DAL-50-15-100

OPERATOR'S MANUAL

JULY, 1980

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T A B L E O F C O N T E N T S

ILLUSTRATIONS

SPECIFICATIONS--Model 50-15-100

Voltage Range: 3-50V

Constant Current: 0-15A

Constant Resistance: 1 A/V, 3 A/V

Maximum Power: 100W

Ammeter Ranges: 1.8A, 6A, 18A full scale as selected by switch; accuracy 2%

Short Circuit Contactor: 300A surge capability

Load Current Regulation: Less than .05% per volt

Temperature Coefficient: Less than .03% / ^{o}C

Overpower Protect Circuit: The combination of input voltage and current are monitored to reject power inputs in excess of approximately 125W.

Line Regulation: Less than 1%

Ripple Current: Less than .1% RMS

Turn-on Time: Approximately 20mseconds

Temperature Rise: 36^{o}C maximum

Programming Rate: Less than 50useconds to 90% load

Remote Programming Accuracy: 1% from .5 to 15A

THEORY OF OPERATION

Refer to schematic diagram D106813 below.

AC power is applied through the line cord to AC line fuse F101 (1A) to the primary of transformer T1. The secondary is full wave center-tap rectified by CR6, CR7, and filtered by capacitor C3 to generate approximately 24 VDC, which in turn is reduced and regulated by series-dropping resistor R4 and zener diodes VR1 and VR2, developing approximately ± 6V.

REGULATOR CIRCUIT

A voltage proportional to the load current is generated by shunt SH101. This voltage is fed through R13 to the inverting input of operational amplifier U1. In the 1 A/V mode, U1 compares a portion of the input voltage determined by divider R28, R29, and the load adjust controls R8 and R9 to the voltage developed across the shunt SH101. As the input voltage is increased, the non-inverting input of U1 becomes more positive than the inverting input. This causes U1's output to become positive, driving transistors Q2, Q101, and the pass transistors Q102 through Q105. As more current flows through shunt SH101, the voltage on the inverting

input rises until an equilibrium is reached. At this time U1 regulates the current, simulating a resistive load.

The 3 A/V mode works in the same manner as the 1 A/V mode, except that a larger portion of the input voltage, determined by divider R26, R27, and the load adjust controls R8, R9, is fed to U1's non-inverting input.

In the constant current position 0-15A, U1 compares the voltage developed across the shunt to a reference voltage determined by VR1, divider R5, R6, and the load adjust controls R8, R9. In this position the load current will remain constant regardless of any change in input voltage, provided the power limit point is not reached. It should be noted that power supplies with a foldback type of current limit may not start into a constant current type of load.

PROTECTIVE CIRCUITS

Overcurrent and overpower protection is provided by operational amplifier U2. Current limit is determined by the setting of R18 (current limit adjust). As the current through the shunt is increased, the increasing voltage developed is fed through divider R17, R18 to the inverting input of U2.

When sufficient current flows through SH101, the inverting input is driven positive. This causes the output to become negative, pulling the drive current away from transistor Q2, limiting the load current.

As the input voltage is increased, a signal is added by VR4, R31, R19, and R20 (power limit adjust) to the current limit signal. This reduces the amount of signal required from the shunt, which causes the current limit action to take place at a lower input current, approximating a constant power limit characteristic. At extremely high input voltages some of the power limit signal is shunted away by R32 and VR3, preventing an excessive reduction in power.

Reverse voltage protection is provided by rectifier CR101. Short circuit current is provided by contactor K101, which places the ammeter in series with the input. K1 is activated by the short circuit button located on the front panel. The ammeter may be switched to the desired current range as required.

AMMETER

A three-range ammeter is provided to display the load current. This meter may be calibrated by using an external calibrated ammeter for reference and adjusting R33 for the low range, R35 for the center range, and R37 for the high range.

CIRCUIT BREAKER

A 20A front panel circuit breaker is provided to switch both the AC and DC inputs on and off as desired. This breaker will open if DC current in excess of 20A is drawn through the load.

