



RADIO NOTES

AMERICAN TELEPHONE AND TELEGRAPH COMPANY
OPERATION AND ENGINEERING DEPARTMENT

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1. Portable TV Microwave Used to Restore Toll Service
2. Radio Used During Failure of Transatlantic Cable
3. Bell Station Aids in Air Crash Rescue
4. TD-2 Interchannel Interference
5. Applications Filed for Microwave Systems in Oregon
6. New California TD-2 Route with TJ Order Circuits
7. New Michigan TD-2 Route
8. Motorola Microwave System in Virginia
9. Collins 6000 MC Equipment - Preliminary Results of Field Tests
10. Frequency Meters for Narrow Band Mobile Systems
11. FCC to Change Part 21 of Its Rules Regarding Low-Pass Audio Filter
12. Direct Testimony in FCC 25-890 MC Hearing Due
13. Oral Argument in Great Lakes Hearing
14. CCIR Assembly in Los Angeles
15. G. E. Narrow Band Modifications
16. Adapting Private System Mobile Sets for Mobile Telephone Service
17. Private Mobile Radio Systems
18. Mobile Service Areas and Channels
19. Radio Information

Attached - Map of Bell System Television Network Routes

- Map of Bell System Overseas Telephone Service

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1. PORTABLE TV MICROWAVE USED TO RESTORE TOLL SERVICE

The Illinois Bell Telephone Company recently utilized their mobile television microwave facilities to restore telephone service disrupted by a severe storm of sleet, freezing rains and high winds. The emergency equipment included truck mounted portable TV type microwave units, hydraulically operated towers and type "O" carrier terminals.

Clinton, a connecting company town and toll center, was isolated from the outside telephone network because of heavily damaged facilities. The microwave system was established on a 15 mile path between the Clinton central office and an open wire-cable junction near Decatur approximately 24 hours after the service interruption. A total of 12 "O" carrier circuits were established over the emergency facilities. Four of these circuits were obtained by making use of the "OD" carrier terminals that are part of the Illinois Company mobile TV pickup units and the remaining 8 circuits by use of existing "OB" and "OC" carrier equipment normally employed on the wire route between Clinton and Decatur.

Eleven of the re-established circuits were used for voice transmission while the remaining circuit carried three 43A1 telegraph carrier channels. This emergency layout was in continuous service from January 23 until February 6, and more than 850 calls a day were handled. Portable VHF equipment operating in the Telephone Maintenance Radio Service was used as an order circuit between the mobile microwave terminals.

2. RADIO USED DURING FAILURE OF TRANSATLANTIC CABLE

The group of 12 radiotelephone circuits normally operated with London was augmented to a total of 28 during the transatlantic cable failure which lasted from 10:43 a.m. Saturday, February 21 to 10:28 a.m. Sunday, March 1. The additional circuits were provided initially by radio in both directions. The West-East cable was not damaged, however, and subsequently 14 of its circuits were used in that direction. Additional West-East cable circuits could not be made available due to lack of connecting facilities between the cable and radio terminals in England.

The additional radio circuits were obtained as follows:

The normal group of 12 London circuits is provided by 4 radio systems. These were all converted to 4-channel operation to yield 16 circuits.

Service with Warsaw, Poland normally on a direct radio system, was shifted back to a forked channel shared with Finland and Iceland on a time basis, on which it formerly operated. The radio facility thus released was operated with London on a 4-channel basis.

The four 3-channel radio systems normally used for service with Frankfurt, Germany were converted to 4-channels each. Three of these then handled the Frankfurt service and the fourth provided 4 more London circuits.

The New York-London system formerly operated on a relayed basis via Barbados, was reactivated and yielded four channels.

Also the former New York-Amsterdam system, relayed via Paramaribo was re-established to provide an extra telephone circuit to the Netherlands.

Radio conditions during the 8-day period were mostly fair to good during daylight hours in New York, but deteriorated considerably towards night.

Although the radio facilities were unable to provide the full capacity of the cable and the grade of transmission was generally not as good as that of the cable, the availability of radio during this emergency enabled maintenance of service and clearly demonstrated the importance of keeping such facilities in operation.

