

# *Technical Manual*

## *MODEL SAP1626*

### *Source Assign Panel*



## *MODEL BOP220*

### *I/O Connector Translation Assembly*



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8601 East Cornhusker Hwy.  
Lincoln, NE 68507 U.S.A.  
Attn: Service

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## SECTION 1: DESCRIPTION AND SPECIFICATIONS

### 1.1 DESCRIPTION

**GENERAL** The SAP1626 Source Assignment Panel is a manually operated matrix switch. This switch assigns each of 20 TW\* User Station strings to two of fifteen possible buses. Twelve buses can distribute both DC power and intercom signals. Three buses distribute intercom signals or program signals. The matrix switch has the effect of transforming a basic two bus intercom system to a fifteen bus system. The switch also assigns six camera intercom stations to a pair of intercom / program buses or twelve camera stations to a single intercom / program bus.

**SAP1626 BUSES** There are three kinds of buses in the SAP1626: 1) two-way two-wire type intercom buses, 2) DC powered two-way two-wire intercom buses, and 3) program audio buses. There are twelve primary intercom buses and three program or secondary intercom buses. All buses allow for two-way two-wire intercom operation. The twelve primary buses may also be "powered" buses. The powering is accomplished by plugging TW type power supplies into the SAP1626. The powering allows a TW intercom station to receive power on its channel one wire (one of three wires connecting the TW user station to the SAP1626). Most TW user stations require DC power to appear across two of the three wires connecting it to a system. (The TW stations that don't require this DC power either have a "Local Power" option or they are a special kind of TW station.) The two wires that accept DC power on a TW station are the common and [CHannel One] connections. This means that, in general, the upper row of switches on the SAP1626 should be set only to powered buses. Up to ten user stations may be in a group of TW user stations connected to a SAP1626 output. The twenty outputs discussed above are available on the back of the SAP1626 on two fifty-conductor connectors, or on the optional BOP220 as twenty three-conductor male XLR type connectors.

**PROGRAM BUSES** Three program buses allow three different program sources to be connected to a SAP1626. TW user stations can be assigned these pro-

grams on their channel two connection (bottom row of switches on the SAP1626). If TW user stations are assigned one of the program buses with program not connected, the bus functions as an intercom bus.

**CONNECTING SAP1626 BUSES TO MODEL 802 CHANNELS** The twelve primary buses of the SAP1626 correspond to the twelve balanced channels of the Model 802 intercom systems and can be interconnected using a Model 862 System Interconnect.

**CAMERA OUTPUTS / OPTIONAL OUTPUTS** In addition to the twenty outputs discussed above, there are six additional outputs. These outputs are intended primarily for cameras, but can be used for additional TW intercom stations or groups of stations. These six outputs are available on a twenty-five pin "D" type connector on the back of the SAP1626.

Camera output pairs 1 thru 6 are designated for television camera intercom. Output connections can be made directly to each camera or to the Model VIE306 Station-Isolate System. In the latter, the outputs are switched and/or processed accordingly and then routed to the individual cameras.

**PACKAGING: SAP1626** The SAP1626 fits into a standard two unit high EIA equipment rack. The front panel contains the thumbwheels used to accomplish the matrix switching.

**PACKAGING: BOP220** The three rack unit high BOP220 generally mounts on the rear rails of a rack panel. BOP220 connectors are mounted on a recessed panel allowing space for mating connectors and cables yet not interfering with rack door closing. The BOP220 connects to the two 50-conductor cables from the SAP1626 and provides twenty male XLR-type 3-pin connectors for direct connection to user stations. All external user station lines connect to this central point.

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\* TW here refers to the two-wire unbalanced type intercom system sold by RTS Systems, Inc.

## 1.2 SPECIFICATIONS\*\*: SAP1626

Maximum Switch Carrying Current	2.0 amperes per output
Maximum Switch Breaking Current	0.5 amperes per output
Inputs	
Full duplex lines	12
Program Inputs	3
Outputs (Two Channel)	
User Station	20
Camera*	6
Program Input:	
Impedance	800 ohms
Level	-4 dBm to +8 dBm
Power Requirements	No external power required; Power distributed from RTS Systems Power Supplies: PS30 or PS31,
Size	3.468 inches (88 millimeters) high by 19 inches (483 millimeters) wide by 9.825 inches (298 millimeters) deep (Allow another 4.0 inches (102 millimeters) depth for cables on rear panel.)
Weight (Mass)	10 pounds (4.55 kilograms)
Color	Grey, Fed. Std #595A-26492

## 1.3 SPECIFICATIONS\*\*: BOP 220

Inputs	Two 50-pin male microribbon connectors (Amphenol Type Series 57)
Outputs	Twenty 3-pin male XLR-type connectors
Size	5.25 inches high by 19 inches wide by 5 inches deep
Weight (Mass)	2.53 pounds (1.1 kilograms)
Finish	Gold Irridite

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\* Camera Outputs can be adapted to 12 single-channel outputs.

\*\* Note: These specifications are subject to change without notice.

## SECTION 2: INSTALLATION

### 2.1 MECHANICAL INSTALLATION

The Model SAP1626 mounts in a standard 19 inch rack, in a space two rack units high (3.5 inches). The BOP220 should be mounted in the same rack as the SAP1626 behind the SAP1626.

### 2.2 ELECTRICAL INSTALLATION

#### 2.2.1 ELECTRICAL INSTALLATION, POWER

The SAP1626 distributes DC power and signals but no power is required to operate the SAP1626 itself and there are no power connections.

#### 2.2.2 ELECTRICAL INSTALLATION, SIGNALS

The electrical installation of the SAP1626 requires one to four four-conductor shielded cables, two fifty-conductor cables, and optionally, a twenty five-conductor cable, and microphone cables.

The one to four four-conductor cables are used to connect one to four TW\* Power Supplies, respectively, to the SAP1626 "INTERCOM CHANNEL INTERCONNECT" inputs .

The two fifty-conductor cables connect the SAP1626 "EXTERNAL USER STATIONS" "OUTPUTS" to the BOP220 "CONNECTIONS TO SAP1626, J121, J122".

The twenty five-conductor cable connects the SAP1626 "INTERCONNECTION TO VIE306 MODEL 306" outputs to the VIE306, CIF612, or directly to the cameras or optionally, user stations.

The microphone cable connects program sources to the SAP1626. The SAP1626 program input impedance is 800 ohms. Typical levels to feed into the program input ranges from 0dBm to -10dBm.

Alternatively, program inputs can used to monitor optional channels 13, 14, 15. (via a 10 kilohm bridging amplifier)

Figure 2-1 shows interconnection of a SAP1626, BOP220, 1 to 4 TW Power Supplies\*\*, and a VIE306.

Figure 2-2 shows the wiring of a four-conductor cable\*\*.

Figure 2-3 shows the wiring of a twenty-five-conductor cable.

Figure 2-4 shows wiring of a program Input cable.

Figure 2-5 shows how to wire a TW User Station cable to plug into one of the twenty BOP220 outputs.

Figure 2-6 shows the interconnection of the SAP1626 to a TW/802 Series type intercom system.

Since the SAP1626 has no current limiters, PS50 and PS60 power supplies may shorten the life of the thumbwheel switches, but current limiters may be added to the SAP1626. See Appendix B for a triple current limiter circuit assembly. To protect all 12 active buses of the SAP1626 requires 4 assemblies.

(Continued, overleaf)

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\* TW here means the RTS Systems, Two Wire Intercom system which combines DC power and unbalanced intercom signals. One channel requires two wires, two channels, three wires, et cetera.

\*\* If the TW Power Supply is a PS30 made before mid 1983, see Appendix A for instructions on how to connect the PS30 supplies to the SAP1626.

## **2.2.2 ELECTRICAL INSTALLATION, SIGNALS**

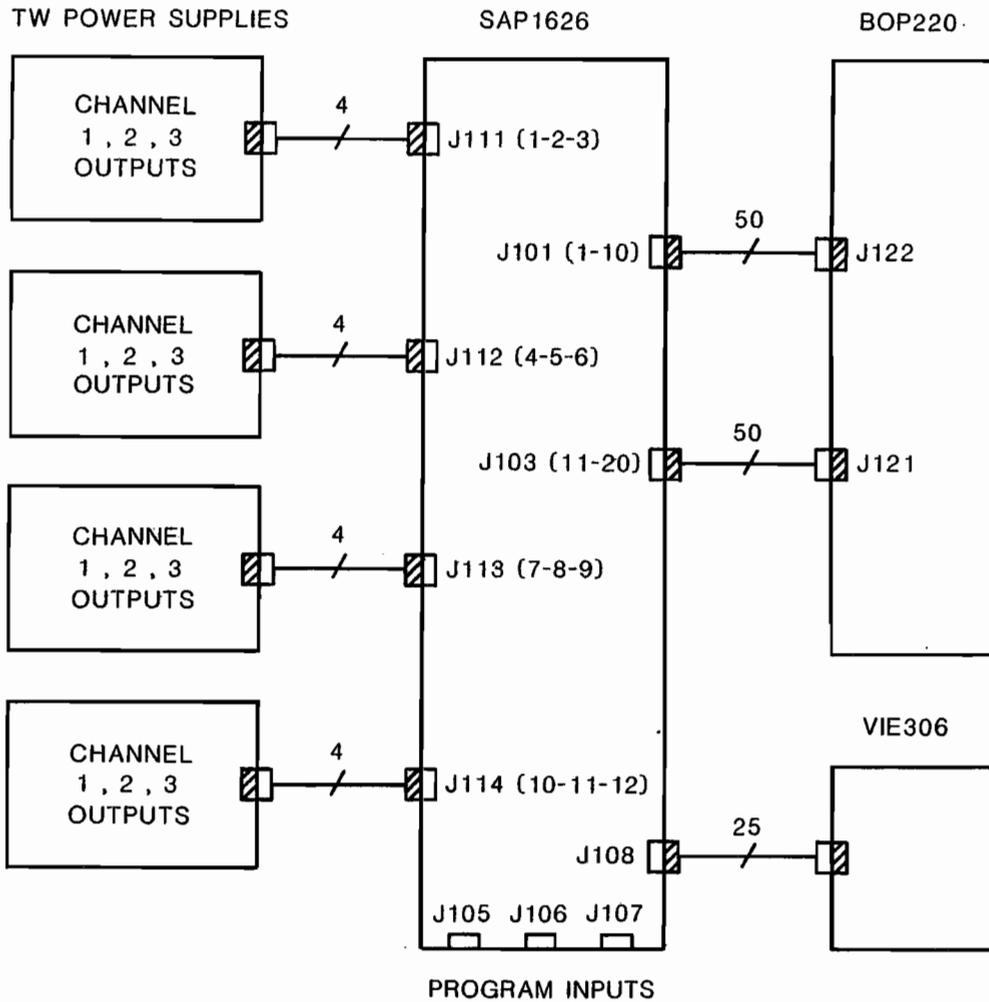
**(Continued)**

**VIE306 CONNECTIONS** Figure 2-1 shows how to connect a VIE306 to the SAP1626. This approach provides two channels of two-wire intercom per channel. Only the lower set of camera thumbwheel switches are processed by the VIE306 electronics to provide station isolate and two wire to four wire conversion. The upper row of camera thumbwheel switches appears at the rear panel of the VIE306 unprocessed and in the two-wire plus DC format.

Two VIE306's may be used for a 12 camera installation. These two VIE306's may be connected in one of two ways.

The first way is with special cable RTS Systems part number 9020-2976-00. Connections are shown in Figure 2-7. This cable sends the upper row of CAMERA thumbwheels, normally [Channel 1] for Cameras 1-6, to one VIE306 as Cameras 1-6. The lower row of CAMERA thumbwheels, which are normally [Channel 2] for Cameras 1-6, to a second VIE306 as Cameras 7-12. The disadvantage of this method is that there is only one channel per camera, however if the cameras are being operated in the 4-wire mode the second channel is generally not used.

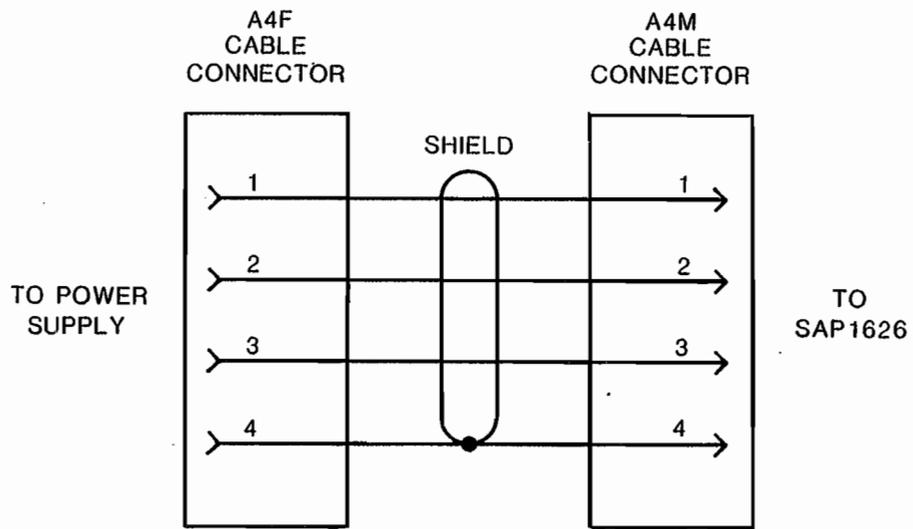
The second method, for a 12 Camera installation, requires two SAP1626's and two VIE306's as shown in Figure 2-8. The advantage of this method is that two channels per camera are available and may be selected via the two rows of thumbwheels.



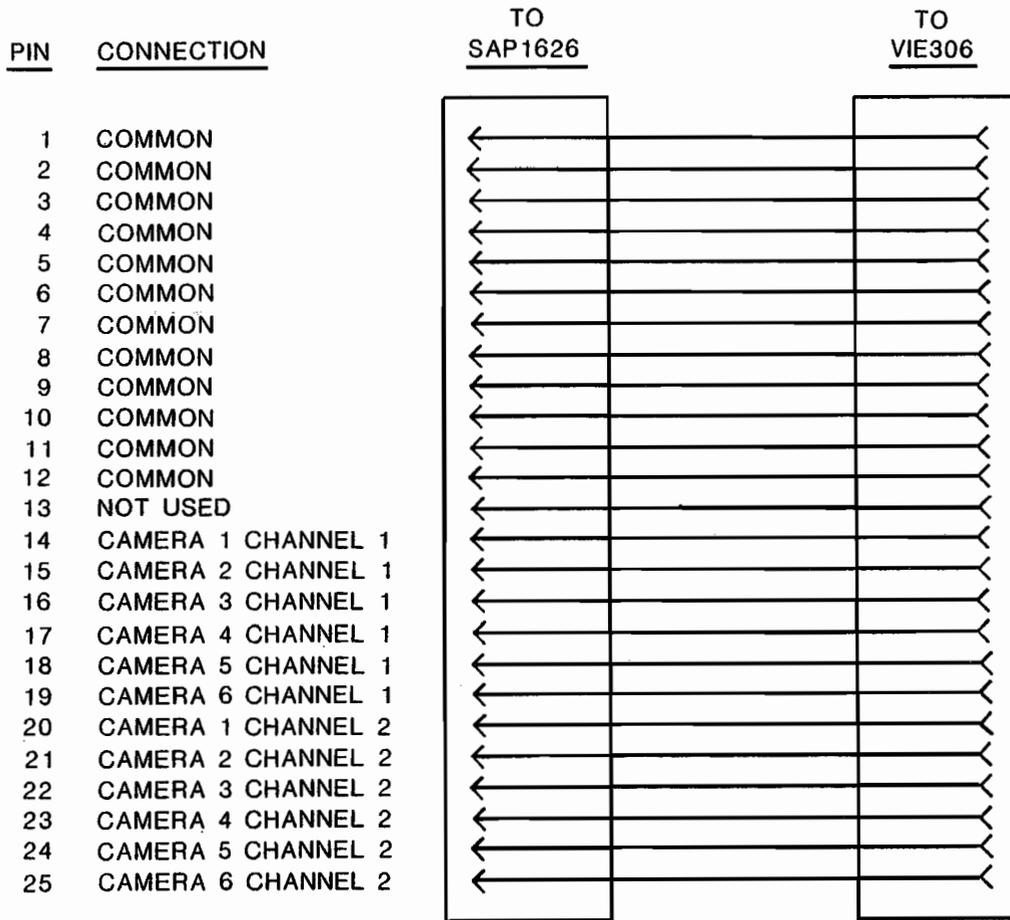
**Notes:**

1. M = Male Connector; F = Female Connector.    M =     F = 
2. Four Conductor Cable: See Figure 2-2 .
3. Fifty Conductor Cable is five foot ribbon cable with insulation displacement type connectors:  
RTS Systems Model Number 4015-5F / RTS Systems Part Number: 9020-2970-00 .
4. Twenty five-Conductor Cable See Figure 2-3.
5. VIE306 or CIF612, optional. See CIF612 Technical Manual for CIF612 connection and wiring details.
6. Program Inputs: See Figure 2-4 .

