EPSON IMPACT DOT PRINTER

DLQ-3000

(upgrade model)

SERVICE MANUAL

EPSON

PREFACE

This document provides supplementary information to describe the new DLQ-3000 (Minerva+), which is a follow-on version of the DLQ-3000 (Minerva). Therefore, you must refer to this information in conjunction with DLQ-3000 (Minerva) Service Manual for details on any subjects common to both printers.

REVISION SHEET

Revision	Issue Date		Revision Page
A	March 15, 1996	-	1st issue

1.1 FEATURES

Minerva+ is a 24-pin serial dot-matrix and flat-bed type impact printer. As this printer follows on DLQ-3000 (MINERVA+), the main future is almost same as DLQ-3000 (MINERVA).
The main features are ;

❏ Two built-in and one optional I/F

> Bi-Directional Parallel Interface (IEEE-1284 nibble mode)
> Serial Interface
> Type-B Interface (Option)

The exterior view of DLQ-3000 (MINERVA+) is the same as DLQ-3000 (MINERVA).

1.2 INTERFACE OVERVIEW

The printer provides an 8-bit Bi-directional parallel interface and serial interface as standard. Moreover, it is possible to interface to various computers using the optional type-B interface board. This section describes the specifications of the standard interfaces.

1.2.1 Parallel Interface Specifications

1.2.1.1 Forward Channel

Transmission mode:	8-bit parallel, IEEE-1284 compatible mode
Synchronization:	By $\overline{\text{STROBE}}$ pulse
Handshaking:	By BUSY and $\overline{\text{ACKNLG}}$ signal
Signal level:	TTL-compatible level, IEEE-1284 level 1 device
Adaptable connector:	57-30360 (Amphenol) or equivalent
Data transmission timing:	See Figure 1-1.

Note: *Transition time (rise time and fall time) of every input signal must be less than 200 ns and every output signal must be less than 120 ns.*

The BUSY signal is at a HIGH level before either -ERROR signal is at a LOW level or the PE signal is at a HIGH level until all these signals return to their inactive state. The BUSY signal is at a HIGH level in the following cases:

- During data reception (see the figure above)
- When the input buffer is full
- When the INIT input signal is active
- During initialization
- When the ERROR signal is active
- In the self-test mode
- In the SelecType
- When the parallel interface is not selected.

The $\overline{\text{ERROR}}$ signal is at a LOW level when the printer is in one of the following conditions:

- Printer hardware error (fatal error)
- A paper-out error
- Release lever operation error

PE signal is at a HIGH level during paper out error.

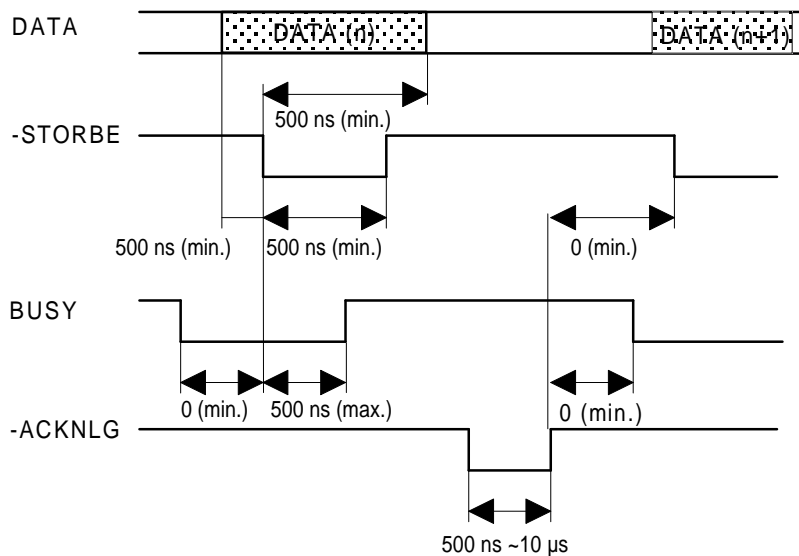**Figure 1-1. Data Transmission Timing**

Table 1-1 shows the connector pin assignments and signal functions for the 8-bit parallel interface.

