

## 248RF Assembly

### contents

section 1	general description	page 1
section 2	application	page 1
section 3	installation	page 2
section 4	circuit description	page 4
section 5	block diagram	page 4
section 6	specifications	page 4
section 7	troubleshooting	page 4

### 1. general description

1.01 The Tellabs 248RF Assembly (figure 1) provides RF-shielded mounting for two Tellabs 4008 Program Amplifier modules. The 248RF Assembly is most frequently used to permit the installation of one or two Program Amplifiers at a radio transmitter site, where the level of RF energy is predictably high. Modules are protected by the 248RF's double-metallic-shielded construction. The Assembly also provides RF decoupling for all transmission and power leads accessing the Amplifiers.

1.02 The 248RF Assembly is designed for wall mounting and attaches to any flat surface with four mounting screws. All external connections are made to screw-type terminal strips located between the inner and outer shields.

1.03 The Assembly includes an integral power regulator designed to operate from either 25 to 35Vac or 48Vdc input. The regulator provides filtered 30Vdc power to each of the two Program Amplifiers.

### 2. application

2.01 The 248RF Assembly should be used in any application involving location of 4008 Program Amplifiers at a radio transmitter site. The shielding and RF decoupling provided by the enclosure prevent coupling of modulated RF energy into the transistorized Program Amplifier circuitry, which eliminates problems of instability, cross-coupling between AM and FM signals, and extraneous noise pick-up. The two shielded amplifier compartments in the 248RF Assembly are isolated, with separate input and output lead decoupling, so that coupling between adjacent amplifiers is virtually nonexistent.

2.02 To minimize exposure to induced RF interference, care should be taken to ensure that external leads are arranged consistent with good noise-mitigation practice. Input and output leads should be individually twisted pairs, ground loops should be avoided, and a low-resistance connection to earth ground should be provided. Specific installation instructions are provided in section 3.

2.03 Power input to the 248RF may be either 60Hz ac (25 to 35 volts rms) or 48Vdc. When ac input power is employed, the Tellabs 1913L4 Transformer may be used to provide the proper ac po-

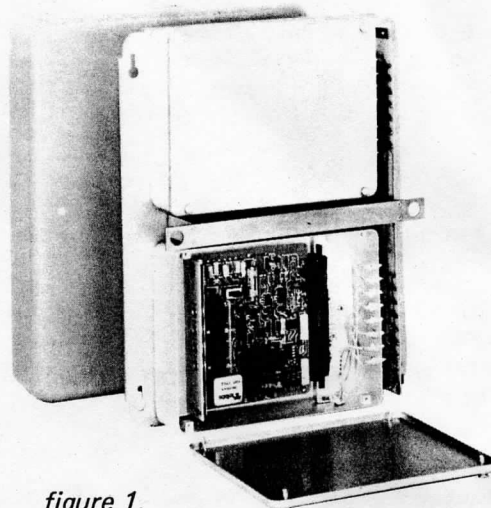


figure 1.  
248RF Assembly

tential from conventional 117Vac, 60Hz commercial power. When dc input powering is employed, the input voltage used may be between 36 and 56 volts. Total current requirement for a fully equipped system (two 4008 Amplifiers in service) is about 70mA.

2.04 Provision is made for access to amplifier jacks and adjustments via hinged connectors in the two amplifier compartments. During alignment and equalizer adjustment, each amplifier may be rotated away from its normal position to permit access to jacks and adjustments. (The Amplifiers are returned to their normal positions and the individual shield covers attached before noise and transmission measurements are made.)

2.05 Primary lightning protection is **not** provided by the 248RF Assembly. Secondary protection is provided on each 4008 Program Amplifier, but input leads from cable facilities with potential lightning or power line exposure should be provided with standard station protection devices.

**Note:** Carbon protectors can be a source of noise in program loops. Carbon protectors should be inspected at time of installation to ensure that the gaps are clean and free of carbon dust and other contaminants, and that connections are secure and free of corrosion.

2.06 As stated previously, the 248RF Assembly is intended primarily for use with the 4008 Program Amplifier in applications requiring both gain and equalization at a transmitter site. The enclosure may also be used with the Tellabs 4012

Program Distribution Amplifier in applications requiring gain but not equalization at a transmitter location. When used with the 4012, the 248RF Assembly provides access to only one of the two available outputs on each 4012.

### 3. installation wall mounting

3.01 The 248RF Assembly is designed for wall mounting in an indoor environment. The Assembly should be attached to a flat vertical surface by means of four No. 8 wood screws (plywood or other wood surface) or No. 8 Ackerman (or equivalent) wall anchors (plaster, cinderblock, or wallboard surface). Slotted holes in the enclosure baseplate allow mounting and removal without removing the mounting screws.

