



**MOTOROLA INC.**  
Communications  
Sector

## OPTION C149CX RADIO METERING PANEL

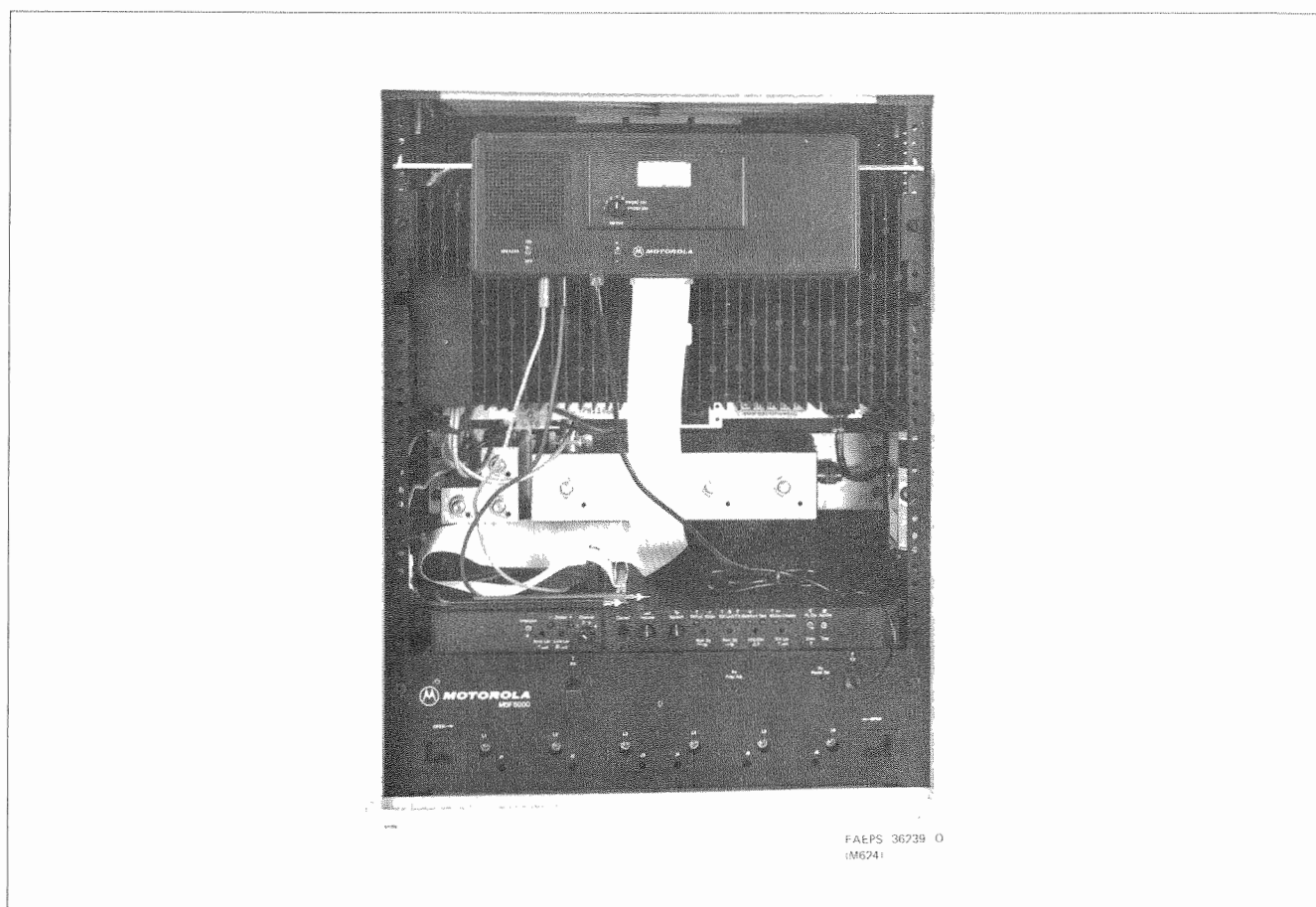


Figure 1. Radio Metering Panel — Front View

### 1. DESCRIPTION

**1.1** The Radio Metering Panel (RMP) is a service option designed specifically for the *MSF 5000* Series of base and repeater stations. The RMP includes a 5-watt audio amplifier (and speaker), and a meter used to monitor the station transmitter and receiver circuits. The meter circuit provides five selected metering positions,

as well as a 10-volt or a 25-volt full scale dc voltmeter selected position.

**1.2** The RMP comes with a separate 40-conductor ribbon interface cable, a separate 8-conductor metering cable with "modular" connectors, two separate voltage probes and a set of housing rods that may be extended and inserted into the mounting rails inside the station cabinet. Refer to Figure 2 for the locations of the con-

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nectors used for the CONTROL (J1201), METER (J1202), + voltage probe (J1203), and — voltage probe (J1204). Refer to Figure 3 for a view of the RMP with its front panel removed.

**1.2.1** The 40-conductor interface cable connects the station EXPANSION connector J800 (located on the top of the control tray housing) to the RMP CONTROL connector J1201. This cable provides interface lines which connect power, and audio signals between the station control board, other control modules within the station, and the RMP. There are two types of signal lines provided, as follows:

- audio line, and
- power and ground lines.