3. BELL STATION AIDS IN AIR CRASH RESCUE

Shortly after midnight on February 4, 1959, an American Airlines Electra airliner crashed into the East River near New York City's LaGuardia Airport. The new Lockheed prop-jet airplane was making a routine instrument landing and mysteriously fell short of Runway 22. A few hundred feet away the seagoing tugboat "H. Thomas Teti, Jr." had been stolidly towing two barges on the choppy waters while navigating by radar through the light rain and fog. Upon hearing the loud crash, Captain Nickerson of the Teti flashed on the searchlight to find the stricken plane rapidly disintegrating in the river.

At 12:19 a.m., the New York Telephone Company's public coast station WOX received a call on Channel 1 from the Teti reporting the crash and asking to be connected to the Coast Guard. Upon answering the telephone call, the Coast Guard advised the Teti that aid was being dispatched and would arrive soon. Meanwhile, the Teti played a heroic part in picking up 8 survivors of the 73 aboard the stricken plane. During these rescue operations, the Bell System station WOX-1 handled four other calls prior to 3:20 a.m.

Among those who lost their lives in this crash were two Bell men who had played important parts in radio affairs - J.B. Maggio of the Laboratories and W.W. Janes of the Western Electric.

4. TD-2 INTERCHANNEL INTERFERENCE

A number of interchannel interference cases have been reported in TD-2 systems using dish antennas. This trouble occurs where two dishes are mounted close together and point in the same direction. Crosstalk from a transmitter on one frequency to a receiver 40 mc away can result in increased noise and reduced fading margin on the receiving channel.

This difficulty may be minimized by increasing the coupling loss between antennas or by decreasing susceptibility of the receiver to interference by means of additional IF filters. Shields have been erected between antennas at several locations to provide the required isolation; however, when antennas are mounted one above the other, a large horizontal shield presents difficult mechanical problems. Cross polarization of the antenna provides some help. IF filters of the type to be used on TD-2 interstitial channels (RADIO NOTES November 17, 1958) have also been tried and found beneficial.

Bell Laboratories is currently investigating this problem. At the Holmdel antenna laboratory exploratory work is under way to determine how effective shielding can be in minimizing coupling between dishes. Very encouraging results have already been obtained with shields as small as 18" x 24", although the placement of small shields appears to be somewhat critical. This investigation is continuing and more definite information may be forthcoming in the future.

5. APPLICATIONS FILED FOR MICROWAVE SYSTEMS IN OREGON

Construction applications were filed with the FCC in January covering a microwave system which includes 6 hops of TD-2 and 7 hops of TJ. These routes interconnect The Dalles, Pendleton, John Day and Baker, Oregon and will provide dual-route facilities for SAGE circuits for installations near Auburn, Burns and Condon, Oregon.

Large plane reflectors or "billboards" will be used as passive repeaters on both hops of the TJ system adjacent to the John Day central office. Since this town is situated in a deep valley, the choice had to be made between passive repeaters with the TJ station at the central office and a plan where TJ stations would be outside of town and connected with the office by very short microwave hops or by wire entrance-link facilities. The "billboards" won out by eliminating the expensive construction and maintenance of remotely located TJ active repeaters.

The physical layout of these two paths into John Day is as follows:

On the path between Fall Mountain and John Day, the passive repeater is 14' x 16' and will be situated 10.2 miles from Fall Mountain and 5520 feet from the central office at John Day. The angle of incidence is 55° (projected area is equal to 183 square feet).

On the path between John Day and Elkhorn, the passive repeater is 20' x 24' and is situated 26.5 miles from Elkhorn and 3425 feet from the central office at John Day. The angle of incidence is also 55° (projected area is 394 square feet).

Received signals have been computed on these paths to be -39 dbm and -36 dbm respectively, within the suggested value of -40 dbm for the TJ System.

6. NEW CALIFORNIA TD-2 ROUTE WITH TJ ORDER CIRCUITS

The Pacific Company has applied for construction permits for a new TD-2 route from Mt. Adelaide to San Luis Obispo, California. Mt. Adelaide is a station on the new north-south Wolf Creek-San Bernardino express route (RADIO NOTES June 17, 1958). The next station west is Bakersfield, an existing TD-2 station and terminus of a TV side-leg off the Los Angeles-East Bay Hills route. At the San Luis Obispo station, connection can be made to the Los Angeles-Oakland coaxial route.

The new route has five TD-2 hops, or 130 route miles. There will be four new stations in addition to the two existing stations. This is another case, like the Ashburnham-Portland route, (RADIO NOTES September 15, 1958) where having line-of-sight between stations of two different routes made possible establishment of a third route with a saving in land, roads, buildings and towers.

