

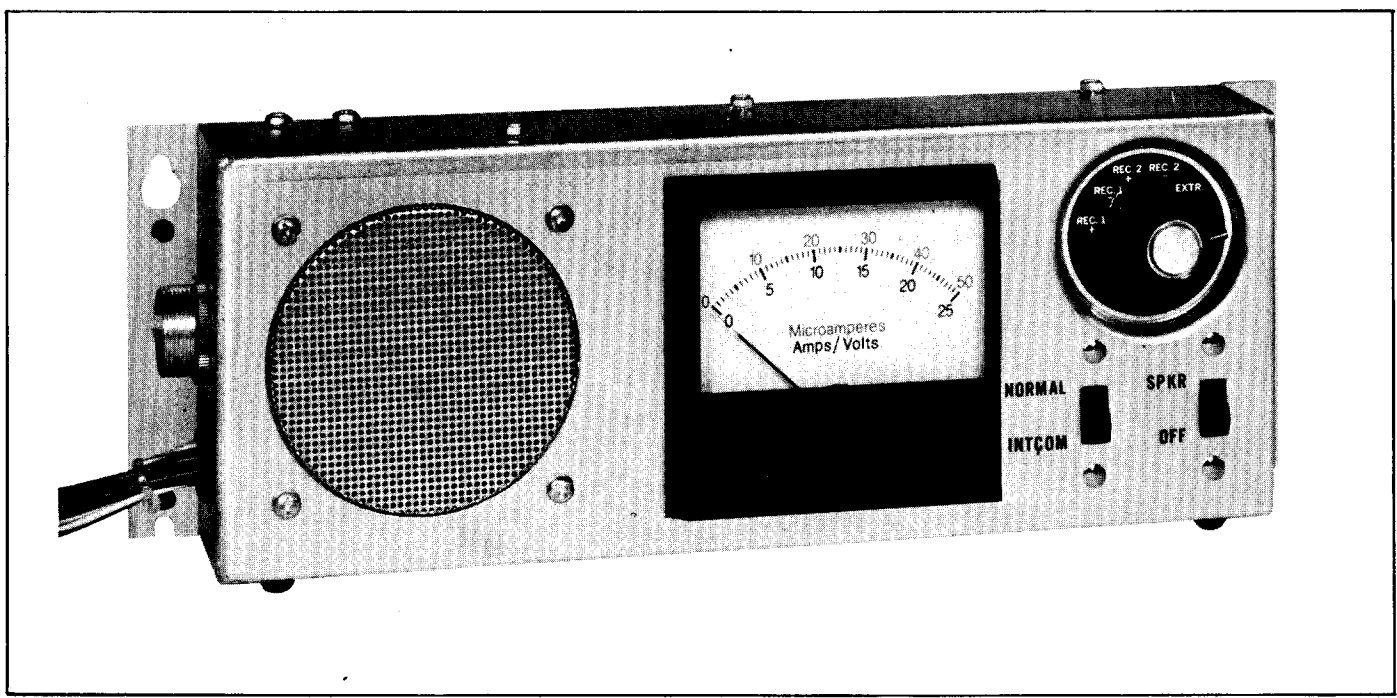


MOTOROLA

MICOR® Base Station Accessories

Metering and Intercom

Option No. C149

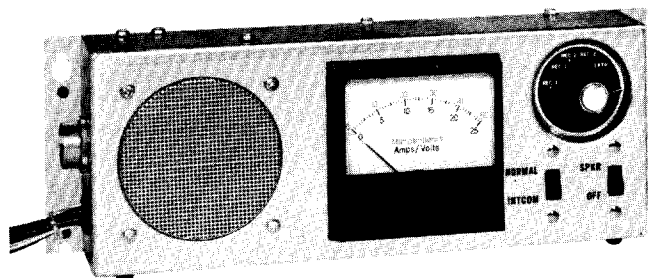


Instruction Manual

68P81018E26-D

BUILT-IN STATION METERING & INTERCOM

OPTION NO. C149



AEPS-11973-O

1. DESCRIPTION

The C149 series of optional accessories provides built-in station metering of over 20 major test points in the transmitter and receiver(s), plus intercom between the station and the remote control point. This accessory item facilitates testing, adjustment and maintenance of the station. There is a specific version of this option available for any "Micor" "Compa-Station" base or repeater radio in any frequency band, either locally or remotely controlled, as listed in the Model Chart.

The meter is a 0-50 μ A instrument mounted on the meter & intercom chassis. A selector switch chooses the specific chassis to be monitored, and a selector switch on the chosen chassis determines the specific function to be checked. Every function available at the metering receptacle of the exciter, power amplifier, power control board and receiver rf & i-f board(s) can be selected for metering.

Using the speaker in the meter & intercom chassis, and a test microphone which may be plugged into the microphone receptacle on the side of this chassis, two-way intercom between

the station and the remote control console is possible without keying the base station transmitter. The speaker and microphone also may be used to locally operate the station for "on the air" testing and maintenance. The NORMAL-INTCOM switch selects the desired mode of operation; NORMAL for "on the air" testing and INTCOM for intercom operation. The SPKR-OFF switch allows the speaker to be used during testing, or to be disabled when the station is unattended. Of course, the intercom feature is not used when the option is installed in a locally controlled station.

The Model Chart lists the items that comprise this accessory. The main item, of course, is the meter & intercom chassis which contains the meter and meter switching circuit, the speaker, the microphone receptacle, an intercom amplifier and intercom switching circuits. Another item is the receiver meter kit which is mounted on the receiver chassis. It includes a cable, which plugs into the receiver metering receptacle, and the switch which selects the specific receiver circuit to be metered. Stations with two receivers use two receiver meter kits. The final major item is the transmitter (or in the case of continuous duty stations, both the exciter and the power amplifier). The model number of the transmitter is different than in the basic version of the station. Model numbers have an "AV" suffix rather than an "AA" suffix; for example, the Model TTB1261AV replaces the TTB1261AA. The "AV" series transmitters are identical to the "AA" series models except for the addition of the meter kits. These meter kits consist of cables which plug into the metering receptacles, and selector switches for choosing the specific circuit to be metered. The diagrams in this instruction section are for the meter kit assemblies only. Continue to refer to

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Communications Division

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the transmitter diagrams in the transmitter portion of the manual for all other circuits; they are unchanged.

The meter & intercom chassis is provided with four elongated holes to permit easy removal. The unit may be mounted on the front shield of either the transmitter or receiver chassis, and can be easily moved for access into the equipment on which it is mounted. The connections to the meter & intercom chassis are via a cable that plugs into receptacle J4 of the stations' remote or local control chassis.

Construction is fully solid-state. Most of the circuitry is located on a single circuit board.

2. OPERATING INSTRUCTIONS

a. Metering

(1) Select the chassis which is to be monitored; receiver 1 (REC 1 + or REC 1 -), receiver 2 (REC 2 + or REC 2 -), transmitter or exciter (EXTR), or power amplifier (PA).

(2) For receiver metering, use the (+) position for all metering except discriminator adjustment or checking. For discriminator adjustment use both (+) and (-) and adjust for meter zero.