#### 1.2.1.1 Select Audio (Pin 32) — Audio Line

The Select Audio signal, originating on the station control module, is the audio input for the local speaker amplifier circuit in the RMP. Any of the following audio signals will be present on the select audio line when it is properly gated by the control circuits in the station: primary receiver audio, secondary receiver audio, transmit audio from the remote wire line, and automatic station I.D. and alarm tone audio. The Select Audio line is con-

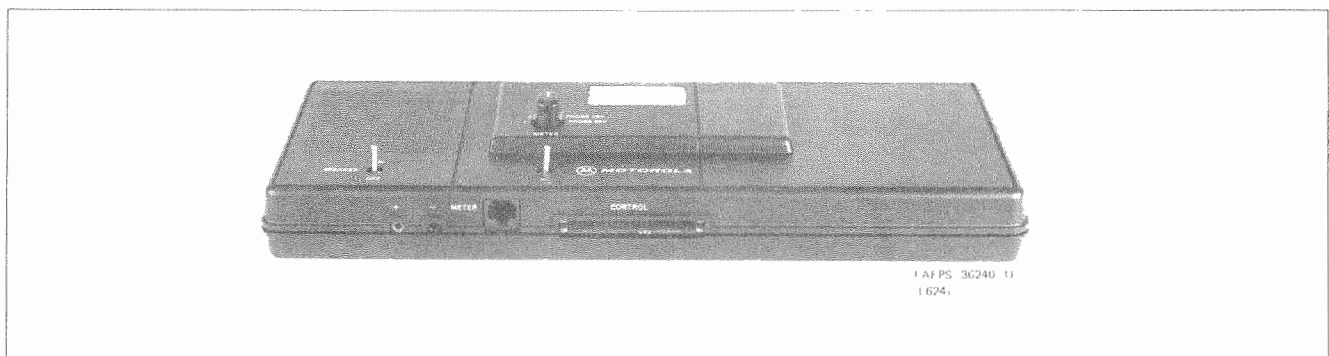


Figure 2. Radio Metering Panel — Edge View

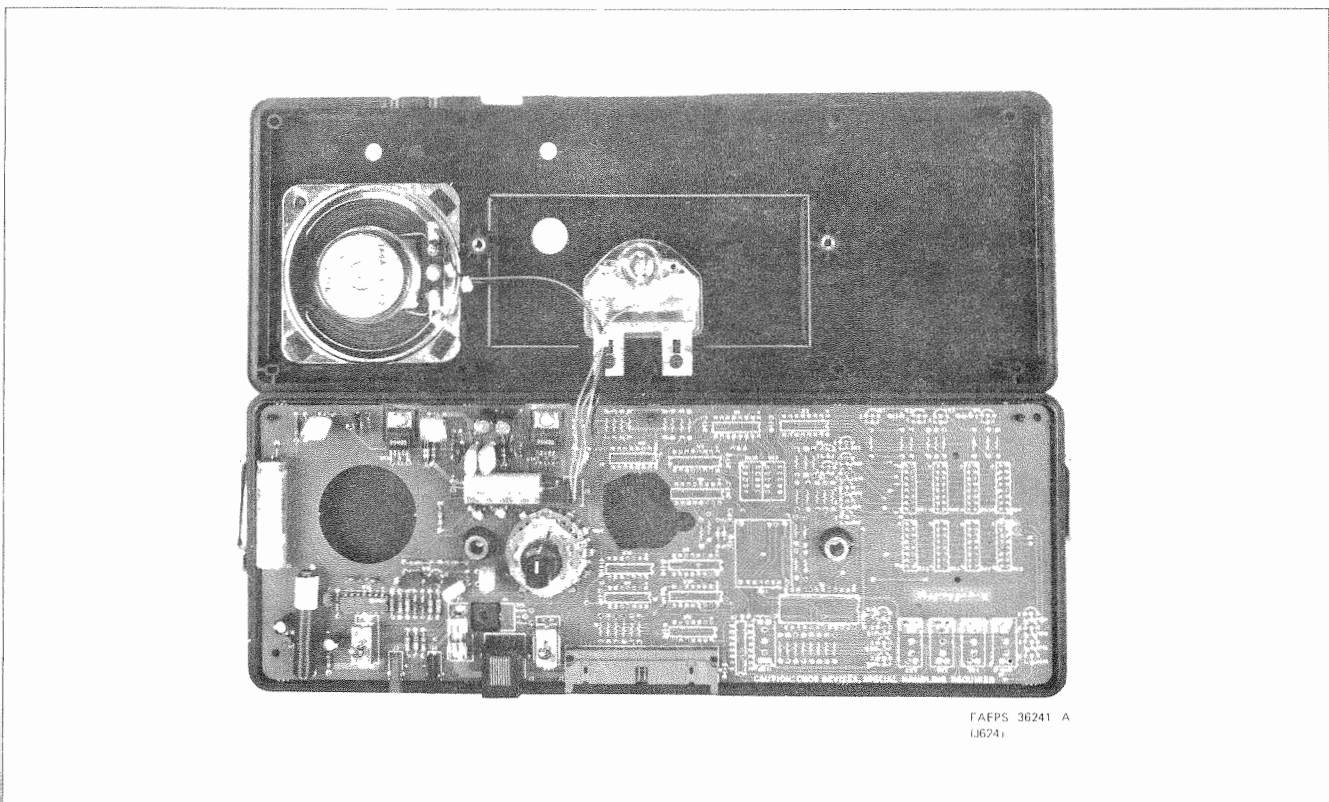


Figure 3. Radio Metering Panel — Internal View

Table 1. RMP Metering Cable Interface Lines

| Line | RMP Meter J1202 | TX Metering J413               | RX Metering J210               | PA Metering J503    |
|------|-----------------|--------------------------------|--------------------------------|---------------------|
| 1    | Meter 1         | Forward Voltage                | Quadrature Detector            | Final Stage 1       |
| 2    | Meter 2         | Not Used                       | I-F Level                      | Final Stage 2       |
| 3    | Meter 3         | Control Voltage                | Mixer Output                   | Final Stage 3       |
| 4    | Meter 4         | Not Used                       | Reference Oscillator           | Predriver Stage     |
| 5    | Meter 5         | XMTR Synthesizer Steering Line | RCVR Synthesizer Steering Line | Driver Stage        |
| 6    | Not Used        | GND                            | GND                            | Factory Test        |
| 7    | Meter Common    | GND                            | GND                            | A + Meter Reference |
| 8    | Not Used        | GND                            | GND                            | Factory Test        |

nected to the wiper of the VOLUME control on the control tray front panel. Therefore, the dc bias level and ac level on the line vary depending on the VOLUME control setting. The RMP employs an audio power amplifier circuit to provide up to 5-watts of local service audio from the Select Audio signal, through the RMP internal 4-ohm speaker. The audio power amplifier circuit can be disabled with SPEAKER ON/OFF switch S1210, located on the face of the RMP. By connecting an optional microphone (HMN1001) to CONTROL Jack J812 on the front panel of the station control tray, the transmitter can be locally keyed and modulated or intercom with the remote control console operator can be accomplished.

**1.3** The 8-conductor metering cable connects RMP METER Jack J1202 to either the station TX Metering, or station RX Metering Jack. The TX and RX Metering Jacks (J413 and J210, respectively) are both located on the station RF Tray front panel. The PA Metering Jack (J503) is located on the PA Distribution Board, within the station Power Amplifier Deck. This cable provides interface lines which connect five metering lines and a meter common line to the RMP, as shown in Table 1.

**1.3.1** The two voltage probes plug into two jacks provided on the bottom edge of the RMP: RED = “+” =

J1203; BLK = “—” = J1204. Each of the probes is equipped with a reversible blunt or pointed tip.

