BOGEN®
A DIVISION OF LEAR SIEGLER, INC.

FM/AM MONO RECEIVER

MODEL RM350A

DESCRIPTION

The Bogen Model RM350 FM/AM Mono Receiver is a 35-watt receiver which may also be used as a multi-purpose paging amplifier. Inputs are provided for use with an auxiliary microphone, Bogen intercoms or with telephone lines, when used with appropriate accessories. In addition, the RM350 provides inputs for phono, tape/cassette deck and TV audio.

Multiple outputs are provided for 4, 8, and 16 ohm speakers, 25V and 70V constant-voltage systems. A front panel switch selects local and/or remote speaker systems. Tape and Booster outputs are also available on the rear panel.

OPERATING INSTRUCTIONS

POWER

The power on-off switch is part of the SPEAKER switch. To turn the receiver off, set switch to POWER OFF. The receiver is turned on in all other positions.

SPEAKER SELECTION

Rotate SPEAKER switch to LOCAL or REMOTE, depending on which speakers you wish to use. If you want all speakers to operate, set switch to LOCAL REMOTE.

AM RECEPTION

Set FUNCTION switch to AM. The AM indicator LED will light. Rotate the tuning knob to the approximate frequency in KHz of the station desired. Clockwise rotation will increase the frequency. As the station frequency is approached, the signal strength meter will have more bars illuminated. Continue to rotate the knob until the peak is reached.

FM RECEPTION

Set FUNCTION switch to FM MUTE; the FM indicator LED will light. Rotate the tuning knob to the approximate frequency in MHz of the station desired. Clockwise rotation will increase the frequency. Carefully adjust TUNING knob until Tuning Meter is at the green (center) LED.

NOTE

Muting removes the annoying noise between FM stations. The muting circuitry may not distinguish a very weak signal from interstation noise. To tune in very weak stations, defeat the mute circuit by rotating the FUNCTION switch to FM.

AUDIO SELECTION

Set FUNCTION switch to either PHONO or AUX. The PHONO position selects the magnetic phono cartridge connected to the PHONO MAG jack on the rear of the unit. The AUX position selects the component (tape/cassette player, TV, etc.) connected to the AUX/INPUT jack.

VOLUME

The Volume control is used for all program sources except microphone.

To increase volume, rotate control clockwise towards MAX position. To decrease volume, rotate toward MIN position.

TONE

The BASS and TREBLE controls determine the overall tonal balance. With the controls in the mid position (detented), the audio response is normal or "flat". To increase or decrease bass response, rotate BASS control toward MAX or MIN, respectively. To increase or decrease treble response, rotate TREBLE control toward MAX or MIN, respectively.

MICROPHONE

When not using a microphone, leave MICROPHONE control at the in position. To use a microphone, pull out the control. Rotate the control clockwise to increase microphone volume or counterclockwise to decrease microphone volume.

NOTE

It is not necessary to touch any other controls when using a local microphone. Pulling out the MICROPHONE control or closing an external mic precedence switch (shorting mic precedence remote terminals) automatically mutes all other program inputs.

INSTALLATION

UNPACKING

Inspect the shipping container for indications of improper handling. The Model RM350 was carefully checked before leaving the factory. Carefully unpack the carton and inspect the unit for damage. If it is damaged, make an immediate claim to the dealer or distributor from whom it was purchased. If the unit was shipped to you, notify the shipping carrier without delay and place your claim.

POWER

LINE CORD. The receiver has an ac line cord terminated in a three-prong plug. Connect the plug to a three-wire grounded outlet providing a nominal 120v ac, 60 Hz power source. If only a two-wire outlet is available, use an adaptor (such as Leviton No. 5017) to convert the outlet for use with three-wire plugs.

A circuit breaker is mounted on the rear panel. Allow the unit to cool before resetting.

AUXILIARY POWER RECEPTACLE. The rear of the Model RM350 has an ac receptacle for supplying power to another component in the system. This receptacle is controlled by the power switch and any component connected to this receptacle can be turned on and off by the POWER switch on the Model RM350. Do not connect any component that requires more than 250 watts to this receptacle.

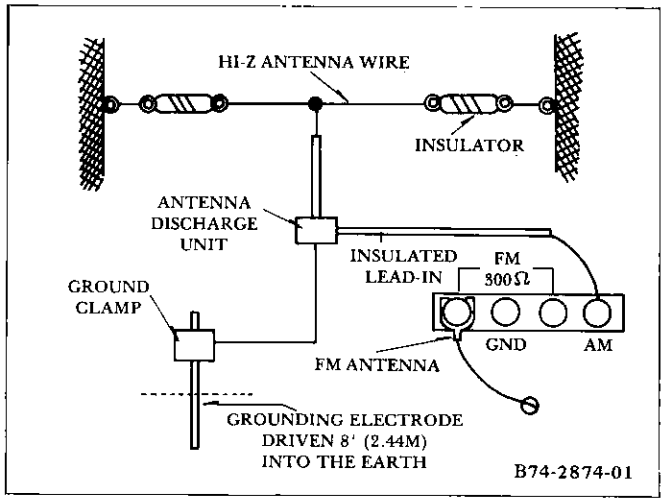


Figure 1–Connecting Outdoor AM Antenna and FM Line Antenna

ANTENNAS

Articles 810 and 820 of the National Electrical Code, ANSI/NFPA No. 70-1978 provides information regarding antenna grounding. The RM350 is designed for connection to various antenna systems, as illustrated in Figures 1 to 4.

CAUTION

Use No. 8 AWG aluminum wire, or larger, as ground wires for both mast and lead-in and secure to building structure with insulators spaced from 4 to 6 feet (1.22m. to 1.83m.) apart. Mount antenna discharge unit as closely as possible to where lead-in enters building structure.

FM LINE ANTENNA. The RM350 line cord may be used as an internal FM Line Antenna for receiving FM broadcasts (see fig. 1). For improved reception, particularly in weak signal areas or for tuners mounted in consoles or racks, installation of an outdoor FM or "T" antenna is necessary.

IMPORTANT

Always disconnect the FM Line Antenna when using an external FM antenna.