OPERATING INSTRUCTIONS

The following procedure is recommended for hooking up the dynaload: The circuit breaker should be turned off so that the load is inherently disconnected. The meter range switch should be set in its maximum current position, and the load adjustments controls should be set in the counterclockwise position. The mode selector switch should be set to the appropriate mode to be used. The dynaload should be plugged into standard 115V, 50-60 Hz, power. (Optional input voltage ranges are available.) Connections should be made from the source to be tested to the appropriate load terminals of the dynaload (E+ and E- on the rear of the unit). Parallel + and - terminals are provided on the front panel for convenience. If external modulation is to be used, the external programming voltage or resistance should also be connected and TB1 on the rear panel should be jumpered accordingly.

The circuit breaker should now be closed. If the circuit breaker trips, check the external hook-up wiring to see that all connections are

of the proper polarity and location. The load may now be increased by turning the load adjust controls slowly clockwise until the appropriate load is obtained. The meter range switch may be switched to the lower scale positions if greater accuracy is required, and external instrumentation may be used to obtain further accuracy and eliminate the effects of leakage currents in the dynaload or line voltage drops at high currents.

REMOTE PROGRAM

When external modulation is used, the dynaload can be programmed from 0-15A with 0-6 VDC applied to TB1-2 (+) and TB1-6 (RTN) if the front panel load adjust controls are set in their maximum clockwise position. The programming sensitivity may be reduced proportionally by the front panel load adjust controls; i.e., turning the load adjust controls counterclockwise reduces the programming sensitivity. A voltage source of +6.2V @ 10mA is provided at TB1-1. (NOTE: The jumper from TB1-2 to TB1-3 must be removed when external modulation is to be used.)

The linearity of the external program is within 1% from .5 to 15A load.

RESISTANCE PROGRAM

By connecting a variable 1K ohms resistor from TB1-4 to TB1-6 and removing the jumper from TB1-4 to TB1-5, the dynaload may be externally

programmed in the A/V or constant current mode. As the programming resistance is increased, the load current will also increase; at 1K ohms the load resistance will be .33 ohms, and at 0 ohms the load resistance will be infinite, with the exception of a few mA of current flowing through the meter and regulator sensing circuits. It should be noted that the programming resistance is not linear in comparison to the load resistance; however, the load resistance will remain constant over the specified input voltage range.

SIMPLIFIED TROUBLESHOOTING

Complaint	Recommended Procedure
The Dynaload will not turn on.....	Check the input plug in the power source and fuse F101.
Circuit breaker trips when DC..... power is applied.	Check contactor K1 to assure that it is open and check the power transistors Q101 through Q105 to assure that they have not failed. Check the input polarity to assure that reverse polarity is not being applied accidentally. Check TB1 jumpering.
Load will not adjust.....	Check R8 and R9. Check the voltages on C3, VR1, and VR2 to assure that they are of the correct value. Check TB1 jumpering.
Other problems.....	Service in accordance with the Theory of Operation.

MAINTENANCE

Very little maintenance is required on the Dynaload. The unit should be inspected for any dust accumulation and the ammeter checked for proper calibration every six months.

CALIBRATION PROCEDURE

(Refer to Figure 1, page 11, for adjustment location.)

Ammeter Calibrate

Use an external 5V source and an external ammeter for calibration. Turn the Dynaload adjust fully counterclockwise and set the mode selector switch to the constant current on 0-15A position. With the ammeter range selector switch at 1.8A, increase the load until the external ammeter is at 1A. Adjust the low amps control R33 so that the front panel ammeter is also at 1A. Switch the ammeter selector switch to 6A and adjust the load current until the external ammeter indicates 4A. Adjust the medium amps control R35 until the front panel ammeter is also at 4A. With the ammeter range selector switch set at 15A, increase the load current to 10A as indicated on the external ammeter and adjust the high amps control R37 until the front panel ammeter also indicates 10A.

Amperes Per Volt Calibrate

With the Dynaload in the 0-1 A/V position, connect a 1K ohm ±1% resistor between TB1-4 and TB1-6. Remove the jumper from TB1-4 to TB1-5. Apply a voltage of 5V to the input terminals of the Dynaload and adjust the low A/V calibrate potentiometer R29 so that 5.0A of load current is obtained.

With the Dynaload in the 0-3 A/V position, apply a voltage of 5V to the input terminals of the Dynaload and adjust the high A/V calibrate potentiometer R27 so that 15A of load current is obtained. (NOTE: Make sure that the current limit setting is not interacting in any way.)