(3) For intermittent duty stations and 72-76 MHz continuous duty stations with a single transmitter chassis, use the EXTR position for all transmitter checks. The PA position is not used in these stations.

(4) Once the chassis to be metered is selected, select the function to be metered with the meter switch on the receiver or transmitter chassis. The functions for each switch position are given on the meter kit diagrams in this section.

(5) Refer to the transmitter and receiver sections of the station manual for typical or minimum readings. Better yet, keep a log of all meter readings each time the station is serviced. Use the last set of readings as a reference and note any degradation in performance.

b. Intercom (Remote Control Stations Only)

(1) Connect a test microphone to the microphone receptacle on the meter & intercom chassis.

(2) Place the SPKR-OFF switch in the SPKR position.

(3) Place the NORMAL-INTCOM switch in the INTCOM position.

(4) The unit is now ready for intercom operation between the station and the remote control point. Close the push-to-talk switch on the microphone and speak into the microphone to send a message. Release the button to listen; replies will be heard in the speaker. The console operator at the remote point must also switch to an intercom mode to prevent keying the station during replies.

(5) Return the SPKR-OFF switch to the OFF position before leaving the station unattended.

c. "On-The-Air" Testing (Remote Control Stations)

(1) Connect a test microphone to the microphone receptacle on the meter & intercom chassis.

(2) Place the SPKR-OFF switch in the SPKR position.

(3) Place the NORMAL-INTCOM in the NORMAL position.

(4) The unit is now ready for "on-the-air" testing. If the microphone push-to-talk switch is closed, the station's transmitter will be keyed. Speak into the microphone to transmit a message. Release the push-to-talk switch to listen. Receiver audio will be heard on the speaker.

(5) Return the SPKR-OFF switch to OFF before leaving the station unattended.

d. Monitoring

To monitor audio quality, etc., place the SPKR-OFF switch in the SPKR position. Both receiver audio and line audio from the remote control point will be heard in the speaker.

NOTE

Do not adjust volume for the local speaker, it is properly set for remote control operation and must be readjusted if changed.

3. CIRCUIT DESCRIPTION

a. Meter Selector Circuit

Refer to the meter & intercom chassis schematic diagram. Meter selector switch S3 selects REC 1 (+ or -), REC 2 (+ or -), EXTR or PA functions and connects meter M1 to the metering

inputs from the selected chassis. The (+) and (-) positions permit rapid receiver discriminator adjustment. The station functions to be metered are routed from the metering receptacles on the receiver and transmitter chassis into the 50-conductor station interconnect cable and thus into the remote or local control chassis. These functions are made available at connector J4 of the remote or local control chassis. Connector P4 of the meter & intercom chassis plugs into J4 of the remote or local control chassis, thus completing the circuit to the meter.

b. Intercom and Speaker

The intercom mode is activated by placing the NORMAL-INTCOM switch (S1) in the INTCOM position, the SPKR-OFF switch (S2) in the SPKR position and depressing the microphone push-to-talk switch. The microphone is connected at receptacle J1. The P-T-T signal energizes relay K1, but diode CR2 blocks the P-T-T signal from the local P-T-T output at P4-16 and the transmitter is not keyed. The microphone audio is routed through the now closed contacts of relay K1 to P4-9 and thus to the line driver and ultimately to the remote control point. The microphone audio is also amplified by Q1 and Q2 and applied to the transmitter, but since the transmitter is not keyed it has no effect. Another set of contacts on relay K1 mutes the speaker (LS1) while the P-T-T switch is closed.

When switch S1 is in the NORMAL position and the mic P-T-T switch is activated, mic audio is again routed through relay K1 to the line driver. However, the line driver is inhibited under these conditions which prevents line noise from being transmitted. Mic audio is applied to the exciter via Q1 and Q2. The transmitter is keyed by the mic P-T-T function because, in the NORMAL position, diode CR2 is bypassed and does not prevent transmitter keying.

c. Receiver Meter Kit

The receiver meter kit connects to the receiver rf and i-f board metering receptacle and to the receiver interconnect board. This is shown on the receiver metering kit schematic diagram. Functions selected by the rotary switch are routed to the meter panel via the receiver interconnect

board, 50-conductor interstation cable, and remote (or local) control chassis circuit board.

Discriminator "0" adjust is performed by placing the selector switch on this kit to the discriminator position. Then place the meter panel selector switch alternately in the (+) and (-) RCVR positions while adjusting for "0" discriminator output.

With two-receiver stations, two receiver metering kits are used and are connected as shown on the receiver metering kit schematic diagram.

d. Transmitter Meter Kits

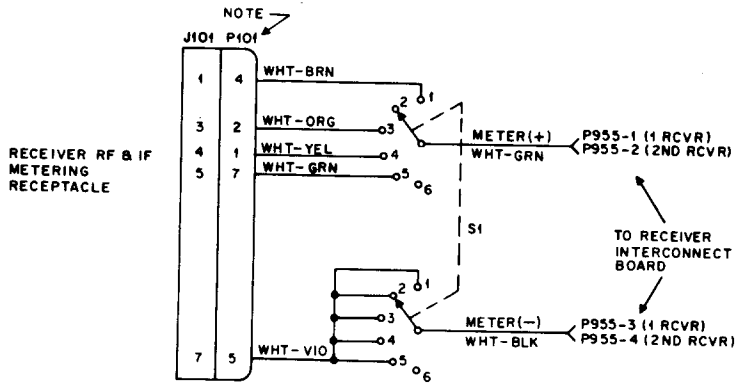
The transmitter meter kit connects to the station at various transmitter metering plugs, and the transmitter interconnect board. This is shown on the applicable transmitter metering kit schematic diagram. Exciter, PA, and power control board functions (as selected by the rotary switch) are routed to the meter chassis & intercom kit via the transmitter interconnect board, 50-conductor interstation cable, and remote control chassis circuit board.

e. Exciter Meter Kits

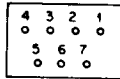
The exciter meter kit connects to the exciter metering receptacle and to chassis mounted feed-thru capacitors C911 and C912. This is shown on the applicable exciter meter kit schematic diagram. Exciter functions (as selected by the exciter rotary switch) are routed to the meter chassis & intercom kit via the transmitter interconnect board, 50-conductor interstation cable, and the remote (or local) control chassis circuit board.

f. PA Meter Kits

The PA meter kit connects to the power amplifier metering receptacle, power control board metering receptacle, remote (or local) control chassis unit board, and meter panel. This is shown on the applicable PA meter kit schematic diagram.



S1 SWITCH POSITION	FUNCTION METERED
1	"EXTENDER" CHANNEL OUTPUT (IF APPLICABLE)
2	---
3	CHANNEL ELEMENT OUTPUT
4	DISCRIMINATOR OUTPUT
5	3R IF AMPLIFIER AND LIMITER
6	---



P401 DETAIL (SHOWN FROM PIN SIDE)

NOTE:
RECEIVER METER PLUG IS INSERTED FROM REAR OF STATION.

