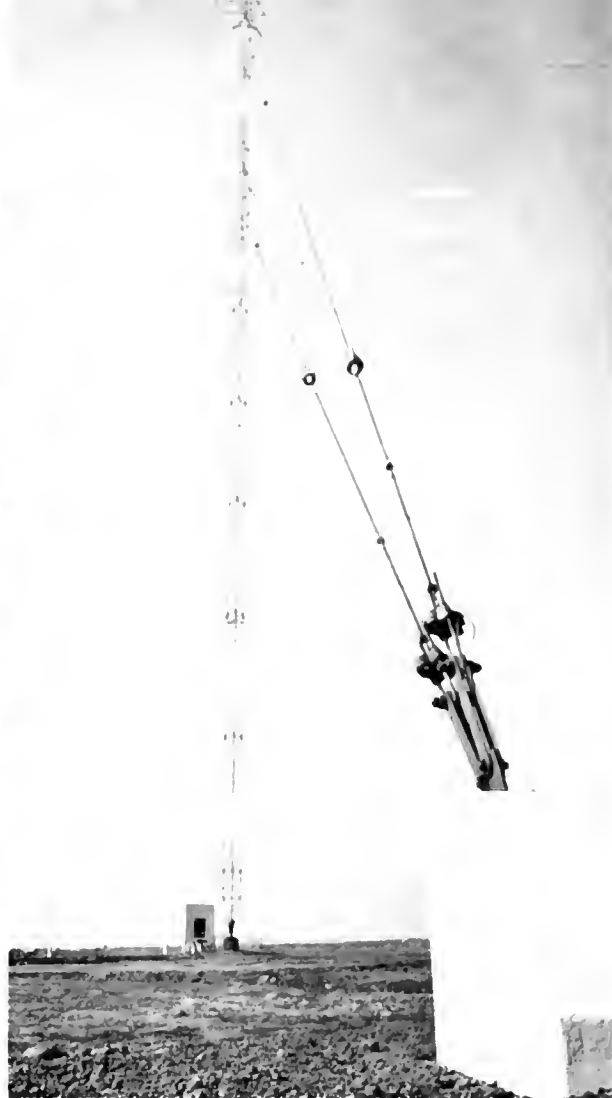
RCA engineers call the structure an "articulated joint" vertical radiator. The "joints" are insulator cones — one at the 400-foot level and the other at the base. The ten-inch lower cone supports the entire weight. The upper cone divides the

tower into two insulated segments. This two-piece antenna augments the horizontal signal and decreases the skywave signal, thus reducing the twilight fading zone to a minimum.

Another feature never before used in antenna design is the three-quarter-inch copper tubing which extends from base to top along each corner of the tower. Also to increase conductivity, 120 narrow strips of copper, each 500 feet long, extend outward in all directions from the base of the tower. These "radials" are buried seven inches under the ground.

Radiator Has Other Advantages

The vertical radiator has other advantages. It acts as tower and antenna, thereby combining economy and efficiency. The use of six guy wires, three for each segment of the tower, eliminates the need for deep concrete foundations and



FILM ROOM OF TELEVISION STATION KRON-TV SHOWING PROJECTORS FOR FILMS (REAR), OPAQUE SLIDES (LEFT) AND TRANSPARENCIES (CENTER). CAMERA IS AT EXTREME RIGHT.



heavy steel construction used in self-supporting towers. Foundations of an ordinary tower the same height would be many times larger than the 12-foot square concrete base which supports the 90 tons of steelwork.

RCA also has installed a new FM antenna for KNBC atop San Bruno Mountain, highest point on the San Francisco peninsula. Taking to the air last October, KNBC-FM's new equipment increases the station's effective radiated power from 3,000

watts to 45,000 watts. With 15 times more power and enjoying the highest elevation in the area, KNBC has gained countless thousands of new FM listeners.

The FM transmitter is housed in an all-concrete, spacious single-story building which overlooks the entire bay area. KNBC-FM shares the structure with KRON-TV, San Francisco's third television outlet, and also RCA-equipped. The site of the KRON-KNBC building and the TV and FM towers has become known as TV Peak.



PYLON ANTENNA OF KNBC'S FM STATION ABOUT TO BE LIFTED INTO POSITION ATOP SAN BRUNO MOUNTAIN, HIGHEST POINT ON THE PENINSULA.

MASTER CONTROL ROOM OF TELEVISION STATION KRON-TV WITH VIDEO MONITORS IN REAR AND TRANSCRIPTION TURNTABLES IN FOREGROUND.



[14 RADIO AGE]

Electrons Detect Stray Coins

Stray coins mailed in envelopes with box-tops and soap wrappers, during contests staged by advertisers, are being spotted at one contest headquarters through the use of RCA's Electronic Metal Detector.

At the office of Associated Activities Inc. of Minneapolis nationally-known advertising service organization, the RCA instrument is used to screen the mountains of mail received in premium promotions as final insurance that no coin has escaped the sorters. This measure, says the firm, retrieves each month many dollars that might otherwise be lost to the advertiser, with resultant confusion and delay in the mailing of premiums to consumers.

It isn't so much the value of the lost coins that concerns the contest promoters as the much greater loss in customer goodwill through delayed mailing of the premiums. Coins clipped or taped to a box-top or wrapper may become detached and remain in the envelope. To guard against loss of such coins, all mail, after sorting, is passed through an aperture in the metal detector on a continuous belt. The entrance of a coin into the electromagnetic field generated within this aperture causes a change in the field, activating a mechanism which diverts the coin-bearing envelope into a separate receptacle.

Film Operators Attend Course in Theatre TV

Thirty motion-picture projectionists, employed by theatres in Manhattan, Brooklyn, Albany, Chicago, Los Angeles, Queens Village, N. Y., and other cities, have completed a special theatre television training course conducted by the RCA Service Company at Camden, N. J. The trainees will be in charge of the RCA theatre TV equipments that are to be installed in ten cities this fall.



MODERN EQUIPMENT AND TECHNIQUES TYPIFY THIS TELEVISION STUDIO OF STATION XHIV, RECENTLY OPENED IN MEXICO CITY.

Television Below the Border

Pioneer Stations in Mexico, Brazil and Cuba Go on Air to Accompaniment of Official Fanfare.



By Meade Brunet

*Vice President of RCA and
Managing Director,
RCA International Division*

TO the accompaniment of official pomp and pageantry carried out to a degree seldom, if ever, approached at similar events in this country, television stations in Brazil and Mexico made their official debuts in August and September. Their appearance on the air highlighted once again the rapid march of progress of our neighbors "below the border". In addition, two Cuban TV stations plan to begin operations in October. The new stations in São Paulo, Mexico City, Havana—all of which are RCA-equipped—will bring international

television much closer to realization.

The transmitter of Brazil's Radio Tupi is located in the State Bank Building, São Paulo's highest edifice, and a three-bay super-turnstile antenna, capable of radiating 20 kilowatts of power, crowns the building, 520 feet above the street. Modern television studios have been built in Sumare, a São Paulo suburb. RCA microwave transmitting equipment is used to link studio, outdoor mobile pickup units and the main transmitter.

The new station, PRF3-TV, which is owned and operated by Brazil's largest radio network, Emissoras Associadas, is using United States television standards of 525 lines, 60 fields, and is assigned to Channel 3.

A four-hour television demonstration, which served as a preview to Radio Tupi's official opening, was attended by President Eurico Dutra, U. S. Ambassador Herschel Johnson, and Nelson D. Rockefeller, in addition to 500 representatives of government, industry and society. The demonstration, conducted over a closed circuit, was the highlight of the official inauguration of the Museum of Modern Art in the Chateaubriand Building at São



XHIV'S SUPER-TURNSTILE ANTENNA TOPS MEXICO CITY'S SKYLINE.

Paulo. Approximately 5,000 persons viewed the exhibition on RCA television receivers installed in the lobby of the building.

The TV preview, which was received enthusiastically by São Paulo residents, created an urgent demand for receivers. To meet it, RCA moved fast to supplement its ocean-bound shipments with a plane load of instruments, scheduled to arrive for the station's official opening.

Arrangements for installation of the RCA equipment were made by Dr. Assis Chateaubriand, Director General of Emissoras Associadas, through RCA Victor Radio, S. A., RCA's associated company in Brazil.

On the occasion of its opening station PRF3-TV received the following congratulatory telegram from Brig. General David Sarnoff, Chairman of the Board, Radio Corporation of America:

"Please accept my heartiest congratulations on the opening of your great new television station at São Paulo. Its lofty tower over Brazil symbolizes unity of purpose among the Americas in extending the cultural arts and the benefits of democratic freedom to the people of our lands. This is indeed a memorable occasion, not only for Brazil, but

(Continued on page 18)

RCA "milli



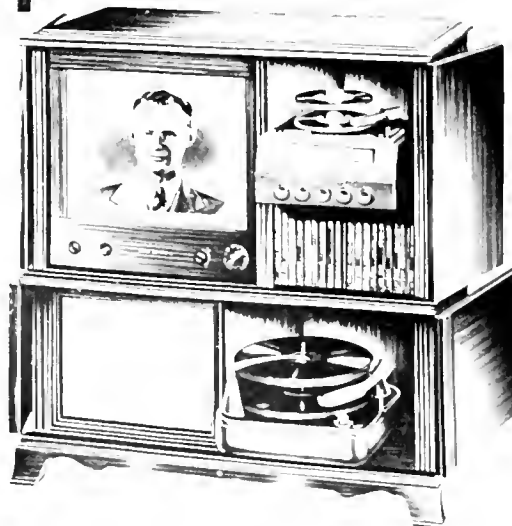
Thousands wait their turn to enter the RCA Exhibition Hall for a view of RCA's new line of television receivers shown in part on this page. To date, more than one million families have chosen RCA Victor television.



The *KINGSBURY*
16-inch screen.



The *YORK*
19-inch picture tube.



The *RUTLAND*
16-inch tube with radio
and 3-speed turntables.



The *FAIRFIELD* has a 16-inch screen
cabinet with figured doors and

The *SEDGWICK* with its 19-inch
turntables and FM-AM facilities



"shock-proof" television receivers



ed in a
screen



The MODERN has a swivel base which permits its 16-inch screen to be turned for the best viewing angle.



The HILLSDALE provides a 19-inch picture in a compact cabinet with doors that cover the screen.

ed turn
y line

The HIGHLAND has a 16-inch tube and is available in cabinets of mahogany, walnut or limed oak finish



The PROVINCIAL has full-length doors which can be closed over the 16-inch tube and speaker grill

Television Below the Border

(Continued from page 15)

for the entire Western Hemisphere. You are deserving of highest personal compliments for leadership in putting station PRF3-TV on the air. All success to you and your countrymen in making television history."

Mexico's first television station, operating on Channel 4 with the call letters XHTV, was officially inaugurated in Mexico City early last month.

The inaugural program consisted of a remote pickup in which President Miguel Aleman delivered a message to the Mexican people at a joint session of the Mexican Congress in the historic Chamber of Deputies, a few blocks from the presidential palace. Since the opening, regularly scheduled programs are telecast on weekdays from 5 to 7 p.m. On Sundays, the time is extended from 4 to 7 p.m., in order to cover the bull fights. The government of Mexico plans to use television receivers in schools as part of its educational program.

XHTV is located in the 20-story National Lottery Building, highest structure in the Mexican capital, and is equipped with a 5,000-watt transmitter, antenna, and associated studio and mobile pickup equipment supplied by RCA. It is owned by Television de Mexico, S. A., an enterprise of Romulo O'Farrill, Sr., publisher of the newspaper *Novedades*.

Facilities of XHTV are similar to those of television stations in the United States. Two floors of the modern building house the studios, control room, sponsor's booth, rehearsal room, dressing rooms, property storage section, transmitter, service shop and offices of the new station. In addition, provisions have been made on the ground floor for a large auditorium which will be used for televising concerts and stage plays. RCA Victor Mexicana, S. A., RCA's associate company in Mexico, installed the equipment.

BRAZIL'S PIONEER TELECASTER, PRF3-TV, IS LOCATED IN SAO PAULO'S HIGHEST BUILDING WITH ITS ANTENNA 520 FEET ABOVE STREET.



[18 RADIO AGE]

Staff Studies U.S. Methods

In preparation for the station's opening, Mr. O'Farrill arranged for members of the staff to visit the RCA Victor plant at Camden, N. J., for a study of manufacturing operations, and the National Broadcasting Company studios in New York for observation of program production methods.

Plans are in progress for the opening during October of two television stations in Havana, Cuba. One of the newcomers is CMQ in Havana's \$2,000,000 Radio Centro. This station under the operation, ownership and management of Goar Mestre is speeding installation of an RCA 5 KW television transmitter and studio apparatus—microwave relay equipment and cameras and studio facilities. A mobile TV unit for CMQ received a send-off at Rockefeller Plaza last July during New York City's celebration of Television Week.

Installation of the second Cuban television station, owned by Union Radio, is practically complete. The station equipment, weighing more than 22,000 pounds, was flown to Havana by two National Airlines C-46 Transports. The shipment included a 5 KW transmitter and complete mobile equipment, microwave relay equipment, television cameras, film projectors and other studio facilities. The Union Radio transmitter and studio will be housed in an old mansion which is being reconverted for television use.

Special reinforcement is being provided for the 200-foot antennas of these Cuban stations because of their location in the "hurricane belt".

Both stations have had teams of writers, announcers, commentators, directors and engineers studying television operations in the United States. The distributor for engineering products in Havana, Cuba is Humara y Lastra, who have been distributors on RCA and Victor products for more than 40 years.

These three Latin American countries—Brazil, Cuba and Mexico—are the only countries in the Western Hemisphere outside of the United States, where it is known that television broadcasting is available to the public.



TELEVISION SERVICE, PROVIDED BY TRAINED TECHNICIANS IS A PARAMOUNT FACTOR IN THE RAPID GROWTH OF THE TV INDUSTRY.

The TV Service Problem

Quality of Service Supplied to Set Owners Must Advance in Step with the Growth of the Video Industry or that Progress will be Retarded.



By C. M. Odorizzi
*Operating Vice President,
RCA Victor Division*

THE quality of television service must match stride with the growth of the television industry or that growth will be retarded. No other industry producing such a highly-technical product as television has grown so rapidly in such a short time. No other industry has ever faced the problems of providing technically trained manpower in such quantities as television's fantastic growth has required.

At the end of last December there were 1 million television receivers in service—3 million more sets have

been added since then up to the first of September. The industry forecasts that more than 2 million receivers will be sold during the balance of the year. This means that dealers throughout the country must be prepared to install and service, during the last quarter of the year, half as many receivers as were sold during the entire 4-year period of 1946-1949.

The real problem of the industry this fall and winter will be the training of a sufficient number of skilled technicians to install and service the receivers which manufacturers plan to produce and sell.

The answer as to whether or not a dealer should perform his own service depends entirely on the dealer—on his available capital, his volume, and his objectives. Many dealers operate fine service departments and take great pride in the excellence of their service.

Technicians Properly Trained

These men have been willing to invest the necessary capital to provide good service facilities, space for the service shop, good office records, and excellent test equipment.

Of equal importance, they have seen to it that they have properly trained technicians and experienced supervisors. They have a sizable investment in installation materials and in repair parts to take care of old as well as new models. The successful servicing dealer keeps accurate cost records, and sells and merchandises his service in the same way that he handles his products.

All of us have seen examples of small dealers, large dealers, and even large department stores, that have rushed into the servicing business without the ingredients which are so necessary to a successful operation, only to discard the program when they found that it was unsatisfactory and unprofitable. In like manner, television service contractors have gone bankrupt, usually because they lacked good business management. Many of them did not provide adequate reserves, and, in an effort to obtain a greater volume of business, sold their services too cheaply to provide high-quality workmanship.

I believe the television service contract to be the greatest merchandising tool that has ever been placed in the hands of dealers. If there is one pitfall that the TV industry must avoid, it is the pitfall of the 50c radio service calls and the sharp radio service practices which we all remember. Consumers are perfectly willing to pay reasonable service charges on mechanical and electrical products.

Effect of Local Conditions

Unlike radio and many other electrical and mechanical appliances, the performance of a television receiver does not depend solely on the product. Local conditions—a gas tank, a tall building, a hill, or any other obstruction between the transmitter and the receiver—may have a greater effect on its performance than its built-in selectivity or its general quality. It has been our experience that the performance of two identical receivers may vary greatly, not only within the same city block, but within an apartment house, or even within a single apartment, and from one side of the room to the other.

While manufacturers have made

amazing progress in chassis simplification, we must keep in mind that even today's television receiver of the highest quality has more than 20 tubes, over 1,000 separate components, and several thousand connections, most of which are subject to gradual deterioration and failure through usage. While great strides have been made in receiver design, any assumption that today's television receivers do not require occasional service is simply not realistic. No dealer can afford for long to perform gratis or to constantly argue with his customers the merits of service charges required by the limitations of local reception.

Too many dealers take the easy way out and sell receivers without adequate provisions for installation and service, hoping that they will squeeze through the warranty period without burdensome service costs. Some dealers, in single station areas where reception problems are not too difficult, are already adopting the old radio practice of giving away service without charge, not realizing that this practice represents a serious profit drain, particularly as additional transmitters go on the air and reception difficulties increase.

Must Maintain Service Quality

While progress requires constant product improvement and simplification, any manufacturer who permits his quality standards to deteriorate places a heavy burden on his dealer organization. Whether or not a dealer handles his own service, neither he nor his service contractor can afford the cost of servicing a receiver of poor quality.

I am proud to be associated with a company which not only was an early pioneer in the television in-

dustry, but which has constantly held leadership in television design improvements. For example, in the new RCA Victor TV receiver line, is a chassis with fewer tubes, almost 30 per cent fewer components and connections, and with 50% less power consumption than its predecessor. Despite this simplification, the numerous improvements not only have resulted in a more powerful chassis with better picture and sound quality, but one which will be easier to service.

Field Testing Essential

Every important engineering change must be thoroughly field-tested before it is finally introduced into the product for sale to the consumer. At RCA, we think of quality as something real—something that can be seen and heard. It begins with good basic engineering. It is built on good components and materials. It is assured and maintained by constant day-to-day field testing, by carefully reviewing service reports from the field, and by rigid inspection on the production line.

Manufacturers and distributors have important responsibilities in helping dealers and servicing contractors in the task of improving the standards of television service. Each television market varies greatly in the character of reception problems. The problems in Easton, Penna., for example, are entirely different from those in New York. The consumer in each area is entitled to know what he should and should not expect in the way of television reception, installation, and service.

Since the beginning of television, one of the greatest problems of the

industry has been to provide a sufficient number of well-trained technicians to keep pace with the industry's growth. Manufacturers and distributors can be helpful to field service organizations by making their service notes available immediately after a new line is introduced—particularly on new models where important circuit changes are involved. Servicemen are needlessly handicapped if they are not fully equipped with schematics and other technical details.

An example of this cooperation is the Service Clinic Lectures which have been sponsored by RCA Victor distributors for their dealers throughout the country. So far this year, over 200 of these service lectures have been held in the 57 television markets for thousands of servicemen and contractors who service TV receivers for RCA dealers.

Lectures for Servicemen

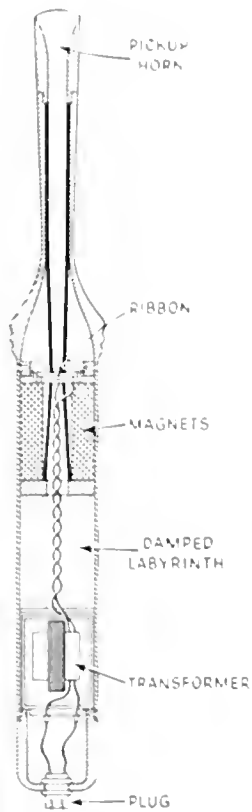
Coincident with the introduction of our fall television line, a series of 80 service lectures, featuring a technical sound slide film and practical discussions on installation and servicing, together with complete service notes and technical manuals were furnished to more than 10,000 servicemen.

Television manufacturers and distributors together have spent literally millions of dollars in similar efforts to train field technical personnel properly and to raise the general standards of television service. This is an endless task that will never be fully completed, but, with the precautions that I have outlined and with constant vigilance on the part of all of us in the industry, I am confident that we shall succeed.

INFORMATION FOR THE USE OF TELEVISION SERVICEMEN IS CAREFULLY PREPARED AND WIDELY DISTRIBUTED IN BLUEPRINTS AND TECHNICAL PUBLICATIONS.

THE FINEST SCIENTIFIC TEST INSTRUMENTS ARE AVAILABLE TO THE EXPERT TECHNICIANS AT ALL RCA TELEVISION SERVICE BRANCHES.





ADVANCES IN ACOUSTICS MADE POSSIBLE THE STREAMLINED "STARMAKER" MICROPHONE NOW WIDELY USED IN RADIO AND TELEVISION



"Starmaker" Microphone

Designed Especially for Television, New Streamlined Instrument Also Ideal for Broadcast Studio Use.

FIRST microphone designed especially for television but equally suitable for many broadcast station applications has been placed on the market by RCA under the name of "Starmaker."

One of the slenderest and least obtrusive broadcast microphones yet developed, the "Starmaker" operates on the pressure ribbon principle and is so designed that it will not hide the faces of singers, speakers, or others using it, nor is it conspicuous in the average setting. The streamlined mike is rendered unobtrusive, not only by its size and shape, but also by a special "TV gray" finish which makes it appear to fade into studio backgrounds or blend with the clothing of entertainers. It is suited for sound reinforcement and radio broadcast pickup, and has an output comparable to larger conventional

studio microphones. It is non-directional and handles equally all tones between 50 and 15,000 cycles.

The "Starmaker" has a maximum diameter of only an inch and a quarter, and weighs only 15 ounces. It is as sensitive as the finest of current broadcasting microphones and may be substituted for any high-quality professional studio microphone.

The "Starmaker" is a non-directional, rubber-pressure type microphone with a slender 7/8-inch diameter horn for increasing response in the high-frequency regions. Portable and free from wind blast and air rumble, the new microphone contains no vacuum tubes, no condensers, and no special amplifiers or power supplies. It can be lifted from its stand and carried around in the hand. It is virtually impervious to mechanical shock.

RCA Surrenders Rights to Four Trade-Marks

Three of television's best known trade-marks and a famous miniature tube name are being voluntarily surrendered to the public domain by the Radio Corporation of America, Frank M. Folsom, President, announced on August 17.

Mr. Folsom said that the U. S. Patent Office has been requested by RCA to cancel its registration of these registered trade names: Iconoscope, first electronic "eye" of the television camera; Kinescope, picture tube of television home receivers; Orthicon, improved television pick-up tube; and Acorn, tiny radio tube now a commonplace in portable sets.

"Now that television has become established," Mr. Folsom declared, "RCA finds gratification in the fact that the industry uses these names in a generic and descriptive manner. In relinquishing our registrations for the benefit of the industry, we are following RCA's traditional policy of stimulating progress in the radio and electronic fields."

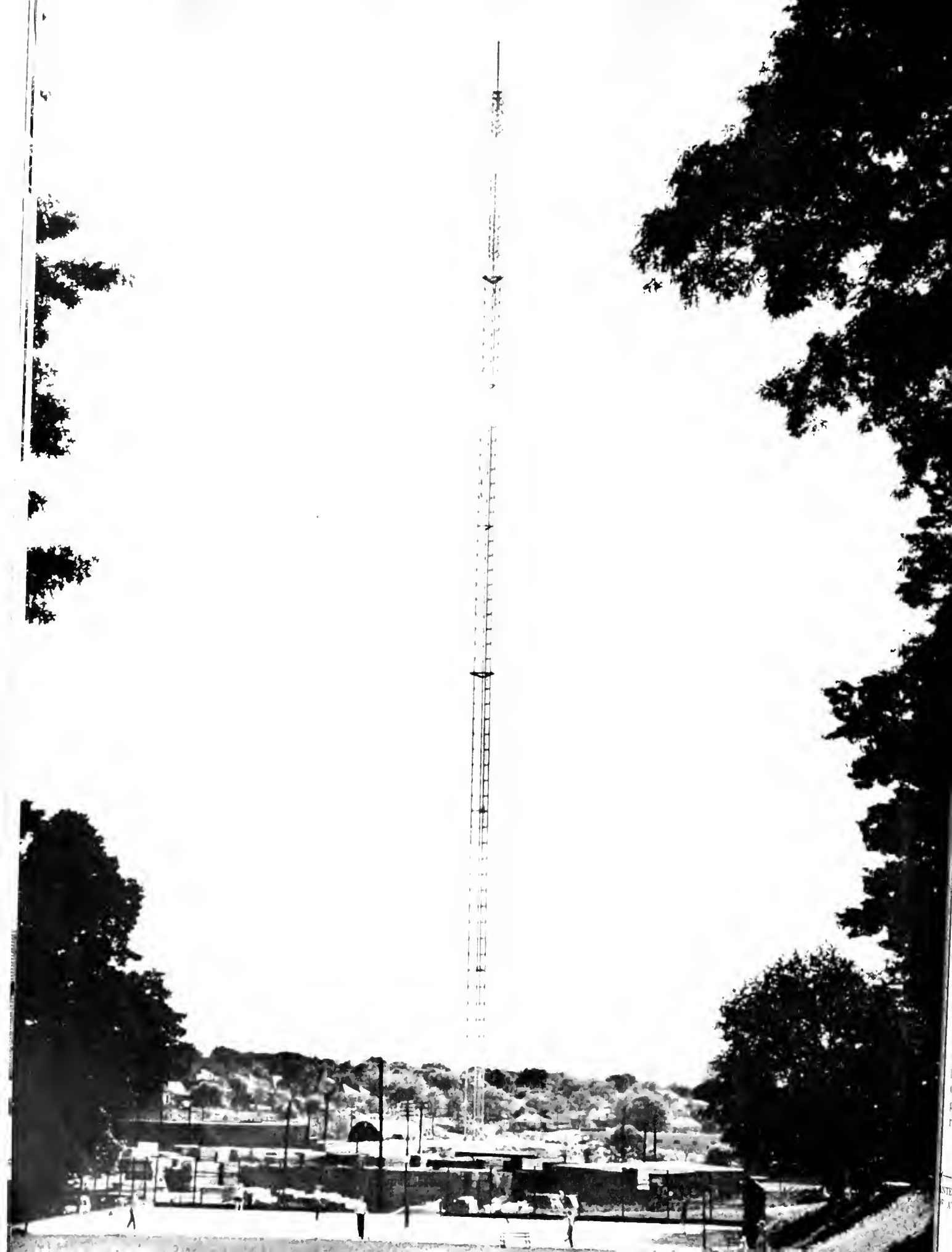
The three television trade-marks are of Greek derivation. Kinescope, registered by RCA in 1932, stems from "kineo," meaning "to move," and "scope," signifying "observation"; Iconoscope, registered in 1935, incorporates the Greek "icon," meaning "image"; Orthicon, registered in 1940, employs the prefix "ortho," meaning "direct."

Distributor Acquired

Physical properties of Bickford Brothers Company, wholesale distributors in the Buffalo and Rochester areas, have been acquired by RCA Victor Distributing Corporation, Paul Wolk, President of Bickford Brothers, and H. M. Winters, Director of RCA Victor's Distribution Department, made the joint announcement on July 28.

Winters also disclosed that the RCA Victor Distributing Corporation, wholly-owned RCA subsidiary would take over the operation of two Bickford branches.

Bickford Brothers has been in operation in Buffalo since 1939.





O. B. HANSON (RIGHT), NBC VICE PRESIDENT AND CHIEF ENGINEER, WITNESSES A DEMONSTRATION OF THE NEW BRIEF-CASE FIELD AMPLIFIER BY ITS DEVELOPERS, J. L. HATHAWAY (LEFT) AND R. C. KENNEDY.

For Remote Program Pickups

NBC Engineers Develop Compact Field Amplifier that can be Carried to Out-of-Studio Broadcasts in Ordinary Brief-case.

USING the latest developments in miniature vacuum tubes and associated components, two NBC engineers, J. L. Hathaway and R. C. Kennedy, have succeeded in designing a practical, ultra-compact, light-weight field amplifier which not only embodies all the principal features of much larger standard models but adds some innovations of its own, yet can be carried in an ordinary brief-case.

For many years, broadcast engineers assigned to handle programs originating outside the studio have been pleading for relief from the large and cumbersome field amplifiers they have had to transport to banquets, sports stadia and news events. They have pointed out that a man loaded down with such an imposing array of broadcast apparatus frequently had difficulty talking his way into certain types of public and private affairs which had been scheduled as broadcast programs. By the time the thwarted engineer had maneuvered his luggage from the front entrance to the rear and up a stairway to the scene

of the program, the "show" may have begun without him. With the new field amplifier, such a disturbing and sometimes costly situation is not likely to occur. A man with a brief-case in hand does not attract special attention in the most exclusive of public places.

One glance at the contents of the carrying-case demonstrates the ingenuity of the Hathaway-Kennedy team. In addition to the amplifier itself, which includes a complete set of batteries sufficient for 25 hours of intermittent operation, there is room for three microphones with their cables, and space for spare cables, batteries and tubes. The amplifier and brief-case weigh only 17½ pounds.

Components Carefully Selected

In selecting components for the amplifier, performance and compactness were equally essential. For instance, more than a dozen miniature and sub-miniature tubes were subjected to rigid tests before the most suitable type was found for the microphone circuit. In the same

way, a critical volume control was not approved until it had been mechanically rotated 50,000 times without showing signs of wear.

That the new unit is as versatile as it is small is evidenced during the testing and balancing of telephone lines leading from the site of the program to the main control board at the studio. This process, called equalizing, is essential in order to insure the transmission of sounds free of distortion. Formerly, equalizing was accomplished with the aid of a test tone transmitted over an extra set of telephone wires from the studio to the field amplifier. The new instrument generates its own tone signal thereby making it possible to reduce the equalizing time from 15 minutes to 30 seconds. Where the time available before the start of a program is limited, this saving in time could well mean the difference between a program of maximum tone fidelity and one of distinctly inferior quality, plagued by hisses, hum and other foreign noises.

Tests of the brief-case amplifier have been conducted throughout the country with gratifying results.

Fourteen Stations Join NBC Television Network

Fourteen television stations, at present affiliated with NBC but non-interconnected have become interconnected with the NBC television network.

As of Oct. 1 NBC had 47 television stations on its interconnected network and 16 on its non-interconnected network, a total of 63 outlets.

The most recent additions to the interconnected network are: WSAZ-TV, Huntington, W. Va.; WFMY-TV, Greensboro, N. C.; WBTV, Charlotte, N. C.; WMBR-TV, Jacksonville, Fla.; WSB-TV, Atlanta, Ga.; WBRC-TV, Birmingham, Ala.; WAVE-TV, Louisville, Ky.; WFBM-TV, Indianapolis, Ind.; WOC-TV, Davenport, Iowa; WOI-TV, Ames, Iowa; KSTP-TV, Minneapolis-St. Paul, Minn.; WOW-TV, Omaha, Neb.; WDAF-TV, Kansas City, Mo.; WSM-TV, Nashville, Tenn., and WTTV, Bloomington, Ind.

Radio to Continue as a Vital Force

J. H. McCannell, President of NBC, Assures Nation Broadcasters that Sound Broadcasting is Certain to Always Remain an Important Entertainment Created by Television.

A FEW FEARS that the sound-broadcasting industry will continue to be affected by the rise of television are unwarranted and shortsighted, J. H. McCannell, President of the National Broadcasting Company, said in an address to the South Carolina Broadcasters Association at Myrtle Beach, S. C., on Feb. 17.

"It is my conviction," McCannell said, "that sound broadcasting is now the basic entertainment medium of the country. It is not meant to say that radio will not undergo drastic changes in the years ahead. No question at all remains as to the structure in a changing world. Radio has been ingeniously used to fill similar conditions ever since it was established a generation ago. Responding to new requirements and maintaining them as a vital force."

"Total radio entertainment is being constantly changed by the new forms of television and motion picture shows. It is true that this is changing in the years to come. But I am confident that the sound broadcasting medium, which has met and grown throughout the social and economic changes of the '30's and '40's, will adjust itself to the new environment of the '50's and '60's. It will do so because we the broadcasters," McCannell will have the flexibility to develop the new services and programs, methods which will meet the new needs of the new decade."

"In a similar personal example of the nature of the broadcast medium, I have found a sound broadcast and motion picture level. While we are television production, management, we are concerned with a new medium of entertainment. It will continue to be a medium which will return to a broadcast level. The time is coming when we will be able to do all of this."

Among the reasons, McCannell says, the radio and television industry will be able to continue to con-



J. H. MCCANNELL

tinued demands and programs it never had the magnitude of the broadcasting medium to handle the share of the business growing at a rapid rate. He stressed that radio is not a single medium but a group of media. The medium is subject to the demands of the market.

Equation for Radio's Fate

Stating that the equation for the new medium will be accordingly more complex than that of radio, McCannell developed the formula that even after the full effect of television is felt, it is probable that radio will remain an important and most comprehensive medium in America offering wide effectiveness at a cost which is lower than any other medium.

Referring to the present industry and future, McCannell called upon the broadcasters to develop the effort of continuing to create a new medium, the broadcasting industry and encourage it from within. It is not enough to depend on the efforts of television to create a new medium, he stressed.

Radio's message, he said, must be "immediate support and advice to the needs of American democracy and that means throughout this nation with confidence in effectiveness of our leaders, leaders whom its very course be assured."

"We propose to keep our own house clean in the very best of our ability," McCannell told the South Carolina broadcasters, "and I am sure that all other broadcasters will want to do the same."

Taking into account the full effect of television, McCannell said, national radio during the coming season will attract a larger audience than it has ever in any year between 1945 and 1947. He also pointed out that while all other media radio has never raised its rates in recent years to reflect its increased cost of operation and that while the advertiser pays more for every service and commodity he uses and charges more for his own product, he is still buying radio at a 1945 rate and receiving more for his money than in 1940.

Television's effect on radio listening is another fear as drastic as popular belief would indicate. McCannell declared. Pointing the worst comparison of present trends and statistics would mean a decrease of only 57 percent in the number of American owning radio homes in the 1950-55 season as compared with 1945, he asserted. This percentage is obtained by applying the current Nielsen research figure of 50,000,000 per cent to average listening of a radio home when a household is estimated to the average 1950-55 figure of 25,000,000 radio families and 10,000,000 televisions families, he explained. In 1945-1950, the average number of radio radio homes estimated for the effect of television will be the same as in January 1947, when there was no color as at the effect of the sound broadcasting medium, McCannell explained, and

Continued on page 31

TV and Radio in Education

Newest of the "Seven Arts" Has a Lure for Children which can be Utilized in Interpreting the American Way of Life for the Nation's Impressionable Juveniles.



E. August Walker

General Manager, ABC Radio
W. J. Walker
NBC Television

There is something about television as a medium of communication which has made it the most popular of all. The new medium has brought us into contact with the world we live in. It has brought us into contact with the people of other countries, with the great cities of the world, with the great works of art, with the great scientific discoveries, with the great achievements of our nation. It has brought us into contact with the great ideas of our time, with the great thoughts of our people, with the great hopes of our future. It has brought us into contact with the great things of our world, with the great beauty of our earth, with the great power of our sun, with the great mystery of our universe. It has brought us into contact with the great things of our lives, with the great love of our hearts, with the great joy of our souls, with the great peace of our minds, with the great hope of our future.

Learn More About Us, Please Yes

When you see a television set, you know what it is. You know what it does. You know what it can do. You know what it can do for you. You know what it can do for your children. You know what it can do for your school. You know what it can do for your community. You know what it can do for your nation. You know what it can do for the world. You know what it can do for the future. You know what it can do for the peace of our world, for the love of our hearts, for the joy of our souls, for the peace of our minds, for the hope of our future.

...the new medium of television has brought us into contact with the world we live in. It has brought us into contact with the people of other countries, with the great cities of the world, with the great works of art, with the great scientific discoveries, with the great achievements of our nation. It has brought us into contact with the great ideas of our time, with the great thoughts of our people, with the great hopes of our future. It has brought us into contact with the great things of our world, with the great beauty of our earth, with the great power of our sun, with the great mystery of our universe. It has brought us into contact with the great things of our lives, with the great love of our hearts, with the great joy of our souls, with the great peace of our minds, with the great hope of our future.

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THE UNDERSTANDING OF THE possibilities of television as a medium of communication is the key to the future of the child. The child is a naturally curious being, and he is always looking for new things. He is always looking for new ideas, for new experiences, for new adventures. He is always looking for new ways to learn, for new ways to play, for new ways to grow. He is always looking for new ways to understand the world around him, for new ways to understand the people around him, for new ways to understand himself. He is always looking for new ways to live, for new ways to love, for new ways to hope. He is always looking for new ways to be a part of the world, for new ways to be a part of the future.

BROADCASTERS REALIZE THAT THE YOUNG AUDIENCE IS ONE OF THE MOST ENTERTAINING AND LOYAL THEY HAVE.

THE IMPORTANCE OF BROADCASTING TO THE YOUNG IS CLEAR FROM THIS PHOTOGRAPH OF A CLASS ROOM.





THROUGH TELEVISION TODAY'S CHILD VIEWS INAUGURATIONS AND CONVENTIONS, SEES AND HEARS CONGRESS IN ACTION.

glad they could read at all. When popular education began, the pessimists were certain that learning would make the masses dissatisfied and so upset the status quo; the optimists were pretty sure that a status quo based on ignorance probably ought to be upset. When the automobile arrived, the pessimists predicted that people's legs would shrivel up and cried that if God had meant men to ride on wheels he'd have provided built-in roller skates; the optimists were glad they could get around easier.

Yes, I am an optimist—I always have been. In particular, I am an optimist about radio and television. And I have five excellent reasons. I base my optimism on the affirmative case for the media, the horse sense of the American parent, the resilience of the American child, the ingenuity of the American teacher and the enlightened selfishness of the American broadcaster. Let's examine each of these characteristics and then you may determine for yourself whether my optimism is foolish or not.

Radio and TV Picture Life

The affirmative case for the media. Both radio and television serve the American home and the American school in interpreting for them a way of life. Because of them, today's citizen child has a greater "freedom to grow". He can far exceed the experiences of children in all previous generations, for the world today is brought close

together by these powerful, swift-moving means of communication. He can see and hear history being made. He can view inaugurations, and political conventions; he can see and hear the President, and the cabinet and the Congress which determines policy. He can see and hear the news of the world—on the day it happens. The list of attractive, diverting and entertaining programs for children is too long to go into here—but they have lured children—and caused comment, as you know.

This brings me to my second article of faith—my belief in the horse-sense of American parents.

Attitude of Parents

Of the several attitudes which parents may take toward radio and television, I should like to single out two which seem to me to be misguided, and which I do not believe the great body of sensible parents will adopt.

The first is held by those parents who shower praise on the new medium because it keeps the youngsters quiet. The second belongs to those parents who have never seen a program, yet condemn it because they have heard "how awful the programs are".

It seems to me it is time we all realized that the child parked in front of a television screen or radio set is not under the care of an electronic baby sitter. He is truly engaged in what is, to him, an important learning process. The re-

sponsible parent should experience this learning process with the child, as frequently as possible. Every child wants to share new sensations and new ideas. Moreover, he wants them interpreted to him. He wants to find out how they relate to him, to his family, and his friends.

There is still another attitude which I do not believe will prevail over the inherent good sense of American parents. It is the notion that a simple formula can be developed which will solve all problems.

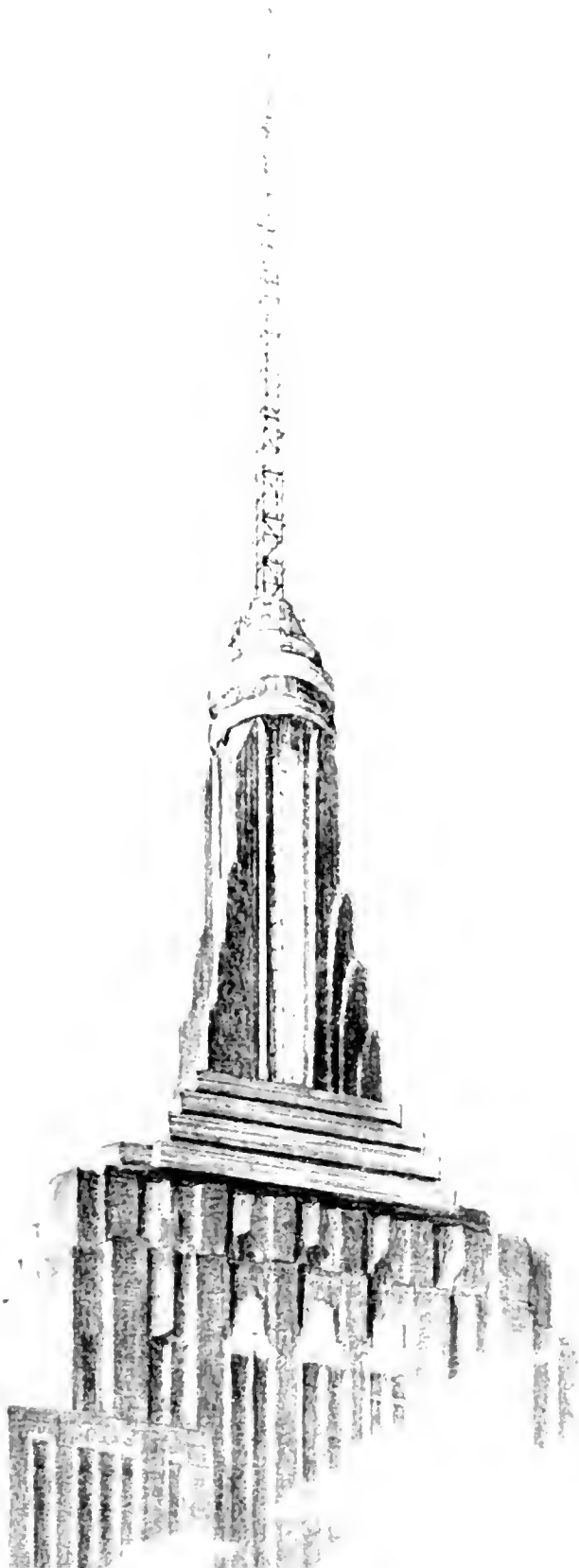
It is surprising how many people would like broadcasters to be arbiters of public taste and morals. The industry is, of course, responsible for its program fare, and for the exercise of fundamental decency and good manners in its presentation. But they, the broadcasters, cannot make taste judgments for you or your neighbors or your children, any more than the automobile manufacturers can build automobiles with built-in drivers.

Most Parents Realize Facts

I think most parents realize this fact. I think too, that their fundamental good sense will recommend to them the practice of some sensible measures in regard to the lively arts. They will help their children develop habits of moderation in listening and viewing. They will share this new experience with their children and will make use of their opportunities to develop discrimination. They will also help their children plan sensible listening schedules, and will give as much time and thought to the preparation of these schedules as they give to the planning of the rest of the educational and recreational diet.

This brings me to my third reason for optimism: my faith in the resilience of the American child. I believe that he is normally a pretty hardy creature, with fairly healthy instincts, and not nearly so fragile as some of his protectors would imply. Unless we insist on rearing him in a hot house under forced feeding and a sterilized environment, he will develop a quite amazing capacity to assimilate an astounding number of impressions, facts and ideas.

(Continued on page 31)



Relation of Scientific Research to War Preparedness

Since Military Preparedness is no Longer a Matter Merely of Men, Materiel and Campaign Planning, Science and Industry Must Share Partnership with the Armed Forces in any Modern, Large-Scale Conflict, Says W. W. Watts.



By W. W. Watts.

Vice President in Charge of Engineering Products Department, Radio Corporation of America.

MILITARY preparedness is no longer a matter merely of men, materiel, and the planning of a campaign. The rapid advancement of human knowledge, notably in the past 50 years, and especially in the period between the two world wars, has made of it a state of dynamic progress, in which science and industry share a partnership with the military.

During our lifetime, the very nature of warfare has changed. The age of electronics, and now of nuclearics, makes obsolete a tactic or a new equipment almost as soon as it is used. The welfare of the people behind an armed force, even the subtleties of their state of mind, are as strong a predisposing factor to national security as the resources which can be brought to its support. Military preparedness thus has come to mean total effort, and, with it, total responsibility for its success.

Until recently, both pure and applied science went their own way, uncovering new fields of knowledge, finding new means of using it, without any special inspiration by possible military objectives.

In a sense, the scientist had to

be a salesman to get the armed forces to use his invention or application. Though I am now talking historically, this relationship of science and the military manifested itself too recently for comfort on certain instances we all recall.

Certainly, history is replete with examples of inventors who carried their work to rulers and attempted to "sell" it on the basis of its military value. The story of Robert Fulton and his submarine is a classic example, all the more so since virtually the same thing happened to Samuel Holland with his more practical development of the same idea, almost a hundred years later.

Human Welfare Advanced

Yet it has been through military acceptance of science's new developments that human welfare has been advanced, and that great social changes have been wrought. The advancement of radio science in the past 50 years is possibly history's most outstanding example of how

a product of the laboratory, which received its initial support from the military, found virtually limitless non-military applications.

We could go back earlier — to the development of gunpowder, which blasted the way for Western European civilization — to the sailing vessel, which displaced the slave-driven galley and opened new worlds for exploration and commerce — to the ironclad warships, which were the precursors of today's huge naval and commercial vessels.

We could also recall other instances without number, but they would illustrate one great fact — the scientist was not in times past a partner in the military effort. His work might be used, he might even be called upon as a consultant on specific problems, but it was not until 10 years ago that scientific research and development were formally integrated into our national security potential.

Earlier beginnings had been made in our own country, and nations

THIS ELECTRONIC COMPUTER, DEVELOPED DURING WORLD WAR II TO MEASURE WITH HIGH ACCURACY THE SPEED OF PROJECTILES, IS AN EXAMPLE OF THE APPLICATION OF INDUSTRIAL RESEARCH TO MILITARY NEEDS.



that were to be our allies in conflicts of the half century — in utilizing scientists' contributions in military affairs. Abraham Lincoln set up the National Academy of Sciences during the Civil War. Woodrow Wilson had authorized the National Research Council during the first World War. But it was not until June, 1940, that a scientific organization was set up with ample funds and authority, and constituted a partner in the military effort. The organization was the National Defense Research Committee, which later became the Office of Scientific Research and Development. The distinguished scientist Dr. Vannevar Bush, was named by President Roosevelt to direct this new activity.

Technology Pattern Developed

Under Dr. Bush's distinguished leadership, the pattern was developed for the battle of technology that is continuing today, to keep our military preparedness "a jump ahead" of our potential enemies. During the war, the OSRD spent about \$135,000,000 a year. It assigned research projects and non-profit development contracts to some 300 university and industrial laboratories, putting to work the best brains in the country in a team effort which is the basis of our successful scientific ventures today. The OSRD contracted for more than 2,000 investigations, of which 564 were completed. Over 200 devices were produced for the war effort, many of them of such transcendent importance that we may fully ascribe to them the credit for tilting the balance of the conflict for our victory.

The development of micro-wave radar was undoubtedly the leading achievement of "our side". This was one of the major fields of research and development by the OSRD, taking the biggest slice, \$30,000,000, out of its annual budget. Submarine warfare came next in importance, with a \$19,000,000 budget. Other principal fields of OSRD activities are indicated by the names of its 18 divisions, among which were Radio, Explosives, New Missiles, Special Projects, and Fire Control.

All along, of course, the Armed Forces had and still have their own research and development establishments. These include the laboratories of the Air Materiel Command for the Air Forces, the Naval Research and the Naval Ordnance Laboratories, the Office of Naval Research for the Navy, the Signal Corps Laboratory, the Engineer Board, the Armed Forces Board, among many others. If I have omitted mentioning them, it is for lack of time, certainly not in depreciation of their good work.

Science Evolves Teamwork

As a result of our wartime experiences, and the continuing activities in the field, a unique teamwork has evolved in our scientific establishments. Research for the Armed Forces, as for other scientific objectives, falls into four categories. These four types of research are fundamental, background, applied, and developmental. Prior to World War II, only a small amount of government money was spent on any of these types of research, and the little which was done was of a developmental nature through contracts with industrial concerns. During and since the war, however, the picture has changed considerably in several respects. In 1947, a typical post-war year, our government spent a total of \$500,000,000 on all types of research for the Armed Forces. Of this amount, about 90 per cent, or \$465,000,000, was spent on applied research and development studies. The contracts which this huge sum represents went, not to just a few larger universities and industrial concerns, but to schools and companies of all sizes.

The importance of these figures lies not so much in their indication of the role played by the university in technological support of our national security, as in the system by which the academic researchers and their professional colleagues in private industry work hand in hand for a common objective. In essence, this is the solid inner core of the strength of science in a democracy.

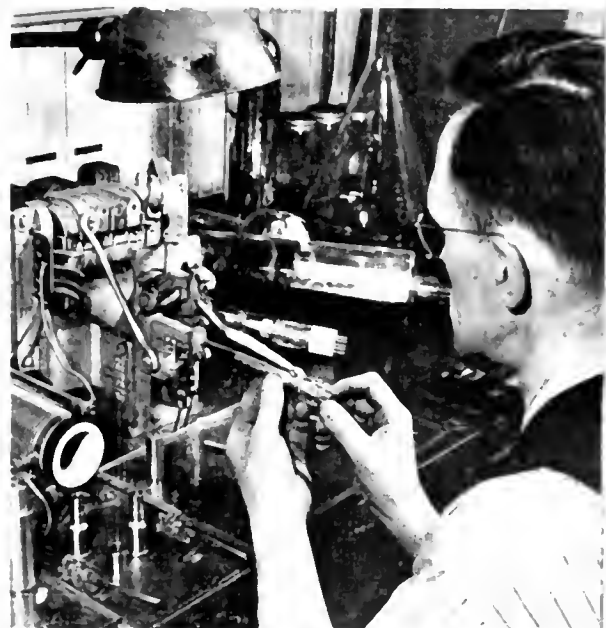
The pattern begun by the NDRC

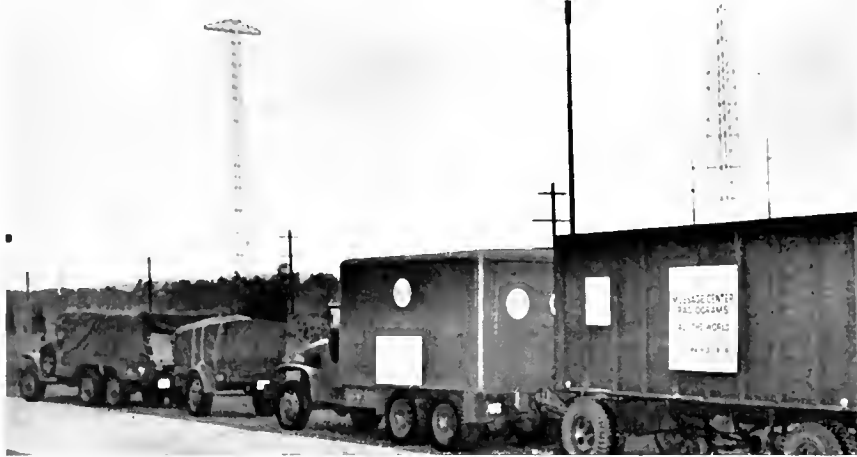
(Continued on page 32)



RCA SCIENTISTS EXPERIMENT WITH A HIGH-VOLTAGE GENERATOR, USING RADIOACTIVITY AS ITS SOURCE OF ENERGY.

ASSEMBLING ELECTRON GUN OF CATHODE-RAY TUBES, WHICH ARE THE HEART OF RADAR UNITS WIDELY USED BY ARMED FORCES.





THE KOREAN-BOUND RADIO CARAVAN PAUSES IN FRONT OF THE FAMOUS LONG-WAVE TOWERS OF RCA CENTRAL ON LONG ISLAND BEFORE STARTING ITS LONG JOURNEY TO THE WAR-FRONT.

Mobile Unit On Way to Korea

Designed by RCA, Radio Caravan will be used to Lighten Army's Burden in Handling Certain Types of Messages.

A COMPLETE mobile station for handling various types of radio communications, now on its way to the Korean fighting front, is expected to relieve Army facilities of much of their burden of important press, government and personal messages that they must currently handle, according to an announcement by Harry C. Ingles, President of RCA Communications, Inc.

The RCA unit, assembled at the

request of the U. S. Armed Services, includes facilities for radiotelephone, radiophoto and voice program service, as well as regular telegraph service. The station will make it possible for men in front-line forces to communicate with their families by direct radiotelegraph service, Mr. Ingles added.

The mobile unit has been housed in Army-type trucks and trailers that can be quickly moved to meet Army requirements. Sixteen radio

operators and technicians will provide continuous, 24 hour service for handling radio communications direct with San Francisco, and, via this route, to other countries.

Henry A. Mortara, of the RCA San Francisco office, is to direct the group in Korea. Mr. Mortara gained valuable experience in this type of operation during World War I when he managed RCA mobile radio stations which accompanied the Allied Armies in Europe. He will proceed in advance of the staff and equipment to establish headquarters and cooperate with the Military Authorities in setting up RCA facilities.

During World War II, RCA Communications operated three radiotelegraph circuits for troops in the European Theater. Terminals for these circuits were housed in mobile vans which moved forward from Africa to Berlin with the Army headquarters to which they were attached.

RCA operated the only direct radiotelegraph circuit between San Francisco and Seoul from 1945 to 1948. In November 1948, the Seoul facilities were turned over to the Korean Government and the direct circuit was operated jointly by RCA and the Korean Telegraph Administration.

Sarnoff Receives Degree for Leadership in Radio and Television

Brig. General David Sarnoff, Chairman of the Board, Radio Corporation of America, has been awarded the honorary degree of Doctor of Humane Letters by the University of Louisville for his leadership in the fields of television and radio. In ceremonies held at the University on September 26, he was cited by Dr. John W. Taylor, president of the university, for his part in building the public affairs and education activities of the National Broadcasting Company, "which has led in the dissemination of informed and enlightened opinion in all fields of knowledge."

Gen. Sarnoff told the students at the year's first student convocation that "there is no more challenging time to be alive than today. However sweet may be security, it is not so sweet as adventure, the adventure of making useful the in-

struments of radio and television."

Following is the citation accompanying the degree awarded to Gen. Sarnoff:

"Brigadier General Sarnoff illuminates this century and our culture. An immigrant from overseas, he rose from messenger boy to the chairmanship of one of the largest American corporations; a technologist of vision, he predicted the development of radio broadcasting in 1915, of television as a service to the public in 1923. For his vision of television as a social force, and for the steadfastness of his leadership in bringing this science and art to perfection, the Television Broadcasters Association in 1944 called him 'The Father of American Television.'

"But his achievements do not stop here. In 1938, he presented to President Roosevelt the original

concept of 'The Voice of America.'

"A man with a sense of obligation to the culture of the nation and of the world, he organized the NBC Symphony Orchestra and persuaded Maestro Toscanini to conduct it. General Sarnoff made it possible for people everywhere to hear the great music produced by the Metropolitan Opera Association. He has sponsored and supported the department of Public Affairs at the National Broadcasting Company, which has led in the dissemination of informed and enlightened opinion in all fields of knowledge, and which has, most recently, introduced a national plan for college education by radio. Of this, the NBC Theater is an integral part. The University of Louisville recognizes and commends his services to the culture of the world by conferring upon him the degree of Doctor of Humane Letters."

TV and Radio in Education

(Continued from page 26)

Now take the matter of crime programs, about which we hear so much. In homes where children, apparently, have no regular bedtime, and where no adult takes the trouble to help them select suitable viewing or listening fare, it is quite possible that some children can see more crime and violence than is good for them. I trust you will not misconstrue what I am about to say. I am not, I assure you, recommending that all children should be exposed to crime programs. Indeed, I am persuaded, personally, that only an apathetic parent would allow an oversensitive child to include any or many crime programs in his diet, or a normal one to gorge himself on them. I do say, however, that healthy minded children are not likely to be warped or scarred by them. I think most of them are able to distinguish between the world of fiction and the world of fact, and that they are quite able to enjoy a vicarious adventure without adopting the morality of the principals.

My fourth reason for optimism is based on my belief in the ingenuity of American teachers. I believe they will help their students develop discrimination; will find many ways of turning the many educational materials prepared by the new media to good account in their classrooms; will find a place for the study of radio and television in their classrooms.

An Optimist About "Lively Arts"

Finally, I am an optimist about the lively arts and their impact on society because of the enlightened self-interest of the broadcaster. You know, in spite of all you may have heard or read, broadcasters are people too. They live in houses, and have children who watch television, and have individual consciences, and belong to churches, and serve on school boards. They worry about the state of the Union, and the high cost of living, and the ominous threat of "the cold war". They feel the responsibilities of

their profession keenly. They realize they are entrusted with the attentiveness of the young listener and viewer for long periods of time; realize too that the young audience is one of the most enthusiastic and loyal they have.

Radio to Continue as Vital Force

(Continued from page 25)

will actually be 23 per cent larger than the number of radio homes in 1940.

Listening and Viewing Divided

In presenting these figures, McConnell pointed out that they do not take into account indications of a trend toward more radio listening in television homes. With multiple sets in the home, some members of the family listen to their personal radios while the television set is on in the living room.

Radio today is the most massive and comprehensive medium of communication the world has ever known, McConnell pointed out. In the United States it reaches virtually everybody, hour after hour, day after day, week after week, he said. Over 10,000,000 American families in this country have radio sets in their homes and they comprise 95 per cent of the population, thus making radio bigger than all newspapers combined and seven times as big as television, he explained. People listen in fabulous numbers, he continued, with an average evening audience of 35,000,000, and spend more time with radio than with any other recreation.

Radio has been growing faster than the American population and faster than any other medium, McConnell added. In the past four years the increase in the number of radio families has been twice the circulation increase of all newspapers and the four leading weekly

And, in the end, the lively arts will go where we go. They will speak in our accents—not yours or mine alone, but in a comprehensive American tongue. They will show us our own faces and forms, in our many gestures and attitudes. They will lead where we will follow. I am an optimist about their influence on our children primarily because I am an optimist about Americans.

magazines combined, and has been twice as large as the increase in television families, he pointed out.

"With an expanding economy, with radio retaining its basic values, with opportunities for even greater development of its present resources—I do not think we have to fear for the outlook of sound broadcasting," he reassured his audience. "It is favorable in the extreme and some of the greatest chapters in its history are yet to be written."

International Division Moves to Radio City

New York headquarters of the RCA International Division, Radio Corporation of America, were moved from 715 Fifth Avenue to the RCA Building in Radio City, on September 18. Executive offices of Meade Brunet, a Vice President of RCA and Managing Director of the RCA International Division, are located on the 12th floor of the RCA Building. Also on that floor are Office Services, Radio and Appliance Sales, Record Sales and RCA Tube Department representatives. On the 4th floor of the RCA Building are the Personnel Department, Market Analysis, Engineering Products, Theatre and Sound Sales and office files.

The Division, formed in 1945, supervises foreign sales and other activities of RCA and its subsidiaries outside of the United States.

Relation of Scientific Research to War Preparedness

(Continued from page 29)

and continued by its successor OSRD, with its tremendous record of success, in the face of failures in totalitarian countries, carries a precept that we must never forget. This is the need for non-partisan, unbiased control of our scientific activities.

Our wartime program was administered by civilians and had a civilian head, who reported directly to the President. A good many of the projects were, of course, requested by the military, or were directed along lines of military application.

But military leadership, we have found, is sometimes resistant to change, to innovations in materiel or in logistics. In the OSRD, for example, there were scientists who were not content to work only on projects requested by the Armed Forces, whose imaginations ranged the fields of global warfare, to find occasionally what seemed fantastic and "hare-brained" applications to the trained and orderly military mind.

Such was the case, if I might cite an example, with the amphibious "Duck" vehicle, which was developed by the OSRD against the strong opposition of some members of the Armed Forces, and which later played an important part in winning the war.

Sound Principle Established

And so, during the war, a wise and sound principle was established, and is still in force — the research people must be given a free hand to decide what basic research work shall or shall not be undertaken at the schools and universities and by industry. Of course, the Armed Forces do and should direct specific activities through the award of special research contracts.

Carrying this thought a little farther, it is clear in my mind that research and development work must be competitive. One thing we have learned from the defeat of the Nazis and the Japanese, and the failures of the Russians, is that

scientific progress cannot be legislated or achieved by dictum, nor can it follow a party line.

Between the two World Wars, though we had a tremendous accumulation of knowledge, this concept of the relationship between research and national security received almost no tangible recognition. Fortunately, when Hitler came into power, he went our apathy one better. Here let me quote Dr. Bush's excellent book, "Modern Arms and Free Men", in which he says of Hitler:

"He proceeded to destroy the great structure of German science. He did so by eliminating those scientists who did not fit into his distorted racial or political concepts and by regimenting the remainder. The fundamental scientist can do little of practical nature alone, but he is an essential link in a chain, and this fact Hitler did not understand. It is fortunate for the world that dictators are very likely to be obtuse, and beyond influence or conversion, when it comes to the subtle ways in which science, engineering, and industry are interlinked to produce more than obvious

progress in any field, and especially in the art of war."

That strange distortion of the human ego which Dr. Bush talks about may account for some of the silly things we have been hearing from totalitarian countries in the name of science — the claims of the Russians, for example, of inventing almost everything we have today, the distortions of an established biologic law in the field of genetics to prove a fallacious party line premise that environmental factors influence heredity.

In conclusion, I merely want to make the observation that insofar as adopting the right attitudes about Scientific Research, our government, our schools and universities, and our industrial companies are doing their bit toward insuring our nation's sincere desire for lasting world peace. It seems to me — again from the limited viewpoint of scientific research — that for the first time in our history we recognize the fact that we are all — government, industry, and university — in the same boat, and even more important we see that we can buck the troubled tides only by pulling on our oars with teamwork coordination. This we are accomplishing: this I feel confident we shall continue to practice with ever-increasing efficiency and effectiveness.

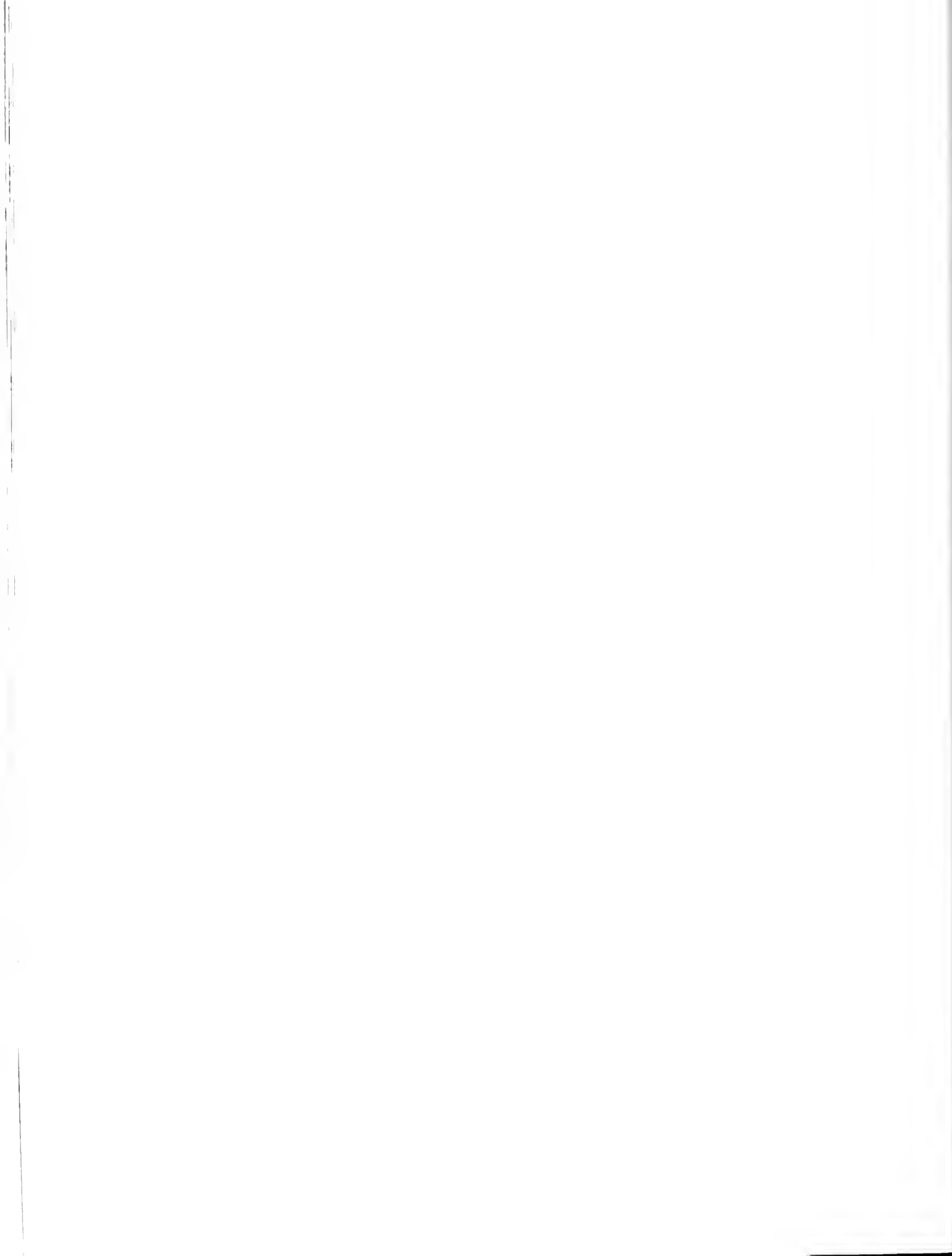
DR. ELMER W. ENGSTROM (LEFT), VICE PRESIDENT IN CHARGE OF RESEARCH, RCA LABORATORIES DIVISION, RECEIVES THE OUTSTANDING ACHIEVEMENT MEDAL OF THE UNIVERSITY OF MINNESOTA FROM J. L. MORRILL, UNIVERSITY PRESIDENT.





JANUARY 1951





RADIO AGE

RESEARCH • MANUFACTURING • COMMUNICATIONS • BROADCASTING • TELEVISION



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JANUARY 1951

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RADIO CORPORATION OF AMERICA
RCA Building, New York 20, N. Y.

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COVER

vements in 1950 included erection of the 200-foot multiple TV-FM antenna atop the Empire State Building in New York; the RCA tri-color television tube; the all-electronic compatible RCA color TV system; intensive motion and wide public acceptance of the 45-rpm microgroove phonographs and records; expansion of television programming and television of TV networks in Jacksonville and Omaha; development of the analog computer by RCA Laboratories as an aid in guided missile research.



Services of RCA are:

RCA Laboratories Division

RCA Victor Division

RCA Communications, Inc.

Marine Corporation of America

Radio Broadcasting Company, Inc.

RCA Institutes Inc.

RCA Service Company Inc.

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RADIO CORPORATION OF AMERICA
RCA Building, New York 20, N. Y.

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LEWIS MACCONNACH, *Secretary*

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- RCA Communications, Inc.
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- RCA National Broadcasting Company, Inc.
- RCA Institutes, Inc.
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- RCA International Division



RADIO CITY'S 3,000 SEAT CENTER THEATRE HAS BEEN ACQUIRED BY NBC TO KEEP PACE WITH TELEVISION'S GROWTH.

Radio and Television in 1950

Chairman of RCA Board in Year-End Statement Declares America is Fortunate at This Time of National Emergency to have Television Reaching 40 Million Citizens, Supplementing Radio's Vast Audience for Purposes of Unity — He Lists Advances of Electronic Fields in 1950 and Describes Year as Biggest in RCA History.

By David Sarnoff,

*Chairman of the Board,
Radio Corporation of America*

THE year 1950 was the biggest in the history of the Radio Corporation of America. Gross income, profits, dividends to stockholders were larger than ever before and employment increased substantially.

Television in performance and growth during 1950 reached proportions that qualify it as one of America's most promising industries. Years of research, engineering and planning were brought to fruition. As a result the signpost on the road of progress is marked TELEVISION—in both black-and-white and color.

There are about 10,000,000 television sets in the United States and 107 television stations. No new industry ever grew so fast in so short a time. While there are still vast areas of the county served only by sound broadcasting, the appeal of television is so powerful that those who remain out of its range eagerly await its arrival.

The sale of television sets throughout the year contributed to industrial progress and to the pleasures which American families in ever increasing numbers are enjoying.

The rate of television's growth, however, has been slowed by a nation-wide "freeze" put upon the construction of additional television stations. In the public interest it is hoped that the "freeze" will be thawed in 1951 so that television can reach every city, town, farm and school and satisfy the public demand for this new and important service. Hundreds of new television stations await the signal to go on the air.

Television accounted for approximately 75 per cent of RCA's total gross income in 1950. Vision and



DAVID SARNOFF

planning, plus confidence in the service that television could render, enabled RCA to maintain leadership in television. No other organization has contributed as much to the creation or more to the advancement of the new science and art as a service to the American people and an important tool for industry.

Dividends to RCA Stockholders

At the December meeting of the Board of Directors a regular dividend of 50 cents per share, and an extra dividend of 25 cents per share were declared on the outstanding shares of Common Stock, payable on December 26, 1950 to holders of record of such stock at the close of business December 8, 1950.

A dividend of 87½ cents per share was also declared on the RCA First Preferred Stock for the period from October 1 to December 31, 1950, payable on January 2, 1951 to holders of record of such stock at the close of business December 21, 1950.

Previous payments on the Common Stock during 1950 were 50 cents on January 23, 1950 (which dividend was declared on December

2, 1949), and an extra dividend of 25 cents paid on May 29, 1950.

With payment of these declarations the total of dividends disbursed by RCA during 1950 will amount to \$23,938,800, consisting of \$3,152,800 on the Preferred Stock, and \$20,786,000 on the Common Stock.

Color Television

Color television in 1950 was a revelation and a provocation. As a rainbow arches across the sky after a storm, so television in color broke through one of the greatest tempests of controversy and conflicting opinions.

As creator and leading proponent of a compatible all-electronic color television system, RCA fought to assure its development and approval over the outmoded incompatible mechanical scanning apparatus.

The Federal Communications Commission closed its public hearings in May, and in October adopted an incompatible system as the standard for commercial color television

"... THE SIGNPOST ON THE ROAD OF PROGRESS IS MARKED *Television* — IN BOTH BLACK-AND-WHITE AND COLOR."





WHAT THE TELEVISION CAMERA SEES, ANTENNAS ON THE SKYLINE PICK UP FOR RECEPTION IN THE HOME.



despite the fact that eminent scientists and virtually all of the radio-television industry warned against such a move. The Commission set November 20 as the date when commercial operations were to begin.

Acting in the public interest, RCA carried the case to Court and on November 16 the United States District Court in Chicago issued a temporary restraining order which deferred the establishment of commercial color television until further order of the Court. RCA maintained that the outlawing of its compatible electronic system was indefensible and contrary to the public interest. It pointed out that the FCC Order was "arbitrary and capricious" and unsupported by substantial evidence; that it would bring irreparable injury to the television industry and to the public.

When the RCA compatible system is used, the present owner of a black-and-white receiver does not need an adapter, nor any change whatever, in his present set to receive color programs in black-and-white. If it is desired to see the programs in color, a converter can be used.

With an incompatible color system, present set owners would not see any picture unless they installed adapters. Even if an adapter for color reception is installed, the black-and-white picture is degraded

from 200,000 to 80,000 picture elements.

It would cost the public approximately \$500,000,000 to adapt the 10 million existing sets to an incompatible system. With the RCA compatible system this unnecessary tax upon the public is avoided.

RCA is a staunch advocate of color television, realizing its great advantages and potentialities, as well as its psychological effect. That is why RCA has so aggressively pursued every possible phase in all-electronic television development. It has spent millions of dollars in research and engineering in backing its faith in an all-electronic system.

Historically significant was RCA's introduction of the first all-electronic tri-color tube. Upon the face of this tube appear clear television pictures in full color and unlimited in size. It eliminates the mechanical whirling disk. Demonstrated publicly for the first time in March, 1950, this tri-color tube was heralded as an electronic miracle of the age.

RCA Improvements Acclaimed

Eight major improvements in the development of the RCA compatible, all-electronic color television system were featured in a series of progress demonstrations beginning on December 5, 1950, before leaders of the radio-television industry and

representatives of the press in Washington, D. C. The improvements were widely acclaimed.

Further revealing the effectiveness of planning and confidence in a new invention is the "45" Victrola-phonograph. It was introduced by RCA in the Spring of 1949 and, as is sometimes the case, it was immediately confronted with opposition from those who would cling to the old rather than accept the new. But the "45", one of the finest musical instruments ever developed and a revolutionary change in the phonograph, steadily proved its worth. Today it leads the field. It has greatly extended the musical pleasures of millions of people and has met all tests of competition. Its magnificent quality has in every respect successfully overcome the early opposition. Now, the 45-rpm records are widely available. Equipment which will play the 45-rpm is produced by 75 different companies. Music lovers are applauding the clear tones of the small plastic disks as played on the fastest, simplest automatic player ever developed.

Since March, 1950, RCA Victor has produced and sold a steadily increasing volume of 33 $\frac{1}{3}$ -rpm long play records of improved quality and tonal fidelity. These records supplement the complete line of recordings on 45 and 78-rpm disks in keeping with the Company's policy

to make available to the public RCA Victor's unsurpassed library of music in the three phonograph speeds.

Foundations of Progress

The Radio Corporation of America, founded upon the bedrock of science and upon service to the Nation and its people, continually plans for the future. In all of its operations the Corporation is mindful of its responsibility to stockholders and employees, to the public and to industry.

RCA Laboratories at Princeton, N. J., is one of the world's great centers of research in radio, television and electronics. From there have come many of the major advances in the art, including the latest triumph—the tri-color television tube. Such research gives solidarity to RCA's future growth.

Radio and television broadcasters do not enjoy the freedom of other industries. Before they broadcast on the air, they must necessarily obtain licenses from the Federal Communications Commission. Radio, in its advance, has passed through many trials and tribulations, and now television is passing through similar experiences. Unsound policies and actions, whether by a Government commission, or a commercial company, can be injurious to stockholders, to employees, to the industry and to the public generally. The adoption of incompatible standards and the controversy that raged throughout 1950 in regard to color television are examples of the dangers that can arise from unrealistic governmental decisions.

Because of the uncertainties of the international situation and the great importance of having America fully prepared for any emergency, the radio and television industry, like other industries, is faced in 1951 with restrictions on normal expansion.

The Radio Corporation of America has pledged to the President of the United States its fullest cooperation in the national effort to resist aggression and to help preserve world peace. RCA is "at the ready" with all of its resources, facilities and manpower to do its

part in helping the Nation to emerge from the crisis into a new era of peace and prosperity.

Major Achievements in 1950

1. Development of the RCA tri-color television picture tube, an essential element of any practical color television system.

2. Improvement and simplification of the RCA compatible all-electronic color television system.

3. Extension of television network program service to Florida and westward to Nebraska.

4. Development by RCA Laboratories of the electronic analogue computer, which shows great promise in contributing to the Nation's air power by speeding up the design of guided missiles and airplanes.

5. The enthusiastic public acceptance of the RCA Victor "45" Victrola phonograph, high-quality vinyl plastic disks, and the quickest record changer ever devised; also extension of RCA Victor's record catalog to include improved long play 33 $\frac{1}{3}$ -rpm wide tonal range recordings.

6. Erection of 200-foot multiple antenna designed by RCA, atop the Empire State Building, New York, enabling five television stations to operate simultaneously from one location. It simplifies the directive setting of home antennas, thereby improving reception in the metropolitan area.

RCA Opens Branch Office in New U.N. Building

Opening of a branch office in the new United Nations building on East 42nd Street, New York, by RCA Communications, Inc., was announced on January 9 by H. C. Ingles, President.

In anticipation of the message traffic from UN government representatives and press correspondents, the RCA branch has been equipped with modern machines which can handle as many as 58,000 outbound words in each eight-hour period of the day. Direct lines connect the new branch with RCA's Central Radio Office in lower Manhattan where direct telegraph channels speed messages to and from more than 60 foreign countries within a few minutes.

RCA currently maintains branches for the UN staff at Lake Success and Flushing Meadows, where on days of peak activity any one press association may send out as many as 10,000 words a day. Since many of the UN news stories are written in foreign languages, RCA employs highly skilled operators to assure the utmost accuracy.

Special telegraph facilities inaugurated at the new building will serve the press and UN officials who have moved their headquarters into the partially completed offices. The third floor of the building contains offices for part of the UN press division.

THE SALE OF TELEVISION SETS CONTRIBUTES TO THE PLEASURES WHICH AMERICAN FAMILIES IN EVER INCREASING NUMBERS ARE ENJOYING.



Television—An Audience of Forty Million Americans

By Frank M. Folsom.

*President,
Radio Corporation of America.*

TELEVISION'S popularity in 1950 mounted with such expanding vigor that by year-end this new art and industry had outdistanced the progress of all of its previous years combined. As 1951 bowed in, the New York metropolitan area alone had more than 2,000,000 sets with an estimated viewing audience of 8,000,000 men, women and children.

Within two years—from January, 1949, to this January—television receiver circulation had increased twelve times. This means that across the Nation today, television brings its magic charm into 10,000,000 homes to entertain and inform an audience of approximately 40,000,000 Americans.

During 1950, the public backed its appreciation of this new broadcasting service by spending a billion and a half dollars for sets—an amount exceeding by more than 100 per cent its purchases in 1949, television's third and best postwar year. To meet these demands, television manufacturers expanded facilities wherever possible and stepped up production schedules to such an extent that in a single month more sets were made available to the public than during the entire year of 1948.

Theatre television, with giant projections of special events on screens of motion picture houses, began to spread across the country in 1950. Installations of RCA Victor's new system were made in a number of cities, including New York, Boston, Washington, Chicago and Los Angeles. This was believed to form the pioneering basis for an independent theatre television network which would supplement regular film fare with special offerings to attract the public. By year-end one large theatre chain was planning for installations in 71 theatres



FRANK M. FOLSOM

from Yuma, Arizona, to San Francisco.

RCA Victor's 1950 line of home television receivers led the market in popularity. Eighteen models were offered, including three with 12½-inch picture tubes, eleven with 16-inch tubes and four with 19-inch tubes. During the year, nearly 70

per cent of the total RCA Victor production was devoted to sets with 16-inch tubes, the overwhelming choice.

Television Operations Expanded

The greatly enlarged television audience spurred broadcasters to superlative efforts in extending networks and improving programs. For instance, when the present construction plans of the National Broadcasting Company are completed, NBC's investment in television will be between \$35,000,000 and \$40,000,000. Plans call for the acquisition of more top talent and the start of morning network programming as the number of sponsors increases.

NBC's commanding lead in all phases of television broadcasting is expected to increase as 1951 progresses. The plan is to provide entertainment of such quality and variety that increasing numbers of set owners will be attracted to the NBC network. At the same time, efforts will be made to provide the finest cultural and informational programs.

A TELEVISION TRUCK IS SWUNG ABOARD A FREIGHTER DESTINED FOR SOUTH AMERICA WHERE THE MOBILE UNIT WILL AID IN EXTENDING THE APPEAL AND VARIETY OF TELEVISION PROGRAMS.



Among the mammoth tasks of expansion completed by NBC in 1950 was the building of a line-up of talent for programs that could be produced at the rate of a hundred a week. Other tasks included the leasing and transforming of the world-famous Center and Hudson Theatres, in New York, and conversion of three large radio broadcasting studios into suitable locales for the production of the great new television shows.

Expansion of TV Outside U. S.

Television's success in the United States caused progressive groups in a number of countries to begin in 1950 an active participation in the new art. During the year, two television stations were opened in Havana, Cuba, one each in Mexico City and Sao Paulo, Brazil, and plans for a Canadian station were being studied. A third Cuban transmitter is expected to go on the air early in 1951. All of these stations are or will be RCA-equipped throughout.

Special demonstrations were conducted during the latter part of the year by E. R. Squibb & Sons, in cooperation with RCA, in four Latin American countries to show television's usefulness in surgical and medical training. More than 16,000 members of medical groups in Cuba, Peru, Colombia, and the Dominican Republic witnessed the demonstrations.

In December, presentation of the Nobel awards by King Gustaf VI in Stockholm, Sweden, was televised for the overflow audience by an RCA Victor television crew which flew across the Atlantic with pickup equipment and receivers at the invitation of the Nobel Foundation. After the historic telecast, demonstrations of American television were conducted for Swedish doctors, scientists and government officials.

Expansion of television outside of our borders is of tremendous significance, for it brings closer the day when there can be an exchange of programs, of ideas and culture, to improve understanding between the nations of this hemisphere and strengthen relationships on which peace and progress depend.

Radio broadcasting continued throughout 1950 to render an in-

valuable service to the public. During the first half of the year, radio averaged 35,000,000 listeners every evening of the week in America. Its potential audience of families having sets in their homes comprised 95 per cent of the population.

The year 1950 was one of the most productive in the history of the record industry, and the outlook for 1951 is highly favorable. One of the principal factors in the remarkable up-swing of record sales is RCA Victor's revolutionary 15-rpm record system with its small, unbreakable discs and the fastest record changer ever devised.

"15" Sets New Standard

So great has been the American public's acceptance of the "15's" that today—less than two years after introduction—this system has set a new standard of musical enjoyment in the phonograph field. By the end of 1950, the retail sales of the industry reached an annual going rate in dollar value of \$40,000,000.

Paralleling this success, RCA Victor's new and improved, non-breakable long-playing record (33 $\frac{1}{3}$ rpm) is rapidly becoming the favorite of music lovers who prefer certain classical selections played without interruption. These records, together with "15's" and 78-

rpm discs, provide the public with an unsurpassed library of the world's greatest artists and music. RCA Victor's 1950 line of home instruments included console combination models playing records of all three speeds.

Outstanding Scientific Achievements

Scientists and engineers at RCA Laboratories continued in 1950 to extend the usefulness of the radio-electronic arts for the benefit of the Nation and the public. Among their outstanding scientific achievements was development, in cooperation with the U. S. Navy, of the world's largest and most accurate analogue computer, an electronic "brain" to evaluate the performance of guided missiles, ships, airplanes and submarines for better protection of American cities.

Designated "Project Typhoon," the computer is expected to save American taxpayers a billion dollars by solving problems that ordinarily would require the expenditure of valuable instruments and apparatus.

Another scientific achievement in 1950 was development by RCA engineers of a portable model of the electron microscope, less complex to operate and only 30 inches high. This instrument, capable of magnifications far greater than that of

(Continued on page 17)

FASHION SHOWS ARE AN IMPORTANT CONTRIBUTION TO THE GROWING DEMAND FOR DAYTIME TELECASTS DIRECTED ESPECIALLY TO WOMEN VIEWERS.



RCA Color Television Acclaimed

Demonstrations of Compatible, All-Electronic System in Washington Enthusiastically Praised by Leaders of Industry and Representatives of the Press.

SUCCESSFUL demonstrations of the RCA compatible, all-electronic color television system held in Washington, D.C., during the first two weeks of December were viewed and enthusiastically acclaimed by more than 2500 leaders of the radio-television industry and representatives of the press.

The consensus among the industry leaders was that major strides had been made in the RCA color system, bringing its quality to a level of general public acceptance. Performance of RCA's new tri-color picture tube won high praise. The television industry was represented by manufacturers, broadcasters, engineers, distributors and dealers. Favorable comment on the improvements of the system was also made by several members of the House Interstate and Foreign Commerce Committee who attended the demonstrations.

Some of the comments from in-

dividuals and publications are quoted below:

Convincing proof that the Federal Communications Commission's October decision on color television was premature has just been provided by the Radio Corporation of America. — WASHINGTON EVENING STAR

Last week's demonstration of the improved color system of the RCA materially changes the whole outlook on the dispute over video in natural hues. . . . And unless all accepted criteria have suddenly become faulty, the RCA appears to have a decided advantage over the long pull. — THE NEW YORK TIMES

RCA showed an excellent color picture, striking progress. . . . Thus, RCA has won important victory in a field where it counts most — color performance. — TELEVISION DIGEST

Last week RCA demonstrated the improvements it has made in its compatible all-electronic television

system during the past six months. They were, we think, significant. —

BROADCASTING MAGAZINE

As 1950 closed . . . compatible all-electronic color-TV met and vanquished every indictment which the FCC had earlier charged against it. —O. H. CALDWELL, EDITOR OF TELETECH

The pictures were excellent. I was very much impressed by the enormous improvement. — ROBERT SPRAGUE, PRESIDENT, RADIO-TELEVISION MANUFACTURERS ASSOCIATION.

The following comments of competitors in the industry were published in Television Digest:

This is a big improvement. There is no flicker, the brightness is satisfactory, and the color is better than CBS's. —DR. ALLEN DUMONT

This is great. The important thing is that we've got the right system. This is it. —DR. W. R. G. BAKER, GENERAL ELECTRIC

Every technical obstacle has been overcome. —DAVID SMITH, PHILCO

This is fine. There's no question about having compatibility now. — ROSS SIRAGUSA, ADMIRAL

Still further refinement of the system, with emphasis on the development of a larger tri-color picture tube, will be pressed, according to Dr. C. B. Jolliffe, Executive Vice President in Charge of RCA Laboratories.

"I believe we have successfully proved our recent marked progress in color television," Dr. Jolliffe said. "Even more important, our all-electronic system is always growing in the research sense and even further improvements are not only possible but are certain."

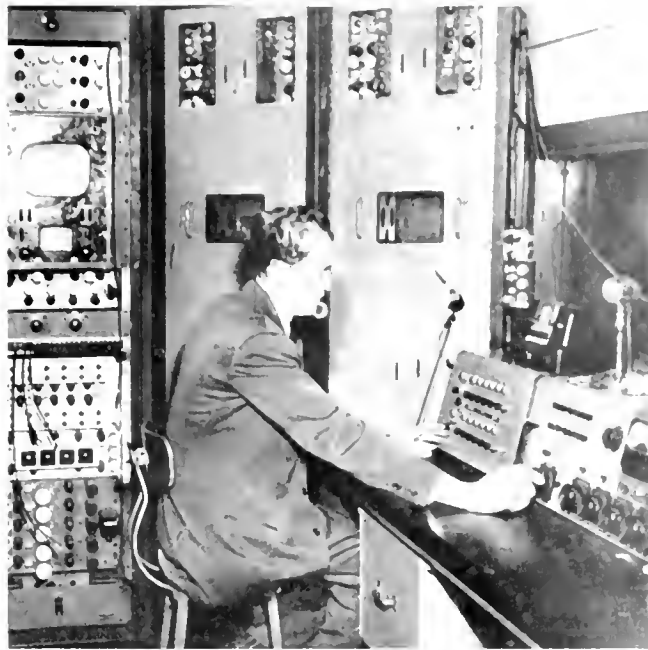
Dr. Jolliffe pointed out that the major advances demonstrated were improved color fidelity, improved picture texture, simpler receiver circuits and increased picture



LATEST DEVELOPMENTAL COLOR TELEVISION RECEIVER (LEFT) COMPARED WITH EARLIER MODEL COLOR TV SET DEMONSTRATED IN OCTOBER, 1949.



RCA COLOR TELEVISION CAMERA FOCUSES ON A MODEL AND MANNEQUIN IN A DEMONSTRATION OF THE VALUE OF COLOR IN TELEVISION FASHIONS.



IN THIS COLOR TV CONTROL ROOM OF NBC STATION WNBW, WASHINGTON, D. C., OUTGOING SIGNALS ARE CONTROLLED AND MONITORED.

COLOR TV RECEIVER, EQUIPPED WITH THE NEW RCA TRI-COLOR PICTURE TUBE WHICH HAS APPROXIMATELY 600,000 PHOSPHOR DOTS ON ITS "SCREEN".

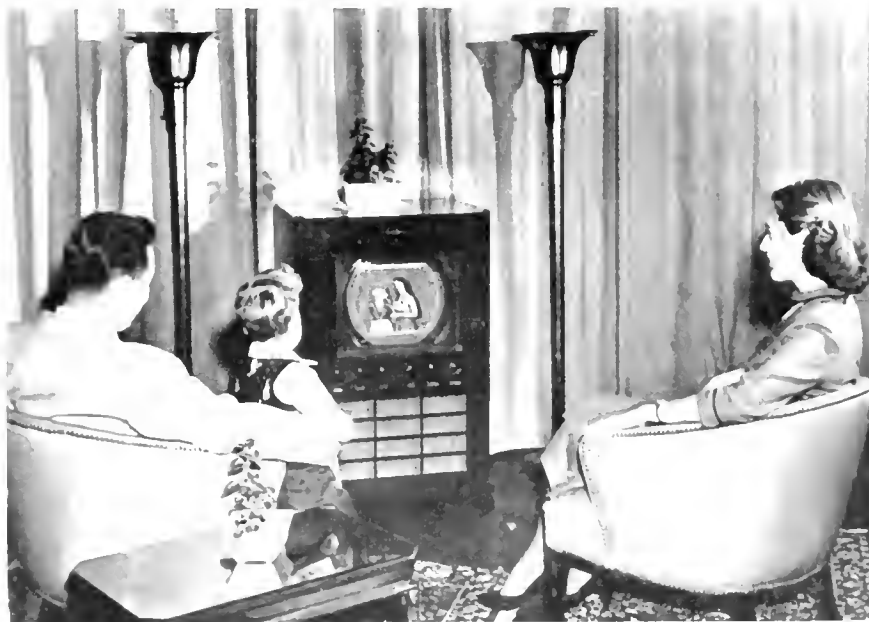
brightness. New red and blue phosphors were used on the tri-color tubes and higher definition of color pictures was achieved by increasing the number of color dots on the tri-color tube from 351,000 to approximately 600,000.

He emphasized that at no time during the 21 individual 20-minute demonstrations was it necessary to retune the receivers.

Three Color Sets Demonstrated

The demonstrations showed in operation three of the latest RCA color receivers as well as two black-and-white sets experimentally converted for color reception. Standard black-and-white sets were operated simultaneously to feature the system's compatibility, that is, the ability of the black-and-white sets to receive color signals in black-and-white without changes in the sets. The receivers were demonstrated in the National Broadcasting Company radio studios in the Trans-Lux Building in midtown Washington.

The color program for each



demonstration originated in the NBC television studios in the Wardman Park Hotel, two miles away.

The color transmitting studio equipment was operated from 8 A.M. to 5 P.M. by the regular staff of WNBW-NBC television engineers during the demonstrations.

The same equipment, with certain refinements, has been in operation since January 9, 1950, for testing, demonstrations, or programs. With the conclusion of the series of demonstrations on December 15, the RCA color signal had been on the air in Washington for a total of 1200 hours.

New Electronic Computer Aids U. S. Air Defense

"Project Typhoon" Solves the Complex Design Problems of Guided Missiles in a Few Seconds.



A PHYSICIST AT RCA LABORATORIES TIMES THE ACTION OF A MODEL USED TO SIMULATE THE BEHAVIOUR OF A GUIDED MISSILE UNDER FLIGHT CONDITIONS AS DETERMINED BY THE ANALOGUE COMPUTER DEVELOPED AT THE LABORATORIES.

THE largest and most accurate electronic analogue computer ever built to evaluate the performance of guided missiles, ships, airplanes, submarines and aid in the air protection of American cities today was shown in operation publicly for the first time at a joint Navy Special Devices Center-Radio Corporation of America demonstration at Princeton, N. J., on November 21.

"Designated 'Project Typhoon', the new electronic computer is expected to save many millions of dollars in the design of guided missiles and also solve many riddles encountered in the air defense of our cities," said Dr. C. B. Jolliffe, Executive Vice President in Charge of RCA Laboratories Division. "Complex simulated problems of a complete guided missile system, which other computers are too small or too inaccurate to handle effectively, can be solved by Typhoon. This will enable the design of equip-

ment with a minimum of experiments that would require expensive apparatus, such as missiles, airplanes and ships."

Dr. Jolliffe predicted that the RCA electronic analogue computer will play a significant role in military science of the future. Very often the construction of an experimental guided missile may cost more than \$100,000, he pointed out, and unless its characteristics are properly checked in advance by accurate computing techniques, actual launchings may be failures resulting in the loss of instruments and apparatus. With Typhoon, he added, any missile problem can be solved over and over, with the characteristics varied each time until the desired results are obtained. Thus, by avoiding costly trial and error tests, the new computer can, with a high degree of accuracy, assure scientists how a proposed missile will react under actual flight conditions.

The new analogue calculator employs approximately 4,000 electron tubes, several miles of intricate wiring and a new set of super-accurate components, exact to better than one part in 25,000. Under contract with the Special Devices Center of the Office of Naval Research, engineers of RCA Laboratories designed and built the instrument for use by the Navy Bureau of Aeronautics. Three years of research and development work directed by Arthur W. Vance, Head of the Electronic Computer Section of RCA Laboratories, preceded actual construction of the computer.

Simulated Problem Solved

During the demonstration, the computed was shown solving a simulated air defense problem wherein a high-speed bomber was successfully attacked by a radar-controlled, supersonic rocket-propelled guided missile. The missile was guided with deadly accuracy to the target.

All information necessary to solve the problem was introduced to the machine by means of more than 100 dials and a portion of 6,000 plug-in switchboard connections, mounted on the tall panel sections of the computer. Different dial positions and plug connections represented such characteristics as aerodynamics of the missile, loss of weight due to fuel consumption, and radar signals which follow the missile and target. Other adjustments accounted for the autopilot or gyro stabilizers of the missile, the path and velocity of the target, and the main guidance system to be used for directing the missile toward the target in the most effective manner.

An instant after the computer was put into operation by the throwing of a switch at the main control console, electrical impulses flowed through Typhoon's thousands of electron tubes and wires. Within

ne device, electrical currents and voltages began representing physical things such as distance, velocity and force. Circuits started functioning according to predetermined patterns.

While the instrument was engaged in its electronic thinking process, the paths of both the high-speed bomber and the rocket-propelled guided missile were traced respectively by red and green pens on two large plotting boards. From these charts, which provided a permanent record of the test flight, skilled technicians were able to determine the exact position of the missile at any given time.

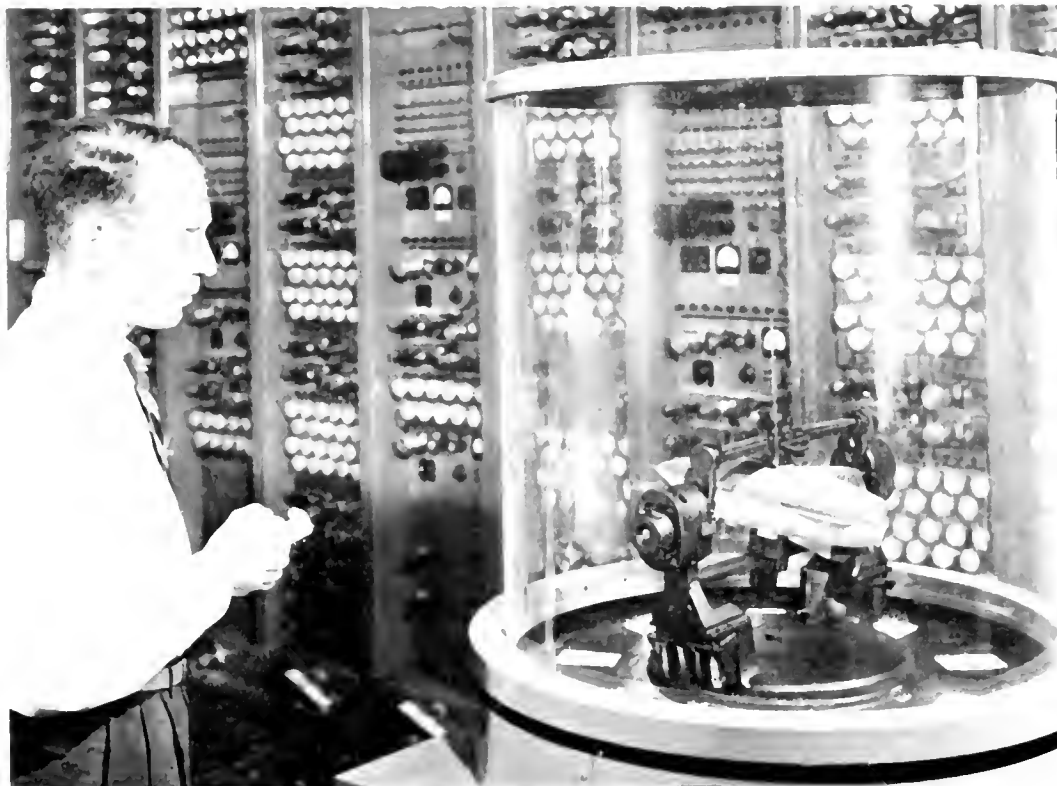
Missile and Target Simulated

A three-dimension visual representation of the "dog fight" as it progressed was provided for spectators by an auxiliary device, called the trajectory model, in which two suspended fluorescent balls traveled the identical course of the missile and target. At the same time, a small scale missile model, 12 inches long and 3½ inches in diameter, moved about on a rotating mechanism to simulate performance of the anti-aircraft missile under test. As the model received control signals or instructions from the computer describing how best to hit the target without wasting too much time or fuel, its three sets of fins were deflected as the corresponding fins of a missile would be deflected in actual flight.

While the solution proceeded, 12 recording voltmeters drew curves on paper rolls indicating the positions of the fins, acceleration, velocity, and rate of spin of the missile, as well as the remaining distance between missile and target. Six sets of flashing neon lights on the panels of the computer displayed numbers representing the rates of spin, and the sidewise and forward velocities of the missile.

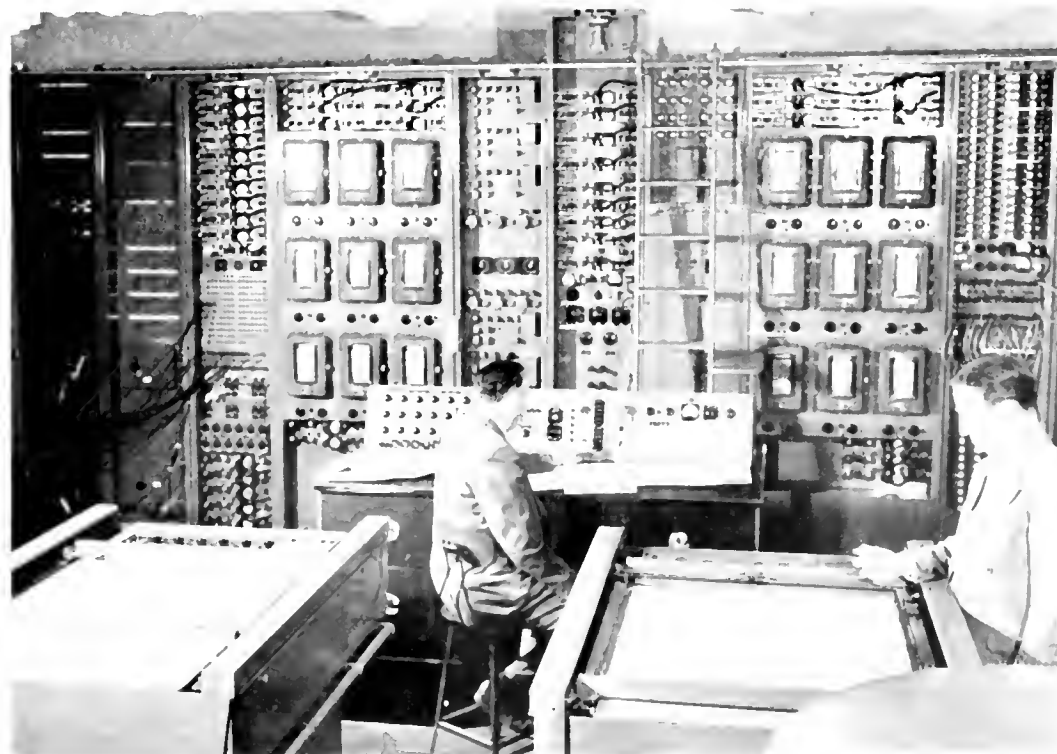
After only 60 seconds of operation, the computer automatically stopped and the solution was examined. RCA engineers then took the complete answers and explained what factors were right or wrong.

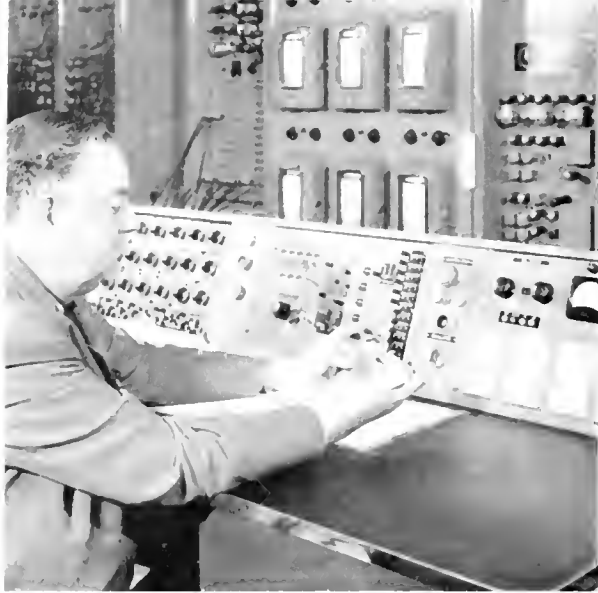
Solution of the problem involved 250 additions, 67 multiplications,



BEHIND THE SMALL SCALE MODEL OF A MISSILE ARE SOME OF THE NUMEROUS PANELS CONTAINING THOUSANDS OF TUBES REQUIRED FOR THE OPERATION OF THE ANALOGUE COMPUTER.

IN THE CENTER REAR IS THE MAIN CONTROL DESK OF "PROJECT TYPHOON" WITH THE TWO PLOTTING TABLES, ON WHICH THE PATHS OF MISSILE AND TARGET ARE TRACED, IN THE FOREGROUND.





A CLOSE-UP VIEW OF THE CONSOLE FROM WHICH THE ENTIRE OPERATIONS OF THE ELECTRONIC ANALOGUE COMPUTER CAN BE CONTROLLED.

30 integrations, and 20 aerodynamic functions, all carried on simultaneously with continuously variable factors. A mathematician and an

assistant would require 6 months to compute a single solution for the minimum number of points required to give an approximate answer. Typhoon gave the continuous solution, for an infinite number of points, in less than 60 seconds.

It was pointed out by Mr. Vance that Typhoon is an extremely versatile instrument. Shortly before the start of the demonstration a complex problem was being solved by the computer. A few hours later, all necessary adjustments had been completed in order to determine the solution for the test problem. On equally short notice, Typhoon may be switched from one problem to another. This feature is a valuable aid to design engineers who require speedy verification of plans before going ahead with construction work.

The heart of Typhoon is a new type of electronic multiplier which consists of a hybrid between ana-

logue and digital apparatus. Basically, an analogue device may be compared to the operation of a slide rule, and a digital one is similar in function to an adding machine. By blending these two techniques in more complex forms, Typhoon achieves a combination of flexibility and accuracy unobtainable by either of the systems alone. Each of the more than 600 electric relays in the computer's multipliers operate in 1/10,000 of a second.

A staff of nine engineers and mathematicians as well as six technical assistants are required to operate the computer when it is solving complex guided missile problems. To keep the sensitive instrument free of climatic influences, Typhoon is housed in a special air-conditioned room at RCA Laboratories which has a constant temperature of 75° Fahrenheit and a relative humidity of not more than 50 per cent.

"Tex" Service Extended To Customers in Denmark

Denmark has become the third European country to be linked with New York and Washington, D. C., in RCA's overseas customer-to-customer radio teleprinter exchange service. Previous TEX circuits opened by RCA provide direct teleprinter connections between customers in the two American cities and those in the Netherlands and Western Germany.

"Public acceptance of the TEX service is paving the way for a much wider application of this important means of direct communication," said H. C. Ingles, President of RCA Communications, Inc., which developed and operates the new service. "We are pleased to extend the service to Denmark, and we expect to expand it to other countries in the near future."

The two-way RCA teleprinter connections, are billed on a time basis, rather than the usual telegraph word rate and provide greater economies than transatlantic telephones, with the added advantage of fully recorded messages.