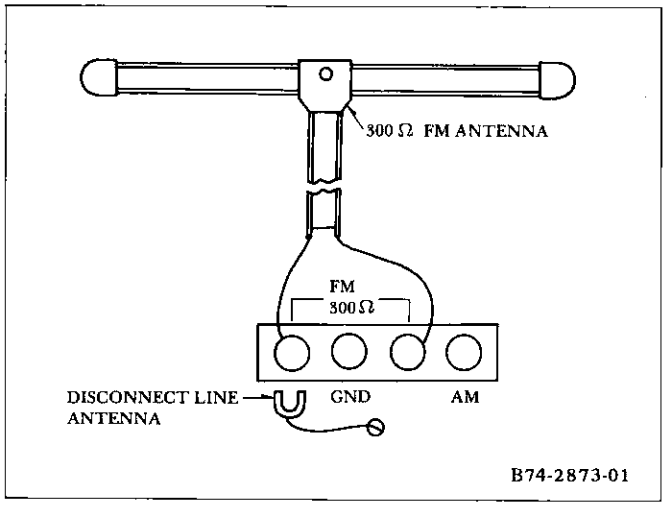


Figure 2–Connecting Indoor FM Antenna, 300 ohm system

EXTERNAL FM ANTENNA. If you are installing a standard 300-ohm antenna system, connect the twin-lead transmission line as shown in figure 2. If conditions require use of a coaxial transmission line, such as RG-11 or RG-59, connect the cable as shown in figure 3. Coaxial cable must be used when the transmission line is run in conduit.

For optimum performance, a separate FM antenna is recommended. If a TV antenna must be used for both FM and TV reception, install an FM signal splitter at the end of the transmission line, as shown in figure 4.

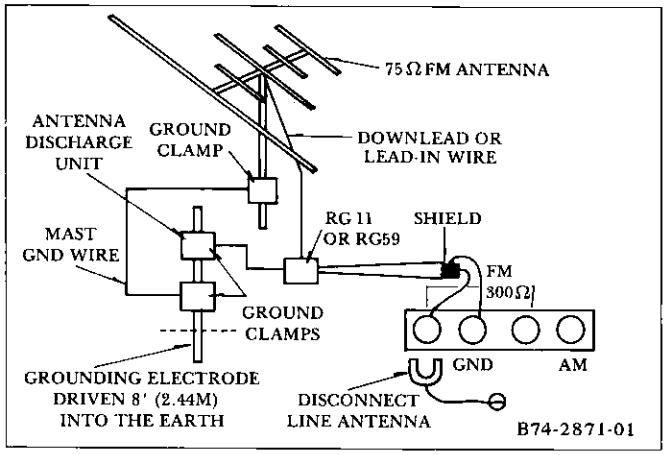


Figure 3–Connecting Outdoor FM Antenna, 75 ohm system

AM ANTENNA. A high-Q ferrite loopstick antenna, located on the rear of the unit, provides for receiving normal or strong AM signals. Rotate the antenna in a horizontal plane only, to avoid damage to the mechanical linkage. No connections are necessary for AM reception with this antenna. For weak signal areas or for receivers enclosed in a metal rack, connect a standard outdoor antenna to the AM terminal, as shown in figure 1.

AUDIO INPUTS

PHONO MAG. The PHONO MAG jack is designed to accommodate the low-level output from a magnetic phonograph cartridge. Use a single-conductor, low-capacity, shielded cable terminated in a standard phono plug (Bogen 85-1005-01, or equivalent). Stereo phono cartridges should be paralleled with a "Y" connector, then connected to the RM350.

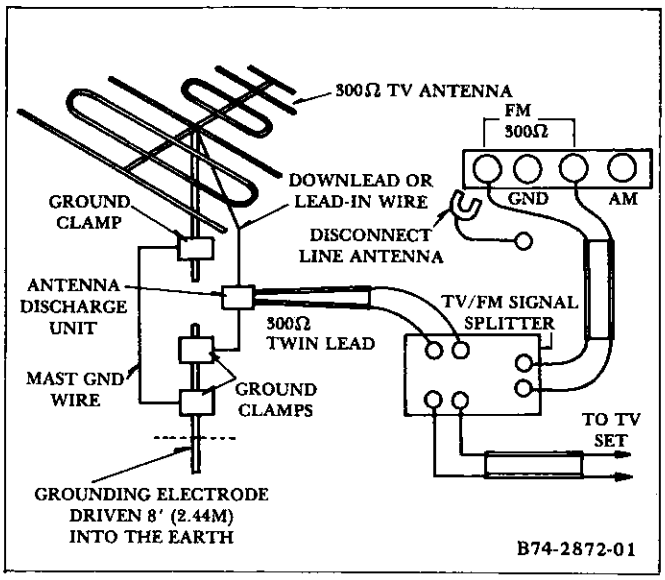


Figure 4–Connecting Outdoor TV/FM Antenna

AUX INPUT. This jack is designed to receive an input from a high-level (0.1V) source such as a tape recorder having a built-in preamplifier or the sound section of a TV receiver. Use a single-conductor shielded cable terminated in a standard phono plug (Bogen 85-1005-01, or equivalent).

HI-Z MICROPHONE. Any high-impedance dynamic microphone may be connected directly to the MIC INPUT connection on the rear panel. Refer to figure 5.

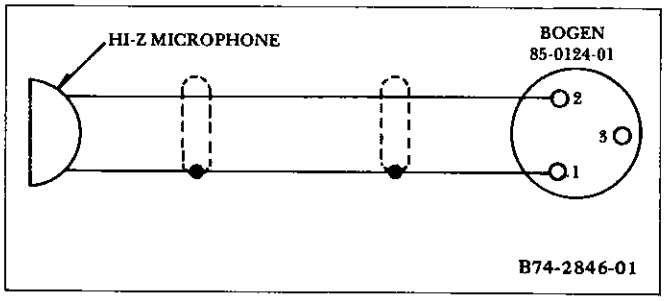


Figure 5A–Connecting Hi-Z Microphone

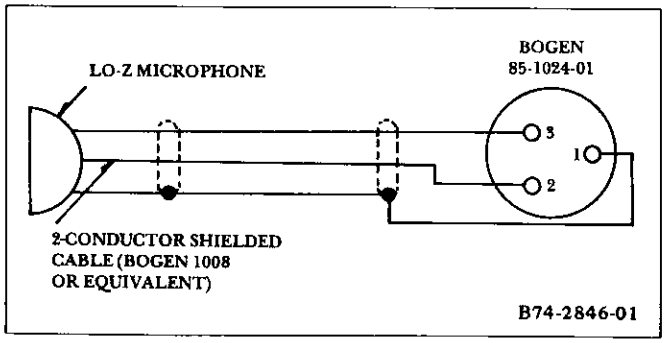


Figure 5B–Connecting Lo-Z Microphone

LO-Z MICROPHONE. A low-impedance microphone may be connected to the receiver by relocating the switch (LO-Z or HI-Z selecting slide switch) to the low-impedance position.

