



RADIO NOTES

AMERICAN TELEPHONE AND TELEGRAPH COMPANY
OPERATION AND ENGINEERING DEPARTMENT

Volume 14, No. 1

January 19, 1959

1. FCC Announces Policy Regarding Bell Telephone Company Lease-Maintenance Radio Systems
2. Engineering Conference
3. Present Status of Telephone Maintenance Service
4. Exemption from Reduced Deviation Standards
5. Hearing on Private Microwave Applications
6. FCC Grants Construction Permits for TH Microwave System
7. 8 Hop Microwave Color System Demonstrated
8. Another Case of Water in Waveguide
9. Short-Haul Microwave Summary
10. Signal Strength Conversion Chart
11. Overseas Service
12. "Transfer" Service now Available on Directly Dialed A.T.& T. PBX Extensions
13. Mobile Telephone Service Activities
14. Organization Changes
15. Radio Information

Attached - Signal Strength Conversion Chart
Short-Haul Microwave Summary

Printed in U.S.A.

1. FCC ANNOUNCES POLICY REGARDING BELL TELEPHONE COMPANY LEASE-MAINTENANCE RADIO SYSTEMS

The FCC has issued a Notice of Proposed Rule Making which would add a new subpart to their Rules and Regulations to govern action on Safety and Special Radio Services furnished on a lease-maintenance basis by the Bell System Telephone Companies.

This Notice requests comments in regard to the formulation of rules to govern future action on radio applications involving Bell System lease-maintenance arrangements. In addition, the Commission sets forth the following policies that will govern action on applications pending finalization of the Rule Making proposal.

- a. Applications for renewals, modifications, or amendments involving alterations or changes not requiring additional equipment will be granted.
- b. Applications involving new or additional equipment will be held in abeyance pending the outcome of the instant proceeding.
- c. All grants made will have a termination date of not later than January 24, 1961.

2. ENGINEERING CONFERENCE

Radio was one of the subjects discussed during a meeting of Chief Engineers at 195 on December 3 and 4. The TH and TJ systems, additional channels for TD-2, personal signaling and public air-ground service were among the recent developments covered. Other topics were radar interference, radiation hazards and FCC matters.

Special emphasis was given to the A.T. & T. Company filing in the forthcoming 25 - 890 mc FCC hearing and plans for the future development of public mobile telephone service (Radio Notes, November 17 and December 15, 1958). It was pointed out that some cost reductions and improvements in the present service are in prospect and there are many locations where more vehicles can be accommodated without appreciable increase in investment.

3. PRESENT STATUS OF TELEPHONE MAINTENANCE SERVICE

Six Bell Companies have filed applications with the FCC requesting authorization to operate in this new service, four of which have already been granted.

<u>Company</u>	<u>Location</u>	<u>Frequencies</u>	<u>No. Base Sta.</u>	<u>No. Mobile Sta.</u>
* New York Tel.	New York City	456.40, 451.40	1	100
* Ohio Bell	Cleveland, Ohio	456.30, 451.30	1	100
* New Eng. Tel.	Taunton, Mass.	35.16/43.16	1	2
* Illinois Bell	Illinois	456.50	-	8
Southern Bell	So. Bell Terr.	151.985, 158.34	-	500
Northwestern Bell	Fargo, N.D.	151.985	1	50

* Authorizations granted by FCC

Items to be considered in connection with the use and application of the new Telephone Maintenance Service are outlined in P.E.L. 6306 - P.O.L. 1770 dated November 10, 1958 (attachment corrected 12-23-58).

4. EXEMPTION FROM REDUCED DEVIATION STANDARDS

Radio Notes of November 17, 1958 advised of a petition by the National Committee for Utilities Radio requesting postponement of reduction of frequency deviation from 15 to 5 kc for mobile radio systems operating in the power radio services on frequencies 37.46 to 37.86 mc until such time as the Commission decides to split these channels which are currently on a 40 kc basis.

The FCC has favorably considered this petition and issued an Order which not only exempts equipments operating in the above frequency range but all equipments licensed under Parts 10, 11 and 16 which operate in the 25-42 mc band which were not affected by Commission action reducing channel separations. In addition, equipments operating in the frequency ranges 46.51-47 mc and 49.51-50 mc are also exempt, as these frequencies have been re-allocated to other services.

We forwarded, on January 6, 1959, a copy of this Order to the Companies with P.E.L. 6934.

5. HEARING ON PRIVATE MICROWAVE APPLICATIONS

The opening hearing on the applications of Central Freight Lines, Inc., for a private microwave radio system (Radio Notes August 20, 1958) was held December 15-17.

The major portion of the hearing was taken up in cross-examination of Central Freight witnesses. The hearing has been recessed until March 31 at which time it is expected that Southwestern Bell and Western Union witnesses will be cross-examined.

