

SORENSEN
POWER SUPPLIES

Instruction Manual

SSD Series

HIGH PERFORMANCE SWITCHING
POWER SUPPLIES

Sorensen Company

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SORENSEN
POWER SUPPLIES

**instruction
manual
for SSD SERIES
MODULAR DC
POWER SUPPLIES**

INCLUDES THE FOLLOWING SSD MODELS:

MODULE IVB

MODULE VIA

5-75	24-22	5-120	15-45
9-50	28-18	5-150	24-32
12-38	36-13	9-80	28-25
15-32	48-10	12-60	36-19
			48-15

SORENSEN **SORENSEN COMPANY**
POWER SUPPLIES
A RAYTHEON COMPANY

676 ISLAND POND ROAD MANCHESTER, NEW HAMPSHIRE 03103



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1. INTRODUCTION

1.1 PURPOSE

This manual contains operation and maintenance instructions for the SSD series of high efficiency modular dc power supplies, manufactured by the Sorensen Company, Manchester, New Hampshire. The SSD models covered in this manual are similar in electrical design and physical appearance. They are grouped into two module sizes; IVB and VIA, differing only in size and in power output ratings. (Refer to Table 1-1, Unit Specifications.)

1.2 GENERAL DESCRIPTION

The SSD series provides a variety of highly regulated dc outputs designed for operation on 115/220 Vac or 300 Vdc. The line also offers exceptionally high efficiency, high power density, and fast recovery times as well as characteristically low output impedances.

The supplies are designed with mounting holes on three planes: end, bottom or side. Four tapped mounting holes are provided on each face. Section 2 provides necessary installation data.

1.3 FUNCTIONAL DESCRIPTION

Operational features of the SSD series power supplies include remote sensing (regulation), voltage and resistance remote programming, overload and short-circuit protection by automatic current-limiting, and overvoltage protection through an integral electronic shutdown circuit.

1.3.1 Remote Sensing

For applications where variation in the load-lead voltage drop may adversely affect load regulation, remote sensing may be used to establish the regulating point at the load rather than at the output terminals.

1.3.2 Remote Programming

The SSD series power supply outputs may be altered from a remote location by either the resistance or the voltage programming methods.

For resistance programming, a calculated value of resistance at the ratio of 1000 ohms/volt is inserted in the programming network. For voltage programming, a value of voltage at the ratio of 1:1 is inserted.

1.3.3 Series Operation

For applications requiring output voltages higher than a single unit can provide, SSD units may be connected in series to a maximum total of 100 Vdc. Regulation in series operation is the sum of the regulations of all units.

1.3.4 Parallel Operation

Direct paralleling using the current-limit mode (Figure 3-2) is permitted.

1.3.5 Over-Current Protection

In the event of an excessive current condition such as short circuit, a current-limit circuit acts to limit the unit output current. This circuit is factory-set to approximately 108% of the unit rated output current at 40°C (+104°F).

1.3.6 Overvoltage Protection (OVP)

In the event of an overvoltage condition on the output, such as would be induced by an open sense lead, an overvoltage electronic sensing circuit is actuated. This OVP acts to quickly reduce the output voltage to zero and to disable the input dc circuit.

1.3.7 Remote Shutdown

An external transistor or logic switch connected across J1-1/J1-2 at the rear of the unit may be used to shut down the supply. The unit output is restored when the shutdown signal is removed.

1.4 ACCESSORIES

Several universal rack-mount adaptors are available for the SSD series. For specific information on these adaptors, contact your service representative, or the factory.

Table 1-1A SSD Common Specifications

Input Rating:	AC: Model 5-150, 115/220 volt nominal (105-125/210-250 volts) @ 47-63Hz/360-440Hz* All others: 115/220 volt nominal (98-132/187-250 volts) @ 47-63Hz/360-440Hz* DC: Model 5-150, 320 volts nominal (Limits; 270-350Vdc) All others: 300 volts nominal (Limits; 250-350Vdc)	
Maximum Input Current:	Nominal Input Voltage	Module IVB Module VIA
	115 Vac 208/220/230 Vac 300 Vdc	7A 3.5A 2.7A 17A 8.5A 6.5A
Recommended Fuse @ Nominal Input Voltage:	15A	20A
Output Ratings:	Efficiency: 68 to 80% Voltage Regulation: Line: 0.03% over full ac input range. Load: 0.03%, NL-FL Ripple, RMS: 8mV maximum (typically 5mV) 20Hz-20MHz Ripple, P-P: 50mV maximum (typically 20mV) 20Hz-20MHz Temp. Coefficient: 0.008%/°C Turn-ON/OFF Overshoot: None (output voltage) Transient Response: 1.0ms for half-load change/return to 1% band Remove Programming: 1000 ohms per volt (resistance) 1V:1V (signal) Output Impedance: Consult factory.	
Current Limit:	Automatic, internally adjustable from 20 to 150% of rated full-load current. Factory set at approximately 108% of rated current at 40°C. (See individual unit specifications.)	
Overvoltage (OVP) Limit:	Automatic, adjustable shorting action, self-contained. Factory set to 1.2V or 10% whichever is greater above nominal output voltage. (See unit specifications.) Reset requires cycling input power. (Allow 10 seconds for discharge of input capacitors.) Adjustable to within 1%. OVP action is delayed (typically) by approximately 750 microseconds to avoid nuisance tripping. Accurate to within 2% (for 6 months). Resolution of OVP adjustment 0.1% of output voltage rating.	
Stability:	After one hour warm-up, 0.05% for 24 hours with all external effects held constant.	
Resolution:	0.05% of output voltage maximum.	
Parallel Operation:	May be directly paralleled without derating (in current-limit mode).	
Series Operation:	To 100Vdc maximum.	
Remote Sensing:	The voltage drop per load lead is constrained only by the maximum rated unit output voltage. (For example, 5-volt nominal supplies have an E_g maximum of 6.5 volts. Thus, operating at an output of 5 volts, a 1.5-volt lead drop, or 0.75 volt per load lead.)	
Ambient Rating:	0 to 71°C (32 to 160°F). (See current ratings in unit specifications.) Storage: -55 to +85°C	
Cooling:	Natural convection.	
Dimensions: inches (mm)	Module IVB	Module VIA
Height	4-15/16 (125)	4-15/16 (125)
Width	7-1/2 (190)	7-1/2 (190)
Depth	11-1/2 (292)	16 (406)
Weight: lbs. (kg)	15 (6.5)	21 (9.5)
Volume: cu. in. (Cm ³)	426 (26)	593 (36)
Input-Output Connections:	All connections are made to a 9-terminal barrier strip using #5-40 screws.	
Isolation:	2.1kVdc input-chassis. 500Vdc output-to-chassis.	
Fall-out Characteristics:	40msec at full load current (115/220Vac or 300Vdc). Half output for 80ms.	

*Double rms ripple spec with 400-Hz input.

Table 1-1B SSD Unit Specifications Module IVB

Model No.	5-75	9-50	12-38	15-32	24-22	28-18	36-12	48-10
Output Ratings (dc):								
Nominal Voltage (V)	5.0	9.0	12.0	15.0	24.0	28.0	36.0	48.0
Voltage Range (V)	4.7-6.5	6.5-9.5	9.5-13.0	13.0-17.0	20.0-26.0	25.0-32.0	32.0-43.0	43.0-56.0
Regulation (mV)*	2.5	4.5	6.0	7.5	12.0	14.0	18.0	24.0
Current (A):								
@ 40°C	75.0	50.0	38.0	32.0	22.0	18.0	12.0	10.0
@ 50°C	67.5	45.0	34.2	28.8	19.8	16.2	10.8	9.0
@ 60°C	56.3	37.5	28.5	24.0	16.5	13.5	9.0	7.5
@ 71°C	37.5	25.0	19.0	16.0	11.0	9.0	6.0	5.0
Current Limit (Adc) Factory set to;	81.0	54.0	41.0	34.6	23.8	19.4	13.0	10.8
Overvoltage Limit (Vdc) Factory set to;	6.2	10.2	13.2	16.5	26.4	30.8	39.6	52.8
Input Ratings (Typ.)** Efficiency (%)	72	73	74	74	74	75	75	76
Output Adjust Resolution (mV)	3.25	4.75	6.5	8.5	13.0	16.5	21.5	28.0

*Combined line and load.

**At nominal line, nominal adjust full load (40°C)
typically 2-4% higher at higher adjust, full load.

Table 1-1C SSD Unit Specifications Module VIA

Model No.	5-120	5-150	9-80	12-60	15-45	24-32	28-25	36-19	48-15
Output Ratings (dc):									
Nominal Voltage (V)	5.0	5.0	9.0	12.0	15.0	24.0	28.0	36.0	48.0
Voltage Range (V)	4.7-6.5	4.75-5.25	6.5-9.5	9.5-13.0	13.0-17.0	20.0-26.0	25.0-32.0	32.0-43.0	42.0-56.0
Regulation (mV)*	2.5	2.5	4.5	6.0	7.5	12.0	14.0	18.0	24.0
Current (A):									
@40°C	120.0	150.0	80.0	60.0	45.0	32.0	25.0	19.0	15.0
@50°C	108.0	135.0	72.0	54.0	40.5	28.8	22.5	17.1	13.5
@60°C	90.0	112.5	6.0	45.0	33.8	24.0	18.8	14.3	11.3
@71°C	60.0	75.0	40.0	30.0	22.5	16	12.5	9.5	7.5
Current Limit (Adc) Factory set to;	129.6	162.0	86.4	64.8	48.6	34.6	27.0	20.5	16.2
Overvoltage Limit (Vdc) Factory set to;	6.2	6.2	10.2	13.2	16.5	26.4	30.8	39.6	52.8
Input Ratings (Typ.)** Efficiency (%)	69	70	75	76	76	78	79	79	80
Output Adjust Resolution (mV)	3.25	3.25	4.75	6.5	8.5	13.0	16.5	21.5	28.0

*Combined line and load.

**At nominal line, nominal adjust, full load (40°C)
typically 2-4% higher at high adjust, full load.



2. INSTALLATION

2.1 GENERAL

After unpacking, general inspection and preliminary check-out procedures should be performed to assure that the unit is in proper working order. If it is determined that the unit has been damaged, the carrier should be notified immediately. Repair problems may be directed to the nearest Sorensen representative, or to the Service Department, Sorensen Company, 676 Island Pond Road, Manchester, New Hampshire 03103.

2.2 INSPECTION

Check for damage incurred during shipment as follows:

1. Inspect enclosures for dents, chips and other obvious signs of damage.
2. Check condition of external terminal board TB1. Make certain that all terminal screws are in place and that links are fitted over the barrier strips between TB1 terminals -1 and -2, TB1-3 and -4, and TB1-8 and -9 (115 Vac operation only).
3. Inspect fuse holder for evidence of damage.
4. If internal damage is suspected:
 - a. Remove all flat-head retaining screws from around the perimeters of the case assembly.
 - b. Inspect the components and printed-circuit boards for damage.
5. Check that the circuit boards and power transistors are firmly plugged into their sockets. These are readily removable for servicing.

2.3 INPUT CONNECTIONS

SSD units are shipped ready for use with 115 Vac.



For 220 Vac or 300 Vdc operation, REMOVE LINK FROM TB1-8/TB1-9. For 115 Vac, this link remains in place.

For either connection, fuse F1 is in series with the input line connected to TB1 pin 7. Maximum circuit protection is provided when the high side of the input line (the black wire in standard a-c connections) is connected to this pin.

2.4 ELECTRICAL CHECK

NOTE

Before applying power to the unit, it is important that input/output isolation be checked. This may be done using a VOM set to the x10K scale. Assure maximum resistance from input at TB1-6 and -7 to case (ground), and positive output terminal to case. It is recommended that this measurement be performed each time the unit case is removed and replaced.

To perform an initial electrical check, proceed as follows:

1. Make certain that unit is located in an area where passage of air is unrestricted. Connect input leads to terminals TB1-6 and -7 (IN). Use terminal 5 (G) for input system chassis ground.
2. Connect a dc voltmeter across terminals TB1-1 and -4 (OUTPUT SENSING). Select a voltage range compatible with rated output.
3. Apply nominal rated input power.
4. Rotate VOLT control sufficiently to swing the dc voltmeter from minimum rated voltage to nominal output voltage per Table 1-1. (If overvoltage (OVP) circuit should trip, reset per paragraph 3.3.5 on page 3-2).
5. Set output voltage at its nominal value and remove input power.

2.5 MOUNTING

SSD units may be mounted in a variety of positions and locations, plus rack mounting.

NOTES

- 1) Mounting screws should be No. 8-32 and just long enough to penetrate through the mounting surface, 1/4" into the unit using lock and flat washers.

(cont'd)

NOTES (cont'd)

2) Fabricate knockout panels as shown in Figure 2-2. Figure 2-1 is an overall outline drawing of the SSD modules. (Consult factory for specific mounting data.)

1. For cantilever-type mounting from a vertical panel or wall (where vertical airflow is unrestricted):

End mounting - Use knockout per Figure 2-2. This knockout clears the terminal block and fuses.

Side mounting - No knockout is needed. Use the four mounting holes shown in Figure 2-2.

2. For flat mounting on a horizontal surface (where vertical airflow is restricted):

End mounting - Not recommended.

Side mounting

Units may be mounted directly with no knockout required.

Bottom mounting - Use knockout per Figure 2-2.

Vertical panel mounting per paragraph 1 preceding is preferred since maximum airflow is assured. Horizontal surface mounting per paragraph 2 preceding, using bottom mounting with proper knockout is the second preference.



During installation, if two or more supplies are to be rack-mounted or otherwise stacked, the operating ambient of the upper units will be affected (not to exceed 71°C/160°F). Output current must be derated according to specifications for ambients above 40°C/104°F, typically measured midway between adjacent surfaces.

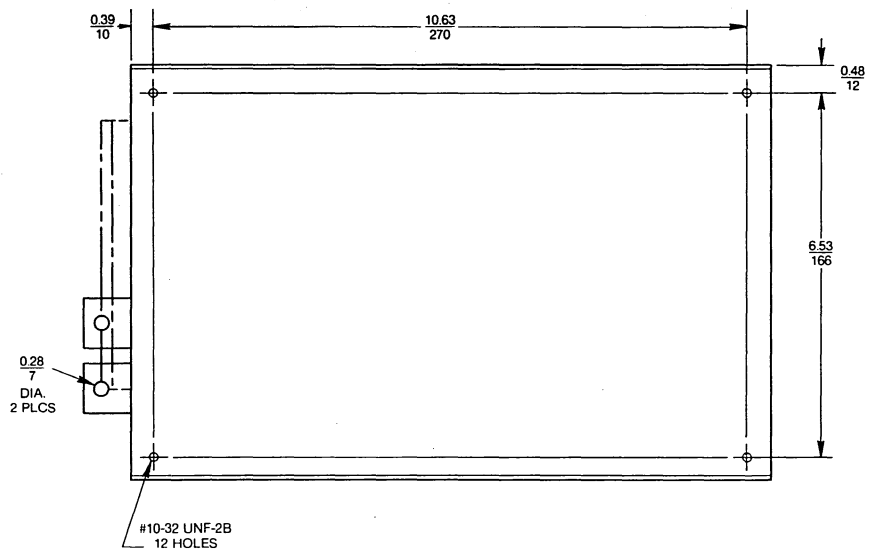
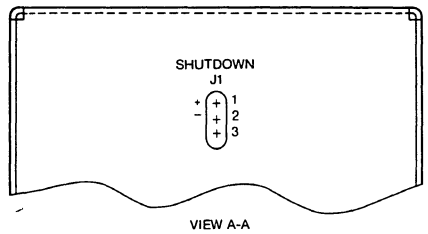
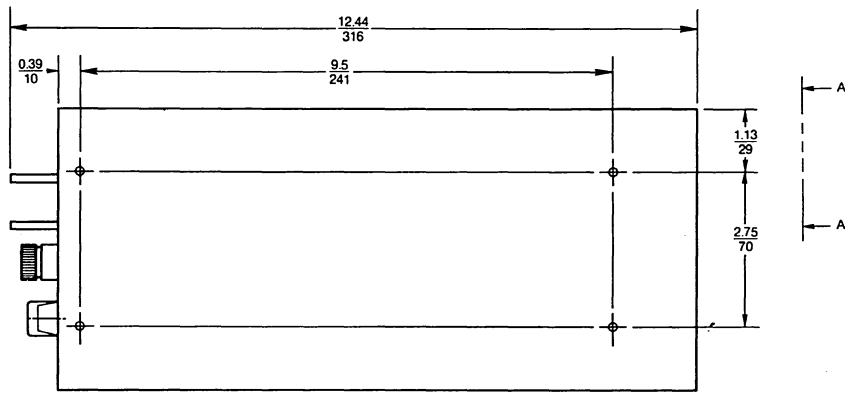
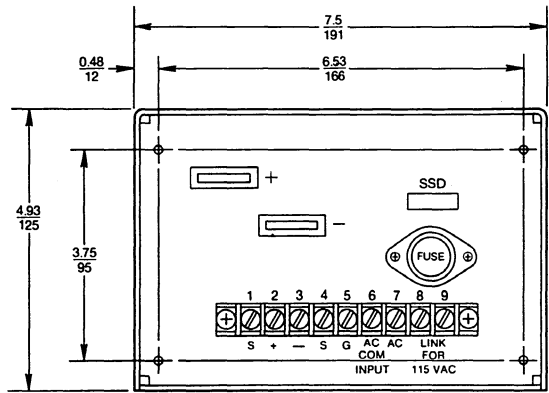
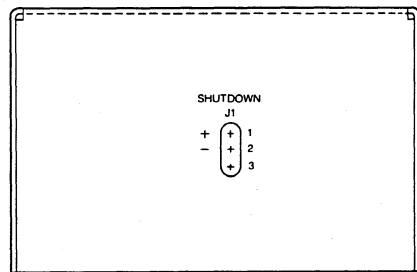
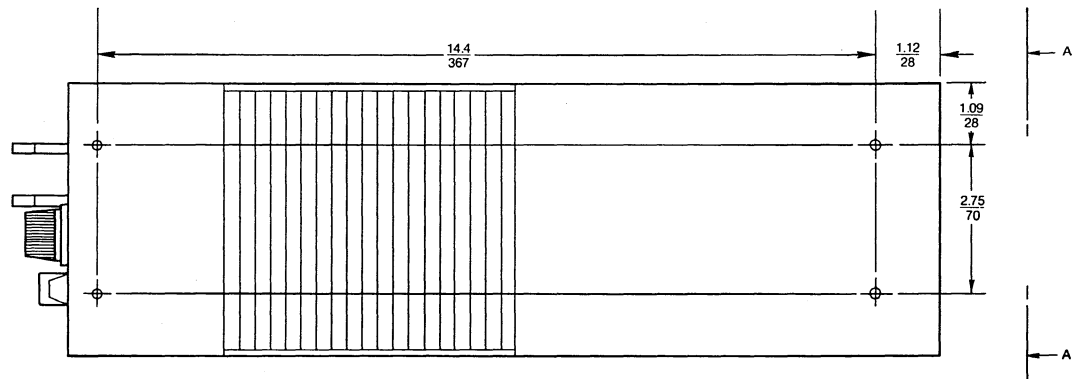
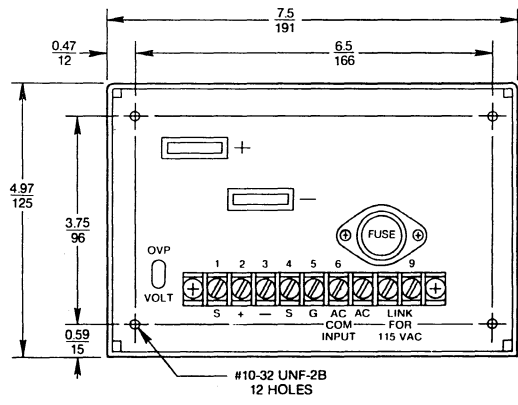