Current Calibrate

Set the mode selector switch to the 15A constant current position. Using a 5V source, turn the front panel coarse load adjust potentiometer in the maximum clockwise position and adjust the constant current calibration potentiometer R6 to obtain 15A of load current. (Make sure that the current limit setting is not interacting in any way.)

Current Limit Calibrate

Place the Dynaload in the 0-3 A/V position. Using a 6V source, increase the load current to approximately 18A or until current limiting is achieved. Readjust the current limit adjust potentiometer R18 for 18A maximum load current.

Overpower Protection

Apply a 50V source to the Dynaload in the 0-15A mode. Increase the load current adjust either to its maximum clockwise position or 2.5A, whichever occurs first. Adjust the power limit potentiometer R20 to limit the current at 50V to between 2.2 and 2.6A.

Linearity

Remove the jumper TB1-2 to TB1-3 and connect a 0-6 VDC programming source to TB1-2 (+) and TB1-6 (RTN). With the load in the 0-15A mode, apply a 6.0 VDC programming signal. Using a 5V source, adjust the front panel load adjust controls for 15.0A of load current. Reduce the programming signal to 1.0 VDC, and adjust the linearity potentiometer R10 for 2.50A of load current. Repeat the above procedure, applying 6.0V and 1.0V programming signals until the linearity is within 1 per cent.

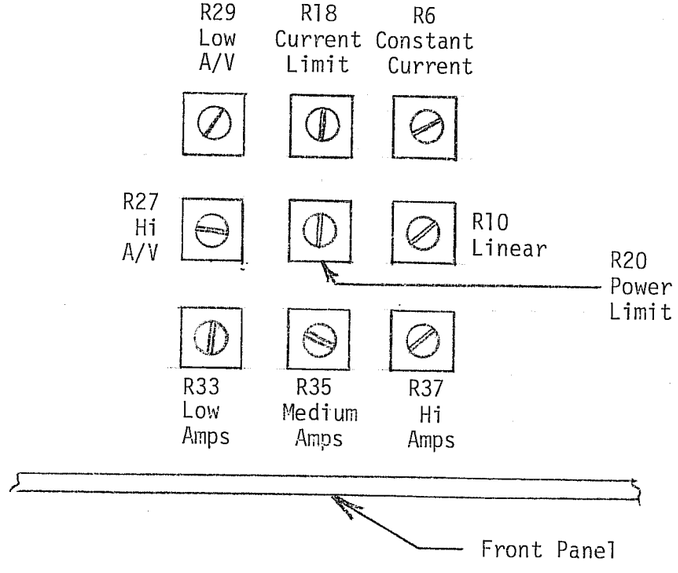
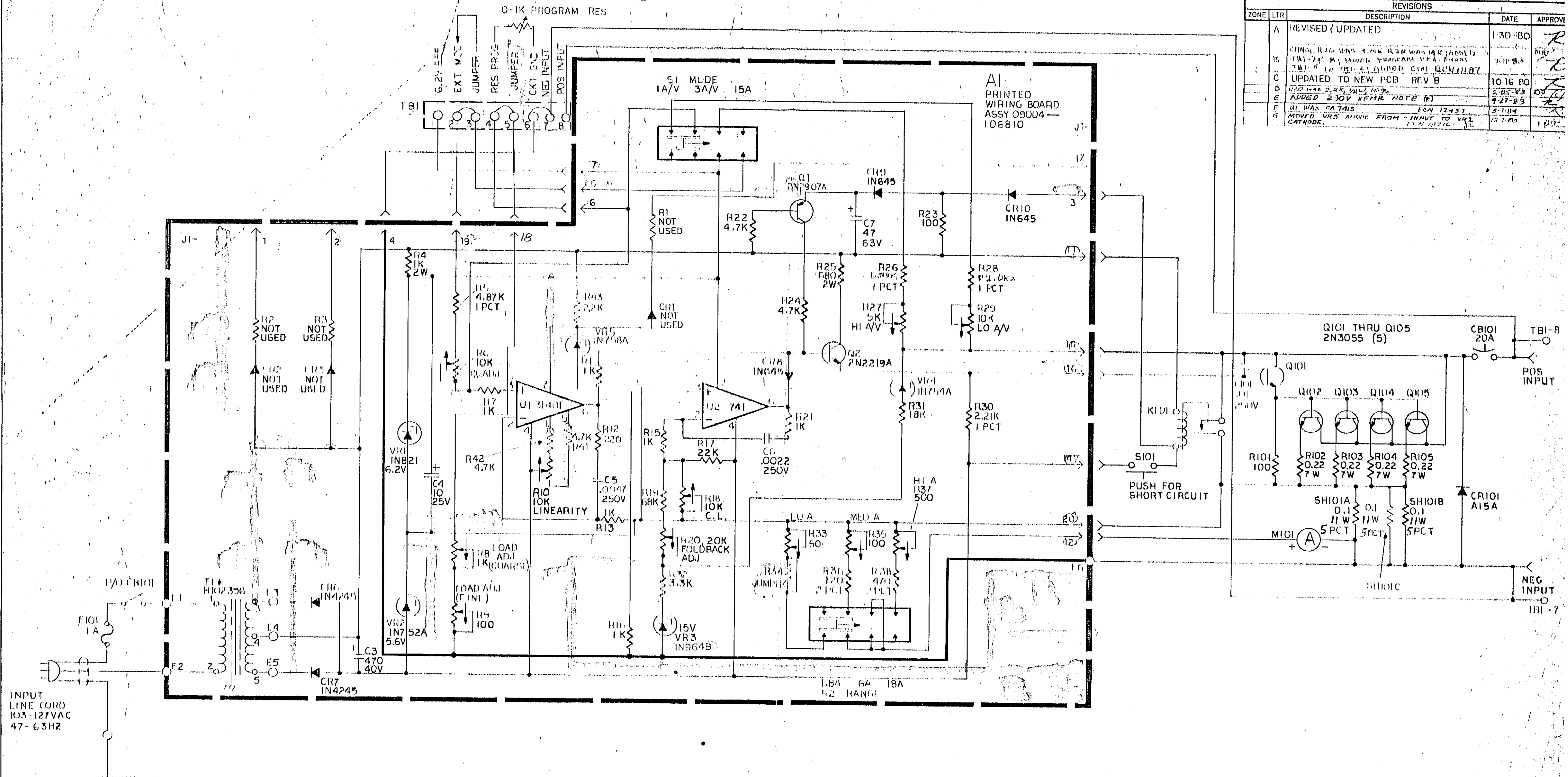


