

Model 206L

High Efficiency Cabinet Power Supply Operations Manual

SERIAL NUMBER: 1711XXXXX and higher
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SECTION 1 GLOSSARY

A	Amperes	mVpp	millivolt peak to peak
AC	Alternating Current	PCB	Printed Circuit Board
C	Celcius	PDA	Power Distribution Assembly
DC	Direct Current	PFC	Power Factor Correction
EG	Equipment Ground	RMS	Root Mean Square
F	Farenheit	uF	micro farad
Hz	Hertz	VAC	Voltage Alternating Current
LED	Light Emitting Diode	VDC	Voltage Direct Current
m	milli		

SECTION 2 GENERAL

The Model 206L Cabinet Power Supply is a rack mounted high efficiency switching power supply that provides a single regulated +24VDC output for a PDA #2 or PDA #3 assembly commonly found in a 332 or 336 style cabinet. The Model 206L is plug-in compatible with a Caltrans Model 206 Cabinet Power Supply.

SECTION 3 GENERAL CHARACTERISTICS

The Model 206L provides full output regulation across changes in AC Line voltage and output load over the full operating temperature range of -34C to +74C. Power Factor Correction is also provided reducing peak AC Line input current and associated stress on wiring. The AC Line input is rated for 80 to 270 Vac operation at 50 or 60 Hz.

SECTION 4 INSTALLATION

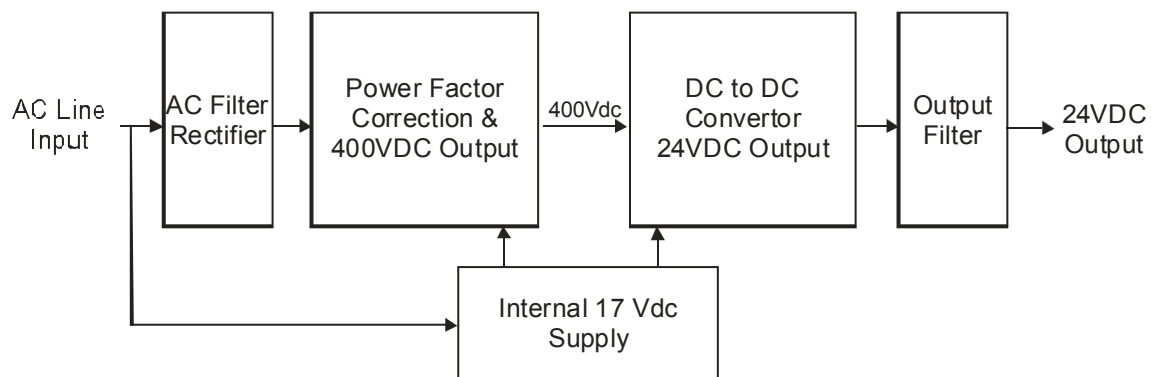
The Model 206L is a rack mounted device that requires no adjustments or programming when installed. The Model 206L requires no maintenance or periodic adjustments.

SECTION 5 ADJUSTMENTS

The Model 206L requires no adjustments or programming. Test jacks are provided to measure the 24VDC output.

SECTION 6 THEORY OF OPERATION

6.1 SYSTEM DESCRIPTION



6.2 CIRCUIT OPERATION

The internal 17Vdc supply is a buck type integrated switching supply used to generate the 17Vdc voltage which supplies operating power to both the PFC and 24VDC output controller circuits. The integrated controller (U6) uses rectified AC from C29 and down converts it to 17 Vdc (VCC). The front panel LED (DS1) indicates the AC Line is applied and the 17 Vdc output is active.

The AC Filter and Rectifier circuit converts the incoming AC Line voltage to a rectified voltage at T1.2. Filter network C11, R45, R46, T3, and C27 prevent high frequency switching noise from being coupled back into the AC Line. The AC input is fused for over-current protection with a 3 Amp slow blow fuse.

The integrated PFC controller (U1) converts this rectified voltage to a 400 Vdc value (HV+) stored in C29. Comparator circuit U2-A is used to shut down the PFC controller during low AC Line conditions. **Caution: Internal LED DS3 is used to warn a service technician that high voltage is present on C29 (HV+).**

DC to DC Controller (U5) down converts the 400 Vdc to create an isolated and regulated +24 Vdc output at C8, C9, and C10. Components L1, C6, and C7 filter out switching noise to the output. The front panel LED DS2 indicates that the 24Vdc output is active. Signal PFC_RDY is used to shut down the DC to DC Controller (U5) during low AC Line conditions.

