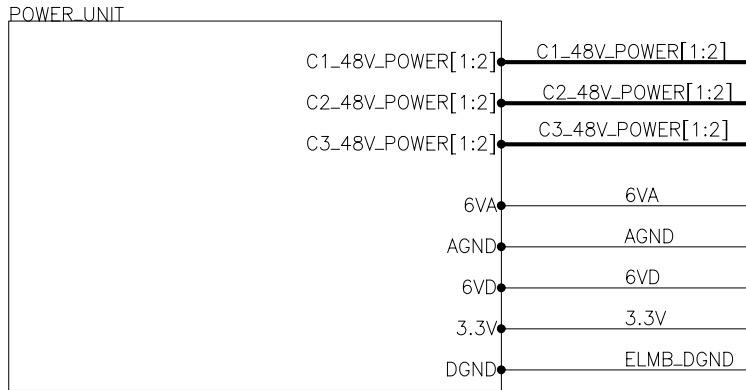
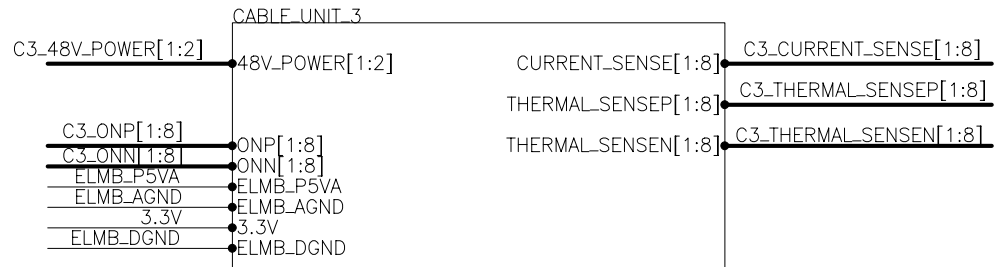
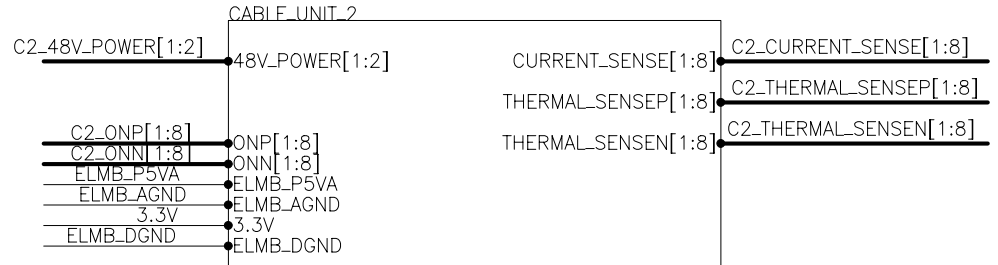
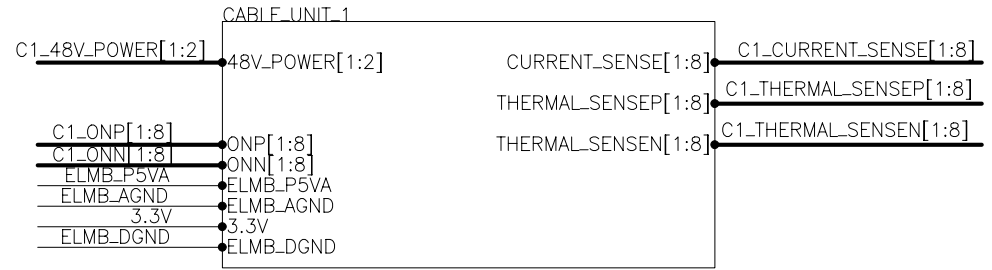


TOP LEVEL: PAGE 1



REF	CONNECTOR	SHEET LOCATION	FUNCTION
P1 P2 P3	AMP-213289-1 AMP-213289-1 AMP-213289-1	CABLE_UNIT1V2.0.SCH CABLE_UNIT2V2.0.SCH CABLE_UNIT3V2.0.SCH	HEATER CABLE HEATER CABLE HEATER CABLE
P4	MALE DB9	ELMB.SCH	CANBUS
P5 P6	BergStac 61083-101000 BergStac 61083-101000	ELMB.SCH ELMB.SCH	ELMB MOUNT ELMB MOUNT
P7	MOLEX 42820-4213	POWER_CONVERTER.SCH	48V POWER



ONE HEATER CONTROL CARD SERVICES 24 HEATER ELEMENTS.
CONTROL AND MONITORING FUNCTIONS PROVIDED BY ELMB MODULE, FOR ALL 24 CHANNELS.

