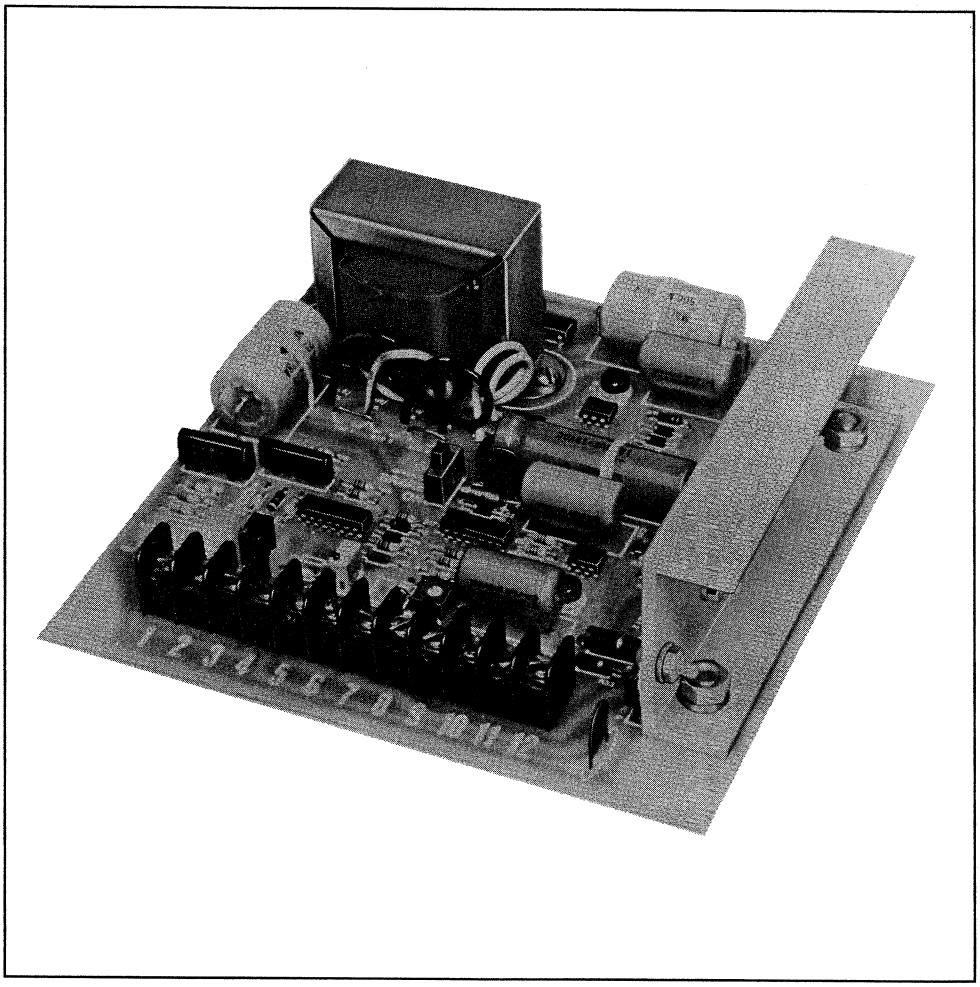
Jordan Controls, Inc.

IM-0483

AD-8800 Series

Instruction Manual

ON-OFF STATIC OUTPUT SERVO AMPLIFIER



Jordan CONTROLS

GENERAL DESCRIPTION

The AD-8800 series amplifier is an On-Off, reversing ac drive used for positioning and controlling bi-directional ac motors, relays, motor starters, and solenoids. In general, the amplifier is used in closed-loop servos where there is a positional feedback signal such as a feedback potentiometer, voltage, or current.

The command may be manually programmed using a 1K ohm potentiometer with the reference voltage supplied from the amplifier. The command may also come from a normal process control current or voltage signal.

The AD-8800 series are solid-state, self contained amplifiers with reference and power supply, and operate from a command and feedback potentiometer bridge. The output of the amplifiers are 120 V ac or 240 V ac.

