

# Radio Notes

AMERICAN TELEPHONE AND TELEGRAPH COMPANY

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(Editor - Room 1710 - Telephone: EX 3-3926)

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Attached - General Work Assignments for the Radio Section

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FREQUENCY ALLOCATIONS - 25 TO 890 MEGACYCLES

**1**

## NEW MOBILE TELEPHONE SERVICE COMMITTEE

To prepare for future growth and technical improvements, and with Mr. McNeely's concurrence, a Mobile Telephone Service Committee has been formed. Significantly, the Committee is composed of all operating departments - Engineering, Plant, Rates, Traffic and Marketing.

This Committee will concentrate on ways and means to:

- Improve mobile service in existing service areas
- Obtain needed operating cost reductions
- Plan now for coordinated expansion and integration of future dial systems when suitable equipment becomes available

We think that much can be gained by this committee approach and hope that similar committees now exist or are in the process of formation in the Companies.

As a result of the first meeting held on August 24, 1961, you can expect a general letter describing the areas in which we know progress can be made now. We would appreciate your help in keeping us informed of mobile activity in the Companies by sending copies of the minutes of meetings of any active Mobile Improvement Committees to the Mobile Radio Engineer.

**2**

## EMERGENCY RADIO RESTORES SERVICE TO ISOLATED COMMUNITIES

Hurricane Carla, which hit the coast of Texas between Corpus Christi and Galveston on September 11, 1961, caused extensive damage - both to exchange and toll plant. Approximately 1,000 toll circuits were interrupted, causing isolation of 63 communities in the southeastern part of the state, of which 17 were Bell-operated exchanges.

Temporary restoration of toll service to three communities using General Electric ET1C 150 mc equipment, broadbanded to provide three circuits, and single-circuit General Electric ED equipment (also 150 mc) was effected. The ET1C equipment was used to restore circuits between Wharton and Bay City and the ED equipment was

used to provide a circuit between Bayside and Woodsboro.

After the normal facilities were restored between Bayside and Woodsboro, the ED equipment was moved and set up to provide a circuit from Bay City to Matagorda.

**3**

## TL ROADSHOW CONTINUES

The May issue of RADIO NOTES included additional dates for the Western Electric TL "roadshow" and indicated that after June 15 these presentations would be discontinued during the summer. Since several Companies requested earlier schedules for their areas, the show was continued during the summer months. Here is the latest schedule starting with the last published dates.

7-12 Chicago	9-21 Oklahoma City
7-19 St. Louis	9-29 Dallas
7-20 Little Rock	10- 3 Cincinnati
8- 2 Boston	10- 6 Philadelphia
8- 8 New Haven	10-10 New Jersey
8-15 Washington	10-16 Syracuse (T)
8-17 Baltimore	10-17 Westchester
8-22 Richmond	10-19 Long Island
8-23 Charleston, W. Va.	10-24 Houston
8-29 Atlanta	10-31 New Orleans (T)
8-31 Nashville	11- 2 Charlotte
9-12 Louisville	11- 7 Jacksonville
9-14 Kansas City	11- 9 Miami
9-19 Topeka	11-14 Pittsburgh (T)

Western Electric advises that all of the above dates are final except where indicated (T) for tentative.

**4**

## SOME INEXPENSIVE MICROWAVE INSURANCE

With more and more areas getting into the light route microwave field, we felt it might be worthwhile to pass along a few suggestions which areas with experience have had to learn the hard way. We think you will find that these precautions will give you some very inexpensive insurance. A few recent cases have pointed up the desirability of passing these thoughts on to others.