Table 1-1. Signal and Connector Pin Assignments for Parallel Interface (Forward Channel)

Pin No.	Signal Name	Return GND Pin	I/O	Description
1	$\overline{\text{STROBE}}$	19	In	Strobe pulse. Input data is latched at the falling edge of this signal.
2-9	DATA1-8	20-27	In	Parallel input data to the printer. Active-HIGH input. LSB: DATA1 MSB: DATA8
10	$\overline{\text{ACKNLG}}$	28	Out	Indicates that data has been received and the printer is ready to accept more data.
11	BUSY	29	Out	A HIGH level means the printer cannot accept further data.
12	PE	30	Out	A HIGH level means a paper-out error. Always the logical opposite of the ERROR signal.
13	SLCT	-	Out	Always at a HIGH level (pulled up to +5 V through a 1K-ohm resistor).
14	$\overline{\text{AFXT}}$	-	In	Auto feed execution means that a line feed is automatically performed upon input of a CR code. Checked when the printer is initialized. Active-LOW signal.
31	$\overline{\text{INIT}}$	16	In	Initialize printer. Minimum 50 μs pulse is necessary. Active-LOW signal.
32	$\overline{\text{ERROR}}$	-	Out	A LOW level means that an error has occurred.
36	$\overline{\text{SLIN}}$	30	In	Not used.
18,35	Logic H	-	Out	Pulled up to +5V and shorted to +5V via Schottky diode, making these signals appear low to the host when the printer is turned off.
17	Chassis GND	-	-	Chassis GND
16,19-30, 33	GND	-	-	Signal GND
15,34	NC	-	-	Not used. Not connected.

Note: In/Out refers to the direction of signal flow as viewed from the printer.

1.2.1.2 Reverse Channel

Transmission mode: 8-bit parallel, IEEE-1284 nibble mode

Synchronization: Refer to the IEEE-1284 specification

Handshaking: Refer to the IEEE-1284 specification

Signal level: IEEE-1284 level 1 device

Data transmission timing: Refer to the IEEE-1284 specification

Extensibility request: the printer responds to the extensibility request in the affirmative, when the request is 00H or 04H, which mean;
        00H: Request nibble mode of reverse channel transfer
        04H: Request device ID in nibble mode of reverse channel

Transfer Device ID:

Table 1-2. Transfer ID

ESC/P2	IBM 2391 Plus
[00H][33H] MFG:EPSON; CMD:ESCPL2-00; MDL:DLQ-3000; CLS:PRINTER;	[00H][34H] MFG:EPSON; CMD:PRPXL24-01; MDL:DLQ-3000; CLS:PRINTER;

Table 1-3 shows the connector pin assignments and signal functions for the 8-bit parallel interface.

Table 1-3. Signal and Connector Pin Assignments for Parallel Interface
(Reverse Channel)

Pin No.	Signal Name	Return GND Pin	I/O	Description
1	Host Clk	19	In	Host clock signal.
2-9	DATA 1-8	20-27	In	Parallel input data to the printer. Active-HIGH input. LSB: DATA1 MSB: DATA8
10	Ptr Clk	28	Out	Printer clock signal
11	PtrBusy / Data Bit -3,7	29	Out	Printer BUSY signal and reverse channel transfer data bit 3 or 7.
12	Ack Data Req / Data Bit -2,6	28	Out	Acknowledge data request signal and reverse channel transfer data bit 2 or 6.
13	Xflag / Data Bit -1,5	28	Out	Xflag signal and reverse channel transfer data bit 1 or 5.
14	Host Busy	30	In	Host busy signal
31	$\overline{\text{INIT}}$	30	In	Not used.
32	$\overline{\text{Data Avail}}$ / Data Bit -0,4	29	Out	Data available signal and reverse channel transfer data bit 0 or 4.
36	1284-Active	30	In	1284 active signal
18	Logic H	-	Out	A high signal indicates that all other signals source by the peripheral are in a valid state.
35	+5V	-	Out	This line is pulled up to +5V through 3.3K Ω resister.
17	Chassis	-	-	Chassis GND
16,19-30,33	GND	-	-	Signal GND
15,34	NC	-	-	Not used. Not connected.

