

their push-pull effect through the High Side bias servo devices, drive the fully complementary output stage. For more information on the LVA's, refer to section 4.2.

U106 and U107 bring in feedback information and protection muting to the Voltage Translator stages. The feedback controls gain from Voltage Translators to output jacks. The protection inputs ( $\pm$ LH) pull off feed to the Voltage Translators in proportion to ODEP limiting, and completely in the event of power-down or a Fault.

#### 4.5.7 Inverting Stages

Overall the amplifier is non-inverting. Four stages within the amplifier, however, do invert the audio signal for a net non-inversion. The individual stages are: the BGS, which inverts the audio; the Variable Gain Stage, which inverts it back, the input side of U106 and U107 which drive the Voltage Translators re-inverts the audio (the Voltage Translators are a common-base configuration for high voltage gain); and finally the LVA's invert the audio for the last time for a net non-inversion through the amplifier.

## 4.6 PROTECTION SYSTEMS

The MA-5000VZ has several protection mechanisms to limit drive or shutdown the amplifier completely in the event of a fault of almost any kind. Mechanisms include: ODEP (covered in depth in section 4.4), current limit (covered in section 4.2.2), over-voltage (on AC mains), DC/LFI, common mode output current, output thermal, transformer thermal, FET thermal, loss of AC mains, compression (covered in section 4.5.4), LOI (covered in section 4.5.5), and slew rate limit (covered in section 4.2.2). After any non-latching fault clears which has shut down the amplifier, the amplifier will automatically power back up via soft-start. Because the fans within the MA-5000VZ cool the amplifier to (under normal conditions) prevent thermal shutdowns and ODEP limiting, the fan control circuit is also covered in this section.

Refer to Fig. 4.6, 4.7, and 4.8. Fig. 4.7 shows soft-start and fan control. Fig. 4.7 shows the soft-start control signals. Fig. 4.8 shows the over-all protection scheme of the MA-5000VZ. Each augments the others, and explode the basic block diagram of the unit (Fig. 4.9).

#### 4.6.1 Soft-start

Soft-start circuitry controls the rate at which power is initially applied to the primary of the toroid transformers for the high-voltage power supplies. For ease of

explanation, assume the amplifier is operating properly and is just being turned on from the front panel power switch.

Before the power switch push-button is depressed, the input to the low voltage supply is open. The high voltage supply is isolated via input relay K700 and triac Q701 (which is in parallel with K700).

Several things occur immediately at turn-on. First the low voltage supply powers up and produces its main unregulated  $\pm 24$ VDC and regulated  $\pm 15$ VDC. It also immediately produces pulsed DC via full-wave rectifier D709/D714.

As this occurs all op-amps in the amplifier receive power, including front-end stages, relay power control U111C, and standby control U111B. The output of U111C powers relay K700 via relay drive transistor Q700. When the output of this op-amp goes high, Q700 turns on and the relay closes. The output of U111C is held low until the amplifier delay times out by comparing a high voltage on its inverting input to an RC network voltage on its non-inverting input. R329 and R330 fix a window at about +10.4VDC. At turn-on C220 (a 10 $\mu$ F cap) is fully discharged. In that first instant it keeps -15V on the non-inverting input of U111C, keeping its output low. As the capacitor charges it produces a ramped rise in voltage as it charges through R327. After about 4 seconds the voltage between R327 and R328 exceeds the window voltage and U111C output goes high, in turn causing relay K700 to close.

**Note:** Any protection signal within the amplifier which is used to shut it down will discharge this capacitor (C120) immediately causing the relay (K700) to open. Upon clearance of such shut-down protection signal, the charge will begin again with the same ramp effect and same delay.

The ramped voltage on the capacitor C120 is also sensed by Standby amplifier U111B. Its unity gain output is non-inverting. It drives the Soft-start op-amp (U701A) inverting input with its ramp to control the rate at which the field develops in the toroid. On the non-inverting input to U701A is the pulsed DC drive from the U701B/Q708 pulse circuit. Jumper JP1 may be set to 50 or 60Hz, but must be set properly to have the correct pulse width for soft-start. Pulse width is determined by C717 and either R777 (50Hz) or R777 in parallel with R806 (60Hz).

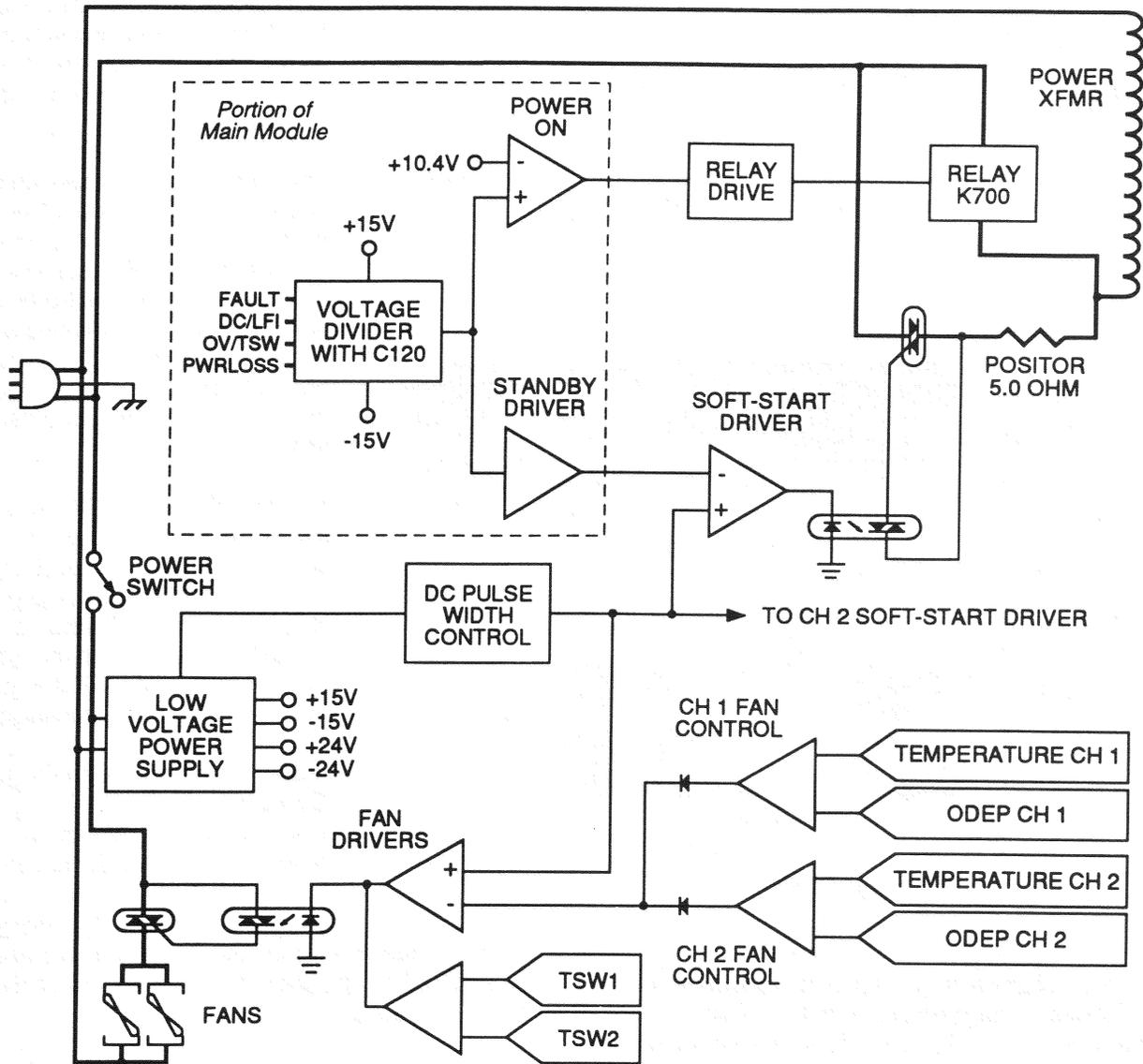


Fig. 4.6 Soft-start and Fan Control

The output of U701A controls the Soft-start. Refer to Fig. 4.6 for a graphic of Soft-start operation.

When the output of U701A goes low, the opto-triac device U700 turns on. While on the input triac Q700 conducts. Positor R702 limits peak input current to the toroid to a maximum of 22A peak (with 120VAC mains). U701A combines the sloped input from the C120 circuitry on the main module with the pulsed DC. As the portion of time which the output of U701A goes low increases, the amount of time where AC mains conduct to the transformer (via Q700 and R702) increases until it remains on. When the U111C PWR circuit times out, the relay closes bypassing the current

limiting soft-start circuit. Soft-start control signals are shown in Fig. 4.7. The upper signal is that produced by C120. At time 0 the amplifier is off. At time 1: the power switch is pressed (on). At time 2: C120 has fully charged, the magnetic fields have built up in the high voltage supply, and the main relay closes. At time 3: a protective action occurs; note that the DC supply remains. At time 4: the condition clears and the restart begins. Time 5 is akin to time 2, and time 6 is another protective action. The lower graph shows Q701 operation (high = on).

Any time a protection mechanism has acted and the condition then clears, this entire process repeats.