BRIG. GENERAL DAVID SARNOFF, CHAIRMAN OF THE BOARD, RADIO CORPORATION OF AMERICA, AND GENERAL GEORGE C. MARSHALL, RED CROSS PRESIDENT, DISCUSS THE 1951 AMERICAN RED CROSS FUND CAMPAIGN WHICH GENERAL SARNOFF WILL DIRECT AS CHAIRMAN.

Urges Public be Given Chance to Select Color TV System

RCA Executive Asserts FCC Decision Puts Ceiling on Scientific Development.

THE right of the American public to determine "by its ballot in the marketplace" which color television system it prefers was urged by Robert A. Seidel, Vice President of the Radio Corporation of America, in an address before the National Retail Dry Goods Association in New York on January 11.

If RCA is permitted to offer its system to the public, NBC will begin broadcasting good color television programs in good commercial time, "not just experimental broadcasts at odd hours," he told the nation's retailers.

Declaring that the right of the public "to pick and choose" is inherent in American freedom, Mr. Seidel said the recent FCC decision favoring a spinning-disk, non-compatible color television system "is exactly the same" as if, in the early days of the automobile industry, some government bureau had standardized the Stanley Steamer to the exclusion of gasoline motors.

"In effect," he said, "the FCC order tells the public: 'This is the type of color television we prefer, and it's the only type you're going to be given an opportunity to buy.' We have the unprecedented situation of a Government Agency actually placing a ceiling on scientific development."

Public Should be the Judge

All RCA asks, he continued, is that the public be given a chance to judge for itself.

"That's how everything good was developed in this country," Mr. Seidel declared. "Everybody who had a product in which he had confidence could bring it to the marketplace. There it was placed side-by-side with competing products, and the people voted on which they thought was better. They voted with their dollars, instead of ballots. The product they liked best was the one they bought. The others went off the market.

Asserting that RCA is ready to stake its resources, its dollars, and its reputation, "both as broadcasters and as set manufacturers," on its compatible, all-electronic color system, he expressed confidence that the public, if allowed to judge, "will make the right choice, as they always have".

Faults of FCC-Approved System

Mr. Seidel pointed out that the system approved by the FCC produces images composed of only 83,000 individual picture elements, as compared to the 200,000 elements constituting present black-and-white images, resulting in degraded picture quality. He also pointed out that present set owners would not be able to receive color broadcasts even in black-and-white without the wholly unnecessary investment of large amounts in adapters or converters.

Estimating that it would cost the public one billion dollars to convert the 10,000,000 television receivers now in use so as to receive programs broadcast with the mechanical color system, he said:

"Compatibility is a fundamental requirement of any good broadcasting system, and is the responsibility of the people developing the system, and not of the people who bought black-and-white sets in good faith.

"Even though current national developments may retard or completely stop its progress," he said, "color television will ultimately have an important bearing on the promotional activities of every manufacturer and every retailer, and its effect will be felt in every household in America."

Color Will Benefit All

Everybody wants color television, including manufacturers, Mr. Seidel declared, because good color television will benefit the manufacturers and distributors of television receiving equipment, as well as the

broadcasting stations and the American public. RCA has put sound planning and intensive effort into the perfection of color television, he said, and has invested several million dollars in it.

Mechanical Method Discarded

More than twenty years ago, he recalled, RCA started experimenting with a system similar to the one recently approved by the FCC, but later abandoned it because of its limitations. Convinced that its own interest and that of the public demanded the harder course of developing an all-electronic color system, the company undertook research leading to the single tri-color tube compatible system demonstrated successfully in Washington last month.

When the receivers seen in Washington are engineered to a point where they can be put on a production line, Mr. Seidel promised, "they will produce a color picture adequate to meet the demands of the most exacting customer."

"Regardless of what system or systems are finally approved," he said, "color television is going to assume its place gradually and naturally over a period of years. For a long time to come, black-and-white television must remain the backbone of the industry. Sponsors of television programs are going to stick to black-and-white until a good audience has been built for color. NBC and other television broadcasters are improving and expanding their black-and-white television service day by day, and they will continue to do so. And every day, the public is buying, and will continue to buy, more and more black-and-white receivers, regardless of all the talk about color."

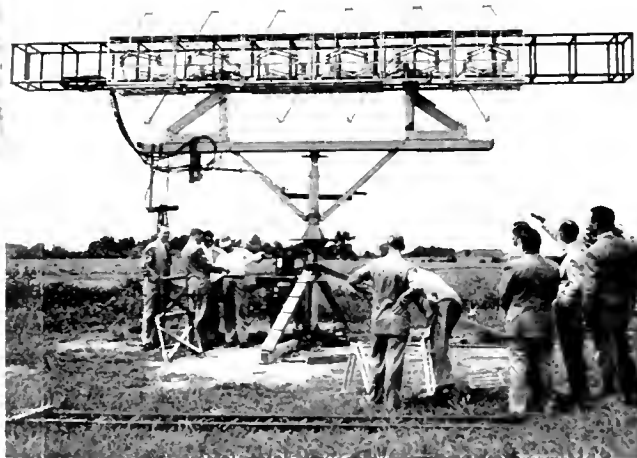
Third TV Station for Cuba

The third television station built by the Radio Corporation of America for operation in Havana has been shipped to Cuba. The new station will be operated by Telenews Company, Alonso, S. A. Its President is Manuel Alonso, owner of the Cuban firm, *Noticiario Nacional*, producers of newsreels and documentary films. Mr. Alonso hopes to have the Telenews station on the air early in 1951.

Erecting New TV Antenna

Flanked on either side
of WNBT and WJZ-
has reached the 130

Workmen with torch and sledge prepare to
dismantle the old antenna mast which
supported WNBT's TV radiator.



RCA engineers, working at a field labor-
atory near Camden, N.J., conduct tests on
a model of the Empire State antenna.



Steelwork for the 217-foot tower is raised
from ground level to the top through one
of the building's elevator shafts.



Temporary antenna is assembled and raised
on support alongside the main mast.

for the New York Area

orary antennas
er, in this view,
n 80 feet to go.

Looking down from the dizzy height of the steel lattice-work which will support five TV and three FM antennas.



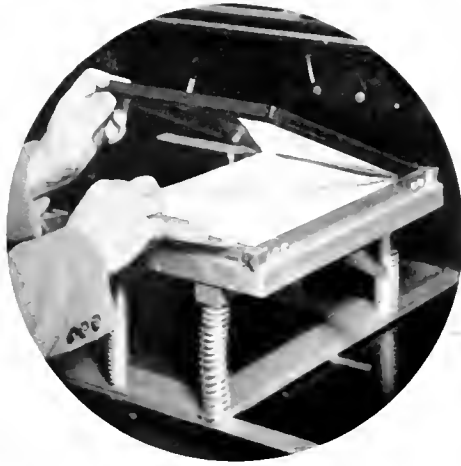
Working on a narrow staging 1300 feet above the street riggers prepare to set up a super-gain TV antenna.



Intrepid riggers hail the completion of the lofty structure by raising a flag on the tower's peak, 1500 feet above the street.

Workmen attach transmission cables to a temporary antenna which WNBT has been using while the new tower is going up

RIGHT: PRINTED MATERIAL TRANSMITTED BY RCA FACSIMILE EMERGES FROM THE RECEIVING CONSOLE AT THE RATE OF 15 LINEAR INCHES A MINUTE. BELOW: COPY TO BE TRANSMITTED BY FACSIMILE IS PLACED ON THE "COPY BED" AND AUTOMATICALLY MOVED FORWARD LINE BY LINE UNDER A FLYING SPOT SCANNING BEAM.



Fast, Long-Distance Facsimile

Test Model, Installed at Oak Ridge, Speeds Library Service for Research Laboratories at Atomic Energy Plant.

A TEST model of a new high-speed, long-distance facsimile system, developed by RCA Laboratories, Princeton, N. J., under contract with the Atomic Energy Commission, has been installed at the Oak Ridge National Laboratory for providing full reference library service to outlying research laboratories.

The new system incorporates several innovations in the field of facsimile reproduction. The reader-transmitter will scan printed copy or drawings on flat surfaces such as book pages and will make direct enlargements of material in small type by any ratio up to 4 to 1. The copy bed can handle individual sheets or books up to 3 inches thick. The signal is transmitted over an ordinary telephone line and the recorder will reproduce clear, highly legible black-on-white copy at a speed of 15 linear inches or 120 square inches per minute.

Operational tests to be started at Oak Ridge immediately will indicate to what extent existing library services at the Laboratory can be expanded without greatly increasing the outlay for new books and particularly scarce and expensive sets of bound scientific periodicals. The system will also prevent possible contamination of books and

journals in laboratories using radioactive materials.

At the present time at Oak Ridge more than a score of separate research and production facilities scattered over a wide area require library services. If the new facsimile service proves useful, it may be possible to consolidate many of these library services into larger, more adequate units.

The transmitter is located at the central library at the X-10 site while the only operating recorder is located 8 miles away at the Y-12 site. On the initial test of the system a research chemist at Y-12 requested the complete text of a 2-page article to which he had found a reference in *Chemical Abstracts*. The bound periodical was located in the X-10 library stacks, placed in the transmitter, and a facsimile copy was delivered at Y-12 within 4½ minutes after the request was made.

Flying Spot Scans Copy

A cathode ray flying-spot scanner at the sending unit is the most important innovation. The five-inch cathode ray tube directs a tiny spot of light through a focusing lens to "read" the copy in a thin line from left to right. The reflected light

from the copy is picked up by a bank of four photomultiplier tubes which convert the varying light impulses into normal electrical facsimile signals.

The copy bed automatically moves the copy forward under the flying-spot cathode ray tube. The length of the scanning line on the copy can be adjusted from 2-1/16 to 8½ inches by simply turning a knob. This automatically adjusts the lens to maintain the proper focus and the same adjustment changes the speed of the copy bed to maintain the correct scale.

The receiver, or recorder, also incorporates several new mechanical and chemical features to simplify operation and to supply a permanent print of the transmitted material. The electrolytic process used in recording eliminates photo developing and printing and avoids the mess, clogging and corrosion of previous electrolytic methods. The paper is moistened no more than is absolutely necessary, and as it passes out of the machine it is completely dried. Ultraviolet light fixes the chemicals so that neither the printing nor the background will fade. The clogging and corrosive action of the chemical solution is eliminated by keeping separate the

(Continued on page 28)



STATE DEPARTMENT'S NEW STUDIO-ON-WHEELS RECEIVES OFFICIAL SEND-OFF UNDER FLAGS OF THE UNITED NATIONS IN ROCKEFELLER PLAZA, NEW YORK.

Radio Studio on Wheels

Van Built by RCA for Voice of America Broadcasts, Contains Complete Shortwave Transmitter and Recording Units.

A STREAMLINED radio studio-on-wheels, built by the Radio Corporation of America with the best types of shortwave transmitting and recording facilities, has been delivered to State Department representatives for use on roving assignments for "Voice of America" broadcasts.

Delivery was made by the RCA International Division at a ceremony under the flags of the nations in Rockefeller Plaza, Radio City, New York. Receiving the mobile unit on behalf of the "Voice of America," Foy D. Kohler, Chief of the International Broadcasting Division of the State Department, declared:

"This unit is a tribute to American industry as a whole and to the American radio industry in particular. With it the Department of State of the U. S. A. can better take to the road for its material.

"This studio-on-wheels will bring our roving microphones to the very spots that best tell America's story to listeners overseas: its homes, factories, fairs, sports events, its research centers, musical groups, schools. This beautiful motor vehicle, so typical of America itself, will help us get closer to America

and thus the better to tell our story."

In response, Meade Brunet, a Vice President of RCA and Managing Director of the RCA International Division, said: "We are glad to be the instrument of the radio industry which has helped the 'Voice of America' in its great task of world enlightenment."

The mobile unit, a shapely, enclosed blue and white truck, was designed by "Voice of America" engineers and is RCA-equipped throughout. It contains a complete radio studio, transmitter, control room, recording apparatus, intercommunication system. With its own power supply, the unit can broadcast programs directly from outlying locations.

Commentaries, interviews and musical programs can be conducted from a sound-proof studio; a control room in the center of the mobile unit contains all the equipment necessary for broadcasting and receiving programs. Besides two disc-recording machines and two magnetic tape recorders, a low-powered shortwave transmitter relays programs back to the main studios of the "Voice of America," whence they are re-transmitted overseas.

Television—An Audience of Forty Million Americans

(Continued from page 7)

conventional light microscopes, is expected to appeal particularly to colleges, hospitals and industrial laboratories.

A new and highly effective television system that extends human sight far beyond normal limits for benefits to science, industry and education was disclosed and demonstrated in 1950 by RCA. The apparatus, portable and easy to operate, can be used for nonbroadcast industrial televising. The system is based on a remarkably sensitive pickup tube, known as the vidicon, which is expected to be the forerunner of smaller electronic "eyes."

A test model of a new high-speed, long-distance facsimile system, developed by RCA Laboratories, under contract with the Atomic Energy Commission, was installed at the Oak Ridge National Laboratory to provide full reference library service to outlying research laboratories.

In the field of international communications, RCA proceeded with success in extending use of its automatic tape relay method of transmission and advanced mechanization for greater speed and accuracy in handling overseas radiotelegraph traffic. During the year, RCA Communications introduced a new two-way, customer-to-customer teleprinter exchange service, known as TEX, and extended this service for operations from New York and Washington to the Netherlands and Western Germany.

Radiomarine Corporation of America, another service of RCA, in 1950 produced shipboard radar, loran, radiotelephones and other navigational aids and communications devices in quantities exceeding those of 1949.

A record number—957—of students were graduated from RCA Institutes in 1950. Reflecting the increasing importance of the courses in radio, electronics and television virtually all of the graduates found jobs immediately with industry. Veterans of World War II accounted for 60 per cent of the 1950 enrollment.

Alert Receiver Gives Warning With the Speed of Light

Simple Instrument, Now Proposed for Use in Nation's Defense Plans, Proved Itself in 1949 Test.

DANGER of sudden attack on the United States brings to the fore the urgent need for adequate defense not only to ward off the attack itself, but to minimize loss of life and property. Of vital importance, therefore, is a system of warning that can cover wide areas with the greatest possible speed and dependability.

Radio communications provide the basis for such a system. As fleet as light, radio signals travel at 186,000 miles a second; they can carry virtually any type of information; they can be reliable to a point of perfection. The problem is to establish radio signalling networks in tactical defense areas—networks that can link civil defense control centers directly with all forces needed for immediate action when the alarm goes out.

General requirements of a suitable warning system are these: (a) that it communicate almost instantly over distances of several hundred miles at least; (b) that it be selective in reaching any one of several areas, or reach simultane-

ously all areas in danger; (c) that it be selective in reaching any one group in an area, or all groups in an area; (d) that it be simple and dependable; (e) that it be low in initial cost of equipment and inexpensive to maintain; (f) that it be susceptible to national standardization; (g) that it be capable of easily coordinated operation in civil defense plans.

When notice of a coming air raid reaches a Defense Control Center, it is essential that the warning be relayed at once to all proper authorities, as well as to all key defense personnel within the danger zone. These groups may include governors of states, mayors, law enforcement and fire officials, hospital and public works directors, transportation supervisors and civilian defense block wardens. The alert, to be effective, has to be complete.

Alerting Method Developed

Recognizing the need for a satisfactory civilian warning method, the Radio Corporation of America began research in this direction almost a year before the Japanese surprise assault on Pearl Harbor on December 7, 1941, alerted the Na-

tion to the danger of sneak attacks from distant enemies.

Research had progressed to such an extent that by mid-summer, 1941, RCA staged a demonstration in which it revealed publicly for the first time the ability of the RCA Alert Receiver to serve as a means of defense warning. Participating as National Director of Civil Defense, the late Mayor F. H. LaGuardia of New York described the device as "of the greatest possible value to our national defense."

New Instrument Introduced

Brigadier General David Sarnoff, then President of RCA, briefly introduced the new instrument and discussed its usefulness with the Mayor, while a nation-wide audience, tuned into a network of the National Broadcasting Company, listened to the description of this new service to the public which had come out of RCA Laboratories.

The initial demonstration took place in the Administration Building at LaGuardia Airport. It consisted of a three-point hookup. Word that "enemy planes" had been sighted was relayed by telephone by Army officers at Mitchell Field to a Civilian Defense Officer in an NBC studio at Radio City. Immediately, this officer pressed a button that sent a robot, or sub-audible, signal riding over the station's waves. Within a second or two, the impulses turned on the Mayor's RCA Alert Receiver at the Airport. Lights glowed and a bell on the receiver rang to notify him that the

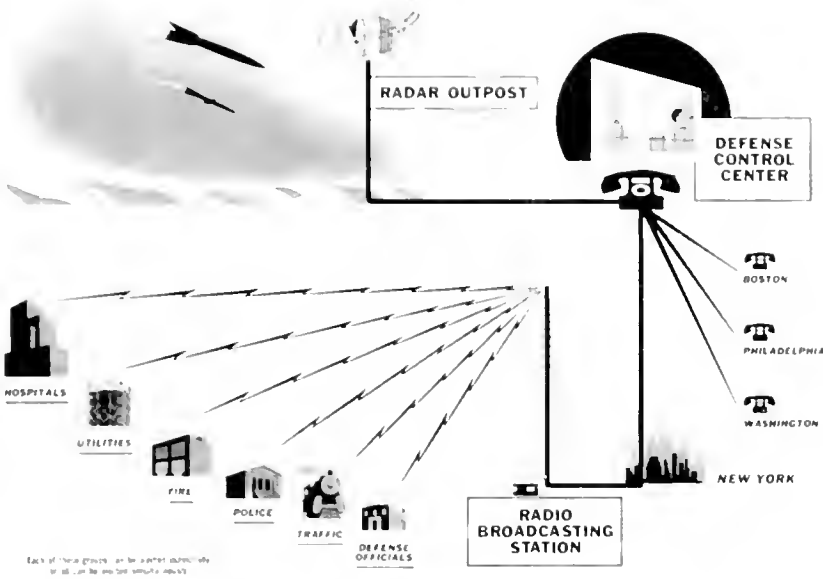


ALERTING APPARATUS AT TRANSMITTER IS COMPACT AND SIMPLE TO OPERATE.

[18 RADIO AGE]

FOUR EXPERIMENTAL MODELS OF THE RCA ALERT RECEIVER ARE SHOWN BY ARTHUR F. VAN DYCK (RIGHT) OF RCA LABORATORIES.





THIS DIAGRAM SHOWS HOW EACH DEFENSE GROUP CAN BE ALERTED INDIVIDUALLY OR ALL GROUPS IN CONCERT THROUGH THE USE OF RCA ALERT RECEIVERS INSTALLED AT STRATEGIC LOCATIONS.

network was ready from coast-to-coast to broadcast any message he might have as National Director of Civilian Defense.

With the end of the global conflict, interest in the Alert Receiver subsided. But less than four years after the "cold war" had made the international situation so critical that, once again, civilian and military forces began discussing defense plans, and the receiver made another appearance. On September 5, 1949, civil defense forces participating in "Operation Lookout" were called to action in New England by this ingenious alert method.

As more than a hundred Air National Guard pilots "raided" the East Coast from Maine to Delaware, a signal was sent from a command post of the Continental Air Command in New Hampshire to station WFEA, Manchester, N. H. There it was transmitted as an inaudible tone to station WBZ, Boston, and by that station to an RCA Alert Receiver in the air raid warning center of Montpelier, Vt. This signal, which arrived only a few seconds after its original transmission, warned the defense staff that the raid was in progress.

In an earlier stage of Operation

Lookout, which was conducted under the Continental Air Command, the warning signal originated at a command post on Long Island. Passing over private wire to the transmitter of NBC's station WNBC at Port Washington Long Island, the signal was added as an inaudible tone to the station program beams. It was received by an RCA Alert Receiver at Station WGGL, Scranton, Pa., and retransmitted to civil defense headquarters in that city.

Signal Warns Defense Staff

These demonstrations revealed the ability of the RCA alert system to work effectively over distances of several hundred miles and to provide defense authorities with the specific degree of emergency.

The RCA Alert Receiver transforms existing radio broadcasting facilities into a warning system of unsurpassed speed and scope. Through its use, entire communities, regions, or the Nation itself can be alerted within the space of a few seconds.

The instrument, about the size of a portable radio set, turns on automatically when it receives a special inaudible signal from a broadcast-

ing station, rings a bell, turns on a red or yellow light according to the kind of alert being sent out, and a white light when the all-clear signal is flashed.

The receiver is simply constructed, and its tubes require such negligible power that it can be operated twenty-four hours a day over long periods of time at low cost. It can use batteries or electric current.

The device may be fixed-tuned to any one broadcasting station. It is then receptive to the inaudible signal from that transmitter. A self-contained loudspeaker remains silent until the special signal is received.

Signal Operates Relay

When this signal arrives, it energizes an electric relay which clicks the loudspeaker into the circuit to reproduce the transmissions from the broadcasting station.

Simultaneously, the bell rings. This is to insure the summoning of the listener in the event that the alert occurs at night. The bell, if desired, may be located at a distance from the receiver, so that the listener, although in a different part of the building, will not miss the call.

Lights atop the instrument can carry the color signal denoting the type of alarm. For instance, colors that might be specified are: yellow, indicating preliminary warning of possible attack; red, indicating attack imminent, and white, announcing the all-clear.

At the transmitting station, the apparatus is very simple. It consists merely of a vacuum tube oscillator which generates the inaudible sound frequencies—one for each of the desired actions to be performed.

The signal generating unit is connected to the broadcast transmitter like a microphone. In fact the control room operator plugs the oscillator device into the microphone circuit. When a button is pressed it releases the "On" sub-audible signal, which turns on all of the Alert Receivers equipped to be activated by it.

Engineers stress the fact that
(Continued on page 28)

Design for Television

Illusion is an Important Part of the New Medium but Only Through Realism Can TV Achieve Its Proper Role in Society.



TELEVISION HAS PROVED ITS WORTH IN BRINGING FINE MUSIC AND GREAT SINGING FROM THE CONCERT STAGE TO THE HOME.



THE TELEVISION SCREEN EXPOSES THE VIEWER TO WORLD EVENTS AND THE PEOPLE RESPONSIBLE FOR THEM.



EVERYTHING we do in television is an influence on those who are watching and listening to us. For that reason we in television are all public relations people. Not only do we recognize the social effect of what we will be sending into the home but we rejoice in it.

The contribution that television can make in communications to the understanding of the various facets of life, the various peoples of the world, is tremendous. We can show what they do and what their strengths and weaknesses are, their ambitions and aspirations. The whole mosaic of factors surrounding modern life can be made understandable when known to people through television. Because essentially television is a medium of reality.

We use television, of course, for illusion and we use it greatly for entertainment. But essentially in revealing people as they really are without the formalism of convention and manners, in revealing events as they really happen, in making one present at history as it is born, in all the myriad phases of television and the peculiar quality of miracles that television has, the wonderful spontaneity, the wonderful contemporaneity of television—all means that this medium of communication is going to make the people of this world understand each other better, like each other more, or at least know each other well enough to find procedures and means of getting along with each other without open warfare and open clash.

The general impact of the entire television medium will serve the people even without much thought or care. By this I mean that all networks and all stations covering as they will under the private enterprise system all possible forms of diversion and entertainment, all possible forms of special group interests and their satisfaction through special programs will in general offer such a wealth of exposure to so many different things



By Sylvester L. Weaver, Jr.,

*Vice President in Charge of Television,
National Broadcasting Company*

that the overall accumulative effect will be to broaden the cultural horizons and broaden the interests of our people, broaden their understandings, add to their knowledge and in general activate many of the latent traits which they have within them.

Pattern Will be Established

It is not, however, NBC's purpose merely to take part in this gradual amelioration of our society through the basic power of this great communication instrument in the living room. It is our intention rather to base an approach upon the things that we learned from two decades or more of showmanship in the living room with the radio set. It is our intention to set up a pattern that will accelerate all of the good things that television has within it.

One thing that we certainly do not intend to do is to take television and to have a small, lost department called "Cultural Events" or "Educational and Public Affairs" or something of that sort, and try to have a rearguard retreating action against the pressure of the small but articulate cultural groups of this country. Rather, we will conduct our social responsibility from the highest offices.

What we can do in public affairs and news coverage we will do. What we can do in the general use of our medium through high circulation,

gh voltage programming, by including in relatively short doses things in which the people have no particular interest in the hopes of gradually creating special interest. These people, will be done on a planned level. Let me be specific. The opera will on occasions get large audiences. Nonetheless it is more likely that even larger audiences will result from such happenings as the Metropolitan Opera stars, Robert Merrill and Margherite Piazza performing in operatic vignettes on Your Show of Shows on Saturday nights. When we put opera on, we are catering to the wishes of a special group relatively small in numbers. But simultaneously and more important we are broadening and increasing the size of that group by presenting opera attractively in vignette form to people who would not now watch in longer form. Some of them will become opera lovers.

The same thing can be said for the ballet and the efforts in the great entertainment shows to include ballet.

Fine music and great singing from the concert stage can be handled in similar style.

NBC to Join in Social Advance

NBC, to recapitulate first in a general way, will be part and parcel of the great social advances that television will bring about through the exposure through television to the world and all the people in it of importance, a knowledge of our times and exposure to cultural influences by all families with sets. Secondly, NBC through its public service and public events coverage, through its news, will do a great job in advancing the special cause of news information. Then, NBC through high voltage, high circulation attractions will reach the all-set circulation and when that all-set circulation is available, we will give the audience exposure to cultural and informational experiences of plan.

And finally, we wish to replace the radio experience that we had with a marginal time operation appealing to special interests with a new device which I am unveiling today for the first time.

This plan has the working title "Operation Frontal Lobes". As you can see, it is a cultural plan, and it is, in my opinion, the most intriguing possibility that has ever happened in the communication field as far as marrying the practicalities of a network operation and its high circulation necessity with the need to do a great job for all the people.

To Create Reporting Style

First, the shows NBC wants America to see: the operas in English, the NBC Symphony, the Masterpiece Playhouse. Certainly we want to offer Sadler's Wells Ballet next year in peak time. Then in addition to music and drama of the finest, we want to create a new kind of reporting for the American people. We want to present the issues of our times to the people with enough showmanship so that most of the people will watch the shows.

Americans believe in self advancement. We in advertising know how to get visibility for ideas and acceptance for ideas. We can get visibility and acceptance of the idea that important issues and people of our times should be watched on television. We can build shows and an acceptance of shows for the all-set circulation, even though the subject matter is not immediately appealing.

For instance, the issues of our times certainly include the great problem of the individual and his rights and the group or state and its rights. Whether we have Bertrand Russell and his book "Authority and the Individual", or whether we dramatize the life of an average man to show the large limitations on his freedom brought about by the development of our industrial society,—or whether we create a whole new approach to this creative challenge,—we have an opportunity and an inspiration to make people understand the times in which they live, so that they may make more intelligent decisions in the years of decision through which we are passing. We could get Dartmouth College, for instance, to develop a show based on its Great Issues course. Or we could make the issue of a future economic system of

private enterprise or socialism, surely one of the greatest questions of the century. We could present that issue by debates between selected American and English intellectual, business, and political leaders.

We could do a show on the changing credo of the American nation, showing what we as a people believed a century ago and today, and why those beliefs have changed. We could face up to and report on the tide of nihilism that constitutes one of the obvious shaping forces of our era. Everywhere we look we can find subjects that should be explored and exposed to our people, because our people, you and I and the man next door, are going to need all the intelligence and knowledge possible to solve our problems.

Television has Impact

America's future cannot be decided on the information given us at Mother's knee, unless Mother gave us information open to proof, and capable of demonstrating its social usefulness in today's world. Of all the forces that can move in on lethargy and prejudice, television has the impact, the power, and the fascination to make adult subjects worthy of mass circulation. Obviously, the selection of subjects and the handling of subjects must stem from the central core of material that might be called the area of agreement among most American groups. We plan to explore and expose—not propagandise.

These great shows of cultural or
(Continued on page 28)

"EVERYTHING WE DO IN TELEVISION IS AN INFLUENCE ON THOSE WHO ARE WATCHING AND LISTENING TO US."



Manufacturing the RCA 17-inch Rectangular TV Picture Tube

at the RCA Plant in Lancaster, Pa.



Fluorescent screen surfaces of television picture tubes are quick-dried in the special racks shown in foreground.



Tubes move slowly on this travelling belt while the fluorescent powder becomes a flawless surface on the glass face-plate.



An elevated conveyor transports the 17-inch rectangular tubes from one process to another.



Tubes are cleared of air by pumps which create the vacuum required for television kinescopes.



After air is removed, tubes are passed through an oven to expel gases from the metal shells.



Workers place the tubes on a conveyor belt leading to the next process in mass production.



The tubes move slowly through an oven where the fluorescent screen surface is baked.

Servicing Military Equipment

A Technicians Help Keep Armed Forces' Electronic Devices in Order on Land, in Air and Aboard Ships.

WHEREVER the sun shines—on the battlefields of Korea, an Air Force base on Guam, on a battleship in the South Pacific—shines on an RCA Service Company field engineer, a specially-trained civilian technician using know-how to help keep the armed forces' electronic equipment top working order.

These men are the backbone of the Company's recently established Government Service Division. Numbering in the hundreds, these highly qualified technicians are on duty today with U. S. Army, Navy, and Air Force units the world over, in 17 different foreign countries, on islands in the Atlantic and the Pacific, and at military bases throughout the United States.

Their basic assignment is to install, maintain, and repair electronic equipment of all types and make, and to instruct military personnel in operation, installation and repair procedures. Such equipment runs the gamut from standard teletype, radio, and aircraft communication systems to highly complex radar, sonar, and electronic bombing equipment. Wherever such equipment is used by the military, RCA Service Company personnel will be found, doing the work that has to be done to keep the equipment on the beam.

The Government Service Division represents a pool of electronic



By P. B. Reed

Vice President in Charge of Government Service Division, RCA Service Company

specialists, ready and waiting to rush on short order to any part of the globe where the servicing of military communications equipment is required, whether it be the army post nearest the Gloucester, N.J., headquarters of the RCA Service Company, or in Pusan, Korea. While the division itself is relatively new, it is the outgrowth of an activity that dates back to World War II. During their preparation for the war, the armed forces discovered that they had insufficient trained technicians to properly install and maintain the deluge of new and complex electronic equipment pouring from the laboratories and production lines of American industry. In response

to Government requests for factory servicing, the RCA Service Company, among others, provided the pool of technicians to fill the gap.

Today, we are still providing this service. Our procedure is simple. We respond to military requests for technicians, no matter in what part of the world they originate, by dispatching the required technicians via plane or boat.

Third of Staff on Overseas Duty

While the number and specific pin-point locations of these technicians are matters of military security, it can be revealed that the RCA Service Company today has more men in the field on Government service than it had during the peak of its World War II activities. Actually, one out of every three of the Government Service Division's hundreds of technicians is now on duty overseas.

While overseas duty is assigned on a volunteer basis, there is no telling in advance where any one technician will eventually land. Some are lucky and draw choice assignments in large European cities or at well-established military bases. Others wind up at lonely island outposts.

The overseas assignments generally call for one year of duty, and the men are classified as civilian personnel attached to military units. They serve under military regulations and pretty much share the living conditions of the units with which they are associated. Our men provide the technical advice and assistance. The military provides the equipment and the



ONE OF RCA'S BATTLEFRONT TECHNICIANS HOLDS A CABINE — ESSENTIAL ITEM FOR KOREAN DUTY.



FIELD ENGINEERS BOARD A TROOP TRAIN IN KOREA TO SET UP OPERATIONS AT AN ADVANCED BASE.



VETERAN RCA SERVICEMAN SURVEYS THE PUSAN SCENE WITH PICTURESQUE NATIVES.

necessary replacement parts and tubes.

With the outbreak of the shooting war in Korea, we were called upon to provide the military with a vital part of its needs within a few weeks—radar and communications experts for Air Force squadrons to be multiplied, for naval ships to be recommissioned or held in commission, and for new or expanding Army units. In addition, new continental air defense nets and overseas military aid programs needed high-grade servicemen and instructors right away.

Trained Men Ready for Duty

We were ready: we had a pool of topnotch engineers specializing in the required subjects—radar, sonar and intercommunications—to draw on for the start of the new Government Service Division. From experience, these fellows knew the exacting nature of military needs and specifications.

At the outbreak of the Korean war, the men were portioned off among key naval shipyards throughout the U. S. (teaching and servicing radar, sonar, and homing beacon equipment) and among most of the bases of the Airways & Air Communications System (AACSS).

Now, with the multibillion-dollar defense program beginning to hit its stride, the best technicians available still are being recruited into RCA government service. The call is still out, with the company taking want-ad space in a dozen trade journals, and recruiting officers combing the country. Our procurement machinery is well organized, with the itinerary of trained interviewers geared to a schedule of spot newspaper advertising in major cities throughout the United States. Applicants are carefully screened and tested. Only one in ten is found to possess the high degree of training and skill required to qualify for these positions which are so essential to the national defense. Selected applicants are brought to Gloucester, where, with technicians and engineers who have transferred from other divisions of RCA, they receive intensive indoctrination and refresher training.

The United States is very much in the buildup state of rearmament. Requirements will change from week to week. Shifts in tactical and strategic plans of the armed forces are inevitable. Service contracts, already keeping us busy, will continue to rise—and sharply, after the first of the year.

RCA Service Company engineers began working side by side with the armed forces ten years ago, and have built up a tradition of distinguished service for our men to live up to today.

Among those who helped establish that tradition by serving their country and their Company with distinction during the World War II were Ed Traey, now of Engineering Products, who was handed a War Production Board Citation of Merit by President Roosevelt for an improvement in airborne radar testing and Frank Hartwick, mobile communications, Los Angeles, who received a commendation for extraordinary diligence and devotion to duty under difficult and hazardous conditions from Navy Secretary James Forrestal.

Engineers Receive Navy Awards

Also from the Navy came Certificates of Merit for William J. Zaun, now head of the RCA Service Company's Quality Division; and Paul Melroy, Government Division Contract Negotiations manager. The chief of the Bureau of Ships wrote Zaun: "This award

is made for your outstanding accomplishment in supervising the electronic field engineers of the Service Company." Melroy received a similar citation for sonar work.

Navy BuShips expressed appreciation for the field engineers as a group, working under difficult circumstances and in hazardous locations in their stations at strategic points in a far-flung battle front, pointing out that it was not necessary to name one individual above another. Also from the bureau came special recognition for the men who conducted the instruction courses on MAR-UHF equipment for trainees at Navy Yard at Pearl Harbor and in the U. S.

Hundreds of engineers were deployed over the world under contracts with the Navy, Army, Signal Corps, Coast Guard, War Shipping Administration, Red Cross, and O.S.S. In France, Italy, and at home, our engineers instructed airmen in operation and maintenance of radar, tail warning, and precision shoran equipment. In England, they modified airborne altimeters for low-level flying.

In France, Belgium, Italy, they supervised tape facsimile operations in tanks and armored cars for liaison and casualty reports based at Casablanca, Gibraltar and Oran, RCA engineers installed and maintained shipborne radar, gunfire control, battle announcement radio, and sonar equipment. At

(Continued on page 28)

DR. VLADIMIR K. ZWORYKIN, (LEFT), VICE PRESIDENT AND TECHNICAL CONSULTANT, RCA LABORATORIES, RECEIVES THE 1950 PROGRESS MEDAL, HIGHEST AWARD OF THE SOCIETY OF MOTION PICTURE AND TELEVISION ENGINEERS, FROM EARL I. SPONABLE, PRESIDENT OF THE SOCIETY.





REBUILT STUDIO 8-II IN RADIO CITY HAS 300,000 CUBIC FEET OF SPACE AND CAN ACCOMMODATE SIX TELEVISION CAMERAS IN OPERATION.

Famous Studio Rebuilt for TV

NBC has Invested over \$1,000,000 in Converting 8-II into the World's Most Modern and Best Equipped Television Studio.

THE National Broadcasting Company's renowned Radio City Studio 8-II, caught up in the deep of the times, has had its face lifted for television.

Representing an investment of over \$1,000,000, 8-II has been reconverted into the most modern, the most versatile and the largest television studio in the world.

A swarm of engineers, production men, technicians, and workmen in a little over three and a half months have descended on 8-II, ripped it apart from wall to wall and converted it into a glistening studio which can do more things than any other studio in the country.

Studio 8-II now looks out on the city through axial cables with a spanking new facade, including:

1. The most modern and most extensive lighting system in the world, incorporating all the lighting requirements ever needed in any other studio;

2. A platform or "island" hanging from the ceiling from which spotlights and television cameras will operate;

3. Six television cameras operating on the floor;

4. Three control rooms — the most modern and most workable control rooms ever built for a television operation;

5. A completely-equipped stage for theatre-type presentations, using no elevation;

6. A stage which can be completely "struck" in an hour and a half to make the whole studio available for dramatic presentations;

7. Fifteen separate dressing rooms;

8. The most modern make-up room in television;

9. An over-all size of 300,000 cubic feet, making it the largest single unit of television studio production space in the country;

10. A series of new special-effects, especially constructed for this studio;

11. The largest rear projection screen ever used in television.

From the standpoint of lighting, no studio of any kind has ever been so completely nor so extensively equipped as 8-II. The lighting sys-

tem incorporates everything ever needed in any television studio, whether for a stage or dramatic-type presentation. Each lighting unit can be adjusted at any height from five to 27 feet.

Remote-Control Light System

The ceiling of 8-II is literally paved with lights. More than 4,000 individual lamps, ranging in wattage from 100 to 5,000, have been installed in 8-II and every individual light is remotely controllable from the control room. Such a system has never been used before in any kind of studio.

The control rooms, the most modern and workable in television, also are located on the ninth floor. They comprise a lighting control room where the dimmers and circuits are housed; a video control room, and the audio control room. The latter two are separated by a glass curtain which can be opened or closed, depending upon whether the two rooms are to be connected or separated for any individual show.

To afford every modern convenience the producer, director and technical director will sit in the video control room, supplied with eight viewing monitors.

The directorial staff will face nine monitors, including one for each of the six cameras, one preview monitor, one on-the-air monitor and a ninth for possible outside or film transmissions.

Most Modern TV Control Room

The audio control room also is the most modern in TV. Located there are one master console and three sub-masters for intricate controlling and switching of microphone booms, microphones and other audio effects. Each of the secondary consoles is equipped with red, white and green lights to indicate to the engineer the control which has been switched on.

An innovation which is part of 8-II is the placement of a camera just off the ceiling. The special platform or "island" suspended from the studio's ceiling will support spotlights and special lighting effects for stage-type presentations. In addition, a television camera will be stationed there for high shots

(Continued on page 28)

TV Extends Microscope's Range

Color-Sensitized TV Camera Tubes Make Possible Study of Cell Structures Beyond Scope of Human Eye — Technique Demonstrated by Scientists of Princeton University and RCA Laboratories.

SIGNIFICANT extension of the range, power and versatility of the light microscope by use of special electronic eyes of the television camera, instead of the human eye, was demonstrated by scientists of Princeton University and the RCA Laboratories Division in Princeton, N. J., on January 9.

The new technique of televised microscopy, since it enables the interchanging of television camera tubes made sensitive to specific wave lengths of light, gives considerably sharper contrast than heretofore available, according to Dr. A. K. Parpart, chairman of the Princeton Department of Biology. Dr. Parpart has tested the experimental RCA industrial television equipment in biological research since last April.

The television-microscope combination, Dr. Parpart said, also has the advantages of making possible (1) the study of many components of living cells normally visible only after killing and staining and (2) the direct observation of motion of, and within, these cells at high magnifications. Even without the specially sensitized tubes a high degree of contrast enhancement can be obtained by means of the variable light level controls on the television receiver screen.

Used in Classroom Demonstrations

Though the RCA televised microscopy equipment has been used primarily for research at Princeton, Dr. Parpart said that it had proved convenient for showing specimens to several persons simultaneously in a conference group. It has also been used successfully in large classroom demonstrations by Dr. Harry Fulbright, former Princeton physics professor, in two otherwise difficult microscopic demonstrations — the Millikan oil drop experiment and the demonstration of Brownian motion in smoke particles.

Adaptation of the RCA industrial television system for microscope



DR. A. K. PARPART (LEFT) AND L. E. FLORY DEMONSTRATE THE TELEVISION-MICROSCOPE COMBINATION WHICH PERMITS DIRECT OBSERVATION OF LIVING CELLS.

work was done by L. E. Flory and J. M. Morgan, of the RCA Laboratories research staff. The equipment was made available to Princeton University by RCA Laboratories. Dr. V. K. Zworykin, Vice President and Technical Consultant of RCA Laboratories, directed the development of the RCA industrial television system.

The experimental installation consists of a laboratory microscope mounted beneath an RCA industrial television camera, which is no larger than a personal 16-mm motion picture camera. The televised microscopic scene is transmitted by cable to a standard receiver-monitor placed nearby.

At the heart of the industrial television camera is a remarkably small and sensitive pickup tube — the Vidicon. For microscopy, the Vidicon can be sensitized with materials which make it receptive to a particular narrow band of wave lengths. For the model used by Dr. Parpart, a red-sensitive tube and a

violet-sensitive tube have been provided. RCA research engineers are developing tubes which may extend the range of the microscope's vision into the infra-red and ultra-violet regions. The microscope can also be equipped with a binocular viewer and a second television camera so that two selective tubes scan the microscopic scene at the same time.

With the red or violet tube, Dr. Parpart explained, it is possible to select a narrow wave length band for study of a particular cellular material whose light absorption characteristics lie in that band. The degree of contrast between various chemical components within the cell, he said, is much superior to that previously gained by the tedious method of photographing the specimen through color filters. In fact, he added, some granules in living cells have been brought out this way for the first time.

Many biological specimens, such as granules of certain red blood cells, can at present be studied only

er they have been stained, he said. With televised microscopy, an appropriate tube will make the specimen stand out clearly without staining, he said, explaining that staining often either kills a specimen or, in some instances, a specimen must be killed before it will absorb the stain.

Dr. Parpart pointed out that the new technique enabled examination of either slow or rapid motion of material under a microscope at magnifications which formerly could have been "watched" only by motion picture photography. This method offered no effective way of monitoring what the camera was doing and required such an intense light source that living material was either killed or injured, he said. With the low light levels needed for televising the microscopic scene, living material can be examined for many hours without damage.

Large Projections Possible

Dr. Flory said that enlargement of the image up to 15 to 20 times through the television system made ease of viewing and made the equipment particularly adaptable for classroom or conference use.

Even larger enlargements are feasible by projection of the image onto a screen, he said.

Commenting on his research with the RCA equipment in a recent letter to Dr. Zworykin, Dr. Parpart stated: "It has been possible to observe certain microscopic particles in cells in active Brownian motion that have not been observed before; it has been possible to expose various egg cells, red cells and plant cells to light of different wave lengths and thus be able to study at a particular wave length, details of cellular structure that are not clear or not observable visually.

"For example, in eggs of the sea urchin, the violet-sensitive tube will pick out the echinochrome granules and exclude yolk and protein granules. The latter granules are well defined under the red-sensitive tube while the echinochrome granules are apparently absent. This ability to see details by selective absorption at narrow wave lengths is a very real advantage."

Dr. Parpart has used the equipment primarily in studies of a wide variety of marine life at the Marine Biological Laboratory, Woods Hole, Mass. Besides its value in other branches of biology, the technique

should be of importance in medicine, chemistry, geology, physics and other fields of research.

The Vidicon tube was developed at RCA Laboratories by Dr. Paul K. Weimer, Stanley V. Fergue and Robert R. Goodrich, under the supervision of Dr. Albert Rose. Research engineers of RCA credited with the development of the overall industrial television system are Richard C. Webb and J. M. Morgan. Special tube faces used in the Vidicon for the new technique of televised microscopy were evolved by A. D. Cope.

Dealers Advised to Prepare for Shortages

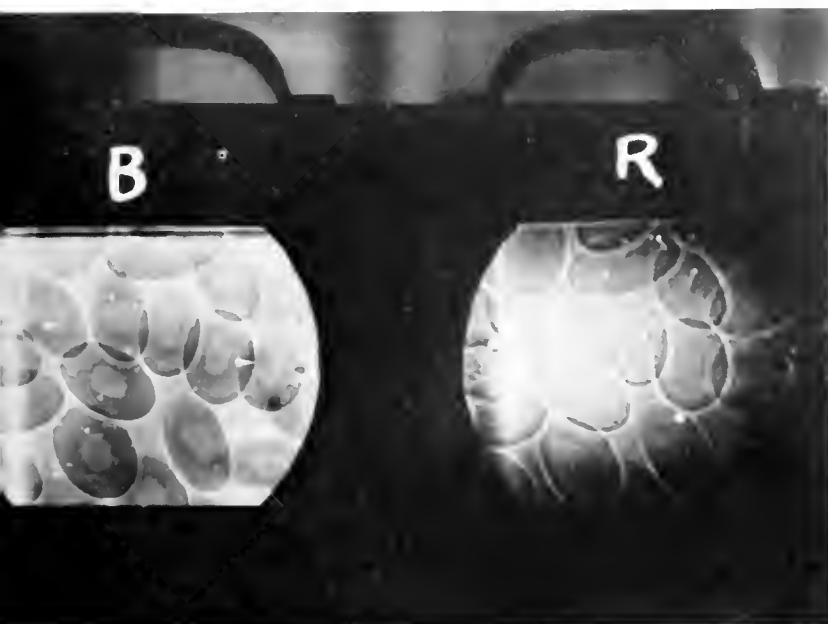
A warning to the nation's radio and appliance retailers that "business as usual" is "out" in 1951, unless conditions change, was sounded by Joseph B. Elliott, Vice President in charge of RCA Victor Consumer Products, in an address before the National Appliance and Radio Dealers Association at the Hotel Stevens in Chicago on January 15.

Urging retailers to prepare for merchandise shortages in the near future, Mr. Elliott declared:

"There is no prospect of business as usual. Manufacturers can't anticipate production beyond the first quarter of the year. We don't know what allotments of key raw materials to expect, because nobody knows from day to day what news the next few hours will bring from the fighting fronts."

Mr. Elliott said that RCA Victor will make every effort to have replacement parts available for servicing and maintaining television sets now in use in homes.

This can only be done, he pointed out, by diverting a portion of whatever materials and components are available from new production to the production of replacements parts. In addition to fulfilling his responsibility for keeping present television sets in operation because of their vital role as a communications medium, he declared, a manufacturer of an established brand-name product must undertake to do this, even at a sacrifice of maximum production, to safeguard brand-name reputation and good will.



PHOTOGRAPHS OF CELL STRUCTURE AS REVEALED ON SCREENS OF CATHODE RAY TUBES SHOWING DEFINITION OF THE MAGNIFIED IMAGES AFTER EXPOSURE TO VIDICON CAMERA TUBES WHICH HAVE BEEN MADE SENSITIVE TO LIGHT FROM THE BLUE (B) AND RED (R) PORTIONS OF THE LIGHT SPECTRUM.

Studio S-H Rebuilt

(Continued from page 25)

and other trick effects which directors may specify.

When the standard stage, with a specially-built proscenium, is put in place it has a depth of 30 feet. It has no elevation, so that the cameras are not restricted to platforms as they are in other types of theatre studios. Forty feet are allowed for the camera action, and behind this will be seats for an audience.

Among the new additions to the studio is a motor-driven "transistor". This is a device to provide transitional effects, such as dream sequences, or to change the mood of a play. Other facilities include a combination hand- and motor-driven crawl for titles and a motor-driven revolving display table, which resembles a "lazy-suzan" in appearance, with different sized disks on which to display objects of varying sizes.

The studio is equipped with the largest rear-projection screen ever used, measuring 15 by 20 feet. It also can use the smaller rear-projection screen of 9 by 12 feet. Both screens employ the newly-developed blue-tint for optimum results in television transmission.

Facsimile

(Continued from page 16)

two components of the solution until applied to the paper.

An intercommunication system set up with the facsimile equipment enables the operators of the transmitter and recorder to discuss the material as it comes over the wire.

The recorder can be operated simply by an on-off switch. Operation of the sending unit, the performance of which is monitored by an oscilloscope on the front panel, is also simple so that nontechnical operators can be trained in less than a day.

The experimental model of the new facsimile system was developed over the past 18 months at the RCA Laboratories Division by Maurice Artzt, Roger Olden, R. H. Fisher and K. J. Magnusson, research engineers under the direction of C. J. Young, section head in radio systems research.

Design for Television

(Continued from page 21)

social significance would be scheduled each week at a different period, the period being pre-empted from the advertiser. The advertiser would lose one show during the 41 week contract, but would still sign for 44 weeks, which would run 45 weeks on the calendar because of the pre-empted time.

The shows would fit the time given to them. For instance, This Is Your Government, might be a show we would do from Washington, with all the remote crews in Washington to handle pick-ups from the Supreme Court, the Senate, the White House, the Fort Knox gold room, et cetera. Such a show could be publicized to all schools and civic groups, and would be shown at 7 to 8, to let the young people watch. A more straightforward do-gooder, like a documentary on safety, for instance, would be done from 5 to 6, for the juvenile audience. An adult show could be set from 10 to 11, and be repeated by kinescope

in the same time to avoid having children see it. A show on mental health or some other subject which could upset youngsters would fit this late night scheduling.

The shows would be sponsored, I hope. This plan might either be offered to our affiliates on a sustaining basis, or we might get present sponsors to pay for the time if we allowed some commercial time before and after the performance. Or, more likely, we can get some major organization to underwrite the time cost, with NBC paying program charges.

By the fall of 1951, then, I would hope that NBC could offer a full network weekly hour show—once a month musical, once a month dramatic, and twice a month of a special nature—a new kind of three dimensional reporting and commenting on our life and times. This would be the major final step in the NBC use of television for social good.

Alert Receiver

(Continued from page 19)

use of the RCA Alert Receiver is as flexible as the highly developed transcontinental broadcast network systems, which permit the hook-up of two stations or hundreds by means of intricate switching arrangements already in service. Furthermore, the Alert does not require even one additional radio frequency allocation for its full use.

Civilian defense organizations usually have many different groups which must be warned, such as hospitals, public works agencies, police and fire departments. It is often desirable to warn some of these groups and not others, particularly in the preliminary stages of an alarm which may not eventuate in an actual attack. An outstanding feature of the RCA Alert Receiver is that signalling can be made selective by groups in any way desired.

The RCA Alert Receiver was developed by Arthur F. Van Dyck, Stuart W. Seeley and H. B. Deal, engineers of RCA Laboratories.

Service for Armed Forces

(Continued from page 24)

Brazzaville and Leopoldville, African headquarters of the Free French and Free Belgian governments, respectively, and in England, they oversaw installation of high-power broadcast transmitters. For the Brazilian Navy at Recife, they put in electronic equipment and held training classes.

They went on shakedown cruises and test flights in the Atlantic and Pacific, were stationed at Bermuda and Guantanamo, at Guam and New Guinea, and aboard carriers. Charlie Hobbs, now of the RCA Service Company's technical publications group, for instance, was on the *Enterprise* when a Kamikaze knocked her out of action off the Japanese island, Kyushu. He was servicing night bombing equipment. Merrill Gander, now the Company's chief engineer, was aboard a ferry at Pearl Harbor when the base was attacked on Dec. 7, 1941. He was returning from a job repairing PBY altimeters.

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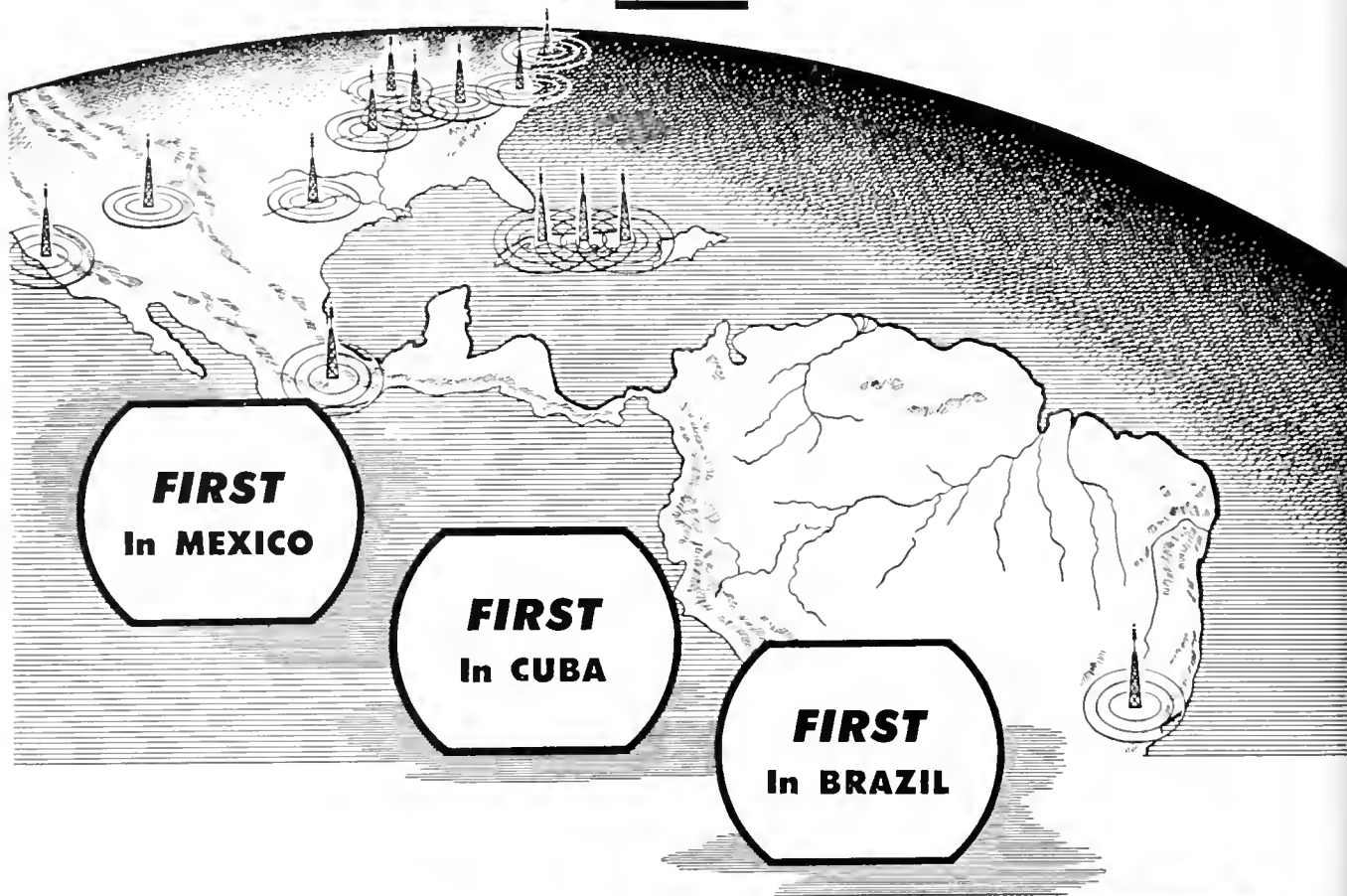


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PORTABLE TELEVISION TRANSMITTER
AND CAMERA

RCA TELEVISION

First choice of ALL the Americas!



RCA is proud to welcome Mexico, Cuba, and Brazil—their great audience, and their great creative talents—into the family of RCA Television. The first stations to bring video programs to Mexico, Cuba, and Brazil are completely RCA equipped.

In the United States of America, the great *majority* of television stations have installed RCA transmitters and associated equipment. RCA is the first choice of *all* the Americas.

Television, the new teacher, is helping to train and to educate, as well as to entertain.

Your RCA Distributor will be glad to keep you fully informed on

RCA television and its great possibilities in the economy and the culture of your country.

RCA salutes Latin America's pioneers in television:

BRAZIL

PRF3TV—Emissoras Associadas
São Paulo

CUBA

Union Radio, Havana
CMQ—Havana
Telenews Co., Alonso, S.A., Havana

MEXICO

XHTV—Televisión de Mexico, S.A.,
Mexico, D.F.



More than a million RCA TV Receivers are in use in homes in the U.S.A.

RCA television receivers inherit the manufacturing and design experience poured by RCA into the more than 1,000,000 RCA television sets now in use in the U.S.A. More than 20 years of experience and \$50,000,000 in video research have made RCA quality and performance the finest in television.

¹Under construction



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RADIO CORPORATION of AMERICA

RCA BUILDING

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only 53 pounds,
battery-operated
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transmitting station,
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"spot" pick-ups of
events, and remote
of industrial pro-
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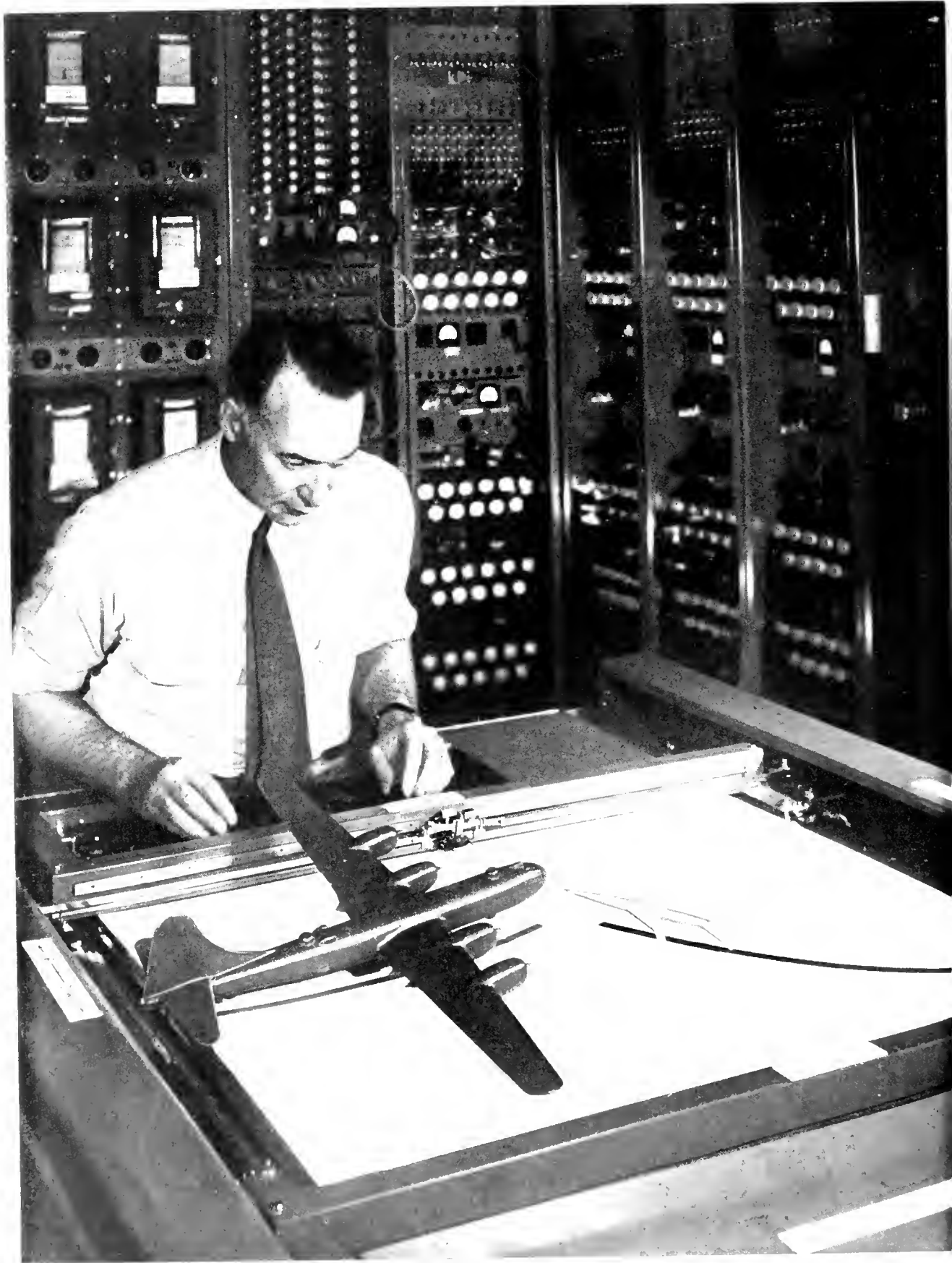
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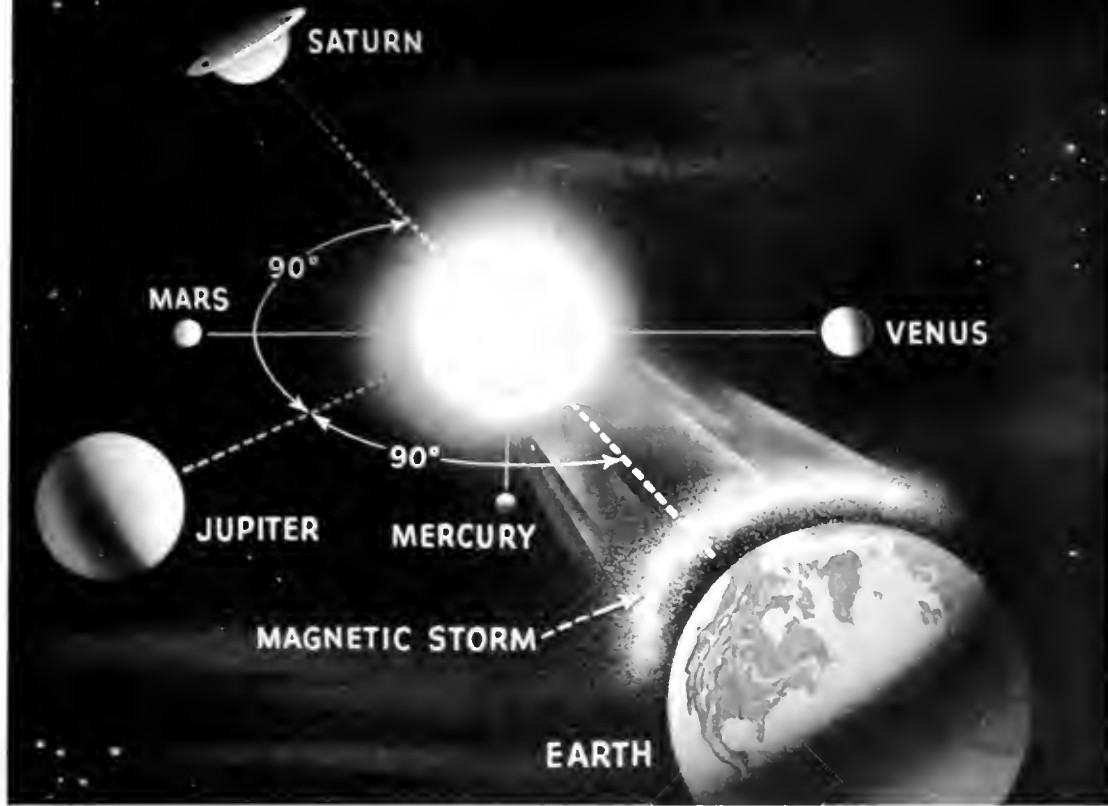
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MODELS OF GUIDED MISSILE AND "ENEMY" BOMBER ABOUT TO MEET IN A DEMONSTRATION OF THE ELECTRONIC ANALOGUE COMPUTER DEVELOPED AT RCA LABORATORIES.



WHEN PLANETS IN THEIR TRAVELS AROUND THE SUN ARRIVE IN THE RELATIVE POSITIONS SHOWN HERE, MAGNETIC STORMS APPEAR ON EARTH

Magnetic Storms Directly Related to Positions of the Planets

Analyst at RCA Communications, Inc., Reveals Findings After Five-Year Study. May Lead to Long-Term Predictions of Radio "Weather" Changes.

EVIDENCE that a direct relationship exists between magnetic storms on earth and the position of planets with respect to each other and the sun was disclosed recently by John H. Nelson, radio-wave analyst of RCA Communications, Inc.

Findings of Mr. Nelson supporting this new approach to the cause of forces that disturb world radio communications appeared for the first time as a documented report in the current issue of the *RCA Review*, a scientific quarterly of the Radio Corporation of America. Heretofore, sunspots and allied activity on the solar surface have been considered prime causes of magnetic storms that bombard the earth.

Mr. Nelson's report suggested

that these disruptive forces may be forecast months or even years ahead of their materialization, thus permitting ample time to select the best radio channels to avoid curtailment of traffic.

Based on Mr. Nelson's predictions for the 1951-'52 winter season, selection already has been made by RCA for the best working radio routes and frequencies of its world-wide radiotelegraph circuits to be used under the radio weather conditions forecast for that period.

The conclusions reached in Mr. Nelson's report were the result of nearly five years of studying radio-wave behavior in relation to sunspots and the movement of the planets. Using a six-inch telescope atop an RCA Communications

building in the heart of New York's financial district, he daily plotted the position and characteristics of sunspots on the solar surface.

It was during the observation of sunspots that Mr. Nelson became convinced that, besides their activity, other forces acting upon the sun also affected magnetic weather conditions upon the earth's surface. This conviction led him into research involving the exact position of planets with respect to the sun.

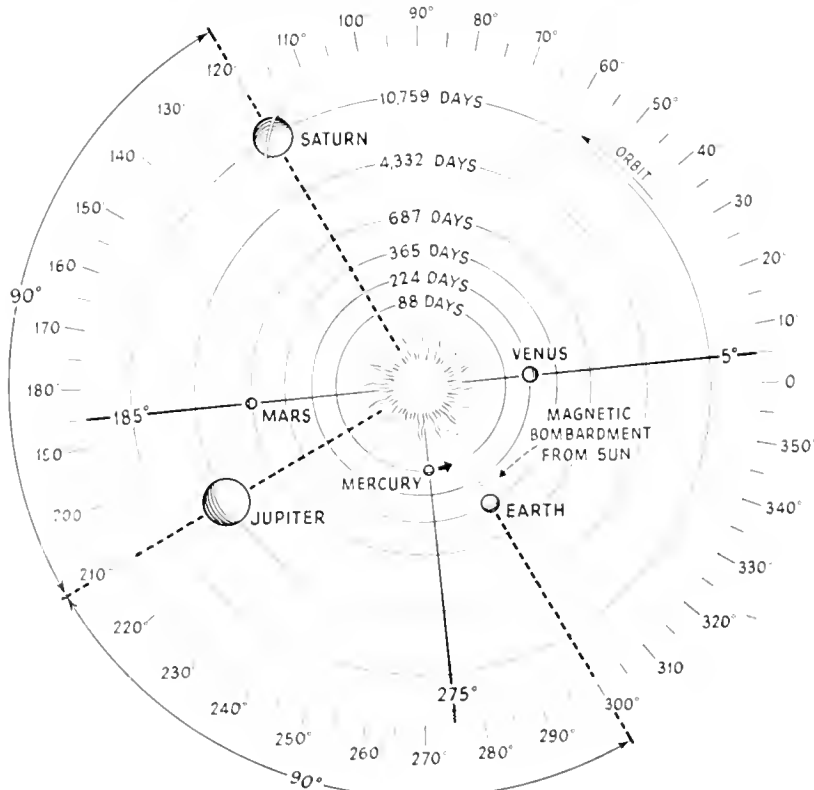
By plotting the course of the six inner planets of the solar system on a daily basis, Mr. Nelson found that:

1. When two or more planets are at right angles to each other, or in line on the same side of the sun— or in line with the sun between them— magnetic disturb-



JOHN H. NELSON, RCA RADIOWAVE ANALYST, TRAINS HIS TELESCOPE ON THE SUN FROM HIS ROOFTOP OBSERVATORY AT 25 BEAVER STREET, NEW YORK CITY, WHERE HE DISCOVERED EVIDENCE OF A NEW RELATIONSHIP BETWEEN THE POSITIONS OF PLANETS AND MAGNETIC STORMS.

WHEN PLANETS AND SUN ARE IN THE POSITIONS SHOWN IN THIS DIAGRAM, THE RESULTING BOMBARDMENT OF THE EARTH BY MAGNETIC STORMS REACHES ITS MAXIMUM INTENSITY.



ances occur more frequently on the earth's surface.

2. That the most disturbed 12 months' periods will be those preceding and following the positioning of Saturn and Jupiter in such a configuration with relation to the sun.

3. That the most severe disturbances occur when Mars, Venus, Mercury and the Earth are in critical relationship near the points of the Saturn-Jupiter configuration.

4. When Saturn and Jupiter have moved away from the critical relationship, there is a corresponding decline in the severity of magnetic weather, although storms of shorter duration result from the critical combinations of smaller planets.

5. That the least disturbed periods occur when Saturn, Jupiter and Mars are equally spaced by 120°.

By means of his planetary research, Mr. Nelson has been able to predict for two years in advance the approach of major magnetic disturbances on the earth's surface. Combining his planetary observations with a daily telescopic inspection of the sun's surface, he has obtained an accuracy of 85 per cent in his daily forecasts of good and bad radio weather.

Conclusions presented by Mr. Nelson in the *RCA Review* have support to other investigators, notably Ellsworth Huntington and Henry Helm Clayton, who suspected that the planets had an influence upon sunspot activity and conducted extensive research on the subject.

Planets Affect Solar Surface

Although Mr. Nelson's research was related to the earth's magnetic storms in relation to radio communications rather than sunspots, his study indicates that the planets influence the surface of the sun and the solar reactions frequently associated with sunspots.

In developing evidence of planetary influence, Mr. Nelson prepared hundreds of charts of planet positions, radiotelegraph circuit behavior and sunspots, and then compared the relationships between them. He found that because of their slow motion around the sun

Saturn and Jupiter may stay in a critical relation to each other for as much as two years, in which event the inner planets, as they circle the sun more rapidly, have an opportunity to create additional critical relationships, which add to the effects of the Saturn-Jupiter team.

In preparing his evidence, Mr. Nelson relied heavily on the hundreds of daily propagation reports gathered for him by RCA technicians at Riverhead, L. I., and by overseas technicians associated with Radio France and the Telegraph Administration in Sweden. Assistance also was rendered by his brother Carl W. Nelson, an amateur astronomer and meteorologist in Massachusetts, who aided in plotting the planetary configurations and in ascertaining the angles of least disturbance.

Sunspot Size Not Critical

Prior to planetary studies that have made possible his long-range predictions, Mr. Nelson achieved considerable success in forecasts based solely upon his observations of sunspots. In 1918, he and his associates caused comment in astronomical circles by a report in which they said their investigations showed the size of sunspots to be "a meaningless criterion" in predicting disruption caused to radio circuits. The type of the sunspots, their age and activity, and their position on the face of the sun, were declared to be the determining factors of disruptive bombardment.

Moreover, Mr. Nelson and his associates established at that time the existence of a "critical zone" on the face of the sun—an area about 26° in radius from the optical center of the sun, on its eastern hemisphere. It was discovered that the position of the sunspots in relation to this critical zone was of utmost importance. Damaging effects were noted when new active spots were within this zone.

Subsequent investigations by Mr. Nelson have shown this critical zone to be expanding as the sunspot cycle approaches its next low point of activity, which is expected to occur at approximately the end of 1954. This zone remains a valuable asset to Mr. Nelson in making his daily forecasts of magnetic weather.



WITH SLIDE-RULE AND GLOBE, NELSON TABULATES INFORMATION WHICH PERMITS ENGINEERS TO PLAN STATIC-FREE COMMUNICATIONS CIRCUITS FAR IN ADVANCE OF THE COSMIC DISTURBANCES THAT HERETOFORE HAVE BAFLED EXPERTS.

Aggressive Promotion Will Meet TV Sales Situation, Says H. G. Baker

The same old-fashioned, aggressive advertising and merchandising efforts, and the promotional ingenuity which the industry in the past has demonstrated that it commands, should be successful in meeting the current television sales situation. This was the encouraging statement issued by H. G. Baker, Vice President and General Manager of the RCA Victor Home Instrument Department, in response to queries from the press when television set sales showed a slight decline in late March.

Admitting that the situation is a "challenging" one, Mr. Baker said: "Television business begins to fall off every year around this time. There should be no cause for concern in a situation the radio and television industry has experienced in the past. From our own standpoint, RCA Victor's current television sales are considerably higher than they were during the like period last year.

"We in the television industry must face the fact that we cannot expect forever that the customer

will beat a path to the television dealer's door," he added. "There must be a return to aggressive, competitive retail operation. And if that time has already arrived, then certainly this industry, by employing its established talent for sales promotion, can go a long way toward taking up the slack in the current sales decline, without falling back on pricing measures."

Emphasizing that the sales initiative is in the hands of the industry, Mr. Baker pointed out that RCA Victor is currently pushing the greatest concentration of television advertising in the company's history, built around full-page and half-page insertions in 137 major newspapers in 108 cities.

"This campaign is a hard-hitting effort to carry our television sales story to every major television market in the country," he said. "And it represents a major reason why RCA Victor television sales today, despite the seasonal decline, are considerably higher than they were this time last year."

Planning Industrial Mobilization

Research, Development and Adequate Production of the Millions of Items Essential for National Defense Represent the Challenge which Faces American Industry, Foster Says.

INDUSTRIAL Mobilization Planning can be defined as the joint effort of industry and Government to insure the best utilization of our industrial might. It is indispensable for the assurance of adequate national strength to preserve our national security. Our experience in the two world wars has proved the vital necessity of such planning. On each occasion, we were given two years of grace in which to tool up for war — an opportunity we most likely will never again be permitted — while our allies took the brunt of the initial attack. Even then, it took us many months to develop the support required for a successful war effort. In the meantime, the enemy made sweeping advances over territory which it took us years to regain — at unconscionable cost, in terms both of resources and lives. It is just as important to avoid "too little too late" in terms of industrial support as it is in terms of fighting forces.

Although our fighting forces should be maintained in sufficient strength to preclude any sane thoughts of military action against us, it is axiomatic that our national economy cannot and should not be expected, in peacetime, to support the fighting potential required in time of war. It is, likewise, axiomatic that we cannot expect industrial facilities, geared to the production of goods for the peacetime economy, to be converted overnight to the production of enormous quantities of munition of war. Nevertheless, if costly lessons of the past are to be heeded, we are faced with the stark necessity of curtailing to the irreducible minimum the time required for such conversion.

Facilities and equipment must be available, and harnessed, ready to go, to produce items not now manufactured at all or in insufficient quantities. The best technical know-how must be developed, in the most efficient manner and in the minimum of time, to produce predeter-



By Admiral Edwin D. Foster

*Director,
Mobilization Planning Department,
RCA Victor Division.*

mined quantities of these munitions. And specific plants must be assigned the responsibility for specific wartime production, and equipped with precise knowledge of conversion requirements. These are the prime military objectives of Industrial Mobilization Planning.

Must Support Civilian Economy

At the same time, provision must be made for the continued support of our civilian economy, since without this support, no military effort can be sustained. It is the job and the duty of both Government and industry to work together to preserve an optimum balance between these dual objectives.

Basic to all of this effort is determination of requirements. Requirements can be determined only if we have a plan of operations. Our defense plans, of course, are made by our Joint Chiefs of Staff to meet the requirements of the international situation, as evaluated by the National Security Council.

The character of this whole program—including the basic and supporting plans, and the requirements that stem from these—is one of constant change and adjustment. On the one hand, the basic operational plan must be geared to changes in the international situation. On the other hand, technological progress has added and is still adding further complexity to the solution of our logistical problems. It was not so many years ago that armies subsisted on their bellies; that navies could replenish their supplies at almost any port of call, if necessary by plunder; and that air forces were unheard of. Technological evolution has changed all of this. Our fighting machine has now become a mechanical and electronics colossus with a seemingly insatiable appetite, requiring a constant stream of an unbelievable number of supplies, flowing from all parts of our country, and in many instances from remote parts of the world.

Millions of Items Involved

The magnitude of the problem is indicated by the number of items required. The Navy alone requires almost three million items. The Army and Air Force require other items peculiar to their needs, which likely add a couple of million more. It is not enough that most of these items be ready for use when and where required. It is mandatory that all of them be available. Consider the helplessness of the most modern fleet, completely manned with the finest and best trained personnel and thoroughly equipped in every respect, except that the ships have no rudder mechanisms—or that of an Air Force lacking spark plugs.

The development of our fighting machine into an infinitely complex structure has been paralleled by the rise in importance of speed in putting our fighting machine into operation. The pace has been accel-

erated in every way. The measure of distances, for example, has been progressively reduced, because of these technological and scientific advances, from years, to months, to days, to hours, and in some cases even to minutes. Areas formerly considered impregnable because of their geographical isolation have now become vulnerable.

To meet the challenge of Mobilization Planning under these circumstances, the full impact of what so often has been termed our secret weapon—research, development, and quality and quantity production—must be utilized to the maximum, and that requires hard-headed planning.

The Department of Defense industrial mobilization program is a broad structure of many parts. One that is of special interest to us here is Mobilization Planning for War Procurement, particularly as it applies in these days of "creeping" mobilization.

All-out Effort Predictable

By comparison, all-out mobilization planning is less complex. The conditions which we must face in an all-out effort are fairly predictable. We know then that we will make the maximum effort logistically to support the military—consistent with what is required for essential needs of the civilian economy. The emphasis may change operationally, as it did in World War II, from one theatre to another (Europe to Asia) or from one type of weapon to another (tank to landing craft), but the industrial effort is pretty well defined, both in scope and character. In the event of an all-out effort, many mobilization plans of the Department of Defense would go into active operation. These plans include programs for reserve plants and tools and the production allocation program, under which plants selected by the various defense agencies have tentatively agreed to accept orders immediately following M Day for the production of certain basic equipments in specified quantities. While these very extensive plans are far from having been fully perfected, a great deal has been accomplished to the end of cutting down the time needed to reach full scale operations in an all-out

war. In an all-out war, we can depend upon full controls being imposed and accepted by industry, by labor, by Congress and by the general public.

The situation today is entirely different. Conditions which must be faced in times of "creeping" mobilization are far less predictable. We just don't know the extent or kind of war, limited or otherwise, that we may be called upon to support. We cannot look to the Services for the positive guidance during "creeping" mobilization which they can give us for all-out mobilization. Accordingly, industry now must initiate its own plans for meeting the innumerable unpredictable contingencies of "creeping" mobilization.

Factors to be Evaluated

This involves maintenance of that fineness of balance between military and civilian production which will afford the military the support it requires, and still not weaken the civilian economy to a point where it cannot continuously sustain effective support of the military. Following are the more important factors we in industry must analyze and evaluate if we are to make the decisions which will attain this objective:

Availability of Materials: What will be the effect of restrictions imposed by the Government, either voluntarily or involuntarily, upon the importation of basic materials? What will be the effect of the price and wage controls, of manpower controls, of restrictions upon inventories, of the use in production of basic materials, and of allocations and priorities? What changes are likely to be made in these controls, and what would be the effect of such changes?

Civilian Consumer Demand: Civilian consumer demand for one's product must be considered in the evaluation of almost any commercial or industrial problem. At this time, it must be considered in the light of various abnormal factors and conditions. For example, what will be the effect upon consumer product demand of the increases in taxes that have been imposed; what additional taxes may we anticipate; when will they be made effective;

and what will be their effect upon demand for our products? Our living costs continue to rise and how will they affect the consumer market, particularly the marginal buyer, and what will be the psychological effect of substitution of materials in the manufacture of products, particularly if the potential customer assumes, even wrongly, that such substitution will adversely affect quality of the product? What will be the customer's reaction to any potential product shortages he may assume will exist? Will resulting buying cause peaks and valleys in demand? What war scares will develop and what will be their effect on consumer demand? What additional credit controls will be imposed and what will be their effect?

Military Requirements: Essential to determination of probable availability of materials for production are, of course, reliable estimates of what will be the character, scope, and magnitude of the abnormal military requirements. The uncertainty of operational needs, due to changes in strategic factors and technological advances, make impossible an exact determination of military requirements. The nature of equipment needs depends in large measure on the kind of action on which plans are concentrated—for example, whether on land, on the sea, or in the air.

Congressional Appropriations: How much the armed services buy is limited by the amount of money Congress appropriates for defense. We know that the attitude of Congress or of the Administration, or of both, has changed from one of a comparative "free-rein" to one of "let's have a good look-see."

Effect on Defense Funds

What effect will this have upon next year's defense appropriations? Will Congress repeat its practice of the last two years in deferring action for two months after expiration of the fiscal year?

Contrary to what many business men have assumed, "creeping" mobilization does not call for Government procurement of the type or magnitude of that of World War II. Whereas the maximum peak spending rate at the end of the war



SYMBOLIC POSTERS IN RCA VICTOR MANUFACTURING PLANTS EMPHASIZE THE COMPANY'S PROGRAM TO CONSERVE MATERIALS AND MANPOWER.

was almost 90 billion dollars, which in dollars of today would mean about 145 billion, the *spending rate* is now only 20 billion dollars, and it is estimated that it will be increased only to 30 billion dollars by July 1 of this year. Even if the total 1951 defense appropriations were spent in one year, the *spending rate*, allowing for the change in dollar value, would be less than 30% of the maximum *spending rate* in World War II.

Only 60% for Procurement

Another significant fact is that only about 60% of the 41.8 billions appropriated thus far this year will go for procurement, the remainder being required for routine services essential to maintenance of the military establishment—for example, pay of military and civilian personnel. This means that only about 25 billion dollars is available for procurement—and we have been told that almost 20 billion of these 25 billion dollars have already been obligated—that is, covered by contract or letter of intent.

Time Lag: Another most important factor for our evaluation is the time lag between the time funds

are appropriated and the time they are expended for the products manufactured. Two phases of this lag require consideration. The first is the long period it takes to prepare specifications, and the second is the time involved in reducing the overall specifications to blueprint forms and in tooling up for production. Remember that most of these items are new, or at least improved versions of what has been used heretofore. This is both logical and mandatory. We cannot freeze design in the military field for a protracted period. If we do, we will suffer defeat through a "Maginot Line" philosophy of defense. And it does take time to engineer new designs.

In any event, these essential time lags must be anticipated—by all concerned. Otherwise, there is danger of a serious production vacuum between the time normal commercial production is cut back and military production picks up. The effects of such a vacuum are all too well known in terms of unemployment, recessions and depressions. Of special concern, too, is the risk of dissipating technical know-how at the very time when it should be

developed and increased. This we find particularly true in the electronics industry, where a much greater than average increase in productive effort will soon be demanded because of the tremendous increase in military electronics requirements.

Government Procurement Procedures: Because the necessary conversion of facilities is costly, care must be taken to see that the interest of both the Government and industry are protected in negotiation, redetermination, and renegotiation. This calls for special attention to changes in current procurement. Since the beginning of the Korean effort, negotiation has been used more and more in the award of Government contracts. When, last December, the President declared a National Emergency, the awarding of military contracts by negotiation rather than after formal advertised bid requests was greatly facilitated. Army, Navy and Air Force procurement offices were authorized to dispense with formal bidding procedures to the degree necessary to prevent production delay. The exercise of this authority has improved the coordination of current procurement with all-out mobilization plans under the production allocation program.

Tooling-up Problems

How, for example, can industry satisfactorily meet requests as one recently posed by the Services: namely, tooling up for all-out mobilization for a specific item on the basis of a firm order for a small quantity only and with no guarantee of later orders for large quantities.

But if we do our mobilization planning fairly and realistically, and if we all put our shoulders to the wheel, the decision we make in the interest of our individual companies will, in most cases, serve the interests of the nation as well, and our company's interests will be best served if we do this planning now. Otherwise, the time lag may result in a gap between the time commercial production *may* be curtailed and the time we get war production under way. This *might* well cause a lot of red ink in our

(Continued on page 30)

Great Voices Brought to Life

Priceless Recordings by the World's Outstanding Musical Artists have been Taken from RCA Victor Vaults, Skillfully Restored, and Made Available to the Public.



ONE OF OPERA'S MOST FAMOUS QUINTETS AS IT LISTENED TO ITS OWN RECORDING OF VERDI'S "THE QUINTET". STANDING, LEFT TO RIGHT: LEON ROTHIER, ANDRES DE SEGUROLA, AND ENRICO CARUSO; SEATED: FRIEDA HEMPEL AND MARIA DUCHENE.

SELECTIONS FROM THE NEW "TREASURY" SERIES ARE PRESENTED TO DR. LUTHER H. EVANS, LIBRARIAN OF CONGRESS, BY ROSA PONSSELLE (CENTER), MRS. ENRICO CARUSO (LEFT), AND MRS. JOHN MCCORMACK.



By George R. Marek

*Director of Artists and Repertoire,
Record Department,
RCA Victor Division.*

PRICELESS master phonograph recordings, many of them stored for decades in RCA Victor's vaults at Camden, N. J., have once again been removed from their felt-lined envelopes and used to reproduce the music and voices of the world's greatest artists in a new twelve-album collection of historic records, titled "Treasury of Immortal Performances." Spanning the period from 1901 to 1937, the Red Seal albums consist of 120 performances by 51 vocal and instrumental personalities including Caruso, McCormack, Schumann-Heink, Farrar, Bori, Garden, Chaliapin, Ponselle, Rachmaninoff and Paderewski.

Six additional albums of the new series are devoted to a historic collection of popular records, each representing a phase in the development of jazz, swing, blues and folk music in this country. Also available in both 15- and 33-1 3-rpm records, they contain favorites by Russ Columbo, Hal Kemp, Glenn Miller, Ted Weems, Tommy Dorsey, Benny Goodman, Bing Crosby, Frank Sinatra, Fats Waller and Louis Armstrong.

To commemorate the release of

this series of albums and the 50th anniversary of phonograph recording by RCA Victor, a special presentation of the "Treasury" collection was made to the Library of Congress on February 20.

In accepting the albums for the national archives from Rosa Ponselle, operatic soprano, Dr. Luther H. Evans, Librarian of Congress, noted that, "It was gifts from the Victor Company in the mid-1920's which started the Library of Congress record collection." He went on to say, "Over the years, without interruption—under the old name and under the present name of Radio Corporation of America—the company has continued to be very generous in giving to the Library recordings by its outstanding artists." Among the celebrities attending the presentation ceremony were Mrs. Enrico Caruso and Mrs. John McCormack, widows of the two artists whose legendary performances have been recaptured.

Music Critics Selected Records

The "Treasury" is the result of months of intensive research by RCA Victor's Record Department at Camden where more than 7,500 old copper master records are carefully preserved in specially ventilated vaults. Several competent musical authorities listened to more than 700 master discs and then chose by vote the records which they considered most representative of a particular vocalist or musician. After the artistic decisions for the repertoire had been arrived at, RCA Victor technicians made the ultimate decision as to the suitability of each record for modern reproduction. The earliest selection in the album series is from a 1904 acoustical recording of the "Death of Otello" by Francesco Tamagno and the most recent was taken from Paderewski's 1937 electrical recording of his own "Minuet in G" and the first movement of Beethoven's "Moonlight Sonata."

In transferring such memorable performances from original masters to the 45- and 33-1 3-rpm records, each of the discs was subjected to meticulous technical scrutiny and rehabilitation. During the fall of

1950, six men under the direction of Albert Pulley, Chief Recording Engineer of the RCA Victor Record Department in New York City, went to work on this formidable task.

Many of the old copper masters "showed their age." By laboring over each record groove with microscope and engraving tools, RCA technicians skillfully restored the original waves and whorls of the spiral tracks. Some of these men are so skillful in this specialized field that they are able to read music by observing fluctuations of the record grooves.

Transferred to Magnetic Tapes

All the "Treasury" performances were then transferred from the restored masters onto magnetic tape recordings, which permit retakes, editing, cutting and the removal of excess noise. Without affecting the music, the scratches and flaws in the primitive tone tracks were detected and erased by sensitive in-

struments. In some instances, several masters of the same recording were available, making it possible to use one to fill in certain portions where another had blanked out. As the result of such engineering techniques, these matchless musical performances have been brought back to life on the new vinyl plastic records with remarkable fidelity.

Among the selections by Caruso are some which were "revitalized" a decade or more after the tenor's death in 1921. This accomplishment was made possible by re-recording his voice against an improved orchestral background. These electrical reissues, which created a sensation at the time, have retained the magnificent tonal quality of Caruso's voice in roles from "Rigoletto" and Bizet's "Pearl Fishers," and others.

In 1952, RCA Victor plans to issue a second "Treasury" series compiled from its musical gems of bygone years.

Vault of priceless master recordings in Camden, N. J., from which outstanding performances of 54 world-famous artists were chosen for the "Treasury" series.



New Walkie-Talkie Produced by RCA in Record Time

Production Schedule Beaten by 60 Days as First Unit of Smaller, More Powerful Radio is Presented to Maj. General Akin, Chief Signal Officer.

A NEW walkie-talkie for the armed forces with twice the range of its World War II counterpart, but having only half the weight and bulk of its predecessor, has been developed by the Radio Corporation of America and turned over to the U.S. Army Signal Corps, which provided the specifications. The first production model was presented to Maj. General Spencer B. Akin, Chief Signal Officer, U.S. Army, by Walter A. Buck, Vice President and General Manager, RCA Victor Division, in ceremonies held at Camden on March 8.

An outstanding example of the advance in the design of sub-miniature components, the new walkie-talkie is the smallest tunable radio transmitter-receiver of its type ever produced. Through the ingenuity of engineers, many of the parts have been compressed to fit into metal cylinders no larger than a miniature electron tube. The complete two-way communication unit contains 16 tubes, yet is only $9\frac{1}{2}$ inches high, $10\frac{1}{2}$ inches wide and 4 inches deep. Including batteries, antennas and handset, it weighs only 29 pounds. It can be used while strapped to the back of the operator, mounted in a vehicle, or set up as a semi-permanent ground station. With an output of approximately 1 watt, the walkie-talkie has a range of about 5 miles.

Design Problems Outlined

Some of the major problems met and solved by RCA engineers in cooperation with the Signal Corps were outlined by T. A. Smith, Assistant General Manager, Engineering Products Department, during the presentation ceremonies in Camden.

"The story," he said, "begins officially shortly after the war. Unofficially, it began even earlier—before the end of the war. It might



MAJ. GENERAL SPENCER AKIN, CHIEF SIGNAL OFFICER, U. S. ARMY, DIRECTS MANEUVERS OF ARMY PLANE IN FIRST PUBLIC DEMONSTRATION OF NEW RCA WALKIE-TALKIE UNIT AT CAMDEN, N. J.

be said to have begun with the problems of GI's struggling with vital communications gear, made as light and portable as anyone could design it, but still heavy and cumbersome to carry.

"World War II 'walkie-talkies' had added a new concept of communications to field warfare. But along with great advantages they brought certain difficulties in the way of reduction of maneuverability, maintenance problems and transportation requirements. Bulkiness and weight, however, were the two main disadvantages of the old equipment. In fact, in some sectors they were referred to—not too lovingly—as 'backie-breakies'.

"Engineers of the Signal Corps were, of course, well aware of this.

Even before the war ended they were making plans for a new equipment. They started putting their ideas down on paper based upon their experiences during World War II and soon drew up a list of specifications for the set they wanted. These requirements seemed impossible of achievement by techniques known at the time.

"Signal Corps engineers, however, believed that by utilizing the newly-developed art of sub-miniaturization to the fullest extent it would be possible, over a reasonable period of time, to develop the set they wanted.

"The problem of sub-miniaturization, or making things much smaller, is not simple because all of the many parts—and there are



MANY WALKIE-TALKIE COMPONENTS ARE SO SMALL THAT THEY MUST BE ASSEMBLED UNDER MAGNIFYING LENSES.

hundreds in the new walkie-talkie—must be reduced in size. This means that the ordinary transformers, condensers, resistors, tubes, nuts and bolts and even wires used by the designer had to be redesigned. In most cases in the design of a new piece of electronic gear, standard, easily available components could be employed. Here, nearly every component had to be redone and a model built to test its efficiency and performance. New circuits had to be devised to provide added flexibility and efficiency.

"Signal Corps representatives talked the project over with RCA engineers, who agreed that it was possible—though very difficult. Accordingly, in June 1946, the Signal Corps placed a contract with RCA which called for the development of a new, much smaller, much lighter walkie-talkie that would meet a long list of exacting requirements.

"During the following period, RCA engineers working with Signal Corps engineers built, tested, rebuilt, retested and rebuilt again until they had completed engineer-

ing models of a new unit which met all of the requirements originally laid down. These models were exhaustively field-tested and finally in spring of 1950, declared ready for production."

When RCA was first asked to bid on the instrument, it was estimated that 55 weeks must elapse before the completed units could begin rolling off production lines. However, the Signal Corps needed the equipments and urged company engineers to use every facility to shorten the schedule. Anxious to deliver the goods, RCA put into motion all tricks known to the trade and as a result production was promised in 44 weeks.

Every Department Alerted

To accomplish a feat that, to many, seemed impossible, it was necessary that every department be alerted and primed for the task ahead. Soon, Engineering, Purchasing, Inventory Control, Fabricating and Material Inspection knew almost to an hour when its contribution would be needed if the tight schedule were to be maintained. How well this integration worked out was acknowledged by General Akin when he accepted the first walkie-talkie. The instrument, he said, "represents a major engineering and production achievement. The speeding up of this production 60 days ahead of schedule tells its own story of efficiency on the part of management—and cooperation and energy on the part of the skilled workers who built this equipment. It did not just grow. It was created through a combination of scientific advance, industrial know-how and military experience.

"And as these sets come off your assembly line, we—the military—will take over. Our supply system will deliver these sets where they are needed. We will send the replacement parts required to maintain them. Our schools will train the communications specialists, who will use them as a weapon in national defense."

Large-scale production of the new walkie-talkie, it was announced, will start as soon as the Signal Corps has completed its field tests.

CHECKING ONE OF THE WALKIE-TALKIE SUB-UNITS FOR MECHANICAL PERFECTION AT THE RCA VICTOR PLANT IN CAMDEN.



Major TV Expansion Foreseen

Dr. Jolliffe Tells Princeton Students that Public Will Benefit from RCA-NBC Tests with UHF at Bridgeport.

MORE than a year of field testing by the Radio Corporation of America and the National Broadcasting Company has shown that major expansion of television broadcasting is practical and possible at ultra-high frequencies, Dr. B. Jolliffe, Executive Vice President in Charge of RCA Laboratories, declared in a lecture at the School of Engineering, Princeton University, on April 17.

"Our engineers have determined that practical UHF television receivers can be built and that present television sets can be readily adapted for use at ultra-high frequencies," Dr. Jolliffe said. "This means that sets now in use and sets being manufactured will not be made obsolete by the new development. Receivers and adapters will be available when UHF television transmissions are authorized. When ultra-high frequencies are used, many communities can have satisfactory television that could not have had any television service without this expansion in UHF. Existing service at very-high frequencies also can be extended." Dr. Jolliffe's remarks concerning the success of RCA and NBC in pioneering investigations of the UHF were made to emphasize the importance of industrial research in the progress of television and other American industries, the

theme of his Cyrus Fogg Brackett Lecture before the Princeton engineering students.

He recalled that at the time of the "freeze" in 1948, when the Federal Communications Commission halted action on applications for new television stations, use of the UHF was proposed for the expansion of television. He added:

"There was little information available at that time concerning the usefulness of these frequencies for television broadcasting, although some propagation tests had been made. To determine the problem of television broadcast transmission and reception in the UHF, RCA inaugurated a full-scale field test.

"A transmitter was built and installed at Bridgeport, Conn., and test receivers were installed in a number of homes in and near that city. The station, KC2XAK, which is operated by NBC, began transmissions in December, 1949.

"The regular schedule of programs of NBC's New York station WNBT has since that time been relayed by microwave from New York to Bridgeport. This was the first UHF station in the United States to operate on a regular schedule. The Bridgeport area has been used as a testing ground for UHF receivers by RCA and others."

Recalling that the FCC has re-

cently announced a proposed allocation which involves the use of UHF, Dr. Jolliffe said the Commission's proposed channel assignments provide for nearly 2,000 UHF and VHF television stations in more than 1,200 communities. He pointed out that certain procedure steps by the FCC are necessary before the "freeze" can be lifted, but added that if production facilities are available for television at the conclusion of this procedure, television broadcasting will expand rapidly and television broadcasting service can become a "really nation-wide service."

UHF Converter for TV Proved Best by Test

Large-scale experiments in the transmission and reception of ultra-high-frequency television signals, carried out by RCA, show that a converter is the best means of enabling present TV sets to receive stations that may operate in the higher frequency channels recently proposed by the Federal Communications Commission. A bulletin containing this information has been sent to distributors of RCA television receivers by W. A. Buck, Vice

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FROM THIS TOWER NEAR BRIDGEPORT, CONN., RCA-NBC HAVE BEEN CONDUCTING EXTENSIVE FIELD TESTS OF TELEVISION PROGRAMS TRANSMITTED ON ULTRA-HIGH FREQUENCIES. BELOW: CONTROL CONSOLE AND TRANSMITTER SWITCHBOARD AT BRIDGEPORT STATION.



Television Goes Abroad

Crews of RCA Technicians, Transporting Special Equipment, have Demonstrated American Television in Ten Foreign Countries.

WHILE television has become a household word to Americans, it still symbolizes mystery to millions outside the United States who read about its wonders, but cannot enjoy them regularly. However, through the activities of the RCA Victor Shows and Exhibits Division, more than 9,000,000 people in 10 foreign countries have actually viewed telecasts for the first time. To carry on this missionary work, teams of technicians, acting as emissaries rather than salesmen, have traveled more than 500,000 miles to date, introducing the new medium abroad through on-the-spot demonstrations.

On the average of once a week, a Service Company demonstration crew is somewhere "on location," in this country or abroad, telecasting a parade, ship launching, religious ceremony, sports event, public affair, or surgical operation. Attired one day in hip boots and the next in tails and cummerbund, these nomadic technicians who transport RCA equipment to South America, Sweden, Italy and other far places stand apart from their desk-bound fellow workers.

The recent introduction of television in Sweden, at the interna-



By Richard C. Hooper

*Manager,
Shows and Exhibits Department,
RCA Victor Division.*

tionally famous Nobel Prize Award ceremony, was a typical overseas assignment. The crew took off for Stockholm on extremely short notice, with 6,800 pounds of broadcast equipment and 56 pieces of personal luggage. Two TV field cameras; two "life-size" projectors, which give 6- by 9-foot pictures; and an array of 16- and 19-inch receivers were used to set up operations in Stockholm's Concert House.

When King Gustav VI presented the coveted awards to the world's leading physicists, chemists, medi-

cal scientists, and writers, 3,500 spectators witnessed the event, approximately half of them on RCA television sets installed outside the auditorium. In order to give complete coverage to the 2½-hour ceremony, one camera was set up in a box on the right side of the stage to obtain a picture of the presentations as seen by the audience. A second camera was mounted on a balcony at the rear of the stage to cover the entire audience.

To enable the King, his royal family, and others seated in the orchestra to observe the technical perfection with which the ceremonies were reproduced on television, a 16-inch receiver was installed at the base of the speaker's rostrum, facing the audience. Other direct-view receivers and two projection models were installed outside the main hall to accommodate the overflow crowd. Additional equipment was placed in Stockholm's Cinema Royal, which was filled to its 1,000-seat capacity.

As is often the case with foreign assignments, the crew faced a technical problem before it could proceed with the actual telecast. Sweden uses 50-cycle electric power, while RCA equipment is designed

RCA TELEVISION CAMERAS AND RECEIVERS, INSTALLED IN STOCKHOLM'S CONCERT HOUSE, BROUGHT A CLOSE-UP VIEW OF THE FAMOUS NOBEL PRIZE AWARD CEREMONY TO THOUSANDS OF EAGER SPECTATORS INSIDE AND OUTSIDE THE AUDITORIUM.



operate on the 60-cycle power line in the United States. As a solution to this situation, the technicians provided their own source of electricity by borrowing two gas-engine-driven generators from the United States Navy.

Although telecasting the Nobel awards ceremony was the group's main task on this assignment, it was not the only one. The engineers telecasted the King Gustav a private show at his palace; put on a demonstration for the Riksdag (legislature); telecasted a heart operation at the Karolinska Hospital, and an abdominal surgery at Stockholm's Karolinska Hospital.

Crew Worked Long Hours

With only four hours of daylight in winter in Stockholm—the technicians went to bed and got up in the dark, working nearly around the clock, scarcely knowing that the sun had shone, when it did. At the request of government officials, the RCA group produced several special programs, one of which covered the operation of recently-developed television sets. Another demonstrated the use of TV in the classroom as an aid in the teaching of physics, science, electronics and home economics. Before the crew embarked for home they had shown American television to approximately 25,000 residents of Stockholm.

While this RCA group was at work in "the land of the midnight sun" another crew—almost halfway around the world—was demonstrating television to several thousand government leaders, doctors and nurses gathered in Havana's General Calixto Garcia Hospital.

The Cuban demonstration was part of a series of four conducted by RCA in Latin America, in cooperation with E. R. Squibb & Company. A total of 149 pieces of television equipment, weighing 8,500 pounds, was transported from Peru (the first stop) to Colombia, to the Dominican Republic, and finally to Havana to stage the dramatic surgical casts.

In each demonstration, which lasted approximately two hours, the procedure was much the same. The camera was suspended directly over the operating table to pick up the operating field and the hands of the surgeon and his assistants.



RCA TELEVISION EXPERTS BOARD A PLANE FOR SWEDEN TO INTRODUCE THE NEW MEDIUM IN THAT COUNTRY.

A second camera, on a level with the doctors, gave an over-all picture of the action. Adjacent to the surgery, the crew set up a small studio in which doctors held discussions on surgical methods, patients' symptoms and case histories. Camera No. 2 was wheeled into position to cover the studio, and back to the surgery for the actual operation.

In Lima, the cameras, which were set up in the modern Hospital Obrero, covered 14 operations presented under sponsorship of the Seventh Inter-American Surgical Congress. Physicians from all parts of South America were among the audience of approximately 7,500 persons.

Surgery Televised in Bogotá

The Bogotá operations were televised in the Hospital of San Jose, and receivers were made available in a nearby medical school for approximately 6,000 spectators.

At Ciudad Trujillo, about 3,000 persons watched similar demonstrations conducted in the Professor Marion Military Hospital.

Surgery is frequently selected as the subject for such demonstrations because it dramatically illustrates that television is not merely an entertainment medium. People everywhere have heard of American comedy, drama and juvenile shows, but

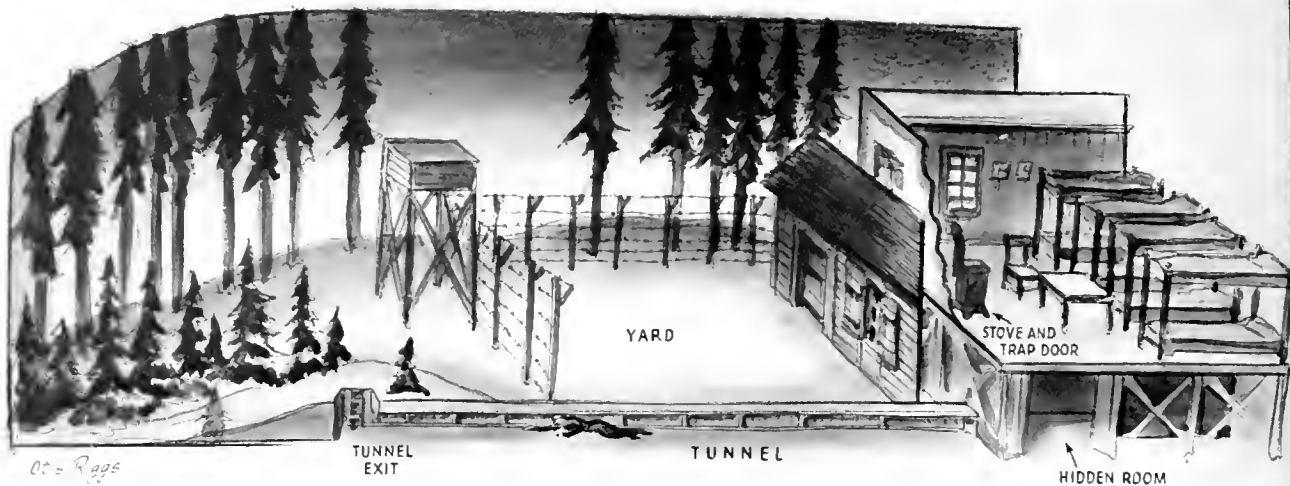
few are aware of television's potential as an instrument of education and public service.

