AN/FRC-37 Filament Power Supply — Wiring Error Hint

This article provides an alert as to a possible factory error in the filament power supply circuits to the Lighthouse tubes V313, V314 and V315. The error results in reduced transmitter output power.

The error has been found on the terminal board TB-502, which connects to the filament power supply transformer T503. Figure 6-3, page 6 15 of the NAVSHIPS 93462 instruction manual should be used as a reference. The wires from the filament transformer T503 terminals 7 and 8 instead of being connected to 7 and 8 of the terminal board TB-502 have been mistakenly interchanged with the wires 9 and 10 on the terminal board TB-502.

1. If a wiring error is detected, the correction should be made at the terminal board TB-502. No soldering is required as the terminals are the screw-on type.

(EIB 909)

AN/FRD-10A(V) Manual DF Position Receivers—Alternate Procedure for Minimum Discernible Input Signal Check

Pages 19 and 20 of Maintenance Standards Book for Direction Finder Set AN/FRD-10A(V) (CONF) (NAVSHIPS 95744.42) delineate a test configuration. To reduce the time required to record the "minimum discernible input signal" to the four receivers of the manual DF position; a test panel may be constructed, permanently mounted and used in an alternate procedure.

This alternate test panel, shown here in figure 1, modifies the test configuration by using a pair of 600-ohm headphones instead of the 600-ohm, one watt resistor and by the addition of a five-position switch. The switch allows both the 600-ohm load and the multimeter to be switched to any one of the four receivers, as desired, leaving only the signal generator output (receiver output) to be physically moved from receiver to receiver. The headphones make it possible for the receiver output to be audibly monitored while the check is made. (16S)

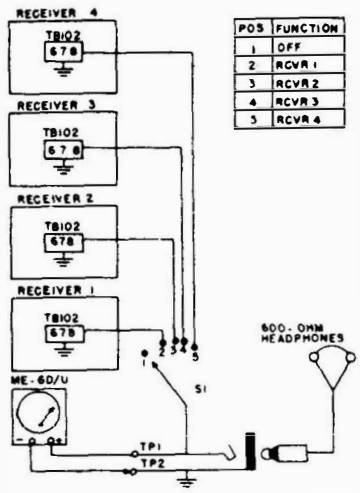


Figure 1. Minimum discernible signal input test panel for the AN/FRD-10A(V) manual DF position receivers.

***Electronic Goniometer—Maintenance Hint**

This article provides a method to stop the slow persistent oil leaks often found in the electronic goniometers used in the R.F. distribution systems at the AN/FRD-10 sites. This method is to be used on all types and serial numbers of electronic goniometers at those sites.

1. If an oil leak is discovered around the oil seals of the main shaft assembly of the electronic goniometers, then increase the viscosity of the lubricating oil to the next higher level until the leak stops, (i.e. change SAE 30 oil to SAE 40,... to SAE 50,... etc.

2. Under no circumstances proceed beyond the SAE 80 level. If the leakage does not stop at this level then major Corrective Maintenance, in the form of main shaft assembly overhaul, will be required.

3. Do not perform any Corrective Maintenance unless all replacement parts (spare main shaft, new oil seals, new bearings, etc.) for this overhaul are immediately available.

4. Further technical assistance if required should be requested in accordance with NAVSECGRUINST 4350.1B and NAVELEXINST 4350.3.

(EIB 942)

AN-FRN-12A—Maintenance and Test Procedures to Improve Performance

Maintenance personnal at some stations have experienced difficulty in obtaining the rated power output (200w) from the AN/FRN-12A transmitter. In most cases where the output is low, the plate current tends to be unstable and neutralization is incomplete and erratic. Investigation of these conditions has disclosed that most of these symptoms are caused by high RF resistance between the elements of the Beehive cavities Z-0401 and Z-0402. Another factor contributing to unbalance in the circuit is improper tuning of the variable cavity Z-0401. It is imperative that the two cavities be electrically identical, otherwise the power tubes, V-1004 and V-1005, will not deliver equal power.

Performing the following steps will eliminate the symptoms mentioned above:

a. Remove the AM-323/FRN-12 chassis from the transmitter and place on work bench.

b. Carefully remove Beehive Cavities Z-0401 and Z-0402 from the amplifier chassis.

c. Disassemble each cavity, clean the cavity elements thoroughly, and burnish all mating surfaces with fine abrasive paper, such as crocus cloth.

d. Before reinstalling the cavities on the amplifier chassis, perform the following (see figure 1):

(1) Loosely couple the output of a VHF signal generator, such as an AN-URM-26, through a one turn coil to the fixed tuned cavity Z-0402.

(2) Connect the RF Probe of a VTVM (HP-410A or equal) across the other end (high impedance end) of the cavity.

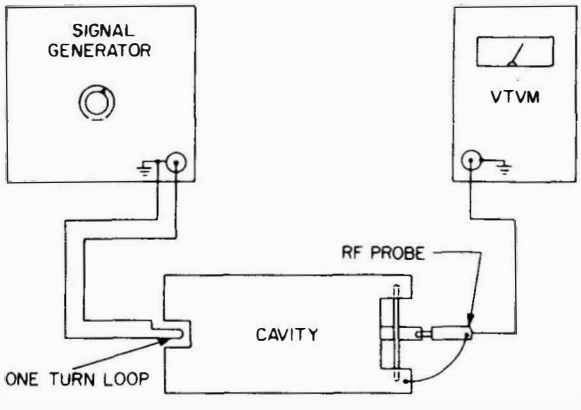


Figure 1. Method of Tuning Cavities

(3) Tune the signal generator to cavity resonance as indicated on the VTVM. This frequency will be in the neighborhood of 140 mcs.

(4) Using the same test setup, and without changing the signal generator setting, tune the capacitor disc of cavity Z-0401 for maximum reading on the VTVM.

(5) Lock the variable disc in the position and make no further adjustment of this disc.

e. Reinstall both cavities in the RF amplifier AM-323/FRN-12.

F. Reinstall the amplifier chassis in the transmitter.

g. Tune up the RF stages, neutralize and load the power amplifier in accordance with instructions in the technical manual.

h. No difficulty should be experienced in loading to full 200w into a dummy load. Make sure that the coupling control is properly aligned and no binding exists. Start coupling adjustment with the coupling coil as far out as possible.

i. Adjust the output coupling for 150w output into the antenna system. This should provide adequate field strength and will increase p.a. tube life.

The above procedures were developed under the cognizance of the Industrial Manager, 8th Naval District. (17S)

AN/FRN-24 UHF HOMING BEACON

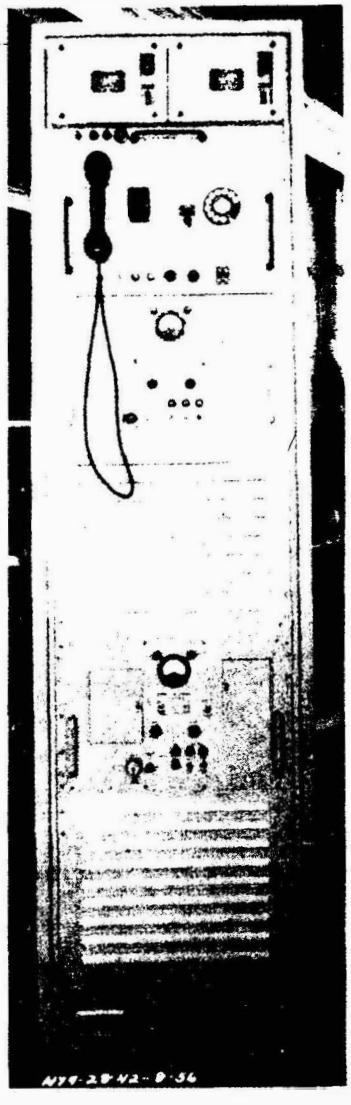
The AN/FRN-24 homing beacon shown here consists of a UHF transmitting system designed for remote installation and unattended operation. The antenna is a stacked array designed for service to high-altitude aircraft and radiates an identified MCW signal for air-station location and voice modulation for ground-to-aircraft communication.

Continuous operation of the beacon is assisted by employing a standby transmitter in the system with provision for automatic transfer in event of initial transmitter failure. Improved transmitter reliability is accomplished by the introduction of heavy-duty ventilating units in the system. Indicators at both the local and remote locations are incorporated to disclose functions taking place in the system.

Control of the various functions is accomplished by a conventional telephone-dial system similar to that employed in the YA radio range. Two telephone conductors are required between the remote site and the control tower. The transmitter of the AN/FRN-24 is a modified Navy model TED keyed with a Navy model KY-123/URN keyer. To increase operational reliability, the TED and KY-123/URN are provided in duplicate.

To maximize proper operation of the beacon, a monitor is provided to monitor the modulation of the detected carrier of one of the TED transmitters. In the event of loss of more than 25% of the output of the detector, the other TED is switched on; and red lights are displayed on the remote-control unit in the tower and on the transmitter rack to indicate that the alternate transmitter is in operation. Either of the TED transmitters can be made the master by switching at the transmitter rack. In addition to automatic transfer by loss of output, the transfer of TED transmitters either from master to alternate or reverse can be achieved from either operating position by means of the telephone dial system. When the alternate transmitter is in operation, no monitor protection is provided but the red lights are on, indicating an abnormal condition. The monitor does not provide protection when voice communication is in use, or when the keyer sticks causing the tone to be transmitted continuously.

In addition to the two transmitters and two keyers, the automatic--control unit and ventilating equipment are mounted in a CY-597/G cabinet, figure 1. The transmitting-site component is entirely self-contained and needs only to be connected to a suitable source of 115-volt, 60-cycle, single-phase, ac power, a telephone pair to the control-tower unit, the antenna, and ground. The tower remote-control unit contains an AM-413/G amplifier, microphone, dial mechanism, and indicator lights. These units are now being assembled by the Philadelphia Naval Shipyard and availability dates will be published when firm.



AN/FRN-24 UHF HOMING BEACON

Figure 1

AN/FRA-501, AN/FRA-19(V), AN/FRR-502, AN/FRR-49 (V), CV-591/URR, CV-591A/URR, AND TECHNICAL MATERIAL CORPORATION COMMERCIAL MODEL MSR-5 - USE OF AUTO-TRANSFORMER TO REDUCE EXCESSIVE LINE VOLTAGE

See article in AN/FRA-19 section under the same title.

AN/WRR-2, -2A, AN/FRR-59, -59A COMMUNICATION EQUIPMENTS; Elimination of Meter Failures In

Refer to article in AN/WRR-2 Section under the same title. (EIB 644)

AN/FRR-59A, AN/FRR-59B, Frequent Replacement of V-805, Blocking Oscillator--Maintenance Hint

1. It has been reported by Naval Air Station, Patuxent River that they have replaced a large number of 5670 type tubes, used in blocking oscillator circuit, V-805. Upon investigation they have found incorrect values of the following components installed, R-836 and R-837. The values found corresponded to those used prior to TC-1 for TM 0280-810-3000. The correct values are 1000 ohms and 2.2 meg ohms.

2. If frequent replacement of V-805 occurs check the values of the two subject resistors shown in figures 5-65 (sheet 1 of 2) of TM 0967-139-3010 (formerly TM 0280-810-300). Replace if incorrect.

3. In addition the values of C-822 and C-824 should be checked at the same time as they were changed by the same temporary correction. They are shown in figure 5-65 (sheet 2 of 2). The proper values of the two capacitors are 1200 mmf and 7-45 mmf, respectively. Replace if incorrect.

4. The FSN's for the correct components are as follows:

Type No.	Capacitor	Values	FSN
R-836	RC 20GF102J	1000 ohms	5905-195-6806
R-837	RC 20GF225J	2.2 meg-ohms	5905-190-8885
C-822	CM 20C122J	0.0012 uf	5910-765-6316
C-824	CV 11D450	7-45 uuf	5910-648-9543

(820, 834)

AN/WRR-2, -2A, -2B and AN/FRR-59, -59A, -59B Receivers, Relocation of Test Points on the IF Amplifier--Maintenance Hint

Refer to article in AN/FRR-59 Section under the same title. (EIB 935)

RADIO TRANSMITTING SET AN/FRT-6( ) BURN-OUT OF PA FILAMENT CHOKES AND CERAMIC GRID CONDENSERS

Recurring failures of filament chokes and ceramic-grid by-pass condensers in the AN/frt-6 power amplifier have been traced to the practice of tuning up the 15-kw driver stage without filament power being applied to the 40-kw grounded-grip power amplifier. As a result, the unloaded driver stage develops very high radio-frequency voltages in the "cold" input circuit of the power amplifier causing burnouts. The correct procedure is to apply filament power to the final amplifier before plate power is applied to the driver stage.

To avoid ''pinning'' the PA grid-current meter, plate voltage should also be applied to the power amplifier before tuning the driver, making sure that the PA plate current is ''dipped'' to avoid possible damage to the tubes.

A field change for the AN/FRT-6 series transmitters is being developed which incorporates interlock circuits to automatically provide the above protection. Meanwhile, operating personnel are advised to use care to avoid the conditions causing burn out.

REPLACEMENT OF RECTIFIER TUBE IN POWER SUPPLY OF AN/FRT-6

Rixon load divider reactors, Federal Stock No. 6130-641-8273, are provided to insure that both rectifiers in a parallel combination will fire simultaneously. However, it has been noted by some using organizations that, even with the reactors installed, Mercury vapor rectifier tubes, type 575A, have a much longer life than Xenon-filled rectifier tubes, type 4B32. Accordingly, Mercury vapor rectifier tube, type 575A, Federal Stock No. 5960-188-8630, is recommended as an alternative to Xenon-filled rectifier tube, type 4B32.

When using Mercury vapor rectifiers, certain precautions must be observed. The rectifiers must be operated at an ambient temperature between 10° C. and 50° C. and with filament voltage applied for only several minutes before application of plate voltage.

AN/FRT-15, -15A RADIO TRANSMITTERS

When using the AN/FRT-15, -15A Transmitters modified by kit RM-193 to feed the unbalanced 70-ohm transmission line, improved operation will result by opening the strap between output terminals E-3002 and E-3003. The revised circuit is as follows:

Correct the diagram in EIB 467, page 3, and Figures 2-9A and 7-95B of Modification Kit RM-193, NAVSHIPS 91690(A)-1 to agree with figure 1.

Cut 4A

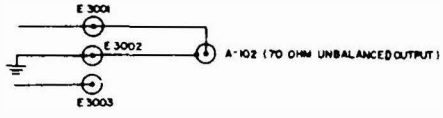


Figure 1

AN/FRT-15-HAZARD TO SAFETY OF MAINTENANCE PERSONNEL

It has recently come to light that some AN/FRT-15 Radio Transmitters have not been modified with High-Voltage Interlock Switch Kit RM-194.

Recently a maintenance technician was seriously burned while making preventive maintenance checks on an AN/FRT-15 Radio Transmitter which had not been equipped with a H. V. Interlock Kit RM-194.

Installation of the H.V. Interlock Switch Kit RM-194 provides additional protection for personnel by shorting the DC output of the high-voltage rectifiers to ground when the transmitter doors are opened, or when the rectifier tube protective screen is removed.

Users of AN/FRT-15 Radio Transmitters are directed to ascertain if H.V. Interlock Switch Kits RM-194 have been installed. AN/FRT-15 Radio Transmitters not equipped with H.V. Interlock Switch Kit RM-194 should be so equipped at the earliest opportunity. H.V. Interlock Switch Kits RM-194 are available in stock under FSN F5820-503-4849.

Use of Spectrum Analyzer to Eliminate the Causes of Spurious Radiations from High Frequency Radio Transmitters

Reports from monitoring agencies indicate that Navy transmitters are sometimes responsible for spurious radiations. In some instances the intensity of the spurious radiations has been sufficient to produce readable copy at monitoring stations located at considerable distances from the transmitter site.

The spectrum analyzer CPN-SSB-3, AN/GRM-33, or similar equipment is ideally suited to the problem of eliminating spurious radiations caused by faulty oscillator adjustments. An example of the techniques involved follows:

Radio transmitters equipped with master oscillator synthesizers are more prone to radiate spurious sidebands than crystal controlled transmitters, and this is understandable considering the numerous mixing processes and balances modulators associated with this type of oscillator.

