



Radio Notes

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FREQUENCY ALLOCATIONS - 25 TO 890 MEGACYCLES

RADIO AND GUIDED WAVES SECTION

Effective April 16, 1966, a number of changes were made in the organization of the Engineering "B" Division of the Engineering Department in order to place particular emphasis on forward planning in all areas and to give increased attention to the development and engineering of exchange area facilities.

The Radio Section became the Radio and Guided Waves Section and includes responsibility for guided wave transmission systems, including coaxial cable, submarine cable and future waveguide systems, and broadband multiplex terminals. This will facilitate joint planning and engineering of all systems for long-haul transmission.

The new assignments follow.

H. E. Weppler, Engineering Director – Radio and Guided Waves

R. C. Harris, Engineering Manager – Microwave and Guided Wave Planning

Includes planning for future transmission systems for the long-haul network, including microwave radio and satellite systems, and coaxial cable and other guided wave systems.

G. G. Ericson, Engineering Manager – Microwave and Guided Wave Systems

Includes current system coordination on microwave radio and guided wave systems, including broad band multiplex terminals.

P. B. Engh, Engineering Manager – Mobile and Special Radio Systems

Includes mobile radio systems, including vehicular, air-ground and hand-carried. Also, maritime service, high frequency overseas radio and VHF/UHF point-to-point systems.

J. B. Keane, Engineering Manager – Radio Frequency Coordination

Includes frequency allocations and FCC liaison. Also, radio frequency interference and radiation matters, and functions common to the entire section.

PROPOSED DOMESTIC COMMUNICATIONS SATELLITE SYSTEM

In a letter to James McCormack, Chairman of the Board of Comsat, Mr. Wingert, A.T. & T. Vice President, urged early discussions directed toward deployment of a large-capacity satellite for use in long haul domestic communications of all types. Mr. Wingert said, "We envision a plan to use at least one large-capacity synchronous satellite with appropriate standby, purely for domestic service, to supplement our interstate cable and microwave facilities."

He stated that it was especially important that the earth stations needed for the service be owned and operated by the domestic communications carriers involved because of the high degree of coordination required between terrestrial and satellite facilities. He added that such coordination could involve the probability of assigning circuits to satellite facilities in one direction and terrestrial facilities in the other direction in an effort to reduce the transmission impairments of round-trip delay and consequent echo effects. "... we would propose that Comsat launch and own the satellites for which we would assume the responsibility for the carrying charges including a fair return on Comsat's investment and equitable access to other domestic common carriers upon their bearing their share of Comsat's charges."

Dr. J. V. Charyk, President of Comsat, replied to Mr. Wingert on April 5, suggesting individual meetings during the week of April 18th with representatives of the A.T. & T. and Western Union, to explore the use of commercial satellites to meet United States domestic communications requirements.

In his letter Dr. Charyk said, "We view earth stations as an integral and critical part of a satellite communication system which must be planned and operated in concert with the space segment. Accordingly, we feel that this responsibility must be reflected in ownership."

TORNADO IN MISSISSIPPI

Raymond radio relay tower, the first tower west of Jackson, Miss. on the Long Lines Jackson-Vicksburg TD-2 route, was destroyed by a tornado at 5:23 p.m., EST on March 3. Only 75 ft. of the 285-foot tower was left standing. Six broadband message channels and seven television channels were interrupted. 3,600 voice circuits were affected including seven selected circuits.

The selected circuits were restored between 5:30 p.m. and 5:51 p.m. The first broadband message channel was rerouted at 6:05 p.m. and all broadband message channels were made good by 8:19 p.m.

Heavy sender delays were experienced at Jackson and some delays were experienced at the Rockdale, Ga. regional center during the evening period. Control measures were implemented to favor traffic originating in the affected area. Operators were instructed to make only one attempt to complete calls into the affected area. Traffic was heavy the next morning into the disaster area and network controls were applied as required.

Emergency restoration vans including TD-2 equipment and temporary towers were dispatched from Meridian, Miss. and Adams, Tex., as soon as the damage was assessed. Thirty-seven people, including one construction crew, were at the site at 11:30 p.m., March 3. Preparations for erection of the tower were made during the night and the tower erection was begun shortly after daybreak, March 4. By 8:00 p.m. Sunday, all services except television were switched to the new facility. Television facilities were cut over after the close of the broadcast day.

Southern Bell reported that approximately 5,500 stations went out of service, but no communities were isolated due to the tornado. All stations were back in service Sunday, March 6.