Figure 2-1
Outline Drawing, SSD
Module IVB

2-4



VIEW A-A

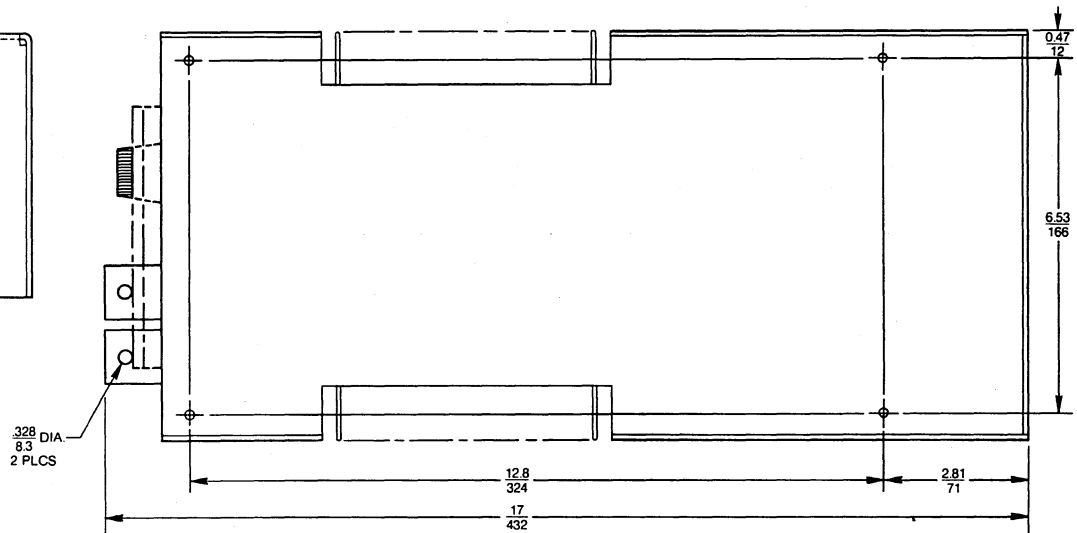


Figure 2-2, Outline Drawing,
SSD Module VIA

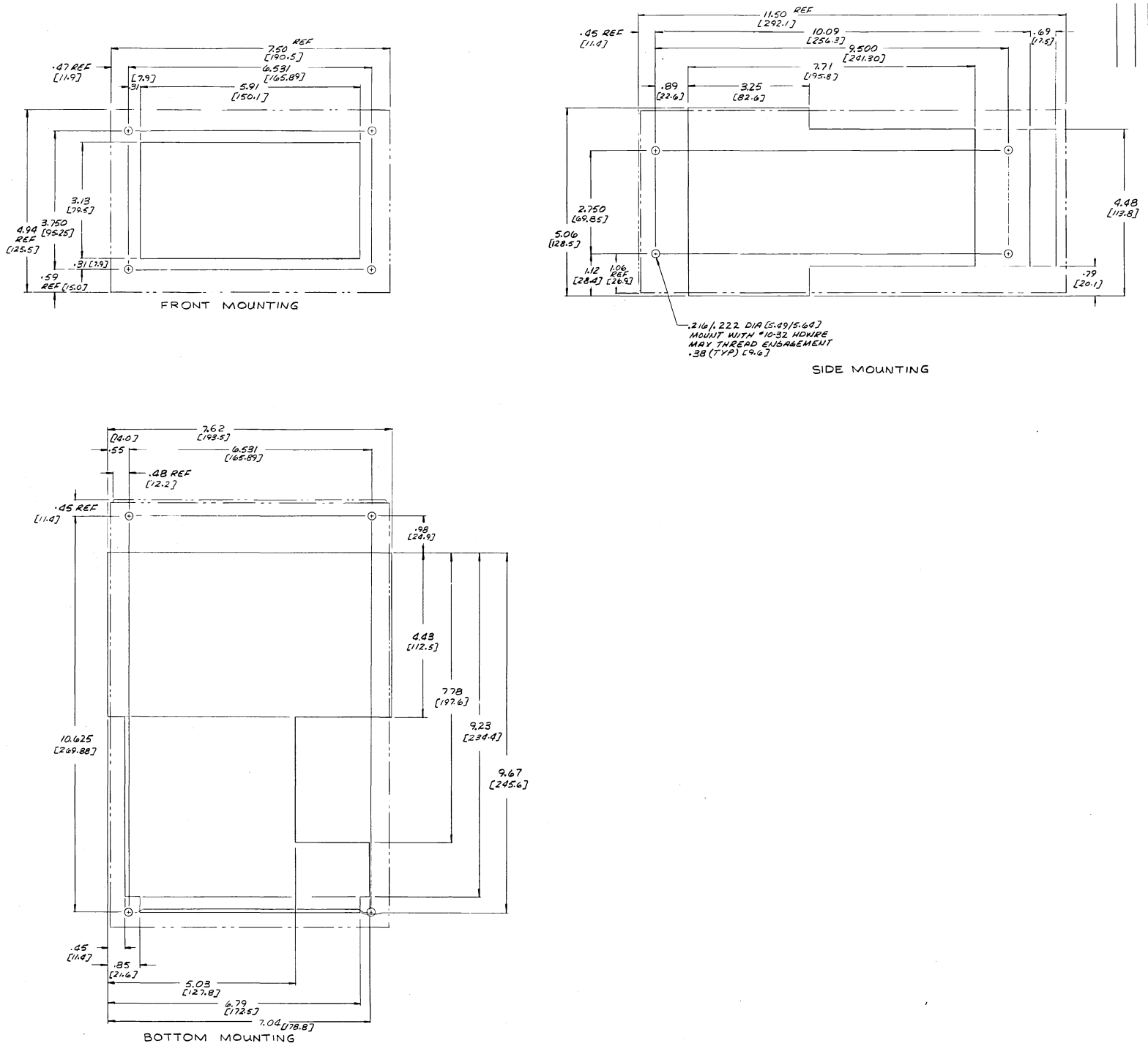
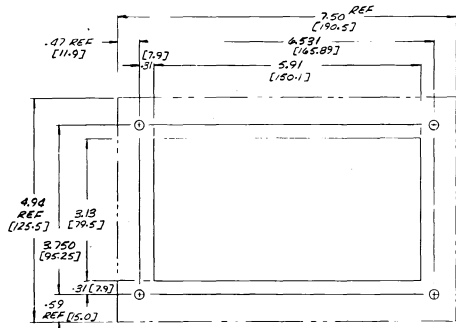
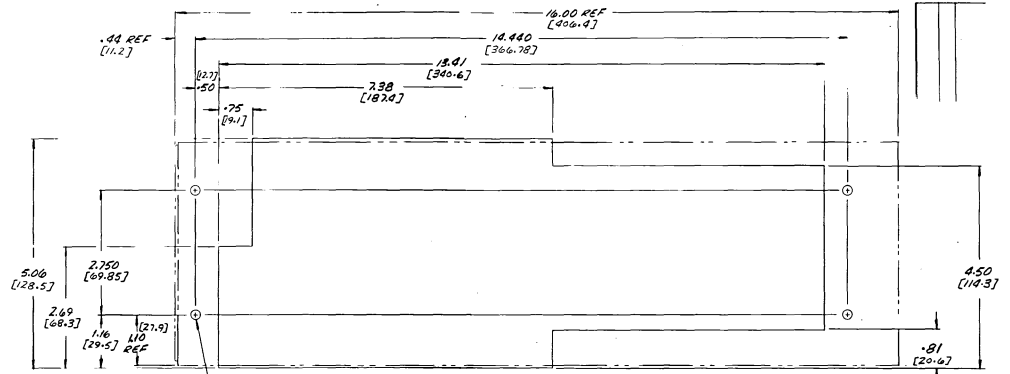


Figure 2-3, Knockout Dimensions
SSD Module IVB

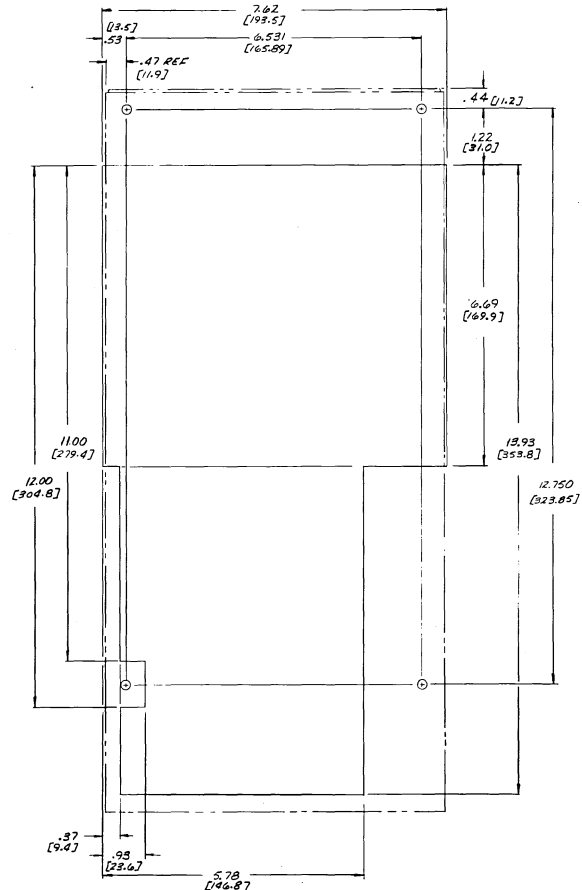


FRONT MOUNTING



SIDE MOUNTING

.216/.222 DIA [5.49/5.64]
 MODUL WITH *0-02 MONIE
 MAX TUREAD CLEARANCE
 *38 (TYP) [9.6]



BOTTOM MOUNTING

Figure 2-4 Knockout Dimensions
 SSD Module VIA

3. OPERATION

3.1 GENERAL

This section contains instructions on how to adapt the unit to and operate it in varied applications. These include remote sensing, remote programming, series operation, and remote shut-down.



The sensing and power circuits form a closed loop. Opening this loop, either by removing a terminal board link or disconnecting a sensing or programming lead will result in a high unit output and will cause the OVP circuit to operate.

3.2 CONTROLS

SSD units are equipped with two controls; the output voltage, and the overvoltage adjustment (OVP) potentiometers accessible at the terminal-board (TB1) end of the supply. The output VOLT control (R4) varies the output voltage while the OVP control (R2) sets the OVP trip point. Both are factory-set to nominal values.

3.3 PRE-OPERATION CONSIDERATIONS

3.3.1 Current Limit Setting

To reset the current limit proceed as follows:

1. Rotate limit adjust control R11 on circuit board A2 approximately 2/3 clockwise. Do not operate unit with R11 fully clockwise. (Control is accessible through an opening in the side of the unit.)
2. Connect a voltmeter across output terminals TB1-2 (+) and -3 (-). Apply nominal input power and adjust output VOLT control R4 for the unit's rated nominal value.
3. Remove input power and connect an ammeter and variable load resistor in series across the output terminals.
4. Reapply input power and adjust load

so that the test ammeter indicates current limit determined in paragraph 3.3.1.

5. Rotate limit control A2R11 slowly counterclockwise (CCW) until both output voltage and current begin to drop.
6. Remove input power, disconnect test instruments and load.

3.3.3 Overvoltage (OVP) Trip Point

The OVP trip point is factory-set to 1.2V or 10% (whichever is greater) higher than the rated nominal output voltage (Table 1-1). However, if the output voltage will be operated in remote sensing, it may be desired to raise the trip point. When setting the OVP limit, load-lead drop must be taken into consideration.

3.3.4 OVP Trip Point Reset

To reset the OVP, proceed as follows:

1. Rotate OVP panel control R2 fully CW.
2. Rotate output VOLT control R4 on panel until the output voltage is equal to the desired trip point.
3. Rotate OVP control R2 slowly CCW until the output voltage suddenly drops to zero. This indicates that the OVP circuit has been triggered.
4. Remove the input power. Rotate VOLT control several turns CCW. Allow approximately 15 seconds for unit to discharge.
5. Apply input power. Reset output to desired operating voltage.

NOTE

The OVP circuit includes a time-delay network such that the overvoltage condition must exist for approximately 100 microseconds before the OVP fires. This delay prevents short-duration OV pulses from triggering the circuit.

3.3.5 Reset After OVP Fires

If the OVP fires, proceed to reset the circuit as follows:

1. Remove input power and disconnect load (in case 0V condition is externally induced). Allow approximately 15 seconds for unit to discharge.
2. Rotate VOLT adjust R4 fully CCW (minimum voltage).
3. Apply input power and raise output voltage to desired value.

NOTE

If the OVP again trips, internal failure is indicated, or the output is set too close to operating voltage (see 3.3.4 preceding).

3.4 LOCAL SENSING

The unit is shipped ready for use in the local-sensing mode. In this mode, regulation is at the output terminals, not at the load. If variations in load-line voltage drops are expected to be prohibitive, refer to paragraph 3.5, remote sensing.

To operate the unit, proceed as follows:

1. Connect a voltmeter across output sense terminals TB1-1 (+) and TB1-4 (-).
2. Attach the input leads to terminals TB1-6 and -7. Use terminal 5 (G) to ground input system.
3. Apply nominal input power.
4. Rotate output adjust until desired output voltage is indicated on voltmeter.
5. Remove input power. Disconnect voltmeter and connect load leads to (+) and (-) output terminals. Do not remove or loosen any of the interconnecting links. Apply nominal input. Unit supplies highly regulated power to load.

3.5 REMOTE SENSING

To sense (regulate) unit output at the load rather than at output terminals, remove the links between terminals TB1-1 and -2, and TB1-3 and -4. Run a sensing lead from terminal TB1-1 to the positive side of load; connect the other lead from terminal TB1-4 to the negative side of load (Figure 3-1). Use a shielded, twisted pair of wires for sense leads. Set unit in operation per paragraph 3.4, and assure that the voltage at the output terminals does not exceed the maximum rating (per Tables 1-1). A decoupling capacitor across the load will minimize the effects of high transients on the control circuitry.

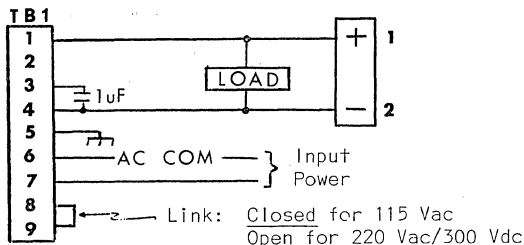


Figure 3-1
Remote Sensing Connections

3.6 REMOTE PROGRAMMING

The unit may be programmed to supply pre-determined output voltages by inserting a calculated resistance into the voltage-sensing circuit. Programming sensitivity is approximately 1000-ohms-per volt; that is 1000 ohms are required for each volt difference between the desired output and the minimum value of the unit's specified range. The programming resistor should be a 1/8-watt (or larger) precision film resistor with a 25 PPM/°C coefficient (equal to MIL style RN55E). The programming current is approximately 1 milliampere. However, a 1.0 uF capacitor in parallel with the inserted programming resistor is recommended to prevent the unit from oscillating, as shown in Figure 3-1.

To adapt the unit for remote programming, proceed as follows:

1. With normal local sensing (paragraph 3.4), set power to ON and adjust output to specified rated minimum output voltage.

2. At this point, any value within rated output range (Table 1-1) can be obtained by inserting 1000 ohms-per-volt difference between the desired voltage and the minimum voltage. For example, to obtain 12.0-volt output in the preceding example, the difference is 12.0 (-) 9.5 or 2.5 volts. The program resistor should be 2.5 x 1000 or 2.5K ohms.
3. Set power to OFF. Remove the link from TB1-3 and -4 and connect programming resistor in its place. Either local or remote sensing may be used.
4. Parallel the program resistor with a 1.0uF capacitor.
5. Apply input power and verify load voltage across the (+) and (-) output terminals as the desired value (using local sense).

3.7 SERIES OPERATION

Series operation is utilized for the purpose of obtaining a higher output voltage than available from a single model. Two supplies may be connected in series to form a dual polarity (+) and (-) output system such as (\pm) 12V with a common

return. Any amount of bridging load may be tolerated. Series operation of SSD units to a maximum of 100 Vdc is permissible.

3.8 PARALLEL OPERATION

Two or more SSD power supplies (with identical voltage ratings) may be directly paralleled without derating. Figure 3-2 illustrates the interconnections for two such units in parallel. Typically, the unit with the higher output will supply the total system current up to its limit setting. The second unit then supplies the balance of the system current requirements.

For equal current sharing, the current limit of each unit should be set to half of the desired current level.

3.9 REMOTE SHUTDOWN FUNCTION

SSD supplies may be shut down externally by connecting 100 ohms (or less) across pins J1-1 (+) to J1-2 (-) at the rear of the unit. The shutdown circuitry, (5-volt bias voltage) is completely isolated, allowing for several methods of activation. Thus a remote relay, transistor, or logic switch can be used to reduce the supply output. The unit output is restored when the signal is removed.

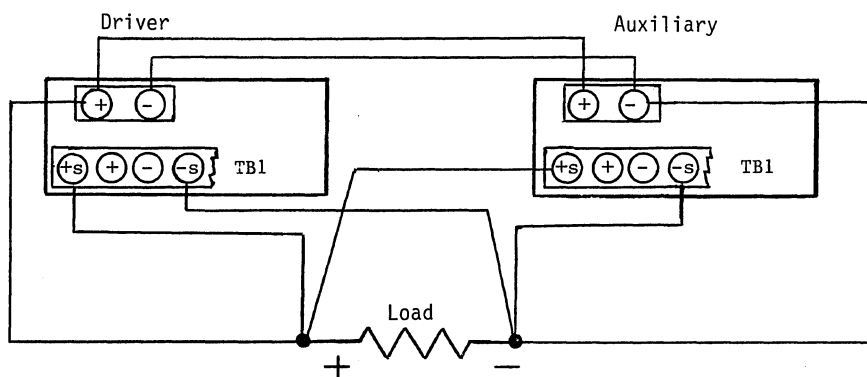


Figure 3-2
SSD Direct Parallel Connections



4. THEORY OF OPERATION

4.1 SUMMARY (Refer to Figure 4-1, Block Diagram)

SSD circuitry uses 20-kHz switching techniques to provide high efficiency and exceptional power density (high power output from a physically small package).

The proper input (115/220 Vac or 300 Vdc) is applied through input rectifiers/RFI filters and/or voltage doubler (115 Vac) where, at 300 Vdc unregulated, it is applied to a stepdown power chopper. The chopper is pulse-width modulated to produce a controlled d-c level which supplies an inverter circuit. Secondary windings on the inverter power transformer are connected to the full-wave output rectifier and output filter to produce a regulated d-c output.

The output is "sensed", and compared with a reference voltage. Any difference, or error voltage, is amplified and fed back to the chopper to control the duty cycle. Thus a closed loop is achieved, resulting in excellent line/load regulation.

Control portions of the circuitry consist of:

- Preregulator printed-circuit board (PCB) A1; switching regulator which generates the reference frequency and system bias voltages and trigger pulses.
- Duty-cycle control PCB A2; pulse width modulator which maintains the desired level of power-supply output, and;

- Base Driver PCB A3; driver for power inverter, generates bias current for duty-cycle control.

4.2 INPUT CIRCUIT

NOTE

For identification of components called out in the following text, refer to Figures 6-1/-2, system schematic diagram, or Figures 6-3 thru 6-5 (circuit boards A1 thru A3) when specified.

The input is applied through input RFI choke L1 and bridge rectifier CR1: full-wave rectifying mode for dc/220 Vac (TB1-8/-9 link open), or half-wave rectifying, voltage-doubler mode for 115 Vac, (link TB1-8/-9 closed). Input capacitors C3/C4 are in series in the full-wave mode and in parallel in the doubler mode. The input appears as an unregulated 300 Vdc at step-down chopper Q1/Q2 through soft-start RT1/RT2 and RFI chokes L3/L4. The chopper establishes the required duty cycle, whose pulse width is controlled by inputs from the A2 chopper control circuit board. Variations in power supply output are fed back as error signals to the A2 PCB, where they are processed and applied to the chopper to vary the duty-cycle pulse width. The power filter section, consisting primarily of L5 and L6, averages the duty cycle into a controlled d-c level of 120-200 volts, depending on the output load requirements.