FEATURES

These amplifiers feature triac switching that is electrically isolated from the dc control input, a null output (for releasing an electromechanical brake when the amplifier is not at a null), and a regulated reference voltage supply.

OPTIONS

- Reverse null output logic—null output is ON when amplifier is at null
- 2 K ohm 20 turn high trim potentiometer (in place of 1 K ohm fixed resistor) terminal 6
- 2 K ohm 20 turn low trim potentiometer (in place of -15 V dc regulated output) terminal 5
- Command and feedback input current shunt 680 ohm 1 W for 4 to 20 mA input or other values as required
- Model AD-88X3-1001 (non stock) having balanced differential inputs and a 2 K ohm high trim potentiometer (in place of span and elevation control). Please consult factory.

DYNAMIC BRAKING

A dynamic brake is available on the AD-8800 series amplifier. This aids in stopping the motor when the control inputs of the amplifier are within the deadband region. The braking functions may be added or removed in the field by a slide switch on the amplifier chassis. The braking circuit simultaneously applies line voltage to both windings of the motor for a period of 130 milliseconds. At the end of this time, all voltages are removed from the motor. The braking circuit is always de-energized when the split phase capacitor motor is operating.

APPLICATION

The AD-8800 series are designed to operate with Jordan Controls SM series rotary actuators and LA series linear actuators with ac single-phase motors. They are equally suitable for use with any bi-directional load with compatible input power characteristics.

BASIC MODELS

There are four basic models: AD-8813, 8823, 8833, and 8843. The AD-8813 is recommended for loads less than 5A at 120 V ac. The AD-8823 is rated for higher current applications at 120 V ac. The AD-8833 and AD-8843 are both rated for 240 V ac operations.

SPECIFICATIONS

Circuit board W x D = 7.25" x 7.25"
Amplifier height H = 2.5" (allow a minimum of .5" beneath circuit board when mounting)
Mounting hole dimensions = 6.62" x 6.62"
Amplifier weight = 2.2 lbs.
Operating temperature range: $+32^{o}$ to $+151^{o}$ F (0^{o} to $+55^{o}$ C)
with optional heater: -40^{o} to $+151^{o}$ F (-40^{o} to $+55^{o}$ C)

ADJUSTMENTS

	Maximum	Minimum
Span range-command input as measured by the percent of the feedback voltage with which a command signal may be nulled	156% (nominal)	30% (nominal)

Span Adjustment	20 turn potentiometer CW increases span
Elevation Range (as measured by the voltage deviation of the feedback signal)	0 ± 5.7 V dc
Elevation Adjustment	20 turn potentiometer CW increases voltage at feedback required for null

DIELECTRIC TEST VOLTAGE

1000 V ac, 60 Hz, 1 minute between ac power circuits and dc/signal input circuit.

QUIESCENT OPERATING CURRENT

(no external load)

Input Volts	1 LED on	NULL
100 V ac	46 mA ac	49 mA ac
117 V ac	59 mA ac	61 mA ac
134 V ac	80 mA ac	82 mA ac

HYSTERESIS

Terminals 2 to 4	Typical 10 millivolts

INPUT RESISTANCE

Terminals 1 to 4	65 K ohms
2 to 4	74 K ohms
1 to 2	139 K ohms

MAXIMUM POSSIBLE OPERATING INPUT VOLTAGE RANGE

Terminals 1 to 4	±45 V dc
2 to 4	±23 V dc
+15 and -15 V dc Regulated supply output	±15 V dc ±5%
Maximum external load (for each output)	200 mA

INSTALLATION

CAUTION

Fusing is not provided internally for the amplifier power circuit. This must be provided externally. Fuse to a current value equal to the driven load, or null output load, whichever is greater, plus 5.5 amp. (The dc power supplies are self-protecting.)