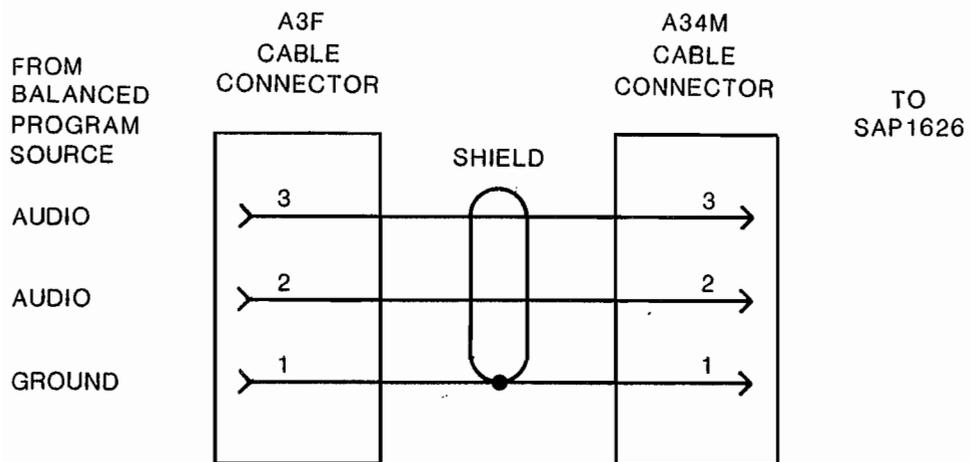
**Figure 2-1  
Interconnection of TW Power Supplies, SAP1626, BOP220, and VIE306**



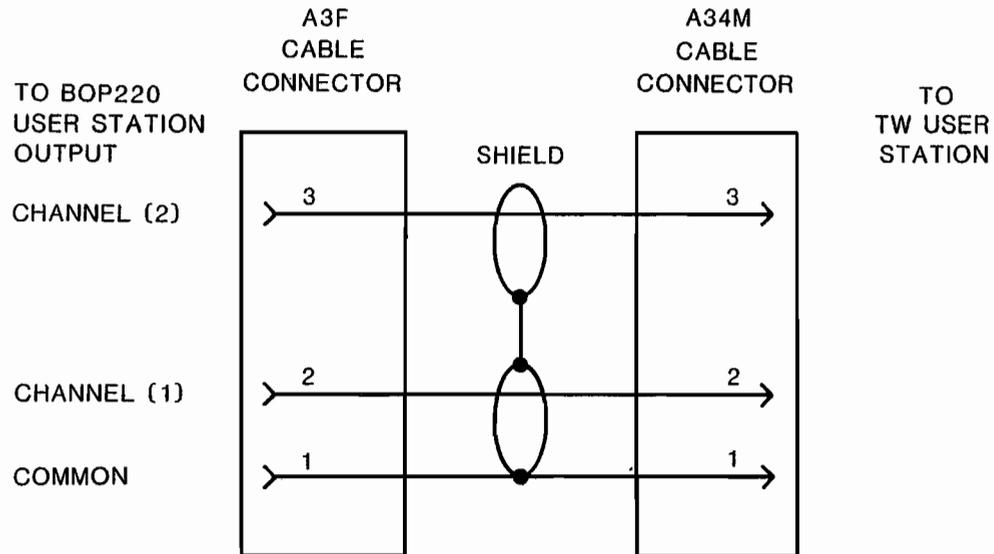
**Figure 2-2**  
**Four-Conductor Cable Wiring Diagram**



**Figure 2-3**  
**Twenty-Five Conductor Cable Wiring Diagram**



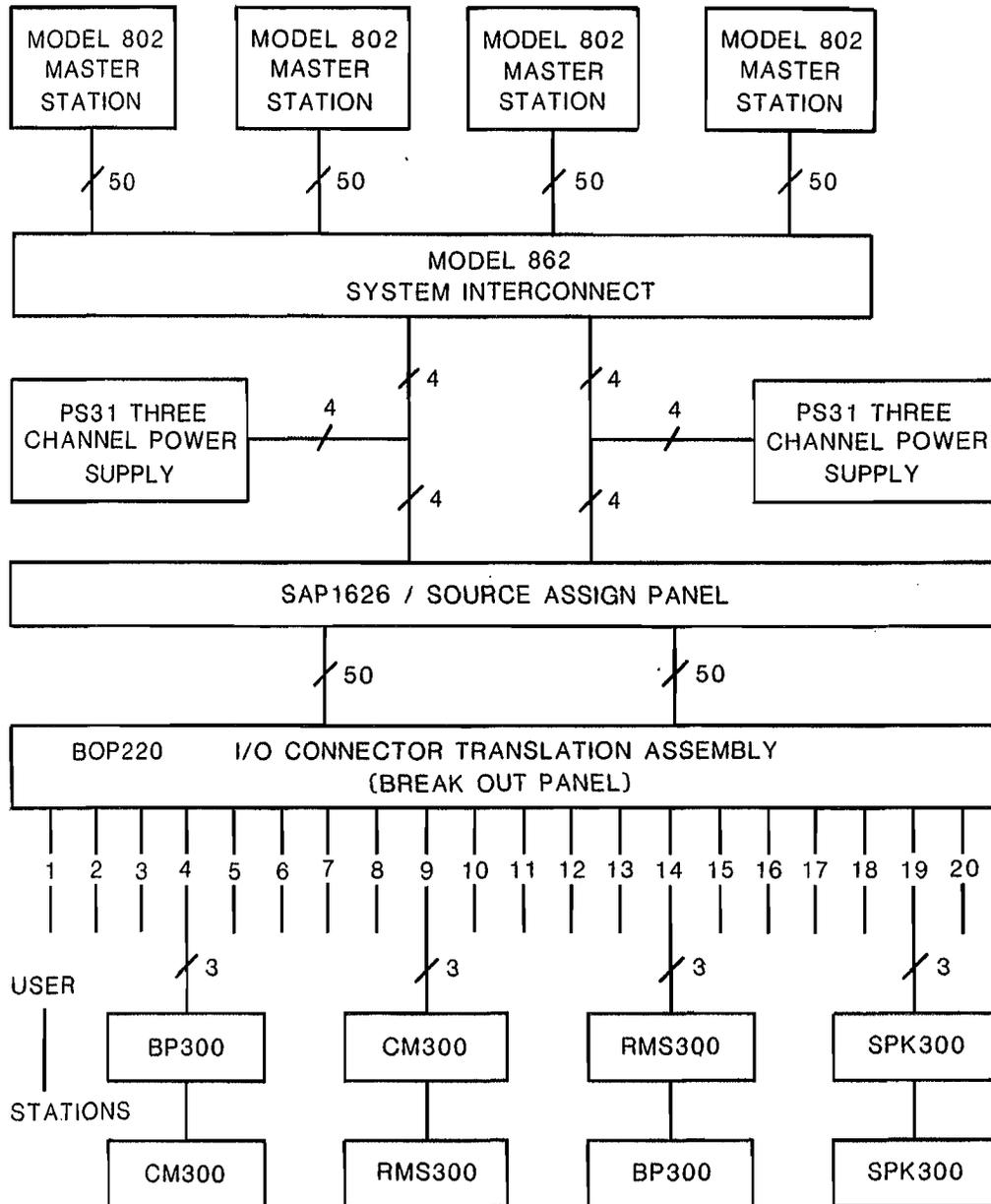
**Figure 2-4**  
**Program Cable Wiring Diagram**



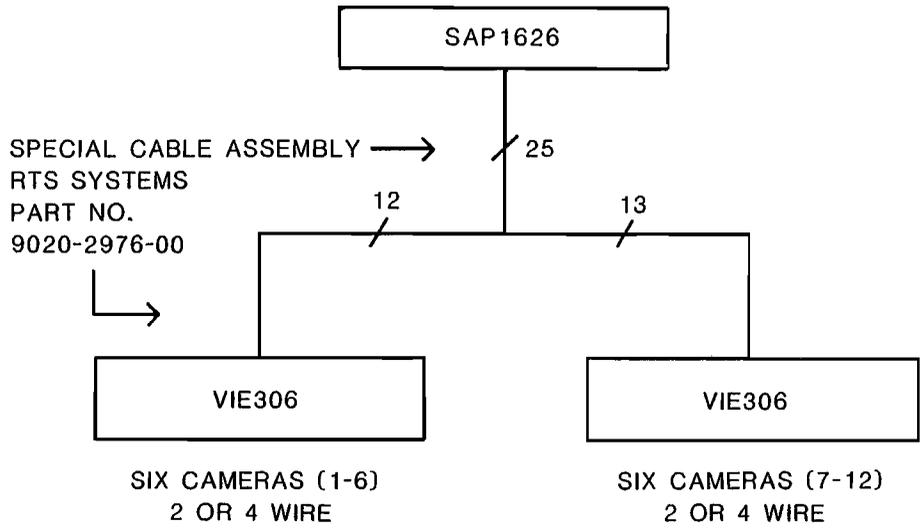
**Notes:**

1. Channel [1] refers to the top row of thumbwheel switches on the SAP1626, or the Channel 1 switch position on a two-channel TW User Station Channel Selector Switch.
2. Channel [2] refers to the bottom row of thumbwheel switches on the SAP1626, or the Channel 2 switch position on a two-channel TW User Station Channel Selector Switch.
3. Using two individually shielded wires in the cable will provide less crosstalk than a standard microphone cable.

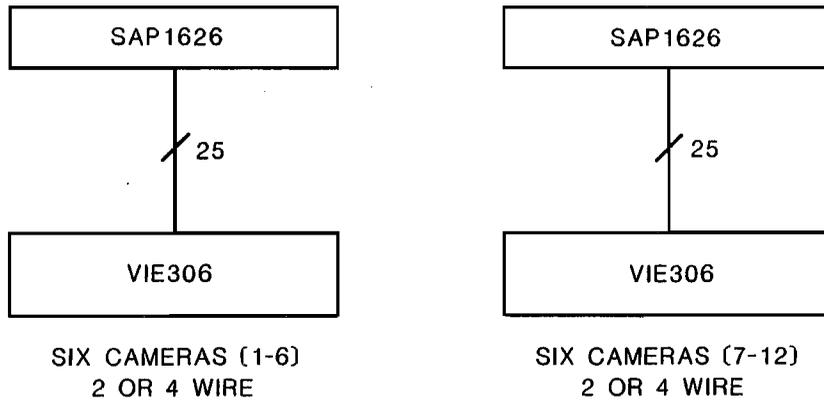
**Figure 2-5  
User Station Cable Wiring Diagram**



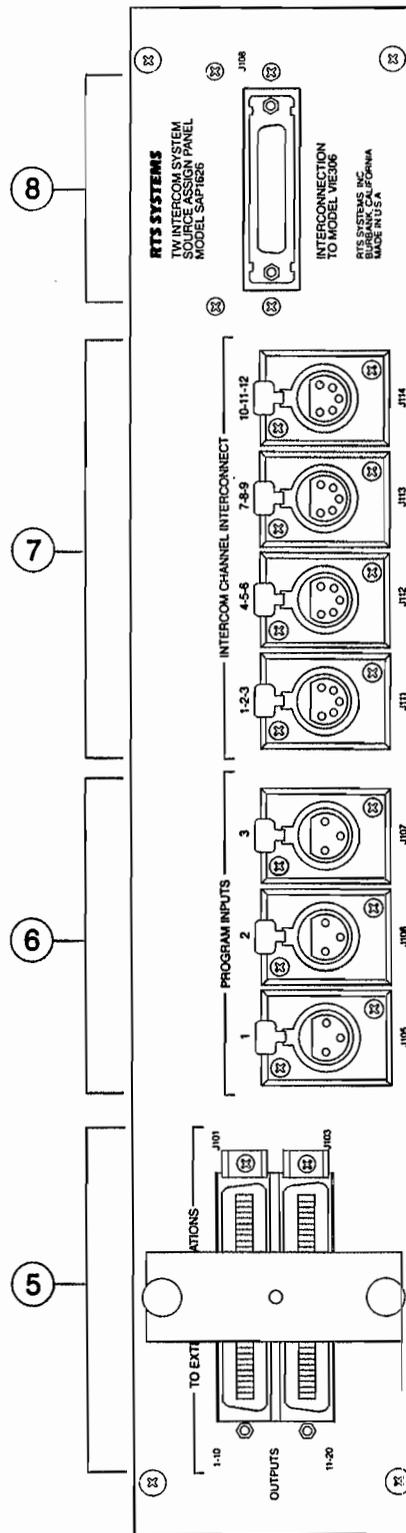
**Figure 2-6**  
**System Diagram**



**Figure 2-7**  
**Twelve Camera Operation, SAP1626 To Two VIE306's**



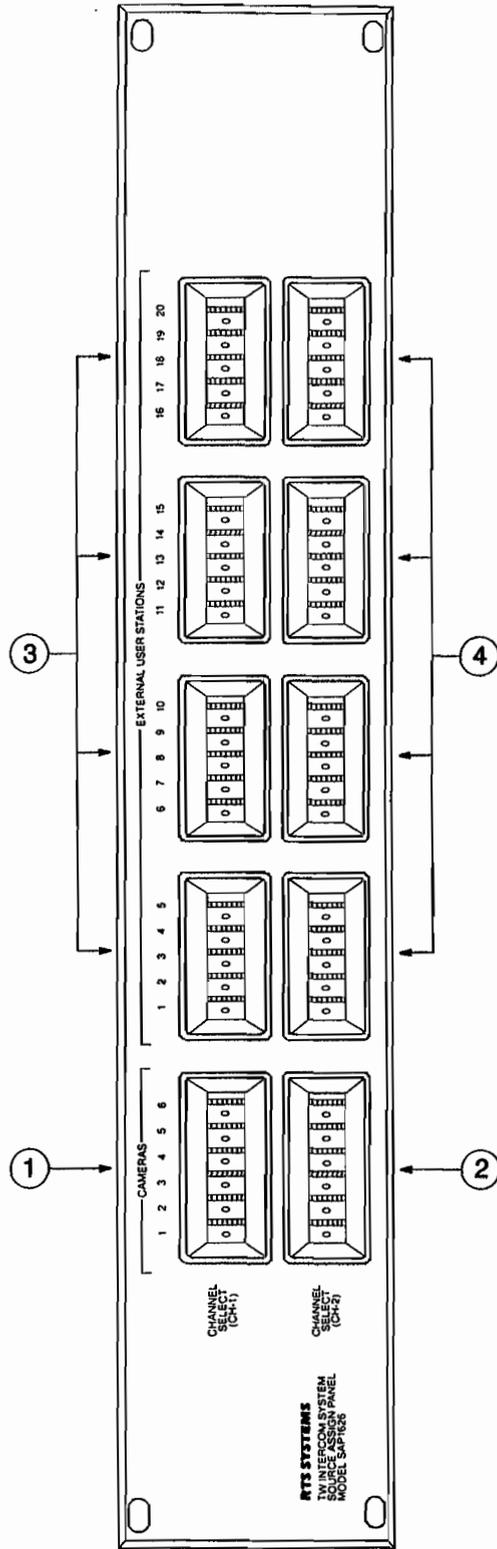
**Figure 2-8**  
**Twelve Camera Operation, Two SAP1626's To Two VIE306's**



**Figure 2-9**  
**Model SAP1626 Rear Panel**

### 2.2.3 Rear Panel Description

REF	NAME	DESCRIPTION
5	OUTPUTS	50-pin female microribbon connectors. Outputs from front-panel EXTERNAL thumbwheel switches to the BOP220.
6	PROGRAM INPUTS	3-pin female XLR-type program input connectors. Accept line-level audio input.
7	POWER SUPPLY INPUTS	4-pin female XLR-type connectors. Power supply inputs from a PS30 or PS31.
8	OUTPUTS TO VIE306	25-pin female D connector. Outputs from front-panel CAMERA thumbwheel switches. Connects to optional VIE306.



**Figure 3-1**  
**Model SAP1626 Front Panel**

## SECTION 3: OPERATING INSTRUCTIONS

### 3.1 FRONT PANEL DESCRIPTION

REF	NAME	DESCRIPTION
1	CAMERAS [CH 1]	Thumbwheel switches. Select first channel on cameras 1 thru 6.
2	CAMERAS [CH 2]	Thumbwheel switches. Select second channel on cameras 1 thru 6.
3	EXTERNAL USER STATIONS [CH 1]	Thumbwheel switches. Select first channel on user stations connected to the BOP220. Station numbers on the BOP220 correspond directly to EXTERNAL USER STATIONS numbers on the SAP1626 front panel.
4	EXTERNAL USER STATIONS [CH 2]	Thumbwheel switches. Select second channel on user stations connected to the BOP220.

### 3.2 OPERATION

To select the channels that camera user stations will talk and listen on, turn CAMERAS thumbwheel switches to the desired channels. The upper thumbwheel selects channel 1 on camera intercom. The lower thumbwheel switch selects channel 2 on the camera intercom. Unless the camera user station is local powered the channel 1 thumbwheel must be set to a powered channel, i.e. channels 1-12. Channel 2 may be set to any channel regardless of power, unless the user station has been modified to accept power from a channel 2 connection.. If a VIE306 is used, channel 2 is the isolated "isoed" channel. Thus the lower row of thumbwheels will select the channel that is interrupted by the VIE306.

To select the channels that the external (non-camera) user stations will talk and listen on, turn the desired EXTERNAL USER STATIONS thumbwheel

to the desired channel. EXTERNAL USER STATIONS numbers correspond directly to the numbers on the BOP220 Connector Translation panel. Unless the external user station is local powered, channel 1 must be set to a powered channel, i.e. channels 1-12.

Because of electrical current limitations, a maximum of 30 headset user stations can be assigned to the same powered channel. This only applies to channel 1 of the user stations (upper row of thumbwheels) and is because power for the user stations is derived from channel 1 (see Figure 4-1). More than one user station can be connected to each SAP1626 output so it is possible to exceed this limit. If stations with speakers or call lights are used the maximum number is less. For exact numbers see the relevant Power Supply Technical Manual.