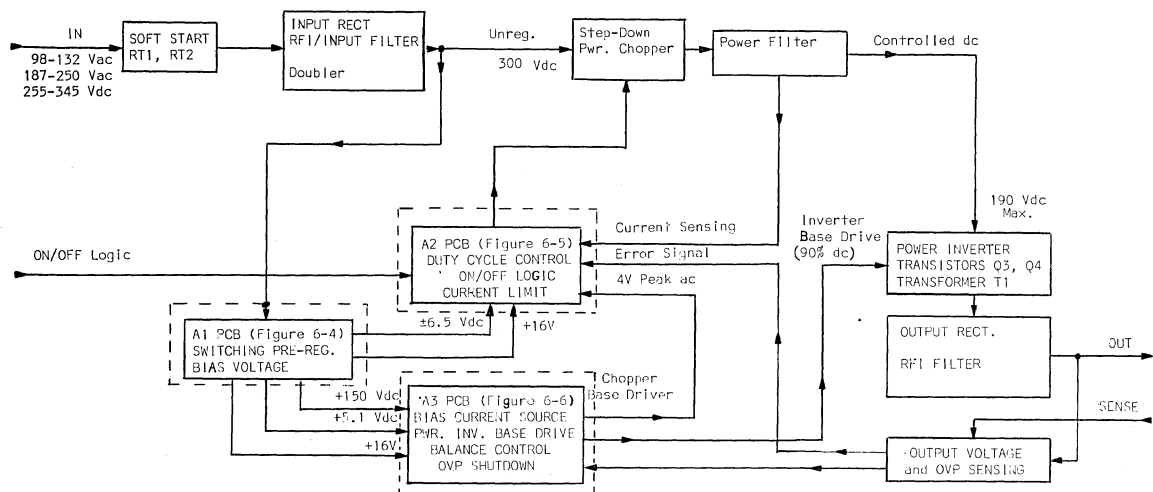


Figure 4-1 SSD Simplified Block Diagram

4.3 PREREGULATOR/BIAS SUPPLY PCB A1 (Figure 6-4)

The preregulator provides a regulated 150 Vdc to the bias inverter, and is the source of bias voltages required by the SSD system. The unregulated dc input is processed into a controlled duty-cycle pulse which establishes and maintains proper bias voltages through secondaries A-E of A1T1.

4.3.1 Input/Start-Up Circuit

The unregulated 300 Vdc at input capacitors C3/C4 (main assembly) is applied through A1F1 into the preregulator. Chopper A1Q2, under control of timer A1U2, processes the dc into a controlled duty cycle at the primary of bias transformer A1T1.

During system turn-on, "start-up circuit (A1) Q1/VR1/C1 provides starting bias for circuit operation until the proper d-c level of bias for preregulator control is established at A1T1. At that point, the start-up circuit A1Q1 is cut off.

4.3.2 Comparator (A1U2)/Chopper (A1Q2) Control

Reference clock A1U1 generates a series of 40-kHz negative pulses to trigger comparator A1U2 at pin 2. The output of the comparator at pin 3 determines the duty-cycle for step-down chopper A1Q2. The comparator operates as follows (refer to Figure 4-2):

The instantaneous voltage at A1U2-6 is a function of the (A1) R9/C6 time constant. After being triggered by the input at pin 2, this voltage increases until it reaches the d-c level at pin 5 (error signal, paragraph 4.3.3). The rise-time represents the ON period of the duty-cycle at A1Q2, and thus the A1T1 primary voltage. The voltage at pin 6 decays until a subsequent trigger at pin 2 repeats the process. The error voltage at pin 5 determines the ON time of the duty-cycle, as seen in Figure 4-2.

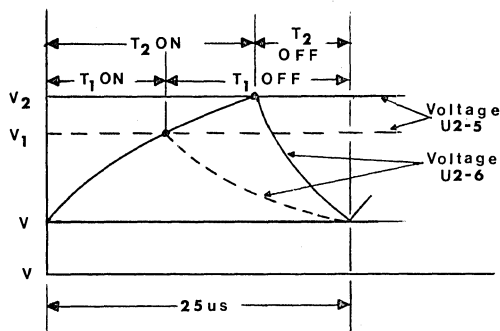


Figure 4-2 (A1) Comparator
Duty Cycle Control

4.3.3 Error Amplifier (A1U3) and Bias Control

Secondary winding "A" of transformer A1T1 is actually connected to the primary winding, and serves two purposes:

- provides bias for overall preregulator circuit operation, and
- establishes the voltage at A1U3 which controls the error signal at A1U2-5.

The voltage across secondary A1T1-A senses any variation across the winding "A". This regulation effectively maintains the voltage across A1C12 (which functions partly as an LC filter with the A1T1 primary) at a constant 150 Vdc assuring accurate bias levels at the remaining A1T1 secondaries "B"- "E".

Potentiometer A1R17 is adjusted to set secondary winding "B" to precisely 5.1 volts. The remaining bias levels (+16V, ±6.5V, +150V) are dependent on the 5-volt bias level setting.

4.4 CHOPPER CONTROL PCB A2 (Figure 6-5)

This board contains the circuitry which controls the duty-cycle input to the power filter, thus regulating the system output level. Three primary circuit functions contribute to this control:

- Voltage error amplifier (A2) U2/U4
- Low voltage sensing (A2) U1-A/U1-E and logic shutdown A2U3.
- Current-limiting error amplifier A2U5.

The output of each of these circuits appears as a dc error input to OR gate (A2) CR3/4/5. The OR gate passes the larger of the three inputs into constant-current comparator circuit (A2) U6-A through -E. Here it is compared to the relatively constant 40-kHz ramp signal (developed by the trigger from preregulator board A1) appearing across A2C9. The comparator outputs at (A2) U6-D/-E are in the form of square-wave pulses, positive at A2Q1 for ON time control, and complementary negative-going turn-off pulses at A2U1-B. The resultant output at A2Q1-C is applied simultaneously to bias drivers (A4) Q1/Q2 at a 40-kHz repetition rate.

Only one of base drivers A4Q1/Q2 will be activated, as their emitters are tied across a 20-kHz, 4.5-volt secondary of bias transformer T1 on the A3 base driver circuit board (Figure 6-5). Thus, while one driver is ON, controlling its respective chopper transistor on the main assembly, the other is OFF. Since the transformer waveform is at 20-kHz, synchronized with the comparator (40-kHz), only alternate outputs are fed to choppers Q1/Q2 on the main assembly (Figure 6-2/-3).

4.4.1 Remote Logic Shutdown

A logic ON/OFF bias generated in the A3 circuit board may be externally switched to momentarily shut down the output voltage. Shorting terminals J1-1 to J1-2 at the rear of the supply connects the bias to A2J1-5/-6 to control optical isolator A2U3. When activated, the d-c OR gate level at A2CR3 increases to a level above the ramp (Figure 4-3), cutting off the duty cycle of the comparator.

4.4.2 Typical Chopper Control Operation

In a typical operating situation, any tendency of the supply output to increase is sensed through error amplifier A2U2. The A2U2 output activates optical isolator A2U4, and A2CR3, increasing the OR gate level to the comparator and thus narrowing the width of the duty-cycle pulse which controls the ON time of chopper Q1/Q2 on the main assembly.

The duty-cycle control function is illustrated in the following diagram.

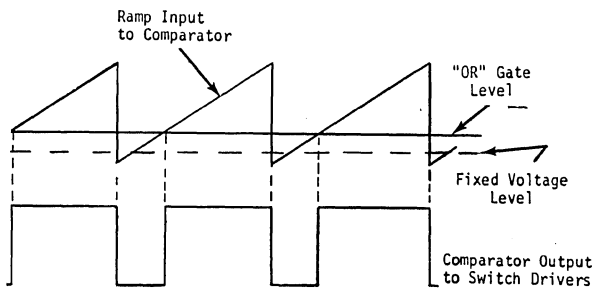


Figure 4-3 (A2) Comparator Duty Cycle Control Function

In the current mode, the voltage at A2CR5 is the controlling voltage from amplifier A2U5. A fixed voltage at A2CR4, determined by the ratio of (A2) R11/R14 establishes a maximum pulse width (minimum OR output) allowable, to prevent chopper transistors Q1 and Q2 from overlapping, and damaging transistors Q1 and Q2 by switching both ON at the same time.

Portions A and E of A2U1 (Figure 6-5) provide for cutting off the duty cycle in the event of a low bias-voltage condition. When the input bias drops below a predetermined level, A2U1-E turns ON resulting in a d-c level at CR4 greater than the ramp level. The duty-cycle output of the comparator is cut off completely, disabling power choppers Q1/Q2.

4.5 BASE DRIVER PCB A3 (Figure 6-6)

Circuit board A3 provides: base drive to the power switching transistors Q3/Q4 on the main (A6) assembly, bias current for the chopper pulse driver (A2), overvoltage sensing shut-off capability, and logic ON/OFF bias.

4.5.1 Start-Up Circuit

Components (A3) Q1/VR1 act as a "start-up" circuit to provide a 5-volt operating potential for (A3) U1-A/-B, and start-up voltages for (A3) U2, U5 and associated circuitry. When the voltage at A3J3-5 reaches its (+) 5-volt level (from the A1 preregulator circuit board) A3CR3 becomes reverse-biased shutting off A3Q1.

4.5.2 Clock Generator Balance Control Comparator/Error Amplifier

The trigger input from the A1 control board at A3J3-6 is used to synchronize reference clock A3U2 through A3Q2. During start-up, the reference clock free-runs until the bias voltage comes up. At this point, A3U2 synchronizes with the A1 preregulator trigger. A narrow 40-kHz clock pulse is generated at A3U2-3 which triggers flip-flop A3U1. The outputs of A3U1 at -12/-13 change state with each subsequent clock pulse, establishing the base drive for bias inverter A3Q5/Q6.

The 40-kHz clock from A3U2 is also applied to balance control comparator A3U5 at pin 2. The output duty cycle at A3U5-3 is inverted through balance error amplifier A3Q7 and applied to the bases of (A3) Q8/Q9 switch drivers. With 20kHz applied to these drivers through A3T1, and the 40-kHz pulses applied at each base, only alternate clock outputs appear as driver outputs to the main switching transistors Q3/Q4 in the power inverter.

The pulse width at A3U5-3 determines the power inverter OFF time, and establishes the proper Q3/Q4 current balance. The pulse width (typically 2.5 microseconds), and thus the OFF time, is governed by error amplifier A3Q4, which feeds back error signals to U5-5. The greater the error, the wider the pulse generated by A3U5. The proper current balance for the power inverter is therefore maintained.

4.5.3 Bias Transformer/Inverter

Transformer A3T1 is the bias current source for the following functions:

Logic ON/OFF bias

Base drive to chopper control transistors in the A2 circuit board

Base drive for the power inverter switching transistors on the main assembly

Primary drive for A3T1 occurs through bias inverter transistors A3Q5/Q6, controlled by base drive inputs from flip-flop multivibrator A3U1. A3U1 is synchronized with the 40-kHz clock from A3U2 discussed earlier. A3U1-B provides a 20-kHz push-pull output for bias inverter base drive.

4.5.4 Overvoltage (OV) Circuit

Under normal supply output conditions, pin A3U1-9 remains high, which maintains a high at "Q" outputs to the bias inverter. In the event of an overvoltage condition at the supply output, OV error amplifier A3/U3 reacts through output sense lines at TB1-2/-3. Optical isolator A3U4 is activated, applying a low to A3U1 pin 6 (CLEAR). The output at pins 9 and 2 go low, removing the clock at A3U1-1, stopping the flip-flop action. Base drive to the bias inverter is removed, shutting down the supply. The input power must then be recycled to continue operation.

4.5.5 Logic ON/OFF Bias Remote Shut-down

A separate secondary on A3T1 generates the bias voltage at A3J4-1/-2 which is used to cut off the supply output as detailed in paragraph 4.4.1.

4.6 OUTPUT CIRCUIT (Figures 6-2/-3)

The controlled 120-200 volts from the input

power choppers (paragraph 4.2) establishes the operating voltage for power inverter Q3/Q4/T1. Switches Q3/Q4 in the push-pull mode provide a nearly constant (90%) duty cycle to power transformer T1 (with small adjustment for current balance).

At the secondary, rectification takes place through CR12. The resultant 40-kHz signal is then filtered by L8/C9 and L9/C10 and appears as the supply output voltage. The integration function of the filtering reduces the 40-kHz component of the output to less than 3 millivolts (typically).

4.7 RADIO FREQUENCY INTERFERENCE (RFI) CONTROL

The switching action of this type of supply might be expected to create a source of RFI. The design of the SSD series has minimized this interference, using the limits specified in MIL-STD 461A as a reference.

Conducted interference on the input lines is considerably reduced by L1/L2/L3 together with C3/C4 on the main chassis. Conducted interference at the output load and sense leads is minimized by RFI chokes L8, L9, and L10 and caps C14 through C19. Radiated interference is effectively minimized by the metal enclosure of the SSD series power supplies.

5. SERVICE AND REPAIR

5.1 GENERAL

This section provides unit troubleshooting data, and calibration and performance-testing procedures. The troubleshooting data should be used in conjunction with the schematic diagrams and parts location drawings in section 6: (Drawings and Parts List), plus section 4 which outlines the theory of operation. Questions pertaining to repair should be directed to the nearest Sorensen service representative or to the Service Dept., Sorensen Company, 676 Island Pond Road, Manchester, N. H. 03103. Include the model and serial numbers in any correspondence. Should it be necessary to return a unit to the factory for repair, authorization from the Sorensen service department must first be obtained. Sorensen Company will not assume responsibility for units returned without prior authorization.

Unit troubleshooting hints are provided in Table 5-1 in the form of SYMPTOM/PROBABLE CAUSE/REMEDY. Where practicable, step-by-step procedures are used to facilitate isolation of a problem area.

Care should be taken when replacing any component, even if it appears obviously defective. A failed component is generally the result of a malfunction elsewhere in the system. It is the purpose of this troubleshooting procedure to help isolate both the failed component and the cause of its failure.

5.2 PERIODIC SERVICING

The SSD models require no periodic servicing. However, when a unit is taken off line it is recommended that the enclosure be inspected and cleaned of any accumulations of dust or other debris which could impede the free flow of air through the unit.

5.3 TEST EQUIPMENT REQUIRED

Use the test equipment listed (or an equivalent)

1. Oscilloscope, dual trace, 20-200MHz bandwidth, isolated from ground (Tektronix 454 or 475 with 10X voltage probe for channel A)
2. Current probe (Tektronix P6042)
3. Digital voltmeter (Fluke 8400)
4. Differential voltage probe (Tektronix P6046)

5. True RMS voltmeter (Hewlett Packard HP-3403C) or Fluke 8400-09
6. VOM (Simpson 260)

CAUTION

1. During testing, use an isolation transformer whenever possible. If impractical to use an isolation transformer, DO NOT GROUND TEST EQUIPMENT.
2. Each time the unit is opened, re-check for input and output isolation to case ground before turn-on.

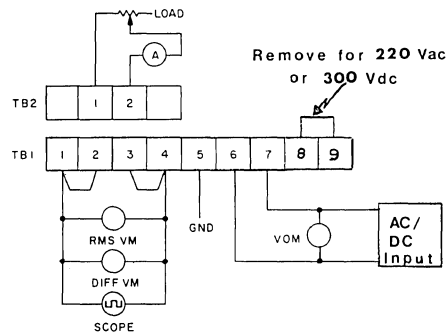


Figure 5-1
Test Equipment Setup

5.4 TROUBLESHOOTING

5.4.1 General Considerations

Before attempting repairs, the SSD unit should be carefully inspected for apparent defects, such as broken or damaged components/connectors or PCB, or for obvious heat damage or loose pin connections.

After replacing an electrical component, the Hi-pot test procedure as outlined in paragraph 5-6, and the simulated turn-on procedure outlined in paragraph 5.5.1 should be performed before placing the unit in service.

The physical size and shape of a replacement part can have an effect on the performance of the power supply. The part should therefore be a direct replacement whenever possible. Section 6 of this manual contains all schematics and component location drawings, plus replaceable parts along with the Sorensen and manufacturer part numbers as applicable.

5.4.2 Switching Transistors Q1-Q4



The casings of these transistors are "live" during operation.

1. Set input power to OFF, and remove the transistor connector.
2. With a VOM set to the R X 1 scale, measure an open circuit from the collector (+) to the emitter (-) of each power transistor. If a resistance of 15 ohms or less is encountered, remove the transistor from the circuit and repeat the resistance test. A low reading indicates a faulty transistor.

NOTE

If a transistor requires replacement, the cause

of failure should be determined before re-applying input power.

5.4.3 Overvoltage Protection (OVP) Circuit

If OVP function occurs repeatedly, check for proper setting of OVP adjustment potentiometer R2 on the front panel. If necessary, reset per paragraph 3.3.4 in section 3 of this manual. Assure that the sensing links at the output connector are intact across terminals TB1-1 and -2, and TB1-3 and -4.

Continued malfunction of the OVP may indicate problems in the A3 Base Drive circuit board.



Whenever a component is replaced in the SSD system, perform Hi-Pot test (para 5.6) and Simulated Turn-on Procedure (para 5.5.1) before placing the unit in service.

Table 5-1 Main Chassis Troubleshooting

SYMPTOM	PROBABLE CAUSE	REMEDY
1. No Output: Input Fuse (F1) intact.	A. Remote shutdown function operational.	Remove short across J1-1/J1-2 at rear of unit.
	B. Overvoltage protection circuit tripped.	1) Check OVP indicator LED (red). If lit, proceed as follows. 2) Reapply input voltage after approximately 10 seconds. 3) Verify proper setting of OVP trip point (R2, accessible on front panel). CW adjustment increases the output voltage trip point. If this adjustment resolves the problem, reset R2 per paragraph 3.3.4 in section 3 of this manual. 4) If OVP tripping recurs with normal output loading, or with no output, refer to OVP troubleshooting procedure (paragraph 5.4.3).
	C. Current limit improperly adjusted.	If, During unit calibration or repair, potentiometer R11 on PCB A2 has been left in the fully CCW position, no output will appear. Refer to final calibration procedure (paragraph 5.5.2).
	D. Output circuit shorted.	Check individual output circuit components.
	E. 115-volt input with TB1-8/-9 link open.	Insert link.
	F. Internal fuse (F2) on main circuit board (A4) open.	1) Remove supply case, check commutation diode CR5. 2) Check power transistor Q1, as outlined in switching transistor troubleshooting in paragraph 5.4.2.
	G. A1F1 (fuse on A1 circuit board) open (internal F2 intact).	1) Check power transistors Q1 thru Q4 per paragraph 5.4.2. 2) Check bias inverter transistors (A3) Q5/Q6 on base drive board A3.
2. No Output: All fuses intact.	A. Power inverter transistor(s) failure.	Check Q3/Q4 per paragraph 5.4.2.
	B. Output short (unit in current-limiting mode).	Check current limiter LED indicator (yellow). If lit, check individual output components.
	C. A3 board start-up circuit malfunction.	Check (A3) Q1/VR1.
3. No Output: Input Fuse (F1) open.	A. Input rectifier filter.	Check/replace.
	B. 220-volt input with TB1-8/-9 link intact.	Remove link (used only with 115-volt input). Check for possible damage to input capacitors C3/C4, and internal fuse A6F1. Also check fuse A1F1 on preregulator circuit board, (if open, refer to SYMPTOM 1.G).
	C. Input pin TB1-6 or TB1-7 shorted to ground.	Isolate input lines from chassis.

