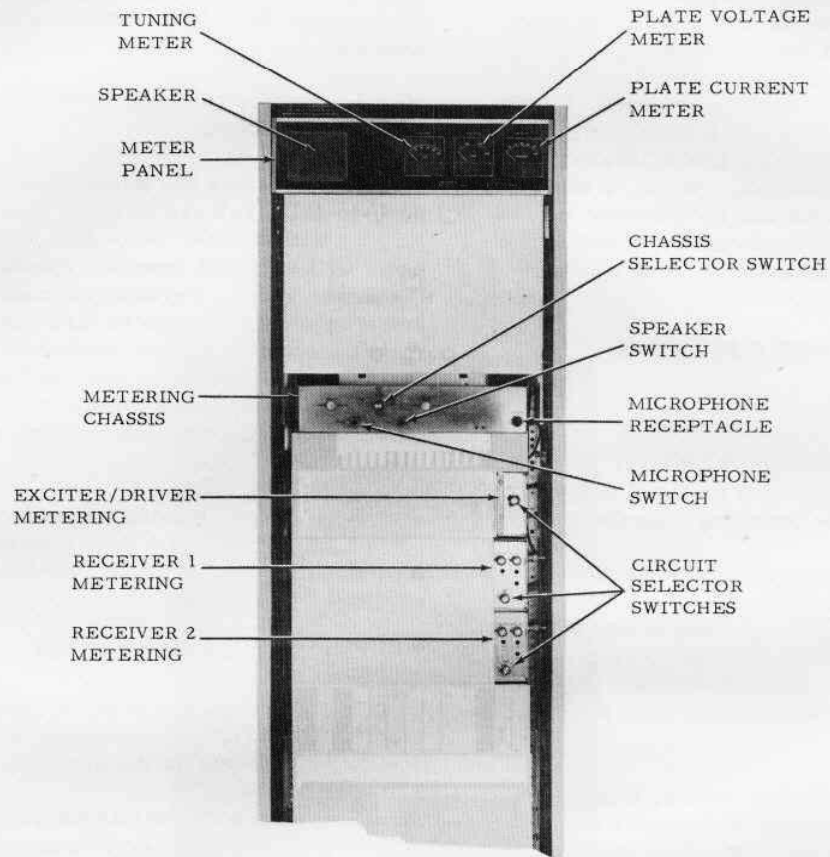


# STATION METERING



FAEPS-15801-O

ITEM	DESCRIPTION
TLN5697A	Meter Panel
TLN1675A	Metering Chassis
TLN5170A	Exciter/Driver Metering Kit (For 25-50 MHz Stations)
or	
TLN5169A	Exciter/Driver Metering Kit (For 136-174 MHz Stations)
TLN5168A	Receiver Metering Kit (Two required for two receiver stations)

 **MOTOROLA INC.**  
Communications Division

**service publications**  
1301 E. Algonquin Road, Schaumburg, IL 60196

## 1. DESCRIPTION

The station metering kits provide complete metering and local operation facilities to test, align and troubleshoot the station. All important station functions can be easily monitored by rotating selector switches. The main METER selector switch determines which chassis is to be metered. Metering switches on the respective chassis selected determine the specific circuit to be metered. Circuit performance is measured on the three meters provided: TUNING, PLATE VOLTAGE, or PLATE CURRENT. The metering chassis contains a MICROPHONE receptacle for a local test microphone, a MICROPHONE switch for selection of "Normal" or "Intercom" mode of operation, and a SPEAKER switch to enable or disable the local speaker mounted in the meter panel.

## 2. OPERATING INSTRUCTIONS

### 2.1 METERING

Step 1. Select the chassis (RCVR #1, RCVR #2, XCTR or PWR AMPL) to be metered with the METER switch on the metering chassis.

Step 2. Select the circuit to be metered with the meter switch on the respective chassis (receiver or exciter/driver) corresponding to the selection made in Step 1. Note that the plate voltage and plate current meters are not switched. These meters continuously monitor the high power amplifier performance.

Step 3. Take all metering reading from the tuning meter except the high power amplifier plate voltage & plate current. For receiver metering, use the (+) position for all readings except when checking the discriminator circuit for "0". The discriminator circuit must be checked by alternating between the (+) and (-) RCVR switch positions.

Step 4. The metering block diagram included in this section provides a cross-reference between the switch markings on the various metering kits and the circuit and/or function metered. Refer to the associated transmitter or receiver instruction section within this instruction manual for typical and minimum readings. Good maintenance practices dictate that the serviceman keep a log of all meter readings taken each time the station is serviced. The last set of readings can then be used as a reference to determine any degradation of circuit performance.

### 2.2 LOCAL STATION TESTING

Step 1. Connect a test microphone, Motorola Model TMN6071A or equivalent, to the MICROPHONE receptacle on the metering chassis.