### outer cover removal

3.02 The outer metallic cover for the 248RF Assembly is fastened to the main assembly by two twist-lock fasteners. To remove this cover, rotate the two fastener screws approximately one-half turn **counterclockwise** and lift the cover from the main Assembly. To reattach the cover, orient the cover so that the two twist-lock retainers are aligned over the large holes in the retaining bracket, slide the cover into place, and rotate the fastener screws **clockwise** approximately one-half turn. An audible "click" will be heard when the fastener is properly locked. All connections to the Assembly must be made with the outer cover removed.

### entrance leads

3.03 All external leads, including power and ground leads, enter the 248RF Assembly through an access aperture at the lower right-hand corner of the enclosure. Care should be exercised when attaching the outer cover to ensure that all leads are properly dressed through the slot in the cover and not trapped between the cover and the baseplate.

### power wiring — ac power input

3.04 AC power input to the 248RF Assembly must be between 25 and 35 volts rms, 60Hz. The input power leads should be twisted pair, 20AWG or larger, and no more than about 30 or 40 feet long. A shielded twisted pair is preferable to unshielded power leads, but shielding is not mandatory. If a shielded pair is used, the shield should be connected to power ground at the transformer, but no shield connection should be made to the 248RF Assembly unless a local telephone company ground is not available. (See paragraph 3.13 for grounding instructions.)

**Note:** If a shielded power cable is used and telephone company ground is connected to the 248RF Assembly, strip the shielding back sufficiently far to permit connection of the power leads, and then insulate the shield with tape to prevent incidental ground contact with the chassis.

3.05 Connect the two ac input leads to terminal block TB1. Use the first two terminals from the left, labeled 30 VAC for these connections (fig.2).

### 1913L4 Transformer wiring

3.06 If a 1913L4 Transformer is used to derive ac input power to the 248RF Assembly, connect the 248RF power leads to terminals 1 and 3 on the 1913L4. If a shielded pair is used, connect the shield to the 1913L4's ground terminal 4. Make no connection to terminal 2 on the 1913L4 Transformer. (Terminal 2 provides access to a center tap on the transformer secondary and is not used in powering the 248RF.)

3.07 After all other wiring to the 248RF Assembly has been completed, plug the 1913L4 Transformer into a convenient three-plug wall receptacle. To retain the Transformer in place, secure it to the receptacle plate by means of the screw lug on the Transformer.

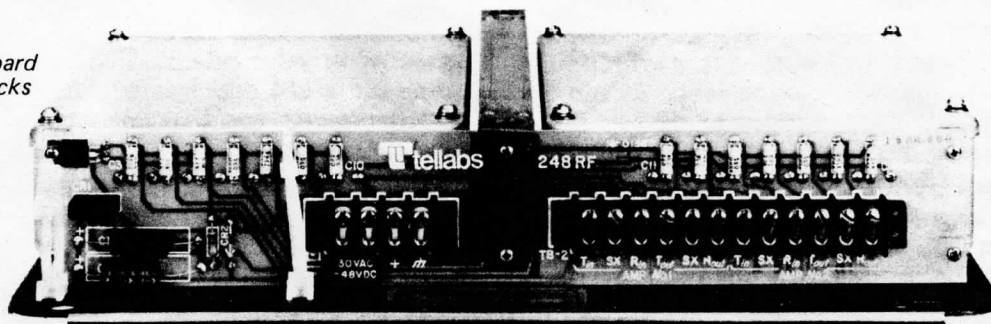
**Note:** The 1913L4 Transformer is capable of supplying ac power to up to three fully equipped 248RF Assemblies from a conventional 117Vac source.

### power wiring — dc power input

3.08 Power may also be supplied to the 248RF Assembly from a nominal 48Vdc source. Power leads from the supply to the 248RF Assembly should be twisted pair or shielded twisted pair, 20AWG or larger, and no more than 10 or 20 feet in length. If the positive output terminal of the power supply is connected to ground at the supply, the positive power lead should be connected to position 3, TB1, labeled "+". The negative lead should be connected to **either** position 1 or position 2 (counting from the left) on TB1. (To minimize the possibility of an inadvertent power supply short circuit resulting from stray wire, use of position 1 for the negative input is suggested. See figure 2.)

3.09 If the dc power supply is ungrounded, connect the **ungrounded** positive lead to position 2 on TB1 and the negative lead to position 1. In this application, it is **essential** that a separate low-resistance ground be provided to position 3 on TB1 (see paragraph 3.15).

figure 2.  
248RF Circuit Board  
and Terminal Blocks



### grounding instructions

3.10 Careful attention to grounding will do much to ensure proper functioning of the 248RF Assembly. To avoid ground loops, it is important that a single low-resistance ground connection be made to the Assembly.