Table 3-1 Main Chassis Troubleshooting (cont'd)

SYMPTOM	PROBABLE CAUSE	REMEDY
3. No Output: Input Fuse (F1) open (cont'd).	D. Power transistor failure.	Check transistors per paragraph 3.4.2.
	E. Input circuit failure.	Proceed to simulated turn-on procedure in paragraph 3.5.1.
4. High Output:	Improper setting of VOLT adjust (R26) or OVP adjust (R24), accessible at front panel.	Reset R4 and/or R2 per paragraph 3.5.2.
5. Low Output:	Current limit (A2R10) or VOLT control (R26) improperly adjusted.	Readjust per calibration procedure (paragraph 3.5.2).
6. Excessive ripple on output:	A. Low line input.	Monitor input line voltage.
	B. Measuring instrument improperly grounded.	Ground instrument.
	C. RFI L8/L9/L10 defective.	Visually inspect for signs of deterioration or damage.
	D. Output filter capacitors malfunctioning or defective.	1) Check for proper tightening of capacitor hold-down screws. 2) Check capacitors for short/open.
7. Poor regulation:	A. Measuring across load terminals.	Regulation must be measured across sensing terminals.
	B. Unit overload.	Load not to exceed maximum rated current specification.
	C. Current limit improperly adjusted.	Refer to adjustment procedure in paragraph 3.5.2.
8. Output Oscillates:	A. Output filter.	Check filter capacitors for damage or loose hold-down screws.
	B. 40-kHz frequency improperly adjusted (oscillation with no load).	Check frequency. Adjust A1R3 as required for precisely 40 kHz.
	C. Output of voltage sense amplifier A2U 2 improperly adjusted.	With high line input (132 Vac), and minimum output at no load, check for 9.5 Vdc at test points (+) and (-) adjacent to potentiometer A2R22 on A2 circuit board. Adjust A2R22 if necessary.

5.5 OPERATIONAL CHECKOUT

Whenever a component is repaired and/or replaced, the appropriate operational check procedure should be performed prior to placing the unit in service:

1. hi-Pot test (Paragraph 5.6)
2. Output failure; final calibration cedure (paragraph 5.5.2).
3. Input or circuit board failure; simulated turn-on procedure paragraph 5.5.1 (internal fuse F2 removed to isolate power drive components) followed by final calibration.

5.5.1 Simulated Turn-on Procedure

Use the test equipment listed in paragraph 5.3 as required in the following procedures.

1. Set unit power to OFF and remove cover. REMOVE INTERNAL FUSE F2. Connect voltmeter, set to the 250-volt range, across A1C12 (C12 on regulator board A1).
2. Set current-limit control A2R11 to its approximate mid-position.
3. Connect current probe to green common-emitter wire of Q3/Q4 power transistors.
4. Set input power to ON. A1C12 voltage should be approximately 150 Vdc. (If zero volts, check A1F1; if considerably higher than 150 Vdc, a faulty A3 circuit board is indicated).
5. Q3/Q4 drive current should be approximately 1.1A. Current pulse OFF time should be from 3.5 to 5.0 usec (see Figure 5-2).

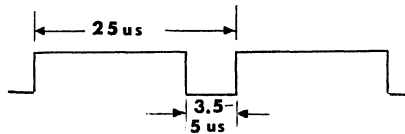


Figure 5-2
Drive Current Waveform

6. Connect current probe to green common-emitter wire of drivers Q1/Q2. This level should also be approximately 1.1A with a current pulse OFF time of 2 to 4 usec.

7. Momentarily short J1-1 to J1-2 at the rear of the supply to check the shut-down function. Q1/Q2 drive current should be cut off.
8. Set unit power to OFF, and replace internal fuse F2. Set current limit control A2R11 fully counterclockwise.
9. Apply input power. Unit will be in deep current limiting mode (zero output voltage). Turn A2R11 slowly clockwise. Output will gradually increase to a preset level. Reset current limit as described in paragraph 5.5.2.

5.5.2 Final Calibration

If the switching transistors and/or drive circuit components have been changed, perform tests per previous paragraph 5.5.1 before continuing.

1. Remove input power and connect current probe to (green) common-emitter wire of Q3/Q4 output transistors.
2. Connect the digital voltmeter and rms voltmeter across the output sensing terminals (TB1-1 and -4).
3. On front panel, set the output voltage control (R4) to its approximate mid-range, and the OVP control R2 fully clockwise.
4. Remove load from output.
5. Set current limit adjust A2R11 fully counterclockwise.
6. Apply nominal input power and turn A2R11 slowly clockwise. The output voltage should increase and the current waveform on oscilloscope should appear as in pattern of Figure 5-3.
7. Set output voltage to desired level.
8. Reset current limit control A2R11 to 108% of rated 40°C current, and reset OVP to the greater of 1.2 volts or 10% above rated output voltage. Both procedures are outlined in section 3, Operation.

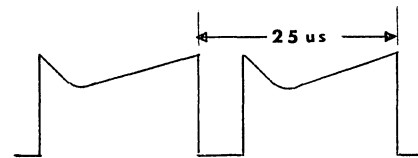


Figure 5-3
Output Current Waveform

5.6 HIGH POTENTIAL TEST

High potential test procedures have been carefully carried out at the factory. These units are 100% tested and they should not require further testing in the field.

High potential tests can overstress or destroy the power semi-conductors in this power supply.

If it is essential to use the high potential test method, please contact the factory for information on special precautions that should be taken.



Sorensen Company cannot be held liable for any malfunction resulting from the application of a high potential test (greater than 100V). See standard Sorensen Co. warranty.

6 DRAWINGS AND PARTS LISTS

6.1 INTRODUCTION

This section contains system and sub-system schematic diagrams, component location diagrams and coded "replaceable parts list" tables, keyed to Figures 6-1 through 6-9. Table 6-1 covers all components in the module IVB group (Figure 6-1) and Table 6-2 covers all components in the module VIA group (Figure 6-2).

Figures 6-3 through 6-7 depict plug-in printed circuit boards common to all models in the module IVB and VIA series.

6.2 TABLE HEADINGS DEFINED

6.2.1 Circuit Symbol

This is an alpha-numeric identification of the component as called out on the unit drawings.

6.2.2 Sorensen P/N

This number should be used when ordering parts direct from:

Sorensen Company
Replacement Parts Dept.
676 Island Pond Road
Manchester, N. H. 03103

6.2.3 Mfr., Type

This is the basic group or series under which the part is listed by a manufacturer. The coded identification of representative manufacturers is summarized below, listed alphabetically.

MANUFACTURER CODES

<u>Mfr. Code</u>	<u>Manufacturer</u>	<u>Mfr. Code</u>	<u>Manufacturer</u>
AB	Allen Bradley Co.	ME	Mepco, Inc.
AC	Acushnet Capacitor Co.	MG	Magnetics, Inc.
AER	Aerovox Corp.	NS	National Semiconductor
BNS	Bourns, Incorporated	RAM	RAM Electronics
BUS	Bussman Mfg./Div. McGraw-Edison	RCA	RCA Corporation
CD	Cornell-Dublier Corp.	RCL	RCL Electronics
CG	Corning Glass Works	RDM	Radio Material Co./Div. P.R. Mallory
CL	Clarostat Corp.	RO	Rodan
CTS	CTS Corporation	SAN	Sangamo Electric
ELA	Electra/Midland	SE	Seacor, Incorporated
EMC	Electromotive Mfg. Co.	SEM	Semtech Corporation
GE	General Electric Co.	SEN	Sensitron Semiconductor
GI	General Illuminating Co.	SIG	Signetics Corp.
HP	Hewlett Packard	SP	Sprague Electric
IND	Industrial Devices	SR	Sorensen Company
IR	International Rectifier	ST	Solitron Devices
ITT	International Telephone	STM	STM Corporation
KEM	Kemet Div. Union Carbide Corp.	TEL	Teledyne Semiconductor Division
KC	Keystone Carbon	TI	Texas Instruments
LF	Littelfuse Corporation	TL	Tel-Labs
MA	Motorola	TRW	TRW
MAL	P. R. Mallory Co.	UC	Union Carbide
		WH	Westinghouse Semiconductor Division
		SL	Ward Leonard

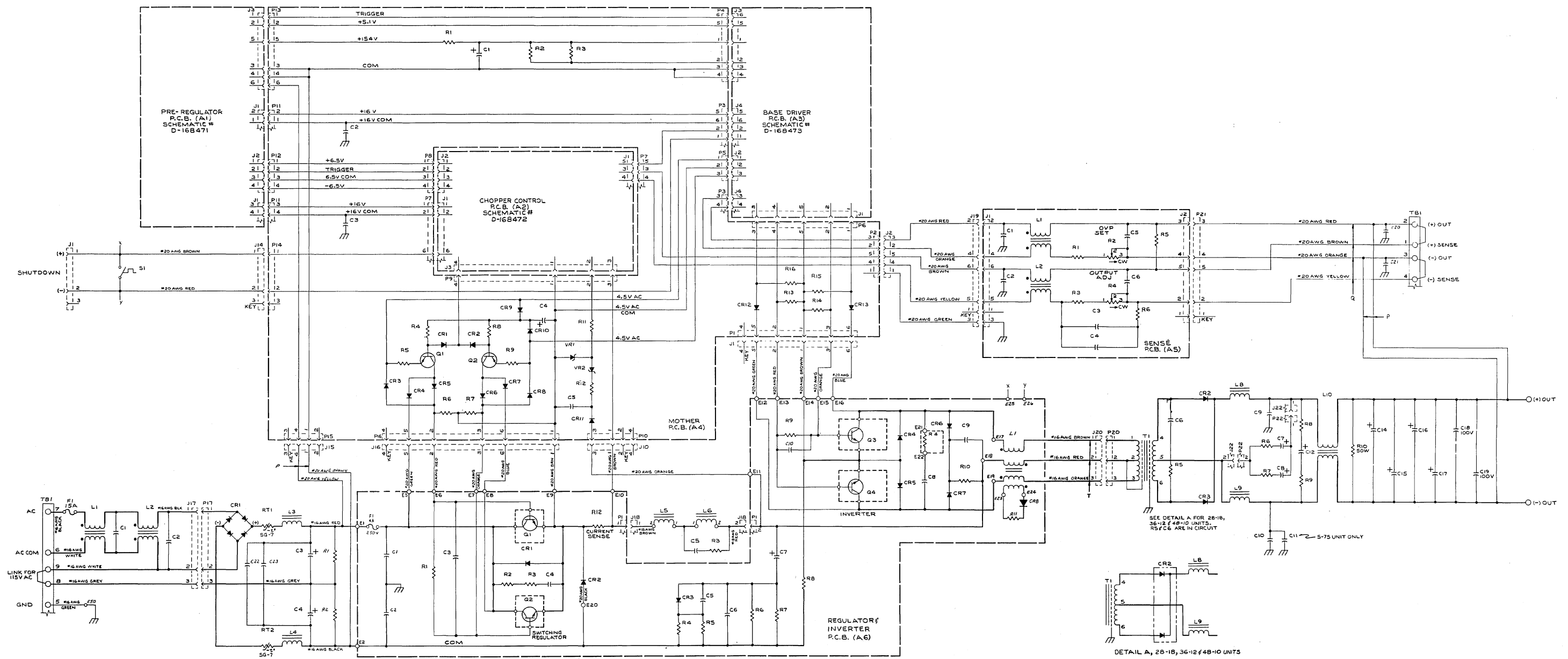


Figure 6-1
SSD Module IVB System Schematic Diagram

Table 6-1
Replaceable Parts List
SSD Module IVB, Main Assembly*

CIRCUIT SYMBOL	SSD-D Model								DESCRIPTION	SORENSEN PART NUMBER	MANUFACTURER, TYPE
	5-75	9-50	12-38	15-32	24-22	28-18	36-13	48-10			
									Capacitors (uF unless noted)		
C1	x	x	x	x	x	x	x	x	0.1, 500V	235-7207P41	SP, Y5V
C2	x	x	x	x	x	x	x	x	0.1, 500V	235-7407P41	SP, Y5V
C3	x	x	x	x	x	x	x	x	2,000, 200V	981329-1	Merco, T0200
C4	x	x	x	x	x	x	x	x	2,000, 200V	981329-1	Merco, T0200
C5	x	x	x	x	x	x	x	x	470pF, 500V	235-7355P272	EMC, DM19
C6	x								0.0033, 300V	235-7355P65	EMC, DM19
		x	x						1000pF, 300V	235-7355P42	EMC, DM19
				x					680pF, 300V	235-7355P248	EMC, DM19
					x				330pF, 300V	235-7355P414	EMC, DM19
						x			220pF, 300V	235-7355P215	EMC, DM19
							x		150pF, 300V	235-7355P406	EMC, DM19
								x	100pF, 300V	235-7355P207	EMC, DM19
C7	x								220, 10V	586057-10	UC, MIL
		x	x						100, 20V	586385-10	UC, T110
				x	x				47, 35V	586058-27	UC, MIL
						x			18, 50V	585071-44	UC, MIL
							x		10, 75V	586386-8	UC, MIL
C8	x								220, 10V	586057-10	UC, MIL
		x	x						100, 20V	586385-10	UC, T110
				x	x				47, 35V	586058-27	UC, MIL
						x			18, 50V	585071-44	UC, MIL
							x		10, 75V	586386-8	UC, MIL
C9	x	x	x	x	x	x	x	x	.01, 500V	235-7207P41	SP, Y5V
C10	x	x	x	x	x	x	x	x	.01, 500V	235-7207P41	SP, Y5V
C11	x	x	x	x	x	x	x	x	.01, 500V	235-7207P41	SP, Y5V
C12	x								36,000, 10V	167817-9	MG
		x							19,000, 15V	167817-10	MG
			x						16,000, 20V	167817-11	MG
				x					12,000, 25V	167817-12	MG
					x				11,000, 30V	167817-13	MG
						x			7,400, 40V	167817-14	MG
							x		5,700, 50V	167817-15	MG
								x	3,000, 75V	167817-16	MG
C14	x								220, 10V	586057-10	UC, MIL
		x	x						100, 20V	586385-10	UC, T110
				x					47, 35V	586058-27	UC, MIL
					x				22, 50V	585071-45	UC, MIL
						x			18, 50V	585071-44	UC, MIL
							x		10, 75V	586386-8	UC, MIL
C16	x								220, 10V	586057-10	UC, MIL
		x	x						100, 20V	586385-10	UC, T110
				x					47, 35V	586058-27	UC, MIL
					x				22, 50V	585071-45	UC, MIL
						x			18, 50V	585071-44	UC, MIL
							x		10, 75V	586386-8	UC, MIL
C17	x								220, 10V	586057-10	UC, MIL
		x	x						100, 20V	586385-10	UC, T110
				x					47, 35V	586058-27	UC, MIL
					x				22, 50V	585071-45	UC, MIL
						x			18, 50V	585071-44	UC, MIL
							x		10, 75V	586386-8	UC, MIL
C18	x	x	x	x	x				0.56, 100V	587626-6	SE, 105
						x	x		0.22, 100V	587626-3	SE, 105
C19	x	x	x	x	x				0.56, 100V	587626-6	SE, 105
						x	x		0.22, 100V	587626-3	SE, 105
C20	x	x	x	x	x	x	x		0.1, 500V	235-7207P41	SP, Y5V
C21	x	x	x	x	x	x	x		0.1, 500V	235-7207P41	SP, Y5V
C22	x	x	x	x	x	x	x		0.1, 500V	235-7207P41	SP, Y5V
C23	x	x	x	x	x	x	x		0.1, 500V	235-7207P41	SP, Y5V

Table 6-1
Replaceable Parts List
SSD Module IVB, Main Assembly* (cont'd)

CIRCUIT SYMBOL	SSD-D Model								DESCRIPTION	SORENSEN PART NUMBER	MANUFACTURER, TYPE
	5-75	9-50	12-38	15-32	24-22	28-18	36-13	48-10			
									Diodes		
CR1	x	x	x	x	x	x	x	x	SD5178	588096-4	Varo, K014
CR2	x	x	x						1N3910	165196-2	TRW, SD5178
					x	x			Bridge Rect	587842-2	WH
CR3	x	x	x						SD5178	981438-3	NAE, INC
						x	x		1N3910	165196-2	TRW, SD5178
										587842-2	WH
F1	x	x	x	x	x	x	x	x	Fuse	42-1811	BUS
XF1	x	x	x	x	x	x	x	x	Fuseholder	167373-1	BUS
									Inductors		
L1	x	x	x	x	x	x	x	x	AC RFI Choke	168769-1	SR
L2	x	x	x	x	x	x	x	x	AC RFI Choke	168769-1	SR
L3	x	x	x	x	x	x	x	x	DC Input RFI Choke	168768-1	SR
L4	x	x	x	x	x	x	x	x	DC Input RFI Choke	168768-1	SR
L5	x	x	x	x	x	x	x	x	1st Input Choke Ass'y	169196-1	SR
L6	x	x	x	x	x	x	x	x	Choke Ass'y	169198-1	SR
L8	x								1st Output Choke Ass'y	168460-1	SR
		x								168460-2	SR
			x							981478-1	SR
				x						981478-2	SR
					x					169193-1	SR
						x				169193-2	SR
							x			169193-3	SR
								x		169193-4	SR
L9	x								Choke Ass'y	169942-1	SR
		x	x							169942-2	SR
				x	x					169943-1	SR
						x				169943-2	SR
							x	x		169943-3	SR
									Resistors (ohms)		
R1	x	x	x	x	x	x	x	x	47K, 2W, 10%	280-1147P134	AB, HB
R2	x	x	x	x	x	x	x	x	47K, 2W, 10%	280-1147P134	AB, HB
R3	x	x	x	x	x	x	x	x	470, 3W	167401-105	TL, EL-21
R5	x	x	x	x	x	x	x	x	10, 2W, 10%	280-1147P2	AB, HB
R6	x								0.10, 3W, 5%	167401-17	TL, EL-21
		x	x						0.18, 3W	167401-23	TL, EL-21
				x	x				0.33, 3W	167401-29	TL, EL-21
						x			1.0, 3W	167401-41	TL, EL-21
							x	x	2.2, 3W	167401-49	TL, EL-21
R7	x								0.10, 3W	167401-17	TL, EL-21
									0.18, 3W	167401-23	TL, EL-21
									0.33, 3W	167401-29	TL, EL-21
									1.0, 3W	167401-41	TL, EL-21
									2.2, 3W	167401-49	TL, EL-21
R8	x								3.376 mOhms, 10%	981581-1	SR
		x							5.06 mOhms, 10%	981581-2	SR
			x	x	x				20.93 mOhms, 10%	981581-3	SR
R9	x								3.376 mOhms, 10%	981581-1	SR
		x							5.06 mOhms, 10%	981581-2	SR
									20.93 mOhms, 10%	981581-3	SR
									38.78 mOhms, 10%	981581-5	SR
R10	x								1.82, 50W, 1%	586677-502	DA, RH50
		x							3.48, 50W	586677-509	DA, RH50
			x						6.49, 50W	586677-175	DA, RH50
				x					12.1, 50W	586677-517	DA, RH50

Table 6-1
 Replaceable Parts List
 SSD Module IVB, Main Assembly* (cont'd)

CIRCUIT SYMBOL	SSD-D Model								DESCRIPTION	SORENSEN PART NUMBER	MANUFACTURER, TYPE
	5-75	9-50	12-38	15-32	24-22	28-18	36-13	48-10			
cont'd									<u>Resistors (ohms) - (cont'd)</u>		
R10				x		x		x	30.1, 50W	586677-524	DA, RH50
									38.3, 50W	586677-527	DA, RH50
								x	64.9, 50W	586677-271	DA, RH50
									115, 50W	586677-295	DA, RH50
RT1	x	x	x	x	x	x	x	x	Thermistor SG-7	169485-7	Rodan Ind.
RT2	x	x	x	x	x	x	x	x	Thermistor SG-7	169485-7	Rodan Ind.
									<u>Transformers</u>		
T1	x									169208-1	SR
		x								169208-2	SR
			x							169208-3	SR
				x						169208-4	SR
					x					169208-5	SR
						x				169208-6	SR
							x			169208-7	SR
								x		169208-8	SR
TB1	x	x	x	x	x	x	x	x	Terminal Strip	169290-9	Kulka
									<u>Miscellaneous</u>		
		x	x	x	x				Schematic Cover	J981366	SR
						x	x	x	Cover	168887-1	SR
									Cover	981577-1	SR
P1									Logic Shutdown Plug (Requires following items)		
									1 each 09-67-1031 (Molex)	589801-3	Molex
									1 each 09-50-7031 (Molex)	586287-11	Molex
									3 each 09-50-0106 (Molex)	586289-2	Molex
A1	x	x	x	x	x	x	x	x	Preregulator PCB Ass'y	168462-1	SR
A2	x	x	x	x	x	x	x	x	Chopper Control PCB Ass'y	168464-2	SR
A3	x	x	x	x	x	x	x	x	Base Drive PCB Ass'y	168466-1	SR
A4	x	x	x	x	x	x	x	x	Mother PCB Ass'y	168468-3	SR
A5	x								Sense PCB Ass'y	168470-12	SR
		x								168470-13	SR
			x							168470-14	SR
				x						168470-15	SR
					x					168470-16	SR
						x				168470-7	SR
							x			168470-8	SR
								x		168470-9	SR
A6	x	x	x	x	x	x	x	x	Reg. & Inv. PCB Ass'y	981228-1	SR