Step 2. Place the SPEAKER switch to the ON position. Local speaker volume may be adjusted by using the VOLUME control on the receiver chassis.

Step 3. Place the MICROPHONE switch to the NORMAL position.

Step 4. Operate the microphone in the normal push-to-talk, release to listen manner when conversing with another radio set. The receiver audio will be heard from the speaker mounted in the meter panel. Perform channel monitoring and frequency selection as directed in the associated equipment section contained within this instruction manual. To prevent the remote control point from keying the station, engage the LINE DISABLE switch on the station control module.

Step 5. Before leaving the station, return the SPEAKER switch to OFF, disconnect the microphone and return the LINE DISABLE switch to its off position.

### 2.3 INTERCOM OPERATION

Step 1. Connect a test microphone, Motorola Model TMN6071A or equivalent, to the MICROPHONE receptacle on the metering chassis.

Step 2. Place the SPEAKER switch to the ON position. Local speaker volume may be adjusted by using the VOLUME control on the receiver chassis.

Step 3. Place the MICROPHONE switch to the INTERCOM position.

Step 4. Operate the microphone in the normal push-to-talk, release to listen manner. The audio from the remote control point will be heard from the speaker mounted in the meter panel. During the initial call to the remote control point, request that the operator switch his facility to intercom operation. This will prevent the station from being keyed during replies from the remote control point.

Step 5. Before leaving the station, have the distant operator restore his facility to normal

operation. Also, return the SPEAKER switch to OFF, return the MICROPHONE switch to NORMAL.

### 3. CIRCUIT DESCRIPTION

#### 3.1 METER SELECTOR CIRCUIT

The chassis selector switch on the metering chassis selects the chassis to be metered: RCVR1, RCVR2, XCTR (exciter) or PWR AMPL (high power amplifier). The (+) and (-) RCVR positions permit rapid receiver discriminator adjustment. Except for the high power amplifier plate voltage & current which are metered directly, the power amplifier grid circuit and all other circuits and/or functions are selected through separate metering switches mounted on the respective chassis. These metering switches are interconnected into the 50-conductor ribbon cable where the functions metered are applied to the remote control chassis. Refer to the metering block diagram.

#### 3.2 MICROPHONE AUDIO AND SPEAKER AUDIO

3.2.1 The intercom mode is selected by placing the MICROPHONE switch in the INTERCOM position. When the local test microphone push-to-talk function is applied, relay K1 energizes. This switches the microphone audio into the line driver module via P1-9 (LD OUT) where the microphone audio is applied to the control lines and subsequently to the remote control point. Another set of relay K1 contacts open and interrupt the speaker input circuit which prevents possible audio feedback through the local microphone. Diode CR2 is used to isolate the intercom P-T-T function from the normal test P-T-T function and thus prevent keying the transmitter during the intercom mode of operation. Thus, the microphone audio which is amplified by the two-stage amplifier and fed to the transmitter via P1-13 has no effect.

3.2.2 The normal mode of operation for local testing is selected by placing the MICROPHONE switch in the NORMAL position. When the P-T-T function is applied, relay K1 energizes, and the transmitter is keyed through the station control module via CR3 and P1-16 (LOCAL P-T-T). Relay K1 mutes the speaker audio by interrupting the audio input through the

normally closed contacts which are now open. Microphone audio is amplified by the two-stage amplifier and is fed to the transmitter. The switched ground applied to the station control module also disables the input to P1-9 (R1 IN) from the line driver module. This prevents line noise from being applied to the two-stage amplifier and eventually modulating the transmitter.

#### 3.3 RECEIVER METERING KIT

3.3.1 The receiver metering 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 circuit selector switch are routed to the meter panel via the receiver interconnect board, 50-conductor interstation cable, and remote control chassis circuit board.

3.3.2 Discriminator "0" is adjusted by placing the selector switch to position 4 and then placing the meter chassis selector switch alternately in the (+) and (-) RCVR positions.