The Mt. Adelaide-San Luis Obispo route will be equipped initially with one message and one protection channel in each direction. TJ facilities will be provided for order, alarm and control purposes over part of the route. The application also includes a one hop 22 mile side leg employing Lenkurt 74A equipment to an Air Force location from a TD-2 repeater station on the new route.

7. NEW MICHIGAN TD-2 ROUTE

The Michigan Bell Company has applied for permission to construct the remaining segment of a TD-2 route extending from the Saranac repeater station on the Parma-Grand Rapids TD-2 route northward through Traverse City to Allenville on the upper peninsula. At Allenville connection will be made to a TJ route running northeast to Sault Sainte Marie and to another TJ route west to Forsyth, Dead River and Escanaba. Forsyth is the northern terminus of the Forsyth-Stevens Point TD-2 route being constructed by the Long Lines Department (RADIO NOTES October 17, 1958) and Dead River is a repeater station on the Marquette-Gratiot Lake Motorola system.

Because of the short construction season in northern Michigan, work on the route was undertaken in two parts. The first section from Traverse City to Allenville consisting of three hops totaling 100 route-miles was begun last summer. The portion from Saranac to Traverse City on which work is about to start consists of five hops or 136 additional route miles.

At each end of every hop a single horn-reflector antenna will be used for transmitting and receiving. Initially there will be one working (message) and one protection channel in each direction.

8. MOTOROLA MICROWAVE SYSTEM IN VIRGINIA

On February 1, the Chesapeake and Potomac Telephone Company of Virginia commenced service on a two hop Motorola MR-10 frequency diversity system from Roanoke to a military site. At Roanoke the new 6 kmc system is launched on a horn reflector antenna sharing one hop of the Long Lines TD-2 route to the Greens Knob repeater station. Here the second Motorola hop diverges from the TD-2 route to serve the military site. The initial service includes 24 circuits on Lenkurt 45BX carrier equipment some being used for data transmission.

9. COLLINS 6000 MC EQUIPMENT - PRELIMINARY RESULTS OF FIELD TESTS

The Laboratories and O. & E. Department have recently completed tests on a Collins 6000 mc system between Virginia and Baudette, Minnesota for the purpose of determining the transmission performance and circuit carrying capabilities of this equipment. This is a 7 hop - 115 mile system established by the Northwestern Company primarily for serving a radar site.

Intermodulation measurements made on one and three hops looped to simulate two and six hop systems are now being evaluated by the Laboratories. Introduction of simulated fades of 30-35 db indicated that the microwave system and the electronic combiner used in this system to combine the diversity channels introduced no errors in SAGE data transmission.

Several routes using this equipment have been in successful operation in the Bell System for over a year.

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10. FREQUENCY METERS FOR NARROW BAND MOBILE SYSTEMS

The DuMont Laboratories 24-channel frequency and modulation meter (RADIO NOTES March 21, 1957) is now under final Bell Laboratories evaluation tests. Numerous changes have been made in the meter since its announcement in 1957 to incorporate improvements suggested by the Laboratories. The meter is presently in its sixth version and is coded Model 5890-B6. The earlier versions did not meet the $\pm .00025\%$ frequency accuracy requirement. If the Model 5890-B6 proves to be satisfactory, price and ordering information will be provided by a general letter.

The Budelman Electronics Corporation has recently announced a new Model 17A4A frequency and modulation meter with a program to modify existing Budelman and Link meters to make them equivalent to the Model 17A4A. The new meter provides means for measuring up to four RF frequencies, and the manufacturer has claimed $\pm .00025\%$ frequency accuracy. Tests conducted by Bell Laboratories indicate that the Model 17A4A does not have the frequency accuracy claimed and the manufacturer has been so advised. It appears, however, that the manufacturer will be able to improve the meter to make it meet the accuracy requirement. At that time the meter will be again evaluated for possible Bell System use.

11. FCC TO CHANGE PART 21 OF ITS RULES REGARDING LOW-PASS AUDIO FILTER

Part 21 of the FCC Rules requires single channel mobile telephone and rural radio transmitters to be equipped by January 1, 1960 with an audio low-pass filter to limit the maximum modulating frequency.

The original rule making which established narrow-band standards intended this requirement to become effective in 1963. This has been called to the attention of the FCC staff who are now taking steps to amend Part 21 to specify this later date. When an FCC Order to this effect becomes available, we plan to advise the Companies.