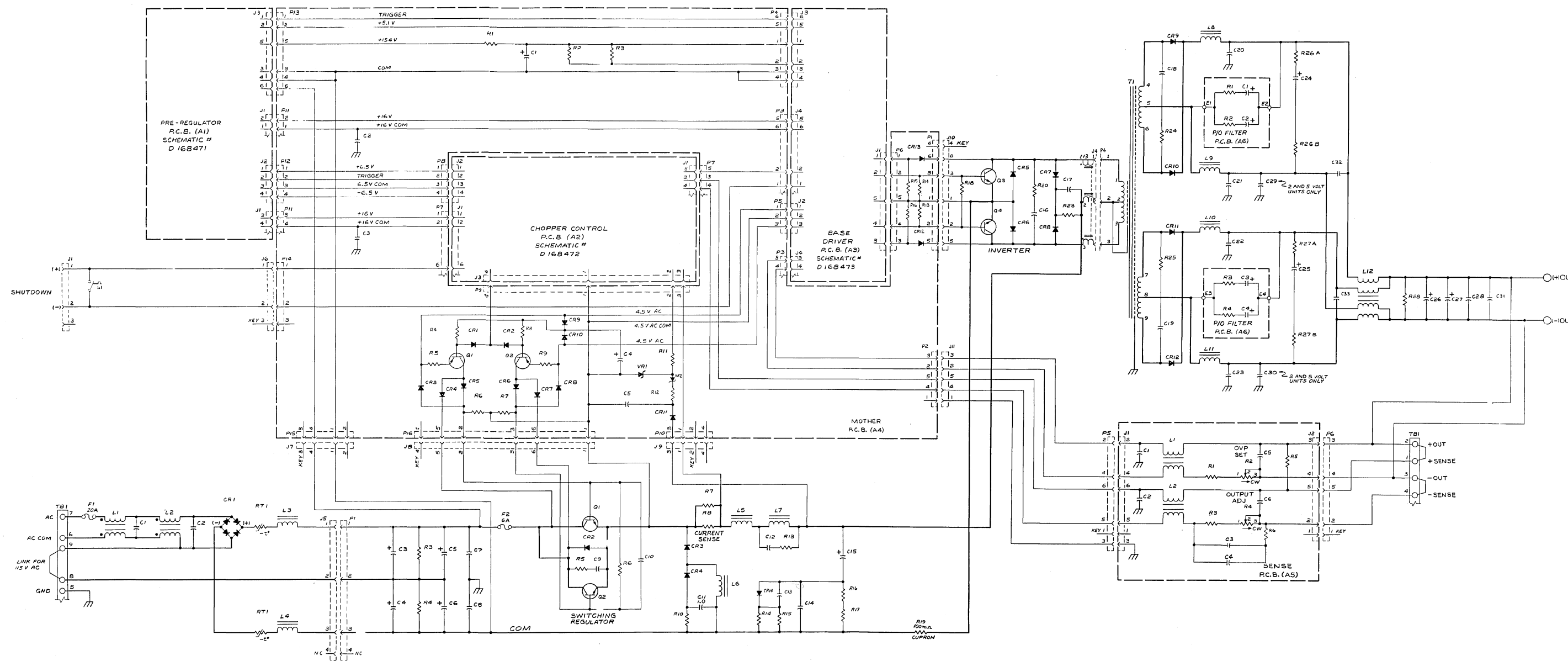


Figure 6-2
SSD Module VIA System Schematic Diagram

Table 6-2
Replaceable Parts List
SSD Module VIA, Main Assembly*

CIRCUIT SYMBOL	SSD-DX Model								DESCRIPTION	SORENSEN PART NUMBER	MANUFACTURER, TYPE
	5-120	5-150	9-80	12-60	15-45	24-32	28-25	36-19			
									Capacitors (uF unless noted)		
C1	x	x	x	x	x	x	x	x	0.10, 500V	235-7207P41	SP, Y5V
C2	x	x	x	x	x	x	x	x	0.10, 500V	235-7207P41	SP, Y5V
C3	x	x	x	x	x	x	x	x	1500, 200V	586052-2	CD, FAH
C4	x	x	x	x	x	x	x	x	1500, 200V	586052-2	CD, FAH
C5	x	x	x	x	x	x	x	x	1500, 200V	586052-2	CD, FAH
C6	x	x	x	x	x	x	x	x	1500, 200V	586052-2	CD, FAH
C7	x	x	x	x	x	x	x	x	.01, 1600V	235-7207P30	SP, Y5V
C8	x	x	x	x	x	x	x	x	.01, 1600V	235-7207P30	SP, Y5V
C9	x	x	x	x	x	x	x	x	560pF, 500V	235-7355P420	EMC, DM19
C10	x	x	x	x	x	x	x	x	0.01, 400V	587626-89	SE, 105
C11	x	x	x	x	x	x	x	x	1.0, 200V	24-2409-19	AC, V146XR
C12	x	x	x	x	x	x	x	x	560pF, 500V	235-7355P420	EMC, DM19
C13	x	x	x	x	x	x	x	x	3.3, 100V	24-2037-25	SE, MMK
C14	x	x	x	x	x	x	x	x	1.8, 100V	24-2037-22	SE, MMK
C15	x	x	x	x	x	x	x	x	175, 300V	169321-2	MAL
C16	x	x	x	x	x	x	x	x	1800pF, 500V	235-7355P432	EMC, DM19
C17	x	x	x	x	x	x	x	x	0.22, 200V	24-2409-15	AC, V146XR
C18	x	x							0.0033, 1000V	235-7421P21	RDM, JF
			x	x					0.001, 1000V	235-7421P14	RDM, JF
					x				680pF, 300V, 5%	235-7053P325	EMC, DM15
						x			330pF, 300V, 10%	235-7053-141	EMC, DM15
							x		220pF, 300V, 10%	235-7053P121	EMC, DM15
								x	150pF, 300V, 5%	235-7053P104	EMC, DM15
								x	100pF, 300V, 10%	235-7053P89	EMC, DM15
C19	x	x							0.0033, 1000V	235-7421P21	RDM, JF
			x	x					0.001, 1000V	235-7421P14	RDM, JF
					x				680pF, 300V, 5%	235-7053P325	EMC, DM15
						x			330pF, 300V	235-7053P141	EMC, DM15
							x		220pF, 300V	235-7053P121	SAN, 015
								x	150pF, 300V, 5%	235-7053P104	SAN, 015
								x	100pF, 300V	235-7053P89	SAN, 015
C20	x	x	x	x	x	x	x	x	0.1, 500V	235-7207P41	SP, Y5V
C21	x	x	x	x	x	x	x	x	0.1, 500V	235-7207P41	SP, Y5V
C22	x	x	x	x	x	x	x	x	0.1, 500V	235-7207P41	SP, Y5V
C23	x	x	x	x	x	x	x	x	0.1, 500V	235-7207P41	SP, Y5V
C24	x	x							36,000, 10V	167817-9	MG
									19,000, 15V	167817-10	MG
									16,000, 20V	167817-11	MG
									12,000, 25V	167817-12	MG
									11,000, 30V	167817-13	MG
									7400, 40V	167817-14	MG
									5700, 50V	167817-15	MG
									3000, 75V	167817-16	MG
C25	x	x							36,000, 10V	167817-9	MG
			x						19,000, 15V	167817-10	MG
				x					16,000, 20V	167817-11	MG
					x				12,000, 25V	167817-12	MG
						x			11,000, 30V	167817-13	MG
							x		7400, 40V	167817-14	MG
								x	5700, 50V	167817-15	MG
								x	3000, 75V	167817-16	MG
C26	x	x							220, 10V	586057-10	UC, MIL
			x	x					100, 20V	586385-10	UC, T110
					x				47, 35V	586058-27	UC, MIL
						x	x		18, 50V	585071-44	UC, MIL
								x	10, 75V	586386-8	UC, MIL
C27	x	x							220, 10V	586057-10	UC, MIL
			x	x					100, 20V	586385-10	UC, T110
					x				47, 35V	586058-27	UC, MIL

Table 6-2
Replaceable Parts List
SSD Module VIA, Main Assembly* (cont'd)

CIRCUIT SYMBOL	SSD-DX Model								DESCRIPTION	SORENSEN PART NUMBER	MANUFACTURER, TYPE
	5-120	5-150	9-80	12-60	15-45	24-32	28-25	36-19			
									Capacitors (uF unless noted) - (cont'd)		
cont'd									18, 50V	585071-44	UC, MIL
C27						x	x		10, 75V	586386-8	UC, MIL
								x	0.56, 100V	24-2037-16	SE, MMK
C28	x	x	x	x	x				0.22, 100V	24-2037-11	SE, MMK
C29	x	x							0.1, 500V	235-7207P41	SP, Y5V
									Not Used		
C30	x	x							.1uF, 500V	235-7207P41	SP, Y5V
									Not Used		
C31	x	x	x	x	x	x	x	x	0.56, 100V	587626-6	SE, 105
									0.22, 100V	24-2037-11	SE, MMK
C32	x	x	x	x	x				0.56, 100V	587626-6	SE, 105
									0.22uF, 100V	587626-3	SE, 105
C33	x	x	x	x	x				0.56, 100V	587626-6	SE, 105
									0.22uF, 100V	587626-3	SE, 105
									Diodes		
CR1	x	x	x	x	x	x	x	x	Rectifier, 400JB6L	169318-1	IR
CR2	x	x	x	x	x	x	x	x	SEN-R-42	586378-4	SEN
CR3	x	x	x	x	x	x	x	x	1N3983	169317-1	MA
CR4	x	x	x	x	x	x	x	x	400V	165360-5	MA, 1N3883
CR5	x	x	x	x	x	x	x	x	SEN-R-42	586378-4	SEN
CR6	x	x	x	x	x	x	x	x	SEN-R-42	586378-4	SEN
CR7	x	x	x	x	x	x	x	x	600V, 1A	586379-8	SEM, SIF6
CR8	x	x	x	x	x	x	x	x	600V, 1A	586379-8	SEM, SIF6
CR9	x	x	x						SD5178	165196-2	TRW, SD5178
									SD51	165196-1	TRW, SD51
									200V	588097-3	WH, 1N3901
CR10	x	x	x						SD5178	165196-2	TRW, SD5178
									SD51	165196-1	TRW, SD51
									200V	588097-3	WH, 1N3901
CR11	x	x	x						SD5178	165196-2	TRW, SD5178
									SD51	165196-1	TRW, SD51
									200V	588097-3	WH, 1N3901
CR12	x	x	x						SD5178	165196-2	TRW, SD5178
									SD51	165196-1	TRW, SD51
									200V	588097-3	WH, 1N3901
CR14	x	x	x	x	x	x	x	x	363B	587305-1	WH
									Fuses		
F1	x	x	x	x	x	x	x	x	20A, 600Vac	169526-1	BUS
F2	x	x	x	x	x	x	x	x	6A, 250V	226-7176P58	BUS
									Fuseholders		
XF1	x	x	x	x	x	x	x	x		980080-1	BUS
XF2	x	x	x	x	x	x	x	x		343-1011P2	BUS
									Inductors		
L1/2	x	x	x	x	x	x	x	x	AC RFI Choke	168769-1	SR
L3/4	x	x	x	x	x	x	x	x	DC Input RFI Choke	168768-1	SR
L5	x	x	x	x	x	x	x	x	1st Input Choke Ass'y	168454-1	SR
L6	x	x	x	x	x	x	x	x	Choke	169516-1	SR
L7	x	x	x	x	x	x	x	x	2nd Input Choke Ass'y	168456-1	SR
L8/10	x	x							1st Output Choke Ass'y	168460-1	SR

Table 6-2
Replaceable Parts List
SSD Module VIA, Main Assembly* (cont'd)

CIRCUIT SYMBOL	SSD-DX Model									DESCRIPTION	SORENSEN PART NUMBER	MANUFACTURER, TYPE	
	5-120	5-150	9-80	12-60	15-45	24-32	28-25	36-19	48-15				
cont'd L8/10		x		x							<u>Inductors (cont'd)</u>		
											1st Output Choke Ass'y	168460-2	SR
											1st Output Choke Ass'y	169303-1	SR
											1st Output Choke Ass'y	169303-2	SR
											1st Output Choke Ass'y	169193-1	SR
											1st Output Choke Ass'y	169193-2	SR
											1st Output Choke Ass'y	169193-3	SR
											1st Output Choke Ass'y	169193-4	SR
L9/11	x	x									2nd Output Choke Ass'y	168494-1	SR
											2nd Output Choke Ass'y	168494-2	SR
											2nd Output Choke Ass'y	168859-1	SR
											2nd Output Choke Ass'y	168859-2	SR
											2nd Output Choke Ass'y	168859-3	SR
L12	x	x	x	x							Output Choke Ass'y	169556-1	SR
											Output Choke Ass'y	168866-1	SR
											Output Choke Ass'y	168866-2	SR
											Output Choke Ass'y	168866-3	SR
											<u>Transistors</u>		
Q1	x	x	x	x	x	x	x	x	x			169527-1	IR
Q2	x	x	x	x	x	x	x	x	x			169527-1	IR
Q3	x	x	x	x	x	x	x	x	x			169527-1	IR
Q4	x	x	x	x	x	x	x	x	x			169527-1	IR
											<u>Resistors (ohms)</u>		
R3	x	x	x	x	x	x	x	x	x		47K, 2W, 10%	280-1147P134	AB, HB
R4	x	x	x	x	x	x	x	x	x		47K, 2W, 10%	280-1147P134	AB, HB
R5	x	x	x	x	x	x	x	x	x		100, 5W, 5%	586054-37	RCL, T5
R6	x	x	x	x	x	x	x	x	x		330, 1/2W, 10%	280-1145P56	AB, EB
R7	x	x	x	x	x	x	x	x	x		0.22, 5W, 5%	586054-5	RCL, T5
R8	x	x	x	x	x	x	x	x	x		0.22, 5W, 5%	586054-5	RCL, T5
R10	x	x	x	x	x	x	x	x	x		121, 50W	586677-534	RCL, AL-50
R13	x	x	x	x	x	x	x	x	x		330, 5W, 5%	586054-43	RCL, T5
R14	x	x	x	x	x	x	x	x	x		1.0, 5W, 5%	586054-13	RCL, T5
R15	x	x	x	x	x	x	x	x	x		1.0, 5W, 5%	586054-13	RCL, T5
R16	x	x	x	x	x	x	x	x	x		1.0, 5W, 5%	586054-13	RCL, T5
R17	x	x	x	x	x	x	x	x	x		1.0, 5W, 5%	586054-13	RCL, T5
R18	x	x	x	x	x	x	x	x	x		330, 1/2W, 10%	280-1145P56	AB, EB
R19	x	x	x	x	x	x	x	x	x		0.1, 5%	169577-1	SR
R20	x	x	x	x	x	x	x	x	x		182, 25W, 3%	586369-536	RCL, AL-25
R23	x	x	x	x	x	x	x	x	x		47K, 20W, 10%	280-1147P134	AB, HB
R24	x		x	x	x	x	x	x	x		10, 1W	167059-19	CG, C6
											10, 1/2W, 10%	280-1145P2	AB, EB
R25	x		x	x	x	x	x	x	x		10, 1W	167059-19	CG, C6
											10, 1/2W, 10%	280-1145P2	AB, EB
R26A	x	x	x								Resistance Ass'y	169586-1	SR
											Resistance Ass'y	169586-3	SR
R26B	x	x	x								Resistance Ass'y	169586-5	SR
											Resistance Ass'y	169586-6	SR
											Resistance Ass'y	169586-7	SR
											Resistance Ass'y	169586-8	SR
											Resistance Ass'y	169586-9	SR
R27A	x		x								Resistance Ass'y	169586-2	SR
											Resistance Ass'y	169586-5	SR
											Resistance Ass'y	169586-4	SR
R27B	x	x	x								Resistance Ass'y	169586-5	SR
											Resistance Ass'y	169586-6	SR

Table 6-2
Replaceable Parts List
SSD Module VIA, Main Assembly* (cont'd)

CIRCUIT SYMBOL	SSD-DX Model									DESCRIPTION	SORENSEN PART NUMBER	MANUFACTURER, TYPE	
	5-120	5-150	9-80	12-60	15-45	24-32	28-25	35-19	48-15				
cont'd R27B										x	Resistors (ohms) - (cont'd)	169586-7 169586-8 169586-9	SR SR SR
R28	x		x								1.21, 50W, 3% 0.887, 50W, 1% 2.49, 50W, 3% 4.53, 50W, 3% 8.25, 50W, 1% 20, 50W, 3% 29.4, 50W, 1% 49.9, 50W, 3% 86.6, 50W, 3%	586677-500 586677-92 586677-505 586677-512 586677-185 586677-520 586677-238 586677-530 586677-568	RCL, AL-50 RCL, AL-50 RCL, AL-50 RCL, AL-50 RCL, AL-50 RCL, AL-50 RCL, AL-50 RCL, AL-50 RCL, AL-50
RT1	x	x	x	x	x	x	x	x	x	x	Thermistor	980149-1	
RT2	x	x	x	x	x	x	x	x	x	x	Thermistor	980149-1	
S1	x	x	x	x	x	x	x	x	x	x	Thermostat, 120V, 15A	92-512	
											<u>Transformers</u>		
T1	x											168458-3 168458-1 168458-4 168458-5 168458-6 168458-7 168458-8 168458-9 168458-10	SR SR SR SR SR SR SR SR SR
											<u>Miscellaneous</u>		
A1	x	x	x	x	x	x	x	x	x	x	Preregulator PCB Ass'y	168462-1	SR
A2	x	x	x	x	x	x	x	x	x	x	Chopper Control PCB Ass'y	168464-1	SR
A3	x	x	x	x	x	x	x	x	x	x	Base Drive PCB Ass'y	168466-1	SR
A4	x	x	x	x	x	x	x	x	x	x	Mother PCB Ass'y	168468-1	SR
A5	x										Sense PCB Ass'y	168470-2 168470-10 168470-3 168470-4 168470-5 168470-6 168470-7 168470-8 168470-9	SR SR SR SR SR SR SR SR SR
A6	x	x		x	x						Filter PCB Ass'y	168486-1 168486-2 168486-3 168486-4 168486-5	SR SR SR SR SR
TB1	x	x	x	x	x	x	x	x	x	x	Terminal Board	169290-9	Kulka, 1694A
											Schematic Cover	J168474 168452-1	SR SR
P1	x	x	x	x	x	x	x				Logic Shutdown Plug (Requires following items) 1 each 09-67-1031 (Molex) 1 each 09-50-3031 (Molex) 3 each 08-50-0105 (Molex)	589801-3 586287-1 586289-1	Molex Molex Molex

*Includes components on rear chassis (A4) and front panel (A5) circuit boards (Figures 4-7/4-8).