FIGURE 1

REVISIONS

ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	REVISED & UPDATED	1-30-80	
	B	CHNG. R26 WAS 5.49K, R28 WAS 14K, ADDED TB1-7,8 -B, MOVED PROGRAM RES FROM TB1-5 to TB1-4, ADDED C101 ECN 11107	7-11-80	
	C	UPDATED TO NEW PCB REV B	10-16-80	
	D	R30 WAS 2.2K, 1/2W, 10%	2-05-83	
	E	ADDED 230V XFMR NOTE (*)	4-22-83	
	F	U1 WAS CA741S. ECN 12457	5-7-84	
	G	MOVED VR5 ANODE FROM - INPUT TO VR2 CATHODE. ECN 13276	12-7-85	



NOTES
1. UNLESS OTHERWISE SPECIFIED,
RESISTANCE VALUES ARE IN OHMS, 1/2W, 10PCT,
CAPACITANCE VALUES ARE IN MICROFARADS.
2. FOR COMPONENT INFORMATION SEE ELECTRICAL PARTS LIST A-SIZE, DWG NO. 106885
3. FOR EXTERNAL MODULATION INPUT REMOVE JUMPER FROM TB1-2 TO TB1-3. MAKE CONNECTION FROM 0-6V SOURCE TO TB1-2 FOR 0-FULL LOAD CONSTANT CURRENT.
4. FOR RESISTANCE PROGRAMMING, SELECT A/V RANGE, CONNECT REMOTE POT BETWEEN TB1-4 AND TB1-6. CURRENT INCREASES WITH RESISTANCE.

