



# RADIO NOTES

AMERICAN TELEPHONE AND TELEGRAPH COMPANY

Volume 15, No. 5

May 24, 1960

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Attached - Map of Mobile Telephone Service

- Map of Western Union Radio Relay Expansion Program

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## 1. TOP SIX 450 MC CHANNELS FOR AIR-GROUND

In planning a nationwide public air-ground radiotelephone service it appears that a minimum of six channels will be required to provide complete coverage and at the same time avoid interference. The F.C.C. has ordered that this air-to-ground service should be furnished on the same frequencies (454.40-455 mc and 459.40-460 mc) presently allocated for Domestic Public Land Mobile and Rural Radio Services.

Currently, service is being provided in the Chicago-Detroit areas using the QM and QX channels. During August, ground stations will be added at Pittsburgh, Washington and Newark which will make the service available along a 200 mile corridor from 100 miles west of Chicago to New York City. Additional channels will be required early next year when 450 mc airborne sets become available in quantity and the demand for service grows.

In view of the above requirements and the fact that frequency sharing between land and air service is impractical, the F.C.C. staff has put an informal "HOLD" on the top six channels (454.70-454.95 mc and 459.70-459.95 mc) in the 450 mc band and intends to reserve these channels for the public air-ground radiotelephone service. It is felt that an immediate hold on these channels will minimize reassignment problems when the rules governing this service are finalized.

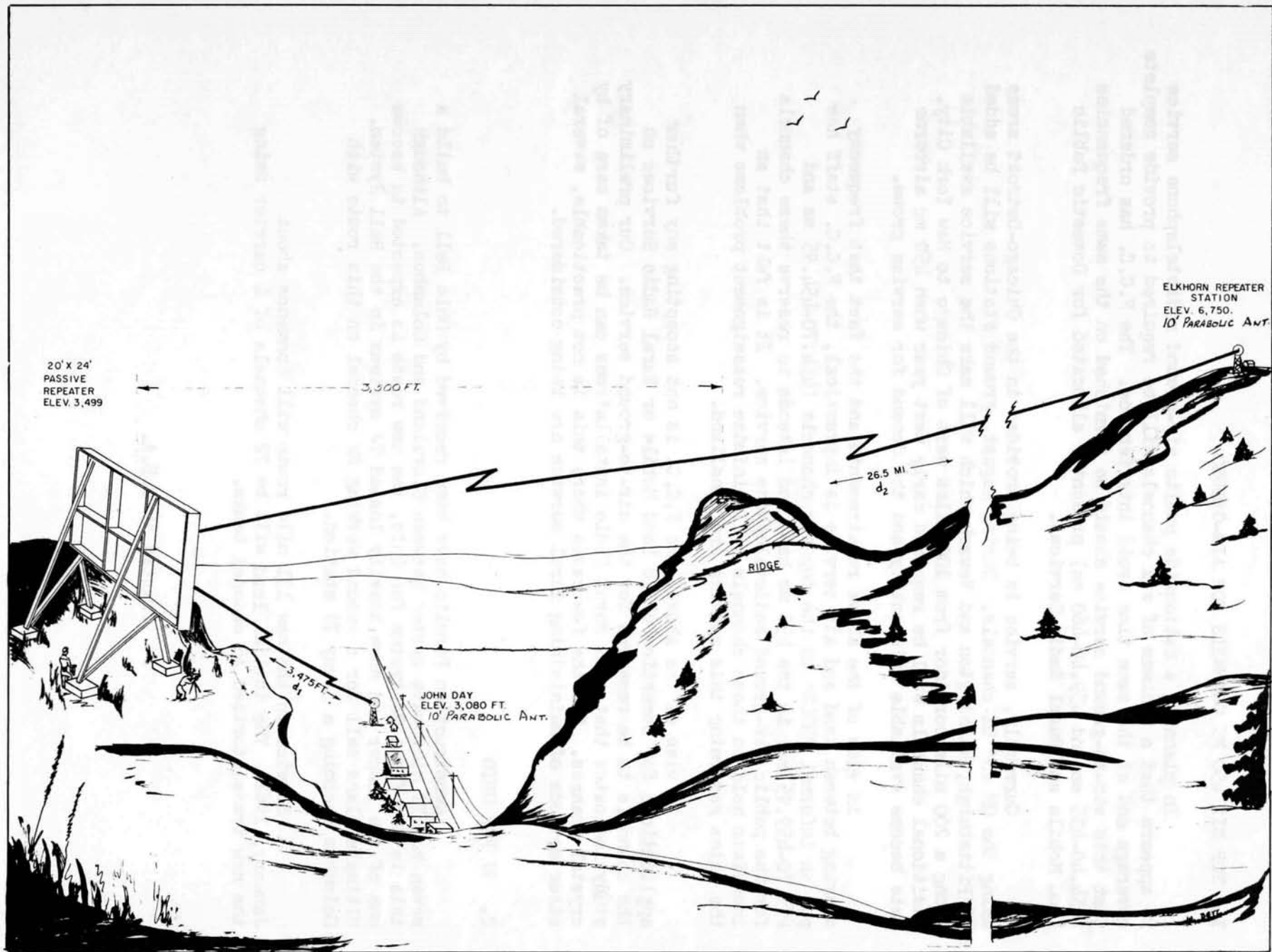
In view of the above, the F.C.C. is not accepting any further applications for Domestic Public Land Mobile or Rural Radio Services on the channels to be reserved for the air-to-ground service. Our preliminary study indicates that most Rural Radio installations can be taken care of by crystal changes. For the few cases where this is not practicable, several other methods of maintaining rural service are being considered.