6. FCC GRANTS CONSTRUCTION PERMITS FOR TH MICROWAVE SYSTEM

On December 31, 1958 the FCC granted construction permits to the Long Lines for the initial installation of TH microwave radio relay. (Radio Notes June 15, 1958)

This installation will be made between Prospect Valley (Denver), Colorado and East Bench (Salt Lake City), Utah and is expected to be ready for service by Autumn of 1960. Initially the system will provide three westbound and two eastbound broadband channels. Two channels in each direction will be used for telephone and protection. The additional westbound channel will be available for TV. In a fully loaded system the TH equipment will provide eight broadband channels in each direction of transmission with two of these normally used for protection. The TH system also will provide two narrow band channels in each direction for order-wire, alarm, and the transmission of control signals for switching purposes.

7. 8 HOP MICROWAVE COLOR SYSTEM DEMONSTRATED

Eight links of RCA TVM-1A television microwave equipment ultimately destined for a 2400-mile service in Brazil, were used to demonstrate, in the RCA shop on December 11, the feasibility of transmitting NTSC color signals over such an extended system. With this equipment the signal is demodulated to baseband at each repeater. Performance of this system was observed to be good on the basis of A-B picture comparisons.

System signal to noise (p-p/rms) with 70 db net path loss in each hop was measured by RCA at 46.5 db and signal to hum (in phase p-p/p-p) of 36 db also was measured. Differential phase and gain were measured at 2° and 0.5 db respectively, and the video response was maintained within + 1 db to 4.5 mc. These measurements were made using a new pre- and de-emphasis network differing somewhat from the type normally used. This network suppresses frequencies between about 5 kc and 200 kc by some 12 db but leaves the very low and the high frequencies undistorted thereby minimizing the effect of hum pickup in the equipment.

Though no measurements were made of intermodulation between the audio diplexer subcarrier and the color subcarrier no evidence of any beat product was observed in the picture pattern under the limited viewing condition.

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8. ANOTHER CASE OF WATER IN WAVEGUIDE

Water in a waveguide at the Cloverdale, California, TD-2 station was responsible for about $5\frac{1}{2}$ hours service interruption on December 26 which affected circuits in the Hawaiian cable and some to the Pacific Northwest. The air supply which pressurizes the horn reflector antenna and waveguide failed as a result of an ac power failure and was restored a few hours later by using the tube cooling air supply. The service failure occurred later in the evening, after the regular air supply had been restored. A small leak in the horn reflector antenna apparently allowed water to enter.

As a result of this and similar failures the Laboratories has been asked to develop a device which will drain off any water that enters the waveguide. In addition they are investigating ways to provide an alternate source of air pressure that will automatically operate in the event of regular air supply failures. A committee composed of Laboratories, Long Lines, and O. & E. representatives has been appointed to study the problem.

9. SHORT-HAUL MICROWAVE SUMMARY

Attached to this issue of Radio Notes is a revised list of Associated Company short-haul microwave systems (excluding TV) in service at the end of 1958 and those planned for service during 1959. The summary shows that total circuit miles at the end of 1958 were almost double the figure computed for the previous year. This large increase was due not only to an increase in number of microwave systems for 1958 but also to a considerable number of circuit groups added to existing systems. The Mountain States and Pacific Companies account for more than half the total circuit mileage in service. The Northwestern, Michigan, and Southern Bell Companies are leaders in growth for 1959. A sharp rise in the use of L carrier on short-haul microwave systems is noted for 1958-59.

10. SIGNAL STRENGTH CONVERSION CHART

Many of us fumble a bit when confronted with the need to translate field strength into received voltage or power, or to convert the latter quantities to the former. The basic relationships are simple enough, but these are easily forgotten unless frequently used. Ed Borden concocted the attached nomograph to minimize this problem. Although the same chart will appear in a BSP to be issued soon, (R100.090 entitled "Land Mobile and VHF Maritime Radio Systems - Estimates of Expected Coverage"), this advance copy may prove to be a handy reference to have around.

11. OVERSEAS SERVICE

Overseas traffic on Christmas set an all time high for number of messages handled in any one day. Messages handled by the various overseas operating centers on December 24 and 25, compared with the same dates the previous year were as follows:

Office	December 24		December 25	
	Messages	Comparison with 1957	Messages	Comparison with 1957
New York	3,197	- 7.5%	4,742	+21.7%
White Plains	2,048	+ 6.7	2,172	+17.1
Miami	804	+27.8	957	+18.4
Oakland	1,108	- 9.3	1,173	-13.2
Seattle	1,486	+20.1	2,284	+20.5
Total	8,643	+ 2.1%	11,328	+15.5%

Radio traffic was bothered considerably by poor propagation conditions, particularly on calls to Germany on the 24th and to Japan on Christmas day.

The total number of overseas messages handled during 1958 was approximately 8.5% more than in 1957.

12. "TRANSFER" SERVICE NOW AVAILABLE ON DIRECTLY DIALED A.T.& T. PBX EXTENSIONS

Calls dialed directly to extensions of the A.T.& T. General Departments in New York can now be transferred to other extensions without loss of connection. Although the new transfer arrangement, which started December 15, 1958, has been working satisfactorily there is still a large number of calls to the PBX attendant (i.e., dialed to EX 3-9800 rather than to the EX 3 extension number) for transfer. We hope you will use this new feature and will call us direct when you intend to be transferred to other extensions. Telephone extensions for members of the Radio Section were listed in the November issue of Radio Notes.

At the present time this transfer feature is not available for calls made direct to extensions of the Long Lines Department.