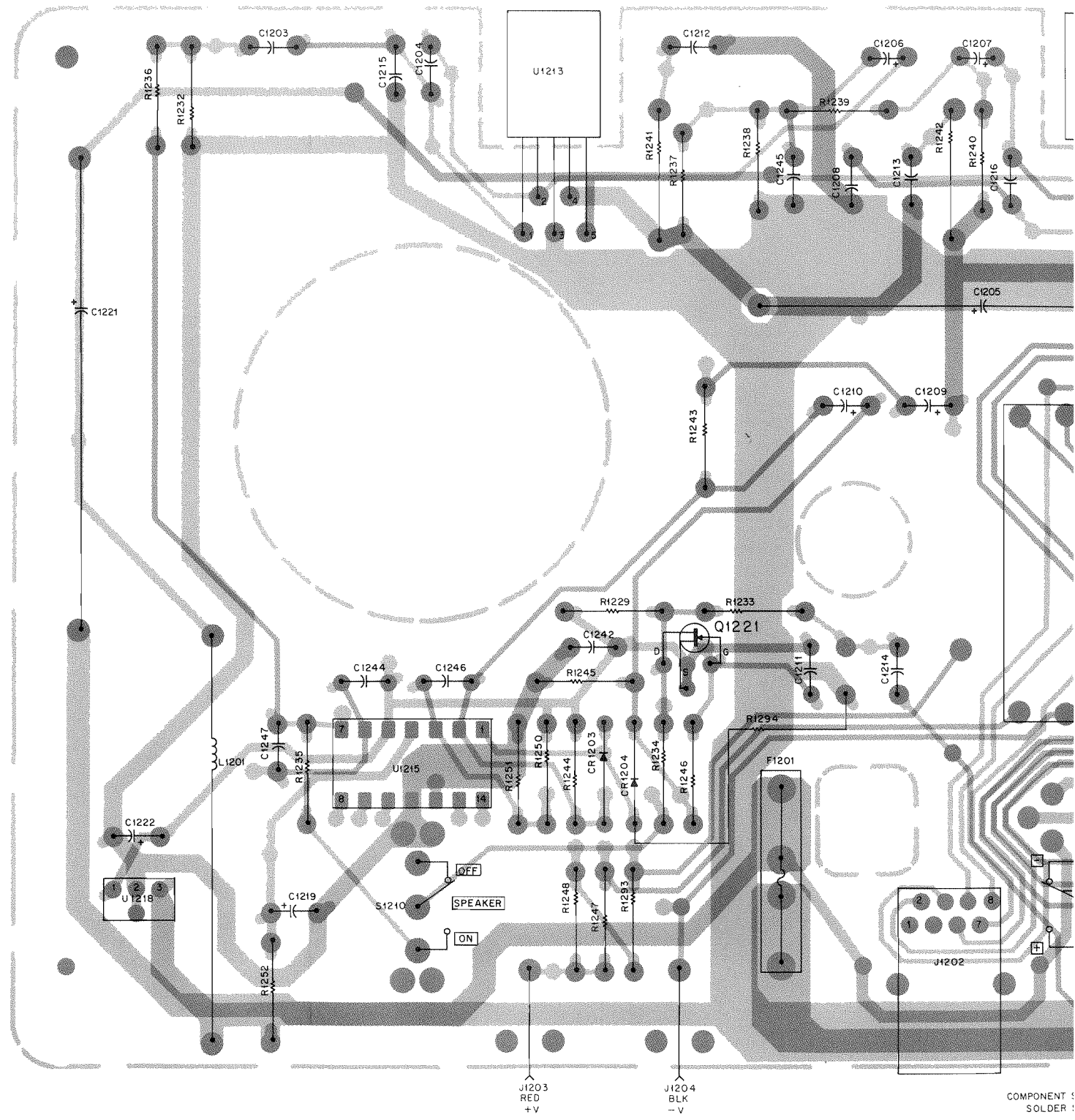
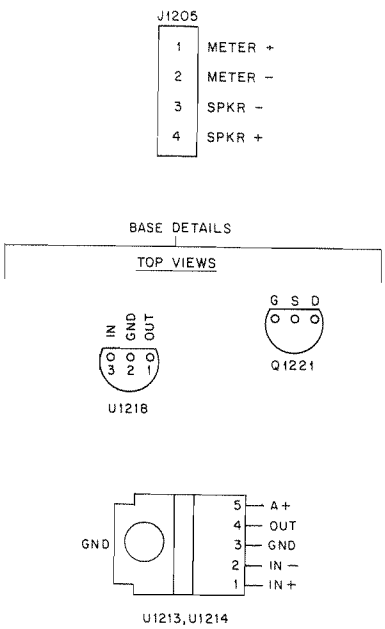
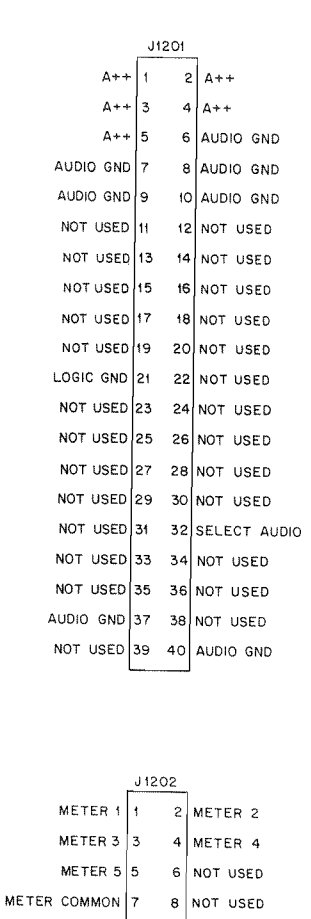
## 2. METERING FACILITIES

The RMP provides a measured indication for the signals listed in Table 2 on a 0-50 uA full-scale meter (M1201). The proper indications are the same as those obtained using a Motorola Portable Test Set or TEK-5F Meter Panel, as described in the *MSF 5000* Base Station and Repeater Instruction Manual. A specific meter position is selected by using the METER selector switch S1208 on the face of the RMP. When METER selector switch S1208 is in the “10 V” or “25 V” position, the meter monitors the voltage probes and is calibrated to read full-scale voltage (instead of full-scale microamperes).