3.11 If the 248RF is powered from an ac source, a separate ground lead must be provided between position 4 on TB1 and either telephone station ground (preferred) or local power ground. The 248RF is equipped with a ground lug jumper between positions 3 and 4 on TB1, and this jumper must be in place. The wire used for the ground connection must be 20AWG or larger, and this lead should be as short as possible.

3.12 If a telephone station ground is not available and shielded wire is used for ac power input wiring, the shield may be used for the ground connection. Connect one end of the shield to position 4 on TB1 and the other end to power ground at the transformer. Be sure that the jumper between positions 3 and 4 on TB1 is in place.

3.13 If a grounded dc supply is used to provide power to the 248RF Assembly, the positive power lead, and the wire shield if available, provide the assembly ground input. No other ground connection should be made to the 248RF Assembly. Be sure that the shorting strap between positions 3 and 4 on TB1 is in place.

3.14 If an ungrounded dc supply is used to power the 248RF Assembly, a separate ground lead must be connected to position 3 of TB1. This lead should be 20AWG or larger, and as short as possible. Ground may be supplied from either local station ground (preferred) or from local power ground. If shielded power wiring is used, the shield may be used for the ground connection between station or power ground and position 3 on TB1. The shorting strap between terminals 3 and 4 on TB1 must be in place.

3.15 The shorting strap between terminals 3 and 4 on TB1 provides low-resistance connection between the Assembly chassis and power supply ground. This jumper should be in place in all conventional applications of the 248RF Assembly. In the unlikely event that the Assembly is mounted to a metallic surface that is locally grounded, it may be desirable to maintain separate grounds between the chassis and local power ground. In such case, the shorting strap may be removed to isolate the grounds, and external power ground connections must be made to TB1 terminal 3.

### transmission lead wiring

3.16 Transmission leads to and from the two Program Amplifiers terminate on a 12-position terminal strip identified as TB2 (figure 2). The first six positions on TB2 provide access to Amplifier number 1 (lower compartment), and terminals 7 through 12 access Amplifier number 2 (upper compartment). Lead assignments for the two amplifiers are shown in table 1.

function	TB2 terminal
Amp 1 input. . . . .	.1 and 3
output. . . . .	.4 and 6
input sx. . . . .	.2
output sx. . . . .	.5
Amp 2 input. . . . .	.7 and 9
output. . . . .	.10 and 12
input sx. . . . .	.8
output sx. . . . .	.11

table 1. Transmission lead connections

3.17 Input leads to the Program Amplifiers are very vulnerable to noise and RF pickup, and should be twisted pairs or, preferably, shielded twisted pairs (with separate shields for each input pair, of course). If shielded pairs are used, the shields should be grounded at the station protector or terminal block, but no connection should be made between the shield and the 248RF Assembly.

**Note:** *If shielded cable is used, be sure to strip the shield back sufficiently far to prevent inadvertent contact between the shield and any terminal on TB2, as this could be a significant source of input noise.*

3.18 Output leads from the Program Amplifiers are less vulnerable to noise and RF coupling than are the input leads, but use of twisted pairs is strongly recommended for cabling between the 248RF and the radio station transmitter equipment. If shielded cable is used for the output leads, the shields should be connected to ground at the transmitter end, and no shield connection should be made at the 248RF.

3.19 Connections are provided on TB2 for input and output sx leads to both Amps. Though it is unlikely that these leads will be used, RF decoupling is provided in the enclosure for these leads.

**Note:** *The simplex leads are active only if the associated 4008 Program Amplifier input and output impedances are optioned for 600 ohms.*

### program amplifier module installation

3.20 To equip the 248RF Assembly with Program Amplifiers, remove the individual compartment covers (4 screws each) and rotate the connector bracket outward until the module can be fully inserted into the 56-pin connector. Refer to the 4008 (or other appropriate module) practice for optioning and alignment instructions. The module must be fully optioned and aligned before the compartment cover is replaced. Access is afforded to module jacks and adjustments when the module is pivoted outward from its normal position. After all adjustments have been made, rotate the module back into place against the front panel bracket and replace the compartment cover. Noise measurements may now be made at the appropriate terminals on TB2.

3.21 After all measurements have been completed, dress the various leads along the baseplate, using tie-wraps or tape to aggregate the leads. Replace the outer cover, being careful to dress the bundled leads through the aperture in the cover. This completes installation of the 248RF Assembly.