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13. MOBILE TELEPHONE SERVICE ACTIVITIES

New channels have been placed in service as follows:

<u>Location</u>	<u>Channel</u>	<u>Date</u>
Midland, Texas	YJ	Dec. 20, 1958
McCamey, Texas	YJ	Dec. 20, 1958
Pecos, Texas	YR	Dec. 20, 1958
Sweetwater, Texas	YR	Dec. 20, 1958
Las Vegas, Nevada (1)	JL	Jan. 1, 1959
Kingstree, S. Carolina (2)	ZH	Jan. 1, 1959
International Falls, Minn. (3)	ZB	Jan. 1, 1959
Ely, Minnesota (4)	ZB	Jan. 1, 1959
Two Harbors, Minnesota (4)	ZB	Jan. 1, 1959
Hobbs, New Mexico (5)	YJ	(Unknown)

Notes: (1) Southern Nevada Telephone Company
(2) Farmers Cooperative Telephone Company
(3) Minnesota Telephone Company
(4) Duluth Missabe and Iron Range RR Company
(5) General Telephone Company of the Southwest

14. ORGANIZATION CHANGES

Commencing with this issue, J. D. Crawford (Jack) has assumed duties as editor of Radio Notes. O. C. Foster (Tony), who has surrendered this responsibility, held the job for 33 months. Contributions for future issues should be telephoned to Jack on EXeter 3-3315 or mailed to him in Room 1708.

Mr. E. P. Cook (Earl) from the Southern Bell Telephone and Telegraph Company plant organization in Atlanta has joined the Plant Toll Service Engineer's group effective December 1, 1958. He replaces R. W. Hoffman (Roy) who returned to the Long Lines, Eastern Area plant extension group. Earl's new responsibilities include plant matters relating to microwave, overseas radio, coastal harbor, emergency radio services and plant damage reports.

Mr. W. W. Lambert (Bill) from the Pacific Telephone and Telegraph Company, Northern California plant extension organization has joined the Toll Equipment Engineer's group effective November 1, 1958. Bill replaces J. H. Meyer (John) who returned to the Northern California Area plant extension group. Bill's new responsibilities include equipment matters relating to Western Electric manufactured radio systems.

Mr. S. D. James (Sam) from the Pacific Telephone and Telegraph Company, General Administration plant extension organization has joined the Toll Equipment Engineer's group effective November 1, 1958. Sam replaces E. J. Tyberghein (Ty) who has transferred to the O. & E. Toll Planning Engineer's group. Sam's new responsibilities include equipment matters relating to non-Western manufactured microwave and carrier systems.

15. RADIO INFORMATION

The following have been forwarded since the last issue of Radio Notes:

- BSPM 647 A501.918, Issue 1 - Piece-Part Data and Replacement Procedures - KS-5794 Air Blower - Tube Cooling System TD-2 Radio Relay System
- A208.111, Issue 1 - Dual Facility Trunks - Local Tests of A/G Trunks at Site Testboard - Air-Ground Voice Communication System - Private Service Systems
- A493.157, Issue 4 - Non-Western Electric Electron Tube Test Data - KS-15559 L1 Tube Tester
- A493.159, Issue 4 - Non-Western Electric Electron Tube Test Data - KS-15560 L1 and L2 Tube Testers
- A493.167, Issue 4 - Non-Western Electric Electron Tube Data - KS-15750 L1 Tube Tester
- E40.559.2, Issue 4 - Non-Western Electric Electron Tube Test Data - KS-15559, L1 Tube Tester
- E40.560.2, Issue 4 - Non-Western Electric Electron Tube Test Data - KS-15560, L1 and L2 Tube Testers
- E40.561.2, Issue 4 - Non-Western Electric Electron Tube Test Data - KS-15750, L1 Tube Tester
- R70.710.2, Issue 4 - Non-Western Electric Electron Tube Test Data - KS-15560 L1 and L2 Tube Testers
- R70.740.2, Issue 4 - Non-Western Electric Tube Test Data - KS-15559 L1 Tube Tester
- R70.860.2, Issue 4 - Non-Western Electric Electron Tube Data - KS-15750 L1 Tube Tester
- R90.334.15, Issue 1 - TJ Radio - Transmitter Tests and Adjustments - Transmitter Component Replacement

AA266.073, Issue 1 - TH Radio FM Terminal Equipment -
Toll Systems

AA367.044, Issue 2 - Power Supply for TJ Radio -
Power Systems

BSPM 647A -

BSPM 648 -

BSPM 648A -

BSPM 649 EL7.420.2, Issue 2 - Television - KS-15512, List 5
Oscilloscope

R70.625.2, Issue 2 - Television - KS-15512, List 5
Oscilloscope

BSPM 649A -

BSPM 650 R20.710, Issue 1 - Wilcox Type 606A Radio Receiver -
General

R20.713, Issue 1 - Wilcox Type 606A Radio Receiver -
Maintenance Routines

R20.714, Issue 1 - Wilcox Type 606A Radio Receiver -
Maintenance Methods

R20.715, Issue 1 - Wilcox Type 606A Radio Receiver -
Description and Operation Principles