The AN/FRT-15 series transmitter is used in this example because it is one of the most frequent offenders.

There are two main causes of spurious radiations from the AN/FRT-15 series transmitters, these are: (1) Faulty adjustment of the balanced modulator potentiometer R-3838 in the amplifier-oscillator AM-483/FRT-15 and (2) faulty adjustment of balancing potentiometers R-3171 and R-3191 in the balanced modulator associated with frequency selector-mixer CV-276/FRT-15.

To adjust these balanced modulators for a minimum of spurious output proceed as follows:

1. Connect the input of the spectrum analyzer to the RF sampling jack on the transmitter to be tested. See the article High Frequency Transmitter RF Output Sampling in this issue of The EIB Shore Supplement. Do not use the diode probe of the spectrum analyzer for this test.
2. Connect a dummy load to the output of the transmitter and load the transmitter in a normal manner, being careful not to exceed the power rating of the dummy load.
3. Tune the converter oscillator on the spectrum analyzer to display the spectrum 200 kc. higher or 200 kc. lower than the transmitter operating frequency. Adjust the sensitivity of the spectrum analyzer for a satisfactory amplitude of the 200 kc. spurious signal.
4. Adjust R-3838 in the amplifier oscillator AM-483/FRT-15 until the amplitude of the 200 kc. spurious signal is at least 60 db below the reference level of the transmitter output frequency.
5. Remove RF oscillator O-140/FRT-15 from the transmitter cabinet and place on a suitable work table. Use the appropriate extension test cables and check the transmitter for normal operation.
6. Tune the converter oscillator on the spectrum analyzer to display the spectrum ± 50 kc. from the transmitter output frequency. Spurious sidebands of various intensities can be observed between 5 and 50 kc. either side of the transmitter output frequency.
7. Alternately adjust R-3171 and R-3191 in frequency selector-mixer CV-276/FRT-15 until the spurious sideband frequencies are at least 56 db below the reference output of the transmitter. (33)

AN/FRT-17, RESISTOR FAILURE

The following information was forwarded by the Assistant Industrial Manager, USN, Seattle.

In two instances, AN/FRT-17 transmitters could not be made to operate with the Cal-Line-Operate Switch in the OPERATE position. Relay K-809 fuctioned as if a plate voltage overload existed. Investigation of the relay circuitry revealed a defective (open) potentiometer R-801 (see schematic, figure 2-30, NAVSHIPS 91963, the AN/FRT-17 Instruction Book). Opening of this shunt resistor permitted excessive current flow through the relay coil, although all other conditions were normal. It should be noted in the schematic that a false indication could also be induced by failure of the other associated shunt resistor, R-847.

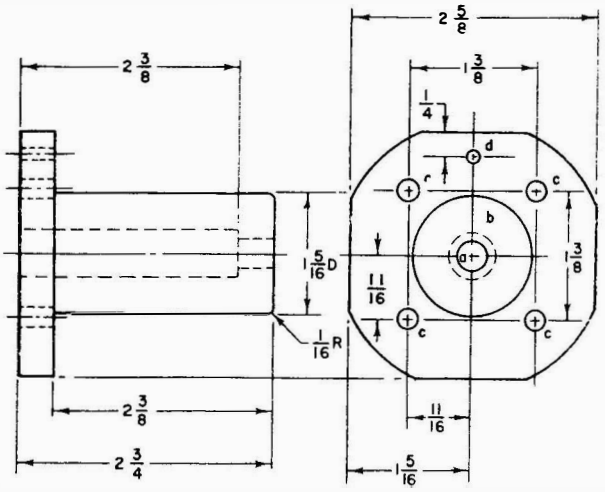
Two other overload relays, K-810 and K-808, figures 2-30 and 2-32, NAVSHIPS 91963, also have associated shunt resistors, R-803, R-802, and R-848, failure of which could falsely indicate "Screen Overload" or "Medium Voltage Overload".

The foregoing information should be entered in the Instruction Book, NAVSHIPS 91963, Table 7-1, Trouble Shooting Chart.

MODIFICATION OF P-106A IN RADIO TRANSMITTER SET AN/FRT-24

The High Voltage Standoff Insulator P-106A in the AN/FRT-24 is subject to breakage when the RF Assembly is rolled in and out of the cabinet. If repeated failure of P-106A cannot be corrected by properly aligning it with its banana plug, the difficulty may be corrected by replacing this ceramic insulator with a more rugged one made of teflon.

Instructions for fabrication of this teflon insulator are given in figure 1.



MATERIAL: TEFLON ROD, 3 INCH DIA
HOLE SIZES: a. 3/8" DRILL, 1 HOLE
b. 1/2" DRILL, 1 HOLE
c. 3/16" DRILL, 4 HOLES
d. NO. 25 (0.1495) DRILL, 1 HOLE

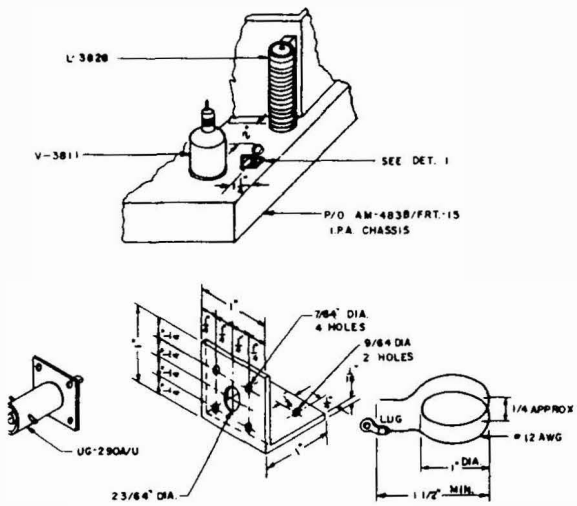
AN/FRT-24 RADIO TRANSMITTERS CHANGE IN STOCK NUMBER FOR HIGH VOLTAGE PLATE POWER TRANSFORMER T-401

Stock Number FSN N5950-629-4434 has been assigned by the Electronics Supply Office to T-401 for AN/FRT-24 Radio Transmitters. This stock number applies to Collins Spec No. 672-0385-00 as revised 20 February 1956 and as manufactured by Chicago Transformer, Spec No. 14947, issue 12. This is an improved version of the original T-401 transformer installed in AN/FRT-24 transmitters bearing serial numbers 1-253 and is expected to exhibit a greatly reduced failure rate.

Future requisitions for replacement T-401 transformers should specify the new stock number since the Electronics Supply Office has initiated action to withdraw from stock the T-401 transformers currently stocked under the old stock number, FSN N5950-647-8564.

AN/FRT-25 TRANSMITTER MODIFICATION

Several naval shore-type transmitters, presently in use with an unbalanced coaxial output, do not incorporate facilities for frequency measurements of the actual output energy. The Naval Ship Repair Facility, Guam, has devised a circuit for the AN/FRT-25 which has the Bureau of Ships approval. A small induction loop, Figure 1, is placed near the IPA-plate tank coil - the first point where the output frequency is assured regardless of multiplication factors employed in the transmitter. RF sampling at any of the previous stages would result in measurement of a subharmonic of the output frequency and lesser frequency spread when the transmitter is operated in F1 or F4 modes of emission. This method of RF Sampling may be applicable to other shore type transmitters, provided consideration is given to the power involved which would necessitate a construction change of the induction loop, such as number of turns and spacing from IPA-plate tank coil.



DETAIL 1 RF COUPLING LOOP EXPLODED VIEW

NOTES:
1. COUPLING LOOP TO BE PLACED NO LESS THAN 2" FROM COIL L-3828 AND LOCATED SO THAT IPA CHASSIS CAN BE DRILLED FOR (2) TWO MOUNTING METAL SCREWS WITH OUT INTERFERENCE WITH OTHER COMPONENT PARTS.
2. COUPLING LOOP TO BE PLACED IN HORIZONTAL PLANE.

Figure 1

RF OSCILLATOR 0-140B/FRT-TEST PROCEDURE

The following procedure is recommended for use:

The AN/USM-26 frequency meter is an extremely useful instrument in quickly locating a trouble in the RF oscillator 0-140B/FRT-15 utilized in AN/FRT-25 equipments. Advantages of this procedure are speed and accuracy in locating troubles. Reference to specific pages of the instruction manual is avoided, since more than one equipment is involved. Reference to dials "A," "B," "C," "D," and "G" in this procedure are those of 0-140B/FRT-15 equipments.

Procedure:

1. The 200 kc oscillator, the basic oscillator of the unit, should be checked first. The frequency counter may be connected to J-3501. The frequency counted should be close to 200 kc.

2. The output of the 101-100 kc oscillator should be checked at J-3702. Setting dial "D" to zero on the white scale should result in a frequency of 101 kc. Adjust dial "D" for exactly 100 kc.

3. The multivibrators should be checked next. The 100 kc output is available at P-3501, the 10 kc at P-3502, and the 1 kc at P-3503. Remember that any error in the 200 kc oscillator will result in an error in the multivibrator checks. As an example, a 10-cycle error in the 200 kc oscillator will result in a 5-cycle error in the 100 kc, a 0.5-cycle error in the 10 kc, and no readable error in the 1 kc. Every effort should be made, however, to remove all error in the 200 kc oscillator. Any count other than that described above indicates need to adjust the multivibrator. If the multivibrator needs adjustment, the procedure outlined in Section 7 of the instruction book should be followed, except that the AN/USM-26 may be used in place of the oscilloscope and the audio oscillator.

4. The 29-20 kc output may be ckecked at J-3302. The setting of dial "C" should be 9 for 20 kc output, and zero for 29 kc. Check the output at each setting of dial "C."

5. The 130-120 output may be checked at P-3602. If the 101-100 kc oscillator is set at exactly 100 kc, this check will be easier. There is no need to rotate dial "C" again, since this check only shows that there is an output at the correct frequency. This frequency is affected by both dials "C" and "D."

6. The 500-400 kc output appears at P-3402. Rotating dial "B" should change this output in 10 kc steps. The 500-400 kc signal is affected by dials "B," "C," and "D," and by manipulating these controls, the entire range of 500-400 kc may be observed.

7. There are no further quick checks of the 0-140B/FRT-15 there the AN/USM-26 is useful. It is not possible to check the RF output at J-3153, since both the sum and difference frequency outputs of the balanced modulator appear here. If no trouble was found in the above checks and the RF output at J-3153 still is not correct, assume that the trouble lies in the frequency selector-mixer CV-276/FRT-15A. If it is necessary to check the 2300-4500 kc input to the balanced modulator, a convenient point to connect the AN/USM-26 is across L-3155. Should strong RF fields from nearby transmitters interfere with this check, requiring better shielding, an alternate procedure is to connect the frequency

counter to the RF output jack J-3153. Remove the 500-400 kc input at J-3152, and rotate R-3171 until a reading can be obtained on the counter. Note, however, that this procedure unbalances the balanced modulator, and it must again be balanced out following the procedure described in Section 7 of the instruction manual.

8. A final check of the RF Oscillator 0-140B/FRT-15 may be made by rotating the mixer tuning dial "G," and observing the multiplier cathode currents.

AN/FRT-39 TRANSMITTER-TUNING DIAL SLIPPAGE

Attention of all hands is invited to Volume II-S of the AN/FRT-39( ) Technical Manual, part III B, page 3-1, paragraph headed WARNING. The operator is cautioned against exceeding the Frequency Operating Range limits printed below the panel counter of the Controlled Master Oscillator. Another abuse, that of high speed dial spinning, is cited under CAUTION, page 3-6, same volume. Both instructions are repeated in a third warning on page 6-1, same volume.

Failure to abide by the foregoing cited instructions will result in equipment damage which can be costly in time and money.

PLUG AND JACK, CORRECTION OF

The U.S. Naval Aviation Engineering Service Unit, Philadelphia, in its Technical Report 40461/1 of 3 July 1963, reports the following:

The top cover screen on the Controlled Oscillator in the AN/FRT-39( ) and AN/FRT-40( ) could not be secured on the right rear corner. The screen and chassis flange forced the power plug to one side. Examination revealed that the cable clamp on P706 (P3040) was too wide for the slot in the cover screen.

Correction consisted of filing the cover screen to increase the width of the slot. The report also recommended an alternative correction, that of use of Cannon Connector part number RSK-C16-24C-5/8 for P706 (P3040).

Since this defect was found on two transmitters with consecutive serial numbers, it is possible that a manufacturer's part substitution may have occurred, and that the condition may exist as yet undetected elsewhere.

In order to expedite detection and correction, all AN/FRT-39( ) and AN/FRT-40( ) transmitters will, at the earliest opportunity, be checked for proper positioning of plug P707 (P3040) and all other plugs and connections which could be subject to similar misalignment.

Corrective action should be confined, if possible, to enlarging shield opening as described in paragraph 1. Proper precaution should be observed to keep metal filings away from equipment.

Completion of the foregoing will be recorded on the Electronics Equipment History card, NAVSHIPS 536.

MAGNITUDE OF RADIATED NOISE FROM AN/FRT-39B AND AN/FRT-39D in "KEY UP" CONDITION

Many Naval activities have AN/FRT-39 ( ) high frequency single sideband transmitters located in close proximity to receivers operating on the same frequency. Since no provision is made in these transmitters to bias the linear amplifier stages to cutoff during "key up" (receive) periods, the "shot" noise generated in these amplifier stages reaches the antenna and is radiated. This noise covers a bandwidth of several hundred kilocycles, centered on the carrier frequency. In many cases, the noise generated by the transmitter under key up conditions reaches the receiver with sufficient magnitude to render the receiver insensitive to all signals, except those of very high intensity. This is of praticular concern when HF equipped aircraft flying near the transmitter site may be attempting to receive signals on the same or an adjacent frequency channel to the AN/FRT-39( ) frequency. Since this noise sounds similar to the normally expected from a receiver, it is difficult for the operator to recognize.

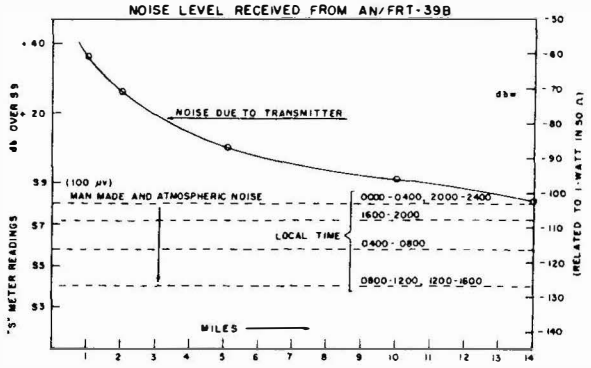


Figure 1. f = 3 mc.

Figure 2. f = 5 Mc.

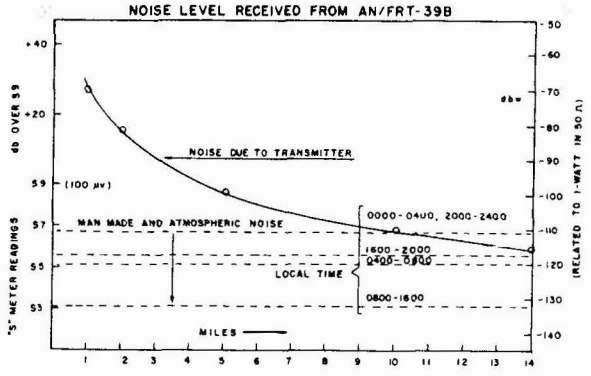
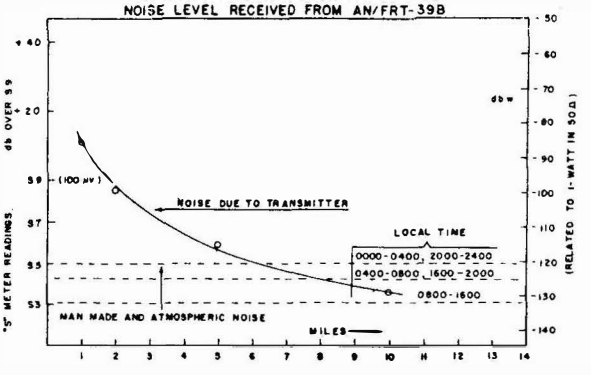


Figure 3. f = 10 Mc.