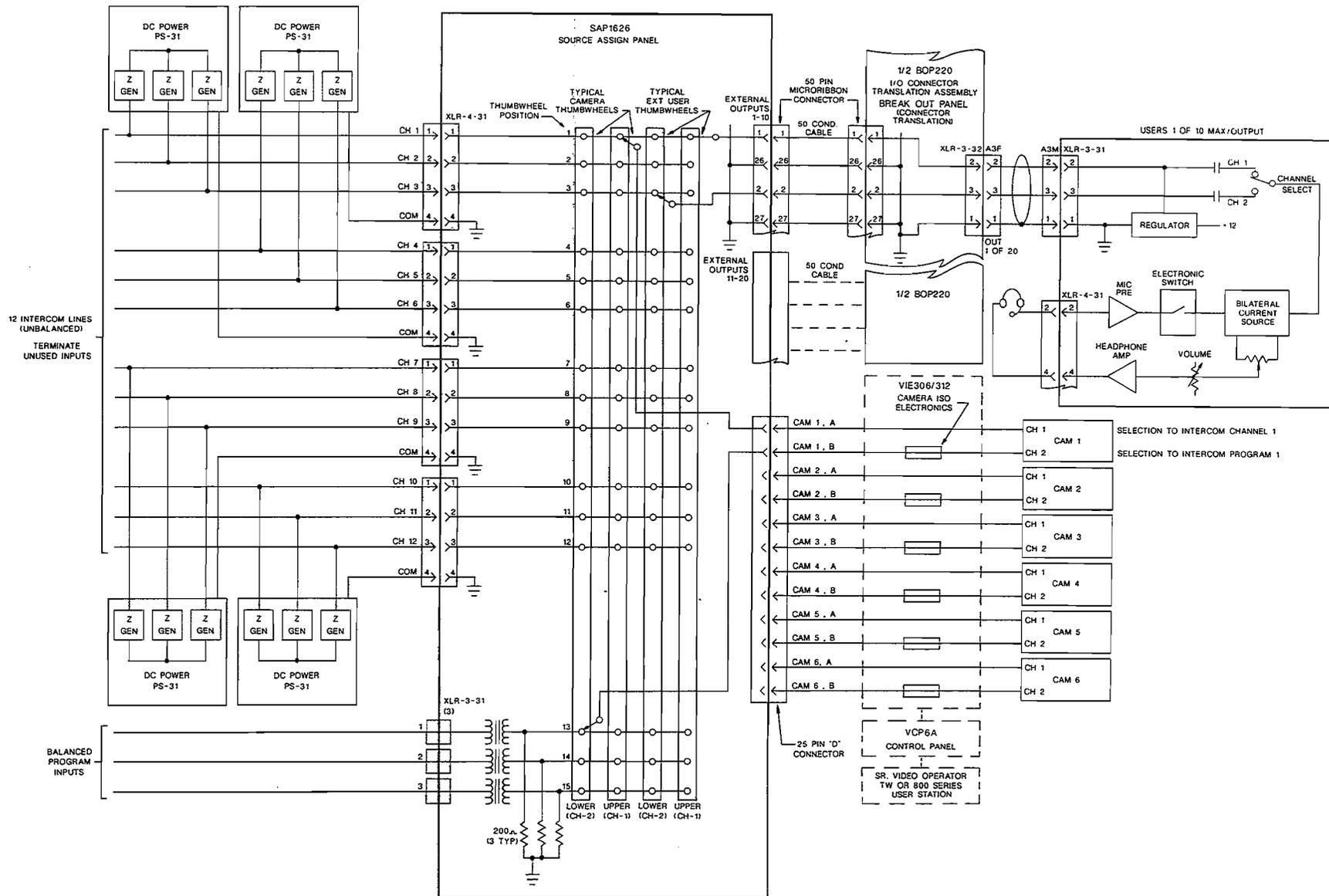


Figure 4-1 / SAP1626 Block Diagram

## SECTION 4: THEORY OF OPERATION

### 4.1 OVERALL FUNCTIONAL DESCRIPTION

(See Figure 4-1)

**GENERAL** The SAP1626 Source Assignment Panel is a rack-mounted matrix switch. This switch assigns each of 20 TW\* User Station strings to two of fifteen possible buses. Twelve buses can distribute both DC power and intercom signals. Three buses distribute intercom signals or program signals. The matrix switch has the effect of transforming a basic two bus intercom system to a fifteen bus system. The switch also assigns six camera intercom stations to a pair of intercom/program buses or twelve camera stations to a single intercom/program bus.

**SAP1626 BUSES** There are three kinds of buses in the SAP1626: 1) two-way two-wire type intercom buses, 2) DC powered two-way two-wire intercom buses, and 3) program audio buses. There are twelve primary intercom buses and three program or secondary intercom buses. All buses allow for two-way two-wire intercom operation. The twelve primary buses may also be "powered" buses. The powering is accomplished by plugging TW type power supplies into the SAP1626. The powering allows a TW intercom station to receive power on its channel one wire (one of three wires connecting the TW user station to the SAP1626). Most TW user stations require DC power to appear across two of the three wires connecting it to a system. (The TW stations that don't require this DC power either have a "Local Power" option or they are a special kind of TW station.) The two wires that accept DC power on a TW station are the common and [Channel One] connections. This means that, in general, the upper row of switches on the SAP1626 should be set only to powered buses. Up to ten user stations may be in a group of TW user stations connected to a SAP1626 output. The twenty outputs discussed above are available on the back of the SAP1626 on two fifty-conductor connectors, or on the optional BOP220 as twenty three-conductor male XLR type connectors.

**PROGRAM BUSES** The three program buses allow three different program sources to be connected to the SAP1626. The TW user stations can be assigned these programs on their channel two connection (bottom row of switches on the SAP1626). If the TW user station is assigned one of the program buses as above but there is no program connected, the bus can then function as an intercom bus.

**BUS CONNECTIONS: 1 TO 12** On the SAP1626, twelve intercom unbalanced powered or unpowered intercom inputs are tied to SAP1626 thumbwheel switch buses one through twelve via INTERCOM CHANNEL INTERCONNECT connectors, J111, J112, J113, J114. Each connector ties three intercom channels to three buses respectively. (See SD3871). The contacts can handle a contact carrying current of 2.0 amperes and a contact breaking current of 0.5 amperes.

**BUS CONNECTIONS: 13 TO 15** Three balanced program inputs at the rear panel on connectors labeled "PROGRAM INPUTS" (J105, J106, J107) tie to buses 13, 14, and 15.

**USER STATION CONNECTIONS** The front panel thumbwheel switches tie the EXTERNAL USER STATION outputs to one of 15 buses. At the BOP220 each XLR 3-32 connector ties to an upper thumbwheel and a lower thumbwheel in a column, so that a TW user station plugged into one of these connectors has its "Channel one and its Channel two selected by a column of switches. select these 15 buses. The "EXTERNAL USER STATION" switches connect through two 50-conductor rear-panel external output connectors, J101, J103, which normally connect via two 50-conductor flat cables to the BOP220. The BOP220 wiring converts the two 50-conductor connectors to twenty 3-pin XLR-type connectors.

Thumbwheel switches S13-S52 select channels for EXTERNAL outputs labeled 1-20 on the BOP220. Odd numbered switches are top row and select intercom channel 1. Even numbered switches are bottom row and select intercom channel 2. Outputs from these switches connect to rear-panel microribbon connectors J101 and J103.

**CAMERA CONNECTIONS** The front panel thumbwheel switches tie the camera outputs to one of 15 buses. The camera thumbwheel switch outputs are available on a rear panel 25-pin female "D" connector. An optional Camera Iso Electronics, Model VIE306, can be connected the 25 pin "D" connector.

Note that the lower row of camera thumbwheel switches, labeled [CH 2], select the channel that is to be isolated by the VIE306.

Thumbwheel switches S1-S12 select the channels for cameras 1-6. Odd numbered switches are the upper row and select the camera's intercom channel 1. Even numbered switches are lower row and select the camera's intercom channel 2.

Output from these first 12 switches connects to rear-panel D connector J8.

#### **4.2 PROGRAM CHANNEL DESCRIPTION**

(See SD3871 in Section 7)

The three program channels have identical circuitry. Program 1 will be used as an example. Program 1 enters through rear-panel XLR-3-31 connector, J105. Capacitors C1 and C2 prevent direct current from damaging the transformer, T1, if a cable carrying DC is accidentally connected to the program inputs.

The transformer, T1, converts the 800 ohm balanced input to a 200 ohm unbalanced line. The resistor, R1, establishes the 200 ohms. The 200 ohm unbalanced line can also serve as a "dry" RTS Systems TW bus

Capacitor C7 protects the transformer from direct current from the RTS line.

#### **4.3 BOP220 DESCRIPTION**

(See SD 4689, Section 7)

Two-wire intercom audio plus 32 volts DC from the SAP1626 connects to the BOP220 at J121 and J122 male 50-pin micro-ribbon connectors. The microribbon connectors are wired to the 20 XLR-3-32 type male output connectors on the BOP220. A pair of intercom channels appear on each XLR-3-32. On each XLR-3-32, pin 1 is common, pin 2 is a channel or bus selected by the upper row of switches on the SAP1626, and pin 3 is a channel selected by the bottom row of switches on the SAP1626. The "EXTERNAL OUTPUT" number of the XLR-3-32 connectors corresponds to the column numbers on the SAP1626. Thirty two volts DC may appear on an XLR-3-32, pins 2 and 3, referenced pin 1. To operate TW User Stations, pin 2 must have +18 to +32 volts DC on it with reference to pin 1 (common). The exception to this rule are TW User Stations with "Local Power Option", or TW or other stations operating in the balanced mode, including Series 800.

## SECTION 5: MAINTENANCE

### 5.1 INTRODUCTION

This section provides service information for normal maintenance, factory performance tests and troubleshooting.

### 5.2 SERVICE INFORMATION

The Model SAP1626 is warranted for a period of one year from the purchase date. The warranty and return instructions are in the front of this manual.

### 5.3 GENERAL MAINTENANCE

#### 5.3.1 SAFETY CONSIDERATIONS

These servicing instructions are for qualified personnel only. To avoid electric shock, do not perform any servicing other than that contained in the operating instructions unless qualified to do so. Service and adjustments should be performed only by qualified service personnel.

If fuses are used, be certain that only fuses with the required current rating and of the specified type (normal blow, time delay, slo-blo, etc.) are used for replacement. The use of repaired fuses and the short-circuiting of fuse holders is prohibited.

#### WARNING

The service information presented in this manual is normally used with the protective covers removed and power applied to the equipment. Energy available at many points may, if contacted, result in personal injury.

**ACCESS** To get inside the Model SAP1626, remove the screws on the top and bottom covers. Slide covers off.

#### 5.3.2 CLEANING

Clean the outside of the Model SAP1626 with denatured alcohol or a mild solution of detergent and water. Clean the interior with dry, low pressure air. The circuit boards can be cleaned with 1,1,1 trichloroethane or Freon TF. **Do not allow these or any solvents to get into the pots or switches.**

### 5.4 PERFORMANCE CHECK

#### EQUIPMENT NEEDED

Sine wave oscillator  
Oscilloscope, 1 MHz minimum bandwidth  
Input cable  
Small blade screwdriver  
RTS "TW" power supply (PS30 or PS31)  
Voltmeter to measure 35 volts DC

And for parts replacement:

Temperature controlled soldering iron  
Rosin core, 60/40 composition, solder.

**DO NOT USE SOLDER PASTE!**

#### 5.4.1 VISUAL

Inspect unit.  
Check for damage or missing parts.  
Check for broken or frayed wires.  
Check that all connectors are fully seated.  
Verify that capacitors have proper polarity.

#### 5.4.2 TURN--ON

**5.4.2.1** Start with the thumbwheel switches at 0. Connect the "TW" power supply to the power supply input (J111) on the SAP1626 as shown in Section 2. If more power supplies are available, they may be connected to the other inputs (J112, J113, J114) on the SAP1626, however the rest of this procedure assumes that one power supply is used. Connect a BOP220 as shown in Section 2.

**5.4.2.2 (OPTIONAL--When triple current limiter is installed).** Power up the "TW" power supply and measure the output of each section of the triple current limiter board. Output can be measured at the fuses of the triple current limiter A1. Output should read  $30 \pm 2$  volts DC.

**5.4.2.3** Check voltage at the bus connecting pins 1-3 of the thumbwheel switches. Voltage should be  $30 \pm 2$  volts DC on both the upper and lower thumbwheels.

### **5.4.3 OUTPUT CHECK**

**5.4.3.1** Connect a 2-channel user station to channels 1-2 of the PS30 or PS31. This station will be called station 1. If using PS31, user station stays at channel 1-2.

**5.4.3.2** Connect a 2-channel user station to BOP220 output 1 (J101). This station will be called station 2.

**5.4.3.3** Set all EXTERNAL thumbwheels to 1.

### **5.4.4 TALK TEST 1**

**5.4.4.1** Talk on channel 1 of station 2 and verify that audio transfers to channel 1 of station 1. Move upper EXTERNAL 1 thumbwheel to 2 and check that audio stops.

**5.4.4.2** Talk on channel 2 of station 2 and verify that audio transfers to channel 1 of station 1. Move lower EXTERNAL 1 thumbwheel to 2 and check that audio stops.

**5.4.4.3** Connect station 2 to BOP220 output 2 (J102). Repeat talk test 1, switching the appropriate EXTERNAL thumbwheel. Repeat this procedure for each output on the BOP220.

**5.4.4.4** Set all EXTERNAL thumbwheels to 2.

**5.4.4.5** Connect station 1 to channels 3-4 on PS30.

### **5.4.5 TALK TEST 2**

**5.4.5.1** Talk on channel 1 of station 2 and verify that audio transfers to channel 1 of station 1. Move upper EXTERNAL 1 thumbwheel to 3 and check that audio stops.

**5.4.5.2** Talk on channel 2 of station 2 and verify that audio transfers to channel 1 of station 1. Move lower EXTERNAL 1 thumbwheel to 3 and check that audio stops.

**5.4.5.3** Connect station 2 to BOP220 output 2 (J102). Repeat talk test 2. Repeat this procedure for each output on the BOP220.

**5.4.5.4** Set all EXTERNAL thumbwheels to 3.

**5.4.5.5** Connect station 1 to channels 5-6 on PS30.

### **5.4.6 TALK TEST 3**

**5.4.6.1** Talk on channel 1 of station 2 and verify that audio transfers to channel 1 of station 1. Move upper EXTERNAL 1 thumbwheel to 4 and check that audio stops.

**5.4.6.2** Talk on channel 2 of station 2 and verify that audio transfers to channel 1 of station 1. Move lower EXTERNAL 1 thumbwheel to 4 and check that audio stops.

**5.4.6.3** Connect station 2 to BOP220 output 2 (J102). Repeat talk test 3. Repeat this procedure for each output on the BOP220.

**5.4.6.4** Now connect the to J112 on the SAP1626.

**5.4.6.5** Set all EXTERNAL thumbwheels to 4.

**5.4.6.6** Connect station 1 to channels 1-2 on PS30.

### **5.4.7 TALK TEST 4**

**5.4.7.1** Talk on channel 1 of station 2 and verify that audio transfers to channel 1 of station 1. Move upper EXTERNAL 1 thumbwheel to 5 and check that audio stops.

**5.4.7.2** Talk on channel 2 of station 2 and verify that audio transfers to channel 1 of station 1. Move lower EXTERNAL 1 thumbwheel to 5 and check that audio stops.

**5.4.7.3** Connect station 2 to BOP220 output 2 (J102). Repeat talk test 4. Repeat this procedure for each output on the BOP220.

**5.4.7.4** Set all EXTERNAL thumbwheels to 5.

**5.4.7.5** Connect station 1 to channels 3-4 on PS30.

#### **5.4.8 TALK TEST 5**

**5.4.8.1** Talk on ch. 1 of sta. 2, verify that audio transfers to channel 1 of station 1. Move upper EXTERNAL 1 thumbwheel to 6 and check that audio stops.

**5.4.8.2** Talk on ch. 2 of sta. 2, verify that audio transfers to channel 1 of station 1. Move lower EXTERNAL 1 thumbwheel to 6 and check that audio stops.

**5.4.8.3** Connect station 2 to BOP220 output 2 (J102). Repeat talk test 5. Repeat this procedure for each output on the BOP220.

**5.4.8.4** Set all EXTERNAL thumbwheels to 6.

**5.4.8.5** Connect sta. 1 to channels 5-6 on PS30.

#### **5.4.9 TALK TEST 6**

**5.4.9.1** Talk on ch. 1 of sta. 2, verify that audio transfers to channel 1 of station 1. Move upper EXTERNAL thumbwheel to 7 and check that audio stops.

**5.4.9.2** Talk on ch. 2 of sta. 2, verify that audio transfers to channel 1 of station 1. Move lower EXTERNAL thumbwheel to 7 and check that audio stops.

**5.4.9.3** Connect station 2 to BOP220 output 2 (J102). Repeat talk test 6. Repeat this procedure for each output on the BOP220.

#### **TO ADD TALK TEST 7, 8, 9 10, 11 AND 12:**

Repeat Talk Test 1, substituting 7 for 1. Connect 2 channel user station to PS30 channel 1-2.

Repeat Talk Test 2; substituting 8 for 2. Connect 2 channel user station to PS30 channel 3-4.

Repeat Talk Test 3, substituting 9 for 3. Connect 2 channel user station to PS30 channel 5-6.

Repeat Talk Test 4, substituting 10 for 4. Connect 2 channel user station to PS30 channel 1-2.

Repeat Talk Test 5, substituting 11 for 5. Connect 2 channel user station to PS30 channel 3-4.

Repeat Talk Test 6, substituting 12 for 6. Connect 2 channel user station to PS30 channel 5-6.

#### **5.4.10 PROGRAM TEST**

**5.4.10.1** With "TW" power supply still connected to J112, connect signal generator to program input 1 (J105). Set generator for 1 kHz and 4 volts AC peak-to-peak (1.41 volts rms).

**5.4.10.2** Check the AC voltage on bus wire connecting pin 13 of the thumbwheel switches for 2.0 volts AC peak-to-peak (0.70 volts rms).

**5.4.10.3** Set the lower row of thumbwheels to 13. Set the upper row of thumbwheels to 12.

**5.4.10.4** Connect station 2 to BOP220 output 1 (J101).

**5.4.10.5** Listen on channel 2 of station 2 for the 1 KHz tone. Move station 2 to BOP220 output 2 (J102) and listen for tone. Repeat for each output.

**5.4.10.6** Connect signal generator to program input 2 (J106). Set generator for 100 Hz and 4 volts AC peak-to-peak (1.41 volts rms).

**5.4.10.7** Check the AC voltage on bus wire connecting pin 14 of the thumbwheel switches for 2.0 volts AC peak-to-peak (0.70 volts rms).

**5.4.10.8** Set the lower row of thumbwheels to 14.

**5.4.10.9** Connect station 2 to BOP220 output 1 (J101).

**5.4.10.10** Listen on channel 2 of station 2 for the 100 Hz tone. Move station 2 to BOP220 output 2 (J102) and listen for tone. Repeat for each output.

**5.4.10.11** Connect signal generator to program input 3 (J107). Set generator for 10 kHz and 4 volts AC peak-to-peak (1.41 volts RMS).

**5.4.10.12** Check the AC voltage on bus wire connecting pin 15 of the thumbwheel switches for 2.0 volts AC peak-to-peak (0.70 volts RMS).

**5.4.10.13** Set the lower row of thumbwheels to 15. The upper row stays at 12.

**5.4.10.14** Connect station 2 to BOP220 output 1 (J101).

**5.4.10.15** Listen on channel 2 of station 2 for the 10 KHz tone. Move station 2 to BOP220 output 2 (J102) and listen for tone. Repeat for each output.