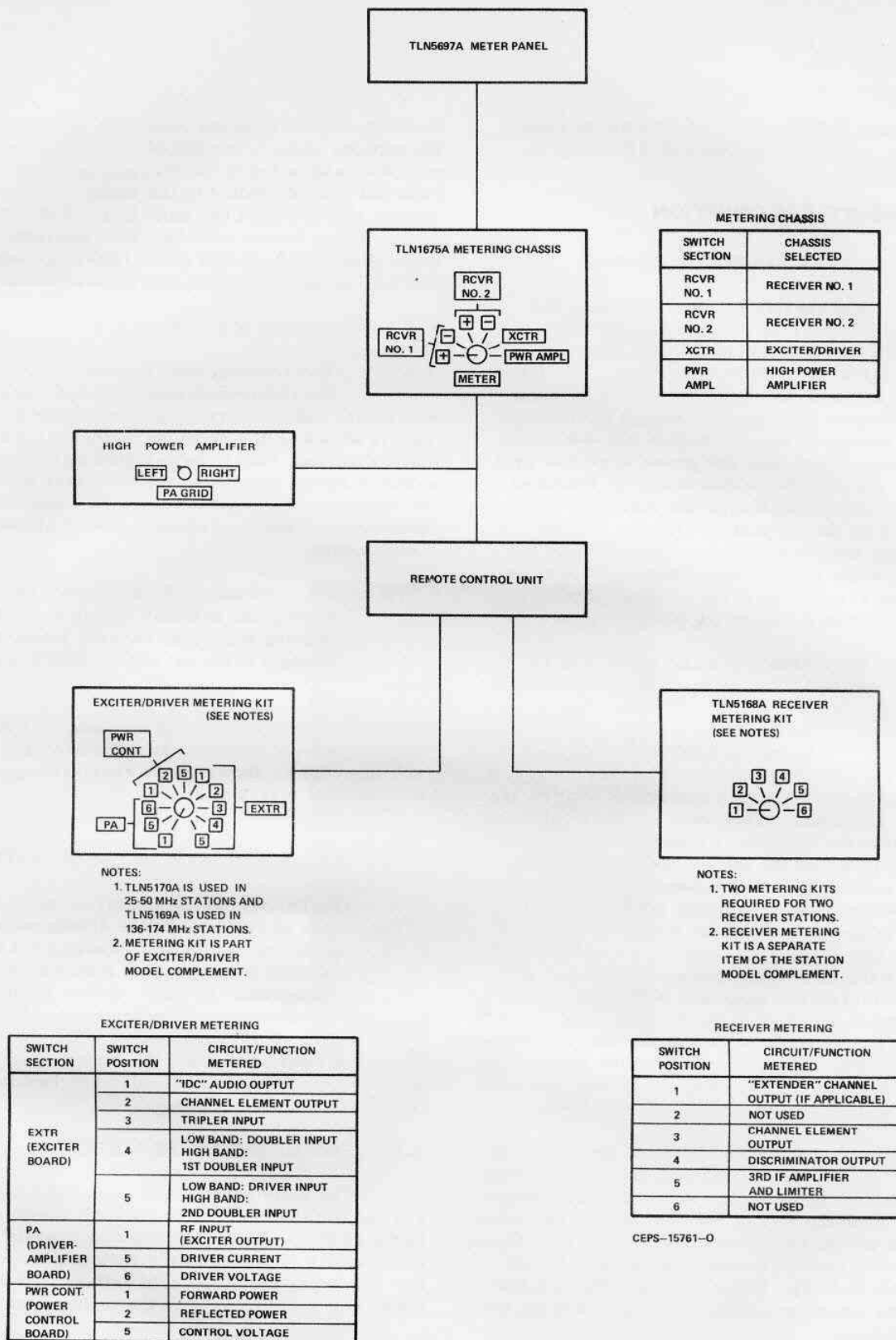
3.3.3 With two-receiver stations, two receiver metering kits are used and are connected as shown on the receiver metering kit schematic diagram.