1. Profiles. Good, accurate profiles are a very essential part of route study work which should not be skimmed. They set your tower heights (which cannot be easily changed after construction) and, together with field work, help you to determine whether a path may have reflecting points.
2. Calculations. Calculations of expected RF signal levels should be done carefully and accurately. Data currently available have been checked many times against measurements in the field and should permit calculations accurate to a db or so. There is sometimes a tendency to make approximate calculations, saying the large fading margin (30 to 40 db) usually provided will take care of any errors. Don't be fooled. You need margin to keep propagation outages down, and you need to know what the margin is in order to achieve the reliability designed into the system.
3. Measurements. Among the most important measurements to be made on a completed installation are those of the actual RF signal levels and voice circuit noise. Make them accurately. Check them against the calculations, adjusting for conditions which may be different from those assumed - such as more or less transmitter power than nominal. You should usually come within a db or so of the calculations. If not, investigate now, before the system is turned up for service - and write the final values down somewhere for future reference.

Because of the large fading margins provided, a system usually looks good at first even if it is working in low gear, so to speak. But when the "fading season" comes (and somehow there seems to be one about 6 months after the service date, regardless of the time of year a system is installed), you will have trouble on your hands. If at this time, there are not available good original calculations, good original measurements and good correlation of the two, you will hardly know where to start to localize a propagation problem.

Careful and accurate work in these three areas should go a long way to help insure a good start for a microwave system and to give you and your maintenance people confidence in your system. Don't overlook any of them.

## MOUNTAIN STATES TELEPHONE COMPANY EXTENDS TJ PATHS TO OVER SEVENTY MILES

Mountain States Telephone Company recently installed a new TJ microwave system between Phoenix and Safford, Arizona, with a sideleg to Globe. Two of the hops exceed seventy miles in length. The system was placed in service on July 1, 1961.

The main repeater point is located on Pinal Peak, 8.2 miles southwest of Globe, at an altitude of 7,826 feet. A single hop of 73.6 miles is used between Pinal Peak and Phoenix. Another long path of 72.6 miles is used between Pinal Peak and a repeater at Tuab, located 7.8 miles northeast of Safford.

To provide additional fade margin, the system was originally designed with 16-foot antennas for the unusually long paths. Due to last minute technical difficulties, the manufacturer was unable to deliver them, and 10-foot antennas were substituted. This caused a reduction in the fade margin, but all received signals meet the design objective of -40 dbm.

A dual strip chart recorder is being used to record the received signal level at Phoenix on each diversity channel. These figures will be carefully analyzed to determine system performance. In addition, noise measurements are being recorded on a terminated message channel to determine whether or not noise objectives will be met during periods of fading. These measurements will also indicate the effectiveness of diversity action during periods of frequency selective fading.

Arizona's first TJ system placed in service on December 13, 1958 originally had the longest 11,000 megacycle path in the Bell System. This was 47.8 miles between Mt. Elden and Mingus Mountain. The system was then extended to Winslow on May 15, 1960 with a 54-mile path between Mt. Elden and Winslow. These long paths have provided excellent service and have been used as the basis for the engineering of the new route.



## EXPERIMENTAL SATELLITE SYSTEM - CONNECTING FACILITIES

A radio relay route between Boston and Rumford, Maine, will provide connections between the experimental satellite system and the nationwide network. This route will use existing TD-2 stations between Boston and Portland, Maine, and will require construction of three new radio stations to provide two hops of TD-2 and two hops of TJ between Portland and Rumford. The new stations will be located at Cornish, West Paris and Black Mountain. Of these Cornish and West Paris are expected to be part of the proposed TD-2 Portland by-pass and Canadian SAGE routes. Black Mountain will be used both for a radio relay repeater and for the "bore sight" transmitters and a satellite repeater needed for alignment of the ground-based satellite equipment.

Two broad band channels will be equipped in each direction to provide regular and spare facilities. The channels will be fed in parallel and manually patched at the receiving ends for protection.

Terminating equipment will be installed at Rumford to handle both voice and video circuits. Sufficient monitoring and testing equipment is also planned to assure the satisfactory operation of all the circuits.