The output is fused for over-current protection with an 8A slow blow fuse. The output is protected against voltage transients by a 1500 Watt suppressor (Z1).

6.3 SPECIFICATIONS

AC Operating Voltage Minimum	80 Vac
AC Operating Voltage Maximum	270 Vac
AC Operating Frequency	45 to 65 Hz
Power Factor (120 Vac at full load).....	0.98
Efficiency (120 Vac at full load).....	86%
DC Output Voltage.....	24 Vdc +/- 1 Vdc
DC Output Current Maximum.....	5 Amps
DC Output Ripple Maximum	200 mVpp
Note: Ripple is measured at 20MHz of bandwidth using a 12" twisted pair-wire terminated with a 0.1uf & 47uf capacitor.	
Minimum Holdup Time (5 Amp load).....	50 milliseconds
Height	6.0 inches
Width.....	5.5 inches
Depth (excluding handle & connector pins)	7.35 inches
Storage Temperature Range	-45 to +85 °C
Operating Temperature Range	-34 to +74 °C
Humidity (non-condensing)	0 to 95% Relative

SECTION 7 MAINTENANCE

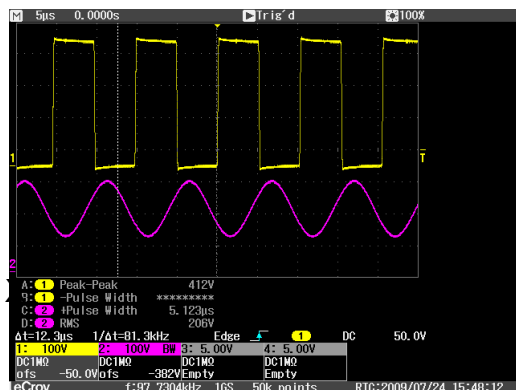
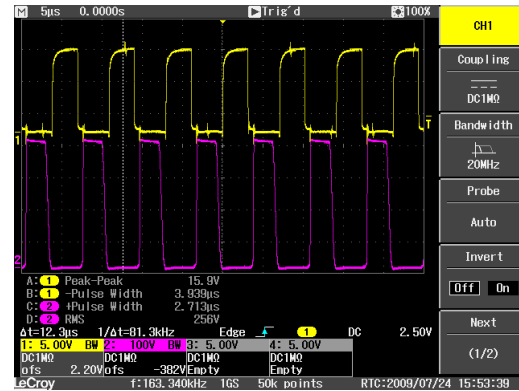
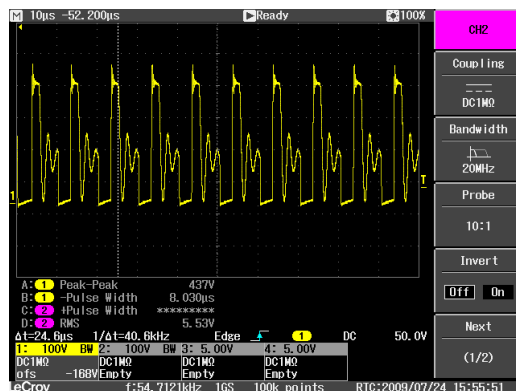
A green LED indicator is provided to display AC Line input status and fuse integrity. A separate green LED indicator is provided to display output status and fuse integrity for the 24VDC output.

The Model 206L requires no adjustments or programming. Test jacks are provided to measure the 24VDC output.