#### 3.4 EXCITER/DRIVER METERING KITS

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

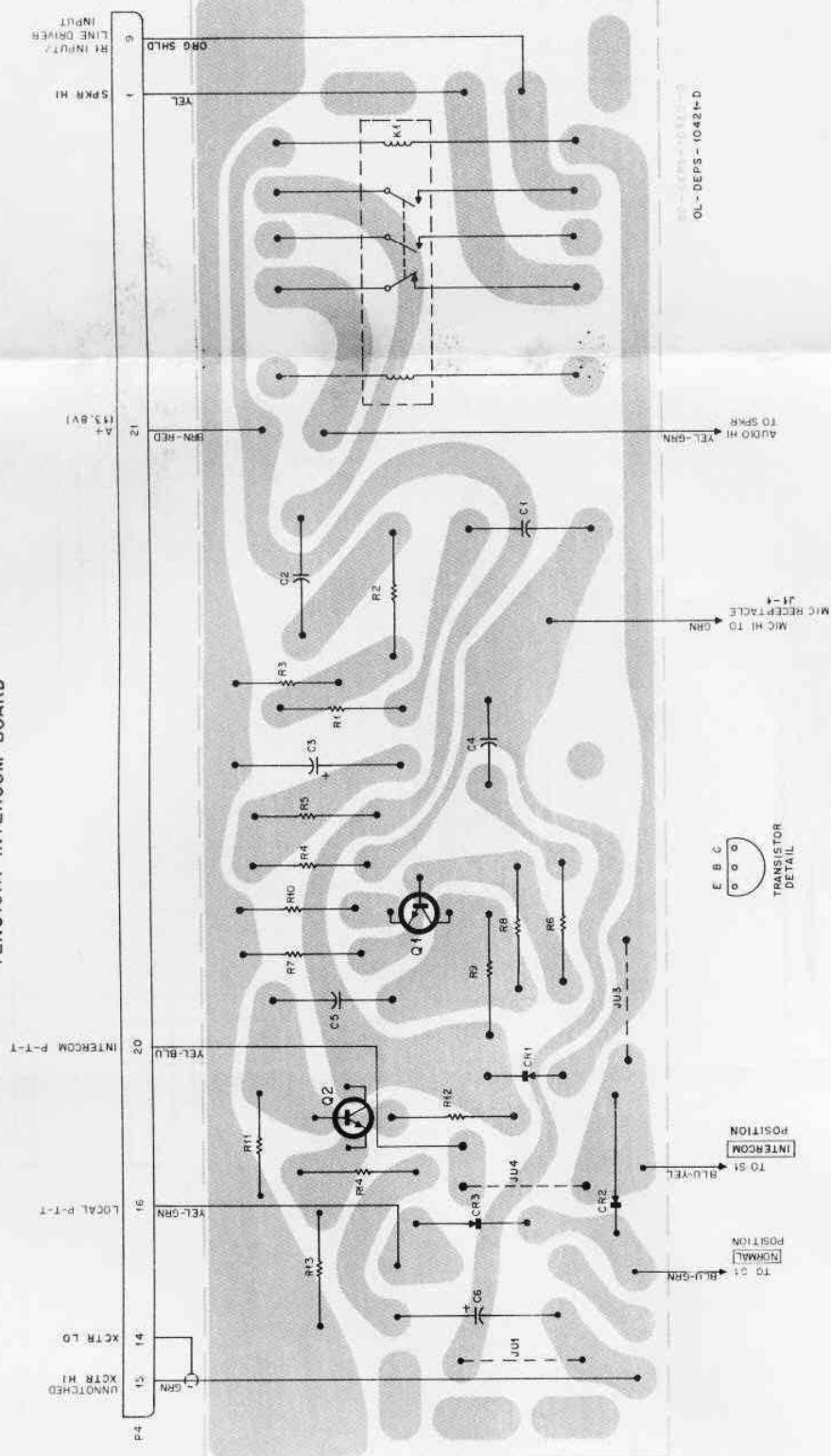
#### 3.5 POWER AMPLIFIER METERING

The plate current and plate voltage meters are connected directly into the high power amplifier circuitry. When the metering chassis selector switch is placed in the PWR AMPL position the power amplifier grid voltage (left & right) may be measured on the tuning meter.



High Power "Micor" Upright Station  
Metering Block Diagram  
Motorola No. CEPS-15761-O  
4/27/76-UP

## TLN5167A INTERCOM BOARD

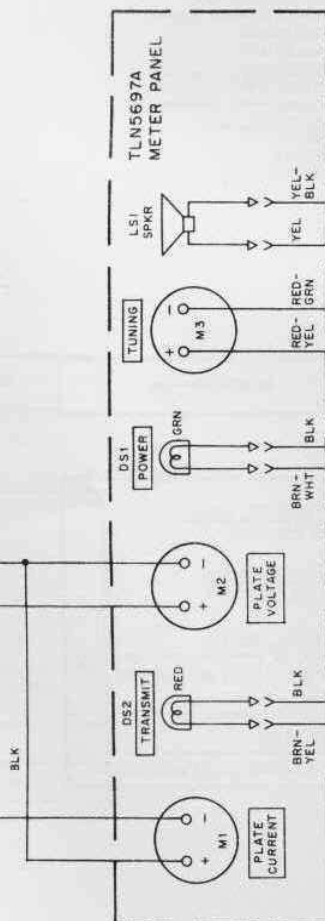


SHOWN FROM SOLDER SIDE

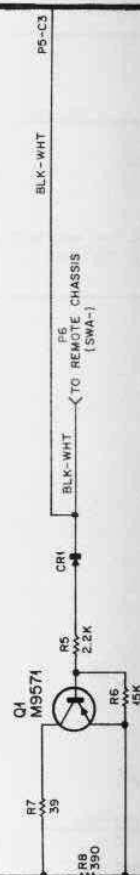
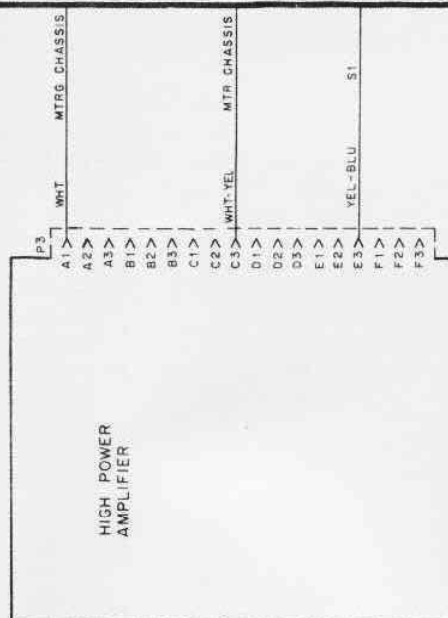
WHT-GRN P5-C2  
WHT-RED P5-C1  
BLK P5-F1

