



RADIO NOTES

AMERICAN TELEPHONE AND TELEGRAPH COMPANY

VOLUME 16, No. 3

March 28, 1961

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Attached – Short Haul Microwave Summary

Printed in U.S.A.

BELL SYSTEM RESPONSE FILED IN FCC SPACE INQUIRY (DOCKET NO. 13522)

On February 28, the A.T.&T. Co. submitted a response to the FCC in Docket No. 13522, "An Inquiry Into the Allocation of Frequency Bands for Space Communications." This proceeding was instituted by the Commission to gather information on which to base the position of the United States at the meeting of the International Radio Consultative Committee (C.C.I.R.) in New Delhi, India in October 1962 and the Extraordinary Administrative Radio Conference proposed by the International Telecommunications Union for late 1963. The Commission inquiry requested statements on specific matters directed particularly at the needs of frequency bands for space communications.

The following lists a few of the more important matters covered in the response.

Bell Laboratories participation in Project Echo and experimental work now under way is reviewed and discussed. The experimental system now planned will use low altitude (2000 to 8000 miles) active satellites to demonstrate multi-channel telephone and television transmission and to provide information for design of commercial systems.

Factors limiting the usefulness of various portions of the radio spectrum for earth-space-earth communications are considered, with the conclusion that the most favorable frequencies lie between 1,000 and 10,000 mc.

The amount of frequency spectrum space required for broad band satellite systems handling large numbers of telephone circuits, high speed data and television signals are discussed.

The advantages of wide band modulation techniques are emphasized. By the use of a two-watt transmitter and a gain antenna in the satellite, it may prove possible to reduce the basic RF bandwidth per path from 100 mc, mentioned in original testimony, to about 40 mc. If this proves feasible it will be possible to fit additional working channels into the 2,000 mc of spectrum space previously proposed.

The need for a full frequency allocation for four broad band channels to provide a basis for planning full-fledged world-wide system is emphasized.

The response reaffirms the previous view of the Bell System that exclusive frequencies should be allocated for international satellite communication service, but states that in view of recent Commission action it is planned to proceed initially with operation on frequencies shared with the domestic common carrier service.

It points out the inadvisability of sharing the same frequency bands for Government and non-Government broad band space communication systems. However, the frequencies for auxiliary functions might be shared.

The location of terminal sites will depend upon further development and it is too early to decide how many and at what specific locations future terminals may be constructed.

Broad band satellite communication systems hold the promise of meeting requirements for international telephone and television service economically and reliably. The use of submarine cables is continuing and eventually microwave radio and cable will form complementary facilities to provide diversified service.

UNDERSTANDING BETWEEN F.C.C. AND NASA ON SPACE COMMUNICATIONS ACTIVITIES

NASA and the F.C.C. have issued a joint memorandum providing a basis for coordinating their activities in the application of space technology to civil communications.

The memorandum states that both agencies recognize that the use of satellites to expand and improve existing facilities for world-wide communications service is feasible.

They are concerned with the nation's total communications capabilities from the points of view of civil communications policy and the commercial utilization of space technology, and recognize the participation of common carriers and others in the development of space telecommunication technology through private expenditures.

The present usable radio spectrum for world-wide communications cannot support the increase in capacity necessary to satisfy new services (TV, data, etc.) or expansion of ordinary (voice) types of service.

The following guides for coordination were included.

The earliest practicable realization of a commercially operable communications satellite system makes concerted action by existing agencies of Government and private enterprise necessary.

Private enterprise should be encouraged to undertake development and utilization of satellite systems for public communications services.

There will be a full exchange of information between NASA and the FCC.

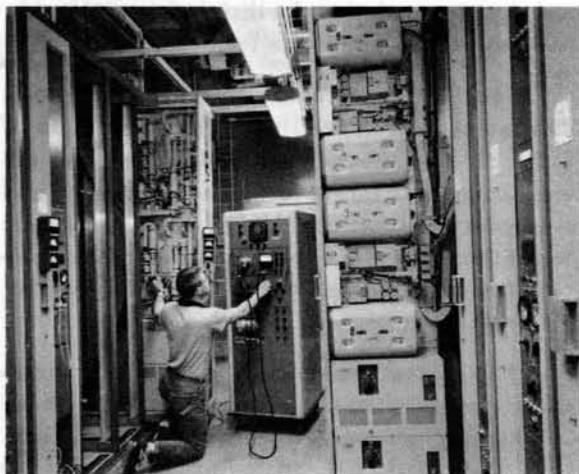
NASA will continue to direct its activities toward the advancement of space technology and its application to civil communication. The FCC will continue to direct its activities toward development of communication policy and implementation and utilization of space telecommunication technology through licensing and regulation of common carriers.