BEPS-10414-A

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
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PARTS LIST

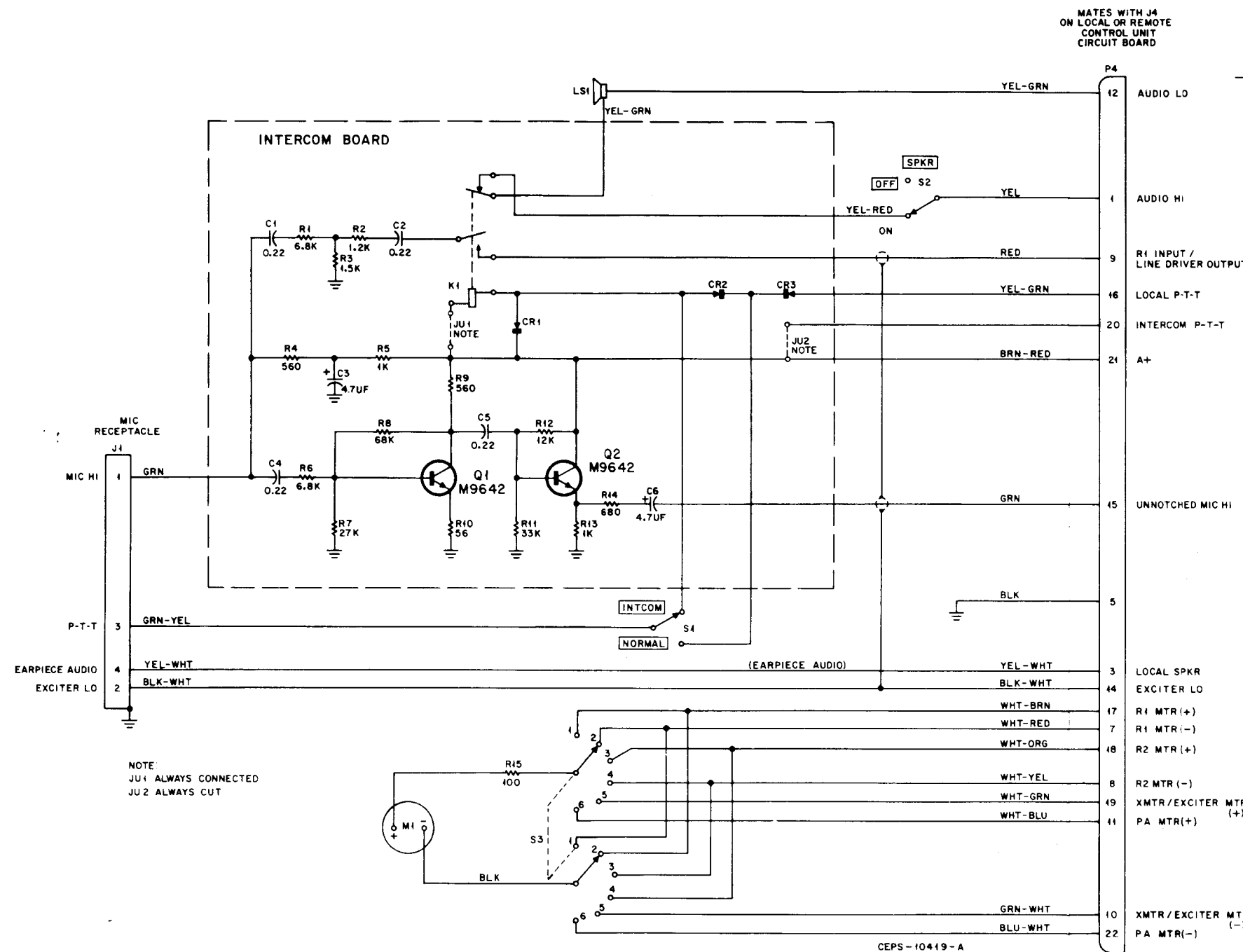
TLN5168A Metering Kit

PL-2157-O

P101	28-84208B01	<u>CONNECTOR, plug:</u> male; 7-contact
S1	40-84618G01	<u>SWITCH, rotary:</u> 2-pole; 6-position; non-shorting; does not include 36-82630H01 KNOB, control

OPTION			RECEIVER SWITCH & CABLE	RECEIVER HARDWARE	TRANSMITTER OR EXCITER SWITCH & CABLE METER KIT WITH SWITCH HARDWARE	POWER AMPLIFIER + SWITCH & CABLE METER KIT	TRANSMITTER OR EXCITER	POWER AMPLIFIER				
C149AA LOW BAND NON EXTENDER INTERMITTENT DUTY	STANDARD STATION	+	1	TLN5168A	1	TLN5233A	TTB1260BV = TTB1260BA } +TLN5170 SERIES = SERIES } -TLN5231 -TLN4756	TTB1260BA SERIES				
C149AB HIGH BAND INTERMITTENT DUTY 110 W			1	TLN5168A	1	TLN5232A	TTD1690AV = TTD1690AA } +TLN5169 SERIES = SERIES } +TLN5230 -TLN4730	TTD1690AA SERIES				
C149AC LOW BAND NON EXTENDER CONTINUOUS DUTY			1	TLN5168A	1	TLN5233A	TLB1420BV = TLB1420BA } +TLN5174A SERIES = SERIES }	TLB1420BA SERIES	TLB1410AA SERIES			
C149AD HIGH BAND CONTINUOUS DUTY 110 W			1	TLN5168A	1	TLN5232A	TLD1710BV = TLD1710BA } +TLN5173A SERIES = SERIES }	TLD1690BV = TLD1690BA } +TLN5171 SERIES = SERIES }	TLD1710BA SERIES	TLD1690AA SERIES		
C149AE LOW BAND EXTENDER INTERMITTENT DUTY					1	TLN5168A	1	TLN5233A	SAME AS C149AA	SAME AS C149AA		
C149AF HIGH BAND INTERMITTENT DUTY 60 W					1	TLN5168A	1	TLN5232A	TTD1700BV = TTD1700BA } +TLN5169A SERIES = SERIES } +TLN5230A -TLN4730A	TTD1700AA SERIES		
C149AG LOW BAND EXTENDER CONTINUOUS DUTY					1	TLN5168A	1	TLN5233A	SAME AS C149AC	SAME AS C149AC	SAME AS C149AC	
C149AH HIGH BAND CONTINUOUS DUTY 60 W					1	TLN5168A	1	TLN5232A	TLD1712BV = TLD1712B + TLN5173A	TLD1700AV = TLD1700AA } +TLN5171 SERIES = SERIES }	TLD1712AA	TLD1700AA SERIES
C149AJ LOW BAND NON EXTENDER INTERMITTENT DUTY					2	TLN5168A	2	TLN5233A	SAME AS C149AA	SAME AS C149AA		
C149AK HIGH BAND INTERMITTENT DUTY 110 W					2	TLN5168A	2	TLN5232A	SAME AS C149AB	SAME AS C149AB		
C149AL LOW BAND NON EXTENDER CONTINUOUS DUTY					2	TLN5168A	2	TLN5233A	SAME AS C149AC	SAME AS C149AC	SAME AS C149AC	
C149AM HIGH BAND CONTINUOUS DUTY 110 W					2	TLN5168A	2	TLN5232A	SAME AS C149AD	SAME AS C149AD	SAME AS C149AD	
C149AN HIGH BAND INTERMITTENT DUTY 60 W					2	TLN5168A	2	TLN5232A	SAME AS C149AF	SAME AS C149AF		
C149AP HIGH BAND CONTINUOUS DUTY 60 W					2	TLN5168A	2	TLN5232A	SAME AS C149AH	SAME AS C149AH	SAME AS C149AH	
C149AR 72-76 MHZ			1	TLN5168A	1	TLN5233A	TTC1040BV = TTC1040BA } +TLN5334A SERIES = SERIES }	TTC1040BA SERIES				
C149AS 72-76 MHZ			1	TLN5168A			TTC1040BV = TTC1040BA } +TLN5334A SERIES = SERIES }	SAME AS C149AR				