NOTE 2

INTERLOCK SWITCH S1  
BRN-GRN P5-B1  
YEL-BLU P3-E3



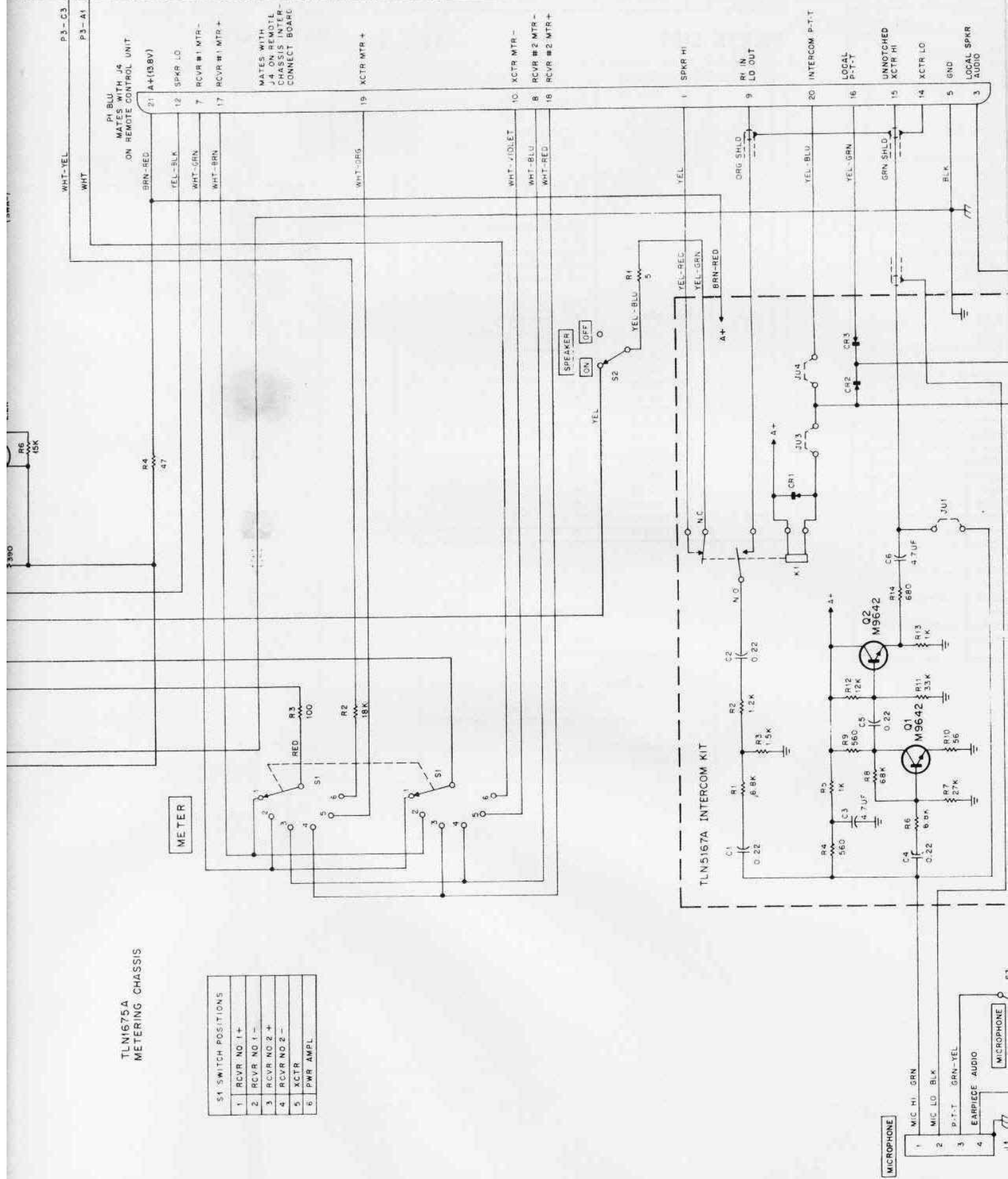
P/O  
MAIN CABLE  
NOTE 2

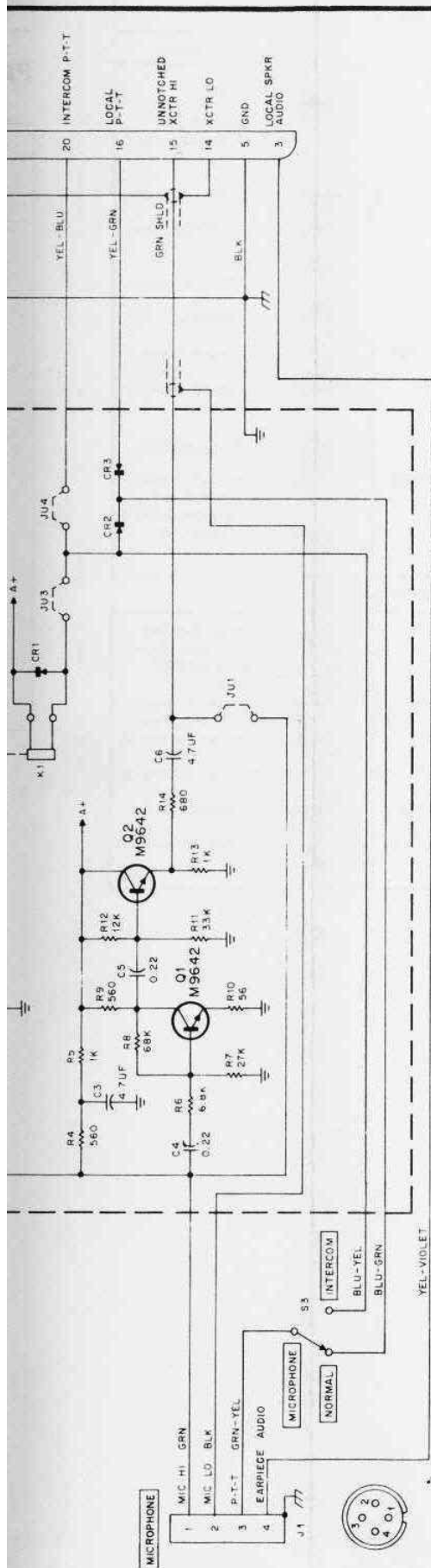




# TLN1675A METERING CHASSIS

S1 SWITCH POSITIONS	
1	RCVR NO 1 +
2	RCVR NO 1 -
3	RCVR NO 2 +
4	RCVR NO 2 -
5	XCTR
6	PWR AMPL

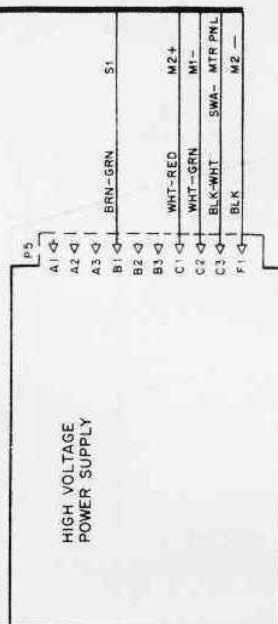




MODEL	SUFFIX	DESCRIPTION
TKN6704A		CABLE METER
TLN5167A		INTERCOM BOARD
TLN5706A		METERING CHASSIS

P1 DETAIL	
1	↕
2	↕
3	↕
4	↕
5	↕
6	↕
7	↕
8	↕
9	↕
10	↕
11	↕
12	↕
13	↕
14	↕
15	↕
16	↕
17	↕
18	↕
19	↕
20	↕
21	↕
22	↕

PLUG DETAIL  
SHOWN FROM  
MATING SIDE



EEPS-14443-A

- NOTES:
- UNLESS OTHERWISE STATED:  
ALL RESISTOR VALUES ARE IN OHMS, AND ALL CAPACITOR  
VALUES ARE IN MICROFARADS.
  - UNLESS OTHERWISE STATED:  
ALL CONNECTORS AND WIRES ARE PART OF THE MAIN  
CABLE.

PARTS LIST SHOWN ON  
BACK OF THIS DIAGRAM

TLN5697A Meter Panel and  
TLN1675A Metering Chassis  
Schematic & Intercabling Diagram  
Motorola No. PEPS-15806-B  
4/27/76-UP



REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
------------------	-------------------	-------------

## PARTS LIST

TLN5706A Metering Chassis

PL-3028-O

J1	9-830418	CONNECTOR, receptacle; female: 4-contact
Q1	48-869571	TRANSISTOR; (SEE NOTE) PNP; M9571
R1	17-82177B04	RESISTOR, fixed: $\pm 10\%$ ; 1/2 W; unless otherwise stated
R2	5; 5 W	
R3	6-802470	18k $\pm 1\%$
R4	6-125C25	100
R5	6-125C17	47
R6	6-124A57	2.2k $\pm 5\%$ ; 1/4 W
R7	6-124A77	15k $\pm 5\%$ ; 1/4 W
R8	6-125C15	39
	6-125A39	390 $\pm 5\%$
S1	40-84618G01	SWITCH, rotary: 2-pole; 6-position; non-shorting
S2	40-83890A01	slide: dpdt
NON-REFERENCED ITEMS		
	36-82630H01	KNOB, control
	38-10388	PLUG BUTTON