1. Use 20 AWG wire for signal connections on terminals 1 through 6. Use 18 AWG wire (minimum) for terminals 7 through 12 on models AD-8813 and AD-8833. Use 14 AWG wire (minimum) for terminals 7 through 12 on models AD-8823 and AD-8843.
2. For signal connections less than 50 feet long, standard wiring may be used on dc lines, provided the conductor is not in close proximity to ac power lines. For installations exceeding 100 feet, shielded cable is recommended for command/feedback connections, with grounding of the shield to the amplifier common at the amplifier end only.

START-UP

Refer to the interconnect wiring diagram supplied with the unit, or proceed as follows:

1. Begin with all terminals vacant and power off.
2. Connent the command signal to terminals 1. (Voltage should typically be between +15 and - 15 V dc. Damage will occur if command voltage exceeds ±50 V dc.)
   A. If the command is a potentiometer (Fig. 1), the excitation voltage across it may be supplied by amplifier terminals 3 and 4.
   B. If the command is a current source (Fig. 2), a current shunt resistor must be added to the circuit board to achieve a voltage (typically between 10 and 15 V dc).
   C. If the command is a voltage (Fig. 3), connect directly to terminals 1 and 4.
3. Connect the feedback signal to terminal 2. (Feedback voltage must not exceed ±20 V dc.) The feedback voltage must be made to approximately match the command voltage within the limits of the SPAN and ELEVATION adjustments, i.e. the desired feedback voltage range must be between 150% and 30% of the input voltage range.
4. Connect the 3-wire motor to terminals 9, 10, and 11. (Where 10 is the motor common.) An increasing command voltage will now result in a line voltage between terminals 10 and 11.
   NOTE: If a customer-supplied motor is used, a current limiting resistor must be connected in the motor capacitor circuit as shown.
5. Connect 120 V ac power to terminals 7 and 8 (terminal 8 should be neutral, or earth ground for models AD-8813 and AD-8823). Connect 240 V ac for models AD-8833 and AD-8843.
6. Connect a mechanical brake solenoid between terminals 8 and 12 if a mechanical brake is used. (Dynamic braking is not affected by the presence or absence of a mechanical brake.)
7. Calibration: Turn power on. Set the input command signal to minimum input value. Adjust ELEV. for desired actuator position. Set the input command signal to maximum input valve. Adjust SPAN for desired actuator position. Adjust the deadband clockwise until the motor does not overshoot when approaching null.

ACTUATOR SPAN AND ELEVATION RANGE

The AD-8800 span adjustment provides for a null condition with a ratio between the feedback signal and the command signal of 1.5:1 at maximum span to .3:1 at minimum span. All Jordan Controls actuators are designed for use between 60% and 90% of the actuator feedback potentiometer travel while going through their rated output turns. This means that if a command potentiometer producing a command voltage of 0 to +15 V dc is used, the SPAN adjustment must be set for a multiplying ratio of between .6 and .9 to produce 100% actuator travel. This will increase the minimum range of actuator travel that can be set with the span adjustment. For various input signals the actuator minimum spans that the actuator can be adjusted to are as follows:

Input Signal	Minimum SPAN Actuator using 90% of fdbk. pot.	Actuator using 60% of fdbk. pot.
0 to +15 V dc Pot. Command	33%	50%
0 to 10 V dc Voltage Command	22%	30%
4 to 20 mA Current CMD with 680 ohm shunt	22%	30%