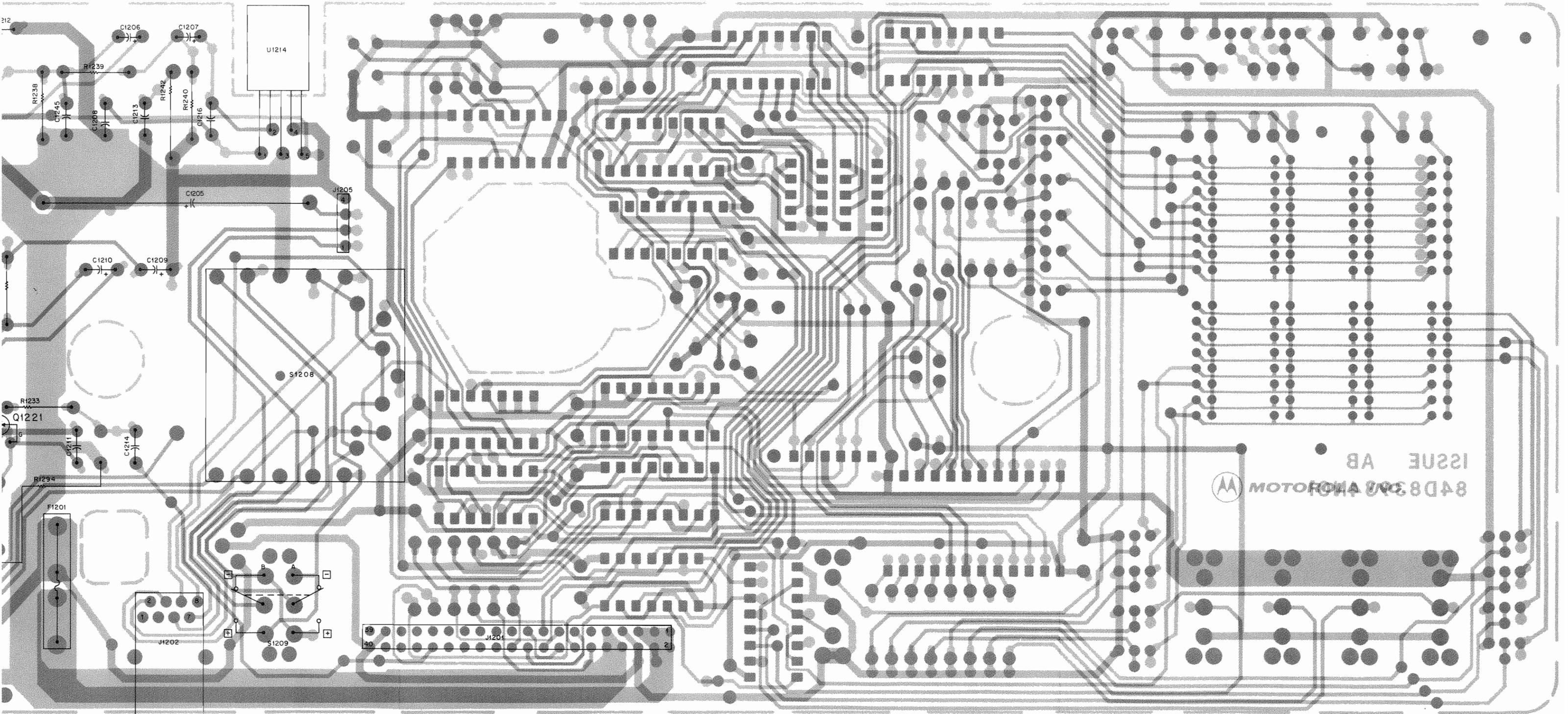
### IMPORTANT

When measuring the power amplifier circuits, via J503, meter REVERSING switch S1209 must be placed in the “—” (or reverse) position. METER REVERSING switch S1209 is normally in the “+” (or forward) position when the RMP is connected to either J413 or J210 (TX or RX Metering Jack, respectively).