12. DIRECT TESTIMONY IN FCC 25-890 MC HEARING DUE

Another step in the Commission's inquiry into allocation of non-government frequencies in 25-890 mc band was announced in a recent FCC Notice of Hearing which requires that complete direct testimony be filed by March 30, 1959.

The response of A.T. & T. in behalf of the Bell System Companies to the initial order of inquiry was filed on November 22, 1957 (RADIO NOTES December 17, 1957) and a statement of proposed evidence was filed on October 30, 1958 (RADIO NOTES November 17, 1958). These filings stressed the importance of allocating a sufficient portion of this spectrum in a continuous band for a broad-band multi-channel public mobile telephone service.

The current notice indicated that the oral witnesses to be called will be designated as soon as possible after March 30, 1959. Selection of these witnesses will be made solely by the Commission and they will be limited to 15 minutes for a summary explanation of the written testimony and exhibits. A.T. & T. witnesses in the order of presentation of written testimony are as follows:

J. J. Hanselman	Assistant Vice President	A.T. & T.
R. Bright	Mobile Radio Engineer	A.T. & T.
P. W. Blye	Director of Systems Engineer	B.T.L.
H. R. Huntley	Chief Engineer	A.T. & T.

13. ORAL ARGUMENT IN GREAT LAKES HEARING

In renewed activity in the Great Lakes hearing case, the FCC has ordered oral agreement on the hearing examiners initial decision before the full Commission on April 11, 1959.

This case, regarding applications filed by the Wisconsin, Ohio and Michigan Bell Telephone Companies in the fall of 1952 for VHF maritime station at nine cities, has been dormant since the hearing examiner's initial decision ordering denial of the applications was issued on July 31, 1957. (RADIO NOTES August 20, 1957)

14. CCIR ASSEMBLY IN LOS ANGELES

The United States will be host to the 9th Plenary Assembly of the International Radio Consultative Committee (CCIR) of the International Telecommunication Union, which takes place in Los Angeles from April 1-30 inclusive. As usual, the agenda includes a wide variety of technical radio questions of international interest.

Bell System participation in the United States delegation will include members of the A.T. & T. Company's Operation and Engineering and Long Lines Departments, the Bell Telephone Laboratories and the Pacific Telephone and Telegraph Company. In addition to technical representation, the A.T. & T. and Pacific Companies are cooperating with government and other industry organizations in arranging for the many activities which the United States as host government wishes to provide for the Assembly.

On the weekend of April 18-19, the delegates will be guests of a number of American telecommunication companies on a trip to Santa Catalina Island. This will include a banquet at which Mr. H. R. Huntley, A.T. & T. Company Chief Engineer, will give the welcoming talk on behalf of the host companies.

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15. G. E. NARROW BAND MODIFICATIONS

The General Electric Company Metal-Cal Compliance Tag furnished with narrow band modification kits does not properly meet FCC requirements. A letter is being prepared to clarify the use of this Tag in designating transmitters that have been converted to narrow band standards.

16. ADAPTING PRIVATE SYSTEM MOBILE SETS FOR MOBILE TELEPHONE SERVICE

The new fully transistorized selector for mobile telephone service, mentioned in the previous issue of RADIO NOTES, is designed to be used with "standard" mobile units of the type used for private systems. Only the new selectors and associated 47E-3 Control Units are needed to adapt surplus private system mobile sets for mobile telephone service. No modification of the radio equipment is required other than new oscillator crystals and realignment to the proper frequencies.

17. PRIVATE MOBILE RADIO SYSTEMS

For your reference the item regarding ~~lease~~-maintenance of private mobile radio systems from the February 20, 1959 O. & E. ITEMS OF CURRENT INTEREST is quoted below:

On February 10 the FCC was advised that A.T. & T. and its operating subsidiaries are taking steps to withdraw (by January 24, 1961) from the business of providing private mobile radio systems on a lease-maintenance basis, i.e., on the basis of the Telephone Company providing and maintaining radio equipment for use on frequencies licensed to the customer (except as to systems furnished to the US Government).

There are now in service about 22,000 private mobile units, 2,200 land stations and about 1400 customers.

In advising FCC of this action, A.T. & T. reiterated its belief that "lease-maintenance" of private mobile systems is properly a "common carrier communications" service. However, the matter has been in controversy for two years and it seems likely that a final determination of the issues can not be expected for some time. It is believed, therefore, that our customers are entitled to have this matter resolved quickly in order to make satisfactory arrangements prior to January 24, 1961.

