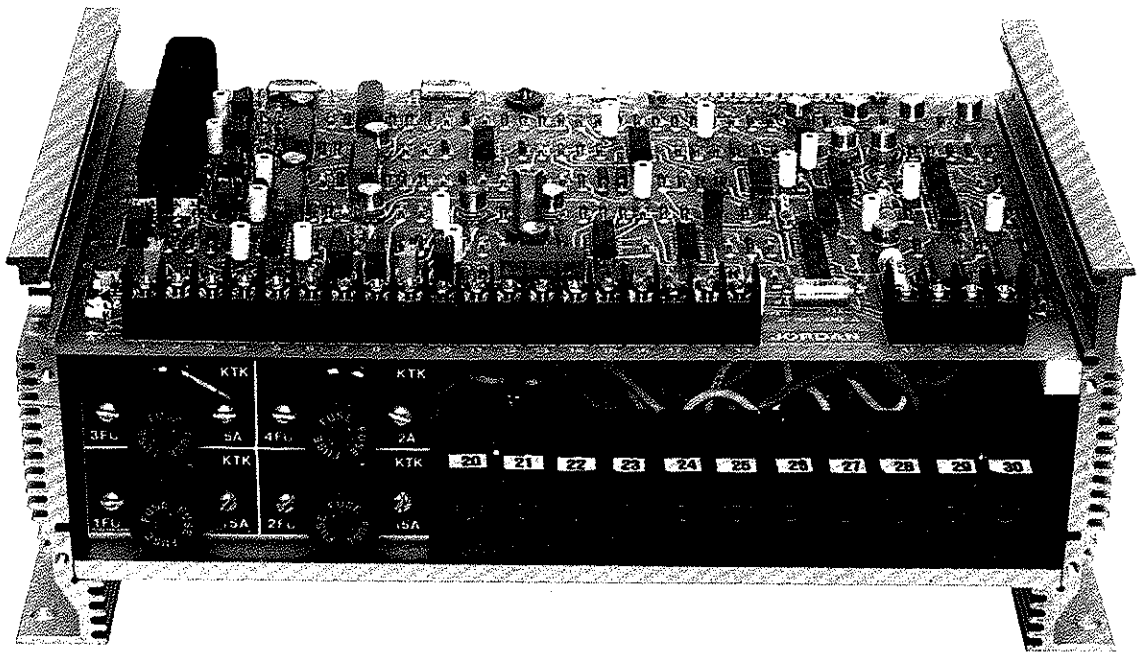
Jordan Controls, Inc.

IM-0497

AD-7300 Series

Instruction Manual

SERVO AMPLIFIER



Jordan
CONTROLS

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AD-7300 AMPLIFIER

DESCRIPTION

The AD-7300 Style A amplifiers provide full wave, SCR rectified reversing output for proportional control of dc motors. The unit is designed for two (2) power output ranges. The selection of jumpers on a terminal barrier within the amplifier and the application of the proper input voltage allow for either 90 V dc or 180 V dc armature power output. The 90 V dc armature (100 V dc field if needed) unit is capable of powering motors up to 1.5 hp and requires a power input of 230 V ac with a center tap. The 180 V dc armature (200 V dc field if needed) unit is capable of powering motors up to 3.0 hp and requires a power input of 460 V ac with a center tap. Either unit is capable of high response positioning, sensitivity to 0.1% and an extremely broad speed range. A plug-in circuit compensation card is provided and tuned for a given size motor. When changing motor drive size or motor armature voltage, this card is changed to provide proper tuning and motor response.

APPLICATION

The AD-7300 is designed for closed-loop positioning of Jordan Controls actuators equipped with 90 Vdc or 180 V dc permanent magnet or field wound motors. It is equally suited for use with compatible SCR rated 90 V dc or 180 V dc motors.

CONTROL LOOP COMPATIBILITY

AMPLIFIER OUTPUT	INPUT POWER TRANSFORMER SIZE (kva)	Jordan Controls ACTUATOR MODEL	FASTEST FULL TRAVEL SHIFT TIME
90 V dc	1 kva	SM/LA-1160	5 sec
90 V dc	1 kva	SM/LA-1560	10 sec
90 V dc	1 kva	SM-1660	10 sec
90 V dc	1 kva	SM-1760	14 sec
90 V dc	1 kva	SM/LA-5160	13 sec
90 V dc	1 kva	SM/LA-5260	19 sec
90 V dc	2 kva	SM/LA-5360	23 sec
180 V dc	4 kva	SM-5460	40 sec
180 V dc	4 kva	SM-5480	40 sec
90 V dc	1 kva	LA-2460	1" sec
90 V dc	1 kva	LA-2860	.9" sec
180 V dc	4 kva	LA-2280	¼" sec