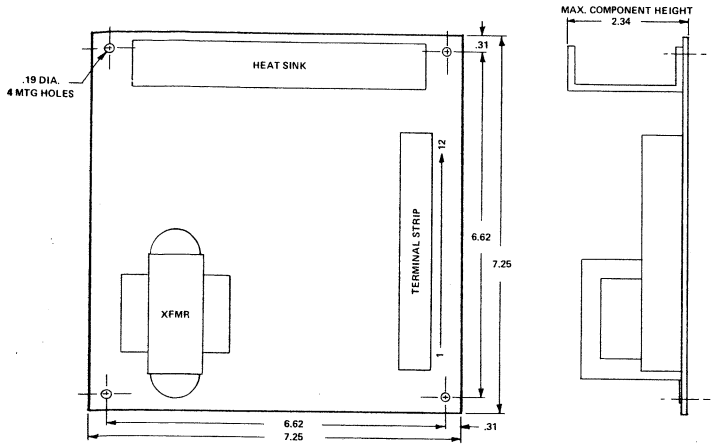
If an actuator is using a potentiometer command and a smaller span is required than is available with a 0 to +15 V dc potentiometer input, the command pot. may be connected between terminals 4 and 6 to halve the minimum span range. Terminal 6 is connected to the +15 V reference supply through a 1 K ohm dropping resistor. If a 1 K ohm command pot. is connected between this terminal and common (terminal 4) it will produce a command signal of half the magnitude.

If the command signal is less than 0 to 10 V dc, it may not be possible to obtain 100% SPAN on an actuator with a 0 to +15 V dc pot. feedback. Under these conditions the span ranges may be doubled by connecting the feedback pot. between terminals 4 and 6 as shown in Fig. 3. A 0 to +5 V dc command would then allow a span range identical to that obtained with a 0 to 10 V dc command and a 0 to +15 V dc pot. feedback.

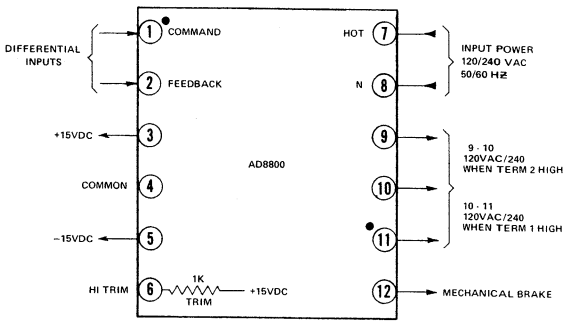
Dynamic braking	Switch selectable ON or OFF
Dynamic brake period	130 msec. upon reaching a null condition
Null output logic	Output is OFF when aplifier is at null
Dead Band Range (as measured by the deviation of the voltage between 2 and 4 from a null voltage)	All models ±15 to ±30 millivolts
Dead Band Adjustment	1 turn pot. CW for increase