It was also emphasized that the decision of the Bell Companies to withdraw from the lease-maintenance of private mobile radio systems is not to be understood as a decision that there is no place for a private line mobile radio telephone service furnished by telephone companies as a part of their overall common carrier service.

In such a mobile service the telephone companies would be the licensees for the base stations and have full responsibility for their operation.

There are a limited number of cases where there are two or more interconnected radio base stations which are an integral part of a private line network furnished by the telephone companies. (Of the 1400 customers mentioned above, only about 30 would fall in this category.) In these cases, customer service considerations may make it most desirable that the base stations be furnished by the telephone company.

In such cases, the telephone company is willing to provide the base stations, as a part of the network, on a common carrier basis utilizing a frequency allocated to the service involved but only where the customer requests and the Commission permits the telephone company to be the licensee for the frequency on which the base stations operate.

Also in these cases the customer would provide and maintain the mobile stations and be licensed for the frequencies used by the mobile transmitters.

The Bell Companies believe that the public mobile service they are now offering can be greatly improved and expanded and have a request for the allocation of the necessary radio frequencies pending before the Commission.

If the public mobile service develops as the Bell Companies hope and expect, the economical way to render some common carrier private line mobile services, with the most efficient use of the frequency spectrum, will be with base station facilities and frequencies which are used in common with base station facilities for public mobile service, just as common carrier point-to-point private line and public message services have made common use of facilities from the beginning of telephony.

It is our thought that the customer would be the licensee for, and would provide and maintain, the mobile radio equipment.

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18. MOBILE SERVICE AREAS AND CHANNELS

New channels have been placed in service as follows:

<u>Location</u>	<u>Channel</u>	<u>Date</u>
La Junta, Colo.	YJ	Feb. 10, 1959
Swan Hills, Alberta Canada (1)	YR	Feb. 25, 1959

Note: (1) Alberta Government Telephones

The following additions and changes should be made in the tabulation included in the February 13, 1959 RADIO NOTES.

<u>Location</u>	<u>Channel</u>	<u>Date</u>
Boston	JR	Nov. 1, 1958
Birmingham, Ala.	YR	Sept. 13, 1957
Seminole, Tex.	YR	Oct. 9, 1958
Snyder, Tex.	YR	Nov. 22, 1958

Q Band QH channels are in service in Detroit, Michigan. Delete JS channel shown for Jennings, La. The JL channel is in service at Greensboro, N.C. rather than YJ and the YJ channel is in service at Winston Salem, N.C. rather than JL.

19. RADIO INFORMATION

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

BSPM 655A	-	
BSPM 656	-	
BSPM 657	R00.030	Issue 3 - Alphabetical Index to General Letters and BSP's In The Radio Series
	AA367.049,	Issue 1 - Power Supply for TH Radio - Power Systems
BSPM 657A	-	
BSPM 658	-	
BSPM 658A	-	