*-ALSO REQUIRES TLN5335A TRANSMITTER HARDWARE
 **-ALSO REQUIRES TLN5337A TRANSMITTER HARDWARE



TLN1552A Meter Chassis & Intercom Kit
Schematic Diagram
Motorola No. PEPS-17440-O
3/7/75-UP

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
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PARTS LIST

TLN1552A Meter Chassis & Intercom Kit
TLN5167A Intercom Board PL-2156-A

C1,2	8-82905G11	CAPACITOR, fixed: μ F; 0.22 +10%; 50 V
C3	23-865137	4.7 +20%; 25 V
C4,5	8-82905G11	0.22 +10%; 50 V
C6	23-865137	4.7 +20%; 25 V
CR1,2,3	48-82392B03	SEMICONDUCTOR DEVICE, diode; silicon
K1	80-84157B02	SWITCH, magnetic reed; 13.4 V dc dual-coil; 2 form "A", 1 form "B"; resistance of each coil 285 ohms +10%
Q1,2	48-869642	TRANSISTOR; NPN; type M9642
R1	6-128687	RESISTOR, fixed: +10%; 1/4 W; 6.8k
R2	6-129235	1.2k
R3	6-127803	1.5k
R4	6-129620	560
R5	6-127802	1k
R6	6-128687	6.8k
R7	6-127806	27k
R8	6-129144	68k
R9	6-129620	560
R10	6-129860	56
R11	6-127807	33k
R12	6-129230	12k
R13	6-127802	1k
R14	6-128599	680

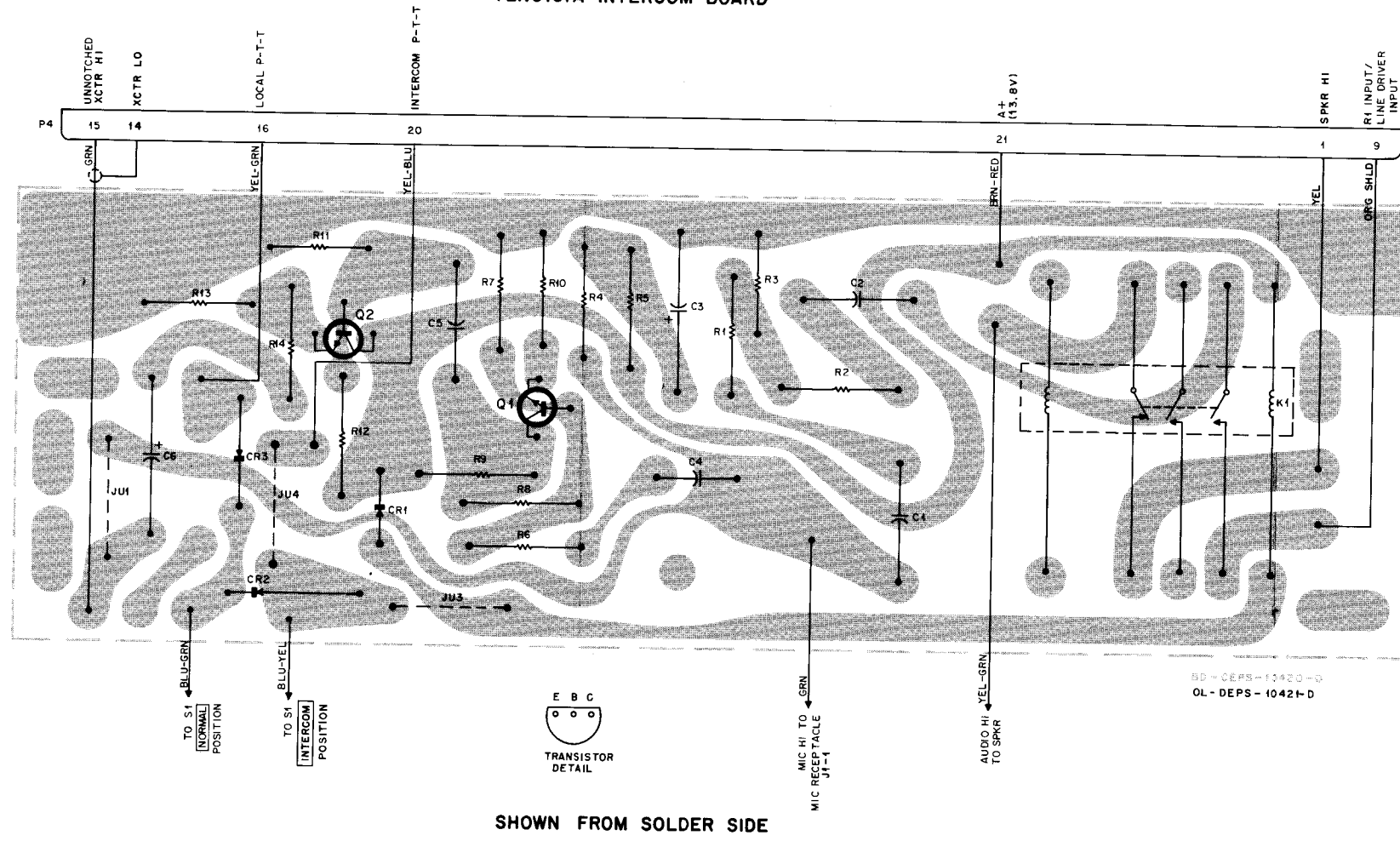
TLN5166A Metering & Intercom Chassis PL-2155-O

J1	9-830418	CONNECTOR, receptacle; female; 4-contact
LS1	50-84710G01	LOUDSPEAKER, permanent magnet 3"; square 16 ohms voice coil impedance; weatherproof
M1	72-84279G01	METER, ammeter; 50 μ A movement
R15	6-802072	RESISTOR, fixed; 100 +1%; 1/2 W
S3	40-84618G01	SWITCH, rotary; 2-pole; 6-position; non-shorting; does not include 36-82630H01 KNOB, control
		NON-REFERENCED ITEMS
		35-84530G01 GRILLE, speaker
		37-12706 GROMMET, rubber
		37-867632 SLEEVE, rubber