**5.4.10.16** With the tone still connected to program 3, set the upper row of thumbwheels to 15. With the oscilloscope, check between pins 1 and 2 of all the XLR output connectors on the BOP220 for 2.0 volts AC peak-to-peak (0.70 volts RMS).

**5.4.10.17** Connect the tone to program input 2 (J106). Set the upper row of thumbwheels to 14. With the oscilloscope, check between pins 1 and 2 of all XLR output connectors on the BOP220 for 2.0 volts AC peak-to-peak (0.70 volts RMS).

**5.4.10.18** Connect the tone to program input 1 (J105). Set the upper row on thumbwheels to 13. With the oscilloscope, check between pins 1 and 2 of all XLR output connectors on the BOP220 for 2.0 volts AC peak-to-peak (0.70 volts RMS).

## **5.4.11 CAMERA OUTPUTS TEST**

With the "TW" power supply still connected to J111 on the SAP1626, connect station 1 to power supply channels 1 and 2.

Build a camera output test fixture. Use Figure 5-1 as a guide. Connect wires to a male 25 pin connector. Strip, tin, and label the wire ends. Plug the connector into J108 on the back panel of the SAP1626. Connect the oscilloscope common lead to pin number 1.

**5.4.11.1** Set all CAMERA thumbwheels to 1.

Touch scope probe to pin 14. Talk on station 1 channel 1 and verify audio. Move upper CAMERA thumbwheel to 2 and check that audio stops.

Touch scope probe to pin 20. Talk on station 1 channel 1 and verify audio. Move lower CAMERA thumbwheel to 2 and check that audio stops.

Repeat for cameras 2 - 6, pins 15-25.

**5.4.11.2** Set all CAMERA thumbwheels to 2.

Touch scope probe to pin 14. Talk on station 1 channel 1 and verify audio. Move upper CAMERA thumbwheel to 3 and check that audio stops.

Touch scope probe to pin 20. Talk on station 1 channel 1 and verify audio. Move lower CAMERA thumbwheel to 3 and check that audio stops.

Repeat for cameras 2 - 6, pins 15-25.

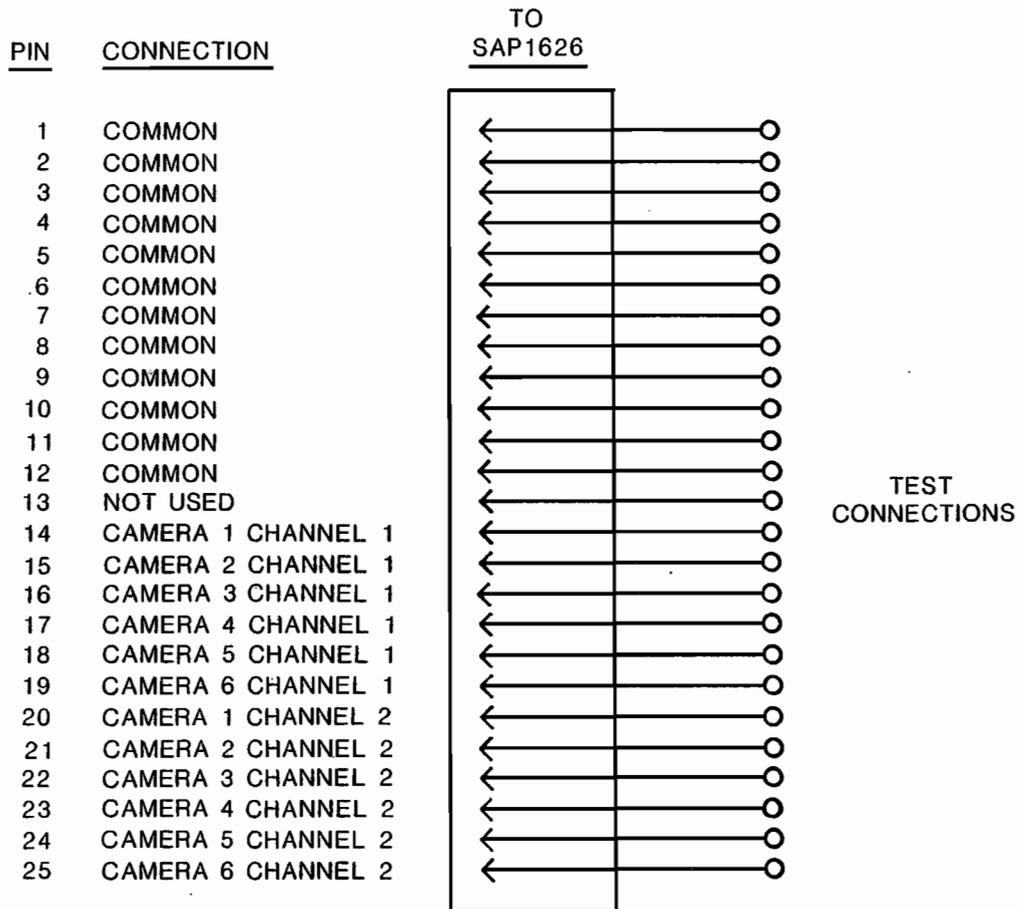
**5.4.11.3** Set all CAMERA thumbwheels to 3.

Touch scope probe to pin 14. Talk on station 1 channel 1 and verify audio. Move upper CAMERA thumbwheel to 4 and check that audio stops.

Touch scope probe to pin 20. Talk on station 1 channel 1 and verify audio. Move lower CAMERA thumbwheel to 4 and check that audio stops.

Repeat for cameras 2 - 6, pins 15-25.

Connect station 1 to channels 5 and 6 of the "TW" power supply. Connect the "TW" power supply to J111 input on SAP1626.



**Figure 5-1**  
**Camera Output Test Fixture**

## CAMERA OUTPUTS TEST, cont'd

### 5.4.11.4 Set all CAMERA thumbwheels to 4.

Touch scope probe to pin 14. Talk on station 1 channel 1 and verify audio. Move upper CAMERA thumbwheel to 5 and check that audio stops.

Touch scope probe to pin 20. Talk on station 1 channel 1 and verify audio. Move lower CAMERA thumbwheel to 5 and check that audio stops.

Repeat for cameras 2 - 6, pins 15-25.

### 5.4.11.5 Set all CAMERA thumbwheels to 5.

Touch scope probe to pin 14. Talk on station 1 channel 1 and verify audio. Move upper CAMERA thumbwheel to 6 and check that audio stops.

Touch scope probe to pin 20. Talk on station 1 channel 1 and verify audio. Move lower CAMERA thumbwheel to 6 and check that audio stops.

Repeat for cameras 2 - 6, pins 15-25.

### 5.4.11.6 Set all CAMERA thumbwheels to 6.

Touch scope probe to pin 14. Talk on station 1 channel 1 and verify audio. Move upper CAMERA thumbwheel to 7 and check that audio stops.

Touch scope probe to pin 20. Talk on station 1 channel 1 and verify audio. Move lower CAMERA thumbwheel to 7 and check that audio stops.

Repeat for cameras 2 - 6, pins 15-25.

### 5.4.11.7 Set all CAMERA thumbwheels to 7.

Touch scope probe to pin 14. Talk on station 1 channel 1 and verify audio. Move upper CAMERA thumbwheel to 8 and check that audio stops.

Touch scope probe to pin 20. Talk on station 1 channel 1 and verify audio. Move lower CAMERA thumbwheel to 8 and check that audio stops.

### 5.4.11.8 Set all CAMERA thumbwheels to 8.

Touch scope probe to pin 14. Talk on station 1 channel 1 and verify audio. Move upper CAMERA thumbwheel to 9 and check that audio stops.

Touch scope probe to pin 20. Talk on station 1 channel 1 and verify audio. Move lower CAMERA thumbwheel to 9 and check that audio stops.

### 5.4.11.9 Set all CAMERA thumbwheels to 9.

Touch scope probe to pin 14. Talk on station 1 channel 1 and verify audio. Move upper CAMERA thumbwheel to 10 and check that audio stops.

Touch scope probe to pin 20. Talk on station 1 channel 1 and verify audio. Move lower CAMERA thumbwheel to 10 and check that audio stops.

### 5.4.11.10 Set all CAMERA thumbwheels to 10.

Touch scope probe to pin 14. Talk on station 1 channel 1 and verify audio. Move upper CAMERA thumbwheel to 11 and check that audio stops.

Touch scope probe to pin 20. Talk on station 1 channel 1 and verify audio. Move lower CAMERA thumbwheel to 11 and check that audio stops.

### 5.4.11.11 Set all CAMERA thumbwheels to 11.

Touch scope probe to pin 14. Talk on station 1 channel 1 and verify audio. Move upper CAMERA thumbwheel to 12 and check that audio stops.

Touch scope probe to pin 20. Talk on station 1 channel 1 and verify audio. Move lower CAMERA thumbwheel to 12 and check that audio stops.

### 5.4.11.12 Set all CAMERA thumbwheels to 12.

Touch scope probe to pin 14. Talk on station 1 channel 1 and verify audio. Move upper CAMERA thumbwheel to 13 and check that audio stops.

Touch scope probe to pin 20. Talk on station 1 channel 1 and verify audio. Move lower CAMERA thumbwheel to 13 and check that audio stops.

END OF TEST

## 5.5 TROUBLESHOOTING

### SYMPTOM

No program sound

Distorted sound

Hum at user stations

No sound at user stations

### CHECK:

Program input connections; Program input; Volume pot (optional)

Input connections; Supply voltages.

Input/Ground connections;  
Headset left lying on top of equipment with microphone on.

Power supply voltages; Connections: for shorts, for opens in cabling.



## SECTION 6: LISTS OF REPLACEABLE PARTS

**6.1 INTRODUCTION** This section contains parts lists and instructions for ordering replacement parts. The parts lists are divided into four sections: shipping list, final assembly, back panel, and printed circuit board. Immediately following the description of a part is the manufacturer and the manufacturer's part number.

### 6.1.1 DIVISION OF PARTS LISTS

<u>Section #</u>	<u>Description</u>
6.3	Shipping Lists
6.31	Model SAP1626 Shipping List, 9000-3949-00
6.32	Model BOP220 Shipping List, 9000-4689-00
6.4	Model SAP1626 Final Assembly, 9010-3949-00
6.5	Model SAP1626 Back Panel Assembly, 9020-3866-00
6.6	Model SAP1626 Printed Circuit Assembly, Connector Adapter, 9030-4025-00
6.7	Model SAP1626 Printed Circuit Assembly, Switch, 9030-3871-00
6.8	Model SAP1626 Triple Current Limiter, (Optional), 9030-1602-00
6.9	Model BOP220 Final Assembly, 9010-4689-00

**6.2 HOW TO OBTAIN PARTS** Parts may be obtained directly from RTS Systems, Inc.:

Telex Communications, Inc.  
12000 Portland Avenue South,  
Burnsville, MN 55337 U.S.A.  
Telephone: (877) 863-4169  
Fax: (800) 323-0498

### 6.3 SHIPPING LISTS

#### 6.3.1 SAP1626 (Ordering Number 9000-3949-00)

<u>QTY</u>	<u>DESCRIPTION</u>	<u>RTS PART #</u>
1	Model SAP1626 Source Assign Panel	9010-3949-00
1	Technical Manual	9300-4200-00
1	Model SAP1626 Shipping carton	

#### 6.3.2 BOP220 (Ordering Number 9000-4689-00)

<u>QTY</u>	<u>DESCRIPTION</u>	<u>RTS PART #</u>
1	Model BOP220 Break Out Panel	9010-4689-00
1	Technical Manual	9300-4200-00
1	Model BOP220 Shipping carton	

**6.4 FINAL ASSEMBLY, SAP1626 9010-3949-00**

<u>REF#</u>	<u>QTY</u>	<u>DESCRIPTION</u>	<u>RTS PART #</u>
1	6	Screw, 4-40 x 1/4", pan head, phillips, black	1008-4007-00
2	2	Switch Assembly, 6 position thumbwheel, Unimax SR55CX6	1907-0005-00
3	8	Switch Assembly, 5 position thumbwheel, Unimax SR55CX5	1907-0006-00
4	1	Cable Assembly, camera connector	9020-5317-00
5	1	Back panel assembly	9020-3866-00
6	1	Printed Circuit Assembly	9030-3871-00
7	20	Spacer strip, PCB, SW	9040-4232-00
8	1	Chassis Assembly, SAP1626	9090-3959-00
9	2	Covers, top/bottom	9100-3230-00
10	6	Bracket	9110-3867-00
11	4	Screw, 8-32 X 3/8", pan head, phillips	1008-8022-00
12	4	Washer, lock, #8	1006-0027-00

**6.5 BACK PANEL, SAP1626 9020-3866-00**

<u>REF#</u>	<u>QTY</u>	<u>DESCRIPTION</u>	<u>RTS PART #</u>
1	1	Back panel, SAP1626, per finishing detail FD3866	9080-3866-00
2	2	Cable mounting cradle Panduit P/N TM1S4	1005-0046-00
3	2	Screw, jack, hex, 9/16", Electrical Hardware P/N RA-47-50-7	1005-0092-00
4	1	Connector Stabilization Plate	9100-1942-00
5	18	Nut, hex, kep 4-40	1007-0001-00
7	4	Screw, 4-40 X 3/8", pan head, phillips, cad plated	1008-4035-00
8	14	Screw, 4-40 x 3/8" flat head, phillips	1008-4037-00
9	2	Thumbscrew, 6-32 x 1/2" Smith P/N 2366	1008-6002-00
10	2	Screw, 4-40 x 1/2" pan head, phillips	1008-4025-00
11	2	Screw, 6-32 x 3/8", bind head, phillips, cadmium	1008-6013-00
12	1	Cable assembly, 50 conductor	9020-3950-01
12	1	Cable assembly, 50 conductor	9020-3950-02
13	1	Cable assembly	9020-3952-01
13	1	Cable assembly	9020-3952-02
13	1	Cable assembly	9020-3952-03
14	1	Cable assembly	9020-3953-01
14	1	Cable assembly	9020-3953-02
14	1	Cable assembly	9020-3953-03
14	1	Cable assembly	9020-3953-04
16	1	SAP1626 Connector Adaptor, PCA	9030-4025-00
17	2	Spacer hex 6-32 x 1 1/2", Smith P/N 8429	1001-0006-00
18	3	Connector, round, 3-pin, female Cannon XLR 3-31	2018-0003-00
19	4	Connector, round, 4-pin, female Cannon AXR 4-31	2018-0001-00
20	2	Washer, lock internal tooth, # 6	1006-0006-00
	11	Shrink Sleeving, 3/16" blk	1301-0005-00

**6.6 PRINTED CIRCUIT ASSEMBLY CONNECTOR ADAPTOR, , 9030-4025-00**

<u>REF#</u>	<u>QTY</u>	<u>DESCRIPTION</u>	<u>RTS PART #</u>
1	1	Printed Circuit Board, SAP1626 PCA Connector Adapter	9040-4025-00
2	1	Jack Socket Assembly, 3M P/N 3341-1L (This standard, prepackaged assembly consists of two jack sockets [used here], and assorted hardware, [not used here]).	1005-0045-00
3	1	Connector, "D", 25 pin female, Cannon P/N DB25SV	2004-0010-03
4	4	Spacer, 4-40 x 1/8", PCB, PEM P/N KFB3-440-4	1001-0102-00
5	1	Header, 26-pin, dual row, boxed, 3M P/N 3593-6002	2007-0076-00
6	2	Stand Off, 4-40 x 3/16", PEM P/N KFB3-440-6	1001-0096-00

**6.7 PRINTED CIRCUIT BOARD SWITCH, 9030-3871-00**

<u>REF#</u>	<u>QTY</u>	<u>DESCRIPTION</u>	<u>RTS PART #</u>
C1-10	10	Capacitor, electrolytic, aluminum, radial 10uF/50V	1513-R106-4I
J1-4	4	Connector, PCB boxed header, male, 20 pin dual row (3M P/N 3592-6002)	2007-0074-00
J5	1	Connector, PCB straight header, male, 6 pin single row, Panduit P/N MHLS 100-6C	2007-0075-00
J8	1	Connector, PCB straight boxed header, male, 26 pin dual row, 3M P/N 3593-6002	2007-0076-00
J11-14	4	Connector, PCB header, male, 4 pin single row Panduit P/N MLSS 100-4C	2007-0077-00
PC1	1	Printed circuit board	9040-3871-00
R1-3	3	Resistor, Carbon Film, 200 ohm 1/4W $\pm 5\%$	1402-2000-5D
R4-15	12	Resistor, metal oxide, 0.1 ohm, 1/2W $\pm 5\%$	1413-0R10-5E
T1	3	Transformer, audio, 600 ohm:600 ohm, 200 mW, Bourns P/N LM9003	2306-0001-00
XS1-XS52	52	Connector, PCB header, 24 position dual row, female, Aptronics P/N 929852-01-12	2007-0078-00

**6.8 TRIPLE CURRENT LIMITER ASSEMBLY, SAP1626 (Optional) 9030-1602-00**

<u>REF#</u>	<u>QTY</u>	<u>DESCRIPTION</u>	<u>RTS PART #</u>
PC1	1	Printed Circuit Board, triple current limiter	9040-1600-00
CR1-CR6	6	Diode, rectifier, 3 ampere, Motorola P/N MR502	1601-0502-00
F1-F3	3	Fuse, 3 amp slo-blo Littelfuse P/N 313003	2801-0018-00
R1,R3,R5	3	Resistor, wire wound, 1 ohm 5%, 5 W	1404-01R0-5I
R2,R4,R6	3	Resistor, carbon film 2.2 kilohm 5%, 1 W	1402-2201-5F
U1-U3	3	Integrated Circuit, voltage regulator, LM317	1603-0317-0K
14	3	Insulator, mica, TO-3, Motorola P/N B552600F011	1306-0001-00
16	3	Heatsink, / mounting bracket,	9180-1605-00
17	3	Heatsink, TO3 type, THE 6014B	4502-0004-00
18	6	Washer, insulating, Keystone P/N 3054	1006-0022-00
19	6	Screw, 6-32 x 1/2", pan head, slotted	1008-6018-00
20	6	Nut, hex, kep 6-32	1007-0002-00
21	6	Washer, #6 flat cadmium plated	1006-0005-00
22	6-	Fuse clip, P.C. Littelfuse P/N 102071	2802-0005-00
25	A/R	Thermal grease	

**6.9 FINAL ASSEMBLY, BOP220 (2nd Generation) 9010-4689-00**

<u>REF#</u>	<u>QTY</u>	<u>DESCRIPTION</u>	<u>RTS PART #</u>
1		Not Used	
2	6	Spacer, hex 6-32 x 7/8 THD, Smith P/N 8426	1001-0018-00
3	2	Thumbscrew, 6-32 x 1/2, Smith P/N 2366	1008-6002-00
4	6	Screw, 6-32 x 3/8 pan head phillips	1008-6051-00
5	2	Connector, 50-pin male microribbon, TRW Cinch P/N 57-10500-27	2008-0010-00
6	20	Connector, 3-pin XLR, male, plastic, Neutrik 3MPP	2018-0048-00
7		Not Used	
8	1	BOP220 Printed circuit board	9040-1630-00
9	1	BOP220 Front panel	9070-1632-00
10	1	BOP220 Back panel	9080-4596-00
11	2	Cover, 4012 & BOP220 / Rack Ear3	9100-4598-00
12	2	Side rail 4012	9100-4597-00
13	1	Bracket	9110-4620-01
14	8	Screw, 8-32 x 3/8 pan head phillips	1008-8004-00

**Note:**

The REF#, above, is the Reference Designator when given as a letter/number combination. When given as a number only, this number correlates with the circled numbers on assembly drawings.