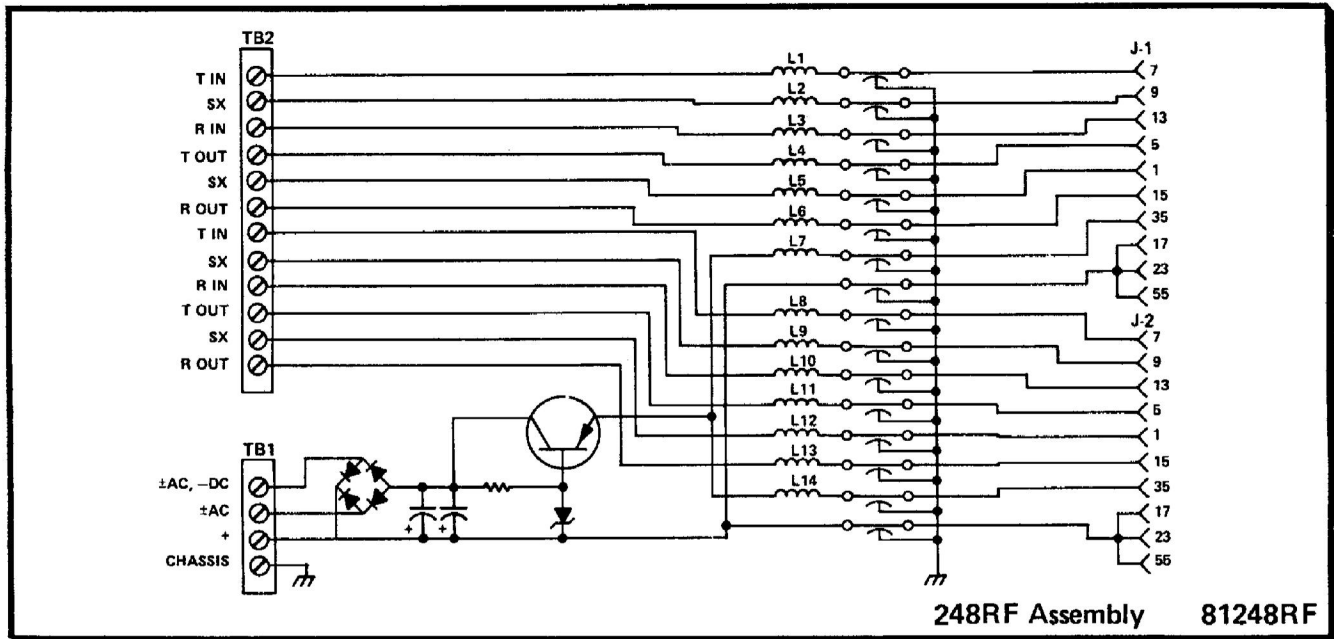


#### 4. circuit description

4.01 The 248RF Assembly is a metallic-shielded enclosure with an integral power rectifier, filter, and regulator. All access leads to the Amplifiers inside the shielded compartments incorporate LC decoupling networks comprised of series RF chokes and feed-through capacitors. Break fre-

quency of the filter network is approximately 100kHz. Refer to section 5 for a schematic diagram of the enclosure.

4.02 The power supply in the 248RF consists of a full-wave bridge rectifier, filter capacitors, and a single transistor regulator. A 30-volt zener diode is used as a reference source.



#### 5. Schematic Diagram

#### 6. specifications

##### input voltage

25 to 35Vac rms or 35 to 56Vdc

##### input current

75mA maximum with two Program Amplifiers active

##### capacity

two model 4008 Program Amplifiers or other Tellabs Series 248 Program modules

##### operating environment

-40° to +140° F (-40° to +60° C), humidity to 95% (no condensation)

##### mounting

wall mounting, four screws required

##### weight

9½ pounds (4.20kg) without amplifiers

11 pounds (4.99kg) equipped with two 4008 Program Amplifiers

##### dimensions

14-5/8 inches (37.15cm) high, 12¼ inches (31.12cm) wide, 2¼ inches (6.99cm) deep

#### 7. testing and troubleshooting

7.01 This Testing Guide may be used to assist in the installation, testing or troubleshooting of the 248RF Assembly. No component level testing should be attempted on the 248RF Assembly. Unauthorized testing or repairs may void the 248RF's warranty.

7.02 If a 248RF is diagnosed as defective, the situation may be remedied by Tellabs' *replacement or repair and return* procedures.

7.03 If a situation arises that is not covered in the Testing Guide, contact Tellabs Customer Service at (312) 969-8800 for further assistance.

#### troubleshooting guide

trouble condition	possible cause (in order of likelihood)
RF interference or cross-coupling between AM and FM channels	1) Improper grounding of 248RF □. 2) Severely unbalanced input from station protector or cable □. 3) Inadvertant connection between a transmission lead and cable sheath or ground wire □. 4) Compartment covers not in place □.
amplifier instability	1) 248RF chassis not properly grounded — strap between terminals 3 and 4 on TB-1 removed, □ 2) Improper connections between Input and Output SX leads □.
excessive 60Hz noise	1) AC input voltage below 25VAC RMS (verify wiring to 1913L4 transformer) □. 2) Improper grounding of 248RF Enclosure. (See 3.11 to 3.16) □. 3) Excessive hum on DC input or input voltage less than 32 volts □. 4) Improper connection to Input SX leads. □