PROPOSED ANTENNA STRUCTURE RULES CHANGES

The FCC has issued notice under Docket 16474 of proposed changes in Part 17 of their Rules covering the construction, marking and lighting of antenna structures with the objectives of (a) more expeditious handling of antenna structure applications by decreasing the number of site location errors, and (b) incorporating changes in the Rules to make them more consistent with FAA regulations.

No radical changes in the Rules relating to FAA procedures are being proposed. However, the FCC proposes to add a requirement that only engineers or surveyors, either registered or licensed, shall prepare the technical data, including maps, and certify as to accuracy. This requirement, although aimed primarily at non-Bell Companies, would add a burden to application preparation.

Bell System comments forwarded to the FCC expressed the opinion that technically qualified people could satisfactorily do the work and that the preparation and processing of applications could be expedited by the elimination of duplication of antenna structure data shown on FCC Forms 401A and 714. The modification of Form 401 to show additional data would permit the elimination of Forms 401A and 714 and thus reduce the time required for preparing applications as well as the risk of clerical error.

In this connection, we at 195 have had a number of discussions with the FCC staff on applications having site location errors, usually of two types. One of these types is where the geographic coordinates were specified on the basis of inaccurate preliminary information. The second type is where separate applications filed by an Associated Company and by the Long Lines Department cover the same antenna location but list different coordinates in locating the antenna.

It is to our advantage to avoid these errors whenever possible in order to avoid unnecessary work on the part of the FCC and the Bell System.

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TL-2 RECEIVER INPUT POWER TESTS

The conversion factor, stamped on the body of J99296AA, List 2 modulator-preamplifiers in TL-2 receivers, is used in a different manner than with List 1 units for determining receiver input power. Issue 2 of BSP 409-406-503 has been written to cover this change; however, it will be several weeks before this section will reach the field. Since some of the first List 2 units are currently being installed, there may be some confusion as to how to apply the new conversion factor.

As stated in PEM 9626, "List 2 modulator-preamplifiers have a conversion factor stamped on the unit which can be used to relate IF test power applied to the monitor jack to the received signal power at the modulator input." For example: if a -10 dbm IF power applied at the monitor jack produces a normal AGC meter indication, and the conversion factor is stamped 30 db, the received RF input power would be $(-10) + (-30)$ or -40 dbm. Remember, for this test the normal 11 Gc/s input signal must be removed by killing the head end transmitter carrier or detuning the receiver beat oscillator.

In the approximate method for finding the receiver input power, an 11.3 db monitor circuit loss should be assumed to determine the modulator-preamplifier unit gain. If the conversion factor is stamped 30 db, the unit gain would be $30 - 11.3$ or 18.7 db. Therefore, if the AGC meter indication chart shows a -25 dbm input power to the IF and baseband unit, the RF input power would be $(-25) + (-18.7)$ or -43.7 dbm.

Incidentally, in PEM 9626 there is a change on Page 3, Table A concerning the ordering of modification kits for List 2 units. In Table A L60 and 61 should be substituted for L58 and L59 respectively.

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WHERE'S MK?

The March 1965 issue of RADIO NOTES announced the beginning of a Bell Laboratories development aimed at providing IMTS type mobile service on the six 450 Mc/s channels. Since then the FCC has requested the Land Mobile Advisory Committee to investigate and make recommendations on narrowing of the 450 Mc/s common carrier channels. The LMCA recommendations are expected later this year. We expect that additional channels will result. The Bell Laboratories have been forced to delay their planning. Channel bandwidth and number of channels are major system parameters. These must be pinned down before our development can proceed.

We are hopeful that the new FCC standards will be known by the end of the year. MK equipment should be available eighteen months after the FCC sets the standards.

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"OLD DOGS" CAN BITE BACK

Many of the Operating Companies are replacing older tube-type mobile sets with the KS-specification MJ mobiles. It is quite natural to attempt to recoup as much salvage as possible from the older units. However, resale usually winds up with the sets coming back as customer-owned units to haunt us for years to come. In many cases the owners of these older mobile units refuse to modernize and become real burdens when converting to MJ type operation. We wonder if the small fraction of the original cost obtained from resale is really worth the penalties paid.