When TV made its Canadian debut in 1949, technicians set up RCA cameras and receivers in the Saskatoon General Hospital, in Saskatchewan for the Medical Association's annual convention. This demonstration impressed its Canadian spectators to such a degree that RCA crews were called back on subsequent occasions to televise non-medical conventions in Toronto and Montreal.

These travelling members of the RCA Service Company are as adept at maneuvering a TV camera in a "corrida de toros", or bullring, as they are in an operating room. In fact, one of the Division's first foreign assignments was a junket to Mexico City, in 1946, to telecast a series of bullfights from the 60,000-seat Plaza Mexico. On this occasion the program was transmitted by microwave radio relay to the Hotel del Prado, six miles away, where an additional 7,500 spectators viewed the event on RCA receivers.

In the summer of 1948 RCA television cameras were focused on similar bullfights in Madrid, during a series of demonstrations conducted by RCA to acquaint the Spanish people with American television.

(Continued on page 26)



ARTIST'S ORIGINAL SKETCH FROM WHICH THE STAGE SETS FOR "THE GREAT ESCAPE" WERE DESIGNED.

"The Great Escape"

*Staging Specialists at NBC Adapt a Thrilling Wartime Episode for Television Presentation
Providing Viewers with One of TV's Outstanding Dramas.*



By Robert J. Wade

*Manager,
Staging Services Division,
National Broadcasting Company.*

CREATING scenery for the "average" television drama, no matter how spectacular or gigantic the presentation may be, normally presents no great problem for NBC's experienced production staff. But occasionally designers of the network's stage settings are confronted with a script which challenges even the most imaginative mind and the most extensive TV facilities.

Such was the case with NBC's production of "The Great Escape", one of the most thrilling adventure stories to come out of World War

II. In this escapade, which took place in 1944, 76 British and American airmen, overcoming seemingly insurmountable obstacles, tunneled their way to freedom from the German prison camp called Stalag Luft II. Their achievement was no less amazing than its transition to the television screen.

How is it possible to simulate a tunnel 300 feet long and 30 feet underground?

Why is barbed wire hard to get nowadays?

How can four tons of dirt be made to weigh just one-quarter of that amount?

What happens to the paper holes cut from loose-leaf notebooks?

These were only a few of the questions to be answered by the staging specialists who prepared the scenery and props for "The Great Escape". Scenic designer Otis Riggs, who has created settings for more than 200 television productions, found this to be his most difficult assignment.

In order to create the illusion of underground activity for the key scenes in the drama, Riggs had to create a set which was substantially above the ground. He constructed the barracks room (where the un-

derground trap-door was located) 10 feet above the studio floor in NBC's studio 8-G, with the room's rafters resting just below the 17-foot-high studio ceiling.

A six-foot vertical shaft was constructed leading from the barracks room to the horizontal tunnel below. This vertical opening was a facsimile of one dug to a depth of 30 feet by the Allied PWs in Silesia. The second studio tunnel, 20 feet long and two feet wide, represented the original escape medium which ran underground for 300 feet to the outside of the German camp in the actual escape.

Tunnel Built Above Floor

The main escape tunnel had to be raised four feet off the studio floor so that all action would be on a level with normal camera height. To support the weight of this off-the-floor construction, as well as the players and props, elaborate and sturdy platforms were erected—the largest ever demanded by an NBC show.

The winter setting of the drama caused NBC's Staging Services Department to reach for another superlative. Six hundred square feet of playing space, representing the



AUTHOR (LEFT) AND ART DIRECTOR
ELWELL USE A MOCK-UP MODEL OF THE
SET TO STUDY SCENERY AND STAGING.

PW yard and the final escape hole outside the compound, had to be covered with snow. This required 1,200 cubic feet of snow—which explains where the paper holes of loose-leaf notebooks go. The round and irregular shaped paper bits have a peculiar floating quality which makes them ideal in snowfall scenes. In addition to the paper, snow was represented by bleached corn flakes and commercial confetti, together with mica, which shimmers like ice. Dampened salt simulated snow spots on the men's uniforms.

"The Great Escape" also required more earth and sand than any other network production. The audience would hardly have accepted a tunneling scene without dirt and sand, particularly when the earth itself was a greater enemy of the escape-minded prisoners than the German guards and their bloodhounds.

Tons of Earth Required

Four tons of earth initially were estimated for the show, but since this tonnage presented an enormous problem to staging men who had to transport the load up eight floors to the studio, the weight was reduced one-quarter by mixing tan-bark and cork with gravel.

Designer Riggs, who became familiar with German prisoner-of-war camps when he was in Army service, discovered that barbed wire was scarce in New York. He solved his problem, however, by writing



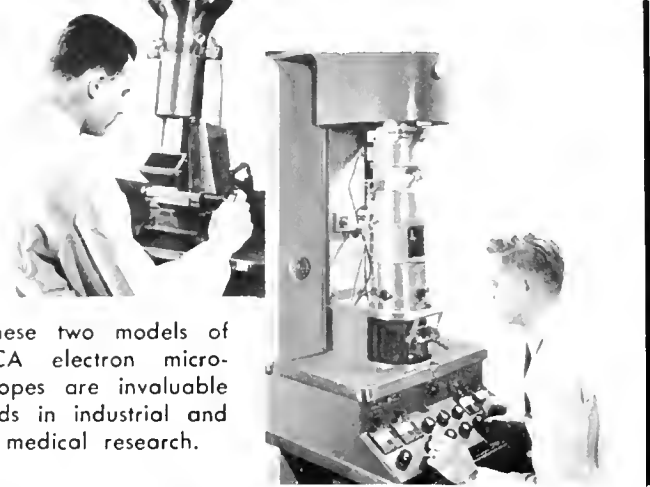
REALISTIC COMPLETED SETTINGS FOR THE PRISON CAMP YARD (ABOVE) AND ESCAPE TUNNEL (BELOW) CREATED THE ATMOSPHERE DEMANDED BY THE TENSE PLOT OF THE DRAMA.

to a mail-order house which specializes in farm equipment.

From the blueprint and script stages through to the final curtain, actors and technicians alike were imbued with the spirit of this moving drama. The cast of 10 actors, headed by Everett Sloan, Leslie Linden and Oliver Thorndike, rehearsed in the Paladium Ballroom, using night-club tables and chairs as crude props to create the effect of a tunnel. In the studio itself, skilled technicians, under the di-

rection of Mr. Riggs and Robert Garthwaite, staging coordinator, spent one entire night setting up the complicated scenery and props.

During the actual telecast a total of 70 people occupied the studio's somewhat limited space. Camera-men, dollymen, actors and stagehands worked in perfect coordination with Producer Fred Coe and Director Gordon Duff, the final result bringing wide acclaim from the network's TV audience and the press.

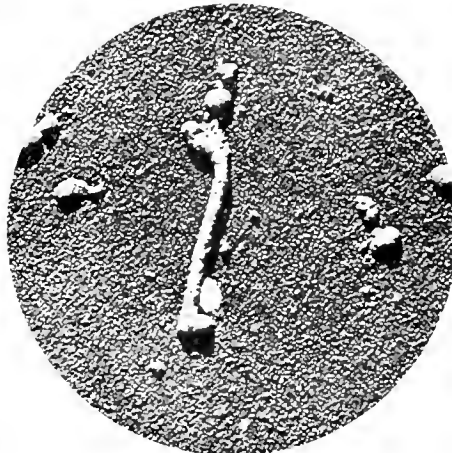


These two models of RCA electron microscopes are invaluable aids in industrial and medical research.

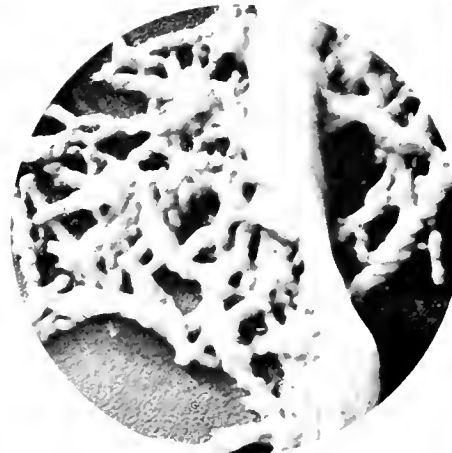
the Electron Microscope opens Unseen Worlds



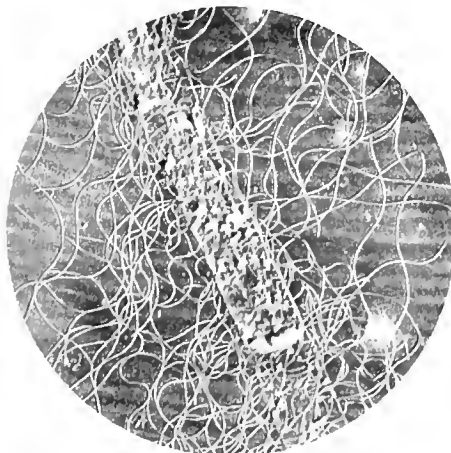
Medical research has been stimulated by enlargements of minute organisms such as this one, showing a type of colon bacillus.



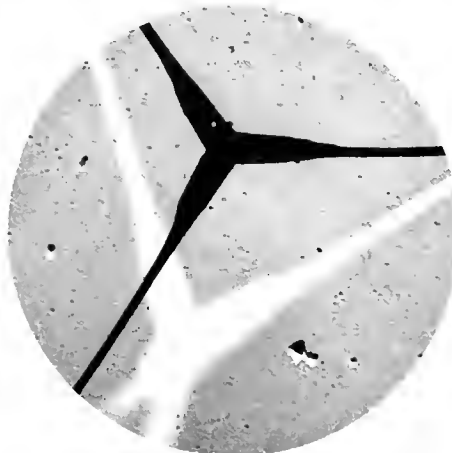
A relation between rodlike particles and influenza virus is indicated to bacteriologists in this micrograph, magnified 35,000 times.



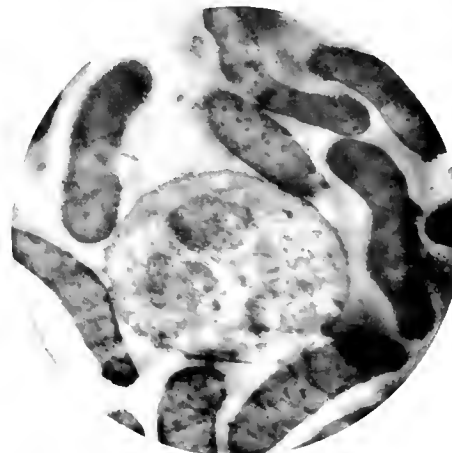
Ropey structure of lime soap grease was unsuspected until the electron microscope brought the unusual formation to visible size.



The wavy threads in this micrograph of a bacterium are less than a millionth of an inch wide, visible only in an electron microscope.



A crystal of zinc oxide smoke is a pattern of perfect symmetry under the powerful lens of the electron microscope.



Red blood cells surround a white blood cell in this ultra-thin section of human tissue photographed at RCA Laboratories.



THE NEW RCA-EQUIPPED LUXURY LINER SS INDEPENDENCE RECEIVES A TYPICAL MARINE SALUTE AS IT ENTERS NEW YORK HARBOR FOR THE FIRST TIME.

AN OFFICER TAKES THE SHIP'S BEARING WITH THE LATEST MODEL RADIOMARINE DIRECTION FINDER.



New Luxury Liner Is Equipped with Latest Radio Instruments

All Navigation and Communication Apparatus on Independence Supplied by Radiomarine.

WHEN America's newest luxury liner, the 26,000-ton American Export Line's *Independence*, sailed on her maiden voyage in February, she was virtually a showcase of Radiomarine communications and navigation apparatus. As adjuncts to the safety and convenience of the ship's 1,000 passengers were the following equipments, all manufactured by RCA: long range radar; direct-reading loran; pinnacle-type direction finder; two radiotelephone transmitters; a radiotelegraph station and an internal communication system which permits passengers to send and receive radiograms, ship-to-shore, direct from staterooms and cabins.

RCA's new high-power shipboard console consists of a 500-watt main transmitter with eight channels, a 500-watt high-frequency transmitter with 10 channels, a 40-watt emergency transmitter with five channels, and three receivers with a combined frequency range of from 15 to 650 kilocycles and from 1.9 to 25 megacycles.

The radar, with its 12-inch viewing scope, is an improved version of the type now installed aboard

such ships as the Holland-American Line's *SS Niour Amsterdam*, the Swedish-American Line's *SS Stockholm*, the United States Line's *SS Washington* and many other large, transoceanic liners. The unit operates on a wave length of 3.2 centimeters, with a range from 75 yards to 40 miles.

In the ship's Chart Room, the direct-reading loran indicator displays time differences directly on a simple dial, making interpolation unnecessary.

After his ship's recent ocean

trials had been completed, Captain Hugh L. Switzer, master of the *Independence* (the American Export Line's speedy flagship), said: "Our communications and navigation equipment performed admirably, as expected. Radiomarine can well be proud of the accuracy, durability and dependability of their products."

A duplicate of the *Independence* installation is being made aboard her sister ship, the *Constitution*, now nearing completion at the Quincy Mass., shipyard.

SCENE ON BRIDGE OF THE INDEPENDENCE SHOWING, AT LEFT, THE RCA RADAR UNIT WHICH CAN DETECT OBJECTS WITHIN A 40-MILE RANGE.



Portable Television Transmitter And Camera

*Using Pencil-Sized Tubes and Miniature Components, RCA Develops Back-pack Unit
Weighing Only 53 Pounds and having Range of One Mile.*

A NEW portable television camera and transmitting station, designed to operate in the field as a one-man back-pack unit, was demonstrated by L. E. Flory, of the RCA Laboratories, at a meeting of the Institute of Radio Engineers on March 21.

Weighing only 53 pounds, the back-pack station is planned to function with its own battery-power supply. It has a range of approximately one mile. Because of its easy portability, numerous applications for the new equipment are foreseen by RCA research engineers. Among these are news coverage, with television-equipped reporters flashing pictures and commentary directly to editorial rooms, and remote industrial viewing and control.

The new transmitter operates in conjunction with a control station which may be located as far as a mile from the camera. Signals corresponding to the scene being televised are transmitted to the control point on an ultra-high frequency with a power of two watts. In addition to acting as a monitor for the

televised picture, the control point performs two other functions. It sends out a stream of pulses which stabilize the camera and can be used also to issue vocal instructions to the cameraman.

Recent developments in the design of pencil-sized tubes and other sub-miniature component parts made possible the impressive reduction in bulk and weight of the equipment.

Equipment Carried as Back-Pack

The back-pack is carried in knapsack fashion, suspended from the narrator's shoulders by flexible straps. Two small antennas extend from the top of the pack and are used respectively to transmit the picture signal to a base station and to receive voice and control signals from that same point.

The camera is an adaptation of the RCA industrial TV camera using the Vidicon tube. As an added feature, the camera includes a miniature kinescope picture tube which serves as a view-finder for the cameraman. Through it he is able to see an exact reproduction of

the scene on which the camera lens is focused.

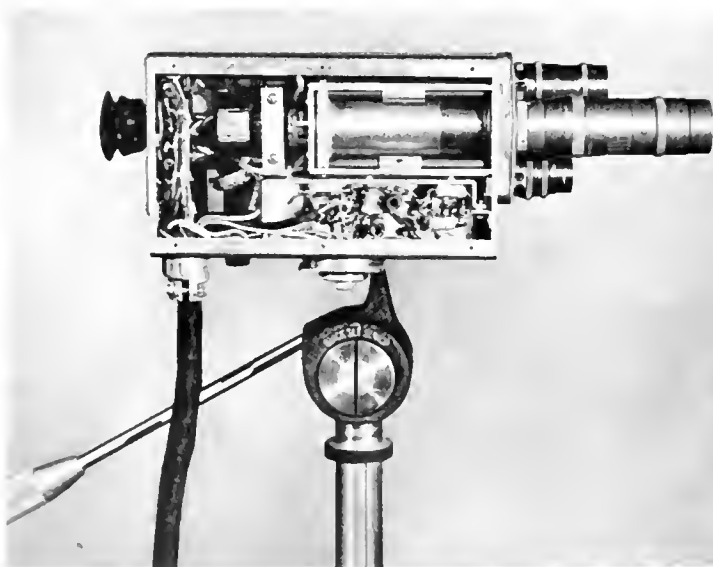
The equipment contains 42 tubes which, with their associated circuits, provide all synchronizing frequencies for a standard 525-line, 30-frame interlaced television picture. Included in the unit are the battery-operated power supply, deflecting circuits, amplifiers, and a radio receiver for receiving instruction and other essential information from the control point. A single battery operates the portable station for about 1½ hours.

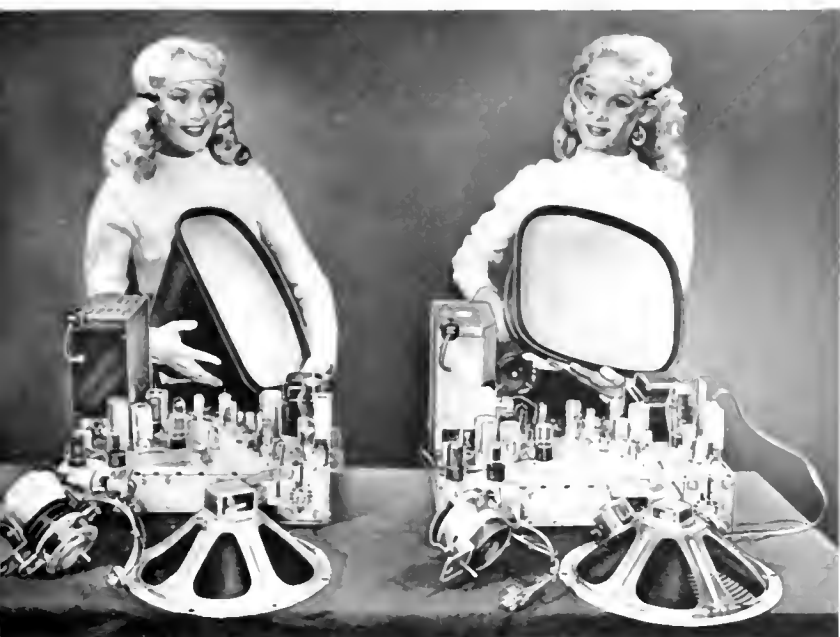
The narrator-cameraman's voice is picked up and transmitted through the combination of a small microphone built into the camera case and an ingenious electronic circuit which adds the voice signals to the picture signals as they are radiated to the control point.

Research and development of the portable television equipment were carried out by Mr. Flory, W. S. Pike, Jr., J. E. Dille, and J. M. Morgan, of the RCA Laboratories, under the direction of Dr. V. K. Zworykin, Vice President and Technical Consultant.

CONTROL PANEL OF PORTABLE TV SYSTEM, INCLUDING MONITOR SCREEN AND TWO-WAY RADIOTELEPHONE FACILITIES.

SIDE VIEW OF PORTABLE TELEVISION CAMERA, SHOWING VIDICON TUBE (UPPER RIGHT) AND CONTROL UNITS.





SUBSTANTIAL SAVINGS IN COBALT, STEEL AND OTHER CRITICAL MATERIALS HAVE BEEN ATTAINED IN THE NEW RCA TELEVISION CHASSIS (RIGHT) WITHOUT AFFECTING RECEIVER OPERATION.

Critical Materials Saved

Technical Developments in Picture Tubes and Loudspeakers Alone Reduce Cobalt Usage by 90 Percent.

NEW technical developments, which will enable the radio and television industry to effect savings in defense-strategic materials and still maintain present high-quality standards, have been disclosed by the Radio Corporation of America.

They include an electrostatic picture tube and redesigned loudspeakers, which alone reduce the amount of critical cobalt in the average television receiver by 90 percent.

"When these conservation steps are applied by the industry," Frank Folsom, President of RCA, declared, "they will save millions of pounds of cobalt, copper, nickel, aluminum, brass, steel, and other critical metals."

The new engineering developments, which extend over the whole range of radio and television production, are the direct result, Mr. Folsom said, of the Corporation's comprehensive conservation program which was stepped up with the outbreak of the Korean War.

RCA already has turned over to radio, television, and tube manufacturers throughout the industry developments resulting from its 8-months emergency-intensified research work, he said. The manufacturers were also assured that additional engineering advances will be passed on to them.

Product Quality Maintained

RCA approached the problem of material conservation, it was pointed out, with the idea of maintaining product quality and performance by taking full advantage wherever possible of new non-critical materials.

In his letter to the manufacturers, Mr. Folsom declared:

"I know you will join with us in earnestly pursuing this conservation program, not only for the resulting substantial savings in vital metals, but also to demonstrate to our Government officials the industry's resourcefulness in this time of emergency." He added:

"Only by doing everything possible to help itself can the industry feel morally justified in asking the help of Government agencies in supplying sufficient critical materials to permit continued production of peacetime products which, in turn, enable us to hold together our technical skills and our trained workers until they are needed to produce electronic equipment for the military services."

By finding new ways to use scarce materials, Mr. Folsom explained, the industry has been able to maintain a substantial level of production which has meant continued employment for thousands of skilled workers in the plants of both manufacturers and suppliers.

Mobilization Determines Production

How long the present production rate can be maintained will depend, he added, on material restrictions imposed by expanding requirements of the mobilization program, as well as on the continued ingenuity of the industry in finding ways to further conserve strategic materials.

Mr. Folsom listed these material savings for every million average 17-inch television sets produced by the industry: Alnico V (an alloy containing 24 percent cobalt, and other scarce materials), 732,800 pounds; steel, 784,000 pounds; copper, 510,700 pounds; aluminum, 224,000 pounds; brass, 146,100 pounds; and nickel, 16,000 pounds.

The conservation program also has been extended by the RCA Service Company to installation of television sets in the home. By redesigning the antenna, aluminum has been cut 50 percent, an annual saving of 2,000,000 pounds per million installations if applied on an industry-wide basis. The use of copper in transmission lines also has been drastically reduced with the possibility of still further savings.

The new electrostatic picture tube eliminates the need for a large external focusing magnet, biggest cobalt user of any television part, and is fully comparable in performance to picture tubes now in use. The redesigned loudspeakers also permit substantial savings of this scarce metal through the use of a new magnet structure.

Measures Color Values

Electronic Device, Called a Tristimulus Photometer, Gives Accurate Analysis of Spectrum Components in Light Source.

COLOR from a direct light source can be measured quickly and accurately through the use of a new instrument developed by RCA Laboratories, Princeton, N. J.

Called a "tristimulus photometer," the new instrument uses only five electron tubes and is no larger than a shoe-box. It simultaneously determines the relative strength of the three basic color components in a light source under study and gives an instantaneous reading. Previous methods of color specification require roughly one-half hour of measurement with a spectrometer followed by several hours of computation.

Though the spectrophotometric method gives a higher degree of accuracy, the tristimulus photometer can give values of the three-color components sufficiently precise for every-day engineering work and can readily distinguish between two different color samples which are close enough together in value so they would appear identical to the eye.

The instrument was designed specifically to provide a laboratory and studio check on the faithfulness of color reproduction in color television. However, since it can determine the values of a reflected light

source as well as a direct one, the device may also have valuable application in the textile, paint and other industries where color matching is critical. A direct-reading electronic instrument has been designed by the National Bureau of Standards of the U. S. Department of Commerce, which can define the components of reflected light, but cannot handle a direct light source such as that of a television screen.

Apparatus has "Eye" and "Brain"

The new instrument consists essentially of an "eye" and a "brain." The "eye" is made up of a lens which focuses the light under study onto a mirror assembly designed to split the beam into three parts of equal intensity. The three beams then pass through three filters, each sensitive to a range of wavelengths corresponding to the basic color components.

The "brain" of the instrument starts with three photocells, one for each filter. The photocells convert the light energy to electrical energy which passes through circuits, each of a different design, to compensate for the mathematical dissimilarities between the three color components. Finally, a corrected value for each component is read on microammeters.

Proposes "Pool of Ideas" For Television Service

Confidence that the television service industry could, by pooling its ingenuity, effect measures necessary to see it through the critical months ahead in the face of the twin problems of availability of qualified service technicians, installation materials, and replacement parts and tubes has been expressed by E. C. Cahill, President of the RCA Service Company.

As a contribution to the "pool of ideas", the Service Company will soon make available to the servicing industry a comprehensive conservation and alternate materials program related wholly to installation and servicing of television receivers, Mr. Cahill disclosed.

This report will expand and supplement the over-all materials conservation report which the Radio Corporation of America has already turned over to television, radio, and tube manufacturers. The RCA materials conservation report has also been sent to the servicing industry, he said.

The supplementary report will contain a compilation of the most commonly used parts and tubes in installing and servicing television sets. A comprehensive cross index indicates the many alternate parts and tubes which can be used when so-called standard components not readily available.

"While the industry has long been aware of the wealth of alternate components available, we have all more or less concentrated on specific parts and tubes," Mr. Cahill pointed out. "Today, there is a great need for a compilation which can keep the technician and service agency fully informed on alternate components which perform as effectively as a given part or tube which may be in scarce supply."

Mr. Cahill declared that the RCA Service Company will continue to make available the one-year Factory Service Contract as well as the lower-cost limited contract. It will also provide service on a time-and-materials basis to those RCA Victor television set owners who prefer this type of service.

GEORGE C. SZIKLAI, OF RCA LABORATORIES, DEMONSTRATES THE TRISTIMULUS PHOTOMETER, WHICH PERMITS RAPID ANALYSIS OF COLORS.



Engineers Assured Enemy Action Will Not Silence Radio Stations

RCA Laboratories Staff Member Says Protective Measures Will Be Effective in Emergencies.

PROTECTIVE measures already in force at American radio stations are sufficient to outwit enemy attempts to silence all broadcasting by bombing and sabotage, Arthur Van Dyck, staff assistant at RCA Laboratories, assured members of the American Institute of Electrical Engineers in session at the Hotel Astor, New York, on January 23. In densely populated areas such as New York, he pointed out, radio stations are distributed over a wide area and even though one or more are silenced by enemy action the remaining transmitters would continue to be available for distributing vital information and instructions to the populace.

The problem of transmitter protection, he said, is not a serious one in this country.

"If our system were like that of most other countries," he said, "with but one station serving each area the problem would be more difficult. To interrupt broadcast service from the 26 stations in the New York area, it would be necessary for an enemy to silence not one or two stations, but at least the fifteen which give good signals throughout the metropolitan area."

The damaging of any lesser number, he continued, would not stop broadcast service, provided that substitution and alternate use of stations had been arranged. Only a minor degree of organized planning is necessary to accomplish this, and it is being carried out.

In peacetime, Mr. Van Dyck explained, major stations have devised means for staying "on the air" when confronted by abnormal conditions, and their staffs are fully experienced in the requirements for continuous operation even under these difficulties. Emergency transmitters are available for immediate use in many stations, and some have emergency antennas.

"While it is probably impossible to prevent an expert and determined saboteur from putting any

single station out of operation, at least temporarily," Mr. Van Dyck conceded, "the protection is complete enough to discourage all but the most determined and well-equipped efforts."

Even the loss of the large towers of broadcasting stations would not be a crippling blow, he said. Emergency service could be established quickly through the erection of hundred-foot poles, or balloon-supported wires. Furthermore, he told the engineers, World War II experience proved that it is extremely difficult to put a radio station out of commission by air bombing, unless by a direct hit.

Care in setting up special protective measures would prevent the unauthorized use of broadcasting facilities by subversive action, he pointed out.

Sarnoff Receives World Brotherhood Award

Brig. General David Sarnoff, Chairman of the Board, Radio Corporation of America, received one of the first World Brotherhood Awards of the Jewish Theological Seminary of America at ceremonies held at the Waldorf-Astoria Hotel on March 18. The award, which was presented by Dr. Louis Finklestein, president of the seminary, cited General Sarnoff for "his scientific contributions that have brought men everywhere closer in mind and spirit."

In accepting the award, RCA's Board Chairman pointed out that if men are to become masters rather than slaves of science, "we must learn to use its powers with good purpose; and that purpose must be the well-being of our fellow men."

"What is needed," he said, "is for all of us—you and I and our fellow men everywhere—to recognize and give practical application to the ideal of brotherhood. . . . We have no choice. Either all men

Mr. Van Dyck also expressed a doubt that broadcasting would be shut down in the event of an enemy attack, as was the custom at times in World War II. The silencing then, he said, was carried out to deny to enemy planes the use of radio signals for navigational purposes.

"No modern aircraft navigator," he explained, "would need to use broadcast station emissions to locate any city in the United States. As a matter of fact," he added, "there is more danger from special stations installed by enemy agents and operated when needed, than from use of our radio stations."

"In the event of an air attack," he explained, "many hundreds of points need to be alerted and signalling to them within a few seconds is vital. This can be done only by widespread high-power radio stations, and means are available whereby it can be accomplished on standard broadcast stations without interfering in any way with the normal operations of the stations."

learn to live and work together, or all men will perish together."

General Sarnoff recalled that he had recommended plans for an international broadcasting service which materialized as "The Voice of America," and subsequently also as "The Voice of the United Nations."

"Today," he said, "both of these broadcast services are striking examples of the power of radio to reach afar in an effort to cultivate greater understanding among the free peoples of the world." He expressed the hope that "the range of these broadcasts will be extended and that people everywhere—even those behind the Iron Curtain—will be permitted by their governments to listen to them."

"Television has not yet spanned the ocean," he said, "but I am sure it will. And when it does, we shall have a program that may be called 'The Voice and Vision of the U.S.A.' This can be a strong and powerful force for peace."

Scientific Research as a Factor in American Business

In Address to Patent Law Experts, E. C. Anderson Cites Contributions of RCA to Radio, Television and Other Technical Industries.

MORE than \$50,000,000 has been invested by the Radio Corporation of America in television research and development, E. C. Anderson, Vice President in Charge of the Commercial Department of RCA Laboratories, said in an address before the Patent Law Association of San Francisco on February 28.

"Most of this outlay," Mr. Anderson added, "was made before a single dollar returned to anybody, including RCA."

Scientific research, he declared, has become the major factor in the progress of all American business. Out of pioneering research efforts, such as RCA made in television, have come the new inventions and techniques which have brought prosperity to entire industries, he said.

With both black-and-white and color television, RCA's research costs were borne in the belief that television would become a "great new American art and industry," according to Mr. Anderson. RCA had faith that its money and research would eventually pay off in good will and in service to the public and the industry, he added.

Illustrating RCA's contribution to the television industry, Mr. Anderson told how, after World War II, various competitors were invited by Frank M. Folsom, President of RCA, to inspect the facilities of RCA's Camden, N. J., plant.

"At Camden," declared Mr. Anderson, "we handed our guests the blueprints for the manufacturing of our television receivers, complete with a bill of material, and we told them they were free to use them any way they desired. Then we took the entire party through our television plant and let them see what we were doing. We told them it was a job for an entire industry—not just one company.

"We got competition, all right. Several of the companies have told

us since that they never would have gone into television if they had not been so thoroughly sold at that first post-war meeting. Let us see what this good-will gesture did for the industry. Here are a few figures that tell the exciting story:

"On January 1, 1947, sets in use by the public numbered 16,476. By January, 1948, the total reached 189,000. On January 1, 1949, it was 1,000,000. January 1, 1950, it was 3,950,000. On January 1, 1951, the total was over 10,000,000!"

Results Available to Industry

Mr. Anderson said that, of course, RCA had benefited from this, through the sale of large quantities of television sets and by supplying a mounting quantity of tubes and parts to competitors in the radio-electronics field.

"In addition," he said, "we have

the satisfaction of knowing that the results of our twenty years of research in television have been made available to American industry and to the American public at an exceedingly modest price."

Mr. Anderson recalled that when he entered the radio industry, some 29 years ago, the confusion and uncertainties, particularly with regard to patents and invention represented a far cry from today's flourishing vigor of radio, television and electronics.

"The blight on the budding radio industry," he declared, "stemmed largely from confusion over the ownership of inventions. Some of these inventions dated back to 1890 when radio's first dots and dashes emanated from Marconi's experiments.

"Others were the result of American and British initiative before and during World War I. Characteristic of the situation, as the United States Navy learned, was the refusal of many patent owners to exchange their inventions with others. By 1919 the uncertainty over rights had created almost a complete stalemate in radio progress.

"It was that year, at the sugges-

(Continued on page 31)



IN FOUR YEARS THE TELEVISION SET INDUSTRY HAS INCREASED ITS ANNUAL OUTPUT MORE THAN 35 TIMES.

Home Study Television Course Offered to Industry

RCA Institutes Makes Texts Available to Meet Growing Shortage of Technicians.

As a major move to circumvent the rapidly developing shortage of trained television servicemen, RCA Institutes, Inc., one of the nation's oldest electronics training schools, has announced that it will open to the industry a highly-specialized, field-tested Television Home Study Course for training television servicing technicians. The course will be limited to working members of the radio and television industry, but previous service experience is not required. Unemployed independent radio and television servicemen are also eligible. Enrollments are now being accepted.

Developed jointly by the RCA Service Company and RCA Institutes, Inc., for use in training company technicians, the course resulted from 14 months' study in the field, according to General George L. Van Deusen, President of RCA Institutes, Inc. Revised and amplified, it is now being made available to the entire radio and television industry.

Representing a combination of practical "how it works" information with pre-tested "how to do it" techniques, the course is planned to extend the work potential of the existing manpower pool by supplementing the knowledge and improving the techniques of servicemen now on the job, Gen. Van Deusen said.

Meets Special Need of Industry

"Designed to meet the special needs of the servicing industry, this Television Home Study Course emphasizes practical, pre-tested installation and servicing functions, and presupposes that the student is actually working in the industry," he said. "Its purpose is not only to make servicemen, but to make better ones."

In addition, General Van Deusen added, the course makes possible the rapid conversion of installation men into service technicians, and represents supplementary training which makes practicable the hiring of inexperienced trainees.

CORPS OF DRAFTSMEN WORKED FOR MONTHS IN LAYING OUT DIAGRAMS AND ILLUSTRATIONS FOR THE HOME STUDY COURSE.



GENERAL G. L. VAN DEUSEN (LEFT), PRESIDENT OF RCA INSTITUTES, INC., RECEIVES HOME STUDY LESSON NO. 1 IN TELEVISION FROM BERNARD GROB, WHO DIRECTED PREPARATION OF THE TEXTS.

Approved by the New York State Department of Education, the Study Course consists of 10 lesson units, the first of which is mailed to the student upon enrollment. Each unit contains a home assignment which covers the material presented. Completed by the student and returned to the RCA Institutes, Inc., the assignment is reviewed and graded by a qualified instructor. The assignment is then returned to the student with appropriate comments and advice, and the next unit is furnished to the student.

The first lesson was made available to the RCA Service Company, for incorporation in its technician training program, in October, 1949. Today, thousands of RCA technicians take the Course.

A detailed course outline, together with further information regarding tuition rates and enrollment forms are available on request from the Home Study Division, Room 300, RCA Institutes, Inc., 350 W. 4th St., New York 11, New York.



A BATTERY OF SOUND EFFECTS RECORDS WAS REQUIRED TO RE-CREATE THE FIRST ATOMIC BOMB BLAST FOR THE "QUICK AND THE DEAD" PROGRAMS, NOW AVAILABLE ON RECORDS.

"Quick and the Dead" Radio Dramas Recorded

"The Quick and the Dead," NBC's dramatic documentary radio series on the atomic and hydrogen bombs, has been recorded by RCA Victor in all three speeds—33-1/3, 45 and 78 revolutions a minute.

"The Quick and the Dead" stars Bob Hope in the role of an American taxpayer eager to learn about nuclear fission when he discovers that he is contributing substantially to the support of the atomic energy program. His questions are answered, in layman's language and through the use of dramatic flashbacks, by William L. Laurence, New York Times science reporter and two-time Pulitzer Prize winner who explained the atom to the public in 1945.

Other stars appearing in "The Quick and the Dead," which won great critical and popular acclaim, include Helen Hayes in the role of Lise Meitner, the German woman scientist who first split the atom, and Paul Lukas as Professor Albert Einstein. Many of the other voices are those of the scientists and military men who took part in creating the bombs.

Highlights of "The Quick and the Dead" include the re-enactment of the explosion of the first atomic bomb in the New Mexico desert. Special sound effects in NBC's largest broadcasting studio resulted in an accurate re-creation of the explosion.

The building of the first atomic chain reaction at Stagg Field, Chicago, is also featured in "The Quick and the Dead," as is the story of the bombing of Hiroshima.

The momentous events which preceded President Truman's instruction to the Atomic Energy Commission to build a hydrogen bomb are also described in the documentary.

"The Quick and the Dead" concludes with a description of the peacetime uses of atomic energy for mankind's benefit.

"The Quick and the Dead" was written and directed by Fred Friendly and produced by NBC's News and Special Events Department under the supervision of William F. Brooks, vice president in charge of public relations.

Television Goes Abroad

(Continued from page 15)

For this six-week sojourn, the technicians used two mobile TV units to cover such colorful spectacles as the dances of Sevilla and Aragon reviews of the Moorish Guards, and the Spanish ballet. In addition, a special demonstration was given in the palace of Generalissimo Francisco Franco.

Demonstrations conducted in Bermuda and London also have been included in the itinerary of these peripatetic crews, who have found that junketing from country to country with several tons of video equipment, and producing programs in strange locations, is not an easy task.

Describing the function of an image orthicon tube to bewildered and somewhat suspicious customs officials; installing transformers to compensate for undependable power supplies; outlining problems to local electricians, whose willingness to help is sorely handicapped by their inability to speak English; explaining to eager newsmen in a few "simple" sentences just how television works—these are some of the minor problems confronting these travelling crews. Although the men regularly encounter hard work and minor crises, the completion of a successful assignment brings a degree of satisfaction which more than compensates for the strenuous life they lead.

Bolivar Statue Unveiled By Electronic Device

An electronic device, especially constructed for the occasion by RCA Communications, Inc., was used to unveil, by remote control, the refurbished statue of Simon Bolivar at ceremonies in New York's Central Park on April 19.

Following his scheduled address to be transmitted here over an RCA shortwave radio circuit, President German Suarez-Flamerich, of Venezuela, sent signals from his desk in Miraflores, the Presidential Palace, in Caracas. His push-button signals caused the electronic apparatus to light up and to unloosen the shroud covering the statue at its new location facing the Avenue of the Americas.



USING RCA MOBILE-RADIOTELEPHONE UNITS, INSTALLED IN EIGHT TRUCKS OF CUBA'S LARGEST EXPRESS FIRM, DRIVERS CAN RECEIVE INSTANT INSTRUCTIONS FROM HEADQUARTERS.

ONE DISPATCHER CAN DIRECT MOVEMENTS OF ALL RADIO-EQUIPPED TRUCKS.



Cuban Firm Adopts 2-Way Radio

EXPRESS trucks equipped with RCA mobile radio units are making their first appearance in Latin America. Installed in eight vehicles of Cuba's largest express trucking firm, *Trafico y Transporte, S.A.*, the RCA Fleetfone units proved successful in their initial tests.

Before the installations were made, valuable time was lost by drivers who had to stop frequently to telephone the main office for further instructions. With the RCA radiotelephone units, however, an expressman can, in a matter of seconds, give his location and receive his next assignment without moving from the driver's seat. This new method of operation has made it possible for *Trafico* to serve

many more customers in a quicker and more efficient manner.

Humara y Lastra, RCA distributors in Cuba, planned the mobile radio network that eventually may connect the firm's Havana office with *Trafico* trucks in every part of Cuba. The installation consists of a Fleetfone 250-watt fixed station transmitter, located in the Company's headquarters; a nondirectional VHF antenna, erected atop a 100-foot mast on the main office building, and Fleetfone units for the vehicles themselves.

The initial installations have proved so beneficial to the Company and its customers that plans are in progress to equip many more of the fleet of 125 trucks in a similar manner.

NBC to Present History of Navy in TV Series

A television history of the U. S. Navy from the period immediately preceding World War II and leading up to the present—the first of its kind—is to be produced by the National Broadcasting Company, in cooperation with the Department of the Navy, beginning later this year.

The series, according to Sylvester L. Weaver, Jr., NBC vice president in charge of television, represents NBC's first major effort to establish a pioneering pattern for presenting history by television. In commenting on the project, Under Secretary of the Navy Dan A. Kimball said: "Navy and NBC technicians are preparing to screen literally hundreds of thousands of feet of official Navy film to pick out the very best for presentation to the American public. Much of this film, for security reasons, has never before been exhibited. NBC's television techniques plus the technical skill of the Navy Photographic Center should be able to combine to produce a memorable series."

In his announcement of the series, Weaver said: "This new project represents the first major attempt by television to tackle the problem of presenting contemporary history on a comprehensible, dramatic basis."

Based primarily on Captain Samuel Eliot Morison's "History of U. S. Naval Operations, World War II," commissioned by President Franklin D. Roosevelt, the series will utilize films made by the U. S. Navy in all its activities, including sea, air, Marines, submarine, amphibious sea and land operations and related operations with other services.

Weaver announced that the network would set up a special unit to coordinate and produce the new project and that Henry Salomon, Jr., (Lt. Comdr., USNR) who assisted Capt. Morison in the six-year preparation, production and writing of the "History," would be in over-all supervision of the content. Salomon, as Capt. Morison's first assistant, participated in many of the major naval operations as a historical observer.

"Shoran" Used in Korea

*Highly Accurate Electronic Bombing Aid of World War II
Now Pin-Pointing Enemy Objectives in Far East.*

SHORAN, the bomber pilot's distance-measuring "yardstick", which won distinction in the closing months of World War II as one of the most dramatic contributions of electronics to America's military strength, is being used in Korea, according to press dispatches from Fifth Air Force Headquarters.

Invented by Stuart W. Seeley, director of the Industry Service Laboratory of RCA Laboratories Division, and developed by scientists and engineers of the Radio Corporation of America as an outgrowth of the study of television "ghosts", shoran makes it unnecessary for airmen to see the target in order to make a pin-point strike. The system was used with devastating effect in "blind" bombing over European battlefields, where it was credited with uncanny accuracy in spotting targets at distances up to 250 miles, and under any condition of visibility, night or day.

Shoran, like radar, employs the

echo-timing principle in which distance is measured by the elapsed time between transmission of a radio-wave pulse and the receipt of its reflection. In the military application of shoran, the bomber transmits individual signals to two widely separated ground stations whose locations in friendly territory are known with great accuracy. When the signals reach the ground stations, the pulses are retransmitted to the plane where special receivers and apparatus automatically compute the distance of the plane from each ground station. This information, together with the known distance between ground stations, determines the plane's location with respect to the target.

A Secret for Eight Years

Although RCA began work on the shoran project in 1938, it was not adapted to military use until late in World War II, when development for the Army Signal Corps was completed. Shoran remained a

closely guarded military secret until 1946. First proof of its effectiveness in the last war came when shoran-aimed bombs demolished a 30-foot enemy bridge in Northern Italy which several runs by visual bombers had failed to destroy. Thereafter, it was widely used and with phenomenal results. Toward the end of the war in Europe, the amount of tactical bombing done in any area depended largely on the availability of shoran equipment.

Shoran bombing was employed not only against military targets, but with devastating effect against enemy personnel. On many occasions, rolling barrages of fragmentation bombs were laid down only a few hundred feet ahead of advancing Allied troops. Such barrages, delivered by planes completely hidden from the ground, had a tremendously demoralizing effect on opposing ground forces. Shoran is also well-suited for air support of landing operations, since planes equipped with the device can lay a barrage of aerial bombs precisely along a definite line, enabling air crews to release bombs at correct points for maximum impact along such a line.

Accuracy Shown in Field Tests

During World War II, field tests made of shoran-equipped planes during photographic reconnaissance flights showed that the probable error often was not more than 50 feet, independent of altitude distance, and without the necessity of establishing control points (known absolute positions) in the area to be photographed.

Shoran equipment, including ground stations, can be readily transported by air and set up in a few hours. Equipment in the plane requires only one operator, who may be an existing crew-member such as navigator or bombardier. Each ground station also can be operated by one man, and two ground stations can furnish shoran service to a number of equipped planes within range.

Other possible military uses of the system include shoran navigation of remotely controlled planes, and shoran position-indication for precise dropping of air-borne troops, weapons and supplies.



BRIG. GENERAL DAVID SARNOFF, CHAIRMAN OF THE BOARD, RADIO CORPORATION OF AMERICA, IS PRESENTED WITH A CITATION FOR DISTINGUISHED SERVICE TO THE AMERICAN RED CROSS BY E. ROLAND HARRIMAN, PRESIDENT OF THE RED CROSS, AS GENERAL GEORGE C. MARSHALL (CENTER), WHO RECEIVED A CERTIFICATE OF MERIT AT THE SAME PRESENTATION CEREMONIES, LOOKS ON. GENERAL SARNOFF HAS BEEN SERVING AS NATIONAL CHAIRMAN OF THE 1951 RED CROSS FUND CAMPAIGN.

UHF Converter for TV

(Continued from page 13)

President and General Manager of the RCA Victor Division.

In the statement, Mr. Buck also assured owners of two million RCA Victor television sets that, while such service from UHF stations is not expected before late 1952 or early 1953, a simple, high-quality converter will be made available so that telecasts can be received on ultra-high-frequency channels with quality comparable to those received from the very-high-frequency bands now in use.

Pointing out that every current television set, regardless of make, will require some modification to receive a UHF signal, Mr. Buck added:

"Our experiments at Bridgeport and in the laboratory have conclusively proved to us that the best way of accomplishing UHF reception on existing receivers, when UHF arrives, is by means of a converter.

"No receiver currently manufactured has provision for conversion to UHF without additional cost for equipment and installation, normally including the addition of a special outdoor antenna."

Other points made by the RCA Victor executive were:

Final approval of the new UHF channels as yet has not been given by the FCC.

Assignments of the new channels to stations cannot be made until such final approval has been given by the FCC.

Aside from delays which may be caused by shortages of critical materials, the time cycle required for construction and installation of transmitting equipment, and erection of transmitting antennas, is such that large-scale telecasts of UHF will not commence before late 1952 or early 1953.

When UHF broadcasts commence, RCA Victor, and, it is assumed, other manufacturers, will have available an adequate supply of high-quality converters for present VHF receivers assuring full-band reception of all the UHF channels without sacrificing any of the present VHF channels.

Dr. Zworykin Receives I.R.E. Medal of Honor

Dr. Vladimir K. Zworykin, Vice President and Technical Consultant of RCA Laboratories, Princeton, N. J., received the 1951 Medal of Honor, highest award of the Institute of Radio Engineers, at the organization's annual banquet at the Waldorf-Astoria Hotel, in New York City on March 21. He was cited "for his outstanding contributions to the concept and development of electronic apparatus basic to modern television, and his scientific achievements that led to

fundamental advances in the application of electronics to communications, to industry, and to national security."

In accepting the award, Dr. Zworykin urged his fellow radio scientists to make electronics serve mankind through medicine. "The range of problems in medicine to which electronic methods could be applied," he said, "is remarkably broad, embracing both diagnosis and therapy. Increased emphasis on this objective would enhance the service of our profession to mankind and broaden the base of the electronics industry."

Tri-Color Tube Details Revealed

COMPLETE information on the procedure to follow in building the tri-color television picture tube developed by the Radio Corporation of America for the reception of all-electronic, compatible color television, has been made available by RCA to other television receiving tube manufacturers.

This tube, acclaimed a "miracle of science" and recognized as vital for the complete development of a practical, all-electronic color television receiver, was first demonstrated publicly on March 29, 1950. A week later it was shown officially to members of the Federal Communications Commission.

Details disclosing for the first time the full technical characteristics and construction of the tri-color tube were contained in a bulletin prepared and issued by the Industry Service Laboratory of the RCA Laboratories Division.

This bulletin was the fourth issued by RCA making known to other manufacturers its progress and methods in developing an all-electronic, compatible color television system. Previous bulletins contained circuit details of RCA color television sets, demonstrated for the press and television industry in December at Washington, D. C.

The latest bulletin illustrated and described steps that may be taken to build engineering models, similar to the RCA experimental three-gun color picture tube of direct-

view type used during the Washington demonstrations.

It pointed out that a single-gun tube (one having but one emission source of electrons) may be built on the specifications provided, with relatively few modifications, and that many of the techniques used in making present black-and-white picture tubes also may be employed.

One of the steps described in today's bulletin lifted the veil on an achievement which has caused wide speculation in the industry. This was how RCA engineers succeeded in placing 600,000 phosphor dots of the primary colors, green, red and blue, in the screen assembly.

These diminutive dots are arranged in groups of three and so positioned that the electrons from each of the three electron guns in the base of the tube always strike the dots of its own color. The phosphor dot groups are so small and so close together that when illuminated by the electron streams they present a continuous, smooth, full-color picture.

Manufacture of the tri-color tube, the bulletin pointed out, is divided into two parts: (1) fabrication of a screen assembly which includes an aperture mask and a phosphor-dot plate, and (2) the building of this assembly together with electron guns into a metal envelope to form the finished tube.

The tri-color tube may be built in sizes comparable to those of present black-and-white television receiving tubes.

Planning Industrial Mobilization

(Continued from page 8)

Profit and Loss statements. Furthermore, good planning obviates heavy post-war conversion costs which might involve so much economic disruption impairment of our national strength that any war we might win would entail a realistic losing of the peace. Incidentally, industry cannot recover the post-war reconversion costs from the Government.

We must also recognize, as part of our industrial mobilization planning, the problems of small business and conservation.

Small Business: Small business is an integral part of our economic life. It is the responsibility of big business to recognize this and take the lead in seeing that small business is provided its full share of Government orders. One means of accomplishing this is by subcontracting, thereby making available to small business the engineering know-how it may not have and cannot normally afford. Using the Government definition of small business as those firms which employ fewer than 500 persons, the RCA Victor Division has found that of the 4800 suppliers in 41 States with whom it did business in 1949, a total of 3771, or 79% are small business concerns. These suppliers received approximately 45% of our total dollar purchases. As examples of the importance of small business in supplying RCA Victor with some of its major commodities, it should be noted that 90% of our lumber and log purchases are from small companies, as well as 40% of our wire purchases. Over \$6,000,000 is spent annually with small business for cabinets.

These statistics cover our overall purchases — both commercial and Government. To determine the participation of small business in our Government orders, we analyzed one contract, and found that of the 119 subcontractors, 73% were small business, and that they received 45% of the total volume of purchases. The fact that the percentages in this sampling were consistent with our overall figures may indicate that we are running

at about the same rate in our purchases against Government contracts as we are in our overall purchases.

Conservation: It's perfectly obvious that any saving of critical materials redounds not only to the benefit of the company making the saving, but also to that of industry and of the nation. RCA is making a noteworthy contribution to this cause, both by substitution of other materials for those in critical supply, and through the campaign currently underway to eliminate waste throughout our plants. There are doubtless many more pioneers in this field. Conservation is truly "everybody's business."

Overall industrial mobilization planning presents many vital problems, and their satisfactory solution will take all the ingenuity we can jointly bring to bear on them. It is an all-hands job — both for those in Government and those in industry. Each of us should analyze and evaluate the factors involved, determine their application

to our individual activities, and adjust our plans and operations to the common cause.

If each of us promptly and realistically plans to do what he believes will best serve his company's interests, in 90 per cent of the cases, the nation's interests will also best be served. This means equitable participation, with no over-extending of individual companies, either financially or otherwise. Fineness of balance—support to the mobilization effort with simultaneous strengthening of our economy, and hence, our national strength—is an objective for which each of us must strive. It must be remembered that unless industries are operated for profit and kept in a healthy economic condition, there will be no one to pay the bill for the defense program. We cannot retain military strength without maintenance of economic strength. Only through the proper balancing of the two can we attain our real goal, which is the national strength to withstand any attack, be it military, political, or economic.

DR. E. W. ENGSTROM, (LEFT) VICE PRESIDENT IN CHARGE OF RESEARCH, RCA LABORATORIES, AND SIDNEY SPARKS, VICE PRESIDENT IN CHARGE OF COMMERCIAL ACTIVITIES, RCA COMMUNICATIONS, INC., RECEIVING CERTIFICATES OF COOPERATION FOR THEIR RESPECTIVE SUBSIDIARIES FROM MAYOR MACKAY STURGES OF PRINCETON, N. J., REPRESENTING THE U.S. ECONOMIC COOPERATION ADMINISTRATION. THE CERTIFICATES WERE IN ACKNOWLEDGEMENT OF TECHNICAL ASSISTANCE FURNISHED "TO THE PEOPLES OF THE MARSHALL PLAN COUNTRIES TO AID THEM IN MAINTAINING INDIVIDUAL LIBERTY, FREE INSTITUTIONS AND PEACE."



Scientific Research as a Factor in American Business

(Continued from page 21)

tion of the Navy, that the Radio Corporation of America was formed, not only to provide America with an independent international system of communications but to make radio inventions available to industry. The founders of RCA created with it the first comprehensive availability of patents.

"During the next seven years, most of the uncertainty and confusion over patent rights were eliminated, and in 1927 a patent licensing policy was inaugurated whereby the principal inventions of radio became readily available to other manufacturers."

Mr. Anderson said that through RCA's policy it is possible and practicable for any manufacturer to obtain quickly, conveniently and economically most of the patent rights necessary for the production of virtually all kinds of radio and electronic equipment, and to do so on a fully competitive basis at an extremely nominal royalty rate.

Valuable Rights of Licensee

He explained that under an RCA patent license a manufacturer obtains for a single rate these four distinct and highly valuable rights:

1. Rights to all patents owned by RCA at the time of the agreement.
2. Rights to all inventions made by RCA itself during the entire term of the agreement.
3. Rights to patents not owned by RCA, but under which it has a non-exclusive license and a non-exclusive right to grant licenses to others.
4. Rights to all inventions for which, during the entire term of the agreement, RCA may obtain a non-exclusive license that includes non-exclusive sub-licensing rights.

Mr. Anderson declared that it has been deemed necessary for the radio industry to have a liberal patent licensing policy which, as far as he knew, might not be adaptable to other industries.

"With this in mind," he asserted,

"I would like to point out that licenses issued by RCA do not restrict or limit competition. They contain no price fixing provisions, nor do they limit the licensee's production, sales or territory.

"There is no minimum royalty fee. Moreover, no licensee is required, as a condition of obtaining a license, to grant a license under his own patents to RCA or to anyone else; nor is a licensee required to release any alleged claim or right against RCA or anyone else.

"Our patent licenses stimulate competition. They render impossible monopoly and restraint of any branch of the radio business by RCA or others. They make it impossible for RCA or any of its licensees 'to put on the shelf' any radio invention and thus keep it from the public.

"If one manufacturer should fail to use a valuable invention, others almost certainly would use it in order to obtain an advantage over the non-user. That these licenses are in the interest of the public, and that the public receives great benefit from them is beyond reasonable doubt."

Mr. Anderson declared that the broad objectives of RCA's practical and basic research have created a business which is not only a business in itself but which supports many others. He concluded:

"That business is research—research and invention, made available to any responsible company in America. RCA has made a business of research and of making available the product of that research.

"As many of you know, we have publicly declared in the *Patent Gazette* of the Department of Commerce that all our patents on file are available on uniform and standard terms. It provides additional evidence of RCA's sincerity and willingness to make its discoveries available to industry and to the public. It also is good business and an important factor in keeping America in the forefront of progress."

Adult Educational Series Planned for Radio Network

Television's first major network experiment designed for adult education was announced on March 6 by the Alfred P. Sloan Foundation, Inc., and the National Broadcasting Company. At that time, it was revealed that Teleprograms, Inc., a non-profit corporation, had been set up for the purpose of bringing the adult education series to the American public.

In announcing the formation of Teleprograms, Dr. Arnold J. Zureher, executive director of the Sloan Foundation, and Frederick W. Wile, Jr., vice president in charge of Television Production for NBC, stated that William Hodapp, formerly script editor and producer of WAVE, Louisville, Ky., would act as executive director of Teleprograms, and producer of the new series, 26 programs of which will be presented during 1951.

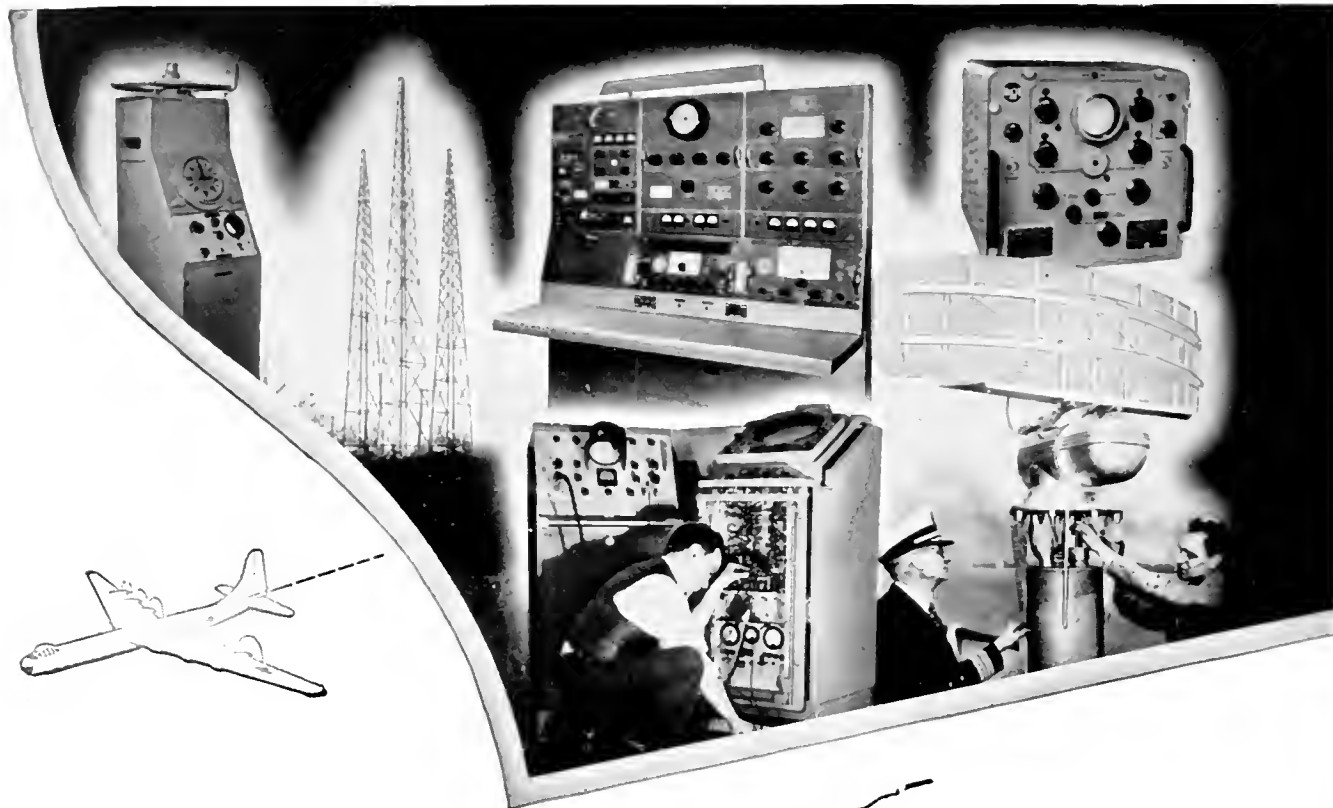
Serving on the board of directors of Teleprograms, Inc., are, in addition to Wile and Dr. Zureher, who will be president, Theodore S. Replier, president of the Advertising Council of Washington, D.C., and William J. Driscoll, assistant vice president of the Chemical Bank and Trust Company of New York. This group will serve as advisors in the production and presentation of the series.

Concentrating primarily in the field of economics, the Sloan Foundation-NBC project will be devoted also to public issues involving both social sciences and natural sciences. Davidson Taylor, general production executive of NBC television, will supervise the entire project for the network.

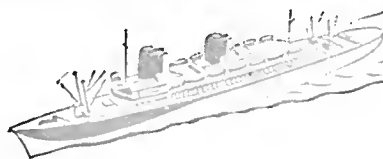
New Radio Circuit Opened

A direct radiotelegraph circuit was opened on April 18 between New York and Maracaibo, Venezuela's second largest city. H. C. Ingles, President of RCA Communications, Inc., has announced. This new circuit will supplement the existing New York-to-Caracas channel.

The channels are operated jointly by RCA and the Venezuelan Ministry of Communications.



RADIOMARINE *stands watch*



For a quarter of a century Radiomarine has been designing, manufacturing and servicing radio communications equipment and electronic navigational aids. Radiomarine's leadership in the development of radio-electronic equipment for the marine field is world known. Its products are recognized as outstanding for durability, dependability and performance.

It is the mission of Radiomarine to advance the art of radio and electronics on vessels of all kinds—on the high seas, in harbors and on inland waterways . . . to co-operate with the military services of the United States for National Defense.

The entire facilities of Radiomarine Corporation of America; personnel, technical knowledge, research and production capacity are "standing watch" ready to serve America's maritime and military needs.

For information on how Radiomarine can be of service to you, write to: Radiomarine Corporation of America, Department , 75 Varick St., New York 13, N. Y.

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Shore Service Stations—Speedy, reliable inspection and maintenance on all types of radio-electronic equipment. 29 service depots in principal U. S. ports. World-wide service facilities through foreign associates.

Coastal Radio Stations—13 coastal stations provide radio communication system for contact with vessels in all parts of the world.

Training School—Theoretical and operational instruction in radio aids to navigation.

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Offices, Communications and Service Stations in principal ports.



RADIOMARINE CORPORATION of AMERICA

A SERVICE OF RADIO CORPORATION OF AMERICA

RESEARCH • MANUFACTURING • COMMUNICATIONS • BROADCASTING • TELEVISION



JULY
1951





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Free
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RADIOMARINE CORPORATION of AMERICA, 75 Varick St., New York 13, N. Y. Offices and Service Stations in principal ports.
Foreign Service - RCA International Division, 30 Rockefeller Plaza, New York 20, N. Y.



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Radio Age

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JULY 1951



COVER

Experimental RCA color television receiver with 21-inch picture tube which was operated during recent New York field tests of the RCA compatible color television system.

NOTICE

When requesting a change in mailing address please include the code letters and numbers which appear with the stencilled address on the envelope.

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RADIO CORPORATION OF AMERICA
RCA Building, New York 20, N. Y.

DAVID SARNOFF, *Chairman of the Board*
LEWIS MocCONNACH, *Secretary*

FRANK M. FOLSOM, *President*
ERNEST B. GORIN, *Treasurer*

Services of RCA are:

RCA Victor Division • RCA Service Company, Inc. • RCA International Division
National Broadcasting Company, Inc. • Radiomarine Corporation of America
RCA Communications, Inc. • RCA Laboratories Division • RCA Institutes, Inc.



Dr. E. W. Engstrom, Vice President in Charge of Research, RCA Laboratories, holds a model of the 16-inch tri-color picture tube, with RCA's 21-inch tri-color tube in the foreground.

RCA COLOR TELEVISION FIELD TESTS BEGIN IN THE NEW YORK AREA

*Compatible, All-Electronic Color Television System Wins Praise
from Audience in RCA Exhibition Hall and From Public*

Viewing Same Color Programs in Black and White on Their Home Sets

FIELD tests for the RCA compatible, all-electronic color television system, showing the new 21-inch tri-color picture tube and other advances, were held in New York during the week of July 9 by the Radio Corporation of America.

The programs, consisting of a variety show presenting talent from the theatrical, music and fashion worlds, and an outdoor pickup by a mobile unit were enthusiastically praised by the press and representatives of the radio-television manufacturing industry. Guests witnessed the tests in the RCA Exhibition Hall in Radio City.

In addition, owners of 2,400,000 receivers in the metropolitan area responded favorably and in impressive volume to the request for comments on the reception of the programs in black-and-white. This feature of compatibility is one of the advantages of the RCA Color Television System.

From the Broadway stage, Nanette Fabray, star of "Make A Wish", made her debut before the color cameras in a series of fifteen-minute programs. Miss Fabray acted as mistress of ceremonies, introducing each act and performer.

Yma Sumac, the South American songstress whose voice races from octave to octave, was also featured on the colorcasts, originating from the National Broadcasting Company's studios in Radio City. Ray Malone, the whirlwind dancing star of "Broadway Open House" and other television shows, gave the color cameras a supreme test in the field of action.

Other performers in these realistic tests of compatible color were Bob Smith with "Howdy Doody", and George Burton and his birds. Ben Grauer, veteran NBC announcer, opened the color programs.

A group of Conover models presented an informal fashion show before the color cameras. They were draped in clothing of rich and varied hues to illustrate the fidelity and range of the RCA compatible system in color reproduction.

As a surprise feature of the programs, outdoor scenes

and action in natural color were picked up and transmitted from Palisades Amusement Park, across the Hudson River from Manhattan. There, beside the world's largest salt water swimming pool, a mobile RCA color camera captured the performance of Buster Crabbe and his aquatic ballet in garb and movements that displayed various hues of the spectrum.

Purpose of the Tests

The field test pickup from Palisades Amusement Park was arranged for a number of purposes. Among these were:

1. To test remote operation of the RCA color television system.
2. To test pickups under outdoor lighting conditions.
3. To test the flexibility of the RCA color camera in covering scenes of varied action.

Scenes picked up at the Palisades pool were transmitted by microwave radio relay (6,962.5 megacycles) to a receiving antenna atop the RCA Building in Radio City, and thence by coaxial cable to NBC to be fed to its transmitter on the Empire State Building.

The outdoor pickup was announced as the forerunner of future transmissions that are to be made as the field tests of the RCA system are conducted in the New York area.

The colorcasts were held three times daily, starting at 10 a.m., 2:15 p.m., and 4 p.m. A regular schedule of field tests, open to the public, will be announced at a later date.

The tests were conducted under experimental license issued by the Federal Communications Commission. Previously, RCA conducted experimental color broadcasts in Washington. Its last series of tests began December 5, 1950, from the NBC studio in the nation's Capital.

Color equipment was installed in the NBC studios, and when the experimental tests were on the air, the



Color television cameras focus on close-up of model in NBC color studio in Radio City.

regular black-and-white television transmitter of station WNBT, atop the Empire State Building, operating under experimental call letters of KE2XJV, was used to telecast the color programs on Channel 4.

As an added attraction, the RCA Exhibition Hall devoted part of its window display to color television. Visitors were able to inspect the components of a color set, and the spectacular tri-color tube, which plays an important role in RCA's color system. The tri-color tube has been hailed as a "miracle of the electronic age".

Frank M. Folsom, President of RCA, in opening the tests, stressed the advantages of the type of system which RCA has developed. He declared:

"In addition to testing equipment, these field tests will prove to the manufacturer, broadcaster, advertiser, and the public that color can be introduced as a television service logically, economically, and soundly.

"We were never more certain than we are now that a compatible, all-electronic color television system is in the public interest. These field tests will prove how such a system will allow the public to continue to enjoy their favorite black-and-white programs and to see color programs in black-and-white without any change whatever in their present sets and without buying extra contraptions.

"Compatible color can be logically introduced into television broadcasting with advantage to everyone and loss to none. Proper introduction will assure a fertile base for a healthy growth of the entire television industry.

"During the coming months, the public will have an opportunity to see the RCA color system and judge its

many advantages through our field tests. We also plan to send the color programs to other cities in network operation, linked with New York via radio-relay stations or the coaxial cable.

"These developments in color television, important as they are, should not be considered as displacing existing television service," said Mr. Folsom. "For years to come, black-and-white television will continue to be the backbone of the industry."

Dr. E. W. Engstrom, Vice President in Charge of Research of RCA Laboratories, reported that since the showing of the RCA color television in Washington last December, a number of improvements have been achieved. He declared:

"We have refined and put into pilot-plant production our tri-color kinescope, details of which were turned over to the radio-television industry three weeks ago. We have improved the circuitry of studio equipment and receivers. And we have also improved the operation of our system.

"The improvements have showed up well in our laboratory tests and also have performed well in our preliminary operation in New York. We propose to proceed with careful and extensive field tests on these and other improvements."

Dr. Engstrom said that during the course of the field tests, programs originating in New York, will be checked over network facilities, radio relay and coaxial cable. He disclosed that RCA proposes to make field-test signals and field-test experience available to RCA licensees and to members of the panels of the National Television System Committee.

"Schedules for some of this are already being set," Dr. Fingstrom declared. "Later during the summer when our transmissions become more regular we will keep the appropriate NTSC panel advised as to the times and conditions of transmissions. We have already provided specifications on the signals we are currently using. It is our plan to participate in the work of the NTSC in arriving at industry standards. This, of course, is for the purpose of seeking approval for the establishment of a compatible color television system."

At the conclusion of the program, O. B. Hanson, Vice President and Chief Engineer of NBC, explained the broadcasting procedure employed in the tests. He pointed out that while the Washington test last year employed research apparatus, equipment in the present test was produced by RCA Victor Division.

"RCA Victor engineers, together with engineers of the NBC staff, installed the present apparatus and put it into action," explained Mr. Hanson. "The operating engineers and the program staff of NBC produced the broadcast. Thus, it shows that the RCA system is capable of being operated by a broadcasting organization with the usual engineering staff."

Owners of Standard TV Sets are Asked to Comment on Color Programs

IN AN advertisement in New York daily newspapers on July 8 and 9, and also by appeals broadcast during the 5-day colorcasts, RCA asked set owners in the New York metropolitan area to give their reaction to the field tests of color broadcasts when received in black-and-white on their present sets. Before the tests had ended more than 5,000 postcards and letters, expressing enthusiastic approval of the picture quality were received. Since then thousands of additional replies have

Nonette Fabroy and Rene Poul, stars of the Broadway stage, in one of the scenes which were a part of the field-test programs of RCA's color television system.



been recorded.

Under the caption "You Can Help Test RCA Color Television . . . Now!" the ad explained that one of the principal features of the RCA system is its "compatibility." This means that when a color picture is broadcast, it can be received in black-and-white on all present sets without any change.

"At 10 o'clock each morning for five days beginning July 9, we will televise over Channel 4 in New York a variety program in full color," the ad explained.

"These programs will be viewed by members of the press and the radio-television industry on experimental RCA color receivers. . . . Later, RCA plans to place color sets where the performance of this all-electronic system can be seen by the public . . . so that you can give us your reactions.

"It will be helpful to us, in our efforts to bring good color television to the American public, if we can find out how these color broadcasts appear in black-and-white on existing television sets in the different sections of the metropolitan area."

The reason for this request, RCA explained in the advertisement, was that compatibility, by common agreement, was preferable with a color system. With an incompatible system—one that cannot receive color broadcasts in black-and-white on existing sets—nearly a billion dollars in additional cost would be saddled on present set owners so that a black-and-white picture could be restored to their sets during color broadcasts, according to the RCA ad.

"Then drop us a card," the ad continued, "giving your address, the age of your set, the size of its screen and type of antenna, which day you saw the program and telling us how these pictures compare with the black-and-white pictures you normally receive from NBC's regular black-and-white television programs."

Ymo Sumoc, South American songstress with a multi-octave voice, was one of the features of the color television programs broadcast from station KE2XJV.



Public Responds with Comments on RCA Color Television System

SPONTANEOUS reaction from television viewers taxed telephone switchboards of the Radio Corporation of America and the National Broadcasting Company in Radio City and the RCA Service Company at 144 East Twenty-fourth Street, following the morning telecasts of RCA's compatible, all-electronic color television in the New York metropolitan area.

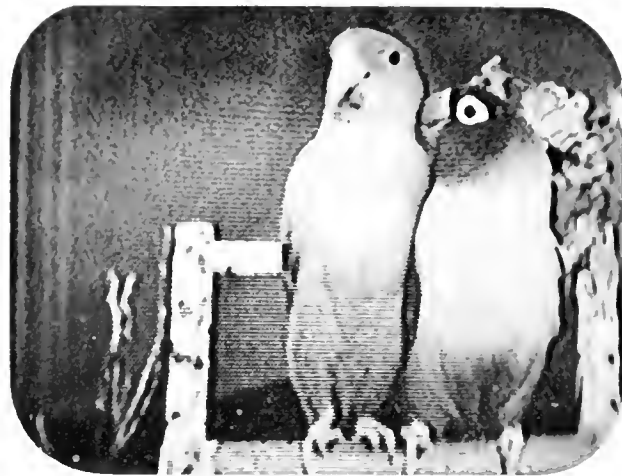
The enthusiastic response came from hundreds of viewers of black-and-white television sets who wanted RCA to know that the color transmission had been received exceptionally well in black-and-white without any change whatever in their sets. They reported that all they did was tune in on Channel 4, which carried the test colorcast from NBC's experimental station KE2XJV.

Most of the calls were in response to an invitation extended by RCA to all viewers in this area to assist in the current color tests by reporting how the transmissions compared with their regular black-and-white reception, thus testing the compatibility feature of the RCA color system.

Typical of the responses were those from:

Mrs. Edward Schweitzer, 93-06 209th Street, Queens Village, N. Y.: "The reception of the RCA color program was wonderful on my set. It was the finest picture

O. B. Hanson, NBC Vice President and Chief Engineer, studies some of the thousands of letters and cards received from television set owners after viewing the field-test programs on their black-and-white receivers.



Photograph taken from black-and-white picture tube of two of the "artists" who appeared on the variety program broadcast during field tests of the RCA compatible color television system.

I have received, and I would be happy to have it like this for the rest of my life. The best part was that I saw the picture without having to buy any gadgets for my set."

Cabell Halsey, 400 East 57th Street, New York, N. Y.: "Reception was perfect. I never saw better black-and-white pictures. I live in a 19-story apartment and my set has no outdoor antenna. In my opinion, on the basis of my reception of these RCA color tests, this is the color system we should have. I paid \$675 for our set and we didn't feel very good about having it obsoleted by incompatible color."

Lucius Nobbe, 17 Wellington Road, Garden City, L. I.: "The picture we received was excellent. I propose to get together with my neighbors and have a petition signed urging the Federal Communications Commission to give RCA's compatible color television system a chance. The Commission should realize that the public wants good reception without investing additional money. It's a pity when something good like this is ignored."

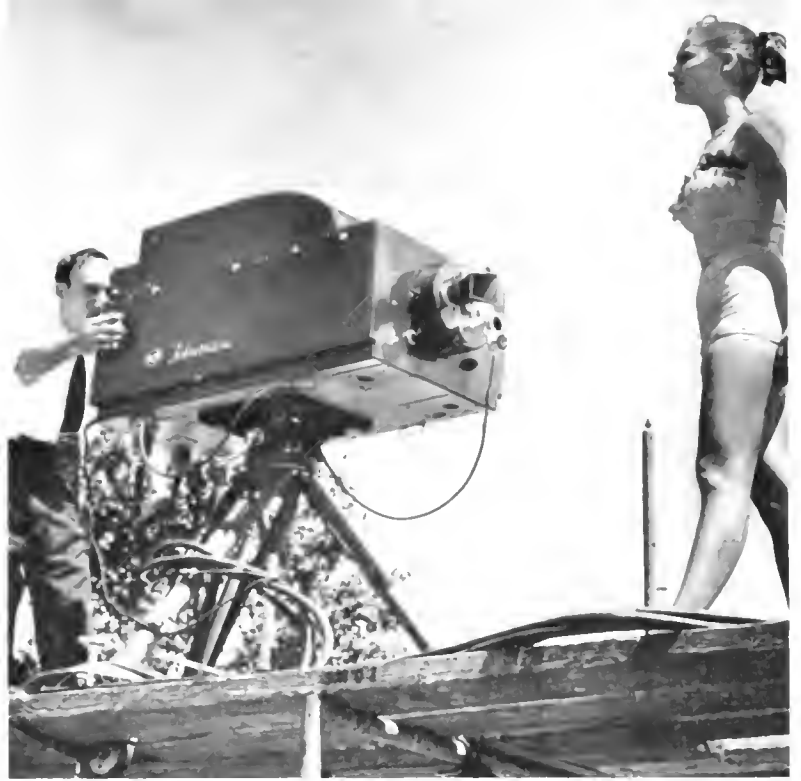
Mrs. Howard Charles, 1115 Fifth Avenue, New York, N. Y.: "The reception was beautiful. It seemed better than we usually receive."

Miss Anna M. Cotter, 5 Stuyvesant Oval, New York, N. Y.: "The black-and-white reception of the color broadcast was far superior to our ordinary reception. The program was very entertaining and RCA is to be congratulated on making this possible."

Mrs. J. J. Donnelly, 5 Maple Avenue, Floral Park, N. Y.: "I want RCA to know that I am very happy over the reception of the color test on my receiver. The pictures appeared to be exceptionally sharp, and I am

RCA all-electronic compatible color system proved its versatility by an outdoor pickup of the aquatic ballet and comedy acts from Palisades Park, N.J.

"Howdy Doody", one of the favorite performers on children's television programs, had a part in the field tests of RCA's color television system.



thankful that I could see the broadcast without buying anything to change my set. RCA has my blessings."

M. Klumas, 766 Myrtle Street, Elizabeth, N. J.: Pictures received during your tests were much clearer than the regular black-and-white transmissions. I want to congratulate RCA on the great achievement."

G. Carmelitano, 1103 Washington Street, Hoboken, N. J.: Reception of the RCA color tests was very good on my black-and-white set."

Mrs. Gladys Brehm, 600 Irving Place, Long Branch, N. J., sent the following wire: "Color TV in black and white coming in perfectly over my set."

Here are more comments from set owners in many different localities:

Bronxville, N. Y.: "Excellent! If I hadn't read about it in the papers, I wouldn't have known the difference between your color broadcast and the others. Very clear. I will never go through the adapter, converter, etc., expense. Keep up the good work because I am sure millions are with you."

Brooklyn, N. Y.: "I watched your color test and found it most wonderful. The black-and-white pictures were clear and beautiful. Good luck."

North Arlington, N. J.: "I received the pictures in black and white and they were clear, bright and perfect. There is no doubt that the RCA color system is in the best interest of the public."

New Brunswick, N. J.: First, may I congratulate

you on your first successful color test which I received in black and white. I hope you will be deluged with thank-you cards and letters, for certainly you are proving beyond a doubt that we can have a 'compatible' system."

Flushing, L. I., N. Y.: "We were amazed at the brighter and clearer pictures in black and white. As a matter of fact, they are better than any time since we've had our set. Thank you for the wonderful job you are doing to make this a better place to live."

Clifton, N. J.: "We received your color program just as clear as if it was a regular black-and-white broadcast."

Mount Vernon, N. Y.: "Your test program came in perfectly on my black-and-white set. I think you're doing a fine thing in trying to give present television owners a fair deal. More power to you!"

Long Branch, N. J.: "I found that the RCA color television test improved very much the black-and-white picture, and that to me is more important than color. I alerted my neighbors and friends to look in and send word to you which I hope they will. I wish you great success, and I am standing by you along, I believe, with millions of others."

Norwalk, Conn.: "The reception of your color television tests is perfect and clear-cut — and we are supposedly in a fringe area. The programs have been as good, if not better, than any black-and-white received. We hope your 'compatible' method will lead the way."

Garden City, L. I., N. Y.: "Have watched your tele-

vision tests and would say it was so near to being equal to our reception of the normal broadcasts that it would be almost impossible to distinguish between them. Like a great majority of set owners, we look forward to the completion of your tests and the acceptance of your system."

Mamaroneck, N. Y.: "Pictures came through beautifully. Keep up the good work."

Union City, N. J.: "I watched your test program and it was perfection in black and white. Our entire family is grateful to RCA."

Brooklyn, N. Y.: "I had the pleasure of watching your experimental color telecasting, and I must say it was quite gratifying. Your system has my vote in your favor, as I know that I will not have to get a new set or resort to an expensive adapter to receive programs telecast in color."

Executives of the radio and television industry expressed enthusiasm and praise on the quality of the color TV tests.

Commenting on the color TV tests:

Dr. Allen B. DuMont, President, Allen B. DuMont Laboratories, Inc.: "It was a lot better color television picture than RCA showed us in Washington last December. The picture was good enough, in fact, to start commercial operations immediately."



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William Balderston, President, Philco Corporation: "We feel that there has been a marked improvement in RCA's color TV system. We were particularly impressed with the color fidelity and the remote pickup. The production of the color picture in black and white was even better than the black-and-white pictures being received on existing sets."

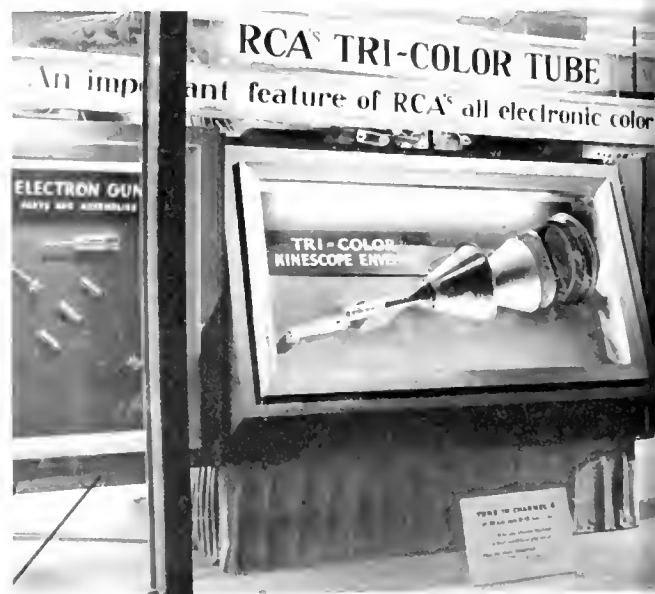
Dr. W. R. G. Baker, Vice President in Charge of Electronics, General Electric Company: "It was a most excellent picture. It was outstanding. I thought the color was really beautiful and the black and white was outstanding. All we've got to do now is to get compatible standards adopted."

Jack Binns, President, Hazeltine Corporation: "This is a great step forward. The black-and-white reproduction on black-and-white sets is improved because of the transmission in color. The color is very good particularly in rapid motion and there is no color break-up at all. The compatible color system has got to win for it is in the public interest."

R. W. Durst, Executive Vice President, Hallicrafters, Inc.: "We thought it was particularly good, especially the high fidelity during rapid movement. Compatibility, however, is the thing that impresses us most and which we think is particularly desirable."

Left: One of the development-model RCA television receivers with 16-inch tri-color picture tubes used during the recent field tests of RCA's color television system.

Below: An RCA tri-color television picture tube is shown disassembled in one of the show windows of the RCA Exhibition Hall, Rodio City, New York.





American Industry and **National Defense**

*Folsom, in Address to Legal Students, Says
Nation's Expanded Industrial Capacity
Can Meet Military and Civilian Needs*

American industry, with a 60 per cent greater productive capacity than in 1940, can meet the nation's defense needs and still produce enough for the civilian economy. Frank M. Folsom, president of the Radio Corporation of America, said in a recent address before the Student Legal Forum of the University of Virginia.

"The public interest demands that we continue, insofar as possible, production of those things that make life good," he declared.

At the same time, Mr. Folsom emphasized that the public interest must come before any private interest and that the job of defending America was industry's first responsibility. He did not contend that all shortages of civilian goods could be averted, but he said that American business, by working in close cooperation, could reduce shortages to a minimum.

Mr. Folsom indicated, however, that the dual goal of ample defense and civilian production could only be reached if America's great industries were left free to do the job. He warned that attacks on big business, either from government or private sources, would play into Communist hands.

"I'm not pretending that big business can do the job alone," Mr. Folsom added. "Big business has never been able to do any job alone. And this particular job calls for a high degree of teamwork among all businessmen."

But big business, he said, had a particularly vital role because "the job we are faced with is a big job, and it calls for men and companies that are used to doing things in a big way.

"So always keep this thought in mind: if you want planes, and tanks, and guns, you have to have production lines. And production lines mean big business.

"Regardless of your attitude on big business," Mr. Folsom continued, "you can't hide one fact: Communism wants to see big business destroyed. Com-

munists are delighted by attacks on our great corporate enterprises."

The RCA official also warned that America, while building a mighty military machine as a safeguard against totalitarian aggression, must guard against the adoption of totalitarian methods.

It would be all too easy, he explained, to use the defense job as an excuse to "stop all civilian production, take away all individual liberties, and draft everybody for military production or service in our armed forces." But, he said, it would certainly be ironical if, in our efforts to defend ourselves we adopted the very system that the enemies of our way of life would like to force us to adopt.

Called for Intensified Research

Surveying the nation's facilities, Mr. Folsom called for intensified research activity by American industry.

"Scientific research has given this country leadership in practically every phase of industrial activity. . . . We have learned to cultivate science as we do our crops. And we have rich harvests as a result," he said.

Mr. Folsom pointed out that through constant research, his own company, for example, has been able to effect tremendous savings in such critical materials as copper and aluminum in the production of television sets.

Mr. Folsom warned that companies could not expect to reap harvests immediately from long-range research projects, however. "Our own company, for instance, invested 50 million dollars in the development of television before we ever got a dollar back."

The RCA official said that "the period ahead is going to call for many sacrifices but if we approach this task, not with the thought, 'what can I get out of this defense effort,' but rather 'what can I contribute to it', I am confident we can be strong and free."



More than 200 radio-television manufacturers attended RCA's two-day technical symposium at The Waldorf-Astoria.

RCA Reveals Details of Tri-Color Picture Tube and Color Television Circuits



E. C. Anderson, Vice President in Charge of Commercial Department, RCA Laboratories, presided.



Dr. E. W. Engstrom, Vice President in Charge of Research, RCA Laboratories, summarized the talks.



Dr. D. W. Epstein, of RCA Laboratories research staff, discussed "Optics of Color Television".



W. P. Maginnis, RCA Victor Tube Department, outlined "Deflection Components of the Tri-Color Tube".



H. R. Seelen, RCA Victor Tube Department, Lancaster, Pa., discussed the "Three-Gun Tri-Color Tube".



Stuart W. Seeley, Manager, Industry Service Laboratory, discussed "Receiver Circuitry".

RCA Color TV Symposium

A 21-inch tri-color television picture tube, proving that there are no external limiting factors to picture size in the RCA compatible all-electronic color television system, was shown at a technical symposium conducted by the Radio Corporation of America at The Waldorf-Astoria Hotel on June 19 and 20. Representatives of more than 200 radio-television manufacturers attended the meetings.

Immediately available free of cost for the manufacturers' use in their laboratory work on color tubes and receivers, RCA announced, are samples of the 16-inch basic developmental model of the tri-color tube and kits of associated circuit components and parts. During the two-day symposium, RCA supplied technical information to assist manufacturers in their production of tri-color tubes and associated circuits for color receivers.

"One of the advantages of RCA color is the fact that there are no external limiting factors to the size of the kinescope (picture tube)," E. C. Anderson, Vice President in Charge of the Commercial Department, RCA Laboratories, informed the group. "As evidence of this, we are now to show you for the first time our larger, 21-inch tri-color tube. This kinescope should prove beyond doubt that the RCA system allows the public a choice of color-picture sizes in the same ranges that are available in black-and-white tubes."

Public Wants Compatible System

In opening the symposium, Mr. Anderson said:

"I find it hard to tell you, just how strongly we at RCA believe in an all-electronic, fully compatible color television system.

"We feel that a compatible system is what the public, the broadcaster and the advertiser are entitled to in order to avoid economic waste and the outmoding of the 12½ million sets now in use, plus perhaps millions more.

"The development of the RCA tri-color kinescope is an outstanding example of accomplishments of modern science and engineering. Its advance to reality in this short period of time is truly one of the engineering miracles of this electronic age."

In a statement to the manufacturers, all of whom are licensed to use RCA inventions, it was pointed out that developmental samples of the RCA three-gun tri-color kinescope and associated circuit components are

available in limited quantities. To each licensed manufacturer, RCA announced it would provide free of cost one tri-color kinescope, one kit of assorted circuit components, and one unit assortment of tri-color tube parts. In the near future, it was said, RCA expects to handle orders for additional sample quantities.

Information Given to Manufacturers

In addition, the manufacturers were supplied a list of the various operations and the equipment RCA uses in making the tube. This equipment, it was pointed out, is developmental and is reproduced only to order.

Although the differences in producing tri-color tubes require additional engineering and manufacturing techniques, the RCA engineers said, they are of such a nature that if adequate manufacturing care and diligence are pursued, production of the tri-color kinescope will impose no more serious problems than those which were experienced in the early days of black-and-white kinescope production.

Topics covered during the symposium included technical features of the tri-color tube and new tube developments, operating characteristics of the tube and its associated components, circuits involved in supplying color signals to the tube, and manufacturing processes, equipment, and machinery, and test equipment.

Technical presentations were made by Dr. D. W. Epstein, H. R. Seelen, S. W. Seeley, and W. P. Maginnis, all of whom are RCA engineers. Dr. E. W. Engstrom, Vice President in Charge of Research, RCA Laboratories, gave factual summaries of the information.

The tri-color television picture tube, recognized by engineers as vital to the complete development of a practical, simplified, all-electronic color television receiver, was demonstrated by RCA for the first time on March 29, 1950. It was hailed at that time as a "miracle of science" and proof of the superiority of electronics over the outmoded and limited mechanical rotating devices as a means of producing color television pictures. In the tri-color tube, television pictures are produced electronically in full color on the face of the tube just as they are in black-and-white television.

On March 30, 1950, RCA informed the industry that as soon as the tri-color tube had been perfected to a point that specific usable information was available, it would be given to RCA licensees. The symposiums, it was pointed out, were in keeping with that statement.

RCA Business Increase

*Gain in Volume of Business from \$128,000,000 to \$586,000,000
in Last Decade is Reported at 32nd Meeting of Stockholders*

Net earnings of the Radio Corporation of America for the first quarter of this year amounted to \$11,901,542, representing the best first quarter that RCA has ever had. Brig. General David Sarnoff, Chairman of the Board, announced at the 32nd annual meeting of RCA stockholders held in a studio of the National Broadcasting Company in Radio City, New York, on May 1.

General Sarnoff said that volume of RCA business has increased to more than four and one-half times what it was ten years ago—from a level of \$128,000,000 in 1940 to \$586,000,000 in 1950. He reported that during the past ten years, dividends paid to RCA stockholders amounted to \$80,184,000, a sum which he declared to be larger than that paid in this period by any other company in the world principally engaged in the radio business.

He credited television, which RCA pioneered, planned and engineered, as the spearhead in establishing the new sales records.

First Quarter Results

The net earnings of \$11,901,542 for the first quarter of 1951 represented an increase of \$665,311, or 6% over the same period a year ago.

After providing for preferred dividends, earnings per common share for the first quarter of 1951 amounted to 80 cents, compared with 75 cents per share for the first quarter of 1950.

Consolidated gross income of RCA for the first quarter of 1951 amounted to \$185,590,755, or an increase of 46%, as compared with that of 1950.

A dividend of 50 cents per share on the common stock of RCA was declared by the Board of Directors on April 5, 1951, payable on May 28, 1951, to holders of record of such stock at the close of business on April 20, 1951.

"It is the intention of the Board of Directors to place the common stock on a semi-annual dividend basis and to declare such dividends payable in May and November of each year, provided the future earnings of the Corporation justify such action, and we hope that they will," said General Sarnoff.

In 1950, RCA paid \$58,205,000 in taxes to Federal,

State, and local Governments. These payments, which included \$7,162,000 in Federal excess profits taxes, and \$3,870,000 in social security taxes, were the highest on record, and amounted to nearly three times the total for the preceding year. These taxes are equal to \$4.19 on each share of the outstanding common stock.

In addition, excise taxes paid by the Corporation in 1950 amounted to \$13,948,000, bringing the total taxes for the year to \$72,153,000.

A total of \$15,842,000 has been estimated and provided for Federal taxes on income in the first quarter of 1951. Approximately 2 million dollars of this total are for excess profits taxes. No excess profits taxes were in existence during the first and second quarters of last year.

Working Capital

General Sarnoff reported that approximately 46% of RCA's net profits, earned during the past ten years, had been paid to stockholders, \$31,685,000 going to preferred stockholders and \$48,499,000 to holders of common stock. The balance of the profits earned during the last decade has been reinvested in the business, he asserted, adding:

"Ten years ago, the net working capital of the Corporation was \$26,695,000. Now it is \$130,902,000. The net figure on our balance sheet for plant and equipment, ten years ago, was \$28,943,000. Now it is \$87,392,000. Stockholders' equity in the Corporation, ten years ago, was \$71,717,000. Now it is \$172,790,000. Stated percentagewise, these figures show the following increases over the ten-year period: Net working capital 390%. Plant and equipment 202%. Stockholders' equity 141%."

On behalf of the Board of Directors, General Sarnoff congratulated RCA's more than 50,000 employees on their "creative efforts and craftsmanship in achieving the splendid results which our reports reveal." He pointed out that in addition to its own employees, it is estimated that the Corporation helps provide employment to an additional 50,000 workers in other companies which last year supplied materials and services amounting to nearly \$300,000,000. RCA Victor's sup-

1/2 Times in Ten Years

pliers, he disclosed, now number approximately 5,000, located in 42 different states. Further, it helps "little business" to prosper and to serve as vital suppliers in peace and in war.

Government Orders

General Sarnoff announced that since June, 1950, RCA has received an increasing volume of Government orders for the design, development and manufacture of radio-electronic equipment for the Armed Forces.

"Government orders recently reached a volume that required conversion of some of our commercial production facilities to the manufacture of equipment for national defense," he said. "A variety of military projects that had been progressing through developmental stages began to reach the production stage. An example is the new compact, light-weight, walkie-talkie developed by RCA for the U. S. Army Signal Corps.

"Since many of the Government orders involve long-range activity and extensive development work, it is anticipated that for the next two or three years substantial portions of our facilities will be devoted to the production of electronic apparatus for all branches of the Armed Forces. We shall pursue our tasks and meet our responsibilities in this national emergency as we have done in the past."

RCA's efforts toward making America strong, he continued, place new demands upon the Laboratories.

"As an illustration of our activities in scientific research, RCA Laboratories, in 1950, completed the development and construction of the largest and most accurate electronic analogue computer ever built to evaluate the performance of guided missiles, airplanes,

ships and submarines," he reported. "This new computer is expected to save the Government many millions of dollars in the design of advance types of weapons and solve many problems in the air protection of American cities. The instrument, developed under contract with the Office of Naval Research for use by the Navy Bureau of Aeronautics, eliminates trial-and-error tests in which costly materials are expended.

"That is only one of our developments. Time and security regulations will not permit me to cover other developments on the broad front of our military research activities. I can report, however, that we have made important strides in the development of new electron tubes, radar, guided missiles and other projects essential to national defense."

General Sarnoff stated that RCA, in response to the Government's needs, has succeeded since the first of this year in saving hundreds of thousands of pounds of strategic materials through technical developments, without diminishing the quality of merchandise. In February, he said, RCA made available to radio, television and tube manufacturers throughout the country the means and the results of its conservation efforts.

Status of Television

Commenting on the fact that current sales of television receivers are below levels established earlier in the year, General Sarnoff declared that among factors contributing to the decline were Regulation W, which places a limitation on consumer credit, and the "freeze" which temporarily prevents erection of additional television stations.

"The growth of television continued in 1950 at a

Brig. General Dovid Sarnoff, Chairman of the Board, addressing 32nd annual meeting of RCA stockholders.





Some of the RCA Victor television receivers which have been meeting the demand for sets having 16-inch picture tubes or larger.

phenomenal rate, with more than 7,000,000 receivers being produced by the industry as a whole," he said. "The trend in public preference for larger size television pictures is indicated by the fact that 93% of the RCA Victor television sets produced in the first quarter of 1951 employed 16-inch tubes or larger. . . .

"While television has been advancing, radio set sales have continued to increase. Last year, 14,500,000 radio receivers were sold by the industry as a whole, compared with 11,000,000 in the previous year."

Already television has justified "our great faith in its power for entertainment, news and education," he affirmed, continuing:

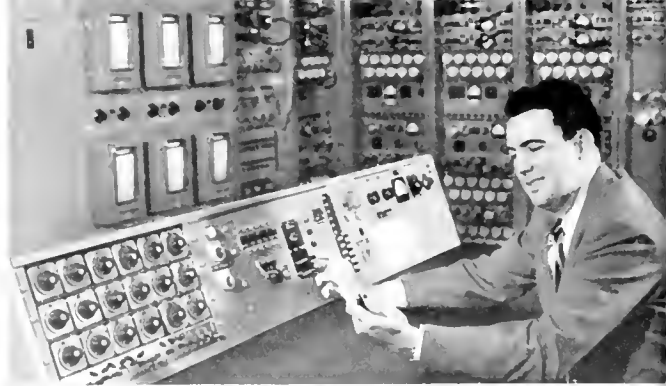
"It is a great spiritual and social force among our people. Politically, it has tremendous potentialities for creating an informed public opinion on the vital questions of the day.

"In the advance of television, no other organizations have contributed as much in pioneering, engineering development and programming as RCA and NBC. The scientists and engineers in RCA Laboratories, through their patient research and inventive genius, continually open new gateways to progress. The engineers of the RCA Victor Division design the finest transmitting equipment, receiving sets and electron tubes, and the engineers of the National Broadcasting Company develop the techniques for broadcasting and telecasting programs to the home."

Developments In UHF

General Sarnoff reported that RCA had expended more than \$2,500,000 in exploring the ultra-high frequencies, known as UHF, for television broadcasting.

"Our engineers, taking the initiative in pioneering the upper frequencies, have determined that a major expansion is practical and possible at ultra-high frequencies (UHF)," he stated. "By adding a simple and inexpensive converter, owners of present television sets can enjoy high quality reception from UHF as well as the very high frequencies (VHF).



An RCA Laboratories physicist operates the control console of the 4000-tube analogue computer, designed to evaluate the performance of guided missiles.

"Practical experience and engineering facts needed to design the best transmitting and receiving equipment in this new field were obtained through large-scale field tests conducted by RCA. In December, 1949, we installed at Bridgeport, Conn., the first UHF television transmitter that operated on a regular schedule. From this transmitter, not only RCA but other manufacturers as well were able to conduct receiving tests in the field.

Recorded Music

Faith and confidence of RCA when it introduced its 45-rpm Victrola-phonograph and small unbreakable records two years ago have been well founded, General Sarnoff reported, asserting that largely as a result of the new "45" system, the phonograph business has been revitalized and sales continue to increase.

"Today, the popular 45-speed vinyl plastic disks are being offered under 55 competitive labels, including all major record manufacturers," he reported. "In 1950, more than a third of phonograph record sales by RCA Victor were 45-rpm.

"The RCA Victor long-play 33 $\frac{1}{3}$ -rpm records, which were introduced a little more than a year ago, also have won widespread acceptance for their technical and artistic quality. Sales of these long-play records have shown a marked increase."

Broadcasting and Telecasting

General Sarnoff said that the National Broadcasting Company is aggressively developing the art of television programming as a new service supplementing the vast coverage of radio broadcasting.

"To keep pace with television's growth, NBC in 1950 began the greatest expansion program in its history," he continued. "NBC begins its second quarter of a century as the No. 1 network in America. The NBC radio network now totals 181 stations, 6 of which are owned and operated by the Company. The television network comprises 63 stations, 5 of which are owned and operated by the company.

"Generally, we are likely to think of television only as a means of broadcasting programs," he continued. "But there are numerous opportunities for its application in other fields. Schools, colleges, hospitals, department stores, manufacturing plants and business offices can use television to great advantage. Further developments in industrial television will enlarge the scope and opportunities for the entire industry."

RCA Policies and Objectives

In conclusion, General Sarnoff outlined the policies that govern the operations of the Radio Corporation of America — from research through manufacturing, sales, servicing, broadcasting and world-wide communications.

"All of us are naturally interested in the prospects for the future," he said. "But, in the present state of international tensions and uncertainties, it is impractical to predict results for the remainder of the year. The existing national emergency and the rules and regulations which govern allotments of critical materials, as well as the controls of consumer prices and financial credits, are factors now confronting all business.

"You may be certain, however, that the Board of Directors and the management of RCA are alert to these problems and uncertainties. Our organization and our planning are such as to enable us to adjust our operations to conditions as they arise.

"The results reported to you for last year and the first quarter of this year, perhaps provide the best proof that our policies have been sound. This is confirmed not only by the satisfactory financial results and by the solid position RCA occupies in the industry, but also by the good will of satisfied customers, the good rela-

tions the Corporation has with its employees and its stockholders, and by the high standing it has with the public.

"Pioneering and diversification comprise our life-blood. We are interested in yesterday and today for the experience and new knowledge gained. But our minds are focused on Tomorrow, and progress is our watch-word."

Financial Results for First Half of 1951

Sales of products and services of the Radio Corporation of America and subsidiaries attained an all-time record volume of \$302,333,000 during the first six months of 1951, exceeding the previous peak set last year by 21 per cent, Frank M. Folsom, President of RCA, announced. Corresponding sales in the first six months of 1950 amounted to \$248,784,000.

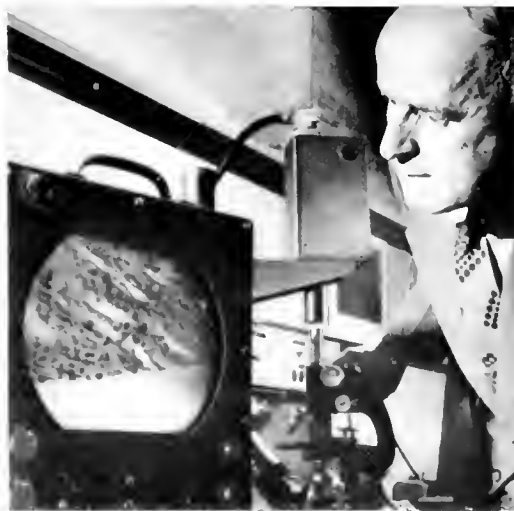
Earnings before Federal income taxes were \$32,311,000, compared with \$55,102,000 in the first half of 1950, a decrease of \$2,791,000, or approximately 8 per cent.

Reflecting an increase of 17 per cent in the provision required for Federal taxes on income, RCA net earnings of \$15,703,000 for the first six months of 1951 were 25 per cent below the \$20,962,000 net for the corresponding period in 1950.

After payment of Preferred dividends, net earnings applicable to the Common stock for the first six months of 1951 were \$1.02 per share, compared with \$1.40 per share in the first half of 1950.



Scientists discuss technical features of an early model of the RCA reflect-view tri-color picture tube.



Living cells can be observed through this combination of industrial television and a light microscope.



Television has tremendous potentialities for creating an informed public opinion.

TV comes to a Pennsylvania Town

Pottsville, Pennsylvania, a mountain-ringed mining and manufacturing town, 75 miles northwest of Philadelphia, has been rescued from the group of American communities which, because of their geographical locations, are deprived of dependable television program service.

This overnight "miracle" was brought about by the skill of RCA engineers who recently completed installation of a Community Antennaplex system, one of the first in the country. Today, for the first time since

the beginning of commercial television, Pottsville's 25,000 residents are able to tap the flow of television signals which heretofore have passed them by, high in the sky. Families in the town now obtain pictures from Philadelphia stations which compare favorably with those enjoyed by set owners living much closer to the transmitters. Before RCA engineers stepped in, reception in Pottsville was rated extremely poor even with an elaborate rooftop antenna that sometimes cost more than the TV receiver itself.

This master antenna assembly, erected on Pottsville's Sharp Mountain, extends TV coverage up to 130 miles.

Utility poles support the coaxial cable strung from the antenna site to the town's residential areas.



← Main amplifier of Antennaplex system, located at the base of the antenna mast.



One section of Pottsville, whose homes are getting television programs through an RCA Community Antenoplex system.

Providing TV signal pickup and distribution service sufficient for the entire community, the new system consists of a master antenna assembly, mounted on a tall mast on Sharp Mountain, the highest nearby elevation; a network of coaxial cable, strung over utility poles from the antenna site throughout the areas to be served, amplifiers, mounted on poles at fixed intervals to maintain the strength of signals; and lead-off lines, terminating in wall or baseboard outlets in the homes. On the antenna mast are separate antenna elements tuned for each channel on which programs are available. The new system makes roof-top antennas unnecessary. The network will be operated by Trans-Video Corporation.