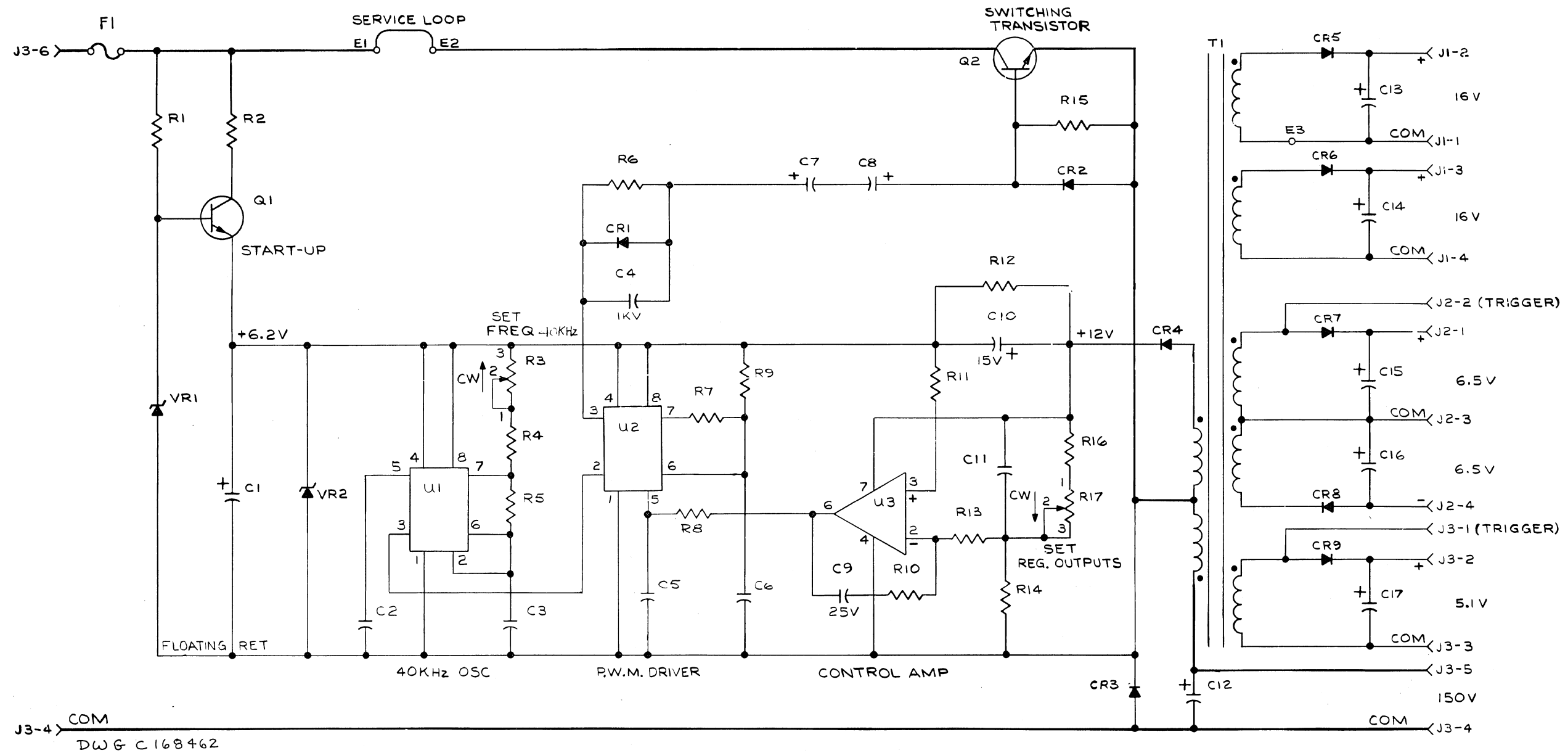
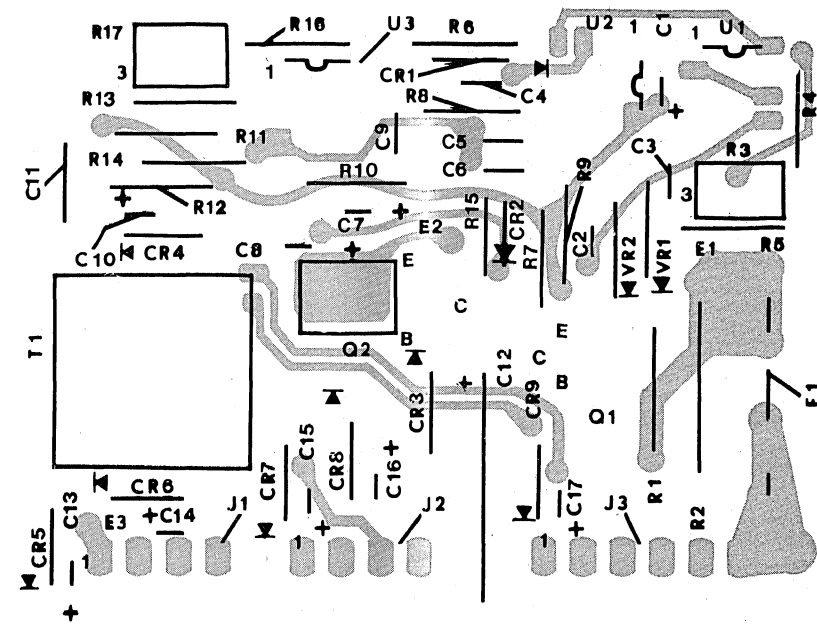
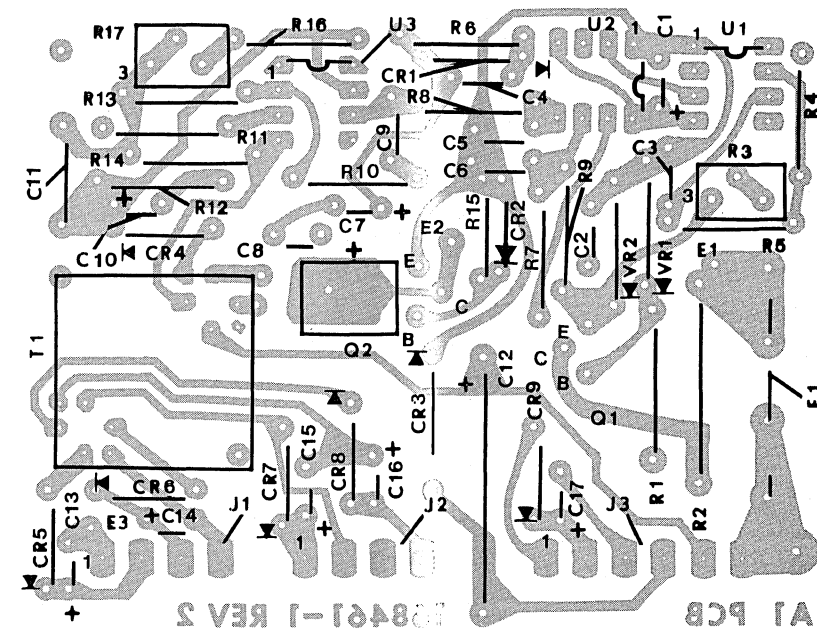


Figure 6-3
 (A1) Preregulator Circuit Board Diagrams
 Modules IVB and VIA

Table 6-3
 Replaceable Parts List
 (A1) Circuit Board Assembly 168462
 SSD Modules IVB and VIA



Component Side



Circuit Side

CIRCUIT SYMBOL	DESCRIPTION	SORENSEN PART NUMBER	MANUFACTURER, TYPE
<u>Capacitors (uf except as noted)</u>			
C1	22, 15V	235-7395P40	UC
C2	0.01, 25V	235-7426P1	RDM, M25
C3	4700pF, 200V	167058-3	AER, CK06
C4	1000pF, 1000V	235-7421P14	RDM, JF
C5	0.01, 25V	235-7426P1	RDM, M25
C6	4700pF, 200V	167058-3	AER, CK06
C7	6.8, 25V	235-7395P81	SP, 196D
C8	6.8, 25V	235-7395P81	SP, 196D
C9	0.01, 25V	235-7426P1	RDM, M25
C10	22, 15V	235-7395P40	UC
C11	0.1, 100V	24-2037-7	EMC, DM15
C12	1.0, 350V	166706-6	SR
C13	6.8, 25V	235-7395P64	SP, 196D
C14	6.8, 25V	235-7395P64	SP, 196D
C15	22, 15V	235-7395P40	UC
C16	22, 15V	235-7395P40	UC
C17	22, 15V	235-7395P40	UC
<u>Diodes</u>			
CR1	1N4148	322-7220P1	ITT
CR2	1N4148	322-7220P1	ITT
CR3	1N4148	586379-8	SEM
CR4	1N4606	585155-1	ITT
CR5	1N4606	585155-1	ITT
CR6	1N4606	585155-1	ITT
CR7	1N4606	585155-1	ITT
CR8	1N4606	585155-1	ITT
CR9	1N4606	585155-1	ITT
F1	Fuse, 0.1A, 250V	226-7176P8	BUS, AGX
J1	Conn. P. C. Card	586288-4	SR
J2	Conn. P. C. Card	586288-4	SR
J3	Conn. P. C. Card	586288-4	SR
Q1	SJE2300	982992-1	MA-
Q2	MJE13003	168779-1	MA
<u>Resistors (ohms, 1/4W, ±2% unless noted)</u>			
R1	150K, 1/2W	585326-219	CG, C5
R2	8.2K, 1W	167059-159	CG, C5
R3	2K, 1/2W, Variable	586370-5	BNS, 3389H
R4	4.7K	585108-43	CG, C4
R5	150	585108-63	CG, C4
R6	330	585108-79	CG, C4
R7	2.2K	585108-27	CG, C4
R8	15K	585108-109	CG, C4
R9	3.3K	585108-35	CG, C4
R10	33K	585108-125	CG, C4
R11	1K	585108-11	CG, C4
R12	330	585108-79	CG, C4
R13	1K	585108-11	CG, C4
R14	5.6K	585108-47	CG, C4
R15	680	585108-95	CG, C4
R16	5.1K	585108-45	CG, C4
R17	1K, 1/2W, Variable	586370-4	BNS, 3389H
T1	Pre-Reg. Transformer	167360-2	SR
U1	IC 555	587995-1	SIG, NE555V
U2	IC 555	587995-1	SIG, NE555V
U3	LM741CN	586372-1	NS, LM741CN
VR1	Diode, Zener, 1N5234B	588101-9	MA
VR2	Diode, Zener, 1N825	588105-3	MA

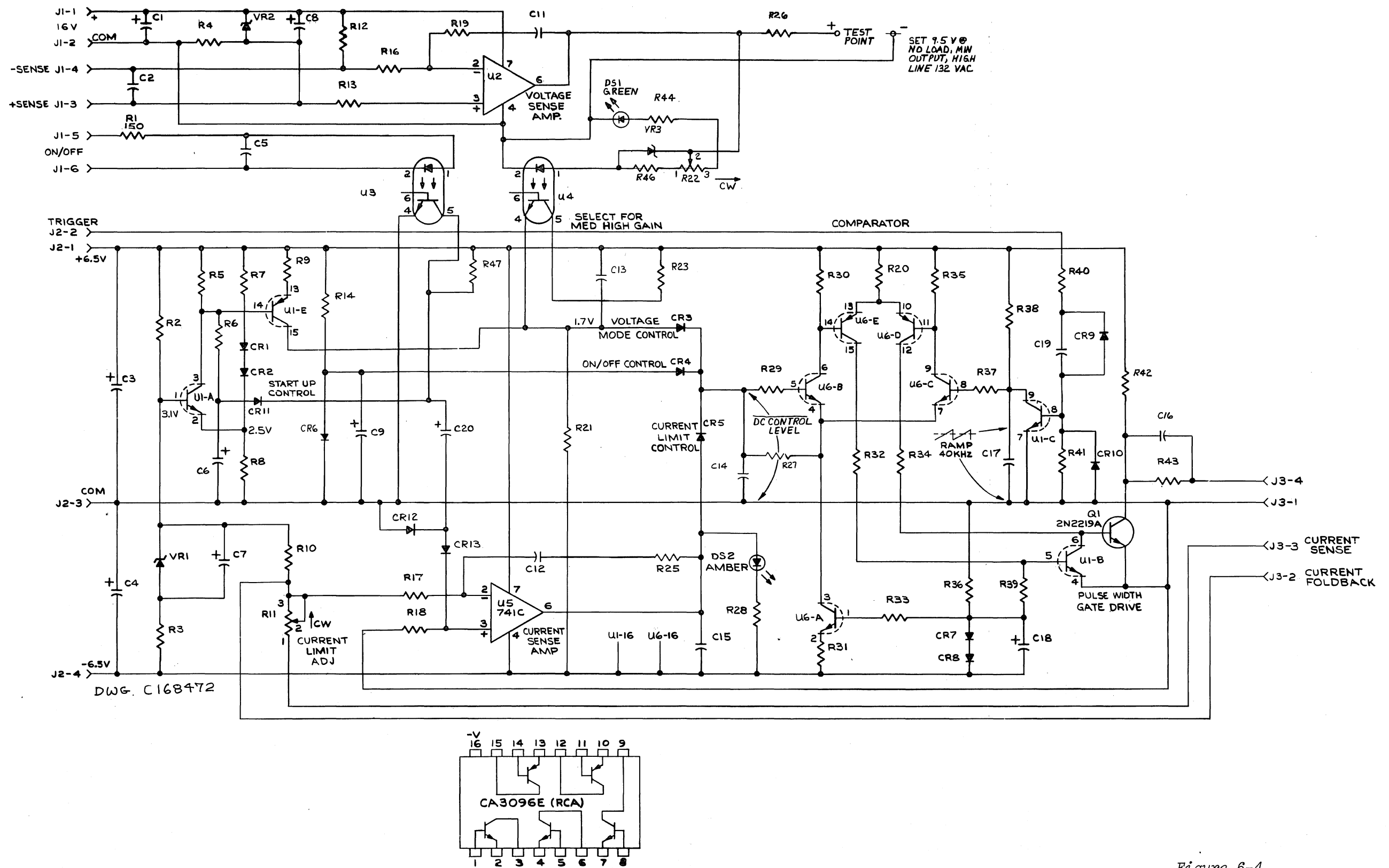
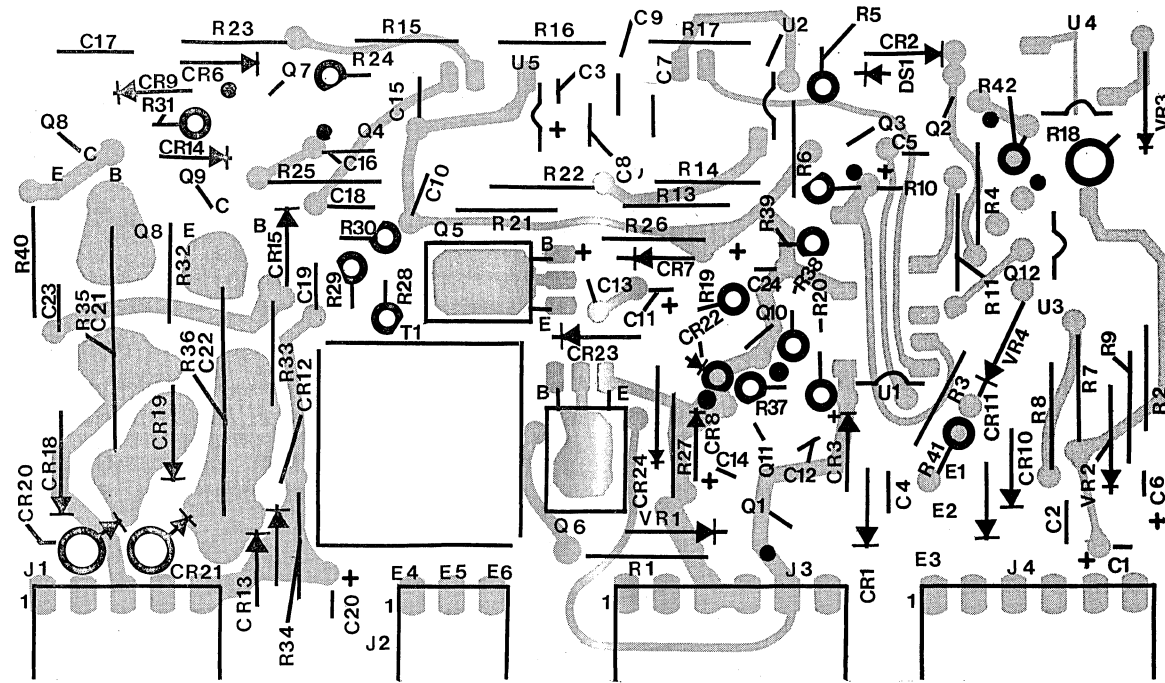
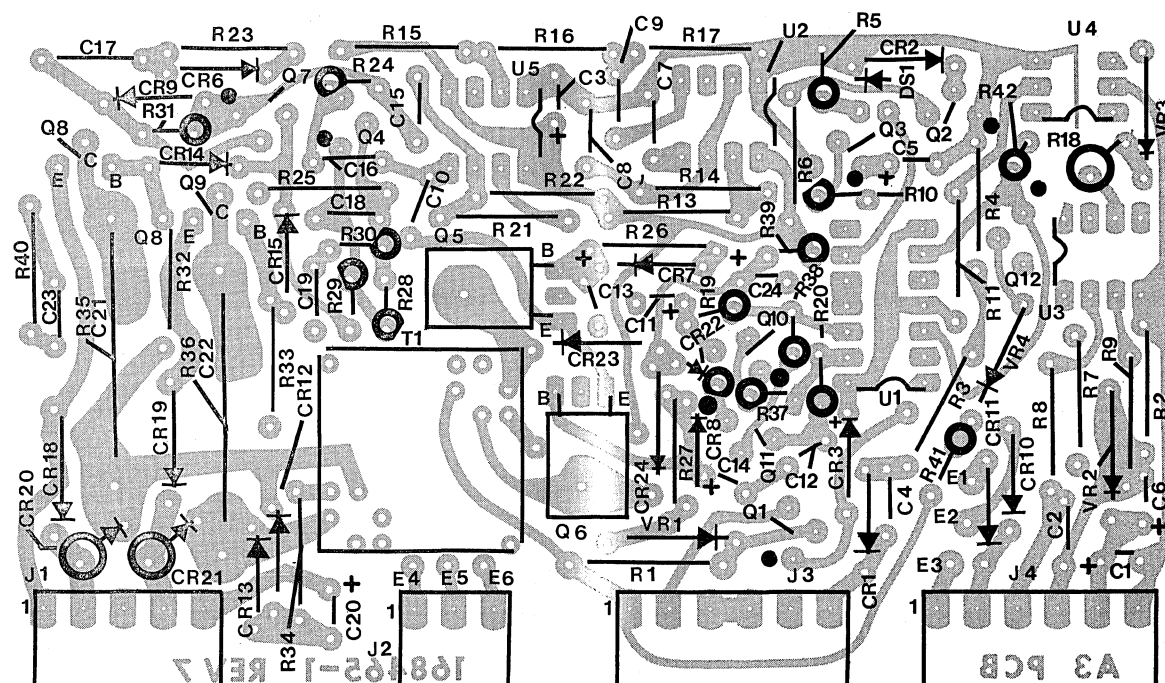