## SECTION A: APPENDIX A

### A.1 General Information and Definitions

Normally the SAP1626 serves the dual purpose of signal and DC power distribution. In general, the SAP1626 connects between the system channels or buses and TW User Stations or strings of TW User Stations (normally to the TW User Stations through the BOP220). The system channels or buses are usually established by TW Power Supplies. Often these buses are also connected to an 800 series balanced intercom system through a System Interconnect (e.g. Models 862, 860).

A "wet" channel contains 32 volts DC and two-way intercom audio.

A "dry" channel contains two-way intercom audio only.

A TW User Station must be connected so that its channel 1 is connected to a "wet" channel; its channel 2 may be connected to either a "wet" or "dry" channel. (Exception: Local powered TW User Stations can be arbitrarily connected to wet or dry channels).

The top row of switches on a SAP1626 connect to the channel one inputs of TW User Stations and should always be dialed to a "wet" channel. (Exception: If all stations are local powered, dial up can be arbitrary).

The bottom row of switches can be arbitrarily dialed to any channel. Dialing to channel zero connects the TW User Station/Stations' channel two connection to ground (dead channel).

The SAP1626 Power Supply Inputs can be connected to one, two, three, or four three channel power supplies to get three, six, nine, or twelve "wet" channels, respectively.

On the SAP1626, Channels 13, 14, and 15 are always dry, and, in general, the top row of switches should not be left on these channels, because an unpowered TW User Station could absorb some of the Intercom or Program Audio that may appear on these channels.

### A.2 Detailed Information

Connect each of the four-pin INTERCOM CHANNEL INTERCONNECT Connectors on the SAP1626 rear panel to a TW three channel Power Supply (for wet channel operation) or a termination plug (dry channel operation). Connect the two fifty pin connectors to a Model BOP220 or equivalent using two 50-conductor ribbon cables.

Regarding the four-pin cable assemblies: One to four cable assemblies required for connecting one to four TW Power Supplies respectively. There are two types of cable assemblies: one for the Early\* PS30/PS60 power supplies and one for all the rest of the TW Power Supplies:

The Late\* PS30  
The PS31  
The PS50  
The Late\* PS60

Figure A-1 below shows early PS30/60 cable assembly wiring.

Figure A-2 below shows the connection of four Early PS30/PS60 Power Supplies to the SAP1626.

Figure 2-1 above shows the connection of four system-standard type Power Supplies (PS31, PS50, Late PS30/PS60) to the SAP1626.

Figure 2-2 above shows the system-standard PS31, PS50, and Late PS30/60, Power Supplies cable assembly wiring.

#### A.2.2 Special Note on Models PS30 and PS60

All Model PS30/PS60's have six "internal" or "local" channels (versus "system" channels or "buses"):

three powered and three unpowered or "dry", available on four 4-pin output connectors (J101, J102, J106, J107).

The powered channels are on channels 1,3,5; the dry channels, 2,4,6.

\* Early and late production PS30/PS60 power supplies differ in their connections, explained below.

### Early versus Late PS30/PS60 Power Supplies

#### Early Production PS 30/PS60 Power Supplies

On units produced before mid 1983, the output connectors are connected as follows:

Output Conn.	Internal/ Local Channels	PS30 #1 Normally Wired to System Channels	PS30 #2 Normally Wired to System Channels	PS30 #3 Normally Wired to System Channels	PS30 #4 Normally Wired to System Channels
J101	1,2,3	1, N, 2	4, N, 5	7, N, 8	10, N, 11
J102	4,5,6	N, 3, N	N, 6, N	N, 9, N	N, 12, N
J106*	1,2,3	1, N, 2	4, N, 5	7, N, 8	10, N, 11
J107*	4,5,6	N, 3, N	N, 6, N	N, 9, N	N, 12, N

#### Late Production PS 30/PS60 Power Supplies

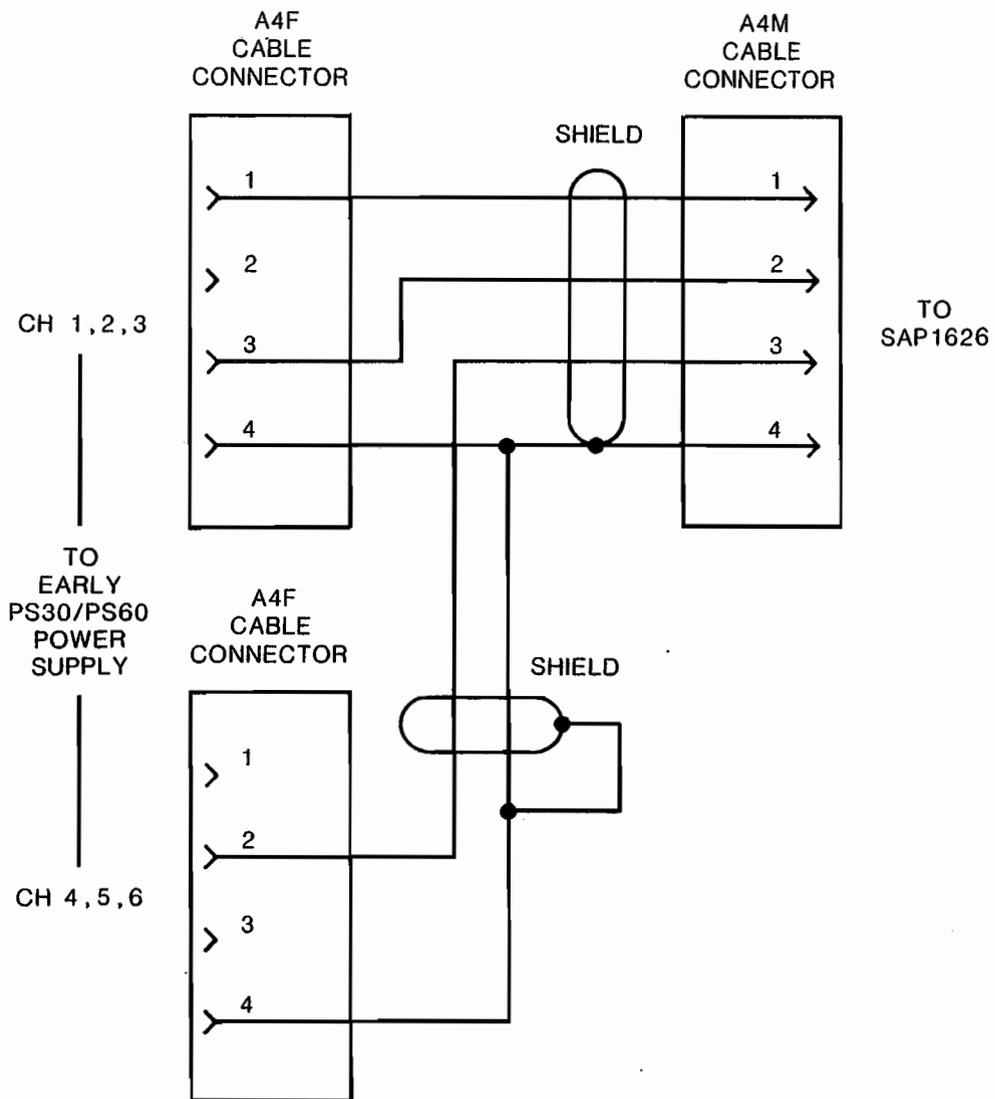
On units produced after mid 1983, the output connectors are connected as follows:

Output Conn.	Internal/ Local Channels	PS30 #1 Normally Wired to System Channels	PS30 #2 Normally Wired to System Channels	PS30 #3 Normally Wired to System Channels	PS30 #4 Normally Wired to System Channels
J101	1,2,3	1, N, 2	4, N, 5	7, N, 8	10, N, 11
J102	4,5,6	N, 3, N	N, 6, N	N, 9, N	N, 12, N
J106	1,3,5	1, 2, 3	4, 5, 6	7, 8, 9	10,11,12
J107	2,4,6	N, N, N	N, N, N	N, N, N	N, N, N

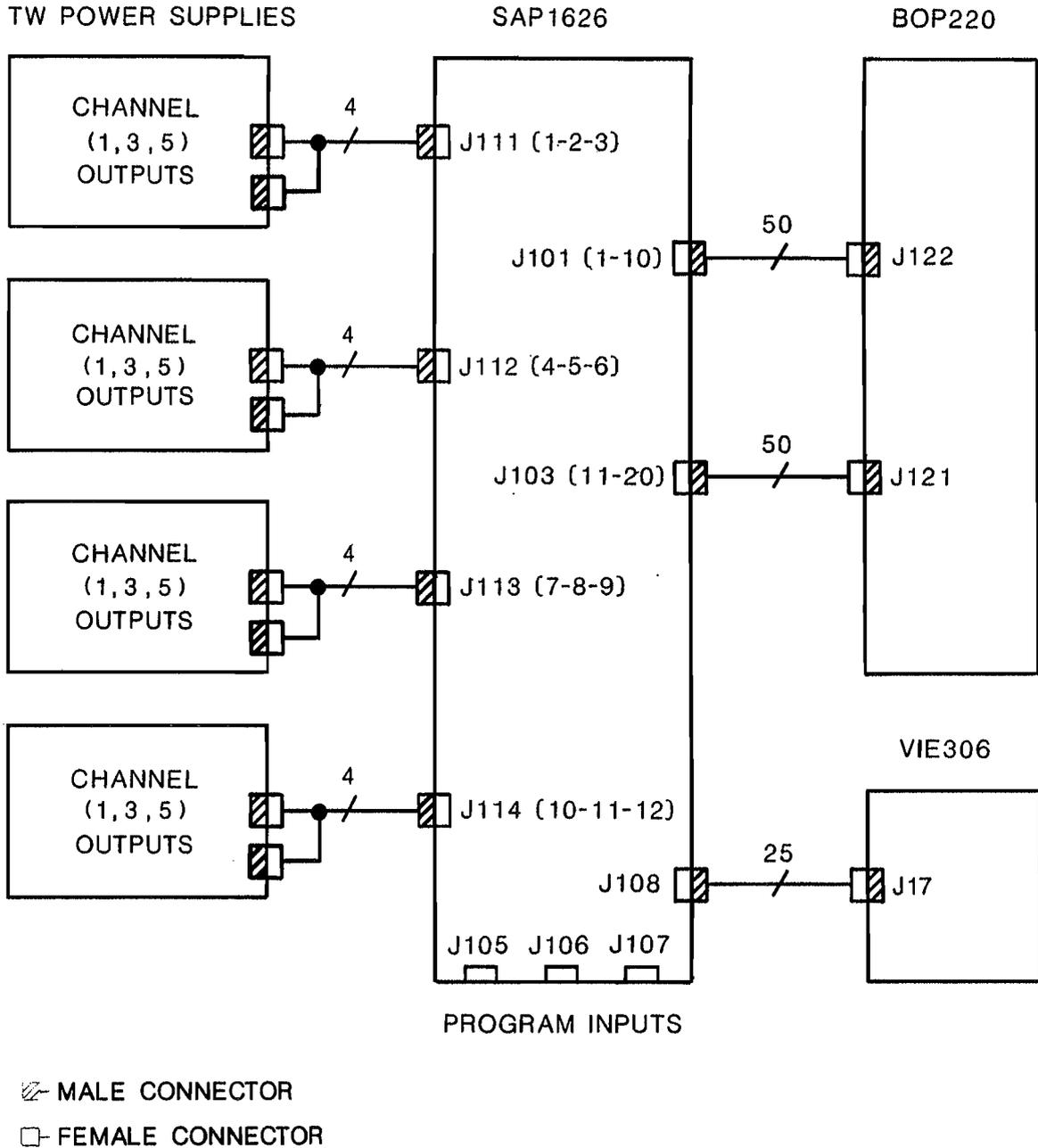
#### PS31 Power Supply Connections

Output Conn.	Internal/ Local Channels	PS31 #1 Normally Wired to System Channels	PS31 #2 Normally Wired to System Channels	PS31 #3 Normally Wired to System Channels	PS31 #4 Normally Wired to System Channels
J101	1,2,3	1, N, 2	4, N, 5	7, N, 8	10, N, 11
J102	4,5,6	N, 3, N	N, 6, N	N, 9, N	N, 12, N
J106	1,3,5	1, 2, 3	4, 5, 6	7, 8, 9	10,11,12
J107	2,4,6	N, N, N	N, N, N	N, N, N	N, N, N

N=No Connection ; \*= Intercom audio only



**Figure A-1**  
**Early Models PS30/PS60 TO SAP1626 Cable Assembly**



**Figure A-2**  
**Connection of Early Models PS30/PS60 TO SAP1626**

## SECTION B: APPENDIX B

### B.1 General Information and Definitions

Normally the SAP1626 serves the dual purpose of signal and DC power distribution. In general, the SAP1626 connects between the system channels or buses and TW User Stations or strings of TW User Stations (normally to the TW User Stations through the BOP220). The system channels or buses are usually established by TW Power Supplies. Often these buses are also connected to an 800 series balanced intercom system through a System Interconnect (e.g. Models 862, 860).

A "wet" channel contains 32 volts DC and two-way intercom audio.

A "dry" channel contains two-way intercom audio only.

A TW User Station must be connected so that its channel 1 is connected to a "wet" channel; its channel 2 may be connected to either a "wet" or "dry" channel. (Exception: Local powered TW User Stations can be arbitrarily connected to wet or dry channels).

The top row of switches on a SAP1626 connect to the channel one inputs of TW User Stations and should always be dialed to a "wet" channel. (Exception: If all stations are local powered, dial up can be arbitrary).

The bottom row of switches can be arbitrarily dialed to any channel. Dialing to channel zero connects the TW User Station/Stations' channel two connection to ground (dead channel).

The SAP1626 Power Supply Inputs can be connected to one, two, three, or four three channel power supplies to get three, six, nine, or twelve "wet" channels, respectively.

On the SAP1626, Channels 13, 14, and 15 are always dry, and, in general, the top row of switches should not be left on these channels, because an unpowered TW User Station could absorb some of the Intercom or Program Audio that may appear on these channels.

### B.2 Detailed Information

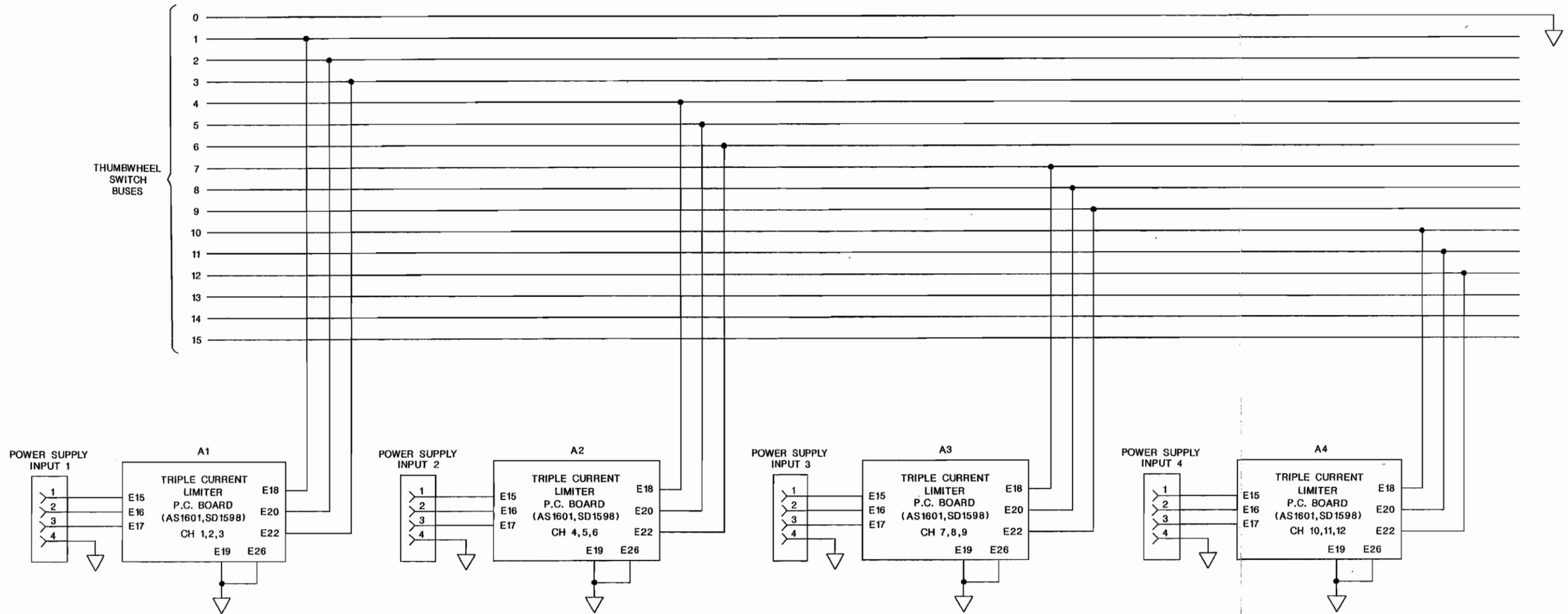
Because the SAP1626 has no current limiters, the PS50 and PS60 power supplies may shorten the life of the thumbwheel switches. Current limiters may be added to the PS50 and PS60 power supplies to lengthen switch life.