BSPM 650A -

BSPM 651 AA367.048, Issue 1 - Power Supply for TH Radio Power
Systems

AA367.921, Issue 1 - Power Plants for TH Radio Systems -
Power Systems

P.E.L. 6364 FCC Rules and Regulations - Amendment of Domestic Public
Land Mobile Rules Regarding Base and Control Station
Operation (1S4.1-191)

P.E.L. 6365 Emergency Restoration - Use of Portable Microwave
Equipment (1S3.9H-6)

P.E.L. 6368 Microwave Radiation - Determination of Power Density
and Safe Working Distances in Front of Radar Antennas
(1S3.10-2)

P.E.L. 6374 FCC Rules - Amendment of Part 7 Concerning Spurious
Emissions (1S4.1-196)

P.E.L. 6382 Antenna Clearance and Related Antenna Information to
be Forwarded to FCC (1S4.1-192)

P.E.L. 6376 FCC Equipment List (1S4.1-195)

P.E.L. 6378 TH Microwave System - Growth Plan and Frequency
Coordination with Light Route 6 kmc Microwave Systems
(1S3.9G1-2)

P.E.L. 6306 Telephone Maintenance Radio Service (Correction Letter)
(1S1.11-1)

Unnumbered Letters to Chief Engineers:

12-17-58 FCC Inquiry into Frequency Allocation 25-890 Megacycles
(1S4.1-197)

ASSOCIATED COMPANY
SHORT HAUL* MICROWAVE SYSTEMS
(EXCLUDING TV SERVICES & LONG LINES)