## 2. TJ FOR OHIO

Construction Permits have been received by Ohio Bell to build a seven hop TJ microwave system between Cleveland and Columbus. Although this is the first TJ system for Ohio, the new route is expected to become one of the longer and more heavily loaded TJ systems in the Bell System. Ultimate plans call for a second working RF channel on this route with Columbus becoming a 3-way TJ station.

Service on the new 131 mile route will commence about January, 1961. The initial load will be 72 channels of L carrier using the new transistorized A5 channel banks.

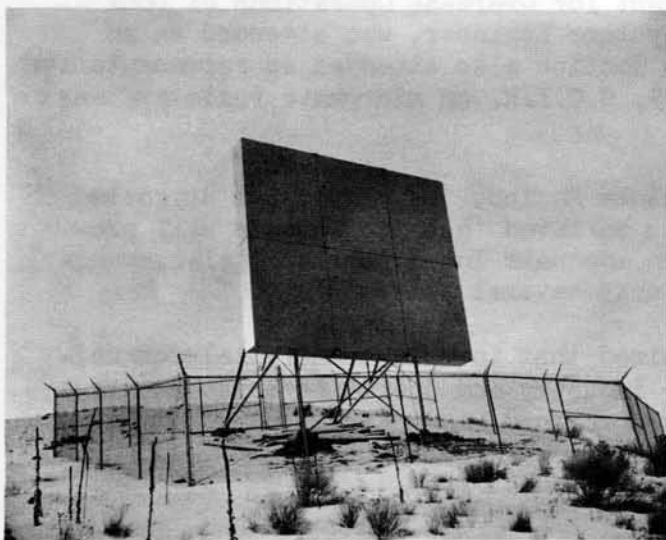
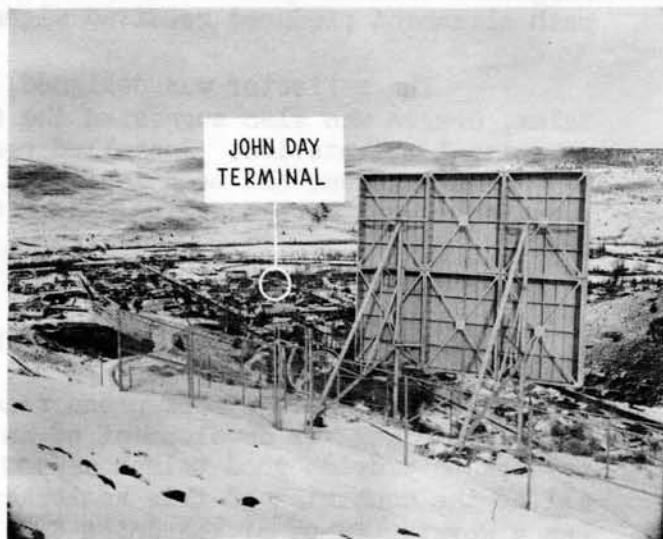
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### 3. OREGON PASSIVE REPEATER