TKN6641A Metering Cable PL-2165-O

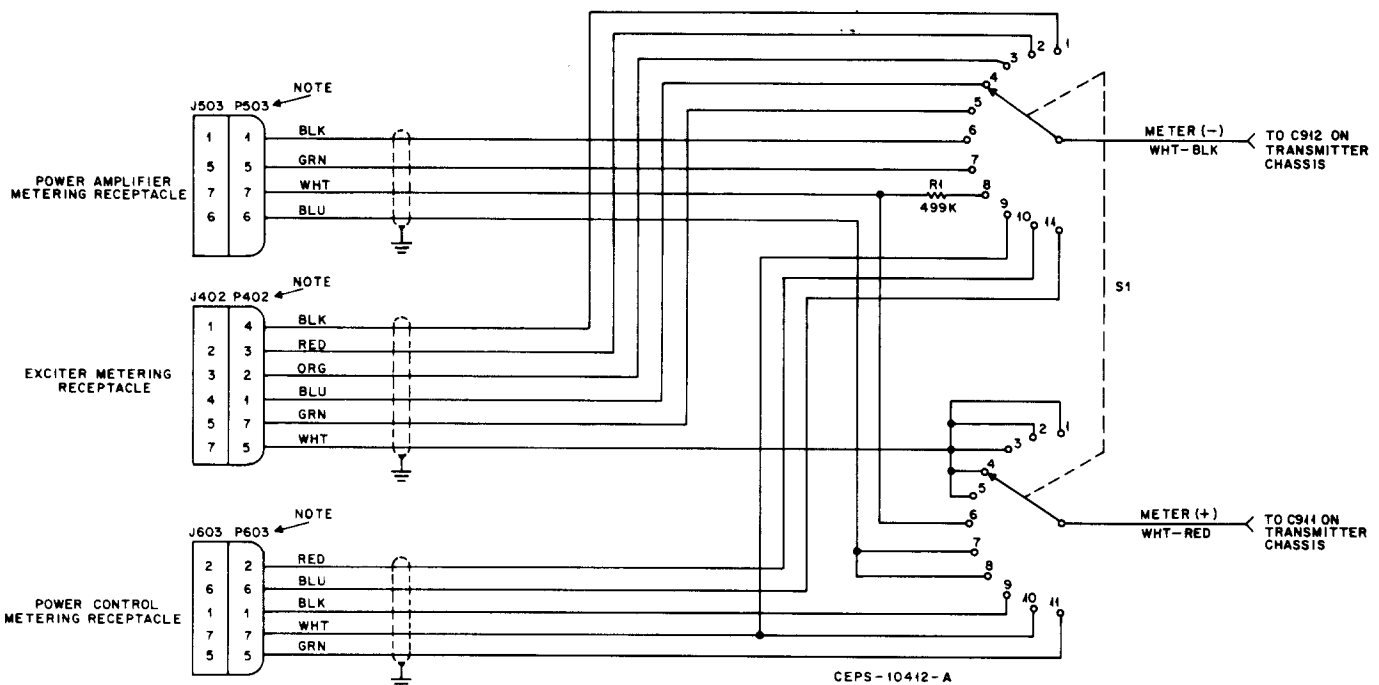
P4		CONNECTOR, plug; includes: 14-84556B02 BODY, connector: 22-contact type 9-84151B01 TERMINAL, connector contact: female
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TLN5167A INTERCOM BOARD



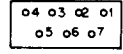
SHOWN FROM SOLDER SIDE

TLN5167A Intercom Board
Circuit Board Detail
Motorola No. PEPS-11182-A
2/19/76-UP



CEPS-10412-A

METER PLUG DETAIL



(SHOWN FROM PIN SIDE)

NOTE

ONLY EXCITER METER PLUG P402 IS INSERTED FROM REAR OF STATION.

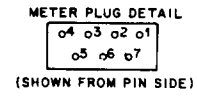
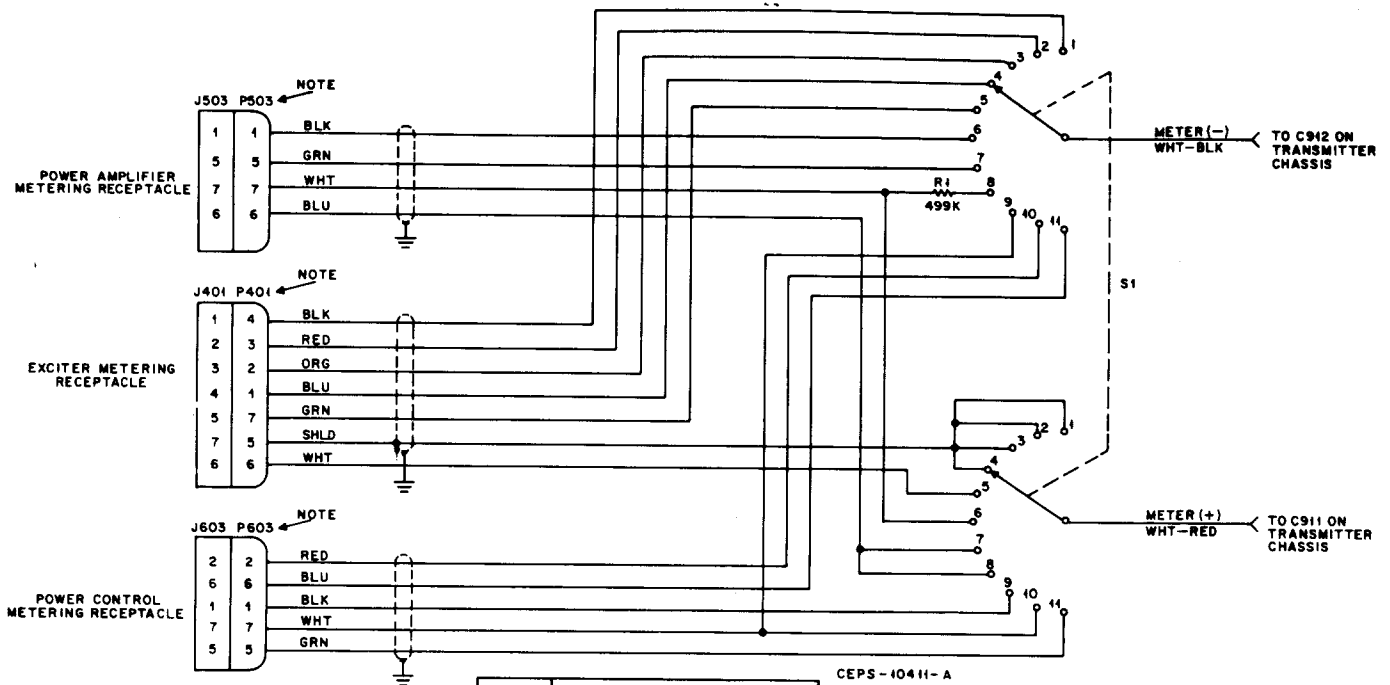
S1 SWITCH POSITION	FUNCTION METERED
1	EXCITER "IDC" AUDIO OUTPUT
2	EXCITER CHANNEL ELEMENT OUTPUT
3	EXCITER TRIPLER INPUT
4	EXCITER DOUBLER INPUT
5	EXCITER DRIVER INPUT
6	PA INPUT
7	PA FINAL CURRENT
8	PA VOLTAGE
9	FORWARD POWER
10	REFLECTED POWER
11	CONTROL VOLTAGE