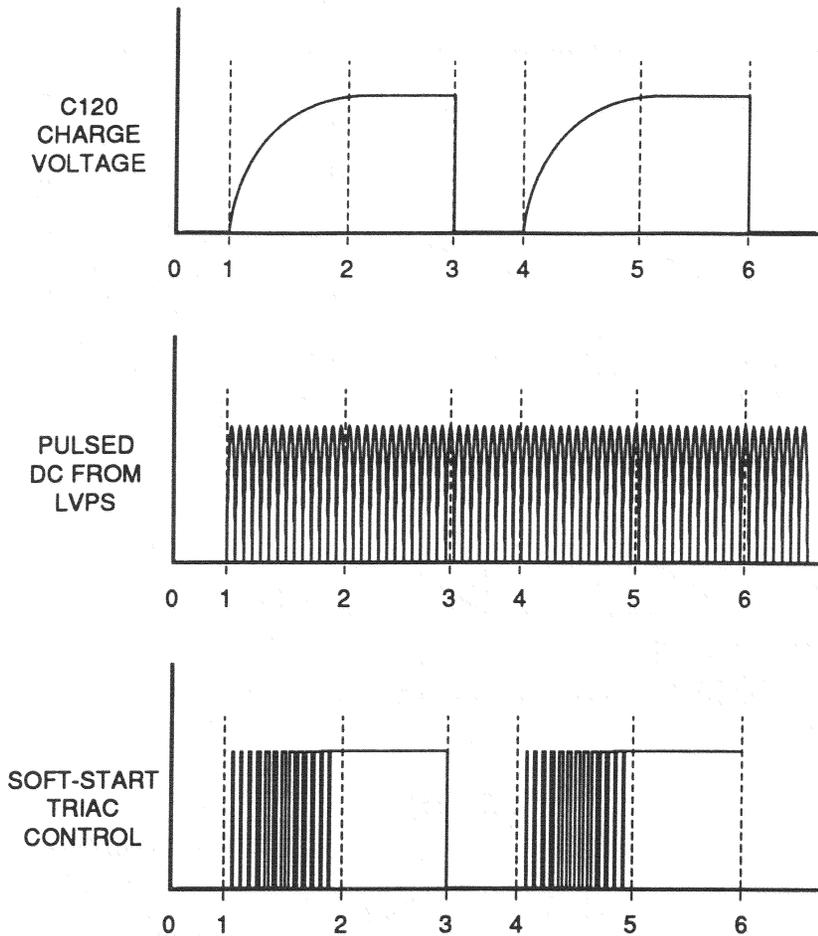


Fig. 4.7 Soft-start Signal

**4.6.2 Over-voltage**

One mode of amplifier protection is a shutdown in the event of over-voltage on the AC mains. This is sensed by the pulsed DC signal produced by the full-wave rectifier in the low voltage supply.

R780 picks off the pulsed DC and U707D will, if the voltage is too high, shift its output to a low. When this happens the over-volt/therm red LED on the control module lights and signal OV1 goes low to the main module.

A low (over-voltage condition) on OV1 causes U211C to shift to a low output. This low, through D1, causes C120 to discharge immediately. This in turn causes the main relay to drop out, soft-start to reset, and the  $\pm$ LL and  $\pm$ LH to clamp audio drive. Over-voltage is a non-latching fault condition.

**4.6.3 DC/LF**

The amplifier senses its own output for DC or very low frequency and will interrupt the amplifier channel in the event of DC or low frequency.

The feedback loop is sensed for voltage and the current sense signal provides current information. An RC network at the input to U109C/D will prevent the LF circuit from activating with normal audio frequency material, and will ensure activation with high level subsonic currents or voltages.

If U109C/D sense a DC (or LF) level, it will output a low which will, through D102, discharge C120 and initiate power supply shutdown. A low will also cause the DC/LF red LED on the main module to light. DC/LF is a non-latching protection mechanism.

**4.6.4 Common Mode Output Current**

Common mode current in the output stage can only be due to an output stage failure, or full power output of RF energy.

Common mode current occurs when a high current level exists in both the positive and the negative halves of the output stage.

U115 is a specialty device. It serves as both an Opto-SCR, and as a conventional SCR. It must have both an optic gate and conventional gate firing at the same time in order to latch. The conventional gate is fired by current sense of the output stage Low-side. The optic gate is fired by the High-side current sense. If high currents exist in both sides simultaneously, the SCR will latch on, and remain on until the unit is turned off.

When the SCR latches, low voltage causes the red LED (labeled Output Module) to light, and places a low on the FAULT signal line. A low on the FAULT line is sensed, via D112, by C120. Once again, a low here discharges C120 and shuts down the amplifier. FAULT is a latching protection mechanism (the only one in the amplifier).



other Macro-Techs, the fans are fully ODEP proportional (operate in proportion to output stage temperature and calibrated ODEP control voltage).

U713B combines channel 1 temperature and ODEP level, U713A for channel 2. D706 and D707 form a diode OR gate. The output of the OR gate drives one input to U707B. The other input to U707B is from the DC pulse width control circuit (U701B). U707B operates in a fashion similar to that of U707A, the Soft-start control amplifier. A graphic example of the fan control waveforms would look a good deal like those in Fig. 4.7, except that the thermal drive would be unique from that of the Soft-start ramp.

The fans will also be forced to operate at full speed in the event a toroid transformer thermal switch trips open. Note that very early units did not include this additional circuit.

#### 4.7 DISPLAY

Amplifier front panel indication includes a total of 7 LED's. These include Enable, ODEP, SPI/IOC, and ILOAD/LIMIT.

The Enable indicator is an amber light which indicates presence of the low voltage supply. It is powered by the unregulated +24VDC supply. It will be on any time the power switch is depressed (unless the low voltage fuse blows).

ODEP indicators provide an on-line indication of amplifier thermal reserve. The LED's are amber (although they may have a reddish appearance) and are normally on. They dim and/or extinguish in the event that the amplifier's thermal reserve is exhausted. ODEP indicators will also extinguish whenever the main supply relays are open (such as a protection action being activated, or during Soft-start time-out).

Green SPI/IOC LED's show signal presence (SPI) and any form of distortion (IOC). They flash dimly with the audio to show signal. In the event of an IOC condition (output waveform differs from input by >0.05%, or input overload) the light will be on brightly. An occasional flash of IOC usually indicates clipping. If the IOC light locks in it usually indicates a protective action, or "hard" ODEP limiting.

ILOAD/LIMIT LED's flash green with the audio when program material is being delivered to a load. Its

function is similar to that of the SPI, except that SPI is voltage driven and does not require a load. ILOAD comes on when the amplifier is loaded, and brightness in proportion to the output current. This is the ILOAD function. In the event of current limiting action, the light will flash to red. This is the LIMIT function.

#### 4.8 MONO MODES

The MA-5000VZ has three main operating modes, namely dual (stereo), bridge mono, and parallel mono.

There are a number of precautions which should be taken when operating the amplifier in either mono mode. The VZ mode switches for each channel must be set the same. Sensitivity, LOI, and Compressor switches for channel 2 make no difference. The input must be to channel 1 only. The input to channel 2 and controls for channel 2 are NOT defeated in either mono mode, therefore no connection to channel 2 may be made in either mono mode. The channel 2 level control should be turned down (counterclockwise) fully in either mono mode.

Monaural amplifier operating modes are covered in detail in the MA-5000VZ Owner's Manual. The discussion below primarily aids in understanding how the mono modes work for testing purposes.

##### 4.8.1 Bridge Mono

Bridge mono is intended for loads of 4 ohms or greater. The feedback loop for channel 1 also drives the input to channel 2 in this mono mode. The input to channel 2 is, however, inverted. This causes the output of channel 2 to be of equal magnitude and opposite polarity (for double voltage output) the output of the amplifier is balanced, and channel hot output is connected to load hot (+), channel 2 hot output is connected to load return (-).

##### 4.8.2 Parallel Mono

Parallel mono is intended for loads less than 4 ohms (as low as 1 ohm) in a monaural amplifier configuration. The channel 1 and 2 amplifier hot outputs must be shorted by an external shorting buss (10 AWG or larger). The amplifier output to the load(s) is taken from either channel's hot output to load hot, and either channel's negative output to the load return (-). The shorting buss must be removed prior to changing from parallel mono to either other mode.