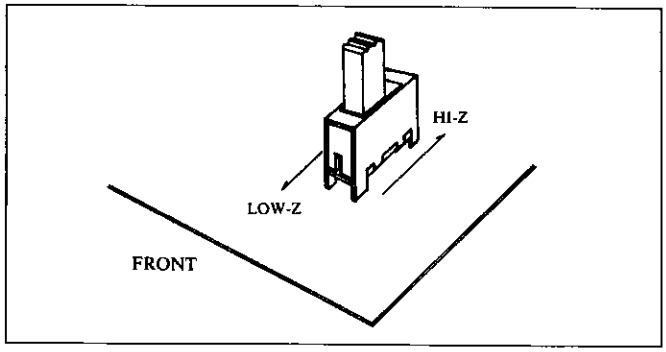


Figure 6 – Relocating LO-Z/HI-Z Switch

WARNING

Removing the cover presents an electrical shock hazard. Only a qualified technician should perform this installation.

1) Remove receiver cover.
2) Relocate switch to the LO-Z position, as shown in fugure 6.
3) Connect microphone as shown in fugure 5B.

MICROPHONE PRECEDENCE. The microphone can take precedence locally, by pulling out the MICROPHONE switch, or remotely by operating a switch connected across the MIC PREC REMOTE terminals on the rear of the Model RM350. The switch on the microphone may be used if it is a double pole type or if an extra pair of leads for controlling an external circuit is available.

STANDARD TELEPHONE PAGING. To connect a standard telephone line, a matching transformer – Bogen Model WMT-1 – is required. For installation, see WMT-1 Instruction Sheet (Bogen No. 54-5215), and make the necessary modifications for microphone input described therein. An additional pair of wires is required to provide a contact closure when the access number is dialed. These are connected at the precedence terminals, and are used to mute the program and turn on the microphone input.

BOGEN PAGING INPUTS. The TIS/TIM INPUT jack on the rear panel may be used to permit pagain from TIS/TIM telephones or from IE intercoms. The telephone and intercom systems are available from Bogen as optional accessories. To connect any of these systems, remove the internal jumper and refer to the applicable installation instructions and drawing.

Remove RM350 cover and cut the wire jumper between the TAPE OUT and the TIS/TIM jacks (see fig. 7). Replace cover and connect cables as shown in figure 8.

TIS/TIM Intercom Phone. The use of a TIS or TIM series intercom phone requires installation of a Bogen TPA-10 Paging Adapter (see figure 8). These adapters permit the telephone page to override all other inputs to the RM350.

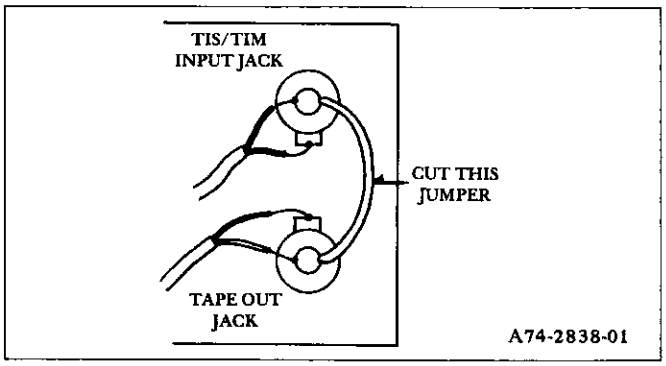


Figure 7–Modifying RM350 for Telephone or Intercom Paging

IE/Intercom. The use of a Series IE intercom requires installation of a Bogen TBR-1A Paging Relay which allows the intercom page to override all other inputs to the RM350. After removing the jumper (as in figure 7) in the RM350, connect the **RM350** to the TBR-1A, as shown in figure 13. If desired, one or two speakers in a constant voltage system may be wired to provide page replies back to the intercom system. These speakers must present an impedance of approximately 500Ω across the SPKR and COM terminals of the TRB-1A as shown. Speakers wired for page reply will receive pages from any intercom master but will not receive program output from the RM350A

AUDIO OUTPUTS

CABLES. Low-impedance speakers may be connected with flexible line cord (zip cord) for distances up to 100 feet, or with unshielded twisted pair (Bogen Type 1401S, or equivalent).

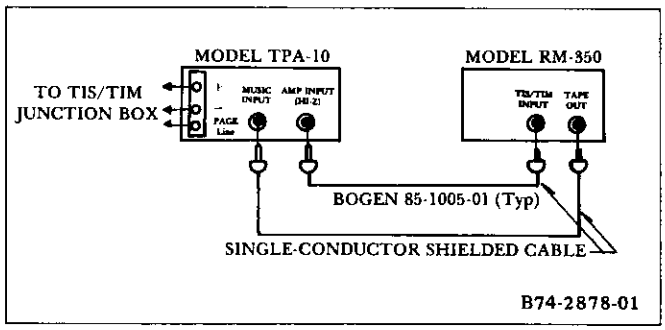


Figure 8–Connecting RM350 to Bogen TIS & TIM Telephone System

SPEAKERS. There are two terminal strips on the rear of the Model RM350 that permit connections to conventional 4, 8, or 16-ohm speakers, 25V or 70V constant-voltage distribution systems. Refer to the paragraph applicable to your system.

4, 8, 16 Ohm Speakers

1) Connect IMP SEL lead to terminal of left-hand strip that corresponds to impedance of your speaker. Figure 9 shows the impedance connection for a 4Ω speaker and figure 10 shows the connection for an 8Ω speaker.
2) Connect one speaker lead to either LOCAL or REMOTE terminals on the second strip. This depends upon whether you want the speaker to operate from the LOCAL or REMOTE position of the speaker selector switch. Connect the other speaker lead to GND. Figure 9 shows a 4Ω speaker connected for local operation, while figure 10 shows an 8Ω speaker connected for remote operation.
3) Note the link between the COM and GND terminals in figures 9 and 10. This is the standard condition for unbalanced lines with one line grounded. If you wish to use two-conductor shielded cable, remove the link and connect the cable shield to GND. In this case, connect the speaker wire to COM, not GND.

NOTE

Refer to the "SPEAKER INSTALLATION" sheet (Bogen Publication 54-5001) for further details on constant-voltage systems.