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
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PARTS LIST

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
P401, 503, 603	28-84208B01	CONNECTOR, plug: male; 7-contact
R1	6-84640C01	RESISTOR, fixed: 499k \pm 0.5%; 1/4 W
S1	40-84619G01	SWITCH, rotary: 2-pole; 12-position; non-shorting does not include 36-82630H01 KNOB, control
NON-REFERENCED ITEM		
	14-84717F01	INSULATOR (Used with P603)

TLN5334A-1 Transmitter Meter Kit
 (For 72-76 MHz Stations)
 Schematic Diagram
 Motorola No. PEPS-17442-O
 3/7/75-UP



NOTE
ONLY EXCITER METER PLUG P401 IS INSERTED FROM REAR OF STATION.

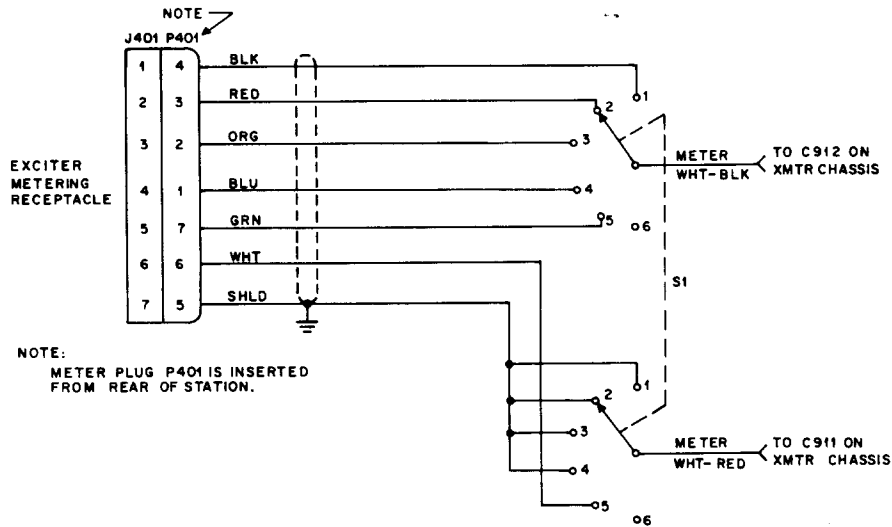
S1 SWITCH POSITION	FUNCTION METERED
1	EXCITER "IDC" AUDIO OUTPUT
2	EXCITER CHANNEL ELEMENT OUTPUT
3	EXCITER TRIPLER INPUT
4	EXCITER DOUBLER INPUT
5	EXCITER DRIVER INPUT
6	PA INPUT
7	PA FINAL CURRENT
8	PA VOLTAGE
9	FORWARD POWER
10	REFLECTED POWER
11	CONTROL VOLTAGE

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
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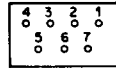
PARTS LIST

TLN5170A Metering Kit		PL-2159-A
P401, 503, 603	28-84208B01	CONNECTOR, plug: male; 7-contact
R1	6-84640C01	RESISTOR, fixed: 499k ±0.5%; 1/4 W
S1	40-84619G01	SWITCH, rotary: 2-pole; 12-position; non-shorting; does not include 36-82630H01 KNOB, control
NON-REFERENCED ITEM		
	14-84717F01	INSULATOR (used with P603)

TLN5170A-1 Transmitter Meter Kit
(For Intermittent Duty 25-50 MHz Stations)
Schematic Diagram
Motorola No. PEPS-17443-O
3/7/75-UP



S1 SWITCH POSITION	FUNCTION METERED
1	EXCITER "IDC" AUDIO OUTPUT
2	EXCITER CHANNEL ELEMENT OUTPUT
3	EXCITER TRIPLER INPUT
4	EXCITER DOUBLER INPUT
5	EXCITER AMPLIFIER INPUT
6	-----



P401 DETAIL
(SHOWN FROM PIN SIDE)

BEPS-10415-B

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
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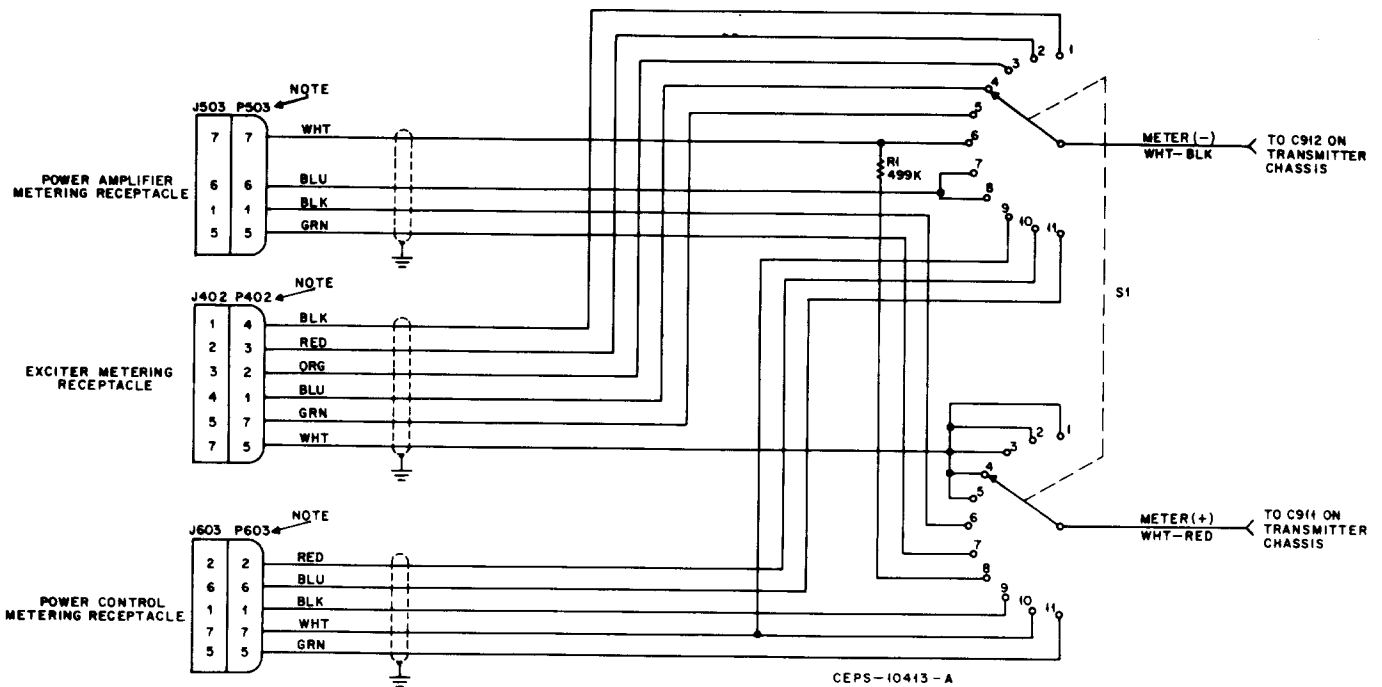
PARTS LIST