7.1 TROUBLE ANALYSIS

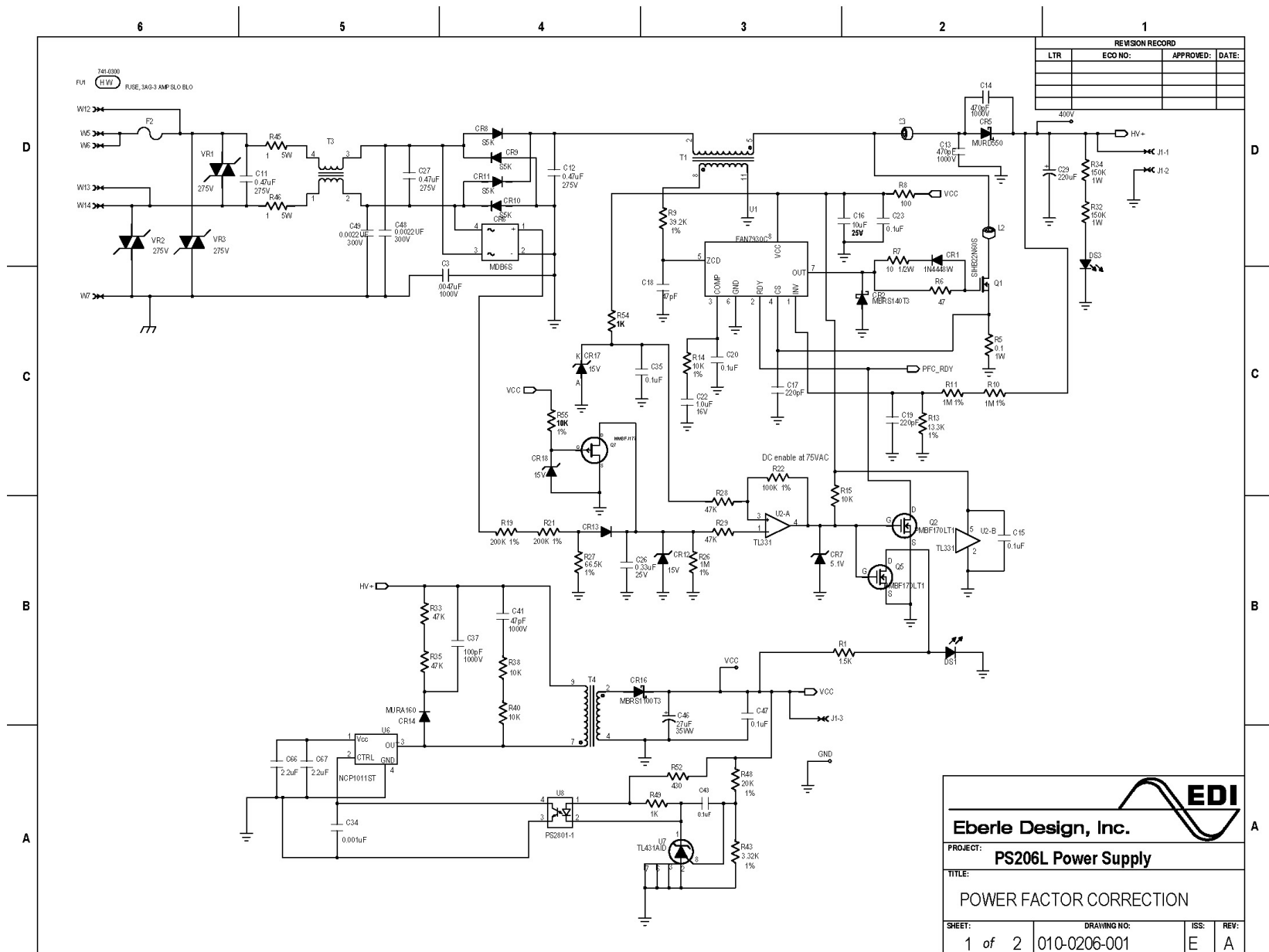
- 1) AC Line indicator DS1 is not illuminated:
 - a. Check that AC Line input fuse (F2) is not blown. Replace with 3A SB fuse.
 - b. Check that AC Line voltage is greater than 80 Vac.
 - c. Check that internal 17Vdc supply is operating (VCC).
- 2) DC Output indicator DS2 is not illuminated:
 - a. Check that internal 17Vdc supply is operating.
 - b. Check that DC output fuse (F1) is not blown. Replace with 8A SB fuse.
 - c. Check that PFC Controller is providing 400 Vdc at HV+, DS3 should be illuminated.
- 3) DC Output is not active:
 - a. Check that the DC to DC controller has not shut down because of an output load that exceeds the maximum value. Once the overload is removed a power cycle will reset the operation of the controller.