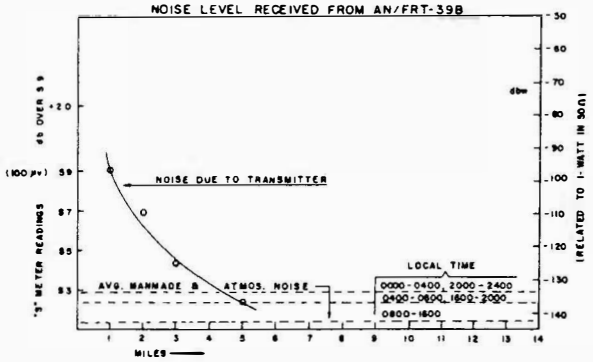


Figure 4. f = 15 Mc.

Figures 1, 2, 3, and 4 show the received noise versus distance in miles from the transmitting antenna for a typical Naval Air Station located in the Southeastern United States. Typical expected man-made and atmospheric noise curves, corrected to 3 kc bandwidth, are shown for different times of the day. These graphs assume conical monopole antennas for both transmitting and receiving. Only the ground wave case is considered and good earth conductivity is assumed.

Information for the curves in figures 1 through 4 was obtained from the following:

1. National Bureau of Standards Report 5092, page 2.
2. Signal Corps Propagation Agency, Fort Monmouth, N.J. Technical Report No. 3, Ground Wave Intensities, figure 13, page 29.
3. International Telecommunication Union Report No. 65, Revision of Atmospheric Radio Noise Data.

In the past, several Field Technical Authorities have devised keyers to reduce the noise generated by the AN/FRT-39( ). In order to standardize installations and to provide simplex RTTY operation, a keyer is being developed for the Bureau of Ships by the Industrial Manager, Eighth Naval District. It is anticipated that a complete shop drawing package for the keyer will be forwarded to all Field Technical Authorities prior to 31 December 1963. The Field Technical Authorities will disseminate the keyer design information to the using activities. This package will include sufficient information to locally fabricate or procure the keyer by contract. All future and existing AN/FRT-39( ) installations, not exclusively utilized on point-to point circuits, should be backfitted with these keyers as soon as possible after receipt of the design information.

AN/FRT-39 SERIES TRANSMITTER; IPA BLOWER MOTOR BEARING FAILURE

Bearing failures in the IPA blower motor (B-201) of the AN/FRT-39 series radio transmitters after approximately 10,000 operating hours have been attributed to the loss of factory lubricant caused by overheating. The bearing which typically fails is located in the motor end bell opposite the cage end of the blower. Location of this bearing, close to the equipment side panel, contributes to its overheating with consequent liquification and drainage of the factory lubricant from the sealed bearing raceway.

Users of the AN/FRT-39 series transmitter are requested to check the bearings in the IPA blower motor at the end of 8,000 operating hours and replace any flat bearings as a preventative maintenance item. Such replacement may prevent later trouble because of bearing seizure. (10S)

AN/FRT-39/40/62 SERIES TRANSMITTERS–SAFETY HAZARD

The Naval Ship Repair Facility, Guam, and others have cited the high voltage warning light on subject transmitters as being an extreme safety hazard to personnel engaged in replacing the enclosed 230 VAC lamp.

As a result of various suggestions for correcting the hazard, arrangements have been made with the manufacturer for the following production change to the light assembly AX-124 on transmitter procured for the Navy:

a. Install metallic stud bolts with removable cap nuts in lieu of the existing removable cap bolts.

b. Install a round bakelite plate drilled for clearance holes for the two (2) stud bolts and socket neck to cover the 230 volt socket terminals. A nut, flat-washer and lock washer to be used in each stud bolt to secure the bakelite plate as well as secure the stud bolt.

c. The installation of a four (4) terminal barrier strip in lieu of the existing two (2) terminal barrier strip, (E-3003), to which the high voltage warning light is currently connected, to permit installation of a type IN-547 diode in series with the lamp to improve lamp life.

The production change is also available from the manufacturer as TMC Modification Kit No. 284 for transmitters previously delivered and not modified on the production line. The kits are available at a budgetary unit cost estimate of $12.50, list price, in quantities of 1 to 10; and $11.85, list price, in quantities of 10 to 100.

Naval Communications System Headquarters message 031444Z of May 1966 and Bureau of Weapons message 231533Z of April 1966 applies to field activities under respective management office control. (17S)

AN/FRT-39, AN/FRT-40 AND AN/FRT-62 RADIO TRANSMITTER SILICON RECTIFIERS–MAINTENANCE INFORMATION

1. The purpose of this article is to promulgate information on maintenance and warranty return procedures for the Westinghouse solid state rectifier stacks installed in the AN/FRT-39, 40 and 60 radio transmitters.

rectifiers.– Unlike tubes, there are but two conditions possible in silicon rectifiers, operable or inoperable. No requirement exists for, nor is anything gained by measuring front-to-back ratios of the individual diodes in the stack. In addition, front-to-back ratios of diodes vary somewhat from lot to lot and are shunted by a resistor which further tends to make such measures meaningless. In general, if high voltage of the correct magnitude is present at the output of the rectifier, the rectifier is good and requires no attention. Rectifier stacks will operate satisfactorily with as many as 20 percent of the diodes shorted.

3. Shunting resistors.– The appearance of two different size shunting resistors 68K ohm and 470K ohm on similar stacks is not an error on the part of the manufacturer. Those cards containing 68K resistors were so made up for previously used alloy junction diodes which have a lower back resistance than the currently used double diffused diodes and, accordingly, require a lower value of shunting resistor to insure equal inverse voltage distribution. A higher value of shunting resistor is permissible across the double diffused diode but is not necessary for proper operation.

4. Soldering of components to rivets on cards.– Several stations have reported what appears to be cold solder joints where components are connected to rivets on the component cards. In other instances, arcs have occured at these points resulting in an open circuit. These conditions are known to occur only in the rectifier stacks for the AN/FRT-62 transmitters. The condition is caused by the inadvertent use of some unplated rivets which have resulted in faulty soldering. The manufacturer will, and in fact, desires to replace all stacks found to contain faulty rivets. Procedures for temporary corrective maintenance and return/replacement of the stacks will be contained in subsequent paragraphs.

5. Warranty provision

a. The manufacturer of the rectifier stacks provides a five-year warranty on all stacks. Warranty provisions have been extended to cover rectifiers when certain substitution of stacks are effected and when a percentage of cards within stacks are shunted out of the circuit. Details of these corrective maintenance steps are provided in later paragraphs and figures 1 and 2. In addition to the warranty provided by the rectifier manufacturer. Westinghouse, a similar warranty for the rectifier kits is provided by their manufacturer, TMC. Neither warranty negates the other, but in general, the provisions of the Westinghouse warranty will be exercised where failures of anything less than the entire modification kit is involved.

b. Return of Defective Stacks.– Defective stacks should be carefully packed and returned directly to Westinghouse Electric Corporation, Semi Conductor Division, Youngswood, Pennsylvania, 15697. In addition, a letter advising of shipment of a defective stack should be prepared and mailed to same address as above with copies to COMNAVCOMM and NAVELECSYSCOM. Westinghouse will

ship warranty replacement stacks upon receipt of defective stack.

6. Corrective Maintenance Procedures. –Corrective maintenance involving anything other than replacement of a complete rectifier stack will be considered a temporary repair and will be effected only to avert equipment outage. Details of temporary corrective maintenance permissible by the terms of the warranty agreement are as follows:

a. Identification of rectifier stacks. –The following numbers are used by TMC and Westinghouse to identify stacks:

Equip.	Contained in TMC Mod Kit No.	TMC Part No.	Westinghouse Part No.
AN/FRT-39	257	DD-116	32C018G-10
AN/FRT-40	258	DD-117	32C018G-09
AN/FRT-62	289	DD-118	32C018G-08

Observe standard safety precautions

b. Interchangeablility of stacks. –The following substitution of stacks to effect temporary repair is permissible:

Defective Stack	Temporary Replacement
DD-116(320C018G-10)	DD-117(320C018G-09) or DD-118(320C018G-08)
DD-117(320C018G-09)	One DD-118(320C018G-08) or two DD-116(320-C018G-10)
DD-118(320C018G-08)	Two DD-117(320C018G-09) in series or two DD-116 (320C018G-10) in series

When connecting stacks in series, polarity must be carefully observed, i.e., positive terminal of one stack to negative terminal of other. Individual stack center connection (AC) will not be used. AC connection will be made to junction of series pair. Substitution of stacks, in series, or a stack differing in physical size, will involve drilling additional holes in the insulated base plate for temporary stack placement. Stacks should be placed in such a manner as to insure maximum separation between individual stacks and between stacks and chassis panels. For details see sketch in figure 1.

c. Temporary repair to stack. –Where measurements, both front and back, indicate an open card in a stack (condition usually caused by faulty rivet as previously noted), emergency repair may be effected by bridging the faulty card with No. 16AWG solid copper, 600V insulated wire, in in accordance with the following procedure:

NOTE

(1) Observe polarity of stack and remove from equipment.

(2) Strip one-half inch of insulation from one end of wire and tin.

(3) Wrap tinned end one complete turn around stack bus wire where it leaves nearest good card at point marked "A" or "A", on photo of figure 2 and solder.

(4) Carefully dress wire at least one-half inch from all components and secure other end of wire at point "B" or "B" on figure 2, following procedure of steps 2 and 3 above.

(5) Remove all foreign material from work area. Sharp , protruding ends of wire should be avoided to prevent corona discharge.

(6) Bridging faulty cards located at the extreme ends of the stack will require connecting a new wire from point "C" or "C" to point "D" or "D" on figure 2.

(7) To bridge faulty cards located at the center of the stack, connect as in (3) above from point "E" (cathode of the diode) to point "F" which shunts out card "X" or from point "E" to point "G" which shunts out card "Y".

(8) Reinstall repaired stack observing same polarity as noted in step (1) above. Up to twenty perce of the cards of any stack may be shunted in the above manner without reducing the effectiveness of the stack.

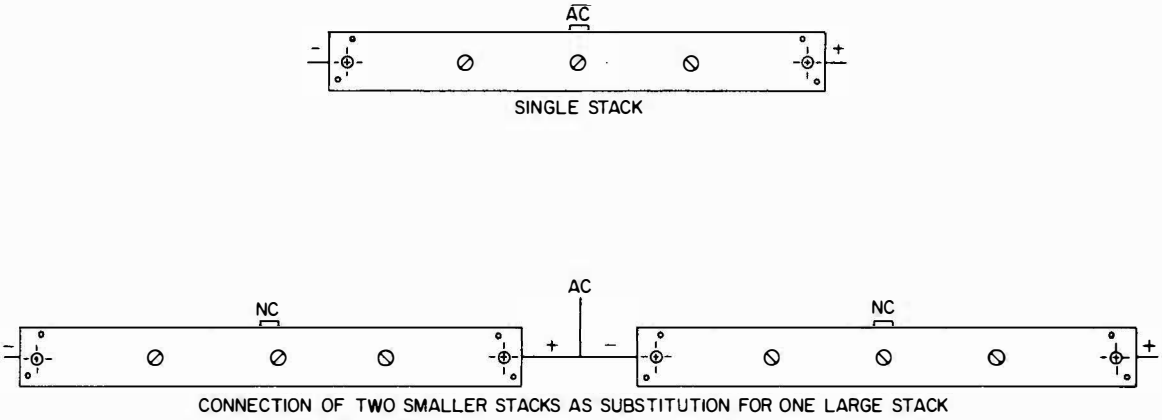


Figure 1. AC Connections to Single and Series Stacks.

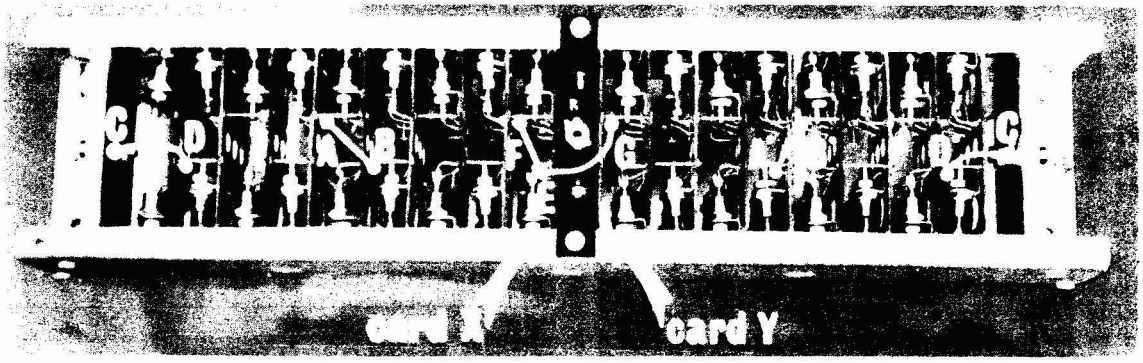


Figure 2. Method of Bridging Faulty Cards.

AN/FRT-39 Transmitter: Excessive Failure of Components in CMO Unit–Maintenance Hint

It has been brought to the attention of the Naval Electronic Systems Command that excessive failures have been encountered in the CMO unit sync indicator circuit of the AN/FRT-39D. Analysis of the failures is that the Keyer KY-554/URT opens the cathode of V305 in the CMO unit which causes V305 to be in a non-conducting state. This increases the voltage on V310 thus causing it to conduct heavily with consequent overheating of R339 and failure of V310.

Activities which experience excessive failure of V310 and R339 in the CMO unit of AN/FRT-39 series are requested to advise Naval Electronic Systems Command via the "User Activity Technical Manual Comment Sheet" normally provided by EIB or other means as appropriate.(788)

AN/FRT-39, AN/FRT-40 Transmitters, Band Switch Detent Mechanism Repair--Maintenance Hint

The indexing mechanism on the rear of IPA Band Switch S-202 in the AN/FRT-39/40 has a teflon wheel which engages a star gear for indexing. The shaft of this wheel has been found to be a high failure rate item and the wheel is not stocked as a discrete part, the entire band switch must be replaced upon failure of the teflon wheel.

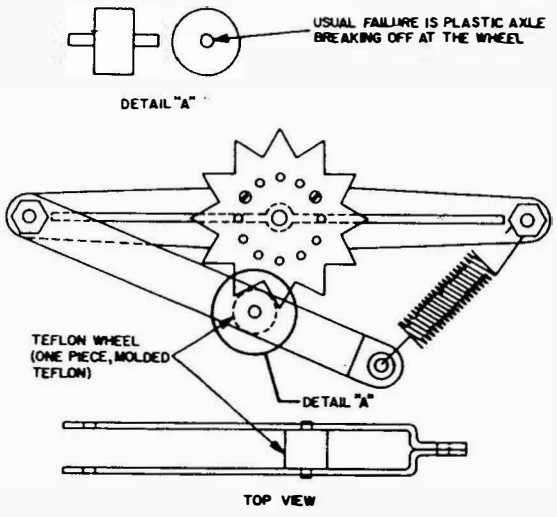


Figure 1. Switch S-202 Index Assembly.

A method of repair of this item is outlined as follows. Refer to figure 1 for details. Steps to be followed in repair are:

1. Remove spring and arm assembly and separate the teflon wheel from the arm by spreading the fork.
2. Drill a 0.125" hole through the center of the teflon wheel.
3. Cut a piece of 0.125 dia. brass rod to slightly more than the width of the fork.
4. Insert the wheel into the fork and press the brass rod through holes in fork and wheel.
5. Peen both ends of the brass rod to hold it in position.
6. Reassemble spring and arm assembly.

This method of repair can be adopted to other switch assemblies which are constructed in a similar manner.(792)

AN/FRT-39, AN/FRT-40, AN/FRT-62 Radio Transmitting Set–IPA (AM-2103/URT) Meter Interpretation and Incorrect Resistor Value

Some activities have experienced low readings of the IPA RF grid voltage while the transmitter appears to be operating normally in other respects.