TLN5697A Meter Panel

PL-3024-O

DS1	65-83183C02	LIGHT, indicator: 125 V DC; includes non-replaceable lamp; includes GRN lens
DS2	65-83183C04	includes RED lens
LS1	50-83562A01	LOUDSPEAKER, permanent magnet; dynamic type: 4"; square; 4 ohms voice coil impedance
M1	72-84865H06	METER, electrical; 500 uA movement; scale: 0-600 milliamperes
M2	72-84865B07	500 uA movement; scale: 0-3000 volts
M3	72-84864B11	50 uA movement; scales: 0-50 microamperes; 0-250 volts

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
------------------	-------------------	-------------

TKN6704A Meter Cable

PL-3029-O

P1		CONNECTOR, plug; includes: 14-84556B02 BODY (BLU) 9-84151B03 TERMINAL, contact
P3		includes: 14-83783A01 BODY: 18-cavity (BLK) 29-82336A01 TERMINAL, contact: female
P5		includes: 14-83337A07 BODY: 18-cavity (BLK) 29-82335A01 TERMINAL, contact: male
P6	39-10184A24	female: single-contact (wire terminal connector); requires 37-82603D60 SLEEVE, heat-shrinkable (not coded)
	30-82905H01	CABLE ASSEMBLY, special purpose: single-conductor; high-voltage type; includes "molded-on" single-contact connectors P2 & P4; length 59" overall; not shown on diagram
NON-REFERENCED ITEMS		
	29-859118	CONNECTOR, plug: female; single-contact ("Faston" type); does not include 14-849051
	29-800038	SHELL, insulating
	29-824151	LUG, slotted tongue: 2 required (interlock switch connections)
	29-847854	LUG, slotted tongue: for No. 10 stud
	37-82603D15	LUG, slotted tongue: for No. 6 stud
	42-10217A10	SLEEVE, heat-shrinkable; coded No. 15 STRAP, wire-bundling; cable anchoring type

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
------------------	-------------------	-------------

## PARTS LIST

TLN1552A Meter Chassis & Intercom Kit

TLN5167A Intercom Board

PL-2156-C

C1,2	8-82905G11	CAPACITOR, fixed: uF; 0.22 $\pm 10\%$ ; 50 V
C3	23-865137	4.7 $\pm 20\%$ ; 25 V
C4,5	8-82905G11	0.22 $\pm 10\%$ ; 50 V
C6	23-865137	4.7 $\pm 20\%$ ; 25 V
CR1 thru 5	48-83654H01	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 $\pm 10\%$
Q1,2	48-869642	TRANSISTOR; NPN; type M9642
R1	6-124C69	RESISTOR, fixed: $\pm 10\%$ ; 1/4 W; 6.8k
R2	6-124C51	1.2k
R3	6-124C53	1.5k
R4	6-124C43	560
R5	6-124C49	1k
R6	6-124C69	6.8k
R7	6-124C83	27k
R8	6-124C93	68k
R9	6-124C43	560
R10	6-124C19	56
R11	6-124C85	33k
R12	6-124C75	12k
R13	6-124C49	1k
R14	6-124C45	680

DESCRIPTION
-------------

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
------------------	-------------------	-------------

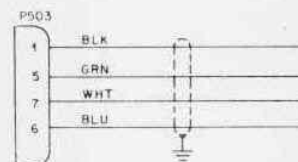
## PARTS LIST

TLN5168A Metering Kit

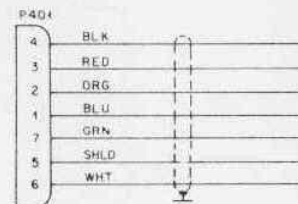
PL-2157-O

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

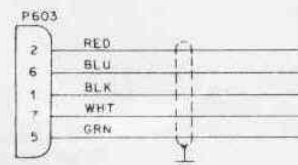
DRIVER AMPLIFIER  
METERING RECEPTACLE  
(INSERT FROM  
FRONT OF CHASSIS)



EXCITER METERING  
RECEPTACLE  
(INSERT FROM  
REAR OF CHASSIS)



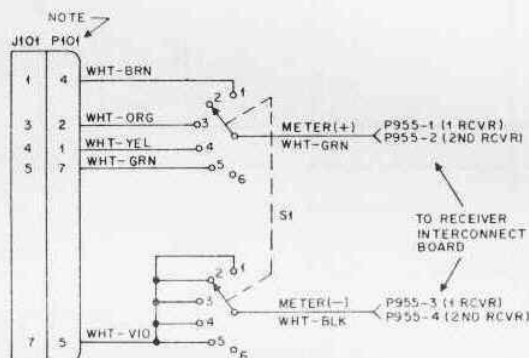
POWER CONTROL  
METERING RECEPTACLE  
(INSERT FROM  
FRONT OF CHASSIS)