7.2 WAVE FORMS



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SECTION 8 TECHNICAL INFORMATION 8.1 SCHEMATICS



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8.2 BILL OF MATERIALS

Item	EDI Part Number	Qty	Description	Reference	Manufacturer
1		3	(NO COMPONENT)	400V GND VCC	
2		11	16 guage wire mounting hole	W1-8 W11 W13-14	
3		1	22 guage wire mounting hole	W12	
4	215-1000-S	1	RESISTOR, 1/2W, 10 OHMS, 5%, 2010 surface mount	R7	
5	215-1030-S	2	Resistor, 10K, 1/2W, 5%, 2010 surf. mnt.	R38 R40	
6	215-1520-S	1	Resistor, 1.5K, 1/2W, 5%, 2010 surf. mnt.	R1	
7	215-2020-S	1	Resistor, 2K, 1/2W, 5%, 2010 surf. mnt.	R2	
8	215-4700-S	1	RESISTOR, 1/2W, 47 OHMS, 5%, 2010 surface mount	R6	
9	220-0001-S	3	RESISTOR, 1W, 0.1 OHMS, 1%, 2010 surface mount	R5 R30-31	
10	220-1540-S	2	RESISTOR, 1W, 159K, 5%, 2512 SMD	R32 R34	Vishay CRCW2512154
11	225-0010	2	RESISTOR, 1.0 Ohm, 5W, 5%, RADIAL	R45-46	OHMITE TWW5J1R0E
12	251-1002-S	2	RESISTOR, 1/8W, 10K, 1%, 1206 surface mount	R14 R55	
13	251-1003-S	1	RESISTOR, 1/8W, 100K, 1%, 1206 surface mount	R22	
14	251-1004-S	3	RESISTOR, 1/8W, 1M, 1%, 1206 surface mount	R10-11 R26	
15	251-1332-S	1	RESISTOR, 1/8W, 13.3K, 1%, 1206 surface mount	R13	
16	251-2002-S	1	RESISTOR, 1/8W, 20K, 1%, 1206 surface mount	R48	
17	251-2003-S	2	RESISTOR, 1/8W, 200K, 1%, 1206 surface mount	R19 R21	
18	251-3321-S	1	RESISTOR, 1/8W, 3.32K, 1%, 1206 surface mount	R43	
19	251-3922-S	1	RESISTOR, 1/8W, 39.2K, 1%, 1206 surface mount	R9	
20	251-6192-S	1	RESISTOR, 1/8W, 61.9K, 1%, 1206 surface mount	R16	
21	251-6652-S	1	RESISTOR, 1/8W, 66.5K, 1%, 1206 surface mount	R27	
22	251-7151-S	2	RESISTOR, 1/8W, 7.15K, 1%, 1206 surface mount	R20 R41	
23	251-8061-S	1	RESISTOR, 1/8W, 8.06K, 1%, 1206 surface mount	R36	
24	255-1010-S	1	RESISTOR, 1/8W, 100, 5%, 1206 surface mount	R8	
25	255-1020-S	3	RESISTOR, 1/8W, 1K, 5%, 1206 surface mount	R25 R49 R54	
26	255-1030-S	3	RESISTOR, 1/8W, 10K, 5%, 1206 surface mount	R15 R24 R50	
27	255-2220-S	1	RESISTOR, 1/8W, 2.2K, 5%, 1206 surface mount	R37	
28	255-2700-S	1	RESISTOR, 1/8W, 27 Ohm, 5%, 1206 surface mount	R42	
29	255-3330-S	1	RESISTOR, 1/8W, 33K, 5%, 1206 surface mount	R17	
30	255-4310-S	1	RESISTOR, 1/8W, 430 Ohm, 5%, 1206 surface mount	R52	
31	255-4730-S	7	RESISTOR, 1/8W, 47K, 5%, 1206 surface mount	R28-29 R33 R35 R44	
				R47 R51	
32	255-8210-S	1	RESISTOR, 820, 1/8W, 5%, SMT 1206	R39	
33	300-1081-050R	3	CAPACITOR, ELECT, 1000uF, 50WV, 20 %, LOW ESR, RDL	C6 C8-9	ILLINOIS 108RZM050M
34	300-2270-450R	1	CAPACITOR, ELECT, 220uF, 450WV, 20 %, RDL	C29	