FEATURES

-- 90 V dc or 180 V dc armature output

-- Plug-in circuit compensation for motor tuning

-- "Power On" indication

-- Potentiometer, dc voltage or current inputs for Command and Feedback signals

-- Input signal conditioning -- Span and Elevation

-- External bias input for modifying feedback signal

-- Conditioned signal output -- for monitoring the conditioned Command or Feedback signal

-- External power input (battery back-up) to power signal conditioning circuit and to maintain the conditioned signal output in the event of power loss

-- Regulated ±15 V dc power supply outputs for 200 mA external load

-- AUTO/MANUAL operation selectivity

-- AUTO/MANUAL mode indication

-- Control inputs for MANUAL mode operation

-- Motor speed clamp circuit -- AUTO mode

-- Adjustable speed -- MANUAL mode

-- Limit switch circuitry -- removes output power when limit switch is opened

-- Adjustable "Deadband" window circuit

-- Proportional control output -- in AUTO mode

-- Armature voltage or tachometer rate feedback for controlling motor response

-- Two (2) Alarm circuits -- selectable for Command, Feedback or Deviation signal monitoring

SPECIFICATIONS

Input Power Transformer Voltage:

Applied to terminals 20, 21 and 22 with terminal 21 being the center tap.

90 V dc armature; 230 V ac rms ±10%
180 V dc armature; 460 V ac rms ±10%

PROPER JUMPERS MUST BE IN PLACE AT TERMINAL STRIP ON BASE PLATE OR DAMAGE WILL RESULT !

Output Power: Measured at terminals 27 and 28

90 V dc armature; 15 AMPS, 1350 WATTS, Max.
180 V dc armature; 15 AMPS, 2700 WATTS, Max.

Armature Voltage: Figure 1 shows the typical output transfer characteristics.

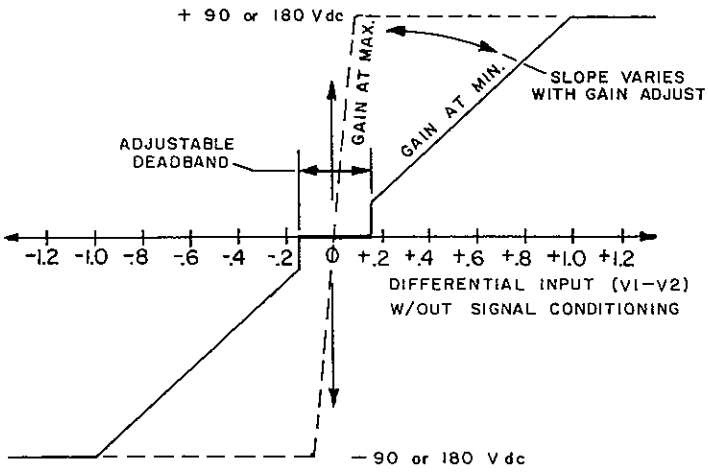


Figure 1

Field Voltage: Available at terminal 30(+),29(-) Fused at 5 AMPS.

90 V dc armature; 100 V dc field
180 V dc armature; 200 V dc field

Input Resistance:

Between terminal 1 and common with terminal 2 tied to common; 48K ohms

Between terminal 2 and common with terminal 1 tied to common; 48K ohms

Between terminals 1 and 2; 150K ohms

Between point D (external bias input) and common; 95K ohms

Values shown are minimum. Exact value will depend on use of signal conditioning and alarm circuits.

Input Signal Conditioning:

Span Range; 35% to 155% of input range
Elevation Range; ±4.5 V dc

Deadband Circuit:

Deadband Width Range; 0 to 100% of effective differential input

Power Supplies:

Term. 4; +15 V dc ± 4%
Term. 5; -15 V dc ± 4%
Term. 6,11 & 19; dc Common
Max. Current Draw, Term. 4 or 5 to Com. 200 mA

Limit Switch Circuit:

Open Terminal Voltage; Term. 7 +3.0 V dc
Term. 8 -3.0 V dc

Closed Circuit Current; Term. 7 +15 mA dc
Term. 8 -15 mA dc

Speed Clamp:

Voltage necessary at terminal 10 to obtain full rated armature voltage (90 or 180 V dc); 8 V dc*

Speed Clamp Range with 1K ohm external speed clamp pot;** 0 to 100% of rated

* Fixed on standard amplifier.
** Requires 94R and 95R to be removed.