LAYOUT NOTES:

- 1) ROUTE THERMAL SENSE WIRES AS DIFFERENTIAL PAIRS
- 2) SEE NATIONAL LM2594HV DATA SHEET FOR LAYOUT NOTES
LM2594HV IS IN POWER_UNIT.
- 3) ALL CONNECTORS EXCEPT CANBUS CONNECTOR ARE LOCATED ON
BACK EDGE OF BOARD. CANBUS CONNECTOR IS ON FRONT EDGE.

SCIPP
RM 383 NATURAL SCIENCES II BLDG.
SANTA CRUZ, CA 95064
831-459-5702

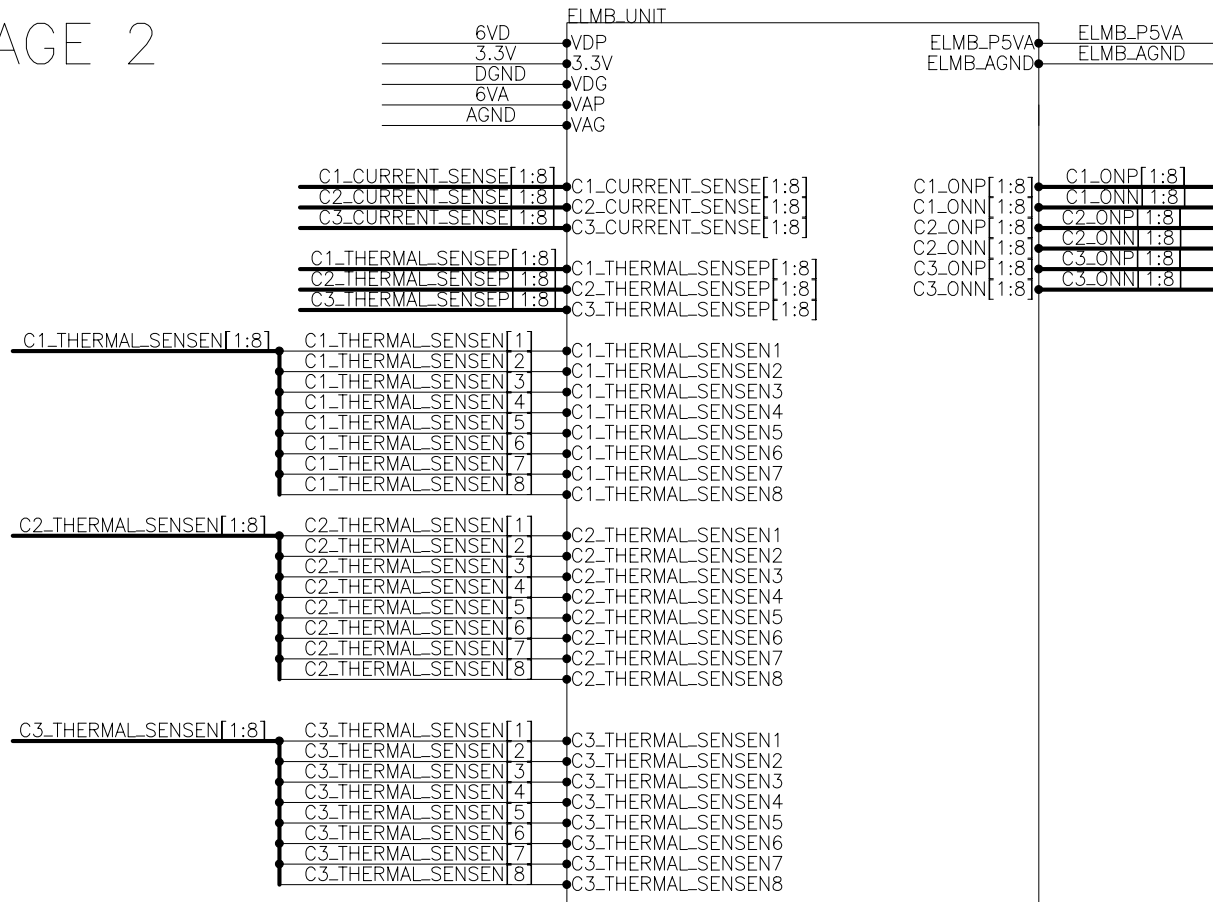
Page Size: A

ATLAS SCT 48V HEATER CONTROL CARD
TOP LEVEL SCHEMATIC

HEATER_CONTROL_MODULE2.0.SCH

Revision: 2.3 OCTOBER 4, 2003 Page 1 of 2

TOP LEVEL: PAGE 2



SCIPP
 RM 383 NATURAL SCIENCES II BLDG.