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35	300-2760-035S	1	CAPACITOR, ELECTROLYTIC, 27uF, 35V, LOW ESR, 20%,	C46	ILLINOIS	
			SMT		276AXZ035MD10	
36	320-1010-1000S	1	CAPACITOR, CER.MULT, 100pF, 1000V, 10%,C0G,1206	C37	AVX 1206AA101KAT1A	
			CHIP			
37	320-1020-050S	1	CAPACITOR, CER.MULT, 0.001uF, 50V, 10%, 1206 CHIP	C34		
38	320-1030-100S	1	CAPACITOR, CER.MULT, 0.01uF, 100V, 10%, 1206 CHIP	C39		
39	320-1040-050S	8	CAPACITOR, CER.MULT, 0.1uF, 50V, 10%, 1206 CHIP	C7 C10 C15 C20 C23		
				C35 C43 C47		
40	320-1050-016S	1	CAPACITOR, CER.MULT, 1.0uF, 16V, 10%, 1206	C22	ECJ-3VF1C105Z	
41	320-1060-025S	2	CAPACITOR, CER.MULT, 10uF, 25V, 10%, 1206 CHIP	C16 C28	Samsung	
					CL31A106KAHNNNE	
42	320-1540-050S	1	CAPACITOR, CER.MULT, 0.15uF, 50V, 10%, 1206 CHIP	C33		
43	320-2210-050S	2	CAPACITOR, CER.MULT, 220pF, 50V, 10%, 1206 CHIP	C17 C19		
44	320-2210-1000S	1	CAPACITOR, CER.MULT, 220pF, 1000V, 10%,C0G,1206	C31	AVX 1206AA221KAT1A	
			CHIP			
45	320-2250-050S	3	CAPACITOR, CER.MULT, 2.2uF, 50V, 10%, 1206 CHIP	C42 C66-67	Murata	
					GRM31CR71H225KA88L	
46	320-3320-050S	1	CAPACITOR, CER.MULT, 3300pF, 50V, 10%, 1206 CHIP	C36		
47	320-3340-025S	3	CAPACITOR, CER.MULT, 0.33uF, 25V, 10%, 1206	C26 C38 C44		
48	320-3910-050S	2	CAPACITOR, CER.MULT, 390pF, 50V, 10%, 1206 CHIP	C40 C45		
49	320-4700-050S	1	CAPACITOR, CER.MULT, 47pF, 50V, 10%, 1206 CHIP	C18		
50	320-4700-1000S	1	CAPACITOR, CER.MULT, 47pF, 1000V, 10%,X7R,1206	C41	AVX 1206AC470KAT1A	
			CHIP			
51	320-4710-1000S	2	CAPACITOR, CER.MULT, 470pF, 1000V, 10%,C0G,1206	C13-14	AVX 1206AA471KAT1A	
			CHIP			
52	320-4720-1000S	3	CAPACITOR, CER.MULT, 4700pF, 1000V, 10%, X7R,1206	C1-3	AVX 1206AC472KAZ1A	
			CHIP			
53	320-4730-050S	1	CAPACITOR, CER.MULT, 0.047uF, 50V, 10%, 1206	C24		
54	330-2230-630R	1	CAPACITOR, POLYPRO, 0.022uF,630V, 5%, RDL	C32	PANASONIC	
					ECW-F6223HL	
55	335-2220-300R	2	CAPACITOR, Y2, 0.0022UF, 300V, 20%, METALIZED	C48-49	Epcos	
			FILM, 10mm		B32021A3222M189	
56	335-4740-275R	3	CAPACITOR, 0.47uF, 275VAC, 20%, METALIZED FILM	C11-12 C27	PANASONIC	
					ECQU2A474ML	
57	405-0311-S	1	IC, TL331IDBVR, COMPARATOR,5 PIN SOT	U2	TEXAS INSTRUMENTS	
					TL331IDBVR	
58	410-0006-S	1	DIODE, BRIDGE, MDB6S, 600V,1A, MICRO-DIP	CR6	FAIRCHILD MDB6S	
59	410-0140-S	1	DIODE, SCHOTTKY, MBRS140T3, 40V,1A, SMB	CR2	ON SEMI	
60	410-0160-S	2	DIODE, ULTRAFAST, MURA160T3, 600V,1A, SMA	CR14-15	ON SEMI	
61	410-0550-S	1	DIODE, ULTAFAST, MURD550PFT4, 520V,5A, DPAK	CR5	ON SEMI	
62	410-1100-S	1	DIODE, SCHOTTKY, MBRS1100T3, 100V,1A, SMB	CR16	ON SEMI	