Both agencies will facilitate international cooperative activity in the field of space telecommunications.

Existing inter-agency organizations (such as those under the Interdepartmental Radio Advisory Committee) and procedures for coordination will be employed with respect to the allocation and assignment of frequencies necessary to support both research and development and the operational phases of a civil communication satellite system.

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COMMERCIAL SERVICE ON TH RADIO



INSTALLER USING RF TEST SET

The first section — Denver to Salt Lake City — of the new TH microwave radio system was put in commercial service on March 27. It consists of 15 sections totaling 477 miles in length. A total of five broadband channels are in service, one west-bound for television, one each way for telephone and one each way for protection. Although only a few hundred circuits will be carried initially, a fully equipped TH system with six two-way working channels is capable of carrying over 11,000 circuits.

The work of installing TH on other parts of the transcontinental route is proceeding rapidly. Approximate service dates for sections between Colesville, New Jersey and Norway, Illinois; Norway and Dodge City, Kansas and Dodge City and Denver are August 1961, December 1961 and March 1962. The final links — Colesville to New York City (new 10th Avenue building) and Salt Lake City to San Francisco (East Bay Hills) — of the transcontinental system are tentatively scheduled for 1963. All of the above mentioned TH installations are being built along TD-2 routes and will share common antennas and towers with the TD-2 equipment.



INSTALLER REPLACING TRAVELING WAVE TUBE

One of the two photographs shows a typical, though only partially complete, TH installation with two of the sliding racks pulled out for service. Each of the two racks contains two RF transmitters and the two high voltage power supplies which provide the +1200 and +2800 volts for the traveling wave tubes. The installer in the picture is using the RF test set to adjust one of the transmitters.

The other photograph shows an installer replacing a traveling wave tube in one of the amplifiers of an RF transmitter.

TL RADIO DEMAND

The first application of TL radio was described in the September 28, 1960 issue of RADIO NOTES. Since that date, a number of additional TL systems have been ordered. TL routes scheduled for service in 1961 are as follows:

Location	Service	Hops	Route Miles
Billings-Hardin, Montana	11- 1-61	4	48
Bellevue-Viburnum, Missouri	11-25-61	2	22
Conway-Harrison, Arkansas	12- 1-61	7	100
Reno-McClellan, Nevada	12-16-61	1	20

All of these are non-diversity systems using ON type carrier equipment. Orders have also been received for several TL systems for service in 1962. These include several frequency diversity systems.

The Western Electric plans to manufacture 100 TL bays for 1961 shipment. Seventy per cent of these are already committed. The remaining 30 per cent are available for fourth quarter shipment. It is a good idea to keep the local distributing houses advised of anticipated TL requirements to insure adequate and orderly programing of this new product.

OUT OF THIS WORLD TELEPHONE CALL

The experimental space communication station at Holmdel, N.J. was used recently to provide a one-way "moon bounce" telephone circuit. A call between Washington, D.C. and Seattle, Washington was made over the facility on February 21 as part of the ground-breaking ceremonies for the 1962 "Century 21" international exposition to be held in Seattle.

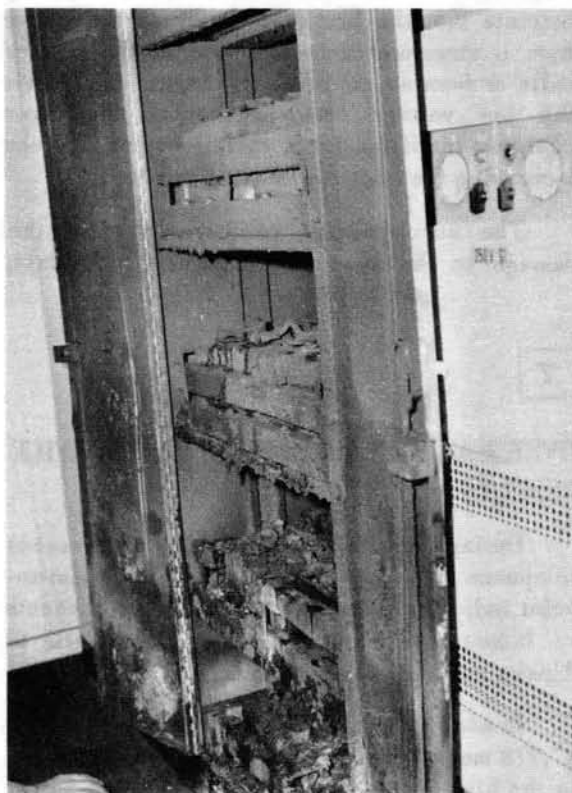
The 500,000-mile telephone call was initiated in Washington and was routed to Holmdel via land lines. At Holmdel the voice message was transmitted to the moon on 960 mc. The

reflected signal was received at the General Electric laboratory at Schenectady, N.Y., and traveled the rest of the way to Seattle over conventional telephone facilities.