Note: *In/Out refers to the direction of signal flow as viewed from the printer.*

1.5 MAIN COMPONENTS

The main components of the DLQ-3000 are designed for easy removal and repair. The main components are :

■ BOARD ASSY., C124 MAIN-B :   control board
■ BOARD ASSY., C124 PSB/PSE :   power supply board(100 ~ 120V/220 ~ 240V)
■ C124 SUB board
■ M-5L60 Printer Mechanism
■ Control Panel
■ Housing

1.5.1 BOARD ASSY., C124 MAIN-B

The main board consists of a µPD70433, an E05A88, Program (256 KB Flash memory), CG (8M for Japan / 4 M for other countries), D-RAMs (256 MB), Bi-Directional Interface circuit, etc.

1.5.2 BOARD ASSY., C124 PSB/PSE

This Power supply board consists of two transformers, two switching FETs, a switching regulator IC, diode bridge, etc. This board has ratings for input AC voltages.

1.5.3 Printer Mechanism

This printer mechanism consists of a 24-pin impact dot head, PF motor , CR motor, color ribbon shift motor, HP/PG sensor, paper width/paper end sensor, etc.
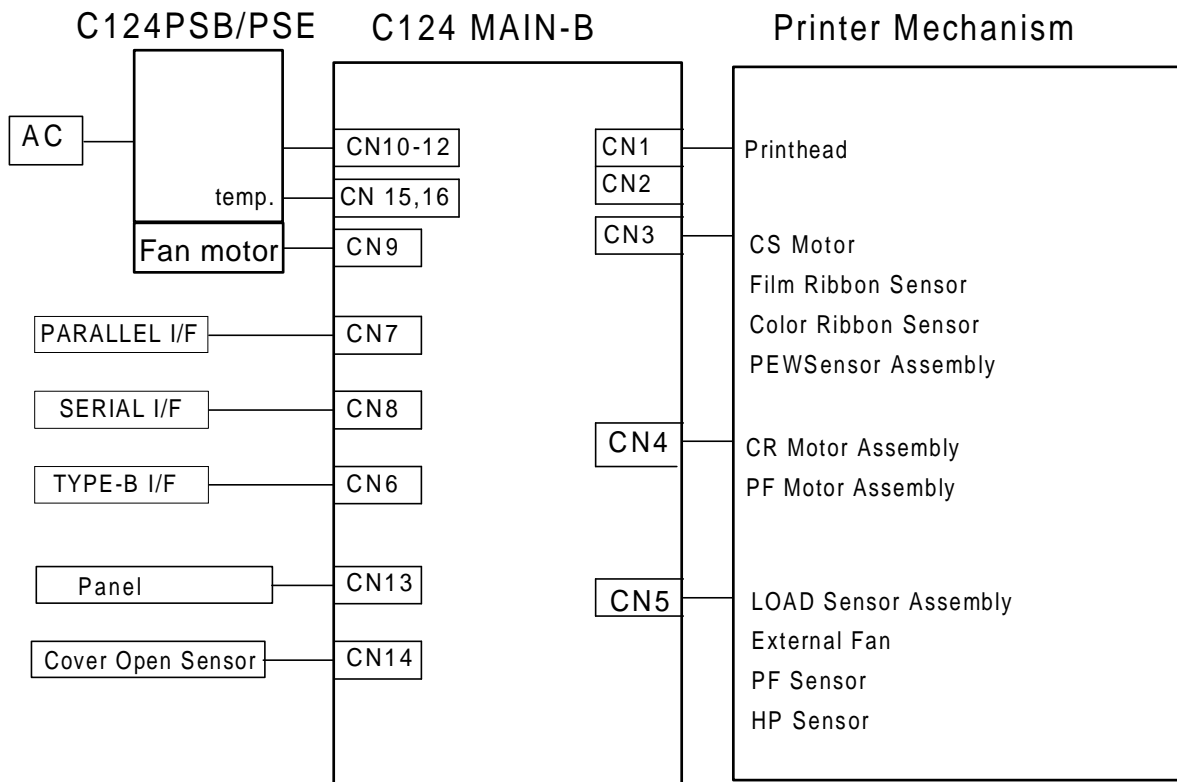
1.4.5 Housing Assembly

This printer Housing consists of the COVER ASSY.,PRINTER, the HOUSING ASSY.,UPPER, the HOUSING ASSY.,LOWER and FRAME ASSY.,BOTTOM.