Aside from circuit malfunctions, this problem may be due to:

a. Improper meter reading interpretation--Position 6 of the Multimeter switch (S204) may be labeled either "IPA Egx1" or "IPA Egx2." This multiplication factor must be included in interpreting the meter reading.

b. Improper value of "multiplier resistor R233 in the multimeter circuit of AM-2103/URT--It has been found that in some equipments, the value of R233 is 120 K ohms vice its proper value of 20 K ohms (for "IPA Egx1") or 39 K ohms (for "IPA Egx2").

Those activities experiencing low IPA grid voltage readings are advised to inspect R233 and, if necessary, replace it with the values cited above. Appropriate replacement resistors are:

20k ohm 1/2 watt FSN 5905-192-0649
39K ohm 1/2 watt FSN 5905-279-3497

This article does not pertain to planned or preventive maintenance. (871)

AN/FRT-39, AN/FRT-40, AN/FRT-62 Radio Transmitter, Announcement of Availability of Replacement Ball Bearings for Blower Assemblies–Maintenance Hint

In the past, Naval Activities which use these equipments have replaced the various component blower motors with new units as failure has occurred. Experience with these equipments has shown that motors with worn-out bearings may be repaired prior to motor seizure/burnout with substantial savings to the Navy. For example, the power amplifier main blower for the AN/FRT-40 transmitter, circuit symbol B-7102, FSN9G4140-606-8656, costs $732.00 to replace. This motor can be fitted with replacement bearings as they become worn-out at a cost of $8.44 per unit plus labor, and thus failure can be avoided if the bearings are replaced when they first become "noisy".

Accordingly, Naval Activities desiring to replace the subject bearings rather than the motors, are advised to procure bearing pullers and replacement bearings as required.

Ordering information for replacement bearings is as shown in Table I.

TABLE I

Blower Motor Description	Blower Motor Circuit Symbol	Number of Ball Bearings Required per Assembly	FSN for Ball Bearings Assemblies	Price per Assembly
AN/FRT-62 P.A. Main Blower	B-5001	1 ea 1 ea	9Z3110-144-8637 9Z3110-927-7919	$1.24 $2.48
AN/FRT-62 PSA, PSB Frame Top Fan	B-6001 B-6601	2 ea	9Z3110-554-0020	$1.20
AN/FRT-40 P.A. Main Blower	B-7102	1 ea 1 ea	9Z3110-144-8637 9Z3110-144-8622	$1.24 $ .86
AN/FRT-40 Top Fan P.A. Section	B-7301	2 ea	*9Z3110-554-6033	$ .63
AN/FRT-40 Top Fan P.S. Frame	B-8102	2 ea	*9Z3110-554-6033	$ .63
AN/FRT-39 P.A. Main Blower	B-800	2 ea	9Z3110-144-8589 9Z3110-776-0643	$ .69 $1.00
AN/FRT-39 IPA Main Blower	B-201	2 ea	*9Z3110-554-6033	$ .63
AN/FRT-39/40/62 Rear Fan Assembly Frame	B-3001	2 ea	*9Z3110-554-6033	$ .63
AN/FRT-39/40/62 Front Fan Aux. Frame	B-3000	2 ea	*9Z3110-554-6033	$ .63

*If blower motor is manufactured by Eastern Air Devices, Inc. use 9Z3110-158-8230, price per assembly - $.88

(EIB 852/881)

AN/URT-19( ), AN/FRT-39( ), AN/FRT-40( ), and AN/FRT-62( ), Radio Transmitters, Improved Alignment Procedure for Side-Band Exciter Model CBE-1, -2

The following improved alignment procedure is hereby provided for the sideband exciter, Model CBE-1, 2 units. This procedure supersedes tables 6-1 & 6-2, section 6, pages 6-1,2,3 of Technical Manual for Sideboard Exciter Model CBE-1,2(0-714/UR).

A. Equipment Required

1. Audio signal generator (TTG or T1S-3 may be used).

2. 70 OHM dummy load Tektronix 011-055 or equal.

3. AN/USM-140 or equivalent oscilloscope.

B. Modulator, Carrier Balance, and Transformer Tuning

1. Remove CBE-1, 2 unit from the auxiliary frame using the CHG unit as a support.

2. Turn the sideband selector switches and carrier level control to OFF and extreme CCW position respectively.

3. Insure that the 250 kHz input from the CHG is at least 1.3 volts RMS (3.68 v p to p) normal indication is 4.1 to 4.5 v p to p.

4. Connect oscilloscope probe to the junction of C-209 and R-209, (near pin 1 of V-204).

5. Turn R-213 (Carrier Balance, USB) to maximum CW position to provide maximum 250 kHz injection signal at T-203.

6. Adjust the top and bottom slugs of transformer T-203 for a maximum indication on the oscilloscope. Normal indication is 1.5-2.0 v p to p.

7. Adjust R-213 (Carrier Balance, USB) and C-216 (Carrier Balance, USB) for minimum indication on the oscilloscope. The 250 kHz leakage signal should not exceed .2 v p to p.

8. Connect oscilloscope probe to the junction of C-226 and R-240 (near pin 5 of V-208).

9. Turn R-244 (Carrier Balance, LSB) to maximum CW position to provide maximum 250 kHz injection signal at T-206.

10. Adjust the top and bottom slugs of transformer T-206 for a maximum indication on the oscilloscope. Normal indication is 1.5-2.0 v p to p.

11. Adjust R-244 (Carrier Balance, LSB) and C-233 (Carrier Balance, LSB) for minimum indication on the oscilloscope.

C. Balance of Combining Network

1. Apply a 1 kHz signal at -30 Dbm (.025 VRMS) at terminals 2 and 4 of E-201 (Channel 1). This signal may be supplied from the T1S-3 in the CW mode with the test switch in the MARK position, or from the TTG or audio generator. The level of this injected signal may be verified by measuring the level at the control grids (pin 6) of V-203 (USB) or V-207 (LSB) with the USB gain or LSB gain controls (R-219 or R-222) in the fully CW positions. The level at pin 6 of V-203 or V-207 should then be .2 v p to p.

2. Connect the oscilloscope probe to the OUT terminal of Z-201.

3. Set the USB channel selector switch to CHANNEL 1. Adjust the USB gain control for a .2 v p to p signal on the scope. Switch the USB channel selector switch to OFF. Do not touch the USB gain control.

4. Connect the oscilloscope probe to the OUT terminal of Z-203.

5. Set the LSB channel selector switch to CHANNEL 1. Adjust the LSB gain control for a .2 v p to p signal on the scope.

6. Connect the oscilloscope probe to the IN terminal of Z-202.

7. Note and record the signal level displayed on the oscilloscope. Switch the LSB channel selector switch OFF and the USB channel selector switch ON. Compare the level with the LSB level noted.

8. Adjust the combining network potentiometer R-237 until the levels noted in step 7 are equal.

D. Adjustment of Carrier Level

1. Set the USB and LSB selector switches in the OFF position.

2. Attach the 70 OHM dummy load to J-202.

3. Connect the oscilloscope probe to the 70 OHM load.

4. Set the carrier level control to 0 DB position.

5. Adjust the carrier insert potentiometer R-236 for .34 v p to p on the scope.

E. Adjustment of USB and LSB Power Indicator Meters

1. Set the carrier level control to the extreme MIN position.

2. Turn the USB channel selector switch to select the 1 kHz input (Channel 1).

3. Advance the USB gain control until the oscilloscope indicates .34 v p to p.

4. Adjust R-216 until the USB meter indicates 100%.

5. Turn USB channel selector switch to the OFF position.

6. Turn the LSB channel selector switch to select the 1 kHz input (Channel 1).

7. Advance the LSB gain control until the oscilloscope indicates .34 v p to p.

8. Adjust R-247 until the LSB meter indicates 100%.

9. Correct level alignment may be verified as follows:

a. Set-up the CBE-1, 2 sideband exciter for normal operation.

b. Set-up the exciter frame for any desired frequency of operation.

c. Observe the M. F. tuning and R. F. output meters on the CHG-2 frequency amplifier.

d. These meters should provide identical indications of 0 DB carrier insertion, or 100% modulation USB or LSB (using the 1 kHz test tone)

(EIB 887)

AN/FRT-40 AND AN/FRT-54 SERIES TRANSMITTERS-TUNING HINT FOR TMC MODEL GPT-40K

It has been determined that the output balance control of the 10-kw driver that is used to excite the 40-kilowatt transmitter has effect on the operation of the 40-kilowatt transmitter to the extent of minimizing the reactive component of drive to the final. The VSWR indication circuitry in the newer 10-and 40-kilowatt transmitters can be used to great advantage by tuning the "Output Balance" control (C916) to minimize the VSWR drive to the final.

In tuning those transmitters that do not contain the VSWR circuitry, it is suggested that the curve illustrated in figure 1 of this article be used to preposition the output balance control. This curve is an idealized curve derived as an average curve taken from readings on several transmitters and will enhance the operation of the transmitter over the total frequency range.

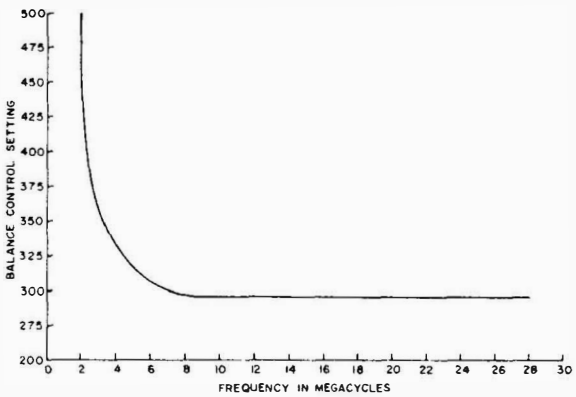


Figure 1. Typical Tuning Curve

AN/FRT-39( ) AND AN/FRT-40( )- MISALIGNMENT OF PLUG AND JACK, CORRECTION OF

See article in AN/FRT-40( ) section under same title.

TIME DELAY FAILURES IN AN/FRT-39 AND AN/FRT-40 SERIES TRANSMITTERS

Refer to article in AN/FRT-39 section under the same title.

RF THERMOCOUPLE FAILURES IN AN/FRT-39( ) and AN/FRT-40( ) RADIO TRANSMITTERS

Refer to article in AN/FRT-39 section under the same title.

MODIFICATION OF AN/FRT-40( ) SERIES TRANSMITTERS

Naval Communication Stations San Francisco and Guam have reported numerous failures being experienced with Pulse Transformer T-8105, a component part of the 10 KV power supply in the AN/FRT-40( ) radio transmitter. High voltage arc-over between terminal No. 1 and the transformer's mounting bracket appears to be a prime contributing cause of all failures reported.

As a preventive and corrective measure, Naval Radio Station (T) Mare Island has been enlarging the terminal clearance hole in the transformer mounting bracket by 1/4 inch in diameter, thereby increasing the arc-path between transformer terminal No. 1 and the mounting bracket. Referral of this matter to the manufacturer has resulted in the following information for dissemination to Naval shore activities:

1. Enlargement of terminal clearance hole in transformer mounting bracket is satisfactory for all AN/FRT-40( ) transmitters up to and including Serial No. 14226.

2. AN/FRT-40C transmitters beginning with Serial No. 14227, and all AN/FRT-62( ) transmitters, are equipped with a redesigned transformer having improved terminal insulation.

3. Appropriate changes were incorporated as an addendum to technical manuals accompanying equipments so modified on the production line. The AN/FRT-40C maintenance manual was subsequently updated and rewritten and bears an issue date of 15 September 1964.

4. The manufacturer's part No. TF-126 and FSN-N5950-645-2946 identifies the original failure-prone transformer. This item is no longer supplied as a spare part by the manufacturer.

5. The redesigned transformer bears the equipment manufacturer's part No. TF-256 and is electrically and mechanically interchangeable with the former TF-126. The item has been assigned stock number FSN-IN-5950-784-7764.

Modification of the T-8106 pulse transformer mounting bracket in AN/FRT-40( ) is approved as a field change pending classification and assignment of a number.

This modification is approved and recommended for early accomplishment, citing this Handbook (NAVSHIPS 900,000.1) as authority. (659)

AN/FRT-40B--AM-115 Power Amplifier Meter Panel Assembly

The technical manual issued 1 June 1962 for the AN/FRT-40B radio transmitter did not contain a spare parts list for the symbol 7200 series items. This series pertains to the AM-115 Power Amplifier Meter Panel section of the transmitter.

The following parts list for the 7200 series item is taken from the Maintenance Manual for AN/FRT-40K, TMC NO. IN0319, Volume III, dated 15 September 1964, and may be of some assistance in identifying parts in the AM-115 panel assembly.

AM-115 POWER AMPLIFIER METER PANEL ASSEMBLY

Sym	Description	Function	TMC Part No.
C7201	CAPACITOR, fixed: mica; .01 µF, ± 10%, 500 wVdc.	Filament Primary Meter Bypass	CM35B103K
C7202	Same as C7201.	Drive Meter Bypass	
C7203	Same as C7201.	Plate Current Meter Bypass	
C7204	Same as C7201.	Plate RF Meter Bypass	
C7205	Same as C7201.	Output Meter Bypass	
C7206	NOT USED		
C7207	NOT USED		
C7208	CAPACITOR, fixed mica; 1000 pF, ± 10%; 500 wVdc.	SWR Bypass	CM20B102K
C7209 thru C7211	Same as C7208	SWR Bypass	
I7201	LAMP, fluorescent: standard cool, 1/2" dia. x 11-1/4" lg.	Meter Illuminating	BI-107
I7202	Same as I7201	Meter Illuminating	
I7203	LAMP, incandescent: frosted; 230/250 V, 25 W; standard screw base; 4" x 1-7/8" o/a.	PA Deck Illuminating	BI-106-2
I7204	LAMP, incandescent: red; 110/115 V, 25 W; standard screw base; 4" x 1-7/8" o/a.	HV ON Light	BI-106-3
J7201	CONNECTOR, receptacle: coaxial.	SWR Connector	UG-625/U
J7202	Same as J7201	SWR Connector	
L7201	COIL, R.F.: fixed; 2.5 mH 100 mA molded case.	SWR Filter	CL-140-1
L7202	Same as L7201.	SWR Filter	
M7201	METER, filament primary: AC voltmeter, 0-300 V, red marker at 230 V; 4-1/2" square case.	Filament Primary	MR-118
M7202	METER, kilovolts, R.F.: 0-1 kV 4-1/2" rectangular case.	Drive	MR-135
M7203	METER, amperes: 0-10 A; 4-1/2" rectangular case.	Plate Current	MR-129
M7204	METER, kilovolts, R.F.: 0-10 kV RF scale, 200 µA DC movement, 4-1/2" square case.	Plate, R.F.	MR-120
M7205	NOT USED		
M7206	METER, kilowatts, R.F.: 0-60 kW 200 µA DC movement.	Unbalanced Output	MR-147
R7201	RESISTOR, fixed: wirewound; 500 ohms, 25 W.	HV ON Light Voltage Dropping Resistor	RW-111-17
S7201	STARTER, fluorescent lamp; 8 W; 13/16" dia. x 1-1/2" lg.	Lamp Starter	PO-170
S7202	Same as S7201.	Lamp Starter	
T7201	BALLAST, fluorescent lamp; 8 W; 118 V, 0.17 A, 60 Hz	Lamp Ballast	PO-169

Sym	Description	Function	TMC Part No.
T7202	Same as T7201.	Lamp Ballast	TS-141
X17201A	SOCKET, fluorescent lamp: 75 watts, 250 volts.	Lamp Socket	
X17201B	Same as X17201A	Lamp Socket	
X17202A	Same as X17201A	Lamp Socket	
X17202B	Same as X17201A	Lamp Socket	
X17203	SOCKET, bulb head mounting: ceramic; for standard base incandescent lamp; rated for 660 watts, 250 volts.	PA Deck Light Socket	TS-143
X17204	Same as X17203.	HV ON Light Socket	
XS7201	SOCKET, starter: fluorescent; 60 watts, 250 volts.	Starter Socket	TS-140
XS7202	Same as XS7201.	Starter Socket	

AN/FRT-39, AN/FRT-40 AND AN/FRT-62 RADIO TRANSMITTER SILICON RECTIFIERS-MAINTENANCE INFORMATION.