 SANTA CRUZ, CA 95064
 831-459-5702

Page Size: A

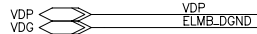
ATLAS SCT 48V HEATER CONTROL CARD
 TOP LEVEL SCHEMATIC

HEATER_CONTROL_MODULE2.0.SCH

ELMB UNIT: PAGE 1

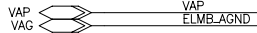
DIGITAL POWER IN, 3.5V - 12V, 15 mA

DIGITAL GND IN



ANALOG POWER IN, 5.5 V - 12V, 10 mA

ANALOG GND IN

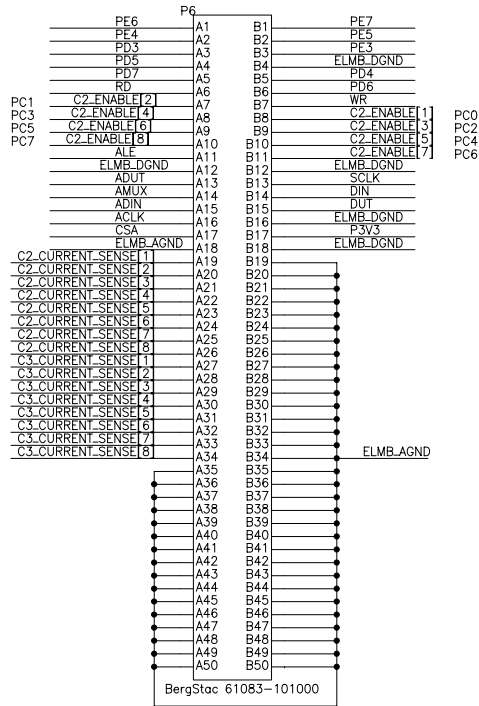


EMBEDDED LOCAL MONITOR BOARD (ELMB) PLUGS INTO CONNECTORS P5 AND P6. IT MONITORS HEATER TEMPERATURES, HEATER CURRENTS, TURNS HEATER ELEMENTS ON AND OFF, AND COMMUNICATES WITH ATLAS DCS VIA CANBUS.