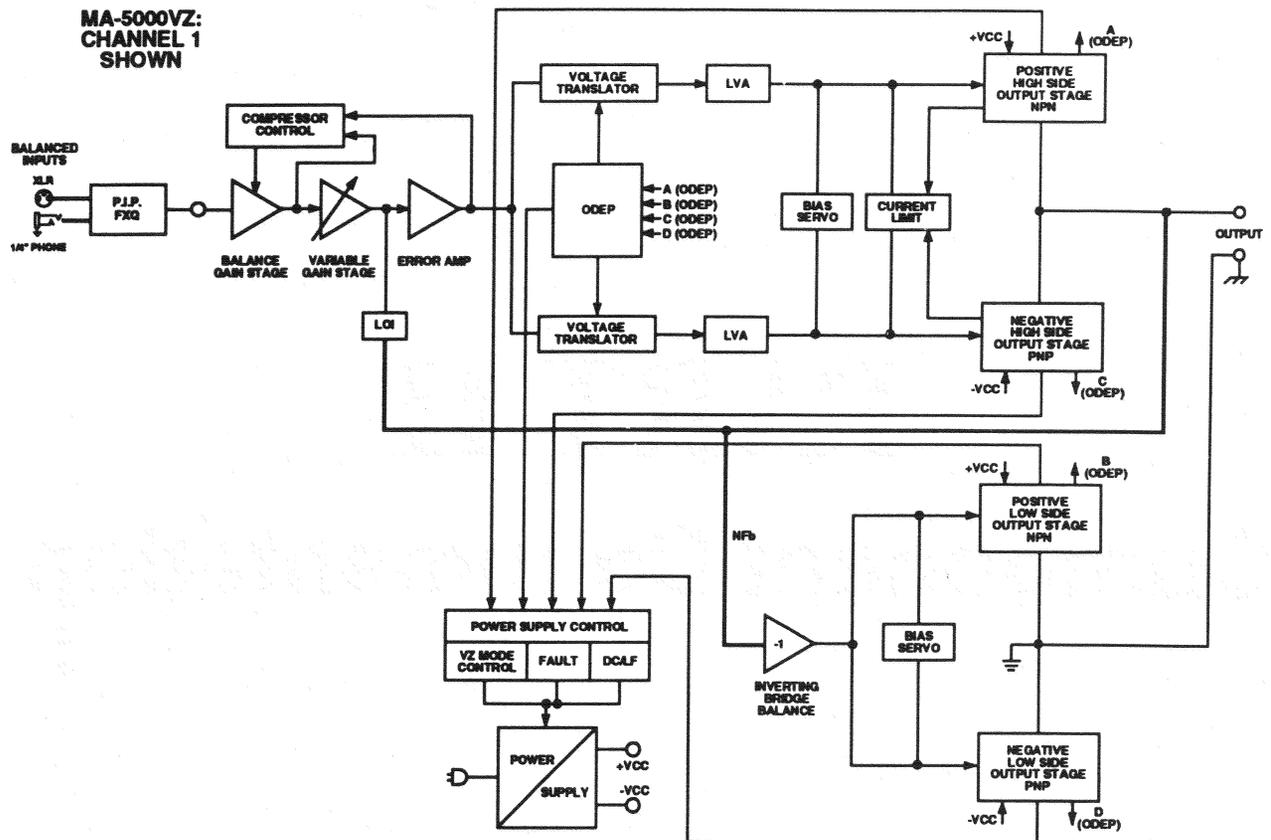


Fig. 4.9 Macro-Tech 5000VZ Amplifier Block Diagram

# **PART II**

## **Component Documentation**

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## 5 Parts

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### 5.1 GENERAL INFORMATION

Chapter 6 includes schematics used for referencing the circuit board components found in chapter 8. Chapter 7 contains exploded view drawings and artwork with associated parts listings.

Most mechanical and structural items are illustrated and indexed in the exploded view drawings. Where electronic parts are shown in these drawings the schematic designations are also given.

Electronic parts located on printed circuit boards are illustrated by schematic symbols on the trace side and by component shape symbols on the component side. Where applicable, quantities of parts are also given.

### 5.2 STANDARD AND SPECIAL PARTS

Many smaller electrical and electronic parts used in the Macro Tech amplifiers are stocked by and available from electronic supply houses. However, some electronic parts that appear to be standard are actually special. A part ordered from Crown will assure an acceptable replacement. Structural items such as covers and panels are available from Crown only.

### 5.3 ORDERING PARTS

When ordering parts, be sure to give the amplifier model and serial number and include a description and Crown Part Number (CPN) from the parts listing. Price quotes are available on request.

### 5.4 SHIPMENT

Shipment will be normally made by UPS or best other method unless you specify otherwise. Shipments are made to and from Elkhart, In, only. Established accounts with Crown will receive shipment freight prepaid and will be billed. All others will receive shipment on a C.O.D. or pre-payment (check or credit card) basis.

### 5.5 TERMS

Normal terms are pre-paid. Net-30 days applies to only those firms having pre-established accounts with Crown. If pre-paying, the order must be packed and weighed before a total bill can be established, after which an amount due will be issued and shipment made upon receipt of pre-payment. New parts returned for credit are subject to a 10% re-stocking fee, authorization from the Crown Parts Department must be obtained before returning parts for credit.

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Call the Crown Parts  
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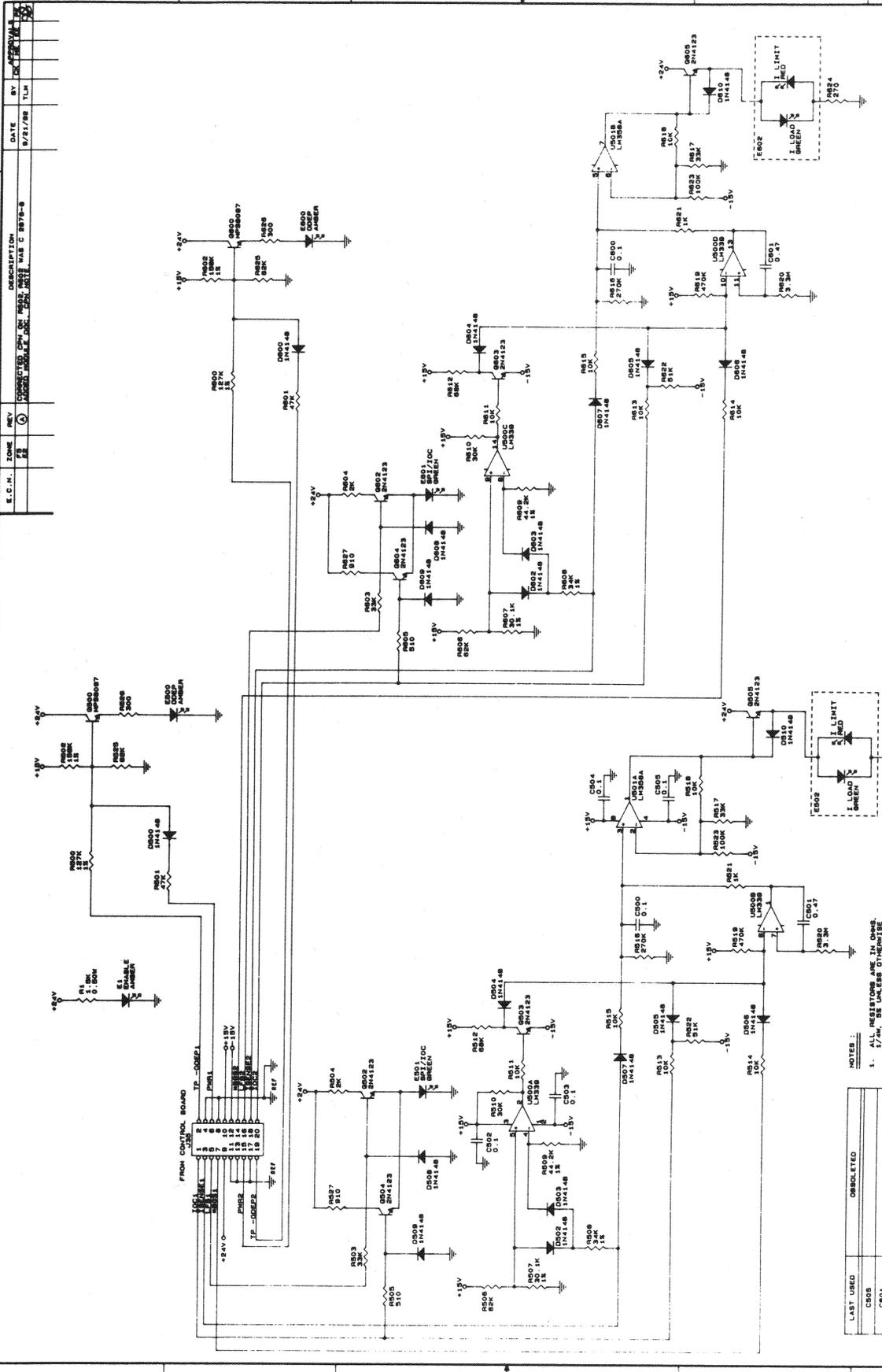
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## 6 Schematics

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- J 0489-5 Main Module Rev B
- J 0488-7 Output Modules Rev C
- J 0491-1 Display Module Rev A
- J 0490-3 Control Module
- J 0490-3 Control Module Rev C
- J 0487-9 Terminator (Current Sense Module)
- J 0492-9 P.I.P.-FXQ

**Note:** Interconnections are mapped on the individual schematics.



**CROWN INTERNATIONAL, INC.**  
 1718 WEST WISCONSINA ROAD  
 ELKHART, IN. 46517  
 PHONE (219) 294-8000

**SCHEMATIC: MA-5000VZ DISPLAY**

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REV.	0

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- NOTES:**
1. ALL RESISTORS ARE IN OHMS UNLESS OTHERWISE SPECIFIED.
  2. ALL CAPACITORS ARE IN MICROFARADS UNLESS OTHERWISE SPECIFIED.
  3. (H) DENOTES A NOT STATEMENT.
  4. PCB C.P.N. D7848-7 (REV. A)
  5. MODULE DOC. C.P.N. 04282-2 (REV. B)

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## 7 EXPLODED VIEW DRAWINGS

The **Exploded Views** section of this service manual is the compilation of drawings of the chassis parts and components found within the Macro-Tech 5000VZ amplifier. For schematic drawings see section 6 and for circuit board layouts along with parts lists see **Modules**, section 8.