See article under AN/FRT-39 with the same title. (EIB 723)

AN/FRT-40 Transposed Leads on Plate Transformer—Maintenance Hint

The Field Technical Authority (FTA) at NAVRADSTA (T) Annapolis has noted that the replacement for the AN/FRT-40 plate power transformers T8101, T8102, and T8103 (FSN 9C6120-774-8584), manufactured by Precision Electronics, Incorporated, may have the start and ending leads of one winding reversed. These transformers are painted grey instead of black. When the transformer with the transposed leads is installed in accordance with instructions and the wires connected to the same numbers as the failed unit, the supply fails to deliver correct voltage.

In case a new transformer is installed and the supply malfunctions, reverse the leads to the primary winding of the newly installed transformer. Tag the primary leads for information to the next maintenance man. This will prevent inadvertent "correction" of the connections at a later inspection. (785)

AN/FRT-39, AN/FRT-40 Transmitters, Bond Switch Detent Mechanism Repair – Maintenance Hint.

See Article under AN/FRT-39 with same title. (EIB 792)

AN/FRT-39,AN/FRT-40,AN/FRT-62 Radio Transmitter, Announcement of Availability of Replacement Ball Bearings for Blower Assemblies--Maintenance Hint

See article under AN/FRT-39 with same title. (EIB 852/881)

AN/URT-19( ), AN/FRT-39( ), AN/FRT-40( ), and AN/FRT-62( ), Radio Transmitters, Improved Alignment Procedure for Side-Bond Exciter Model CBE-1, -2

See article in AN/FRT-39 section under the same title. (EIB 887)

AN/FRT-40 AND AN/FRT-54 SERIES TRANSMITTERS - TUNING HINT FOR TMC MODEL GPT-40K

See article in AN/FRT-40 section under the same title.

AN/FRT-39/40/62 Series Transmitters-Safety Hazard

See article AN/FRT-39 section under the same title (17S)

AN/FRT-39, AN/FRT-40 AND AN/FRT-62 RADIO TRANSMITTERS SILICON RECTIFIERS-MAINTENANCE INFORMATION

See article under AN/FRT-39 with the same title. (EIB 723)

AN/FRT-62, AN/FRT-62A, AN/FRT-62B, AN/FRT-62C AND AN/FRT-62D-RADIO TRANSMITTERS REPLACEMENT PART

Holders of subject equipment are requested to include the following information in correspondence and requests concerning replacement ports:

a. Transmitter model (AN/FRT-62B, etc.)
b. Assembly where replacement part is located
c. Name of part
d. Circuit symbol
e. Manufacturer's part number
f. Federal stock number

EXAMPLE: AN/FRT-62B, 200 KW PA, Capacitor, C5327, TMC# CB 167-2, FSN 9N5910-909-7330

Compliance with the foregoing will greatly enhance efforts to fill replacement part requests. (EIB 723)

AN/FRT-39,AN/FRT-40,AN/FRT-62 Radio Transmitter, Announcement of Availability of Replacement Ball Bearings for Blower Assemblies--Maintenance Hint

See article under AN/FRT-39 with same title. (EIB 852/881)

AN/URT-19( ), AN/FRT-39( ), AN/FRT-40( ), and AN/FRT-62( ), Radio Transmitters, Improved Alignment Procedure for Side-Band Exciter Model CBE-1, -2

See article in AN/FRT-39 section under the same title. (EIB 887)

AN/FRT-83 Series Transmitter "4G" Modules Request for Care in Handling

The purpose of this article is to call attention to the large number of modules received at the repair depot which have suffered physical damage due to mishandling. During the period from 15 December 1974 to 15 June 1975, 183 of 1124 or 16.3% of the parts replaced were damaged due to mishandling.

Some of the causes of this damage are as follows: attempting to insert modules without sufficient care in aligning pins first; failure to tighten modules down, causing damage to hold down screws when drawers are closed; attempting to tighten nuts too far on some of the larger transformers, thus stripping threads, breaking lugs, etc; and dropping modules causing breakage of fragile parts and bending of chassis.

In addition to the damaged modules, 50 of 422 modules processed or 11.9% were found to be non-defective and another 38 or 9% required alignment only.

The net result of the foregoing problems is shown in increased turn around time and more inefficient use of depot resources. If all personnel would take more care in their diagnostic and handling procedures, they would enjoy better support from the module repair depot.

(EIB 919)

AN/FRT-83(V) and AN/FRT-84, Frequency Transmitters — Potential Shock Hazard

The purpose of this article is to advise AN/FRT-83(V) and AN/FRT-84(V) maintenance personnel of a potential shock hazard and to inform them of the availability of DANGER labels that will alert the technician to this hazard.

When the 1 KW power amplifier, RF Amplifier AM-6046/FRT, is withdrawn from its cabinet, 220 VAC is present at relay 1A1K1 terminals 3, 4, and 5 even though the equipment is in standby and interlocks 1A2S1 and 1A2S2 are open. This condition exists when circuit breaker 8A1CB1 is shut. (See Technical Manual for AN/FRT-83(V), NAVELEX 0967-LP-292-9010, figure 4-49 or Technical Manual for AN/FRT-84(V), NAVELEX 0967-LP-293-0010, figure 4-49.) Although a protective plastic cover is installed over relay 1A1K1, this cover is not foolproof and its removal may be required during maintenance.

As an added precaution against the potential shock hazard described in foregoing paragraph, self adhesive DANGER labels are available for distribution by NAVELEXSYSENGCEN, San Diego. This label may be affixed to the protection cover over relay 1A1K1 to remind the technician of the potential hazard. Stations that have not received their DANGER label(s) may acquire same by writing to NAVELEXSYSENGCEN, Code 4311, 4297 Pacific Highway, P.O. Box 80337, San Diego, CA, 92138, referencing this EIB (925), and stating the quantity of labels (1 per equipment) required.

(EIB 925)

Field Change 7-AN/FRT-83/84 Radio Transmitting Set — Installation Difficulty

The purpose of this article is to recommend remedial alternatives to correct the difficulties experienced in the installation of Field Change 7-AN/FRT-83/84.

Installing personnel have reported that the 1-1/4 inch flex hose (Item 23 of field change bulletins NAVELEX 0967-LP-292-9170 and NAVELEX 0967-LP-293-9170) provided with the field change kit is too stiff to ensure a reasonably easy 90° bend where the hose leaves the blower plenum. In some instances, the hose has collapsed at the 90° bend, thereby cutting off air flow to Power Supply PP-6067/FRT.

A procedural NOTE in the field change bulletin (page 7 of NAVELEX 0967-LP-292-9170 and page 6 of NAVELEX 0967-LP-293-9170) mentioned that portions of the procedure had already been accomplished on some transmitters as is indicated by the presence of flex hose between the blower plenum and Power Supply PP-6067/FRT. This hose is much more flexible than that provided in the field change list. A procedural CAUTION stated that those portions already accomplished should be removed and replaced with the parts and material supplied with the field change kit.

As a solution to the difficult 90° bend using the hose provided with the field change kit, those activities that have retained the older more flexible hose may leave it installed or re-install it if it has been removed.

Those activities that did not have the more flexible hose previously installed or have since discarded it, may alter the field change as prescribed below.

AN/FRT-83

Material required: Schedule 40, 1" PVC;

1. Elbow, 90°, 2 each
2. Pipe, 3" long, 1 each
3. Pipe, 5-1/2" long, 1 each

Procedures

1. Remove the hose from the hose adapter at the blower plenum wall.
2. Install a PVC 90° elbow onto the hose adapter in place of the hose. Mount the elbow so that it is pointing straight up.
3. Install the 5-1/2 inch long PVC pipe into the elbow.
4. Add the second elbow to the 5-1/2 inch long pipe so that it is pointing toward the front of the transmitter.
5. Install the 3" long PVC pipe into the elbow.
6. Shorten the flex hose by an amount necessary to install it on the 3" pipe and clamp the hose in place.

AN/FRT-84

Material required: Schedule 40, 1" PVC;
1. Elbow 90°, 1 each
2. Pipe, 3" long, 1 each

Procedures

1. Remove the hose from the hose adapter at the blower plenum wall.
2. Install a PVC 90° elbow onto the hose adapter in place of the hose. Mount the elbow so that it is pointing straight down.
3. Install the 3" long pipe into the elbow.
4. Shorten the flex hose by an amount necessary to install it on the 3" pipe and clamp the hose in place.

The material required may be procured through local supply activities or prepared assemblies may be obtained by writing to NAVELEXSYSENGCEN, Code 4311, 4297 Pacific Highway, P.O. Box 80337, San Diego, CA 92138, referencing this EIB article, and stating the number of assemblies required and for which model (AN/FRT-83 or AN/FRT-84) transmitters.

(EIB 937)

***AN/FRT-83(V) and AN/FRT-84(V) Frequency Transmitters—Lubricant Substitution and Publications Revisions**

The lubricant called for in the PMS requirements on the AN/FRT-83(V) and AN/FRT-84(V) HF transmitters known as "Airo Lubriplate", NSN 9W9150-00-030-0451, is no longer carried in the Navy Supply system. Any general purpose lubricant is acceptable. One readily obtainable substitute is Aircraft and Instrument Grease, MIL-G-23827(A), NSN 9W9150-00-985-7244. The cost is $1.14 per 4 oz. tube.

Pen and ink revisions should be made to the following publications reflecting this substitution:

Maintenance Standards Book AN/FRT-83(V) NAVSHIPS 0967-292-8090 pg viii and pg 13

Maintenance Standards Book AN/FRT-84(V) NAVSHIPS 0967-292-0050 pg viii and pg 16

PMS Cards AN/FRT-83(V) MRC Code C-877 cards BJH9, pg 1 and pg 4 ACP6 pg 1 and pg 3

PMS Cards AN/FRT-84(V) MRC Code C-868 cards BJJ4 pg 1 and pg 4 ACL1 pg 1 and pg 4

(EIB 943)

AN/FRT-85 Radio Transmitting Set—Blower Motor Cable Harness Damage Prevention

There have been some reported incidents of damage to the AN/FRT-85 blower motor cable harness as a result of fan belt breakage; after the fan belts break, the frayed belt parts strike the harness. Inspection of 25 AN/FRT-85 transmitters has revealed that their blower motor cable harnesses were routed incorrectly: the harnesses were dressed to the rear of Shield "C" vice to the front as illustrated in the Technical Manual, NAVSEA 0967-293-1010, Section 2, Figure 2-17. Dressing the cable harness to the rear of the shield exposes the harness to damage from frayed and broken belt parts. Dressing the cable harness to the front of the shield affords harness protection in the event of belt fraying and/or breakage.

The following procedure pertains to both the inspection and correct routing of the AN/FRT-85 blower motor cable harness:

1. De-energize the equipment; tag appropriate switches and circuit breakers.
2. Unlatch and open the right-front door at the power amplifier cabinet.

WARNING

ENSURE HIGH VOLTAGE, HIGH CAPACITANCE COMPONENTS ARE DISCHARGED TO GROUND.

3. Refer to NAVSEA 0967-293-1010, Section 2, Figure 2-17.
4. Inspect equipment for correct blower motor cable harness routing as illustrated in Figure 2-17, i.e., to the front of Shield "C".
5. If cable harness is routed correctly:
   a. Close and latch the right-front door of the power amplifier cabinet.
   b. Return the equipment to its normal operating condition.
6. If cable harness is dressed to the rear of Shield "C":
   a. Remove the cable clamp(s) "B" from the rear of Shield "C".
   b. Remove the cable clamp securing the harness to the right side of the power amplifier cabinet behind Shield "C"; remove the clamp from the harness and discard.
   c. Reroute and dress the cable harness to the front of Shield "C" as illustrated in Figure 2-17.
   d. Install the cable harness clamp(s) "B" on the front of Shield "C"; use original screw holes.
   e. Close and latch the right-front door of the power amplifier cabinet.
   f. Return the equipment to its normal operating condition.

(EIB 971)

AN/FSH-7(V) Recorder-Reproducer--Signal Data Set-Storage Bin Access Door Repair

Various activities using the AN/FSH-7(V) equipment have reported breakage and deterioration of the storage bin access door (A9MP51) hinges because of the absence of door stops. Since the door assembly was not considered to be a failure item during initial provisioning, logistic support was not provided.

Some activities have reported the use of wire rope or metal chain to support the bin access door. Although the adequacy of such fixes is not known, the use of the angle bar support shown in figure 1, appears to offer a worthwile solution to the storage bin access door problem. The stainless steel angle bar can readily replace the existing hinge cover strap on the tape storage bin door and is recommended for implementation where the basic problem exists. The plastic piece, shown in figure 1, should be attached along the top edge of the angle bar to act as a stop and prevent scratching the storage bin access door when open and resting on the stop. *(799)*

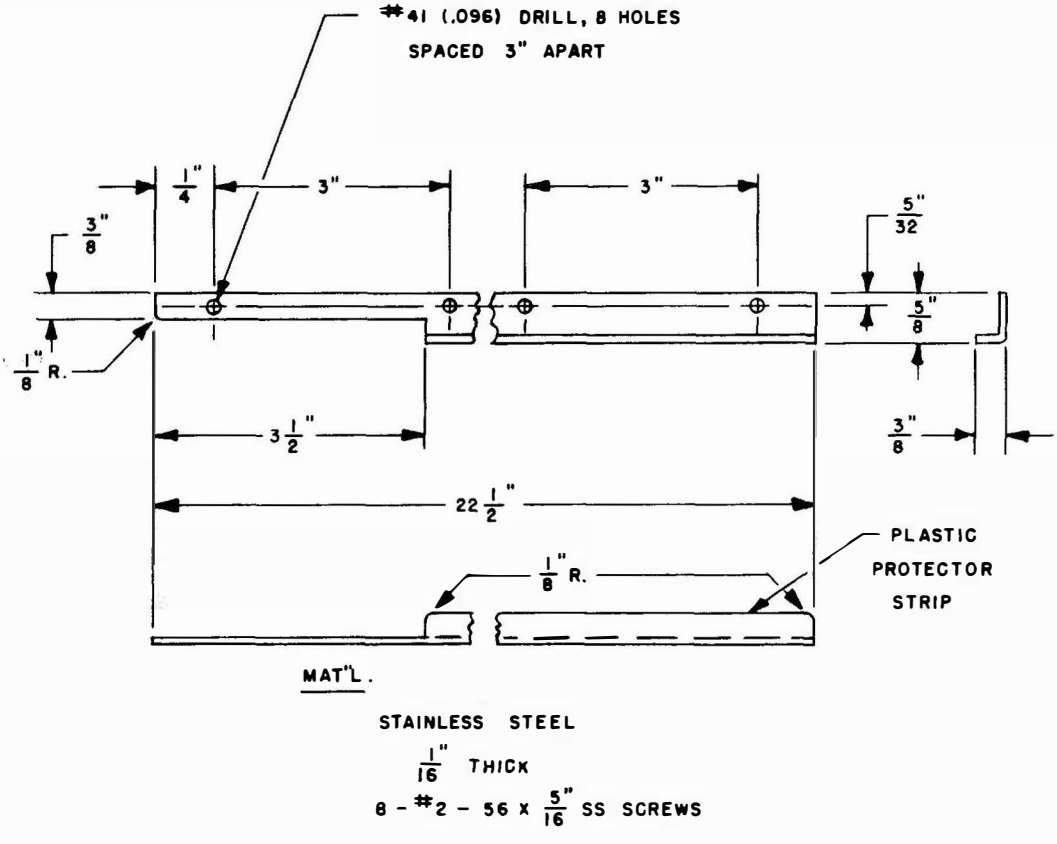


Figure 1. Door Support Tape Storage Bin

AN/FSH-7(V) Dust Cover Door Hinge Repair — Maintenance Hint

This article provides a single, inexpensive method of repair for broken dust cover door hinges in the AN/FSH-7(V) equipment. The hinge, an integral part of the cast aluminum dust cover door, is frequently broken requiring replacement of the entire door. The expense of a new door is avoided by replacing the broken hinge.