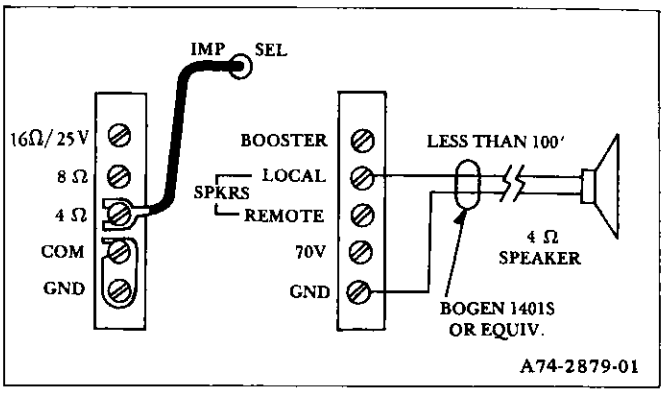


Figure 9–Matching 4-Ohm Local Speaker

25V & 70V Systems

1) Figure 11 shows the connections to a 25V/16-ohm constant-voltage system. The speaker leads may be connected to REMOTE or LOCAL, as required.
2) Figure 11 shows connection for a 70V constant-voltage system. The speaker lead may be connected to REMOTE or LOCAL, as required.

CAUTION. Don' t. operate when no load!

TAPE OUTPUT. The TAPE OUT jack may be used to record programs from the receiver. To do this, connect the input of a tape recorder to the jack, using a single-conductor shielded cable terminating in a standard phono plug.

BOOSTER OUTPUT. If more output power is required than the 35 watts delivered by the RM350, the booster output may be applied to the auxiliary input of a standard PA amplifier or the Hi-Z input of a booster amplifier. The booster output is under control of the tone (Bass/Treble) controls and the Volume control and will provide a maximum of 5V to a high-impedance input.

To use the booster output, connect a single-conductor shielded cable from the BOOSTER terminal to the PA or booster amplifier. Ground the cable shield to the GND terminal. With this arrangement, the RM350 may continue to be loaded to its full power and the booster amplifier may also be simultaneously loaded to its rated output.