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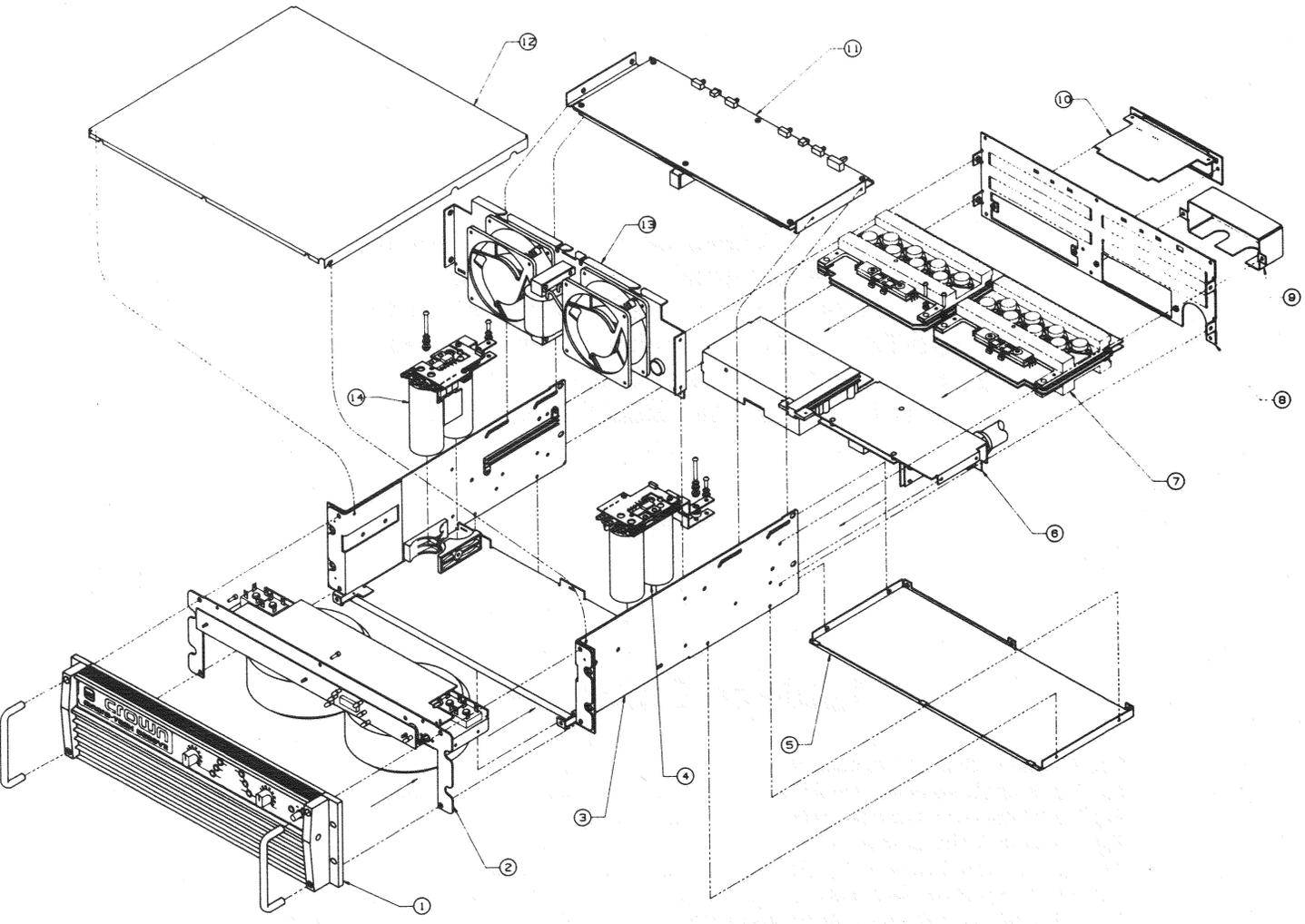


Fig. 7.1 Main Chassis Exploded View

## MAIN CHASSIS ASSEMBLY

ITEM#	QTY	PART #	DESCRIPTION	NOTES
1	1	---	Front Panel Assembly	See Page 4
2	1	---	Transformer Assembly	See Page 11
3	1	M21193J3	Chassis	
4	1	---	Ch 1 Capacitor Assembly	See Page 13
5	1	F12174J2	Bottom Cover	
6	1	---	Terminator Assembly	See Page 17
7	1	---	Output Assembly	See Page 21
8	1	---	Back Panel	See Page 17
9	1	F12302J9	Output Cover	
10	1	M45059-9	P.I.P.-FXQ	
11	1	---	Main Board Tray Assembly	See Page 20
12	1	F12176J7	Top Cover	
13	1	---	Chassis Divider Assembly	See Page 10
14	1	---	Ch 2 Capacitor Assembly	See Page 15

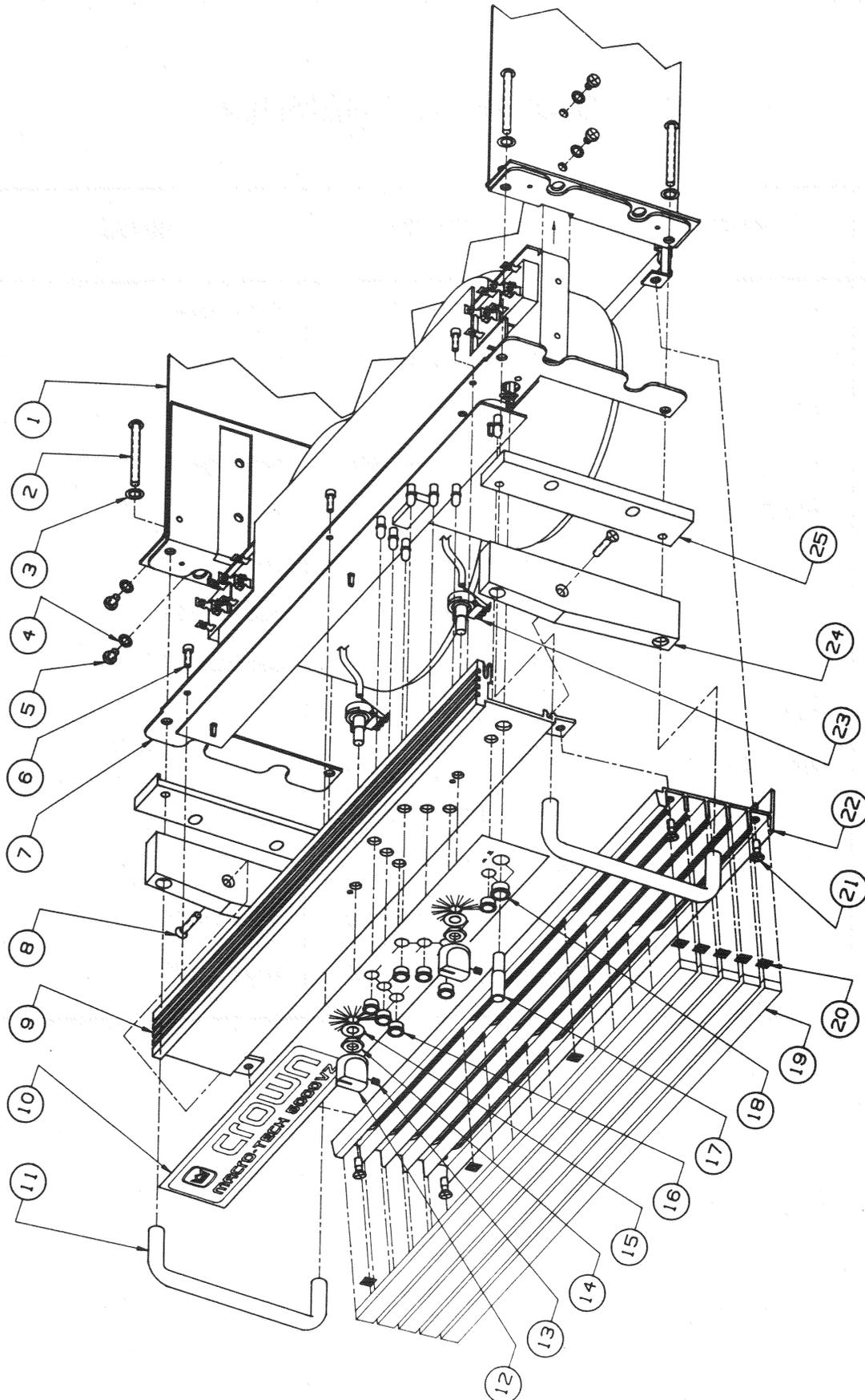


Fig. 7.2 Front Chassis Assembly

## FRONT CHASSIS ASSEMBLY

ITEM#	QTY	PART #	DESCRIPTION	NOTES
1	1	M21193J3	Chassis	
2	4	A10089-11032	Screw	
3	4	A10094-8	Washer	
4	4	A10094-5	Washer	
5	4	C 8874-7	Screw	
6	3	A10094-5	Screw	
7	1	---	Transformer Bracket	See Transformer Assembly, Page 11
8	2	A10091-10812	Screw	
9	1	D 8066J0	Front Panel	Silver color
10	1	F12163J5	MA-5000VZ Lexan Overlay	Crown
	1	F12164J3	MA-5000VZ Lexan Overlay	Amcron
11	2	F12159J3	Handle	
12	2	D 6265-9	Knob	
13	2	C 6005-0	Lockscrew	
14	2	---	Nut	Part of item 23
15	2	---	Washer	Part of item 23
16	7	D 7937-2	LED Collar	
17	1	D 7872-1	Pushbutton	
18	1	D 4108-3	Pushbutton Collar	
19	5	D 7696-4	Foam	
20	20	B 5796-6	Velcro .5" x .25"	
21	4	C 7965-4	Screw	
22	1	F12161J9	Grille Extrusion	
23	2	C 7280-8	5K ohm Level Pots	Includes hardware items 14 and 15
24	2	F12160J1	Panel Cap	
25	2	F12296J3	End Cap	