INSTALLATION DIMENSIONS

DIMENSIONS



TERMINALS



Voltage Command, Pot Feedback Actuator Control

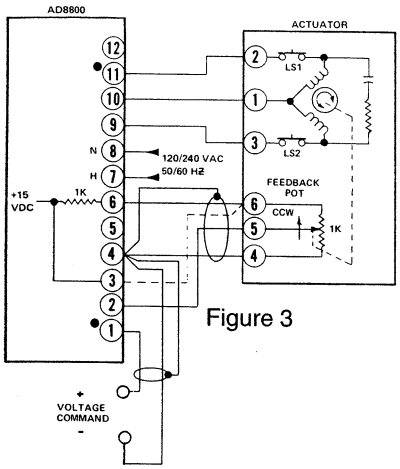


Figure 3

Pot Command, Pot Feedback Actuator Control

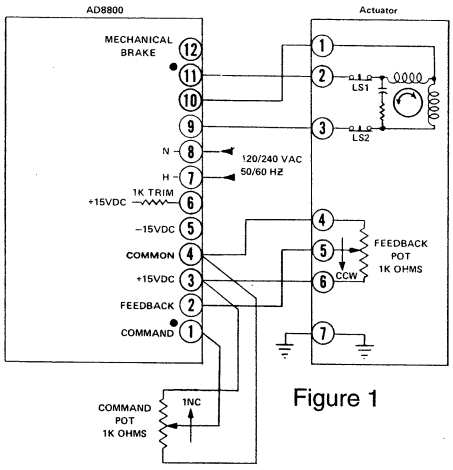


Figure 1

Current Command, Pot Feedback Actuator Control

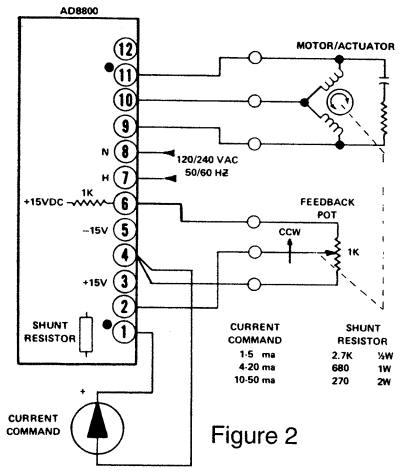
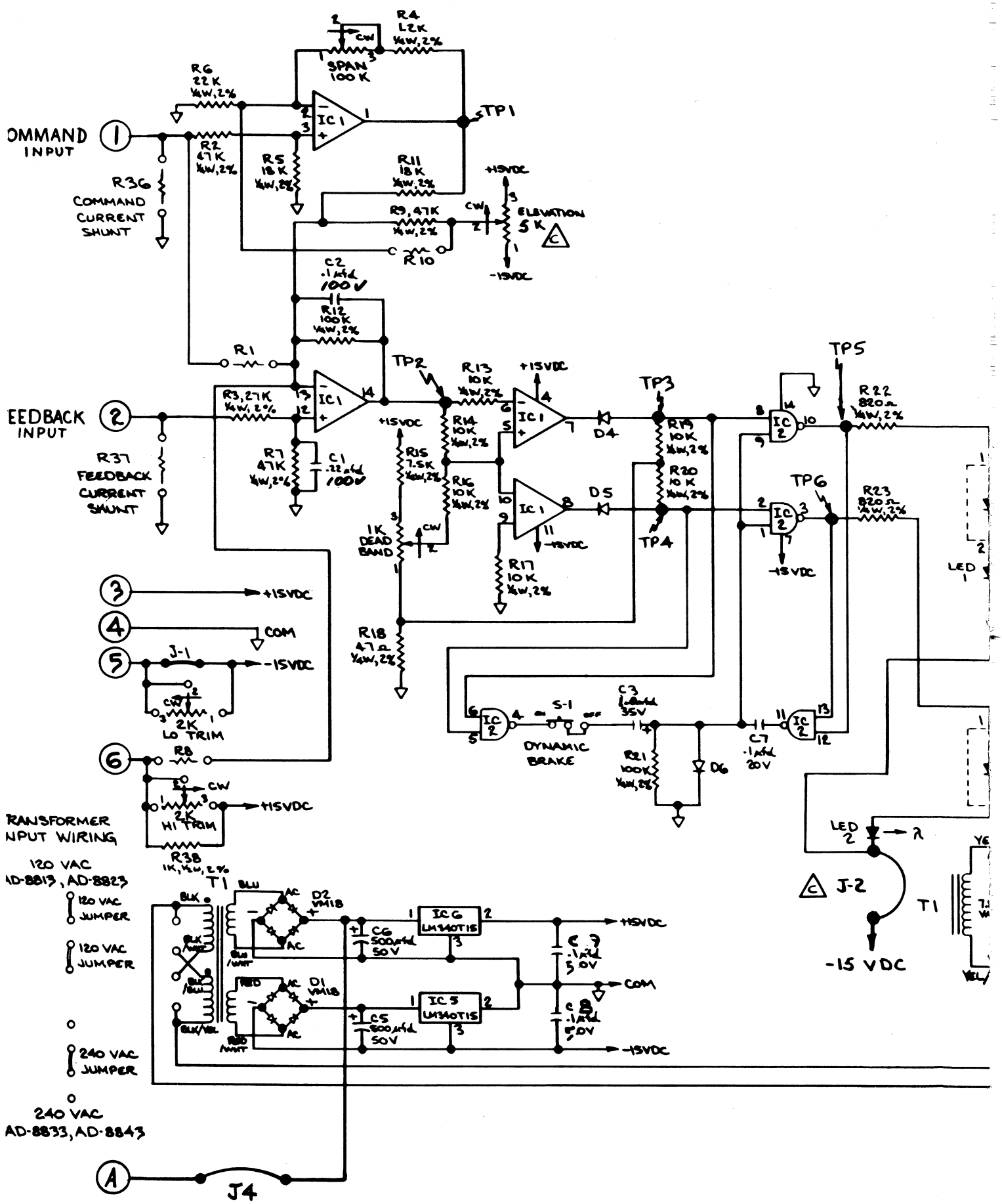