The program service is supplied for a fixed installation fee, plus a monthly service charge. Pottsville residents using the system pay a \$135 initial fee, and \$3.75 monthly. Already more than 275 families are connected

to the community antenna.

By using tall master-antenna towers which would be impractical for use by individuals because of size, weight, and cost, and by mounting these towers on geographical vantage points, RCA engineers pointed out that it is possible to extend the radius of TV station coverage from an average of 45 miles to as much as 130 miles in some cases.

The community system, which is manufactured by the RCA Engineering Products Department, is an expanded version of the RCA "Antenoplex" system now in use in leading hotels, apartment houses, hospitals, and other multiple-unit buildings throughout TV areas.

The Pottsville layout was installed by technicians from the company's branch office at Reading, Pa., under supervision of the RCA Service Company home office.

Trans-Video Corp. was organized by a group of Pottsville business men, headed by M. E. Malarkey, Jr.

Toscanini to Begin Fourteenth Season As Conductor of NBC Symphony

Arturo Toscanini, Guido Cantelli, Fritz Reiner and Charles Munch will conduct the NBC Symphony Orchestra during the 1951-52 Winter season, Samuel Chotzinoff, NBC general music director, has announced. The fifteenth season of the NBC Symphony Orchestra will open on Saturday, Nov. 3 at Carnegie Hall, with Toscanini directing.

This will mark Toscanini's fourteenth season as NBC Symphony director. Last year Toscanini was unable to direct all of his scheduled concerts because of a knee injury. In the forthcoming season he will

conduct 12 concerts in three series of four each.

Guido Cantelli will return to the NBC podium for his fourth consecutive season. He will direct the orchestra in eight concerts.

Fritz Reiner and Charles Munch each will direct one concert, the latter making his first appearance with the orchestra. Reiner has been a frequent guest conductor of the NBC Symphony Orchestra. Munch's appearance with the NBC Symphony Orchestra was arranged in cooperation with the trustees of the Boston Symphony Orchestra, of which he is regular director.



The new Cincinnati plant provides more than 135,000 square feet of floor space for the manufacture of miniature and sub-miniature electron tubes.

New RCA Tube Plant Dedicated in Cincinnati

RCA's new electron tube manufacturing plant in Cincinnati was formally opened on June 11. Local officials, together with executives of the Radio Corporation of America, the RCA Victor Division, and the National Broadcasting Company, participated in the dedication of the large plant to the memory of the late John G. Wilson, former Executive Vice President in Charge of the RCA Victor Division. Frank M. Folsom, President of RCA, made the dedication address.

The new plant, formerly occupied by the Rich Ladder and Manufacturing Company, has been completely modernized and converted for the exclusive manufacture of miniature and sub-miniature electron tubes. This expansion was necessary to meet the increasing demands of the national defense program and of the radio, television, and communications industries.

The Cincinnati plant occupies approximately 17 acres and has more than 135,000 square feet of floor space. It is RCA's third plant for the manufacture of receiving tubes. Others are located in Harrison, N. J., and Indianapolis, Indiana. It was pointed out that the new plant is strategically located to serve large numbers of manufacturers of electronic equipment. Harold A. DeMooy is plant manager.

The RCA contingent to the dedication included, in addition to Mr. Folsom: W. A. Buck, Vice President and General Manager of the RCA Victor Division; Joseph H. McConnell, President of the National Broadcasting Company; L. W. Teegarden, Vice President in Charge of RCA Technical Products; J. B. Elliott, Vice President in Charge of RCA Victor Consumer Products; Charles M. Olorizzi, Operating Vice President of the RCA Victor Division; Richard T. Orth, Vice President

Frank M. Folsom, President of RCA, unveils a plaque which formally dedicated the new plant to the memory of the late John G. Wilson, former Executive Vice President in Charge of the RCA Victor Division.



Mr. Folsom watches the operation of an automatic machine that seals the glass envelopes of miniature tubes in the Cincinnati plant.

in Charge of the RCA Tube Department; V. deP. Goubeau, Vice President and Director of Materials, RCA Victor Division; Orrin E. Dunlap, Jr., Vice President in Charge of Advertising and Publicity, Radio Corporation of America; Edward D. Madden, Vice President of the National Broadcasting Company in Charge of Television Operations and Sales, and Jack Herbert, Vice President of NBC in Charge of Radio Network Sales.

W. R. Kellogg, City Manager; Albert D. Cash, Mayor of Cincinnati, and R. Edward Tepe, Mayor of Norwood, as well as other prominent local civic and industrial figures, also participated.

New Plant to Make Tubes For Defense and Industry

Excerpts from address by Frank M. Folsom, RCA President, at dedication of new Cincinnati plant.

"All of us at RCA are mighty proud of this new plant. In its 136,000 square feet of floor space, many hundreds of men and women will build quality products. From this plant will come tubes for countless industrial and scientific uses, for radio and television, and most important of all, for our Government's armed forces in their defense of the free world. Our pride in a fine product, backed by the pride in skilled craftsmanship traditional to the people of Cincinnati, will be reflected in the tubes made here. We know they will be worthy of the RCA and RCA Victor trademarks.

"This plant is going to make a great contribution to the operations of the Radio Corporation of America. We are sure it is destined to fill an important position in the National Defense Program and in a vigorous and expanding electronics industry, and we hope it will make a real contribution to the life of your community.

"We think of the RCA family as including not only our employees, but also all the other people who enable us to produce the quality products that bear our trademark and put them in the hands of consumers. I speak of RCA Victor's 4,700 suppliers, including many with whom we do business here in Cincinnati. I speak of our very fine distributor and dealer organizations. We are proud of our various distributors here, who include Ohio Appliances, Herrlinger Distributing Company, Steinberg's, United Radio, Gustav-Hirsch, Midwest Theatre Supply Co., and Cavalier Pictures, Inc. I also include NBC's great midwest affiliate, WLW, and other



radio stations which have favored us with their equipment business.

"We hope you will find us to be the kind of people and the kind of company that you will be proud to have in your home and in your city. In short, we want the people of Cincinnati to like us and to be glad we are here. All we ask is that you judge us by our performance."

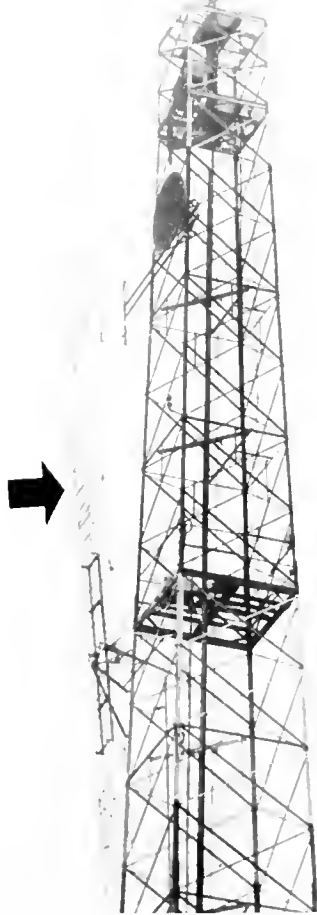
RCA Awards Three Scholarships

Three high school seniors from New York and New Jersey have been awarded scholarships, valued at \$1,500 each, for advanced radio technology courses at RCA Institutes, Inc., one of the oldest radio technical training schools in America. The winners, announced by General George L. Van Deusen, President, were: William Delaney, Bergenfield, N. J.; R. A. Wallner, Waldwick, N. J., and S. A. Rosenkranz, Elmont, N. Y.

The students were chosen on the basis of competitive examinations taken by 37 contestants representing public and private high schools in the metropolitan New York area. Final selection was made by a committee consisting of Professor Walter A. Curry of Columbia University, Professor Charles E. Skinner of New York University and General Van Deusen.

Scholarship winners will be eligible to enroll for free instruction in the two-year advanced technology course at the New York resident school of RCA Institutes, 350 West Fourth Street. The course, accredited by the Engineers Council for Professional Development, prepares students for entrance into the various branches of electrical communications.

Tilted Antenna Increases Range of UHF Signals



The tilted antenna (arrow), erected on tower of RCA-NBC's experimental television station KC2XAK, was designed for a study of the transmission and reception characteristics of ultra-high-frequency signals.

Television signals in the program service area of an ultra-high-frequency station can be doubled in strength by a slight tilting of the transmitting antenna, Dr. C. B. Jolliffe, Executive Vice President in Charge of RCA Laboratories Division, has revealed. The tests were conducted at Bridgeport, Conn., using the facilities of RCA-NBC's experimental station KC2XAK which has been in regular operation since 1949.

The antenna built for the tests was erected on one side of the Bridgeport transmitting tower. By means of

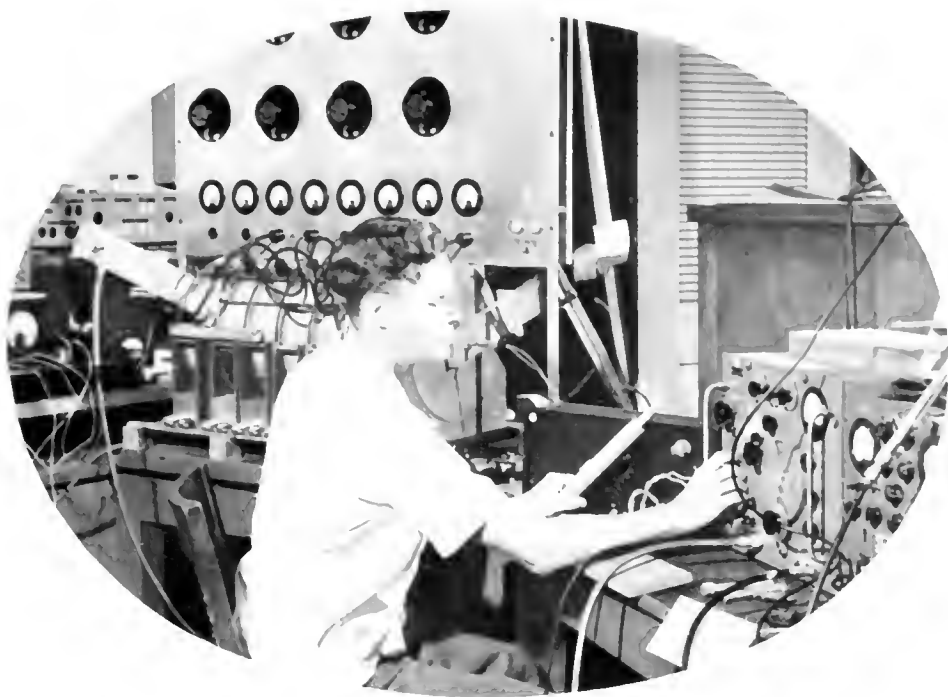
a motor-driven arrangement, the antenna was rocked back and forth in an arc of approximately 12 degrees to permit engineers to record the resulting variations in signal strength. Field tests were made at several locations in the primary service area of KC2XAK and also at Princeton, N. J., 90 miles away. Results in every instance showed that the received signal was at its maximum when the antenna was tilted approximately 2.5 degrees up or down.

This gain in signal strength, achieved without increasing the power of the transmitter, Dr. Jolliffe pointed out, would be particularly valuable in the present state of development of the UHF art. Unlike the very-high-frequency stations now providing program service to the public, UHF stations are limited in their power by the types of electron tubes available for transmitters. By making use of the additional signal strength which the tilted antenna delivers, the effect on the quality of the television picture would correspond to that which would be produced if the power of the transmitter were to be multiplied several times. Furthermore, he added, this gain would bring about a noticeable improvement in picture quality on UHF television receivers installed in the outer, or "fringe", areas of program service.

Because of the occasional propagation of waves well beyond the normal coverage of a station, Dr. Jolliffe said, RCA will conduct further tests to determine whether the gain in signal strength produced by the tilted antenna is likely to increase interference with distant stations operating on the same or adjacent channels.

RCA Laboratories, Dr. Jolliffe stated, also plans to conduct research on tilted antennas in the VHF field. If corresponding gains are obtained on these channels now used by commercial television stations, their program service areas would be similarly extended. The pictures then obtainable at points 35 to 50 miles from transmitters would compare more favorably in quality with those now being enjoyed at locations much closer to the stations.

Jess Epstein and D. W. Peterson, of the research staff of RCA Laboratories, designed the tilted antenna and supervised field tests of the transmitted signals.



Human Factors in Industrial Research

Creativeness, scientific training and good character rate as the most important prerequisites for industrial research workers, according to Dr. E. W. Engstrom, Vice President in Charge of Research of RCA Laboratories. Speaking before representatives of industrial and government laboratories attending the Second Annual Conference on Industrial Research at Columbia University on June 11, Dr. Engstrom revealed that, while the evidence is by no means conclusive, there are indications and experiences to show that the most revolutionary creative thoughts have come to few research workers during their first decade of work. For the average research worker, he said, it seems that his best original and creative work comes before the close of the second decade of activity in the laboratory.

"Members of research staffs are not equally creative," Dr. Engstrom told the group. "In fact, a staff of all highly creative members would be unmanageable. An effective staff is one where all members respond to originality, where all members have some degree of originality and where a portion are highly creative."

Turning to the subject of scientific training, Dr. Engstrom stressed that training is not a substitute for creative ability. He declared that if the research worker's

creation is to mature into useful form, however, creative ability must be backed by fundamental knowledge and specific skills. A research worker does not graduate from the educational scene until he retires from the research scene, he added.

"Perhaps research administrators themselves have not adequately evaluated the importance of character," Dr. Engstrom suggested. "Integrity of purpose in research is vital. Nature is a cruel and exacting taskmaster when it comes to technical or scientific accuracy and honesty." He went on to say that "reliability in prosecuting a work program is rarer than one might think and is richly rewarded."

Dr. Engstrom mentioned other qualifications which a research scientist should possess, including perseverance when the going becomes difficult and determination to overcome obstacles along the way. Commenting on the need for scientific inquisitiveness, he said that progress seems to be made in an atmosphere of discontent with the current order of things, accompanied by a drive toward improvement and enhancement.

"Research," Dr. Engstrom stated, "thrives on freshness of viewpoint and differences of approach to the solution of problems."

NBC CELEBRATE

NBC's six-month celebration of its 25th anniversary was launched on June 1. Between then and November 15, the date on which the first NBC network went into operation in 1926, the anniversary will be brought to the attention of radio and television set owners by special broadcasts, presentations and public events. Throughout the six months, emphasis is to be placed on the slogan, "It's the Silver Jubilee on NBC!" Two anniversary songs written for the occasion by Meredith Willson and Harry Sosnik, respective music directors of "The Big Show" and "The Jack Carter Show", will be used as musical themes.

The network will honor its 25-year affiliated stations with plaques. Original employees of the network still on their jobs will be inducted as charter members of the NBC 25-Year Club at the Company's annual outing on August 18.



Performers in this early radio adaptation of "Rip Van Winkle" worked hard to create their own sound effects.



NBC's first radio program was put on the air November 15, 1926, from this main control room in the A. T. & T. Building, New York City. O. B. Honson, then NBC Chief Engineer, now Vice President and Chief Engineer, stands in the rear.

Affiliated stations are planning local celebrations tying-in with the NBC Silver Jubilee, and the British Broadcasting Company and Canadian Broadcasting Corporation will salute NBC with special broadcasts.

The original NBC network — America's first — was launched over a 25-station hook-up (21 charter affiliates and four specially-added outlets) with a special four-and-a-half hour broadcast from the old Waldorf-Astoria Hotel, New York. NBC stations from the Atlantic seaboard to Kansas City carried the array of talent that included Will Rogers, Weber and Fields, Mary Garden, Dr. Walter Damrosch and the New York Philharmonic, the dance bands of Ben Bernie, Vincent Lopez and George Olsen, and many other choice offerings. Some of the stars were picked-up "by remote control" — a newly-coined phrase of the day — from other cities.

Today, the NBC radio network totals 180 stations and the NBC-TV network has 63 outlets.

William F. Brooks, NBC Vice President in Charge of Public Relations, is Chairman of the NBC 25th Anniversary Committee named to plan and administrate the anniversary campaign. Members include Jacob A. Evans, NBC Manager of Radio Advertising and Promotion; James Nelson, Manager of TV Advertising and Promotion; Victor Schiff, of Carl Byoir and Associates; Ezra McIntosh, of the J. Walter Thompson Company, and Sydney H. Eiges, NBC Vice President in Charge of Press.

SILVER JUBILEE



In the early Thirties, live audiences filled the antics of Ed Wynn, the "Texaco Chief", in NBC's Times Square Studio.



Dual antennas for stations WJZ-WJY were erected on the roof of Aeolian Hall in New York City.



Original transmitter for station WJZ was housed in a small room in a Newark, New Jersey, factory.



Joseph H. McConnell, President, National Broadcasting Company.



NBC's first mobile broadcast unit, which went into operation in 1929, was considered one of the engineering marvels of the age.



First back-pack transmitter was used in 1931 to broadcast a golf tournament.



Early-model portable field equipment, including horn-type loudspeaker.



NBC newsmen tuned to world events at this short-wave listening post.



Short-wave transmitters, such as this, were used to broadcast news from remote points.

TV Servicemen must be Technicians, Diplomats, Peace-Makers, Benefactors

Records Belie Old Idea that a
Serviceman Must be Only an
Authority on Meters and Tubes.



An RCA serviceman rapped smartly on the door of the Smith home in Forest Hills. It was the first call of the week and he felt unusually chipper. "Oh, I'm so glad you're here", cried Mrs. S., "you can watch the children while I go to the store!" Before the amazed technician could protest, mother had disappeared, leaving him with three screaming little "darlings" aged 4 years, 2 years, and 8 months. The week was off to a bad start, but RCA's TV "surgeon" heroically inspected the chassis, located the trouble and corrected it, while his temporary wards hid his tools, rode on his back and tried to hide in the empty cabinet. Mother finally returned one hour later and released the baby-sitter for his next assignment.

Hundreds of similar situations confront the easy-going technicians in RCA Service Company branches all over the country. They regard such breaks in routine as "all in a day's work"—24 hours in which the customer is always right.

The RCA experts, skilled at curing TV's mechanical ailments, must be equally adept as public relations men.

"A CUSTOMER"

"A Customer is the most important person ever in this office—in person, on the telephone, or by mail. A Customer is not dependent on us—we are dependent on him. A Customer is not an interruption of our work—he is the purpose of it. We are not doing him a favor by serving him—he is doing us a favor by giving us the opportunity to do so. A Customer is not an outsider in our business—he is part of it. A Customer is not someone to argue or match wits with. Nobody ever won an argument with a Customer."

— Paul T. Babson
from *Sales Management*

When a Norwalk, Conn., woman phoned the service branch, demanding: "Where do I send the bill? While backing my car out of our drive into the street, I smashed into one of your trucks and put a gouge in my fender!", the manager calmly advised: "Just be brave, madam, and tell your husband."

One customer, detecting strange burning odors in his receiver, gazed in astonishment as RCA's "exterminators" removed several electrocuted mice from his highly-polished cabinet. "They must have come inside the set from the factory; *we* don't have mice!" was the reply.

One service manager succeeded in reuniting a Rockaway, N. Y., couple whom television had estranged. The day after their set was installed it needed adjustment, at which point Mr. X upbraided his spouse for spending all that money for nothing. Blows were exchanged, neighbors called in police, and wife went home to mother as the first step in divorce proceedings. With the best of intentions, the RCA manager talked to both parties and arranged to have a new receiver delivered two days later. The manager was duly cha-

grined when Mr. X stormed into his office with these words: "I've been trying to get rid of that old battle-axe for 10 years, and now when I have a perfect excuse you have to go and run it!"

Although medieval armor is not in vogue these days, many a bruised TV mechanic would welcome its protection. Such was the case of the eager young technician who, having erected a difficult rooftop antenna, stepped back to admire his work. When he landed on the hard ground, the mistress of the house asked if he



had knocked any slate from the roof. "Lady, I came down too fast to count them!" was his bewildered reply.

A similar incident occurred on Long Island during the blizzard of 1947. While mounting an antenna, the serviceman slipped off the icy rooftop, landed in a snowdrift and, somewhat disheveled, rang the doorbell. After reviving the astonished housewife, who fainted at the sight of him, the technician completed the installation.

If a homeowner wants to know how solidly his house is constructed, serviceman Clark can tell him. He tests all ceilings and beams these days, before starting work. While rigging an antenna in the unfinished attic of a Bronx dwelling, Clark lost his footing, slipped between two beams, crashed through the ceiling, and landed on a card table surrounded by a ladies bridge club.

The Service Company's unusual case histories are not without their share of international flavor. A penniless oriental prince, posing as a bona fide UN delegate, stormed into headquarters demanding immediate and very special TV service. Investigation revealed that he lived over a cheap 52nd Street nightclub, but through some scheme received his mail and phone calls at Lake Success.

Two RCA technicians have the distinction of being invited into a Russian inner sanctum. The dubious

duo set out for the Russian Embassy, housed on the Morgan Estate at Glen Cove, Long Island. They were "welcomed" at the gate by heavily-armed uniformed guards who escorted them to the mansion. Inside two other guards, this time with mere revolvers, scrutinized the entire procedure. When the technicians ran the TV feed line down from the attic, their Soviet "helpers" tried to stop them on the grounds that this would make the pictures come in upside down. After completing the installation, our heroes were upbraided because the receiver "would not tune in Russia, where television was invented".

In direct contrast was the temporary TV installation made for the President of a South American republic during his New York visit. In an effort to cement Latin-American relations RCA's technician tried to give immediate service, but was asked to come back at 5 p.m., as the President was taking his siesta. When he returned at the appointed hour, the serviceman had to wait in the hotel lobby until the dignitary, properly garbed in his dinner clothes, could receive him.

A simple address on the day's schedule often turns out to be a virtual obstacle course for the dauntless serviceman. One call—a confectionery store in Garfield, N. J.—was in reality a "horse parlor." The RCA technician rang the bell and knocked loudly, but received no answer. A bystander gave him a second ad-



dress which proved to be a Social Club. Here he was referred to a third address where he finally found a man with a key to the confectionery store in which the TV set was located.

Whether they have to climb a steep slope to a hill-billy's shack, or row out to a house built on stilts, service crews generally accomplish their missions. Unless, as happened in Paterson, N. J., the technicians try to install a TV receiver in a Turkish Bath on "Ladies Day".

(Continued on page 32)



Radio Message Circles Globe to Open Atomic Display

A radio message sent around the world returned to its originating point in New York, via Tangier, Manila and San Francisco, and activated a uranium pile which, in turn, exploded a magnesium charge that officially opened the Armed Forces Week Exhibition at the Seventh Regiment Armory on May 14. The message, addressed to the Armed Forces, was tapped out by Brig. General David Sarnoff, Chairman of the Board, Radio Corporation of America.

General Sarnoff's message, which traveled over the RCA Communications' worldwide system, said:

"May this globe-encircling radio message, opening the Armed Forces Week 'Atoms for Peace' Exhibition at the 7th Regiment Armory in New York, spread the seed of hope around the world that the electron and the atom will be harnessed for peace, security and freedom for all mankind."

The sample of uranium employed in the startling demonstration was supplied by Dr. John R. Dunning, Dean of the School of Engineering, Columbia University. By prearrangement, Dr. Dunning's fission device, containing U-235 uranium atoms, was connected at the Armory terminal point to the RCA circuit. The final impulse from the radio message caused the uranium to activate. Flashes from the splitting atoms were visible on a 20-inch oscilloscope.

The Exhibition featured weapons and special devices of the Army, Navy and Air Force, as well as products and services of RCA, which sponsored the Oak Ridge exhibit as an education service.

The atomic energy display comprised a series of vivid portrayals showing how the atom works and its use in medicine, agriculture and industry. Through animated devices and panoramic illustrations, visitors were able to follow the advancement of atomic energy through the years and beyond to an outlook of what the future holds for the atom.

Among the exhibits with special popular appeal were the working model of a Van de Graff Electrostatic Generator, and the Dime Irradiator. In demonstrating the Generator, a subject standing on an insulated platform laid one hand on the terminal of a high-voltage



Brig. General David Sarnoff tapped out the "round-the-world" message which set off a radioactive charge, thereby officially opening the Armed Forces Week Exhibition in New York City.

device. The electrostatic charge, passing into the subject's body, caused his hair literally to "stand on end". An attendant explained that the electric repulsion corresponded to the force which propels subatomic particles used for bombarding atoms in nuclear experiments.

The Dime Irradiator, in the form of a miniature atomic pile, illustrated the production of radio isotopes. When dimes were inserted and bombarded by neutrons from a sample of polonium-beryllium, the silver pieces became sufficiently radioactive to activate a Geiger-Muller counter.

The RCA displays included a new lightweight walkie-talkie produced for the Armed Forces, the latest model electron microscope, an electronic counter which can measure time-periods in millionths of a second, and two-way radiotelephone units which have been widely accepted by police and fire departments and industrial companies for installation on their fleets of trucks.

WNBT begins Transmissions from New Television Antenna

After 11 months of work atop the Empire State Building, during which progress was often delayed by weather conditions which made it impossible for even iron-nerved riggers to fabricate the steelwork, NBC's new permanent antenna for station WNBT went into regular operation on June 11. NBC was the first to transmit telecasts from the 215-foot mast which crowns the building tower a quarter of a mile above the street.

Four other television stations — WJZ-TV, WABD, WPIX and WCBS-TV — which are to share the spire with WNBT, are expected to start transmissions from their respective antennas during coming months.

"The start of operations," said O. B. Hanson, NBC Vice President and Chief Engineer, "marks the beginning of a new era in television transmission. Rising high above New York City, the antenna is an example of the fine cooperation rendered the project by the broadcasting companies in their effort to provide better service to the viewing public."

The super-turnstile RCA antenna of WNBT, from its position on top of the tower structure 1,465 feet above street level, is expected to assure high-quality program service for New York City and the metropolitan area. Engineers contend that television reception will now be improved in the fringe areas thereby making programs available to a larger audience.

Development of the electronic phases of the Empire State television antennas was conducted by the Radio Corporation of America, under the guidance of a committee consisting of Hanson and Dr. Frank G. Kear, of the consulting engineering firm of Kear and Kennedy, Washington, D.C., the latter representing Empire State, Inc., owners of the building.

The actual installation of the tower and antennas is considered a remarkable technical achievement without precedent in electronic communications. It was accomplished under difficult working conditions and presented many unforeseen problems. Weather was the biggest enemy of the project. Strong winds, storms, rain, cold and ice delayed activity sometimes for weeks at a time. The steel workers who climbed the precarious tower to install and adjust the antennas could work only under the most favorable weather conditions. Frequently, only one or two hours of work was possible in a full day. Ironically, there were numerous days when



Station WNBT recently began regular transmissions from the new 215-foot television mast atop the Empire State Building.

the weather on the ground was fair, the sun shining and the temperature mild, while high on the tower the wind blew in near-gale force.

The Empire State Building is the site from which NBC engineers pioneered the development of video transmission. It is recognized as the cradle of modern television.

The new super-turnstile is the sixth antenna to be placed in operation by NBC in the 20 years it has been transmitting from the Empire State. The single antenna will serve a three-fold purpose. It will transmit the TV picture, the TV sound and the station's FM programs by a device known as triplexing.

Who watches Television . . . ! how much . . . ! when . . . !

Today's average television program produces a payoff of 36,000 extra customers in the New York metropolitan area alone for each brand it advertises, and delivers 15.6 extra customers per month for each dollar invested in television advertising — less than seven cents per extra customer.

This and other startling and significant facts concerning the unparalleled sales effectiveness of television are revealed in "Television Today, Its Impact on People and Products", prepared from a new survey conducted for NBC.

Under the overall supervision of Edward D. Madden, NBC Vice President in Charge of Television Operations and Sales, field work for the survey was undertaken by the Psychological Workshop of Hofstra College, under the direction of Dr. Matthew N. Chappell. The sample design for the study was developed by Willard Simmons, outstanding authority in the field. Development of the entire study and the analysis of its findings were handled by a special NBC research staff headed by Dr. Thomas E. Coffin.

Of prime importance in the findings of the new survey were results which show that:

1. Adult owners of television sets spend 2 1/4 hours a day watching television. They devote more time, every day, to television than to radio, newspapers and magazines combined.
2. Time spent by all family heads, whether or not they are owners of television sets, shows radio winning 1 1/2 hours a day from the average family head. Television, with 75 minutes a day as an average among set-owners and non-owners together, wins more time than newspapers and magazines combined. Newspapers command a little more than three-quarters of an hour a day, while magazines garner only 15 minutes a day.
3. A comparison of similar types of products advertised during the day and in the evening reveals that daytime TV delivers 18.7 extra customers per dollar; evening, 18.6. The similarity of the results is eloquent in itself.
4. Multiple-brand shows (where several brands are advertised on one program), the survey reveals,

produce better than the average number of extra customers per dollar for each brand, whether they are high-budget or low-budget shows. This includes multiple-brand shows sponsored by a single advertiser, such as the "Colgate Comedy Hour", and participation programs like the "Kate Smith Show" and "Your Show of Shows". The two last-mentioned programs deliver, respectively, 38.8 and 36.8 extra customers per dollar. Each of these programs, which represent new sales concepts pioneered by NBC, is delivering twice as many customers per dollar as the average television show.

Based on 5,067 completed interviews with male and female heads of households in the 16 counties of the New York metropolitan area (51% set saturation) in a two-month period ending Jan. 23, 1951, the survey findings cover four main areas of inquiry:

1. The television audience as a market.
2. Television sales effectiveness for both package goods and durables.
3. The payoff in terms of extra customers per TV advertising dollar.
4. The relative effectiveness of various television techniques.

The questionnaire utilized in the survey covered the viewing of 111 television programs on the air at the

TIME SPENT ON MAJOR MEDIA BY TV OWNERS



DAY or NIGHT television

extra customers per dollar

daytime
brands

18.7

evening
brands

18.6

(similar products in each group)



time; a total of 102 hours of programming a week, covering all networks and representing approximately 75% of all network programs available to viewers. There were 187 different brands of packaged goods and durables advertised on these programs.

In establishing the TV audience as a market with its own particular characteristics, the study found that there are more people in television homes than in non-television homes, 62 more per 100 families. Television families have a higher income than non-television families, an average of \$644 more a year, or \$50 a month per family. This difference, when projected to the entire market, grows to a billion and a half dollars more annual income for New York television families. As concrete evidence of the purchasing power of the television audience, the survey points out that 73.2% of all new cars sold in the New York area in the past six months were bought by television families.

In the light of today's higher television costs, increased set ownership and the heightened competitive situation, the current survey points up the fact that the 1949 NBC-Hofstra report showed that television delivered a payoff of 11.6 extra customers per dollar invested in television advertising for the 15 brands studied. Today's comparable figure for these brands is 11.8. Speaking conservatively TV today is delivering as many new customers for the advertiser's dollar as it did two years ago. The report poses the question: In how many other fields does the dollar buy as much today as it did two years ago?

In considering the relative effectiveness of television techniques, the survey's primary consideration was to point out to the users of the medium how to use TV most effectively. It notes that the findings are not rules, but guides, based on results obtained by advertisers already using television.

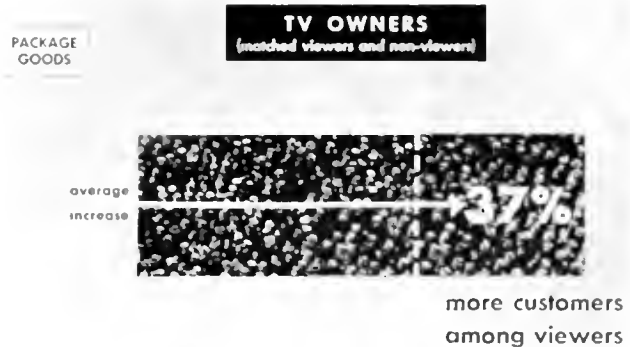
Findings indicate that there is a definite cumulative effect in television advertising. Some of the brands checked had been on TV for less than 13 weeks. For these neophytes, TV created 9.9 extra customers per month for each dollar invested. There is a steady increase of extra customers that parallels the length of time of TV advertising. Brands using the medium over 15 months had built up to a level of 20.0 extra customers—a cost of only five cents a customer.

The most efficient commercials, the survey shows, are those which are well-liked. Sales messages which irritate the viewer bring only half as many extra customers to the product for the TV dollar. Findings indicate that 61.5% of viewers like the average commercial with dislike evidenced by only 6.4%.

High-budget shows, those with weekly program costs above \$17,000 per production hour, deliver about one-quarter more extra customers per dollar than the average program, the survey shows. High-rated shows, those with a rating of 20 or more in the New York area, produce approximately 50% more extra customers per dollar than the average.

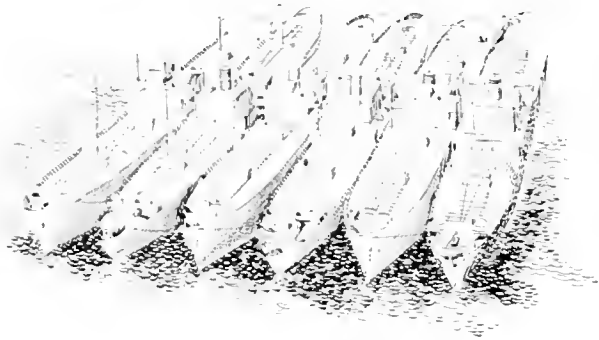
The New York market, the study points out, had 51% TV set saturation at the beginning of 1951. By October of this year, 25 of the top markets in the United States will have at least 51% set saturation. At that time there will be some 14,000,000 television homes in the country.

SALES RESULTS: 143 TV PROGRAMS



In conclusion, the survey notes that NBC is first in coverage of the television audience with an average of 42 stations per program, first in programs with seven of the 10 top-rated shows, first in audience with 2,294,000 homes reached per sponsored program, and first among advertisers with 49 1/2 total weekly sponsored hours.

Radio Technicians go to work on the "Mothball Fleet"



By Forrest H. Flanders
*Chief Service Technician
Radiomarine Corp. of America
Baltimore, Maryland*

Fleets of war-famous "Liberty" ships which, for nearly six years, have been swinging idly at anchor in American backwaters, are now being reactivated in bustling repair shipyards all over the country. Among the crews of skilled workmen who refit, overhaul and refurbish these cargo vessels are crack technicians of the Radiomarine Corporation of America. It is their job to bring to life the radio pulsations which serve as eyes, ears, and voice for every type of seagoing craft.

Mass-produced during World War II to be the sturdy workhorses of the Merchant Marine, the unlabeled Liberties fell into disregard at the war's end. Some were converted hurriedly into makeshift transports to speed our soldiers home, others were examined by friendly foreign interests and purchased to replenish their decimated merchant fleets. A few that were entirely worn out had to be scrapped for valuable steel they contained.

Not considered worthy of the elaborate and costly lay-up procedure accorded our Navy vessels, the Liberties were given a minimum of treatment before going out of service. Fittings and spare parts were inventoried and stored in cargo spaces below the decks. To serve as armor against the inevitable onslaught of rust in years to come, each vessel was made weathertight with a special red preparation, oily in texture, which was sprayed on all machinery and steel fittings, as well as on the outside surfaces of hull and cabins.

Once the Liberty ships had been laid up in sheltered waterways, it was doubtful that they would ever be used again. Maritime planners considered the vessels "too slow" to be of future use. But before larger and



A Radiomarine technician makes a thorough inspection of equipment in the ship's radio room.

faster ships had passed the blueprint stage, a new global menace became a reality. Again it was necessary to transport cargoes to friendly nations and supplies to American soldiers abroad. It is for this purpose that Liberty ships are to be sent back to sea.

As rapidly as possible, the Liberties are being towed to repair yards and eased into drydock where scores of workmen stand ready to begin their special tasks. Inspectors look over that portion of the hull normally below waterline, while other workmen wrap the hull with a web of staging from which a crew, armed with chemicals and brushes, can wash away the protective oil coating. Inside the vessel, government officials check inventoried equipment stored on board, and white-covered engineers, deep in the engine room, shout orders in booming voices necessitated by the din of machinery.

Less publicized but equally important, nevertheless, is the part played by Radiomarine technicians. No intricate staging need be erected for the overhauling of the ship's complicated radio and electronic equipment. Shortly after the arrival of each vessel in drydock, one or two Radiomarine inspectors laden with tool boxes and test equipment, pick their way across the cluttered decks to the radio room.

Despite all lay-up precautions, much must be done

to rehabilitate the radio equipment for the corrosive salt air has had many hours in which to penetrate man's protective efforts. The high gray steel unit containing Radiomarine transmitters, receivers and automatic distress alarm was coated with the oily rust preventative, even though, the copper-clad steel which Radiomarine uses in its equipment is no easy victim to rust.

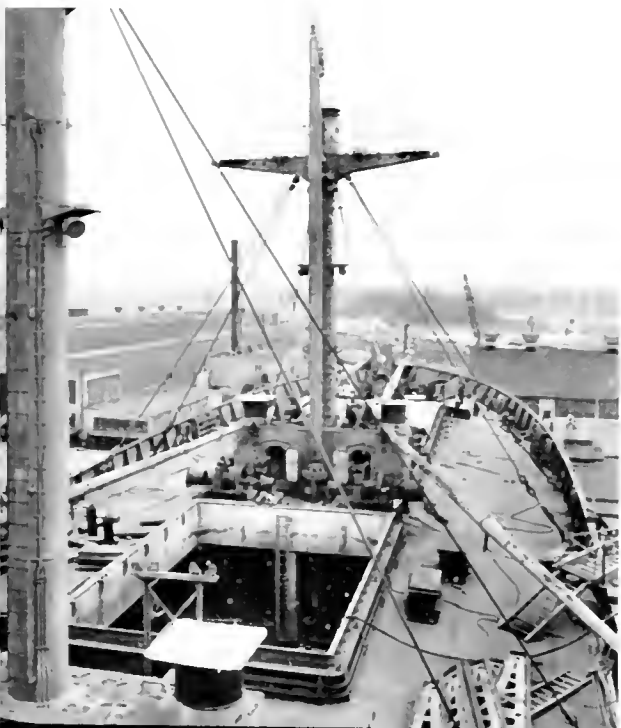
With the outside of the unit shining clean, the real work is yet to begin. Switches must be lubricated and sensitive relays burnished to a jewel brightness. When power is available from the engine room, the units are put into actual operation for the test. Little trouble is experienced as the equipment is rugged and designed for all climatic conditions. The rare failure of a component is quickly localized and the faulty part replaced by the technicians.

Heavy storage batteries, used to supply power to portions of the radio equipment in event of failure of the ship's main generators, must be replaced. Years of lay-up with no attention extracts a penalty that lead-acid batteries cannot survive.

A variety of antennas, each having a specific function, must be erected between the masts. Usually new wire and insulators must be provided to replace the old which have a way of becoming broken or lost during the long lay-up period.

The radio direction-finder, usually located in the chart room near the wheelhouse, requires its share of attention. Its panel is scrubbed and scoured and components cleaned and tested until the technician is confident that performance will be unflinching when called upon.

After a short stay in dry-dock, this sturdy Liberty ship once again will look like new.



Broadcast receivers, together with a network of loudspeakers, placed on board by the government during the war to entertain officers and crew, are checked and repaired if necessary. These receivers were furnished to replace personal broadcast sets which menaced the ship's safety. Inexpensive radios often act as miniature transmitters and emit a squeal that could be picked up miles away by sensitive equipment of enemy submarines. The Government-furnished sets did not have this drawback. Personal radios are no longer prohibited but habit dies hard and the ship's entertainment receiver is a convenience that has grown to a necessity and must therefore be accorded technical attention.

During this brief shipyard visit some Liberty vessels are being equipped with the latest type of Radiomarine radar. This involves close cooperation with other shipyard craftsmen who are called upon to erect a sturdy mast to support the revolving radar scanner. Vast progress has been made in the design of radar since the Liberty was first built and Radiomarine, always acutely aware of marine requirements, has engineered one of the finest and most sensitive units.

With gleaming new antenna wire strung between the masts and renovated equipment in place below, the Liberty is ready for her final inspection by Federal authorities. This inspection determines her fitness for the awards of certificates attesting that she meets all legal requirements and constitutes a seaworthy addition to our merchant fleet.

Radiomarine still has a task to perform. The accuracy of the direction finder must be checked at the nearest lighthouse having a radio beacon. This takes place usually only a few miles from the port of departure. Upon arrival in this vicinity, the vessel's speed is slackened and the pilot orders that the ship be steered to travel in a huge circle. Radio bearings are taken at frequent intervals while simultaneous sight observations are recorded by one of the deck officers. Comparison between the radio and sight bearings discloses the amount of error introduced into the direction finder by adjacent steel masts, guy wires and other structures. These errors always prevail but, with the knowledge of their value, the Radiomarine direction finder can be compensated to eliminate the mental calculation otherwise necessary to obtain an accurate bearing.

Adjustments completed, the technician, after a handshake with the captain, climbs down a rope ladder into the launch below. A parting salute from the horn of the launch as it heads for shore is answered by the deep whistle-blast of the larger vessel as she picks up speed. There is an exhilarating tone to that whistle, bestowed by a realization that another Liberty has been reborn and is ready to serve her country again.

TV Servicemen

(Continued from page 25)

On occasion the impossible rears its defiant head to stump the most experienced serviceman. Witness the time one tried to locate the source of heavy interference on a Bronx set located in a good reception area. The enterprising RCA man finally gained entrance to an unfinished attic which had been closed off for over 10 years. Here he found lighted an old, chattering carbon bulb, apparently installed by the workers who had run the original electric line up to the attic. Once this obstacle was removed, reception was perfect.

Another baffled family had to choose between video and heat, until a technician solved the mystery. When the new TV set was tuned in, the oil burner quietly ended operations. RCA's sleuth discovered that a receiver should never be located under a thermostat—especially in winter weather.

The famous case of Brooklyn's "Bessie" is familiar to RCA V.I.P.'s and servicemen alike. She has called them all. Bessie purchased an expensive projection-type receiver, and then complained bitterly and frequently that the picture got fuzzy every night at 9 o'clock. After countless check-ups, which revealed no trouble, the branch manager went to her home each night for a week to see this phenomenon for himself. It turned out that Bessie was not exactly a teetotaler, and, as might be expected, the picture to her eyes sometimes got fuzzy. Since it isn't wise to tell a customer that she may be seeing things, the manager made motions of adjusting several knobs behind the set, whereby the complainant was temporarily happy.

One distinguished serviceman can testify to the fact that appearances are indeed deceiving. His was the task of installing a receiver in the Brooklyn State Hospital. He had no problem gaining entrance to the institution, but leaving was another story. Guards detained him for nearly an hour, confident that he was one of their mental patients, masquerading as a television engineer.

A few months later the same man was "locked up" again, this time by a conniving housewife who refused to let him leave until he had put in all the screens in her six-room house.

When the telephone rings in a Service Company branch office, the staff members are prepared for anything. One woman demanded that they put a shade on the screen of her set so the TV performers couldn't spy on her; another requested them to "pull up the shade in front of the orchestra" on her receiver, which was actually showing a test pattern with canned music.

A retired schoolteacher was convinced that television was making her radioactive, while an expectant mother asked if metal-cone tubes really gave off a harmful ray. Dozens of calls have come in requesting servicemen to install films in the TV instruments.

Back in 1947, when receiver sales were skyrocketing faster than the Service Company could expand its staff, things were really hectic. Installation orders had reached a three-week backlog and people offered all kinds of gifts in return for immediate installations. Service trucks returned cases of whiskey, suits, jewelry, pens, and numerous gadgets which hopeful customers sent in with cards attached. Hundreds of written requests were received from doctors who claimed they wouldn't be responsible for their patients if the latter had to look any longer at unopened cartons containing their long-awaited television sets.

In those trying days, the serviceman was king. One particular technician named Sweeney was assigned to the Park Avenue trade because of his engaging personality. Monday through Friday, Sweeney never bought a meal. He had breakfast with the maid, lunch with the woman of the house or her daughter, and dinner with the whole family. Judges, bankers, and vice presidents called for him by name when they wanted service.

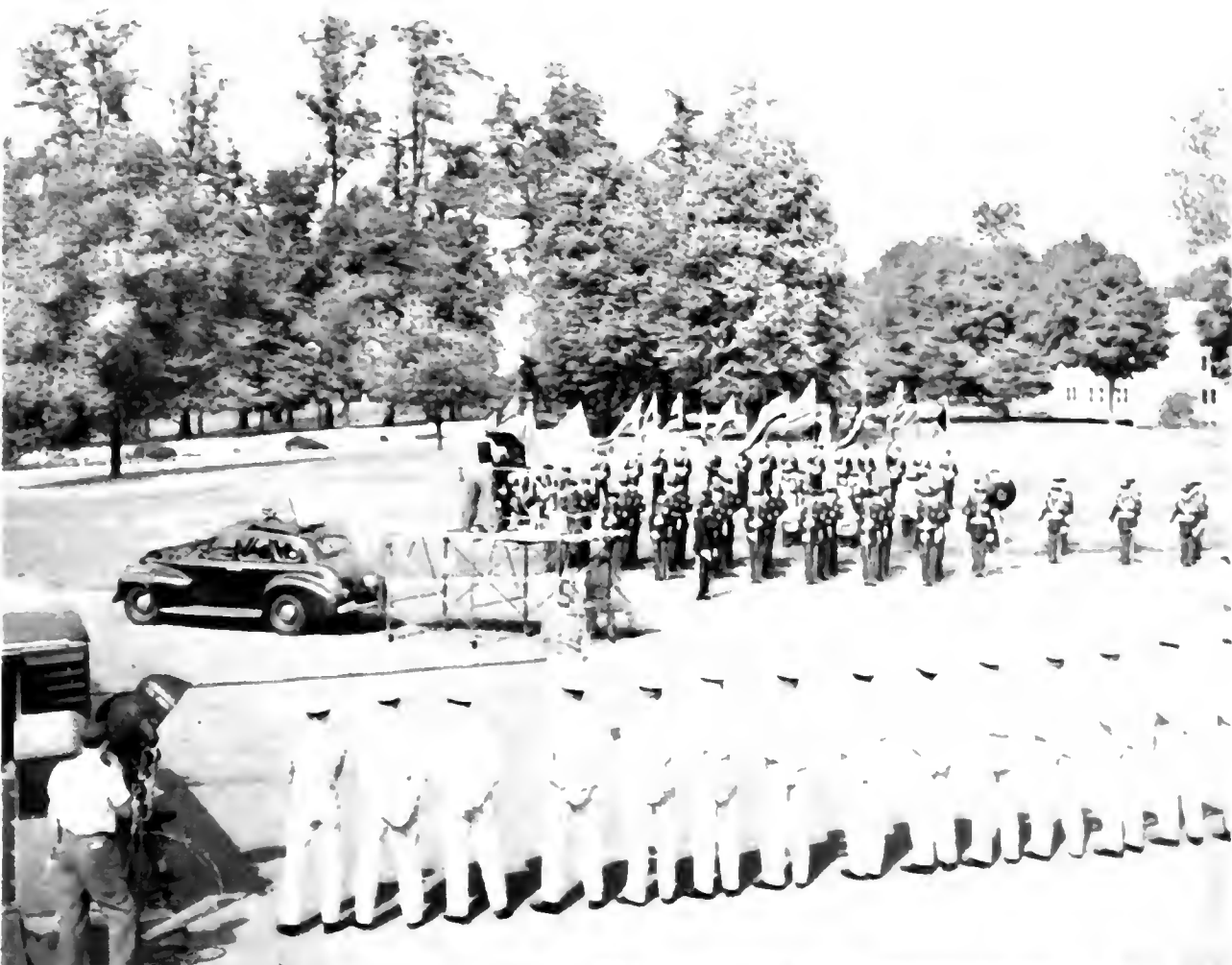
At the peak of the early demand for TV sets, eager owners were willing to make almost any sacrifice for a clearer glimpse of Uncle Miltie or a championship fight. Some even insisted on having full-size antennas erected indoors in any spot where reception was best. One family had such an antenna in the bathtub, another, under the bed, and several had masts mounted on the bedposts. A swank Forest Hills apartment owner agreed to put his antenna on the dining room table. The family dined between dipoles.

Which only goes to prove that the customer may not always be right—but he wants what he wants where he wants it. Any serviceman will agree to that!



RESEARCH • MANUFACTURING • COMMUNICATIONS • BROADCASTING • TELEVISION

no 1



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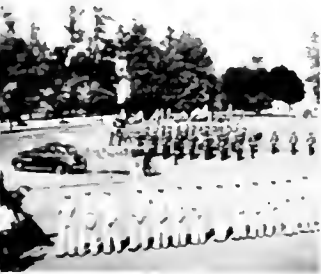
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Radio Age

• MANUFACTURING • COMMUNICATIONS
• BROADCASTING • TELEVISION

OCTOBER 1951



OVER

detachments of U. S. Marines and Merchant Marine cadets appear before color television cameras at the U. S. Merchant Marine Academy, Kings Point, N. Y., as a feature of the programs presented during recent field tests of RCA's all-electronic compatible color television system.

NOTICE

When requesting a change in mailing address please include the code letters and numbers which appear with the stencilled address on the envelope.

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RADIO CORPORATION OF AMERICA

RCA Building, New York 20, N. Y.

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DAVID SARNOFF

COMMEMORATING THE FORTY-FIFTH ANNIVERSARY OF DAVID SARNOFF'S ENTRY INTO THE FIELD OF RADIO ON SEPTEMBER 30, 1906, THIS PLAQUE IS DEDICATED BY HIS ASSOCIATES IN THE RADIO CORPORATION OF AMERICA AS A SYMBOL OF THEIR ESTEEM AND ADMIRATION.

AS A PIONEER OF WIRELESS, HE HAS CONTRIBUTED IMMEASURABLY TO THE DEVELOPMENT OF RADIO, TELEVISION AND ELECTRONICS AS NEW SERVICES TO THE NATION AND TO THE AMERICAN PEOPLE.

A CREATIVE CRUSADER OF PROGRESS ENDOWED WITH A PENETRATING VISION, DAVID SARNOFF HAS CONTINUALLY LED THE WAY ACROSS NEW FRONTIERS IN SCIENCE, ART AND INDUSTRY TO MAKE THE UNIVERSE VIBRANT WITH INTERNATIONAL COMMUNICATIONS.

THESE LABORATORIES, THE RCA VICTOR PLANTS, THE RCA WORLD-WIDE RADIO CIRCUITS AND THE NBC RADIO-TELEVISION NETWORKS, SYMBOLIZE HIS FAITH IN SCIENCE, HIS CONSTRUCTIVE PLANNING AND ENDURING ACHIEVEMENTS.

DAVID SARNOFF'S WORK, LEADERSHIP AND GENIUS COMPRISE RADIO'S PREEMINENT RECORD OF THE PAST, TELEVISION'S BRILLIANT PERFORMANCE OF THE PRESENT, AND A RICH LEGACY IN COMMUNICATIONS FOR THE FUTURE.

THIS LABORATORY OF RCA IS NAMED
THE DAVID SARNOFF RESEARCH CENTER

SEPTEMBER 30, 1951

This bronze plaque, commemorating General Sarnoff's 45 years in the field of radio, has been placed in the entrance foyer of the David Sarnoff Research Center at Princeton, N.J.

Color Television on Theatre Size Screen

AS AN impressive climax to its most recent field tests of all-electronic compatible color television, which were held in New York and Washington from October 9 to 19, RCA brought the series to a close with a four-day demonstration of theatre-size color TV at the Colonial Theatre in New York. In addition to the thousands who viewed the programs on direct view receivers installed in Radio City and in an NBC Studio in Washington, an even greater number were admitted to see the large-screen images. Representatives of the press, radio and theatre industries, and the public were unanimous in praise of the lifelike color, clarity and brightness of the pictures. At the same time, untold thousands were able to witness the programs in black-and-white on their home receivers, an accomplishment made possible by the compatible feature of the RCA system.

The color programs were transmitted over WNBC New York, and WNBW in Washington. Furthermore, to demonstrate the adaptability of the system to existing network facilities, the signals were sent to Washington over both coaxial cable and microwave relay. There the pictures were observed by the Washington press, members of the Cabinet, of Congress, the Federal Communications Commission and other interested groups.

In New York, capacity audiences watched the tests on experimental direct view color television receivers in the lounge of the Center Theatre, Radio City. As an aid to a survey of public reaction to the RCA tests, viewers were asked to note their comments on printed questionnaires supplied by the Opinion Research Corporation of Princeton, N. J.

The morning programs at 10 o'clock were transmitted on Channel 4 in Washington and in New York by the same transmitters that normally send out monochrome television programs. Afternoon programs, at 2:15 and 4:00, were transmitted by closed circuits from the studio to the viewing points in the two cities.

Throughout the duration of the tests, three programs were staged daily in NBC's studio 3H, supplemented by outdoor pickups. Starring in the presentations was Nanette Fabray, Broadway songstress who acted as mistress of ceremonies. Others who appeared were Dorothy Keller and Earl Barton, novelty dancers; Gail Manners and Arthur Maxwell, vocalists, supported by a waltz team in a Viennese number; George Burton's lovebirds and a select group of fashion models. Ben Grauer acted as commentator.

As an added feature to test progress in color television pickups out of doors, an RCA-NBC mobile color television unit transmitted scenes from Palisade Amuse-

ment Park, New Jersey. Microwaves carried the outdoor scenes to WNBC.

In a completely unscheduled exposure to the elements, the mobile camera unit proved its ability to operate under conditions far from ideal for outdoor pickups. While one of the programs was under way from Palisade Park, the skies darkened and a heavy shower of rain fell on the participants. Instead of adversely affecting the screen images, the diffused lighting produced excellent color textures. The only precaution taken by the mobile crew was to throw weather-proof covers over the color cameras.

To show the large screen images at the Colonial Theatre, use was made of apparatus consisting primarily of the RCA tri-color receiver-projector developed under the direction of Dr. David W. Epstein of the David Sarnoff Research Center of RCA. The receiver-projector was described as "a painstakingly achieved refinement of one demonstrated by RCA in 1947 at The Franklin Institute in Philadelphia."

Although the unit at the Colonial was mounted in the audience section for the demonstration, it was stated that subsequent models will be designed for a longer projection, permitting installation on theatre balconies. It was further explained that there is no reason why the

Dr. David Epstein of the David Sarnoff Research Center at the controls of the RCA tri-color receiver-projector which provided theatre size screen images during recent field tests in New York.



RCA receiver-projector cannot be made to project pictures on full sized theatre screens up to 18 by 24 feet.

It was also pointed out that the projection apparatus utilizes the same type of optical system employed in RCA's black-and-white theatre television projectors, now installed in theatres in New York, Philadelphia, Washington, Chicago, Los Angeles and other American cities. It was recalled that RCA conducted its first public demonstration of big-screen black-and-white television pictures, using a projection optical system installed in the New Yorker Theatre ten years ago.

The improved receiver-projector employs three powerful five-inch projection kinescopes, or picture tubes, each coated with a phosphor which glows in one of three primary colors—red, green, and blue. Powerful and accurate projection lenses take the images from these three picture tubes, each much smaller than those used in present home television sets, and project these images for perfect registration to blend into a brilliant full-color picture on the big screen.

Special projection kinescopes achieve their brightness and effectiveness, in large part, through advances made by RCA since development of the original kinescope by Dr. V. K. Zworykin, Vice President and Technical Consultant of the RCA Laboratories Division. Some of these advances, such as the design of electron guns to operate at higher voltages, and the development of efficient phosphors with a wider range of color, have

been under continuous research for many years.

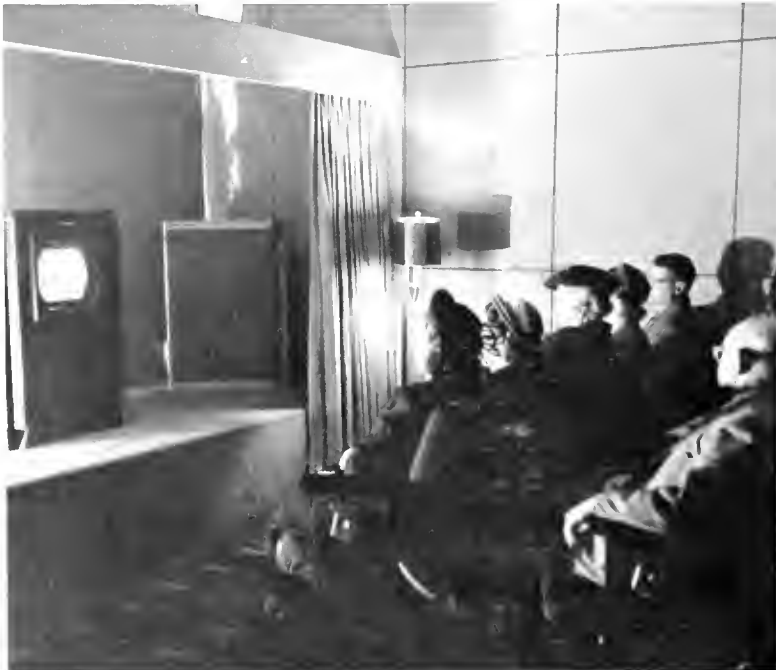
Brig. General David Sarnoff, Chairman of the Board of RCA, in praising the engineers for their achievement, pointed out the three-fold purpose of the demonstration at the Colonial Theatre: (1) To reveal how motion picture theatres of the future may receive and project color television programs on theatre-size screens; (2) To show a new dimension of the compatibility of the RCA color system with black-and-white television standards; (3) To prove that color television transmissions can reach theatres satisfactorily by radio relay, coaxial cable or on-the-air broadcasts.

"This is another effective test of the flexibility of RCA's compatible, all-electronic color television system, and the variety of valuable uses to which it can be put, not only in homes, but in theatres across the nation," said General Sarnoff.

The brightness and clarity of the large-screen color television pictures, General Sarnoff noted, were achieved within present black-and-white broadcast standards. He pointed out that because of this compatibility it was possible with the RCA color theatre television equipment to receive and project transmissions in either color or black-and-white, without changing the apparatus. He also declared that such transmissions can be taken from on-the-air broadcasts of local stations, or over coaxial cable or radio relay.

(Continued on Page 31)

One of the viewing rooms in the Center Theatre, New York, where the public viewed programs transmitted by the RCA compatible color television system.



Artist's interpretation of the large-screen color television apparatus installed in the Colonial Theatre, New York, for the October field tests.



Sarnoff Challenges Scientists of RCA to Make Three Important Inventions

Brig. General David Sarnoff, Chairman of the Board of Radio Corporation of America, speaking at a ceremony in Princeton, N. J., on September 27, commemorating his 45th anniversary in the field of radio, told RCA research scientists that there are three important inventions he would like to have them make before he reaches his 50th radio anniversary in 1956.

Citing contributions RCA scientists already have made to the advance of science and industry, General Sarnoff asked them to invent an electronic amplifier of light for television, a television picture recorder, and an electronic air-conditioner for the home.

The occasion of the triple challenge to RCA scientists was the dedication of RCA's Princeton laboratories as the "David Sarnoff Research Center," in appreciation of General Sarnoff's "faith in science, penetrating vision, constructive planning and enduring achievements in the fields of radio, television and electronics."

"I realize the challenge to your ingenuity in these three new inventions I am asking for," General Sarnoff said, "but I know that you can solve the problems because you have an enviable record of accomplishment in science."

The specifications for the three inventions are as follows:

First, an electronic amplifier of light that would provide brighter pictures for television which could be projected in the home or theatre on a screen of any desired size. An amplifier of sound gave radio a "loud-speaker" and an amplifier of light would give television a "big-looker." He named it a "Magnalux."

"A true photo-amplifier that could produce bigger and brighter pictures in fine detail would greatly advance television in the home," said General Sarnoff. "It is also needed for theatres and industrial purposes. The presently known optical systems cannot accomplish it. We can, of course, enlarge pictures optically but in the process light is lost and the pictures become dimmer instead of brighter. What is needed is a true amplifier of light itself."

Second, a television picture recorder that would record the video signals of television on an inexpensive tape, just as music and speech are now recorded on a phonograph disk or tape. Such recorded television



BRIG. GENERAL DAVID SARNOFF

"I would like to ask you now . . . for three presents that I wish you would give me some time between now and my 50th Anniversary in radio."

pictures could be reproduced in the home, or theatre, or elsewhere, at any time. He called it a "Videograph."

"The television art needs an electronic recorder of television picture signals," said General Sarnoff. "Today when a television program is recorded, the pictures pass from the camera through the major portion of the television system and first reproduce the picture on the face of a kinescope. Another and special camera placed in front of the kinescope, photographs the program on motion picture film. But that technique is costly, time-consuming and limited. The pictures pass through all the possible hazards of the television system, and then through all the photographic process with its possible

degradations. As a result, the recorded picture suffers in quality.

"In contrast with present kinescope recordings on film, the instantaneous recording of the actual television picture signals on tape would be more economical, would save time in processing, and would simplify certain problems of distribution. Also it would solve the national time-zone problem in telecasting. Any number of copies of such tapes could be made instantaneously, and copies could be preserved for historic reference or other use. The Videograph would be a new instrument that could reproduce television programs from tape at any time, in the home or elsewhere, in much the same way as the present phonograph reproduces the music you want when you want it."

Third, an electronic air-conditioner for the home that would operate with tubes, or possibly through the action of electrons in solids, and without moving parts. It should be small, noiseless and inexpensive and should fit into any size room. He named it "Electronair."

General Sarnoff called attention of the scientists to the discovery and recent applications of electrons working in cold solids instead of heated vacuum tubes.

"Electrons in solids offer tremendous possibilities," said General Sarnoff, "and I bid you to harness them to work in 'solid comfort,' instead of subjecting them to red-hot heat. Indeed, cold electrons are a great challenge, the promise of which is already manifested in tiny transistors, now being developed for use as detectors and amplifiers in radio, wire and cable communications. You have succeeded in throwing away the spinning wheels in television, and I am sure you will also succeed

in discarding the wheels and noise in air-conditioners.

"These are essential inventions for which there is a basic public need. They would expand existing industries and create new ones," said General Sarnoff. "I hope you will have them ready for service by the time I celebrate my 50th radio anniversary in 1956."

While some work has been done along the lines indicated, General Sarnoff said, much work remains to be done before practical solutions are found to the problems involved in these new developments.

"Naturally, I look to the scientists and engineers of RCA to be first in solving these problems," he continued. "But it is in the American spirit of competition under the private enterprise system that I call attention, publicly, to the need for these inventions. Whether it be the lone inventor in the attic, or the scientists in competing industrial laboratories who will produce these inventions, the results will spell new opportunities for science and progress for all.

"I realize the challenge to your ingenuity, but I know that you can solve the problems because you have an enviable record of accomplishment in science and invention.

"RCA scientists and engineers have made marvelous contributions to the advance of science and industry, especially in the realms of radio, radar, television and electronics.

"World-wide communications, radio broadcasting, talking pictures, microphones, phonographs and records, public address systems and industrial devices have been developed and advanced by RCA research and engineering.

DR. C. B. JOLLIFF

"We are all very happy to have you recognize General Sarnoff's interest in technical matters. It is a pleasure for us to work with him . . ."



GEORGE DE SOUSA

"General Sarnoff's outstanding achievements in the service of RCA have justly earned for him our highest admiration and devotion."





DR. GANO LUNN

David Sarnoff's life has been an inspiration for me and I deeply feel the honor of being asked to take part in this ceremony."

From RCA Laboratories have come the kinescope — now the universally used television picture tube — and the famous image orthicon television camera tube. The electron microscope — the basic inventions in the microwave radio relay — ultratax — are the products of your genius.

Your research and inventive skills have produced the present system of all-electronic black-and-white television and the compatible color television system.

The tri-color tube, which I consider to be a scientific marvel of this age, has been created and developed by the RCA.

Through your explorations in space you have extended the radio spectrum for more and more useful purposes. Through pioneering research in our laboratories and by experimentation at our Bridgeport station, you have pioneered and opened up the ultra-high frequencies to practical use. These achievements will extend the service of television to all parts of the Nation.

"Television in itself," said General Sarnoff, "is like a new book, and on each new page you turn you will find new ideas and challenges just as all inventors have done in turning the pages of radio."

"The wireless I knew 15 years ago is not the radio of today. The television you know now as pioneers will not be the television of tomorrow. Indeed, we

have only earned its page one" in Chapter I of the Electronic Age. So I bid you study well the past and to achieve in the present by creating for the future.

Project "Typhoon"

As busy as you are in research, you may not have had time to realize what your inventive skills mean to our country and to the world. For example, consider the project in our Laboratories known as "Typhoon." In the past the design of guided missiles has necessitated an expensive trial and error process. There was no guarantee that a new missile would perform as expected. Now, through a super-brain known as an electronic computer equipped with 4,000 electron tubes, designed and built by RCA Laboratories in cooperation with the Bureau of Aeronautics, U. S. Navy Department, missile design has been greatly simplified and speeded with mathematical accuracy.

"Within the past ten months nearly 1,000 test runs of proposed guided missiles have been made before the missiles were actually built and flown. This has saved our government \$250,000,000.

"This latest computer has contributed so effectively to the guided missile research program of the United States that years of valuable time as well as hundreds of millions of dollars are being saved in the development of these important weapons.

"You who work directly in the research fields of radio and television may find new ideas and challenges in the fact that your brother scientists working in nuclear physics in our Laboratories have successfully derived electrical voltages from radioactive materials. This achievement — still in its initial stages — holds tremendous promise for the future."

A bronze plaque, (see frontispiece) unveiled at the luncheon in General Sarnoff's honor, was presented by Gano Dunn, President of The J. G. White Engineering Corporation, and Director of the Radio Corporation of America. Included in the many congratulatory messages received by General Sarnoff and read at the luncheon were telegrams from President Truman and Governor Dewey. Said the President:

Congratulations on your forty-five years of great achievements in the field of radio, television and electronics. Through your leadership in American industrial life and in science, you have contributed immensely to the growth of America and its preeminence in communication. It is most fitting therefore that RCA Laboratories at Princeton be named the David Sarnoff Re-

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Five Types of Tri-Color Kinescopes

*Vast Scope of Research and Engineering in Developing Electronic
Picture Tubes for Color Television Disclosed by RCA*

DISCLOSING the vast scope of its research and engineering in developing electronic picture tubes for color television, the Radio Corporation of America announced on October 23 that it has built at least five types of tri-color tubes, each one capable of operation on all known television systems, including the RCA compatible all-electronic system, as well as the field sequential method and standard black-and-white.

The announcement coincided with publication of eleven technical papers by RCA scientists and engineers, making public their work on various aspects of color television tube design, in the October issue of the Proceedings of the Institute of Radio Engineers.

The five types of color television tubes illustrate basic designs covering a wide range of principles, according to Dr. E. W. Engstrom, Vice President of the RCA Laboratories Division. He said that RCA research scientists have studied and investigated many ideas and concepts of color picture tubes, including some later shown by persons outside of RCA.

Dr. Engstrom pointed out that the five prototypes of tubes developed by RCA include those employing viewing screens formed of color phosphors arranged in patterns of dots, lines and checkerboard. Although the dot structure has been adopted for the tri-color tube now used experimentally in the RCA compatible color television system, other designs, he said, can incorporate any one of the several screen textures or a variation of them, without affecting the system.

In commenting on the information, which the technical papers make available to the industry, Dr. Engstrom said:

"The development of the tri-color picture tube is one of the outstanding scientific achievements to come out of the electronic industry since the end of the war. The selection by RCA of one particular tube as a production model does not mean that the other tubes are not promising. Practical reasons made it desirable, at this time, to narrow the choice to one tube for pilot-plant production. By initially concentrating the major part of our work on five tubes instead of one, we had a five-fold better chance of coming up with one which would be best suited to our present needs."

The scope of the effort involved in the development of the tri-color tubes is indicated by the fact that several hundred people, recruited from many different Divisions of the Corporation, were involved in the project.

Engineering details for the tri-color tube RCA is using in current field tests were turned over to the television industry in July, 1951, together with actual working models.

"As an objective for a good color reproducer," Dr. Engstrom continued, "we aimed at a tube which would give us good color, would perform on any known color system, and would also reproduce pictures in black-and-white from present television broadcasts.

"The RCA tri-color tube now being used meets all these requirements. It is a high performance tube. It provides high-quality color pictures and it operates with all known television systems. It does not impose external limiting factors on picture size."

Dr. Engstrom also said that "RCA's wide engineering and manufacturing experience in electron tubes enabled us to take both cost and performance factors into account in choosing the tube.

"A tri-color tube," he continued, "is the keystone to a successful color television receiver. But no color tube by itself affects compatibility—that is, the ability of a standard black-and-white receiver to get color broadcasts in black-and-white. This is a quality which must be inherent in the color television system itself.

"The RCA color television system," he emphasized, "is completely compatible."

Methods Tried

In a general discussion of the basic requirements for a good color television picture tube E. W. Herold, a member of the staff at the David Sarnoff Research Center of RCA at Princeton, N. J., tells of methods suitable for reproducing color television pictures.

The tri-color tube now in pilot-plant production at the RCA tube plant in Lancaster, Pa., is described in detail in an article by H. B. Law, of the Research Center. This is a three-gun tube for either simultaneous presentation of the three primary colors—green, red and



Four scientists of RCA examine five of the tri-color television picture tubes developed at the company's laboratories at Princeton, N.J., and Lancaster, Pa. They are: (left to right) E. W. Herold; Dr. E. W. Engstrom, Vice President in Charge of RCA Laboratories Division; H. B. Law, and Dr. V. K. Zworykin, Vice President and Technical Consultant of the Division.

blue—as in the RCA system, or sequential presentation of the same colors.

This tube comprises a glass plate and a metal shadow mask. On the plate are 600,000 small, closely-spaced phosphor dots, each .014 inch in diameter, arranged in triangular groups. Each group consists of three dots which glow in the three primary colors,— red, green, blue— when hit by the scanning electron beam.

Behind the phosphor dot plate is the shadow mask. This is a thin metal sheet perforated with 200,000 tiny holes, and acts as a mask so that each electron beam as it scans can "see" only one dot of each color group. In the neck of the picture tube are three electron guns. These generate the beams of electrons which "paint" the color pictures on the phosphor plate.

The other four tri-color picture tubes described in the papers are basically similar in that the color is created by the action of electron beams on color phosphors.

Tube with One Electron Gun

One of these four tubes, described by R. R. Law, of the Research Center, is similar to the three-gun production model, except for the use of one gun instead of three. This tube and the three-gun model were shown publicly in Washington, D. C., in March, 1950. The other tubes, however, are disclosed for the first time publicly in the Proceedings.

Another tube, called a "line-screen color kinescope" is described in an article by D. S. Bond, F. H. Nicoll, and D. G. Moore. In this tube, narrow parallel strips of color phosphors are used in place of dots. The single electron gun scans the phosphor strips in an unorthodox manner, the beam being deflected up and down in stairstep fashion in such a way as to scan each color in synchronism with the received color signal during each journey from one side of the screen to the other.

An entirely different tube is described by P. K. Weimer and N. Rynn. In this, the axis of the electron gun is placed at a 45-degree angle to the phosphor screen. The scanning electron beam passes through slits in the phosphor screen and is then reflected back onto the phosphor. The emitted color is controlled by the deflection of the electron beam in the immediate vicinity of the phosphor screen. This makes the color control entirely independent of the scanning process.

Grid Control Tube

Still another type of tube, based on principles analogous to the layers of emulsion in Kodachrome film, was developed by S. V. Fargue. In this tube, the layers of red, blue, and green phosphors are placed on three closely-placed screens. By controlling the voltage changes on two intervening grids, the color is controlled. Success-

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Dr. C. B. Jolliffe



Dr. E. W. Engstrom

Jolliffe and Engstrom Promoted to New Posts

DR. CHARLES B. JOLLIFFE was elected to the newly created position of Vice President and Technical Director of the Radio Corporation of America and Dr. E. W. Engstrom was elected Vice President in Charge of RCA Laboratories Division by the RCA Board of Directors on September 7.

Dr. Jolliffe has served as Executive Vice President in Charge of the RCA Laboratories Division since December 7, 1945, and Dr. Engstrom has been Vice President in Charge of Research of the RCA Laboratories Division since that date.

Dr. Jolliffe, in his new position, will be responsible for the development of long-range plans for the Corporation and generally will supervise the execution of such plans by the divisions and subsidiary companies of RCA.

In addition, Dr. Jolliffe will coordinate broad engineering policies of RCA and will direct the representation of the Corporation in technical matters before public and governmental bodies.

Dr. Jolliffe joined RCA in 1935 as Engineer-in-Charge of the RCA Frequency Bureau. He was appointed Chief Engineer of RCA Laboratories in 1941, and early in 1942 he was made Assistant to the President of RCA. In September, 1942, he became Vice President and Chief Engineer of the RCA Victor Division, and three and one-half years later he was elected Vice President in Charge of the RCA Laboratories Division.

Dr. Jolliffe, a native of Mannington, W. Va., was graduated from West Virginia University with a Bachelor of Science degree in 1915 and received a Master of Science degree in 1920. He was awarded a Ph.D. in 1922 at Cornell University, and West Virginia Uni-

versity conferred upon him an honorary LL.D. degree in 1942.

Prior to his election in 1945 as a Vice President, Dr. Engstrom served for two years as Director of Research of RCA Laboratories, supervising research and engineering which resulted in wartime advances in radar, television, radio and other electronic developments. He had previously served for 13 years in various RCA research positions. He is a graduate of the University of Minnesota and a Fellow of the Institute of Radio Engineers. In June, 1949, he received an honorary degree of Doctor of Science from New York University for his contributions as a research engineer.

Dividends Declared

A dividend of 50 cents per share on the Common Stock of the Radio Corporation of America, payable November 26, 1951, to holders of record at the close of business October 19, 1951, was declared by the RCA Board of Directors on October 5.

This payment brings the total dividend on Common Stock for the year to \$1.00 per share, and follows the announcement by the Board of Directors on April 3, 1951, placing the Common Stock on a semi-annual dividend basis, provided earnings of the Corporation justify such action.

At the same meeting a dividend of 8 $\frac{1}{2}$ cents per share was declared on the First Preferred Stock for the period October 1, 1951, to December 31, 1951, payable January 2, 1952, to the holders of record of such stock at the close of business December 17, 1951.



This bat-wing transmitting antenna erected atop West Berlin's City Hall gave German residents their first glimpse of American television.



One of the two microwave relay units used in the Berlin telecasts was mounted on the side of the City Hall tower, one of the highest points in the area.

Germans View American Television

Specially Trained Crews of RCA Technicians Set Record in Assembling Complete Video System for West Berliners

By Richard C. Hooper

*Manager, Shows and Exhibits
RCA Victor Division*

THROUGH the ingenuity, skill and round-the-clock labor of 29 technicians, directors and administrators specially trained for the project, more than a million West Berliners had their first view of American television during demonstrations held in the German city from August 15 to 26. Thousands of others, mostly youths from the Communist Youth Festival in East Berlin, eluded border guards to enjoy the spectacle which they had never been able to witness on their side of the Iron Curtain.

The program presented in Berlin was, by a wide margin, the most comprehensive and ambitious television exhibition ever staged in Europe, or ever undertaken

by RCA. The equipment for the demonstration, valued at \$355,000, was packed in 401 cases weighing a total of 55 tons. Included were a complete broadcast station and transmitting antenna, 110 home-type receivers, and two theater TV systems with 15- by 20-foot screens.

Highlight of the Berlin achievement was the construction of a complete television station in the heart of the city, broadcasting on Channel 4, its 500-watt signal blanketing the city. The TV transmitter was shipped from the RCA Victor plant in Camden, N. J.

Under the most favorable circumstances, the task undertaken was one that required great ingenuity and technical skill. However, the circumstances encountered by the television crew were anything but favorable. A wide assortment of problems, none of which could have been anticipated, faced the men from the start.

The crew left by plane in two groups on August 1 and 2. The equipment, which had been shipped ahead,

was unloaded in Rotterdam and transported by train through France and Germany to West Berlin.

When the RCA representatives arrived in Berlin, they learned that, due to the Communist Youth Festival the western sectors of the city were on an "alert," and consequently, all trucks needed to transport the equipment, and all passenger cars scheduled for use by the staff, were confined to a motor pool where they would be handy to cope with any emergency.

Only ten days stood between the crew and the opening date of August 13, yet for seven of those days they had to sit around waiting for transportation to become available. When the trucks and cars finally appeared, the men had 85 hours to build a complete system.

Transmitters and Studios

Probably never before in the history of the industry did a technical crew face a comparable problem.

The 35 tons of delicate electronic equipment had undergone an eight day trip over water, had been slung on and off ship, trucked through a couple of cities, carried many miles on a German military train, and finally loaded and unloaded three times in Berlin. As might be expected, it suffered considerable damage. One transformer had to be rebuilt, and two micro-wave relays and one television camera required complete overhauling.

The five-story Schoenberg Rathaus (City Hall), one of the highest points in the city, was selected as the site of the transmitter and a bat-wing antenna. After a thorough study of facilities it was decided to locate an outdoor studio in Schoenberg-Stadt Park about a block from the City Hall, and an indoor studio in the Titania Palace, West Berlin's biggest theatre.

The outdoor stage, from which the programs were to originate, had to be built before the demonstration

could begin. But nature refused to cooperate. During the first week the crew spent in Berlin, a constant, driving rain stopped all work. Finally, with clearing skies on August 11, the men began setting up equipment. The stage was completed shortly before time for the opening program. In fact, while the floor manager was giving the alert sign to the performers on the first "live" program, the German carpenters were gathering up their tools, before departing.

By American standards, the Park studio was anything but elaborate. It consisted of a stage about 40 feet by 75 feet with a canvas roof and drapes on three sides. Control equipment occupied a curtained-off room at one side. Both live and film programs originated from this site, the signals traveling to the transmitter over cable.

At the indoor studio, one camera was stationed in the balcony, another on the stage. The control room was set up in a wing of the balcony, and signals reached the transmitter by micro-wave relay.

Russians Throw a "Party"

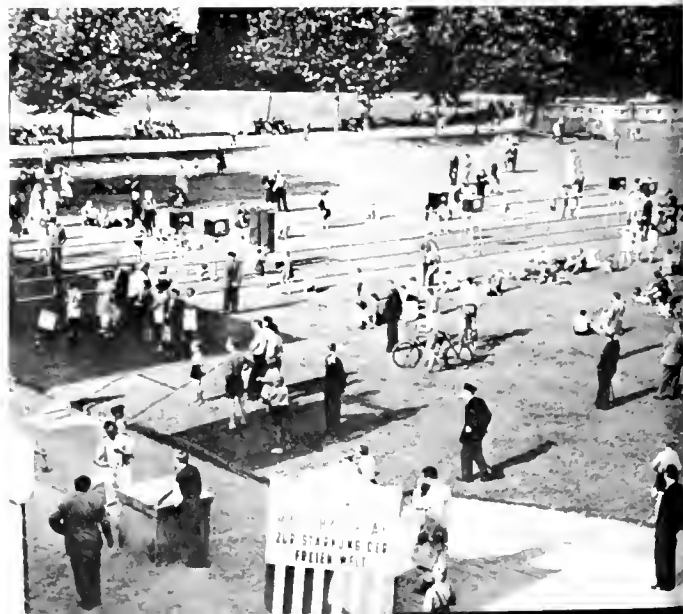
Although construction of the studios and transmitter constituted the biggest part of the job, the installation of the receivers was no small undertaking. The 110 home-type sets were distributed throughout West Berlin, in the windows of large and small stores, and in meeting halls, parks, squares, and other public places, some of them 10 miles from the transmitter.

Many of the buildings where the receivers were located were war-damaged six and eight-story structures of which only the first or second floors had been repaired.

During the first telecast, the crowd around the outdoor studio numbered about 25,000. The 16 home-type receivers operating at the park were nowhere near ade-

Curious crowds gathered to watch RCA technicians erect a 15- by 20-foot theatre television screen in the ruins of Potsdamer Strasse.

RCA home-type television receivers, set up in Schoenberg Stadt Park, attracted up to 25,000 German residents nightly during the demonstrations.



quate, so a projection receiver was added, providing a picture the size of the average movie screen.

The second large-screen receiver was set up in the Potsdamer Platz, only 200 yards from the main crossing point into the Russian zone. Whether by design or accident, the Russians held a celebration just across the border from this installation, the high spot of which was a gigantic display of fireworks, including magnesium flares, Roman candles, and showers of rockets with myriad sparks.

Because the operation of a projection receiver requires semi-darkness for good results, the fireworks occasionally blacked out the television picture. Although many of the spectators at this location were people from East Berlin, they protested the interruption, loudly and emphatically. If the Russian fireworks represented a deliberate attempt to discourage interest in American television, it sadly backfired.

Standing Room Only

RCA transmitted programs every evening during the two-week period, starting at 7:30 and continuing without interruption until sign-off at 11:30. The schedule showed surprising diversity, thanks in a large measure to the assistance of RIAS (Radio In the American Sector), which supplied film and lined up talent.

A typical program would lead off with a fifteen-minute film, followed by variety acts, including gymnasts, jugglers, vocalists, orchestral groups, and comedians from the studio in the Park. Origination would then shift to the Titania for a short play, drama or comedy, a symphony orchestra or a fashion show, and then back to the Park studio for another film, a dance act, and more music. The symbol for signing on and signing off was a reproduction of West Berlin's Freedom Bell, with a Marshall Plan sign superimposed.

Reception in all areas was excellent and, there was no doubt about it: the Berliners loved television. According to police estimates, the crowd that gathered nightly around the studio and receivers in the park averaged between 12,000 and 15,000. Unlike a similar gathering in America, these people did not watch for awhile, and then drift on. Instead, the crowd began to gather several hours before show time, and stayed, standing and applauding, throughout the four-hour schedule.

The receivers spotted around the city were watched by crowds that resulted in serious traffic jams. At two places, the German police asked the TV crew to remove the sets because viewers blocked the movement of vehicles.

The Germans not only enjoyed watching television, but many of them wanted to be part of it. To the TV crew, it seemed that every other person in the city con-



More than 100 television receivers were installed in store windows, meeting halls, parks, squares and other public places throughout West Berlin.

sidered himself a television producer, even to the extent of climbing onto the stage, giving cues, instructing announcers and MC's, and rearranging acts.

In addition to the amateur producers, friends and relatives of the talent often clambered on stage. At times, the studio became so crowded with unidentified people that the technical director in the control room and the camera men and floor manager were unable to see each other.

The unexpected visitors from the east were made as welcome as local residents by RCA and the sponsors of the demonstration, the Economic Cooperation Administration and the U. S. High Commission in Germany. Later, the American occupation officials expressed the conviction that the Youth Festival delegates who had made their way into the American Sector had found the television programs a convincing example of western democracy's technical advancement and scientific skill.

In the words of Howard P. Jones, Director of the Berlin Element of the High Commission:

"This technical achievement of the free world will, I'm sure, be remembered for a long time by the thousands of visitors from the east who witnessed the television exhibition."

Major General Lemuel Mathewson, U. S. Commander in Berlin, described the demonstration as a major success and expressed a "deep sense of indebtedness to the men responsible for its successful presentation".



Good Times Ahead for TV!

By J. B. Elliott

*Vice President in Charge of Consumer Products
RCA Victor Division*

THERE are good, commonsense reasons for believing that the television industry will enjoy a thriving, profitable fall season, and beyond that, years and years of solid and substantial growth and development, making an immense social and economic contribution to our country.

Production for this year will not reach 1950's record of almost seven and a half million units, but by the end of 1951 we should pass the five million mark. At a reasonably conservative estimate, the industry's unit production, as of right now, is 3,850,000. Between now and January 1st, I believe it is safe to say that the industry will turn out another million and a half receivers—which will bring the 1951 total to about 5,300,000. And I am confident we will sell these and could sell more without any difficulty.

The sales picture in television has improved markedly during recent weeks. Reports from dealers indicate a resurgence of optimism and confidence in the fall and winter season.

There are several factors contributing to the assumption that the current improvement in sales is only the beginning of a profitable season.

One of them, certainly, is the relaxation of credit restrictions.

Another is the recent power increase granted most television stations by the FCC. The extension of effective transmitting power will bring untold thousands of additional American homes into TV range.

The development and convincing field tests of an all-electronic compatible system of color television have done much to lay the bogey of obsolescence that has haunted prospective buyers ever since the FCC's endorsement of the CBS color system.

Another factor is new, better, and more diversified programs.

And, lastly, there is the extension of network facilities to the Pacific Coast.

Slowly but surely the industry's attitude toward broadcasting in the ultra-high-frequency band is changing. Station applicants who were inclined to resist the move "upstairs" are beginning to change their minds.

One of the reasons for this is Wayne Coy, FCC chairman, who several weeks ago, on the occasion of RCA's UHF seminar at Bridgeport, Connecticut, delivered a strong affirmation of the advantages of telecasting in the upper reaches of the spectrum.

Mr. Coy pointed out that UHF is relatively free from some types of interference, and that the primary service area for UHF stations is expected to be as great as that for VHF, possibly greater.

Mr. Coy's remarks, plus the actual demonstration of UHF reception, did much to convince many heretofore dubious engineers that a bright future awaits telecasters in the upper areas.

We have heard talk of shortages of metals and components for more than a year, and because the shortages failed to materialize, at least sufficiently to curtail production, many elements of our business have decided that they never will.

"Just another case of crying 'wolf,'" they say.

Material Shortages Are Real

For the benefit of the people who don't take shortages seriously, I have some news. Shortages are real, they are here now, and they are going to continue to plague us for some time to come.

Our production will be hit hard during the balance of 1951, and harder during the first six months of 1952. We're beginning to bump our heads against metal shortages right now. A sharp drop in factory output is inevitable. I consider it a very real possibility that quality TV receivers will be in short supply as early as December 15.

Our first shortage problem is metals—copper, steel, aluminum, and nickel.

The copper situation is pretty well understood. The recent strike put a huge nick in the U. S. output. Imports have fallen off and the scrap copper industry is all but shut down. Copper production is considerably under government expectations, and it is doubtful if the TV set makers can obtain even their original allotment.

The cutback on steel is almost equally serious. The military is requiring more of this metal than planned. In addition to the normal uses of steel, it will have to serve television in some instances as a substitute for

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History of RCA Institutes

Industry's Oldest Technical School Has Kept Pace with
Growth of Radio Communications Since Its
Establishment in 1909

By C. E. Tomson
Registrar
RCA Institutes, Inc.

THE international acclaim that followed Marconi's reception on the Newfoundland shore of a faint code signal sent out from Cornwall, England in 1901, had scarcely subsided before tall wireless towers began to appear at strategic points along the Atlantic shorelines. Slowly at first, and then more rapidly, progressive ship-owners installed wireless aboard their craft. This activity afloat and ashore created a demand for trained personnel to operate the equipment. Out of this urgency came the RCA Institutes, present-day outgrowth of the first training school founded by the United Wireless Telegraph Company in 1909.

The need for men skilled in Morse code and capable of operating transmitting and receiving apparatus became acute a year later with the passing of the Radio Act of 1910. This law specified that ships of a certain classification must carry wireless equipment and "a person skilled in its use."

Fortunately, radio, like life itself in those years, had not yet become complicated. There was only one way to connect the parts of a radio set, a method that could be easily chalked up on a blackboard. The pioneer school was a 15- by 30-foot classroom atop a penthouse at 42 Broadway, New York City.

A considerable portion of the early student's time was devoted to learning the functions of motor generators, condensers, tuning coils and helix as well as the crystal detector. Lectures were concerned primarily with such topics as the necessity for keeping the spark gap chamber free of moisture, checking banks of Leyden jars (devices used for storing quantities of static electricity), cleaning and adjusting critical parts of generators. Because so little was generally known about wireless, a course covering both theory and practice could be completed in two weeks.

During 1912, the United Wireless Telegraph Company was acquired by the Marconi Wireless Telegraph

Company of America. In the same year, the Radio Act of 1910 was amended to require two licensed radio operators and an auxiliary source of power on each and every passenger ship. To take care of the increased de-

Continued on page 501



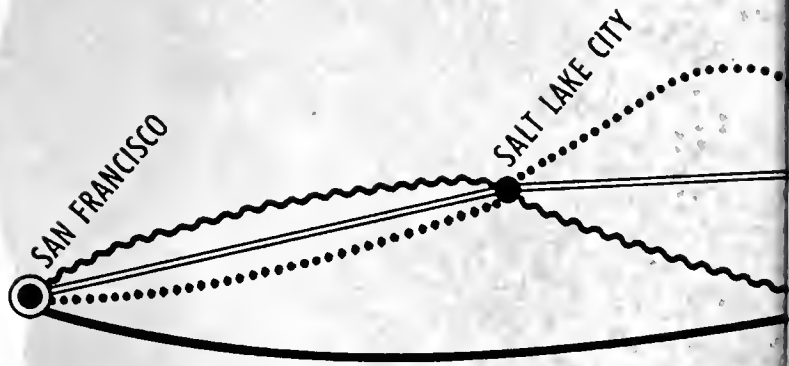
Radio class of New York's Police Department undergoes a code examination at the old Marconi Institute.

Students at present-day RCA Institutes, study circuit design in the school's modern television receiver laboratory.