A.1 CONNECTOR SUMMARY

This section describes the component connection and detailed pin assignments of each connector of the units.

Figure A-1 shows the component connections of the DLQ-3000, and Table A-1 lists the connector assignments and reference tables.

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C124PSB/PSE        C124 MAIN-B              Printer Mechanism

AC                  CN10-12          CN1        Printhead
                                     CN2
           temp.    CN 15,16
                                     CN3        CS Motor
      Fan motor     CN9                          Film Ribbon Sensor
                                                 Color Ribbon Sensor
                                                 PEWSensor Assembly

  PARALLEL I/F      CN7

   SERIAL I/F       CN8              CN4        CR Motor Assembly
                                                 PF Motor Assembly
   TYPE-B I/F       CN6

      Panel         CN13             CN5        LOAD Sensor Assembly
                                                 External Fan
Cover Open Sensor   CN14                         PF Sensor
                                                 HP Sensor
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Figure A-1. Cable Connection

Table A-2 through appendix lists connector pin assignments.

Table A-1. Connector Assignment

Board	Connector	Pin	Description
BOARD ASSY.,C124 MAIN-B	CN 1	20	Printhead drive signal output
	CN 2	20	Printhead drive signal output
	CN 3	14	CS motor, Color ribbon / film ribbon / CS home sensor
	CN 4	11	CR motor, PF motor output
	CN 5	13	PG/ REL/COVER OPEN/LOAD sensor, External fan motor
	CN 6	36	Type -B I/F
	CN 7	36	Bi-Directional parallel I/F
	CN 8	25	Serial I/F
	CN 9	2	Power supply board fan motor
	CN 10	4	Power supply input (+5V)
	CN 11	6	Power supply input (+35V)
	CN 12	6	Power supply input (+35V)
	CN 13	10	Control panel
	CN 14	2	CR motor common (cover open sensor)
	CN 15	2	Power supply board temp.
	CN 16	2	Power supply board temp.
C124 SUB BOARD	CN 4		From CN1 to Printhead output signal
	CN 5		From CN2 to Printhead output signal
	CN 6		From CN3 to CS motor, Color ribbon / film ribbon / CS home sensor
BOARD ASSY., C124 PSB / PSE	CN 1	2	AC input line
	CN 2	10	DC output (+5V, +35V)
	CN 3	6	DC output (+35V)

Table A-2. Connector Pin Assignment - CN7

Pin	I/O	Name	Description (Forward / Reverse)
1	I	$\overline{\text{STOBE}}$ / Host Clk	Data strobe / Host clock signal
2 - 9	I	DATA 0-7	Parallel data bit 0 to 7
10	O	$\overline{\text{ACKNLG}}$ / PtrClk	Acknowledge / Printer clock signal
11	O	BUSY / PtrBusy, Data Bit-3,7	Printer busy and reverse channel transfer data bit 3 or 7
12	O	PE / AckDataReq, Data Bit-2,6	Paper out / Acknowledge data request and reverse channel transfer data bit 2 or 6
13	O	SLCT / Xflag, Data Bit-1,5	Always HIGH at printer power on / Xflag and reverse channel transfer data bit 1 or 5
14	I	$\overline{\text{AFXT}}$ / Host Busy	Not used / Host busy signal
15	-	NC	Not used and not connected.
16	-	GND	Signal Ground
17	-	Chassis GND	Chassis ground
18	O	Logic-H	Pulled up 5V / A HIGH signal indicates that all other signals soursed by the peripheral are in valid state.
19-30	-	GND	Signal Ground
31	I	$\overline{\text{INIT}}$ / $\overline{\text{INIT}}$	Initialize signal / Not used
32	O	ERROR / data avail, data bit-0,4	Error signal / Data available and reverse channel data bit 0,4
33	-	GND	Signal Ground
34	-	NC	Not used and not connected.
35	O	+5V	Pulled up 5V
36	I	$\overline{\text{SLIN}}$ / 1284-Active	Not used. / 1284-active signal

Note: The signal direction I/O are viewed from the connector on the board.