METER PLUG DETAIL  
(SHOWN FROM PIN SIDE)

SWITCH SECTION
EXTR
PA
PWR CONT

RECEIVER RF & IF  
METERING  
RECEPTACLE



4	3	2	1
0	0	0	0
5	6	7	0
0	0	0	0

P401 DETAIL  
(SHOWN FROM  
PIN SIDE)

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

BEPS-10414-A

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	---

REFERENCE  
SYMBOL

## PARTS LIST

TLN5170A Me

P401, 503, 603

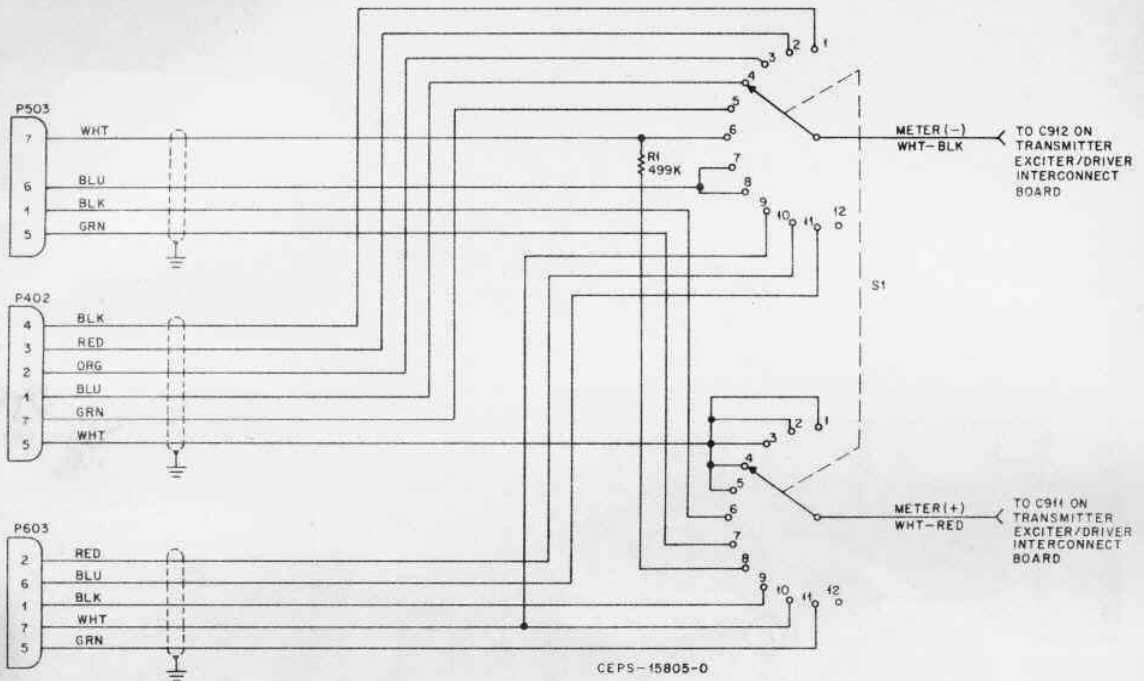
R1

S1

DRIVER AMPLIFIER  
METERING RECEPTACLE  
(INSERT FROM  
FRONT OF CHASSIS)

EXCITER METERING  
RECEPTACLE  
(INSERT FROM  
REAR OF CHASSIS)

POWER CONTROL  
METERING RECEPTACLE  
(INSERT FROM  
FRONT OF CHASSIS)



METER PLUG DETAIL  
o4 o3 o2 o1  
o5 o6 o7  
(SHOWN FROM PIN SIDE)

SWITCH SECTION	SWITCH POSITION	FUNCTION METERED
EXTR	1	EXCITER "IDC" AUDIO OUPUT
	2	EXCITER CHANNEL ELEMENT OUTPUT
	3	EXCITER TRIPLER INPUT
	4	EXCITER 1ST DOUBLER INPUT
	5	EXCITER 2ND DOUBLER INPUT
PA	6	DRIVER AMPLIFIER INPUT
	7	DRIVER AMPLIFIER FINAL CURRENT
	8	DRIVER AMPLIFIER VOLTAGE
PWR CONT	9	FORWARD POWER
	10	REFLECTED POWER
	11	CONTROL VOLTAGE
	12	- - - -

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
------------------	-------------------	-------------

## PARTS LIST

TLN5169A Metering Kit

PL-2158-A

P401, 503, 603	28-84208B01	CONNECTOR, plug: male; 7-contact
R1	6-84640C61	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)