“firsts”

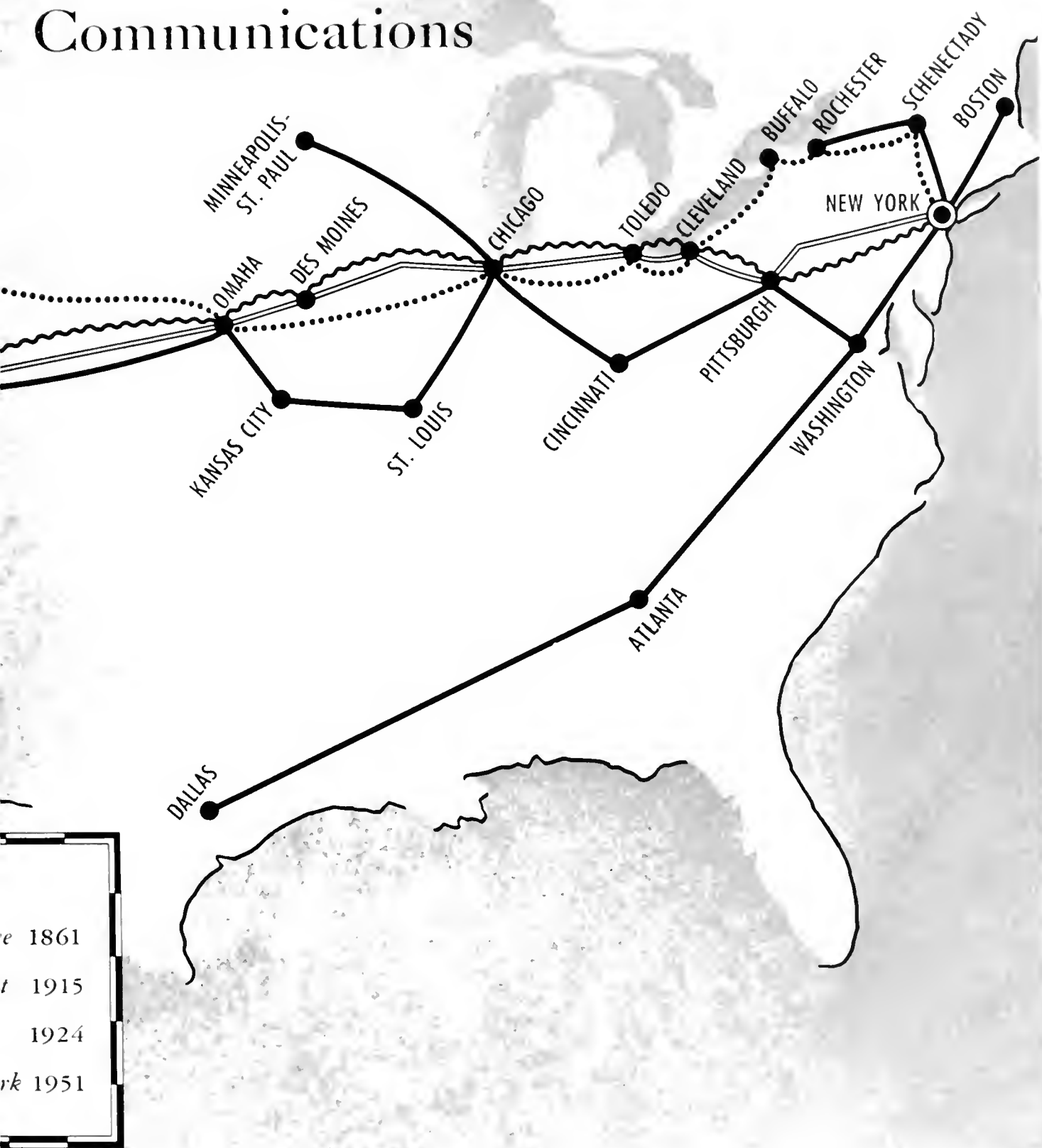
in Transcontine



KEY TO MAP

- *First Transcontinental Tele*
- ==== *First Cross-Country Telepho*
- *First Nation-Wide Radio F*
- ~~~~ *First Coast-to-Coast Televisi*

Communications



1861
1915
1924
1951

If the Sound is Audible — RCA Can Record It!

Birds, Beetles, Bells and Babies are on the Long List of Custom Record Performers.

By James P. Davis, Manager
Custom Record Sales Division
RCA Victor Record Department

WHETHER it be a recording of the voice of the historic Liberty Bell or the gentle sound of a fly walking across the ceiling, General MacArthur's impressive address to Congress or the mating call of the Canadian moose that is needed, the RCA Victor Custom Record Division can fill the order.

These are only a few of the thousand-odd assignments that are completed each year in RCA's studios in New York, Chicago and Hollywood. During 1950, the Custom Record Division alone made nearly 10 million transcriptions and recordings to meet the unusual requirements of phonograph and transcription producers, individuals, manufacturers, radio stations and promotional campaigns. Virtually every sound capable of being recorded has been put on discs of varying speeds, ranging in size from a 6½-inch "Spinner" to a 16-inch transcription.

For education and for fun, in sales campaigns and medical research, custom-made records have become in-



creasingly important. They can help your canary sing, announce the birth of your baby, or tell the world about your better mouse trap. There is no known instance of a bashful swain proposing by disc, but if any such reluctant Romeo does get the idea, Custom Sales will send him away happy, though not with any guarantee of success.

One man in Connecticut was annoyed by a flock of

starlings that developed a fondness for the area under the eaves of his house. All else failing, the harassed homeowner hit on the idea of recording the hostile hoots of an owl. Presto! the birds took off for parts unknown. Now, whenever a new family of starlings stakes out a claim under the eaves, out comes the RCA record. It never fails to send the intruders packing.

Out in Hollywood, where the bizarre is commonplace, a famous cinema star had RCA record a dog barking furiously. Whenever she hears a Beverly Hills tomcat meandering on her estate, she plays the record and "Tom" heads for a quieter and safer haven.



Animal sounds are reproduced for a wide variety of reasons. Duck calls were once very popular with hunters, but a recent regulation bans their use. Owners of reluctant canaries have found that their pets are put in a singing mood when they hear recordings of their feathered friends trilling happily.

The Chicago studio filled one unusual order, evidently from a retired fox hunter, for the baying of hounds to harp accompaniment. On the reverse side of the same disc were the frenzied sounds of the hounds chasing and cornering the fox.

A wide range of activity in the audio-visual education field is covered by RCA's custom-made transcriptions. Practically every subject and hobby from music, language-study and stenography, to hygiene records for school health programs, has been put on discs.

The wife of an internationally-known opera star was virtually cured of an almost total deafness in one



A telephone booth provides the minimum atmospheric noise for recording the delicate sounds of beetles chewing leaves.

lar by the use of recorded warble frequencies, ranging from the growl of 50 cycles to the shrill whine of 10,000 cycles. The Veteran's Administration also has been very successful with these discs, using them to correct hearing deficiencies which may occur at different points of the audible spectrum.

A group of doctors recently ordered a series of records featuring the sounds of various normal and abnormal heartbeats. The recordings were made for the benefit of general practitioners in outlying sections to help them diagnose heart ailments. Similar discs have been used by the American Heart Association, and in school health programs.

Custom records have become valuable aids in the instruction and entertainment of the blind. The Library of Congress maintains a circulating library of records on which complete stories have been recorded for blind persons. The New York Guild for the Jewish Blind had a series of albums made, accompanied by braille directions, which aided sightless people in learning to play simple musical instruments.

RCA recordings of the languages and musical culture of the Eskimos, Mayan and American Indians, African natives, and many other colorful foreign peoples are in constant use by lecturers, schools and museums. The Library of Congress maintains a special section of such unusual and valuable recorded material.

The resounding tones of the world's most famous carillons and church bells have been recorded for posterity, just as such important contemporary events as the speech to Congress by General of the Army Douglas MacArthur. Disc reproductions of the bells of St. Peter's in Rome, the carillon at Copenhagen, the famous chimes of Big Ben and of French cathedrals have been

purchased by numerous churches for playback through their own beltry public address systems. These records are also used as sound effects by broadcasting stations.

Several branches of the armed forces employ RCA records as an integral part of indoctrination and training programs. The U. S. Air Force ordered reproductions of aircraft sounds for use in identifying the many types of combat and transport planes, and for the scientific study of motors and plane vibrations.

Similar work has been done for the Navy Department, including a series of records entitled "Sounds of Battle" for indoctrination of personnel. Another group of technical transcriptions had to be recorded under water and in submarines. These discs were cued to tell what each sound was. For example: "This is a heavy cruiser passing overhead from 500-foot depth", or "This is three PT boats at vector 270 travelling at 40 knots."

The Chicago studio filled one unusual order for a customer with an enterprising commercial scheme. Wall plaques were made from plain records moulded into the shape of a scalloped dish, the center of which was decorated with leaves, fruit, etc.

Most intriguing of all the unique "stars" of RCA custom records were the Japanese beetles that obligingly nibbled on leaves while the microphone caught every faint crunch. This order came from the DuPont Company's advertising department for use in an entomology lecture. Another RCA client in Chicago had records made on "Teaching Parakeets to Talk." Only slightly less bizarre was the assignment to record the sound of flies walking across a wall. This was accomplished by putting the insects into a cardboard box located on top of a microphone.

Aside from the spectacular and unique orders filled each year, a sizable portion of RCA's custom-record business is comprised of electrical transcriptions for radio stations, program producers and advertising agencies as well as sound tracks for slide films. In addition, commercial phonograph discs are produced for over 100 small, independent companies which don't have their own recording facilities.



For the Defense of Cities

THE need for a dependable communications system, which could be used to warn inhabitants of cities in the event of air-raids or atom bomb attacks, has led to the development by RCA of a Civil Defense Warning System of wide flexibility. The system has been approved by the Federal Civil Defense Administration and already has been installed in Washington, D. C.

The RCA System consists of a network of electronically operated air-raid alarm stations all remotely controlled by radio from one command center. At this central location, a VHF radio transmitter emits coded pulses to strategically located decoding receivers. These automatically activate high-powered amplifier systems which broadcast siren alarms or verbal instructions over giant loudspeakers throughout the community.

In the event of an alarm, the pressing of two buttons at Master Control instantaneously sets off the entire network of sirens and alerts the entire populace. The system also permits the broadcasting of important instructions by radio to facilitate rescue operation, direct fire control, and supplement the police, fire, and public utilities radio systems during an emergency.

The use of two-way radio as the heart of the system makes it especially flexible. Any community now operating a two-way radio system can incorporate the RCA electronically controlled alarm stations with a minimum of change. When the national emergency no longer exists, the system can continue its important function of

warning and communications during fires, floods and other civic disasters.

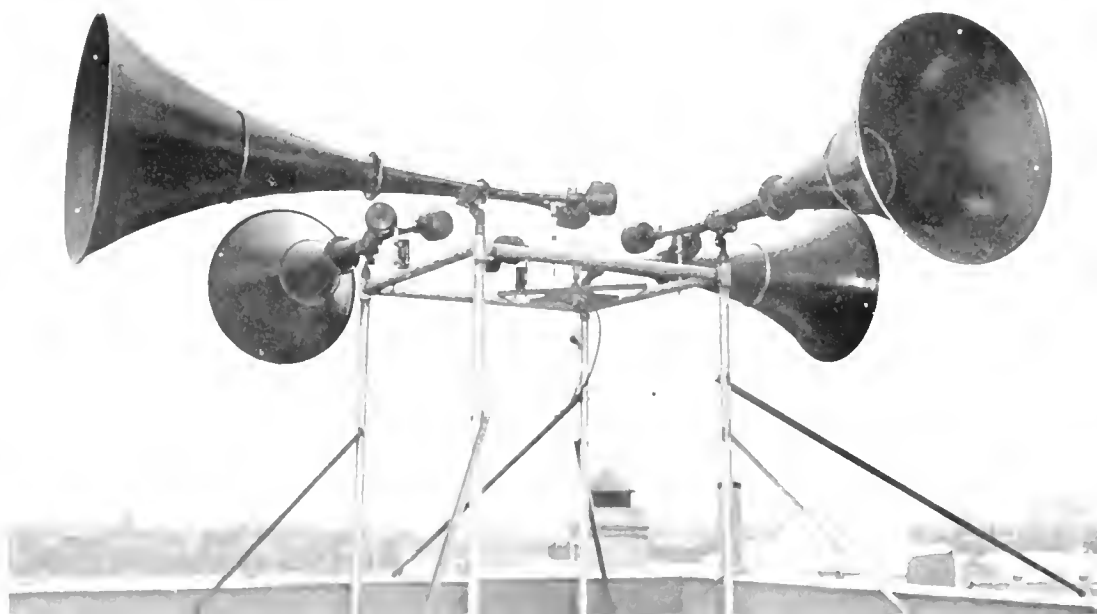
The use of radio makes the Warning System completely independent of land lines which are highly vulnerable to air attack. This also means that alarm stations can be increased at will with no need to tax land lines further for civil defense purposes. Furthermore, large office buildings and factories could easily tie into the radio net by installing one of the radio controlled alarm stations which would sound automatically with the rest of the system.

The radio transmitter at Command Center can contact all the neighboring communities which are included in the mutual aid plan to be alerted and where necessary ask for vital assistance.

The System has other desirable features. The electronic sirens can, for example, generate any tone signal or combination of tone signals to meet changes in future civil defense plans. The system operates under all types of weather conditions and when supplied with its own generator, can operate even when the city's power is temporarily out of operation.

Complete control of the entire Civil Defense radio system originates at the Command Center where the master control console is located. At this nerve center of operations, all warning signals from the Air Force and from other sources are correlated and information and orders disseminated. Coordination with all the control

Centrally-located giant loudspeakers can broadcast civil defense siren alarms or verbal instructions throughout the Washington, D. C. area.



centers is maintained by the station transmitter. The warning system operates automatically and requires a minimum of technical knowledge on the part of the control operator at master control.

To originate a yellow-alert, the operator simply presses two push-buttons momentarily—one sends out the properly coded pulses to activate the alarm stations; the second automatically places in operation an electronic timing device which operates the system sirens according to pre-determined setting. Signal lights indicate the type of alarm set off and the sirens are heard on the monitor speaker. The equipment can be left in "on" position or automatically returned to standby readiness.

When it is desired to give verbal instructions over the loudspeaker system, the control operator talks into the desk-type microphone in the same way that the dispatcher in any two-way radio system goes "on air".

Facilities are provided to interrupt any alarm during any phase of its transmission. Manual keying of an alarm is also possible should that become necessary for any reason.

The signals from the Master Control console are fed to the main station transmitter, the power of which is determined primarily by the radius of coverage desired, both for the alarm system and for two-way radio needs. A 250-watt transmitter is recommended for two reasons: to make possible a greater degree of system expansion, and to provide a safety factor for radio transmission.

In smaller communities, 60- or 70-watt transmitters depending on the frequency, can provide adequate signal coverage. A station receiver, built into the transmitter rack, permits two-way radio communications when desired.

From the Master Control Console at the Command Center, the Civil Defense Director can coordinate all the communication activities of an entire civil defense organization. He can announce an alert to all the Control Centers and adjacent communities by VHF radio without revealing it to the public. He can activate all the sirens to alert the populace, broadcast instructions to the public and civil defense workers throughout the city. From this focal point, the Civil Defense Director can tie together the entire organization within the city, and mutual-aid groups in neighboring communities, into one well-integrated system with the best communications network yet developed.

Alarm reproducing units are located throughout the city. Each reproducing station consists of a VHF receiver, a decoding unit, power amplifiers and four huge horn-type loudspeakers. For emergency use, each reproducing unit can be equipped with its own gas-driven generator power.

The four loudspeakers, making up one cluster at each

THE ADVANTAGES OF RADIO WARNING AND COMMUNICATION SYSTEM

1. The system is all electronic and works independently of land lines, which are highly vulnerable.
2. An unlimited number of signals can be generated to cover all future emergencies such as gas and "BW".
3. The system being all electronic contains no mechanical rotating parts and is more dependable.
4. Siren tones are immediately recognizable and are distinct from police and fire alarm sirens.
5. The system can be used during floods, fires, and other emergencies, especially when lines are down.
6. All units of the system are mechanically and electrically interchangeable for fast service.
7. The system is capable of continuous operation and is designed to operate in all types of weather.
8. No warm-up time necessary—the sirens sound instantly and cut off immediately. There is no delay.
9. The system is controlled from one point. Alarm sirens operate automatically—no human element involved.
10. Combination of radio, loudspeakers and sirens makes the system the most versatile one yet developed.

alarm station, are installed in the four directions of the compass. Should the situation require it, it would be just as simple to place all speakers in one direction to achieve concentrated directivity and sound volume.

The loudspeaker method of reproducing siren tones has many advantages over mechanical and wind driven sirens. The loudspeakers are weather-proofed to operate under all conditions of weather and require no warm-up time. There is no lingering effect of siren sounds. Immediate cut-off takes place instantly with cut-off of electronic siren generator at the Command Center. Not only can loudspeakers reproduce siren tones of any type and duration required, but they operate automatically and have the unmatched quality of being able to reproduce verbal instructions from qualified leaders in the community at a time when instructions are most urgently needed to quell panic and save life and property.

RCA VICTOR
introduces
New Television
Receivers



The "Talbot", table-model receiver with a 16-inch kinescope, is housed in a moroon metal cabinet



The "Bristol" features a 17-inch picture tube and is available in either blond or dark metal finish.



The "Preston" provides a 17-inch television picture and has two different matching bases.



The "Kendall", new TV console in mahogany, walnut or limed oak, has a 17-inch picture tube.



The "Suffolk" features a 21-inch tube in a cabinet of colonial style, appropriate in any setting.



The "Hampton", new television console with 17-inch tube, is made from top to bottom.



The "Donley", functional modern television console with full-length doors, offers a 21-inch picture tube.



The "Haywood" open-faced TV console has a 17-inch picture tube and 12-inch supersensitive speaker

Radio is Here to Stay

By William S. Hedges

*Vice President in Charge of Integrated Service
National Broadcasting Company*

RADIO broadcasting has a permanent place in the social and economic structure of the nation because it fulfills a purpose which can be served by no other medium of mass communication.

It is the one medium which is always available—in the bathroom, in the kitchen, on the beach, in your car, in the woods, on remote mountain tops, or in the privacy of your own room. No other medium can simultaneously reach more than 95% of the people of America. As such it is the most comprehensive advertising medium in the nation—greater in circulation than all the newspapers combined.

These radio set owners possess 96,000,000 radio receivers, which represent an investment of more than five billion dollars, not counting the obsolete and discarded models. The very presence of this big stake in radio is a large reason why radio has a continuing place in the sun. The American public is quite unlikely to waste its investment in radio, and on the other hand there will be broadcasters ready to make the continuing use of radio well worth while.

There is only one reason why anyone should raise the question "Has Radio a Future?" That reason is, of course, television. Although it has penetrated into only sixty-seven markets, television is diverting public attention and many advertising dollars not only away from radio but from other media as well. While I am sure that television, when it reaches its full stature, will be the most effective sales force this country has ever known, its attainment of preeminence in the advertising world should not and will not obscure the future of radio broadcasting. However, there will be many changes made and the brightness of radio's future is dependent upon the adaptability as well as the ingenuity of those who are interested in the survival of broadcasting.

In our appraisal of radio it is important to remember that all of those who are looking at television are not subtracted from the radio audience. The combined radio and television audience is considerably higher than the

radio audience was in 1948, ranging from 10 to 19% in certain months in various cities. It must be acknowledged, however, that radio listening is less now than in 1948 in the TV markets. On the other hand, it must likewise be noted that most TV viewers are radio listeners at some time of almost every day.

Actually, television and radio supplement each other to a much greater degree than they compete. While radio blankets all markets, urban and rural, and all income groups, television at this stage of its development is concentrated very heavily in urban areas and gives better coverage of the upper income group than in the lower levels. Furthermore, there are many geographical sections of the country which have not yet been reached by television. For these reasons, radio cannot be abandoned by advertisers whose sales are truly nationwide. But if both radio and television are used, the advertiser is virtually assured of saturating all possible markets.

Radio Must Become Adaptable

There can be no doubt that broadcasting is undergoing a revolution at this particular time. Significant changes in the economic conditions affecting radio are taking place. If those changes are not reckoned with they can prove fatal. Radio must learn to roll with the punches and to become flexible and adaptable if it is to have a prosperous future.

One of the basic foundations of American broadcasting is the program service furnished by networks—programs of a scope and flexibility that individual stations could not develop themselves—programs featuring the greatest entertainment personalities of the times, world wide news services, and informational programs presenting the leaders of American opinion. Such a program service attracts audiences to affiliated stations, builds their position in their communities and enhances the value of the time they have for local and national spot sales.

The network program service is an expensive one. The revenues supporting it must come from network advertisers. Now at this point, let's pause and look at some of the economic trends affecting network radio. In the period of its major growth—during the '40's—the main economic basis for the network medium was the multi-million-dollar advertiser who bought one or more evening hours or half hours or daytime strips. The cost structure and sales policies of the medium were such that the smaller budgeted advertiser was priced out of it. He

Continued on Page 22

Mrs. Horton Succeeds Arthur E. Braun on RCA Board



Mrs. Douglas Horton

RESIGNATION of Arthur E. Braun and election of Mrs. Douglas Horton to succeed Mr. Braun on the Board of Directors of the Radio Corporation of America were announced by Brig. General David Sarnoff, Chairman of the Board, following a meeting in Radio City, New York on October 5. Mrs. Horton, who as Mildred McAtce commanded the WAVES in World War II, is the first woman elected to the RCA Board of Directors.

Mr. Braun, a member of the RCA Board since 1921, had served since 1936 on the Board of Directors of the National Broadcasting Company, from which his resignation also is effective. He is Chairman of the Advisory

Committee of the Mellon National Bank & Trust Co. of Pittsburgh, Pa.

Last December, Mrs. Horton became the first woman elected to the Board of Directors of NBC. She is Vice President of the Federal Council of the Churches of Christ in America and is a former President of Wellesley College. She had the distinction of being the first woman ever to be commissioned by the United States Navy. She was placed on active duty in August, 1942, as Lt. Commander upon becoming Director of the Women's Reserve, USN, known as the WAVES. She resigned from the Navy in February, 1946, with the rank of Captain and was awarded the Distinguished Service Medal.

Following nine years as a teacher and executive in several colleges, Mrs. Horton was named President of Wellesley College in 1936. She resigned effective June, 1949, to join her husband, Dr. Douglas Horton, Minister and Secretary, General Council of Congregational Christian Churches, New York.

Graduating from Vassar College in 1920, Mrs. Horton received her MA degree from the University of Chicago in 1928. She holds 19 honorary degrees from universities and colleges.

Mrs. Horton is a native of Parkville, Mo.

Speeds Preparation of Specimens for Electron Microscope Analysis

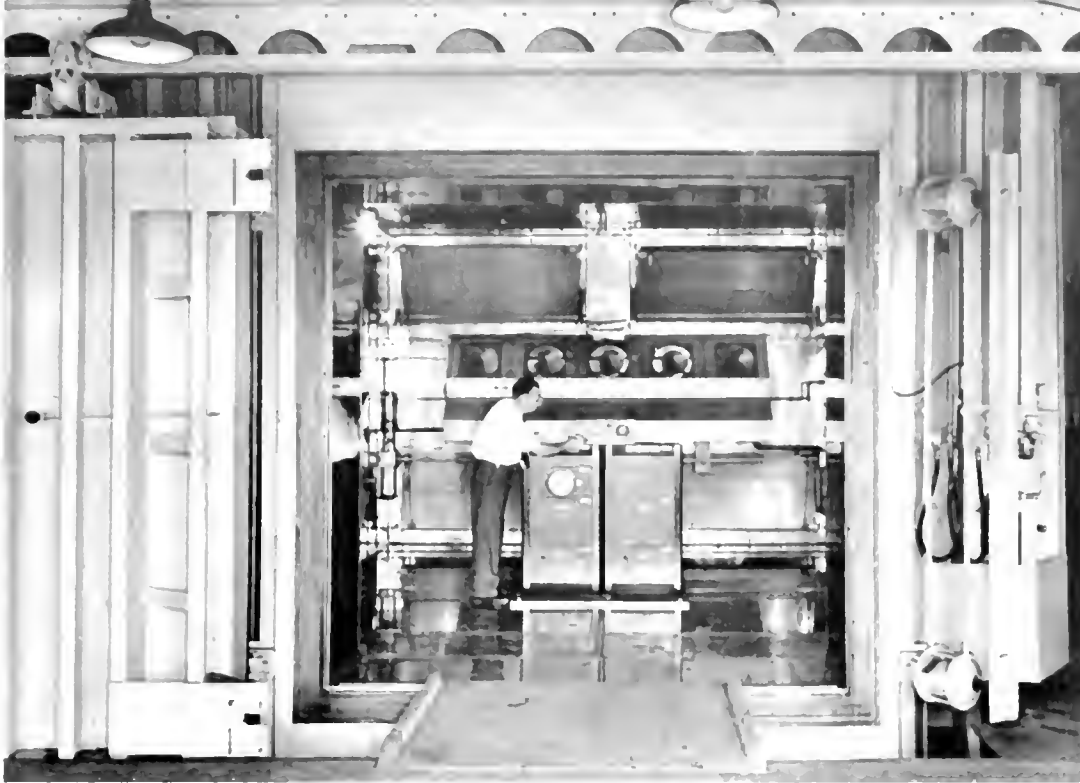


A NEW, low cost shadowing unit to speed preparation of "shadow cast" specimens for the electron microscope has been developed by RCA.

The new apparatus permits laboratory personnel to deposit a thin coating of tungsten, molybdenum, or other suitable material by evaporation on as many as six glass microscope slides at one loading in the all metal vacuum chamber. The specimen contrast is enhanced and the third dimension usually made evident.

The unit consists of a small, steel vacuum chamber which can be evacuated at high speed. Flummating the handling of heavy, fragile bell jars, the equipment provides ease of specimen insertion. Specimen slide holders provide a wide range of shadowing angles without filament adjustment.

With this newly developed "shadow-cast" unit, laboratory personnel are able to prepare electron microscope specimens more quickly and economically.



A standards engineer prepares electronic equipment for test in RCA's new "stratosphere chamber", which can simulate any climatic or atmospheric condition.

Weather Made to Order

ALL the world's weather is now available in a single room 14 feet square and 10 feet high in the testing laboratory of the RCA Engineering Products Department in Camden, N. J.

With this 50-ton chamber, recently installed for the testing of all kinds of electronic equipment under conditions to which it may be exposed in use, laboratory personnel can simulate all temperatures, humidity levels, and other climatic and atmospheric conditions found on or above the earth, to an altitude of 70,000 feet above sea level.

Here, every device made by RCA for military or civilian use in far-away places, from airplane transmitters to walkie-talkies, can be proved under conditions prevailing in the Sahara or Siberia, in the jungles of the South Pacific or atop the Himalayas.

Known as a "stratosphere chamber", it can reduce atmospheric pressure to the level encountered at an altitude of 70,000 feet, which is higher than the accepted altitude record for heavier-than-air craft and almost as high as man has ascended in a balloon. The partial vacuum produced is sufficient to reduce a 29-inch column of mercury to one inch.

Heating and refrigeration equipment within the chamber can create temperatures from 185° F — more than 50 degrees higher than the highest natural temper-

ture ever recorded on the earth's surface — to minus 85° F — within a few degrees of the lowest natural temperature earth-bound instruments have recorded. To provide refrigeration for the unit requires 180 horsepower, enough to run 720 average size domestic refrigerators simultaneously.

Humidity within the chamber can range from a heavy fog to almost complete lack of moisture.

Because of its size and weight, the chamber, which cost \$150,000, posed a number of installation problems. It was built in three sections and transported from Newark, N. J. to Camden by trailer truck. Because the chamber overhung the trailer three feet on each side, creating a traffic hazard, special approval from the State Highway Department was necessary, and the trip was made in the early hours of the morning, when traffic was light. The three sections weighed 11, 17, and 21 tons, respectively. In order to get them into the laboratory, a wall area measuring 18 by 20 feet had to be removed from the building.

The door of the chamber weighs about two tons and is moved into place on rollers fixed at the top of the chamber. To obtain a perfect seal, an air cylinder is fixed on each corner of the door to exert the required pressure. An inner wall of 9-inch-thick insulation is used to maintain temperatures

Electronic "Detective" Spots Foreign Metal Particles

New metal detection equipment for more efficient and speedier location of the most minute metallic particles contaminating non-metallic products, was introduced recently by the RCA Engineering Products Department.

Product lines in which the equipment will have applications include meat, bakery products, candy, plastics, paper, rubber, tobacco, textiles, and explosives.

The new metal detectors, called the "Utility Series", feature four types of small-aperture inspection heads, which will indicate the presence of tiny particles of metals or alloys, whether magnetic or non-magnetic, regardless of their depth in the material. The products pass through an inspection aperture on an endless conveyor belt, or through a chute at rates of 10 feet to 1000 feet per minute.

The detectors can be used to light a warning lamp, ring a bell, stop a continuous process, mark the contaminated object, or deflect it into a special channel or receptacle for rejects. The new equipment is the Company's latest industrial tool for quality control. It is also invaluable as a means of preventing machinery damage, eliminating fires and explosions resulting from tramp metal, and reducing lost production time in industrial processing.

The "Utility" detectors consist of two units. The control unit, which weighs 20 pounds, and is the same for all models and applications, has an overall measurement of 8 $\frac{1}{4}$ inches high, 6 $\frac{3}{4}$ inches wide, and 10 inches deep. The second unit, the inspection head, is provided in four different styles to meet specialized installation requirements. Two of the box-type heads have rectangular apertures—one measuring 2 $\frac{1}{2}$ x 7 $\frac{1}{2}$ inches; the other, 4 x 5 inches—and are designed for detecting metal in candy, chewing gum, pharmaceutical products, and other items that can be carried on a small conveyor belt during processing. The others have smaller, box-shaped heads with round apertures—one measuring 1 $\frac{1}{8}$ inches in diameter; the other, 2 inches in diameter—and are suitable for ground meat, liquids carried in glass tubes, cigarettes, and similar items that can pass through the small head in a nonmetallic tube or trough.

Materials passing through the inspection aperture

are screened by a high-frequency electromagnetic field, generated by scientifically-designed coils embedded in a water-proof material. High-frequency power is fed to the coils from a self-contained electronic oscillator, and the reaction caused when metal is present in the material being screened operates a relay which triggers either a signaling device (lamp or bell) or an automatic marking or ejecting mechanism.

The equipment is practically immune from building and conveyor vibration, while electronic voltage regulation assures freedom from effects of line voltage fluctuations. The units are not affected by normal humidity and temperature changes, and are sealed against dirt, lint, and dust.

Pieces of candy passing through the portals of this electronic detector are rejected automatically if metallic particles of any size are present





Television demonstrates its effectiveness as an aid in teaching the latest methods in veterinary practice.

TV cameras brought close-ups of this operation on a cow to a convention audience of more than 2,000.

Television Used to Demonstrate Techniques in Animal Surgery

LABING veterinarians were featured actors in special television programs staged at the 88th annual convention of the American Veterinary Medical Association held recently in Milwaukee. During the convention, specialists in animal surgery, working in front of RCA cameras, demonstrated their techniques before veterinarians from the United States, Canada and 15 foreign countries.

Through the medium of television, an audience of more than 2,000 watched delicate operations on the screens of RCA Victor television receivers installed in Milwaukee's city auditorium. The broadcasts, sponsored by Allied Laboratories, Inc., manufacturers of pharmaceutical and biological products, were transmitted from the operating theatre over coaxial cable.

The demonstrations included new methods of anesthetizing pets and farm animals, diagnosing poultry diseases and the performance of cesarean sectioning.

After witnessing the program's first of its kind in America, Dr. J. G. Hardenberg, Executive Secretary of the AVMA, expressed his belief that television will prove a useful aid in teaching animal surgery. "The care, skill and surgical techniques of today's veterinarians,"

he said, "equal those used in hospitals for human patients. We are confident that with television we can still further the knowledge and improve the practice of animal surgery."

Television equipment used at the convention was installed and operated by the RCA Service Company.

Transmitting and monitoring equipment, installed in Milwaukee's auditorium for the veterinarians' meeting





Four huge vans comprise the modern "TV station on wheels" developed by RCA for the U. S. Army Signal Corps.

"TV Station on Wheels" for Army

THE most complete television station ever mounted on wheels has been constructed for the U. S. Army Signal Corps by engineers of the Radio Corporation of America, and delivered recently to the Signal Corps' Fort Monmouth, N. J., Laboratories.

The mobile television caravan, which was built in close cooperation with Signal Corps engineers, consists of four special 10-ton trucks, each 31 feet long. Two of the trucks are fitted with a complete line of TV transmitting and monitoring equipment, three TV field cameras, ten receivers, a large-screen TV projector which will show life-size pictures, and a radio intercommunication system. The other two trucks contain power supply generators.

The caravan will be used to explore the feasibility of television for field instruction, and to develop instructional techniques via TV. The equipment may prove extremely valuable in televising intricate field exercises and "piping" the picture to expert observers, maneuver umpires, or to classrooms.

Programs picked up in the field, will be "piped" to military classrooms, or to a broadcasting station, by microwave radio link or coaxial cable. If they go to a broadcast station, the programs will then be transmitted in the usual manner; if they are conveyed to classrooms, the programs will be carried to a mobile display

unit equipped with both direct-view and projection-type television receivers.

The first vehicle in the television fleet is equipped with three complete TV field camera chains, a microwave transmitter for video signals, and a 46-watt FM transmitter for transmitting sound signals. Associated monitoring and switching control equipment is utilized in accordance with standard TV broadcast practice. Four microphone inputs, and tape and disc recording equipment—all with latest amplifying units—are among the audio facilities. The unit also houses a separate monitor-announce position, and an order-wire radio communication system, utilizing an RCA 15-watt Car-fone two-way mobile installation.

The custom-built body of the vehicle houses a complete transmitting studio, which is equipped with a specially-constructed operating desk for portable monitoring, control and power supply units used with the TV field cameras. All equipment is shock-mounted to guard against damage, including lockers provided for transporting the cameras, tripods, cables, and transmitting units. The operating desk is mounted in the rear of the unit, facing large shatterproof glass windows which give a clear view of pick-up activities outside.

The roof of the truck is reinforced to support the weight of both equipment and operators when they

wish to use it as a vantage point for cameras or the relay transmitter. A ladder with hand railing is provided for access to the roof through a self-locking waterproof hatch. Provision has been made for roof-mounting the four-foot parabolic antenna of the relay transmitter as well as whip antennas for the FM audio transmitter and intercom radio system.

The second mobile unit contains the transmitter power supply equipment, which consists of two powerful gas driven generating units. One of the generators is designated for standby use, or to supply power to special lighting equipment for illuminating the scene to be televised. By means of a special switch, the truck batteries are able to supply power to the two-way radio communication system when the caravan is in motion and the generators are not in use.

A receiver-display unit forms the third coach in the caravan. In addition to housing the FM and microwave

receiving equipment, it contains ten 16-inch picture monitors, a 16mm TV projector and film camera, slide projector, a large-screen television projector, and a video switching panel for selecting any of several TV signal sources.

The self-contained power supply for the receiver-display coach is housed in the fourth truck. It is similar to the transmitting power supply unit, except that it contains only one generator.

The entire caravan has been carefully built and styled to Signal Corps specifications. Every vehicle is equipped with necessary test equipment and spare parts. Each of the coaches bears the Signal Corps insignia and is painted in traditional Army olive drab, with attractive aluminum strip. The units are completely weather-proofed, with cooling and heating units to condition the interior for all-weather operation.

21-inch Kinescope Uses Full Screen Area

THE television industry's largest metal, rectangular picture tube, a 21-inch kinescope, has been announced by the RCA Tube Department. The new kinescope employs the metal-shell construction, first introduced by RCA over two years ago as a major innovation in the 16-inch round metal tube.

The new kinescope utilizes the full screen area, producing a picture 18½ inches wide by 13-15 16 inches high, with slightly curved sides and rounded corners. Providing pictures with high brightness and good uniformity of focus over the entire picture area, the tube has a white fluorescent screen on a relatively flat face made of frosted Filterglass, which minimizes reflection of bright objects in the room and increases picture contrast.

Conforming to proportions of the transmitted picture, the tube's rectangular shape avoids waste of screen area. This permits the use of a cabinet having about 20 per cent less height than is required for a round-face tube providing pictures of the same width. In addition, the chassis need not be depressed or cut out under the face of the tube, and controls can be located as desired beneath the tube.

Employing magnetic focus and magnetic deflection, the new kinescope is designed with a funnel-to-neck section which facilitates centering of the yoke on the neck. This feature, in combination with improved cen-

tering of the beam inside the neck, contributes to the tube's good uniformity of focus.

Other features incorporated in the new 21-inch picture tube are short over-all length, substantially lower weight than that of a similar all-glass tube, a higher-quality faceplate than is commonly used in all-glass tubes, and an ion-trap gun requiring only a single-field, external magnet.

This 21-inch kinescope, developed by the RCA Tube Department, is the industry's largest metal rectangular picture tube.



History of RCA Institutes

(Continued from Page 15)

mand for qualified operators, the school was reorganized as the Marconi School of Instruction and moved to larger quarters at 29 Cliff Street.

During the following years, the school was moved to several different locations within New York City as the swelling demand for operators called for more extensive classroom facilities. In 1915, the institution became known as the Marconi Institute and, for the first time, inaugurated evening courses in the Edison Building at Duane and Elm Streets.

With the formation of the Radio Corporation of America in 1919, the Marconi Institute became a part of the Corporation under the new name of the Radio Institute of America. Shortly thereafter, the school was moved to 326 Broadway. In 1922, following the introduction of radio broadcasting, courses were formulated for training radio receiver servicemen. Because of public interest, the school prepared catalogs and advertisements for magazines and newspapers.

Institutes Incorporated in 1929

Progressive expansion of the Radio Corporation of America made it necessary to form a separate organization devoted exclusively to technical training. Therefore, in August 1929, RCA Institutes, Inc., was incorporated as a wholly-owned subsidiary of RCA. Three years later the Institutes then located at 75 Varick Street, established courses in radio broadcasting, radio servicing, sound technique and commercial radio operating. A "General Course" of a higher technical level than had been previously offered was added to the Institutes' curriculum in 1936. This was done to keep pace with the growing need for technicians qualified to design radio equipment. The course included such subjects as electrical physics, transmitter technology, sound reproducing and recording systems, radio receiver instruction and frequency modulation design.

Anticipating the need for trained television technicians, RCA Institutes in 1938 added the servicing of television receivers to the Servicing Course, and integrated the operation, maintenance and development of television circuits in the General Course. The latter course, now called the Advanced Technology Course, requires full time attendance for two and one-quarter years (2610 hours) and offers instruction in the operation, maintenance and development of all types of radio circuits. Graduates of this course are qualified for all

types of radio technician employment, particularly development and laboratory work. So thorough is the course that those who complete it are often granted appreciably advanced standing when applying for admission to engineering colleges and universities.

In April 1948, the school was moved to larger and more suitable quarters at 350 West Fourth Street, where it now occupies 40,000 square feet on the second and third floors. A large number of visual aids are used here to supplement instruction in all courses. The Institutes has sound motion picture projectors, disc and tape recorders, and a large library of sound and silent films, film strips and slides. Reference material and the latest textbooks are accessible to all students in the school's well-stocked library.

Inspection Trips for Students

Supplementing regular academic instruction, students of certain courses are taken on inspection trips to important broadcasting and industrial centers located in or near New York City. In addition representatives of industry and government address senior classes on the various phases of radio, television and electronics.

In common with other schools, most of the students at RCA Institutes come from nearby areas. However, as time goes on, students from abroad are applying in greater number for admission to study here. During the past decade, students have matriculated from Argentina, Bermuda, Brazil, Canada, Chile, Cuba, Ecuador, Iceland, India, Iran, Iraq, Israel, Liberia, Mexico, Pakistan, Panama, Peru, British Malaya, Thailand, Turkey and many other countries.

To assist students in obtaining satisfactory positions RCA Institutes maintains a placement service. A recent survey, made two months after the end of the school year, shows that of a total of 569 graduates during the year, 471 or 82.8 per cent were employed. These graduates became associated with development laboratories of leading electronic companies and broadcasting stations in 45 different states, Puerto Rico, Hawaii and Alaska.

Through the years, RCA Institutes has kept abreast of the major changes in radio and television, and has sought to maintain a high level of instruction in the technical institute area of education. Today, the school not only ranks as one of the leading technical institutions of the nation, but is also recognized by the electronics industry as a valuable source of qualified men.

Sarnoff Challenges Scientists

Continued from Page 7

search Center, and I extend to you and your staff of scientists my warm good wishes for continued progress.

Harry S. Truman

The message from New York's chief executive said:

I have just learned that on Thursday you will celebrate the Forty-Fifth Anniversary of your entrance into the radio industry. My heartiest congratulations to you. Throughout your years of service, you have been a vital and imaginative force in the development and expansion of radio. Under your leadership and genius, radio has grown from a very small beginning until today it serves as an integral part of our daily lives, bringing to all of us the best in entertainment, public service and the tremendous news events of these times. May your anniversary be a very happy one indeed and may you continue to guide RCA for many years to come.

Thomas E. Dewey."

Five Tri-Color Kinescopes

Continued from page 9

ful experiments were conducted with one and with three electron guns.

The five remaining papers in the series discuss specific technical developments which are needed for the successful engineering of almost any tri-color tube.

The process used in applying the color phosphors to glass plates, used in four of the tubes, is described by N. S. Freedman and K. M. McLaughlin of the RCA Victor Tube Department. This process, which was developed out of silk-screen printing methods, is used for applying dots and lines, as well as any other pattern.

Miss H. C. Moody (the only distaff representative on the tri-color engineering team) and D. D. Van Ormer, also of the Tube Department, describe a number of practical designs for the three-beam electron gun.

Two other papers take up the mechanical assembly of aperture mask tubes.

These tubes use metal masks, placed just behind the phosphor plates, which are essential in keeping the electron beams from striking the wrong color dots. If this were not prevented, colors would "bleed" or run in the reproduced pictures. The papers by B. E. Barnes and R. D. Faulkner, also of the Tube Department, describe the design for the aperture masks, and show how the mask and phosphor plate are kept in alignment during the operation that seals the tube together.

D. D. Van Ormer and D. C. Ballard describe the effects of screen tolerances on operating characteristics of the aperture mask type tri-color tube.

In the final paper, A. W. Friend tells how it is possible to bend the electron beams without interfering with the correct registry of the color images. This is done by well-designed electron deflection systems.

These systems bend the electron beams without distortion in the manner that a good optical lens bends light rays without distortion.

The eleven papers, which are expected to become of major importance as a basis for future developments in color television, are being reprinted as a separate section of the Fall issue of *RCA Review*, technical publication of RCA Laboratories.

Theatre Size Color Television

Continued from Page 11

Several research groups at the David Sarnoff Research Center, at Princeton, and engineers of the RCA Victor Division, cooperated with Dr. Epstein and his associates in the Cathode-Ray and Optics Section of the Center, in developing the equipment used in this initial New York showing of the RCA theatre color television system. Special credit also was accorded R. D. Kell, Head of the Television Section of the Center, and his associates, to Saul Lasof, of Dr. Epstein's staff, and to Roy Wilcox, RCA Victor engineer.

RCA to Enter Air Conditioning Field

The RCA Victor Division of Radio Corporation of America plans to enter the home air-conditioning field. The announcement was made by Frank M. Folsom, President of RCA, on October 1. The first room air conditioners to be sold under the RCA Victor name and trademark will be placed on the market in January, 1952.

In a letter to its distributors, RCA Victor revealed that the air conditioners will be distributed through its present nation-wide organization of independent home instrument distributors and retail dealers.

Present plans call for the introduction of three models—a one-third, a one-half, and a three-quarter horsepower unit, the Company told its distributors. New designs and specifications for these units have been completed by RCA Victor design engineers and the units will be manufactured under arrangements with the Fedders-Quigan Corporation of Buffalo, New York. Fedders-Quigan is one of the leading air conditioner manufacturers in the country.

Radio is Here to Stay

Continued from Page 25

could not afford to spend almost 1 million dollars—the cost of network time and talent for an evening half hour on an annual basis—in a single advertising venture.

In 1949, 27 of the 28 advertisers spending \$5,000,000 and over were in network radio. In 1950, 29 out of the 33 advertisers in this group used the medium. However, network radio was not used in 1950 by half of the advertisers spending between \$1,000,000 and \$3,000,000, nor by 80% of those spending between \$500,000 and \$1,000,000, nor by 90% of the advertisers spending between \$250,000 and \$500,000. These figures demonstrate the great potential of customers available for radio. Taking them all together, there are 549 advertisers spending between one-half million and five million dollars a year. Only 158 of them (or 29%) are using network radio. This leaves 391 (or 71%) of advertisers spending one-quarter million dollars or more who are potential customers for the radio networks, but some of them cannot be sold in accordance with the old formulas.

Attractive to Small Advertisers

With the development of network television, the interest of many multi-million-dollar advertisers has been diverted to it and away from network radio. They can be brought back into the medium if it makes itself more flexible to meet their advertising requirements under the changed conditions of the market. At the same time, the network medium can adapt itself so that it can be used by smaller budgeted advertisers who offer a tremendous new revenue potential. By these means, network radio can regain the revenues needed to support its program structure and can continue to provide a strong service to the public, the advertisers, and the affiliated stations.

In changing times such as these, network radio cannot be frozen to old patterns of operations which were developed in a different advertising era. It must gear itself to new types of opportunities not only for its own preservation but for the preservation of other forms of broadcasting which are dependent on it.

These are not ordinary times. The changes taking place in radio come at a time when the nation faces a more serious threat than we have ever known before. We must be prepared to meet a potential enemy whose resources of materials, manpower and sheer fanaticism exceed anything that we have ever confronted in the history of our nation. If we should ever get into the conflict and should lose, we lose not merely a battle, not merely a war, but the precious heritage which mankind has struggled for centuries to attain.

Broadcasters can do many things to prevent such a tragedy. They can help to keep the American public awakened to these dangers; they can help to build a unity of national purpose. They must protect the medium against sabotage from within; they must be sure of the integrity and loyalty of those whose job it is to serve the public interest.

Yes, radio has a future, limited only by the scope of the imagination of those responsible for its destiny.

Good Times Ahead for TV

(Continued from Page 14)

aluminum, because aluminum is rationed to us at 48 per cent of the rate for the first half of 1950.

The nickel crisis is a very real crisis. This metal is in such short supply that the tube industry will be living hereafter on a hand-to-mouth basis. Even with the development and application of conservation techniques, tube production is going to hit the skids. Glen McDaniel, President of the Radio and Television Manufacturers Association, has forecast that manufacturers will have to start cutting tube production this month unless special relief is allowed. By December 15, he predicts that the production rate will be down to half the present rate.

And after taking a body blow from metals shortages, the industry seems fated to run head-on into a parts shortage some time in the first quarter of 1952, with transformers and coils, as well as tubes, among the hardest-to-get items.

Taking all of these things into account, the RCA Victor Market Research Department has estimated that the industry can turn out 1.8 million TV receivers during the first six months of next year. During the second half, with many shortage problems at least partially solved, the production capacity will increase, and from July to January we anticipate an industry output of 3 million units, giving us a total for 1952 of just under 5 million units. I predict this will not be enough to satisfy the demand.

At RCA, we consider the television and radio business as the most exciting business in the world. We occupy a position of leadership in this business, and we intend to keep it. When other TV factories were shutting down during the dark days of last spring, we continued to produce, warehousing our products against the time when the market would harden. As long as broadcasting endures, we shall continue to produce the finest television and radio receivers we know how to build, and broadcasting will endure as long as organized society endures.

RADIO AGE

RESEARCH • MANUFACTURING • COMMUNICATIONS • BROADCASTING • TELEVISION



RCA

JANUARY

1952

TV OPERA

Not a Mirage!



It's the 1000-mile Trans-Arabian Pipeline's desert marvel, TAPLINE . . . RCA radio equipped

From Persian Gulf to Mediterranean Sea . . . across more than a thousand miles of shifting sands and rugged desert . . . runs TAPLINE, one of the world's greatest oil-carrying systems, built by Trans-Arabian Pipeline Company.

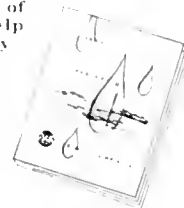
Tribute to the engineering resourcefulness of many organizations, TAPLINE takes its place as a marvel of modern vision and commercial achievement. RCA engineers were among the first in the field, in 1947 . . . to provide radio

communication as the oil line was built.

The great system, now in complete operation, is RCA radio equipped. Desert vehicles receive and transmit with mobile radio units of new design. Aviation radio directs air traffic serving TAPLINE. Marine radio aids tankers off shore. Fixed control and relay stations, that operate in all the weather of 1000 desert miles, keep up the flow of radio communication that is vital to the flow of oil.

RCA's experience in radio is world-wide. Its equipment is recognized as the standard for highest performance. The international facilities of RCA are ready to help industry or government in all fields of radio. Consult your RCA distributor or RCA International Division.

The interesting booklet "Sand, Oil and Radio," the story of TAPLINE, may help you. It is free. Simply write for it.



RCA INTERNATIONAL DIVISION

RADIO CORPORATION of AMERICA

RCA BUILDING

30 ROCKEFELLER PLAZA, NEW YORK, N.Y., U.S.A.

Radio Age

MANUFACTURING • COMMUNICATIONS
BROADCASTING • TELEVISION

JANUARY 1952



OVER

dramatic scene from the premiere of "Amahl and the Night Visitors", an opera composed by Gian-Carlo Menotti and telecast by NBC on Christmas eve. (Story on page 9.)

NOTICE

When requesting a change in mailing address please include the code letters and numbers which appear with the stencilled address on the envelope.

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RADIO CORPORATION OF AMERICA

RCA Building, New York 20, N.Y.

DAVID SARNOFF, *Chairman of the Board*
LEWIS MOCCONNACH, *Secretary*

FRANK M. FOLSOM, *President*
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Services of RCA are:

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National Broadcasting Company, Inc. • Radiomarine Corporation of America
RCA Communications, Inc. • RCA Laboratories Division • RCA Institutes, Inc.



Dave Garroway (right) as "communicator" of "Today," NBC's new morning television program, will reach throughout the world for news items for his broadcasts from a special studio in the RCA Exhibition Hall, Radio City.

Television to Play Big Role In 1952 Presidential Campaign



By Brig. General David Sarnoff,
Chairman of the Board,
Radio Corporation of America

DURING the past year, television established itself as such a vital force in the life of America that in 1952 it promises to be a decisive factor in the nomination and election of the President of the United States, Brig. General David Sarnoff, Chairman of the Board of the Radio Corporation of America, declared in a year-end statement.

"By election day," General Sarnoff said, "there will be approximately 18 million television sets in the United States, with a potential audience of more than 60 million persons — exceeding the total population of the United States when Grover Cleveland campaigned for the presidency in 1884. For the first time coast-to-coast network facilities will be available for the national campaigns.

"No other force, in so short a time, has ever exerted such a widespread impact on the home, on entertainment, education, politics, advertising, news and sports."

Describing television as the most effective means of mass communication known to man, he said that "therein lies its great destiny," and added:

Chairman of RCA Board, in Year-End Statement, Declares Television Promises to be a Decisive Factor in Selection of Next President of the United States.

"The power of such a medium for moulding public opinion is unprecedented. It provides an open forum in which every home has a front-row seat in the discussion of national and international problems. The leaders, as they speak, become living personalities whose emotions and appearance are viewed directly by millions of people. This new art brings sincerity or insincerity into focus and has an intimate way of portraying the distinguishing characteristics of a natural leader.

Television of today, however, is only the prelude to the television of tomorrow. It will change its format from time to time to keep pace with new program trends and new inventions. It is a live and flexible medium. In the process of its evolution it will develop its own art form, distinct from radio, motion pictures, stage and press. It will create and develop new entertainers and new personalities for the television screen.

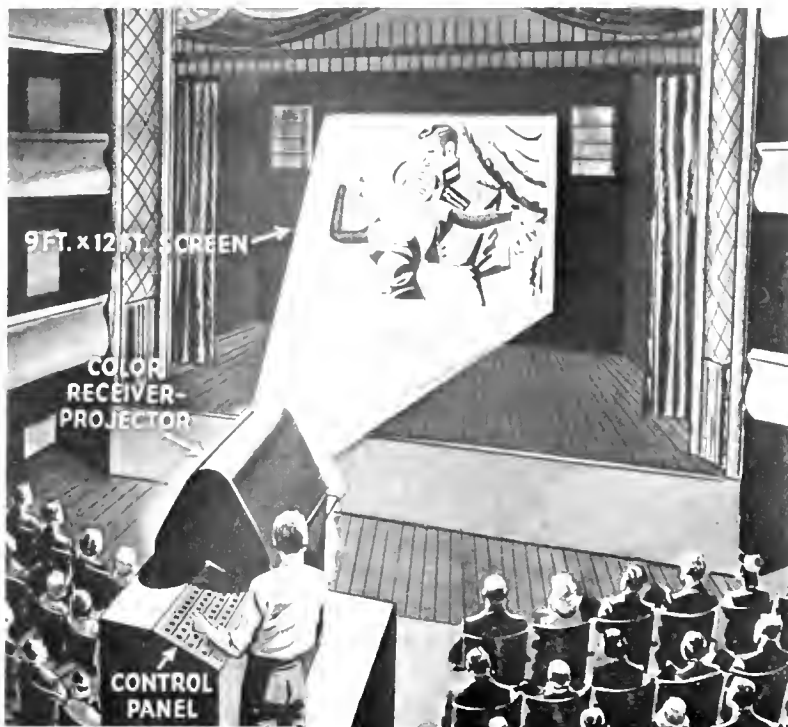
"Already television has revealed its tremendous impact as an advertising medium. Based on the financial results of the first ten months, the 1951 time billings of four TV networks and 109 stations should reach at least 250 million dollars. This year, for the first time, television surpassed network radio in revenue. Today there are 15 million television sets in the United States. About forty theatres are television-equipped."

General Sarnoff declared that television in 1951 revealed a number of significant advances that portend a great future. He listed these, as follows:

Television stations have proved their ability to operate successfully in the economic foundation of the American system of broadcasting.

The television manufacturing industry has survived its early economic "hills and valleys." Sales of receivers are on the upswing and there now is a sell-out of TV time on the air.

The truth about color television became evident in 1951. The public learned the basic meaning of compatibility during field tests and public viewings of the RCA compatible, all-electronic system, which makes it possible for owners of present television sets



Artist's version of large-screen color television as demonstrated by RCA in a Broadway theatre.



Development of Vidicon tube (in girl's right hand) made possible the back-pack TV transmitter shown at right.

to receive color programs in black-and-white without adding any contraptions.

There is unanimity in almost the entire radio and television industry on what constitutes desirable and practical standards for color television — and these standards call for compatibility. RCA plans to ask the FCC to see and consider the improved compatible system before mass production of color television sets is permitted by the Defense Mobilizer at some future date.

Color pictures also were produced successfully by the RCA compatible system on a 9 x 12-foot screen at a Broadway theatre.

Television programming in 1951 demonstrated that the new art has a keen appetite for talent and ideas. TV, in a year, presents more new programs than all other media of public contact combined.

Coast-to-coast TV network programs, made possible by cross-country microwave radio relays, and coaxial cable extensions, demonstrated that the day is not far distant when every corner of the country will have a reserved seat in the amphitheatre of television.

Extension of religious programs and the use of television in education during 1951 revealed the marked effectiveness of such telecasts in vast new fields of service to church, school and home.

Television's expansion in the UHF (ultra-high-frequency) portion of the broadcasting spectrum was proven in 1951 to be both possible and practical by RCA-NBC scientists and engineers by their experimental station near Bridgeport, Conn. The UHF can accommodate 70 new TV channels, providing for perhaps more than 2,000 UHF stations.

Development of the RCA Vidicon tube, or small electronic "eye," has made possible portable television cameras and transmitters, even of back-pack size.

Achievement of coast-to-coast service during the year gave eloquent promise that television would eventually become international in scope.

General Sarnoff pointed out that while television has thus advanced, radio also has continued to move forward. He declared:

"Today there are 2,400 AM and 680 FM stations in the United States. Daily broadcasts cover 95 per cent of the country. Approximately 12 million new radio sets were sold by the industry in 1951, lifting the total in this country close to the 100 million mark, including about 24 million automobile radios. There are 45 million radio equipped homes."

During 1951 the phonograph record business took a new upswing, with an industry-wide dollar volume about 15 per cent over 1950, he revealed.

Measured from the date of Marconi's first transatlantic wireless signal in 1901, radio in 1951 celebrated a Golden Anniversary," he recalled. Throughout its half century of progress as a science, art and industry, it has met the tests of ups and downs in business. The constant invigoration of science has given radio a perennial vitality and versatility. Its Golden Age is still ahead."

General Sarnoff said that the radio industry looks forward with confidence to each new year as one of increasing promise and progress. He continued:

The year 1952 will be no exception, for the field of electronics — of which radio and television are a vital part — is on the threshold of many new developments. These include the harnessing of electrons in solids for useful work, instead of subjecting them to incandescent heat inside a vacuum tube.

Tiny devices, known as transistors, have been developed for use as detectors, amplifiers and oscillators for radio, wire and cable communications. These use germanium crystals as small as a match head. They will play an important role in the future of many forms of communications.

Today, communication is only one facet of the future of electronics, the roots of which are imbedded in radio and television. There are limitless possibilities also

Tower of RCA-NBC experimental UHF television station at Bridgeport, Conn.



for electronic inventions in new and broader fields, especially in the field of home appliances.

On the threshold of 1952, it is difficult to imagine a world without radio, or homes without broadcast receivers and television sets. This record of accomplishment and public service is the result of the freedom we enjoy in America to research, invent, develop and progress under a democratic system of competitive private enterprise that surpasses in achievement any other system in the world.

Seven Radiomarine Employees Join Quarter Century Club

Seven employees of the Radiomarine Corporation of America, a service of RCA, have become new members of the Radiomarine Quarter Century Club, it was announced by Thomas P. Wynkoop, President of Radiomarine. In recognition of their 25 years of service, completed with the Corporation in 1951, the veteran employees received gold watches and honor scrolls. The Radiomarine Quarter Century Club, organized in 1948, now has a membership of 50.

The new members are: Miss Dorothy R. Boller, Secretary to the Vice President and Treasurer; George P. Shandy, Great Lakes Regional Sales Manager; William M. Uhler, Philadelphia Sales and Service Manager; Edmund B. Burgess, Coast Station Manager of WOE, Lake Worth, Fla.; Frank Geisel, Coast Station Manager of KPH, Point Reyes, Calif.; Robert C. Steadman, Radio Operator at WCC-WIM, Chatham, Mass.; and A. Arthur Karas, Personnel Manager. Miss Boller is the first woman to become a member of the Quarter Century Club.

One of the viewing rooms, installed at Center Theatre, New York, where thousands watched public showings of RCA's compatible color television system.



Outlook for Radio-TV Industry

President of RCA Reports Facilities Available to Meet Increasing Military and Civilian Demands—Foresees Continuing High Level of Radio and TV Sales



By Frank M. Folsom
President,
Radio Corporation of America

AS THE radio-television industry enters 1952, it has an all-time peak production capacity available for the Nation's rapidly increasing demands for military, as well as domestic production and service, Frank M. Folsom, President of the Radio Corporation of America, announced in a year-end statement.

Mr. Folsom said that to meet this dual production requirement of the national emergency, RCA — as one of the industry's major producers — continued during 1951 a multi-million dollar plant expansion program. He reported that new manufacturing facilities, plus those established in earlier postwar years under the impetus of television, give RCA the greatest production potential of its 32-year history.

"Throughout 1951," he declared, "RCA accepted a rapidly increasing number of Government contracts for scientific research, engineering development, and production of military equipment in the radio-electronics field. This volume of work, substantial in 1951, is expected to be three to four times greater in 1952, and will reach record levels during 1953. Next year's military output

will probably equal in dollar volume the 1942 rate, when RCA plants were devoted 100 per cent to war production.

"Military equipment produced by RCA in 1951 included various types of radio communication instruments, 'walkie-talkies,' radar and sonar equipment, range-finding and navigational instruments, audio and radio devices for airplanes, and numerous types of electron tubes. Radio-electronic instruments currently required by the Nation's military forces are far more complex than those used in World War II. For this reason a large and increasing number of RCA engineers is engaged in research and engineering development work on Government projects."

Mr. Folsom revealed that one of RCA's outstanding engineering contributions is the "miniaturization" of equipment, an excellent example being the Signal Corps' new "walkie-talkie" which is half the size but twice as powerful as the one used in the last war. Similarly, it is now possible to get far more electronic control equipment into airplanes than ever before.

In addition to RCA's military development and production projects, he said more than 600 engineers and

Simple converter designed by RCA Victor to enable owners of standard television sets to receive UHF stations.



technicians of the RCA Service Company are working with the U. S. armed forces in 20 different countries, assisting in the training of military personnel, as well as servicing radio-electronic equipment.

He noted that in response to military demands activities in connection with RCA's "Premium" electron tubes — designed and manufactured to meet stringent military requirements — were intensified, with twice as many new types of "Premiums" planned for production during 1952, as compared with the past year.

High Production Levels Maintained

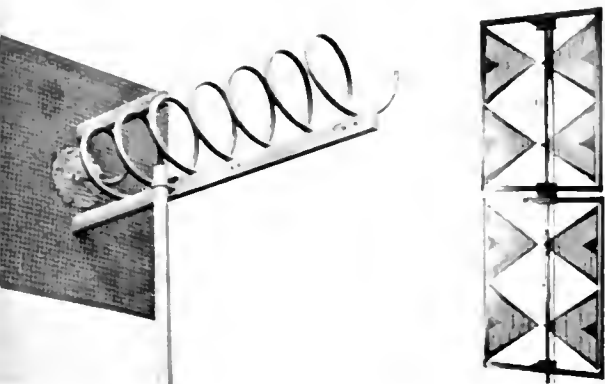
Mr. Folsom reported that in the domestic field, RCA and other leading manufacturers in the industry maintained relatively high levels of production of television and radio sets, as well as phonograph records during 1951. Purchases of TV receivers by the American public during the year reached approximately 5,000,000, bringing the total in use throughout the Nation to more than 15,000,000 sets, he reported. He declared that these sales, plus new installation and servicing, added more than \$1,500,000,000 to the national income.

Increases in transmitting power and improvement in TV receiver design were cited as contributing to the widening receiver distribution potentials in areas presently served by television.

Numerous sections of large cities, as well as rural communities, where reception has been either impossible or of marginal value, are now getting excellent television pictures for the first time," said Mr. Folsom.

"As a contribution to this development, RCA Victor introduced, in the fall of 1951, a line of super-powered television receivers with two to three times greater selectivity, picture stability, and freedom from noise interference in sound reception. Among numerous communities to benefit from receivers of this type are

Two types of experimental UHF antennas created by RCA for field tests of UHF programs.



This "Walkie-Talkie" developed for the Signal Corps is one of RCA's contributions to the Nation's defense.



Television engineers raise a portable antenna to check the strength of UHF signals transmitted by the RCA-NBC station at Bridgeport, Conn.

Trenton, N. J., certain areas in Eastern and South Eastern Pennsylvania, and several towns within a 100-mile radius of Atlanta, Ga."

In the important field of ultra-high-frequency (UHF) television, hailed as the means of supplementing the present very-high-frequency (VHF) television to bring about a truly nationwide television service, the various divisions and departments of RCA showed marked progress during the past year in adding to their pioneering work, he continued.

"New developments in tubes, receivers, converters, antennas and transmitters contributed to a high order of quality and reliability in recent demonstrations of UHF television," he reported. "These demonstrations centered about the RCA-NBC UHF television transmitter near Bridgeport, Conn., the first and only experimental UHF transmitter operating on a regular schedule. Receivers installed in the surrounding homes by the RCA Service Company provided 'listening posts' from which much valuable data were obtained."

Radio-Phonograph Business in Healthy State

Mr. Folsom, pointing out that "the glamour of television sometimes overshadows the fact that the radio and phonograph businesses also are in a very healthy condition," revealed that the production of radio receivers and radio-phonograph combinations during 1951 was approximately 12,000,000 units — more than double the number of TV set sales. This raised the number of radio sets in use throughout the country to more than 100,000,000, or an average of more than two sets per family, he said.

Plans of RCA Victor to enter the room air conditioning field in the coming year were reported to have been completed.

Sales of recorded music rose sharply in 1951, establishing a trend that Mr. Folsom said is expected to continue throughout the next year, with the increasing popularity of both the RCA Victor 45 and 33 $\frac{1}{3}$ systems.

Discussing the future production outlook, Mr. Folsom declared:

"With a sharp increase in military deliveries scheduled, domestic production in 1952 is expected to be somewhat lower than in 1951. It is probable, however, that the industry as a whole will produce between 4 and 4 $\frac{1}{2}$ million television receivers and 9 to 10 million radio sets and radio-phonograph combinations.

Limiting Factors in Production

"The limiting factor in domestic production will be, of course, the availability of raw materials and component parts. Curtailment of supplies for non-military production is expected to be felt most during the first half of 1952. This condition may improve to some extent in the second half, as the expanded production of suppliers begins to reach manufacturers."

RCA achieved high levels of production and service in 1951 through the outstanding teamwork and cooperation of its employees and the thousands of independently-owned companies that supplied raw materials, component parts, and various types of special services, said Mr. Folsom, adding:

"As one dramatic example of this teamwork and cooperation, RCA was able to begin deliveries of the new 'walkie-talkie' it developed for the U. S. Signal Corps sixty days ahead of a super-rush deadline.

"Another example of the importance of RCA suppliers is seen in the cooperation of 560 different companies on just three of the Corporation's Air Force production contracts.

"These are but two instances of American team-play operating in the best interests of the Nation. They are clear proof, however, that the products and services of modern American industry come from no single self-sufficient source, but from a wide range of interests welded together by a common purpose — the national welfare."

More than 15,000,000 American homes now enjoy television program service.



First TV Opera Widely Acclaimed

Menotti's "Amahl and the Night Visitors," Composed for Television, Wins Enthusiastic Praise from Press and Public



Gian-Carlo Menotti, composer of the television opera "Amahl and the Night Visitors."

MORE than two years ago, Samuel Chotzinoff, NBC's General Music Director, acting on behalf of the company, commissioned Gian-Carlo Menotti to write an opera especially for television production. The NBC television opera project was in its first year and already had indicated from several productions that it was capable of taking on the presentation of an entirely new work.

NBC had confidence that Menotti would produce an opera which would be good television and a fine work of art at the same time. Its confidence was based upon its own previous experience with Menotti, who had been commissioned to write the first radio opera in America in 1937. This opera, "The Old Maid and the Thief," made a signal success on radio and has since been performed in opera houses throughout the world. Menotti has won great acclaim in opera and on the Broadway stage with his "The Medium," "Amelia Goes to the Ball" and most recently "The Consul." To insure the success of this television presentation, NBC also arranged to have Menotti stage his own opera.

At the time Menotti was commissioned, he was given carte blanche as to subject matter and all other details of the opera. After two years, Menotti submitted the opening pages of the music and the libretto for "Amahl and the Night Visitors." NBC agreed to put the opera into production for Christmas Eve presentation.

Scheduling an opera before the score and libretto had

been completed might have seemed a foolhardy thing to do, but Chotzinoff's experience with Menotti had indicated that Menotti would come through with colors flying, which he did. The triumphant reception that the opera has had from press and public alike has been virtually unequalled in music or in television.

In the *New York Times*, Olin Downes wrote: "Mr. Menotti, with rare art, has produced a work that few indeed could have seen and heard last night save through blurred eyes and with emotions that were not easy to conceal. It might be said at once that if nothing else had been accomplished by this work, television, operatically speaking, has come of age.

John Crosby in his syndicated column said: "Menotti's music, so powerful in 'The Consul,' was marked here, I thought, by a rare melodic sweetness completely in harmony with the breathless sweetness of the tale he unfolded. Besides the boy (Chet Allen), a low bow is due also to Rosemary Kuhlmann for her performance and singing as the mother, to Samuel Chotzinoff who produced it, to NBC who commissioned it and who, I hope, will revive it many times."

These sentiments were repeated by newspapers, magazines, syndicated columns and wire services all over the country. Not only was Menotti singled out for praise, and NBC for commissioning the opera, but all of the singers and particularly the 12-year-old boy, Chet

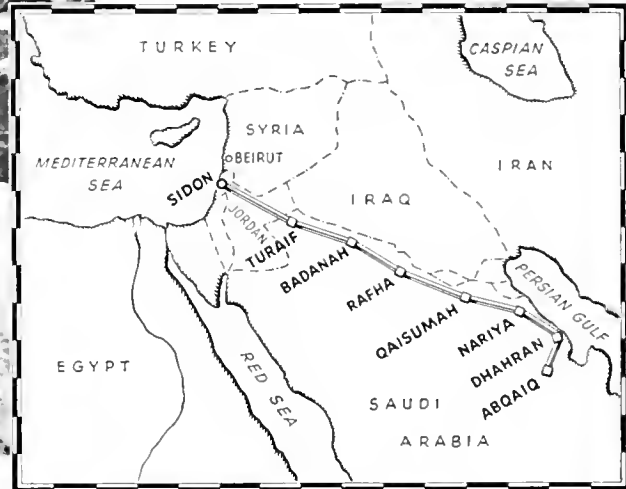
(Continued on page 31)



Samuel Chotzinoff, General Music Director of NBC, who has directed the network's opera project.



Left: Section of Tapline conduit which carries daily flow of 300,000 barrels of oil over 1,000 mile route shown below.



Radio Speeds Work on World's Largest Pipe Line

By H. C. Edgar,
*Merchandising Director,
RCA International Division*

CONSTRUCTION and operation of the world's largest oil pipe line across more than a thousand miles of desert wasteland from the Persian Gulf to the Mediterranean Sea represents a modern wonder achieved by a combination of radio and petroleum engineering. Successful 24-hour operation of the mighty oil highway, which traverses four countries—Saudi Arabia, Jordan, Syria and Lebanon—depends upon instantaneous, reliable radio communications. RCA was entrusted to design and install a radio system between terminal points and the six pumping stations that control the daily flow of 300,000 barrels of oil.

Tapline, the abbreviated name commonly used to identify this project, was built by the Trans-Arabian Pipe Line Company and the Arabian American Oil Company. It cost more than 200 million dollars to build and required more than 265,000 tons of steel pipe. Completion of the project involved three years of work and more than five billion ton-miles of freight shipments. Most of all it involved vision.

Actually, the history of Tapline starts with the dis-

covery of oil in commercial quantities in Saudi Arabia. The oil there is close to the Persian Gulf, but by tanker route it would have to be carried 3,500 miles to the Mediterranean, by way of the Indian Ocean, the Red Sea and through the Suez Canal. Looking at their maps, oilmen saw that tremendous savings in time and money could be made by piping the oil across the sands and gravelly plains of the Arabian Peninsula. After extensive planning and study, construction on the pipe line was begun in the summer of 1947.

Communications engineers of the RCA International Division were among the first to go into the field. These engineers were organized into two groups for the Tapline project. The field team was composed originally of eight engineers but later was expanded to 20. The other group, at the New York home office, was made up of from three to eight draftsmen and engineers. While the field force was erecting temporary radio facilities, the New York group was busy on blueprints of the permanent system of communications.

The initial step in designing an integrated radio system for Tapline was to investigate the best method to use under the prevailing geographic and physical conditions. RCA technicians made detailed ionospheric propagation studies and then developed a frequency

allocation plan for the many services that would be required. The problems of obtaining radio station licenses and frequency assignments from the four countries were finally solved. Preliminary studies revealed that special antennas would have to be designed in order to reduce static interference from desert sandstorms which had previously obliterated radio reception.

Radio Circuit Completed in Month

Installation of a radio circuit between Tapline's main office in Beirut on the Mediterranean and Ras el Mishaab on the Persian Gulf was the first major task. In one month, this circuit was completed and was carrying executive telephone and teletype traffic. To insure efficient handling of messages over the circuit, two expert operators were furnished by RCA Communications, Inc. When the temporary stations at Beirut and Ras el Mishaab were replaced by permanent stations, the changeover was accomplished without loss of operating time. The direct circuit between these terminals has been in continuous operation, day and night, since service was inaugurated.

As work progressed along the pipe line, RCA engineers provided communications for field construction units, camps, motor caravans, supervisors and survey parties. At all times, field personnel was in constant radio contact with either Ras el Mishaab or Beirut.

As radio engineers and pipe line construction crews advanced from opposite ends of the 1,000-mile course, they encountered one of the world's most barren areas. A tree is a rarity in this land where the average rainfall is only three inches a year. The summer temperature rises to 130 degrees Fahrenheit, with a humidity below seven per cent. In such a climate a man requires

two gallons of water a day. Metal surfaces, such as the sections of steel radio antennas, were too hot to touch.

Close teamwork between the RCA International Division at home and abroad eliminated delays in the construction work. In New York, shipments of equipment and supplies were coordinated according to schedules set up by field engineers. There was a constant exchange of information between Arabia and New York on engineering details of the entire system.

Before oil began to flow in the pipe line in November 1950, the communications system installed by RCA had carried more than 500,000 telegrams and more than 750,000 telephone messages.

The completed system, as operated today, has the following specialized functions: (1) dispatching pumping operations, (2) airway and vehicular communications and (3) dispatching movements of oil tankers.

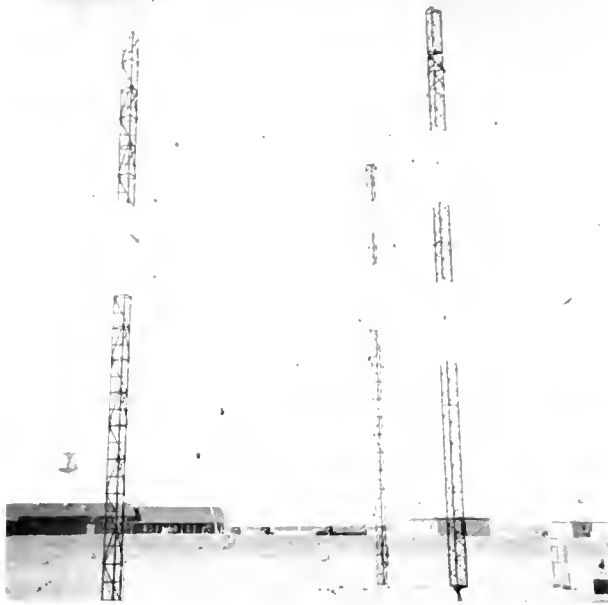
Voice Communications Can Be Coded

Communications for pumping operations consist of parallel telephone and teletype circuits. Signals from the various pumping stations are received by an automatic repeater station at Ratha, midway on the pipe line, and retransmitted from there to other points. Through the use of automatic repeater operation and frequency diversity, nearly 100 per cent reliable telephone service is available between the pumping stations and the terminals at Beirut and Ras el Mishaab. For security purposes, a method was developed whereby all voice communications may be encoded into more than a hundred different combinations.

Since Tapline's pumping stations are separated by as much as 175 miles, air transportation is vital for the speedy shipment of materials, equipment, medical and food supplies, and personnel. Each station has its own

Plodding dromedaries form an old world foreground against a backdrop of Tapline's radio towers.





Radio antennas designed by RCA and erected at one of the oil pumping stations in Saudi Arabia.

airstrip for company airplanes. Communications with both vehicles and airplanes are coordinated with particular airports and stations by the operators at the various radio stations. Calls from an automobile or plane en route across the desert are received on a telephone switchboard like any ordinary call. If desired, communications may be conducted between a vehicle and an aircraft in flight.

All six airports are equipped with RCA air navigational beacons for the safe guidance of transport planes. Shortly after the beacon system went into operation, some of the commercial airlines changed their routes in order to take advantage of these navigational facilities.

Old and New Worlds in Contrast

Oil from Saudi Arabia reaches the end of its journey through Tapline at Sidon, on the Mediterranean, where tankers are loaded. Radio antennas towering above the orange and fig trees of this ancient city offer an unusual contrast between Old and New Worlds. Actual dispatching of tankers is controlled from the main office at Beirut by means of the radio station at Sidon. This station also supplies vital weather information to the tankers being loaded.

To accomplish the various specialized functions, the RCA-designed communications system utilizes frequencies from 250 to 88,000 kilocycles. Frequencies in the VHF range are employed for the radio link (instead of wire lines) between Sidon and Beirut. This link is engineered to carry eight voice channels, two teletype channels and two control channels for simultaneous communications in each direction.

A majority of the apparatus for the Tapline radio

system was standard RCA equipment, specifically intended for this type of service. However, custom-made components were needed in several cases to meet unusual conditions and requirements.

All transmitting and receiving antennas for the project were custom-made to provide interference-free communications. Antenna towers were designed to withstand the combined forces of the violent sandstorms and high winds that sweep the desert.

Saudi Arabs Trained for Radio Work

Aside from the actual installation of the radio system, the RCA International Division performed many technical and non-technical services which are important for successful operations. One contribution was the training of Saudi Arabs for radio operating and service work.

The two main difficulties encountered in this training were language and inexperience. Few Arabs were able to speak even a few words of English and only a handful of Americans were acquainted with Arabic. But gradually words were exchanged and slowly a new language came into being along the pipe line. It wasn't Arabic or English but a workable combination through which both groups could converse without too much difficulty.

Before the construction crews arrived, most of the Arabs had never seen such simple tools as a screwdriver or monkey wrench, yet in time they learned many skilled trades. After being carefully tested and selected for aptitude, Saudi Arab employees were given instruction in telephone, radio and instrument maintenance by RCA field engineers.

To minimize inventory problems, RCA developed a standardization program for spare-part equipment and techniques. The fewest possible types of tubes, equipment and antennas were utilized wherever specialized functions permitted. As a result, a technician familiar with one station can be transferred to another and find himself acquainted with equipment and procedures.

After the radio system was completely installed, many of RCA's engineers remained as permanent Tapline employees. This is not difficult to understand. At each pump-station settlement are air conditioning and refrigeration plants as well as recreation halls and infirmaries. In addition, the stations have comfortable dwellings, dining halls and athletic fields.

By overcoming such obstacles as climate, language barriers and technical problems, petroleum and communications engineers have made a tremendous contribution to the world's oil economy. Tapline is striking proof of America's ability to cope with difficult communications problems abroad and to solve them successfully.

RADIO AND ELECTRONICS

Their Status and Promise

By Dr. E. W. Engstrom

Vice President in Charge,
RCA Laboratories Division

An address delivered at the 60th Anniversary Convocation of Drexel Institute of Technology in Philadelphia on October 31, 1951

IT IS particularly appropriate on this occasion to speak about radio and electronics as a science and as an industry. It is appropriate because radio followed by electronics, had its beginning at about the same time this Institute was founded. We may but think of Hertz's experiments in electromagnetic radiation. We may consider Branly and his coherer for detecting radio frequencies in the early 1890's. Again we may think of Marconi and his experiments of the 1890's, culminating in his historic transmission of the letter "S" across the Atlantic in 1901. These were the beginnings and I have called attention to but a few of the pioneers. They were followed by a host of others until today the technical workers are counted by the tens of thousands and those who serve in the industry, by the hundreds of thousands or millions.

In the years that followed the first practical radio transmissions, the service grew rapidly in both its continent-to-continent and ship-to-shore branches. During those early years the use of radio was confined to code communications. While some experimental work on radio telephones was done, the idea of broadcasting had not yet been proposed. The period of World War I and the years just following saw the development and initial use of the "vacuum tube." It is this electronic tube which today is at the base of the huge radio-electronics industry. I shall say more about this later.

While radio communications grew rapidly, it even now is small in terms of plant and equipment and in operating revenue when compared to the services to which it and the electron tube gave birth. I refer, of course, to radio broadcasting—sound and television—and to the many applications of electronics. Before leaving the subject of radio telegraph communications, it may be of interest to note that during the past several years the radio message traffic handled by private com-



The author points to one type of tri-color television picture tubes developed by RCA.

panies in the United States has run from one-half to three-quarters of a billion words each year.

With the advent of radio broadcasting in the 1920's, radio really began reaching its seven league stride. This new service, the outgrowth of radio communication, soon outdistanced its parent. As an example of the magnitude of this now mature service, 12 million sound receivers were produced last year in the United States. These had a retail value of 650 million dollars. In that same year some 380 million electron tubes were produced at a value of approximately 500 million dollars. Radio billings for network broadcasting totaled some 200 million dollars. As of the start of this year, 96

million radio receivers were in use in 45 million homes of our country — or 95 percent of the population.

This, then, is the measure of the service which has extended man's power to hear — to listen at a distance. For as long as man has had the concept and the vision to do so, he has likewise dreamed of sight at a distance. It is significant that as the pioneers were first experimenting with and conceiving uses for radio transmission, other pioneers were carving out the beginnings of television. Here, however, real progress in the art had to await the development of refined instrumentalities of electronics.

Television of a practical and commercial nature began as World War II developed. Once started, the service marked time until the cessation of hostilities. Since then, the growth has been phenomenal — beyond the estimates of the most optimistic. Last year in this country some 71½ million television receivers were produced, representing a retail value of approximately 2 billion dollars. Today, more than 14 million television receivers are in operation.

109 television broadcasting stations serve more than 60 important areas representing roughly 60 percent of the nation's population. The number of stations would be much larger except for the "freeze" on new stations which has been in effect since 1948. The majority of the 109 stations are now served by network programs. This network facility has just recently become trans-continental. Currently, billings for television network broadcasting are approximately the same as that of sound broadcasting. Soon it is expected that new station authorizations will be given, both through the lifting of the freeze and the establishment of service in the ultra-high radio frequencies.

What Electronics has Accomplished

We have examined three of the stepping stones leading to the present. There are others. Electronics gave the silent films a voice. Electronics gave the speaker, the singer, and the performer an enlarged voice for large audiences. Radio and electronics gave the public, industry, and individuals means to communicate and means to control at a distance. Electronics means control and safety on land on sea and in the air. Now industrial forms of television permit sight at a distance in places where it is difficult or dangerous for man to view. Other forms of industrial television permit teaching in new and improved ways. Electronics abounds in control processes for machinery in factories. Now electronics is doing our counting, our computing at lightning speed. There are facets so numerous that I can but mention these few examples.

Radio provided its first major test as a military tool during World War I. By World War II, radio and electronics were integral parts of the military machine. Superiority in radio, radar, and electronics had much to do with the outcome of the conflict. One used to say that an army marched on its stomach. Now one may say that military might on land, on sea, and in the air, lives, moves, shoots, and conquers on its electronics. Radio and electronics are the "brains" on which all military movements and actions depend.

New Materials Enter Scene

Radio equipment of the early days made use of essentially the same materials as its older brother, the electrical industry. I mean the use of conductors — materials permitting the ready movement of electrons when under the proper influence; insulators — materials where the electrons are bound; and magnetic materials. From almost the beginning, however, a new class of materials entered the radio scene. These were neither conductors nor insulators in the usual sense and they did not obey Ohm's law. I refer to the loosely packed particles of the coherer and the crystal with its point contacts. These were the detectors of radio waves. While the performance of such units could be measured, the basis of the performance was little understood. Except for such specialty applications these semi-conductors were the discards of the electric and radio arts. They served well

(Continued on Page 26)

The tiny transistor (left) is compared here with a miniature vacuum tube which it may eventually replace in radio sets and other electronic apparatus.



TELEVISION IN 1955

Prospects of Video Industry Outlined by NBC President in Year-end Statement which also Analyzes Trends of Viewing Audience, Theatre Television and Sponsor Participation



By Joseph H. McConnell
President,
National Broadcasting Co.

A TELEVISION viewing audience of 81,000,000 people, more than half the total national population is envisaged for 1955 in a year-end statement by Joseph H. McConnell, President, National Broadcasting Company. "By that time," he said, "we will think of television as we think of radio today, not in regional terms but as an instrument of mass communications for all of America."

Mr. McConnell expressed his opinion that theatre television will keep abreast of home viewing. "I anticipate that 4,100 theatres will be television equipped on our target date (1955). Each will accommodate an average audience of 1,000 bringing the theatre total to 4,100,000 viewers.

"The economic graph for television will climb with all the speed of audience growth," he continued. "We now count television billings in the tens of millions, but 1955 should put us in figures several times as great.

Total national expenditures for advertising in 1951 were \$1,775,000,000. With an expanding economy, with television vaulting toward maturity, with growing business awareness of the importance of all advertising media,

I anticipate that the total annual income from all advertising sources in 1955 will reach \$8,000,000,000

Considering the present leaping demand for television network time, it is probable that television in 1955 will achieve billings of \$1,000,000,000, or one out of every eight dollars spent by American advertisers *in all media.*

At first glance, this sounds fantastic—one communications medium, in three additional years, to achieve a gross income that represents more than 50 per cent of today's total advertising budget. But that is typical of television's history. A billion dollar industry has been created almost overnight. Hundreds of millions are being spent on new equipment, on scientific research, on programming and talent and on network expansion.

Despite the vast increases in revenue, the major networks will not record large profits. Income will be plowed into growth. It is possible, even probable, that networks will continue to show losses in this period of feverish expansion.

We who are custodians of the airwaves have an obligation to the American people to use this new medium for the benefit of all. We intend to fulfill it. By 1955, I expect to see television well entrenched as our foremost cultural instrument. Not since the printing press has any invention offered such opportunities for the enlightenment of everyone."

David S. Rau Promoted

Election of David S. Rau as Vice President and Chief Engineer of RCA Communications, Inc., was announced by H. C. Ingles, President on January 3. C. W. Latimer, formerly Vice President in Charge of Engineering, was appointed Vice President and Chief Technical Consultant of RCA Communications.

Mr. Rau, who joined RCA as a student engineer upon his graduation in 1922 from the United States Naval Academy at Annapolis, has served since 1950 as Assistant Vice President and Chief Engineer.

Mr. Latimer has been with RCA since its formation in 1919, having begun his engineering career three years earlier with its predecessor, the Marconi Telegraph Company of America.

Microwaves Protect Motorists on New Jersey's New Turnpike



MOTORISTS travelling the 118 miles of the recently opened New Jersey Turnpike extending from the New Delaware Memorial Bridge at Pennsville to the George Washington Bridge will be safeguarded throughout their journey by a comprehensive seven-station microwave radio relay system.

This modern highway communication control network was created through the joint efforts of the Paul Godley Company of Upper Montclair, New Jersey, which formulated the broad engineering requirements, and the RCA Engineering Products Department, which designed the radio equipment and worked out the details of the system. The Godley Company also developed the VHF antennas used in the two-way mobile radio system installed as an adjunct of the highway communication system. Installation of the system was carried out by the RCA Service Company.

The seven-station hook-up, operating at a frequency of 960 megacycles, provides a voice channel for monitoring the entire system, another for dial-phone administrative calls, two voice channels for communication with state police cars and maintenance trucks fitted with two-way mobile radio equipment, and one partyline teletype. At five of the microwave towers there are VHF base stations which furnish two-way radio coverage for the length of the turnpike.

The new microwave relay installation obviates the need for underground cables or overhead pole-and-wire lines as a means of communication. It also assures continuous functioning through sleet, snow, and windstorms. Calls are made and received over the microwave system

in a manner similar to ordinary telephone procedure, but between sending and receiving points, there is a difference. Voice sounds are converted into microwave radio signals and sent to a transmitting antenna. The antenna focuses the microwave signals in a narrow beam which is then directed through space to a relay station from 25 to 40 miles away. The relay station antennas are located on towers, erected on the highest elevations available along the turnpike. The first relay station picks up the signals, amplifies them, and beams them on to the next station. This process is repeated at successive stations. At the receiving point, the signals are reconverted to voice sounds.

Workmen hoist a parabolic microwave antenna into place on one of the turnpike's relay towers.



The system is also capable of sending code signals such as those used in teletype. Furthermore, the system can, when desired, carry a number of conversations at the same time and unscramble them at the receiving point.

The new microwave facilities provide the Turnpike Administration at New Brunswick with a means of instantaneous communication with all state troopers, maintenance trucks, and toll gates along the road. The dial phones and teletype link the police divisions along the turnpike with one another and with the State Police Headquarters at Trenton.

Each police car is furnished with dual-frequency two-way radio equipment operating in the 152 to 174 megacycle band. The cars transmit on one of their two frequencies and receive on the other. The very high frequency base stations at the microwave towers operate on the same frequencies as the cars, reversed as to sending and receiving. That is, they receive on the frequency on which the cars send, and transmit on the other frequency. Hence, the normal path for a message transmitted from a car is to the nearest base station, from which it is retransmitted to other cars in the vicinity and to toll gates. At the same time, the VHF receiver at the base station feeds the message into the microwave system, where it is relayed to all other base stations and retransmitted by them.

System Has Extra Features

Several unusual "extra-feature" provisions make the system one of the most flexible and foolproof ever installed.

In most cases, two base stations will be able to receive a direct transmission from a single car. A special "sensing" and lock-out device has been provided, therefore, to select the base station receiving the strongest signal as the one to feed the microwave system at the same time locking out the other station. The rejected station, as well as the other remaining base stations, receive the message through the microwave system.

If an officer in one police car wishes to talk directly to one in a nearby police car without entering the microwave system, he may do so by throwing a switch which changes his transmitter to the receiver frequencies. This feature prevents local communications from tying up the entire turnpike communication system.

Base station antennas are two-element arrays designed to concentrate a high proportion of the radiated signal along the turnpike. This insures a strong signal on the highway with a minimum possibility of interference to and from adjacent communities.

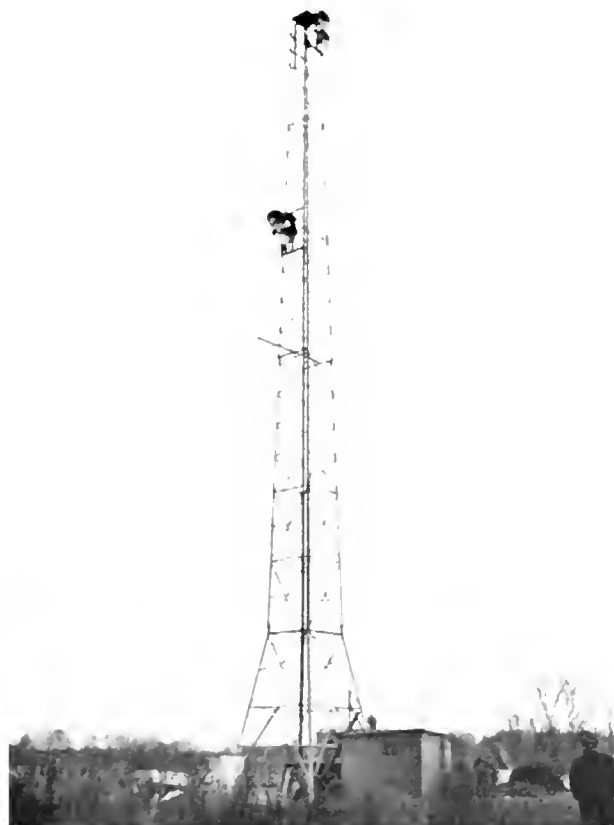
The radiations from two consecutive base stations

necessarily overlap, and there is an area where signals from both stations are of approximately equal strength and reception would normally be distorted. To prevent this, dual antennas are mounted on the roofs of the police cars. A switch selects directional reception characteristic favoring the chosen base station.

At the New Brunswick Turnpike headquarters, a switching arrangement permits separation of the system into two, three, or four sections. This arrangement increases both the flexibility and the message capacity of the system. When tied end-to-end, the system is essentially one large party line. If serious vehicle traffic develops in any one region, the New Brunswick headquarters can isolate that section of the communication system, leaving it free to handle its local affairs without tying up calls for the rest of the turnpike. However, headquarters is still in a position to monitor messages exchanged in the area, and can, by a throw of the switch, bring it back into the overall system.

More than \$100,000 has been spent on the new communications facilities. Towers up to 150 feet in height have been erected in or near Swedesboro, Moorestown, Bordentown, Trenton, New Brunswick, and Newark, with two near the latter city. The base stations employ 60-watt RCA radio transmitter-receiver units. In addition, 15-watt fixed station transmitters are located at interchanges, maintenance buildings, and other points. More than 50 police and maintenance vehicles have been equipped with 15-watt RCA Carfone mobile units. The microwave relay equipment is RCA's latest Type CW-5B 960-megacycle equipment.

Microwave relay station near Bordentown, N. J.





Workmen assemble walls, balustrade and doorways to form an interior scene for a television production.



Wizardry of scene painters creates an illusion which the television camera cannot penetrate.

Diary of a TV Set Designer

By Tom Jewett

*"Television Playhouse" Designer,
National Broadcasting Company*

A SET DESIGNER for an hour-long weekly television program such as NBC's "Television Playhouse" has everything at his command except a 14-day week. Tools are there in abundance, talent is always available but time is a relentless taskmaster. This unusual situation is created by the fact that while the designer is creating 15 or 20 sets for one show he is currently planning a similar volume of scenery for the program that is scheduled a week later.

For purposes of illustration let us use the December 23 production of the Vogeler story "I Was Stalin's Prisoner". In diary form, this is the procedure that was followed by the writer during the seven days preceding the actual broadcast.

Monday: Worked all morning on paint shop elevation and detailed plans which included specifications of colors to be used in all sets. In the afternoon, accompanied a camera crew to a rural area near New York to film outdoor scenes which would be inserted in the program.

Tuesday: After a production meeting in the morning hours were devoted to the selection of furniture, pictures and lamps for the indoor sets. Came evening, and a conference called by the producer to make last minute changes in settings.

Wednesday: This was the day set aside for the designer's weekly visit to the property shop in the basement of NBC's huge storage warehouse and production

plant on West 56th Street. Stored there are more than 1250 pieces of furniture and miscellaneous "props" that may number 2,500 or more. To sort over and inspect this mass of material takes time. Some of the items sought may come from shelves of imitation breakfast foods or from the stalls where old taxicabs and horse-drawn shays are stored. Whatever is chosen, it must be in precise keeping with the period and locale of the drama. Errors here are quickly detected by astute viewers. On Wednesday afternoon plans were begun at a production meeting for the program of December 30. At this conference, the designer was expected to come through with a rough floor-plan of the stage settings. This he did, and then returned to the warehouse to continue his selection of props for the show of the 23rd.

Thursday: Morning hours devoted to the making of drawings for the second production after which attention was turned again to supervising the construction and painting of the scenery for the Vogeler story, then only three days away. In the construction shop, the designer showed his blue print specifications to the foreman and then selected additional pieces of stock scenery from a photographic catalogue. The twelve experienced stage carpenters employed here can build almost any object from a "flat" to a castle. The many out-of-the-ordinary requirements placed upon these artisans have taught them that nothing is impossible to simulate. In the past they have reproduced rocks, a Gothic cornice and a Victorian gingerbread porch.

It is in this stage of set production that ingenuity comes to the fore. Both time and money must be saved, wherever possible. One way of doing this is to design sets that are flexible. It is not unusual to make two

stage settings do the work of four or five. The dressing can be altered, tapestries can be rolled down like maps, pictures shifted and furniture changed.

There are numerous other money-saving "kinks." A cellar window can be produced by turning a fireplace wing upside down and topping it off with an inexpensive mullion. Doors and windows are constructed so that they may be used front and back, and even an elaborate cave can be built out of heavy wrapping paper, staples and paint.

Friday: Now with only two days to go, the tempo increased. First came a rehearsal of the Vogeler drama, then more time across town in the paint shop. Dinner over, back to NBC studio 8G in Radio City to supervise the erection of "flats." Flats are the vertical surfaces which comprise the walls of a set. After being completed at the production shop these flats, together with furniture, draperies, etc., had been trucked to a receiving platform 54 feet under ground below the RCA building and brought to studio level on a freight elevator.

Saturday: Beginning at 8 a.m., the set designer, together with the "dressing crew", went to work in 8G putting drapes and furniture in their prescribed places and touching up paint jobs where necessary. Then back to the designer's drawing board for more work on the following show which already was creeping up.

Sunday: The Day! The set designer moved back and forth between the studio stages and the control

room. At a time like this, it is always amazing what the camera will reveal. For instance, at one point the producer decided on a higher camera shot than had been specified originally. The producer was satisfied by having one flat mounted above the other, bolted on and then painted to correspond with the color already applied. A chair which, on the monitor screen, didn't seem quite authentic enough was removed and a replacement located by making a fast taxi tour of theatrical rental firms and antique shops. Of course, the correct chair was found eventually, and placed on the stage. But just as the designer was about to put his O.K. on the setting, he realized that one picture was so brilliant that its reflection blackened the face of an actor standing beside it. A spray gun solved this problem, but immediately the control room reported that a coffee pot was casting a bad reflection. This time a coating of wax deadened the glare.

And so it went on, right up to the minute when the little buttons on the front of the television cameras glowed red to warn the performers that they were "on the air." Then and only then could the set designer sit back and relax. There was nothing more that could be done for the Vogeler story, but, facing him like another necessary spectre was the show of the 30th. On Monday, the hectic pace would be picked up again.

Truly, fourteen days in a week would be a solution—after a fashion.

Dress rehearsals give the set designer his final chance to make the changes in scenery and "props" that will add reality to the drama.





ROBERT L. WERNER



ERNEST B. GORIN



DR. IRVING WOLFF

Werner, Gorin and Wolff Promoted

ROBERT L. Werner and Ernest B. Gorin were elected Vice Presidents of the Radio Corporation of America by the RCA Board of Directors on December 7.

Mr. Werner, who has been General Attorney of RCA since April 6, 1951, was elected Vice President and General Attorney. He joined RCA in 1947 as First Assistant Attorney in the Law Department. He was graduated from Yale in 1933, and received an LL.B. degree from Harvard Law School in 1936.

Mr. Gorin was elected Vice President and Treasurer of RCA, having served as Treasurer since September 2, 1949. He became associated with RCA in June, 1944, as Administrative Assistant to the Vice President in Charge of the RCA Victor Division, and subsequently was named Budget Director of that Division. In April, 1949, he became Budget Director of RCA.

Dr. Irving Wolff, formerly Director of Radio Tube Research for the RCA Laboratories Division, and a specialist in ultra-high frequencies, was named Director of Research for the Division on November 26. Headquarters of the Division are at the David Sarnoff Research Center, Princeton, N.J.

Dr. Wolff joined the RCA research staff in 1928. He concentrated on research in the audio field, developing one of the most-used loudspeakers of the '30s. He later shifted his field of interest to the development of equipment for the generation of microwaves. In 1934, he began experiments in radio reflection work—much of which proved basic to the development of radar.

Dr. D. H. Ewing was appointed Director of Research Services, RCA Laboratories Division, in November. Dr. Ewing, formerly Director of Development for

the Air Navigation Board of the U. S. Government, was previously manager of advanced development for the Engineering Products Department of the RCA Victor Division.

To recommend and make plans for long-range research projects, Dr. E. W. Engstrom, Vice President in Charge of RCA Laboratories Division, announced in November the formation of a Research Planning Committee composed of Dr. V. K. Zworykin, Vice President and Technical Consultant, Chairman, Dr. Wolff, L. P. Smith, Consultant, Physical Research Laboratory; C. D. Tuska, Director of Patent Department; and Dr. Ewing.

At the same time, Dr. Engstrom also made the following promotions in the Laboratories staff: E. W. Herold, Director of Radio Tube Research Laboratory; G. H. Brown, Director of Systems Research Laboratory; R. S. Holmes, Director of Contract Research Laboratory.

RCA Radiophone Only Link With "Flying Enterprise" Hero

The radiotelephone which served as the only form of communications between Capt. Henrik Carlsen, master of the ill-fated "Flying Enterprise", and the ships standing by to rescue him, was a small 20-pound ship-to-shore unit designed by Radiomarine Corporation of America for use aboard small pleasure boats.

According to a statement from Radiomarine, the captain bought the equipment just before sailing on the freighter's last trip, and carried it along to test its operation on the high seas.

A model of the compact radiophone was one of the feature exhibits at the recent Motor Boat Show in New York.

Nostalgia and Old Records

By George R. Marek,

*Director, Artists and Repertoire
RCA Victor Record Department*

THE experienced people in the record business say that an artist's records stop selling when the artist stops concertizing, when he is no longer in the limelight. In general, that is true. In particular, it is not. RCA Victor has one artist on its roster who has actually earned more money after his death than during his lifetime. Granted, he is a unique artist: he is Enrico Caruso. Caruso's total income from record royalties amounts to about \$3,000,000. About \$1,700,000 of this was earned after his death in 1921. Caruso is the most financially solvent memory you are ever likely to meet. His continued popularity is not only an expression of Caruso's pre-eminent position in the operatic world, his matchless quality as a singer, but also of the fact that there exists a lively interest in the recordings of a past age.

Caruso is a favorite of thousands of people who have never seen him. He is known to thousands who probably have never been inside an opera house. They want to hear not only what he sounds like, but also what his companions in greatness sound like. The phonograph has given them this opportunity.

Henry Irving once said that an actor is a sculptor in snow. This is true as well of the singer or the musician. Rather, it was true before the phonograph. As soon as the voice was mute, as soon as the last echo of the piano tone had died away, the singer or the musician became but a memory, often a highly inaccurate memory. In a double sense of the word, no record of his art survived. Until recordings came along!

Many of the early phonograph records are still prized by connoisseurs, and some early issues bring high prices. But their general circulation is necessarily limited to the "collectors." The old recordings are no longer good technically—and particularly unsuitable for the new speeds which, being more sensitive, show up the flaws more clearly. The untrained musician is, quite naturally, bothered by their raspy sound. Gradually they are disappearing from the dealers' shelves. Still, the interest in the old singers, the great pianists of the past, etc., remained alive. This interest increases as distance lends enchantment and as we, living in the frightening fifties, look back with fairy-tale fondness to the early part of the century.



Caruso's recordings have totalled nearly two million dollars in royalties since his death in 1921.

In March 1950, RCA Victor embarked on the project of rehabilitating the masters of the old records and transferring them to the new speeds. It was quite a project! In the first place, some 2,000 masters were examined. From them were chosen 300 recordings which seemed most valuable artistically. Then these old masters were subjected to the most painstaking and meticulous repair work. Ticks, pops and other extraneous noises were removed, as far as possible. They were then transferred to tape, first selecting a pickup that would give the highest fidelity and lowest surface noise. It was during this operation that all the devices known to the art, such as filters, compensators and transfer turntables, were brought into play in order to improve the quality of the musical content, reduce distortion, etc. In a number of the recordings, excerpts from several parts were pieced together in order to assemble one side that was good overall.

The acclaim which the "Treasury of Immortal Performances" received from dealers and public proved that this care was well applied. More than a quarter of a

million albums of the first edition of the Treasury were sold.