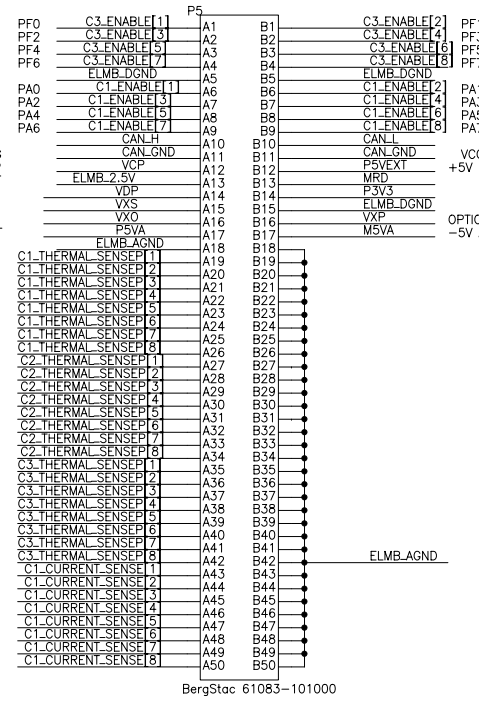
THIS SCHEMATIC ONLY SHOWS CIRCUITRY THAT IS DIRECTLY CONCERNED WITH MONITOR AND CONTROL FUNCTIONS. ALTHOUGH ALL CONNECTOR PINS ARE LABELED, MANY OF THE DIGITAL PINS ARE NOT CONNECTED.

DOCUMENTATION FOR ELMB MOTHERBOARD CONNECTORS MAY BE FOUND AT: <http://elmb.web.cern.ch/ELMB/DOC/blockdiagram.html>

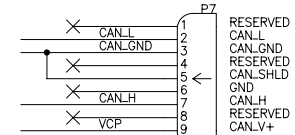
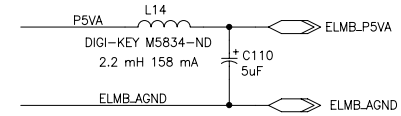
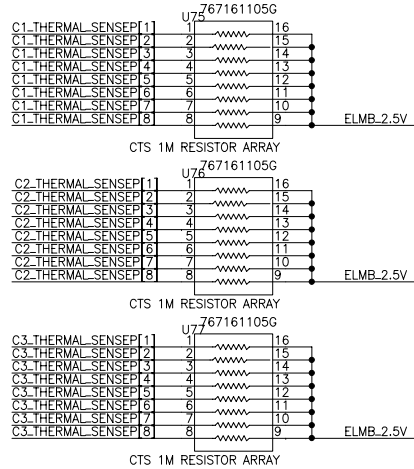
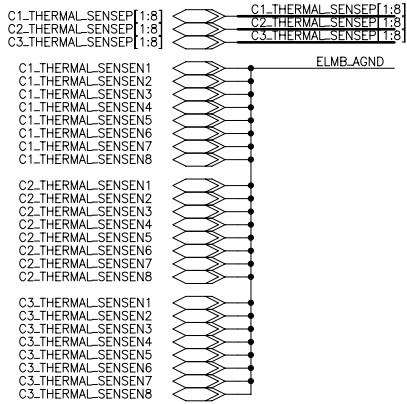
SEPARATE ELMB ANALOG AND DIGITAL GROUND PLANE WITH GROUND PLANE CUT ISOLATE WITH INDUCTORS ON POWER AND GND



VCC
CAN POWER SUPPLY, +10V TYP
2.5V REFERENCE OUTPUT
DIGITAL SUPPLY INPUT, +10V TYP
IC40 SHUTDOWN
+5.4V OUTPUT, CHG PUMP
+5V ANALOG OUTPUT
AGND