TLN5174A Metering Kit

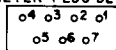
PL-2163-O

P401	28-84208B01	<u>CONNECTOR, plug:</u> male; 7-contact
S1	40-84618G01	<u>SWITCH, rotary:</u> 2-pole; 6-position; non-shorting; does not include 36-82630H01 KNOB, control

TLN5174A Exciter Meter Kit
(For Continuous Duty 25-50 MHz Stations)
Schematic Diagram
Motorola No. PEPS-17444-O
3/7/75-UP



METER PLUG DETAIL



(SHOWN FROM PIN SIDE)

NOTE

ONLY EXCITER METER PLUG P402 IS INSERTED FROM REAR OF STATION.

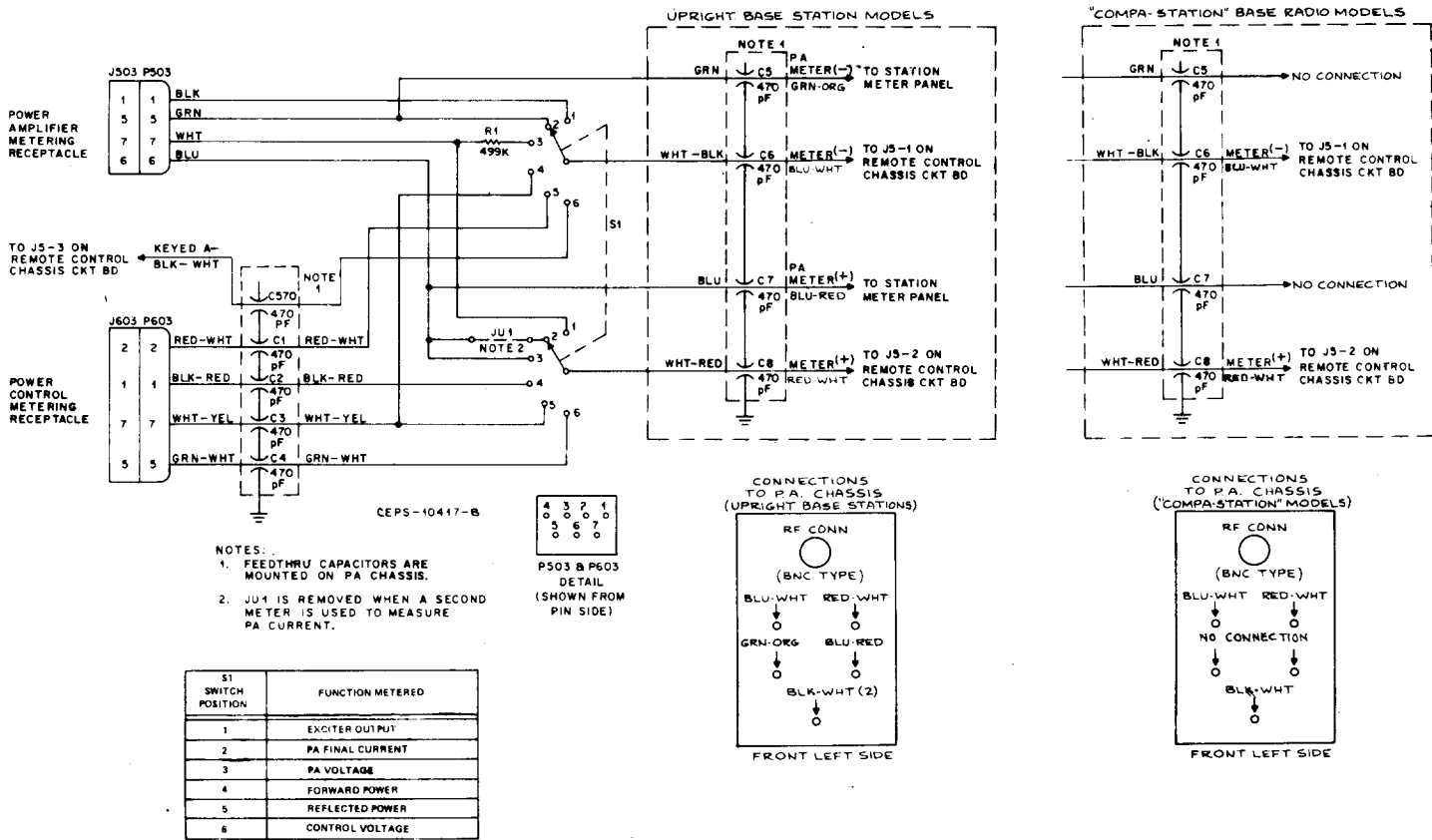
S1 SWITCH POSITION	FUNCTION METERED
1	EXCITER "IDC" AUDIO OUTPUT
2	EXCITER CHANNEL ELEMENT OUTPUT
3	EXCITER TRIPLER INPUT
4	EXCITER 1ST DOUBLER INPUT
5	EXCITER 2ND DOUBLER INPUT
6	PA INPUT
7	PA FINAL CURRENT
8	PA VOLTAGE
9	FORWARD POWER
10	REFLECTED POWER
11	CONTROL VOLTAGE

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
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PARTS LIST

TLN5169A Metering Kit		PL-2158-A
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
P401, 503, 603	28-84208B01	CONNECTOR, plug; male; 7-contact
R1	6-84640C61	RESISTOR, fixed; 499k +0.5%; 1/4 W
S1	40-84619G01	SWITCH, rotary; 2-pole; 12-position; non-shorting; does not include 36-82630H01 KNOB, control
NON-REFERENCED ITEM		
	14-84717F01	INSULATOR (used with P603)

TLN5169A-1 Transmitter Meter Kit
 (For Intermittent Duty 132-174 MHz Stations)
 Schematic Diagram
 Motorola No. PEPS-17445-O
 3/7/75-UP