AUTO/MANUAL Selection:

Open Terminal Voltage (term. 12 to 11) +15 V dc
Closed Circuit Current (term. 12 & 11) 50 mA

Manual Operation:

Open Term. Voltage;
Terminal 13 -15 V dc
Terminal 14 +15 V dc
Closed Circuit Current;
Term. 13 & 15 -1 to -12 mA
Term. 14 & 15 +1 to +12 mA
Manual Speed Range; 5 to 100% of rated

Battery Back-up:

Requires Customer Supplied External Power Supply;
+15 V dc @ 100 mA maximum at solder pad A
-15 V dc @ 25 mA maximum at solder pad B
Solder pad C is Common connection.

Indication Circuits:

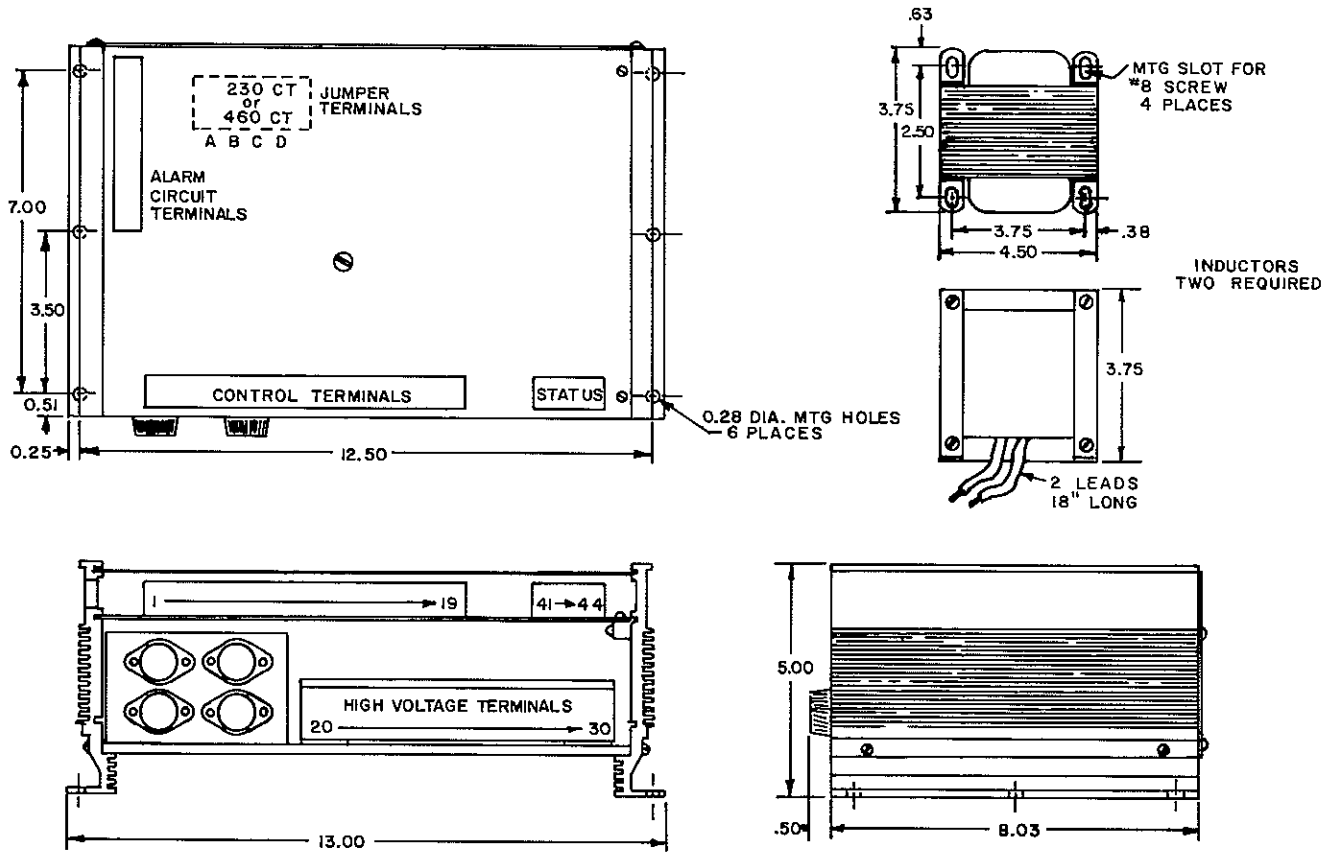
Maximum Contact Ratings (term. 31 thru 44);
Switching: 28 V dc 3 watts
Current: .05 A switching
.25 A carring
Alarm Circuits Set Point Range; ±15 V dc