NO. DWGS.	DIST LETTER & DATE
1	6641E-247 7-17-75
7	6641E1-237 5-8-75
11	6641E1-553 9-29-75
3	6641E1-69 2-16-73
6	6641E1-286 5-8-74
1	Rec. NAVSECNORDIV 6-22-75
8	6641E1-319 7-15-75
4	6642E1-406 10-7-71
6	6642E1-508 12-29-71
8	6641E1-604 10-8-75

Parts Needed:

Allen Head Screw 10-24 X 1-1/4" (two per hinge) 9Z305-00-978-9359
5/8" Brass Hex Rod 1-7/8" per hinge (10 ft. min order) 9Z530-00-232-5618

Repairs are accomplished as listed in the steps below:

1. Remove all but 1/16 inch of existing hinge with hacksaw and file. The remaining portion will serve as a guide for alignment of the new hinge piece.
2. Cut off 1-7/8 inch brass stock and drill the 17/64 inch hole as shown in figure 1.

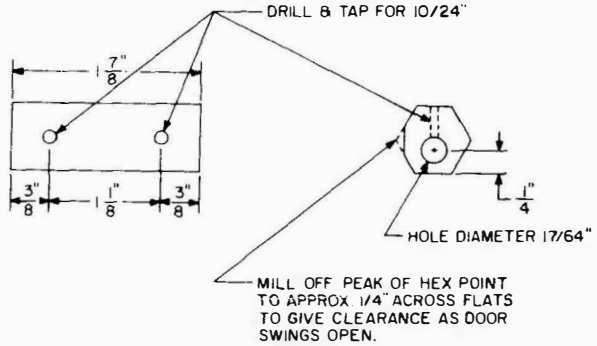


Figure 1. Replacement Hinge Dimensions.

3. Refer to EIMB Reference Book (NAVSEA 0967-LP-000-0140) Screw, Drill and Tap Data. Drill and tap the holes for the 10-24 mounting screws in the brass stock.
4. Drill two holes in the door for the screws. Final alignment of the hinge may be achieved by filing the bearing surface of the hinge for equal weight distribution.
5. Mill off the peak of hex point to give clearance for the door to swing open.
6. Place flat washers as necessary under the mounting screw head to prevent screw from contacting hinge pin.
7. Re-adjust door latch if necessary.

(EIB 913)

AN/GMQ-13 Cloud Height Set–Heater Power Supply Information

The DC voltage level applied to the heaters of the first and second amplifier stages of the detector amplifier of Cloud Height Set AN/GMQ-13 (all models) has been found to have considerable effect on the amplifier noise level and signal-to-noise ratio. This voltage level should be 4.8V DC, measured at the output of the heater supply (point "B", figure 7-4, of NAVAIR 50-30GMQ-13-1). The D.C. output voltage may be made variable by replacing resistor R-239 with an adjustable, 10-ohm, 10-watt resistor (IRC 1-3/4 AA or equal).

This modification should be made in all installations where higher than normal noise is experienced at the detector amplifier output. An accurately calibrated vacuum-tube voltmeter must be used when making the adjustment to 4.8V DC.

If difficulty is encountered in obtaining bridge rectifier CR-201, utilized in the 4.8V heater power supply, a replacement such as Motorola P/N MDA 952-1, or equivalent, may be utilized. *(751)*

Installation Notes On AN/GRA-47 and AN/GRA-48 Shore TACAN Antennas

An excessive number of failures has been experienced in these types of antennas due to bearing failures, open antenna array, and vibration.

A total of 20 were purchased for the Bureau of Weapons Ground Electronics Program, and no further procurement of this type will be authorized. In order to insure the longest service-life possible, it is recommended that the following steps be taken during installations:

(a) The tower antenna-base plate should be machined flat if possible. If not, set the antenna on the base plate and insert shims where necessary to correct for an unlevel or warped base plate.

(b) Lighten the mounting bolts after all shims are in place, to prevent damaging stress to the antenna base.

(c) Ascertain that all screws holding the access covers are tight. When the magnetic deviation has to be set during a flight check, be sure to replace the access cover as soon as possible. It has been found that antenna vibration increases with these access covers removed. (534)

AN/GRC-27, Preventing Down Time

A number of AN/GRC-27 equipments have been immobilized by broken contact pins on the special sockets for the two 4X150A tubes (V-601, V-602) in the RF power amplifier. This can result when the tube is replaced and the key on the tube stem is not alined with the guide in the socket. Pushing the tube "home" results in breaking the contacts. Special attention to this situation when replacing tubes is suggested.

AN/GRC-27 LUBRICATE HELIPOT R601

Proper lubrication can prevent the Helipot (R601) shaft from freezing in its bearing. This type of mechanical failure has occurred, and results in breakage of the associated flexible shaft coupling (to the tuning drive motor). If such a failure occurs before preventive maintenance can be effected, repair can be made by carefully disassembling the helipot, refinishing the shaft and bearing with corcus cloth, and lubricating the bearing area after reassembly. Replace the shaft coupling if it has broken.

During routine preventive-maintenance procedures, put a drop or two of oil (MIL-L-664) on the shaft bearing of Helipot R601. Helipot R601 is now carried as a stock maintenance item.

IM-89/UR CHECKING AN/GRC-27 TRANSMISSION LINE

The Standing Wave Indicator IM-89/UR can be used in checking the transmission line of AN/GRC-27 by operating the transmitter-receiver at 60 watts and using the "percent reflected power" indication as a measure of the transmission line condition.

C-1180/GRC-27 START-STOP RELAY ADJUSTMENT

Armature chatter in start-stop relay K-105 in Radio Set Control C-1180/GRC-27 has been reported. This relay was changed to a shock-resistant type (Price Electric Company Type 2107), starting with Serial No. 116. The armature return springs are adjusted by the manufacturer so that the relay would close at 100-volts line voltage. When the coil heats up after a short period of operation, the ampere-turns ratio decreases somewhat. This results in a tendency for the springs to open the relay, causing armature chatter slight decrease in the spring tension, permitting closure on 90-volts line voltage, will correct this condition.

Radio Set Controls C-1180/GRC-27, Serial 116 through 315, can be adjusted in the field by bending the armature return spring arms (see figure 1) upward slightly. A variable transformer (Variac or similar) should be used when marking this adjustment after the relay has cooled for several hours, to obtain relay closure at 90-volts line voltage. If the spring tension is decreased too much, then the relay contacts are sure to open under mechanical shock and shut down Radio Set AN/GRC-27.

Radio-Set Controls, Serial 1 through 115, will be field changed to use the new, properly adjusted relay. Stock maintenance relays of the old type will be replaced with the new type.

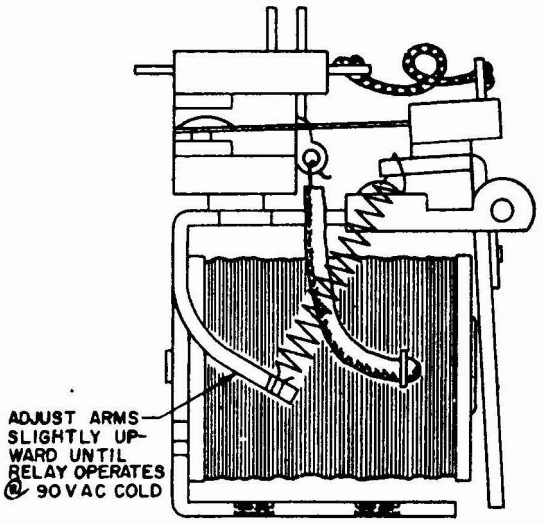


Figure 1. Relay K-105, Armature Return Spring Arm Adjustment

BROKEN END PLATES ON RF TUNERS ON THE AN/GRC-27A

Reports have been received of numerous cases of broken end plates on RF Tuners Z501, Z502, and Z503 in the driver unit of T-217A/GR. The broken end plates are apparently a result of extraction or insertion of 2C39A tubes without paying heed to the warning, "Caution-loosen clamp and use twisting motion to extract or replace tubes," stamped on the unit cover plate. It is suggested that strict adherence to this procedure be followed to avoid unnecessary damage to the tuners.

AN/GRC-27A—WIRE CODE LEGEND

It has been pointed out that there are difficulties in identifying internal leads in the AN/GRC-27A because of omission of a wire code legend in NAVSHIPS 92774. This legend is published herewith (figure 1.) for use by all activities concerned with servicing the AN/GRC-27A:

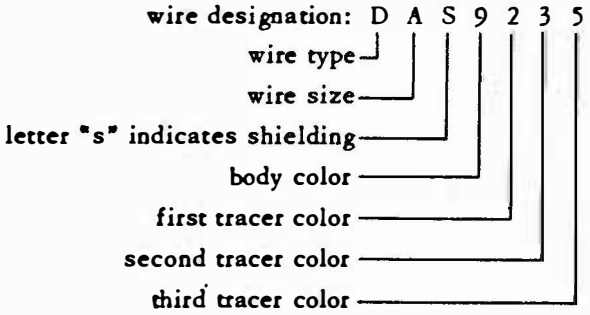


Figure 1. Wire Code Legend

A	AN-J-C40 wire
B	Busbar, round, tinned copper
C	JAN Type WL (600 volts)
D	Miniature JAN wire (Prodelin)
R	JAN Type SPIR (1000 volts)
V	JAN Type SRHV (2500 volts)

Wire Size	
A	No. 22 AWG
B	No. 20 AWG
C	No. 18 AWG
D	No. 16 AWG
E	No. 14 AWG
F	No. 12 AWG
G	No. 10 AWG
H	No. 8 AWG

Color	
0	Black
1	Brown
2	Red
3	Orange
4	Yellow
5	Green
6	Blue
7	Violet or Purple
8	Gray
9	White

AN/GRC-27 and AN/GRC-27A Radio Sets, Adjustable Tuning Cores

Many electronic techicians are ordering transformers for the AN/GRC-27 and AN/GRC-27A when the tuning core fails. The tuning cores are not packaged with the transformer as an assembly, and, therefore, must be ordered separately. Listed below are symbols of the transformer, coils, and cores with the respective Federal Stock Number of each core:

Receiver (R-278/GR, R-278A/GR, R-278B/GR)

Transformer	Coil	Core	Core Stock No.
T401	L402	E405	9N5950-647-8402
T401	L403	E405	9N5950-647-8402
T402	L404	E405	9N5950-647-8402
T402	L405	E405	9N5950-647-8402
T403	L407	E405	9N5950-647-8402
T403	L408	E405	9N5950-647-8402
T501	L501	E506	9N5950-647-8399
T501	L502	E507	9N5950-647-8399
T502	L503	E508	9N5950-647-8399
T502	L504	E509	9N5950-647-8399

Transmitter (T-217/GR and T-217A/GR)

T401	L403	E421	9N5950-645-0464
T401	L404	E420	9N5950-645-0464
Z401	L405	E422	9N5950-645-0464
T402	L406	E419	9N5950-645-0464
T402	L407	E418	9N5950-645-0464
T403	L408	E417	9N5950-645-0464
T403	L409	E416	9N5950-645-0464

NOTE: This information was assembled from NAVSHIPS 92774, Section 7, and Allowance Parts List for AN/GRC-27 NOMENCLATURE CODE 55376100, dated Dec. 1960, and Allowance Parts List for AN/GRC-27A NOMENCLATURE CODE 55376101, dated Jan. 1962.

AN/GRC-27 Radio Sets — Maintenance Information

Tuning (parallel) lines of the grid and plate circuits in the power amplifier of Radio Transmitter T-217A/GR are subject todamage that destroys the effectivness of their coin-silver contact surfaces. When such damage occurs, the shorting bars no longer make the positive contact required to ensure power output and reset accuracy. The following procedure for rehabilitating these lines was submitted by the Long Beach Naval Shipyard.

While the information contained herein is directed to field activities which have facilities for silver plating operations, it also should be of interest to field activities responsible for the maintenance and repair of these equipments.

A. REMOVAL AND DISASSEMBLY

The following removal and disassembly procedures must be performed before silver plating operations are begun.

NOTE: Figures and paragraphs referenced herein are found in NAVSHIPS 92774.

1. Remove power amplifier subassembly from transmitter chassis (paragraph 6-3b (10)).
2. Remove plate side cover (figure 6-19).
3. Remove blower housing and blower from grid side (figure 6-19). Remove two screws securing motor support to power amplifier subassembly and two screws securing forward end of blower housing to allow motor blower assembly to be lifted from side without damage to the motor wiring.
4. Remove two screws securing plate on which resistors R608, R609, and R613 (figure 6-19) are mounted.
5. Remove two screws securing capacitor C615 to plate A601 (figure 6-22).
6. Remove two screws securing resistors R606 and R605 (figure 6-22).
7. Remove all screws securing plate A601 to power amplifier chassis.
8. Unsolder lead at L603 which connects to Z602 (figure 6-20).
9. Remove nuts, washers, and screws securing teflon insulator located between tuning lines and screen.
10. Remove two retaining rings from shaft 0643 (plate line) and retain for reuse.

NOTE

Care should be taken in removing retaining rings as they will be difficult to obtain through supply channels.

11. Unsolder brass strap E625, each end of which is soldered to each half of tuning lines.
12. Loosen coupler (figure 6-22).
13. Remove side plate A644(figure 6-19) and, at same time, remove Z602 (figure 6-20) as an assembly from power amplifier.

B. INSTRUCTIONS FOR SILVER PLATING

1. Remove side plates from tuning line Z602.
2. Machine tuning line to a smooth finish, removing as little metal as possible.
3. Flash with copper (paragraph D) from 1-1.5 minutes at 1.5 volts with tank temperature at 100-110 degrees Fahrenheit.
4. Coat with 1 Mil of silver (paragraph D) for one-half hour at 1 volt.
5. At completion of plating, buff bright with a Bristol brush.

C. REASSEMBLY AND ALIGNMENT

1. Reassemble tuning lines by performing, in reverse order, disassembly procedures.
2. Use the following procedure to reload the spring-loaded gears:

a. Located on left side of Power Amplifier are four studs which are in line with plate loading gears 0619 and 0621. Fit apertures in 0619 and 0621 to these studs; loosen lock nut and slide loading gear toward side plate of power amplifier. Studs will now fit in apertures, locking 0619 so that it cannot move.

b. Using a flat blade screwdriver, press 0607 until it slips between 0619 and 0621.

c. Load 0621 by turning it clockwise.

d. Release tension on 0607. This locks 0619 and 0621.

e. Slide 0619 and 0621 in place and tighten lock nut.

Care should be taken to ensure that studs fit in apertures, locking 0619 so that it cannot move. Equipment does not have to be disassembled to accomplish the above work.

3. Align power amplifier and servo system tracking in accordance with instructions in paragraphs 6-2c (8) (a) through 6-2c (8) (f).

D. INSTRUCTION FOR SILVER PLATING

WARNING

Cyanide poisoning can result from improper handling of the chemicals that comprise the plating solutions. This plating process is to be undertaken only by a Naval Shipyard or Repair Facility where a chemist is available to supervise the preparation of these solutions.

The plating solutions are prepared as follows:

* Copper solution	–
Copper Cyanide	– 3.5 oz. per gal. of water
Sodium Cyanide	– 4.6 oz. per gal. of water
Sodium Carbonate	– 4.0 oz. per gal. of water
Rochelle Salt	– 6.0 oz. per gal. of water
Copper Metal	– 2.5 oz. per gal. of water
Free NaCN	–0.75 oz. per gal. of water
pH adjusted with Caustic Soda	–12.5 oz. per gal. of water
Current Density	–20-50 amp per sq. ft.
**Silver Solution	–
Silver Cyanide	– 10-15 av. oz. per gal. of water
Potassium Cyanide	– 12-18 av. oz. per gal. of water
Potassium Carbonate (min) 2	– av. oz. per gal. of water
Potassium Hydroxide	– 0-4 av. oz. per gal. of water
Metallic Silver	– 7.5-11.5 tr oz. per gal. of water
Free Cyanide	– 7-12 av. oz. per. gal. of water
Temperature	100-120°F
Current Density	50-100 amp per sq. ft.