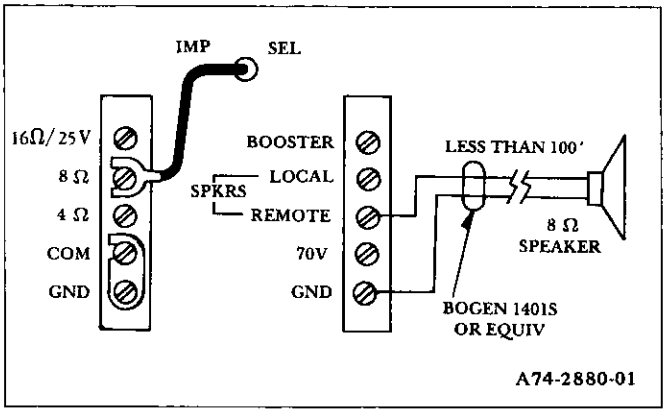


Figure 10–Matching 8-Ohm Remote Speaker

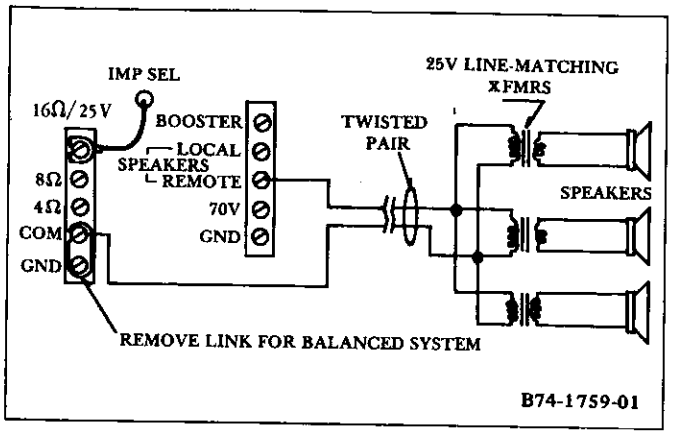


Figure 11–Matching 25V Constant-Voltage System

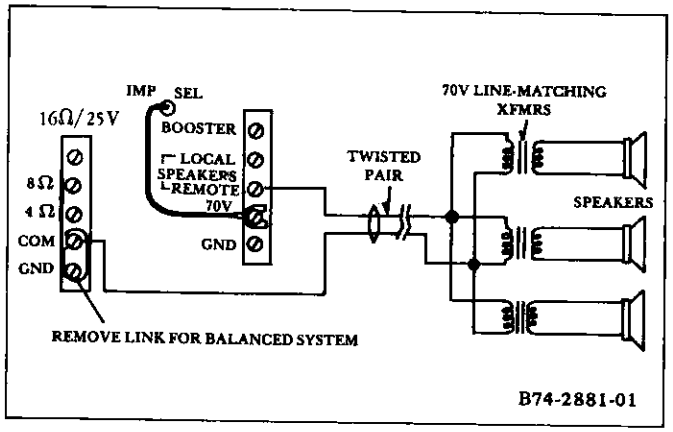


Figure 12–Matching 70V Constant-Voltage System

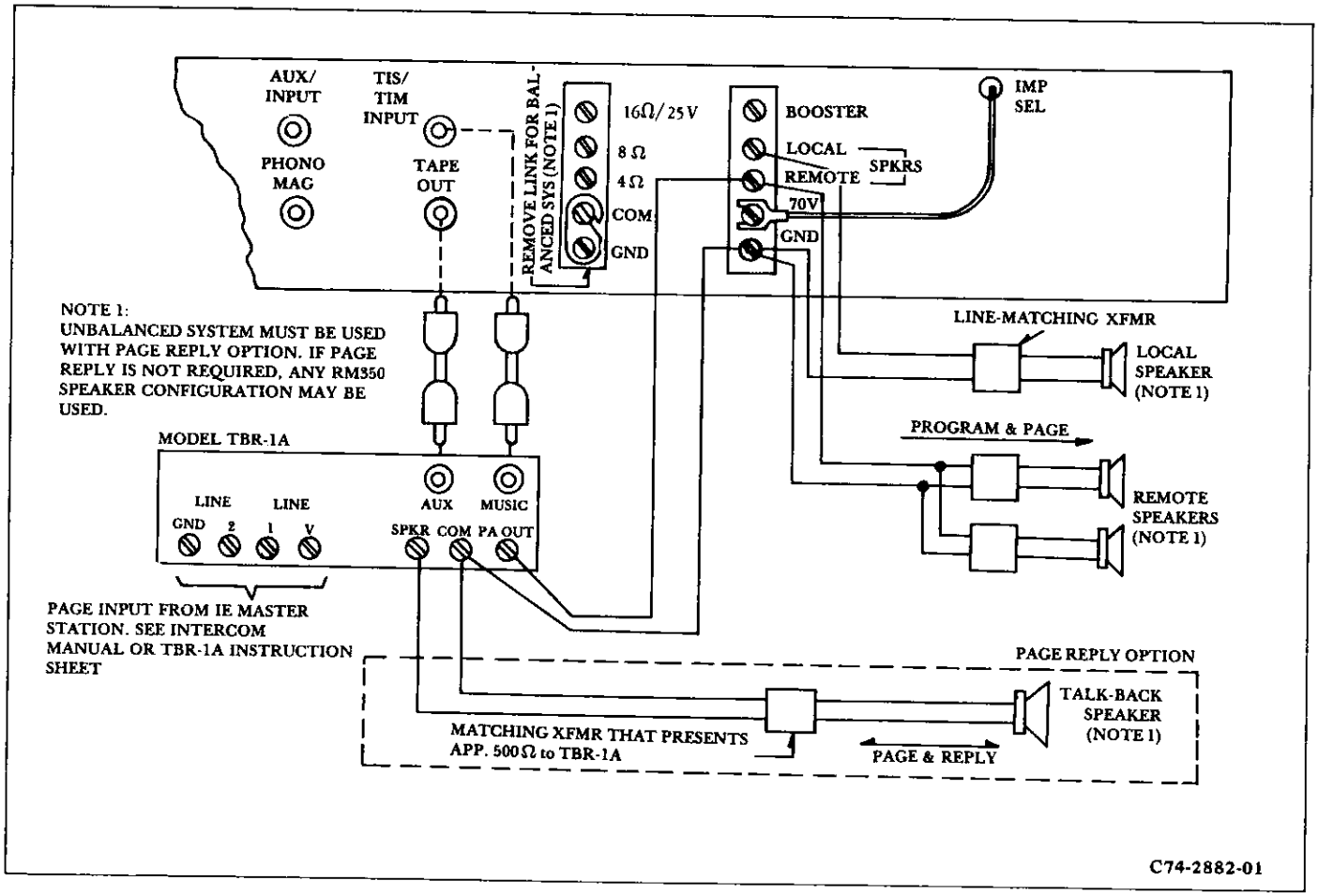


Figure 13–Connecting RM350A to Model TBR-1A for Intercom Paging

PRK-45 RACK PANEL BRACKETS

The receiver may be installed in a standard 19″ equipment rack, using Bogen Model RPK-47 Rack Mounting Brackets.

DIAL CORD RESTRINGING

Refer to figure 14 and proceed as follows:

a) Remove front panel by pulling off knobs and removing four Phillips-head screws.
b) Connect eyelet end of dial cord at lower drum hook shown in diagram.
c) String dial around nylon pulleys and tuning shaft, as illustrated in figure 14, then 2½ times around drum and attach dial cord securely to upper drum hook. Make certain cord winds around tuning shaft from rear toward front.

MAINTENANCE

WARNING

There are no user-serviceable parts inside the unit and removal of the cover presents an electrical shock hazard. Interior servicing should be attempted only by a qualified technician.

BOGEN SERVICE

We are interested in your Bogen receiver for as long as you have it. If trouble ever develops with your unit, please do not hesitate to ask our advice or assistance. Write to Service Department, Bogen Division, Lear Siegler, Inc., P.O. Box 500, Paramus, New Jersey 07652.

When communicating with us, give the model number and series of your unit. Describe the difficulty encountered and the effect each operating control has upon the trouble symptoms. Include details on electrical connections to associated equipment, and list such equipment. When we receive this information, we will send you service information if the trouble appears to be simple. If trouble requires servicing, we will send you the name and address of the nearest Bogen authorized service agency to which you can send your unit for repairs.

When shipping your unit, pack it carefully, using the original shipping carton or similar container and filler material to prevent damage in transit. Send the unit, fully insured and prepaid, via any responsible carrier. The unit will be promptly repaired and returned to you.