SYSTEM IN SERVICE (UNDER CONSTRUCTION OR PLANNED IN '59)	TYPE RADIO EQUIPMENT	NUMBER OF HOPS	ROUTE MILES	NUMBER OF VOICE CIRCUITS	TYPE OF CHANNELIZING	SERVICE DATE	REMARKS
<u>CANADA</u>							
FORT WILLIAM - LONGLAC	MOTOROLA FD	2	60	31	LENKURT 45	10-56	
FORT WILLIAM - NIPIGON	MOTOROLA FD	3	84	9	LENKURT 45	10-56	
NIPIGON - GERALDTON	MOTOROLA FD	1	30	4	LENKURT 45	10-56	
GERALDTON - LONGLAC	REL DF	2	52	12	LENKURT 45	6-58	
TADOUSSAC - CAP A L'AIGLE							
CLARKE CITY - KNOB LAKE - GOOSE BAY	REL FD	2	223	50	L	6-58	800 MC OVER-THE-HORIZON SYSTEM
CLARKE CITY - EMERIL	REL FD	1	118	4	L	6-58	JOINT BELL AND INDEPENDENT CO.
EMERIL - KNOB LAKE	REL FD	2	216	46	L	6-58	
EMERIL - GOOSE BAY	FEDERAL 10B SB	1	10	8	FEDERAL	12-58	A DISCONTINUED SYSTEM THAT HAS BEEN REACTIVATED FOR A LIMITED TIME.
QUEBEC - ST. HENRI DE LEVIS							
<u>CHESAPEAKE AND POTOMAC</u>							
OCEANVIEW - CAPE CHARLES, VA.	REL 756 N	1	26	22	K + EB's	2-52	
OCEANVIEW - CAPE CHARLES, VA.	REL 756J N	1	26	12	ON	2-54	
OCEANVIEW - MILITARY SITE, VA.	LENKURT 72C DF	1	20	60	LENKURT 45	1-58	
(HAMPTON - MILITARY SITE, VA.)	TJ	1	23	36	LENKURT 45	2-59	
LYNCHBURG - MILITARY SITE, VA.	MOTOROLA FD	1	21	48	LENKURT 45	4-55	
(ROANOKE - MILITARY SITE, VA.)	MOTOROLA FD	2	30	24	LENKURT 45	2-59	
SHENANDOAH NATIONAL PARK, VA.							PARK SYSTEM WORKING FROM CDO
LEWIS MT. - BIG MEADOWS	MOTOROLA N	1	7	3	MOTOROLA	8-57	
BIG MEADOWS - SKYLAND	MOTOROLA N	1	5	9	MOTOROLA	8-57	
SKYLAND - ELKWALLOW	MOTOROLA N	1	12	5	MOTOROLA	8-57	
RICHMOND - WARSAW, VA.							
RICHMOND - KING WILLIAM	LENKURT 74A FD	1	24	16	LENKURT 45	6-58	JOINT BELL AND INDEPENDENT CO.
KING WILLIAM - WARSAW	LENKURT 72C N	1	24	16	LENKURT 45	6-58	INDEPENDENT CO.
WASHINGTON, D.C. - MILITARY SITE, MD.	MOTOROLA FD	1	23		SEE REMARKS		CUSTOMER OWNED CHANNELIZING
<u>MICHIGAN</u>							
MACKINAW CITY - ST. IGNACE	LENKURT 72B N	1	5	20	N	11-54	
MACKINAW CITY - SAULT STE MARIE	LENKURT 72B N	3	53	12	N	11-54	
TRAVERSE CITY - MILITARY SITE	MOTOROLA SB	2	30	24	MOTOROLA	11-54	TO BE DISCONTINUED IN 1959
(TRAVERSE CITY - MILITARY SITE)	MOTOROLA FD	1	18	36	MOTOROLA	12-59	JOINT BELL AND INDEPENDENT CO.
(ST. IGNACE - MACKINAC)	COLLINS FD	1	5	12	N	8-59	
MARQUETTE - MILITARY SITE	MOTOROLA FD	5	107	24	MOTOROLA	2-55	TO BE CONVERTED TO L CARRIER ROUTE 12-59
(MARQUETTE - DEAD RIVER)	MOTOROLA FD	1	8	60	L	12-59	
(DEAD RIVER - MILITARY SITE)	MOTOROLA FD	4	99	60	L	12-59	
(DEAD RIVER - ESCANABA - SAULT STE MARIE)							
(DEAD RIVER - FORTSYTHE)	TJ	1	22	120	L	12-59	
(FORTSYTHE - ESCANABA)	TJ	2	42	120	L	12-59	
(FORTSYTHE - ALLENVILLE)	TJ	6	143	108	L	12-59	
(ALLENVILLE - SAULT STE MARIE)	TJ	2	46	48	L	12-59	
(MT. CLEMENS - ATLAS - PORT AUSTIN)							
(MT. CLEMENS - ATLAS)	TJ	2	40	36	L	8-59	
(ATLAS - PORT AUSTIN)	TJ	4	83	36	L	9-59	
<u>MOUNTAIN STATES</u>							
DENVER - GRAND JCT., COLO.	TD-2	3	117	144	L	12-57	
DENVER - MONARCH PASS	TD-2	4	84	84	L	12-57	
MONARCH PASS - MONTROSE	TD-2	3	58	108	L	2-58	
MONTROSE - GRAND JCT.	TJ	2	19	60	L	6-59	
(MONARCH PASS - SALIDA, COLO.)	MOTOROLA FD	6	108	48	L	1-58	
MONTROSE - DURANGO, COLO.	MOTOROLA N	1	18	8	LENKURT 45	9-58	
GRAND JCT. - GRAND MESA, COLO.	TD-2	2	43	84	L	7-58	
SALT LAKE - PROVO, UTAH	TJ	5	137	48	L	12-58	
FLAGSTAFF - PHOENIX, ARIZ.	MOTOROLA FD	1	15	24	LENKURT 45	4-57	
YUMA - MILITARY SITE, ARIZ.	MOTOROLA FD	1	45	2	LENKURT 33	1-59	
(YUMA - MILITARY SITE, ARIZ.)							
TUCSON - SAN MANUEL, ARIZ.							