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63	410-1526-S	1	TRANSORB, SMCJ26A, 26V, 1500W	Z1	DIODES, INC.	
64	410-4448-S	2	DIODE, HI SPD SWITCHING, 1N4448W, SOD123	CR1 CR13	VISHAY	
65	410-5231-S	1	DIODE, ZENER, MMBZ5231BLT1, 5.1V, 225mW, SOT-23	CR7	ON SEMI	
66	410-5245-S	2	DIODE, ZENER, MMBZ5245BLT1, 15V, 225mW, SOT-23	CR12 CR18	ON SEMI	
67	410-5245-S	1	ZENER, 1N5245B, 0.5W, 5%, 15V	CR17	ON SEMI	
68	410-5800-S	4	DIODE, RECTIFIER, SILICON, S5KL, 800V, 5A, SMC	CR8-11	DIODES Inc	
69	410-8010-S	2	DIODE, SCHOTTLY, SS8PH10, 100V, 8A, D2PAK	CR3-4	VISHAY SS8PH10	
70	420-2811-S	2	OPTOCOUPLER, PS2801-1, 4 PIN SOP	U4 U8	NEC PS2801-1	
71	425-0150-RS	1	LED, RED, WC LENS, 1206, FLAT, SMT	DS3	LITEON	
					LTST-C150KRKT	
72	425-0322-G	2	LED, GREEN, T1, RIGHT ANGLE, WITH LOCATING PINS	DS1-2	SUNLED XPV1LUG147D	
73	430-0177-S	1	TRANSISTOR, MMBFJ177, NPN, SOT-23	Q7	On Semi MMBJ177LT1G	
74	430-1700-S	2	N-CHANNEL MOSFET, PMBF170LT1	Q2 Q5	MOTOROLA	
75	430-2260-S	1	TRANSISTOR, SIHB22N60E, MOSFET, 650V, 22A, D2PAK	Q1	Vishay	
					SiHB22N60E	
76	430-3904-S	1	TRANSISTOR, MMBT3904LT1, NPN, SOT-23	Q3		
77	430-3906-S	1	TRANSISTOR, PNP, MMBT3906LT1, SOT23	Q4		
78	440-0431-S	2	REGULATOR, TL431AID, VOLTAGE REF., 1%, SO8	U3 U7	MOTOROLA	
79	440-1011-S	1	REGULATOR, SWITCHING, OFFLINE, NCP1011ST130T3G	U6	ON SEMI	
					NCP1011ST130T3G	
80	440-2101	1	IC, FSFR2100XS, PWR. SUPPLY CNTLR	U5	FAIRCHILD	
					FSFR2100XS	
81	440-3275	3	REGULATOR, METAL OXIDE VARISTOR, V275LA40A, 20mm	VR1-3		
82	440-7930-S	1	IC, FAN7930CMX, PF CNTLR, SO8	U1	Fairchild	
					FAN7930CMX	
83	520-0429-P	1	CONNECTOR, HEADER, 3-Pin, Mate-N-Lock	J1	Tyco (AMP)	
					350429-1	
84	740-0022	2	FUSE, HOLDER PCB HORIZONTAL MOUNT	F1-2	LITTELFUSE	
85	800-0140-S	1	TRANSFORMER, PCMT, OFFLINE, 2.5W	T4	Signal H-1480	
86	800-0182	1	TRANSFORMER, COMMON MODE FILTER, 3.2mH, 2.2A	T3	CWS 24V-3K2	
87	800-0191	1	TRANSFORMER, PFC, 200uH, With MTG Clips	T1	Santronics	
					SNX-R2127	
88	800-0200	1	TRANSFORMER, PCMT, OFFLINE, 200W, DUAL SEC.	T2	Santronics SNX2446	
89	850-1047-S	1	INDUCTOR, 4.7uH, 7.2A, SURFACE MOUNT	L1	SIGNAL	
					SC3326F-4R7	
90	860-0100-S	3	BEAD, FERRITE, TYPE 61, SMT	L2-4	FAIR-RITE	
					2761021447	

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8.4 CONNECTOR

Connector intermates with Beau S-5406 or equivalent:

Pin	Function	Pin	Function
7	+24VDC Output	10	No Connect
8	DC Ground	11	AC Neutral
9	Equipment Ground	12	AC Line +