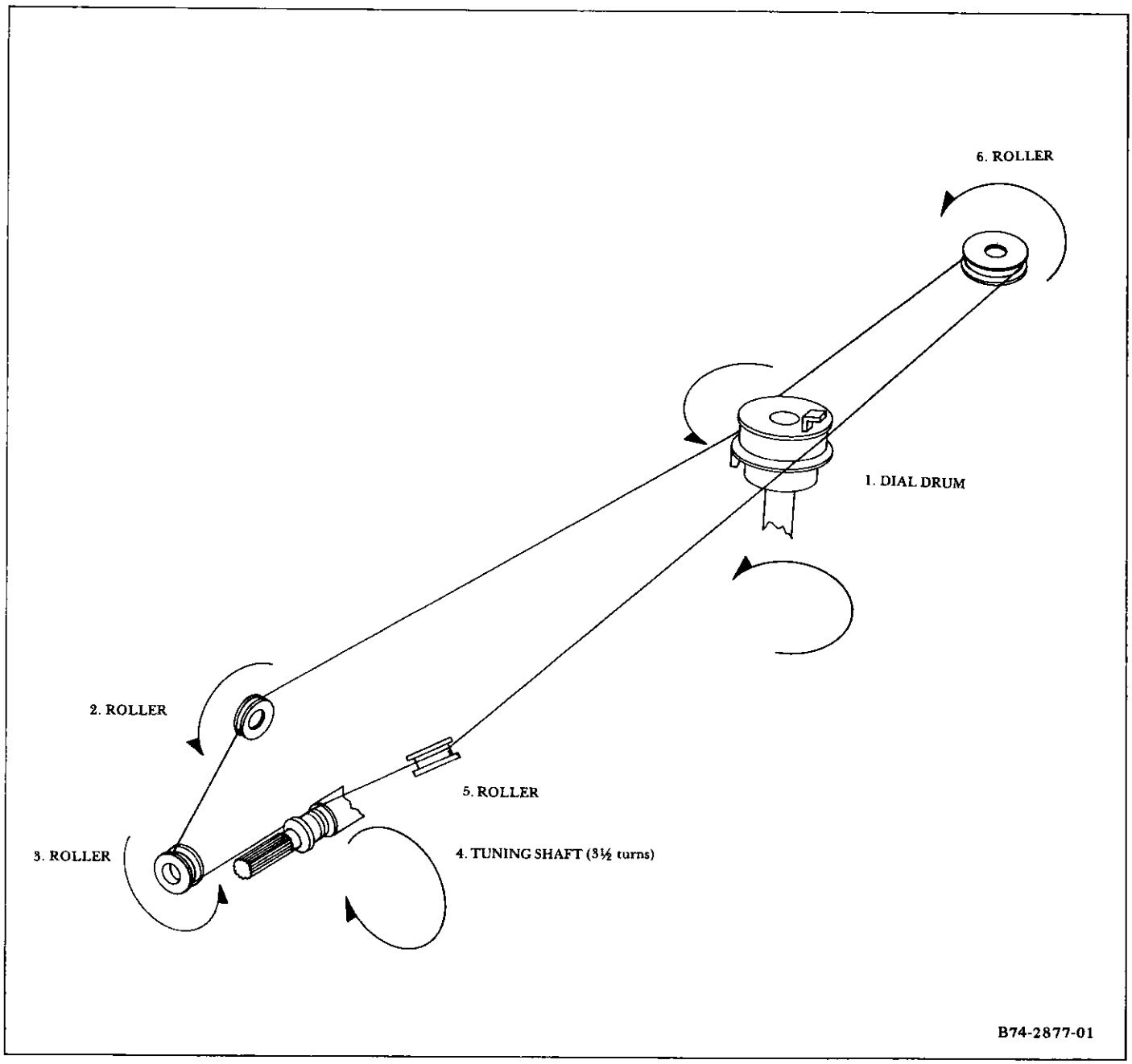


Figure 14–Dial Cord Restringing

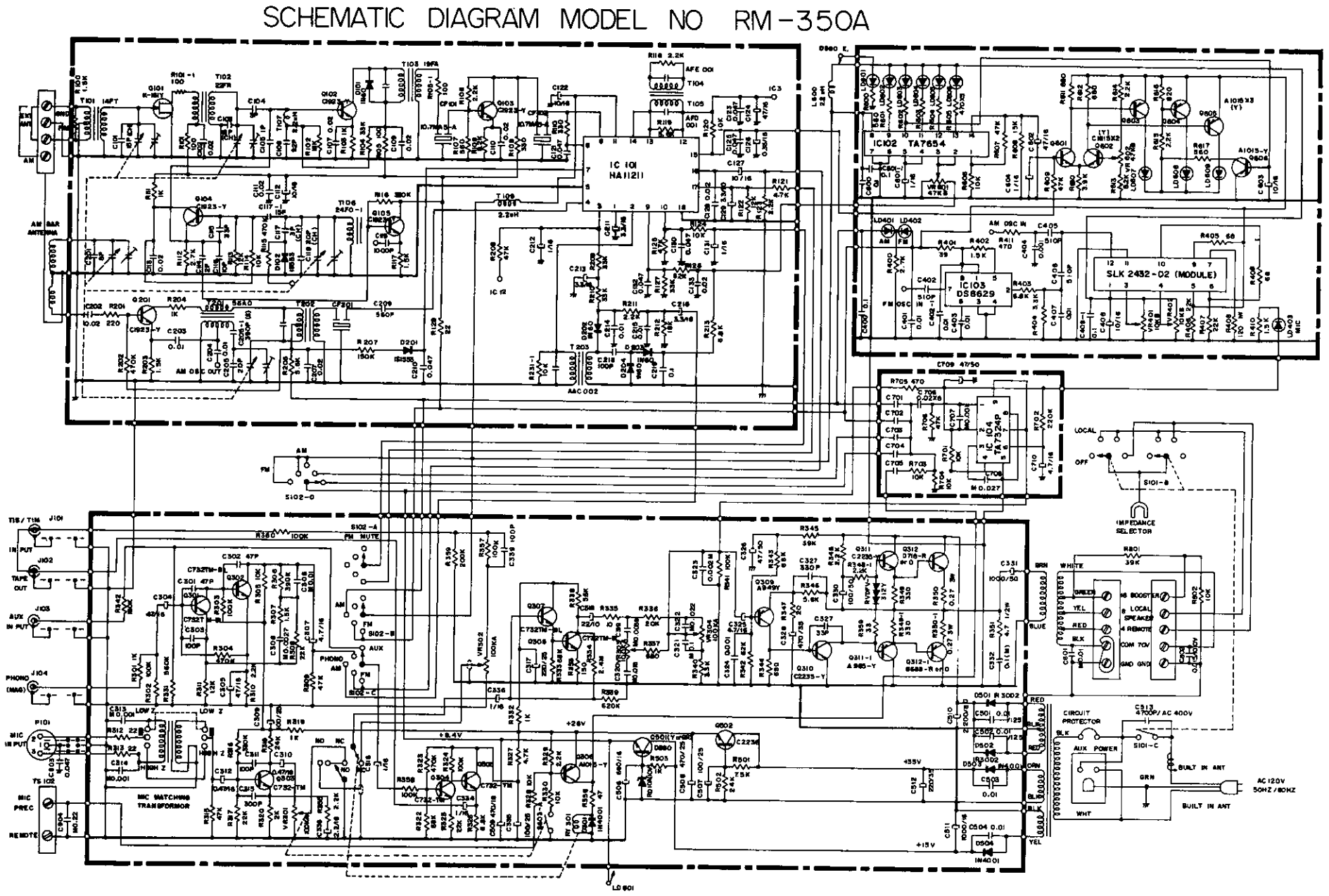


Figure 15–Schematic Diagram, Model RM350A

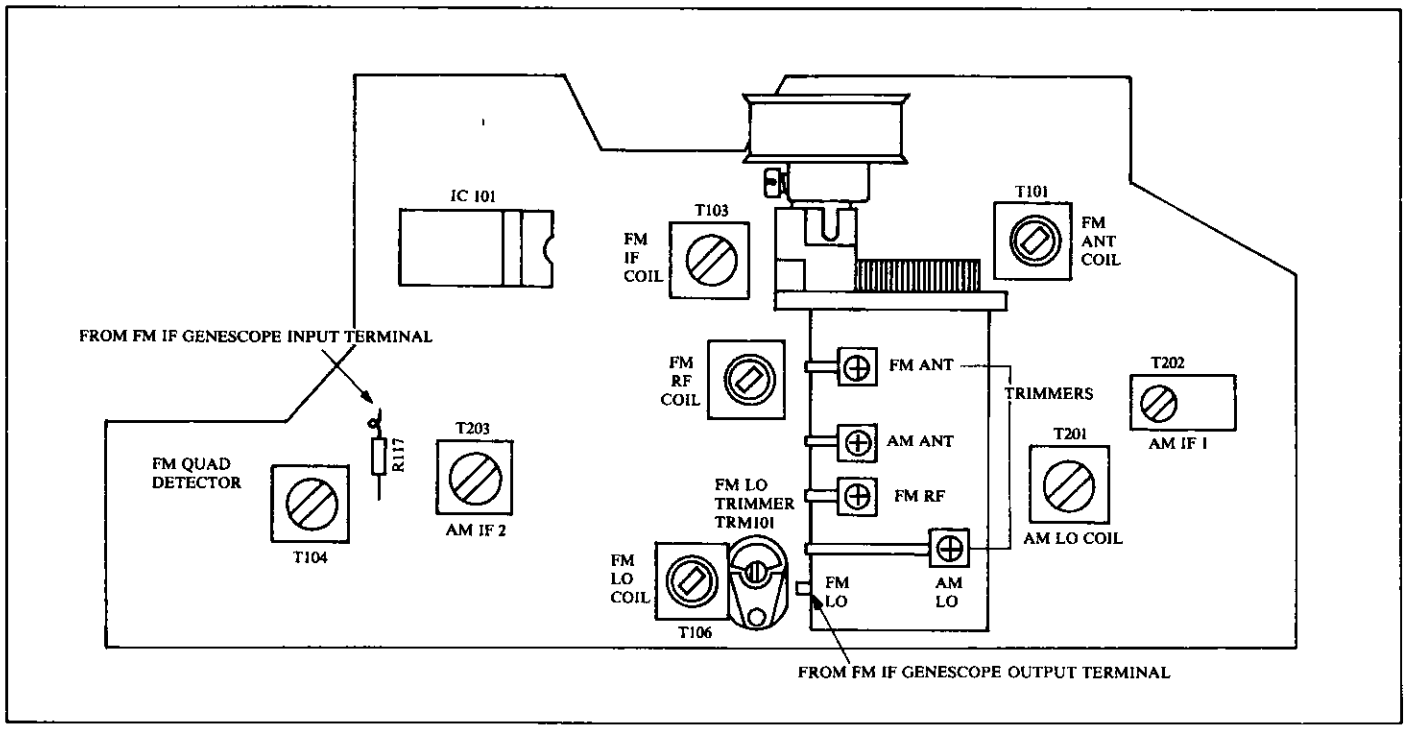


Figure 16—RF Section Circuit Board

ALIGNMENT

The following instruments (or equivalent) are required for a complete alignment of the receiver.

DC VTVM, RCA WV 98-C
AC VTVM, HP 400D
General Purpose Oscilloscope
AM Signal Generator, Measurements Corp 65-B.
FM Sweep Generator, Measurements Corp 88 or Boonton Radio Corp 202H
AM, FM IF Genescope.

TABLE I — AM ALIGNMENT CHART

Step	Band & Dial Setting	Generator	Signal Input	Indicator & Connection	Adjustment
1	Pointer at extreme right end of dial.	Freq. 455 kHz, 30% mod at 400 Hz. Output level approx 1000 uV.	Figure 16	Signal strength meter as indicator	Adjust T202 and T203 for max indication on meter. As a gain check, audio output should be approx. 0.5V for an RF input of 2000 uV.
2	Right end of dial	Freq. 1650 kHz, 30% mod at 400 Hz. Output level 200 uV	Figure 16	Signal strength meter as indicator	Adjust AM OSC TRIM for max indication on meter.
3	Left end of dial.	Freq. 535kHz, 30% mod at 400Hz. Output level 200 uV.	Figure 16	Signal strength meter as indicator	Adjust T201 for max indication on meter.