RADIO METERING PANEL  
OPTION C149CX







COMPONENT SIDE ● BD-EEPS-36182-A  
SOLDER SIDE ● BD-EEPS-36183-A  
OL-EEPS-36185-A

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LOCATION

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PARTS LIST

# RADIO METERING PANEL

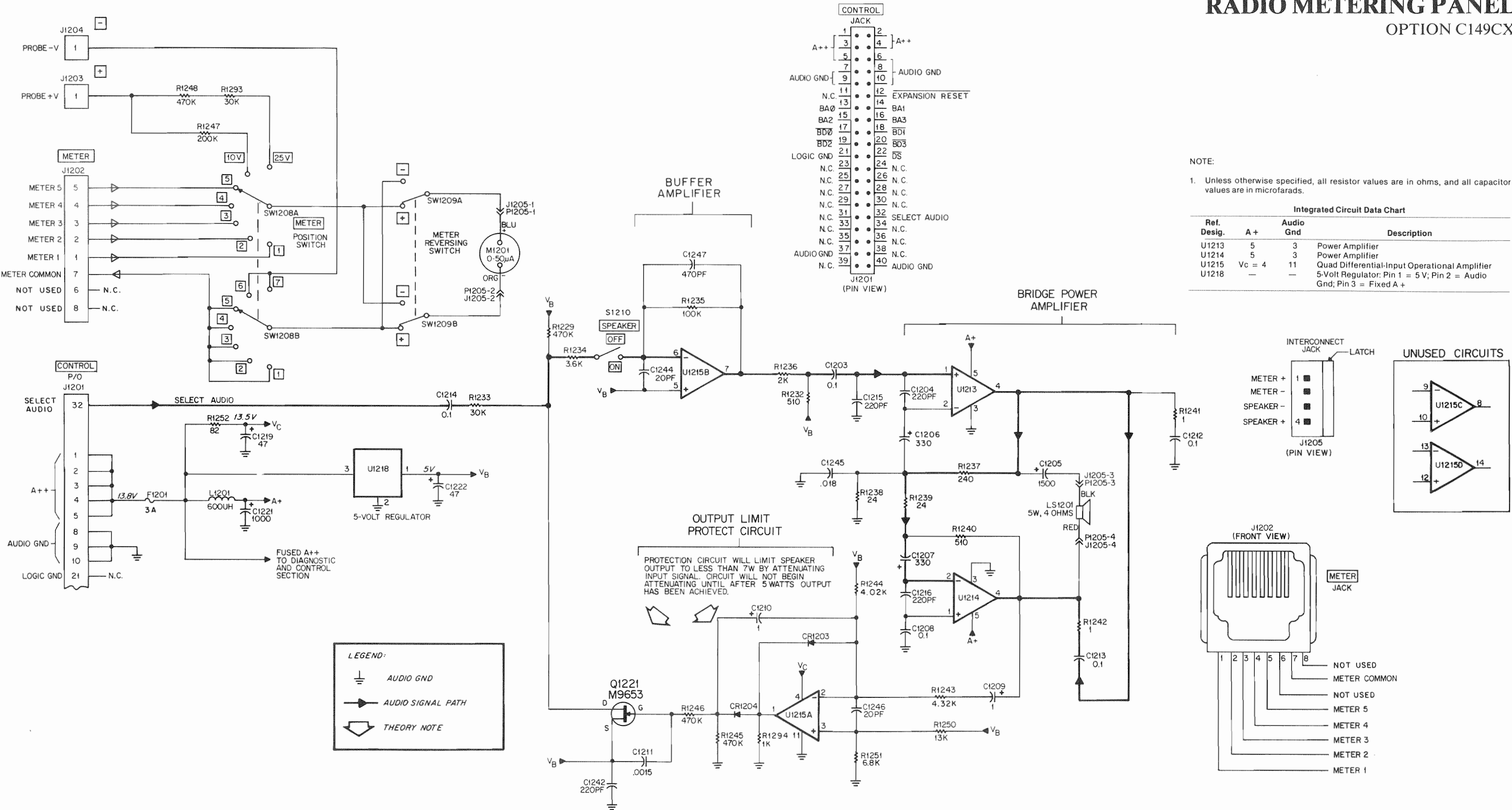
## OPTION C149CX

NOTE:

1. Unless otherwise specified, all resistor values are in ohms, and all capacitor values are in microfarads.

### Integrated Circuit Data Chart

| Ref. Desig. | A +    | Audio Gnd | Description                                                         |
|-------------|--------|-----------|---------------------------------------------------------------------|
| U1213       | 5      | 3         | Power Amplifier                                                     |
| U1214       | 5      | 3         | Power Amplifier                                                     |
| U1215       | Vc = 4 | 11        | Quad Differential-Input Operational Amplifier                       |
| U1218       | —      | —         | 5-Volt Regulator: Pin 1 = 5 V; Pin 2 = Audio Gnd; Pin 3 = Fixed A + |



DEPS-35229-A

TLN2418A MSF 5000 RMP  
Metering, Audio, and DC Power  
Schematic Diagram and Parts Lists  
Motorola No. PEPS-36254-A  
(Sheet 2 of 2)  
1/7/85- PHI

parts list

TRN5173A Metering Board PL-8434-A

| REFERENCE SYMBOL                                         | MOTOROLA PART NO. | DESCRIPTION                       |
|----------------------------------------------------------|-------------------|-----------------------------------|
| capacitor, fixed; uF ± 5%; 50 V: unless otherwise stated |                   |                                   |
| C1203                                                    | 8-11017A17        | 0.1                               |
| C1204                                                    | 21-11022K50       | 220 pF                            |
| C1205                                                    | 23-84665F17       | 1500 ± 100-10%; 16 V              |
| C1206, 1207                                              | 23-84665F32       | 330 ± 20%; 10 V                   |
| C1208                                                    | 8-11017A17        | 0.1                               |
| C1209, 1210                                              | 23-11019A09       | 1.0 ± 20%                         |
| C1211                                                    | 8-11017A02        | .0015                             |
| C1212 thru 1214                                          | 8-11017A17        | 0.1                               |
| C1215, 1216                                              | 21-11022K50       | 220 pF                            |
| C1217, 1218                                              |                   | NOT USED                          |
| C1219                                                    | 23-11019A40       | 47 ± 20%; 25 V                    |
| C1220                                                    |                   | NOT USED                          |
| C1221                                                    | 23-83210A24       | 1000; 20 V                        |
| C1222                                                    | 23-11019A40       | 47 ± 20%; 25 V                    |
| C1223 thru 1241                                          |                   | NOT USED                          |
| C1242                                                    | 21-11022K50       | 220 pF                            |
| C1243                                                    |                   | NOT USED                          |
| C1244                                                    | 21-11022K25       | 20 pF                             |
| C1245                                                    | 8-11017A10        | .018                              |
| C1246                                                    | 21-11022K25       | 20 pF                             |
| C1247                                                    | 21-11015B09       | 470 pF ± 10%; 100 V               |
| diode: (see note)                                        |                   |                                   |
| CR1203, 1204                                             | 48-11034A01       | silicon                           |
| fuse:                                                    |                   |                                   |
| F1201                                                    | 65-82496G01       | 3A; 32 V                          |
| connector, receptacle:                                   |                   |                                   |