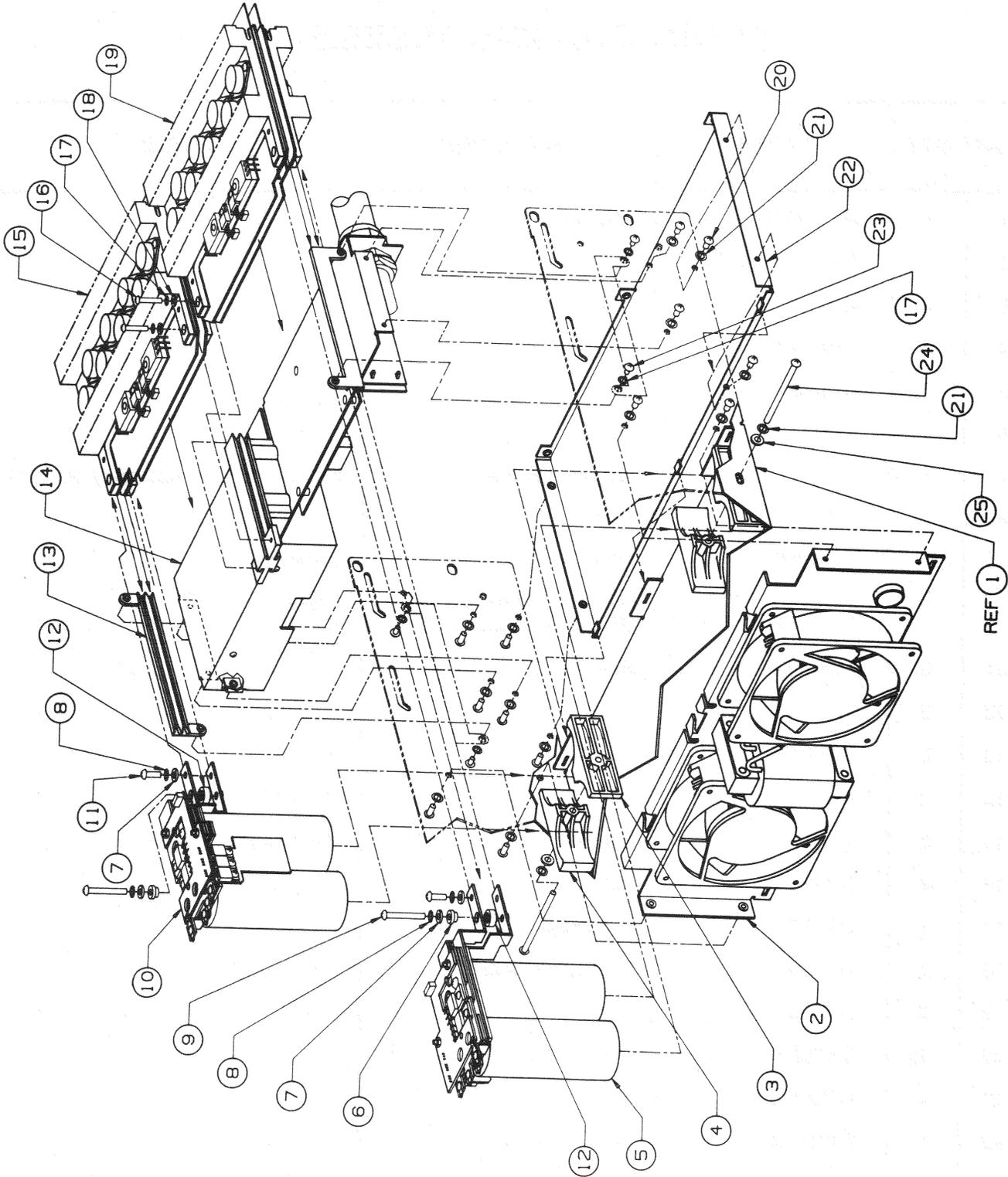


Fig. 7.3 Middle Chassis Assembly

## MIDDLE CHASSIS ASSEMBLY

ITEM#	QTY	PART #	DESCRIPTION	NOTES
1	1	M21193J3	Chassis	
2	1	---	Divider Assembly	See Pg 10
3	2	D 7927-3	Capacitor Holder, Inner	
4	2	D 7928-1	Capacitor Holder, Outer	
5	1	M45110-0	Ch 2 Bi-Level Switch Assby	See Pg 15
6	2	D 7870-5	Valox Washer	
7	6	A10100-10	Flat Washer	
8	6	A10094-6	Lock Washer	
9	2	A10089-70820	Screw	
10	1	M45109-2	Ch 1 Bi-Level Switch Assby	See Pg 13
11	2	A10089-10808	Screw	
12	4	D 7871-3	Valox Spacer	
13	2	D 7818-4	Output Slide Guide	
14	1	---	PIP Terminator Assembly	See Pg 17
15	1	---	Ch 1 Output Assembly	See Pg 21
16	2	A10089-10612	Screw	
17	2	A10094-4	Lock Washer	
18	2	A10100-4	Flat Washer	
19	1	---	Ch 2 Output Assembly	See Pg 21
20	13	C 8874-7	Screw	
21	15	A10094-5	Lock Washer (Black)	
22	15	F12174J2	Bottom Cover	
23	4	A10109-70604	Screw	
24	2	A10089-70844	Screw	
25	2	A10100-12	Flat Washer	

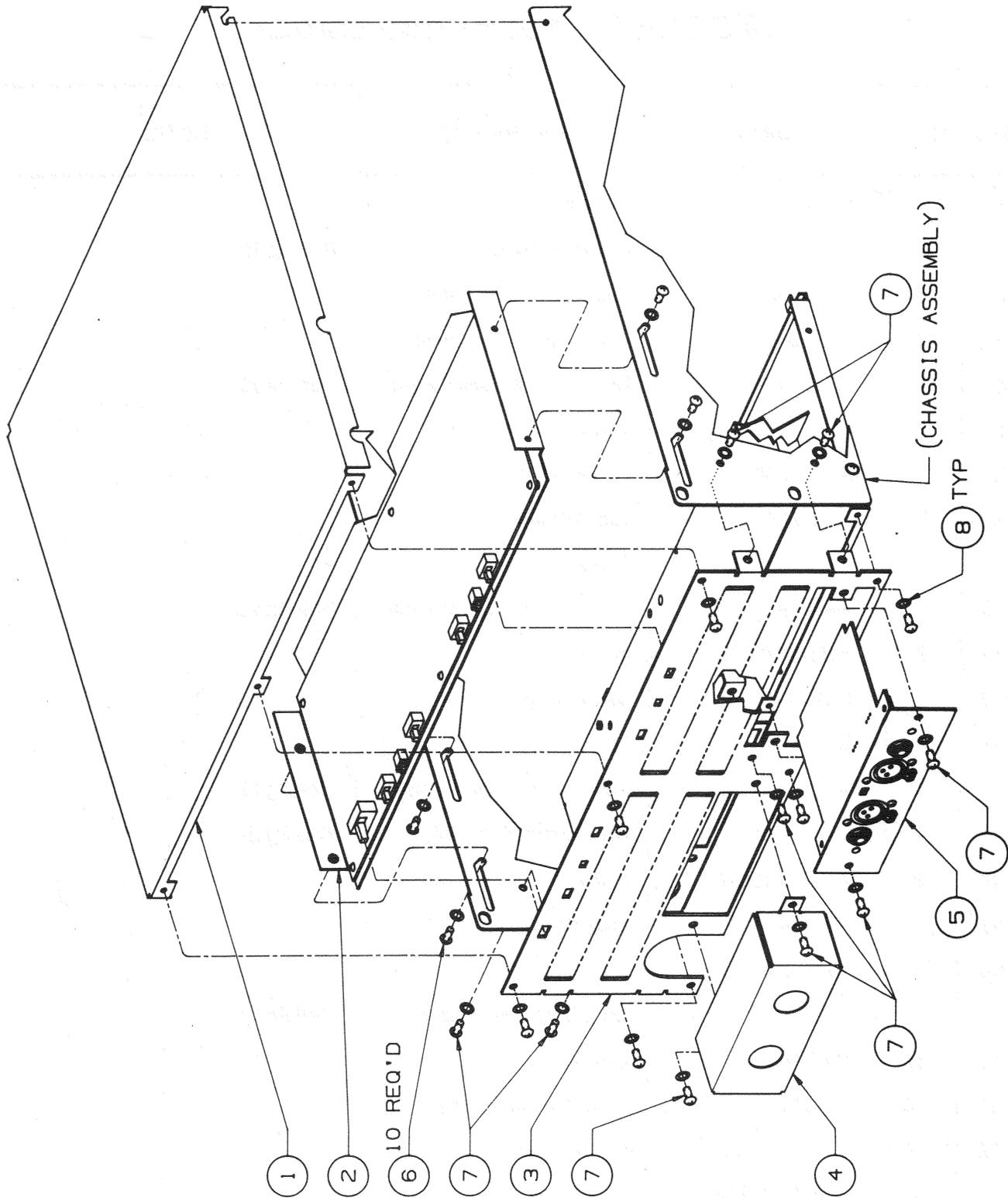


Fig. 7.4 Rear Chassis Assembly

## REAR CHASSIS ASSEMBLY

ITEM#	QTY	PART #	DESCRIPTION	NOTES
1	1	F12176J7	Top Cover	
2	-	---	Main Board Tray Assembly	See Pg 20
3	1	M21192J5	Back Panel	
4	1	F12302J9	Box Shield	Output post protective cover
5	1	M45059-9	P.I.P.-FXQ	
6	4	C 8874-7	Screw	
7	13	A10089-70806	Screw	
8	17	A10094-5	Lock Washer	

## CHASSIS DIVIDER (FAN) ASSEMBLY

ITEM#	QTY	PART #	DESCRIPTION	NOTES
1	1	F12175J9	Divider Plate	
2	2	C 7858-1	Fan	
3	1	D 7883-8	XFMR	Low Voltage Transformer
4	1	C 9069-3	Bushing, Universal 0.875	
5	8	A10110-10808	8-32x.5 Screw	Phillips, pan-head, tri-lobe