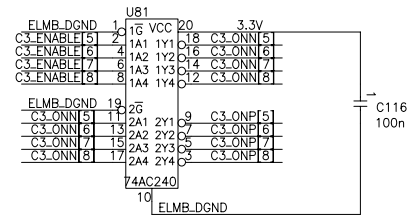
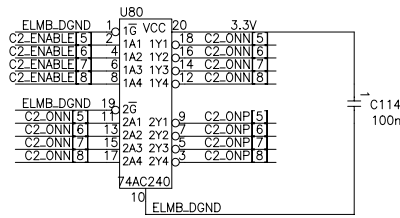
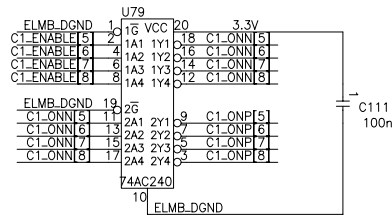
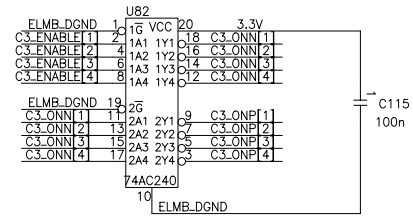
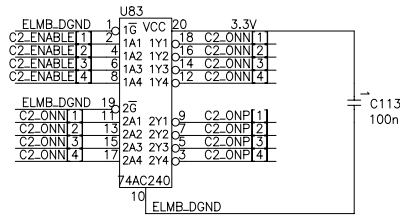
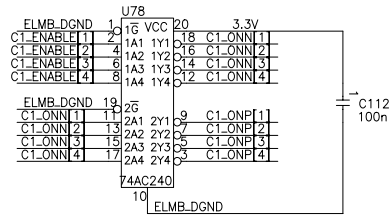
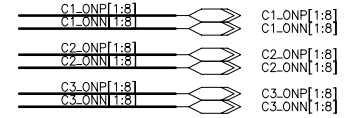
VCC, CAN SUPPLY GND
+5V FOR CAN TRANSCEIVER
OPTIONAL AUX POWER SUPPLY
-5V ANALOG OUTPUT



CANV+ NOT CONNECTED.
DOES IT GO TO P5VEXT, OR VCP?
CHECK ELMB128 SCHEMATIC

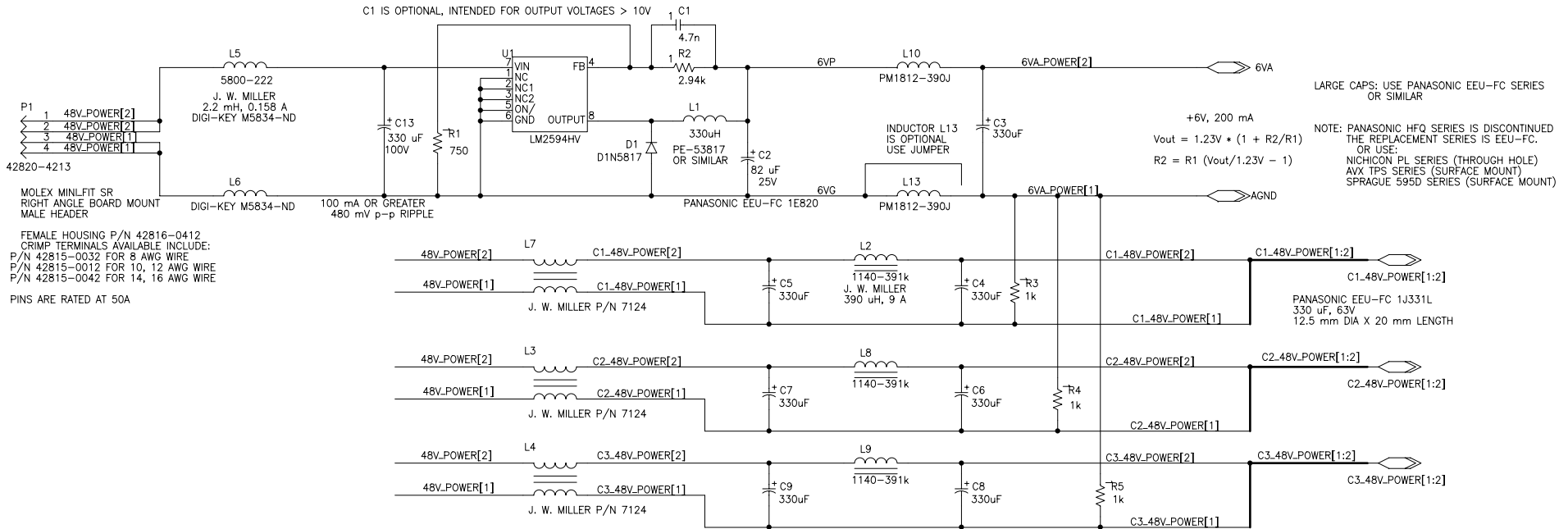
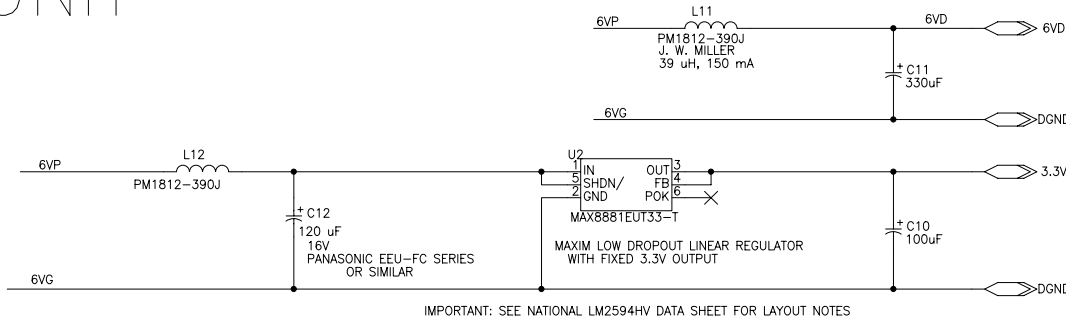
DB9M-B
CANBUS CONNECTOR
PLACE ON FRONT PANEL
USE CONNECTOR WITH PLASTIC SHELL