| J1201                                                    | 28-83935N02       | male; 40-contact                  |
| J1202                                                    | 9-83112N02        | female; 8-contact                 |
| J1203                                                    | 9-88254C03        | female; single-contact; coded RED |
| J1204                                                    | 9-88254C01        | female; single-contact; coded BLK |
| J1205                                                    | 28-83143M05       | male; 4-contact                   |
| coil, audio:                                             |                   |                                   |
| L1201                                                    | 25-82786N01       | choke, 600 uH                     |
| transistor: (see note)                                   |                   |                                   |
| Q1221                                                    | 48-869653         | FET, N-channel; type M9643        |
| resistor, fixed; ± 5%; 1/4 W: unless otherwise stated    |                   |                                   |
| R1229                                                    | 6-11009B14        | 470k                              |
| R1230, 1231                                              |                   | NOT USED                          |
| R1232                                                    | 6-11009A42        | 510                               |
| R1233                                                    | 6-11009A84        | 30k                               |
| R1234                                                    | 6-11009A62        | 3.6k                              |
| R1235                                                    | 6-11009A97        | 100k                              |
| R1236                                                    | 6-11009A56        | 2k                                |
| R1237                                                    | 6-11009A34        | 240                               |
| R1238, 1239                                              | 6-11009A10        | 24                                |
| R1240                                                    | 6-11009A42        | 510                               |
| R1241, 1242                                              | 6-125B70          | 1; 1/2 W                          |
| R1243                                                    | 6-10621C56        | 4.32k ± 1%                        |
| R1244                                                    | 6-10621C53        | 4.02k ± 1%                        |
| R1245, 1246                                              | 6-11009B14        | 470k                              |
| R1247                                                    | 6-11009B05        | 200k                              |
| R1248                                                    | 6-11009B14        | 470k                              |
| R1249                                                    |                   | NOT USED                          |
| R1250                                                    | 6-11009A76        | 13k                               |
| R1251                                                    | 6-11009A69        | 6.8k                              |
| R1252                                                    | 6-11009A23        | 82                                |
| R1253 thru 1292                                          |                   | NOT USED                          |
| R1293                                                    | 6-11009A84        | 30k                               |
| R1294                                                    | 6-11009A49        | 1k                                |
| switch:                                                  |                   |                                   |
| S1208                                                    | 40-84449N01       | rotary; 7-position; 2 pole        |
| S1209                                                    | 40-83685N06       | toggle; dpdt                      |
| S1210                                                    | 40-83685N04       | toggle; spdt                      |
| integrated circuit: (see note)                           |                   |                                   |
| U1213, 1214                                              | 51-83629M86       | audio power amplifier             |
| U1215                                                    | 51-82609M05       | operational amplifier             |
| U1218                                                    | 51-84561L86       | 5-volt regulator                  |