## TRANSMITTER IN TROUBLE CAUSES WIDESPREAD INTERFERENCE

Early this summer, Southern Bell began experiencing numerous false signals from an intermittent unmodulated carrier on their YJ channels at Charlotte and Winston Salem, N.C. After about ten days, this ceased abruptly, but simultaneously appeared on the JL channels at Charlotte, Greensboro and Fayetteville (Independent Company), N.C., Greenville, S.C., and to a lesser extent at Rocky Mount, N.C. (also Independent Company). Investigation was fruitless for over a month until the F.C.C. District Engineer in Charge located a police transmitter in Statesville, N.C., which was radiating more power on the JL frequency, 157.77 mc, than on its assigned frequency of 155.31. Presumably, this resulted from lack of neutralization in the

final amplifier; in any event, local coverage of the police system continued to be adequate and provided no indication of malfunctioning.

This points up the fact that, despite progress in the transmitter art, improper tuning and adjustment of final amplifiers can result in unauthorized radiation which can have far-reaching effects. Indication of proper system operation is not always insurance that everything is OK. Statesville is about 40 miles from Charlotte and Winston Salem, 60 from Greensboro, over 100 from Greenville and Fayetteville and 170 from Rocky Mount.

## GENERAL WORK ASSIGNMENTS FOR THE RADIO SECTION

Attached to this issue of RADIO NOTES is a revised list of General Work Assignments for the Radio Section.

Since the last issue (November 30, 1960 RADIO NOTES) of these assignments, there have been quite a number of changes in Radio Section personnel. A review of these changes follows.

The most recent change is in the Mobile Radio Group. Dick Barnes left on September 1 to join the Bell Laboratories Satellite System Studies Group. Frank Oblinger is taking over the work on BELLBOY Personal Signaling Service which Dick has been handling. On October 1st, John Kocik of the Western Electric Defense Projects Organization will join the group and handle Maritime Mobile and Personal Two-Way Radio. Ken Thomson joined the Group on March 20, working primarily on mobile telephone service improvement. Weldon Ingersoll returned to the Western Electric Company on July 1.

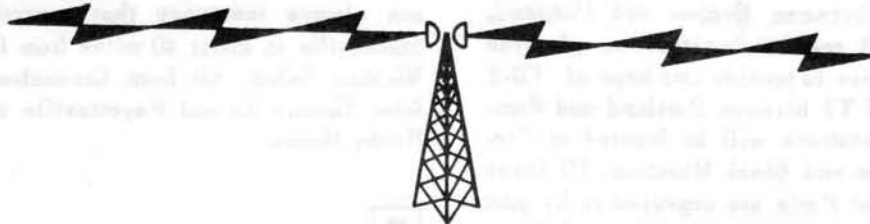
In the Point-to-Point Radio Group, Walter Camp returned to the New Jersey Bell on April 1 and Al Haushamer joined the Group on July 31. Effective October 1, Marianne Sechanic has accepted a position in the Engineering Economics Division.

In the Point-to-Point Radio Group, Bob Kiesling transferred to the Transmission Section on January 1 and Jack Crawford took over TL microwave systems. Buff Buffo retired on July 31, and Jack O'Shea took over the non-Western

Microwave System for Message Service. Russ Johnson returned to the Mountain States Company on June 1. Elaine Vreeland was replaced by Joan Zimmermann March 19.

In the Radio Frequency Group, Murray Calhoun joined the group on April 10. Mary Jane Guthrie replaced Midge Gorman on July 31.

In addition to the changes in the Engineering Section, effective August 16, Harley F. Rolfe accepted a position as Staff Representative in the Major Account Sales Group of the Marketing Department. He will handle marketing activities pertaining to Public Land Mobile matters. Harley can be reached on EX 3-2855.



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## RADIO INFORMATION

The following have been forwarded since the last issue of RADIO NOTES.