CN1
Head Conn 1
from mainboard

COM14	20		20	COM14	
COM10/18	13		13	COM10/18	
COM6/22	2		2	COM6/22	
COM2	14		14	COM2	
COM23	10		10	COM23	
COM3/19	4		4	COM3/19	
COM7/15	6		6	COM7/15	
COM11	3		3	COM11	
HD2	17		17	HD2	
HD3	9		9	HD3	
HD6	15		15	HD6	
HD7	19		19	HD7	
HD10	16		16	HD10	
HD11	11		11	HD11	
HD14	12		12	HD14	
HD15	1		1	HD15	
HD18	18		18	HD18	
HD19	8		8	HD19	
HD22	7		7	HD22	
HD23	5		5	HD23	

CN 4
Head conn 1
to Head

CN2
Head Conn 2
from mainboard

COM12/16	10		10	COM12/16	
COM8/20	15		15	COM8/20	
COM4/24	11		11	COM4/24	
COM1/21	1		1	COM1/21	
COM5/17	7		7	COM5/17	
COM9/13	2		2	COM9/13	
HD1	13		13	HD1	
HD4	17		17	HD4	
HD5	3		3	HD5	
HD8	18		18	HD8	
HD9	5		5	HD9	
HD12	12		12	HD12	
HD13	4		4	HD13	
HD16	16		6	HD16	
HD17	5		5	HD17	
HD20	9		9	HD20	
HD21	8		8	HD21	
HD24	14		14	HD24	
TENP	19		19	TEMP	
TEMP	20		20	TEMP	