TUCSON - MT. LEMMON	MOTOROLA SB	1	19	18	MOTOROLA	6-54	
MT. LEMMON - SAN MANUEL	MOTOROLA SB	1	14	6	MOTOROLA	6-54	
TUCSON - MILITARY SITE, ARIZ.	MOTOROLA SB	1	20	48	LENKURT 45	5-56	
ALBUQUERQUE - FARMINGTON, N.M.	TD-2	4	148	60	L	7-58	
(ALBUQUERQUE - ROSWELL, N.M.)	TD-2	4	184	120	L	11-59	
SANTA FE - MILITARY SITE, N.M.							
SANTA FE - CHAMA	LENKURT 72B DF	1	56	32	LENKURT 45	6-56	
CHAMA - MILITARY SITE	LENKURT 72B DF	1	14	20	LENKURT 45	6-56	
SANTA FE - LOS ALAMOS, N.M.	PHILCO CLR 7	1	25	12	LENKURT 45	12-53	
HOLLOMAN - MILITARY SITE, N.M.	MOTOROLA SB	1	18	12	MOTOROLA	5-54	
POCATELLO - IDAHO FALLS, IDAHO	TJ	2	50	84	L	10-58	
IDAHO FALLS - ARCO, IDAHO	MOTOROLA SB	2	45	24	LENKURT 45	10-54	
(GLENDALE - GLENDALE JCT., MONT.)	TJ	1	11	36	L	12-59	
<u>NEW ENGLAND</u>							
BARNSTABLE - NANTUCKET, MASS.	REL 756J N	1	29	12	N	8-52	
BARNSTABLE - NANTUCKET, MASS.	REL 756J N	1	29	20	ON	11-53	
BOSTON - MILITARY SITE, MASS.	FEDERAL 10D SB	2	58	23	FEDERAL	11-53	
BANGOR - MILITARY SITE, ME.	MOTOROLA SB	1	25	23	MOTOROLA	11-54	
NARRAGANSETT - BLOCK ISLAND R.I.	LENKURT 72B N	1	18	12	ON	7-55	
NARRAGANSETT - BLOCK ISLAND R.I.	LENKURT 72B N	1	18	6	ON	7-56	
LITTLETON - EAST MTN., N.H.	LENKURT 72B DF	1	25	23	LENKURT 45	11-56	
<u>NEW YORK</u>							
POTSDAM - MASSENA	MOTOROLA FD	1	18	62	STROMBERG CARLSON	7-57	
BUFFALO - NIAGARA FALLS	MOTOROLA FD	1	17	90	STROMBERG CARLSON	7-57	
AUBURN - SYRACUSE	MOTOROLA FD	2	28	25	STROMBERG CARLSON	1-58	
<u>NORTHWESTERN</u>							
MINOT - WILLISTON, N.D.	MOTOROLA FD	6	112	18	MOTOROLA	2-55	REPLACE WITH 36 CIRCUITS OF LENKURT 45 IN 1959
MINOT - MILITARY SITE, N.D.	MOTOROLA FD	1	15	29	LENKURT 45	6-58	
FARGO - GRAND FORKS, N.D.							
FARGO - FINLEY	MOTOROLA FD	3	71	36	LENKURT 45	2-55	ADD L CARRIER IN 1959
FINLEY - GRAND FORKS	MOTOROLA FD	2	44	24	LENKURT 45	5-58	ADD NEW REPEATER AND L CARRIER IN 1959
(FINLEY - GRAND FORKS)	MOTOROLA FD	3	54			8-59	
BISMARCK-WISHEK, N.D.-GETTYSBURG, S.D.							
BISMARCK - LINTON	MOTOROLA FD	2	44	26	ON	2-56	ADD L CARRIER IN 1959
LINTON - WISHEK	MOTOROLA FD	1	30	8	ON	2-56	
(LINTON - GETTYSBURG)	MOTOROLA FD	3	92	36	L	9-59	
(ABERDEEN - PIERRE, S.D.)							
(ABERDEEN - GETTYSBURG)	TD-2	3	91	60	L	6-59	
(GETTYSBURG - PIERRE)	TD-2	2	48	24	L	6-59	
(GRAND FORKS, N.D.-BAUDETTE, MINN.)							
(GRAND FORKS - THIEF RIVER FALLS)	COLLINS FD	2	45	36	LENKURT 45	11-59	
(THIEF RIVER FALLS - BAUDETTE)	COLLINS FD	5	107	24	LENKURT 45	11-59	
VIRGINIA - BAUDETTE, MINN.							
VIRGINIA - INTERNATIONAL FALLS	COLLINS FD	4	82	24	LENKURT 45	12-58	ADD 24 CIRCUITS IN 1959
INTERNATIONAL FALLS - BAUDETTE	COLLINS FD	3	61	28	LENKURT 45	12-58	ADD 24 CIRCUITS IN 1959
DULUTH - MILITARY SITE, MINN.	LENKURT 72B SB	2	60	24	LENKURT 45	11-54	ADD 36 CIRCUITS IN 1959
MINNEAPOLIS - MILITARY SITE, WIS.	LENKURT 72B SB	1	25	24	LENKURT 45	11-54	ADD 24 CIRCUITS IN 1959
(WYOMING - MILITARY SITE, WIS.)	LENKURT 74A FD	1	20	24	LENKURT 45	11-59	
LUVERNE - MILITARY SITE, MINN.	MOTOROLA SB	1	19	20	ON	11-54	
(WADENA - SODERVILLE, MINN.)	TJ	7	155	48	LENKURT 45	4-59	
(MINNEAPOLIS - SODERVILLE, MINN.)	TJ	1	22	24	LENKURT 45	11-59	
(RAYMOND - WAVERLY, IOWA)	COLLINS FD	1	21	24	ON	11-59	
(DES MOINES - OTTUMWA, IOWA)	TJ	4	87	60	L	11-59	
<u>OHIO</u>							
CLARINGTON - BARNESVILLE	MOTOROLA FD	1	20	24	MOTOROLA	5-57	
TOLEDO - BRYAN							
TOLEDO - DEFIANCE	COLLINS FD	3	49	48	COLLINS	11-57	ADD 12 CIRCUITS IN 1959
DEFIANCE - BRYAN	COLLINS FD	1	18	24	COLLINS	11-57	