Figure 6-4
 (A2) Chopper Control Circuit Board Diagrams
 Modules IVB and VIA

Table 6-4
Replaceable Parts List
(A2) Circuit Board Assembly 168464-1



Component Side

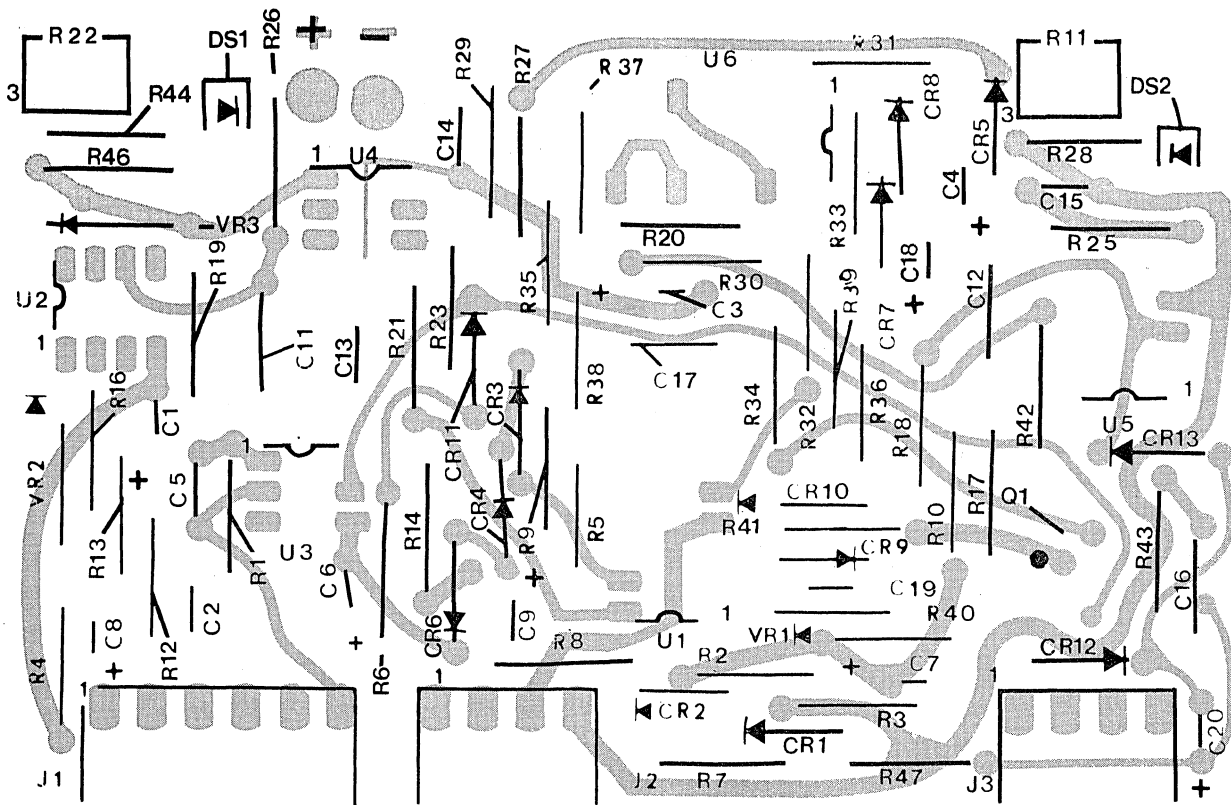


Circuit Side

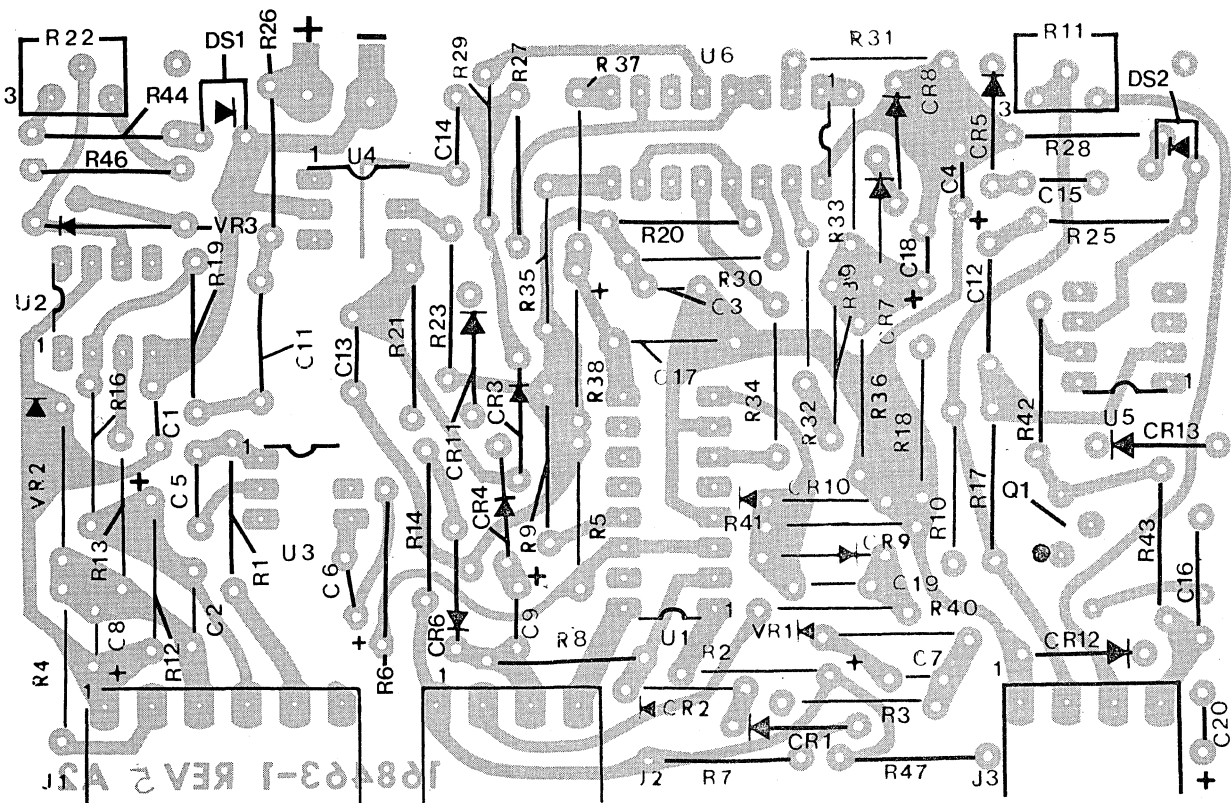
CIRCUIT SYMBOL	DESCRIPTION	SORENSEN PART NUMBER	MANUFACTURER, TYPE
<u>Capacitors (uF except as noted)</u>			
C1	6.8, 25V	235-7395P64	SP, 196D
C2	0.01, 25V	235-7426P1	RDM, M25
C3	22, 15V	235-7395P40	SP, 196D
C4	22, 15V	235-7395P40	SP, 196D
C5	0.01, 25V	235-7426P1	RDM, M25
C6	10, 10V	235-7395P23	SP, 196D
C7	6.8, 25V	235-7395P64	SP, 196D
C8	10, 10V	235-7395P23	SP, 196D
C9	6.8, 25V	235-7395P64	SP, 196D
C11	0.015, 250V	24-2015-3	SE, MMK
C12	0.015, 250V	24-2015-3	SE, MMK
C13	1000pF, 100V	235-7355P266	EMC, DM15
C14	1000pF, 100V	235-7355P266	EMC, DM15
C15	0.01, 25V	235-7426P1	RDM, M25
C16	0.22, 100V	24-2037-11	SE, MMK
C17	0.01, 250V	24-2015-1	SE, MMK
C18	10, 10V	235-7395P23	SP, 196D
C19	680pF, 300V	235-7053P326	EMC, DM15
C20	6.8, 25V	235-7395P64	SP, 196D
<u>Diodes</u>			
CR1	1N4148	322-7220P1	ITT
CR2	1N4148	322-7220P1	ITT
CR3	1N4148	322-7220P1	ITT
CR4	1N4148	322-7220P1	ITT
CR5	1N4148	322-7220P1	ITT
CR6	1N4148	322-7220P1	ITT
CR7	1N4148	322-7220P1	ITT
CR8	1N4148	322-7220P1	ITT
CR9	1N4148	322-7220P1	ITT
CR10	1N4148	322-7220P1	ITT
CR11, 12, 13	1N4148	322-7220P1	ITT
DS1	LED	167793-2	HP, 5082-4958
DS2	LED	167827-1	HP, 5082-4558
<u>Connectors</u>			
J1	Conn. P. C. Card	586288-4	SR
J2	Conn. P. C. Card	586288-4	SR
J3	Conn. P. C. Card	586288-5	SR
Q1	2N2219A	386-7249P32	GE
<u>Resistors (ohms, 1/4W, ±2% unless noted)</u>			
R1	150, 1/4W	585108-63	CG, C4
R2	470, 1/4W	585108-87	CG, C4
R3	470, 1/4W	585108-87	CG, C4
R4	1.5K, 1/4W	585108-19	CG, C4
R5	10K, 1/4W	585108-59	CG, C4
R6	10K, 1/4W	585108-59	CG, C4
R7	1.8K, 1/4W	585108-23	CG, C4
R8	1.5K, 1/4W	585108-19	CG, C4
R9	1K, 1/4W	585108-11	CG, C4
R10	6.2K, 1/4W	585108-49	CG, C4
R11	1K, 1/2W, Variable	586370-4	BNS, 338
R12	6.19K, 1/8W, 1%	586055-112	EMC, MF4
R13	2.2K, 1/4W	585108-27	CG, C4

Table 6-4
 Replaceable Parts List
 (A2) Circuit Board Assembly 168464-1 (cont'd)

CIRCUIT SYMBOL	DESCRIPTION	SORENSEN PART NUMBER	MANUFACTURER, TYPE
	<u>Resistors</u> (ohms, 1/4W, ±2% unless noted)-(cont'd)		
R14	2.2K, 1/4W	585108-27	CG, C4
R16	33, 1/4W	585108-175	CG, C4
R17	1K, 1/4W	585108-11	CG, C4
R18	1.2K, 1/4W	585108-15	CG, C4
R19	10K, 1/4W	585108-59	CG, C4
R20	330, 1/4W	585108-79	CG, C4
R21	4.7K, 1/4W	585108-43	CG, C4
R22	2K, 1/2W, Variable	586370-5	BNS, 3389H
R23	1K, 1/4W	585108-11	CG, C4
R25	1.5K, 1/4W	585108-19	CG, C4
R26	10K, 1/4W	585108-59	CG, C4
R27	10K, 1/4W	585108-59	CG, C4
R28	1K, 1/4W	585108-11	CG, C4
R29	100, 1/4W	585108-8	CG, C4
R30	2.2K, 1/4W	585108-27	CG, C4
R31	330, 1/4W	585108-79	CG, C4
R32	2.2K, 1/4W	585108-27	CG, C4
R33	100, 1/4W	585108-8	CG, C4
R34	1K, 1/4W	585108-11	CG, C4
R35	2.2K, 1/4W	585108-27	CG, C4
R36	1K, 1/4W	585108-11	CG, C4
R37	100, 1/4W	585108-8	CG, C4
R38	10K, 1/4W	585108-59	CG, C4
R39	5.6K, 1/4W	585108-47	CG, C4
R40	680, 1/4W	585108-95	CG, C4
R41	1K, 1/4W	585108-11	CG, C4
R42	2.2K, 1/4W	585108-27	CG, C4
R43	33, 1/4W	585108-175	CG, C4
R44	680, 1/4W	585108-95	CG, C4
R46	680, 1/4W	585108-95	CG, C4
R47	1K, 1/4W	585108-11	CG, C4
U1	IC, CA3096E	589782-1	RCA
U2	IC, LM741CN	586372-1	NS
U3	Opto. Isolator	586463-2	TI, L114
U4	Opto. Isolator	586463-3	TI, L114
U5	IC, LM741CN	586372-1	NS
U6	IC, CA3096E	589782-1	RCA
VR1	Diode, 1N825	588105-3	MA
VR2	Diode, 1N825	588105-3	MA
VR3	Zener, 1N5240B	588101-13	MA



Component Side



Circuit Side
 (A3) Sense Board Assembly

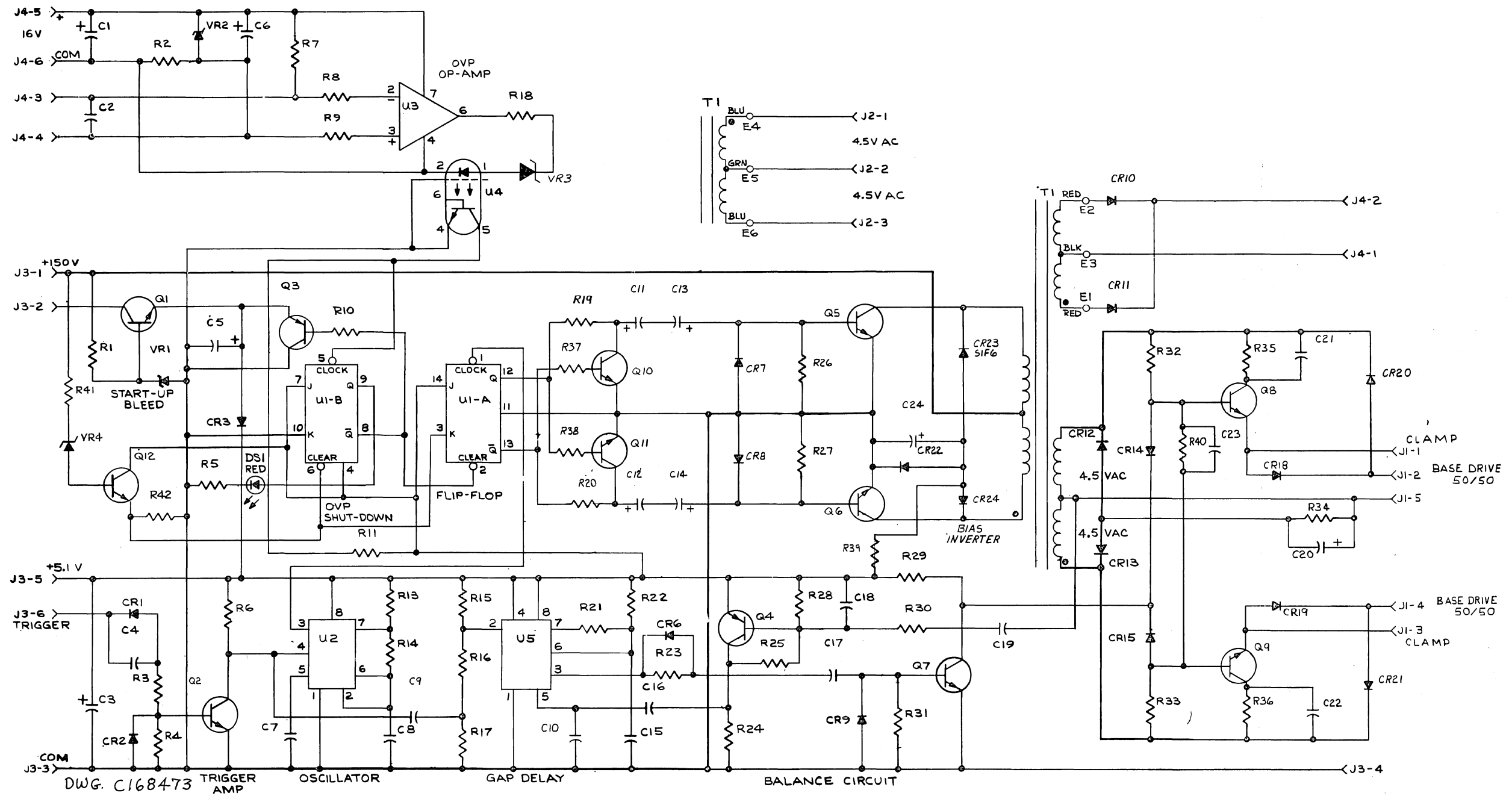


Figure 6-5
 (A3) Base Driver Circuit Board Diagrams
 Modules IVB and VIA

Table 6-5
Replaceable Parts List
(A3) Circuit Board Assembly 168466-1/-2*
SSD Modules IV and VI

CIRCUIT SYMBOL	DESCRIPTION	SORENSEN PART NUMBER	MANUFACTURER, TYPE
	<u>Capacitors</u> (uF unless noted)		
C1	6.8, 25V	235-7395P64	SP, 196D
C2	0.01, 25V	235-7426P1	RDM, M25
C3	22, 15V	235-7395P40	UC
C4	470pF, 300V	235-7053P157	SAN, O15
C5	6.8, 25V	235-7395P64	SP, 196D
C6	10, 10V	235-7395P23	SP, 196D
C7	0.01, 25V	235-7426P1	RDM, M25
C8	4700pF, 200V	167058-3	AER, CK06
C9	470pF, 300V	235-7053P157	SAN, O15
C10	0.01, 25V	235-7426P1	RDM, M25
C11	6.8, 15V	235-7395P37	UC, T368
C12	6.8, 15V	235-7395P37	UC, T368
C13	6.8, 15V	235-7395P37	UC, T368
C14	6.8, 15V	235-7395P37	UC, T368
C15	1000pF, 100V	235-7355P266	EMC, DM15
C16	0.01, 25V	235-7426P1	RDM, M25
C17	0.22, 100V	24-2037-11	SE, MMK
C18	0.01, 25V	235-7426P1	RDM, M25
C19	1000pF, 100V	235-7355P266	EMC, DM15
C20	6.8, 25V	235-7395P64	SP, 196D
C21	0.56, 100V (Module IVB)	587626-6	SE, 105
	0.22, 100V (Module VIA)	587626-3	SE, 105
C22	0.56, 100V (Module IVB)	587626-6	SE, 105
	0.22, 100V (Module VIA)	587626-3	SE, 105
C23	1000pF, 100V	235-7355P266	EMC, DM15
C24	10, 10V	235-7395P23	SP, 196D
	<u>Diodes</u>		
CR1	1N4148	322-7220P1	ITT
CR2	1N4148	322-7220P1	ITT
CR3	1N4148	322-7220P1	ITT
CR6	1N4148	322-7220P1	ITT
CR7	1N4148	322-7220P1	ITT
CR8	1N4148	322-7220P1	ITT
CR9	1N4148	322-7220P1	ITT
CR10	1N4606	585155-1	ITT
CR11	1N4606	585155-1	ITT
CR12	1N4606	585155-1	ITT
CR13	1N4606	585155-1	ITT
CR14	1N4606	585155-1	ITT
CR15	1N4606	585155-1	ITT
CR18	3SF1 (Module IVB)	586378-1	SEM
	S1F2 (Module VIA)	586379-4	SEM
CR19	3SF1 (Module IVB)	586378-1	SEM
	S1F2 (Module VIA)	586379-4	SEM
CR20	3SF1 (Module IVB)	586378-1	SEM
	363B (Module VIA)	587305-1	WH
CR21	3SF1 (Module IVB)	586378-1	SEM
	363B (Module VIA)	587305-1	WH
CR22	S12	587656-2	SEM
CR23	S1F6	586379-8	SEM
CR24	S1F6	586379-8	SEM
DS1	Diode, Light Emitting	1057634-1	TI, TIL220
J1	Conn. P. C. Card	586288-10	SR
J2	Conn. P. C. Card	586288-3	SR
J3	Conn. P. C. Card	586288-5	SR

Table 6-5
Replaceable Parts List
(A3) Circuit Board Assembly 168466-1/-2*
SSD Modules IV and VI (cont'd)

CIRCUIT SYMBOL	DESCRIPTION	SORENSEN PART NUMBER	MANUFACTURER, TYPE
J4	Conn. P. C. Card	586288-5	SR
	<u>Transistors</u>		
Q1	3N3440	386-7249P13	GE
Q2	2N2222A	386-7249P57	GE
Q3	2N2907A	386-7249P58	GE
Q4	2N2907A	386-7249P58	GE
Q5	MJE 13003	168779-1	MA
Q6	MJE 13003	168779-1	MA
Q7	2N2219A	386-7249P32	GE
Q8	D44H2	589963-5	GE
Q9	D44H2	589963-5	GE
Q10	2N2222A	386-7249P57	GE
Q11	2N2222A	386-7249P57	GE
Q12	2N2222A	386-7249P57	GE
	<u>Resistors</u> (ohms, 1/4W, ±2% unless noted)		
R1	150K, 1/2W	585326-219	CG, C5
R2	1.5K	585108-19	CG, C4
R3	680	585108-95	CG, C4
R4	1K	585108-11	CG, C4
R5	470	585108-87	CG, C4
R6	2.2K	585108-27	CG, C4
R7	6.19K, 1/8W, 1%	586055-112	EMF, MF4
R8	1K	585108-11	CG, C4
R9	1K	585108-11	CG, C4
R10	2.2K	585108-27	CG, C4
R11	5.6K	585108-47	CG, C4
R13	6.8K	585108-51	CG, C4
R14	150	585108-63	CG, C4
R15	2.2K	585108-27	CG, C4
R16	1K	585108-11	CG, C4
R17	2.2K	585108-27	CG, C4
R18	680	585108-95	CG, C4
R19	150	585108-63	CG, C4
R20	150	585108-63	CG, C4
R21	3.3K	585108-35	CG, C4
R22	6.2K	585108-49	CG, C4
R23	680	585108-95	CG, C4
R24	5.6K	585108-47	CG, C4
R25	100K	585108-149	CG, C4
R26	1K	585108-11	CG, C4
R27	1K	585108-11	CG, C4
R28	47K	585108-133	CG, C4
R29	2.2K	585108-27	CG, C4
R30	10K	585108-59	CG, C4
R31	680	585108-95	CG, C4
R32	100	585108-8	CG, C4
R33	100	585108-8	CG, C4
R34	470	585108-87	CG, C4
R35	2.2, 5W, 5% (Module IVA)	586054-17	TL, EL-5
	3.9, 6½W, 5% (Module VIB)	586054-20	TL, EL-5
R36	2.2, 5W, 5% (Module IVA)	586054-17	TL, EL-5
	3.9, 6½W, 5% (Module VIB)	586054-20	TL, EL-5
R37	1K	585108-11	CG, C4
R38	1K	585108-11	CG, C4
R39	1K	585108-11	CG, C4
R40	1K	585108-11	CG, C4
R41	10K	585108-59	CG, C4
R42	560	585108-91	CG, C4