4	Repeat Steps 2 & 3 above, until all outputs are peaked at the proper frequency.				
5	Pointer at 1400 kHz.	Freq. 1400kHz, 30% mod at 400 Hz. Output level 500 uV.	Figure 16	Signal strength meter as indicator	Adjust AM ANT TRIM for max indication on meter.
6	Pointer at 600 kHz.	Freq. 600 kHz, 30% mod at 400 Hz. Output level 500 uV.	Figure 16	Signal strength meter as indicator	Adjust AM ANT coil T503 for max indication on meter.
7	Repeat Steps 5 & 6 above, until there is satisfactory tracking at both frequencies.				

PREPARE: 1. Use a plastic ADJ. driver for all adjustment.
2. Function switch to "AM"
3. Volume to MINIMUM.

AM ALIGNMENT. To completely align the AM section, start with the last AM IF transformer and work back toward the antenna. In order to limit the effect of the AGC circuit, continually reduce the generator signal level to the minimum required for an output indication. Make the adjustments listed in Table 1.

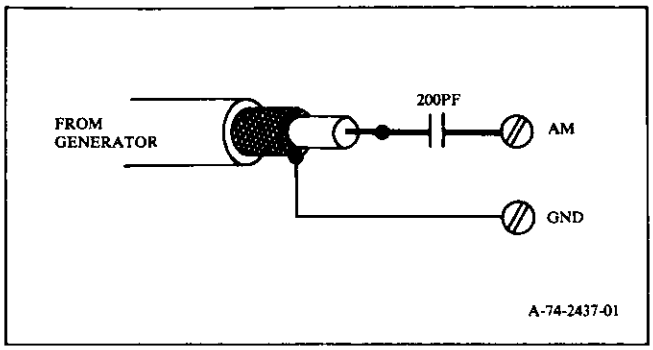


Figure 17—AM Antenna Test

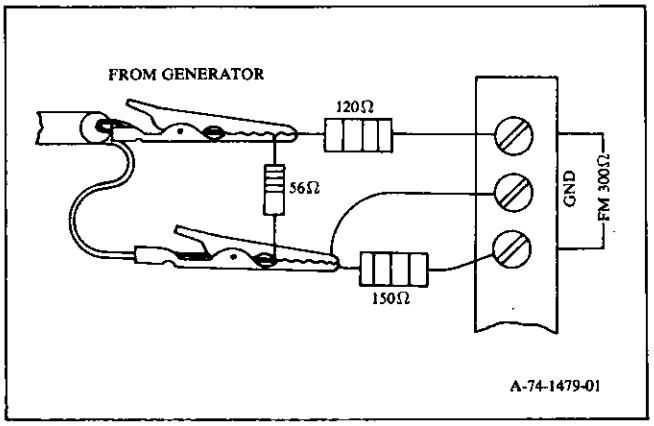


Figure 18—Dummy Antenna for FM Alignment

FM ALKIGNMENT. To align the FM section, follow the procedure given in Table II.

1. Connect generator as in Fig. 17; deviation ±75 kHz at 400 Hz.
2. Connect scope and AC VTVM at tape output jack.
3. Tune to extreme left and set the dial pointer to "0".