AN/GRC-27, -27A RADIO SET - TRANSMITTER IF ALINEMENT.

The purpose of this article is to provide a detailed alinement procedure of IF strip in the T-217A/GRC-27A Transmitter.

Information gained from Performance and Operational Reports and CASREPTS received by the Electronics Maintenance Engineering Center (EMEC) has shown that alinement of the IF strip in the T-217A/GRC-27A transmitter has been a cause of prolonged equipment downtime. Alinement as outlined in the Technical Manual, NAVSHIPS 92774, page 6-24, paragraph (5), although a reliable alinement procedure, is presupposing that the "sum frequency" of the 1 and 0.1 mc oscillators will be the only available signal at J-403. This definitely is not true, and unless T-401, T-402, and T-403 are actually tuned to the "sum frequency" of the 1 and 0.1 mc oscillators, alinement is impossible to accomplish.

IF and Oscillator Alinement:

1. Before attempting to aline the IF amplifiers and oscillators, proceed with the following preliminary steps.

Step a. Set the frequency selector unit to 399.9 mc. The cam followers will be on the first step of the cams.

Step b. Adjust the slugs in each of the amplifiers and the oscillator (T-401, T-402, T-403, and Z-401) to approximately 1-7/32 inches down from the surface of the shielding can.

Step c. Disconnect the B+ to tube V-406 at feed-through insulator E-429 (junction of C-456 and L-414).

Step d. Remove tubes V-305 and V-101.

Step e. Put the brass end of the tuning wand in the plate side (primary) of transformer T-401. Leave the wand in place until Tuner Z-401 is tracked.

2. To tune the 1 mc oscillator, proceed as follows.

Step a. Set the frequency selector unit to 390.0.

Step b. Connect dc VTVM AN/USM-116, or equivalent, to Jack J-402.

Step c. Key transmitter and adjust coil L-405 for a peak indication on the VTVM.

Step d. Set the frequency selector to 399.9 mc.

Step e. Adjust trimmer C-433 for a peak indication on the VTVM.

Step f. Repeat steps a. through e. until adjustment of either capacitance or inductance no longer causes an increase of negative voltage at jack J-402.

Step g. Unkey transmitter, and remove tuning wand from primary of T-401.

> NOTE: It is possible for the mixer to oscillate as a tuned plate-tuned grid oscillator if Tuner Z-401 is tuned to the IF frequency instead of the crystal frequency. This situation may occur, since these two frequencies are separated by only 2.0 mc. An oscillating mixer will cause a reading of approximately - 5.0 volts at J-402. The reading will be approximately -3.0 volts dc at the correct operating frequency.

When a Frequency Counter (CAQI-524 or equivalent) is available, frequency of the 1 and 0.1 mc oscillator should be checked. This may be accomplished by removing V-401, inserting tube socket adapter, replacing V-401, and taking signal from pin 7 of V-401. The 1 and 0.1 mc oscillator signals are present at this pin.

The frequency of the 1 and 0.1 mc oscillators should be checked in each of their incremental steps.

After completing frequency check, remove tube socket adapter and replace V-401.

3. To check the 0.1 mc oscillator, proceed as follows:

Step a. Connect the dc VTVM to Jack J-401.

Step b. Key the transmitter and check the voltage at J-401 with dc VTVM. The voltage should range between -12.0 and -20.0 volts dc.

Step c. Unkey transmitter.

4. Tuning the IF:

Step a. Set the frequency selector unit to 390.0 mc.

Step b. Adjust capacitors C-408, C-417, C-424, C-436, and C-443 for approximately one-half capacity (silvered portion up).

Step. c. Remove tube V-403 and place rf probe or ac probe on pin 1 of V-403 socket.

> NOTE: Correct voltage will be approximately 0.1 volts rms. Incorrect voltage could be as much as 3 volts rms.

Step d. Key transmitter and tune powdered iron cores in T-401 primary and secondary for peak on VTVM.

Step e. Remove V-402. Voltage at pin 1 of V-403 should drop to ZERO.

> NOTE: If the output drops to ZERO, T-401 has been properly tuned and you may continue with alinement procedures as given in this article. If the output does not drop to ZERO, T-401 has been tuned to 18 mc, which is the output of the 1 mc oscillator only. This is the part of the alinement procedure that has been causing the difficulty, and making IF strip alinement almost impossible.

Step f. Replace V-402.

> NOTE: If T-401 has been tuned to the 1 mc oscillator only, it is tuned too low in frequency. To tune to a higher frequency, it will, therefore, be necessary to decrease inductance by turning the powdered iron cores in the primary and secondary of T-401 clockwise while looking for a second peak on the VTVM. The second peak will be very slight and can be easily overlooked. As a general rule, 3 or 3 1/2 turns of the powdered iron cores is all that is required.

When T-401 is tuned to the second peak, remove V-402 and the output will drop to zero.

Step g. Unkey transmitter and change frequency selector to 399.0 mc.

Step h. Key transmitter and tune trimmer capacitors C-417 and C-408 of T-401 for a peak on VTVM.

Step i. Repeat steps a, d, g, and h until output is peaked on both the inductors and capacitors.

Step j. Remove tube V-402 and make sure output still drops to ZERO.

Step k. Unkey transmitter and replace V-402 and V-403.

Step l. Remove tube U-405 and perform steps a, d, g, and h to tune T-402, using capacitors C-424, 436, and inductors L406 and L407.

Step m. Unkey transmitter and replace V-405.

Step n. Remove tube V-406 and place ac or rf probe on pin 7 of V-406 tube socket.

Step o. Repeat steps a, d, g, and h to tune T-403, using capacitors C-443, C-447 and inductors L-408 and L-409.

Step p. Unkey transmitter and replace V-406.

Step q. Set VTVM to - 10 volt dc scale and connect to Jack J-403.

Step r. Repeat steps a, d, g, and h, trimming all capacitors and inductors in T-401, T-402, and T-403 slightly for maximum voltage at jack J-403.

NOTE: Step r. in a final touchup. Upon completion, V-402 should be removed to assure that the IF strip is still tuned to the sum frequencies of the 1 and 0.1 mc oscillators.

Step s. Reconnect B+ to tube V-406 at feedthrough insulator E-429 (junction of C-456 and L-414).

5. Replace tubes V-305 and V-101; IF strip tuning is completed.

AN/GRC-27 AND AN/GRC-27A - FEDERAL STOCK NUMBERS OF MAJOR UNITS

The stock numbers of subassemblies for the AN/GRC-27 and AN/GRC-27A are not listed in the allowance parts list. The following list of stock numbers is provided in the event that replacement subassemblies are required. All subassemblies listed with stock numbers are available in the supply system.

Reference Designation	Federal Stock Number	Item Name
101-199	1N5820-503-3383	Receiver RF Amp.
201-299	1N5820-765-4525	Receiver RF Osc.
301-399	1N5820-319-2089	Receiver RF Amp.
401-499	2N5820-642-7666	Receiver IF Amp.
501-599	2N5820-642-7648	Receiver IF Amp.
601-699	No FSN	Receiver IF Amp.
801-899	No FSN	Receiver AF Amp.
901-999	No FSN	Receiver P Supply
1001-1099	No FSN	Receiver DC Filt.
1101-1199	2N5820-378-4807	Receiver Freq. Sel.
101-199	2N5820-665-0683	Transmitter RF Amp.
201-299	2N5820-642-6904	Transmitter RF Osc.
301-399	2N5820-318-4439	Transmitter RF Amp.
401-499	2N5820-301-0917	Transmitter IF Amp.
501-599	2N5820-665-0684	Transmitter RF Amp.
601-699	2N5820-665-1110	Transmitter RF Amp.
701-799	No FSN	Transmitter Servo Amp.
1101-1199	2N5820-378-4807	Transmitter Freq. Sel.
1301-1399	No FSN	Transmitter AF Amp.

AN/GRC-27 AND AN/GRC-27A - MAINTENANCE HINT TO OBTAIN INCREASED LIFE OF DRIVER AND AMPLIFIER TUBES

The purpose of this article is to disseminate procedures for extending the service life of the Driver and Power Amplifier tubes in the AN/GRC-27 and the AN/GRC-27A.

The Electronic Maintenance Engineering Center has determined that extended service life of the Driver and Power Amplifier tubes (V-501, V-502, V-503, V-601, and V-602) can be obtained by adjusting the filament voltage applied to these tubes for a value between 5.4 and 6.0 volts ac. The upper limit of 6.0 volts ac should never be exceeded.

In a three-month trial period conducted at U.S. FAAWTC, Dam Neck, the tubes were operated at the proper filament voltage, as set forth herein. During this trial period, tube usage has been on the order of one tube per week.

The filament voltage supply to these tubes is controlled by the FIL VOLT ADJ switch (S-1204) which is located on the left side panel of the transmitter chassis. This switch should, for most installations, be set at the 118-volt position.

The filament voltage supply to these tubes should be measured with an AN/PSM-4 multimeter or equivalent and can be accomplished as follows:

1. Remove the servo amplifier sub-assembly.
2. For tubes V-501, V-502, and V-503, connect the multimeter between Terminal 12 of transformer T-1201 and ground. Multimeter should indicate from 5.4 to 6.0 volts ac.
3. For tubes V-601 and V-602, connect the AN/PSM-4 multimeter between Terminal 10 of transformer T-1201 and ground. Multimeter should indicate from 5.4 to 6.0 volts ac.

If the filament voltages at these points exceed the upper limit of 6.0 volts ac, set the FIL VOLT ADJ switch (S-1204) to the 123-volt position and measure voltage at the above points. Multimeter should then indicate from 5.4 to 6.0 volts ac.

NOTE: It should be noted that, by setting the primary input, voltage will be reduced accordingly.

Upon completion of above voltage measurements, replace servo amplifier sub-assembly and return equipment to normal operation.

AN/GRC-27A, Power Amplifier, Maintenance Hint

One of the existing problems of AN/GRC-27A Power Amplifier Assemblies has been the poor contract between the plate of the 4X150 and the plate socket connecting fingers. If all fingers are not touching, the circuit Q is lowered and the high plate current at point of contact causes burnt spots on the plate of the 4X150's. This can be observed by looking down on the power amplifier tubes, and/or by spots on the plate of the 4X150 when removed from XV602.

This can be remedied by the:

a. Removal of 4X150 from the socket.

b. Bending the fingers toward the center of the tube socket using a tool in the form of a hook, such as a dentist's scaler.

c. Care must be exercised to prevent breakage of fingers and the possibility of the fingers falling into the grid tank.

d. Replace tubes (V601 and V602) and visually check contact to the tubes.

With the proper contact of all fingers on the plates of 4X150's, proper alignment will be easier to accomplish, and tube life (4X150) will be extended. (629)

RADIO SET AN/GRC-165( )-INFORMATION CONCERNING

The U. S. Army has procured Radio Set AN/GRC-165. The AN/GRC-165 is an equivalent equipment to the U. S. Navy Radio Set AN/URC-58. The prime differences between the equipments are in color (the AN/GRC-165 is standard Army olive drab), the manual antenna coupler is mounted on a shock and vibration separated from the the receiver-transmitter unit (the AN/URC-58 has both units mounted on one single mounting), and a difference in case design for more rugged environment. Other than those differences, the equipment circuit design and components are the same as for the AN/URC-58.

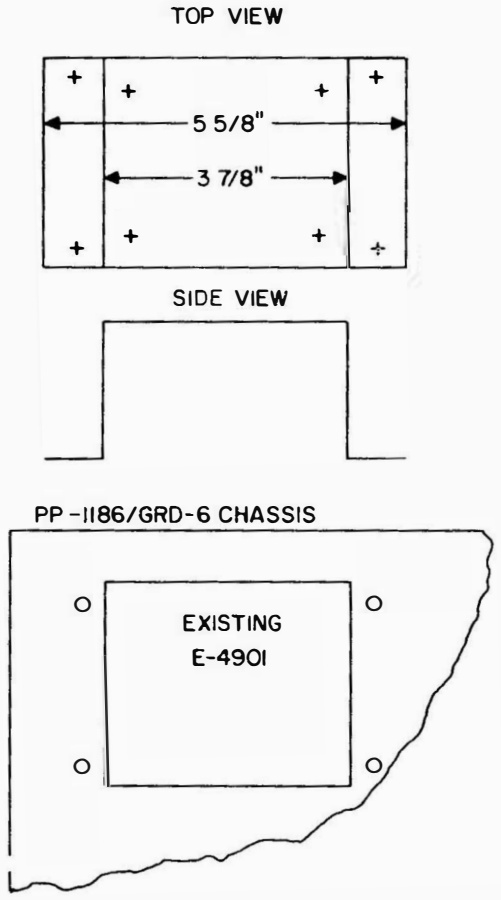
The AN/GRC-165 has a primary power input capability of 115/230 VAC, 24 VDC; the AN/GRC-165X is 115/230 VAC, 12 VDC; and the AN/GRC-165Y is for 115/230 VAC only.

The above information is furnished for reference in equipment similarity to that used by the U. S. Navy and is provided for possible local emergency support assistance purposes. (EIB 721)

Federal Stock Number Assigned for Solid State Replacement for E-4901 Now Used in the PP-1186/GRD-6 Power Supply

ESO recently assigned IN 6130-069-9851 as the FSN for the Chicago Condenser Company Model 551-NR Solid State High Voltage Power Supply Replacement for the E-4901 unit now used in the PP-1186/GRD-6. Using activities should order E-4901 replacements by the new number as ESO has been requested todeplete all stocks of the E-4901, and to issue only the new 551-NR units. Using activities must fabricate mounting brackets locally, as shown in figure 1, to install the 551-NR in the same space from which the E-4901 unit was removed.
Figure 1.

Figure 1.



Tube Type USN-SAL-89 – Determination of Restoration Feasibility

Tube Type USN-SAL-89 (FSN IN5960-844-8284) is used in radio transmitter applications AN/GRN-9A, -9B, -9C, -9D; AN/SRN-6, -6A, -6B; and AN/URN-3A. ESO Instruction 4440.100A requires that spent USN-SAL-89 tubes be returned to NSC Bayonne for determination of restoration.

All personnel concerned with equipment maintenance are requested to ensure that tubes are turned in with leads, ground screw, output coupling plug, and cathode protective cover (cup). In addition, personnel will assure that equipment malfunction is in reality a result of fatigue of the USN-SAL-89 prior to removal and return of same to NSC Bayonne. Tubes meeting specifications and having additional useful life are being discarded. Considering the high unit cost, substantial TYCOM funds are being utilized for the erroneous replacement of non-defective tubes.

The new nomenclature for the SAL-89 (FSN IN5960-844-8284) is the type 8493 (FSN IN5960-079-4043). Turn-in of this preferred version also should be accomplished in accordance with ESO Instruction 4440.100A. (634)

UNDESIRABLE OSCILLATIONS IN AN/URN-3A, AN/SRN-6 (SERIES), AND AN/GRN-9 (SERIES) TACAN

See article in AN/URN-3 section under the same title.

General Tuning Procedure for Sperry SAL-89 Klystron

Introduction–This tuning procedure describes the application of the SAL-89 klystron to the AN/GRN-9A, AN/GRN-9B, AN/GRN-9C, AN/SRN-6, and AN/SRN-6A TACAN system. The procedure describes the means by which rated klystron output power and best spectrum can be achieved without creating dangerous voltages along the rf transmission line. Unless this procedure is followed carefully, damage can result in the SAL-89 klystron output connector and consequently ruin the tube.

SAL-89 Aging Procedure–This procedure to be followed for all new tubes and tubes which have not been operated for a period of more than 3 months.

1. Reduce the grid drive voltage to zero. (Do not change the bias voltage from its normal -125 v setting.)
2. Disconnect the rf drive at the input BNC jack on the klystron.
3. Apply rated filament voltage for 15 minutes.
4. Rearrange the main power transformer T1001 or T1002 primary from delta to wye.
5. Apply the resulting beam voltage (Approximately 7 kv. from step 4 above) for 15 minutes.
6. Increase the grid drive from zero to a value which gives 10 ma. of average beam current.
7. Increase the grid drive for an additional 10 ma. of average beam current every 5 minutes until 50 ma. of beam current is reached.
8. Reduce the beam voltage to zero and reconnect the power transformer in its original delta setting.
9. Apply the rated beam voltage and continue to increase the grid drive to values which provide 10 ma. beam current increases every 5 minutes until the current reaches 90 ma.