ELMB UNIT: PAGE 2



CMOS OCTAL INVERTERS
USED TO DRIVE OPTOCOUPLERS IN HEATER CHANNELS

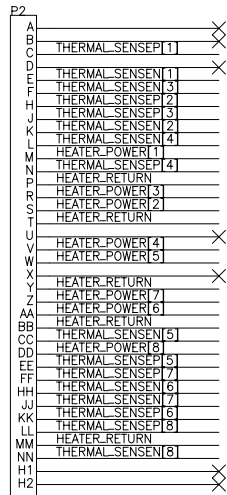
POWER UNIT



42820-4213
FEMALE HOUSING P/N 42816-0412
CRIMP TERMINALS AVAILABLE INCLUDE:
P/N 42815-0032 FOR 8 AWG WIRE
P/N 42815-0012 FOR 10, 12 AWG WIRE
P/N 42815-0042 FOR 14, 16 AWG WIRE
PINS ARE RATED AT 50A

CURRENT DRAW:
ELMB ADC: 10 mA
ELMB MICROPROCESSOR AND CANBUS: 15 mA
HEX INVERTERS: 4 mA X 24 EA = 96 mA + QUIESCENT CURRENT
1NA168 QUIESCENT CURRENT: 45 uA X 24 EA = 1.1 mA
TOTAL CURRENT DRAW ASSUMING 80% EFFICIENCY IN DC/DC CONVERTERS: 153 mA

CABLE UNIT (1 OF 3)



CONNECTOR P1 POWER TRIPLES ON PINS:

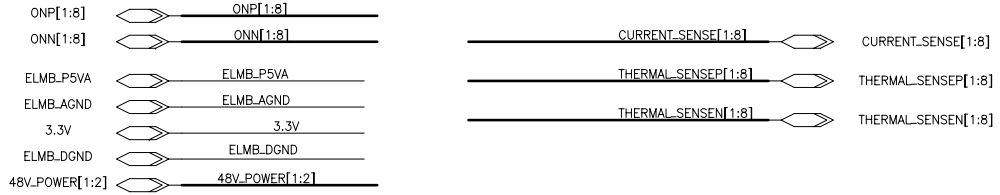
M, P, S
R, V, T
W, Y, AA
Z, BB, DD

CABLE SHIELD DRAIN WIRE GOES TO P1 PIN MM

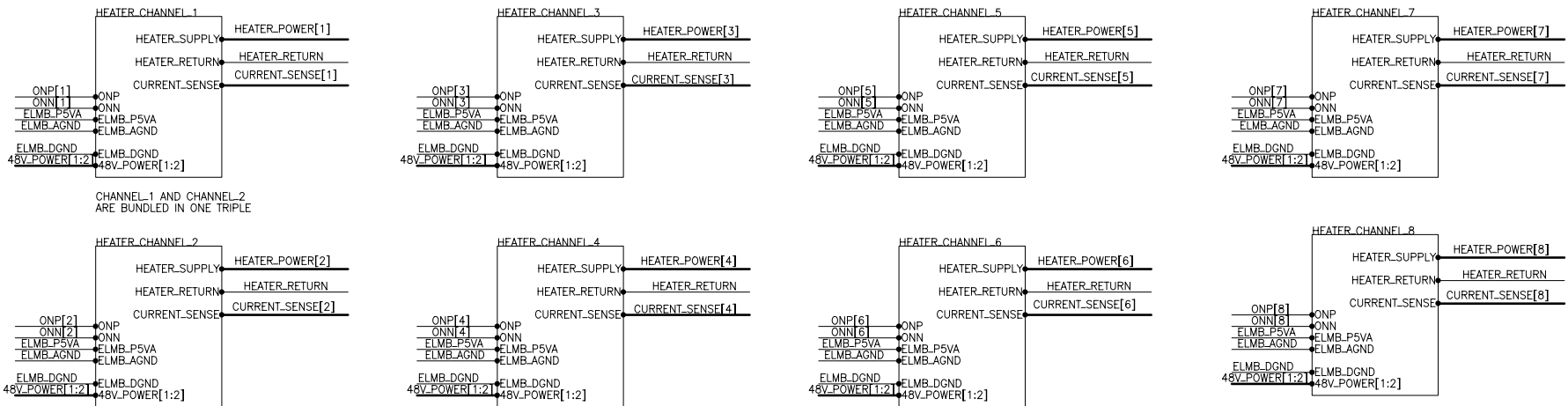
THERMISTOR SENSE PAIRS GO TO P1 PINS:

C, E
H, K
J, F
N, L
EE, CC
KK, HH
FF, JJ
LL, NN

AMP V.35 RETANGULAR RIGHT ANGLE BOARD MOUNT CONNECTOR
CABLE AND POWER CONNECTORS MOUNT ON REAR EDGE OF CARD.
NOTE: H1 and H2 are mounting hole hardware in ohmic contact with jackscrews and through them, cabl