Figure B-1 shows the connection of the triple current limiter in the SAP1626.

The triple current limiter schematic diagram, SD1598, is on page 7-17, in the next section.

The triple current limiter assembly diagram, AS1601, is on page 7-19, in the next section.





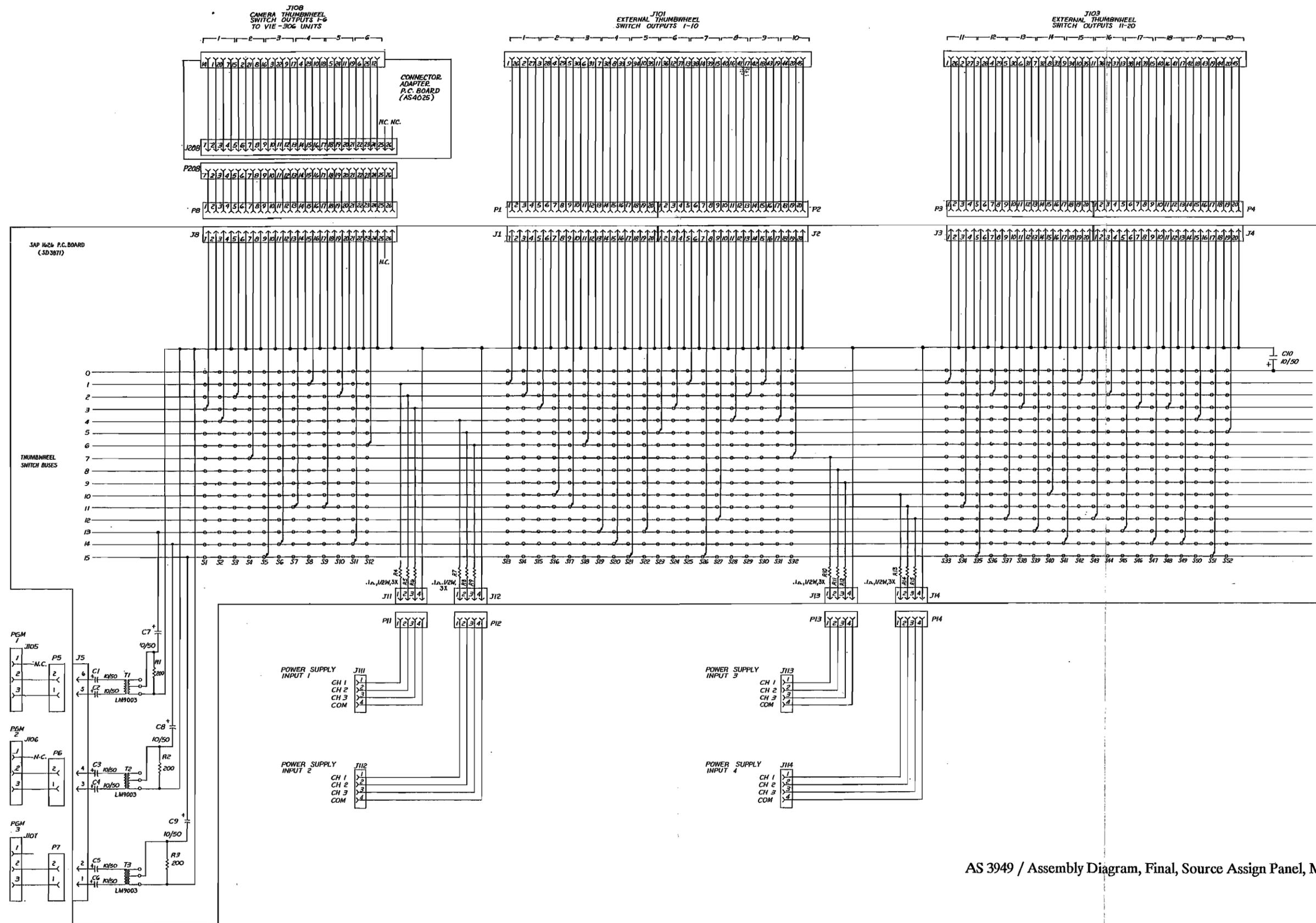
**Figure B-1**  
Triple Current Limiter Installation Into the SAP1626



**SECTION 7: DIAGRAMS**

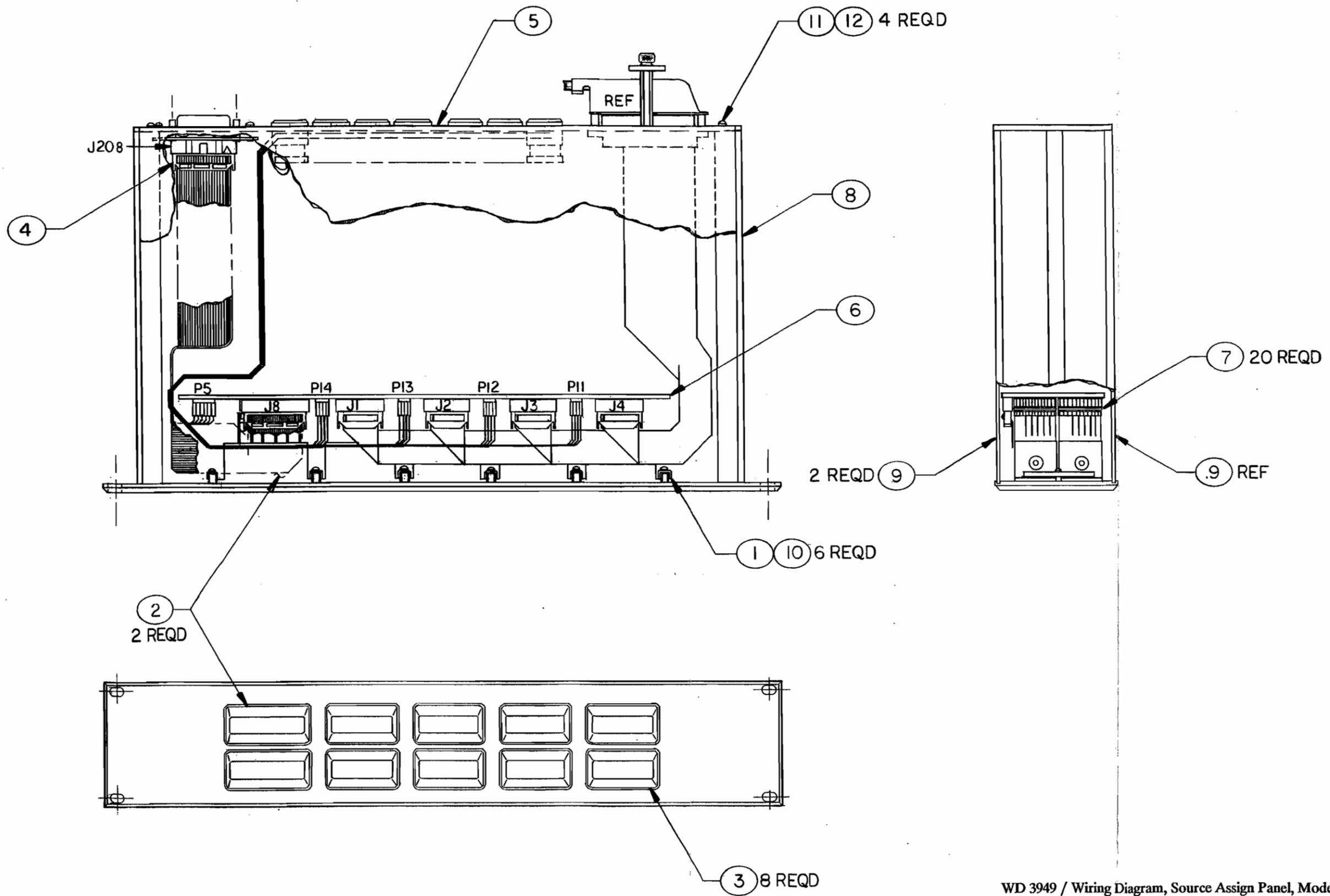
<u>Document Number</u>	<u>Title</u>	<u>Page Number</u>
<b>Final Assembly (Assembly of Assemblies)</b>		
SD 3949	Schematic Diagram, Source Assign Panel, Model SAP1626.....	7-3
AS 3949	Assembly Diagram, Final, Source Assign Panel, Model SAP1626.....	7-5
ID 3949	Installation Diagram, Source Assign Panel, Model SAP1626.....	7-7
WD 3949	Wiring Diagram, Source Assign Panel, Model SAP1626 .....	7-9
<b>Back Panel Assembly</b>		
AS 3866	Assembly Diagram, Back Panel, Source Assign Panel, Model SAP1626.....	7-11
AS 4025	Assembly Diagram, Connector Adapter PCA, Source Assign Panel, Model SAP1626 .....	7-13
<b>Switch Motherboard Assembly</b>		
AS 3871	Assembly Diagram, Switch Motherboard PCA, Source Assign Panel, SAP1626 .....	7-15
SD 3871	Schematic Diagram, Switch Motherboard PCA, Source Assign Panel, SAP1626 .....	7-17
<b>Triple Current Limiter Assembly (Optional)</b>		
SD 1598	Schematic Diagram, Triple Current Limiter, Source Assign Panel .....	7-19
AS 1601	Assembly Diagram, Triple Current Limiter, Source Assign Panel .....	7-21
<b>BOP220</b>		
SD 1773	Schematic Diagram, Break-Out Panel, Model BOP220.....	7-23
ID 1634	Installation Diagram, BOP220 .....	7-25
AS 4689	Assembly Diagram, Final, Break-Out Panel, Model BOP220.....	7-27





AS 3949 / Assembly Diagram, Final, Source Assign Panel, Model SAP1626



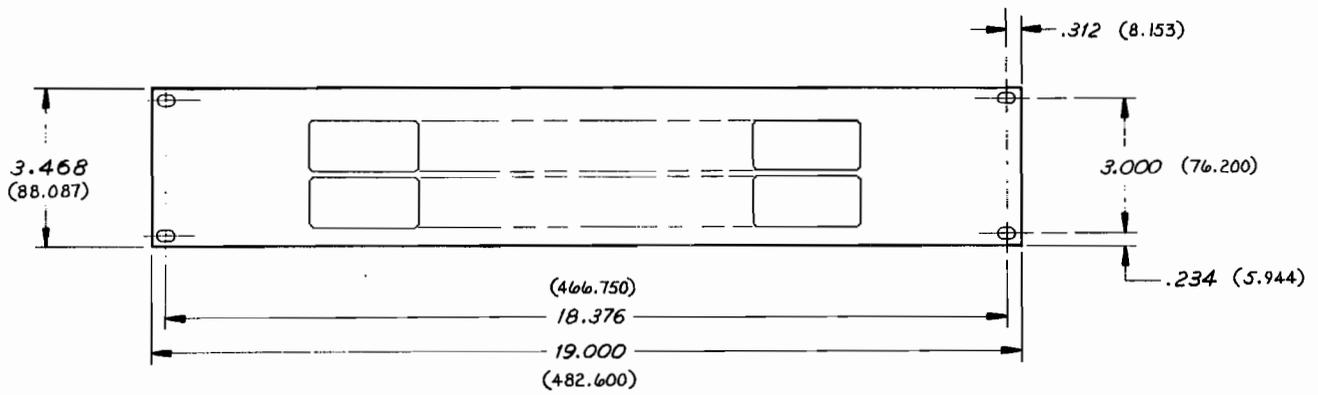
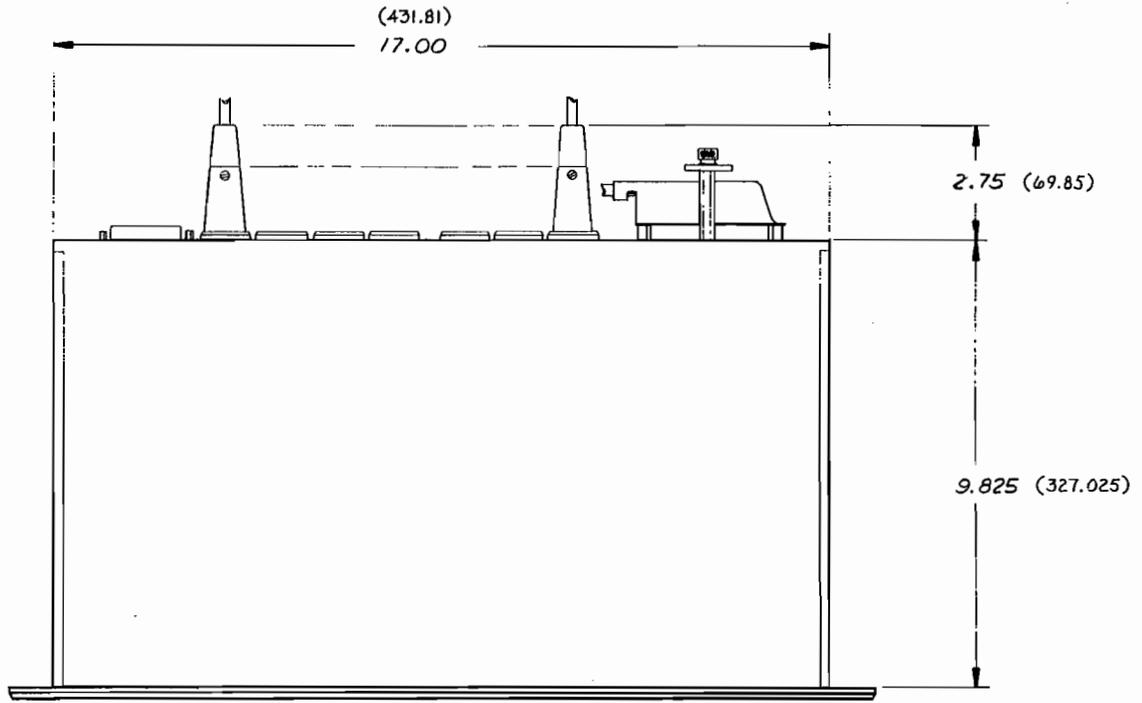


1. SEE WIRING DIAGRAM WD3949 FOR REF.

NOTES:

WD 3949 / Wiring Diagram, Source Assign Panel, Model SAP1626



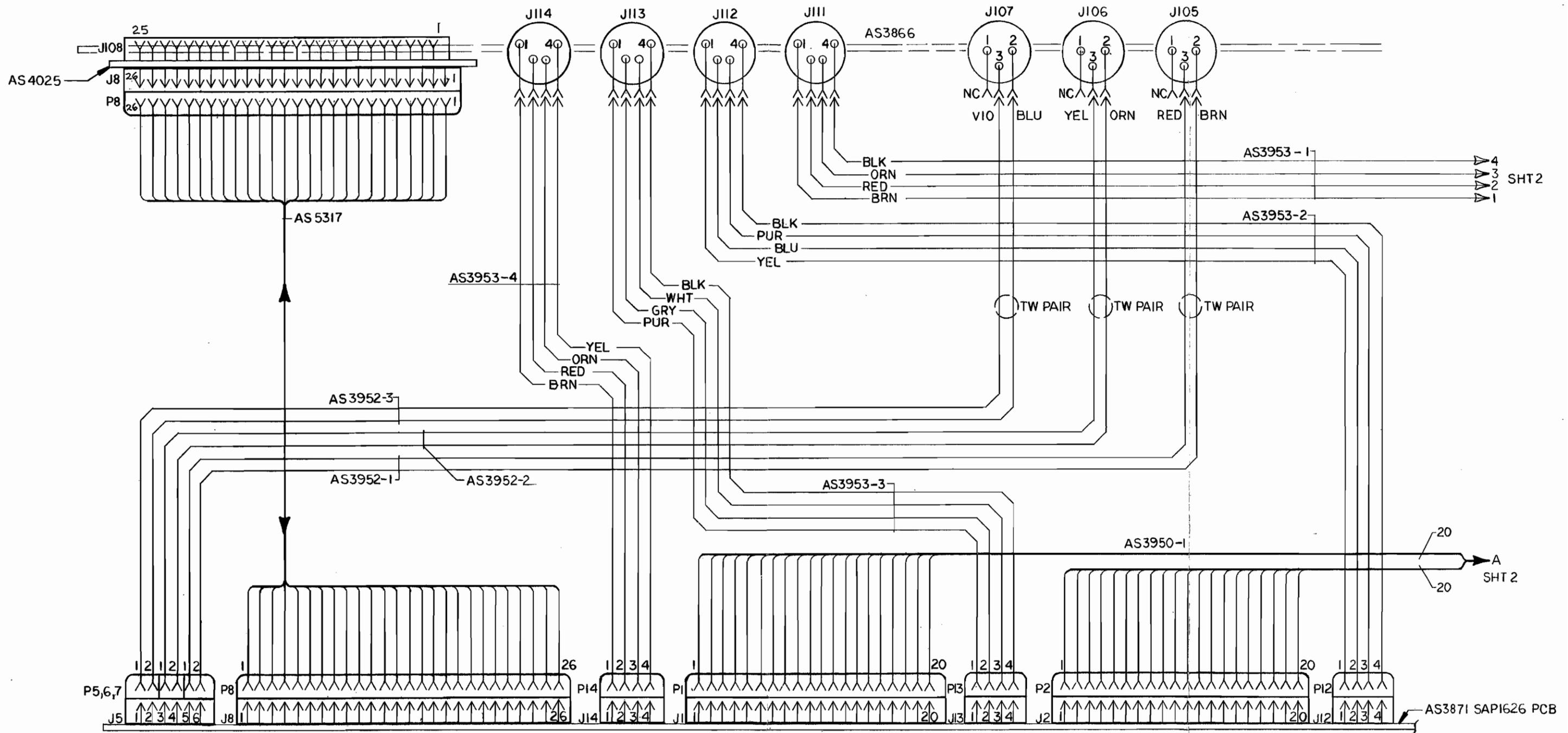


2. WEIGHT : 10.0 lbs (4.5 Kg).  
 1. ALL DIMENSIONS : INCHES (mm).  
 NOTES:

AS 4025 / Assembly Diagram, Connector Adapter PCA, Source Assign Panel, Model SAP1626