The tube now is considered to be properly aged and ready to be placed into service.

SAL-89 Tuning Procedure–The proper tuning procedure as outlined contains three basic steps (conditions A, B, and C):

A. Create a matched rf transmission line while operating at reduced klystron output power levels. (Follow steps 1 through 8 below.)

B. Apply rated klystron output power to this matched line by tuning the klystron to deliver maximum power at rated operating voltage. (Follow steps 9 through 12 below.)

C. Without retuning the klystron output cavity, adjust the matching transformer, filter cavities, and klystron input and middle cavity for best shape and spectrum with rated antenna power. (Follow step 13.)

When the followings steps are applied, these conditions will be fulfilled, and no damage will occur to the SAL-89 klystron output connector from high transmission line voltages and rf arcing.

Condition A–Steps to follow:

1. To a tube which has been preset to the desired operating frequency range by the manufacturer's tuning curves, and properly aged as described above, turn grid drive control to minimum drive and reconnect the BNC input jack on the klystron.
2. Apply rf drive and increase the grid drive to a value corresponding to 30 ma. of average beam current.
3. Alternately tune the input cavity of the klystron and the rf exciter for maximum absorption of power from the exciter at the time in the rf pulse when the grid drive pulse is at its peak. This is observed at the reflected coupler on the rf drive line.
4. While viewing the center cavity monitor of the klystron (using a crystal detector and oscilloscope), adjust the center cavity of the klystron for maximum amplitude of the detected pulse.
5. Adjust the output cavity of the klystron for maximum detected voltage on the first incident coupler of the output transmission line.
6. Tune the first filter cavity for a minimum at the peak of the pulse when viewed at the reflected coupler.
7. Tune the second filter cavity for maximum on the second incident coupler.
8. Because some filter interaction may occur, repeat steps 6 and 7. On models where only one filter cavity exists, adjust it for the maximum signal on the incident coupler and minimum signal on the second reflected coupler.

Condition B–Steps to follow:

9. Adjust the shape of the grid drive voltage to that recommended by the manufacturer and increase its amplitude to a point just below the saturation level of the tube as indicated by a flattening of the pulse observed at the first incident coupler. (Do not operate with a pulse which appears to be saturating at the peak.)

10. Repeat step 3.

11. Adjust the center cavity of the klystron for maximum signal at the first incident coupler (taking care to maintain a smooth pulse on the center cavity monitor in the interest of good spectrum). The center cavity will now be slightly detuned to the high frequency side.

12. Alternately adjust the output cavity of the klystron and the matching transformer for maximum signal at the first incident coupler. Condition B has now been met, and the output cavity of the klystron must not be retuned.

Condition C.

13. Repeat steps 6 and 7 and make minor adjustments in the matching transformer and the klystron input and center cavities while viewing the second incident coupler for specified power and best pulse shape for spectrum.

The above SAL-89 klystron tuning procedures will replace the present SAL-89 klystron tuning procedures as outlined in these TACAN manuals: AN-GRN-9A, NAVSHIPS 0967-073-5010; AN/SRN-6, NAVSHIPS 0967-073-5010; AN/GRN-9B, NAVSHIPS 0967-073-6010; AN/SRN-6A, NAVSHIPS 0967-073-6010; AN/GRN-9C, NAVSHIPS 0967-109-1010.

AN/URN-20(V)1, AN/URN-20(V)2, AN/GRN-9B, AN/SRN-6A, and AN/URN-3A – Gases for Tacon Spectrum Filters Applicable to Pressurized Filters.

See Article under AN/URN-20(V)1 with same title. (EIB 788)

AN/URN-3A, AN/GRN-9, and AN/SRN-6( ) – Requisitioning of 2C39WA Tubes.

See Article under AN/URN-3A with same title. (EIB 791)

TACAN Maintenance Hint for Klystron Tube, ITT Type 8493 for AN/SRN-6( ), AN/GRN-9( ), and AN/URN-3A TACANs

See article under AN/SRN-6 Section with the same title. (EIB 958)

SAL-39A Klystrons–Modified Procedure for Aging

TACANS AN/GRN-9 and AN/URN-3--Increased Aging Times for Klystron SAL-39A.

The following increased aging times are recommended for the SAL-39A klystrons which have been in storage for one or more years:

1.	Ef = 5.0V Pd = 0.0W eb = 0.0KV	Age for 20 minutes
2.	Ef = 5.0V Pd = 0.0W eb - 3.0 KV	Age for 30 minutes
3.	Ef = 5.0 V Pd = 20.0W eb = 3.0 KV	Age for 30 minutes
4.	Ef = 5.0V Pd = 20.0W eb = 6.0KV	Age for 30 minutes
5.	Ef = 5.0V Pd = 20.0W eb = 11.0KV	Age for 30 minutes
6.	Ef = 5.0V Pd = 40.0W eb = 11.0KV	Age for 60 minutes

Ef = filament voltage
Pd = FMO RF drive
eb = beam pulse voltage

(840)

New Planar Triodes for AN/URN-3A, AN/SRN-6 (Series), and AN/GRN-9 (Series) TACANS--Availability of

See article under AN/URN-3 with the same title. (EIB 922)

MODIFICATION OF TUNING PROCEDURE in UHF TRANSMITTERS AN/GRT-3

When tuning Transmitter AN/GRT-3 in accordance with Technical Manual NAVSHIPS 93336, the transmitter current meter and meter fuse are subjected to undue stress. In order to save "wear and tear" on these two components, it is recommended that the tuning procedure be modified as follows:

Instead of initially peaking the grid drive to the "drive stage" (refer to tuning steps 17, 18, and 19) and then tuning the driver plate, first, tune the grid to indicate a small value of grid current. Next, tune the plate for a minimum indication, and then tune the grid circuit for the rated drive.

This modified procedure will decrease the number of times the current fuse opens, thus protecting both the fuse and current meter. It should be noted that by alternately tuning the grid and plate circuits, over-rating of the 4X150A driver is eliminated, and driver tube life is extended.

AN/GRT-20 Radio Transmitter--Maintenance Hint

The Naval Electronic Systems Command has been advised that some activities are experiencing an abnormal number of failures to the 4CX250 PA tube and component parts in the immediate area of the PA cavitity of the AN/GRT-20 transmitter.

Investigation reveals that the blower motor (B1) only operates when the transmitter is keyed, resulting in an extremely high heat build up which causes component failure.

Pending the promulgation of an official field change to correct this situation, activities experiencing high failures as a result of this heat build up are authorized to solder a jumper wire between pins 2 and 3 of relay K2 on the relay bracket chassis A7. This minor modification will permit blower motor B1 to run continuously as long as plate switch S3 is in the ON position and reduce failures due to heat.

Activities making this modification shall ensure that suitable notation is made in associated technical documentation citing this EIB (834) as authority. *(834)*

*AN/GRT-21, AN/GRT-22 Transmitting Sets; 10 Watt Operation — Information Concerning

This article clarifies the proper method of operating the AN/GRT-21 or AN/GRT-22 transmitting sets in the exciter only mode.

The AN/GRT-21 and AN/GRT-22 transmitters presently being placed in service for ground to air utilization at Air Traffic Control Facilities are configured for use in the 50 watt output mode, with the T-1108/GRT-21 (EXCITER) connected to an associated AM-6154/GRT-21 (LPA) or the T-1109/GRT-22 (EXCITER) connected to an associated AM-6155/GRT-22 (LPA) with interconnecting cables W-3, W-4, and W-5 and the antenna connected to K1J1 on the EXCITER.

To operate in a 10 watt "EXCITER ONLY" mode, interconnecting cables W-3, W-4, and W-5, must be disconnected from the T-1108/GRT-21 or T-1109/GRT-22 and the antenna coaxial cable connected to K1J3 on the EXCITER.

At first glance, it would appear that the easy way to provide 10 watt operation would be to secure the high voltage on the LPA's. This will provide 10 watt operation, but causes a 200 millisecond delay from initial keying until RF power radiation. This delay "chops off" the first words of the controller's transmission and is not operationally acceptable. The delay in the start of RF transmission is immediately evident to the controller, since no sidetone is available until the associated receiver provides audio. (This delay can be used by a controller or technician to identify a failed LPA if the set is configured for 50 watt operation.) (EIB 908)

*AN/GRT-21, AN/GRT-22 Transmitting Sets — Reduction of Power Amplifier Tube Failures

This article provides maintenance hints regarding reduction of power amplifier tube failures in the AM-6154/GRT-21 and AM-6155/GRT-22 amplifiers.

To minimize the failure of 2A7V1, whenever the AM-6154/GRT-21 or AM-6155/GRT-22 is secured for PMS or troubleshooting, wait at least five minutes from the time the HIGH VOLTAGE is switched off before switching off the MAIN POWER. When the MAIN POWER is switched off the blower for 2A7V1 stops. When the blower stops concurrently with the HIGH VOLTAGE shut down, the heat in the tube and RF cavity assembly causes a temperature rise which contributes to the failure of 2A7V1 and associated components.

It is also essential that the unkeyed plate current of the tube be kept within acceptable limits. Excessive unkeyed plate current will deteriorate the life expectancy of the tube.

Another contributing factor to short life of the tube is improper adjustment of the AM-6154/GRT-21 or AM-6155/GRT-22. This is usually due to confusion about the proper method of adjusting the OUTPUT TUNING and OUTPUT COUPLING controls. It is absolutely essential that the OUTPUT TUNING control be adjusted for minimum plate current. The actual value of plate current which exists when the OUTPUT TUNING control is adjusted for minimum plate current is determined by the position of the OUTPUT COUPLING control. But ALWAYS adjust the OUTPUT TUNING control for minimum plate current as the last adjustment in the tuning procedure.

The output power of the AN/GRT-21 (when operated with the LPA) should be 50 watts. Note that even considerable mistuning of the LPA will not reduce the power output due to the APC (Automatic Power Control) feature of the equipment. If the power output is not 50 watts (either too low or too high) this condition can be corrected by performing paragraphs 5-49 and 5-52, in that order, of NAVELEX 0967-429-5010 (Change 4, 30 June 1973). (EIB 908)

AN/GRT-21, AN/GRT-22 Radio Transmitting Sets—Repair of RF Transmission Lin Switch—Maintenance Hint

This article provides for a quick repair and checkout of AN/GRT-21 and AN/GRT-22 RF Transmission Line Switch (Relay) 1K1. Because of a high failure rate, repair of 1K1 can save replacement cost and reduce equipment downtime.

A common cause of failure has been traced to a defective solder joint at the junction J4 center conductor and the printed circuit board inside the unit. To repair, follow the repair procedure below:

Repair Procedure

1. Remove the RF Transmission Line Switch 1K1 from the transmitter case.

2. With a small, sharp tool such as a chisel, shavehook, etc., carefully shave away the solder where the two housings are joined (a #81 dental tool for this is ideal).

NOTE

If a heavy (100 W) soldering gun and desoldering bulb are available, USE THESE TO DISASSEMBLE THE HOUSINGS INSTEAD. It is also a good idea to reassemble the housings using solder. Use of these techniques eliminates the

need for steps 2, 3, 4, part of 11 that mentions epoxy, and 12. Be sure the tip is small enough so the corner where the solder will lay will be well heated.

3. With the same tool held approximately 15° from vertical, again scrape carefully around the solder joint (a #8 dental tool is ideal here).

4. With any small blunt object tap all four sides of the upper housing until a small crack appears at the joint.

5. Firmly tap the upper housing on one side and lift the housing.

6. Remove the bail from around the relay armature assembly, and lift the whole mechanism out of the lower housing.

7. Remove solder and scrape J-4's center conductor until bright.

8. Re-solder the joint using standard soldering techniques.

9. Clean off all excess solder where the two housings join.

10. Re-install the relay armature and bail.

NOTE

Check all solder joints before resealing unit.

11. Set the upper housing back into place after checking that no metallic particles remain in the unit, and with a small amount of prepared epoxy, reseal the joint. See note following step 2; a good mechanical joint is a must.

12. Wrap a rubber band around the unit and allow the epoxy to cure before re-installing the unit in the transmitter. If quick-curing epoxy is used, the unit need only be held together by hand until the glue firms up.

NOTE

If an excessive amount of solder exists on the repaired pins, especially K1J1, the relay will not seat properly on the PC board and may cause operational problems as well.

Testing Repaired Relay. Test the unit as follows before reinstalling in radio.

1. Set-up equipment as shown in Figure 1.

2. Adjust output level of Signal Generator CAQI-608 to establish a reference on Receiver AN/URR-35 or AN/URR-27 input meter. It is best to test relay 1K1 at the frequency at which it will operate.

3. Close switch S1 to energize relay 1K1. If meter reading varies appreciably, it is an indication of poor solder connections.

NOTE

A slight variation can be expected when S1 is closed.

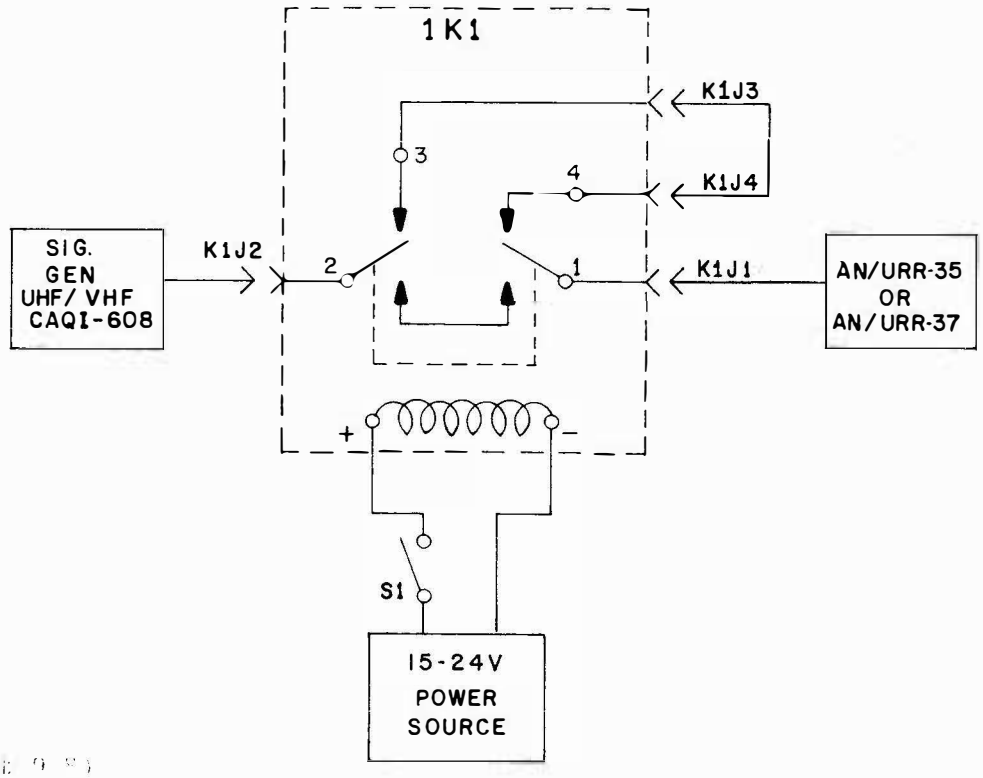


Figure 1. RF Transmission Line Switch, Test Setup.

AN/GRT-21, AN/GRT-22 Transmitting Sets; 10 Watt Operation–Information Concerning

See article in AN/GRT-21 section under the same title. (EIB 908)

AN/GRT-21, AN/GRT-22 Transmitting Sets– Reduction of Power Amplifier Tube Failures

See article in AN/GRT-21 section under the same title. (EIB 908)

AN/GRT-21, AN/GRT-22 Radio Transmitting Sets--Repair of RF Transmission Line Switch--Maintenance Hint

See article in AN/GRT-21 Section under the same title. (EIB 978)