8

R SERIES CONVERSION COMPLETES - FINAL RELEASE TO BE IN TWO PARTS

The final conversion of the R Series to the Plant Series, as announced in PEM 9487 and

modified by PEM 9537, is about to be completed. The new plant sections will be released in two groups. The first group, consisting of practices on administration, Coastal Harbor, Overseas, High Seas, Emergency Point-to-Point, Federal and REL Microwave Radio, and one section on Radio Engineering (Divisions 400, 403, 408 and 940) has been assigned to BSPM 1007 and is scheduled for release May 9, 1966. The second, and last, group covering Manual Mobile Radio (Division 404) is tentatively set for release early in June. The R List, canceling all of the remaining R Series practices, will be issued simultaneously with the second group of plant practices.

One section to be released in the first group was not listed in the attachments to either PEM covering the conversion. This is Section 940-200-109 (formerly R90.910) on engineering multi-channel mobile radio systems. Offices now on standing order for Division 940 or Division Layer 940-2 will, of course, receive this section automatically. Others who wish it should place a regular or standing order.

The "R Series to Plant Series" cross-reference list (400-020-014) is being updated to reflect the final conversion and will be released with the first group. Ordinarily, when an alphabetical series is completely converted, the appropriate cross-reference list is relocated in Division 000 as Section 000-020-ZZZ. During the conversion, when the list may be revised a number of times, it is printed in an appropriate division within the block assigned to the particular alphabetical series (Division 400 in our case). This is done to minimize printing quantities during the period of change.

For example, current orders for Division 000 exceed 80,000 while we print about 5,000 for each "400" or "radio" BSP. Experience has shown, unfortunately, that occasional numerical errors do creep into the cross-reference list. We have also observed that any such errors are usually noted within one or two months after release. We have decided, therefore, to delay moving the cross-reference list to Division 000 for four or five months. During this time, we would greatly appreciate your letting us know of any errors you discover by calling Mr. J. B. Fitch on Area Code 212 - 393-2946.

One final word about the conversion - and that word is "Manuals." Four of the R Sections to be converted now have manufacturers' manuals attached to them. These manuals should be transferred to the replacing Plant Sections. All are out of stock in the Western Electric Company and are very likely unobtainable even from the manufacturer. We have a filing notice in red on the replacing plant sections and will have a note on the BSPM canceling the R section concerning the need to transfer the manuals, but we urge those responsible for radio files to take any steps that occur to them to prevent inadvertently throwing these manuals away.

And so endeth the R Series.

B. 1938; D. 1966

R.I.P.

Long Live the Plant Series!

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IS THIS SECTION NECESSARY?

While the thirst for knowledge is undoubtedly a laudable ambition, it appears that in some instances we may be drinking more than is necessary. As you know, Plant Series BSP Standing Orders may be placed for entire divisions - (first three digits) - or for specific layers - (fourth digit). The standing order concept permits rapid receipt of new practices as they are issued. The division and division layer arrangement allows grouping together practices on similar subjects or appealing to similar interests.

For the most part we have been able to take advantage of these features in assigning radio practices to the Plant Series. For example, large systems, such as TD-2, are assigned an entire division. Major parts of the system, such as terminals, repeaters, maintenance center, etc., are each given a layer. Thus, an office desiring to have all the latest sections on TD-2 may place a standing order for the entire division while a repeater station might be confined to one or more specific layers depending upon the equipment or operations located there.

Where the total quantity of practices, including anticipated growth, does not seem to justify assigning an entire division to a type of radio system or service, we have attempted to group like services together in the same division and then to provide each system or service with its own layer. Sometimes a "common" layer is needed for sections whose contents cross the lines of demarcation of the layers. This, too, permits selective ordering for offices which have need for one or more layers but not for the entire division.

However, it appears that there are a number of instances where full advantage of selective ordering by layers has not been used. As a result, the extra costs of the unneeded sections, the cost of filing them, and the expense of the space in which to house them have been incurred.

To cite two examples: current standing orders for the TD-2 system (Division 410) show almost as many orders for Layer 4 covering the Transmitter-Receiver as for Layer 2 on the FM Terminals. While the terminals have T-R bays associated with them, there must be many locations where T-R bay practices are needed but where there are no requirements for FM terminal sections.

Perhaps an even more outstanding example of ordering – and paying for – unneeded layers is to be found in the soon-to-be-released Division 403. Here Layer 1 covers Common Equipment, Layer 2 Coastal Harbor, and Layer 3 High Seas and Overseas Radio. To date, standing orders for the Common Equipment and Coastal Harbor layers total about 850, indicating a certain degree of activity in the Coastal Harbor Service. Yet the orders for Layer 3 on High Seas and Overseas Radio are now running at 820 or 97% as many sections for a service limited to about half a dozen locations in the United States.