TABLE II — FM ALIGNMENT CHART

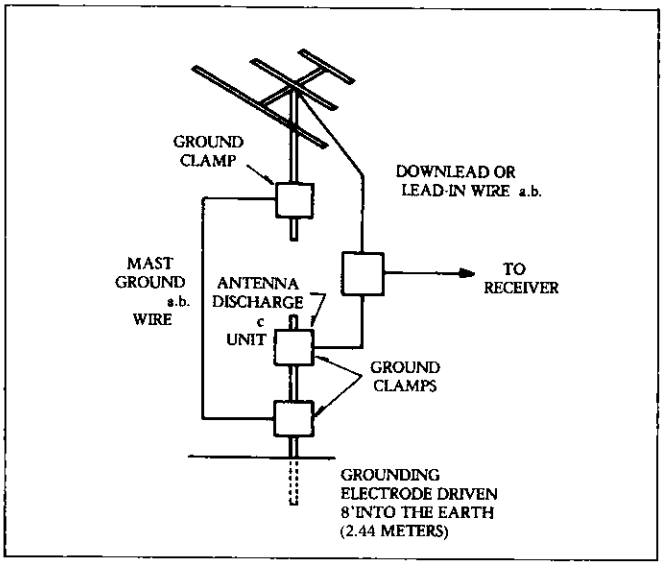
	DIAL POINTER	GENERATOR	CONNECTION	ADJUSTMENT
1	Off station	0 uV	1. Connect generator as in Figure 17 deviation ±75kHz at 400Hz 2. Connect scope and AC VTVM at tape output jack.	Tuning meter should read zero. If not, adjust T5 for zero reading.
2	Right end of dial	109 MHz level at 20 uV; increase if needed	as above	Adjust oscillator trimmer until clean 400 Hz sine wave is visible and the tuning meter indicates center (green LED)
3	Left end of dial	87.5 MHz level at 20 uV; increase the level if necessary to see clean output	as above	Adjust osc. coil until clean 400 Hz sine wave is visible and the tuning meter indicates center (green LED)
4	Repeat steps 2 and 3 until the proper tracking at both frequencies is obtained.			
5	106 MHz	106 MHz; reduce level as needed to keep the output signal appearing noisy	as above	Adjust antenna and RF trimmers and IF Coils (T103) for max. output or min. noise on scope.
6	90 MHz	90 MHz; reduce level as needed to keep the output signal appearing noisy.	as above	Adjust antenna Coil (T101) and RF Coil (T102) and IF Coils (T103) for max. output or min. noise on scope.
7	Repeat stpes 5 and 6 until maximum sensitivity is obtained.			
MUTING TEST				
8	98 MHz	1 mV	AC VTVM at output	Read signal level
9	Off station	0 uV	Function switch to "FM MUTE".	Noise should be attenuated by at least 35 db from the previous reading

SAFETY INSTRUCTIONS

1. Read Instructions-All the safety and operating instructions should be read before the appliance is operated.
2. Retain Instruction-The safety and operating instructions should be retained for future reference.
3. Heed Warnings-All warnings on the appliance and in the operating instructions should be adhered to.
4. Follow Instructions-All operating and use instructions should be followed.
5. Water and Moisture-The appliance should not be used near water-for example, near a bathtub, washbowl, kitchen sink, laundry tub, in a wet basement, or near a swimming pool, etc.
6. Carts and Stands-The appliance should be used only with a cart or stand that is recommended by the manufacturer.
7. Wall or Ceiling Mounting-The appliance should be mounted to a wall or ceiling only as recommended by the manufacturer.
8. Ventilation-The appliance should be suitated so that its location or position does not interfere with its proper ventilation.
   For example, the appliance should not be situated on a bed, sofa, rug, or similar surface that may block the ventilation openings; or, placed in a built-in installation, such as a bookcase or cabinet that may impede the flow of air through the ventilation openings.
9. Heat-The appliance should be situated away from heat sources such as radiators, heat registers, stoves or other appliances (including amplifiers) that produce heat.
10. Power Sources-The appliance should be connected to a power supply only of the type described in the operating instructions or as marked on the appliance.
11. Grounding or Polarization-The Precautions that should be taken so that the grounding or polarization means of an appliance is not defeated.
12. Power-Cord Protection-Power-supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords at plugs, convenience receptacles, and the point where they exit from the appliance.
13. Cleaning-The appliance should be cleaned only as recommended by the manufacturer.
14. Power Lines-An outdoor antenna should be located away from power lines.
15. Antenna System-This receiver, tuner or tuner-amplifier is designed for connection to an antenna system, including outdoor antennas or community antenna television (CATV) system, installed to provide some protection against voltage surges and built up static charges.
    Section 810 and 820 of the National Electrical Code, ANSI/NFPA No. 70-1978, provides information with respect to proper grounding of the mast and supporting structure, the lead-in wire to an antenna discharge unit, and a coaxial cable system; size of grounding conducts, location of antenna-discharge unit, connection to grounding electrodes, and requirements for the grounding electrode.

If an outside antenna is connected to the antenna terminal of the tuner; be sure the antenna system is grounded in a manner similar to the accompanying Figure. (See Figure)

EXAMPLE OF ANTENNA GROUNDING AS PER NATIONAL ELECTRICAL CODE INSTRUCTIONS



A. Use No. 10 AWG (5.33mm^2) copper, No. 8 AWG (8.4mm^2) aluminum or No. 17 AWG (1.0mm^2) copper-clad steel or bronze wire, or larger as ground wires for both mast and lead-in.
B. Secure lead-in wire from antenna to antenna discharge unit and mast ground wire to building structure with-stand-off insulators, spaced from 4 feet (1.22meters) to 6 feet (1.83meters) apart.
C. Mount antenna discharge as closely as possible to where lead-in building structure.

16. Nonuse Periods-The power cord of the appliance should be unplugged from the outlet when left unused for a long period of time.
17. Object and Liquid Entry-Care should be taken so that objects do not fall and liquids are not spilled into the enclosure through openings.
18. Damage Requiring Service-The appliance should be service by qualified service personnel when:
    A. The power-supply cord or plug has been damaged; or
    B. Objects have fallen, or liquid has been spilled into the appliance; or
    C. The appliance has been exposed to rain: or
    D. The appliance dose not appear to operate normally or exhibits a marked change in performance; or
    E. The appliance has been dropped, or the enclosure damaged.
19. Servicing-The user should not attempt to service the appliance beyond that described in the operating instruction. All other servicing should be referred to qualified service personnel.