BSPM778A	-		
BSPM778B	-		
BSPM779	-		
BSPM779A	-		
BSPM779B	-		
BSPM780	R70.630,	Issue 1 -	J68345A Transmitter-Receiver Test Set (General)
	R70.632,	Issue 2 -	J68345A Transmitter-Receiver Test Set (Operating Methods)
	R70.633,	Issue 1 -	J68345A Transmitter-Receiver Test Set (Maintenance Routines)
	R70.634,	Issue 2 -	J68345A Transmitter-Receiver Test Set (Maintenance Methods)
	R70.635,	Issue 2 -	J68345A Transmitter-Receiver Test Set (Description and Operating Principles)
BSPM780A	-		
BSPM781	R00.030,	Issue 8 -	Alphabetical Index to General Letters and BSP's in the Radio Series
	Addendum		
	AB27.340.2,	Issue 1 -	Mobile Telephone Systems - Delay Equalization Equipment
BSPM781A	-		
BSPM781B	357-100-300,	Issue 1 -	Message Connecting Link - Interconnection of TH Radio and L Facilities - Initial Line-Up and Maintenance Tests



	357-100-520,	Issue 1	- Message Connecting Link - Interconnection of TH Radio and L Facilities - Gain Equalization of Message Connecting Links
	Addendum		
BSPM782	R20.724.01,	Issue 1	- Test Equipment, Tools and Patch Cords
BSPM782A	-		
BSPM783B	357-100-505,	Issue 1	- Message Connecting Link - Interconnection of TH Radio and L Facilities - Power Supplies
	357-100-510,	Issue 1	- Message Connecting Link - Interconnection of TH Radio and L Facilities - Switching Circuits
	357-100-515,	Issue 1	- Message Connecting Link - Interconnection of TH Radio and L Facilities - Amplifiers and Regulators
	357-100-525,	Issue 1	- Message Connecting Link - Interconnection of TH Radio and L Facilities - Replacement of Trunks
	357-100-530,	Issue 1	- Message Connecting Link - Interconnection of TH Radio and L Facilities - Repair of Amplifiers and Regulators
BSPM784	R90.270.00,	Issue 1	- RCA Television Microwave Radio Equipment - Type TVM-1A (General)
	R90.271.00,	Issue 1	- RCA Television Microwave Radio Equipment - Type TVM-1A (Operating Routines)
	R90.272.00,	Issue 1	- RCA Television Microwave Radio Equipment - Type TVM-1A (Operating Methods)
	R90.273.00,	Issue 1	- RCA Television Microwave Radio Equipment - Type TVM-1A (Maintenance Routines)
	R90.274.00,	Issue 1	- RCA Television Microwave Radio Equipment - Type TVM-1A (Maintenance Methods)
	R90.274.01,	Issue 1	- Transmitter - Unit Tests and Adjustments
	R90.274.02,	Issue 1	- Transmitter - Tuning Procedure
	R90.274.03,	Issue 1	- Transmitter - Adjustment of Modulation-Deviation Reference-Test Voltages
	R90.274.04,	Issue 1	- Transmitter - Monitor Unit Tests and Adjustments
	R90.274.05,	Issue 1	- Transmitter - Video Modulator Unit Tests and Adjustments

R90.274.06,	Issue 1 -	- Transmitter - AFC Tests and Alignment
R90.274.07,	Issue 1 -	- Transmitter - Differential Phase and Gain Test
R90.274.08,	Issue 1 -	- Transmitter - Video Frequency and Square Wave Response Tests
R90.274.09,	Issue 1 -	- Transmitter - RF Power Output Measurement and Wavemeter Frequency Check
R90.274.10,	Issue 1 -	- Transmitter - Power Supply Checks and Adjustments
R90.274.15,	Issue 1 -	- Receiver - Unit Tests and Adjustments
R90.274.16,	Issue 1 -	- Receiver - Tuning Procedure
R90.274.17,	Issue 1 -	- Receiver - Check of IF System Alignment
R90.274.18,	Issue 1 -	- Receiver - IF Preamplifier Tests and Alignment
R90.274.19,	Issue 1 -	- Receiver - IF Amplifier Tests and Alignment
R90.274.20,	Issue 1 -	- Receiver - Limiter-Discriminator Tests and Alignment
R90.274.21,	Issue 1 -	- Receiver - Video Amplifier Tests and Adjustments
R90.274.22,	Issue 1 -	- Receiver - AFC Test and Alignment
R90.274.23,	Issue 1 -	- Receiver - Differential Phase and Gain Test
R90.274.24,	Issue 1 -	- Receiver - Video Frequency Response Test
R90.274.25,	Issue 1 -	- Receiver - Noise Level Measurement
R90.274.26,	Issue 1 -	- Receiver - Power Supply Checks and Adjustments
R90.274.30,	Issue 1 -	- System - Over-All Tests
R90.274.31,	Issue 1 -	- System - Tuning Procedure
R90.274.32,	Issue 1 -	- System - Differential Phase and Gain Test
R90.274.33,	Issue 1 -	- System - IF Gain and Video Frequency Response Tests
R90.274.34,	Issue 1 -	- System - Square Wave Response Test
R90.274.35,	Issue 1 -	- System - Noise and Hum Tests