AMP-213289-1

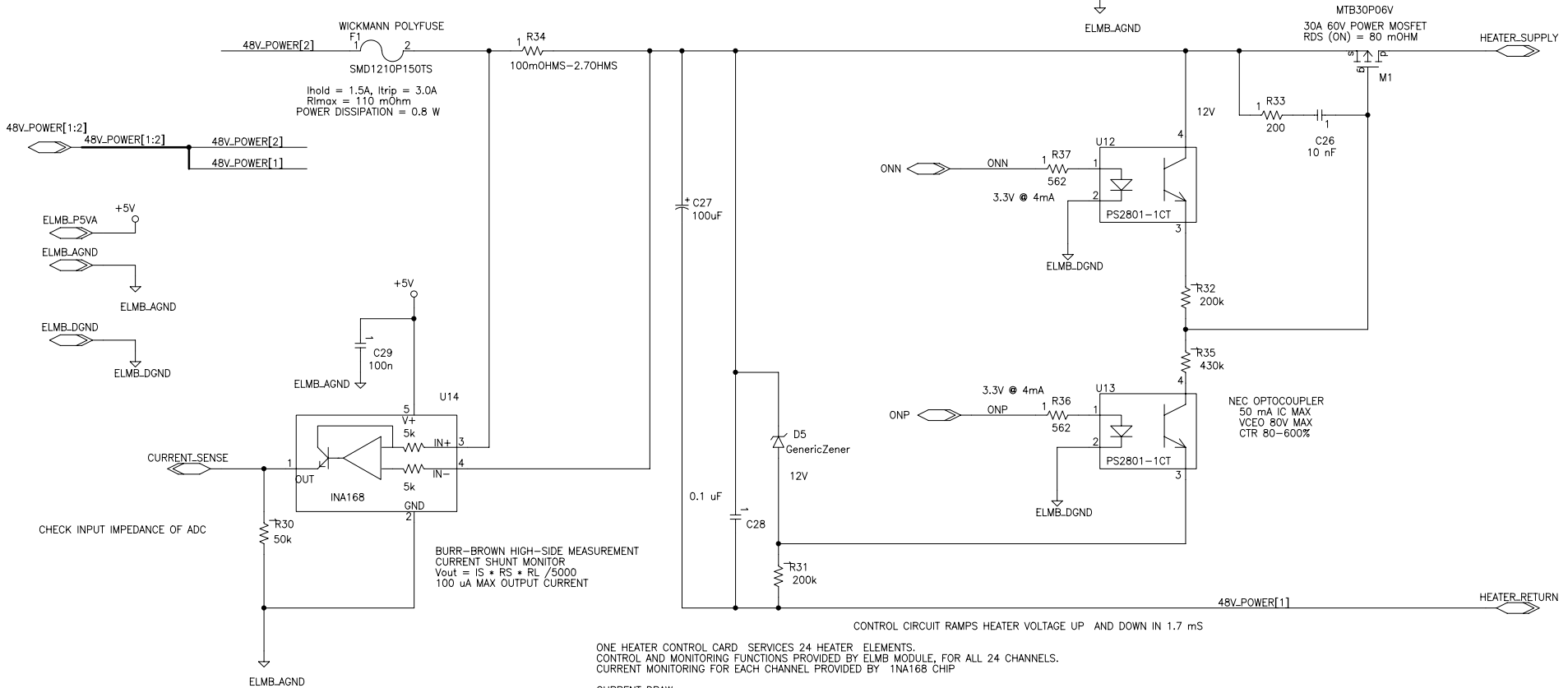


A CABLE UNIT CONSISTS OF ALL CIRCUITRY CONNECTED TO ONE HEATER CABLE, EXCEPT FOR THERMISTOR WIRING. EACH CABLE UNIT SERVICES 4 HEATER PADS. EACH PAD HAS TWO HEATER ELEMENTS (CHANNELS), SHARING A COMMON HEATER RETURN. HEATING ELEMENTS ARE TURNED ON BY ENABLE LINES (ACTIVE HIGH). EACH CURRENT_SENSE LINE RETURNS A VOLTAGE PROPORTIONAL TO HEATER CURRENT DRAW.

HEATER CHANNEL (1 OF 24)

THERE ARE THREE TYPES OF HEATER CHANNEL RESISTORS:

R6 CURRENT SENSE RESISTOR VALUE TABLE					
CHANNEL COUNT	SUPPLY CURRENT	SENSE RESISTOR	VOLTAGE DROP	POWER	RESISTOR PANASONIC PART NO
16 64 40	0.14A 0.09A 0.05A	2.7 OHM 2.7 OHM 2.7 OHM	378 mV 243 mV 135 mV	53 mW 22 mW 7 mW	ERJ-8RQF2R7V
100 114 84	0.5A 0.24A 0.22A	680 mOHM 680 mOHM 680 mOHM	340 mV 163 mV 150 mV	170 mW 39 mW 33 mW	ERJ-8RQFR68V
52 64 160	1.1A 0.88A 0.82A	100 mOHM 100 mOHM 100 mOHM	110 mV 88 mV 82 mV	120 mW 77 mW 67 mW	ERJ-L14KF10CV



ONE HEATER CONTROL CARD SERVICES 24 HEATER ELEMENTS.
CONTROL AND MONITORING FUNCTIONS PROVIDED BY ELMB MODULE, FOR ALL 24 CHANNELS.
CURRENT MONITORING FOR EACH CHANNEL PROVIDED BY INA168 CHIP

CURRENT DRAW:
ELMB ADC: 10 mA
ELMB MICROPROCESSOR AND CANBUS: 15 mA
HEX INVERTERS: 4 mA X 24 EA = 96 mA + QUIESCENT CURRENT
INA168 QUIESCENT CURRENT: 45 uA X 24 EA = 1.1 mA
TOTAL CURRENT DRAW ASSUMING 80% EFFICIENCY IN DC/DC CONVERTERS: 153 mA