During the week of March 21-25 Pacific Telephone - Northwest, Oregon Area successfully aligned a 20 x 24 foot passive repeater on their TJ microwave path between John Day and a repeater station called Eklhorn, (RADIO NOTES, March 19, 1959). Several passive repeaters are currently being used on microwave routes carrying television services. One such repeater in Massachusetts used parabolic antennas mounted back-to-back described in the April 20, 1959 issue of RADIO NOTES. Another in Maryland used a pair of standard 6 x 8 reflectors to make a passive repeater element as described in the March 25, 1960

issue of RADIO NOTES. The new "billboard" type passive repeater at John Day is the first of this type to be placed in Bell System service. The attached artist's sketch shows the overall system layout. One photograph views the reflector overlooking the town of John Day. The other view shows the reflective face.



When the radio equipment was first energized and the initial path lineup was attempted via the passive repeater, received signal levels could be brought within about 12 db of calculated by adjustment of the ten foot dish antennas at each end of the path. This was made possible by careful advanced planning of the billboard orientation and good optical alignment methods prior to actual radio path tests. With this experience behind them, the Oregon Engineering people believe that even better results could be obtained in the future - to within about 6 db of calculated prior to aligning the billboard on radio signals. Later tests showed that such a billboard must be initially installed to less than one half of a degree in azimuth and elevation to

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achieve this accuracy. The passive repeater foundation survey and optical alignment work was performed by Telephone Company engineers. Final electrical path alignment produced received signal levels within 1 db of calculated.

The reflector was designed, fabricated and erected by a company in Salem, Oregon who also suggested the optical alignment method which was used in initial orientation. Installed cost of the passive repeater was about \$7500. A recorder has been installed at the John Day terminal to record received signal levels during months when variations are most likely to occur.

#### 4. INTER-AMERICAN TELECOMMUNICATION NETWORK

Two meetings took place recently in Mexico City to discuss and formulate plans for development of an international telecommunication network to provide good telephone and other communication services between all of the countries of this hemisphere. One meeting, from April 19-26 was a Working Party of the Joint C.C.I.R.-C.C.I.T.T. (International Radio and International Telegraph and Telephone Consultative Committees) Plan Committee on Development of the International Telecommunication Network, in accordance with a directive from the ITU (International Telecommunication Union) Plenipotentiary Conference, Geneva, 1959 to extend its activities to Latin-America. The other was a Meeting of Experts on the Inter-American Telecommunication Network, April 19-May 6, under the auspices of the Organization of American States.

The A.T. & T. Company was represented at both meetings by Mr. C. C. Duncan, Assistant Vice President for Overseas Operations of Long Lines and Mr. W. E. Bloecker, Carrier Systems Engineer, who attended as an observer. Mr. E. W. Bemis of the Radio Section also attended as representative of the U. S. Committee for Study Group 9, C.C.I.R. on microwave radio systems of which he is chairman.

Starting with a draft proposal by Mexico, the conference suggested various changes and additions, and it is believed that the results will provide a sound basis on which growth of an adequate Inter-American telecommunication network can take place over the next several years.

The U. S. position was emphasized that in this country telecommunication services are operated by private industry and operating arrangements will be made with the private companies concerned.