* FOR 230VAC T1 BECOMES 104045

QTY REQD	CODE IDENT NO	PART NO. OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION

PARTS LIST

50-15-100	
NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES: ANGLES ±
FRACTIONS ±
3 PLACE DECIMALS ±
2 PLACE DECIMALS ±
1 PLACE DECIMALS ±
MATERIAL:

CONTR NO.
DR 1-30-80
CHK
APPD 2/14/80
APPROVED
BY DIRECTION OF

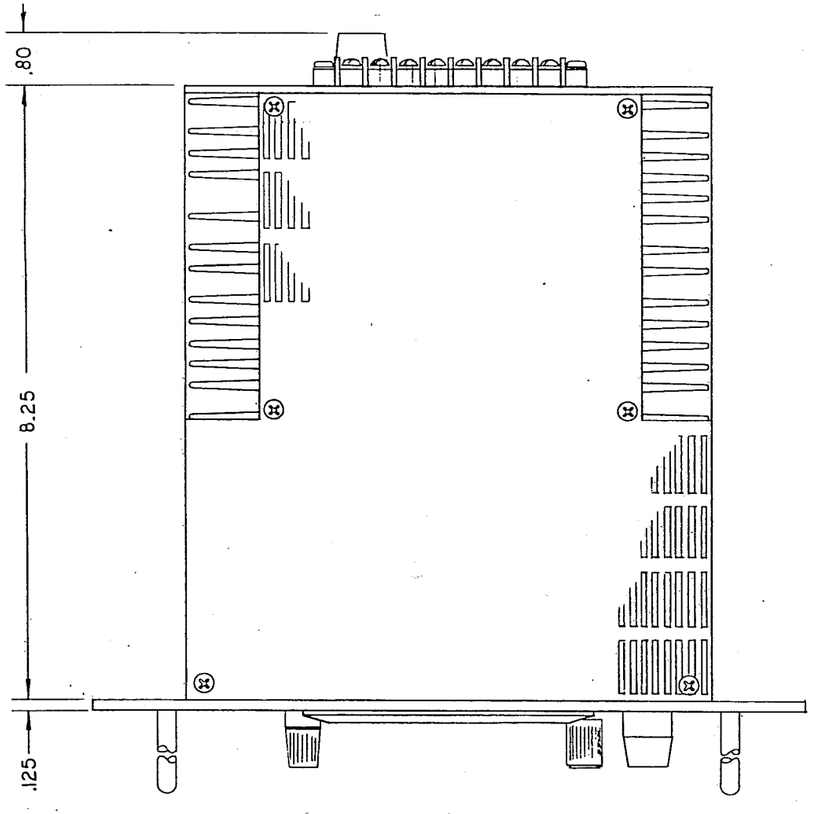
Transistor Devices Inc.
Cedar Knolls New Jersey

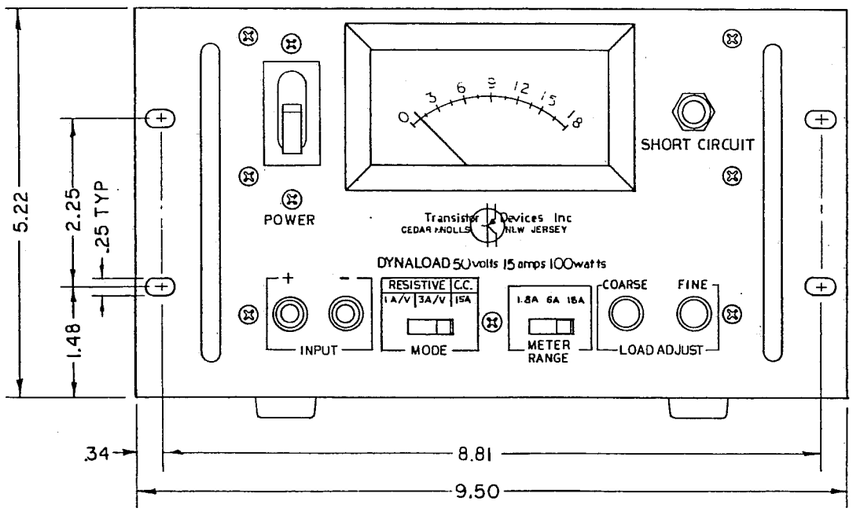
DRAWING TITLE
SCHEMATIC DIAGRAM
DYNALOAD
50V-15A-100W