| mechanical parts |             |                        |
|------------------|-------------|------------------------|
| 36-83144N01      | 42-10122A12 | KNOB, control          |
|                  |             | CLIP, retainer; 2 used |

note: For optimum performance, diodes, transistors, and integrated circuits must be ordered by Motorola part numbers.

TKN8914A Diagnostic Cabling Kit PL-8430-O

| REFERENCE SYMBOL | MOTOROLA PART NO. | DESCRIPTION                                        |
|------------------|-------------------|----------------------------------------------------|
| P1203            | 28-84751N01       | connector, plug: male; single contact (RED)        |
| P1204            | 28-84751N02       | male; single contact (BLK)                         |
| P1205            | 15-83142M08       | housing; 4-contact                                 |
| mechanical parts |                   |                                                    |
|                  | 1-80766D37        | ASSEMBLY, connector and wire; includes P1205, and  |
|                  | 39-82717M01       | CONTACT, receptacle; 4 used                        |
|                  | 1-80766D47        | ASSEMBLY, voltage probe (RED); includes P1203, and |
|                  | 10-82465B02       | WIRE, test probe (RED); 36" used                   |
|                  | 29-82676C02       | PROBE, test (RED)                                  |
|                  | 1-80766D48        | ASSEMBLY, voltage probe (BLK) includes: P1204, and |
|                  | 10-82465B01       | WIRE, test probe (BLK); 36" used                   |
|                  | 29-82676C01       | PROBE, test (BLK)                                  |