The radio transmitting facilities used at Holmdel for this demonstration were the same as those used for the Project Echo experiment (10 kw transmitter, 60 ft. parabolic antenna). The G.E. facilities consisted of a 28 ft. parabolic antenna and parametric receiver. Single sideband modulation was employed. With these facilities and the type of modulation used, the "moon bounce" link provided a usable circuit, but one which was far below the quality of conventional long haul circuits.

FIRE IN NEVADA TD-2 RADIO RELAY STATION

Fire damaged a part of the 250-volt battery supply at the Hot Springs, Nevada, TD-2 microwave station early in February. Intense heat and a smoldering fire completely destroyed a 56-cell, 120-volt group of batteries mounted in a closed, vented cabinet. The cabinet and its internal wiring were severely damaged. Other equipment in the station was covered with soot; there was some evidence of damage due to smoke and acid fumes.



The first indication of trouble came with a low voltage alarm at 11:38 AM, followed shortly by intermittent low microwave power output alarms. Both message and video services were impaired. By 3:00 PM all services had returned to normal. This probably happened when a 250-volt feeder burned out, removing the damaged batteries and leaving the undamaged parallel string to carry the load. Maintenance men were unable to enter the building until about 3:45 PM because of the smoke and fumes.



The exact cause of the fire is unknown. Inspection of the charred batteries and wiring indicate that the fire could have started either from a structural defect in one of the battery cells or from an arc or short circuit. Apparently the low voltage condition caused the three charging rectifiers to go to full output, thereby increasing the amount of heat dissipated.

The accompanying photographs show the damage to the interior of the battery cabinet.

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OVERSEAS AND HIGH SEAS 1960 SERVICE RESULTS

During 1960, a total of 3,665,405 overseas telephone messages were handled by point-to-point radio facilities and cable. This represents an increase of about 20% over 1959. Calls to Alaska and Hawaii accounted for 917,223.

In addition to the above point-to-point totals, 47,778 messages were handled by radio to ships in the high seas service.

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STATUS OF 35 MC BELLBOY SYSTEMS

At the end of December 1960, there were a total of 1,442 customers served by thirteen 35 mc BELLBOY systems.

The following is a list of cities in which 35 mc service is offered.

Company	City	
New England	Boston, Mass.	
New York	Binghamton	} 1 system
	Endicott	
	Owego	
	Johnson City	
Pennsylvania	Allentown	} 1 system
	Bethlehem	
C. & P.-W. Va.	Charleston	} 1 system
	St. Albans	
	Dunbar	
	Belle	
Southern	Mobile, Ala.	
Ohio	Dayton	} 1 system
	Fairborn	
	Youngstown	
	Canton	
	Columbus	
Michigan	Grand Rapids	
Illinois	Springfield	
Southwestern	Houston	
Mountain States	Denver	

The following cities have 35 mc BELLBOY systems under construction.

Diamond State	Wilmington, Del.	
Indiana	Indianapolis	
Pacific	San Diego	
Northwestern	Omaha	} 1 system
	Council Bluffs	

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RADIO NOTES Mailing List

RADIO NOTES is at present being distributed to over 2,000 Bell System people. Last

month we ran out of copies due to the continually rising demand for this publication. The frequent changes in organization throughout the System present a problem in keeping the mailing list up to date. We need your help on this. Therefore, we would like to hear from those of you who are incorrectly addressed or are receiving more copies than needed. For any such changes in title, address or number of copies received, please either write or call:

Alice Boyne (EX 3-3926) or
Fran Arnone (EX 3-3466)

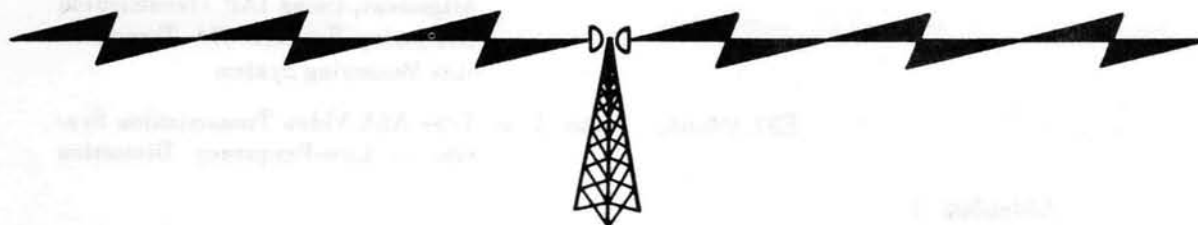
American Telephone and Telegraph Company
195 Broadway, New York 7, New York

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ORGANIZATION CHANGE

Kenneth C. Thomson, Jr., Supervising Engineer in the Customer Equipment organization of the New York Telephone Company in Utica joined the Mobile Radio Group on March 20. Ken will be working primarily on a program of general mobile telephone service improvement. He can be reached on EXeter 3-3029.