The extra costs for being on standing order for unnecessary layers are, of course, continuing. Each new or revised practice released in these unneeded layers means extra direct and filing costs. We suggest, therefore, that those responsible for standing orders may wish to review their current status with an eye toward seeing that all required information is available at a given location, but that the order does not include unnecessary layers. Plant Series BSP 000-010-011 on Ordering Information includes instructions on the use of Form KM-135-C covering changes to standing orders.

IS SSB REALLY ON THE HORIZON FOR THE MARITIME SERVICES?

Over the years the maritime radiotelephone channels operating on frequencies below 27 Mc/s have been extremely congested. Many believe that the introduction of single sideband (SSB) techniques is now technically feasible and would relieve this congestion by permitting the establishment of additional channels in the same spectrum space. A World Administrative Radio Conference (WARC) has been scheduled to convene during 1967 to deal with this problem (RADIO NOTES, February 1966). In preparation for the WARC, RTCM Special Committee 53, made up of users, manufacturers, coast station operators and Government agencies, is now preparing recommendations for the adoption of SSB techniques in the marine services. The RTCM has already recommended the following schedule for conversion on the marine radiotelephone channels from double sideband (DSB) to single sideband.

Proposed RTCM Schedule

Discontinue installation of double sideband equipment on ship stations	– January 1, 1970
Equip. Coast Stations for SSB Operations	– January 1, 1970
Discontinue double sideband emission*	– January 1, 1974

*Exceptional treatment may be needed on a national basis, for example, users on inland waters and non-commercial vessels.

Two important factors influenced the RTCM's recommendations for a short conversion schedule. First, the need for additional channels is great and the assignment of the newly derived channels made available by using SSB technology will not be practicable until the use of DSB ceases. Secondly, an additional advantage in reducing the conversion period is gained because the larger quantities of SSB radio equipments produced each year will enable the manufacturers to provide somewhat lower cost because of economies obtained by larger production quantities. For these reasons the RTCM felt that an early conversion schedule is justified.

However, before SSB can be implemented, national and international regulations must be adopted which will specify the class of emission to be used. Presently, international organizations are attempting to determine which class of emission should be used for the maritime services. At least two schools of thought are prevalent. One group prefers the use of A3J (suppressed carrier) emission, a second group proposes A3A (reduced carrier) emission. Those who favor A3J emissions believe that suppressed carrier is necessary to reduce the effect of beat tones that occur when several transmitters are operating simultaneously on the same channel. This group also points out that suppressed carrier relaxes the selectivity requirements for receivers. The latter group, which includes the Bell System, favors A3A emissions. This group points out that a small amount of carrier is required for AFC and AGC purposes as well as for carrier-operated devices. This is especially true for services such as public correspondence in which the quality is extremely important for the provision of a service acceptable to the public. This group believes that AFC must be used to maintain satisfactory voice recognizability. Tests have shown that voice recognizability (but not intelligibility) suffers markedly when a frequency off-set between the transmitter and receiver frequencies as much as 60 cycles is experienced. Some have proposed the use of a "clarifier" on the SSB receiver to reduce the effect of frequency off-set. This device allows the operator to adjust the frequency of the receiver to obtain the best possible signal. The "clarifier" is obviously a problem if required on unattended receivers. The latter group also points out that a small amount of carrier is required for adequate gain regulation. Without a carrier for AGC purposes there is a tendency for receivers to "blast" during the first few syllables after there has been a pause in modulation. "Blasting" also would be objectionable to the public. The proponents of A3A emission further contend that carrier operated devices have proven most reliable over many years and are necessary for alerting operators at remote locations. Carrier operated devices are especially necessary for public correspondence and safety services where several unattended receivers are used in a single system.

To complicate matters further, present FCC rules, as well as international radio regulations, now call for A3H (full carrier) emissions on 2182 kc/s (International Distress and Calling Frequency) when single sideband is used. This class of emission is commonly known as "compatible single sideband" emission. To maintain the integrity of the safety system, A3H emission will undoubtedly be required during the conversion period on 2182 kc/s and may also be required for an indefinite period. It can be seen that the conversion from double sideband to single sideband will be difficult at best. Every effort is being made to plan a conversion which will be economical to all concerned without jeopardizing safety which has been so important in maritime telecommunications.

In short, it is the consensus of people in the marine industry that single sideband should be introduced and become mandatory. When this will happen is a matter for the speculators. However, the FCC, in their final decisions, will undoubtedly weigh heavily the schedule proposed by RTCM. Final decisions in the United States on the time frame for conversion to SSB as well as the class of emissions that will be mandatory will not probably be made until after the WARC in 1967. People at "195" are participating in the program and will keep the Companies promptly informed so that suitable plans can be made for converting Coastal Harbor and High Seas Services to SSB operation when required.