During this month, the second Treasury, consisting of seven volumes of classical music and twelve volumes of popular music is being published. Among the classical albums there will be, of course, another Caruso album. For the first time, both John McCormack and Rosa Ponselle will be featured in individual albums. The other albums are *Famous Duets*, *Pianists of the Past Play Chopin*, *Stars of the Golden Age*, and a new idea, *Aida of Yesterday*, a presentation of excerpts from the world's most popular opera sung by Caruso, Homer, Martinelli, Ponselle, Gadski, Amato, Pinza, Rethberg and Gigli. Among the artists represented in the popular series are Benny Goodman, Sidney Bechet, Jelly Roll Morton, Lionel Hampton, Earl Hines and Billy Eckstine.

Several curiosities are featured among these records. In the McCormack album there is one record in which the great John sings an excerpt from *Tristan and Isolde*. He never sang Tristan in any opera house. In fact, he made this record merely as an experiment and for his own amusement. No master of it could be found for a long time. We appealed to Mrs. McCormack, who started a search in her home in Ireland and after some time disclosed a test pressing. This rarity, now published for the first time, makes it possible for the public to listen to McCormack's art in all of its facets, from Irish



Lucrecia Bori and the late John McCormack as they appeared for a broadcast in the early Twenties.

songs such as *I Hear You Calling Me* to *Adeste Fideles*, and to arias from *Lucia* to the *Tristan* excerpt.

In the Caruso album will be found the last record that he made. It was recorded in Camden on September 16, 1920, less than a year before his death. Appropriately enough it is a church aria, the *Domine Deus* from Rossini's Mass. But the album also contains an aria from *La Boheme*—not Puccini's famous *La Boheme* but Leoncavallo's forgotten opera, an opera which Leoncavallo wrote to spite Puccini. Caruso scored one of his early great successes in the Leoncavallo *Boheme*.

Realism Enhanced by New Theatre Screen

A NEW and radically different motion picture projection screen, hailed as the first major improvement in film projection in 25 years, has been placed on the market by the Radio Corporation of America. The first installation was made in the Plaza Theatre, New York.

Designed by theatre architect Ben Schlanger and his associate, William Hoffberg, the screen features side wings and a top panel which together pick up and reflect diffused light from the picture. When color pictures are shown, reflected hues appear on the wings and panel. This effect gives a dramatic sense of realism by making the screen action appear to occupy a larger portion of the viewer's field of vision. The screen is made of RCA Snowwhite screen material, a heavyweight Firestone "Velon" plastic.

Because the projecting wings are not directly lighted, but pick up only the illumination from the screen, the intensity of light and the predominant color reflected by these panels vary in proportion to these same factors present in the screen picture. The optical impression is that of viewing a "live" scene, where vision is concen-

trated on a particular object or in a certain direction, but the viewer is conscious of the surrounding area at which he is not looking directly. The new RCA screen allows for this peripheral vision, or "seeing out of the corner of the eye," in contrast to the sharp cut-off necessary in the conventional screen, which gives a picture sharply outlined against a black background.

The RCA wide-vision screen consists of the image screen on which the picture is actually projected, narrow (9-inch) flanges set at a relatively acute angle to the screen, and wings projecting from the flanges at the sides and from the top of the projection screen. The picture image is actually "framed" on the screen by the flanges, which perform the same function as the usual black masking to eliminate fuzzy edges, but diffused light and color from the projected picture are picked up by the wings at sides and top of the screen. Reflection of light on these wings eliminates the sharp, contrasting outline of the screen image and makes it appear to taper off in the outer portions of the spectator's field of vision.

Patent Granted Sarnoff on Radar System For Detecting Planes and Missiles

THE Official Gazette of the U. S. Patent Office published in its October, 1951 issue a description of an invention made by Brig. General David Sarnoff, Chairman of the Board of the Radio Corporation of America, of an automatic early warning system. The U. S. Patent Office has granted him Patent No. 2571386, which he assigned to the RCA.

The invention relates to an automatic early warning system which combines the principles of television, radar, microwave relay and the latest methods of detection and direction-finding. The new system can utilize equipment already developed and in use.

In describing the principles of the system disclosed in this patent, Dr. Elmer W. Engstrom, Vice President in Charge of RCA Laboratories Division with headquarters at the David Sarnoff Research Center, Princeton, N. J., said:

"General Sarnoff's patent discloses a method and means for surveillance of a string of areas off-shore, or remote from the borders of a country, for detection of planes, guided missiles, enemy vessels, or other targets in those areas. It provides for instantaneous communication of running target positions to a central intelligence station or command post within the country.

"The patent describes a method and means for dispatching fighter aircraft and directing them to the enemy planes, guided missiles, or the like that have been detected.

"It also describes means for early interception of report and control signals sent from and to a guided missile, and the radiating of identical signals for jamming of the channel, or counter-controlling of the missile.

"The system proposed by General Sarnoff would enable detection at much greater distances than is now feasible. At the same time it would transmit the information to a Control Center that could act immediately. By this new method, countermeasures will have a greater opportunity to deal with enemy planes or guided missiles that might be carrying atomic bombs and to destroy them at sea before they can reach their targets on land.

"A further object of this invention is to provide an improved radar fence with a greater depth of protected area.

"The patent specification includes information about

an airborne radar net for national defense in which a succession of planes leaving shore on a predetermined course, search the specified area with radar equipment. The information thus compiled, is then relayed automatically from the lead plane successively through the trailing planes and finally to the Control Center on the home base. In this way, the radar net is moved continuously across vast distances covering possible enemy invasion routes.

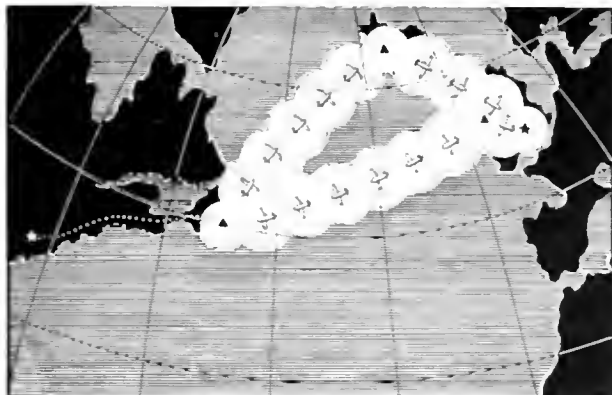
By adding a television camera to the plane's equipment, as explained in the patent specification, the radar information, together with dial readings indicating air-speed, compass bearing, altitude of the craft and any other needed facts, can be relayed to the Control Center in the form of a continuously changing television picture.

General Sarnoff's patent also describes means for intercepting the control and position signals transmitted by an enemy to and from a guided missile and the immediate radiation of identical signals for the purpose of eliminating enemy control over the winged weapon. In this way, the missile could be directed on a new path which would be continued until its fuel is exhausted and it falls harmlessly into the sea or on an uninhabited land area.

"In a variation of the same military application, the patent specification describes an arrangement for the early detection of enemy planes or long-range radio-controlled missiles, and describes a method for dispatch-

(Continued on Page 25)

In General Sarnoff's proposed system, properly spaced planes would provide a radar "fence" giving greater depth of protected area.



Tozzi's 4¢ Ring Brings Him National Recognition

ANGELO M. TOZZI, president of the Tozzi Manufacturing Company, a small metal parts business in Bayonne, N. J., vaulted into national prominence as the result of an RCA institutional advertisement.

Mr. Tozzi was cited for his contribution to the defense effort in the advertisement, which was headed "America's Secret Weapon and Angelo Tozzi's 4¢ Ring." It told how he had provided a finely-tooled aluminum ring for the new aircraft interphone system developed by RCA for the Air Force. This ring, which he produced for only 4 cents, resulted in a large saving, which RCA was able to pass on to the Air Force.

The advertisement singled out Mr. Tozzi, who has never employed more than 50 people, as one of the thousands of small businessmen who are contributing to the defense effort. It said that America's real secret weapon was the ability of all our industry — big and little — to work together as a team.

After the full-page advertisement appeared in several leading newspapers, Frank M. Folsom, president of RCA, received over 300 letters praising Mr. Tozzi as typical of America's ingenious small businessmen, and endorsing this campaign to promote better understanding of the importance of industrial teamwork. The letters came from members of the President's cabinet, his top production officials, Congressional leaders, corporation executives, financiers, labor leaders, educators and prominent clergymen.

Mr. Tozzi, too, received bagfuls of congratulatory mail at his Bayonne plant. His telephone buzzed steadily for several days. He was invited to Washington to be guest of honor at a luncheon attended by two dozen of the nation's top newspapermen. His opinions were quoted in a nationally syndicated column.

The editors of *Reader's Digest* reprinted the advertisements as a full page feature and hailed it as an example of "Advertising *cum laude*."

Business Week magazine devoted four columns to a picture of Mr. Tozzi and to a report on the advertisement and the importance of the Bayonne businessman to the defense effort.

"Nationwide fame touched Angelo Tozzi one day early in October," the article said, "when RCA ran a full-page ad in the newspapers headlined 'America's Secret Weapon and Angelo Tozzi's 4¢ Ring.' . . .

"Tozzi has no patience with the moaners who cry that changing times have stifled the chances of the small businessmen. 'Why should it?' he says. 'With all the technical advances in this field just since I've been in it, there are all kinds of opportunity for a man to start out by himself.'"



Angelo M. Tozzi (right) receives scroll of commendation from Earl Bunting, managing director of the National Association of Manufacturers, for his contribution to the Nation's defense

The *Business Week* article completed the story begun in the RCA advertisement. It told of his early career, his start in business, and of the inventiveness which led to the 4¢ ring and other articles of value to defense.

As a final honor, Mr. Tozzi was invited to the annual convention of the National Association of Manufacturers. Earl Bunting, managing director of the NAM, presented Mr. Tozzi with a scroll of commendation for his typically small-business contribution to defense.

RCA Television Transmitter Sold to Dominican Firm

A 5-kilowatt television transmitter, the ninth to be sold by the Radio Corporation of America in Latin America, has been purchased by Director Colonel J. Arismendi Trujillo Molina, President, Treasurer and founder of radio station La Voz Dominicana at Ciudad Trujillo. In making the announcement, Meade Brunet, a Vice President of RCA and Managing Director of the RCA International Division, said that the new station unit is the first one for use in the Dominican Republic.

The antenna of the new station will be located atop the Palacio Radial, modern Palace of Radio, in the capital city of Ciudad Trujillo. Facilities of the Palacio Radial are now being enlarged to accommodate the television transmitter and studio equipment.

New Line of Air Conditioners Introduced by RCA

Details and prices of three models of home air-conditioners, the first to be offered by RCA, were announced on December 27. Designed for rooms with floor areas up to 485 square feet, the new units range in price from \$249.50 to \$399.50.

Initial shipments of the models will be made during January to distributors in all major market areas, Robert A. Seidel, Vice President of RCA Victor Division, disclosed. Technicians of the RCA Service Company will install and service the air-conditioners.

Suitable for any room decor, the models are designed with simple lines and finished in two colors — the cabinets in 'polar beige' and the grilles in "arctic tan."

To assure quiet, trouble-free operation, compressors of the units are hermetically sealed and spring-mounted. Adjustable grilles on all models make possible the easy control of air flow and draft-free operation.

RCA's entrance into the air-conditioning industry marks the company's first step beyond radio, television and phonograph instruments in the appliance field, Mr. Seidel pointed out. The decision to handle air-conditioners was made after a detailed survey of market conditions and a study of competitive products in the field, he said.

"The home air-conditioning market has scarcely been tapped," Mr. Seidel declared. "According to reliable surveys, the industry has achieved less than 1/2 of one per cent of its potential.

"One of the principal obstacles in increasing home air-conditioner sales has been the lack of adequate installation and service facilities. While some air-conditioner manufacturers and distributors have maintained service organizations in some cities, there has been no



This model RCA Air Conditioner is suitable for rooms up to 485 square feet.

nation-wide organization offering efficient, direct-to-the-consumer service.

"With the facilities of the RCA Service Company to draw upon, and with its thousands of highly skilled technicians stationed throughout the country, ready to install and service air-conditioners, RCA is in a very favorable position to expand the distribution of air-conditioners and assume an important role in the field."

Patent Granted on Radar System

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ing fighter aircraft to meet and destroy them long before they are able to reach their objective.

"This could be accomplished by launching parasitic planes from the aircraft on radar patrol. These parasite planes, equipped with radar and radio would send back to the nearest group of defensive fighter planes a continuous flow of signals giving the position, speed and direction of flight of the enemy plane or missile. Supplied with this information, the fighter planes, taking off from land base or carrier, would be able to set their course accurately to intercept their target.

"As a peacetime service, the disclosed system would apply also to a similar chain of spaced planes extend-

ing from shore to shore which could be utilized to relay television programs to and from Europe and other foreign countries. Such a relay system, according to the patent specification could also carry high speed ultrafax communications.

"Because of the proposed use of lightweight, low-power microwave relay apparatus, General Sarnoff's plan could be adopted for both military and non-military purposes without materially affecting the freight and passenger carrying capacity of the planes."

In 1948, General Sarnoff was awarded Patent No. 2,455,443, which he also assigned to the RCA. It covered a secret signalling system by which ordinary messages are converted to a succession of arbitrary symbols and transmitted by facsimile or television to a receiving and decoding terminal.

Radio and Electronics—Their Status and Promise

(Continued from Page 14)

during the early radio days but passed from the scene when the electron tube emerged. Like actors in a play, a place was reserved for them in a later scene. We shall come to that soon but first, we need to examine the electron tube.

The electron tube is the lever-arm of radio and electronics. It is the foundation stone or the keystone of all apparatus and techniques upon which the present ever-expanding industry depends.

Industry Built on Electron Tube

In its simple form, an electron tube is a device—a vessel devoid of air—in which electrons are boiled out from a metal or cathode material. When freed in the vacuum space, they are subjected to the desired action by a control influence. Through the effect of a small control influence, a larger output effect is produced on the electrons. This output effect is transformed in a work circuit so as to do what the designer seeks to achieve. From this simple form we have progressed to a myriad of electron tube types. We have transducers of voltage, current, light, and other manifestations of energy. Upon this versatile instrument we have built an industry of first magnitude. It is truly a modern version of Aladdin's Lamp.

While we have progressed far, and while we are still expanding the versatility and usefulness of electron tubes, attention again has been directed to the discard materials, the semi-conductors. As is so often the case, we find in the discard, the real gem itself. But this time the approach was not through empirical experimentation but by painstaking research with understanding of each step. Also it was not a single approach but one which has taken many routes with many evidences of current and potential results. This has been termed the electronics of the solid state. The electron tube might be similarly termed electronics in vacuum.

The first broad uses of these new materials came from their non-linear and unilateral properties which were those of importance for radio-frequency detectors of the early days. Then we moved into small power applications as well. As understanding grew, we learned that conductivity could be influenced by radiant energy (photoconductivity), by electron bombardment (bombardment induced conductivity), and by applied voltage (transistors), just as is the case for the electron tube. Here, however, we are working with the controlled action of electrons in solid materials.

Why is this important? It is important because we have a new tool, a new instrumentality. It promises

to augment and to supplement the electron tube. It means new freedoms in the future in the designs of equipment. It means wider and added services and uses. It provides a new dimension.

In radio and electronics we view the scene on an approximate sixtieth anniversary and we see a vast panorama of what has been created. These are the creations of scientific and applied research with the dress of ingenious engineering. We see a view which has radiated outward in an ever-expanding fashion. Now as we move to the present and look to the future, we do so with new instrumentalities in hand. We do so with a sound established framework of research and engineering. We see service for which our measuring tapes are too short. The horizon is boundless.

NEW TUBE FOR UHF



A new tube in the "pencil-type" series which is capable of producing an output of 1,000 watts in certain types of specialized service, at frequencies up to 3,300 megacycles, has been announced by the RCA Tube Department.

The tube, a triode, is distinguished by its small size, light weight and stability. It was specifically designed for service in transponders, navigation beams, telemeters and pulse altimeters, and for use in signal generators and mobile transmitters operating in the UHF region. All metal parts of the tube's envelope, with one exception, are made of silver-plated steel.

UHF Television Demonstrated At NBC Convention

Radio station representatives who were guests of the National Broadcasting Company at the network's Fifth Annual convention at Boca Raton, Florida in November, witnessed the first demonstration of a new portable ultra-high-frequency television transmitter in actual operation. The purpose of the experiment was to illustrate the simplicity and practicability of converting present very-high-frequency (VHF) receivers to receive high quality pictures from ultra-high-frequency (UHF) transmissions. The simple steps that must be taken to convert from VHF to UHF were illustrated through the use of UHF antennas and converters.

For the demonstration a specially built portable transmitter was designed by the David Sarnoff Research Laboratories of RCA in Princeton, N. J. UHF directional antennas, looking like step ladders, also were built for the Boca Raton project. A number of 21-inch RCA Victor television receivers were shipped from Camden.

The UHF pictures were transmitted from the Lions' Club in Boca Raton Hills, one and a half miles from the hotel. The receivers and their converters were placed throughout the hotel.

The NBC television camera, placed in the hotel grounds, picked up scenes which were fed by microwave radio relay to the transmitter. At the Lions' Club the camera signals were transferred to the UHF transmitter which then beamed the signal to a series of UHF antennas at the hotel.

In addition to the live action scenes picked up by the outdoor camera, a complete film chain transmitted newsreels recordings and motion picture film over the system.

Each UHF antenna was 38 feet long, suspended 50 feet from the ground. The UHF station used the frequency band of 524-530 megacycles, with radiated power of 6 kilowatts for the picture and 3 kilowatts for the sound.

Engineers and technicians of RCA and NBC worked more than six weeks to make the experiment possible.

High Placement Record

Of the 794 students graduated from RCA Institutes during the 1950-51 school year, 98.5 per cent have been employed in various branches of the radio-television and electronics industry. The Institutes' Placement Service has reported that graduates were employed as follows: 222 television installation men, 169 laboratory technicians, 113 transmitter engineers, 71 radio technicians and 25 junior engineers.



Brig. General David Sarnoff sending the letter "S" in Morse Code around the world, as I. E. Showerman, President of the Radio Executives Club (left) and Harry C. Ingles, President, RCA Communications, Inc., look on.

Radio Executives Pay Tribute to Marconi

The vast progress which radio communications has made since Marconi succeeded in transmitting the three dots of the letter "S" in Morse code across the Atlantic in 1901 was demonstrated on December 20, 1951 during a luncheon of the Radio Executives Club commemorating the 50th anniversary of the Italian inventor's accomplishment in communications.

At the meeting, which was held at the Waldorf-Astoria Hotel in New York, Brig. General David Sarnoff transmitted the same letter around the world over the facilities of RCA Communications, Inc. Members and guests of the Club heard the returning signal as it completed its globe-circling path in one-eighth of a second, after travelling via Tangier, Manila and San Francisco. This distance was approximately ten times that covered by Marconi when he spanned the ocean between Cornwall, England, and St. John's, Newfoundland. Later, General Sarnoff held a two-way radiophone conversation with Marchesa Marconi and her daughter Elettra, who were in the radio studio of Italcable in Rome.

At the conclusion of the demonstration, General Sarnoff related incidents in his long association with Marconi, and described some of the technological advances that might be expected in the communications field in future generations.

Network Affiliates Hear NBC Officials Outline Plans for Radio and TV

MORE than 500 broadcasters joined executives of NBC in the network's fifth annual convention in Boca Raton, Florida, from November 28 through November 30. The guests, who included a record number of officials of radio and television stations affiliated with the National Broadcasting Company, listened to NBC speakers as long range plans for the orderly advancement of both radio and television were outlined.

In welcoming the conventioners, Niles Trammell, NBC chairman of the board, urged them to devote themselves to more solid planning, more intelligent study and more self-analysis to insure an expanded future for both media.

"Broadcasting, since its inception," Mr. Trammell said, "has been subject to constant change and requires constant planning for the future. Your network, with the counsel of its partners, the affiliated stations, has always taken a position of leadership in anticipating change and meeting the challenge of the future."

Mr. Trammell said he was convinced that the measures recommended in NBC's Basic Economic Study were absolutely essential to a sound future in broadcasting and predicted that they will set a pattern that will strengthen and stabilize radio.

UHF Stations Advocated

Joseph H. McConnell, President of NBC, delivered the convention's keynote address. He emphasized that NBC radio sales, programming and merchandising will be greater than ever in the coming year. He also urged radio station operators to consider the opportunities for the establishment of hundreds of new television stations with the opening of the ultra-high-frequency band.

"I have more optimism and confidence in the future of network radio than I have ever had before," Mr. McConnell told the meeting. "I think we, at NBC, are coming to grips with our main problems and are developing patterns that will keep radio strong for the future."

"We're finally selling radio on its solid advertising values in moving merchandise, instead of on a show-business basis alone," he continued. Mr. McConnell added that, program-wise, "NBC is enlarging its news service, strengthening its musical lineup and planning to bring to the network an array of talent that would do

radio proud in its greatest days, and to do this at reasonable prices."

Mr. McConnell also read to the convention a message of greeting from President Truman, felicitating NBC on its 25th anniversary this year.

Future of Network Radio

The future of network radio was discussed by Charles R. Denny, NBC executive vice president. After outlining a plan for further strengthening the NBC radio network, he said:

"At NBC, we have great confidence in network radio both for the present and for the long-range future. It is because we have this confidence that we have undertaken a specific program of action with our eyes fixed to the future. We are proud that our network has taken the leadership in rolling up its sleeves and tackling these basic problems."

Among the other speakers at the session devoted to radio were Charles C. Barry, vice president in charge of network programs; Henry Cassidy, director of news, special events and public affairs; John K. Herbert, vice president and general sales manager of the radio network, and Fred N. Dodge, merchandising director.

Power of Television Emphasized

In his keynote address opening a full day session devoted to television, Sylvester L. Weaver, Jr., NBC vice president in charge of television, told the broadcasters that no other group in the world today has the power they hold; that by design, NBC Television can create an aroused, alert, knowledgeable, balanced, mature public opinion, and that public opinion will force a drastic upgrading of all activities for social good.

"This," he predicted, "will form a vigilant, calm, resourceful people who will go into a tremendously brilliant future with resolution and integrity. Cooperation between the network and the affiliates can bring this about."

"If we go forward with your help in making NBC-TV what we plan," he continued, "then the future will mean that your children in five years can tell you every statesman's name on sight, what country he comes from,

what he does, what he's like, and then tell you about his country, its people and their customs, dress and geography.

They will know the physical universe around them because they will have seen it. They will have gone into outer space from Mt. Palomar, and into sub-microscopic worlds through the electronic microscope. They will have seen American history sweep across the tube with an impact hitherto undreamed of.

They will know," he continued, "artists and music, as well as current events and how to interpret them in the larger pattern of life today."

TV More Influential than Print

Weaver said television must do all this to meet the responsibility that comes from the stewardship of the greatest mechanism to influence men, mores and survival, that has ever happened. Yes, a stronger influence than was the discovery of print, the only invention comparable in potential.

The public will look to NBC and its affiliates to serve them," he said, "because we use their air and we will serve them well, and nobly."

He told the affiliates they "are playing a role given to few men throughout history," adding: "You are a major part of an organization that can prove decisive in letting our people freely and with full information choose their own destiny."

Weaver predicted that the public will determine in large part what of the old is to be carried on to the new.

"Here," he states, "is where television can perform a revolutionary service. For the first time in a great world crisis, the people can know the alternatives, can be given an understandable pattern of what is happening and why it is happening and what the choices are for them.

"Television can clarify the great issues of our times, and be a force for good, a force for broad public action, unique in world history. NBC television, by itself, and I exaggerate only slightly, can be the most important single influence for a better adjusted, more mature, more stable, more enlightened, more peaceful world. And accomplish its mission before this decade is out."

Color Television Discussed

In a discussion of color television, Joseph V. Heffernan, NBC financial vice president, declared that NBC is determined to bring programs in color to the homes of the public. He said that NBC, which pioneered in the development of color TV, believes that it will be the most effective medium yet known to convey information, entertainment and sales appeal.

Announcement of the expansion of NBC TV's broadcast operations into the morning hours with the addition to the present schedule of 25 program hours a week, was made by Frederic W. Wile, Jr., vice president in charge of Television Production.

NBC's plans for maintaining undisputed leadership in television programming through the acquisition of more marquee names were outlined by Robert W. Sarnoff, vice president in charge of Television Unit Productions. In addition to acquiring other established box office names for NBC TV, he said, the network will expand its efforts to develop new, young talent as tomorrow's television stars.

Advertisers to Spend \$50,000,000

Advertisers will spend about \$50,000,000 during the next 12 months on NBC's own package programs, Rudrick C. Lawrence, director of Television Sales Development, revealed to the broadcasters. He pointed out that two out of every three hours of sponsored NBC time are devoted to shows packaged by the network, accounting for 78% of NBC's advertisers. Lawrence compared NBC's 331 1/2 hours of sponsored network-controlled programs with the second network's 19.

A glimpse of television's fantastic future was given to conventioners by Robert I. Shelby, director of TV Technical Operations, who announced that the network is constructing a disaster mobile unit—a complete broadcasting and film processing plant entirely independent of external wire connections—which will bring to TV homes on-the-spot views of any great catastrophes the future may bring.

Marvels on Planning Boards

Also on the NBC planning boards, Shelby revealed, are such marvels as air-borne TV from helicopters, a flying box-car capable of transporting a small mobile broadcasting unit to the site of any event of public interest, and a remote control camera operated like a robot plane.

A film titled "Illusions Unlimited" was shown to the affiliates by Fred Shawn, NBC Director of Television Production Services. It outlined the new techniques devised by the network for providing startling and unusual illusions in TV production.

Completing the roster of speakers at the television meeting were Mr. Connell, who spoke of the economics of network television, Edward D. Madden, vice president in charge of TV Operations and Sales, who examined television as an advertising medium, George H. Frey, vice president in charge of TV Sales, and Brig. Gen. E. Lyman Munson, director of TV Operations.

NBC Announces Plans for Political Conventions

COMPLETE television and radio coverage of the Democratic and Republican conventions next July will be supplied by NBC's combined radio and television networks, with Philco Corporation as the sponsor. The announcement was made jointly on January 2 by Joseph H. McConnell, president of the National Broadcasting Company, and James H. Carmine, executive vice president of the Philco Corporation. NBC predicts the largest lineup of stations ever assembled by a single network to carry the more than 60 hours of convention activities.

The Republican convention is scheduled to begin in Chicago on July 7 and the Democratic convention follows two weeks later, beginning July 21.

NBC has assigned its combined radio and television staffs of more than 100 nationally known news reporters, commentators, analysts and writers to the two conventions. They will be supplemented by 200 technical staff members.

Television's newest marvel, the "walkie-talkie-lookie," a portable television camera, developed at the David Sarnoff Research Center, will be used for the first time at the two conventions. The "walkie-talkie-lookie" will bring home-viewers within elbow reach of delegates and other convention and platform notables, as well as important leaders in hotel rooms and corridors and other locations where news is breaking.

NBC television is constructing two complete tele-

vision studios in the International Amphitheatre, site of both conventions, and another studio is being constructed for NBC radio. Two additional studios, one for radio and one for television, are to be constructed in the Hotel Conrad Hilton, headquarters for both parties.

NBC's television coverage of the conventions will be directed by William R. McAndrew, currently NBC-TV's director of Public Affairs and a veteran of six political conventions since 1940. Radio coverage will be under the direction of Henry C. Cassidy, NBC's director of News and Special Events for radio.

Supervising the convention coverage will be William F. Brooks, NBC's vice president in charge of Public Relations; Davidson Taylor, general production executive for NBC-TV, and A. A. Schechter, general executive for NBC-TV. All three are nationally known figures in the field of convention coverage and have had extensive experience in such coverage in the past.

Bill Henry of NBC's Washington staff will report the running story of both conventions on both radio and television. Other well-known NBC news figures who will report the convention include John Cameron Swayze, Dave Garroway, H. V. Kaltenborn, W. W. Chaplin, Leon Pearson, George Hicks, Ben Grauer, Robert McCormick, Morgan Beatty, Earl Godwin, Richard Harkness, David Brinkley, Leif Eid, Ned Brooks, Ray Henle, Albert Warner, Clifton Utley, Alex Dreier, Bob Letts and Elmer Peterson.

RCA Opens Direct Radio Circuits To Three More Countries

Three new direct radio circuits linking the United States with Syria, Thailand and the island of Guam have been opened by RCA Communications, Inc. The Guam circuit also provides direct radiotelegraph service with the Philippines.

In announcing the opening of the first direct radiotelegraph service with Syria, it was reported that the Syrian Government has recently completed the construction of new transmitters and receivers near Damascus. The government has also modernized operations by installing high-speed teleprinter equipment.

The new radio channel linking Bangkok and San Francisco establishes, for the first time, direct radiotelegraph contact between the United States and Thailand. Previously, communications between the two countries were handled via Manila.

World's Loftiest TV Station Is Planned by Mexican Firm

The loftiest TV station in the world, and Mexico's latest addition to its telecasting facilities, will be located at Cortes Pass, 12,500 feet above sea level.

The new station will be operated by Televisión de Mexico S. A., an enterprise of Romulo O'Farrill, Sr., who also owns television station XHTV, radio station XEX, and publishes the newspaper "Novedades."

The 2,500-watt transmitter, purchased from the RCA International Division, will be operated as a satellite of station XHTV Mexico City, to cover the Valley of Mexico, the Valley of Puebla, and other areas where reception from XHTV is blocked by mountains. Cortes Pass is located about 65 miles from Mexico City and 40 miles from Puebla, between Mexico's two famous volcanos, Popocatepetl and Ixtlacihuatl.

Major Radio-TV Achievements in 1951

Ten outstanding achievements in radio and television during 1951 were listed by Dr. C. B. Jolliffe, Vice President and Technical Director of RCA, in a year-end summary issued at Radio City, New York. Dr. Jolliffe's selections follow:

1. Field testing the RCA compatible, all-electronic color television system under regular broadcasting conditions, showing the public and industry its potentialities for service. Tests included outdoor and studio pickups, transmissions by radio relay and coaxial cable from New York to Washington, D. C., reception on experimental home type receivers, featuring the RCA tri-color picture tube, and showings on a 9- by 12-foot screen in a Broadway theatre.

On October 16, 17 and 18, 1951, a test program of the RCA compatible color system was transmitted across the Nation. It was received in San Francisco and Los Angeles and relayed back to New York, where it was also received. In all, these color signals travelled nearly 8,000 miles.

2. Adoption by the National Television System Committee of field-test standards for a compatible color TV system, which were incorporated in the RCA-NBC equipment, and field tests started. Other companies also began testing these standards.

3. Emergence of the practicality of the UHF (ultra high frequency) portion of the broadcast spectrum for television's expansion into 70 new channels that can provide for more than 2,000 UHF stations and bring TV coverage within range of nearly every American community. Major contributions toward this goal resulted from operation by RCA-NBC of America's first UHF experimental station on regular schedule, at Bridgeport, Conn., which has become the testing ground for the receiving-set industry.

4. Inauguration of coast-to-coast television service employing microwave radio relays.

5. Start of pilot production of the transistor, a tiny device which will eventually replace certain types of electron tubes and play an important role in communications of the future.

6. Development of new and improved electronic equipment for the Armed Forces. An important example is "miniaturization," or the diminishing of the size of electronic instruments through development of smaller components, also, the development of special electron tubes to meet the exacting demands of military applications.

7. Super-electronic computer — known as "Project

Typhoon" — designed and built by RCA scientists in cooperation with the U. S. Navy. The unit has been used in 1,000 test runs of proposed guided missiles at an enormous saving to the government in expended materials.

8. Theatre television, which, as a new industry and service, spreads across the country for independent operation and in networks linked by radio relays or coaxial cable.

9. Multiple transmitting antenna, developed by RCA, which made possible simultaneous broadcasts by five TV stations and three FM stations from the tower atop the Empire State Building in New York.

10. Extension of the usefulness of industrial TV, one of the most significant being the television-microscope, which extends the range and versatility of the light microscope.

TV Opera Acclaimed

(Continued from Page 9)

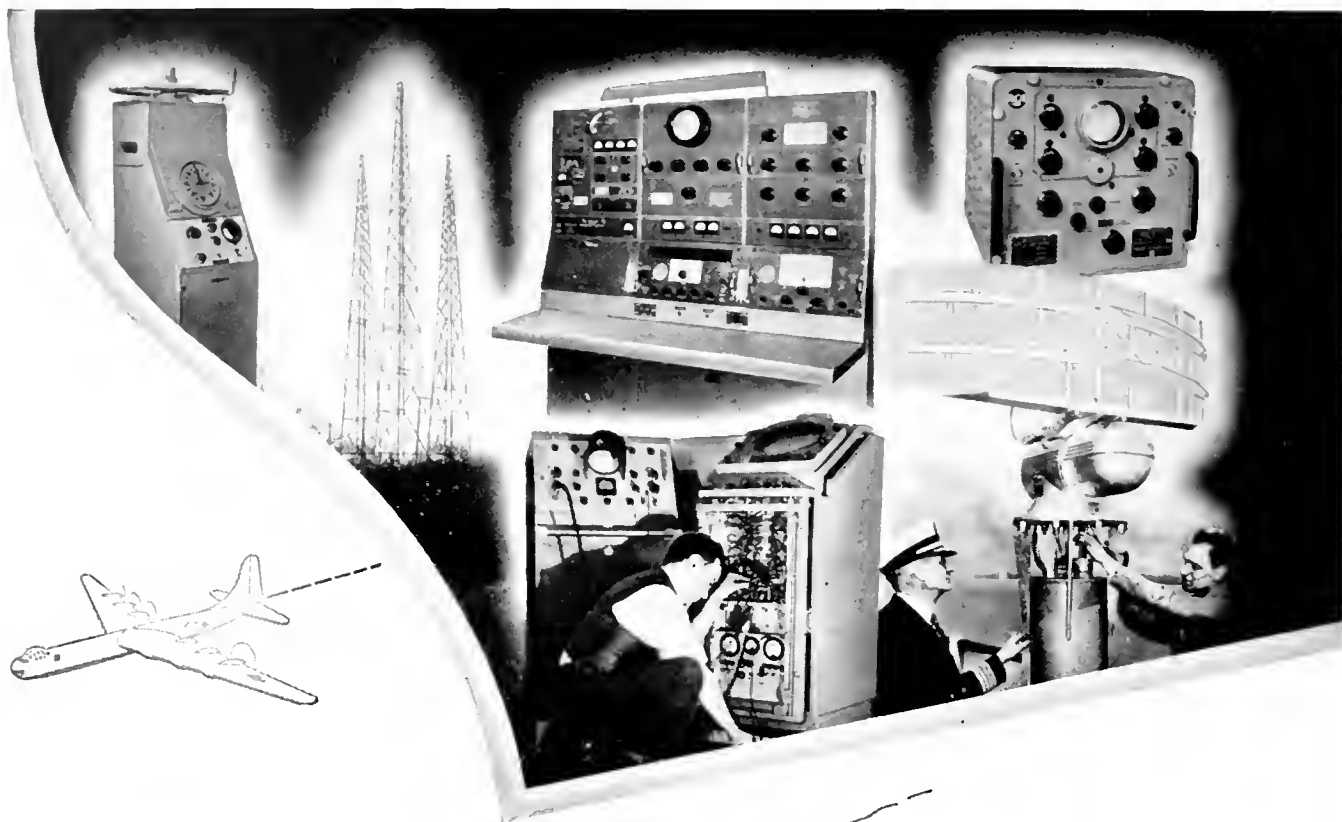
Allen, who played the title role, were given high praise, and Allen has since received offers of movie contracts.

The production given by NBC to "Amahl and the Night Visitors" was impressive in all respects. Eugene Berman, one of the most distinguished artists in the theater, was engaged to design the settings and costumes. No expense was spared and the results were acclaimed by the critics. The 21-year-old conductor, Thomas Schippers, too, was singled out for his sensitive interpretation of the Menotti score.

At the opening of the Opera, Menotti appeared briefly to introduce his new work. His own personal charm and wit captivated the television audience even before the opera itself was unfolded.

The great success of the opera was immediately followed by a recording session of the work by RCA Victor. The records probably will be released sometime this Spring.

An avalanche of requests from listeners and from the press for a repeat performance were seriously considered by NBC. It was impossible to repeat the opera immediately because several of the singers and the conductor had commitments abroad. However, NBC is considering the possibility of producing the opera again in April as an Easter offering. Undoubtedly, "Amahl and the Night Visitors" is the most outstanding success in opera on television to date.



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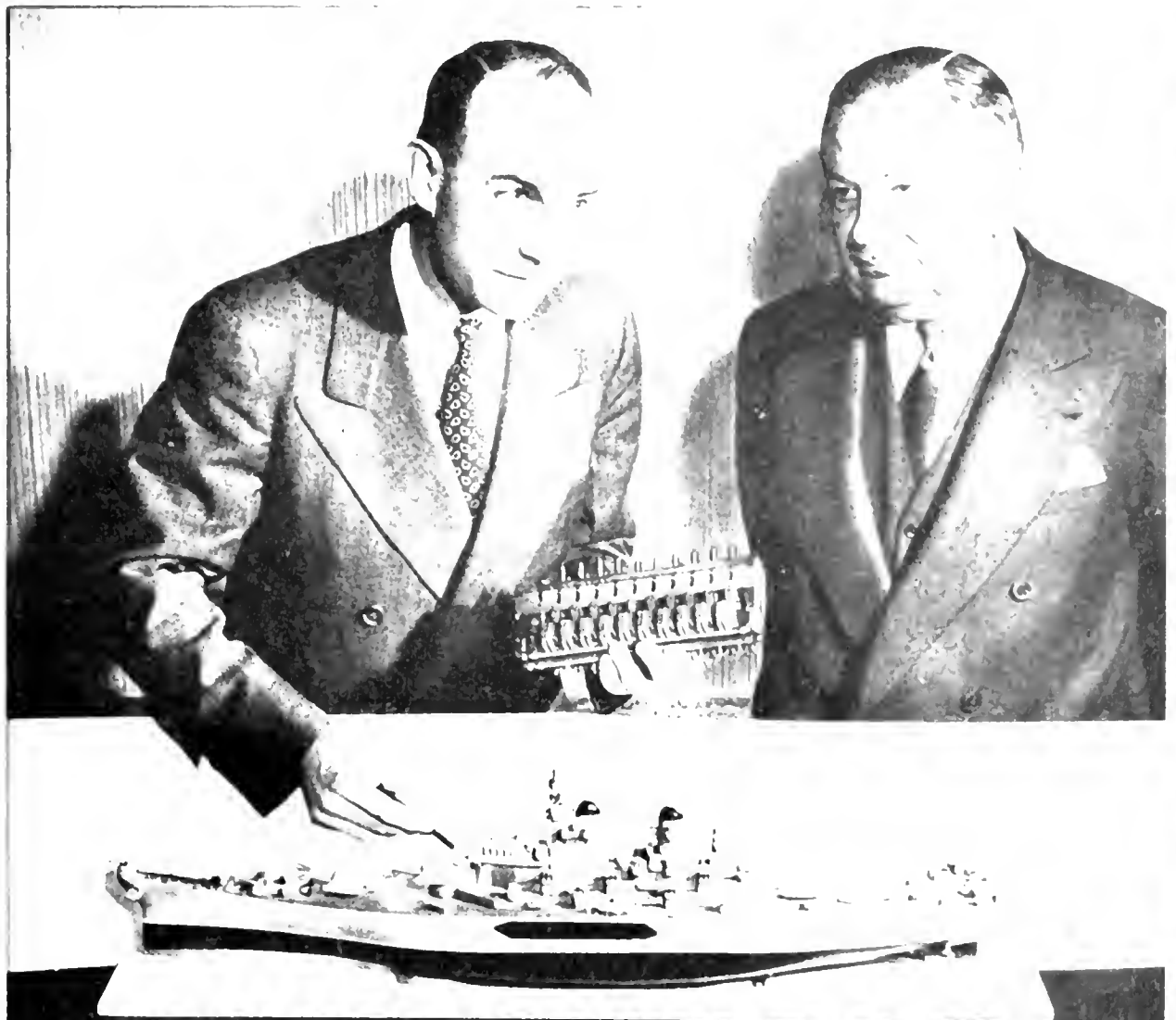
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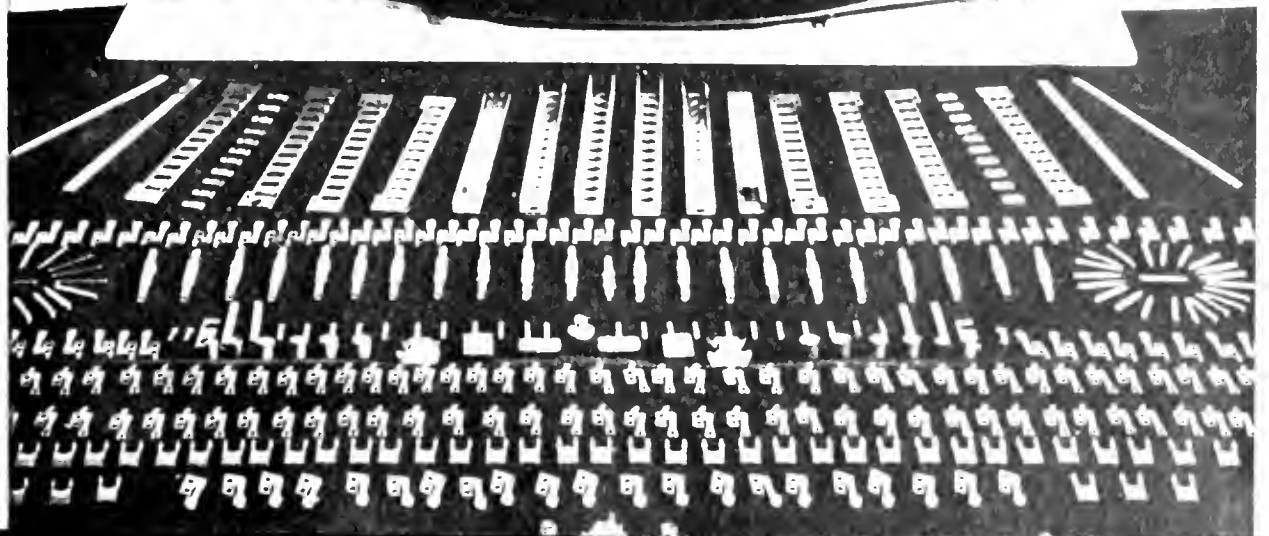
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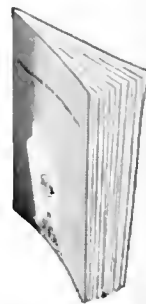


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Radio Age

• MANUFACTURING • COMMUNICATIONS
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APRIL 1952



COVER

Frank M. Folsom, RCA President (right) and Donald Mossman, Jr., examine the "push-button" switch and its 889 parts which brought nationwide acclaim to the Joliet, Ill., businessman. (Story on page 6.)

NOTICE

When requesting a change in mailing address please include the code letters and numbers which appear with the stencilled address on the envelope.

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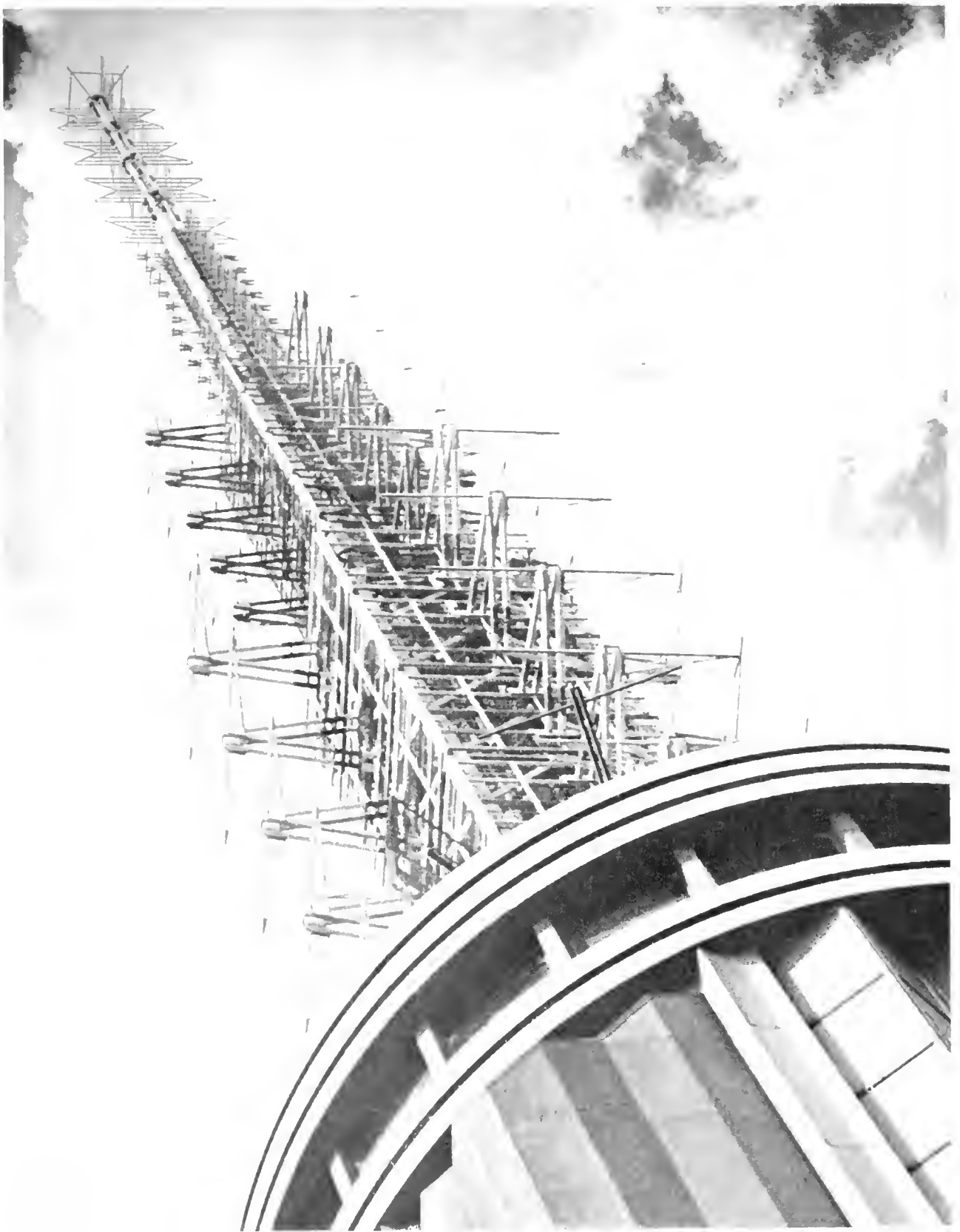
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Antennas for five TV and three FM stations are supported by this 200-foot mast atop the Empire State Building. The array was designed by RCA engineers.

TV and Radio Plan Convention Coverage



By William R. McAndrew

Director of Public Affairs

Education Division, National Broadcasting Co.

THIS July millions of Americans will have a time-honored political custom, the national conventions, laid bare in their living rooms. Through television and radio the deliberations and sometimes the antics of these great quadrennial gatherings will be seen and heard coast-to-coast for the first time.

The effect of these two mediums of communications upon the electorate and the traditional system of political campaigns is unpredictable. Such a widely read columnist as Walter Lippmann wonders if it might not be a change in the whole method of national campaigns. Lippmann suggests that candidates for national office may have to confine themselves to TV campaigns in the last few days or weeks before election rather than make frequent nationwide personal appearances.

Certainly, the preparations going into television

coverage of the conventions indicates that they will be the best covered events in the history of the epoch-making industry. This can be understood when some of the facts and figures of NBC convention coverage are considered.

NBC will move more than two hundred people to Chicago for a period of two to four weeks. More than \$1,500,000 worth of equipment will be utilized. Miles of cable will be installed. Two television studios, capable of holding from twenty-five to fifty people will be built in the International Amphitheatre, on Chicago's south side, the site of both conventions. Teletype printers of the three major press associations will be installed in the network's combined radio and TV newsroom. Office furniture, typewriters, paper, pencils, even paper clips, must be obtained for the use of more than fifty commentators and reporters who will cover for NBC. A full-time 24-hour news desk will be manned to service the various regular news programs, which will originate from the convention city. A complete film developing plant will be leased. Motorcycle messengers will transport film from camera to developer and back to the studios for projection. Two private NBC telephone switchboards will be set up. Direct telephone lines from the convention hall back to New York must be installed for instantaneous communication with NBC headquarters in Radio City. A special teletype circuit will connect all television stations taking NBC service to keep them informed of last minute changes in the con-

RCA's TV "Walkie-Lookie," shown in action at left, is examined below by NBC's William F. Brooks, Bill Henry, O. B. Honson and William McAndrew.





Through a control room such as this will pour the news and pictures supplied by scores of reporters, commentators and cameramen working inside and outside Chicago's Amphitheatre.

vention schedules and the scheduling of special programs that cannot be predicted more than minutes in advance of their taking the air.

To provide roving coverage NBC will concentrate four mobile units in Chicago. These include a new "crash" truck which is completely equipped to transmit live TV pictures or 16 mm. motion pictures direct from the 35-foot truck. The new "crash" truck, to be used for the first time at the conventions, was built to NBC specifications and will carry three RCA television cameras and several movie cameras.

The mobile units will serve NBC's specially created "Human Interest Team", which will provide the audience with feature material to brighten the political reports direct from the floor of the International Amphitheatre. This team will consist of a staff of directors, writers and reporters whose sole job in Chicago will be to ferret out the side stories which will amuse as well as inform viewers.

This staff is already at work on a series of sixteen pre-convention telecasts which will give NBC viewers latest reports on the race for the Presidential nomination prior to the actual balloting in Chicago as well as a picture history of past political conventions.

Meanwhile, NBC engineers have blue-printed the 7,500 square feet NBC convention headquarters in the North Wing of the Amphitheatre. The headquarters

One of the mobile units, carrying TV cameras and film equipment, which will increase the political convention coverage that radio and television will provide the American people.

will be completely air-conditioned and will contain two large television studios and three radio studios specially constructed by NBC for the conventions. A newsroom housing teletypes, switchboards, operations desks for both television and radio, and NBC's central news desk, will occupy 1,200 square feet. To the central desk will pour news from more than fifty reporters and commentators which then will be funneled to both radio and TV networks.

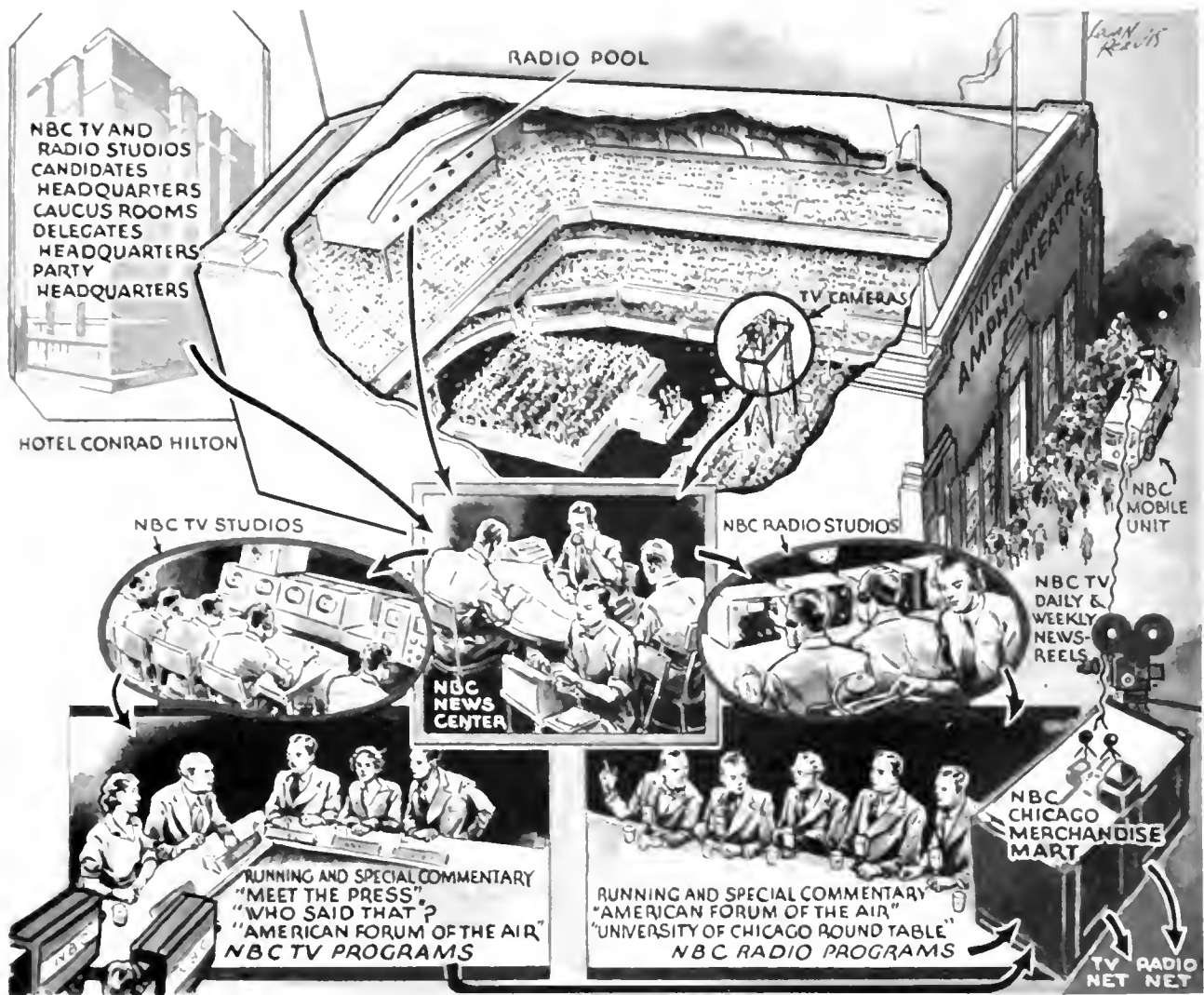
NBC headquarters also will include dark rooms for movie and still picture developing, make-up rooms, staging facilities, dressing rooms, tape recording rooms, studios for NBC affiliate stations and an office for the sponsors of NBC's conventions coverage.

Convention TV to be Sponsored

Another "first" for the 1952 conventions is sponsorship. Negotiations were opened with the two national committees in August of 1951 for permission to sell NBC coverage to a commercial sponsor in order to help defray the huge expense. On January 2nd of this year, executive vice president James H. Carmine of the Philco Corp. and president Joseph H. McConnell of NBC agreed on preliminary details for sponsorship of NBC radio and TV coverage of the conventions.

The convention hall was chosen by the national committees this year to provide better facilities for television. However, even this decision will not make available enough space inside the hall itself for each network to install its own cameras. Therefore, the proceedings from the convention sessions will be "pooled" and fed to all networks. Each network will have its own commentator





Artist's interpretation of NBC's extensive TV and radio operations planned for the two political conventions which are to be held in Chicago in July.

describing what the viewer sees on his screen. For NBC, Bill Henry, long-time newspaperman and radio commentator and now a featured performer on "Who Said That?" and on NBC news programs, will do the "running" story of the convention. Among other famous NBC "names" who will be seen and heard during the convention are John Cameron Swayze, Ben Grauer, H. V. Kaltenborn, Morgan Beatty, Earl Godwin, and others.

The "pooled" scenes of the convention sessions will be fed to the more than two score stations taking the NBC-Philco coverage. The "pooled" picture will actually go from coast to coast but different commentators will be heard in the east and middle west and the west coast. Only one television facility is now in operation from Omaha west to the Pacific coast. To provide sponsor identification for Philco Corp., commercial messages will have to be inserted, on a regional or local

basis, by west coast stations. Thus, in effect, two networks carrying the same picture but different commentators will be operated from Chicago by NBC.

The 1952 conventions will bring to bear more manpower and technical equipment than ever before used in covering one event in the history of network radio and television. Until the gavel raps at Chicago the afternoon of July 7th, the 1949 Inaugural of President Harry Truman will stand as the record breaker for TV coverage. But once the 1952 convention coverage begins, this record will be surpassed.

The Republican convention is scheduled to begin in Chicago on July 7th and the Democratic convention follows two weeks later, beginning July 21st.

NBC television will broadcast a minimum of sixty hours coverage of the two conventions. NBC radio will provide full and comprehensive coverage of the sessions.

American "Small Businessman" is Cited for Contributions to Defense

DONALD P. MOSSMAN, JR., an American small businessman of Joliet, Ill., came into prominence recently when political, industrial and business leaders cited him for outstanding contributions to the defense effort. The starting point of these activities was a full-page RCA institutional advertisement which appeared in newspapers in New York, Washington, Illinois and Connecticut.

Mr. Mossman is one of 121 manufacturers who worked with the Radio Corporation of America on a new "push button" master communications console that is capable of instantaneously flashing vital battle information between warships. The console, a basic part of the Combat Information Center on major warships, was developed and built by RCA at the request of the Navy.

Mr. Mossman was honored by Frank M. Folsom, president of RCA, Governor Adlai Stevenson of Illinois, and the Illinois Manufacturers' Association. In addition, he will be commended by the Navy, which is planning a ceremony in his honor at the Great Lakes Naval Base in Illinois.

Mr. Folsom called Mr. Mossman, whose firm employs 45 people, "a typical member of the All-American industrial team."

Telling of the Joliet manufacturer's relations with RCA, Mr. Folsom said:

"When RCA needed a complicated and non-existent push-button switch to complete the Navy's contract for the communications console, Mr. Mossman took on the job after many other switch manufacturers said it was too complicated to make. He made up a rough sample, based on an RCA sketch, and our engineers saw at once that he was at least a year ahead of the only other company willing to try.

Switch Required 889 Parts

Mr. Mossman visited RCA headquarters at least once a week for three months to coordinate development work on the switch which required up to 889 different parts compressed into the size of a cigar box. To speed the work and get closer to RCA, he went to Danbury, Conn., and made arrangements with the Capitol Machine Company of that city because they had exactly the right kind of tools and skilled craftsmen needed to build the parts for the switch.

"After four weeks of intensive effort, the first engineering model of the switch was completed, and with Navy approval, production of the new Combat Information Center console was started.

"The combined effort of Mossman and Capitol and RCA, in Joliet and Danbury and Camden, made the switch that had to be made."

For two days following publication of the advertisement in Chicago, Mr. Mossman was occupied with a strenuous schedule of radio and television appearances. He was a guest on the Garroway show "Today," and on several television news interview programs. Later, he appeared on the "American Farmer Hour," a full national network program originating in Chicago.

The ceremony in the headquarters of the Illinois Manufacturers' Association, at which Mr. Mossman was cited as the "Small Businessman of 1952" in the presence of some of the nation's leading industrialists, was tape-recorded by NBC's Chicago outlet and broadcast on the day the advertisement appeared.

Mossman Praised by Illinois Governor

Governor Adlai Stevenson went to Chicago from his executive offices in Springfield to honor Mr. Mossman as the "American Small Businessman of 1952." In ceremonies at his Chicago office, covered by NBC television newsreel, he made a speech on the importance of big and little business and on Mr. Mossman's contribution to the defense effort.

The text of the Governor's address follows:

"Mr. Mossman, I want to congratulate you, on behalf of the people of the State of Illinois, for an outstanding contribution to the Nation's defense effort. The work you have done in the design and production of this very complex switch symbolizes the activity of thousands of small businessmen throughout the Nation on behalf of our Armed Services.

"It is my understanding that this switch had to be invented in order for our naval task forces to obtain new communications centers operating with push button speed. The fact that you accepted the challenge of designing a non-existent switch, that you risked your own funds in its development, that you worked long hours to meet the Navy's time schedule,

entitles you to the commendation of every American citizen.

It is interesting to note that 121 companies from every section of the United States worked on this master communications center which the Radio Corporation of America produced for the Navy. The large majority of them, like Mr. Mossman's firm in Joliet, were small businesses. Without them, and without the teamwork of large and small businesses, the job couldn't have been done.

"This, I think, is the real secret of our strength. When American industries of all sizes and from all regions work together as members of the same team, they give us a defensive power that no aggressor can ever crumble.

"I am indeed pleased that a small manufacturer from this State has made such an important contribution to the security of our task forces around the world and to the sailors who man them. I think you typify, Mr. Mossman, the American Small Businessman of 1952.

My warmest congratulations to you."

Small Business Essential to Defense Effort

In ceremonies at the headquarters of the Illinois Manufacturers Association, some of the state's leading industrialists gathered to present Mr. Mossman with an engraved citation for his "outstanding contribution" to the defense effort and for symbolizing the American small manufacturer of 1952. James L. Donnelly, executive vice president of the I.M.A., who made the presentation, told Mr. Mossman that his switch represented "dramatic proof of the importance of small business to the defense effort."

The citation said in part:

"The accomplishments of Don Mossman and his associates exemplify the teamwork typical of American industry — large, small or middle-sized — which has made America strong and presents an unanswerable challenge to those who would destroy the American system of free, competitive enterprise."

In all of his radio and television appearances, and in his responses to the awards given him, Mr. Mossman emphasized that his experience with RCA proved how big and little business could work together effectively under the traditional American system of free enterprise.

Expressing his gratitude to Governor Stevenson, Mossman said he accepted the citation on behalf of all the members of "our team" — the 121 companies that worked with RCA on the Navy contract.

"I really interpret your recognition, Governor, as a



Donald Mossman (right) accepts citation for his "outstanding contributions to the defense effort" from J. L. Donnelly of the Illinois Manufacturers Association.

testimonial to the results that can be obtained," Mossman said, "from the teamwork of small, medium and large organizations operating all across the country within the framework of our free economy."

Enlarging on this theme, Mr. Folsom pointed out, in the announcement that RCA was producing the Navy console, that 5,000 suppliers in every section of the country worked with RCA. Seventy per cent are classified as small businesses and about half employ less than 100 men and women.

Programs on NBC-TV Win Awards

Two NBC Television network series took first awards in the recent annual review of educational radio and TV programs at the 22nd Institute for Education by Radio at Ohio State University.

First prize for TV network programs devoted to systematic instruction went to "American Inventory," a weekly experimental adult education series produced by NBC in cooperation with the Alfred P. Sloan Foundation. It was honored "for effective visual development through mature dramatization of a wide variety of theme basic to understanding of American democracy."

First award for network cultural TV programs — which included drama, music, literature, science and art — went to "Zoo Parade," a weekly series presented by NBC from Chicago's Lincoln Park Zoo and featuring R. Marlin Perkins, the Zoo's director.

Transistors--*Modern Miracle of Electronics*

Development of Tiny Electronic Device Goes Forward Rapidly in Broad Program Initiated by RCA Scientists and Engineers.

NEW possibilities for extending the usefulness of the transistor — tiny electronic device which functions like certain types of vacuum tubes — have been disclosed by research scientists and engineers of the Radio Corporation of America.

Development of the RCA transistor, noted for its reliability and ruggedness, emerged from a broad program initiated at the David Sarnoff Research Center of RCA, Princeton, N. J., and carried forward into practical applications at the RCA plants in Harrison and Camden, N. J. In addition, these activities are providing valuable information on new electronic circuits that will be necessary before transistors can be utilized, according to Dr. E. W. Engstrom, Vice President in Charge of the RCA Laboratories Division.

"As the vacuum tube made possible the modern miracles of radio, television and radar," says Dr. Engstrom, "so will the transistor become a tool with which to open vast new horizons in the electronic art. However, RCA does not expect the transistor to supplant the electron tube any more than radio replaced the phonograph. In fact, the market for electron tubes is almost certain to increase under the full impact of commercial transistors.

"This is because the transistor permits development of electronic instruments and apparatus undreamed of at the present time. Many of these devices will still require electron tubes. Thus, as transistors begin to take the place of certain tubes, the displaced tubes will find new jobs in new electronic gear."

Operates at Low Temperatures

A paper on the improved RCA transistor in the December, 1951 issue of *RCA Review*, prepared by B. N. Slade, of the RCA Tube Department, describes it as shock resistant, unaffected by dampness and able to operate at temperatures as low as liquid air (minus 180 degrees Centigrade). These characteristics have been achieved by embedding the elements of the transistor in thermosetting resin to provide the finished product with an almost indestructible protective case.

In appearance and size, the RCA transistor resembles



Although only the size of a kernel of corn, the transistor performs the functions of certain types of vacuum tubes.

a small kernel of corn, with three needle-like terminals protruding from the end. Its principal embedded element is a quantity of single-crystal germanium about the size of a pinhead. Overall, the transistor measures 6×10^{-2} " by 3×10^{-2} " by 2×10^{-2} ".

One of the world's few setups for producing single-crystal germanium needed for transistors was on public view in New York during March 3-6 at the Institute of Radio Engineers exhibit in Grand Central Palace. Refinement of this rare element was accomplished with professional efficiency through the use of a small electric furnace operated by RCA engineers.

The germanium furnace, part of a display showing research into electronically active solids, transformed the germanium into the desired single-crystal form. To obtain the processed germanium crystals RCA engineers "draw" — instead of cast — a thin, pencil-like ingot

from a crucible of molten germanium. This action takes place inside of a quartz tube.

The main advantages of transistors are long life, small size, resistance to shock, low power requirements, and no "warm-up" period. When properly made and not abused, a transistor should almost never wear out.

A transistor differs basically from an electron tube in that it has no heated filament operating in a vacuum. In an electron tube this filament, when heated by electric power, "boils off" the needed electrons in the vacuum. In the transistor, the electrons are harnessed in a piece of solid matter. They are controlled as they move about within this solid.

Germanium is a Semi-Conductor

The solid material currently used is germanium of the type described — an element which physicists call a semi-conductor. That is, it does not conduct electrical energy nearly as well as copper; but neither is it an insulator. A semi-conductor can be made to conduct current well in one direction, and poorly in the opposite, a phenomenon which does not occur in the metals normally used for conducting electricity.

The point-contact transistor developed by RCA consists simply of the tiny speck of germanium touched by two closely spaced, fine wires. These wires correspond to the terminals in a vacuum tube.

In their present stage of development, transistors have a few drawbacks. They are sensitive to temperature change, and have frequency limitations that further

research and development are expected to eliminate or minimize.

Among the devices which RCA engineers predict will be possible with fully refined transistors are:

Compact, portable electronic computers. In the last ten years, specialized electronic devices have become more and more complex, Dr. Engstrom pointed out. In one electronic computer alone, such as "Typhoon" built for the U. S. Navy by RCA, more than 4,000 electron tubes are used. Engineers have made great strides in decreasing the bulkiness of equipment by using miniature and sub-miniature tubes. But the problem of heat has remained. By using transistors, excessive bulk and heat should virtually disappear.

Smaller personal type portable receivers, with more economical battery life will be developed around the transistor in the future.

In addition to simplicity and small size, elimination of delay in warming up may be regarded as a major feature. Electrons within the transistor are lying ready for action. Transistor equipment comes to full strength the instant it is switched on; long distance telephone amplifiers, marine radios, and other devices which must be ready to operate on demand will not need to be kept turned on continuously.

Transistors Have Long Life

Respecting the longevity of the transistor it is generally agreed that it may be in the vicinity of 100,000 hours, since there is no filament or heating element to burn out.

Perhaps the most striking advantage of the transistor is the modesty of its power requirements. In the vacuum tube, by far the greater part of the power goes to heat the filament; only a small part reappears as output signal. Since it needs no energy to set electrons free the transistor needs only the power necessary for the desired signal. A millionth of a watt is sufficient to operate it and it can then generate signals of the same order of power.

This fact coupled with the transistor's freedom from heat appears to make it ideal for use in many of the complicated electronic instruments such as calculators and control systems which at the present time employ

Liquid resin is dropped into a transistor shell to cement the components in place and protect them from moisture and other elements in the atmosphere.



thousands of electron tubes and which are oftentimes curtailed in effectiveness by the excessive heat generated

While emphasizing that the art of the transistor is still in its infancy, Dr. Engstrom said that its development was made possible by a research program of the broadest dimensions in the field of electrons and solids. He revealed that some of RCA's top scientists have been working on this problem — which involves the basic fundamentals of matter — for many years.

One group of RCA scientists has been concentrating on photoconductive materials — materials which are sensitive to light. Out of this research came the small television pickup tube known as the "vidicon."

Still another group of RCA scientists has conducted pioneering research into luminescent materials — substances which glow when struck by electron beams in a vacuum. Some of these materials, called phosphors, coat the inside of every home television picture tube, he pointed out; others are used in fluorescent lights.

"The transistor, first developed and announced by Bell Telephone Laboratories in 1948, is a special form of device making use of the knowledge of electronically active solids," Dr. Engstrom said.

"Out of all this theoretical, fundamental, and applied research," Dr. Engstrom said, "we are assembling a fund of know-how which will permit us to develop electronic devices which were undreamed of fifty years ago."

New TV Station in Cuba

One of the foremost newspapers of Latin America — *El Mundo* of Havana, Cuba — has completed plans for participation in the building and operation of a powerful television station in the Cuban capital, with microwave relays extending TV program service to three additional provinces on the island, according to an announcement by the RCA International Division. This is believed to be the first microwave system for television scheduled for operation outside of the United States.

Studios and operation headquarters are situated in Havana's three-million-dollar Ambar Motors Building, near the fashionable Vedado residential section. Transmission will be on Channel 2.

Cuba's radio pioneer, Angel Cambo, co-founder of the CMQ radio network, is president of the new station. His re-entry into broadcasting followed two years of observing television operations in the United States.

Associated with Mr. Cambo are Julian Lastra and Miguel Humara, of the firm of Humara y Lastra, RCA distributors in Cuba for many years.

In addition to covering Havana, service of the new station will be expanded by microwave relays south to Pinar del Rio Province, and eastward to the provinces of Matanzas and Las Villas.

Shadowing Device Speeds Electron Microscope Analysis



Shadowing unit introduced by RCA, is used for the rapid preparation of specimens for the electron microscope shown in the rear.



A TV camera and commentator go into the plant of Foote Mineral Company to explain factory operations to a meeting of the firm's stockholders.



From this monitor room, set up at the Foote Mineral factory, program directors control the TV camera pickups and the film sequences.

Stockholders "Tour" Their Plant Through Eyes of TV Cameras

SETTING up and running a 10-ring circus for a one-day stand in a busy industrial plant might seem to enjoy top rating as the neatest trick of the year. But those who watched the preparation and production of the first televised plant tour for a stockholders' meeting, staged February 21 at the Exton, Pa., plant of the Foote Mineral Co., would have the facts to argue any such contention.

Robert D. Drake, Foote's advertising manager, conceived the idea of the unusual telecast when he saw an RCA Victor TV demonstration last fall at the Exposition of the Chemical Industries in New York. He explored the idea with Richard H. Hooper, manager of the RCA Victor Shows and Exhibits Division, and detailed plans, charts, and script were then worked out. Arrangements were coordinated for Foote by Otto W. Renner, Jr., of Renner Advertisers, Philadelphia.

In undertaking the job, RCA Victor's globe-trotting TV production crew, despite a wide and varied experience, was stepping off on new ground. But the field was recognized as one of substantial promise, and that promise has certainly been expanded by the success of this debut performance.

The closed-circuit (wired) telecast enabled more

than 250 stockholders to see new facilities and watch key operations at widely separated locations on the 81-acre Foote property without leaving their seats in the plant cafeteria, where the meeting was held. One sequence of the show, made possible by televised film, brought the stockholders a glimpse of activities at Foote's new Kings Mountain holdings, near Charlotte, N. C., where the company "bought a mountain" containing the nation's largest known source of spodumene, an ore from which lithium is extracted.

To stage this initial stockholders' TV tour, RCA Victor installed and operated the largest closed-circuit system yet employed for a service of this type. The equipment, valued at more than \$80,000, included four image orthicon field cameras, 1800 feet of camera cable, 1200 feet of microphone line, a TV film camera chain, twelve 17-inch home TV receivers, and all the auxiliary equipment needed for a complete control and monitoring station.

Four Cameras Covered Seven Locations

The cameras were initially set up in four strategic locations, and some were swiftly moved when the script permitted, according to a time schedule carefully worked out in advance, to permit coverage of a total of seven



An RCA TV camera makes it possible for stockholders to witness the complex processing of rare elements at the Foote Chemical plant.

plant locations without breaking the program's continuity.

L. G. Bliss, vice president in charge of sales of the Foote company, furnished the commentary from a narrator's desk, covered by one of the field cameras, in a plant building near the cafeteria. Also located in this building were the control station and the TV film camera chain.

One objective at the outset was to eliminate the confusion and inconvenience which would be unavoidable if the stockholders were guided physically through the far-flung plant from one installation to another. Another was to give the stockholders a more concise and understandable view of the company's activities than they could hope to get by actually touring the area. Both aims were accomplished.

The equipment was installed and the show was staged by a crew of eight, including six RCA Service Company engineers and two members of the RCA Victor shows and exhibits group.

Half-mile of Cable Required

Although members of this group have demonstrated television and pioneered new applications of the medium throughout the United States and in many foreign countries, they were confronted by several unusual challenges to their ingenuity in carrying out the Exton program. One was the necessity for stringing a total of approximately 3000 feet of cable and "mike" line, most of it overhead. Another was split-second timing of camera movements, which meant shutting down a camera, moving it to a new location, and putting it back in operation without the usual time for warming up the tubes. Particularly difficult were the quick shifts from indoor to outdoor light levels, and vice versa.

To speed up camera movements, the crew used a special truck with a hydraulic lift on the rear end. When a camera completed one sequence and a camera in another location took over, the first camera would be rolled onto the lowered lift of the waiting truck, tripod and all, without dismantling. It would then be hoisted to the truck floor and hauled to the next location. There, the lift would be lowered and the camera rolled into position. The longest distance covered by such a shift was about 450 feet.

The equipment—five tons of it—hauled by truck from RCA Victor headquarters in Camden, N. J., was packed in 38 large wooden boxes. Uncrating and setting it up took only four hours, but stringing the half-mile of cable consumed eight hours.

To avoid blocking plant streets and drives and to eliminate the risk of damage to the cable by passing vehicles, most of the line had to be run overhead. This also obviated possible damage to insulation from puddles and wet ground, in many cases bearing lithium salts and other chemicals. At one point, the line crossed a spur of railroad track, and the railroad stipulated that it must be hung at least eight feet above the tops of freight cars.

But all these problems had been solved when the hour arrived for the show to go on.

On the receiver screens in the cafeteria, the stockholders saw first the processing of lepidolite ores from Africa to obtain lithium products used for many industrial purposes, including the preparation of special types of glass for TV picture tubes. Other important uses are found in the manufacture of lubricants, ceramics, and air-conditioning systems.

Many Chemical Processes Observed

Next, by means of the televised film, they were shown the quarrying and processing of spodumene, a source of lithium salts, at Kings Mountain. Returned to the Exton plant by the flip of a control switch, they saw more lithium processing operations and the activities in progress in a pilot plant where a new process is being evaluated.

This was followed by detailed close-up action views of complex operations and equipment used in processing zirconium, used for its high corrosion resistance and high strength-to-weight ratio in radar, television, and jet engines, for its low neutron-absorption characteristics in atomic reactors, and for its high gas-absorption factor as a means of increasing vacuum in vacuum tubes. The tour closed with a visit to the plant area where various minerals are processed to produce welding electrode coating materials.

Commenting on Foote's introduction of this new use
(Continued on page 21)

First Floating Broadcaster to Hurl "Voice" Over Iron Curtain

SS *Courier* Carries Powerful Transmitter Designed by RCA

WITHIN a short time, the U. S. S. *Courier*, a 5,800-ton Coast Guard cutter will have completed her shake-down runs somewhere in the Atlantic and will set out on her first assignment as a floating broadcaster especially equipped to carry the "Voice of America" to the people behind the Iron Curtain.

In his speech dedicating the ship on March 4, President Truman said:

This ship is named the *Courier*. It is well named, for it will be carrying a message. It will be carrying a message of hope and friendship to all those who are oppressed by tyranny, it will be carrying a message of truth and light to those who are confused by the storm of falsehood that the Communists have loosed upon the world.

The *Courier* is a small ship—it is not as big as a destroyer—but it is of tremendous significance. Its significance lies in the fact that it will carry on the fight for freedom in the field where the ultimate victory has to be won — that is in the minds of men."

RCA engineers and designers played an important role in supplying the equipment which fills the major part of the *Courier's* cargo holds. Included are a 150,000 watt medium wave RCA transmitter, an assortment of antennas, tape recorders, receivers and a large quantity of helium that will be used to inflate dirigible balloons to support the antenna. With the latter lifted 1,000 feet, signals from the RCA transmitter are expected to reach out with a range of 1,000 miles or more. According to engineers of the "Voice of America" staff, this seaborne voice is more powerful than any operating in the United States.

Captain Oscar Wev, commanding officer of the S.S. *Courier*, and a technician inspect one of the power units aboard the floating broadcasting station.

The *Courier*, world's first sea-going radio-broadcast station during commissioning ceremonies.



The large RCA transmitter is mounted on an eight-inch platform of concrete which "floats" on slabs of cork three inches thick. This cushion protects apparatus from the ship's vibrations. Two other smaller transmitters for general communications purposes radiate their signals from fixed triangular antennas on the flight deck.

In another cargo hold are the Diesel engines which are capable of generating 1,500,000 watts of electric power for all the transmitters aboard the *Courier*.

The floating broadcaster will pick up programs from land-based transmitters of the "Voice of America" and

retransmit them, either directly or by the intermediary means of tape recorders, into the desired areas.

The Coast Guard crew of 80, many of them highly trained radio technicians, is commanded by Captain Oscar Wev, a transport commander in the Pacific during World War II.

Color TV in Biology Research

A new use for color television which adds another dimension to biological research was described to the Institute of Radio Engineers on March 4, by Dr. V. K. Zworykin, L. E. Flory and R. E. Shrader, of the David Sarnoff Research Center at Princeton, N. J. In a paper prepared jointly by the three scientists, they said that the use of color television will enable the biologist to obtain more information about microscopic specimens than with present methods.

The development was made possible by hooking up an RCA tricolor picture tube to a sensitive new ultraviolet vidicon camera which is mounted over a microscope trained on the specimen. The absorption of ultraviolet light by the tissues of the specimen differs among them. By arbitrarily assigning different colors to the tissues, the biologist can make them emerge with individual clarity. This method supplants the old system of staining the tissues.

The new technique adds color artificially to cells or tissues by translating different wave lengths of invisible light into electronic energy. This energy is then translated into the three different primary colors on a color television picture tube.

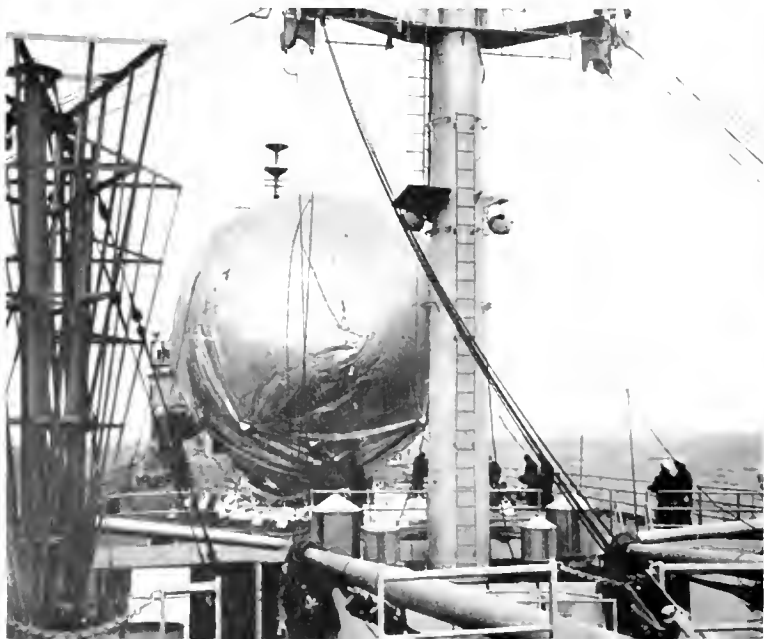
A specimen or thin slice of tissue which, to the human eye, appears colorless and flat through a microscope can then be viewed on a television screen as a dynamic picture in color.

Some of the electron tubes which supply energy for the powerful broadcasting transmitters on the *Courier*.



President Truman inspects some of the extensive radio equipment aboard the *Courier*.

One of the helium-filled balloons is inflated on the flight deck of the *Courier* during a test of the vessel's 150 k.w. transmitter, supplied by RCA.



America Moves Steadily Toward Equal Opportunity for All, Says Buck

RCA Victor Head Tells Cincinnati Audience This Nation Excels All Others in Progress

AMERICA has the only form of government in the world today that provides the opportunity for bringing the good things of life to everyone, down to the last man and woman, Walter A. Buck, vice president and general manager of the RCA Victor Division said in an address at the interracial dinner and annual meeting of the Urban League of Greater Cincinnati on March 26.

The fact that we still have "a considerable distance to go," he said, "is less important than the fact that we are moving more steadily toward that goal than any other nation.

Under the American system," he said, "our only problem is to extend its benefits still further — and to extend with them the basic freedoms and good will to all men which spring from the same Constitutional source. If this seems like a big order, consider the infinitely greater problems inherent in a system which transfers the responsibility for man's welfare to the state, and in the process destroys the freedom of all individual action and enterprise."

Hailing the Urban League for its early recognition of the importance of equal opportunity to the great future of American industry and the nation as a whole, Mr. Buck said its vision and confidence in the destiny of America was "born of the same quality that has inspired the leaders of industry to push this nation to the forefront of the civilized world."

"Business prosperity has made our national prosperity," he said. "The principles of free enterprise are so closely identified with American political principles that it is virtually impossible to speak of one without the other. They were made for each other, and together have produced American civilization as we know it." He defined American civilization as "our particular blend of political, economic, and social ideals, all stemming from a central principle."

The great contributions of business to American civilization, he said, have been mass production, mass distribution, vision, research, and merchandising. These things, he pointed out, have made goods available to all of our people, brought prices down to levels at which



Walter A. Buck, addressing the Urban League of Greater Cincinnati.

most people can afford them, and created new products and services which mean better living for all people.

Mr. Buck asserted that we live in "the one country where the full freedom and rights of the individual are written out for all to see," and predicted that research, supported by industry, will bring a future even brighter than the present, "if granted reasonable freedom from future restraints."

"American industry needs the best people, the best brains, the best skills available," he continued. "No manufacturer, in my opinion, can in the years to come afford the luxury of petty prejudices, of differentiating between competent people because of the color of their skins

"I have faith that in a country built on the rock of individual freedom, progress in the brotherhood of man cannot help but continue until equal opportunities, equal acceptance, are enjoyed by all."



Rapid public acceptance of metal-shell kinescope picture tubes keeps production lines busy at RCA plant, Marion, Ind.

Metal-Shell Kinescopes Gain in Favor

Use of Steel Gives Larger Tubes Greater Strength and Lighter Weight

By Lorry S. Thees
General Sales Manager
RCA Tube Department

METAL-SHELL television picture tubes, introduced commercially less than four years ago, have already won such rapid acceptance among the industry's receiver manufacturers that they currently account for nearly 30 per cent of total kinescope sales. In the 21-inch size, they are actually outselling comparable all-glass types by a wide margin.

The television industry's trend toward larger picture tubes of metal-shell construction developed and introduced commercially by the Radio Corporation of America in 1948, shows that time and usage have confirmed the metal tube's special advantages to electron tube producers, TV receiver manufacturers, and home set owners.

According to available statistics, the industry's major tube producers during 1950 sold approximately eight million kinescopes of all types, of which approximately

two million were of the metal variety. During the first nine months of 1951, the same producers sold more than three-and-a-half million kinescopes, of which more than a million were metal types.

The RCA Tube Department, the industry's largest producer of kinescopes since 1938, currently uses metal-shell construction in approximately two-thirds of all the kinescopes it produces. It can be anticipated that the company will develop and produce more and larger metal types, when and if required by consumer demand.

Although all-glass tubes will remain an important item in the industry, there is every indication that for larger tubes, from the 21-inch size up, the metal-shell construction will be favored. This prediction is based primarily on the metal tube's established advantages for the set manufacturers—advantages which provide superior picture quality, permit streamlined receiver production, and resolve problems of handling, assembly, and breakage loss.

The metal tube's inherent characteristics emphasize the following features:

(1) The faceplate, unlike that of the all-glass envelope, is produced as an independent unit, facilitating

(Continued on page 29)

Plastic "Props" for Television Shows

A NEW concept of television staging through the use of plastics, the result of six months of experimentation in collaboration with the Studio Alliance, has been put into active use by the National Broadcasting Company in its New York studios.

The project, developed by Studio Alliance, was brought to NBC in its early stages and the company then joined forces with the studio in its development. Some of the qualities of the plastic which make it superior to other materials previously used for sets, props and even costume accessories are:

It is waterproof, fire-proof, shatter-proof and warp-proof.

It can be repainted repeatedly for use in different colors. The plastic, while tougher and lighter than wood, has wood's desirable qualities in that bolts and screws can be inserted easily and it can be cut, planed and sanded. Some of it is flexible.

Some items are translucent, with the appearance and texture of marble. Color can be impregnated into such forms as desired.

The newest thing is the perfection of a transparent plastic for use in making "crystal" chandeliers and the like.

Items with joints or seams, once a problem, now are being made in one piece, with a consequent increase in strength and durability.

Many units are made in sections so that any one segment or combination of segments or the entire unit may be used as needed.

Museum pieces, which sometimes can be rented at relatively fabulous rates and which carry heavy insurance for damage risks because of their extreme fragility, can be duplicated in plastic to become part of the permanent property stock. An antique pottery vase, for instance which is delicate and heavy, can be made in sturdy plastic which will weigh one fourth of the original.

Another example in this category is an antique, carved wooden picture frame from Italy. A replica in wood and plaster would cost about \$125 and would require careful handling because of its tendency to break apart. Reproduced in strong plastic, it would cost only half as much and would last indefinitely. It could be painted in any color, washed off and repainted as often as desired.

Window draperies can be made in three sections so that one, two or all three may be used, as required. They need no fire-proofing, dry-cleaning, mending or special



Plastic stage "props" look like the original articles but weigh only one fourth as much.

handling. Like the other items, they can be repainted with ease and repeatedly.

Experimentation with flexible plastic has produced authentic reproductions of ornamental gold braid and similar items for uniforms and other costuming, which can be sewed and handled in the same manner as fabric but never tarnishes or requires repairs.

Through the use of plastics, a standard stage wing has been reduced in thickness by one third, thus making it easier to handle and less bulky for storage. A 100-pound wing can be prepared in plastic at 57 pounds.

TV and Radio Expand In Dominican Republic

The first phase of extensive plans of the Dominican Republic to modernize and expand its communications services has been completed with the opening of a country-wide radio broadcasting network. In making the announcement, Meade Brunet, a Vice President of the Radio Corporation of America and Managing Director of the RCA International Division, said that the new radio network, equipped throughout by RCA with the latest types of broadcasting apparatus, links Ciudad Trujillo, the capital, with Santiago, the nation's second city, by means of automatic repeater stations at La Cumbre and Santo Cerro, operating at very high frequencies.

Complete Chain of Television Equipment Ready for Opening of UHF Band

FORGING of the final link in the electronic chain that makes ultra-high frequency television a practicable, commercial possibility, was disclosed by RCA last February at a seminar in Washington, D.C. At that time, the company revealed a complete line of UHF selectors, antennas, transmitters, and associated equipment — everything needed for transmission and home reception of UHF television — would be available as soon as broadcasting is begun in the upper reaches of the radio spectrum.

The chain had taken 20 years to forge. Earlier links were labelled research, development, experimental broadcasts, and field testing. It had been a vast and difficult undertaking — charting the ultra-high-frequencies for television was comparable to the geographical exploration of a continent. But with RCA's announcement in the nation's capital, the development phase of UHF-TV ended, and the commercial about to begin.

Two hundred of the country's leading television engineers, consultants, and attorneys, plus representatives of the Federal Communications Commission, attended the RCA seminar and applauded the company's report.

They heard representatives of the RCA Victor Division describe a multi-channel selector designed to receive

programs on all channels in the UHF band, housed in its own attractive cabinet and equipped with its own on-off and tuning knobs.

Also announced were simple, inexpensive one-channel and two-channel selectors, for use with present VHF receivers in areas where only one or two UHF stations go on the air.

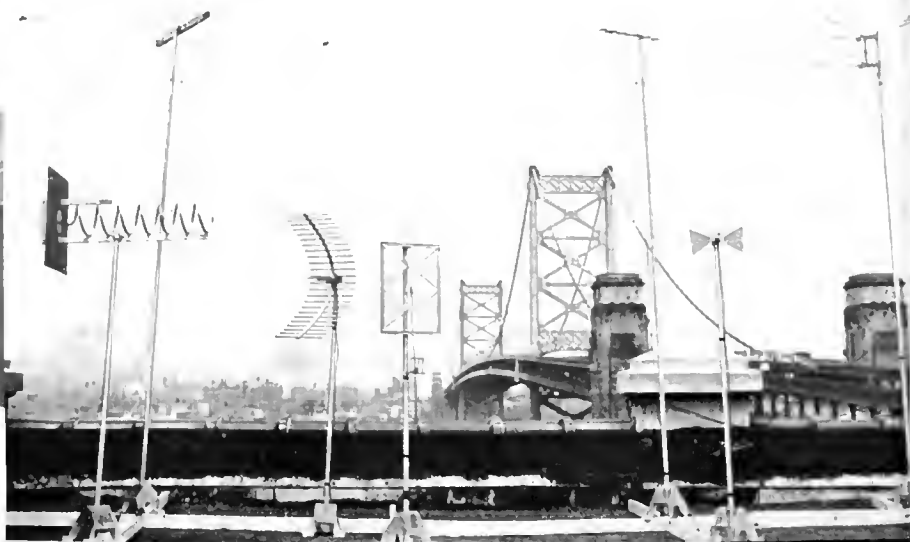
All three selectors, it was noted, are easy to install and will function with any make of television set.

In addition, participants in the seminar learned, RCA Victor will produce a complete line of combination receivers, providing reception in a single instrument for both UHF and VHF.

The RCA Service Company reported that new UHF receiving antennas are available in various styles to meet specified reception needs. They differ radically in design from the now-familiar VHF antennas. The new antennas, designed to meet special requirements of UHF transmission, have been evaluated and classified by RCA Service Company engineers on the basis of extensive field tests.

At other sessions, engineers of the RCA Victor Division unfolded the company's plans to meet anticipated broadcast needs during the next few years, and gave a preview of new products and developments.

Left: Compact all-channel UHF selector, designed by RCA for use with existing television receivers to bring in all UHF programs in any area. Below: Some of the types of development UHF antennas designed by RCA engineers.





Improved model RCA Image Orthicon camera which provides brighter, sharper TV picture reception in the home.

Among the more important disclosures were new 1-kw and 10-kw UHF transmitters, high-grain antennas, and associated equipment capable of providing up to 200 kw of effective radiated power in the 470-890 megacycle frequencies. Engineers of the RCA Engineering Products Department described design features of the equipment, including new developmental UHF tubes of several type, special low-loss UHF long-shoulder transmission line with inner conductor bullets, in several diameters, and constructional details of the company's new slotted UHF antennas.

The conference was the latest in a series of meetings and demonstrations undertaken by the Radio Corporation of America to aid broadcasters in laying plans for UHF television operation.

At the annual convention of the Institute of Radio Engineers in New York, two weeks after the Washington seminar, initial models of the new selectors and receiving antennas were given their first public showing. The solid proof of accomplishment was there for all to see.

Final Equipment Details Added

Early this month, RCA filled in the final details of the TV equipment picture. During the annual exposition of the National Association of Radio and Television Broadcasters, in Chicago, the company unveiled initial models of its complete line of UHF transmitters, studio equipment, antennas, and home selectors, as well as new VHF equipment and a dramatically advanced new image orthicon TV camera.



A UHF antenna which helps in eliminating reflections in cities and improves picture quality in fringe areas.

The new transmitters, which are capable of putting stronger signals on the air, will result in pictures of greatly increased brightness and contrast.

The UHF equipment developed by RCA is the result of more than two decades of studies, field tests, and experimentation, climaxed by work at the company's experimental UHF station at Stratford, near Bridgeport, Connecticut. Built by RCA and operated by NBC, this is the first and only such station to transmit daily programs.

Other television manufacturers have brought their equipment to Stratford and, in cooperation with RCA, tested and perfected products for the new service. Representatives of the FCC have journeyed there to study the latest developments. This quiet corner of New England has grown into the engineering capital of UHF television.

The location where RCA built the station is known in the community as Success Hill. The work accomplished there will eventually enrich the lives of millions.

Tests at Stratford and elsewhere have proved that, contrary to earlier expectations of some elements of the industry, UHF television brings clear, sharp, dependable pictures, comparable in quality to VHF reception.

Television's conquest of the ultra-high frequencies means the medium can now extend its service to virtually every corner of the land. More than 1,000 new stations are expected to share the UHF channels, and they will bring pictorial reports of world affairs and some of the finest entertainment available to towns and villages throughout America.

Industrial Television Expands

Video Equipment Used in Factories, Banks, and Libraries
and in Numerous Government Projects

INDUSTRIAL television, another precocious offspring of the video art, has been available to industry for less than ten years, yet in that relatively short time, it has created an increasingly important role for itself in many unrelated fields. New uses for ITV, as it is labelled for brevity, are being developed constantly by RCA engineers and its adherents are convinced that there are no reasonable limits to its applications.

In 1950, RCA Victor marketed its pilot-model. Today, two years later, RCA is assembly-line producing a new two-unit chain with only 21 tubes, half the number required in the first model. Cost of the basic chain is approximately \$5500.

In February of this year, the RCA Service Company installed its most advanced ITV chain at Farrant Optical Company, New York, for government work. Jack Greene, coordinator of industrial television service, was told no more about the job than the necessary light sensitivity and the field to be picked up. The U. S. A. is RCA's biggest ITV customer to date.

An industrial TV system at Picatinny Arsenal, Dover, N. J., was the next installation. Others are scheduled at Bausch & Lomb, Rochester, N. Y.; and the Library of Congress, Washington. At the latter location, the unit will be used to check documents in distant parts of the library, thereby saving much foot-travel from one part of the building to another.

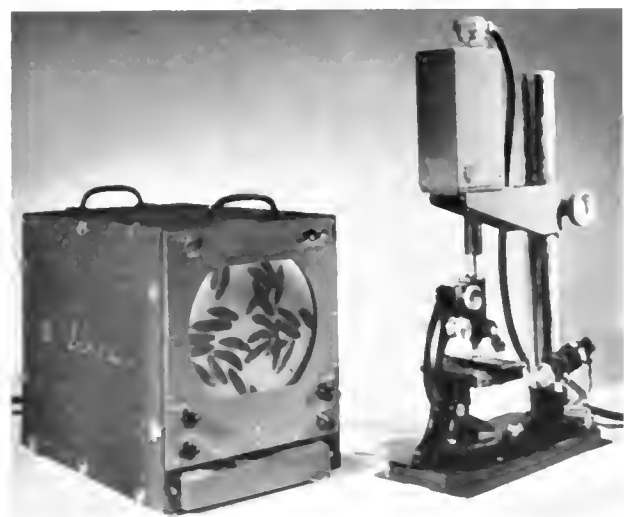
The Atomic Energy Commission, Signal Corps, Navy, General Motors, among many others, are putting ITV to work. At GM, a man is hired to look at television all day long. From his observation post he operates controls which drop bales of scrap into a gondola on a siding outside the plant, a considerable distance away.

Electric utilities, leaders among civilian users of the system rely on ITV units for the viewing of water level, furnace flame, stack smoke, even to scan visitors applying for entrance at gates.

In arsenals, the physical handling of explosives can be reduced to a minimum since ITV makes it possible to study their action close up. Guided missile perform-

Bank employees use an RCA Industrial Television System to compare signatures on checks and other documents.





Monitor screen (left) shows magnified images of living organisms picked up by combination of light microscope and sensitive Vidicon tube at right.

ance also is known to be observed by this means. Classroom teaching is frequently made more effective via TV.

Other fields for which the system is suitable and either in operation or considered for the near future are:

Commerce and Banking — meetings (sales, stockholder); shows, exhibits and demonstrations; office intercom; transmission of signatures, balances, records.

Industrial Control and Testing — wind tunnel tests, time study, oven and furnace operation, smoke control, life tests, remote telemetering, inspection (processes, machines, gauges, etc.); plant intercom, transmission of prints, photos, drawings, foundry and rolling mill operations, training, materials handling.

Medical — surgery, X-ray transmission, training.

Military — handling of explosives, rocket and guided missile performance, view of range finding, training.

Security and Law Enforcement — patrolling, guarding, fingerprint transmission

Specialized Application — under-water work, TV rehearsals, fire control, forestry conservation, rescue work, radiation and nuclear research.

Traffic Control — streets, railway yards, bus and truck terminals, ships and docks.

In other words, wherever it is desirable to view at a distance a clear, exact, instantaneous picture under conditions where direct observation is too dangerous, or the arena of action too inaccessible, too inconvenient or too expensive, industrial TV is the solution.

Design of RCA's ITV system centers around a new camera tube, the Vidicon. It is two-thirds as sensitive as the studio-type image orthicon, costs only one-third as much.

The chain consists of a miniature camera, about the size of a 16 mm. movie camera, and a compact control monitor connected by 500 feet of 18-conductor camera cable, 6.25 inches in diameter.

The connecting cable transmits the picture picked up by the camera to the control monitor's 10-inch viewing screen. The complete chain operates from ordinary 115-volt, 60-cycle power (50-cycle equipment is also available), and is entirely self-contained. Power consumption is only 230 watts.

The RCA industrial television camera is as easy to handle as the average 16 mm. movie camera. It contains only three tubes, one of which is the Vidicon. The small size explains why the camera can be placed in spots inaccessible to humans.

The monitor, together with its own power supply and control panel, is housed in a metal case smaller than the average table-model TV set (20" deep, 15" high, 13" across). The optical-focus control operates a small reversible motor, which changes lens focus.

Interlocking safety switches and a complete shielding unit permit people to work on the equipment in absolute safety. Though a standard set is supplied with 50 feet of camera cable, the monitor may be located at any point within 500 feet of the camera by the addition of extra cable, supplied on special order.

For applications requiring more than one viewer, or where the distance from the camera must be greater than 500 feet, the control monitor has been equipped with provisions for plugging in additional receivers.

Where distances between monitor and auxiliary viewers are extreme, the RCA system is so designed that it can be operated with microwave transmission or by means of coaxial cable.

Stockholders "Tour" Plant

(Continued from page 12)

of television, Bliss predicted that TV will become a valued tool of business and industry for such purposes.

"It provides a unique means of showing stockholders what is being done with their money and how their investments are being protected and enhanced," he said, "without wasting their valuable time and energies and those of company officials in traveling from point to point.

"Further, it makes it possible to present a dramatic vignette of highlights in a company's operations that is more impressive and understandable than a physical tour of the plant. It presents the company's story with more realism and conviction than film can achieve, since it is recognized that there is no window dressing in a TV presentation—no opportunity for cutting and editing."

Home-Built Yacht Carries RCA Radio Equipment

A LIFETIME ambition to own a self-built yacht completely equipped with the finest radio and navigational instruments has finally been realized by Walter F. Carey of Detroit, Michigan. While he was constructing his 63-foot, 70-ton yacht in the back yard of his farm at Birmingham, Michigan, Mr. Carey was giving serious thought to the radar and radio units that he would need. After an extensive study of the field he concentrated on RCA equipment, on the basis of its efficiency, accuracy and economy. Included in his final selection were Radiomarine's Model CR-103 small-craft radar, Model FT-8012-HF radiotelephone and Model AR-8709B radio direction finder.

The 75-watt radiotelephone is installed in a special compartment underneath the enclosed flying bridge of the *Seaquester* with a remote control unit located on the bridge itself. This set provides 7 channels in the 2000-3000 kilocycle band and 3 channels in the 4, 6 and 8 megacycle band for Inland Waterways and Great Lakes use.

The CR-103 radar weighs only 400 pounds installed and features compact design to comply with space limitations on small vessels. It has the power (30 kw) and sensitivity to pick up objects as close as 75 yards and as distant as 20 miles.

The radio direction finder is especially designed for ceiling suspension on boats where space is at a premium.

The *Seaquester* has put more than 7,500 miles under her keel during the past year, her most recent voyage being a trip to the Caribbean. Leaving her anchorage at



Radiomarine direction finder installed in the wheel-house of the yacht *Seaquester*.

the Grosse Pointe Yacht Club in Michigan, she traveled to Chicago via Georgian Bay, thence south to New Orleans, Miami, the Bahamas and Haiti.

Discussing the recent trip, Mr. Carey said that his radar nearly became the most important piece of equipment on his boat. "Once, southeast of Nassau," he recalled, "some of the amateur navigators in the family got us effectively lost during the night. It was only the radar picture, showing us the outline of the different islands that enabled us to ascertain definitely our correct position."

"Several days later," he continued, "we were approaching Haiti in the middle of the night. I think one of the biggest thrills in my boating experience was to make landfall via radar, using the 20-mile range, just when I estimated we should. This was particularly important because of the low power and short visual range of the beacon light on the northwest end of the island."

Graduates of RCA Institutes meet in New York to form an Alumni Association to "further common interests in education and technical recognition."



Air Conditioners and Dehumidifiers Marketed by RCA

New Products Introduced for Home Use
will be Serviced by Company Technicians

HOME air conditioners and electric dehumidifiers, the first ever marketed by the Radio Corporation of America are being placed on display in retail stores all over the country. Judging by initial reports from distributors and dealers, the new products are being well received by the public.

RCA's decision to enter the home air-conditioner industry was reached only after considerable study and analysis. The company made exhaustive surveys on market conditions, and on the actual contributions these appliances can make toward a pleasanter, healthier family life.

Approximately 80 per cent of the room air conditioners that were manufactured prior to 1952 were commercial installations in small shops, private offices, hospitals, and similar places.

Only 20 per cent had been sold for home installation. In other words, of the 39,000,000 electrified homes in this country, less than one-half of one per cent had

room air conditioners—which meant the appliances had an immense sales potential.

Further investigation convinced us that room air conditioners can add so much to the comfort and pleasure of life that they are destined to become as integral a part of the American domestic scene as central heating.

Contrary to the common belief, an air conditioner does much more than supply cool air to counteract summer heat. A quality appliance will also dehumidify the air, wringing out excess moisture up to 50 quarts in 24 hours. Humidity accounts for as much summer discomfort as high temperatures. Furthermore, a true air conditioner will exhaust stale air, kitchen odors, and tobacco smoke, removing up to 80 cubic feet per minute of unpalatable air.

And, of particular interest to hay fever sufferers, these appliances filter the air by drawing it through layer after layer of specially treated spun glass, which catches the dirt, lint, and pollen.

In addition to weighing the sales potential of air conditioners and their ability to better American home life, we considered our company's accumulated experience in marketing and advertising, and our ready-made, nation-wide dealer-distributor organization which would welcome the opportunity to merchandise RCA air conditioners.

To this we added the plus factor available in the RCA Service Company with its trained technicians and its service centers located in most major cities, ready to install and service RCA room air conditioners anywhere. We foresaw that through the cooperation of the RCA Service Company, RCA dealers could write off the installation and maintenance problem which has plagued dealers in the past.

We also took note of the fact that air conditioners enjoy their greatest sales during the summer when television sales tend to slacken off.

When all the facts were in, the company's decision was clear and inevitable. And last October, President Frank M. Folsom issued the announcement that the Radio Corporation of America, through the RCA Victor Division, was entering the home air conditioner field.

New RCA air conditioner especially adapted for small to moderate-sized rooms.



During the six months since Mr. Folsom's announcement, RCA has built the nucleus of an organization to merchandise our new products. As sales manager for air conditioners, the company has appointed William F. Carolan, who has a wide and diversified background in marketing home appliances. S. D. Conley, a veteran of more than 25 years' experience in RCA Victor sales and engineering activities, is merchandise manager. E. Burt Close is in charge of air conditioner advertising, and Thomas Ford is engineering manager.

Three Conditioner Models Available

In addition, the air conditioner department has six field representatives, and 63 distributors. Dealers in all parts of the country will sell our new products.

RCA is offering three models, the "Thirty-three," the "Fifty," and the "Seventy-five," of one-third, one-half, and three-quarter horsepower, respectively. In performance, they equal the best in the field; in appearance, we feel our products surpass all others.

RCA air conditioners are made to the company's own designs by the Fedders-Quigan Corporation of Buffalo, one of the outstanding companies in the industry.

A diversified advertising and promotion campaign will support our new products, leading off with a 2-page color spread in *Life* magazine on May 26, followed by single pages in *Life* and many full-page newspaper ads.

"Tune in perfect weather with an RCA room air conditioner" is to be the theme of the campaign. The copy will be partly educational, highlighting the whole range of services performed by the appliances.

On television, the air conditioners will share the commercial time on the "RCA Victor Show," a Friday evening feature on the NBC-TV network, and on the popular "Kukla, Fran and Ollie" program. RCA Victor radio programs, including the Sunday evening favorite, "Phil Harris-Alice Faye Show," will also carry air conditioner commercials.

The RCA dehumidifier will come under the jurisdiction of the same personnel who handle the company's room air conditioners. The colors of the dehumidifier, a combination of arctic tan and polar beige, are the same as the RCA room air conditioners.

Designed principally for home use, but suitable for many commercial establishments, the RCA dehumidifier will remove up to 12 quarts of moisture from the air in a 24-hour period, and is capable of controlling humidity in closed areas up to 8,000 cubic feet. It is operated by a 1/8-horse power compressor, which is hermetically sealed, permanently lubricated, and quiet in operation.

Experiments have proved that the dehumidifier will help stop mold and mildew damage to fabrics and leather goods, protect furniture and woodwork from rot and warp, and speed up clothes drying by 400 per cent.

RCA's electric dehumidifier removes up to 12 quarts of moisture from the air in a 24-hour period.



Selecting Mood Music for TV Programs

A TELEVISION drama without background music, someone has said, is like a stage setting without scenery; it's bare, empty and lacks the third dimension required to round out the mood of the play. How pertinent this observation is to the operations of NBC television programming is evident in the scope of activities behind the scenes in the network's music department.

Music for NBC's television dramas is carefully selected by a staff of five music programmers, all of whom have had a formal musical education and all of whom have remarkable memories. The latter attribute is essential, because the catalogues of recorded incidental music—no matter how descriptive—are not adequate guides to the approximately 10,000 selections in the special library and to the 100,000 records in NBC's regular record library.

Margaret Snider, who heads this particular operation, started the special section in 1945 with only a desk and a turn-table. When Miss Snider first began working on background music for television, she had access only to the standard classical record library. Today, with physical facilities commensurate to her staff of assistants (an office and four "roomettes" in which music programmers and directors can listen to the music), Miss Snider has amassed, in addition to two libraries of specially recorded music on 16-inch vinylite discs, seven English libraries of special background music, composed originally for film use and now used extensively in television and radio, here and in England.

Catalogues for each special library provide the programmer with clues to the general mood of each record. Under the heading of "Dramatic Atmosphere," for instance, there are records titled "Aftermath," "Deserted City," "Haunted House," "Snow Scene," "Motif for Murder," and "Stop Press." Under "Fanfares," you'd find such titles as "Big Moment" and "Majestic." Under the heading of "Light Atmosphere" the gamut runs from "All Strings and Fancy Free" to "Exhilaration" and "Shopping Center." Other general headings include "Marches," "Melodic," "National," "Oriental," "Sea," and "Storm, Machines, War" (containing "Engine Room," "S.O.S." and "Shipwreck," in that pessimistic order).

Other catalogues may be a bit more helpful. "Fin-
counter at Dawn," for instance, is described as "very heavy and dramatic, but quick moving, then becoming more subdued, but still with a dramatic and sinister atmosphere."

"The individual compositions," Miss Snider said, "can be broken down into several moods and can be used in



With stop-watch and script, NBC's Margaret Snider selects music in the proper mood for the background of a television drama.

whole or in part. But the fact that the library is so much larger and so much more varied than a written catalogue would indicate that the music programmer must rely very heavily on his memory. Besides, he should keep an open mind, since one piece may be applied to many different situations—one week tragedy, another mystery, another comedy, and so forth. Since catalogues don't really indicate the full use to which records can be put, one must interpret the mood of the script and paint in the background from knowledge tucked away in one's own mental file."

Miss Snider and her staff—Marilynn Kilgore, Phebe Haas, Lea Karina and Harold Venho—select music for about 20 television shows a week. Within the last two years a number of radio shows have also found it expedient to use recorded background music. A half-dozen such radio shows are on the air now, with the number rising to twelve or fifteen in the Summer season.

An hour-long TV drama, such as "Television Playhouse" or "Robert Montgomery Presents," demands a varying amount of time for music selection, depending on the individual director and the amount of music to be used. Ten to sixteen hours for a single script is average. A period piece takes longer, because the selector tries first

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Phonograph Records Make Strong Comeback in 1951

By L. W. Kanaga

Manager, Commercial Sales and Merchandise Division,
RCA Victor Record Department

THE phonograph record business—which soared to all-time heights in 1947 only to meet a declining market the following year—has made a strong comeback.

There was a confusing fog for a while created by the introduction of the new-speed records, but it has cleared away, leaving the industry healthier than ever before in its history. According to a consensus of the best available industry estimates, dollar sales, which were \$233 million in 1948 and fell to \$202 million in 1949, rose to \$284 million in 1951.

It is true that record unit sales have declined, but the amount of actual music sold has increased—the difference being that more music is contained on the new-speed records. A symphony which, on the old 78-rpm speed, would occupy an album of four or five records today comes complete on a single 33 $\frac{1}{3}$ -rpm record—usually at lower cost, too. So the rise in dollar volume means that people definitely are buying more music.

It must be explained that the lack of a central data-gathering organization or a standard method of reporting makes it difficult to determine trends in the record industry. Most figures now available (from musicians' union fees, excise taxes, etc.) have to be adjusted and coordinated and often must be projected before they begin to make sense.

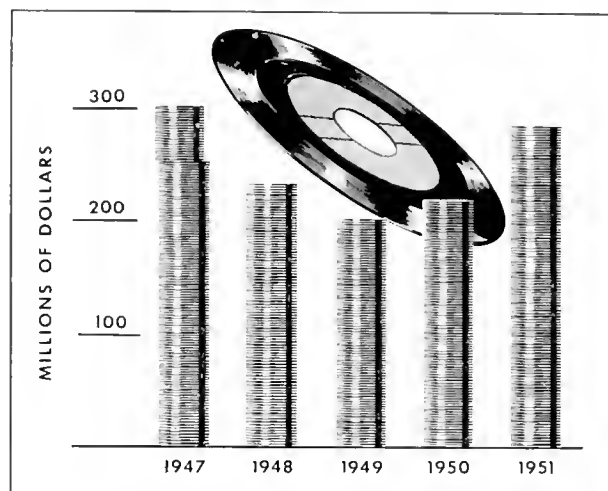
Industry Selling More Music

But one fact is plain: the industry is selling more and more music and is bringing in more and more dollars.

Chief factors entering into the firm position of the phonograph record business are:

1. The "speed" war and its attendant confusion—which kept many from buying records—is now a dead issue, most companies agree. The major record makers now produce in all three speeds. The 78-rpm records are dying out and the new speeds are contributing the largest share of the total volume. Both of the new speeds have their champions among consumers. While it is true that 45-rpm records have the edge in popular and light classical works, and 33 $\frac{1}{3}$'s sell better in the heavier selections, the record buyer's choice depends mostly upon which system he owns.

2. Revivals are beginning to play an important part



Phonograph record sales made strong come-back in 1951.

in both the classical and popular market. Among these, RCA Victor's "Treasury of Immortal Performances" series is notable. Caruso's records alone sold more than a half-million last year. This may be the strongest indication that the industry has come of age—for with its earlier products having a permanent demand from the older generation, there is a constant self-renewing market in collectors' items.

3. A basic sales factor is the number of phonograph players in homes. In 1941 there were only 3.3 million players in home use. During the following decade this sky-rocketed to 21.97 million—a solid market foundation.

TV has increased Record Sales

4. Television has not cut into record sales as was widely feared. In fact, TV has increased sales, according to recent RCA Victor surveys and sales figures. They indicate sales are best in television areas and that TV set owners themselves buy more records than non-owners.

There are several theories as to why this is so. One is that a TV set in the house keeps people home more often, and while they're home their chance of playing records is increased. Another reason might be the fact that, like live musical performances, television "sells" people on music and makes the recording artists more familiar to them.

5. The present state of low inventories (compared to 1948 and 1949) is another market booster. It allows greater facility in meeting fast-changing market demands.

6. The growing popularity of classical music is having its effect, too. Before the war the ratio between pop and classical record sales was about 80 to 20. Now it is estimated at approximately 70 to 30. This is gen-

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Fading of Radio Signals Minimized by New Transmitter System

By Grant E. Hansell

*RCA Laboratories Division
Riverhead, N. Y.*

Fading of radio signals has been a problem for the communications engineer since he first attempted to transmit radio messages over distances of 100 miles or more. It required only a short time for research to reveal the Cause, the Remedy—even a partial one—is taking a great deal longer. While a complete mastery has not yet been reached, one of the most recent developments, a system called Transmitter Diversity, already has demonstrated its value in minimizing the effects of fading in certain types of communications.

In the early Twenties, when transoceanic radiotelegraphy was coming into its own as the fastest means of intercontinental communications, fading had to be taken in stride. In the knowledge of its cause lay a paradox. Strangely enough, the same phenomenon which made long-distance radio possible was also the basic cause of fading signals, namely the so-called Kennelly-Heaviside Layer. This layer, a mass of ionized particles high in the atmosphere, is created by the action of the sun's rays upon molecules of gas in the air. The particles act like a huge mirror reflecting back to the earth the radio signals which have passed beyond the horizon and outward into space.

Without this "ethereal blanket" long-distance telegraphy, radiotelephony, broadcasting, and radiophoto would be undependable, if not impossible. With it there is almost no limit to the travelling span of a radio signal, provided enough power is available at the transmitter.

Early research on fading disclosed that a transmitter signal which faded at one location was, at the same instant, at its maximum strength at another receiving point some distance away. Further experiments revealed that it was possible to connect the outputs of two receivers, connected to spaced antennas, so that the stronger signal, or a combination of the two signals, could be selected at all times. This method, called Receiver Diversity, has been in use for many years at the large radio centers operated by RCA Communications, Inc., at Riverhead, N. Y., Point Reyes, California, and many other locations.

From the foregoing description it is obvious that Receiver Diversity requires considerable space for the location of the two receiving antennas, thus limiting its use principally to fixed land stations. Reception by this method on planes, ships at sea, or at receiving points in congested areas, such as large cities, is impractical.

With this knowledge RCA engineers began work on Transmitter Diversity. They reasoned that duplicate transmitters connected to spaced antennas in the same manner as the receivers in the earlier method would provide a single distant receiving point with a continuously usable signal, since it was extremely unlikely that both incoming signals would fade simultaneously.

To determine the soundness of this theory, RCA conducted tests from Bolinas, Calif., to Riverhead, N. Y., and later from Bolinas to receiving points in lower and midtown Manhattan. In each instance, results demonstrated the effectiveness of Transmitter Diversity, particularly in urban areas where man-made radio noise is at a high level.

Transmitter Diversity, however, is not expected to replace the established Receiver Diversity for most point-to-point circuits but it does offer a practical solution for certain types of important message services, including shore-to-ship, ground-to-plane, and fixed base to mobile vehicles.

From an economic standpoint, also, Transmitter Diversity has an advantage. It is less costly, for instance, to improve the reception of a signal at a single receiver by adding a second transmitter than to increase the power of the single transmitter to get the same results. The power of the single transmitter would have to be increased from 16 to 1,000 times that needed by each of the dual transmitters to give the same results at the receiver.

New Power Tube for UHF

A new power tube, expected to be of special interest to designers of UHF transmitting equipment has been announced by the RCA Tube Department. Intended for UHF service in television and continuous wave applications, the new tube, a triode, is very compact, having a diameter of $1\frac{3}{4}$ inches and a length of $3\frac{1}{4}$ inches. It can be operated at maximum ratings at frequencies up to 900 megacycles per second.



NBC Operates One of World's Biggest Box-Offices

More than Three Million Tickets for Free Programs Issued Yearly

By Peter M. Tintle

*Manager, Guest Relations,
National Broadcasting Co.*

THE National Broadcasting Company operates one of the biggest and busiest box-offices in the world. The Broadcast Ticket Division, a function of the Guest Relations Department, prints and distributes the fantastic number of more than 3,000,000 tickets a year. On any normal day, the Division handles tickets which involve an average of 450 different shows.

The unique feature of NBC's box-office is that all of its tickets are free, even though many admit their holders to productions, symphonies, etc. that may have cost up to \$75,000 to produce. Naturally, with the leading entertainers in the world appearing on these free shows, a greater demand is created for tickets than could be ordinarily expected of paid performances. As a result, more requests for tickets to a popular program are received in one week than could possibly be filled in an entire year. And since demand for "hit" shows is constant, it is, unfortunately, impossible to fill most of the requests.

How Tickets are Distributed

The public generally has little idea of the method and scope of ticket distribution. The broadcaster's first obligation is to the advertiser who has paid for the show and the cost of air-time. Consequently the advertiser obtains a goodly supply of tickets. In most cases these tickets are used for dealer promotion or for other purposes that will help to sell the product advertised. In some instances, many of these tickets will eventually reach the public. Depending upon the popularity of the program, it is customary for the sponsor or his advertising agency to take over 70 to 100 per cent of a studio's seating capacity.

With the first obligation to the advertiser, the broadcaster must then accept the responsibility of handling the remaining tickets with the utmost care and tact.

For example, the Press Department needs tickets for its magazine and newspaper contacts, all of whom are in a position to help NBC with favorable comments on programs. The Sales Department faces a demand for tickets from clients and prospective clients. The Station Relations Department must have its supply for distribution to affiliated station owners and managers, who in turn are obligated to local sponsors and advertisers.

The Broadcast Ticket Division has another important activity. It receives and acknowledges all mail received directly from the general public concerning broadcast tickets. These letters total about 1,200 daily the year around. Because he is an "out-of-towner" and expects to be in New York for only a brief visit, the average letter-writer finds it difficult to understand, for instance, why he cannot get tickets for the Sid Caesar program or one of the other more popular shows. The one thing he does not realize is that New York City is well-populated with out-of-towners at all times.

Listeners Express their Preferences

The correspondence section of the Broadcast Ticket Division does have its lighter moments. Many of the letters, although written in complete sincerity, are sources of amusement to the staff. Recently a letter from a self-styled music lover expressed a wish to attend a Toscanini Concert, but insisted that NBC make sure that the program include only melodic music. He added that, in his opinion, it was a great waste for a tremendous orchestra to play music for a solid hour "going diddle-de-dee — starting nowhere and ending nowhere". In 1947, an elderly lady from Georgia, wrote in asking for two tickets to attend a program which since has gone off the air. This particular program, besides featuring honeymooners, also presented couples who were celebrating wedding anniversaries. To support her request, the woman enclosed a self-portrait in water color, and explained that since she would be celebrating her 50th wedding anniversary in 1953 she wanted to be placed on our list to receive tickets on that anniversary date, six years hence.



R. E. Lafferty (left) and J. L. Hathaway, NBC engineers, demonstrate the electronic "gun-shot reinforcer" which they developed for radio and TV dramas.

Electronic Device Makes Gun-Shots Sound Real on Dramatic Programs

An electronic device that produces the authentic sound of a revolver shot has been added to NBC's storehouse of Special Effects. The "gun shot reinforcer," as it is called, was developed by the network's Engineering Development Group.

The device, which operates automatically, is housed in a rectangular unit the size of a typewriter case. It is plugged into the system or line carrying the sound portion of the TV program. When the script calls for the firing of a shot, a blank pistol is discharged in the studio and the sound of the shot triggers a circuit in the "reinforcer" which instantaneously produces its own gun shot.

The sound, as heard on radio or television at home, is a combination of the actual pistol shot in the studio and the electronic gun shot. The accumulative effect is a "pooowww," or a perfect sound reproduction of a gun shot.

Only the sharp crack of a pistol shot can set off the "gun shot reinforcer." It is not energized by studio dialogue, music, cries, yells, or any such noises.

NBC engineer Raymond F. Lafferty constructed the device based on an electronic principle suggested by J. L. Hathaway, assistant manager of the Development Group.

Metal-Shell Kinescopes

(Continued from page 16)

the meeting of critical specifications. This feature permits the use of a high-grade, drawn, sheet glass which is optically superior to and considerably more uniform in thickness than the faceplate molded as an integral part of all-glass kinescopes. Further, this independent production of the faceplate insures freedom from mold marks, blisters, and other imperfections which may develop during the molding of glass bulbs.

(2) The metal tube has a weight advantage over comparable all-glass types. In larger sizes, metal tubes are as much as 15 pounds lighter, a factor which makes such tubes easier to handle in receiver production and assembly, permits the use of lighter and less-expensive supporting structures in the chassis and receiver cabinet, and reduces shipping costs.

(3) The metal kinescope's inherent mechanical strength reduces breakage and permits a more rapid and flexible handling of the tube during its assembly and test operations.

(4) Exclusive characteristics of the metal tube represent sales appeals to the set manufacturer's customers. The relatively flat, thin, faceplate of uniform thickness permits wide-angle viewing and less picture distortion than the all-glass tube. Further, the metal tube's faceplate is specially treated to eliminate reflections from any angle or source. These features add up to a larger, clearer, superior picture for the manufacturer's customers.

At the present time, RCA produces metal-shell kinescopes at its tube production plants in Lancaster, Pa., and Marion, Indiana.

Metal-shell kinescopes were introduced by RCA in 1948, after more than 13 years of research and development. Recognizing that picture sizes would become larger, and that production problems encountered with all-glass envelopes would be magnified in the larger sizes, RCA tube engineers in 1935 initiated a research program to develop more practical and suitable production materials.

After exhaustive tests, a high-chromium steel alloy was selected for the shell section, giving the tube its unusual combination of strength and light weight.

In December, 1948, the company made commercially available the 16AP4 kinescope, the television industry's first metal-shell picture tube. This first metal tube, pointed the way to low-cost, mass-production of still larger kinescope sizes such as RCA's 21AP4, introduced last year, which continues in heavy demand by set manufacturers.

Phonograph Records Make Comeback

(Continued from page 26)

erally considered to mean a growth in serious tastes and not a reduction of the popular market.

7. Pop sales are also rising. Earlier, a record which sold a million copies was unusual. Now it's unusual if there aren't many of these million-sellers each year.

These high-sale releases are absolutely necessary to the larger companies. Classical, children's, country and western records are the solid base of the industry, but the real earnings are made on the big, low-cost-per-unit "hits." The importance of huge-sale records lies also in the fact that they get more people into the record stores—people who buy other records at the same time. Also, the sales level of standard pop tunes is up.

8. A widening of the sales outlet base has played an important part. Chain variety and department stores that never handled records before now find them money-makers. People who might not bother to make a special trip to a record store will pick up a record or two when they are shopping for something else in a five and dime.

9. Children's records, like revivals, are increasing their share of the market. Large-scale production planning has a great deal to do with their increased popularity. RCA Victor, for example, spent about \$15,000 recording the "Alice in Wonderland" album. This is contrasted with the early days when one man on a banjo made a "kidisc" as they are called. The increase goes into better storybook material, better performers and a more thorough production.

10. The most important factor in the revival of the record market is the all-around higher quality of the product. Slower speeds and non-breakable records have reduced two of the manufacturers' toughest problems—the reluctance of dealers to buy large amounts of space-taking, fragile records. The higher fidelity of the new records gives them wider acceptance at all "ear" levels.

One sign of the phonograph industry's present state of optimism is the current number of re-recordings of older works such as operas which require tremendous investments. Not long ago, record companies would not consider such an expenditure, but in the last 18 months RCA Victor alone has recorded three full-length operas with the best artists available. These were "Carmen," "La Traviata" and "Rigoletto." "Il Trovatore" is now being recorded at a cost of about \$50,000.

There is no reason to believe that the record industry will not continue its present healthy growth. There is a large market to fill and new and better products are available to offer the people of the world.

Selecting Mood Music

(Continued from page 25)

for authenticity, at the same time maintaining the mood and keeping the music unobtrusive and in good taste.

"We get the script about a week in advance," Miss Snider said. "The music programmer, who is assigned a specific group of shows permanently, reads the script, gets an idea of the type of music needed. Sometimes the director marks the places where he wants music in the script. Then the programmer selects music—sometimes pulling out ten times the amount of music finally needed. Helped by the music programmer, the director makes the final choices."

After the director approves the selections, the music programmer types a synopsis of the visual or dialogue cues for the turn-table engineer, and indicates the record numbers, starting positions (which are also marked on the records in red crayon) and other details, stacks the records in the proper order and arranges to have them delivered to the studio in time for rehearsal.

The selection of music is not a programmer's only concern, however. She is responsible for seeing that the music on each program is cleared for copyright, kinescope rights, tape-recording and other rights. She is constantly searching for new material and replenishing her stock.

"We've just ordered our third dozen of King Palmer's 'The Film Opens,'" Miss Snider said. "This is the popular theme of WNBT's 'Eleventh Hour Theater,' and it's played four or five times a day—for station-break announcements—besides being played on the program."

"Generally we can make better use of unfamiliar music for backgrounds. Many well-known classics are specifically identified with a composer or a drama. Of course there are exceptions. We made wonderful use of Stravinsky's 'Rites of Spring' in an Indian battle scene on the Gabby Hayes Show. And the works of Howard Hanson, Aaron Copland and Prokofier are excellent standbys for various kinds of backgrounds."

II RCA Scholarships Granted

Eleven university students from eight different states have been awarded RCA scholarships for the current academic year. These undergraduate students, majoring in various fields of pure science or in branches of engineering, have received scholarship grants of \$600 each. Since 1945, when the awards were inaugurated, more than a hundred RCA scholarship and Fellowship grants have been made.

The Master of ESSO CHATTANOOGA, views the scope of Radiomarine Radar.

The ESSO CHATTANOOGA, one of the sixty ESSO vessels equipped with Radiomarine Radar. Many are also equipped with Radiomarine Radiotelegraph and Radio Direction Finding Equipment.

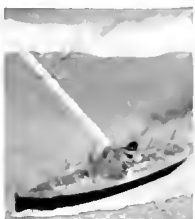


60 RADIOMARINE RADARS[®] for Esso vessels speed oil deliveries in all weathers

You get all 4 navigational aids with Radiomarine 3.2cm Radar



Pilotage



Location Finding



Anti-Collision



Storm Detection

• By the end of 1952 you'll see Radiomarine's 3.2cm, 4-purpose Radar aboard forty-seven seagoing tankers of the fleets of Esso Shipping Co. and other Standard Oil Co. (N. J.) affiliates. In addition, there are thirteen similar units aboard vessels of the Esso Standard Oil Co. on the inland waterways.

In all kinds of weather . . . through fog, darkness and storm . . . on the high seas . . . in and out of heavily trafficked ports, Radiomarine Radar will help ESSO vessels operate on regular schedules . . . make fast and safe deliveries.

Ship operators get more for their money with Radiomarine's 3.2cm Radar. Its 4-purpose application is the answer to faster, safer, more dependable navigation at sea, in harbors or on inland waters.

For complete information write: Radiomarine Corporation of America, Dept. TL, 75 Varick St., New York 13, N. Y.

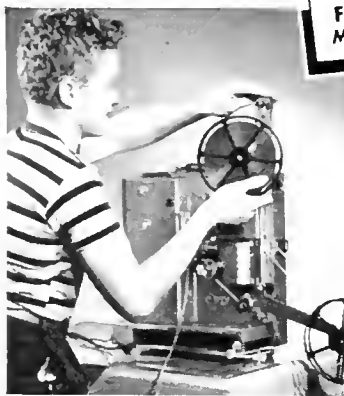
RADIOMARINE CORPORATION of AMERICA, 75 Varick St., New York 13, N. Y. Sales and Service Offices in principal ports. Foreign Distribution and Service—RCA International Division, 30 Rockefeller Plaza, New York 20, N. Y.



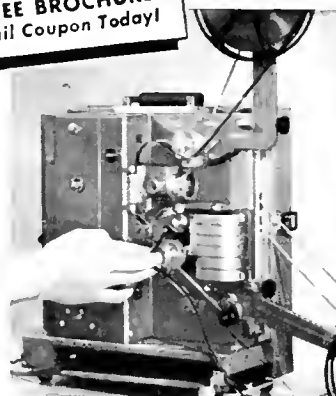
RADIOMARINE CORPORATION of AMERICA

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Amazing New "Thread-Easy" Projector Makes Film Showing *4 Ways Easier!*



1 Set up in 2 minutes!
No more lost time setting up. With the RCA "400," you can put picture and sound on the screen in *only 2 minutes*. Or let a youngster do it. *It's that easy!*



2 Thread film in 30 seconds!
Thanks to RCA's new "Thread-Easy" design, you can thread it while you're lecturing . . . thread it with one hand . . . thread it in the dark.



3 Pack up in 3 minutes!
No more packing-up troubles. You can button up the complete RCA "400" projector and speaker in *only 3 minutes*. Or let a child do it. *It's so simple!*



4 Carry like an overnight bag!
Single-case Junior weighs only 33½ lbs. Women appreciate its lightweight, rounded corners, proper balance. No chafing your leg as you walk.

Easiest Projector to Use!

Imagine showing movies with a projector so simple you can set it up in 2 minutes, thread film in 30 seconds, pack up in 3 minutes, and carry lightly as an overnight bag!

Now . . . thanks to RCA's new "400" Junior projector, you can show 16mm movies *far more easily than ever before!* New RCA "Thread-Easy" design is so simple you can let a 12-year-old child run the projector. They're *top-quality* movies, too. *Both picture and sound far exceed recommended standards of *SMPTE . . . by actual tests.*

No More Torn Film!

Your precious film literally "floats" through this new "400" projector. "Thread-Easy" design is so amazingly effective, even minor errors in threading will not damage film.

With *projector running*, you can open and clean picture gate or sound optics . . . *without damage to film*. And you can project the same film 50 or 500 or 5,000 *times . . . without appreciable wear or damage to film!*

No More Last-Minute Failures!

It's ultra-dependable, too. Built for the hard knocks of school and commercial use. You can easily replace projection lamp in 45 seconds, exciter lamp in 20 seconds. Rewind 10-minute film in 66 seconds, without changing belts, pulleys, or reels. It's the only projector powered by a big A-C motor, 500% *oversize* for better sound stability. Big motor takes it easy, stays cool, *lives longer*. And it's *quiet*. Operating noise only 58.5 decibels. *Quieter than recommended by *SMPTE . . . quieter than other projectors by actual tests.*

In Competitive Tests, RCA 400's Win Out!

In a single purchase, Pennsylvania schools bought 572 RCA "400's." Baltimore schools bought 156. Washington, D. C. schools bought 81. Already many thousands of RCA "400's" are out on the job . . . *giving 4-way help . . . making things easier . . .* for busy people just like you.

Operate It! Convince Yourself!

If you use 16mm film in your teaching or selling (and who doesn't?), *you owe it to yourself* to find out about this revolutionary new easy-to-use projector. The new "Thread-Easy" design is the culmination of 23 years of RCA research. Send coupon for demonstration. *Operate it yourself!* Large sales permit surprisingly low price for this top-quality equipment. Underwriters' Approved. Backed up by RCA. Nation-wide service available. *So mail coupon TODAY.*



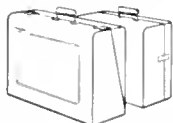
VISUAL PRODUCTS

RADIO CORPORATION of AMERICA
ENGINEERING PRODUCTS DEPARTMENT, CAMDEN, N. J.

In Canada: RCA VICTOR Company Limited, Montreal



RCA "400" Junior. Handsome blue-green finish. Weighs 33½ lbs. 7-watt amplifier, 8-inch speaker. For medium to large rooms.



RCA "400" Senior. Same as "Junior" except 10-watt amplifier, 10-inch speaker. Projector-amplifier weighs 26½ lbs.; speaker-accessories, 26 lbs. For larger rooms, auditoriums.

*SMPTE: "Society of Motion Picture and Television Engineers," leading authority on projector standards. SMPTE recommends "unsteadiness of projected picture less than 3/10 of 1% of picture width."

In RCA "400" projector, horizontal unsteadiness is 1/10 of 1% (3 times as good

as SMPTE standards). Vertical unsteadiness is 1/7 of 1% (2 times as good as SMPTE standards).

Sound quality is also better than SMPTE standards . . . distortion less than 5%.

All tested and proved by RCA, foremost pioneer in 16mm sound projectors.

FREE BROCHURE—MAIL COUPON—NOW!

Visual Products, Dept. 9-V
Radio Corporation of America, Camden, N. J.
Please send me, without obligation, full story on new easy-to-use RCA "400" 16mm projector that I can set up in 2 minutes, thread in 30 seconds, pack up in 3 minutes, and carry lightly as an overnight bag.

Am interested in Junior Model for classrooms
 Senior Model for auditoriums

Name _____

Position _____

Address _____

Please arrange actual demonstration

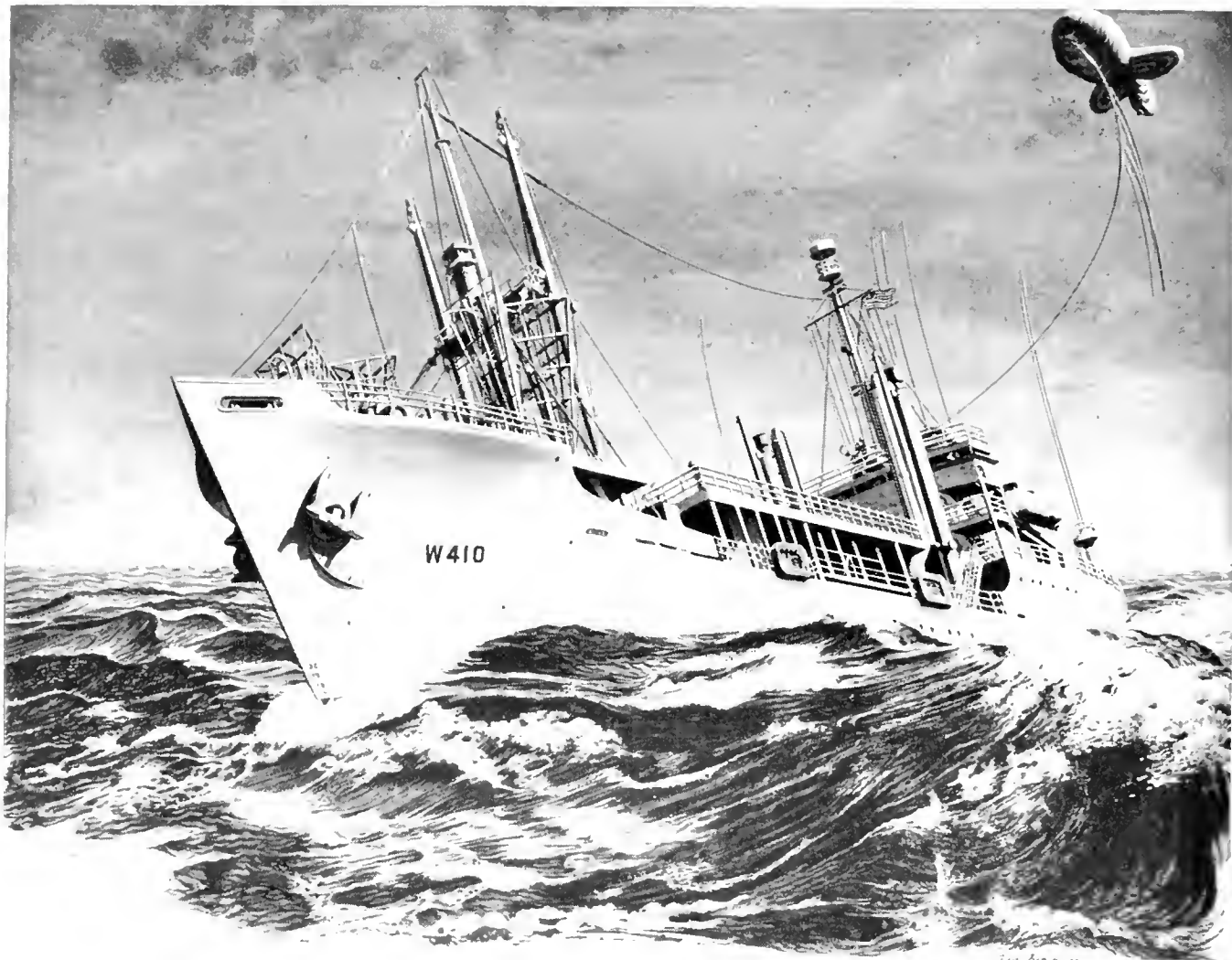


RESEARCH • MANUFACTURING • COMMUNICATIONS • BROADCASTING • TELEVISION



JULY
1952

"ALKIE-LOOKIE"
AT THE
CONVENTIONS



The U.S.C.G. Cutter *Courier*—armed with Truth, not guns—will use its RCA transmitter to beam messages of hope to Iron Curtain countries, and will also be a good-will ambassador to the free nations.

Freedom's clear voice goes to sea

When broadcasting Freedom's message to Iron Curtain countries, transmitters must contend with deliberate radio interference, created to "jam" the air. Aboard the Truth Ship *Courier*, a powerful RCA transmitter fills most of one cargo hold, while a second hold contains Diesel generators which produce 1,500,000 watts of electrical power. Amidship, a special deck is the launching platform for a barrage balloon which carries the antenna high aloft.

In operation, the *Courier's* radio voice will follow regular schedules, so that listeners—often tuning in at serious risk—will know when broadcasts are coming through.

These people are seeking to learn the Truth, and want to hear it despite the thousand jamming stations built in an effort to keep Freedom's messages from penetrating the Iron Curtain.

Development of broadcast equipment for use on land and sea is only one example of RCA pioneering in research and engineering. It is your assurance of finer performance in all products and services of RCA and RCA Victor.

See the latest in radio, television, and electronics in action at RCA Exhibition Hall, 36 West 49th Street, N.Y. Admission is free. Radio Corporation of America, RCA Building, Radio City, New York 20, N.Y.



RADIO CORPORATION OF AMERICA

World leader in radio—first in television

Radio Age

H • MANUFACTURING • COMMUNICATIONS
BROADCASTING • TELEVISION

JULY 1952



COVER

NBC's Dave Garroway demonstrates one of the Walkie-Lookies developed by RCA and used for the first time at the political conventions in Chicago. (Kodachrome courtesy of Popular Science Monthly.)

NOTICE

When requesting a change in mailing address please include the code letters and numbers which appear with the stencilled address on the envelope.

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VOLUME 11 NUMBER 4

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RADIO CORPORATION OF AMERICA
RCA Building, New York 20, N. Y.

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RCA Communications, Inc. • RCA Laboratories Division • RCA Institutes, Inc.



NBC's "TV Newsroom on Wheels" goes into action against a background of Chicago's skyline.

NBC Covers the Conventions

Staff of 300 Technicians and Commentators, Aided by \$2,000,000 of Equipment, Set New Record of Coverage in Service to TV and Radio Set Owners from Coast to Coast

THE view and sound of a gavel wielded by the party's national Committee chairman signaled the opening of the 1952 Republican Convention in Chicago on July 7, and set in motion the most complete and complex array of television-radio facilities ever assembled at one time for any occasion. It brought to realization the extensive plans over which scores of NBC engineers and programming experts had pored for nearly a year.

For the first time in history the video facilities, ranging from TV cameras on the floor to long files of microwave relay towers and miles of coaxial cables made it possible for the colorful and sometimes frenzied scenes of a national political convention to be witnessed simultaneously in nearly a third of all homes from coast to coast.

Actually, NBC's convention coverage had started several days earlier. During pre-convention week the network presented eight hours of special TV programs. Included were sidelights of the tense battles for contested convention seats as well as the press conferences that were held by candidates for the presidential nomination.

Some idea of the extent of NBC's participation in the convention can be had from statistics compiled by the network.

To report and observe every move on and off the convention floor at the Chicago Amphitheatre, at the National Committee headquarters in the Conrad Hilton Hotel, at railroad stations and other focal points, NBC assembled a staff of 300. Some were "borrowed" from the network's owned and operated stations, including eleven technicians from Hollywood.

These staff members were supplied with the latest equipment including several units never before used in the coverage of national events.

One of the most interesting of these accessories was the walkie-lookie, a portable TV camera-transmitter originally developed through research at the David Sarnoff Research Center, Princeton, N. J. The hand sized TV camera, weighing 10 pounds, together with its 50-pound back-pack transmitter made it possible for commentators and observers to extend the scope of their

coverage into areas where standard cameras could not go. The walkie-lookie transmitted a regular TV picture-plus-sound from the scene of action to its associated base station thence through the network to home viewers tuned to NBC stations.

Another equipment newcomer, unveiled for the two conventions, was NBC's super mobile unit, rebuilt from a 44-passenger bus. Variouslly called a "disaster unit", "crash truck" or "TV newsroom on wheels", the 35-foot truck with its complement of television cameras and controls, film cameras and fast-developing dark rooms, film projectors and microwave transmitter showed its ability at Chicago to speed to any point of interest and to record and transmit the action for immediate retransmission over the network or delayed transmission from developed film reels.

The truck's film-developing unit is a radical departure in that field. The apparatus proved that it could turn out 300 feet of negative 16 mm film in 15 minutes, six times faster than ordinary developing machines.

Few home viewers of the convention scenes could realize the full extent of preparations and materials involved in bringing these political highlights to the American people.

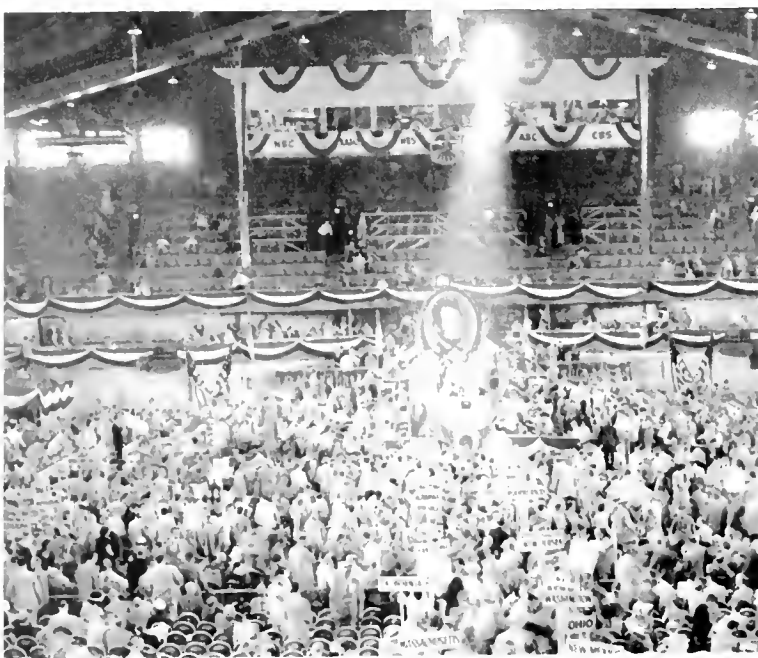
Part of the tons of radio-television instruments and equipment shipped to Chicago by NBC for use during the political conventions.





Portable walkie-lookie unit is dwarfed by a huge parabolic receiving unit used to pick up microwave signals from walkie-talkies on the auditorium floor.

Television and radio booths are located high above the speaker's platform enabling observers to watch action in all parts of the Amphitheatre.



Plans developed by NBC called for the installation, solely for this purpose, of \$2,000,000 of equipment. Included were one hundred miles of wiring and ten tons of audio or voice apparatus, augmented by 28 electronic cameras, 12 film cameras and numerous tape recorders.

Each Delegation has Microphone

Although all networks utilized the facilities, NBC engineers installed and operated the 55 microphones and loudspeaker system which connected the speakers platform and all state delegations seated on the floor of the Amphitheatre.

From a common control point directly beneath the rostrum, the microphone-speaker circuits could also be connected directly with newsreel headquarters and other loudspeaker outlets both inside and outside the auditorium.

To simplify communications with its extensive personnel stationed at widespread locations in the Convention city, NBC compiled its own telephone directory and in addition, arranged a special 24-hour teletype system connecting the Amphitheatre with all affiliated stations on radio and TV networks.

As working space for its contingent at the Amphitheatre, NBC constructed three TV studios, five radio studios, and an assortment of rooms for offices and as storage space for the large stock of spare parts, test instruments and general supplies.

Telecasts originated by NBC at the Republican Convention were broadcast in 47 key market areas throughout the nation, surpassing all other network coverage by more than 35 per cent. Based on the 17,800,000 television sets presently in use, it is estimated that 70,000,000 viewers were in range of the convention scenes transmitted by WNBT and affiliated NBC stations. When television covered the 1948 conventions in Philadelphia, distribution of the featured programs was limited to 5,000,000 persons along the Eastern seaboard. At that time, stations beyond this area were forced to rely on kinescope recordings of the proceedings.

In addition to the thorough coverage of the scheduled sessions of the Republican Convention, NBC also originated numerous regular TV and radio programs from Chicago. Among them were "Camel News Caravan"; "Meet the Press"; "We the People"; "American Forum of the Air"; "Youth Wants To Know"; "News of the World"; "Three Star Extra" and "H. V. Kaltenborn and the News".

All facilities used during the G.O.P. assembly were duplicated for the Democratic conclave which opened July 21, in Chicago.



Iron Curtain Is Penetrated by Powerful RCA Transmitters

WITH a giant half-mile-long antenna pointing the way with pin-point accuracy and force, the four RCA 50-kw high frequency transmitters located at the new Radio Free Europe Station at Gloria, Portugal, are now hurling daily messages to vital target areas behind the Iron Curtain.

Features of the RCA 50-kw units which made them particularly acceptable for use in Portugal include an efficient method of cooling the tubes by circulating air; amplifiers that were stable; ability to shift from one frequency to the other with a minimum loss of time, and their compactness, a factor which reduced installation and building construction costs.

The station at Gloria creates no programs, but for sixteen hours daily it re-transmits Radio Free Europe broadcasts to Poland, Hungary, Rumania, Bulgaria, Czechoslovakia, Albania, and other areas. The station is operated by Sociedade Anonima de Radio Retransmissao (RARET), a joint Portuguese-RFE organization.

Gloria was selected as the site of the transmitters because of its proved excellence as a position from which messages can reach Eastern Europe.

The programs that are broadcast originate in Munich, Germany, where exiles prepare the scripts and read them into microphones for transmission by relay to the Gloria station. The relay is handled by two 10-kilowatt transmitters installed ten miles from Gloria.

With the Gloria station completed and in operation, Radio Free Europe's programs can be broadcast simul-



From this short wave station at Gloria, Portugal, four powerful RCA transmitters beam Radio Free Europe messages across Europe and into Iron Curtain countries.

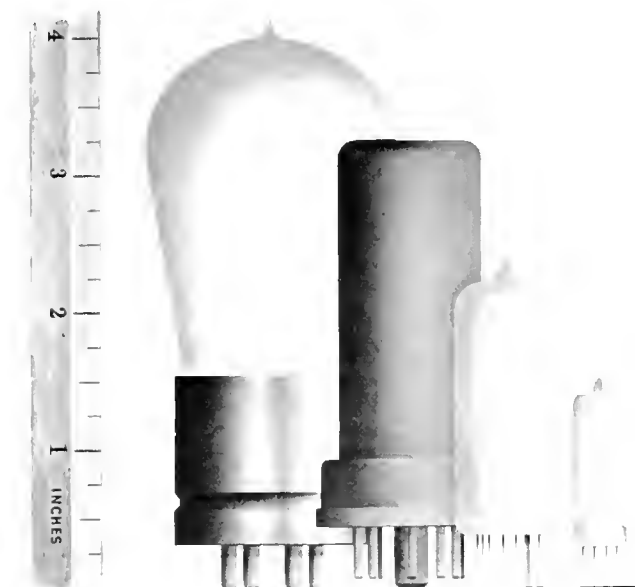
taneously, on different wave lengths, to Eastern Europe, using the facilities of six stations in Munich and Frankfurt in addition to those in Portugal. By transmitting over several frequencies, RFE is able to reach the maximum potential audience in the Soviet captive states and thereby counteract attempts of the communists to jam the programs.

"The expansion of Radio Free Europe, which started broadcasting on July 1, 1950, with a single low-powered transmitter, is a tremendous achievement," said General Lucius D. Clay, national chairman of the Crusade for Freedom.

"Much of the credit for this hard-hitting campaign against Communism goes", he added, "to the American people who have given so generously to the Crusade for Freedom."

General Clay also praised the government and the people of Portugal for their cooperation in making the Radio Free Europe installations possible and completing their construction in the record time of less than six months.

HOW SMALL CAN THEY GET?



Since the familiar type 201 of 1920, electron tubes, like many radio components, have become progressively smaller while improving in performance. Sub-miniature tube of 1952 on extreme right.

A QUIET revolution in design techniques is taking place in the electronics industry. Representing a dramatic expansion of a trend dating back to the late 1930s, it has begun to bear fruit in smaller, lighter, more compact, and more flexible devices and equipment—and some challenging possibilities appear on the horizon.

Probably the most notable disclosure of progress in this program to date came with RCA Victor's announcement of the half-size, half-weight walkie-talkie produced for the U. S. Army Signal Corps. Although some components were so reduced in size that the use of magnifying lenses was required for certain assembly and inspection procedures, the instrument offered twice the range of its larger predecessor, and greater selectivity.

This wedding of smaller size with better performance is typical of results being achieved in this program, known to electronics engineers today as "subminiaturization." An extension of the "miniaturization" which preceded it, this polysyllabic title means simply the reduction of electron tubes, parts, and circuits to the minimum size without lowering the standard of performance.

Subminiature tubes with a volume of only $\frac{3}{4}$ cubic inch, for instance, are being made to do the work formerly allotted to miniature tubes with a volume of $3\frac{1}{2}$ cubic inches. Tuning coils smaller than a dime in

By D. F. Schmit

*Vice President and Director of Engineering
RCA Victor Division*

diameter replace coils several times as large. Flat, two-dimensional printed circuits do away with wiring problems and replace bulky assemblies. A whole family of Lilliputian parts has replaced the familiar capacitors, resistors, transformers, switches, relays, and sockets of yesterday.

The trend to miniaturization began shortly before World War II, but it was the wartime military need for compact units, particularly in the field of airborne communications and navigation equipment, that sparked the miniaturization program. The engineer who has worked on Air Force contracts, knowing how much equipment of all kinds must go into an airplane, understands that, ideally, such electronic equipment should occupy no space and have zero weight. Weight and size are critical considerations. Miniaturization was the best answer to this problem.

The history of miniaturization dates from the late '30s, when RCA developed and produced miniature coils, a 2-by-3-inch speaker, and four miniature tubes for use in RCA Victor's BP-10 "personal" portable radio. These four small tubes, the first of their kind, were a major factor in reducing portable radios to the tiny "personal" size. They were also the forerunners of the whole field of miniature-tube types which have since found widespread commercial application.

Advantages of Smaller Tubes

While considerably smaller in size and lighter in weight than conventional types, these miniature tubes were found in many cases to be superior in performance, especially at the higher frequencies. They also have the advantage of being more flexible in application, and less costly, on the average, than larger types.

The new tubes fitted right into the needs of the military during World War II. As a result of military demands, many new types were developed. The coming of commercial television later gave miniatures another tremendous boost in commercial application. For many functions, miniatures work much better at television's higher frequencies than regular tubes, because they are more compact and have reduced radio-frequency losses. Today, miniature tubes account for between 50 and 60 per cent of RCA's receiving tube production.

RCA's new program of subminiaturization was signaled by the introduction of our battery-operated types of subminiature tubes in 1949. Although subminiatures have now been on the market for some time, their full advantages in size and weight can only be realized when there is a corresponding miniaturization of associated components.

The miniaturization of component parts—coils, transformers, relays, etc.—has been carried out in the Parts Section of the RCA Tube Department.

As new tubes and components have been developed, the market for miniaturized components has steadily increased. The broad possibilities for application of these developments were recognized by the military. This recognition has been a primary factor in the acceleration of both the miniaturization and subminiaturization programs.

How Miniaturization was Accomplished

Three factors helped to make the miniaturization of component parts feasible. One was the development of new materials, of which the best example is the ferrite-core materials, used in deflecting yokes for TV picture tubes, built-in antennas for small radios, etc. RCA was among the first to make use of ferrites in this kind of application. Another was the use of closed powdered-iron circuits which provide higher inductance in smaller spaces. The third was the development of improved methods of humidity protection, employing new types of plastic and casting resins, which make it possible to obtain equivalent performance from coils one-third the size of standard types.

RCA has been producing miniature transformers for about two years. Here, again, most of the orders have come from the government, and units have been manufactured to meet military specifications. In many cases, these orders have merely specified technical requirements

for a unit to fit an assigned space in some military equipment. It has been the problem of RCA Victor engineers to put together a transformer that will meet these requirements.

The availability and continued development of new materials is vital to the miniaturization of transformers. Typical materials are ferrites and new types of magnetic materials which are cheaper, smaller, lighter, and generally superior to the oriented silicon-steel materials which they have replaced. The material used is generally dictated by the technical requirements submitted by the customers.

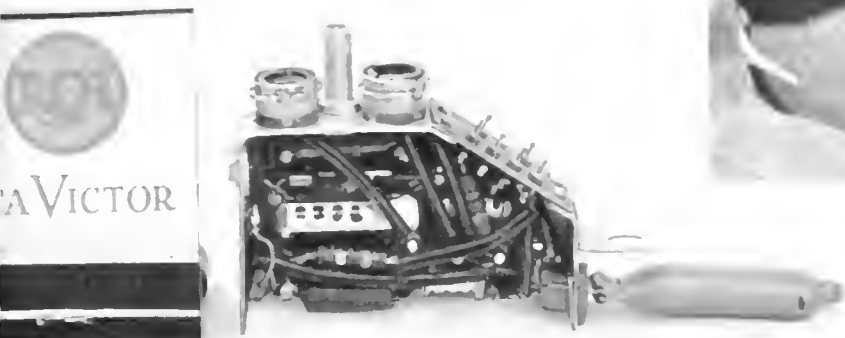
A unique achievement of RCA Victor in the miniaturization of transformers has been the development of a process for encapsulating (covering) certain types of miniature transformers with a special stypol resin—one of the thermosetting plastics. This material eliminates the conventional protective can, reduces the weight of the transformer, and protects it against both heat and moisture. The resin is applied to the transformer with a vacuum impregnation process.

Another RCA Victor achievement in the miniaturization



So tiny are many radio parts today that they must be assembled under magnifying lenses.

Miniature size of complete receiver output section of new walkie-talkie is compared to a match folder.



zation field has been the successful development of a very lightweight multi-circuit relay which is capable of simultaneously switching six different 2-ampere circuits, but weighs only about three ounces.

Although still in a developmental stage, the recently unveiled RCA point-contact transistor—a tiny germanium crystal amplifier which will perform the functions of vacuum tubes in some applications—promises astounding developments in electronic devices. Its long life, small size, resistance to shock, lower power requirements, and ability to function without a "warm-up" period make it one of the most challenging devices in any miniaturization program.

A comparison of sizes is revealing. A typical miniature tube averages $\frac{3}{4}$ inch in diameter and 2 inches in length. The subminiature tube is $\frac{3}{8}$ inch in diameter and $1\frac{3}{4}$ inches long. The point-contact transistor measures only $\frac{6}{10}$ by $\frac{3}{10}$ by $\frac{2}{10}$ of an inch. It consists essentially of a tiny speck of germanium in contact with two closely spaced, fine wires. The wires correspond to the terminals in a vacuum tube.

One of the major problems in any miniaturization program has been that of heat dissipation. Closely packed circuits and components give off large amounts of heat that must be carried off by efficient cooling. Usually, air cooling by means of fans has been relied upon. Since the transistor has no heated filament operating in a vacuum, it does not heat up. This makes it especially desirable for use in subminiature circuits.

Getting about as much attention as transistors in the

miniaturization program of RCA Victor is the use of "printed circuits." Using such circuits, engineers eliminate bulky wires, coils, and other parts in electronic equipment by "printing" and etching their functional equivalents on conductive foil on an insulated base.

Printed circuits have been under study by the U. S. Bureau of Standards for some years, and they have been used in many of RCA's military equipments during the past decade. A recent survey indicates that important military devices now in production make extensive use of printed wiring, while numerous industrial applications are also listed. More than 112 printed wiring plates are required in the government assemblies scheduled for production.

The principal physical effect of printing circuits is the reduction of electronic circuit wiring essentially to two dimensions. The effect is enhanced where it is possible to employ subminiature tubes and compact associated components. It then affords a degree of miniaturization unobtainable by other means. Just how much saving may be realized depends on the application. Standard electronic components are now available in such small sizes that complete amplifiers may be built into volumes of less than 1 cubic inch, and RCA has designed complete plug-in I-F amplifier units employing standard components that resemble miniature vacuum tubes.

The printed circuit also serves as an aid to uniformity of production, by virtue of precise reproducibility of the wiring pattern, as well as reduction of assembly and inspection time and costs, and reduction of line rejects. These factors, together with "dip soldering," make the process attractive, even in applications where size is not important. While not all components of an electronic circuit may be printed, the practice is adaptable to conductors, resistors, capacitors, inductors, shields, and antennas. The development of truly diminutive electronic devices now awaits only the availability of such items as smaller microphones, transformers, speakers, and batteries.

From the foregoing it will be apparent that miniaturization is still in its infancy. But its impact will shortly be felt in all phases of the electronics industry. Design engineers had scarcely designed miniature equipments before they were forced to turn their efforts to subminiaturization. The constant pressure of the military for smaller and smaller equipment, especially in the case of airborne equipment, is still receiving the attention of nearly every available design engineer. Commercial needs for lightweight electronic equipment, however, are beginning to be felt, and the coming year may see an ever-growing number of such developments making the headlines.

Tube-socket combinations from old (left) and new walkie-talkies emphasize the rapid progress in miniaturization of radio components.





Television is "the instrument of reality, putting people in touch with the real world."

Legal Profession Urged to Oppose Curbs on TV's Power to Present Truth

The following text is taken from a recent address by Joseph H. McConnell, NBC President, before the North Carolina Bar Association.

IN talking to you about television, I want to discuss its tremendous influence in strengthening the workings of our democratic society. I want particularly to emphasize the dangers of restricting such an influence. You are members of the profession of Jefferson and Madison and Adams and Marshall and Mordecai — the profession which did the most to establish our liberties in the early days of the Republic. And down to the present day, the legal profession and the courts have stood in the forefront of the battle for maintaining those liberties.

In this country, people have freedom to choose among competing forms of entertainment and information. They have voted heavily in favor of television. The American public is responsible for television's growth to a three billion dollar industry in the short space of five years.

The power of television will not be contained in

the United States alone. In our lifetimes, we will see intercontinental television bring events and personalities from overseas into our living rooms at home. And it will also bring into the homes abroad a picture of our democracy in action, and a better understanding of our attitudes and traditions.

Television serves many different publics that make up the diversity and strength of America. Each must recognize the varying interests of the others. A television service that did not provide for this variety would lose its vitality; and a development by members of the audience of tolerance for the tastes of others is no less important than adherence by broadcasters to sensible standards of taste for all.

Another problem which the industry has faced is that of making television economically available on the broadest possible base. That means that the cost of receivers must be brought within reach of all pocket-books, and this is being done.

There are other practical business problems in television — for example, the development of patterns to assure the complete advertising support which is necessary under the American system of broadcasting. This

system has been built on the principle of providing a source of entertainment and information without charge to the public. The provision of this service is costly and we have had to work out new and ingenious sales devices in order to take in the money to support it, and to insure to the public programs of high quality and wide variety. These efforts to protect the public's stake in our free system of broadcasting must not and will never cease.

Values of Television

All of these technical and economic problems can and will be solved. We have in television a medium whose impact on people and influence on our society will be unparalleled in the history of communications. The fundamental question we must face is how we can best direct this power so that it will reach its full potential as a social force for good in America.

I believe broadcasters have accepted this challenge and are learning step by step how to meet it. I do not mean to pretend that we have found complete answers to all of the questions presented by the growth of an industry so young, so strong, so alive, and so dynamic.

But one thing is certain: Television is not simply a living room toy which offers amusement to people when they do not want to go out. Television is a medium of complete and instantaneous communication for the whole population.

All of us who have been trained in the discipline of the law have had drilled into us, ever since we started to study, the importance of the facts. We have learned, by study and experience, the rule that the facts come first, and when the facts are established, the judgments and interpretations can follow.

"Television should be a free ticket of admission to all Americans, wherever a single spectator is permitted."



Television presents the facts. It presents them with complete accuracy, without exaggeration, without restriction, without prejudice, without personal views, and with complete impartiality. This is not done by words which reflect someone else's eyes, someone else's ears, someone else's opinion, someone else's impressions, perhaps someone else's background. In television, nothing stands between the event and the viewer. It is the instrument of reality, putting the people in touch with the real world.

Those of us who have regularly experienced television can see its effects in our own homes. My children are learning science from such programs as "Zoo Parade," "The Nature of Things," and "Mr. Wizard" — and they are enjoying the process.

They are seeing American history dramatized. They watched the signing of the Japanese peace treaty in San Francisco. They are becoming familiar with grand opera through television. They have seen Toscanini conduct the NBC Symphony Orchestra, and they have witnessed one of the great musical events of the year — "Amahl and the Night Visitors" — an opera about the Nativity, especially commissioned by NBC for television.

They have watched the World Series from their living room, and they have sat in on the North Carolina-Notre Dame football game. They have seen the political candidates and the leaders of our country.

They have heard great poetry and seen great dramas enacted. They have watched current issues and events unfold on the screen — from General MacArthur's return, to the explosion of an atomic bomb at Yucca Flats. They have seen Milton Berle and Bob Hope and Red Skelton and Sid Caesar and Jimmy Durante and Howdy Doody. Every week, they have at their fingertips entertainment which kings could not command even twenty years ago.

At times, they have also seen the pursuit of criminals, lady wrestlers, roller derbies, and other things that are as real a part of our life as the political conventions and the World Series.

Today, television is bringing to our children information and culture and the great entertainment our own country can offer. Tomorrow, they will have a window on the whole world. They will see the great cathedrals of Europe — in color — and the paintings in the museums overseas. They will become familiar with London, Paris, and Rome — and maybe some day with Moscow. They will know the statesmen, the people, and the customs of other countries — because they will have seen them.

We are all aware of the tremendous part television is already playing in the political life of our country and the tremendous influence it will exert as it grows in years to come. The power of television is so great that it has frightened some people. There are, for example, those who have suggested that its influence on politics is dangerous . . . that it can elect or defeat . . . that it can be used by a demagogue to fool the public. But the American public is not easily fooled once it has the facts. The dangers in our system lie in the opposite direction — in shutting off the people from the facts and in limiting their knowledge of the issues.

Television meets this danger. In bringing the candidates face to face with the people . . . in letting these candidates expound their views directly to the people . . . in showing how they behave in action and debate, television gives the citizens the truth and equips them to make their own judgments.

There has recently arisen a small minority who would seek to throttle television through Government censorship of its programs. Any such idea is repugnant to those who cherish liberty. Good taste cannot be legislated. No government authority can determine that a murder in Hamlet is good while a murder in modern drama is bad. The responsibility is on the individual broadcaster, who, in turn, must be sensitive to the taste and discrimination of the audience he serves.

Censorship Violates Principles of Freedom

Moreover, program censorship by the government would violate the great principles of freedom of speech and of the press. This principle is covered by Constitutional guarantees. It applies to broadcasting just as it applies to newspapers and magazines, and just as it has recently been applied by the Supreme Court to motion pictures. The values of that principle are paramount. Its impairment in any area weakens one of the basic foundations of our free society.

The freedom of television is also threatened by proposals for barring it from such places as the news conference, the Congressional hearing, and the floor of the House and the Senate.

I recognize that there are proceedings, involving the national security or personal privacy, where publicity of any sort should be avoided. These proceedings should be held in closed sessions to protect the national interest and private rights. But where the public is physically admitted, we must assume that public attendance is proper.

The freedom to see what goes on in America should not be restricted to those who can be accommodated in such places as the hearing room, the House gallery or



Maestro Arturo Toscanini

"Television is bringing to our children information and culture, and the great entertainment our own country can offer."

the Senate chamber. It should not be limited to those who happen to be in the city where the event is happening — be it Washington or Raleigh; or who have the time and money to travel to it; or who are lucky or influential enough to gain admission. Television should be a free ticket of admission to all Americans, wherever a single spectator is permitted.

I know that many of my respected and learned brethren among the legal profession look with concern at the idea of having the television camera brought into the Congressional hearing and into other public proceedings. I recognize the integrity and good intention of this attitude, but I question its long-range soundness.

The legislative chamber cannot hold all mankind — but the television camera opens the door to all of the people who are interested. Their rights to attend and to view are equal to those of the spectators who are physically present. Similarly, the rights of television to have direct access to the news are equal to those of other news gathering media.

In our system, where the state serves the people and the people determine their own destiny, an especial value is put on having the people know the truth, and all of the truth. Television can give them the truth, because television *is* truth.



NBC's East Coast transmitter building at Bound Brook, N. J., is surrounded by a forest of poles supporting the station's array of shortwave antennas.

"Voice of America" Carried to Europe, Africa and South America by NBC Shortwave Station

FAR better known to radio listeners in foreign countries than to radio fans in America, are the programs broadcast from the NBC-operated shortwave station WRCA at Bound Brook, New Jersey. Each day this station transmits 17 hours of information programs for the Voice of America to peoples in Europe, Africa, South America and to clandestine listeners behind the Iron Curtain.

Although today, the Bound Brook station is dedicated to the broadcasting of America's message of freedom in many languages, its history dates back to 1925. In that year, Station WJZ, then owned by RCA, transferred operations from Aeolian Hall in New York City to its present site. The move to a less populated area was made necessary when the station began transmissions on high power. The WJZ transmitter remained at Bound Brook as long as it served as the key station of the NBC Blue Network. After this network was sold to the American Broadcasting Company in 1943, the WJZ equipment was moved to another location.

In 1930, the importance of Bound Brook increased when it was chosen as the location for experimental shortwave broadcasting by NBC. Under the call letters

W3XL and W3XAL, regular programs of the Blue Network were sent abroad to many lands. As a result of the foreign audience which was immediately attracted to these broadcasts, NBC in the late 1930's established its International Division, a unit of the company devoted to special shortwave programming. The major sponsor was the United Fruit Company, for whose programs a so-called "banana" antenna was later erected to improve signals beamed at South America.

With the outbreak of World War II, NBC turned over its Bound Brook shortwave facilities to the Office of War Information, primarily for European broadcasts. At that time, NBC built a new 50,000-watt transmitter which was added to the two already in operation. Seven new directional antennas and three additional RCA 50,000-watt shortwave transmitters were then installed by the OWI, giving the station the present complement of six transmitters.

Because of the government's decision to provide international shortwave programming via the Voice of America, the NBC International Division was not re-established after the war. Today, while NBC continues as owner, the property and the services of NBC personnel at Bound Brook are leased to the Voice of

America. Programs originating in the New York studios of the Voice of America reach the station over telephone lines.

The exterior of Station WRCA resembles a well-kept residential home with its trees, gardens, and neatly trimmed lawns. In this setting, the transmitter building and the graceful double-spray cooling system are surrounded by towers and antennas of varying sizes, scattered over NBC's 100-acre tract of land.

The building is divided into several sections which accommodate the station engineer's office, transmitting rooms and master control. Around the corner from the office is a long room which houses the three government-owned transmitters. In the center is a transmitter control console, manned by an NBC engineer. By flipping a switch the engineer can connect a monitor speaker with programs in French, English or any of the other languages that might be on the air. The program may be a newscast, music or even an afternoon ball game. Sports events are sent overseas by the Armed Forces Radio Service, for the benefit of American troops assigned to foreign camps.

Technicians Watch Equipment Constantly

To assure continuous satisfactory performance of the transmitters, technicians devote considerable time to the equipment. This includes continuous routine maintenance, replacement of parts and constant precautions to prevent the tubes from overheating.

From the room which houses the government transmitters it is only a few steps to the compartment containing the three NBC-owned transmitters. The two original shortwave transmitters with their old fashioned dials, knobs and large manually-operated switches pro-

vide a striking contrast to the more modern equipment. Nevertheless, both the new and old transmitters work side by side with equal efficiency to carry broadcasts of truth, liberty and education to the peoples of many nations.

In the master control room, all programs received on the telephone lines from the Voice of America studios are monitored and switched to the assigned transmitters. At the end of each program segment, the engineer on duty gives the WRCA station identification. This "break" is considerably more difficult to make than at a standard broadcast station since a separate switch must be made for each transmitter.

The operating schedule on the desk of the master control console indicates the complexity of the daily transmissions from Bound Brook. Programs in English, French, Finnish, Polish and other languages constitute a typical day. These are sent to Europe from 10 A.M. to 6 P.M. and from 10 P.M. to 3:15 A.M. The 6 to 10 P.M. hours are devoted mainly to Spanish and Portuguese broadcasts for South America.

The basement of the Bound Brook station houses power transformers and associated equipment. From copper tanks located there, distilled water used to cool the transmitter tubes is fed to the outside pond and then back to the tubes. The basement also contains a maintenance shop for repairs and numerous bins and shelves filled with replacement parts and tubes.

The NBC staff at Bound Brook consists of 15 men who perform a wide variety of tasks necessary to keep the station operating at peak efficiency. From the chief engineer to the antenna rigger, skilled team-work prevails to give WRCA an important role in telling the American Story to freedom loving people everywhere.

Operator at the master control console of transmitters at Bound Brook.

Three RCA transmitters line the walls of the main floor of NBC's International station.



RCA Scholarship Plan Extended



Dr. F. H. Kirkpatrick, RCA Educational Counselor (right), reviewing academic progress with an RCA Fellow.

FOURTEEN post-graduate fellowships and 19 scholarships have been offered by the Radio Corporation of America for the 1952-1953 academic year under an expanded and revised scholarship program.

Total amount of the awards, according to Dr. C. B. Jolliffe, Vice President and Technical Director of RCA, will be \$53,000, a substantial increase over previous years. This amount reflects RCA's expanded program of helping young engineers and scientists by means of seven new scholarships and one fellowship. It was also pointed out that the annual stipends for RCA Scholarships have been increased from \$600 to \$800.

Decision to expand RCA's Scholarship Program, Dr. Jolliffe said, is the result of recommendations by the RCA Education Committee to make scholarships available in additional geographical areas of the United States, at a women's college and in university centers where RCA manufacturing plants are located.

The objective of RCA's program is to encourage the training of new scientific personnel who are critically needed to meet the rapidly growing requirements of the electronics industry. This is in keeping with industry's increasing recognition of an obligation to help develop young men and women of genuine ability and promise. In 1944, Brigadier General David Sarnoff, RCA Board Chairman, created the RCA Education Committee with

the late Dr. James Rowland Angell, President Emeritus of Yale University, as Chairman. Within the following year General Sarnoff recommended the RCA Scholarship Plan to the Board of Directors.

During 1945, first year of the awards, RCA Scholarships were offered to undergraduates in only eight colleges and universities. In 1947, post-graduate fellowships were offered for students working toward advanced degrees in scientific fields related to electronics. Since the awards were established, RCA has progressively increased the scope of the original Plan until today recipients of RCA scholarships and fellowships are carrying on their studies at more than 20 colleges and universities.

Significant points under the revised program are:

1. Award of the David Sarnoff Fellowship, established in honor of the Chairman of the Board of RCA, for predoctoral students of electrical engineering at New York University. Other RCA Fellowships are available for graduate students at California Institute of Technology, Columbia University, Cornell University, Princeton University and the University of Illinois. An annual grant of \$2,700 is made to each university.

2. Award of the Frank M. Folsom Scholarship, established in honor of the President of RCA, at the University of Notre Dame, and the Charles B. Jolliffe Scholarship at West Virginia University. Five additional new RCA Scholarships, each carrying grants of \$800, have been established at the University of Cincinnati, University of Florida, Franklin and Marshall College, Indiana University and Wellesley College.

Other RCA Scholarships are available at the California Institute of Technology, Columbia University, Harvard University, University of Minnesota, Princeton University, Purdue University, Rutgers University, University of Santa Clara, University of Washington, University of Wisconsin and Yale University.

3. A grant is made available to the National Research Council for the award of four additional fellowships to students working on scientific problems related to electronics. These are open to graduate students in any university.

4. Four fellowships for young scientists and engineers employed in the laboratories and operating units of RCA which each provide a maximum grant of \$2,700.

5. Award of an RCA Scholarship to an outstanding graduate of RCA Institutes who wishes to continue his

(Continued on Page 32)

Three-Speed Record Player Announced by RCA Victor

A NEW and improved type of Victrola three speed record player, which makes it possible, with a single turntable to provide quality reproduction from records of all three established revolving speeds, has been placed on the market by the RCA Victor Division. Under development for more than a year, the new instrument, available in four models, marks the introduction of RCA's first three-speed record-playing system.

Heart of the new instrument is a novel slip-on 45-rpm spindle which houses the automatic record-changing mechanism of the 45-rpm system. The larger slip-on spindle fits over the permanent spindle and converts the new record player into an authentic 45-rpm instrument, with all the engineering advantages and performance features of the "45" system. With the slip-on spindle removed, the instrument, at the twist of a selector knob, will play either 78-rpm or 33 1/3-rpm discs.

Completely automatic, the new record player: Plays up to 14 45-rpm records at one loading; plays up to ten 12-inch or twelve 10-inch standard or long-playing discs at one loading, plays up to ten intermixed sizes of 78-rpm, or the same number of 33 1/3-rpm records of intermixed sizes, stops automatically after playing last record of any of the three speeds; provides two separate pick-up points in a single tone arm, one for playing 78-rpm discs and another for the 45-rpm and 33 1/3-rpm records, and eliminates the need for record inserts.

The new all-speed "Victrola" instruments include a record-player attachment which can be connected to any radio, phonograph, or television set. Other models are a self-contained phonograph with a built-in speaker and amplifying system; a self-contained portable unit housed in a luggage-type carrying case, and a three-speed table model "Victrola" radio-phonograph.

"Engineering advances now make it possible to integrate '45' facilities in an all-speed changer that provides reproduction of equally high quality from all types of records and, at the same time, retains all the advantages found only in 45-rpm instruments," said H. G. Baker, vice president in charge of the company's Home Instrument Division.

Reflecting the simplicity of 45-rpm engineering, the new all-speed Victrola instrument features a single, lightweight tone arm for records of all speeds; a twin-point stylus which is quickly rotated for playing either 78-rpm or 45- and 33 1/3-rpm records by turning a tiny



Three-speed record player installed in combination table-model radio-phonograph.

lever mounted on the tone arm; a "guard position" protects the stylus when not in use; a single speed-selection control knob, and a single knob for on-off-reject control.

For 45-rpm, the operator need only turn the speed-selector knob to the proper speed. For either 78-rpm or 33 1/3-rpm, the only additional step required is to lift the large spindle off the permanent spindle, and adjust speed-selector knob and stylus. Every RCA Victor 3-speed record player has a specially designed receptacle to conceal the 45-rpm spindle when not in use.

Toscanini to Lead NBC Symphony In 14 Concerts This Season

Maestro Arturo Toscanini is to conduct the NBC Symphony Orchestra in fourteen concerts during the 1952-1953 season, beginning November 1. In the new series, Toscanini's sixteenth successive season as conductor, he will direct two more concerts than in the last winter season. Guido Cantelli, who starts his fourth season as a guest conductor of the NBC Symphony, will direct the remaining eight concerts of the twenty-two week series.

Toscanini will conduct concerts on the following dates: November 1, 8, 15, 22 and 29, January 3, 10, 17, 24 and 31, and March 7, 14, 21 and 28. Mr. Cantelli's eight dates will be December 6, 13, 20 and 27 and February 7, 14, 21 and 28. Conductors of the current summer series of the NBC Symphony will include Laszlo Halasz, Samuel Antek, Wilfred Pelletier, Richard Korn and Massimo Freccia.

HOW
RCA
 KINESCOPIES
 are made



Manufacturing process begins with inspection of all parts comprising the tube, whether glass or metal-shell type.



Metal tubes are placed on a crawling conveyor belt to permit the phosphor to settle on the face-plate.



At the end of the settling belt, automatic machinery tips the tube and decants the remaining liquid.



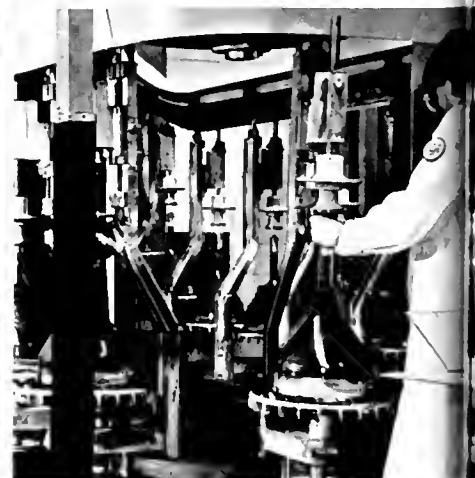
Kinescopes are baked in huge ovens to "boil" out impurities and to dry the inside graphite coating.



As a tube approaches completion it is tested for picture brightness under home lighting conditions.



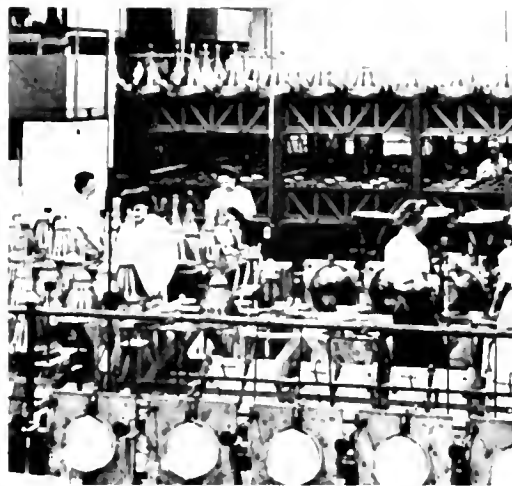
Final tests are made to insure that the tube will give a well-centered perfectly-focused picture.



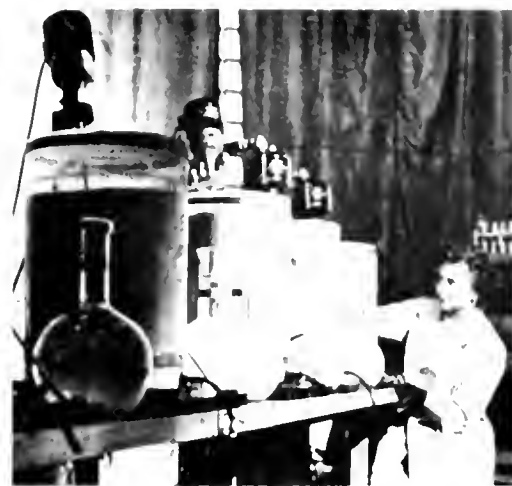
After the tube has passed all tests it is given its final washing before paint is applied to the outside.



s between glass and metal parts checked by polarized light, and by air under high pressure.



The phosphor solution is poured into the envelope where it settles to form the tube's luminous screen.



Purity of the phosphor solution is rigidly inspected to prevent the entrance of injurious foreign material.



Electron guns are assembled here and microscopically tested to watch-makers' rigid specifications.



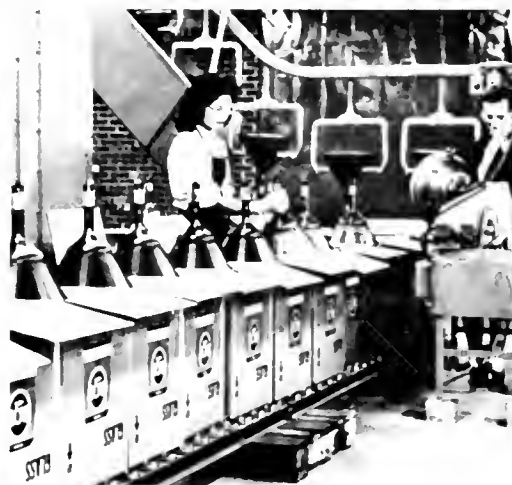
In this rotary machine the stem supporting the electron gun is sealed into the neck of the envelope.



The tubes are now ready for the pumping system which removes all air and gases.



The kinescope is now bronzed with the RCA trademark, which is a warranty of top-quality picture tubes.



Having received the stamp of approval, the tube is given a final polish and placed in its shipping carton.



The RCA kinescope is now ready to provide the customer with the best picture his set can produce.

Small Businesses Essential to Progress of American Industry

RCA Executive Reveals that Approximately Half of Annual Sales Dollar Has Gone to Outside Manufacturers of Materials and Components

The following text is taken from a statement by Vincent deP. Goubau, Vice President in Charge of Materials, RCA Victor Division, before the U. S. Senate Small Business Committee on May 3, 1952.

WE are proud of the relationships we, at RCA, have built up with our suppliers. We like to think of them as friends as well as business associates. Over the many years that we have been in business, we have learned that there is a very strong inter-dependence between our company and the many organizations with which we work in carrying out our responsibilities to our customers, our employees, and our stockholders. This experience embraces a working relationship with companies of all sizes, from the smallest to the largest.

Over the years, approximately half of our annual sales dollar has been spent for materials and components purchased from outside organizations. The proportion purchased is fractionally less in regard to equipment for the Armed Services because of the large amount of engineering development involved. And yet, in reviewing our records, it is remarkable to note how closely this over-all figure has held to 50 per cent — in peace, in war, or — as at present — in time of semi-mobilization.

For the year ended December 31, 1951, RCA spent 50.3 cents out of every sales dollar for materials and services bought from others.

In all, there are roughly 5,000 suppliers with whom we are working day in and day out producing for both the Armed Forces and for the nation's consumers.

Our suppliers are located in 42 states.

Out of this total of 5,000 suppliers, approximately three-fourths — or 75 per cent — are small business organizations by the accepted definition of "500 employees or less." In round figures, that makes 3,750 small concerns with whom we do business.

Many of these suppliers are very small companies. I know of one in particular that is making for us a vital part of an electronic system being manufactured under Air Force contract. This company has a total employ-

ment of six, including the president.

But while this is somewhat unusual, a more significant fact is that of all 3,750 small businesses contributing to our production, about *half* employ less than one hundred people.

It is pertinent to inquire at this point how we determine the amount of our business to be subcontracted, or indeed why we subcontract at all. Why, for example, does a large company like RCA not manufacture all its needs?

The answer begins with our policy that, on items with large volume for which we have manufacturing facilities and know-how, we normally divide our procurement between our plants and our suppliers. We do this in order to have more than one source of supply and to insure our getting the best price for the items that go into our product.

Considering the variety and volume of parts entering into our product, we cannot profitably make all the parts we require because of the capital outlay required to pur-

Wolkie-Talkies for the Armed Forces get final tests at end of production line at RCA Victor plant in Camden, New Jersey.



chase the equipment and the lack of volume to liquidate the cost of the facilities in a reasonable time.

Many small businesses serve large businesses by being specialists in one or more fields of manufacture. Small business functions effectively when it is able to serve several other businesses, either large or small, because it has facilities which can be operated economically due to the combined volume of its customers. Furthermore, their business is flexible and can be readily adapted to the changing requirements of their many customers.

In addition to cost, the utilization of subcontractors frequently speeds delivery of completed items. By working closely with his subcontractor, a prime manufacturer can so arrange schedules that the many components produced by outside firms will arrive at production lines in time to permit final assembly not only in the most efficient and least costly manner but also in time to meet specified deadlines. Prompt delivery, particularly on military contracts, can be vital. The prime contractor who assumes the responsibility for such delivery to the military relieves the Government of the hundreds of details involved when many companies, both big and little, are teamed together to produce weapons and related devices under military contract. More often than not, this responsibility involves far more than mere engineering assistance, expediting of required raw materials, and sometimes financing of needed materials.

The prime contractor also supplements the work of Government inspectors and frequently sees to it that contracted components meet Government specifications. The testing and inspection facilities required for many military items often are intricate and many small business firms could neither equip, staff, nor finance them.

Thus it is true, at least insofar as our company is concerned, that a prime contractor contributes far more than the engineering of a new device and its assembly and production.

Walkie-Talkie Cited as Typical

I would like to mention a few examples to illustrate our work with subcontractors on defense orders generally. They are more or less typical.

One of a great many devices we are working on today is the walkie-talkie for the Signal Corps. The walkie-talkie is a portable radio station containing its own transmitter, its own microphone and earphone circuits, and its own power supply. It is designed to be carried on a soldier's back like a knapsack. The walkie-talkie being used right now in Korea performs the same general function as the walkie-talkie that was first introduced and used in World War II. But there are several major differences.

As you can appreciate, weight is of major impor-

ance — particularly since the walkie-talkie is intended for use by troops in battle where maneuverability can frequently mean the difference between life and death. The old walkie-talkie weighed 50 pounds. Our new walkie-talkie weighs 24 pounds — a reduction in weight of over 50%.

In addition, the new walkie-talkie has a range that is almost double that of the earlier model. In many other ways too — such as its ability to withstand prolonged immersion in water — the new walkie-talkie is a much more effective instrument.

After our design work was completed and accepted by the Signal Corps, we established our production schedules. To help with this important task, we called on 185 suppliers of precision parts. Some of these suppliers are classified by the Government as large business firms. But most of them are small. In fact 151 (or 71%) of the 185 companies collaborating with us on the new walkie-talkie are small business firms.

61% of Dollar Volume to Small Business

In dollar volume the amount of subcontracted business to large business is 39% and 61% to small business.

We recently completed an analysis of another of our military contracts — this one covers a classified electronics system being made for the Air Force.

Parts and supplies for this contract are coming to us from many scattered sections of the country — from Lake City, Minn.; Aurora, Ill.; Muskegon, Mich.; Wyncote, Pa.; Waltham, Mass.; Davenport, Iowa; Dayton, Ohio; and even Hollywood, Calif.

The 307 subcontractors teamed with RCA on this contract are located in 18 states. We sent out a questionnaire to these subcontractors to find out where they, in turn, were purchasing their raw materials and components. Sixty of them replied. These sixty are buying from 365 different suppliers located in 25 states. Of the 365 sub-subcontractors, 55 per cent are large concerns and 45 per cent are "small business." It is natural that the percentage here is slightly in favor of large business because our sub-subcontractors include copper and brass manufacturers, steel concerns and chemical producers.

I am well aware of the fact that the small business man today is faced with unusual difficulties, just as we are. I realize, too, that the necessary procedures for getting into defense production are foreign to his normal way of doing business. The point to emphasize, however, is that they are necessary. If the small business man will accept these conditions and adjust his way of doing business to the economic conditions which prevail, I sincerely feel he will find the means to keep his business going.

Transistors that Operate on 225 Megacycles Result from RCA Research

A SIGNIFICANT advance in transistor research which for the first time points the way to very-high-frequency applications in television, FM radio and point-to-point radio communications has been made by the Radio Corporation of America.

Several developmental point-contact transistors have been made to oscillate at frequencies well up in the 100-to-200 megacycle band and one reached a record high frequency of 225 megacycles per second, according to Dr. Charles B. Jolliffe, Vice President and Technical Director of RCA. Such frequencies include the range in which FM radio and television signals are broadcast. The highest frequency value previously achieved by transistors, according to published reports, has been 50 megacycles per second.

The transistor, still in the developmental stage, consists of a speck of germanium crystal and fine contact wires and is no greater in size than a kernel of corn. It can perform many of the functions of electron tubes.

Prior to recent RCA experiments, transistors have been regarded as limited to relatively low-frequency applications, Dr. Jolliffe said. The new development promises to extend the use of the tiny transistors in high-frequency devices and to new applications in television, FM radio, point-to-point radio communication and other electronic equipment for military and civilian use.

The successful development of transistors which oscillate in the very-high-frequency region was accomplished by B. N. Slade, transistor engineer of the RCA Tube Department, RCA Victor Division, Harrison, N. J. This experimental work was conducted as a phase of RCA's transistor research program which is coordinated at the David Sarnoff Research Center of RCA, Princeton, N. J.

Mr. Slade pointed out that the research theory which led to the development of VHF transistors now makes possible the design of transistors which incorporate particular operating characteristics for a given application.

Tests conducted at the RCA Tube Department's Harrison, N. J., transistor laboratories confirmed a definite correlation between the spacing of a transistor's contact points and its frequency response. Generally speaking, Mr. Slade said, the closer the spacing, the higher the frequency.

Further tests established that a transistor's frequency



Point-contact transistors developed by RCA scientists.

response and stability are also determined to a large degree by the resistivity of its germanium crystal.

RCA transistor engineers, he explained, developed different combinations of spacing and resistivity values which enable them to design experimental transistors having a range of operational characteristics. One such combination of values also resulted in a transistor which oscillated with good stability at a frequency of 225 megacycles per second.

Andean City Installs Radio Police Department

Modernization of the State Police of Táchira, Venezuela, with a Radio Police Department has been begun by Dr. Antonio Pérez Vivas, governor of the Andean state. According to Meade Brunet, Vice President of RCA and Managing Director of the RCA International Division, Dr. Pérez Vivas selected RCA equipment after seeing the efficient performance of the system as used in Washington, D.C., where over 100 RCA mobile and fixed very-high-frequency units are in operation.

The layout at the beginning will comprise a 250-watt transmitter and associated equipment for Táchira and several 60-watt units to be installed at strategic locations. Mobile Fleetfone units will complement the system in the city and surrounding area.



General Sarnoff addressing stockholders at 33rd Annual Meeting in New York.

New Electronic Developments Revealed At Annual Meeting of Stockholders

Chairman of RCA Board Foresees International Television Within
Five Years — New Projects that Aid Business, Industry and
Communications Include Electronic Process to Speed
Production of Color Plates for Printing

NEW radio-electronic developments holding 'great promise for new business in the future' were revealed by Brig. General David Sarnoff, Chairman of the Board of the Radio Corporation of America, at the 33rd annual meeting of RCA stockholders which was held in a studio of the National Broadcasting Company in Radio City, New York, on May 6.

General Sarnoff listed nine new projects which RCA scientists and engineers are presently developing for business, industry and communications.

(1) Automatic electronic equipment — known as a Color Corrector — which reduces by at least 50% the time required to make color plates for printing, in addition to improving materially the fidelity of the plates and lowering production costs.

(2) An electronic inventory control system to facilitate the maintenance of military supplies. This system, developed under a contract with the military, completes in a matter of days an operation generally requiring

several weeks. Widespread commercial applications are foreseen for business and industry.

(3) Electronic inspection apparatus for use by the pharmaceutical industry for safeguarding the purity of drug products such as medical ampules containing vaccines and other liquids.

(4) A portable one-man television station called the "Walkie-Lookie" for use by reporters and broadcasters covering news and special events in the field. This visual counterpart of the wartime "Walkie-Talkie" weighs only 46 pounds.

(5) A simple magnetic sound-recorder projector for use by home-movie enthusiasts, schools and advertising agencies to record individual commentary or musical backgrounds on 16 mm. films.

(6) Two-way microwave radio systems for communication along highways, railroads, pipelines and other routes, as well as for military purposes. Among orders



RCA's two-way radio equipment is the modern means of communication between fixed locations and vehicles.

received is one from the North Atlantic Treaty Organization (NATO) for use in Europe.

(7) A closed-circuit type of industrial television for use as a "remote eye" for industry through hundreds of applications including observation of dangerous processes, the transmission of pictorial information, and mass training in industry and the military services.

(8) Transistors — tiny electronic devices which function like certain types of electron tubes — are being developed by RCA for mass production as a new key that opens vast possibilities for new designs of radio, television and electronic instruments for civilian and military use.

(9) International television as a regular service to be realized within the next five years.

First Quarter Results

General Sarnoff announced that net earnings of RCA for the first quarter of this year amounted to \$7,076,520, as compared with \$11,901,542 for the first quarter of 1951.

After providing for preferred dividends, earnings per common share for the first quarter of 1952 were 45 cents, compared with 80 cents per share for the first quarter last year.

Consolidated gross income of RCA during the first quarter of 1952 amounted to \$163,871,331. Profits, before Federal income taxes, amounted to \$14,841,520.

A dividend of 50 cents per share on the common stock of RCA was declared by the Board of Directors

on April 4, 1952. It is payable on May 29, 1952, to holders of record of such stock at the close of business on April 18, 1952.

"Like the rest of the industry, RCA was affected by a decline in TV set sales during the first quarter of 1952 compared with the first quarter of last year," said General Sarnoff. "At that time scare buying created abnormally high demand which was followed by a slump in TV set sales and increased inventories throughout the trade.

"In the first quarter of 1952, however, RCA Victor manufactured all the television receivers permitted under government allocation of materials. We sold what we produced and our inventory is normal at this time. The prospects for increased sales during the balance of this year appear to be promising."

In 1951, RCA paid \$62,389,000 in taxes to Federal, State, and local governments. This was more than double the net profits earned for the year. Taxes amounted to \$4.49 on each share of common stock.

"This means that for every 8½ minutes throughout 1951, RCA paid \$1,000 in taxes," General Sarnoff reported. He added:

"In the past ten years, RCA's tax payments amounted to 352 million dollars. For the same period, profits — after taxes — totaled 197 million dollars.

"The ten year ratio of tax payments to dividends paid on the common stock, is approximately 6 to 1. That is, six dollars in taxes for every dollar in dividends.

"And even this does not tell the whole story. For in addition to the taxes paid by the Corporation, there are indirect taxes included in the cost of materials and services we bought from others."

Government Orders

General Sarnoff said defense contracts received by the RCA Victor Division have increased rapidly since the outbreak of the Korean conflict, and reported that the backlog of military orders continues to be substantial.

He disclosed that in April, 1952, the RCA Victor Division began construction of an engineering and development center on 450 acres near Moorestown, N. J., as a new "proving ground" for electronics connected with defense contracts in radar and related projects.

Television Service Extended

General Sarnoff reported to stockholders that television broadcasting continued to operate at profitable levels, as it did for the first time in 1951. He cited the fact that television had accounted for a sales increase of 48% over the preceding year in the National Broadcasting Company, and added:

Since we met a year ago, television service has been extended by use of radio relay stations and coaxial cables. Television networks now extend from the Atlantic to the Pacific, and from the Gulf to the Canadian border.

"Today there are about 17 million television sets in the United States and by Election Day in November it is estimated that the total will be more than 18 million. In addition, there are 105 million radios in this country, including 25 million sets in automobiles.

"Elaborate plans for radio and television broadcasting have been made for the coming political conventions in Chicago. Never in the history of the United States have political conventions been within the visual range of as many people as they will be this year.

"When Marconi sent the first wireless signals in 1896 the total population of the United States was 70,000,000. We estimate that the potential TV audience for the convention telecasts from Chicago in July, 1952, will be 70,000,000 persons. By the time another presidential campaign year arrives, four years hence, practically all the voters in the country will be within TV range."

Declaring that the recent lifting of the television station "freeze" will give tremendous impetus to the expansion of television throughout the country, he said that, socially, economically and educationally, television can now attain its full stature as an industry in broadcasting service.

Respecting international television, he reported that its possibilities present a stimulating challenge, and continued:

"But there are technical, economic and political problems that must be solved before international television can be established as a regular service. The pioneering work of RCA that led to the establishment of international radiotelegraphy as well as international radiotelephony, radiophotos and radio broadcasting on a world-wide scale, has enabled our experts in the field of global communications to bring the day of international television nearer to realization.

"Despite the formidable problems which still remain to be solved in this field, it is my present belief that international television as a regular service will be realized within the next five years.

"International television can become a powerful aid socially, educationally and politically. It will cultivate better understanding among nations, and help to reduce tensions born of misunderstanding. 'The Voice and Vision of America' can contribute substantially toward achieving the goal of universal peace."

General Sarnoff said that the dramatic role of theatre television in 1951 brought it to the status of a mass-

audience entertainment medium. Public response to a series of special sports telecasts in principal cities, he reported, resulted in a strong trade demand, with the result that approximately 60 of the Nation's key theatres are now equipped with RCA theatre television installations. He revealed that RCA has underway an experimental program to provide for conversion of this equipment in the theatres to color television.

He disclosed further that RCA scientists and engineers have continued to make improvements in the RCA compatible, all-electronic color television system, including the RCA tricolor picture tube. He declared: "We are convinced more than ever that the compatible, all-electronic system is scientifically correct and practical and that it will best serve the public interest."

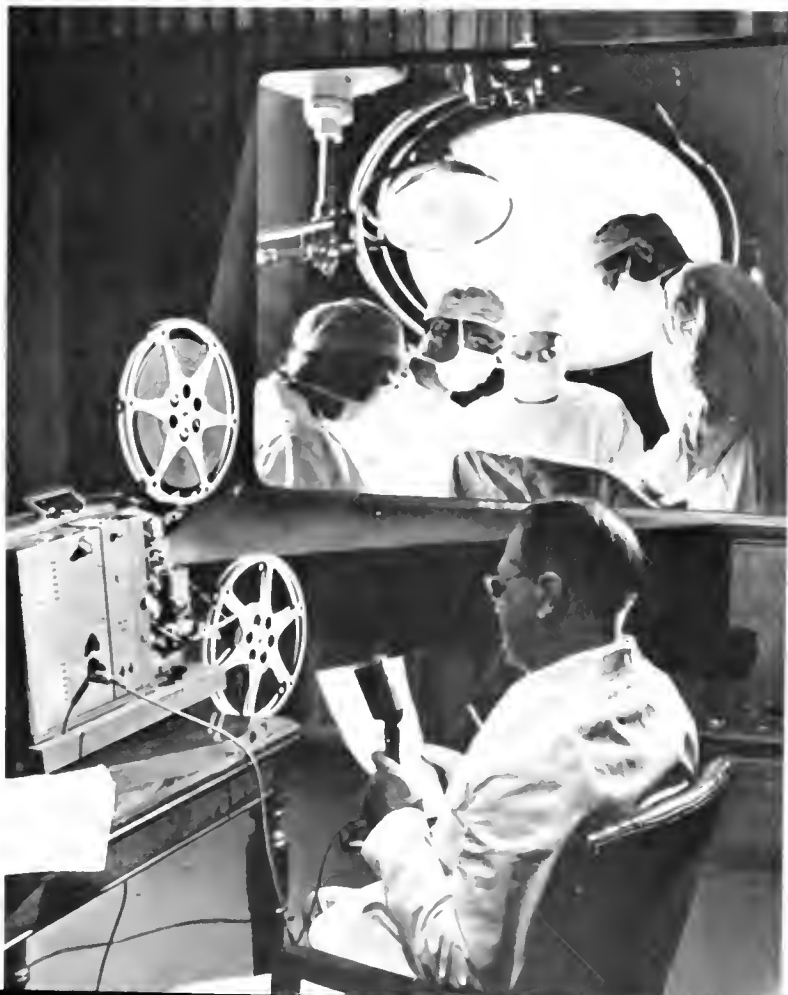
Recorded Music

Reviewing business in the phonograph record field, he revealed that during the first quarter of 1952 sales of RCA Victor 45 and 33 $\frac{1}{3}$ -rpm records substantially surpassed the sales of records using the older speed of 78-rpm.

"We believe that the 45 rpm system, introduced by RCA in 1949, will continue to lead in record sales," he affirmed. "Its popularity is attested to by the large

(Continued on Page 50)

A commentator using RCA's new sound projector records voice to accompany a film on surgical training.



Sarnoff Receives First Honor Medal Award from Radio Television Manufacturers

BRIG. GENERAL David Sarnoff, Chairman of the Board of RCA, has received the "Medal of Honor," awarded by the Radio Television Manufacturers Association for his outstanding contributions to the advancement of the radio, television and electronics industry.

The citation accompanying the award read: "The First Annual Industry Award is made to David Sarnoff in recognition of his courage, vision, judgment and outstanding contributions to the progress and development of the radio-television industry."

General Sarnoff was presented the medal by Robert C. Sprague, Chairman of the RTMA Board, at a dinner climaxing the 28th Annual Convention of the Association at Chicago, on June 26.

"Throughout his career General Sarnoff has received many awards, both domestic and foreign," said Mr. Sprague, "and has found time in his busy schedule to serve his country and his fellows in many fields in war and peace. For this he has had the thanks of Presidents of the United States and commendations of many organizations and men of distinction.

"We present the Medal of Honor as a tribute from his colleagues, a commendation from the men who have worked with him to make our country great.

"In literary circles, the writers' writer is the one from whom many learn new techniques in writing. General Sarnoff is the industrialists' industrialist in the radio-television industry."

Chairman Sprague told General Sarnoff that the award was presented to him as a "small token of the esteem in which you are held by your fellows and in recognition of your many notable achievements toward the development and progress of the radio-television industry. To your colleagues in the industry you are best known for the vision and courage with which you pioneered in the industrial development of radio and television over more than a quarter of a century. It suffices to say that the industry would not be so big and so far advanced as it is today had it not been for David Sarnoff."

The "Honor Medal," authorized by the RTMA Board in February, is to be awarded annually to the person, company or organization which the RTMA Directors believe has performed a distinctive service for the industry.



Brig. General David Sarnoff (left) receives RTMA "Medal of Honor" from Robert C. Sprague, Board Chairman of the Radio-Television Manufacturers' Association.

Two Honorary Degrees Presented to General Sarnoff

Two honorary degrees have been presented to General Sarnoff from educational institutions in Pennsylvania. On June 18, the honorary degree of Doctor of Science was conferred upon him by the University of Pennsylvania. Another Doctor of Science degree was awarded to him on June 10 by Pennsylvania Military College at Chester, Pa.

Speaking at the commencement exercises of the 131-year-old military college, General Sarnoff warned that no nation will remain strong if it relinquishes its interest in science. He urged the graduating class to be alert to everything science has to offer, no matter how fantastic an idea may appear in its initial stages.

"Be prepared, for when war comes, time is of the essence," General Sarnoff said. "It becomes a race of science against time, and America must be strong and 'at the ready.' Our lead in science and technology must not be allowed to pass into the hands of a potential enemy who is striving mightily to catch up and then to overtake us."

Electronic Device Simplifies Studies of Blood Clotting

Vibrating Plate Viscometer was Developed by RCA Scientist



Dr. J. G. Woodward of RCA Laboratories Division demonstrates vibrating plate viscometer.

A NEW electronic instrument which simplifies many previously difficult or impossible measurements of the viscosity of liquids was exhibited by research investigators of Creedmoor State Hospital, Queens Village, N.Y., in an exhibit at the annual convention of the Medical Society of the State of New York, held at the Hotel Statler during the week of May 1-4.

Called a vibrating-plate viscometer, the device, developed by an RCA scientist, has been used in studies of human blood clotting rates by Drs. Arthur M. Sackler, Mortimer D. Sackler, Raymond R. Sackler, Co Tui, and Harry A. La Burt, of the Creedmoor Institute for Psychobiologic Studies, who have found that instruments such as this can open new fields of medical and biological study. Their tests have indicated so far, they report, that such measurement of changes in certain physical characteristics of blood as it clots may serve to differentiate between psychotic and non-psychotic individuals.

Viscosity — the degree to which a liquid resists change in shape — has been in many scientific and industrial fields a troublesome thing to measure. In general, accurate measurements are long and tedious; whereas quick measurements are usually very rough and depend largely on human sight and touch. This has made difficult a continuous and significantly accurate measurement of a liquid in the process of thickening.

The new RCA viscometer, a developmental model, can record at any range from low viscosity alcohol to high viscosity cold molasses. Its measurements are virtually instantaneous and they can be recorded over an indefinite period of time on a moving paper chart. The instrument can take measurements of a liquid whether it is in a huge vat or in a tiny container holding a quarter of a thimble full.

Designed by Dr. J. G. Woodward, of the RCA Laboratories Division, Princeton, New Jersey, the vibrating-plate viscometer consists of a thin metal disc, .2 inches in diameter, at the end of a metal reed less than an inch long. An electromagnetic motor causes the disc to cut back and forth through the liquid at approximately 800 cycles per second.

The plate makes its widest swing when oscillating in air but when dipped in a liquid the swing is restricted by the viscosity. Mounted on each side of the reed are piezoelectric blocks, which generate a voltage when stress is applied to them through the bending of the reed. An alternating voltage is thus generated which is proportional to the swing, or amplitude, of the plate. The more viscous the fluid, the more restricted the plate's vibrations are. The resulting voltages are readily determined on a vacuum tube voltmeter and simply converted to viscosity values.

Besides its use in blood clotting studies, the device has been used experimentally by technicians of the United Clay Mines Corporation of Trenton, New Jersey, in charting the rates at which clay preparations harden in their molds, a new and valuable type of measurement in the ceramics industry. Many other possible applications can be anticipated for such apparatus in the petroleum, plastics, paint, textiles, printing, dye and other industries where precise knowledge of viscosity and viscosity changes is desirable.

Bottling Machine Speeds Handling of Milk Containers

A BOTTLING plant machine that speeds the uncasing and washing of milk bottles was demonstrated recently by RCA at The Borden Company's Hamilton Park plant, in Chicago.

Leaders in the bottling industry saw the new device automatically remove milk bottles from the cases and feed them to a large washer under modern dairy conditions. It is capable of feeding at rates of up to 576 bottles a minute. The machine — known as the RCA Full-Depth Uncaser and Washer-Loader — eliminates one of the last steps in the bottling cycle now performed by laborious manual methods.

The machine is expected to revolutionize container handling, not only in dairies, but also in beer, beverage, and other industrial bottling plants, according to M. S. Klinedinst, manager of industrial products of the RCA Victor Division.

"The new equipment is simple in principle and construction," he said, "and is easy to operate. Adjustments make it possible to assure a continuous flow of cases and bottles of various sizes and shapes to the washing equipment — and at substantial savings."

W. W. Waterstreet, President of the Chicago Milk Division of The Borden Company, said his company expects that the new machine will speed up its operations, be more efficient, and result in a reduction of total costs.

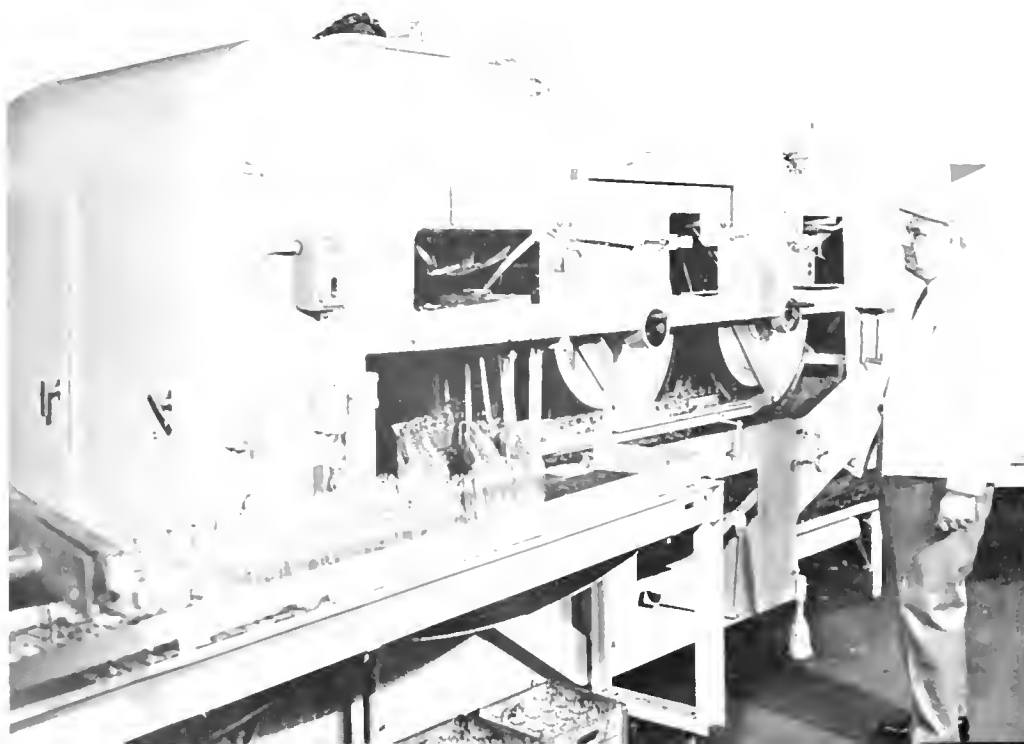
"We are proud to be the first dairy to install the RCA uncaser and washer-loader," he said. "In these days of

rapidly climbing prices, it is more important than ever to find more efficient ways of conducting our business."

The machine can be made to handle wooden, metal, or cardboard cases, or cartons and a wide range of types and sizes of bottles. The cases are fed from the plant case-conveyor directly into the uncaser. Entering the lower portion of the machine, they are carried upward and inverted, with the bottles held in place.

As the cases continue through the machine, they reach points at which first the inner rows of bottles and then the outer rows are gently lowered into large revolving transfer wheels with pliable rubber gripping surfaces. The surfaces of the first wheels firmly grip the bottles in the center rows as they are released, and those in the second set of wheels grip bottles in the outer rows. As they revolve, the two wheels deposit the bottles on conveyor belts which deliver them to the washer-loader. Meanwhile, the cases are set right-side-up and delivered to a conveyor or to the right or left or to the rear of the machine. In the washer-loader machine, the bottles are spread to the full width of the automatic washing equipment, and then are guided into as many channels as required by the washer.

During the demonstrations, it was shown that the new machine will automatically stop and ring a signal bell if faulty cases or improperly positioned bottles are fed in. The machine incorporates a bottle-supply control which automatically keeps an adequate supply of bottles ready to enter the washer.



In this machine, bottles are removed automatically from their cases and placed on conveyors leading to the washer-loader unit at the left.

Greater Efforts in "Pure" Research Urged by Dr. Jolliffe

RCA Scientist Says European Nations Excel in this Field

MANKIND is on the verge of an era in which new scientific knowledge can provide the basis for substantial advances in human health and happiness, Dr. Charles B. Jolliffe, Vice President and Technical Director of the Radio Corporation of America, declared in an address before the National Conference on Airborne Electronics in Dayton, Ohio, on May 13. In his speech, Dr. Jolliffe emphasized the urgency of replenishing science's storehouse of fundamental information and decried the secrecy imposed on researchers because of the unsettled international situation.

"In recent years our scientific emphasis has been heavily concentrated in applied research and engineering," he said. "I do not believe that enough attention has been given to pure, or fundamental, research. As a consequence, we are, in a number of important areas, short of the basic knowledge that is the raw material for engineering developments.

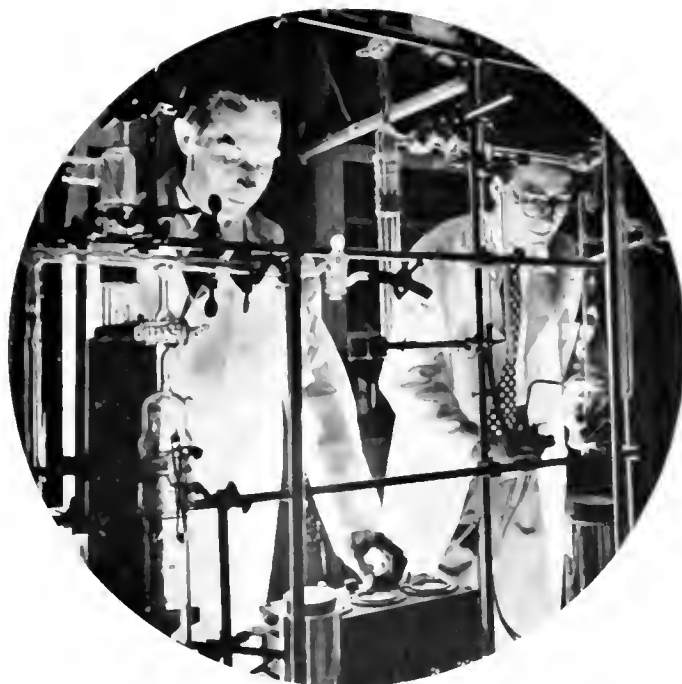
"Historically, Europeans — especially the Germans and the British — have done the most in advancing pure science. In the United States, our greatest accomplishments have been in engineering. Now, the United States must take the leadership in developing fundamental knowledge — Americans should be the 'Pioneers of Science' of the future. Our continuing safety and progress depend upon it.

"Russia, we may be sure, is not neglecting this all-important field; in fact, reports from behind the Iron Curtain indicate that Soviet scientists are given every incentive to move ahead as rapidly as they can in pure research."

Describing the difficulties involved in obtaining appropriate backing and public acknowledgment for explorations in "pure" science that must of necessity lack definite goals, Dr. Jolliffe urged the cultivation in America of "science appreciation" on a par with "music appreciation."

He said the task of advancing the cause of pure science is made more difficult by world conditions, and added:

"The barriers of secrecy at home and abroad are serious deterrents to scientific progress. Unquestionably, the world of science has suffered much because of the



Scientists at David Sarnoff Research Center use high vacuum system in preparing samples of semi-conductors.

ideological conflict between Russia and her communist-dominated satellites on the one hand and the free nations of the world on the other.

"Basic to the advance of science is a free and unlimited exchange of information. In the growth of fundamental knowledge over the centuries, it often has been true that the report of a scientific discovery made in one part of the world stimulated important advances along the same line in other sections of the world. There has been no such chain reaction in numerous vital areas of science for many years."

Dr. Jolliffe said that because of the danger of unwarranted secrecy damaging the advance of science it behooved government as well as scientific leaders to subject research controls to careful review and reevaluation with increasing frequency.

"Discoveries of supreme importance to such sciences as physics, chemistry, and biology will come from studies of the atom," he asserted. "In fact, mankind is on the

(Continued on Page 32)

Long-Life Batteries Add to Performance of Improved "Personal" Receiver

NEW "A" and "B" radio batteries of advanced construction, so outstanding in their performance as to be termed revolutionary, and a new attractively styled "Personal" receiver designed to utilize to the full the impressive operating characteristics of the batteries, have been introduced by the RCA Victor Division.

The new "B" battery, designated the VS216, is of the alkaline dry-cell type, with a voltage rating of 67½. It is the first radio battery to employ the type of alkaline cells formerly restricted to wet-type, non-portable batteries. It is 22 per cent smaller than present comparable batteries, and has an increased playing time capacity of 100 per cent, when used in "Personal" portable receivers. The new "A" is a redesigned version of the "sealed-in-steel" type, and gives four times the playing hours of the latter.

The alkaline dry-cells utilize zinc, manganese dioxide, and an alkaline electrolyte. The original alkaline cell, conceived years ago, was a wet-cell which was non-portable and had to be kept in an upright position. After years of research, the undesirable features of the original wet-cells have been eliminated with the development of the new alkaline "crown"-type construction.

The "crown"-type cell is a self-contained unit which delivers more useful energy per unit of volume than do

conventional types of cells and can be used in any position. Each battery is actually composed of two compact stacks of these exclusive "crown"-type cells combined to give the correct voltage output.

After manufacture, the individual cells are stored for two weeks before being tested. This storage period allows the cells to stabilize and, at the same time, permits the detection of potentially weak cells. After acceptable cells have been stacked and assembled into batteries, the latter are tested and again placed in storage, this time for one week. Following the second storage period, the completed batteries are re-tested. This double-aging, triple-testing procedure, assures batteries of high quality.

Both "A" and "B" batteries are encased in steel to prevent swelling and wedging in the radio.

Two of the "A" batteries connected in parallel in a "personal" radio will have a life equal to one of the new "B" batteries, thereby giving owners a playing time that compares favorably with that of most medium-size portables. In accomplishing these advantages, total battery space requirement is increased by only 30 per cent.

The "B" battery was developed through continuous research over a three-year period at a cost of over a

(Continued on Page 30)



RCA's new "Personal" receiver is available in various colors. Left: Improved "B" battery is 22 per cent smaller than older types and has 100 per cent longer life.

New Radar has 200-Mile Range in Mapping Terrain

SUCCESSFUL field operation of a new lightweight radar set that "maps" detail of terrain and weather obstacles up to 200 miles in front of an aircraft was announced jointly by the U. S. Navy and Radio Corporation of America on May 11.

This advance radar unit is now in production for the Air Force and Navy and already has been installed on President Truman's plane, the *Independence*, and on various military air transports. According to W. W. Watts, vice president of the RCA Victor Division, the instrument is also suitable for commercial aircraft.

At the present time, the equipment is being produced under Navy contract for military use only, and is scheduled for production under an Air Force contract.

Specifications for the new transport radar were prepared by the Navy Bureau of Aeronautics and coordinated with the Air Force to include recommendations reflecting its experience with radar.

According to Watts, the new unit permits the pilot to see a close-up of a selected area as if he were using a powerful telescope that could penetrate through darkness and clouds, and can be used for these four general types of operation:

1. As a means of collision warning. It will show mountains or other aircraft in the vicinity.
2. As an accurate indicator of weather conditions. It will show the position of thunderheads and other cloud formations, and will enable the pilot to avoid turbulent weather or select the safest course through it.
3. As a means of position location when standard landmarks are not visible. It can pick up the signal of ground based radar range units.
4. As a means of mapping terrain. Through a special discrimination circuit, it shows the pilot the salient characteristics of the land over which he is flying.

Pilot Can Select Range

The range of the system can be selected by the pilot for distances up to 200 miles from the plane. A selector switch permits the pilot to bring into view all obstacles and terrain within 5, 10, 30, 100 and 200 nautical miles of his airplane. On a recent flight from Westover Air Force Base, Mass., to Frankfurt, Germany, in a military C-97 equipped with the new radar, the



W. B. Kirkpatrick, manager of RCA Victor's Government Radar Unit, and Commander M. A. Mason, head of the Navy Bureau of Aeronautics Radar Section, examine transmitter-receiver unit of new radar.

first islands of the Azores were observed at a distance of 195 miles from an altitude of 17,000 feet, Watts said. An RCA technician aboard the flight stated that "the entire chain of islands was mapped with excellent definition, and navigation to Lages by radar was easily accomplished.