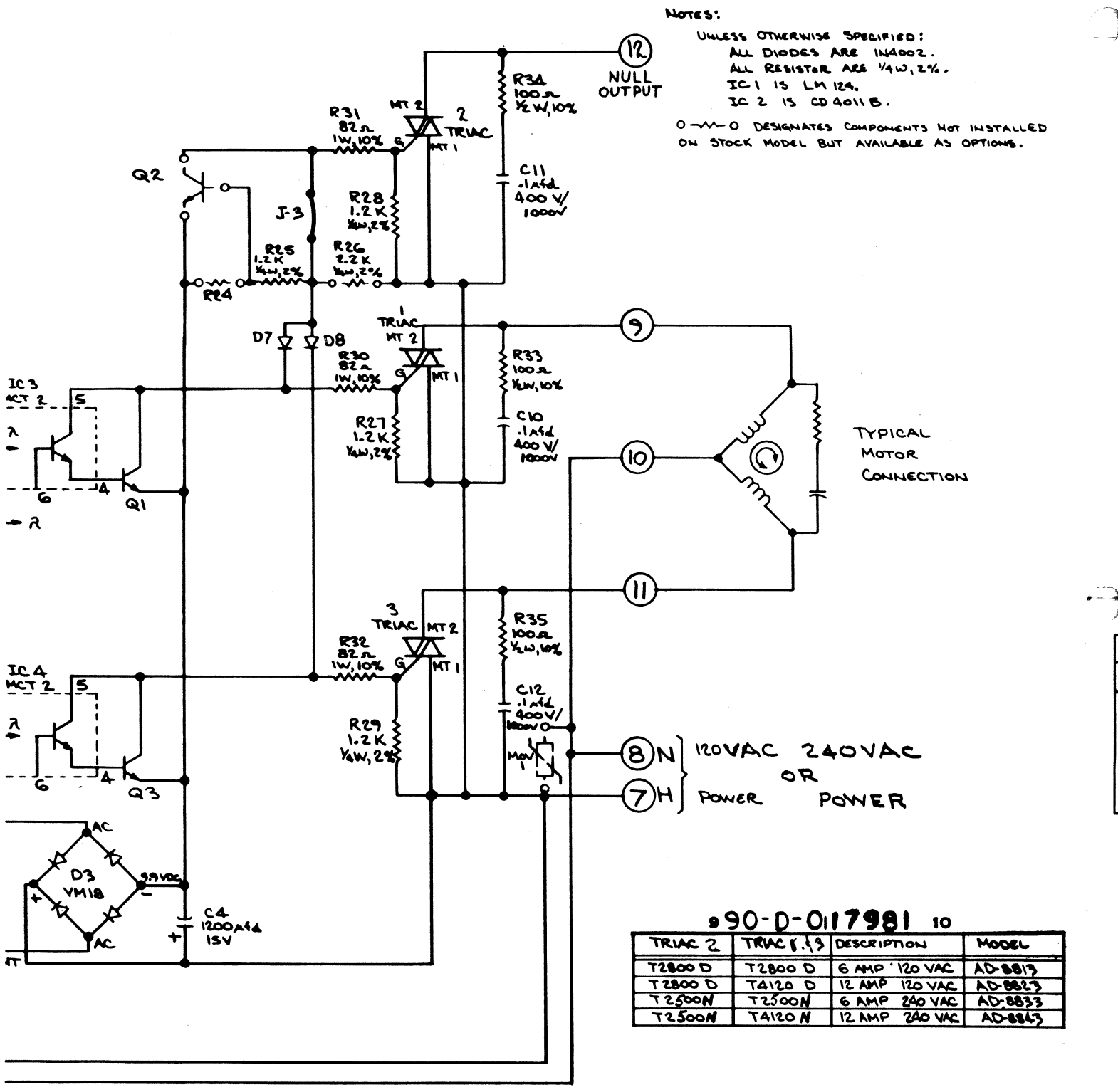
Figure 2

SPECIFICATIONS

	AD-8813	8823	8833	8843
AC Power Range	117 ±10%	117 ±10%	234 ±10%	234 ±10%
Maximum Load Current For each Output				
@ 25° C	6A	12A	6A	12A
@ 40° C	5A	9A	5A	9A
@ 55° C	4A	6A	4A	6A
Maximum Null Output Current				
@ 25° C	6A	6A	6A	6A
@ 40° C	5A	5A	5A	5A
@ 55° C	4A	4A	4A	4A
Maximum Load Current For 10 sec. on/10 sec. off				
@ 40° C	6A	12A	6A	12A
@ 55° C	5A	9A	5A	5A

	NEMA 12	NEMA 4	NEMA 7 & 9	CHASSIS ONLY
ENCLOSURE CONSTRUCTION	Steel	Steel	Cast Aluminum	None
SHIPPING WEIGHT	25 lbs.	25 lbs.	40 Lbs.	4 lbs.


COMMAND INPUT
1
R36
COMMAND CURRENT SHUNT
R2 47K ¼W,2%
RG 22K ¼W,2%
R4 12K ¼W,2%
SPAN 100K
IC 1
TP1
R5 18K ¼W,2%
R11 18K ¼W,2%
+15VDC
R9, 47K ¼W,2%
CW
ELEVATION 5K
R10
-15VDC
C2 .1 mfd 100V
R12 100K ¼W,2%
R1
TP2
R13 10K ¼W,2%
FEEDBACK INPUT
2
R37
FEEDBACK CURRENT SHUNT
R3, 27K ¼W, 2%
R7 47K ¼W,2%
C1 .22 mfd 100V
R14 10K ¼W,2%