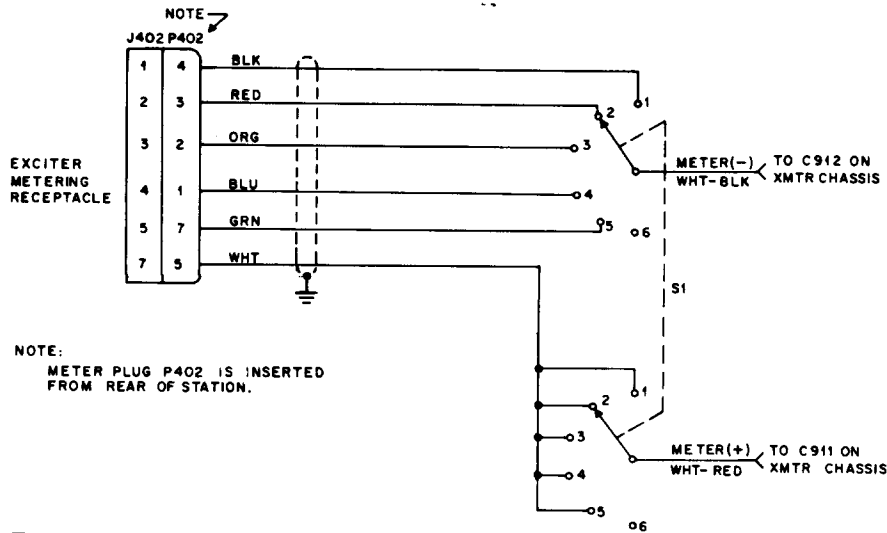
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
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PARTS LIST

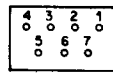
TLN5172A Metering Kit PL-2161-A

P503,603	28-84208B01	CONNECTOR, plug: male; 7-contact
R1	6-84640C61	RESISTOR, fixed: 499k $\pm 0.5\%$; 1/4 W
S1	40-84618G01	SWITCH, rotary: 2-pole; 6-position; non-shorting; does not include 36-82630H01 KNOB, control
NON-REFERENCED ITEM		
	14-84717F01	INSULATOR (used with P603)

TLN5172A-1 PA Meter Kit
 (For Continuous Duty 25-50 MHz Stations)
 Schematic Diagram
 Motorola No. PEPS-17446-A
 2/19/76-UP



S1 SWITCH POSITION	FUNCTION METERED
1	EXCITER "IDC" AUDIO OUTPUT
2	EXCITER CHANNEL ELEMENT OUTPUT
3	EXCITER TRIPLER INPUT
4	EXCITER 1ST DOUBLER INPUT
5	EXCITER 2ND DOUBLER INPUT
6	---



P402 DETAIL
(SHOWN FROM PIN SIDE)

BEPS-10416-A

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
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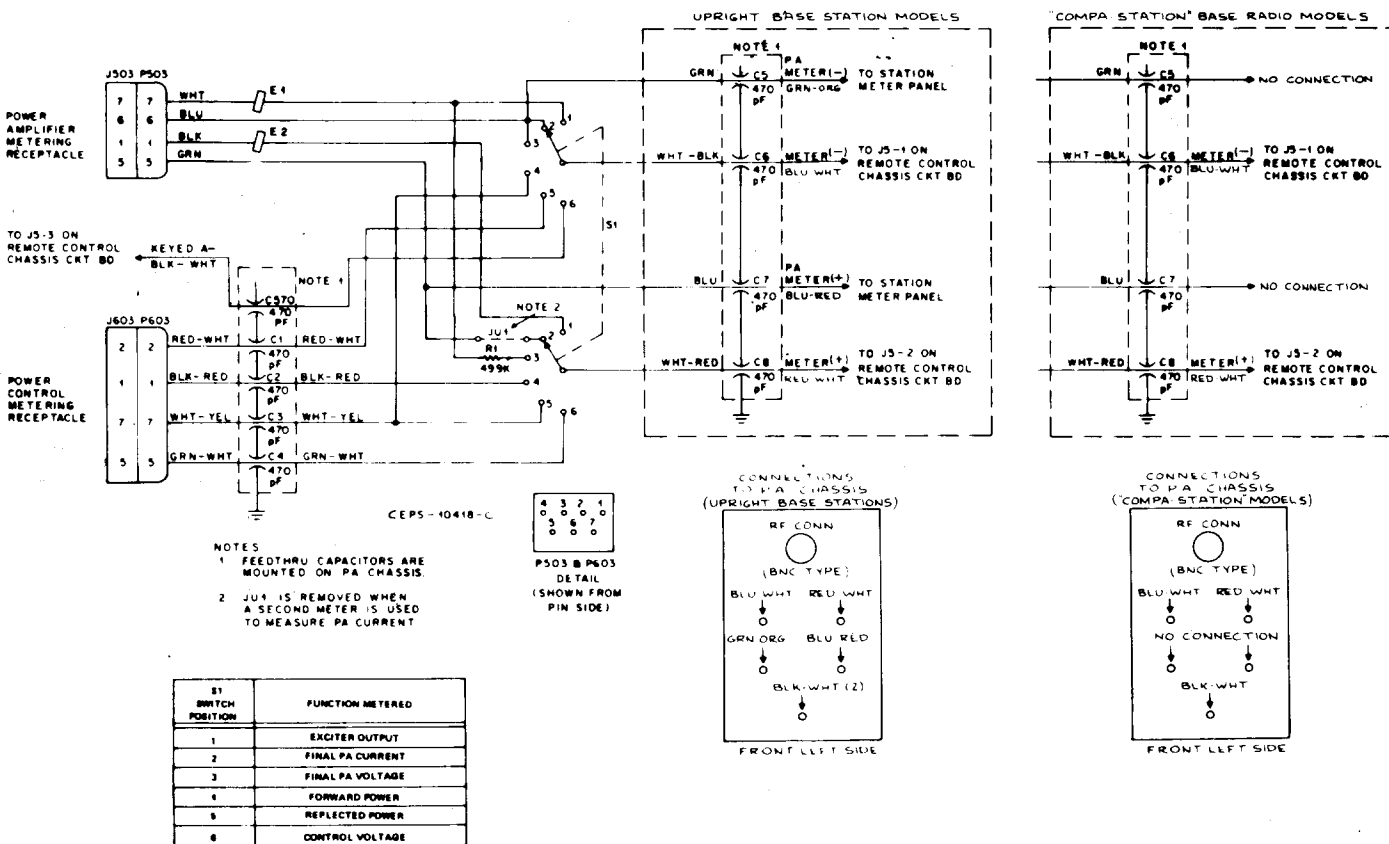
PARTS LIST

TLN5173A Metering Kit

PL-2162-A

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
P401	28-84208B01	CONNECTOR, plug: male; 7-contact
S1	40-84618G01	SWITCH, rotary: 2-pole; 6-position; non-shorting; does not include 36-82630H01
	36-82630H01	KNOB, control KNOB, control

TLN5173A Exciter Meter Kit
(For Continuous Duty 132-174 MHz Stations)
Schematic Diagram
Motorola No. PEPS-17447-A
2/19/76



REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
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PARTS LIST

TLN5171A Metering Kit

PL-2160-B

P503,603	28-84208B01	CONNECTOR, plug: male; 7-contact
R1	6-84640C61	RESISTOR, fixed: 499k $\pm 0.5\%$; 1/4 W
S1	40-84618G01 36-82630H01	SWITCH, rotary: 2-pole; 6-position; non-shorting KNOB, control
NON-REFERENCED ITEM		
	14-84717F01	INSULATOR (used with P603)

TLN5171A-1 PA Meter Kit
 (For Continuous Duty 132-174 MHz Stations)
 Schematic Diagram
 Motorola No. PEPS-17448-A
 2/19/76