# BACK PANEL



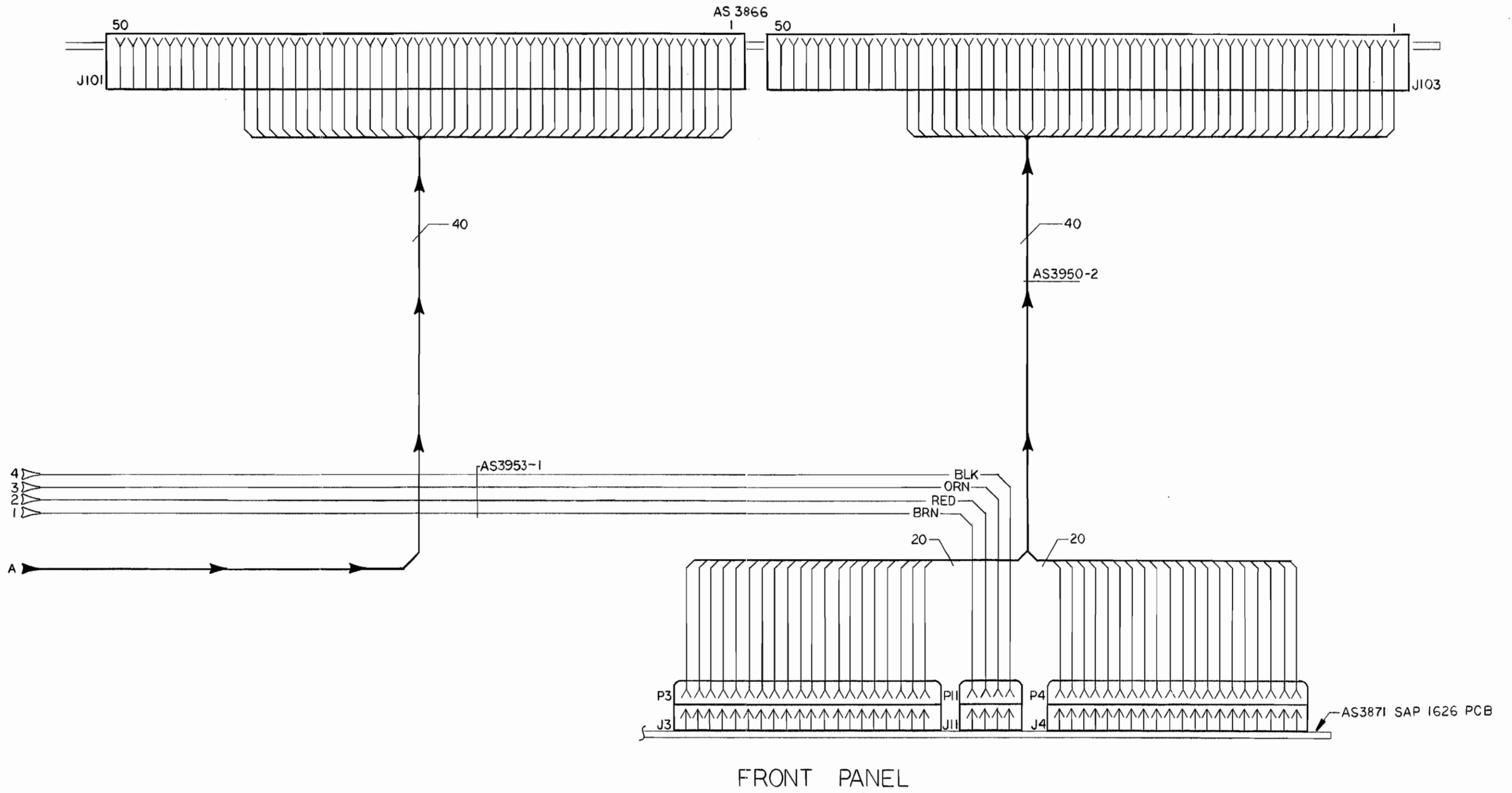
# FRONT PANEL

SD 3871 / Schematic Diagram, Switch Motherboard PCA, Source Assign Panel, SAPI626

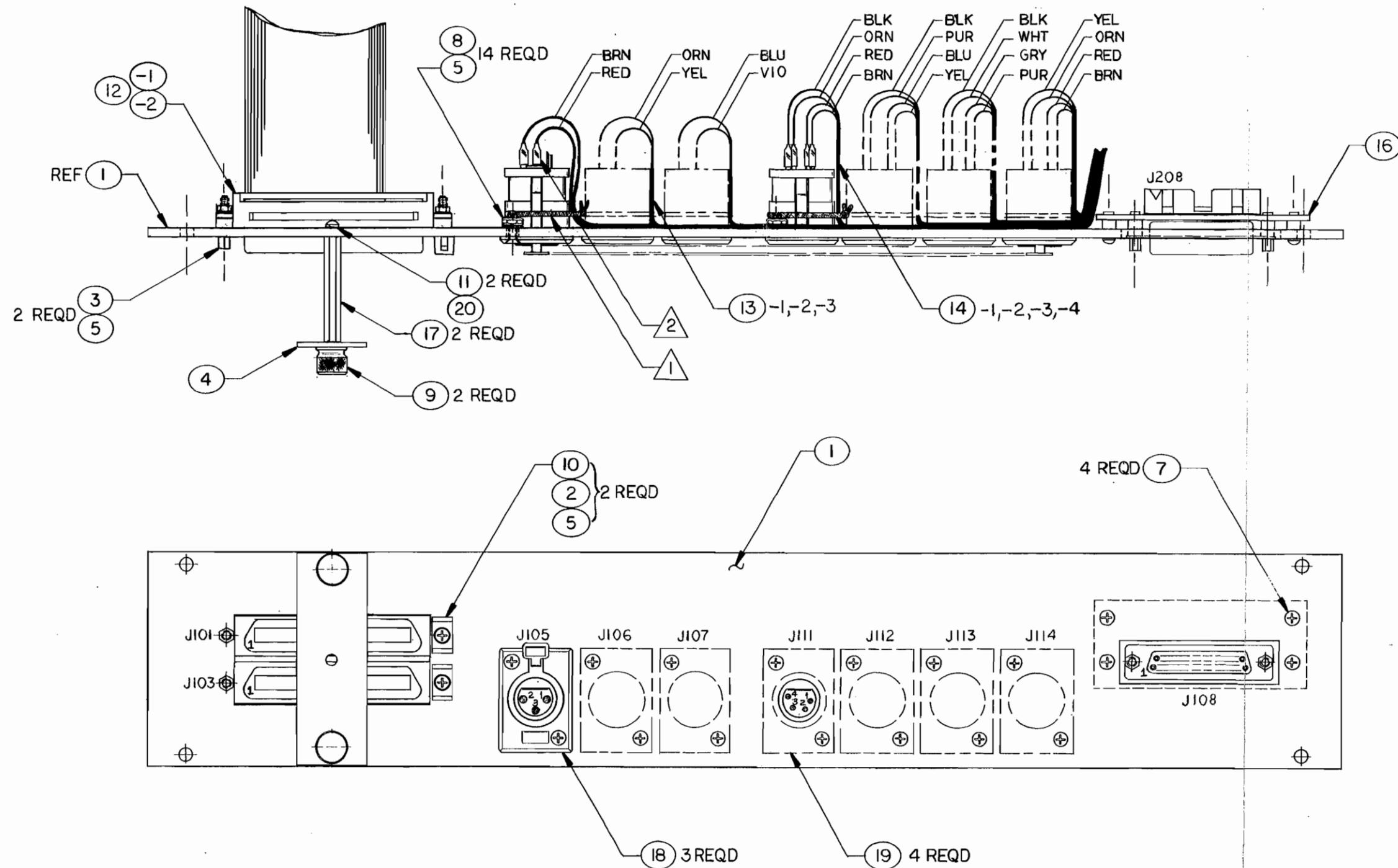
I. SEE FINAL ASSEMBLY, AS3949 FOR REF

NOTES:

# BACK PANEL



# FRONT PANEL



3. SEE WIRING DIAGRAM WD3949 FOR REF.

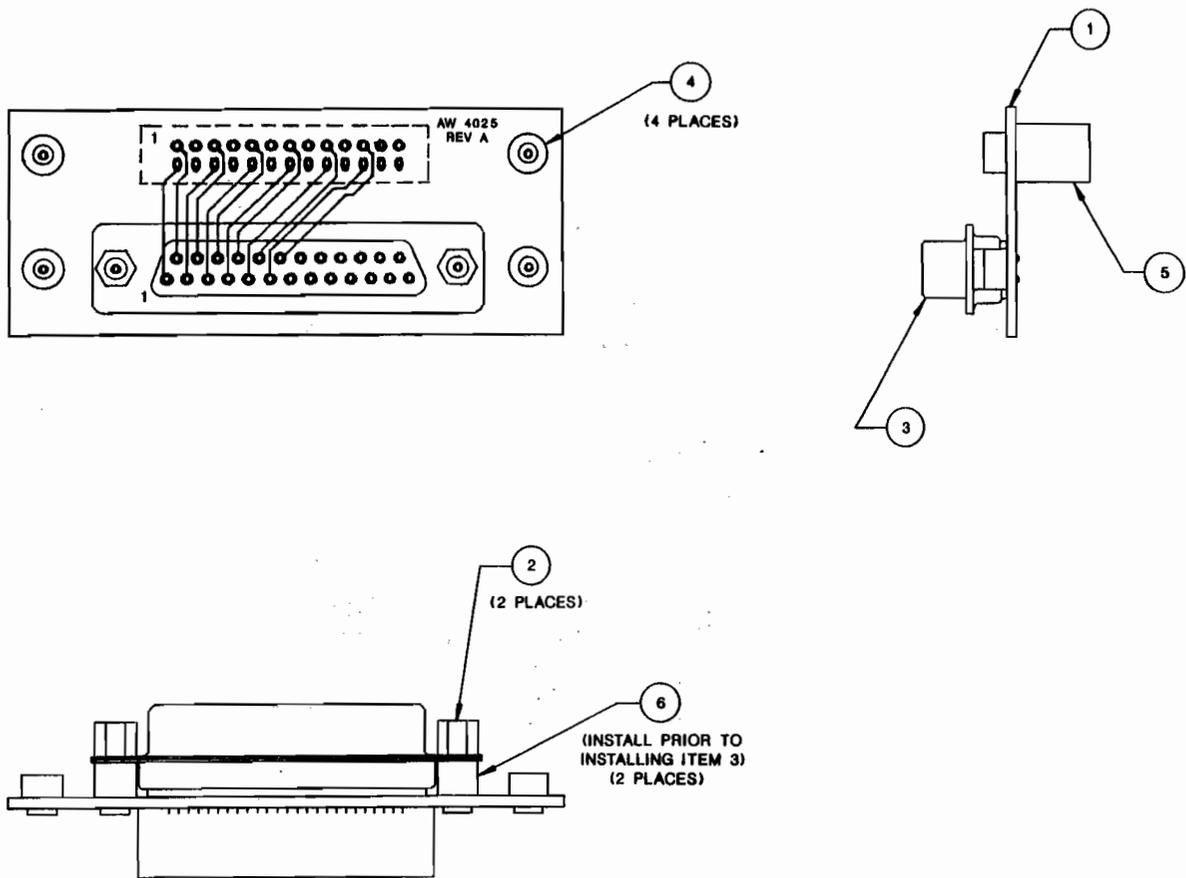
2 APPLY SHRINK TUBING TO ALL TERMINALS, AS SHOWN. ( $\frac{3}{16}$ " DIA X  $\frac{1}{2}$ " L).

1 TIE WIRES FROM CABLE ASSY'S, ITEMS 13 & 14, AROUND CONNS AS SHOWN. ALSO BUNDLE AND TIE AS REQD.

NOTES:

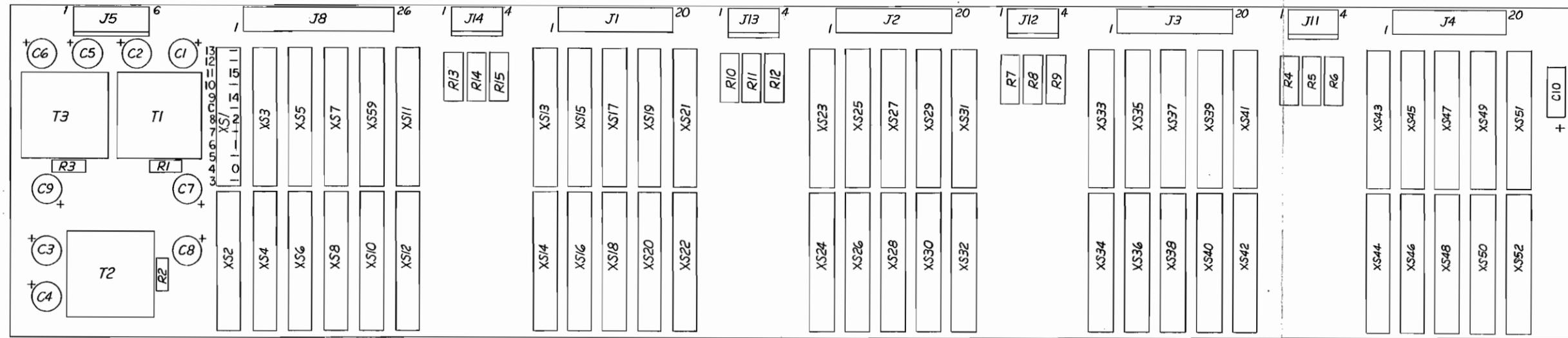
AS 1601 / Assembly Diagram, Triple Current Limiter, Source Assign Panel