R15 7.5K ¼W,2%
R16 10K ¼W,2%
1K DEAD BAND
R17 10K ¼W,2%
D4
D5
TP3
TP4
R19 10K ¼W,2%
R20 10K ¼W,2%
TP5
TP6
R22 820Ω ¼W,2%
R23 820Ω ¼W,2%
IC 2
LED 1
3
+15VDC
4
COM
5
J-1
-15VDC
2K LO TRIM
6
R8
2K HI TRIM
+15VDC
R38 1K, ¼W, 2%
S-1
DYNAMIC BRAKE
C3 35V
R21 100K ¼W,2%
D6
C7 .1 mfd 20V
LED 2
λ
J-2
-15 VDC
TRANSFORMER INPUT WIRING
120 VAC AD-8813, AD-8823
120 VAC JUMPER
120 VAC JUMPER
240 VAC JUMPER
240 VAC AD-8833, AD-8843
T1
BLK
BLU
BLK/WHT
BLU/WHT
RED
BLK/YEL
RED/WHT
D2 VM18
D1 VM18
AC
IC 6 LM340T15
IC 5 LM340T15
C6 500 mfd 50V
C5 500 mfd 50V
C 7 .1 mfd 50V
C 8 .1 mfd 50V
+15VDC
COM
-15VDC
A
J4



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TRIAC 2	TRIAC 1 & 3	DESCRIPTION	MODEL
T2800 D	T2800 D	6 AMP 120 VAC	AD-8813
T2800 D	T4120 D	12 AMP 120 VAC	AD-8823
T2500N	T2500N	6 AMP 240 VAC	AD-8833
T2500N	T4120 N	12 AMP 240 VAC	AD-8843

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