CN 5
Head conn 2
to Head

CN1
Head Conn 1
from mainboard

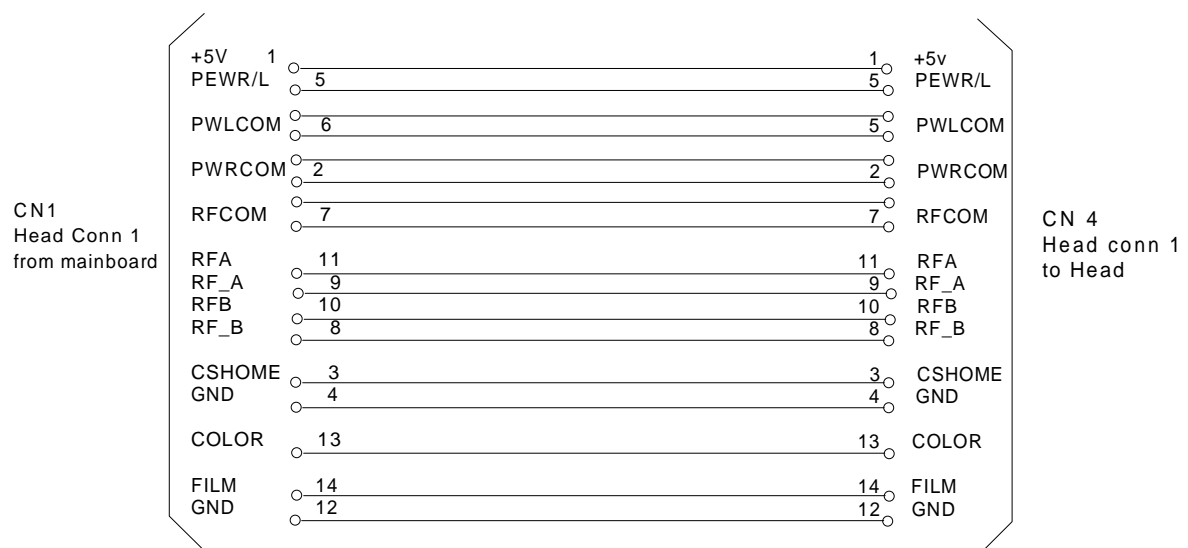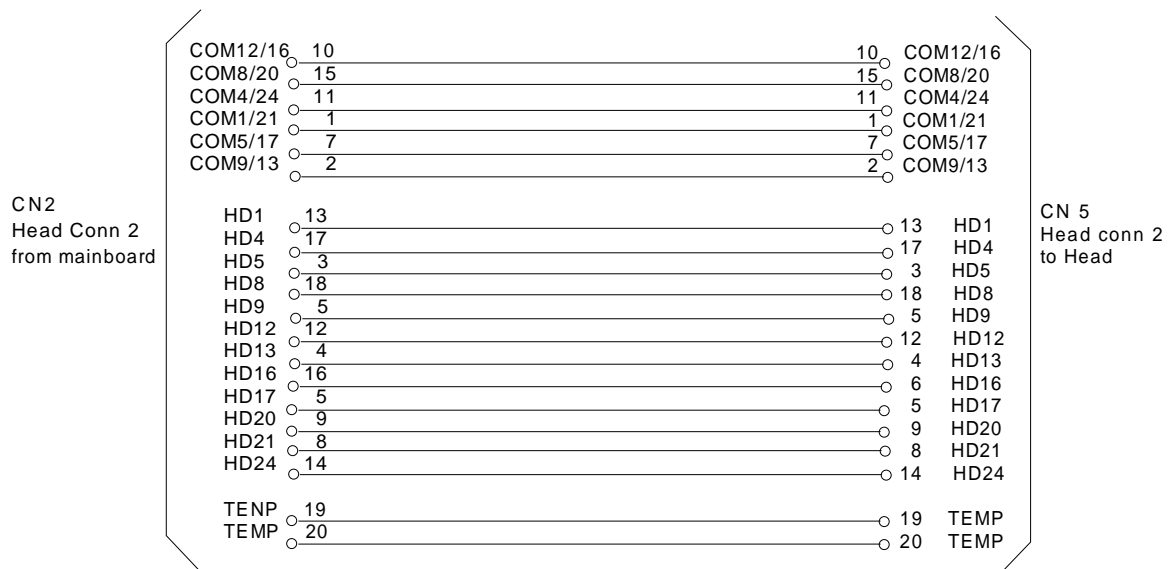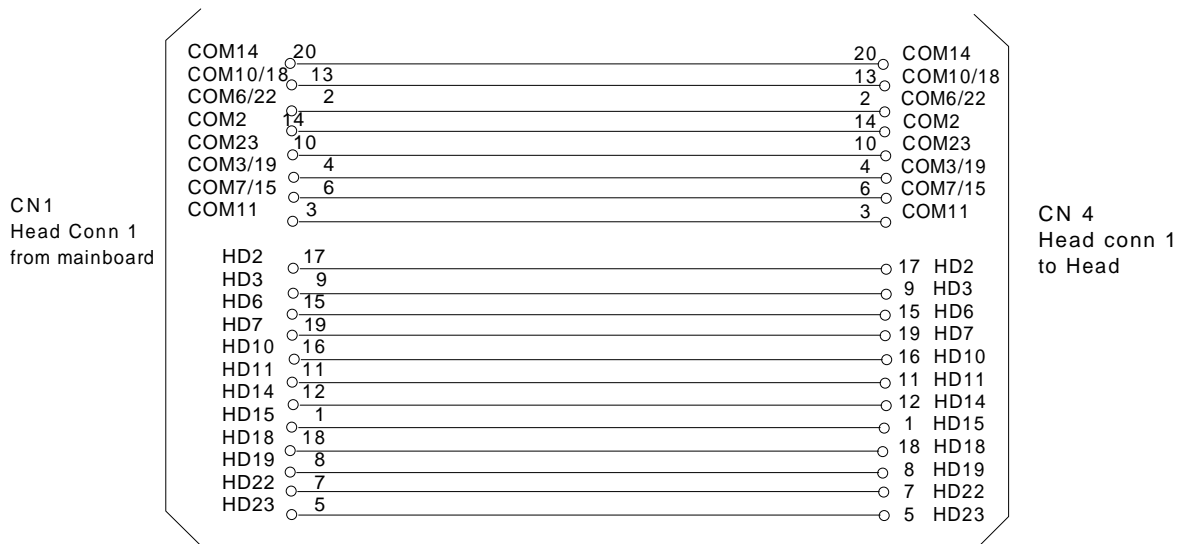|					
+5V	1		1	+5v	
PEWR/L	5		5	PEWR/L	
PWLCOM	6		5	PWLCOM	
PWRCOM	2		2	PWRCOM	
RFCOM	7		7	RFCOM	
RFA	11		11	RFA	
RF_A	9		9	RF_A	
RFB	10		10	RFB	
RF_B	8		8	RF_B	
CSHOME	3		3	CSHOME	
GND	4		4	GND	
COLOR	13		13	COLOR	
FILM	14		14	FILM	
GND	12		12	GND	