SYSTEM IN SERVICE (UNDER CONSTRUCTION OR PLANNED IN '58)	TYPE RADIO EQUIPMENT	NUMBER OF HOPS	ROUTE MILES	NUMBER OF VOICE CIRCUITS	TYPE OF CHANNELIZING	SERVICE DATE	REMARKS
<u>PACIFIC</u>							
SEATTLE, WASH. - VICTORIA, B.C.	LENKURT 72A SB	2	63	20	LENKURT 33	7-53	
SEATTLE - PT. ANGELES	(900 mc)						
PT. ANGELES - VICTORIA	LENKURT 72A SB	1	20	8	LENKURT 33	7-53	JOINT BELL AND INDEPENDENT Co.
	(450 mc)						
PT. ANGELES - MILITARY SITE, WASH.	LENKURT 72B N	1	55	8	LENKURT 45	1-58	TO BE REPLACED WITH LENKURT 74A ABOUT 3-60
BALD HILL - RATTLESNAKE LEDGE, WASH.	RCA MM9CL N	1	7	2	H	10-56	
TACOMA - KTNT-TV, WASH.	REL 792 SB	1	18	1	NONE	9-54	STL PROGRAM CIRCUIT
PASCO - MILITARY SITE, WASH.	LENKURT 72B SB	1	42	12	ON	11-54	
PORTLAND, ORE. - SKAMONIA, WASH.	G.E. UA9B N	1	36	2	H	1-55	
EUGENE - COOS BAY, ORE.							
EUGENE - FLORENCE	LENKURT 72C	2	84	48	ON	10-54	TWO WORKING RF CHANNELS AND ONE PROTECTION
	LENKURT 72C	2	84	60	LENKURT 45	3-57	WITH AUTOMATIC SWITCH
FLORENCE - COOS BAY	LENKURT 72C DF	2	43	60	LENKURT 45	3-57	INDEPENDENT Co.
THE DALLES - MILITARY SITE, OREGON	LENKURT 72B DF	2	46	24	ON	12-54	REPLACE WITH TD-2 IN 1960
SALEM - TILLAMOOK, ORE.							
SALEM - MT. HEBO	LENKURT 72C	1	40	47	ON	7-55	TWO WORKING RF CHANNELS AND ONE PROTECTION
	LENKURT 72C	1	40	36	LENKURT 45	8-57	WITH AUTOMATIC SWITCH
MT. HEBO - TILLAMOOK	LENKURT 72C	1	17	38	ON	7-55	TWO WORKING RF CHANNELS AND ONE PROTECTION
	LENKURT 72C	1	17	36	LENKURT 45	8-57	WITH AUTOMATIC SWITCH
(ROSEBERG - COOS BAY, ORE.)							
(ROSEBERG - KENYON)	TJ	2	26	17	LENKURT 45	11-59	
(KENYON - COOS BAY)	LENKURT 74A	3	35	17	LENKURT 45	11-59	INDEPENDENT Co.
CLOVERDALE PEAK - EUREKA, CAL.	TD-2	5	150	132	L	11-57	
EUREKA - MILITARY SITE, CAL.							
EUREKA - CRESCENT CITY	LENKURT 72B N	1	22	12	LENKURT 45	11-54	JOINT BELL AND INDEPENDENT Co.
CRESCENT CITY - MILITARY SITE	LENKURT 72B N	3	46	12	LENKURT 45	11-54	INDEPENDENT Co.
EUREKA - MT. PIERCE, CAL.	RCA CW5-BL N	1	26	5	LENKURT 33	11-57	
CAHITO PEAK - LAYTONVILLE, CAL.	RCA CW5-BL N	1	9	3	LENKURT 33	11-57	
CLOVERDALE PEAK - BRUSH MT., CAL.	RCA CW5-BL N	1	32	3	LENKURT 33	11-57	
CLOVERDALE PEAK - MILITARY SITE, CAL.	RCA CW5-BL N	1	33	6	LENKURT 45	2-57	
CLOVERDALE PEAK - WALKER RIDGE, CAL.	RCA CW5-BL N	1	29	3	LENKURT 33		
(SANTA ROSA - MILITARY SITE, CAL.)	LENKURT 74A	2	57	16	ON	11-59	
HIGH PLATEAU - MARYSVILLE, CAL.	RCA CW5-BL N	1	17	6	LENKURT 33	11-57	
(STOCKTON - ANGELS PEAK, CAL.)	LENKURT 74A	1	38	8	ON	2-59	
STOCKTON - MT. OSO, CAL.	RCA CW5-BL N	1	32	4	LENKURT 33	9-56	
MERCED - MT. BULLION, CAL.	COLLINS FD	1	28	20	ON	2-58	
MERCED - TURTLE DOME, CAL.	LENKURT 72B DF	2	42	48	LENKURT 45	6-56	
TURTLE DOME - SENTINEL DOME, CAL.	MOTOROLA SB	1	7	8	ON	5-56	
SAN JOSE - LOMA PRIETA, CAL.	RCA CW5-BL N	1	16	4	LENKURT 33	11-55	
JOAQUIN RIDGE - FRESNO, CAL.	RCA CW5-BL N	1	45	4	LENKURT 33	9-56	
JOAQUIN RIDGE - PANOCHÉ MT., CAL.	RCA CW5-BL N	1	65	3	LENKURT 33	9-56	
JOAQUIN RIDGE - PYRAMID HILLS, CAL.	RCA CW5-BL N	1	41	3	LENKURT 33	9-56	
TEMBLOR RANGE - BAKERSFIELD, CAL.	RCA CW5-BL N	1	40	4	LENKURT 33	11-55	
LAS VEGAS - MILITARY SITE, NEV.							
LAS VEGAS - ANGEL PEAK	MOTOROLA FD	1	28	24	LENKURT 45	7-56	ADD 24 CIRCUITS IN 1959