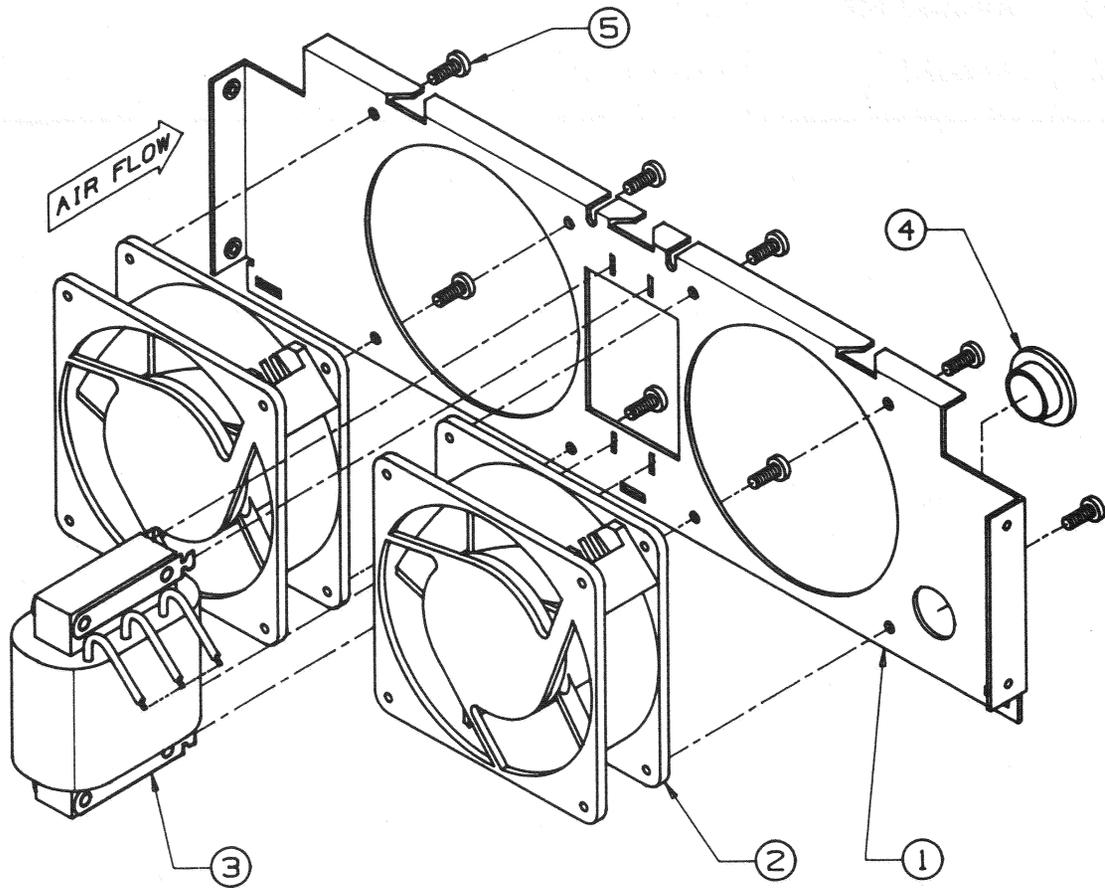


Fig. 7.5 Chassis Divider (Fan) Assembly

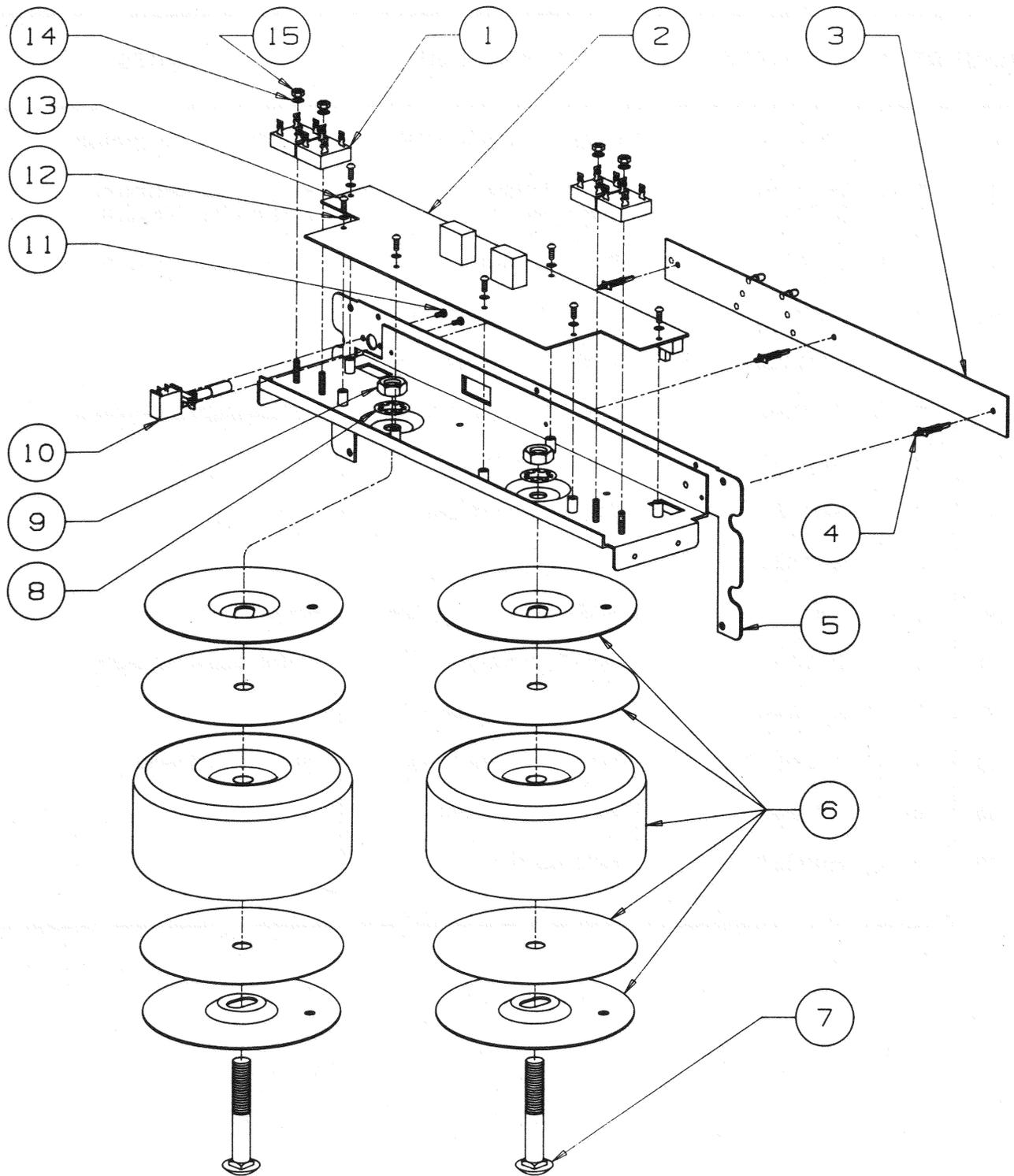


Fig. 7.6 Transformer Assembly

## TRANSFORMER ASSEMBLY

ITEM#	QTY	PART #	DESCRIPTION	NOTES
1	4	C 8962-0	Bridge Rectifier 35A 200V	No Schematic Designations
2	1	Q42930-0	Control Module	See Modules, Section 8.
	1	Q43096-9	Control Module	See Modules, Section 8.
3	1	Q42929-2	Display Module	See Modules, Section 8.
4	3	C 8852-3	0.5" PC Board Support	
5	1	M41063J8	XFMR/Sub-front Bracket	
6	2	D 7775-6	Main Power Toroid XFMR	No Schematic Designations
7	2	C 8919-0	0.5" Steel Bolt	
8	2	A10095-7	0.5" Ext. Lockwasher	
9	2	A10102-21	0.5" Hex Nut	
10	1	C 8810-1	SPST Pushbutton Switch	Power Switch
11	2	D 7261-7	3x.5x7mm Screw	Phillips, pan-head, black
12	7	A10094-4	#6 Int. Star Washer	
13	7	A10086-10608	6-32x.5 Machine Screw	Phillips, round-head
14	4	A10094-6	#8 Int. Star Washer	
15	4	A10102-6	8x32 Hex Nut	