"On the same flight the landing approach at Frankfurt was made by means of the radar, with the runway clearly defined."

Watts revealed that reports from military officials have been very enthusiastic about the new equipment. Rear Admiral Thomas S. Combs, USN, Chief of the Navy Bureau of Aeronautics, Watts said, labels its performance as "exceptional" and reports the Navy is very pleased that size and weight were kept to a minimum, as per the Navy's specifications, without sacrificing the effectiveness of the radar.

The device, designed solely for navigation and obstacle and weather detection, weighs a total of 175

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JOHN Q. CANNON ELECTED SECRETARY OF RCA

John Q. Cannon was elected Secretary of the Radio Corporation of America at a meeting of the Board of Directors on May 9.

Mr. Cannon joined RCA in 1915 as an attorney with the RCA Victor Division and has served as Assistant Secretary of the Corporation since May 4, 1951.

A native of Salt Lake City, Utah, he attended the University of Utah and was graduated from George Washington University in Washington, D. C., in 1928, with a Bachelor of Law Degree.

Following his graduation, he was associated with several government agencies including the Public Buildings Commission as Assistant Secretary; the U. S. Bureau of Standards as Business Specialist; with the Civil Service Commission successively as Legal Examiner, Legal Adviser and Chief Law Officer; Administrative Assistant to the U. S. Attorney General; and with the Securities and Exchange Commission as Director of Personnel.

Mr. Cannon succeeds Lewis MacConnach who retired after 29 years as Secretary of the Radio Corpora-



John Q. Cannon

tion of America. He joined the American Marconi Company, predecessor of RCA, in 1915.

New Electronic Developments

(Continued from Page 23)

number of companies now producing 45-rpm records. Conversion of coin boxes and radio stations to 45-rpm facilities further indicates its popular acceptance."

A new and simple automatic three-speed record player, designed for 45, 33 $\frac{1}{2}$ and 78-rpm records, has been introduced by RCA Victor and will be on the market this month, he said.

General Sarnoff told the RCA stockholders that "today our foremost responsibility is to serve the Nation by providing the Armed Forces with radio, television and electronic apparatus vital to the success of their operations."

"Production of civilian and other commercial products is determined not only by demand," he continued, "but by government control of materials and by the availability of engineering personnel.

"While uncertain factors in the current world situation obscure the general outlook, there are certain factors within our own field of operations that are clearer. For example, productive capacity is the greatest in our history. Television is expanding its services. New markets for television transmitters and receivers are being opened, and the outlook for sales is brightening. We expect that our business for the last half of 1952 will show an improvement over the first half."

New Long-Life Radio Batteries

(Continued from Page 28)

million dollars, it was disclosed by L. S. Thees, general sales manager, RCA Tube Department. When it is used with two of the newly designed "A" batteries, Mr. Thees explained, the balanced power supply makes possible up to 10 times longer performance without change of batteries. He added that with the previous conventional "personal" portable batteries, two "B" and 10 to 12 "A" batteries were required in order to run a set for approximately 100 hours.

About the size of the average book, RCA's new "personal" receiver weighs only 3 $\frac{3}{4}$ pounds with batteries. It is 6 inches in height; 9 inches in width, and 2 $\frac{1}{4}$ inches deep.

Features embodied in the new instrument are 1) an automatic volume control to eliminate alternate fading and blasting; 2) easily removable back-cover for ready access to batteries and tubes; 3) instant play — no warm-up necessary; 4) new easy-to-read, combined "on-off" and volume control switch; 5) completely built-in antenna — no lids to open or flaps to lift; and 6) a "battery life-saver switch" which helps to increase the life of the batteries up to 30 per cent. The "life-saver" switch, for use in strong reception areas, enables part of the batteries to "loaf," delivering the minimum amount of power needed at the time.

Awarded Patent on Improvements in RCA Tricolor TV Tube

THREE basic improvements in tricolor television picture tubes, which made possible the RCA tricolor tube, so important in the all-electronic color television system, have been made by Alfred C. Schroeder, 37-year-old electrical engineer of the RCA Laboratories Division.

A patent, No. 2,595,548, covering Mr. Schroeder's improvements was issued by the U. S. Patent Office on May 6, 1952.

One of the disadvantages in earlier color tubes, prior to the RCA tricolor tube, it was pointed out, has been the fact that sources of electron beams usually have been located at fairly widely divergent positions within the tube's structure making necessary a number of beam-deflection systems. Such an arrangement of electron guns requires a tube with three necks.

Through Mr. Schroeder's invention, the guns are placed close together in a single neck tube, an arrangement permitting a single beam deflection system. This permits the use of a tube envelope and deflection system similar to those used in black-and-white television.

Since Mr. Schroeder's invention, teams of RCA scientists and engineers have integrated the improved tube into RCA's all-electronic system of color television.

A resident of Huntingdon Valley, Pa., Mr. Schroeder is on the research staff of the David Sarnoff Research Center of RCA, Princeton, N. J. He received his Master of Science Degree in electrical engineering at the Massa-



Alfred C. Schroeder and one of the RCA tricolor TV tubes which utilize his invention.

chusetts Institute of Technology in 1937 and joined RCA the same year. Since then, he has devoted a large part of his work to the development of color television.

27-inch Metal-Shell TV Picture Tube Developed by RCA

DEVELOPMENT of a high quality 27-inch metal shell television picture tube which is already being sampled to the television industry set manufacturers was disclosed early in June by L. S. Thees, general sales manager of the Tube Department of RCA Victor Division.

The new tube will be a high quality product designed for top priced, deluxe models, and will be made available to TV manufacturers in time for them to incorporate it into their plans for 1953 designs.

The tube incorporates a 'scaloped' glass-to-metal seal which makes possible a spherical faceplate with superior deflection linearity. The new RCA 27-inch

kinescope is slightly shorter than the 21-inch metal shell kinescope. It has a frosted filterglass faceplate with aluminized backing, which insures pictures having excellent brilliance and contrast completely free of annoying reflection.

According to RCA engineers, the metal shell construction contributes to the tube's inherent mechanical strength, practically eliminates the possibility of implosion, and results in a much lighter kinescope, weighing only about 29 pounds, as compared to a reported 41 pounds in an equivalent glass tube. Specially designed deflection components have been developed for proper operation of the tube.

Facilities for the manufacture of the new 27-inch kinescope are being provided at the RCA plant in Lancaster, Pa.

Urges Greater Efforts In "Pure" Research

(Continued from Page 27)

verge of an era in which new scientific knowledge can provide the basis for substantial advances in human health and happiness."

Based on progress being made in what he termed electronics of solids as contrasted to electrons in a vacuum, Dr. Jolliffe said that this new science already has produced the transistor, a tiny germanium device capable of performing many functions of an electron tube.

Dr. Jolliffe said that one of the intriguing aspects about the development of the transistor is the little-realized fact that this new wonder device will, of itself, help materially in the advance of fundamental knowledge.

He pointed out that, so far, the design of electronic computers has required rather large and bulky equip-

ment, some employing thousands of electron tubes which need to be frequently and carefully checked to guard against error. Space and heat are also serious considerations, he noted, adding:

"It is easy to see, then, the really magnificent contribution the transistor is destined to make in the future simplification and refinement of electronic computers."

Dr. Jolliffe stated that, in creating wider horizons for the electronics art, the transistor does not necessarily supplant the electron vacuum tube. On the contrary, he said, the new applications made possible by transistors may actually increase the use of electron tubes.

"With greater development of transistors, smaller, lighter, more rugged, and more efficient electronic controls will be developed for airplanes and missiles. It may even make new weapons possible. New, better, and smaller control equipment may well result in new types of planes.

"Here, indeed, is an outstanding example of how an advance in the fundamental knowledge of one field can be of inestimable value in another."

Radar Has 200-Mile Range

(Continued from Page 29)

pounds before installation, and is pressurized to operate at altitudes up to 50,000 feet. It is the first system of its kind to go into production that has both military and commercial application.

Operation testing of the set has been done in both Navy and Air Force planes. It already has prevented one serious Navy crash. A passenger packed transport had just taken off in foggy weather when the control tower erroneously instructed the pilot to make a right turn which would have taken him into the side of a hill. Fortunately, the pilot noticed the obstacle on his radar scope and made the correct turn.

Scholarship Plan Extended

(Continued from Page 14)

education at an engineering school. This scholarship and stipend of \$800 is continued for four years or until the student receives the baccalaureate degree.

More than 100 young men, who have completed their education with the aid of RCA Scholarships and Fellowships, are today at work as scientists and engineers in industrial organizations, research laboratories and scientific institutions. In addition, 32 students in 25 colleges and universities throughout the United States are studying under RCA Scholarships and Fellowships.



Frank M. Folsom (left), President, Radia Corporation of America and Henry D. Mercer (center), President, States Marine Corporation, listen as Admiral Thomas P. Wynkoop, President, Radiomarine Corporation of America, explains the operation of Radiomarine's 2,000th Radar installed recently aboard the Lane Star State.



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Radio Age

• MANUFACTURING • COMMUNICATIONS
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OCTOBER 1952



COVER

RCA television cameras are making it possible for millions of football fans to watch the nation's leading teams fight it out on college gridirons this fall. The NBC network will carry 11 of the contests.

NOTICE

When requesting a change in mailing address please include the code letters and numbers which appear with the stencilled address on the envelope.

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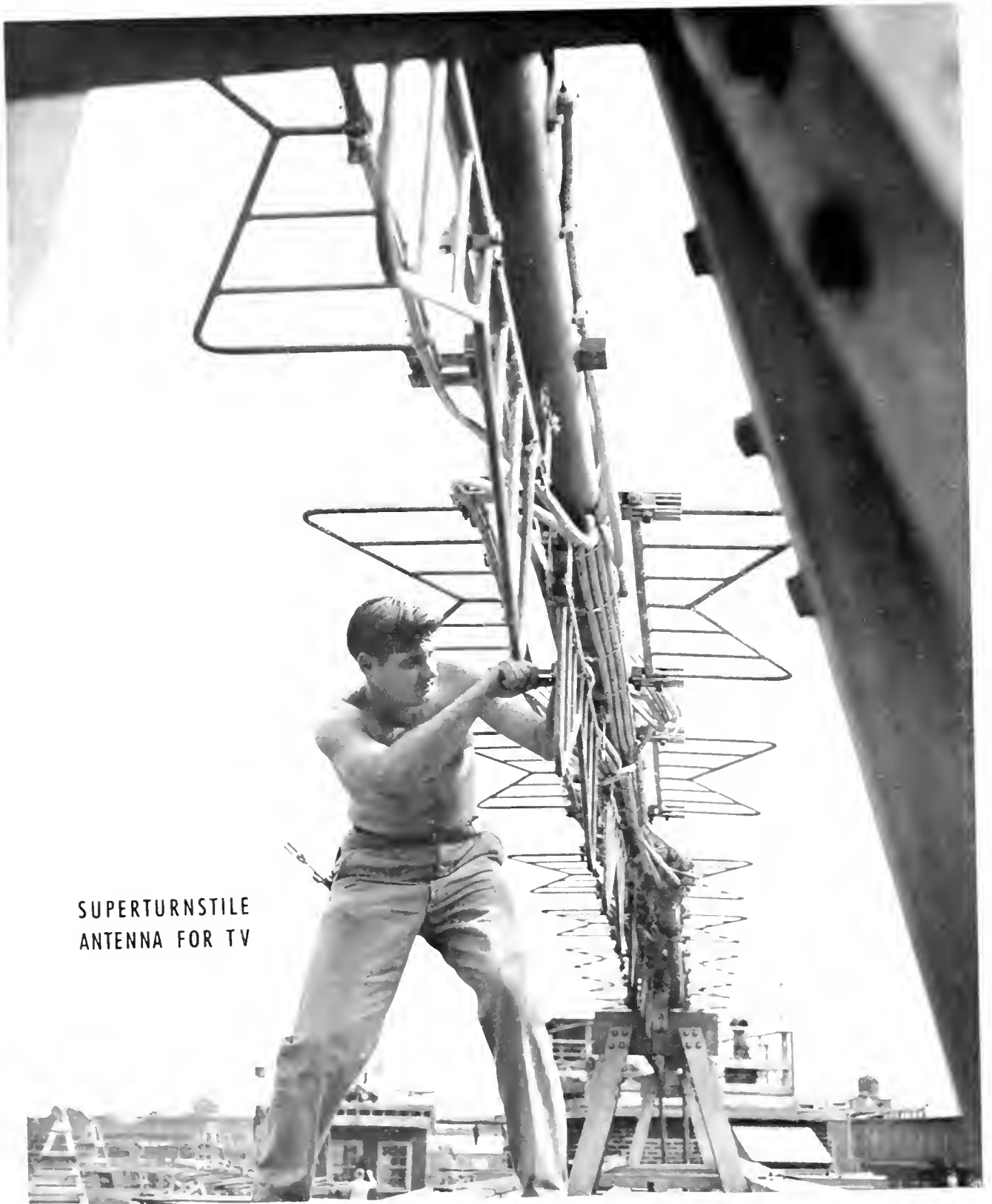
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**SUPERTURNSTILE
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RCA-designed superturnstile antennas have been installed in more than 75 television stations.



This scene in NBC's studio 8-H on election night in 1948 will be re-enacted this year on the evening of November 4.

Operation Election Night

A Staff of More than 1,500, Aided by Newly Developed Computing Machines, will supply NBC's Radio-TV Audiences with Fastest, Most Complete News Coverage of Balloting on November 4th

WITH batteries of television cameras, an augmented corps of radio and television commentators and eight almost-human computing cash-register-like machines developed especially for the occasion, ready to go, the National Broadcasting Company has completed its plans for the most elaborate radio and television news covering of any national election returns in the history of broadcasting. Focal point of activities on the night of November 4 will be 8-H, NBC's largest studio in Radio City, New York.

Continuous around-the-clock reporting of the returns will begin when polls close in the East on Election Day and will continue until most of the returns are in, 12 to 15 hours later. William R. McAndrew, director of NBC's radio and television coverage of both political conventions this year, will be in charge of the election night news center.

Under McAndrew will be a 500 man staff, including the roster of 25 politically experienced newsmen who supplied the nation with its most complete story of the Chicago conventions. More than 1,000 additional newsmen located at NBC-affiliated stations throughout the country will be on the job to report the latest ball-

counts in their respective areas. They will also contribute human interest sidelights and comment on voting trends as local returns are made available to them.

NBC is relying on its new computing machines to speed up and extend the scope of televised results. These machines had their genesis only a few weeks ago when Charles H. Colledge, NBC public affairs operations manager, discussed the network's election-night problems with Charles L. Keenoy, who heads the product development department of the National Cash Register Company, Dayton, Ohio.

Machines Completed in Ten Days

"What we need," Colledge told Keenoy, "is a fast, visual means of presenting the tallies to the television audience. We want to show, as simply as possible and as quickly as possible, who's winning — in the presidential race, and also in the contests for congressional seats and governorships."

Within less than ten days, Keenoy came up with plans for eight super-sized cash register machines. Each machine is capable of performing 27 different functions.

This is their role in the night's operations. Two of



Four years ago, street crowds gathered in Radio City to watch election returns as they were projected onto a large screen from RCA's theatre-type television projector.



Machines similar to those shown above will speed up the tabulation of balloting for NBC's television audience.

the machines, with 24 states on each, will be assigned each presidential candidate; each machine will record the percentage of election districts reporting, the current popular-vote tally by states, and the name of the state. The next two machines, one per candidate, will add up the national totals as taken from the two machines which record by individual states; and machines 7 and 8

will totalize the individual races for Congressional seats.

The first six machines will be so constructed that the TV camera can pick up the image directly. The last two, developed for the Democratic convention in Chicago, work by means of mirrors. In all cases, only the figures will be visible — the machines being blacked out. The figures will be superimposed against a graphic background — possibly against a map of the United States distorted to conform to the number of electoral votes of each state.

To coordinate election results and bulletin news for broadcast, NBC will make use of its combined radio-TV news-desk system which it pioneered with great effectiveness in Chicago. The joint desk will be the nerve center for disseminating all the latest information to radio and television reporters.

NBC will assign commentators to report and analyze the presidential voting, while others will report from a special newsdesk, concentrating on the important Senatorial contests, such as that in Wisconsin. A third combined newsdesk will report gubernatorial contests in Illinois, Massachusetts, Michigan, Ohio, Texas, Indiana and Arizona. A fourth radio-TV group in NBC's election-night headquarters will cover state-by-state voting for hotly contested seats in the House of Representatives.

Alongside the editor and reporter at each of the combined radio-TV newsdesks will be a team of tabulators who will break down the results as they appear on the face of the National Cash Register Company machines and post them on a huge blackboard that will cover the length of studio 8-H.

Cameras to Cover Party Headquarters.

NBC will station TV camera crews, newsmen with tape-recording equipment, and commentators at the various candidates' headquarters in New York and at both Democratic and Republican National Committee offices in Washington.

Several temporary TV settings and radio studios will be constructed adjacent to the newsdesks to provide facilities for interviews with top political figures, commentary and programs on the margin of the election reports. Most of NBC's Washington staff and commentators from other key cities will be concentrated in New York for election night.

Current plans call for continuous network programming on both NBC radio and television beginning about 8:00 p.m., EST., with three to five minutes allotted to local stations at stated intervals for broadcasting local results.

Progress in Electronics

The following text is taken from an address by Brig. General David Sarnoff, Chairman of the Board of RCA, at the Weizmann Institute of Science, Rehovoth, Israel, July 27, 1952.

The spearhead of pioneering and the gateway to progress is research. From it stem new knowledge, new inventions, new products, new services. It brings renewed vitality to business, increases opportunities for employment and provides higher standards of living for the people. Research is a creative effort that enlarges man's horizons and thus leads him onward toward new achievements.

In a sense, the pattern of modern life is largely the product of scientific research and technological development. The wonderful thing about research is the more of it you do, the more of it there is left to do. Each piece of research opens new fields for further exploration.

More Fundamental Knowledge Needed

In the words of Dr. Samuel Johnson, "The future is purchased by the present." And I know of no better way for industry, whether in America or in Israel, to assure its future than to join wholeheartedly in the full utilization of scientific research for the common good.

In recent years our scientific emphasis has been heavily concentrated in applied research, in engineering, and not enough attention has been devoted to pure, or basic research. As a consequence, there is, in a number of important areas, a shortage of the fundamental knowledge that is the raw material for engineering developments. Therefore, we must develop more fundamental knowledge. The safety and progress of the free countries of the world depend upon it.

The scientist bent on basic research is usually given little credit and, frequently, lacks the money and tools to continue his search of the unknown. It is not easy in industry nor in Government, to justify appropriations for pure research. It is hard to answer the question, "Of what value is a program of abstract science without a definite goal?" It is important, therefore, that we cultivate "science appreciation" much as we do "music appreciation."

The task of advancing the cause of pure science is made more difficult by world conditions. The barriers of secrecy are serious deterrents to scientific progress. Unquestionably, the world of science has suffered much

because the requirements of national security necessarily restrict the free flow of scientific information.

Basic to the advance of science is a free and unlimited exchange of information. In the growth of fundamental knowledge over the centuries, it often has been true that the report of a scientific discovery made in one part of the world stimulated important advances along the same line in other sections of the world.

There has been no such chain reaction in numerous vital areas of science for many years. The more basic facts and fundamental knowledge we uncover, the greater and the sooner will be our progress through applied research. Indeed, it is fundamental research that uncovers new phenomena and opens new vistas that are far-reaching in their applications. For example, recent studies in electronics of solids, as contrasted to electronics in a vacuum, are making possible an entirely new device—the transistor—a tiny electronic device made of single-crystal germanium. As an instrument capable of performing many of the functions of an electron tube, the transistor promises to open a new era of development which bids fair to surpass electronics achievements of the past.

Transistor May Increase Use of Tubes

In creating wider horizons for the electronics art, the transistor does not necessarily supplant the electron vacuum tube. On the contrary, the new applications made possible by transistors may actually increase the use of electron tubes.

Apparatus used in research at Weizmann Institute.





One of the buildings of the Weizmann Institute of Science at Rehavath, Israel.

Today, we are likely to think of television substantially from an entertainment viewpoint. This, of course, is natural since television is an electronic brother of radio broadcasting. Nevertheless, television has many applications outside the realm of broadcasting.

In the field of education and instruction, the possibilities of television are unlimited. Teachers in the classroom and the lecture hall, in medical centers and surgical operating rooms, will be able to add the power of demonstration to the effort of description.

Television Only in Its Infancy

Television in the United States has grown in the period of only five years from practically nothing to an industry whose volume of business last year amounted to three billion dollars. Including radio, the industry as a whole is now running at a rate of about five billion dollars a year. Yet television is only in its infancy. Before many years have passed, its black-and-white images also will be seen in color.

Today there are about 18 million television sets in American homes. There are 108 television broadcasting stations serving a potential viewing audience of more than 70 million persons.

Within the next five years there will probably be 50 million television receiving sets in the United States and about 1,500 television broadcasting stations with a potential viewing audience of 150 million persons. Every home in the land equipped with a television set will be within range of television programs.

We have a striking example of how success is being made toward this goal. Never in the history of the United States were the national political conventions within range of so many people as they were in July

of this year. Indeed, Americans had one of the greatest lessons in civics ever put before them on a nationwide scale. Television has revealed itself as one of the most powerful and effective forces that ever came into the political arena. It promises to be a decisive factor in the election results in November.

International Television a Prospect

Within the next five years we may expect to see television established on an international basis. International television will become a powerful aid socially, educationally, and politically. If properly used, it can cultivate better understanding among nations and help to reduce the tensions born of misunderstanding. Television's performance vividly illustrates the old saying that "Seeing is Believing."

I firmly believe that before too many years pass, New York, Chicago, San Francisco, in fact all the cities and towns of the United States will be able to tune in the panorama that television will present of Israel and the rest of the Mediterranean world. Similarly, you will be able to view America as the electronic cameras swing from nation to nation.

Industrial TV has Hundreds of Applications

This is still another type of service known as closed-circuit, or industrial television, also made possible largely by the vidicon tube and a 7-pound miniature camera which can be mounted in normally inaccessible locations. Industrial TV is, in effect, a remote eye for industry. Its hundreds of applications include the observation of dangerous processes as well as transmission of information such as signatures, maps and files. It has a variety of uses in mass training, in industry and in the military services. Industrial television can add immeasurably to the safety and to the efficiency of workers in business.

In still another direction, several years ago our engineers entered into a development program for the electronic inspection of medical ampules containing vaccines and other liquids. This work was undertaken to improve inspection methods for insuring the highest degree of purity in drugs.

We have also developed and demonstrated to the dairy industry a portable inspection machine which makes certain that empty bottles are clear of contamination before they are filled with milk. These, and other electronic developments, are adding importantly to the possibilities of improvement in health.

Now let us look across another horizon of electronics. Through man's inventive and engineering ingenuity, electronic computers have been made to add, subtract,

(Continued on page 31)

Because of the potentialities of this amazing development, the electronics world is interested in

The Status of the Transistor

By M. E. Korns

*Manager, Technical Services,
Commercial Dept.,
Radio Corp. of America.*

LIMITED use of semiconductor elements and devices is as old as radio. The original crystal detector was a semiconductor device. Until recently, however, there had been little technical progress in this art. Within the last few years interest in semiconductors, including transistors, has become very great, particularly in the electronics industry.

The first transistor was announced only four years ago. During this short period the acceleration of engineering effort has been unusual. Important progress has been made in learning the fundamental theory of operation of transistor devices and in establishing control of their operating characteristics and construction processes.

Experimental results already obtained in the laboratories indicate the practicability and usefulness of transistors. There appear to be a number of fields in which transistors will be used widely and to great advantage.

The development of the transistor will make possible new types of electronic equipment which will use not only transistors, but also electron tubes and other electronic components in increasing quantities. The commercial application of transistors appears to be not too distant, although a considerable time is probably required before these units become commercially available on any sizable scale at low cost.

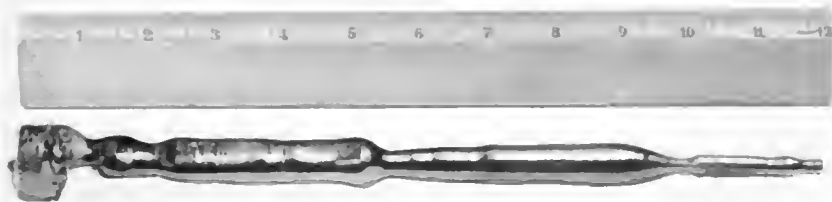
The intense interest in the transistor may be attributed to the fact that it performs functions similar to those of electron tubes. The transistor is of particular

interest to equipment designers who see many circuit possibilities in its characteristics. It is small in size and the power requirements for its operation are extremely low. When suitable circuits are developed, space and power requirements for complex electronic equipment may be simplified to a large degree by the use of transistors. Another promising feature is that the operating life of certain types of transistors shows indications of being very long, thus minimizing replacement problems. The physical ruggedness of the transistor offers other obvious advantages. In addition, the transistor requires no "warm up" time but will operate instantaneously upon application of voltage to its electrodes.

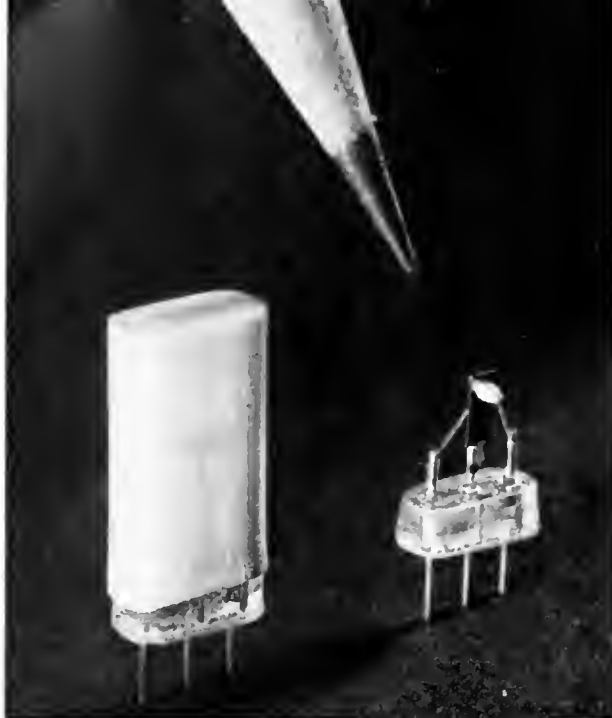
It is anticipated that transistors will be improved in many other respects.

At present, transistors will operate at frequencies up to a few hundred megacycles, but the noise at low frequencies is greater than that of electron tubes. Besides, the power output is relatively low. Nevertheless, when the favorable characteristics of the transistor are weighed against its limitations, it appears that this device, even in its present developmental stage, is destined for many applications. The anticipated improvements in characteristics undoubtedly will create new and expanding fields of use. At the same time, the principles of semiconduction in solids may be expected to play an increasing part in the development of many new electronic devices, of which the present transistor is but the first.

There are two types of transistors of major interest at this time—the point-contact type and the junction type. The point-contact transistor was developed first and has performed at higher frequencies. In many



Part of a single germanium crystal "grown" from a crystal seed. As many as 7,000 transistors can be obtained from the crystal shown.



Developmental junction-type transistor before and after embedment in plastic container, shown here in comparison with pencil point.

applications, however, the junction transistor promises to be as important as the point-contact type. In comparison with point-contact transistors, the junction types have lower noise, higher power gain, greater efficiency, and higher power-handling capabilities, but presently are more limited in frequency response.

At first, the frequency response of the point-contact transistor appeared to be limited to frequencies in the neighborhood of 4 or 5 megacycles. Recently such transistors have been made to oscillate as high as 300 megacycles. Currently, the simple junction transistor has been made to amplify up to several megacycles and the limits are being rapidly raised.

The power capabilities of either the point-contact or the junction transistors depend largely on the rate at which heat can be removed from the active portion. There are no basic limitations imposed by the electronic principles of transistor devices which will prevent the attainment of high powers. With relatively simple special cooling means, particularly with the junction types, it is possible to design units with outputs up to a watt or more.

The life expectancy of transistors is largely dependent on electrical and physical considerations. Realization of tens of thousands of hours does not seem unlikely in normal operation. Transistors can be physically rugged. They can be made practically impervious to moisture and the elements. Resin-embedded units have withstood impact acceleration of 1,900 times gravity and centrifugal acceleration of 31,000 times gravity. Transistors

have been immersed in water for several months, with practically no effect on their characteristics.

Although high ambient temperature is now a limitation, developments indicate progress in lowering this barrier. No damage occurs to the transistor during storage from minus 94° F to 212° F. Operation over the wide ambient range of minus 94° F to 122° F is practical and higher ambient temperatures will be feasible if proper attention is given to heat dissipation.

Uniformity of Characteristics

Uniformity of characteristics comparable to that of the electron tube seems possible. The art of crystal growing is rapidly progressing and the uniformity of germanium has progressed to the point where various transistor characteristics such as current amplification, power gain, feedback resistance, and input and output resistance have been controlled within $\pm 25\%$.

At present, the characteristics of high gain, low noise, greater stability, higher efficiency and higher power capabilities indicate that the junction transistor will be used principally as oscillators and amplifiers at lower frequencies. Another feature of the junction transistor is its ability to oscillate with power inputs around a millionth of a watt. It is anticipated that further development will increase the frequency limits and broaden circuit usefulness.

On the other hand, the point-contact transistor may be applied to very-high-frequency circuits wherever noise is not a limiting factor. Another feature of the point-contact transistor is the negative resistance properties which are especially useful in counter and similar circuits. Negative resistance means that an increase in current flow decreases rather than increases the drop in voltage.

Commercial Use Appears Near

Estimates of the time when transistors will be available in quantity for production of salable products must be somewhat speculative.

Engineering of some types of transistors has reached an advanced stage. The problem of providing adequate supplies of processed germanium with proper characteristics at reasonable costs remains to be worked out. Also, quantity manufacturing processes, machinery and other facilities are yet to be developed.

Limited application in special devices where cost and quantity are not major factors is close at hand. Wider use in quantity production, such as consumer home instruments, is dependent on the availability of processed germanium and production facilities.

KPTV, Portland, First Commercial UHF Television Station on Air

*Transmitter that Made Television History at Bridgeport, Conn.,
Used in Oregon to Send TV Programs to the Northwest*

IN a surprise move made possible by round-the-clock labors of engineers and construction crews, station KPTV, pioneer commercial UHF station, went on the air in Portland, Oregon, at midnight on September 18. Since that time, an increasing flow of TV receivers and UHF Selectors into the Oregon city has made it possible for the station's images to be viewed by thousands of residents. Reports of reception have been enthusiastic in their appraisal of the picture clarity and signal strength throughout the city and in some instances as far as 40 miles from the transmitter site on Council Crest, a 1,000 foot hill near Portland. The speed with which KPTV was put into operation brought praise from a large segment of the industry and from the citizens of Portland.

Regular programming by the station began on October 1 with a special pick-up from New York during which FCC Commissioner Paul A. Walker and Brig. General David Sarnoff extended their congratulations to the station and its owner.

Speaking from Washington, D. C., Chairman Walker referred to KPTV as the "harbinger" of a new era of expansion for American television. He commented upon the speed with which the station was installed at Portland by its owner, Herbert Mayer, President of The Empire Coil Company, Inc.

Upon completion of Commissioner Walker's remarks, the program switched to New York where Miss Sandra Mayer, on behalf of her father, presented to General Sarnoff a citation in appreciative recognition of the manifold benefits which the Radio Corporation of America has contributed to the development and growth of television as well as to the planning and research that made it possible for KPTV to begin broadcasting at that time on UHF.

"In bringing television to Portland, Mr. Mayer and his associates have acted in the traditional pioneering spirit of the great Northwest," General Sarnoff said. "They are blazing a new trail which leads to and from all parts of the country.

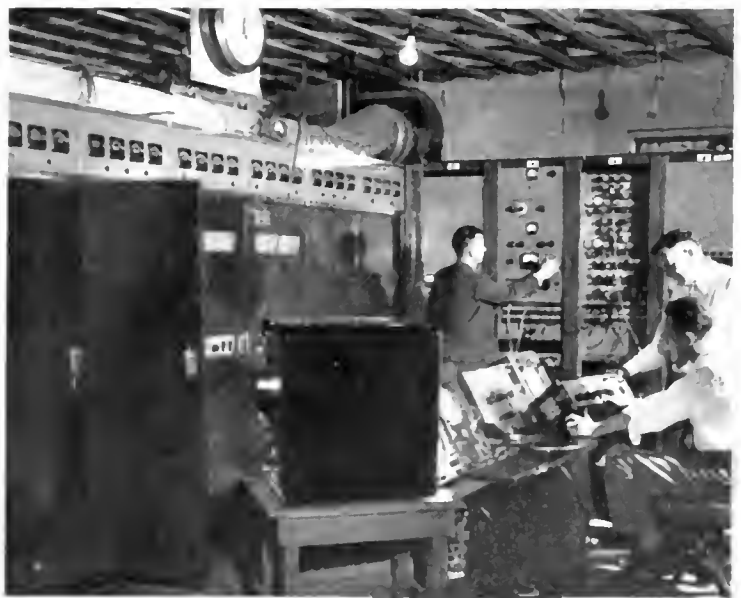
"As a triumph in radio exploration," he said, "the opening of the UHF spectrum may well be compared with the historic Lewis and Clark expedition that opened

up the northwest wilderness and made valuable scientific collections and observations. As those famous explorers pushed westward overland through forests, over rivers and mountains, so RCA research scientists and engineers for more than 25 years have conducted an expedition in the wilderness of space. To reach the goal of UHF they had to develop new electronic tools, new types of electron tubes and other equipment. . . . Indeed, it may be said of UHF, as it was said of the Lewis and Clark expedition, 'Few feats of exploration excel this in romantic interest.'

"These ultra-high frequencies are of great significance to the future of television," General Sarnoff said. "Hundreds of new channels bring additional millions of Americans into range of television programs, not only for entertainment and news but for education.

"Chairman Walker and his associates on the Federal Communications Commission are to be highly commended for their great interest in bringing the new trails of UHF into service. By licensing new stations they now encourage the television broadcasters to make

(Continued on page 30)



Engineers in control room of KPTV making final adjustments as station prepared to go on air.



Coaxial transmission lines lead from central television receiving antenna on Mt. Belknap to Laconia, six miles away. At right: Close-up of Antenaplex tower on 2,400-foot mountain.



Antenaplex Brings TV Programs to New Hampshire City

RESIDENTS of the industrial and resort city of Laconia, New Hampshire, who have been denied dependable television reception are now able to enjoy TV programs through the medium of an RCA Community Antenaplex system, the first to be installed in New England. Located 85 miles from Boston, Laconia's nearest source of TV programs, this community of 15,000 has been balked in its attempts to pick up the signals of station WBZ-TV in the Massachusetts capital because of the ranges of mountains and hills that rise between the two points.

To bring the signals over the mountains, RCA engineers, after a survey of the terrain, selected a site for the antenna on 2,400-foot Mt. Belknap, six miles from the center of Laconia. From a 40-foot tower erected on the peak, cable was laid down the mountainside to a distributing network installed throughout the residential section of the city. Residents who contract for service tap into the system through a TV baseboard outlet in their homes and are able to receive all available stations without individual rooftop antennas.

Some of the problems encountered in installing the system were described by speakers at the gala opening of Laconia's Antenaplex service on June 25.

As the principal speaker at the ceremonies, Governor Sherman Adams of New Hampshire told how workmen had struggled through the snow and rainstorms of last winter to bring television to the community.

"There was no road for the last half mile," he pointed out, "and hundreds of pounds of equipment had to be carried up that slope. I think it was a real demonstration of Yankee grit.

"Today," he added, "we see the results of that tremendous effort—television reception that compares favorably with the best anywhere."

Robert M. Macrae, RCA Regional Manager for the Northeastern Region, told the gathering that the Laconia installation would provide a pattern for the entire region.

He said, "I expect soon to see scores of other mountain-locked towns in this area enjoying good television. With community Antenaplex, there is no reason why TV reception in all New England can't compare favorably with that enjoyed in any other section of the nation."



10 RADIO AGE Workmen drew hundreds of pounds of TV equipment up last half-mile of roadless, snow-covered mountain.

NBC's New TV Center on West Coast Finished in Record Time

*Roomy Studios and Service Quarters Embody
Latest Advances in Design and Construction*

ONLY a few weeks ago two huge slabs of concrete rising like monoliths amidst piles of lumber, a contractor's hut, scattered building materials and debris, dominated a 48-acre site at the busy intersection of Alameda and Olive Streets in Burbank, California. Today, passing motorists see in the same spot two large television studios and a vast service building operating at high speed. This is the first unit of NBC's new West Coast TV headquarters.

Unlike the usual motion picture theatre with its small stage and maximum seating capacity, the NBC studios have been designed in reverse. While the stages are large, each auditorium has seats for only 500. The remainder of the 90- by 140-foot studios has been set aside for scenery, acting, an operating area for cameras, booms and associated equipment.

As the result of a suggestion by NBC star Red Skelton, arrangement of the seating area varies slightly from the normal. Skelton suggested that seats in the west studio start from seven feet above floor level, so that cameramen could move farther back underneath the seats for long shots.

In addition to the production space, the first floor of each studio includes a foyer, a conference room, properties room, producers' offices, an echo chamber, lens storage closet, lighting and technical equipment storage rooms, and a sound effects room.

Spacious Facilities for Stars

Other facilities will include five dressing rooms for stars, equipped with showers, three makeup rooms, two quick-change rooms, one large wardrobe room, a steam room, a rubdown room with showers, and rest rooms at each end of the main corridor. The dressing room section occupies a space 33 feet by 140 feet.

A second floor has seven additional dressing rooms, the control rooms, equipment rooms, engineers' lounge and more rest rooms. Another 10 dressing rooms—four for choruses, which also can be used as rehearsal halls—a makeup storage room and telephone equipment area are housed in the basement between the adjoining buildings.

The one-story service building, 140 feet by 180 feet,

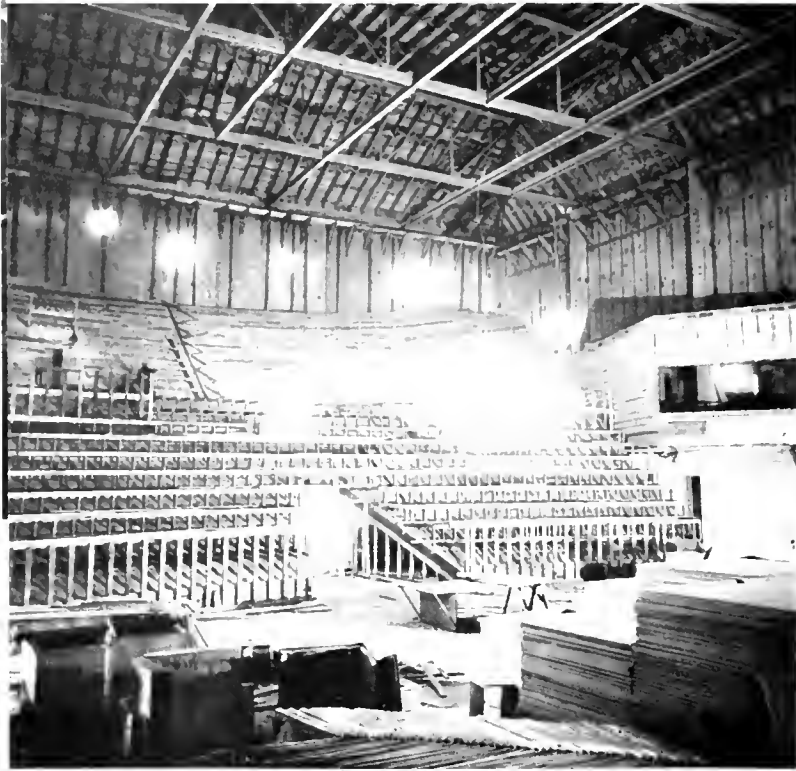
contains two large rehearsal halls, a carpentry shop, paint shop and large storage areas for scenery and other materials. The overall dimensions of the TV Headquarters are 305 feet by 210 feet.

Shows televised in the new Burbank studios normally will go onto the coaxial cable through NBC's "Radio City" at Sunset and Vine in Hollywood. If normal relay facilities should fail, however, Burbank will be able to beam its programs direct to the NBC transmitter atop Mt. Wilson, northeast of Los Angeles, for telecasting. Large dish-type transmitting antennas are being installed on the roof of the studio building to provide this safety factor. A five-mile extension to the transcontinental video cable has been installed along the Cabuenga freeway through the Hollywood mountains, connecting NBC-Burbank with NBC-Hollywood.

Concrete Walls Built on Ground

Structural innovations speeded up the construction work. For example, instead of erecting lofty wooden forms for walls and columns, the reinforced concrete panels—a total of nearly 150 units—were poured in advance on the ground and lifted into place by giant cranes, a feat in itself. Erecting the panels—each weighing 16 tons—one on top the other, required ingenuity. This was accomplished by lifting one panel, or half-wall, turning it sideways, inserting it between the columns, then turning it back and bringing it into position.

To Gordon Strang goes much of the credit for completing the job on schedule, according to John K. West, vice president in charge of NBC's Western Division. Strang joined NBC in 1927, soon after he had visited WJAF, NBC's original New York outlet, to install telegraph facilities for handling election returns. He liked what he saw of the company, applied for a job and a few weeks later, much to his surprise, was invited to join the network, then only one year old. Since then, he has participated in setting up most of NBC's owned-and-operated radio stations outside of New York. In recent years he has been concerned with the construction of NBC television plants in Washington, New York, Chicago and Hollywood.



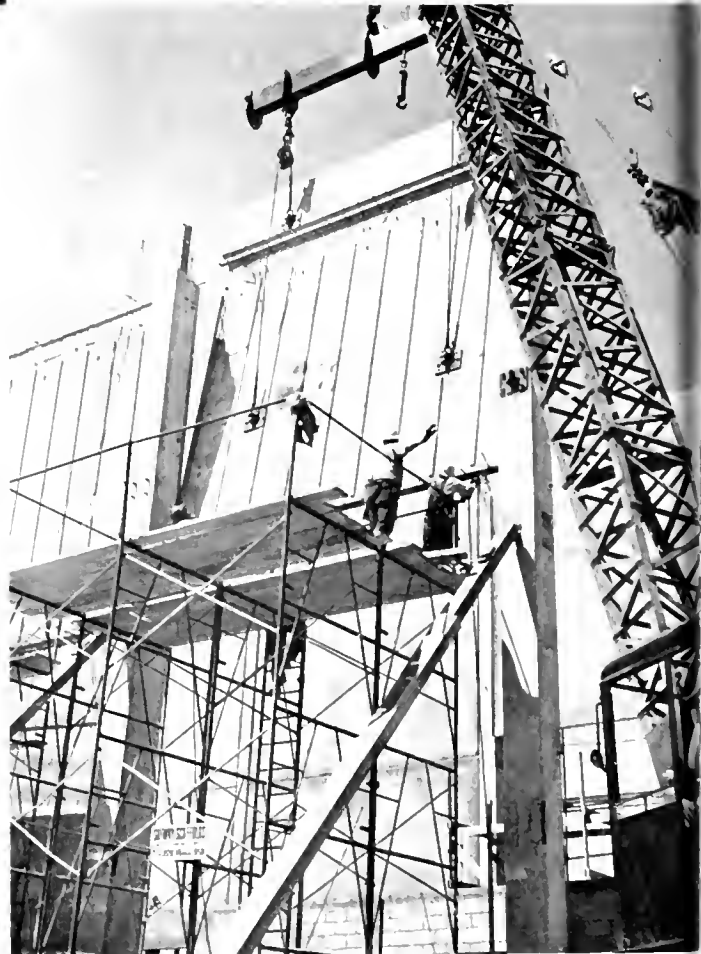
One of the two main studios at Burbank as it neared completion. Elevated control room is at the right.

Before Strang's arrival in Burbank, the project already had been launched by Joe Arnone as supervisor of construction, working under O. B. Hanson, NBC Vice President and Chief Engineer. Earl Retrig, chief of TV operations for the Western Division, and Ed Sobol, production executive, contributed ideas on the required staging facilities and on the layout of the service building. Howard Johnson, TV production facilities supervisor in Hollywood, and his assistants, Joe Tichener, chief scenic artist, and Bruce Reid, carpentry chief, were consulted on makeup rooms, wardrobe quarters and the arrangement of shop facilities. Control rooms, technical equipment and lighting came under the supervision of Bob Clark, chief video engineer for the Western Division, Paul Gale, head of station relations and traffic, handled details on wire and telephone facilities.

The new TV Headquarters, which is expected to expand through the years, is the result of a decision NBC executives made in 1951 to go ahead with its own television center rather than continue to invest increasingly more in leasing and buying theatres for its expanding video network. Property was purchased from nearby Warner Bros. Studios and the City of Burbank. In February, 1952, pencil was first put to paper but it was not until last April that ground actually was broken and plans made to complete the project this Fall.



O. B. Hanson, NBC vice president and chief engineer checks a line on the Burbank site. With him are Roy Ward, engineer-builder; William Homby, design consultant, and Sol Kornberg, NBC production executive.



A huge crane swings a 16-ton concrete panel into place as part of the studio's outer wall.



Rain and snow are two of the numerous visual effects made to order for the producers of NBC television dramas.

It Isn't Always as You See It—on TV

There's Art and Magic in Producing Visual Effects that Heighten the Drama of Television Programs

By James Glenn

*Manager, Staging Services,
National Broadcasting Company*

WF—in Special Effects—are known, among other things, as the "meteorologists" of television. We are responsible for simulating such natural phenomena as rain, fog, fire, smoke, snow and wind, such supernatural phenomena as multiple images and distorted scenes, and such visual gags of the Ed Wynn type as exploding hats and collapsing cameras. When a TV script calls for a special effect, it is up to us to produce it. And so far, our batting average is close to 1000.

NBC's rain comes in three sizes—small, synthetic and wet. In that order, (1) a common, garden-type watering can may be emptied just in front of a camera, (2) synthetic rain is made by glamme, a cellophane-like plastic woven into cloth, the strip of which is attached to a drum and rapidly revolved. One camera shoots the actual scene, the other shoots the revolving glamme—and the superimposed images make it rain, (3) wet rain, on a 12- by 24-foot scale, is produced by a sprayer system installed above the scene to be televised. The water falls into a tank which is under the floor boards on which the actor stands and is re-circulated by an acoustically treated pumping unit. The tank is treated with excelsior or glass wool to avoid noisy "plops" which would rob the scene of conviction. It goes without

saying that this is the most effective of all rains.

We also have several ways to make snow. Falling snow can be produced by a plastic spray; bleached cornflakes (a Hollywood standby that is a little noisy for television); confetti (very convincing except that it doesn't melt indoors), and a powdered ice (it melts, but the mechanical system needed is too noisy). We are currently working on a device that will create a synthetic snowfall a viewer won't be able to tell from the real thing.

For a dressing of snow, we find that powdered gypsum, marble dust and dairy salt are all good. For snow banks or window ledges, dairy salt is first piled to the desired form, then lightly sprayed with water to give it a crusty, frozen look. Real open fires are stringently limited in NBC television productions by the fact that film is stored both in the RCA building and at NBC's 106th Street studio building. Where actual flames are unavoidable for close-ups of fire-places, we have evolved "logs" made of stovepipes covered with plaster and asbestos. Shredded waste asbestos is soaked with wood alcohol and tucked in among the logs. Chunks of "frozen" alcohol, resting in trays under the logs, are ignited, touching off the alcohol-soaked asbestos, and creating a controllable flame. For best photographic effect the flame is colored by the use of various chemical formulae.

Synthetic fires, fine for long shots, are produced by lightweight silk or nylon gauze cut into flame shapes



A bird's-eye view of a city serves as a back-drop to create a realistic impression of height for a TV "thriller".

and attached to a diffusion chamber which contains lights and a connection with a blower system. Even candle flames can be simulated in this manner with miniature mechanisms, driven by flashlight batteries, concealed in the candlestick.

Smoke is made by special pellets dropped on electric hot plates or by igniting tobacco in a tube to which a hand syringe, acting as a pump, is attached. Occasionally, for smoky explosions, magician's cotton or flash powder is set off by an electric charge.

"Martin Kane, Private Eye," gets hit on the head at least once a week. Until recently, the cameraman put the TV audience in Kane's predicament by throwing the camera in and out of focus. This is a relatively slow method. About to be used—for this and other supernatural effects—is a distortion lens, which, when rotated, gives a dreamlike, out-of-this-world image. Prismatic lenses, which turn images upside down or multiply them eightfold, can be rotated by a crank to create all kinds of weird impressions.

The "Flexitron," an electronic device, distorts an image under controlled conditions and is used not only for such supernatural effects as were created during the three-part "Peer Gynt" production but also to give motion to the titles at the beginning of TV dramas.

On a recent "RCA Victor Show" on NBC, Harpo Marx was rebuked by a headwaiter for an untidy dining table—dirty dishes, overturned glasses, empty bottles, empty bottles, full ashtrays. One second later an abused Harpo pointed to the table and revealed an impeccable setting with clean dishes, sparkling glassware, full wine bottles, flowers arranged artistically in the center. On the same show the wretched Harpo fed nickels continuously to a parking meter, which registered a violation each time he turned his back.

All this was done without trick photography. For instance, the table was a two-sided affair, pivoted in the

center, the top cut out along the pattern of the table cloth. Dishes, glassware and silverware were screwed down. Harpo had only to push down on one end of the table and the top flipped over revealing the other setting. The dummy parking meter registered a violation every time a stage-hand off-camera, pulled a string releasing a pin that held down the indicating sign.

One of the department's proudest accomplishments is the fog-making machine. With it we can produce realistic fog that will swirl, hang and allow the actors to walk through it. Prior to the development of the machine, TV fog had been produced by smoke candles, which give off an acrid vapor irritating to nose and throat. Smoke-candle fog was neither predictable, consistent nor realistic. It looked like what it was: smoke not fog.

Another fog-making method was to blow steam on dry ice. This method is still used in smaller studios where it is necessary to get rid of the fog quickly, but it is not desirable for a full-scale, sustaining fog. Still another method was to shoot the scene through a smoke-filled glass chamber, a procedure which tends to drop a veil—both physically and psychologically—between the viewer and the actor.

The new machine, an electric Rube Goldberg-type marvel, atomizes a special oil, which is then vaporized by being sprayed on a hot plate. In other words, it becomes smoke and no longer globules of oil. The vapor is blown through an acoustically treated compartment, passed through dry ice, and exuded under low air pressure. Two of these machines can fill a vast studio like NBC's huge S-H in less than three minutes. Moreover the devices ate so well muffled that they can be operated noiselessly within four feet of a microphone.



A few drops of chemical squeezed into a liquid produces a cloud of vapor that can be photographed for television.

NBC Opera Telecasts Scheduled

Eight Works Including Two Premieres and a Repeat Performance of "Amahl and the Night Visitors" in Fall-Winter Series

EIGHT opera presentations, including the American premiere of Benjamin Britten's "Billy Budd" and the first professional performance of Leonard Bernstein's "Trouble in Tahiti," are to be given in the 1952-53 season of the NBC Television Opera Theatre. The announcement was made by Samuel Chotzinoff, NBC general music director. As in previous years, the series will be under the musical and artistic direction of Peter Herman Adler, with Chotzinoff as producer.

The season also will include a virtually complete version of Richard Strauss' "Der Rosenkavalier," to be given in two segments. Puccini's "Suor Angelica," the second of his triptych of one-act operas, also will appear in the schedule. Gian Carlo Menotti's "Amahl and the Night Visitors," first telecast on Christmas Eve, 1951, will be repeated this season.

Eight of the television presentations will be offered monthly on Sundays. The opening opera was "Billy Budd" on October 19. The performance ran an hour and a half, starting at 2:30 p.m. Theodor Uppmann, baritone, who created the title role in London and Paris, was seen again in this part.

Leonard Bernstein's "Trouble in Tahiti," revised since its presentations at Brandeis University and Tanglewood, will be given as the second opera in the schedule on Nov. 16 at 3:00 p.m. This opera runs about 40 minutes. The remaining time in the one-hour telecast will be devoted to a ballet presentation with music by Bernstein.

Gian Carlo Menotti's phenomenally successful "Amahl and the Night Visitors" will be repeated in December, probably near Christmas time. Menotti again will stage the work, with Thomas Schippers as conductor. The same sets and costumes of Eugene Berman will be used. Menotti is searching for another Amahl since 13-year-old Chet Allen, who sang the role twice on NBC last season, is no longer a soprano.

Operas for January and February have not yet been scheduled, but probably will be selected from the standard opera repertoire.

In March, "Suor Angelica" will be given. This opera has an all female cast and is set in a convent. NBC Opera last season presented the other two of this triptych of one-act operas, "Gianni Schicchi" and "Il Tabarro."

In April no opera is scheduled, because "Der Rosenkavalier" will be given in two sessions, both in May.

The staff of the NBC Television Opera Theatre will be largely the same as last year, with Charles Polacheck as associate producer to Chotzinoff, and Kirk Browning as television director.

All presentations of the NBC Television Opera Theatre are given in English.



Scene from NBC's TV production of "Gianni Schicchi", one-act opera by Giacoma Puccini.

Robert Weede and Elaine Malbin in last season's telecast of Puccini's "The Cloak".



Watchdogs of Quality

Expert Technicians at RCA's Testing Laboratory Check the Company's Products Before They Reach the Customer

By William J. Zaun,
Manager, Quality Control,
RCA Service Co., Inc.

OFF the beaten track, in the pine woods at Browns Mills, N. J., 30 miles due east from Camden, is the one RCA showroom that the public never sees.

There, in a two-story brick building, a visitor would see long rows of the latest TV sets, blocks of 45-rpm record players, lines of air-conditioners, parades of table radios, all hard at work, 24 hours a day. The television screens are alive with pictures; the 45's are spinning; the air-conditioners are extracting degrees Fahrenheit from the atmosphere, and the forest-green radios have their dials alight. Antennas of every description, including of course, the RCA Antenaplex, sprout from the roof top. Outside the building stands a station-wagon, rigged with three mobile-radio systems, one RCA and two of competitive makes. This is the company's Field Quality Testing Laboratory. From its operations come information which contributes substantially to the "priceless reputation of RCA."

The Laboratory, operated by RCA Service Company, bulges with products assembled for inspection under the searching eyes of ten technician-judges. Products for the tests are arriving constantly from the various manufacturing plants throughout the country. In one shipment from Indiana, for instance, there will be more than 100 new models of TV consoles. At the same time, a smaller quantity of competitors' receivers will show up to be put through the same rigorous inspection.

All instruments are tested at once—two and three-quarters of an hour "ON", one-quarter hour "OFF"—24 hours a day—until each has been in operation for 100 hours, a period approximating the set's first-month service in the average home.

These speeded-up tests are conducted to learn if first-run instruments from the production line meet specific standards of RCA quality. Other checks are made to determine the margin of superiority over competitive products. Competing sets are placed side by side with those manufactured by RCA, and examined by technicians for such characteristics as bandwidth, overall gain, synchronizing action, as well as picture definition. When special tests are desirable on new

products, they may continue for 1,000 hours or more.

Upon the completion of the test period on television sets, three types of reports are sent out:

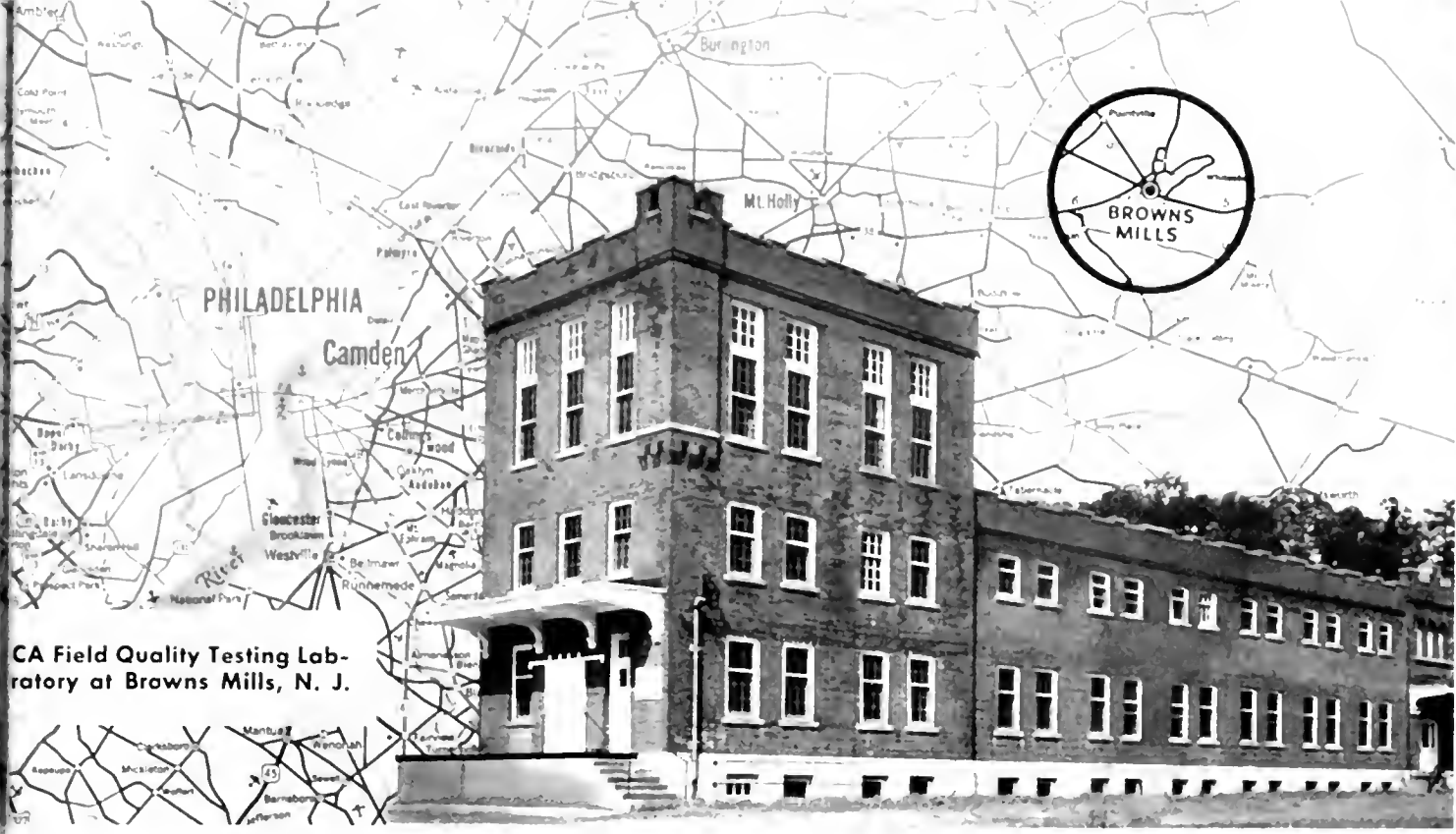
- (1) A daily teletype report is dispatched to the quality manager of the plant which made the models under observation; a duplicate goes to the engineering department. These messages relate what was found wrong or report "no fault." Special emphasis is placed on failure of parts and tubes, cabinet defects and fringe reception that falls below standard.
- (2) At the end of each 100-hour test, a summarized report is compiled, based on the sample lot tested. This is inclusive, including model, line



Thirty-two automatic record players, selected at random from production lines, undergo life-tests.

The finest and most accurate instruments are available for the many tests carried out at the Field Laboratory.

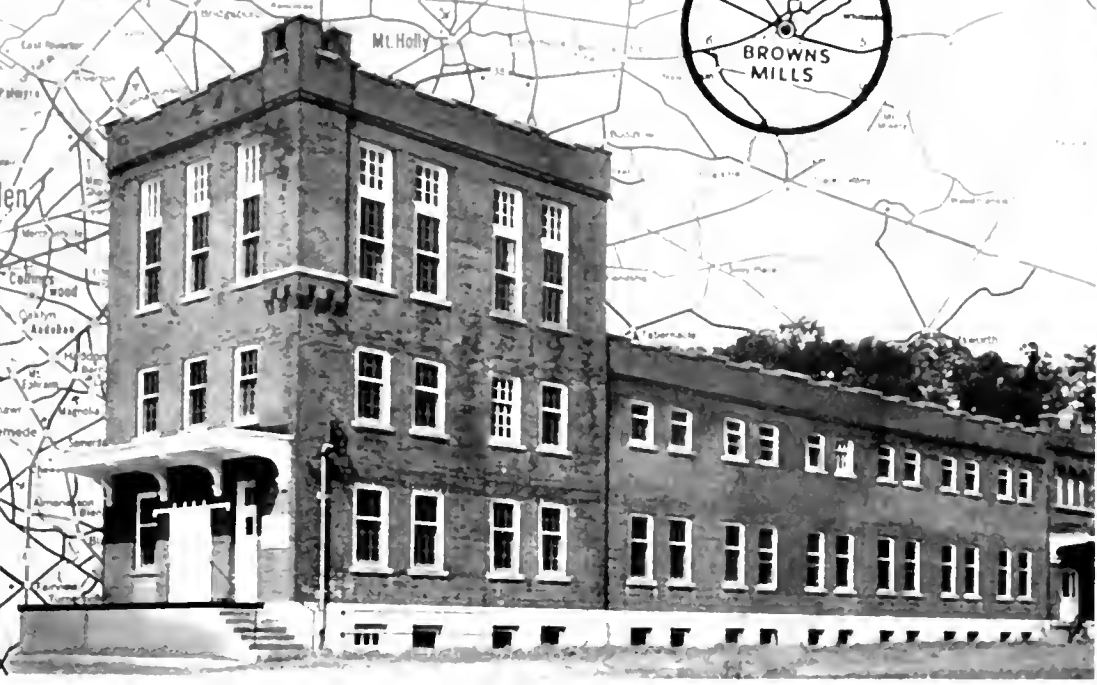




PHILADELPHIA

Camden

BROWNS MILLS



CA Field Quality Testing Laboratory at Browns Mills, N. J.



Rows of table model radio sets (above) and new television receivers (below) are subjected to on-and-off tests for 100 hours or more while technicians watch for any deviations from RCA standard of quality.



and the identity of the plant which turned out any defective parts.

5. An overall or "management" document is compiled, according to originating plants. This part of the program is carried out only after several sample lots have been inspected.

If trouble reaches high percentages, the information is rushed to Production or Engineering Departments or both, in order that necessary changes may be made immediately. Before these foolproof checks were started in 1951, Production and Engineering had to wait, sometimes for as long as 25 weeks for reports from the field.

For the testing of TV sets, Browns Mills is an excellent location. Signals are received there from Philadelphia, Wilmington and New York. The last 60 miles away—provides fringe-type reception conditions. Television signals are brought in on both independent and multi-antennas.

However, the success of the Quality program will not be assured by the simple collection, analysis, and reporting of data. Coordination and team work with Quality Control Managers, Manufacturing Supervisors, and supervisory Engineering personnel of the various Instrument, Tube and Components Plants is an important part in the program. A plant-wide quality committee consisting of representatives from the manufacturing plants, engineering, merchandising and service engineering regularly reviews the overall RCA VCR Quality level and its trends, and institute the necessary action to assure an enduring adherence to high standards.



Benjamin Franklin was the central figure in an historical program of the "American Inventory" series.



"Importance of child care" was one of the educational offerings in NBC's experimental telecasts.

American Inventory — a Successful Experiment in Adult Education by TV

IN JULY 1951, NBC in cooperation with the Alfred P. Sloan Foundation undertook a major television experiment in adult education. The chief objective was to present a series of educational and cultural "for instance" telecasts to determine the most effective techniques which TV might employ for the advancement of public information and enlightenment. Since that time, more than 50 programs, mainly on economics and the social sciences, have been telecast, bringing high praise from educators, the public and the nation's press.

Because the program series was first considered as an experiment, it was believed that there should be no set pattern. Instead, it was decided that the word "experiment" should be taken in the full scope of its meaning: anything and everything should be tried. This would include living newspaper techniques, drama documentaries, panels with a difference, films, cartoons, puppets, individually and in combinations.

Although a majority of programs so far have been presented in "live" form, a more extensive use of film is considered for the remaining shows in the current series.

This change in emphasis was revealed in an announcement of plans for the coming year by William Hodapp, the program's executive producer. Stock films, Hodapp said, will be out, and "live" shows will be relatively few.

There are two reasons for the change, Hodapp explained. "We want to go out more and more on loca-

tion throughout the country to tell the story of what is at stake in America; we want to capture the personality of particular American institutions and communities; we want to show what communities can do.

"And, also, we'd like 'American Inventory' to have uses beyond the original TV screening. If we make our own films, they can be made available to classrooms, and we'd like what we've learned to be sent out to groups. This would not be possible otherwise."

Another innovation for the coming year will be a greater emphasis on star personalities. "We want to go after big film stars and directors," Hodapp said, "especially for films on economic subjects."

A third new trend will find more interpretation of industry's function in the American way of life. "We want to try a new approach to industrial films," Hodapp said. "Not a straight documentary, but something with a human interest story grafted on."

Some of the subjects scheduled for Fall presentation are:

"Social Security," a "Kukla, Fran and Ollie" program, their second for this series.

"Why Wait for a Million?" an on-location film story of Thayer Hospital in Waterville, Me., a small hospital that has attracted increasing attention for its successful hospital-community relations.

"Foreign Students in the U. S.," an account, filmed at Massachusetts Institute of Technology, of this country's foreign student program.

New Historical Series on TV—

“Victory at Sea”

CUMMATING more than 12 months of intense research in film libraries and governmental archives, NBC's long-awaited public service program series, *Victory at Sea*, will make its debut on October 26 at 8:30 p.m. EST. Thereafter, it will be viewed at the same time on alternate Wednesdays until the 26-part video story of war-time naval operations has been completed.

To insure the most accurate visual reporting of the “war at sea”, NBC engaged the services of outstanding authorities who virtually searched the world for film strips. The original musical score for the program was written by the distinguished American composer, Richard Rogers. Robert Russell Bennett arranged the music which was recorded by the famed NBC Symphony Orchestra under his direction. The entire score for *Victory at Sea* will comprise almost 13 hours of music, the longest symphonic work ever written.

The program was produced through the establishment of a special NBC unit, staffed by experts and organized to the last detail. Robert W. Sarnoff, then director of NBC unit productions and now Vice President in charge of NBC-TV's newly created Film Division, immediately envisaged the vast potentialities of a public-service dramatic-documentary when he was ap-

proached two years ago with the idea for *Victory at Sea* by Henry Salomon, naval historian. Sarnoff, whose responsibilities then included “The Comedy Hour,” “Your Show of Shows,” “All Star Revue” and “The Kate Smith Hour,” set machinery in motion that resulted in *Victory at Sea*. He helped arrange for complete cooperation between the network and the Navy, organized a production unit to create the program, and made Salomon producer. He has served throughout the preparation of the series as its executive producer and coordinator.

Victory at Sea was assembled from more than 60,000,000 feet of film obtained from the files of 10 different governments and 26 different agencies. Much of the film, including captured German and Japanese footage, will be seen for the first time. The attack on Pearl Harbor, for instance, is seen largely through the eyes of the Japanese. Submarine warfare in the Atlantic is pictured to a considerable extent from films exposed by U-boat crews.

Neither cost nor effort was spared by NBC in searching for the exact sequences needed to depict specific phases of the war. For instance, the editors

Continued on page 52



Left: Some of the millions of feet of film from which editors selected sequences for the *Victory at Sea* series. Below: One of the exciting scenes from films made available to NBC by the U. S. Navy.



Night Driving Made Safer by Electronic "Eye"

EYE-BLINDING headlight glare, bane of night drivers and one of the hazards of after-dark travel, has succumbed to the wizardry of a small tube developed by RCA. The tube—a multiplier phototube—is the essential component in the "Autronic Eye", an automatic headlight beam control developed by the Guide Lamp Division of General Motors Corporation.

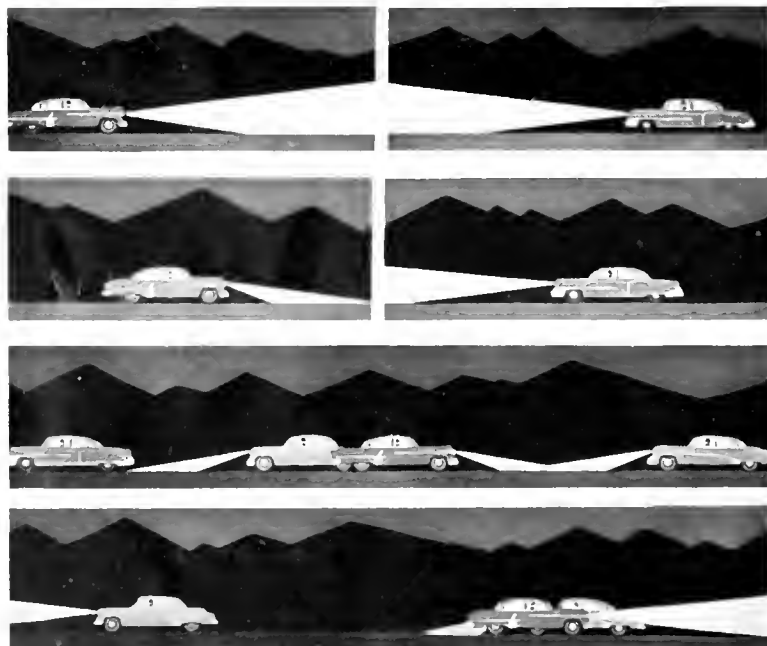
Mounted behind the windshield of an automobile, the "Eye" sees what the driver sees and electronically selects the safest headlight beam to suit approaching road conditions. The "Eye" relieves the driver from the responsibility of constantly operating the conventional foot-switch to dim when approaching other cars or entering well-lighted or dark streets and highways.

The phototube is extremely sensitive to light. When it picks up light from approaching traffic, it triggers a control circuit which dims the headlights of the car on which it is installed, and keeps them dim until the other vehicle or vehicles have passed. Similarly, it dims the headlights when the car enters well-lighted streets, and brightens them when the car enters darkened avenues.



Autronic Eye, containing small light-sensitive tube (insert), electronic relay and control circuits, automatically depresses bright beam when one or more cars approach and raises beam when traffic has passed.

The device is available on several 1952 model automobiles and in due time may become standard equipment on all vehicles because of the greater highway safety and driving comfort it affords.



HOW THE AUTRONIC-EYE WORKS

1. Autronic-Eye keeps headlights bright as long as approaching headlights are beyond the glaring range.
2. Eye automatically shifts headlights from upper to lower beam when oncoming car approaches.
3. Maintains lower beam—even though oncoming lights are depressed—until nearest car and others behind it have passed.
4. Automatically returns headlights to upper beam when all oncoming cars have passed.

Television in Canada

By F. R. Deakins

President,

RCA Victor Company, Ltd.

Montreal, Canada.

CANADIANS, more than 100,000 of whom have been watching television from American border stations for four years, have, since the second week in September, been able to see regular scheduled programs originating in their own country. In the Montreal area, where a small number of set owners picked up distant American stations on a haphazard basis, unscheduled experimental programs went on the air in June and the first regular telecasting in Canada began on September 6.

Television as a Canadian activity is so new that it is still viewed more as a technical marvel than simply as entertainment. The public in both Toronto and Montreal, the only two cities presently having television transmitters, is buying receiving sets enthusiastically, and Canadian homes in these areas are going through the same early stages of the new adventure experienced by American TV audiences three or four years ago. Just as Americans were doing in the years immediately following the war, Canadians are adjusting themselves to this medium of entertainment and education.

Canada's approach to the miracle of the second half of the twentieth century has been more cautious and more gradual than was that of the United States. For the time being at least, telecasting in Canada is restricted to stations built and operated by the Canadian Broadcasting Corporation, a government-owned body which also operates the only radio networks in Canada. Later, at a time still to be decided, private stations will enter the television field and supplement the services of the government-owned system, giving variety and more intense local coverage to a medium which will probably continue to be dominated on a national basis by the CBC.

The delay in introducing television to Canada has been due to two factors: first, the extremely high cost of attempting to provide television coverage in a country which is spread across 4,000 miles and has a population approximating that of the State of New York; and second, the desire on the part of Canadian authorities to benefit from technical and programming experience in the United States before making extensive expenditures in Canada. As a result, the equipment being used

by the first two CBC television stations is of the highest standard and based on that developed for the best television stations in the United States.

Canadian television has been in the planning stage since 1947 when the first Canadian engineers and program staffs were assigned to study television as it then existed in the United States, Great Britain and France. Teams of producers and engineers visited stations in New York, Chicago and the midwest and then continued to London and Paris, reaping the benefits of knowledge accumulated in those centres. On the basis of their studies, television in Canada was organized and the fruits of their labor were made available to Canadians this year when the first programs went out over the transmitters in Montreal and Toronto.

Programs Telecast in English and French

In the two cities, specially designed five-story structures are the operating headquarters of Canadian television. Programs are on the air daily for an average of three hours. In the afternoon a half hour is directed to children, and two and a half hours in the evening for adults. Programs are a mixture of live and film presentations. In Montreal, half of the programs are in the French language, the other half in English. Approximately 70 per cent of the citizens of Montreal speak French.

Montreal's CBFT, with its RCA 5-kilowatt transmitter located on top of Mount Royal, the mountain park in the heart of the city, enjoys the distinction of having been the first station to telecast in Canada. Early last June, several weeks ahead of schedule, it was on the air with test patterns, and in the last week in July was telecasting International League baseball games. To the great satisfaction of Montrealers who carry on year-round competition with Toronto in everything from sports to science, CBFT continued its priority and was on the air two days ahead of Toronto with regular programming in September.

Part of the credit for Montreal's performance belongs to RCA Victor engineers who installed the transmitter and temporary antenna on Mount Royal. Long before any actual construction work began groups of CBC technicians were taken to Camden and to the David Sarnoff Research Center of RCA in Princeton, N. J., to see RCA equipment. These trips were followed by visits to NBC where similar equipment could be seen in operation.

In 1950, an order was received for a TT5A standard 5 kw transmitter, the maximum power available at that time, and for a three section superturnstile antenna designed for Channel 2. For approximately a year the CBC was negotiating with the city of Montreal to secure a transmitter site on the mountain top. When these negotiations were successfully completed, the transmitter was brought to Montreal and instructions were received to go ahead with the necessary engineering plans and drawings for installation.

Meanwhile, CBC proceeded with construction of its building, allowing space for a 20-kw amplifier and an additional transmitter which will be installed later when French and English programs are telecast simultaneously on different channels. As the work proceeded, public interest increased and CBC, which was more or less committed to go on the air by the fall of 1952, was anxious to be telecasting experimentally before that. Then the steel shortage intervened and it appeared that completion of the tower in time might be impossible.

RCA Victor engineers were informed of CBC's problem and offered their assistance in overcoming it. A temporary antenna seemed to be the only solution. Our engineers told CBC: "We will design one for you from scratch and have it ready in time". The offer was accepted. An order for the temporary antenna was received on February 21; on May 29 it was completed

and on June 3 it was installed, tested and was operating under its full power.

Installation of the transmitter commenced April 7 and was completed on June 19. After going through its performance test and following minor adjustments which are always necessary on new installations, it was accepted by CBC on June 23. RCA Victor engineers in the Montreal plant designed the complete transmitter installation and supervised all preliminary telecasts. Bruce MacKimmie, antenna specialist; Bob Norton, transmitter engineer, and John Jackson, supervisor, all of the Montreal RCA Victor plant, handled the installation under the direction of H. B. Seabrook, chief of the Engineering Products division of the Canadian company. For the final check on performance, Ray Colvin, service engineer, was brought from Camden in order that CBC might have the advantage of his experience on many similar jobs in the United States.

Full cooperation from the CBC technical staff, thoroughly designed equipment from RCA Victor's plant, and competent engineering combined to make possible Canada's first telecasting well ahead of schedule. A three-section superturnstile antenna and two FM antennae are still to go up and, eventually, that second TV transmitter to take care of the second language programs. In the meantime CBFT is on the air and is being received in points as far away as eighty miles, with clear reproduction.

Station CBFT's antenna on Mount Royal looks down on this view of Montreal's business section.





Workmen rig a temporary television antenna atop the transmitter building of CBFT, Montreal.

Montreal and Toronto, of course, are only the beginning. While each city has a potential television audience of more than 2,000,000 people, another ten million people across Canada are impatiently awaiting the day when they will get in on Canada's biggest show. Toronto is now linked with Buffalo, N. Y., by microwave and can handle live programs from there, but for some months to come Montreal will view only shows originating outside the city on kinescope recordings. The Bell Telephone Company is installing a series of 12 microwave relay stations between Toronto and Montreal via Ottawa, and this first television network in Canada is scheduled to open in June 1953. It is estimated that a similar network, coast-to-coast, will cost at least \$50,000,000.

Television on a semi-national basis will be established in what CBC refers to as its second stage. Transmitters are planned for Quebec City, Ottawa, Windsor, Hamilton, London, Winnipeg and Vancouver, with only the Ottawa transmitter now having reached the blueprint stage. Ottawa, it is expected, will be on the air with programs fed mainly from Toronto and Montreal, by mid-1953. Other cities in stage two will probably have to wait another two years with Atlantic and Pacific coast cities scheduled for about five years from now.



Test pattern shows up on RCA Victor control console installed at CBFT transmitter.



Canadian and U. S. television representatives at official opening of CBFT. Left to right: C. B. Denny, NBC vice president, and Mrs. Denny; Donald Manson, CBC General Manager; Paul A. Walker, FCC Chairman; Thomsan A. Moore, assistant to President of RCA Victor, Ltd., and André Ouimet, CBC assistant co-ordinator of television.

When the network as envisioned by CBC is completed, private stations will be invited to join. Only then will television coverage in Canada approach that now available in radio, and when that status is reached, Canada will then be able to see itself on the television screen from coast to coast.



A new owner of RCA television receives operating instructions from a service technician.

Tactful Technicians

The RCA man who services your TV set must follow more than 40 rules of Conduct, Courtesy and Diplomacy

HE won't take refreshments in your home, even if you urge him. And he won't smoke unless he's specifically invited to do so. He may not like having you, your children, and your Great Dane looking over his shoulder while he's working, but he's tactful enough not to show his annoyance. There are more than 40 other rules that govern his conduct while he's in your home.

This polite, patient man is a carefully trained installation and service technician from the RCA Service Company. Technical ability isn't enough to qualify these men for their jobs. Their training also includes a firm grounding in courtesy and diplomacy.

"The best TV technician in the world doesn't meet our requirements unless he practices unflinching courtesy and tact in his dealings with our customers," E. C. Cahill, president of the Service Company, states emphatically. "Good customer relations means bread and butter to us. It's as simple as that."

The company goes to great lengths to insure customer satisfaction through courteous treatment and prompt, efficient service. And that goal is achieved by a continuing program carried out in all of the service branches the company maintains throughout the country.

A big feature of this program is the President's Cup campaign, inaugurated last spring by Frank M. Folsom,

president of the Radio Corporation of America. Launched on the theme, "Fix It for Sure; Fix It for Keeps," the drive was designed to stimulate inter-branch competition in efforts to achieve exceptional performance in maintaining customer satisfaction.

The contest proved successful, and another phase, keyed by the slogan, "Courtesy Counts, Workmanship Wins," was launched last fall. The third phase, which ended in June, stressed prompt service with the theme, "TNT — Today, Not Tomorrow."

After each phase of the contest is completed, winning TV service branches are selected on the basis of those receiving the fewest customer complaints. Managers of winning branches are invited to a ceremony in New York, at which they are personally presented with the President's Cup by Mr. Folsom. Each victorious manager, on his return, is host to employees of his branch and their families at a dinner held in recognition of this achievement.

Does this emphasis on courteous service pay off? Hundreds of unsolicited letters from customers says it does. Complaints have been reduced as a result of the program. And some of the complimentary letters would warm the cockles of an advertising man's heart.

"Just a word to congratulate you on the caliber of your local organization. . . ."

RCA Service Company manuals, such as the technicians' handbook, "The Care and Treatment of Tele-

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Three of the manuals prepared for the guidance of RCA Service personnel.

Color Book for TV Scenery Designers

By Albert W. Protzman,
Technical Production Director,
National Broadcasting Co.

IMAGINE a television stage scene as it would be viewed from the TV studio. The set designer has executed the background in the soft tones of grayed gold, the star is wearing a gown of ultramarine blue; the leading man is clad in a suit of medium gray, and the dominating piece of stage property is a divan covered in a brocade of warm green.

To the studio audience, the visual picture in color is a satisfying one, impressive and in the proper mood of the play. But strangely, the thousands who are watching the same scene on their home TV receivers in monochrome are left cold, unresponsive, unimpressed. To them, the video screen picture — in sharp distinction to the scene viewed by the studio audience — appears flat with an almost complete absence of tonal contrast between the costumes of the cast and the stage properties and scenery. In this imagined scene, some vital change has taken place between camera and receiver screen to nullify the best work of designers, producers and cameramen.

Unfortunate situations similar to this one have not been uncommon in television. The basic cause was the inability of the TV camera to convert the different colors of the scene into correspondingly contrasting shades of black and white. In the particular setting just described, the grayed gold, ultramarine blue, gray and green would have appeared on viewers' screens as a monotonously uniform tone of slate gray.

But NBC has taken positive steps to see that such incongruities won't happen again on its network. After months of methodical labor, the author and Cliff Stiegelbauer, NBC Supervisor of Design, have completed preparation of a reference book which removes all element of chance in selecting colors and color combinations for the most effective black-and-white TV presentations.

Preparation of a reference book of this kind would have been useless in the early days of television when the iconoscope was the standard camera tube, because the "ike" was not stable in its color response." Different tubes responded in different ways. But the RCA image orthicon — the present standardized camera tube — is being mass-produced with a dependable and specific spectral response. This response was used as the starting point for the NBC color charts.

When the study of color versus black and white was begun, it was essential first to establish a workable range in the gray scale, that is, from light gray to near black. As a basic source of comparison it was decided to utilize the accurate and standard Munsell Gray Scale. The Munsell system grades tones from black to white and arbitrarily numbers them from 1 to 9.5, but because the television system cannot successfully tolerate this wide contrast, it was necessary to confine the range between ≈ 2 black to ≈ 8.5 white. Munsell ≈ 2 black reflects only 3% of the light striking it while the ≈ 8.5 hue, called "television white," reflects 63.5% of incident light.

By actual tests it was found that a video picture could be more accurately reproduced if the reflectance of scenery, whether in color or in monochrome, were held within this restricted contrast range.

Preparation of the NBC Color Book was a long, tedious job. There were 192 colors to test and each color was broken down into four tints and three shades.

In its final form, the NBC book — which is not available for general distribution — consists of 14 pages.

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The author (left) measures the temperature of the studio illumination as Cliff Stiegelbauer holds a red-orange card against a gray scale. The comparison shows that this particular hue will be reproduced on TV screens as Munsell ≈ 7 gray.



An RCA industrial TV camera scans passing freight cars and transmits the moving images to a recorder who notes the car numbers and other essential data.



TV Demonstrates Usefulness in Railroad Field

NEW uses of television in railroading which may save time, money, and wear-and-tear on both rolling stock and personnel have been explored in tests conducted recently by the Baltimore & Ohio Railroad and RCA at the railroad's Barr Yard in Chicago.

At demonstrations attended by the press and officials of the B. & O. and 28 other railroads, RCA used three of its newly developed "pint-size" Vidicon industrial TV systems to enable personnel in sheltered fixed locations to perform functions normally requiring both extra movement of freight cars and walking by employes over considerable distances.

Instead of walking among trains and over tracks to list car numbers on an incoming train, for use in switching to make up trains destined for various sections of the country, a checker sat before a television screen and listed the numbers as cars passed before a small unattended camera. Similarly, supervisors in a single location were enabled to observe on the screens of two TV receivers, for the purpose of coordinating various activities, the disposition and movement of all cars and switching engines in the big classification yard. These views were picked up by two of the new small TV cameras, mounted atop the yardmaster's tower on bases that could be rotated at will by means of controls at the receiver location.

At a luncheon at the Union League Club preceding the special press demonstration this afternoon, W. C. Baker, B. & O. vice president in charge of operation and maintenance, envisioned numerous other railroad appli-

cations of television and said that the medium may play an important role in the railroading of the future.

Speaking for RCA Victor, W. W. Watts, vice president in charge of the RCA Engineering Products Department, reported that railroading is the newest and one of the most challenging of a growing list of industrial and scientific fields in which television promises increased efficiency, improved products and services, and elimination of risks and hardships for human observers. He said that the use of television in such places as factories, mines, laboratories, and railroad yards may some day be as common and as significant as its use today for home entertainment.

Object of the Chicago experiment, Mr. Baker said, was "to determine whether industrial television will be able to contribute to greater efficiency in the operations of a railroad classification yard."

Other possible uses have been suggested. For example, industrial television may prove to be useful at large railroad-marine terminals, such as the B. & O. operates in Baltimore. There, television might be used to help supervise the loading of ore at the import ore pier. Or, at the tipples of coal mines, television cameras might be adjusted to enable a clerk in a distant office to record the serial numbers of cars which are being loaded. Another possible application, it was pointed out, would be in the inspection of car gear. Industrial TV cameras operated from pits beneath the track or suspended from above the cars would permit an in-

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Two-way Radio System Speeds Flow of Materials in Steel Plant

THE problem of maintaining the orderly movement of millions of steel parts as they are transferred from one manufacturing process to another has been solved by a Pennsylvania company through the use of an RCA two-way radio communications system.

The Standard Pressed Steel Company of Jenkintown, Pa., nine miles north of Philadelphia, is the world's largest producer of socket screws and fabricator of huge numbers of other metal products. Every day the plant converts 80 tons of steel into metal fasteners and shop equipment, for industry and the armed forces. Among these items are bolts for aircraft, and parts for jet, Diesel and reciprocating engines.

To transfer the parts from one station in the production lines to another, Standard relies on a fleet of small, electrically-operated vehicles called fork lifts, which cruise over the company's 15-acre plant and into its yards. Before radio entered the picture, contact with drivers of these lifts was maintained, after a fashion, by phone calls, messengers, public address systems and signal lights. All methods were either time-consuming

or provided only one-way contact. Radio eliminated these drawbacks. Today, with each truck equipped with an RCA Carfone unit, a driver can be directed instantly to needed spots, or if he is on an assignment at the time, can so inform the dispatcher.

Radio Gives More Output from Trucks

Reuben Whitaker, Standard's Chief Expediter, has summed up advantages of the RCA two-way communications system in this manner:

"We used to make dozens of phone calls and run our legs off getting tork trucks to needed spots but now all we do is call over our radio system and we get immediate results. We can now get a truck in five minutes whereas formerly it took half an hour. As a result we get more output from each truck."

Then, there was the matter of employee morale. Before the radio system was in operation, departments often disagreed over the urgency of their respective truckage needs. Now, that doesn't happen. When a department needs a truck, Production Control reaches a

Dispatcher (left) of Standard Pressed Steel plant in Jenkintown, Pa., is able to reach the operator of any lift truck (below) in factory or yards, over the RCA two-way radio system.





Huge machines and stockpiles of metal do not affect the operation of the interplant radio communications system designed by RCA for the Standard plant.

driver at once and the lift arrives within a few minutes. As a result, everyone in the Standard plant is happier, particularly the truck drivers. They have definite assignments and no longer can be blamed for delays for which they are not responsible. Moreover, with radio, the drivers are protected from false accusations of loafing on the job. When they leave their vehicles, they notify the dispatcher who thus knows where they are and where they can be reached at all times.

When RCA communications engineers first studied the installation plans at Standard, there was some doubt as to the efficiency of mobile radio in the plant. This doubt arose because of the huge piles of steel stock and the number of steel machines throughout the buildings. Then there was the deafening din created by the galaxy of thundering machinery. But tests carried out by RCA proved the doubts unfounded.

Communications on the very-high frequencies (152-171 megacycles) assigned by the FCC to "mobile industrial radio" applications, was found to be unaffected by the steel stockpiles and the steel-reinforced walls of the building. The background noise, however, was a tougher problem. With normal conversation in the plants almost impossible, it seemed unlikely that the driver of a fork lift could hear his loudspeaker above the cacophony of sounds. Nor could the dispatcher hear the driver's voice as the latter's words entered his microphone along with the factory din. Again RCA found the solutions.

On trucks operating in the noisiest areas, the conventional loudspeakers were replaced with directional re-entrant horns. These horns beamed the dispatcher's



Headsets for the fork lifts are placed at the left of the operator with the transmitter-receiver installed behind the seat (extreme right).

orders direct to the drivers and excluded confusing sound. Next, the regular microphones were replaced by noise-cancelling microphones which eliminated most of the background noise.

The completed RCA installation at the Standard Pressed Steel plant now consists of six radio units. One semi-portable Carfone is located on the dispatcher's desk and five mobile Carfone units are on the fork lifts, operated from the trucks' storage batteries.

Television in Railroading

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spector, sitting before a television screen in his yard office, to examine the condition of equipment as each car passed the inspection point.

"Someone once said," Mr. Baker added, "that a railroad is no better than its communications. And, the better its communications, the better the railroad. If this is true, then the great new communications medium of television should have an important role to play in the railroading of tomorrow."

The new RCA Vidicon equipment is designed to afford maximum simplicity, compactness, and ease of operation; good picture quality; low-cost operation. The system consists of only two units: a small, light-weight camera, about the size of a 16mm home movie camera, and a combination monitor-power supply-control unit housed in a luggage-type case smaller than a home table model TV set.

The equipment is designed around a new RCA camera tube, the Vidicon, which is only one inch in diameter and six inches long, yet is almost as sensitive as the much larger studio-type image orthicon tube.

Radio Workshop Ends Tenth Year

Almost Unknown Amid Hollywood's Glamour, Summer School Sponsored by NBC and U.C.L.A., is Successful Example of Public Service in Education

By Thomas C. McCray

*Director, Radio Network Operations,
NBC Western Division*

LITTLE known and little publicized amid all the glamour of big names and big shows at NBC in Hollywood are the activities of the U.C.L.A.-NBC Summer Radio Workshop.

While Bob Hope, Eddie Cantor and Red Skelton get the headlines, the Workshop has gone quietly about its business and has amassed an impressive record of accomplishment. Almost 1,000 men and women have attended the summer sessions; an estimated 40 per cent have found permanent careers in radio.

The aims of the Workshop are two-fold: (1) to give university students and teachers who have some background and knowledge of radio an advanced course in the practical workings of the industry; and (2) to give people already in radio a greater knowledge of their own business.

The course was known as the U.C.L.A.-NBC Radio Institute when it began in 1945, and its six weeks of daily sessions were held at Hollywood Radio City, the NBC building at Sunset Boulevard and Vine Street. NBC executives and department heads conducted the classes, for which students received no credit. There were seven courses that first year: control room operation, radio acting, radio writing, radio production, announcing, radio news editing, and a survey course. The curriculum remained the same until 1948 when a course in radio education was added. In 1949 radio sales was added.

Over the years, as the Institute continued, a gradual metamorphosis took place. Until 1950, an enrollment of 100 students was admitted. Now qualifications for admission have been raised, and this year only 30 students were admitted to the Workshop.

The Institute began under the Department of English at U.C.L.A. In 1947 it was transferred to the University Extension. It was in 1951, however, that the most

drastic change took place. In that year, the Institute became the Workshop, the scene of its activities was moved from NBC to the Westwood campus of the University; it was made a part of the Theatre Arts department, and, with the university faculty working with NBC executives and department heads, it offered full college credits to students who took part in it.

Now, after a preliminary course of lectures on the

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Pat Kelley, NBC supervisor of announcers, explains microphone technique to students in the NBC-Bornard College Summer Workshop.

Workshop students attend a lecture on the mechanics of news-gathering in NBC's Radio City newsroom.



KPTV—First Commercial UHF Station on Air

(Continued from page 9)

use of these new pathways through the air by filling them with program traffic.

"We are happy to have had a part in blazing this trail across the continent, and are pleased to have KPTV affiliated with the National Broadcasting Company's TV network. I know NBC will do its best to bring you entertainment, news, education and sports from all parts of our great country, and from places beyond its borders. And we look forward to seeing programs and events from Oregon which you will send to us."

The construction permit for the station was received by The Empire Coil Company on July 11, 1952, soon after the lifting of the FCC "freeze." Then, the firm bought the transmitter and associated equipment which had been operating for more than two years in the RCA-NBC experimental UHF station, KC2XAK, near Bridgeport, Conn. This station had provided the industry with the opportunity to unravel the secrets of UHF broadcasting, and manufacturers with the means for developing and testing UHF receiving equipment. During this same period the RCA Service Company conducted field tests with various types of receiving antennas, transmission lines, UHF tuners, and selectors for TV sets.

On August 25, engineers from NBC, RCA, Adler Communication Laboratory, and Empire Coil Company began dismantling the 1-kw station for shipment, via truck and fast freight, to Portland. Some of the NBC engineering staff went along to help KPTV engineers assemble and install it in its new location.

On September 9, construction was started on a 250-foot tower atop Council Crest. A special RCA broadcast antenna, which left Camden by express on September 6, arrived in Portland September 11, and was installed the same day on the tower, which had already been completed.

By that same date, all the transmitting and related equipment had arrived from Bridgeport, and engineers and technicians were working around the clock to re-assemble it.

Two and one-half days later, a cinder-block building had been completed to house the transmitter, which was then ready for operation.

The high quality of the initial test pattern on September 18 was matched in subsequent tests. The newspapers carried test pattern pictures on page one, congratulating KPTV on their clarity. The excellence

of the reception made it abundantly clear that although the engineers and technicians had worked long, hard, and fast to put KPTV on the air, there had been no compromise with engineering standards. The station stood securely on its performance.

At 4:30 P.M. on Saturday, September 20—only two days after the initial test—the station offered its first commercial program. It was a televised showing of a film, sponsored by RCA Victor, depicting the growth and development of UHF television, and was titled "Success Hill." Commercial UHF television was a reality. This was followed by "live" programs picked up from the NBC network.

In the incredibly short space of three weeks, the country's first UHF station had been constructed and put on the air with sponsored programs.

The station is spreading a strong signal over the city of Portland with its present 1-kw transmitter, and 14-section antenna, providing effective radiated power of 17.6 kw. It is also putting a Grade A signal into the adjacent cities of Vancouver, Wash., and St. Helens and Oregon City, Ore. One of the first to report on the test pattern was a dealer in Salem, Ore., 42 air miles from Portland, who described the picture as "very good."

KPTV eventually will operate with a 5-kw transmitter, providing effective radiated power of 87.9 kw. For the present, the station will air network programs and local film shows only, but when studios in downtown Portland are completed, it will be able to originate "live" programs locally.

Tactful Technicians

(Continued from page 24)

vision Customers," are playing a large part in bringing about the sort of service RCA Victor television owners appreciate. This insistence on maintaining good customer relations is not limited to installation and service technicians. Even the telephone girls have a 28-page manual telling them the proper way to deal with callers. An excerpt from this manual sums up the company's attitude toward service. It reads:

Be cheerful. Remember—Service is our business. Be courteous, sympathetic, and interested.

Convince the customer that you want to be of service—that you represent a company that is vitally interested in providing the best possible service at all times.

Always keep a smile in your voice.

Answer promptly. Be attentive.

Always set a good example. Be understanding and friendly.

Progress in Electronics

(Continued from page 61)

multiply and divide. Besides, they can memorize the results of these operations in such a manner that they are immediately available for another operation. There is every promise that these electronic systems can graduate from high-speed simple arithmetic to high-speed reading and writing too.

These modern robots promise to revolutionize and simplify the clerical operations of insurance companies, banks, tax bureaus, stock exchanges, and business in general. For example, in merchandising organizations, a single electronic computer can do the combined accounting of receivables, payables, purchases and stock control.

These possibilities and applications are by no means in the dream stage. During and after World War II, great impetus was given to these "super-brain machines" for use in the fields of aerodynamics, guided missiles and ballistics.

Future Possibilities of Electronics

We know that the electron has tremendous potentialities for development of new devices in the home appliance field. We already have electronic stoves and cookers, and we may have electronic air conditioners, refrigerators and many other useful appliances. The home of the future may be electronically heated or cooled, and life everywhere made more comfortable.

Already the power of electronics is being felt by motion pictures, the theatre and aviation. It is performing important tasks for the printing industry, and holds great promise for future developments in this field. For example, RCA engineers, in cooperation with the Interchemical Corporation have developed automatic electronic equipment which reduces by at least 50 per cent the time required to make color plates for printing. And the fidelity of the plates is materially improved.

This new process so speeds the manufacture of color plates that we may look forward to the time when daily newspapers will be able to print pictures of the day's events in color. It will be possible for weekly magazines greatly to increase their use of color pictures, and some of them eventually may be printed entirely in color.

Finally, let me refer to a question that is frequently asked by anxious people who watch the march of science. They ask, "Will the scientific machines make this a better world in which to live?"

Each man must himself give the answer to this vital question. For the answer depends upon man himself and not upon machines, for machines are not endowed by the Creator with minds and hearts and souls.

Science alone cannot guarantee security for civilization. Yet the problems facing man cannot be solved without science. Sometimes it seems as if the Lord challenges man to use his intelligence. He makes some lands fertile, others arid. He hides coal and oil in the rocks and fish in the seas. He makes the electron and the atom infinitesimal and the radio waves invisible. But man has proved that he can harness these forces for useful purposes.

Man is Tired by His Toil

Man has been on earth a long time; he has had to toil by the sweat of his brow and he is tired by that toil. He has had to go into the mines and into the forests for fuel; he has had to go into the fields to cultivate the soil and to depend upon the elements for his harvest. Much of his work is unproductive, for even in converting energy into electric light, most of the energy is lost in useless heat. Man cannot survive without food, shelter and clothing; yet, all people on this earth do not share equally in these basic needs of life. And this inequality breeds discontent, hostility and war.

It is man's excuse that he has too little opportunity for spiritual development because so much of his time is devoted to work and to sleep, to combating disease and to fighting wars. But has he not learned a lesson from the horror of this latest war? And has he not been given a new opportunity which may lighten his burdens? Is it not conceivable that in unlocking the secrets of the atom, science offers man a natural power to meet his basic needs with less drudgery and without conflict? May not the new mechanical slaves at his disposal give man the means and the time to obtain and to enjoy more of the spiritual and cultural values of life? Through atomic fission, it may become possible to facilitate the creation of raw materials so that all people will enjoy an abundance of natural wealth, and thus remove one of the age-old irritations that lead to war. Should all of these possibilities become realities, they, plus the great potentialities of the electron, will contribute greatly to the advancement of civilization.

Indeed, today man faces a thrilling opportunity as well as a great threat. The potentialities of science enable him to look bravely at the stars and to seek a finer destiny. He needs most the faith and the spiritual guidance that would lead him to apply his new knowledge to peaceful pursuits. For the hope of peace that is lasting and a world that is free, lies within the soul, the heart and the mind of man.

If man will exercise his imagination and work hard in the arts of cooperation, good will and peace, as he does in the field of physical science, he will find that the road ahead is one of progress.

"Victory at Sea"

(Continued from page 19)

needed 700 feet of 35 mm fine-grain film which, they had learned, was in the possession of the Indian Navy. At NBC's request, the Indian government airmailed the required footage but it arrived in the form of a 16 mm negative. The shipment reached Radio City from New Delhi via the Indian Embassy in Washington. NBC's editors noted the desired scenes and then returned the entire strip by diplomatic pouch to Bombay. Government officials there went to work tracing down the original 35 mm negative. It was discovered in various parts of the country, some in spots as distant as Simla in the Himalayas. From these negatives, the Indian government printed the 700 specified feet and forwarded the prints to New York.

The U. S. Navy gave the undertaking its full and official cooperation, both in supplying actual combat film and in providing technical assistance. Captain Walter Karig, Special Deputy to the Chief of Information, Department of the Navy, was assigned to the project as technical advisor. He brought to the task long experience as a writer of history, fiction, and non-fiction. During his naval service he wrote and edited the epochal "Battle Report", a five-volume series which comprises a narrative-history of the Navy in World War II.

Mr. Salomon, who is acting as producer of programs, served six years in the Navy, beginning as a seaman and eventually retiring from active duty as a Lieutenant Commander. During his service he was assigned to the office of the Secretary and served in the Pacific for three years. After the Japanese surrender he was sent to Tokyo as personal representative of Secretary Forrestal and the Chief of Naval Intelligence. He collaborated with Rear Admiral Samuel Eliot Morison, in writing the 14-volume, Bancroft prize-winning "History of the United States' Naval Operations in World War II."

Direction of the series will be in charge of M. Clay Adams, who came to NBC after many years in Hollywood and in producing films for the Armed Forces. Isaac Kleinerman, veteran motion picture director and editor, edited the film.

Officials of the U. S. Navy, Radio Corporation of America and the National Broadcasting Company attended a preview of two episodes of "Victory at Sea" at the U. S. Naval Air Station in Anacostia, D. C., on October 15. The special showing was arranged for Admiral William M. Fechteler, Chief of Naval Operations. Heading the visiting RCA-NBC officials were

Brig. General David Sarnoff, Chairman of the Board of RCA, and Joseph H. McConnell, President of NBC.

In introducing the two episodes, "Design for War" and "The Pacific Boils Over," Robert Sarnoff described "Victory at Sea" as the most complete picture of sea power ever presented.

"In the 26 years of its existence," he said, "the National Broadcasting Company has had no more challenging task than the production of these 26 half-hour programs — portraying the story of sea power during World War II — which constitute "Victory at Sea." Without the assistance and splendid cooperation of the United States Navy, this story could never have been made available to television."

The series, it was announced, will also be telecast by the British Broadcasting Corporation beginning October 27.

Radio Workshop

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university campus, the students do field work at NBC, where, in small groups of three or four, they work in various departments of the network, not only observing what goes on but actually taking part in the day-to-day activities of the news room, the program department, the publicity department and the rest.

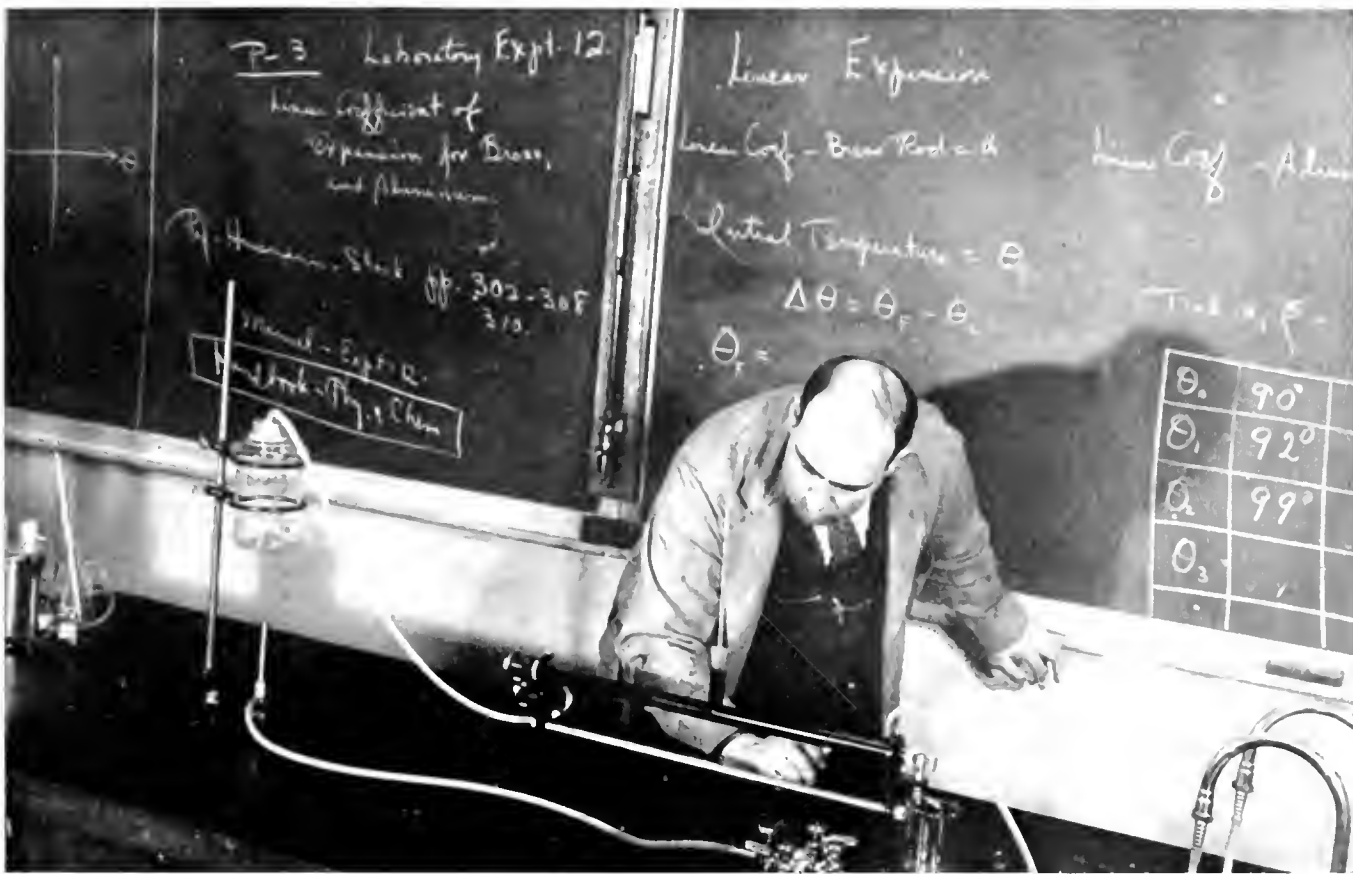
Each week on Friday the students of the Workshop present a mock broadcast in the studios of KCLA, the university's radio station. This program is heard only over a closed circuit, but it gives the students an opportunity to put into practice the things they have learned in the classrooms and at NBC.

Color Book

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ten of which carry inch-square chips of graded color ranging from violet-blue-violet to light yellow. On each page, beside the related group of color swatches, is a Munsell chip embodying the shade of gray equivalent to the shade that will be reproduced at the black-and-white receiver when any hue or tint of the color group is televised.

As a reply to the obvious suggestion that scenery could be painted in the desired grays and costumes chosen in the same manner, rather than bother with colors, it should be pointed out here that the visual effects achieved by the use of color instead of gray do a lot to brighten the spirits of performers. Video directors have learned that actors are more at ease and happier in surroundings of normal colors.



EXPERIENCED ENGINEERS give authoritative technical courses at RCA Institutes

RCA Institutes started its first small classes in 1909 to train "wireless" operators for the only radio service then known—marine communication. As the art developed through the years into the "electronic age," RCA Institutes developed with it. The school now trains large numbers of development laboratory technicians, servicemen, and station engineers—as well as a few radio telegraph operators.

SCHOLASTIC RECOGNITION

RCA Institutes is licensed by the University of the State of New York, an affiliate member of the American Society for Engineering Education, an affiliate member of the Greater New York Council for Foreign Students, approved by the Veterans Administration. The Advanced Technology Course is approved by the Engineers' Council for Professional Development.

ADVANCED TECHNOLOGY COURSE

The Advanced Technology Course consists of 2610 hours of classroom and laboratory work. It requires two and a quarter years (50 weeks per year) in the day school, or six and three quarter years in the evening school. Subject treatment is at professional level; the textbooks are standard college and engineering texts. This course covers such subjects as: college physics, advanced mathematics and its application to electrical and communication problems, English in industry, drafting and shop work, vacuum tubes and their associated circuits, circuit design for receivers and transmitters, audio frequency circuits and practice, circuit design for television receivers, transmitters and studio equipment. The course omits purely academic and cultural subjects so that competent technologists may be trained in the shortest possible time.

The Advanced Technology Course is especially attractive to high school graduates, engineering school graduates wishing a more specialized knowledge of the radio-television field, junior college graduates seeking a superior technical-school preparation for entrance into the radio-television industry.

VOCATIONAL COURSES

RCA Institutes also offers shorter, specialized courses in: Television and Radio Broadcasting (1½ years, days, or 4½ years, evenings), Television and Radio Servicing (9 months, days, or 27 months, evenings), Radio Telegraph Operating (9 months, days, or 27 months, evenings). A correspondence course in Television Servicing is available.

EMPLOYMENT OF GRADUATES

Graduates of the Advanced Technology Course are readily placed in leading radio-television-electronic manufacturing companies, development laboratories, broadcast stations, and many U.S. and foreign government agencies. Graduates are employed in such positions as: engineering aide, instructor, laboratory technician, transmitter engineer, intelligence officer, electronic technician, field engineer, technical writer, announcer-engineer. Graduates of the vocational courses are in great demand in the fields indicated by the course titles. Many companies interview graduating students at the school by arrangement with the Placement Director.

GENERAL INFORMATION

New classes in all courses are started four times each year. Day classes meet Monday through Friday; evening classes meet on alternate evenings. Prospective students and employers are invited to visit classrooms and laboratories of the school, or to write for a descriptive catalog of courses.



RCA INSTITUTES, INC.

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The wings of a hummingbird beat 80 times a second. Transistors, developed experimentally by RCA, oscillate electrically 300 million times a second.

300 million times a second!

Now science has discovered a new and magic tool—a major advance in electronic research—the transistor. Tiny as a kernel of corn, a speck of germanium crystal embedded with wires in plastic can perform many of the functions of the electron tube.

Because it has no heated filament, no vacuum, requires no warm-up and little power, the transistor is a device which has long been needed in electronics. It is also rugged, shock-resistant, un-

affected by dampness and—properly made—it will serve for many years.

Despite these advantages, the transistor, until recently, was limited to a frequency region below 50 million oscillations a second. Experimentally RCA has now increased this to 300 million times a second and even higher goals are sought—to increase the transistor's uses.

Higher frequencies for transistors point the way to their use in television, radio, communications and more efficient electronic controls for air-

planes and guided missiles. The small size, long life, and low power requirements of transistors suggest entirely new electronic devices—as well as use of transistors as working partners with electron tubes.

Expanding the research in electronics of solids, and the possibilities of transistors, is another example of RCA pioneering at work for your benefit. This leadership means finer performance from any product or service of RCA and RCA Victor.



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