## 5. WESTERN UNION FILES FOR C.P.

Western Union has applied for nine microwave station Construction Permits to cover a 240 mile route in California between Vandenburg A.F.B. and Sunnyvale (RADIO NOTES, January 26, 1960). The initial installation includes two northbound video channels using RCA television relay equipment and one Collins frequency diversity message system. This new system parallels the Pacific Company, San Francisco-Los Angeles TD-2 route and utilizes TH frequency assignments. This section is scheduled for service in October 1960. It will connect to Western Union's \$40,000,000 transcontinental microwave system which is expected to be in service by October 1961.

Western Union and their contractor, Microwave Services, Inc., have been working closely with the Pacific Company in California, and appear to have done a good job of route layout to avoid interference with other microwave systems.

The map attached to this issue of RADIO NOTES shows the approximate route that Western Union's cross-country system will follow. We understand that site selection is now in progress in parts of the midwest.

P.E.L. 6606 provides information about Western Union's plans and the Telephone Company representatives who have been designated to coordinate possible interference situations in their respective areas.

## 6. MOBILE TOWER USED TO SELECT MOBILE BASE SITES

Illinois Bell people, Suburban Area, are in the process of selecting sites for a ring of 150 mc base stations 30 to 40 miles from Chicago, to expand mobile service in a number of communities. Coverage requirements are well defined and care is being taken to avoid field intensities which would result in co-channel interference.

Accurate information on the coverage capabilities of possible station sites is being investigated by making tests with facilities which very closely simulate the projected stations. This is made possible by use of mobile microwave tower and operations trucks which were developed for TV pick-up work (RADIO NOTES, October 12, 1956). The tower truck is used to support test antennas at the height and position of the proposed permanent antenna. The operations truck houses radio equipment and, in locations where



View of antenna mounted on tower.



A farm driveway was used as one test site.

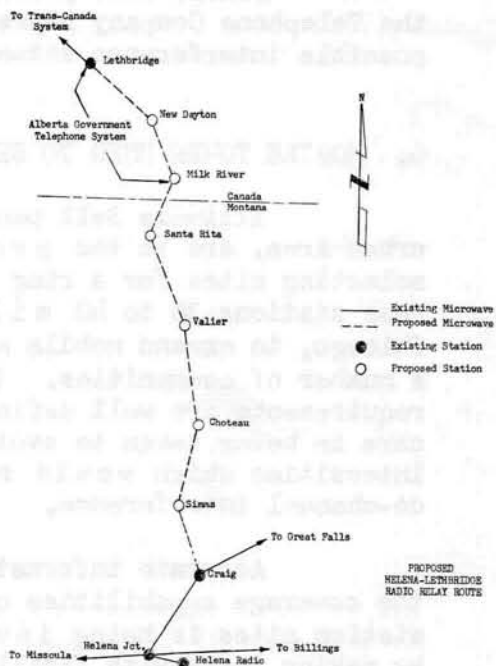
commercial power is unavailable, supplies power from an alternator driven by the truck engine. One photo below shows two trucks at a test site, and the other shows test antennas elevated on the hydraulically operated tower.

With a suitably equipped mobile unit, 2-way coverage from each site of interest can be determined with a minimum of preparatory effort. Of equal importance is the fact that information obtained is highly significant, since it includes actual propagation, noise and interference conditions at the site.

## 7. NEW INTERNATIONAL TD-2 CONNECTION

Another TD-2 route crossing the Canadian border is being engineered by Long Lines between Helena, Montana, and Lethbridge, Alberta. This section will be about 250 miles in length and will provide a connection between the northern transcontinental TD-2 route and the Trans-Canada system. Other Canadian TD-2 crossings currently in service connect with: (1) St. George (2) Montreal (3) Toronto (4) Winnipeg (5) Vancouver.

Initially, two channels in each direction will be provided for telephone circuits to supplement the existing open wire line and associated C and J carrier circuits. Construction permit applications have been filed for the United States portion of this project. Alberta Government Telephones will handle the Canadian section.