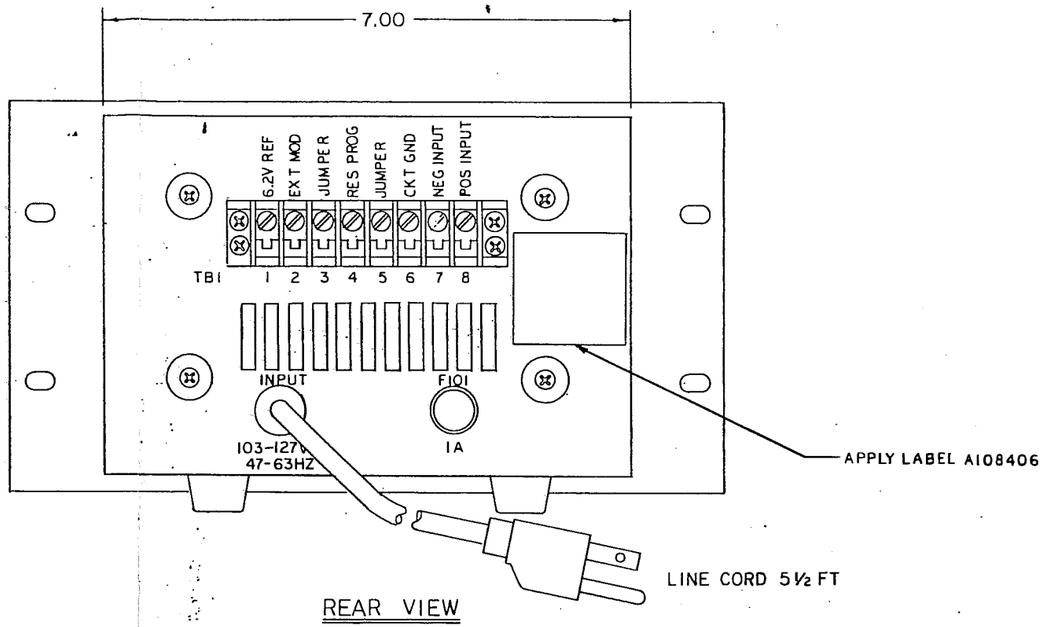
SIZE	CODE IDENT NO	DRAWING NO.
D	09004	106813

SCALE —
SHEET 1 OF 1

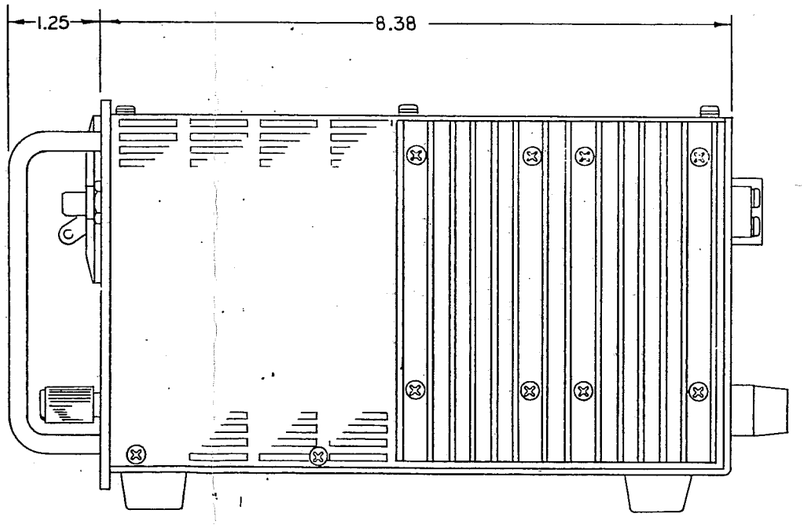
REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	UPDATED CL	12-18-81	







REAR VIEW



DUPLICATE COPY
OF ORIGINAL

QTY REQD	CODE IDENT NO.	PART NO. OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

PARTS LIST

	DAL SERIES
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES: ANGLES ±
FRACTIONS ±
3 PLACE DECIMALS ±
2 PLACE DECIMALS ±
1 PLACE DECIMALS ±
MATERIAL:

CONTR NO.

DR CROUS 10-30-80
CHK T Randle 10-30-80
APPD

APPROVED
BY DIRECTION OF

Transistor Devices Inc.
Cedar Knolls New Jersey

DRAWING TITLE
OUTLINE
DYNALOAD 50-15-100

SIZE	CODE IDENT NO.	DRAWING NO.
D	09004	107000

SCALE 1/1 SHEET

REVISION A