Midge Brown of the Radio Frequency Group became Mrs. Robert Gorman on February 11.



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RADIO INFORMATION

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

BSPM 755	E37.430.00, Issue 6	Type A2A Video Transmission System.
	E37.430.12, Issue 5	Type A2A Video Transmission System - Routine Tests - Transmitting Terminals
	E37.430.14, Issue 5	Type A2A Video Transmission System - Routine Tests - Receiving Terminals
	E37.430.23, Issue 4	Type A2A Video Transmission System - Terminal Tests and Adjustments - Receiving Terminals
	E37.430.31, Issue 5	Type A2A Video Transmission System - Over-All Channel Level Check
	E37.430.32, Issue 5	Type A2A Video Transmission System - Over-All Channel Alignment - Using 1AP Transmission Comparing Set
	E37.430.33, Issue 2	Type A2A Video Transmission System - Over-All Channel Alignment - Using 38A Transmission Measuring Sets

- E37.430.50, Issue 3 - Type A2A Video Transmission System - Associated Tests and Adjustments
- E37.430.51, Issue 3 - Type A2A Video Transmission System - Associated Tests and Adjustments - Differential Phase and Gain Test
- E37.430.56, Issue 1 - Type A2A Video Transmission System - A2A-TOC Test Trunks: Alignment, Using 38A Transmission Measuring Sets and 47A Transmission Measuring System
- E37.430.57, Issue 1 - Type A2A Video Transmission System - A2A-TOC Test Trunks: Alignment, Using 1AP Transmission Comparing Set and 47A Transmission Measuring System
- E37.430.64, Issue 1 - Type A2A Video Transmission System - Low-Frequency Distortion

Addendum 1

- AA636.758, Issue 1 - Performance Requirements - TH Radio Microwave Carrier Supply - Toll Systems
- BSPM 755B -
- ~~BSPM 756~~ R90.314.11, Issue 2 - J68331A Transmitter-Receiver Bay (TD-2 Radio System) Common Considerations, Tests and Procedures
- BSPM 756B 357-035-500, Issue 1 - Branching Arrangements at TD-2 Radio Junction Points - Adjustments and Gain-Frequency Line-Up Tests

CANCELLED SECTIONS

- 358-120-500, Issue 1 - Type A Wire Line Entrance Link for Interconnection of TD-2 Radio and L1 Carrier Facilities
- 358-120-501, Issue 1 - Type B Wire Line Entrance Link for Interconnection of TD-2 Radio and L1 Carrier Facilities
- BSPM 757 E47.430, Issue 4 - Type A2A Video Transmission System
- R00.030, Issue 7 - Alphabetical Index to General Letters and BSP's in the Radio Series
- BSPM 757A -
- BSPM 757B -
- BSPM 758 R90.335.05, Issue 2 - TJ Radio System - Receiver
- BSPM 758B -

BSPM 759	—
BSPM 759A	—
BSPM 759B	—
P.E.L. 6711	Correction Letter (dated Feb. 17, 1961) Television — Modification of 1B Clamper Amplifiers to Prevent Oscillation
P.E.L. 6806	Mobile Telephone Service — AC spark Plug Division, General Motors Corporation Mobile Radio Equipment 144-174 mc (1S3.9D-76)
P.E.L. 6811	Amendment of Part 21 of F.C.C. Rules to Eliminate Type Acceptance Requirement for Transmitters in the 890-940 mc Band (1S4.1-234)
P.E.L. 6815	F.C.C. Rules — Amendment of Part 21 to Reserve Frequencies for Public Air-Ground Radiotelephone Service (1S4.1-235)
P.E.L. 6815	Correction Letter (dated Mar. 10, 1961)
P.E.L. 6823	Frequency Bands for Space Communications (F.C.C. Docket No. 13522)
P.E.M. 7476	Lighting for B Guyed and B Self-Supporting Tower — Descriptions AT-7871 Issue 1, and AT-7872 Issue 1

Unnumbered Letter to Operating Vice Presidents

2-16-61	Educational Television
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