CN 4
Head conn 1
to Head
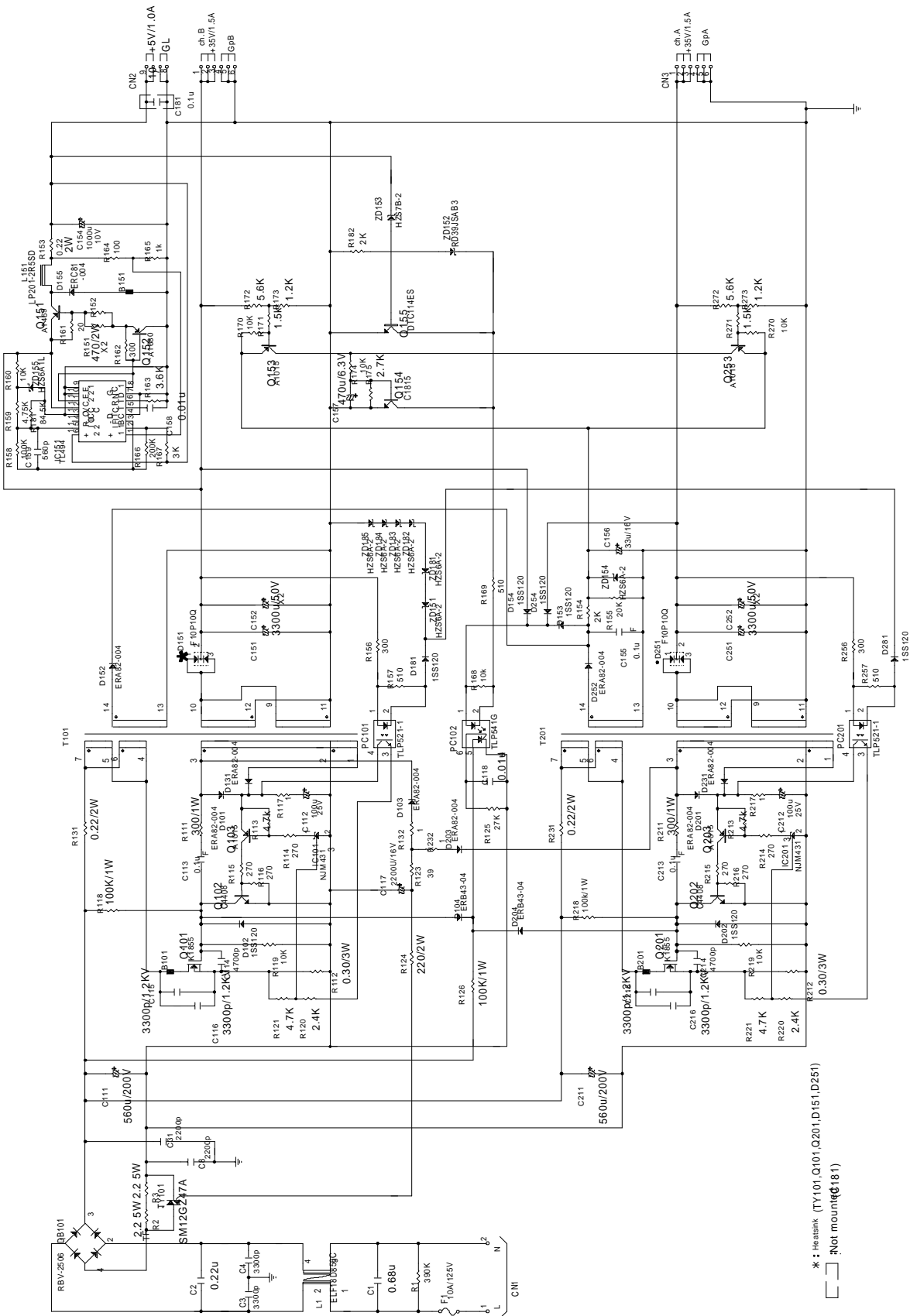
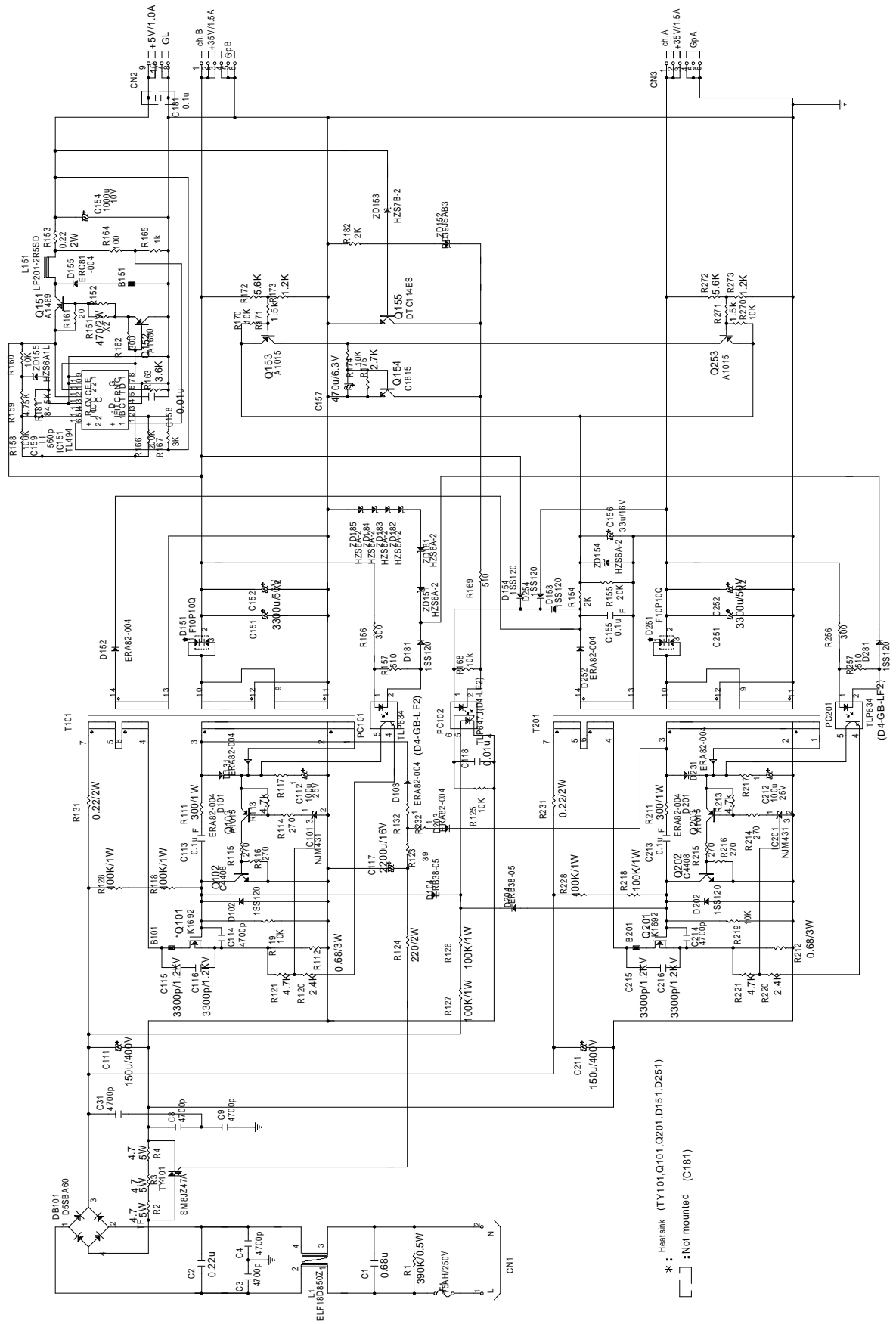## Figure A-4. C124 MAIN SUB Board Circuit Diagram

Figure A-5. C124 PSB Board Circuit Diagram

Figure A-6. C124 PSE Board Circuit Diagram

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