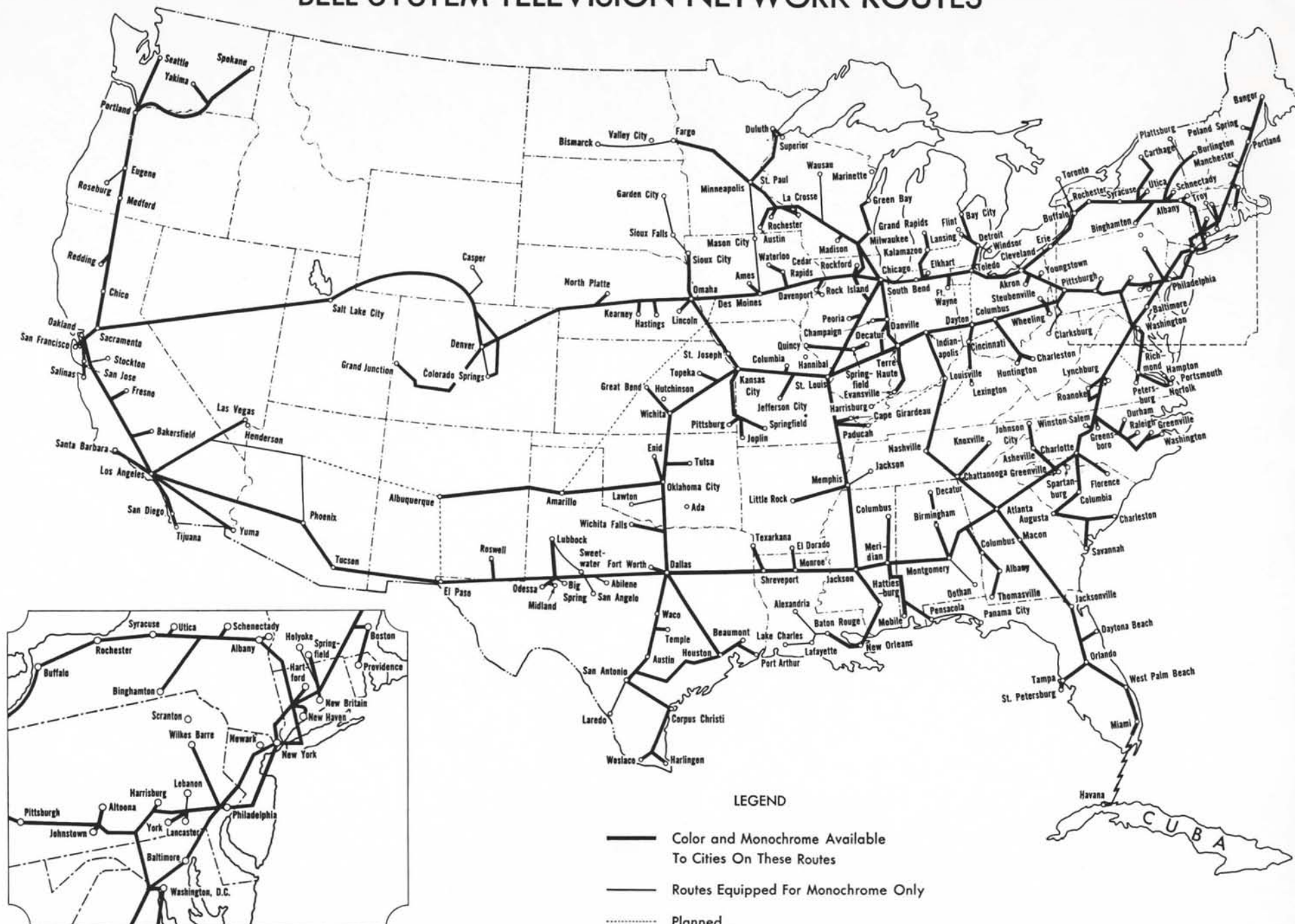
BSPM 659	R90.334,20, Issue 1 - TJ Radio System - Receiver Tests and Adjustments - General
	R90.334,22, Issue 1 - TJ Radio - Receiver Baseband Power Output, Frequency Characteristic, and Noise Quieting Measurements
	AA367.045, Issue 1 - DC Power Supply - For TH Radio Traveling Wave Tubes - Power Systems
	AA640.010, Issue 2 - Performance Requirements - Balanced Clamper - Television Systems
BSPM 659A	-
BSPM 660	-
P.E.L. 6397	Mobile Telephone Service - Transmission Lines and Fittings (1S3.4-129)
P.E.L. 6381	Television - Twenty-One Inch Color Monitor (1S3.7-97)
P.E.L. 6350	Mobile Radio Systems - Conversion Kits for Modifying Motorola Equipment for Narrow-Band Operation (1S3.9D-64)
P.E.L. 6416	FCC Rules - Amendment of Part 21 Regarding DPLM Base Station Antenna Height, Narrow-Band Operation and Other Details (1S4.1-202)
P.E.L. 6419	Mobile Telephone Service - 450-460 mc Base Station Equipment (1S3.9D-59)
P.E.L. 6424	Microwave Radio - New Forms E-4657, E-4658-A, E-4658-B for Microwave Path Testing (1S3.12-33)
P.E.L. 6423	Microwave Radiation - Safe Distance in Front of Certain Radar Antennas (1S3.10-3)
P.E.M. 6855	Modification of Motorola Microwave Equipment (1S3.9F-78)

Unnumbered Letter to Plant Managers

2-19-59	Radio Calls During A CONELRAD Alert (1S4.1-203)
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BELL SYSTEM TELEVISION NETWORK ROUTES



BELL SYSTEM OVERSEAS TELEPHONE SERVICE