Table 6-5
 Replaceable Parts List
 (A3) Circuit Board Assembly 168466-1/-2*
 SSD Modules IV and VI

CIRCUIT SYMBOL	DESCRIPTION	SORENSEN PART NUMBER	MANUFACTURER, TYPE
T1	Bias Transformer	168772-1	SR
U1	IC, DM54LS73J/883B	1057579-1	NS
U2	IC 555	587995-1	SIG, NE555V
U3	IC, LM741CM	586372-1	NS, LM741CM
U4	Opto. Isolator	586463-2	TI, L114
U5	IC 555	587995-1	SIG, NE555V
VR1	Diode, Zener, 1NJ234B	588101-9	MA
VR2	Diode, Zener, 1N825	588105-3	MA
VR3	Diode, Zener, 1N5230B	588101-6	MA
VR4	Diode, Zener, 1N5273B	588101-28	MA

Table 6-6
 Replaceable Parts List
 (A4) Mother Circuit Board Assembly 168468-1/-3*

CIRCUIT SYMBOL	DESCRIPTION	SORENSEN PART NUMBER	MANUFACTURER, TYPE
	<u>Capacitors</u> (uF except as noted)		
C1	6.8, 25V	166706-6	SP-500D
C2	0.01, 25V	235-7421P14	RDM, JF
C3	0.01, 25V	235-7421P14	RDM, JF
C4	6.8, 25V	235-7395P64	SP, 196D
C5	0.1, 250V	24-2015-13	SE, MMK
	<u>Diodes</u>		
CR1	1N4606	585155-1	ITT
CR2	1N4606	585155-1	ITT
CR3	3SF1	586378-1	SEM
CR4	SS3000	587306-8	SEM
CR5	SS2994	587306-2	SEM
CR6	SS2994	587306-2	SEM
CR7	SS3000	587306-8	SEM
CR8	3SF1	586378-1	SEM
CR9	1N4606	585155-1	ITT
CR10	1N4606	585155-1	ITT
CR11	SS3000	587306-8	SEM
CR12	SS3000	587306-8	SEM
CR13	SS3000	587306-8	SEM
Q1	D45H2	588089-2	GE
Q2	D45H2	588089-2	GE
	<u>Resistors</u> (ohms, 1/2W ±2% unless noted)		
R1	10,	280-1145P2	AB, EB
R2	10K, 5W, 5%	586054-61	RCL, T5
R3	10K, 5W, 5%	586054-61	RCL, T5
R4	330, 1/4W	585108-79	CG, C4
R5	3.3, 5W, 5%	586054-19	RCL, T5
R6	150	585326-75	CG, C5
R7	150	585326-75	CG, C5
R8	330, 1/4W	585108-79	CG, C4
R9	3.3, 5W, 5%	586054-19	RCL, T5
R11	270K, 1/4W	280-1171P160	AB, O32
R12	100K	585326-211	CG, C5
R13	150	585326-75	CG, C5
R14	150	585326-75	CG, C5
R15	680	585326-59	CG, C5
R16	680	585326-59	CG, C5
VR1	Zener (Module IV)	588102-19	EIA, 1N4757A
	Zener (Module VI)	588102-20	EIA, 1N4761A
VR2	Zener (Module IV)	588102-19	EIA, 1N4757A
	Zener (Module VI)	588102-20	EIA, 1N4761A

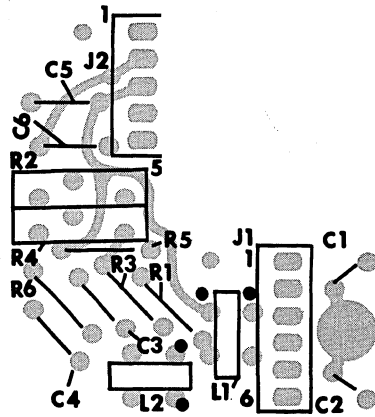
*Module Size IVB/Module Size VIA

Table 6-7
 Replaceable Parts List
 (A5) Sense PCB Assembly 168470
 SSD Module IVB

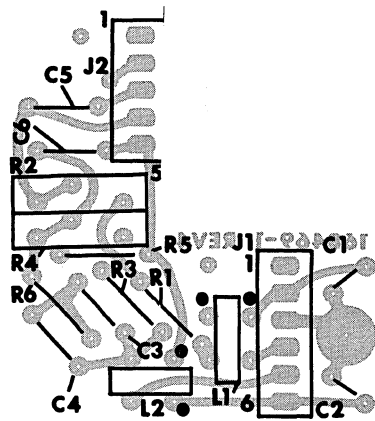
CIRCUIT SYMBOL									DESCRIPTION	SORENSEN PART NUMBER	MANUFACTURER, TYPE
	5-15	9-50	12-38	15-32	24-22	28-18	36-13	48-10			
									<u>Capacitors</u> (uF unless noted)		
C1	x	x	x	x	x	x	x	x	0.01, 25V	235-7421P14	RDM, JF
C2	x	x	x	x	x	x	x	x	0.01, 25V	235-7421P14	RDM, JF
C3	x	x	x	x	x	x	x	x	0.22, 100V	24-2037-11	EMC, DM15
C5	x	x	x	x	x	x	x	x	0.22, 100V	24-2037-11	EMC, DM15
C6	x	x	x	x	x	x	x	x	0.22, 100V	24-2037-11	EMC, DM15
J1	x	x	x	x	x	x	x	x	Conn. Wafer Ass'y	586286-5	SR
J2	x	x	x	x	x	x	x	x	Conn. Wafer Ass'y	586286-5	SR
L1	x	x	x	x	x	x	x	x	Toroid Coil	586471-1	SR
L2	x	x	x	x	x	x	x	x	Toroid Coil	586471-1	SR
									<u>Resistors</u> (ohms, 1/4W, ±2% unless noted)		
R1	x								3.3K	585108-35	CG, C4
		x							6.8K	585108-51	CG, C4
			x	x					10K	585108-59	CG, C4
					x				20K	585108-115	CG, C4
						x			27K	585108-121	CG, C4
							x		30K	585108-123	CG, C4
								x	43K	585108-131	CG, C4
R2	x	x	x						5K, 3/4W, 10%, Variable	586371-6	BNS, 3006P
				x	x	x			10K, 3/4W, 10%, Variable	586371-7	BNS, 3006P
							x	x	20K, 3/4W, 1%, Variable	586371-8	BNS, 3006P
R3	x								4.42K, 1/8W, 1%	586055-105	ELA, MF4
		x							6.19K, 1/8W, 1%	586055-112	ELA, MF4
			x	x					9.09K, 1/8W, 1%	586055-120	ELA, MF4
					x	x			18.7K, 1/8W, 1%	586055-135	ELA, MF4
							x		28.7K, 1/8W, 1%	586055-144	ELA, MF4
								x	40.2K, 1/8W, 1%	586055-151	ELA, MF4
R4	x	x	x						5K, 3/4W, 10%, Variable	586371-6	BNS, 3006P
				x	x				10K, 3/4W, 10%, Variable	586371-7	BNS, 3006P
						x	x	x	20K, 3/4W, 10%, Variable	586371-8	BNS, 3006P
R5	x	x	x	x	x	x	x	x	220	585108-71	CG, C4
R6	x	x	x	x	x	x	x	x	33, 5%	585108-176	CG, C4
									<u>Miscellaneous</u>		
	x								PCB Ass'y (A5)	168470-12	
		x								168470-13	
			x							168470-14	
				x						168470-15	
					x					168470-16	
						x				168470-7	
							x			168470-8	
								x		168470-9	

Table 6-8
 Replaceable Parts List
 (A5) Sense PCB Assembly 168470
 SSD Module VIA

CIRCUIT SYMBOL									DESCRIPTION	SORENSEN PART NUMBER	MANUFACTURER, TYPE	
	5-120	5-150	9-80	12-60	15-45	24-32	28-25	36-19				48-15
										<u>Capacitors</u> (uF unless noted)		
C1	x	x	x	x	x	x	x	x	x	0.01, 25V	235-7421P14	RDM, JF
C2	x	x	x	x	x	x	x	x	x	0.01, 25V	235-7421P14	RDM, JF
C3	x	x	x	x	x	x	x	x	x	0.22, 100V	24-2037-11	EMC, DM15
C4	x		x	x	x	x	x	x	x	Not Used		
		x								0.068, 250V	24-2015-11	SE, MMK
C5	x	x	x	x	x	x	x	x	x	0.22, 100V	24-2037-11	EMC, DM15
C6	x	x	x	x	x	x	x	x	x	0.22, 100V	24-2037-11	EMC, DM15
J1	x	x	x	x	x	x	x	x	x	Conn. Wafer Ass'y	586286-5	SR
J2	x	x	x	x	x	x	x	x	x	Conn. Wafer Ass'y	586286-4	SR
L1	x	x	x	x	x	x	x	x	x	Toroid Coil	586471-1	SR
L2	x	x	x	x	x	x	x	x	x	Toroid Coil	586471-1	SR
										<u>Resistors</u> (ohms, 1/4W, ±2% unless noted)		
										3.3K	585108-35	CG, C4
R1	x									5.1K	585108-45	CG, C4
		x								6.8K	585108-51	CG, C4
			x							10K	585108-59	CG, C4
				x	x					20K	585108-115	CG, C4
						x				27K	585108-121	CG, C4
							x			30K	585108-123	CG, C4
								x		43K	585108-131	CG, C4
R2	x		x	x						5K, 3/4W, 10%, Variable	586371-6	BNS, 3006P
		x								2K, 3/4W, 10%, Variable	586371-5	BNS, 3006P
					x	x	x			10K, 3/4W, 10%, Variable	586371-7	BNS, 3006P
								x	x	20K, 3/4W, 10%, Variable	586371-8	BNS, 3006P
R3	x	x								4.42K, 1/8W, 1%	586055-105	ELA, MF4
			x							6.19K, 1/8W, 1%	586055-112	ELA, MF4
				x	x					9.09K, 1/8W, 1%	586055-120	ELA, MF4
						x	x			18.7K, 1/8W, 1%	586055-135	ELA, MF4
								x		28.7K, 1/8W, 1%	586055-144	ELA, MF4
									x	40.2K, 1/8W, 1%	586055-151	ELA, MF4
R4	x		x	x						5K, 3/4W, 10%, Variable	586371-6	BNS, 3006P
		x								2K, 3/4W, 10%, Variable	586371-5	BNS, 3006P
					x	x				10K, 3/4W, 10%, Variable	586371-7	BNS, 3006P
							x	x	x	20K, 3/4W, 10%, Variable	586371-8	BNS, 3006P
R5	x	x	x	x	x	x	x	x	x	220	585108-71	CG, C4
R6	x	x	x	x	x	x	x	x	x	33, 5%	585106-176	CG, C4
										<u>Miscellaneous</u>		
		x								PCB Ass'y (A5)	168470-2	
			x								168470-10	
				x							168470-3	
					x						168470-4	
						x					168470-5	
							x				168470-6	
								x			168470-7	
									x		168470-8	
											168470-9	



Component Side

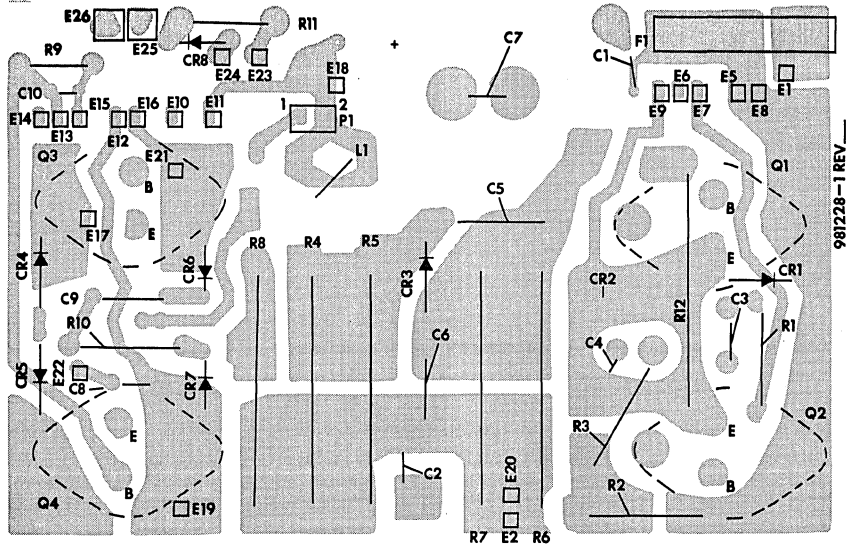


Circuit Side

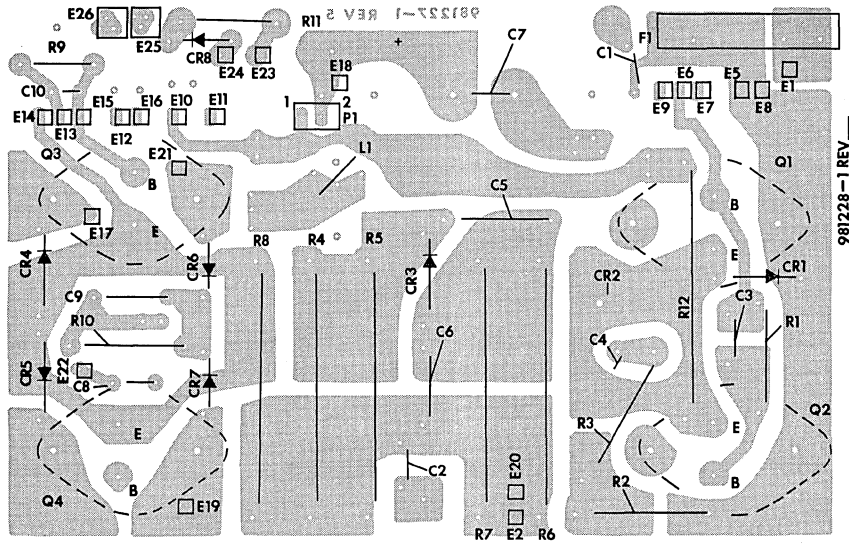
*Figure 6-7
(A5) Sense Circuit Board Assembly*

Table 6-9
(A6) Regulator and Inverter Board Assembly 981228-1
SSD Module IVB

CIRCUIT SYMBOL	DESCRIPTION	SORENSEN PART NUMBER	MANUFACTURER, TYPE
	<u>Capacitors</u> (uF unless noted)		
C1	0.01, 1600V	235-7207P30	SP, Y5U
C2	0.01, 1600V	235-7207P30	SP, Y5U
C3	0.01, 250V	24-2015-1	SE, MMK
C4	750pF, 1500V	235-7355P313	EMC, DM
C5	2.2, 100V	24-2037-23	SE, MMK
C6	1.0, 100V	24-2037-19	SE, MMK
C7	125, 300V	169321-1	MAL, CG
C8	1500pF, 1500V ,	235-7355P320	EMC, DM
C9	0.22, 250V	24-2015-17	SE, MMK
C10	0.01, 25V	235-7426P1	RDM, M25
	<u>Diodes</u>		
CR1	3SF4	586378-3	SEM
CR2	1N3893	169317-1	MA
CR3	3SF1	586378-1	SEM
CR4	SEN-R-42	586378-4	SEN
CR5	SEN-R-42	586378-4	SEN
CR6	SS3000	587306-8	SEM
CR7	SS3000	587306-8	SEM
CR8	S1F1	586379-2	SEM
F1	MTH4, 250V	226-7176	BUS
L1	Coil	169514-1	SR
	<u>Transistors</u>		
Q1	TL-70	981587-1	IR
Q2	TL-70	981587-1	IR
Q3	TL-70	981587-1	IR
Q4	TL-70	981587-1	IR
	<u>Resistors</u>		
R1	330, 1W, 10%	280-1146P56	AB, RC30
R2	47, 5W, 5%	586054-33	TL, EL5
R3	47, 5W, 5%	586054-33	TL, EL5
R4	1.5, 10W, 5%	167403-71	TL, EL10
R5	1.5, 10W, 5%	167403-71	TL, EL10
R6	7.5, 10W, 5%	167403-42	TL, EL10
R7	7.5, 10W, 5%	167403-42	TL, EL10
R8	0.15, 10W, 5%	167403-47	TL, EL10
R9	330, 1/2W, 10%	280-1145P56	AB, EB
R10	47K, 2W, 10%	280-1147P134	AB, HB
R11	0.33, 3W, 5%	167401-29	TL, EL10
R12	0.15, 10W, 5%	167403-47	TL, EL10
S1	Thermostat	92-512	Klixon



Component Side



Circuit Side

*Figure 6-8
(A6) Regulator and Inverter PCB Assembly
Module IVB*

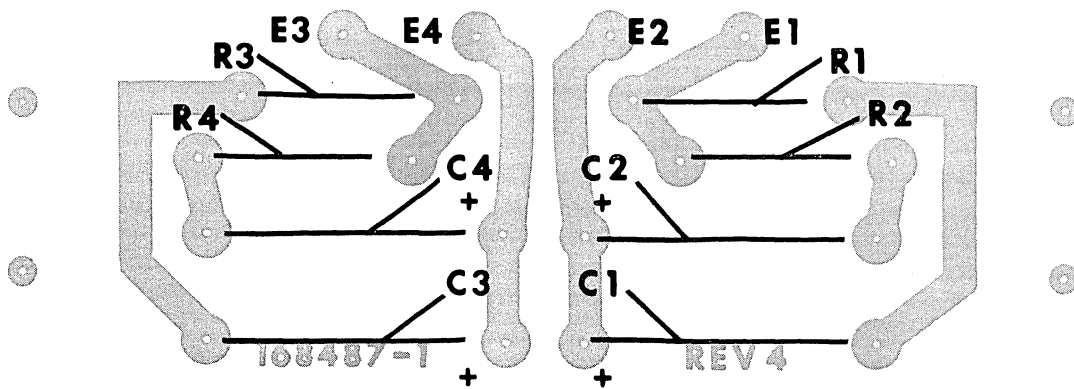


Figure 6-9
 (A6) Filter Circuit Board Assembly
 Module VIA

SERVICE NOTES

FIELD SERVICE REPRESENTATIVES

EASTERN AREA

Ampower Electronic Instrument Co., Inc.
26 Just Road
Fairfield, New Jersey 07006
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Tel: (216)442-8080

Comtel Standards Laboratory
21223 Hilltop Street
P.O. Box 5034
Southfield, Michigan 48037
Tel: (313)358-2500

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1718 Broadway
Rockford, Illinois 61108
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General Electric Instrumentation Service
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WESTERN AREA (Cont'd.)

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1012 Morse Avenue, Suite 6
Sunnyvale, California 94086
Tel: (408)734-5529

Missouri Research Labs, Inc.
630 Haines Avenue N.W.
Albuquerque, New Mexico 87102
Tel: (505)243-6772

Staus Engineering
Unit 26, 1900 Tyler Avenue
South El Monte, California 91733
Tel: (213)442-3634

X-Tek
14824 Northeast 31st Circle
Redmond, Washington 98052
Tel: (206)885-6969

NEW ENGLAND AREA

Sorensen Company
676 Island Pond Road
Manchester, N. H. 03103
Tel: (603)668-4500

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651 St. Paul
Sherbrooke, P.Q., Canada J1H2B6
Tel: (819)569-1408

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Ranelagh House
Felixstowe, Suffolk
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Halbartenstrasse 54
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