R90.276.00, Issue 1 - RCA Television Microwave Radio  
Equipment - Type TVM-1A - In-  
stallation Procedures

BSPM784A -

BSPM784B -

P.E.L. 6899 Testing Equipment - AC Spark Plug Division, General Motors  
Corporation Mobile Telephone Test Set CTS-1 (1S3.7-107)

P.E.M. 7667 BELLBOY Personal Signaling Service - Supply of Phase Equal-  
izers Used in 35 mc Systems (1S3.9M-21)

P.E.M. 7682 Television - KS-15654, L2 Video Monitor - Fuse Blowing

Unnumbered Letter to Chief Engineers

8-11-61 Checking List for General Letters Dealing with Radio Matters -  
Supplement 3 (1S3.0-46)

9- 6-61 Satellite Communications - Material for Talks

Unnumbered Letter to Certain Transmission Engineers

8-16-61 TJ Radio System - Diversity Switching Questionnaire (1S3.9J-20)

Unnumbered Letter to Plant Supervisors

8-10-61 Mobile Service Trouble Summary

9- 5-61 Mobile Radio Cost Results Summary

Unnumbered Letter to Traffic Managers

8- 7-61 Maritime Mobile Service - F.C.C. Request for Distress Logs (File  
No. 3B5.9)

Unnumbered Letter to Marketing Departments

8- 1-61 Public Mobile Telephone Service Results Reporting



AMERICAN TELEPHONE AND TELEGRAPH COMPANY  
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RADIO SECTION  
Area Code 212

- H. E. Weppner (Ed) - Radio Engineer EX 3-3291  
Mrs. E. D. Malone (Elise) - Secretary EX 3-3292
- J. W. Stubner (Jim) - Mobile Radio Engineer EX 3-3465  
E. W. Borden (Ed) - EX 3-3860  
Radio Transmission and Systems Problems on Mobile Services  
Special Studies  
Member I.R.E. Admissions Committee
- P. D. Bodman, Jr. (Phil) - EX 3-2773  
Practices on Radio Mobile Services
- M. C. Fruehauf (Milt) - EX 3-3550  
Public Air-Ground Systems  
Telephone Company Maintenance Radio Systems  
Private Mobile Systems for Military and Federal Government
- F. C. Oblinger (Frank) - EX 3-2517  
BELLBOY Personal Signaling Service  
Administration of "R" Series BSP's
- K. C. Thomson, Jr. (Ken) - EX 3-3029  
Vehicular Mobile Telephone Service - Systems and Equipment  
Mobile Service Improvement (Dial, Multichannel access)
- J. Kocik (John) - EX 3-2415  
Personal Two-Way Radio Devices  
Maritime Mobile Radio Systems and Equipment  
Radio Technical Commission for Marine Services
- Miss A. M. Boyne (Alice) - EX 3-3926  
Editor of RADIO NOTES  
Records and Lists for "R" Series BSP's and General Letters  
Preparation of Conference Material
- Miss F. M. Arnone (Fran) - EX 3-3466  
Maintenance of General Letter Index for Radio Section  
Distribution of RADIO NOTES  
Dictation, Typing and Filing
- R. D. Campbell (Dick) - Point-to-Point Radio Engineer EX 3-3751  
E. W. Bemis (Ed) EX 3-2098  
Overseas and High Seas Service  
Beyond-the-Horizon Systems  
C.C.I.R.
- J. B. Fitch (Jack) EX 3-2946  
Conversion of Radio BSP's to Plant Series  
Practices on Point-to-Point Microwave