11

IEEE CONVENTION

The Annual Convention of the Institute of Electrical and Electronic Engineers was held in New York City March 21-25. Among the papers given were two by Bell System personnel which may be of interest to readers of RADIO NOTES.

Performance of Bell System Intercity Networks Transmitting NTSC Color Television Signals by A. D. Fowler, B.T.L.

A Precision Television Waveform Oscilloscope for the Bell System by J. R. Hefele, B.T.L.

RADIO INFORMATION

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

BSPM 998B - 410-000-000, Issue 17 - Numerical Index - Division 410 - TD-2 Microwave Radio

410-610-300, Issue 1 - Automatic Protection Switching - FM Terminal Transmitter Switching - Overall System - Operation

BSPM 999 - 409-000-000, Issue 20 - Numerical Index - Division 409 - TE, TJ, TL and TM Microwave Radio

409-200-502, Issue 4 - TJ Microwave Radio - General Tests - TR Bay - Power Supply Tests and Voltage Checks

Add.

409-200-503, Issue 1 - Auxiliary Bay - Power Supply Tests and Voltage Checks

409-210-503, Issue 4 - Transmitter Tests - Linearity

409-220-506, Issue 1 - Receiver Tests - Noise Figure Measurements

409-242-509, Issue 1 - TJ/TJ Microwave Radio - System Tests - TJ Noise Loading Measurements

409-400-104, Issue 1 - TL-2 Microwave Radio - Description - Receiver

409-400-113, Issue 1 - TL-2/TM-1 Microwave Radio - Description - TM-1 Transmitter

409-400-125, Issue 1 - Television Transmission

409-403-502, Issue 1 - System Tests - Television Transmission

Add.

409-412-501, Issue 1 - Bistable Diversity Switch and Revertive Switch Tests - Performance Checks, Alignment and Unit Replacement

BSPM 1000 - AA264.137, Issue 3 - Solid-State Wire Line Entrance Links for Connection of L-Type Multiplex to Microwave Radio Systems

AA266.030, Issue 6 - TD Radio - Indoor Waveguide - Toll Systems

App. 5

AA266.031, Issue 2 - Type TD-2 Radio System - General Requirements - Toll Systems

App. 3

AA266.036, Issue 5 - TD-2 Radio - Test Bench Equipment - Toll Systems

App. 1

AA266.081, Issue 1 - TH Radio - Automatic Protection Switching Bay Equipment - Toll Systems

AA266.094, Issue 1 - Microwave Radio - Emergency Broadband - IF Restoration - Toll Systems

AA636.799, Issue 1 - Performance Requirements - 100A Protection Switching System - Job Additions - Toll Systems

405-000-000, Issue 8 - Division 405 - Numerical Index - MJ Mobile Radio Telephone

405-210-501, Issue 1 - Base Station - Control Terminals - Common Information - Tone Generator Tests

405-210-502, Issue 1 - Tone Detector Tests

405-210-503, Issue 1 - Test and Adjustment Procedures

405-210-504, Issue 1 - Vogad Tests

405-210-505, Issue 1 - Vogad Alignment

405-210-506, Issue 1 - Sonad Tests

405-210-507, Issue 1 - Transmit Line Terminating Unit Tests

405-211-511, Issue 1 - MJ Large System Control Terminal - Tests - Duplicate Switching and Test Access Circuit Tests

405-211-512, Issue 1 - Transmitter Control Circuit

405-211-513, Issue 1 - Channel Selector Tests

405-211-514, Issue 1 - Base Station Identifier Control Circuit Tests

405-211-516, Issue 1 - Technical Operator Test Panel

405-211-517, Issue 1 - Test Panel - Common Control Circuit Tests and Service - Trouble Indications

405-212-503, Issue 1 - MJ Small System Control Terminal - Test Panel Tests

411-000-000, Issue 15 - Numerical Index - Division 411 - TD-3 Microwave Radio

411-600-330, Issue 3 - 100A Protection Switching System - System Tests - Periodic Test Intervals

412-000-000, Issue 23 - Numerical Index - Division 412 - TH Microwave Radio

412-400-104, Issue 1 - Broadband Radio Channel - TH Mop-up Equalization Bay

412-640-503, Issue 1 - Common Control Circuit Tests - DC Translator

412-640-504, Issue 1 - Manual Switch Control

410-640-505, Issue 1 - Override Switch Control

412-640-506, Issue 1 - Protection Channel Access Switch Control

Add.