## 8. F.C.C. RELAXES OPERATOR RULES

In a recent Report and Order, the F.C.C. relaxed its operator requirements for Public Mobile and certain Fixed Stations in the Domestic Public Land Mobile Radio Services (Part 21) which operate on frequencies above 30 megacycles. Provision was also made for similar relaxation in the Telephone Maintenance Radio Service.

In brief, no operator license is required for:

1. A mobile station, when communicating with or through a base station in the Telephone Maintenance or the Domestic Public Land Mobile Radio Service.
2. A rural subscriber or mobile station in the Rural Radio Service.
3. Central office stations, inter-office stations, auxiliary test stations, and base stations, including radio control stations, which may be associated therewith.

The Companies have been advised of the above in P.E.L. 6651 dated April 29, 1960 where it was pointed out that the relaxation is based upon the use of radio equipments which require no adjustments during operation and that any transmitter adjustments servicing or maintenance is made under the immediate supervision and responsibility of a person holding a first or second class radio license. The station licensee continues to be responsible for operational control and the proper functioning of radio stations in accordance with the terms of the license and applicable rules of the F.C.C.

## 9. RTCM SPRING ASSEMBLY IN WASHINGTON, D.C.

The Spring Assembly of the Radio Technical Commission for Marine Services was held in Washington, D. C. from April 11-13. Approximately 150 government and industry people interested in maritime communications registered for this three day event. The technical sessions featured papers covering maritime aspects of the recent 1959 international conferences and the Safety of Life at Sea Convention now being held in London.

The Assembly was opened by a business meeting under the chairmanship of Commodore E. M. Webster. Afterward, separate panels of speakers and discussions covered three major items. The first panel involved the effects on marine radio services of the 1959 international conferences held at Los Angeles and Geneva. The second panel covered the relationship to marine radio services of the International Aviation and Maritime Organizations (I.C.A.O. and I.M.C.O.). The final panel was entitled "Recent Domestic Developments of Interest to the Marine Radio Services." These technical sessions were moderated by prominent members of the marine industry and the F.C.C. The final day was spent on a guided tour of the U.S. Naval Communications Station at Cheltenham, Maryland, and the communications facilities of Andrews Air Force Base.

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Chesapeake and Potomac Company people served important roles on the Assembly arrangement committees. Among those attending from the Bell System were representatives of the Illinois, Michigan and C. & P. Companies as well as the Bell Telephone Laboratories and the Radio Section of A.T.&T.

#### 10. SPLIT CHANNEL URBAN SYSTEM IN BOSTON

In order to obtain state wide coverage on four mobile service channels the New England Company recently found it necessary to convert one wide band channel to a narrow band split channel in Boston, Massachusetts. With this change, the Boston Urban system consists of three so called "wide band" channels, JL (152.51 mc), YJ (152.63 mc) and YR (152.75 mc) and the new narrow band JK (152.78 mc). While the latter two channels are separated in frequency by only 30 kc, the base stations are separated geographically by about 12 miles.

The newly converted channel was formerly JR operating on 152.81 mc. At the time of conversion, all units on this channel had both transmitters and receivers modified to operate narrow band. At the same time, the neighboring channel, YR, was equipped with narrow band base receivers. Then the base station modulation on all three wide band channels was reduced to  $\pm 9$  kc. No changes were made in mobile units on the JL, YJ and YR channels.

Coverage tests have indicated to the New England Plant and Engineering people that there is no appreciable loss in coverage. Some 40 customers were using the channel during the cutover period and did not report any inconvenience. To date there is no record of mutual interference between the two adjacent channels and operation is considered to be satisfactory.

#### 11. ORGANIZATION CHANGES

Effective April 15, 1960, Mr. J. H. Felker was appointed Assistant Chief Engineer heading the Engineering B division here at 195. He succeeds Mr. W. K. MacAdam recently elected Vice President. Mr. Felker has been Transmission Engineer at 195 since August 1, 1959.

Those members of the Radio Section who were on the 17th floor at 195 now occupy their temporary quarters on the 12th floor. The new location is in the southwest corner of the building 5 floors directly below the former location. Telephone numbers remain the same. The groups working on practices and located at Dey Street remain at their present location.