(ANGEL PEAK - MILITARY SITE)	MOTOROLA FD	1	31	24	LENKURT 45	5-59	
LOS ANGELES - COMPTON, CAL.	TJ	1	11	358	L	12-58	INCREASE TO 600 CIRCUITS IN 1959
(LOS ANGELES - COMPTON, CAL.)	TJ	1	11	87	L	6-59	
SAN PEDRO - MILITARY SITE, CAL.							
SAN PEDRO - CATALINA	REL 756 SB	1	27	8	LENKURT 45	7-51	
CATALINA - MILITARY SITE	REL 756 SB	1	27	24	LENKURT 42	7-51	
SANTA BARBARA - MILITARY SITE, CAL.	REL 756 SB	1	37	36	LENKURT 42	8-51	
LOS ANGELES - SANTIAGO PEAK, CAL.	MOTOROLA SB	1	47	3	MOTOROLA	1-57	PRIVATE LINE SYSTEM - CUSTOMER FREQUENCIES - FOR REMOTE OPERATION OF VHF BASE STATION
SAN DIEGO - BOREGO, CAL.							
SAN DIEGO - MT. LAGUNA	MOTOROLA FD	1	45	40	LENKURT 45	3-55	TO BE EXTENDED TO EL CENTRO AND L CARRIER ADDED
MT. LAGUNA - BOREGO	MOTOROLA FD	1	25	12	LENKURT 45	9-56	
ANAHEIM - SANTIAGO PK., CAL.	PHILCO CLR 6 SB	1	24	9	LENKURT 45	5-52	TO BE REPLACED WITH TJ ABOUT 2-61
ESCONDIDO - BOUCHER HILL, CAL.	PHILCO CLR 6 SB	1	18	3	LYNCH B37	12-52	BEING REPLACED WITH CABLE PLANT
<u>PENNSYLVANIA</u>							
ALTOONA - MILITARY SITE	MOTOROLA SB	1	18	24	MOTOROLA	7-54	JOINT BELL AND INDEPENDENT Co.
ALTOONA - COALPORT	COLLINS FD	1	13	12	N	12-58	
SCRANTON - MILITARY SITE	MOTOROLA FD	1	35	36	LENKURT 45	2-55	JOINT BELL AND INDEPENDENT Co.
<u>SOUTHERN</u>							
HUNTSVILLE - DECATUR - SHEFFIELD, ALA.							
HUNTSVILLE - DECATUR	TD-2	1	26	84	L	10-57	
SHEFFIELD - DECATUR	TD-2	2	42	60	L	10-57	
(DECATUR - REDSTONE, ALA.)	LENKURT 74A FD	1	21	26	LENKURT 45	4-59	
(BIRMINGHAM - GADSDEN, ALA.)	LENKURT 74A FD	3	59	36	LENKURT 45	6-59	
(SELMA - GUNTER, ALA.)	LENKURT 74A FD	3	46	24	LENKURT 45	10-59	
NEW ORLEANS - BURAS, LA.	MOTOROLA FD	3	55	40	ON	1-58	
(LAUREL - HATTIESBURG, MISS.)	TJ	2	27	36	L	7-59	
(AUBURN - NATCHEZ, MISS.)	TD-2	2	41	48	L	10-59	
(STAR - MILITARY SITE, MISS.)	TJ	1	14	24	LENKURT 45	12-59	
KNOXVILLE - MORRISTOWN, TENN.	TD-2	2	45	60	L	7-58	EXTEND 2 HOPS TO JOHNSON CITY IN 1960
NASHVILLE - SPRINGFIELD, TENN.	TJ	2	26	96	L	11-58	
WINCHESTER - PIKEVILLE, KY.							
WINCHESTER - HAGER HILL	LENKURT 74A FD	4	81	68	ON	8-58	
HAGER HILL - PIKEVILLE	LENKURT 74A FD	1	27	24	ON	8-58	
ORLANDO - MELBOURNE, FLA.							
ORLANDO - COCOA	TD-2	2	43	132	L	10-58	
COCOA - MELBOURNE	TD-2	1	20	24	L	10-58	
CHIPLEY - PANAMA CITY, FLA.	TD-2	3	44	36	L	10-58	
SPRUCE CREEK - VERO BEACH, FLA.	MOTOROLA FD	8	142	SEE REMARKS	L	4-57	CHANNELIZING FOR SPECIAL APPLICATION
MAXTON - WILMINGTON, N.C.	LENKURT 72C DF	4	91	48	LENKURT 45	5-57	ADD 12 CIRCUITS IN 1959
CHARLOTTE, N.C. - FLORENCE, S.C.	TD-2	4	102	108	L	3-57	
<u>SOUTHWESTERN</u>							
COLORADO CITY - SILVER, TEXAS	MOTOROLA SB	1	22	12	MOTOROLA	4-53	
GALVESTON - PT. BOLIVAR, TEXAS	COLLINS FD	1	6	20	ON	10-57	
<u>WISCONSIN</u>							
STEVENS PT. - MILITARY SITE	MOTOROLA SB	2	25	23	MOTOROLA	11-54	

* INCLUDES ONLY THOSE TD-2 SYSTEMS USING PARABOLIC ANTENNAS.
 SB INDICATES SYSTEM EQUIPPED WITH STANDBY RADIO TRANSMITTERS AND RECEIVERS.
 FD INDICATES SYSTEM EQUIPPED WITH FREQUENCY DIVERSITY TRANSMITTERS AND RECEIVERS.
 DF INDICATES DUAL FREQUENCY SYSTEM.
 N INDICATES NO STANDBY OR DIVERSITY RADIO EQUIPMENT.

SUMMARY 12-31-58

No. RF SYSTEMS IN SERVICE - 100
 TOTAL NUMBER OF HOPS - 203
 TOTAL ROUTE MILES - 5,092
 TOTAL CIRCUIT MILES - 195,020