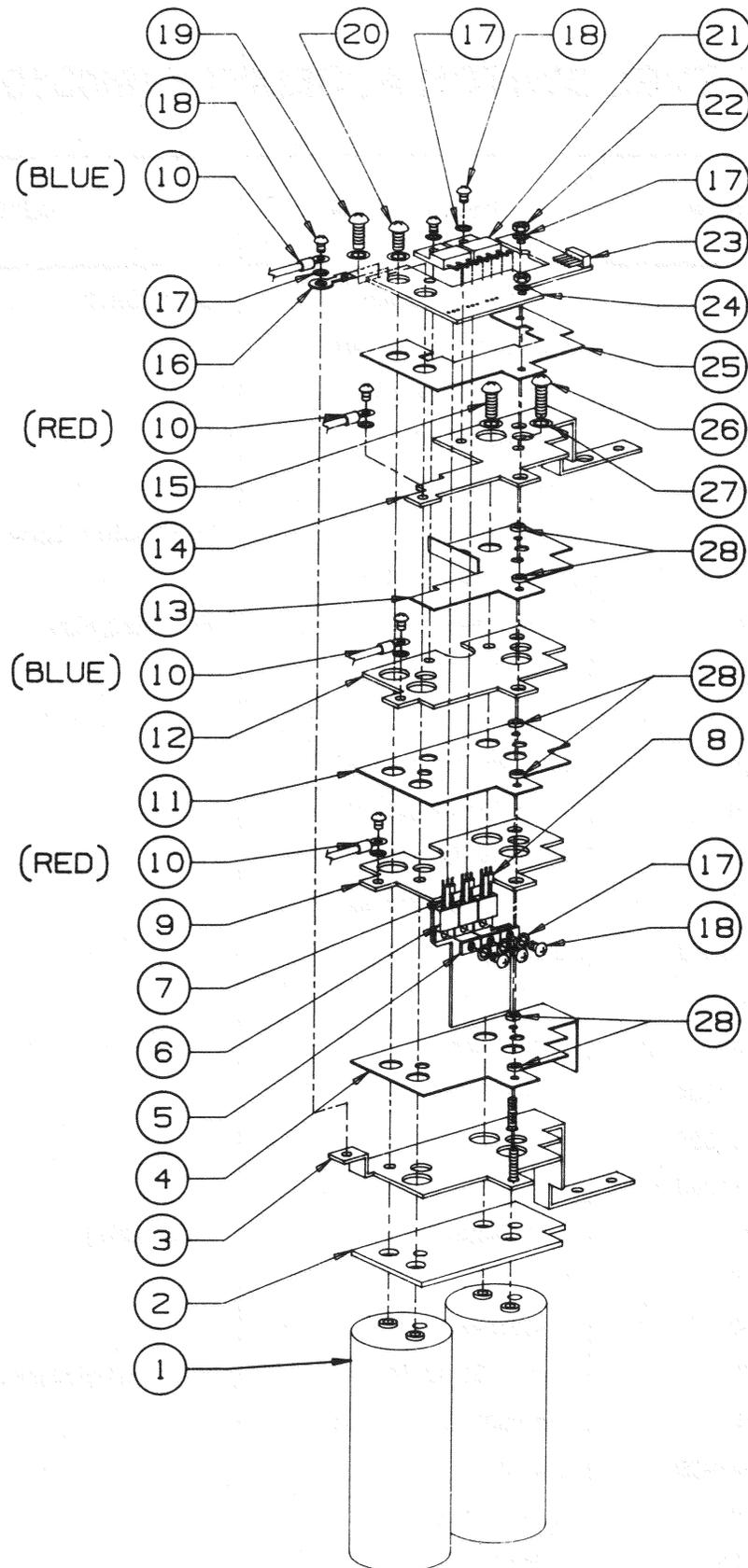


Fig. 7.7 Channel 1 Bi-Level Switch Assembly

## CH 1 BI-LEVEL SWITCH ASSEMBLY (M45109-2)

ITEM#	QTY	PART #	DESCRIPTION	NOTES
1	2	D 7882-0	15000 $\mu$ F Capacitor	C810, C812
2	1	P10357-5	Insulator: Ch 1 & 2 #1	
3	1	M21070-4	Plate: Ch 1 -Vcc #1	
4	1	D 7821-8	Insulator: Ch 1 #2	
5	3	C 6541-4	Torque Spreader	
6	3	C 8516-4	MOSFETs	Q810, Q811, Q812
7	3	H43224-7	Lead Insulation Tube	
8	3	C 8341-7	Ferrite Bead	FB1, FB2, FB3
9	1	M21071-2	Plate: Ch 1 FET #2	
10	-	---	Wires	
11	1	D 7825-9	Insulator: Ch 1 & 2 #3	
12	1	M21072-0	Plate: Ch 1 Diode #3	
13	1	D 7822-6	Insulator: Ch 1 #4	
14	1	M21073-8	Plate: Ch 1 +Vcc #4	
15	1	A10086-11008	Screw	
16	1	D 2934-4	Solder Lug	
17	11	A10094-4	Lock Washer	
18	9	A10086-10604	Screw	
19	1	A10086-11006	Screw	
20	1	A10086-11005	Screw	
21	2	C 8855-6	Dual Diode	D810, D811
22	2	A10102-5	Hex Nut	
23	1	H43171-0	Header (with wires)	
24	1	D 7843-2	Switch Board Ch 1	(Ch 1 half of blank part D 7843-2)
25	1	D 7880-4	Insulator: Ch 1 & 2 #5	
26	1	A10086-11009	Screw	
27	4	A10094-8	Lock Washer	
28	8	A10101-26	Nylon Washer	

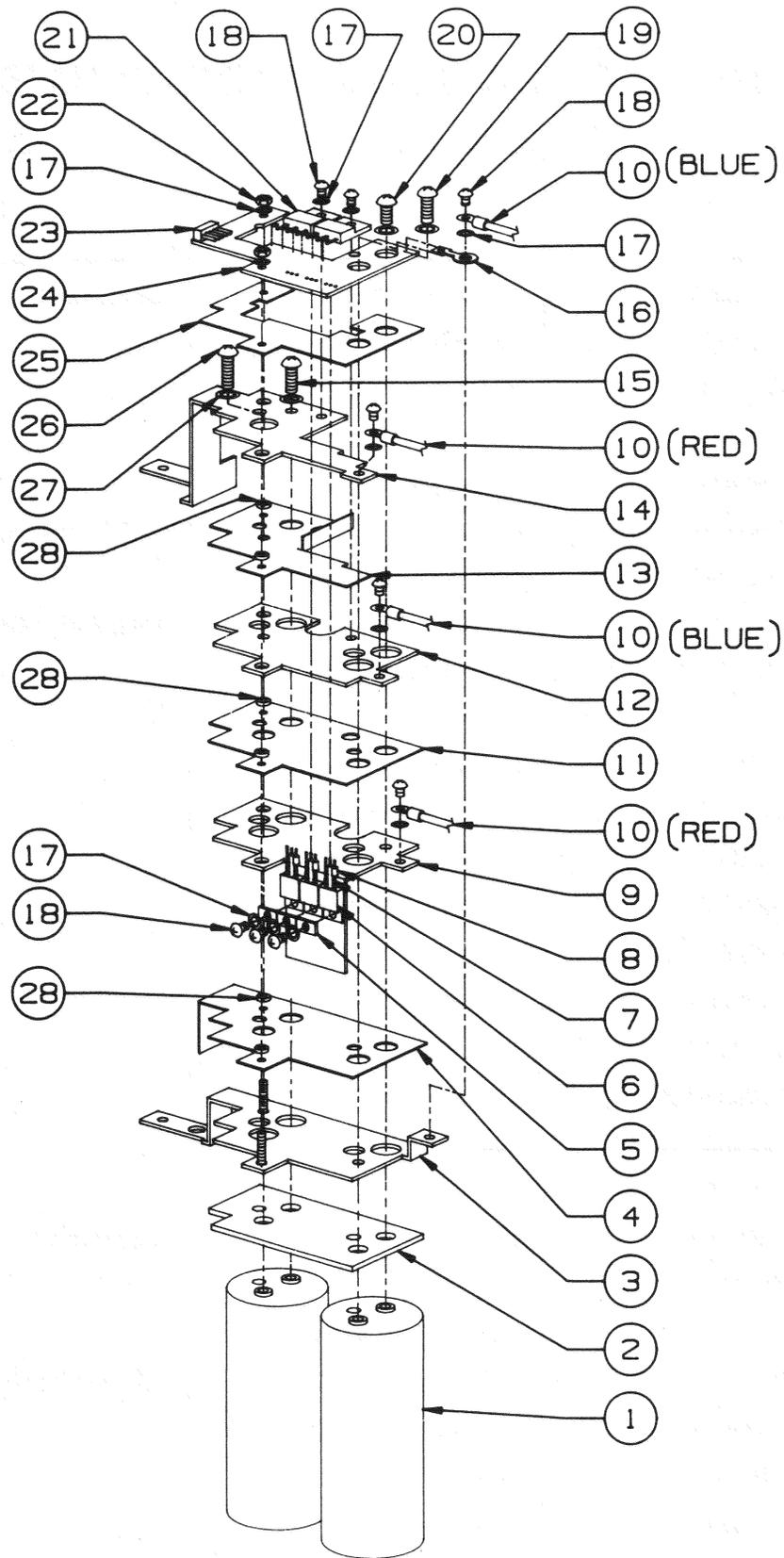


Fig. 7.8 Channel 2 Bi-Level Switch Assembly

## CH 2 BI-LEVEL SWITCH ASSEMBLY (M45110-0)

ITEM#	QTY	PART #	DESCRIPTION	NOTES
1	2	D 7882-0	15000 $\mu$ F Capacitor	C800, C802
2	1	P10357-5	Insulator: Ch 1 & 2 #1	
3	1	M21074-6	Plate: Ch 2 -Vcc #1	
4	1	D 7824-2	Insulator: Ch 2 #2	
5	3	C 6541-4	Torque Spreader	
6	3	C 8516-4	MOSFETs	Q800, Q801, Q802
7	3	H43224-7	Lead Insulation Tube	
8	3	C 8341-7	Ferrite Bead	FB4, FB5, FB6
9	1	M21075-3	Plate: Ch 2 FET #2	
10	-	---	Wires	
11	1	D 7825-9	Insulator: Ch 1 & 2 #3	
12	1	M21076-0	Plate: Ch 2 Diode #3	
13	1	D 7820-0	Insulator: Ch 2 #4	
14	1	M21077-9	Plate: Ch 2 +Vcc #4	
15	1	A10086-11008	Screw	
16	1	D 2934-4	Solder Lug	
17	11	A10094-4	Lock Washer	
18	9	A10086-10604	Screw	
19	1	A10086-11006	Screw	
20	1	A10086-11005	Screw	
21	2	C 8855-6	Dual Diode	D800, D801
22	2	A10102-5	Hex Nut	
23	1	H43171-0	Header (with wires)	
24	1	D 7843-2	Switch Board Ch 2	(Ch 2 half of blank part D 7843-2)
25	1	D 7880-4	Insulator: Ch 1 & 2 #5	
26	1	A10086-11009	Screw	
27	4	A10094-8	Lock Washer	
28	8	A10101-26	Nylon Washer	