## 12. RADIO INFORMATION

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

|             |                                                                                                                                         |                                                                                                                      |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| BSPM 714    | ROO.010,                                                                                                                                | Issue 13 - Numerical Index and Checking List                                                                         |
|             | AA636.759,                                                                                                                              | Issue 1 - Performance Requirements - TH Radio<br>Broadband Channel Radio Receiver -<br>Toll Systems                  |
| BSPM 714A   | -                                                                                                                                       |                                                                                                                      |
| BSPM 715    | -                                                                                                                                       |                                                                                                                      |
| BSPM 715A   | -                                                                                                                                       |                                                                                                                      |
| BSPM 716    | R60.524.1,<br>E37.421.1,                                                                                                                | Issue 2 - Television - KS-15654, List 2,<br>Video Monitor                                                            |
|             | AA636.733,                                                                                                                              | Issue 7 - Performance Requirements - TD-2<br>Transmitter-Receiver Bay Tested<br>with J68340A Test Bay - Toll Systems |
| BSPM 716A   | -                                                                                                                                       |                                                                                                                      |
| BSPM 716B   | -                                                                                                                                       |                                                                                                                      |
| BSPM 717    | AA636.760,                                                                                                                              | Issue 1 - Performance Requirements - TH Radio<br>Broadband Radio Transmitter - Toll<br>Systems                       |
| BSPM 717A   | -                                                                                                                                       |                                                                                                                      |
| BSPM 718    | AA266.027,                                                                                                                              | Issue 6 - TD Radio - IF, Microwave, and Control<br>Units - Toll Systems                                              |
|             | AA266.039,                                                                                                                              | Issue 3 - TD Radio - Transmitter-Receiver Test<br>Set - Toll Systems                                                 |
|             | Appendix 1                                                                                                                              |                                                                                                                      |
|             | AA268.809,                                                                                                                              | Issue 7 - Cl Alarm and Control System - Toll<br>Systems                                                              |
| P.E.L. 6651 | F.C.C. Rules and Regulations - Relaxation of Operator<br>Requirements for Public Mobile and Certain Fixed Radio<br>Stations (1S4.1-226) |                                                                                                                      |

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P.E.L. 6652 F.C.C. Equipment List, Part C (1S4.1-225)

P.E.L. 6656 Mobile Telephone Service - Narrow Band Operation  
(1S3.9D-72)

P.E.M. 7188 Telephone Maintenance Radio Service - Terminating on  
Official PBX (1S1.11-3)

P.E.M. 7190 Power Systems - Modification of the J86232A and J86233A  
Rectifiers to Improve "Hot Switching" Performance in  
LDR1 Radio Receivers

P.E.M. 7205 Mobile Telephone Service - Application of Resonant  
Cavity Filters (1S3.3-43)

P.E.M. 7206 TJ Radio System - Regional Repair Centers (1S3.9J-15)

P.E.M. 7207 Bellboy Personal Signaling Service Changes and Additions  
in 35 mc Equipment Ordering Information (1S3.9M-13)

P.E.M. 7208 Mobile Telephone Service - Leather Carrying Case for  
Jones 711N and 700 Series MicroMatch Wattmeters (1S3.7-104)

Unnumbered Letter to Chief Engineers

4-18-60 Tower Failure

Unnumbered Letters to Plant Supervisors

3-31-60 Mobile Service Trouble Summary

4-11-60 Mobile Radio Cost Results Summary

Unnumbered Letter to Certain Transmission Engineers

3-30-60 Bellboy Personal Signaling Service - System Line-up  
Preliminary Information (1S3.9M-12)

# MOBILE TELEPHONE SERVICE FOR LAND VEHICLES BELL TELEPHONE COMPANIES



TRANS - CONTINENTAL ROUTE  
RADIO RELAY EXPANSION PROGRAM  
THE WESTERN UNION TELEGRAPH COMPANY