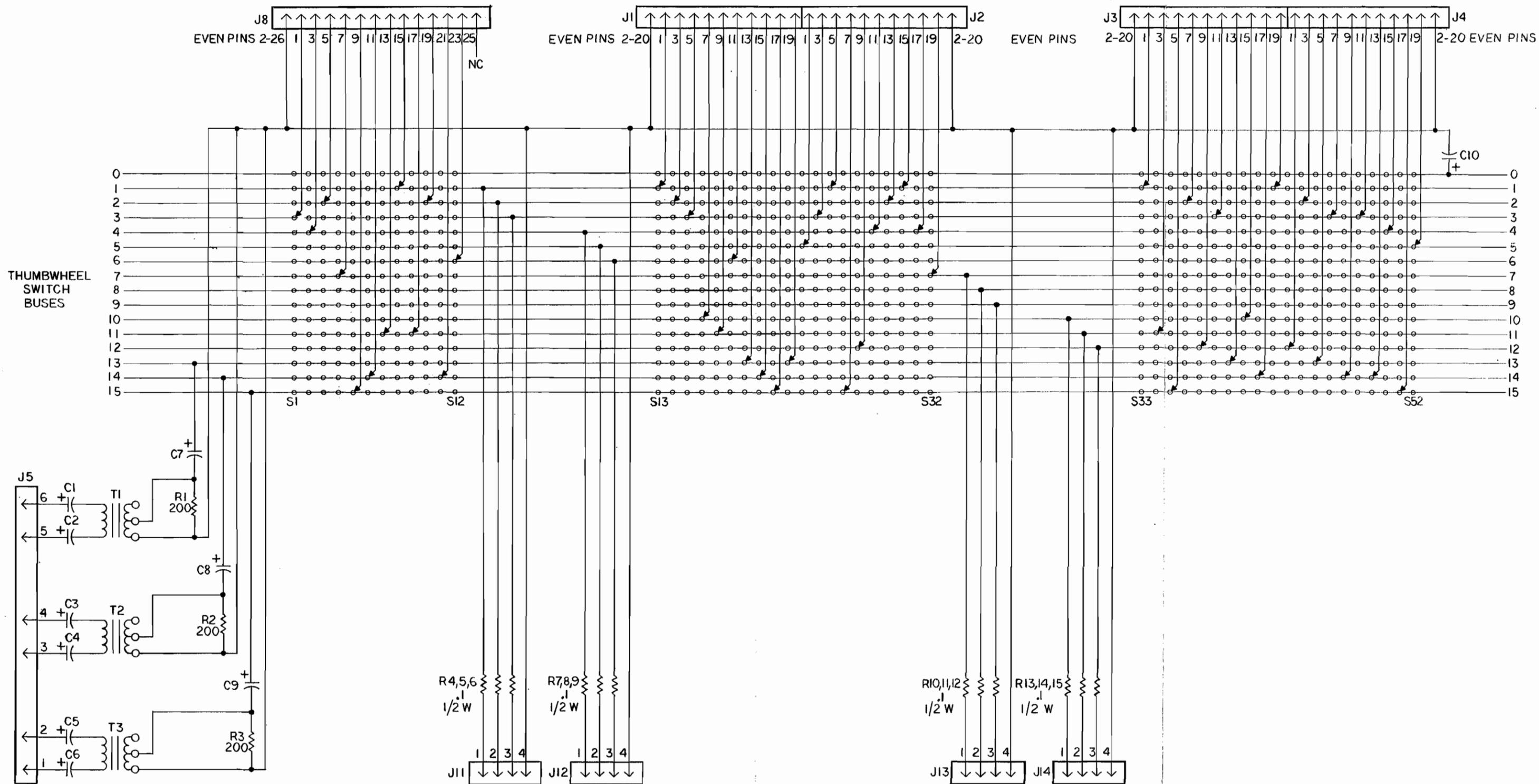


SD 1773 / Model BOP220 Pinout Diagram







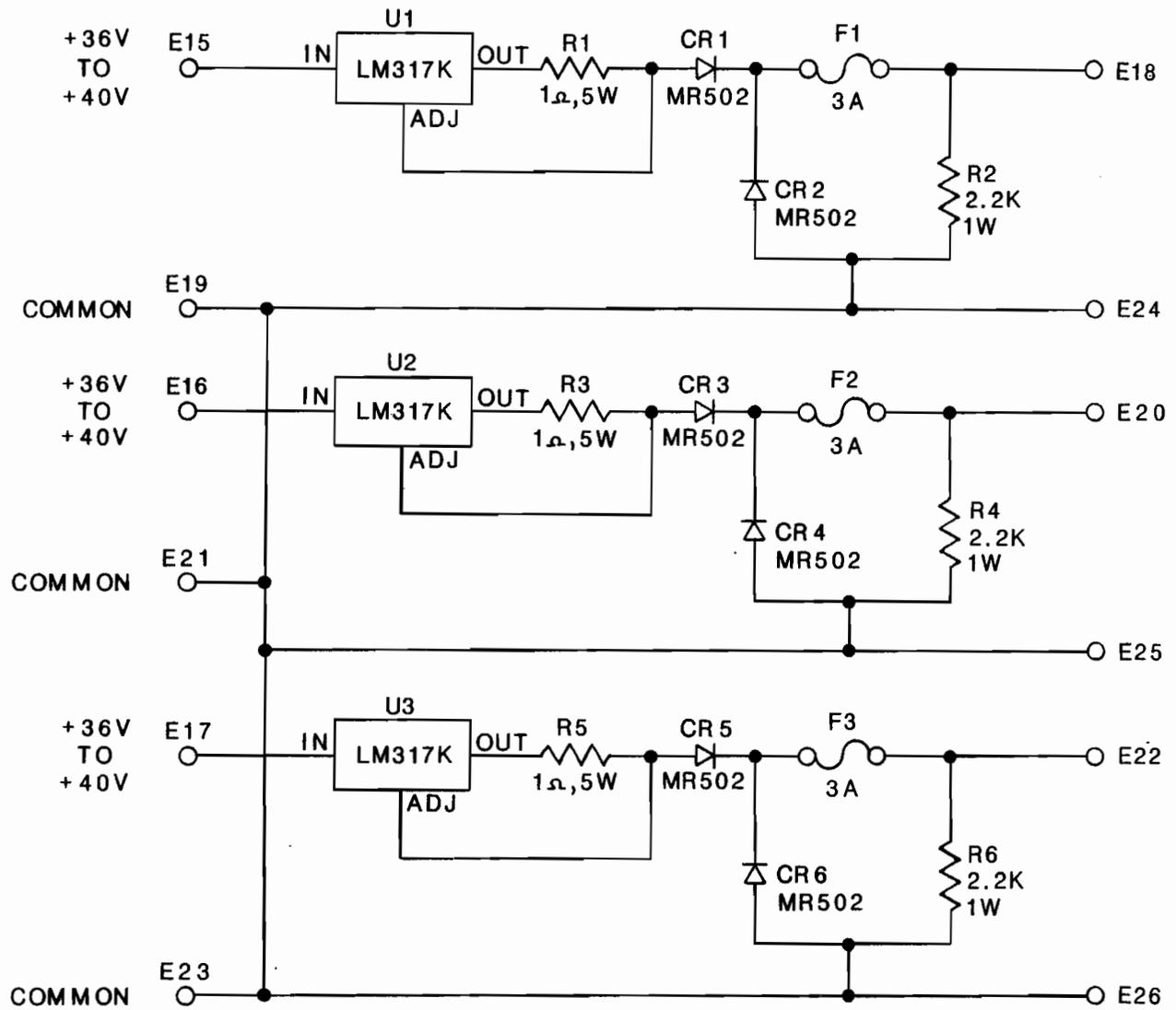


3. ALL TRANSFORMERS ARE 600:600, LM9003.
2. ALL CAPACITOR VALUES ARE 10 $\mu$ f/50 VOLTS.
1. ALL RESISTORS ARE CARBON FILM, 1/4 W  $\pm$  5%. VALUES ARE IN OHMS.

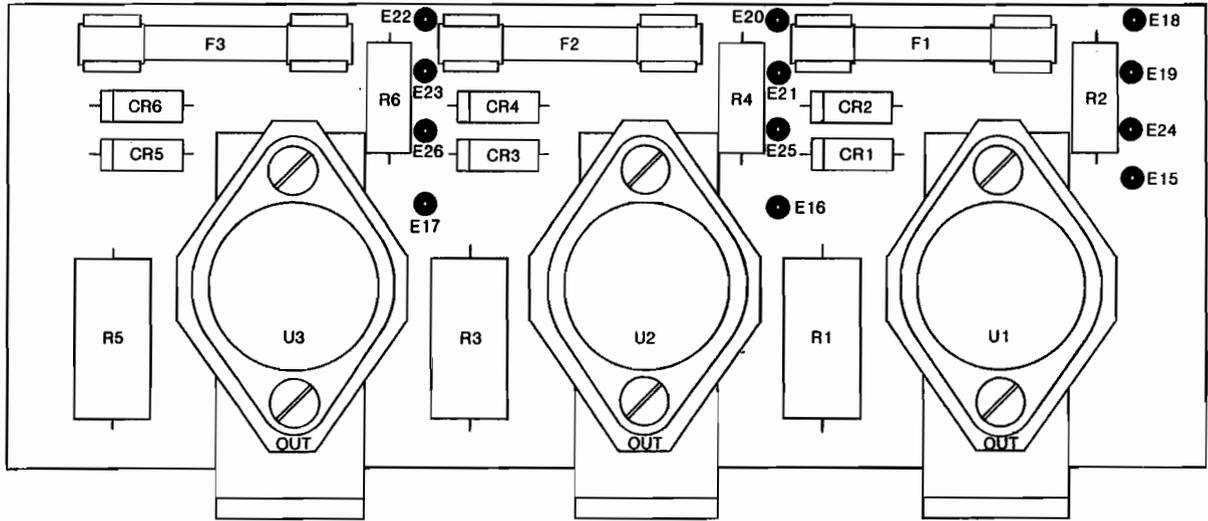
NOTES: UNLESS OTHERWISE SPECIFIED.

AS 4689 / Assembly Diagram, Final, Break-Out Panel, Model BOP220

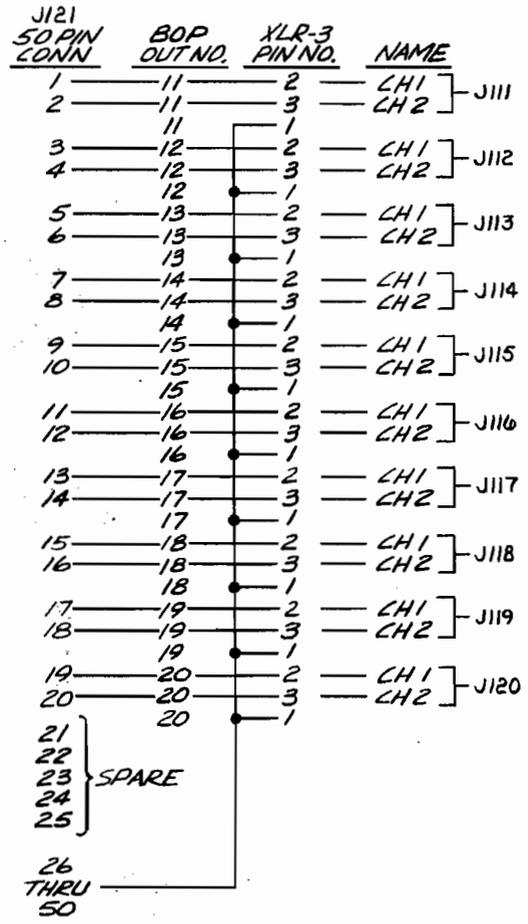
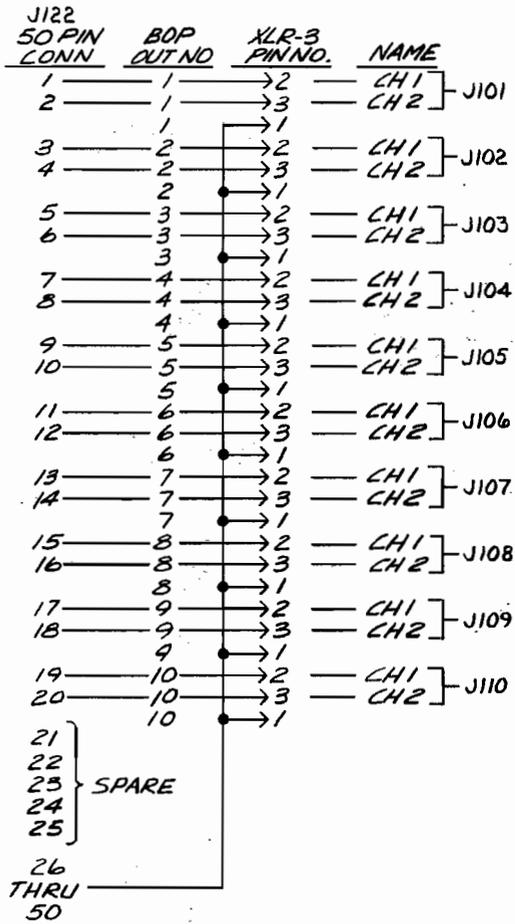




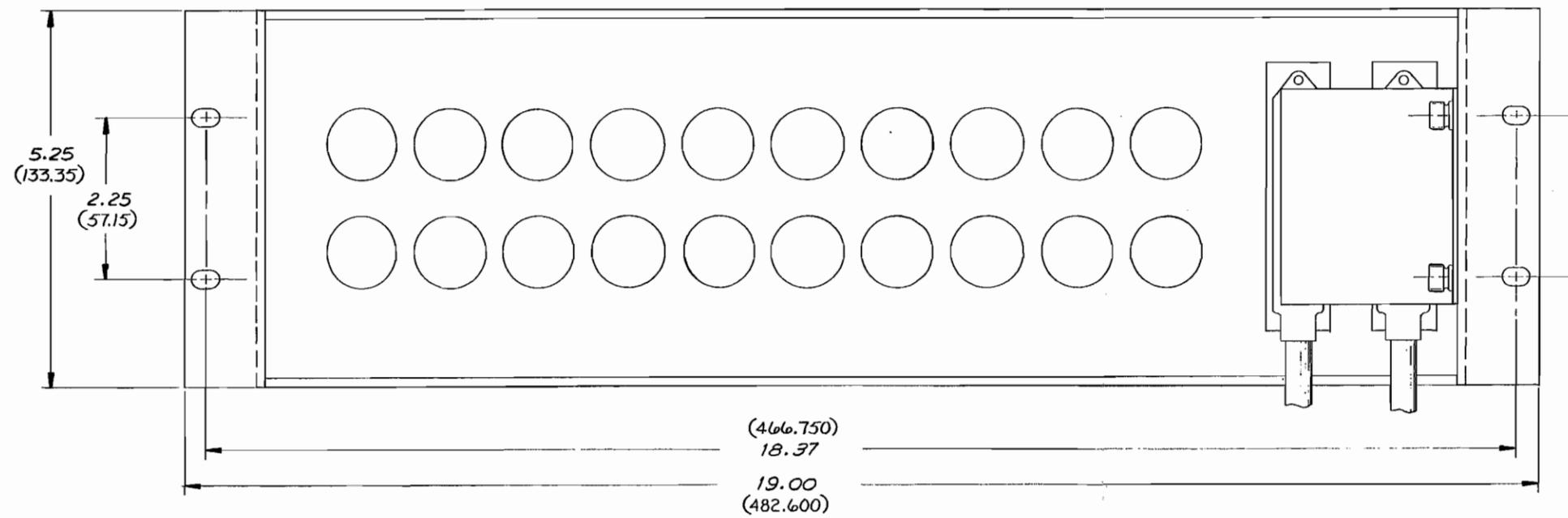
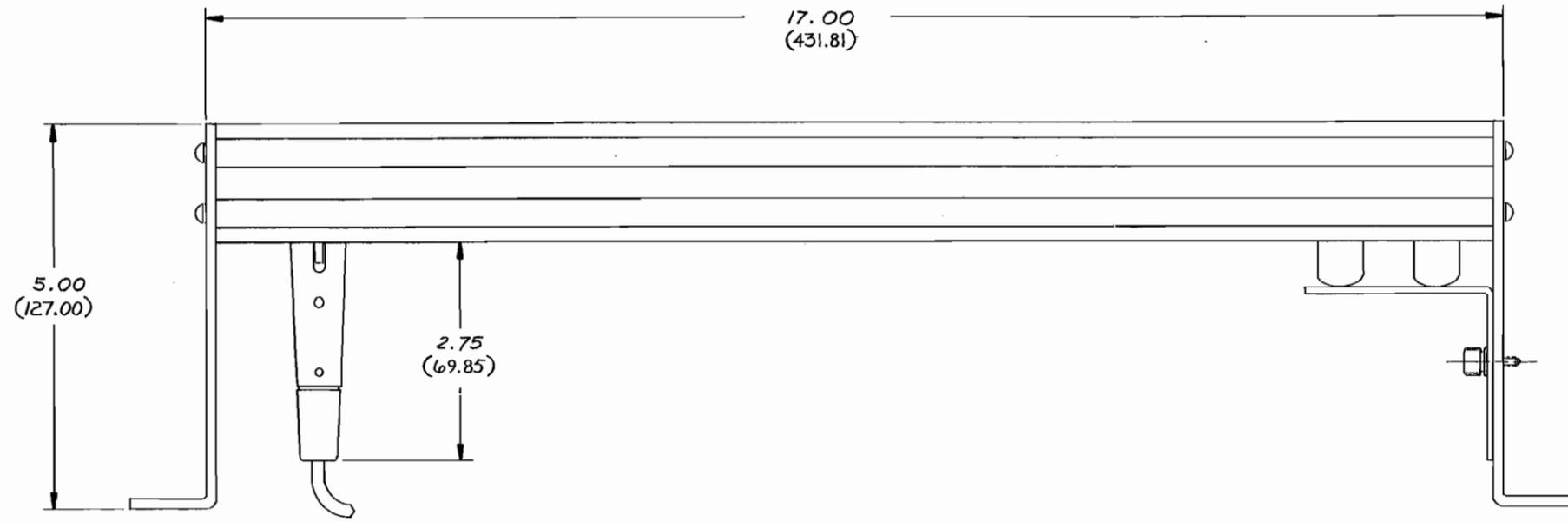




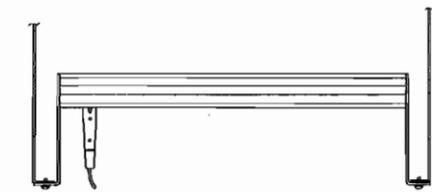








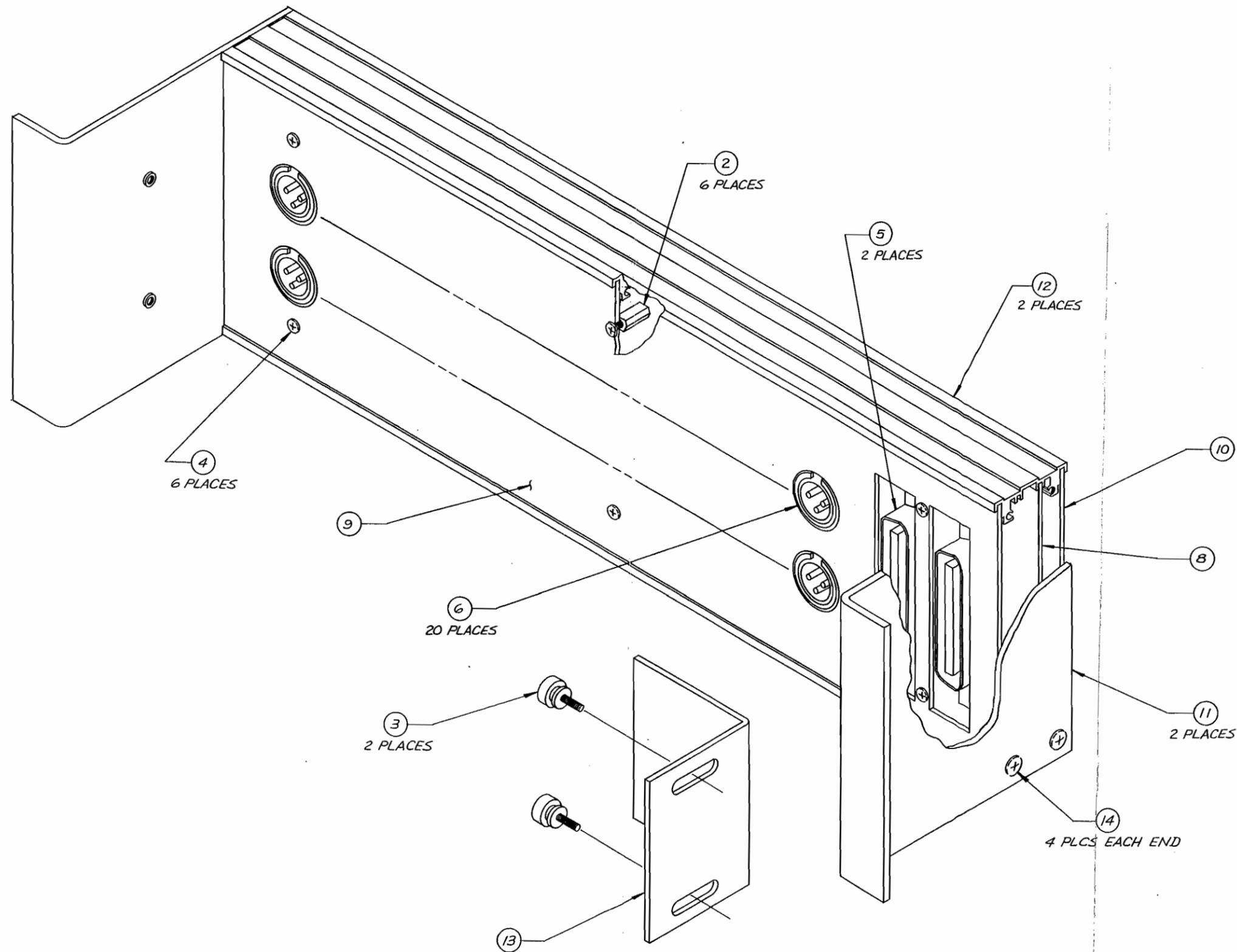
FRONT



RACK MOUNT DETAIL  
SCALE = 1/4

- NOTES:
1. ALL DIMENSIONS : INCHES (mm)
  2. WEIGHT : 3.5 lbs (1.6 Kg)





AS 4689 / Assembly Diagram, Final, Break-Out Panel, Model BOP220

1. FOR PART NO'S AND DESCRIPTIONS SEE  
SEPARATE PARTS LIST 9010-4689-00  
NOTES :