- O. C. Foster (Tony) EX 3-3044
  - TV Microwave (Local)
  - Radar Interference Problems
  - Radiation Hazards
  - Satellite Communications
- A. J. Haushamer (Al) EX 3-3222
  - Practices on Point-to-Point Microwave
- J. B. Keane (Jim) EX 3-2462
  - TV Microwave (Local)
  - Satellite Communications
- J. P. Robertson (Jim) EX 3-2455
  - TD-2 Microwave Systems
  - Microwave Propagation
- H. R. Stevens (Howard) EX 3-4344
  - TH Microwave System
- Unfilled EX 3-2286
  - Special Engineering Work, Filing, Typing
- W. M. VonHagen (Wally) EX 3-2420
  - Practices on Point-to-Point Microwave
- Miss A. C. Massoni (Arline) EX 3-3752
  - Maintenance of Correspondence Records, Filing, Typing
- A. E. Fernald (Al) - Special Projects Radio Engineer EX 3-3604
- J. D. Crawford (Jack) EX 3-3315
  - TL Microwave System (including TV applications)
- W. H. Keller (Bill) EX 3-2120
  - TJ Microwave System (including TV applications)
  - Rural Radio and other VHF/UHF Point-to-Point Systems
  - Passive Repeaters
- E. H. Koeper (Ed) EX 3-2193
  - Practices for Short Haul Microwave and VHF/UHF Point-to-Point Systems
- J. C. O'Shea (Jack) EX 3-3770
  - Non-Western Microwave for Telephone Service
  - Special Studies
- Unfilled EX 3-2611
  - TJ Microwave System (including TV applications)
  - Emergency Radio Systems (except applications of TV equipment)
  - 2 kmc Radio System
- Miss J. M. Zimmermann (Joan) EX 3-3605
  - Maintenance of Correspondence Records, BSP's, Dictation and Typing, Filing
- G. G. Ericson (Grant) - Radio Frequency Engineer EX 3-4447
- M. C. Calhoun (Murray) EX 3-2254
  - FCC Matters relating to Domestic Public Land Mobile; Rural Radio; Air-Ground; Emergency; Aviation; Radiation; Antenna Towers; and CONELRAD
  - Frequency Allocations
  - Section 214 of the Communications Act as it relates to extension and supplementation of wire line facilities including submarine cables
  - Liaison between Bell Companies and F.C.C.



Miss D. J. Livermore (Dorothy) EX 3-2180

FCC Matters relating to Point-to-Point Microwave; Local Television Transmission Service; Experimental Authorizations; Maritime; Public Safety; Industrial; Telephone Maintenance; Land Transportation; Citizens Radio; Disaster; Broadcasting AM, FM and Television; Intercity Relays; Private Microwave Systems; Community Antenna Systems; Operator Licenses and International Frequency Allocations and I.T.U. Publications  
Matters relating to Domestic Frequencies and Users  
Liaison between Bell Companies and F.C.C.

Miss M. J. Guthrie (Mary Jane) EX 3-2394

Records of Bell System applications filed with the F.C.C.  
Details of Bell System Radio Installation by locations, frequency, equipment, etc.  
Bell System Section 214 applications on file with F.C.C.  
Bell System Broadband Microwave Map

Miss B. Thomas (Barbara) EX 3-4448

Maintenance of F.C.C. Rules and Regulations; F.C.C. Dockets; Public Notices and Correspondence  
Records of General Letters  
Dictation and Typing