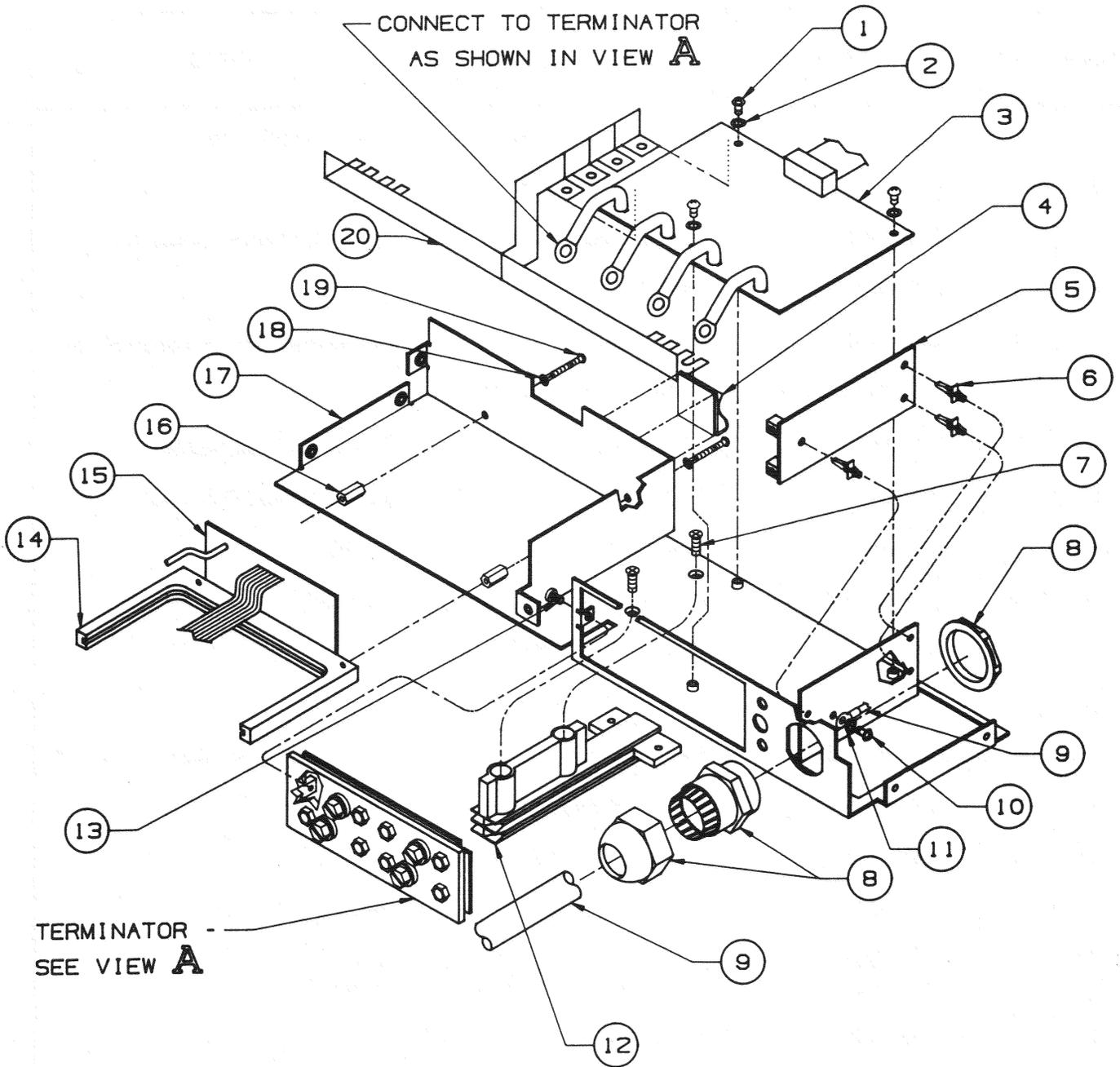


Fig. 7.9 P.I.P. Terminator Shelf Assembly

## P.I.P. TERMINATOR SHELF ASSEMBLY

ITEM#	QTY	PART #	DESCRIPTION	NOTES
1	3	A10086-10604	6-32-.25 Machine Screw	Phillips, round-head
2	3	A10094-4	#6 Int. Star Washer	
3	1	Q42932-6	Current Sense Module	Terminator Portion of Item #5
4	1	C 7705-4	Cable Clamp	
5	1	Q42932-6	Current Sense Module	Current Sense Portion of Q42932-6
6	3	C 8823-4	0.125" PC Board Support	
7	2	D 5903-6	8-32x.5 Screw	Phillips, flat-head, taptite
8	1	F11160-3	Strain Relief	For Power Cord D 7890-3
9	1	D 7890-3	Power Cord	30A 10/3
10	1	A10111-10806	#8x.375 Sheetmetal Screw	Pan-head
11	1	A10095-2	#8 Int. Star Washer	
12	1	D 7817-6	Center Output Slide Guide	
13	1	A10109-7064	6-20x.25 Screw	Phillips, pan-head, black
14	1	C 6821-0	22 Pin PIP Edge Connector	
15	1	Q43052-2	PIP Interconnect Board	
16	2	A10100-7	Spacer, Aluminum	.250Dx.141Dx.312L
17	1	M21189J1	Terminator/PIP Shelf Bracket	Crown Only
	1	M21190J9	Terminator/PIP Shelf Bracket	Amcron Only
18	2	A10094-2	#4 Int. Star Washer	
19	2	A10086-10410	4-40x.62 Machine Screw	Phillips, round-head
20	1	D 7826-7	Output Flex Bar Ch 1	
	1	D 7827-5	Output Flex Bar Ch 2	
*	2	C 8884-6	Red Binding Post (w/ hdwr)	*Amcron Only - Not Shown
*	2	C 8885-2	Black Binding Post (w/ hdwr)	*Amcron Only - Not Shown



## MAIN BOARD TRAY ASSEMBLY

ITEM#	QTY	PART #	DESCRIPTION	NOTES
1	1	M21201J4	Main Board Tray	
2	1	Q42928-4	Main Module	See Modules, Section 8.
	1	Q43095-1	Main Module #2	See Modules, Section 8.
3	6	A10094-4	#6 Int. Star Washer	
4	6	A10086-10604	6-32x.25 Machine Screw	Phillips, round-head

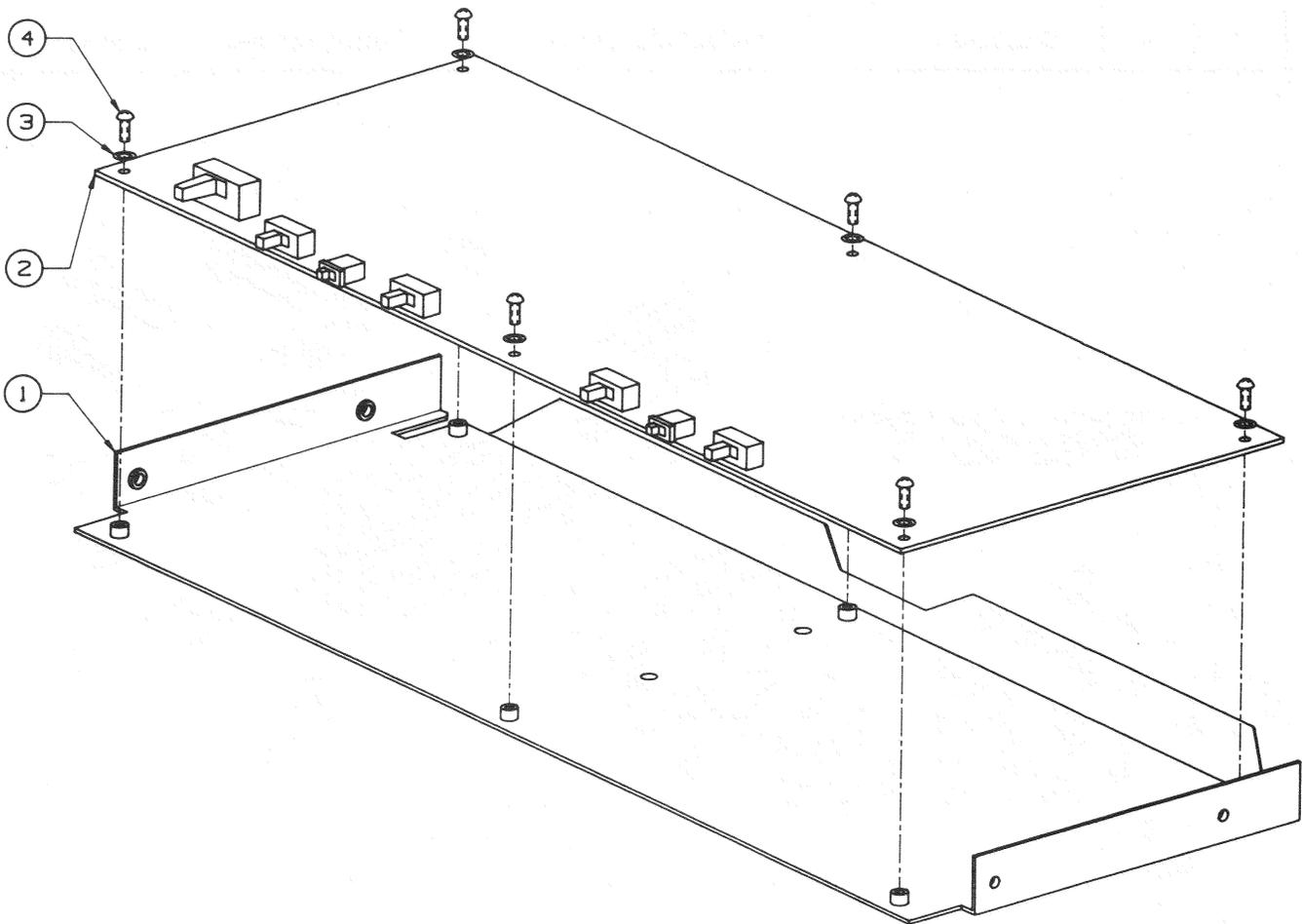


Fig. 7.11 Main Module Tray Assembly