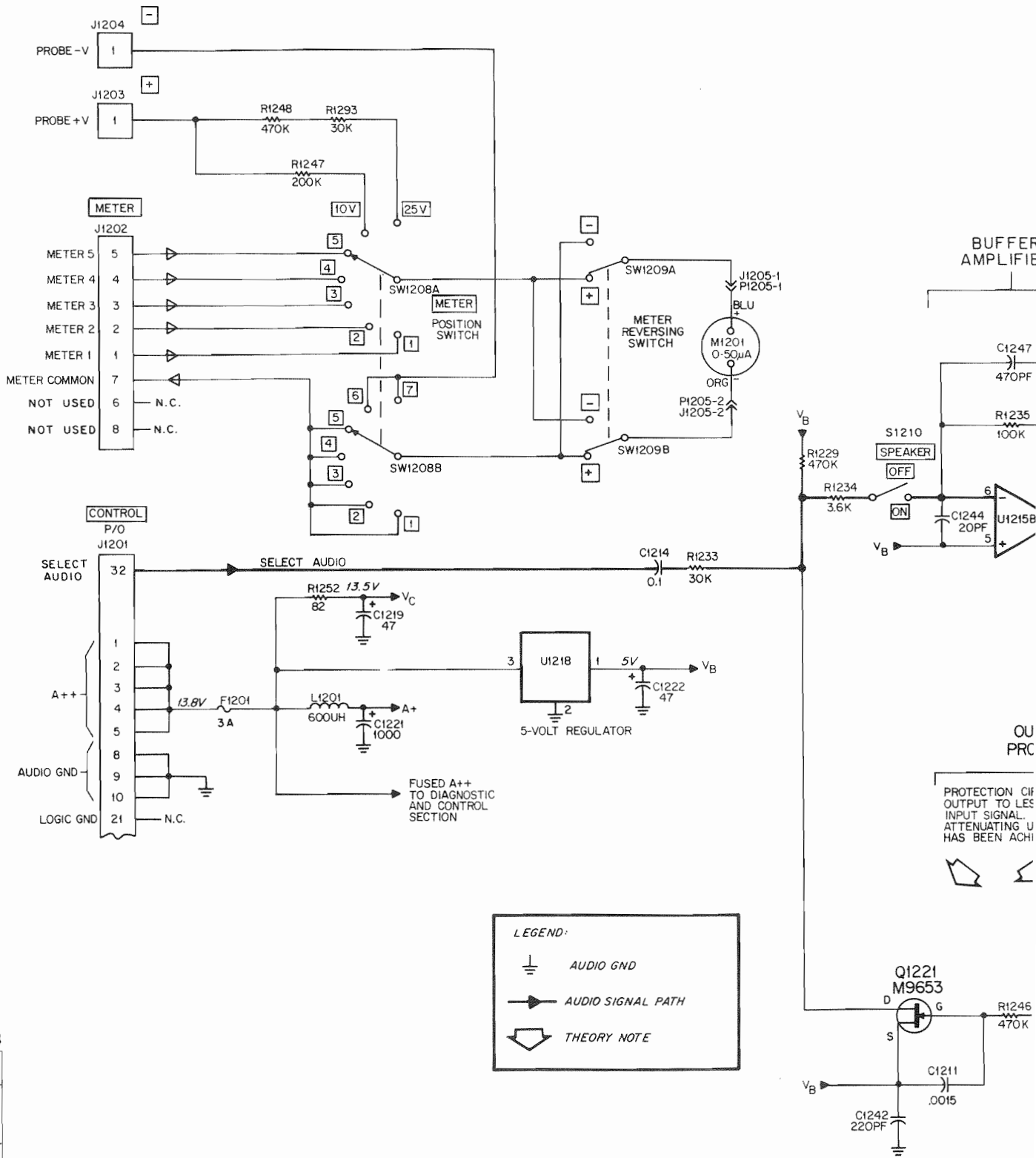
THN6485A Housing and Hardware Kit PL-8433-A

| REFERENCE SYMBOL | MOTOROLA PART NO. | DESCRIPTION                                         |
|------------------|-------------------|-----------------------------------------------------|
| F1201            | 65-82496G01       | fuse, spare: 3A; 32 V                               |
| LS1201           | 50-84450N01       | speaker: 4 ohm; 5 W; 3"                             |
| M1201            | 72-83319G01       | meter: 50 uA                                        |
| W1201            | 30-83941N02       | cable, assembly: 40-conductor; includes: connectors |
| W1202            | 30-84225N02       | 8-conductor; includes: connectors                   |
| mechanical parts |                   |                                                     |
|                  | 2-10101A91        | NUT, spring; 4 used                                 |
|                  | 3-10908A10        | SCREW, machine; M2.5 x 0.45 x 6; 2 used             |
|                  | 3-83498N03        | SCREW, tapping; M3.5 x 0.6 x 14; 4 used             |
|                  | 3-83498N12        | SCREW, tapping; slotted star; 2 used                |
|                  | 3-83938N01        | SCREW, self retaining; 10-32 x 1-1/8"; 2 used       |
|                  | 4-84180C01        | WASHER, shoulder; 2 used                            |
|                  | 7-83830N01        | BRACKET, meter                                      |
|                  | 14-83022P01       | INSULATOR, board                                    |
|                  | 14-84268A01       | INSULATOR, transistor; 2 used                       |
|                  | 15-83826N02       | HOUSING, top                                        |
|                  | 15-83827N02       | HOUSING, bottom                                     |
|                  | 42-10128A14       | RING, screw retaining; rubber; 2 used               |
|                  | 42-10217A02       | STRAP, tie: .091 x 3.62 (WHT); 2 used               |
|                  | 47-84568N01       | ROD, mounting; right hand                           |
|                  | 47-84568N02       | ROD, mounting; left hand                            |
|                  | 75-82230B14       | PAD, rubber; 2 used                                 |
|                  | 75-84215A03       | BUMPER, recessed; 4 used                            |

REVISIONS

PEPS-36254

| ISSUE | KIT      | REF. SYMBOL | CHANGE                 | LOCATION                   |
|-------|----------|-------------|------------------------|----------------------------|
| A     | TRN5173A | R1243, 1244 | WERE: 3.6k; 6-11009A62 | SCHEMATIC PARTS LIST & PCB |
|       |          | R1294       | ADDED                  |                            |
|       |          | KNOB        | ADDED                  |                            |
|       | THN6485A | F1201       | ADDED                  | PARTS LIST                 |
|       |          | INSULATOR   | 14-83022P01; ADDED     |                            |
|       |          | KNOB        | DELETED                |                            |







# instruction manual revision

## GENERAL

This revision outlines changes that have occurred since the printing of your instruction manual. Use this information to correct your manual.

## INSTRUCTION MANUAL AFFECTED:

68P81114E04-A      *MSF 5000* Option C149CX  
Radio Metering Panel

## REVISION DETAILS:

This revision adds Option C149DB to your instruction section. The option provides a radio metering panel for *PURC 5000* Base Stations.