412-730-502, Issue 1 - Maintenance Center - Broadband Channel Transmitter Tests

Cancelled

405-211-501, Issue 1 - MJ Large System Control Terminal - Tone Generator

Add.

405-211-502, Issue 1 - Tone Detector

405-211-502, Issue 1 - Tone Detector

405-211-503, Issue 1 - Receive Line Terminating Unit and Receiver Selector - Test and Adjustment Procedures

405-211-504, Issue 1 - Vogad Tests

405-211-505, Issue 1 - Vogad Alignment

405-211-506, Issue 1 - Sonad

405-211-507, Issue 1 - Transmitter Line Terminating Unit

BSPM 1001 - App. 4
AA266.042, Issue 3 - TD-2 Radio - Automatic Switching - IF Switching Equipment - Toll Systems

App. 4
AA266.082, Issue 1 - TH Radio - Automatic Protection Switching Equipment - Panels, Mountings and Plug-in Units - Toll Systems

App. 1
AA266.096, Issue 1 - Toll Systems - TD-2 Radio - Channel Equalization and Level Adjustment

BSPM 1002 - AA636.794, Issue 1 - IF Restoration - Performance Requirements - J68385N Interconnecting Status and Control - Panel for TH Radio Protection Switching - Toll Systems

409-000-000, Issue 21 - Numerical Index - Division 409 - TE, TJ, TL and TMMicrowave Radio

- 409-220-507, Issue 1 – TJ Receiver Tests – IF Unit Impedance Matching
- 409-241-509, Issue 1 – TJ/TM-1 – Systems Tests – Noise Loading Measurements
- 409-300-100, Issue 2 – TL-1 Microwave Radio – Description General
- 409-300-101, Issue 2 – Over-all System
- 409-400-103, Issue 1 – TL-2, Description – Transmitter
- 409-400-114, Issue 1 – TM-1 – Description – Receiver
- 409-412-501, Issue 2 – TL-2/TM-1 – Diversity Switch Tests and Unit Replacement
- 410-000-000, Issue 18 – Numerical Index – Division 410 – TD-2 Microwave Radio
- 410-610-502, Issue 1 – Automatic Protection Switching – FM Terminal Transmitter Switching – Controls, Indications and Alarms – Tests
- 410-611-300, Issue 1 – FM Terminal Receiver Switching – Over-all System – Operation
- 411-000-000, Issue 16 – Numerical Index – Division 411 – TD-3 Microwave Radio
- Add.
- 411-600-503, Issue 2 – 100A Protection Switching System – System Tests – J68381C Receiving Control Bay
- 411-600-510, Issue 1 – 1 x 1 Simplified Switching System
- Add.
- 411-601-501, Issue 2 – IF Equipment Tests – J68381BK IF Amplifier Circuit
- PEM 9606 – Short Haul Radio – Improved Mounting Arrangements for Gabriel Electronic 10' x 15' Reflectors
- PEM 9671 – Short Haul Radio – Diversity Switch Changes (1S3.9G1-10)
- PEM 9718 – TH Radio System – Traveling Wave Tube Improvements (1S3.9G1-10)
- PEM 9721 – TD-2 Radio – Equipment and Alignment Changes Required for Operation at Maximum Output Power (1S3.9G-50)
- PEM 9729 – Radio Systems – Adjustable Axial Ratio Compensators (1S3.4-178)
- PEM 9737 – Toll Systems – TD-2 Radio – New Indoor Waveguide
- PEM 9745 – TL-2 and TM-1 Radio Systems – RF Measuring Equipment Arrangements (1S3.9U-15)
- PEM 9755 – Short Haul Radio Systems – Designation Cards (1S3.9F-114)

Unnumbered Letters to Marketing Headquarters Video Coordinators

- 1-31-66 – Video Services – January CATV Report
- 3- 1-66 – Video Services – February CATV Report
- 2-11-66 – Talk by G.N. Thayer – Telephone Company Views of CATV

Unnumbered Letter to Plant Supervisors

- 2-25-66 – Mobile Service Trouble Summary
- 3-15-66 – Mobile Service Trouble Summary

Unnumbered Letter to Commercial Managers

- 2- 7-66 – Talk by G.N. Thayer – Telephone Company Views of CATV

Unnumbered Letter to Marketing Dept. Training Coordinators

- 2-10-66 – Mobile Telephone Service Training Course