INSTALLATION

PHYSICAL MOUNTING

The amplifier should be mounted in a clean environment with a moderately stable atmospheric temperature. The operating temperature range of the amplifier is 0°C (32°F) to 55°C (131°F). In the event the amplifier is mounted in an enclosure located outside or where there are temperature variations which will cause condensation, space heaters with thermostats should be used to stabilize the enclosure temperature.

The mechanical layout of the amplifier and it's two (2) inductors is shown below. The inductors must be located close enough to the amplifier to avoid increasing the wire length with splicing as this will change the effective circuit inductance. The wire length may be shortened if desired.



INPUT TRANSFORMER SIZING/INSTALLATION

When the input transformer is supplied by Jordan Controls, excluding special applications, it will be one of the following:

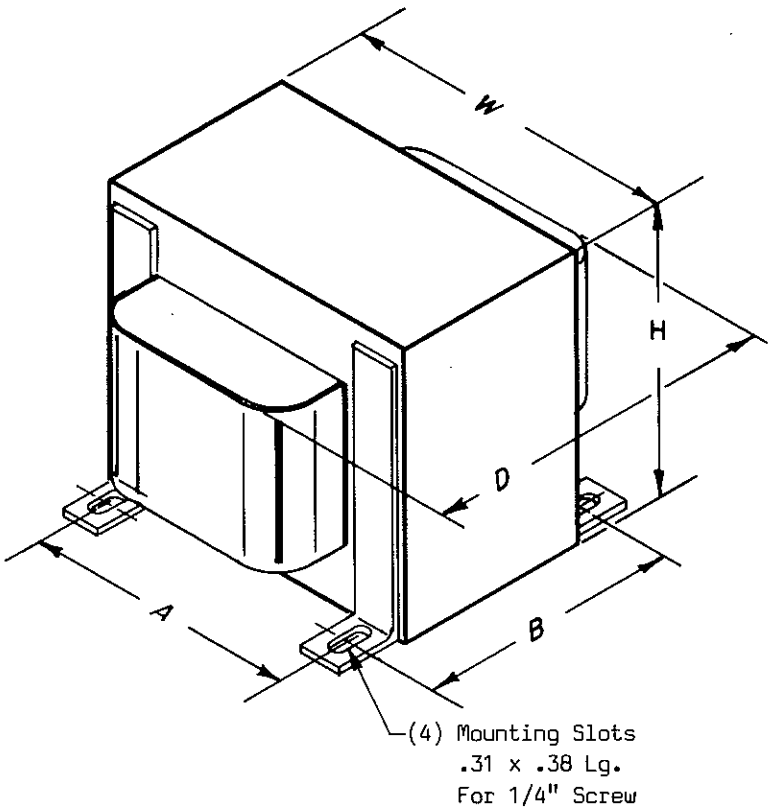
230 V ac secondary with center tap output for use with 90 V dc armature units.

Jordan Controls # 26B-012397-010, rated at 1 kva, for use with motors up to .75 hp.

Jordan Controls # 26B-012397-011, rated at 2 kva, for use with motors up to 1.5 hp.

460 V ac secondary with center tap output for use with 180 V dc armature units.

Jordan Controls # 26B-012397-009, rated at 4 kva, for use with motors up to 3.0 hp.



WEIGHT (LBS.) and DIMENSIONS (INCHES)

POWER RATING	WEIGHT LBS.	HEIGHT (H)	WIDTH (W)	DEPTH (D)	MTG. DIM. (A)	(B)
1 kva	55	6.25	7.13	7.50	5.75	5.50
2 kva	64	6.25	7.13	8.50	5.75	6.50
4 kva	105	7.63	9.00	9.00	6.75	7.50

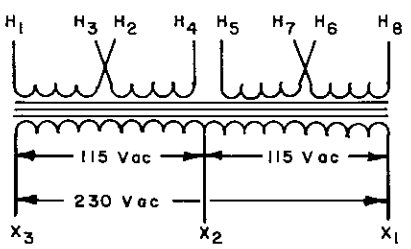
TRANSFORMER SPECIFICATIONS

Transformer Wire:
Primary insulation minimum .03" thermoplastic or equivalent, leads must be UL & CSA labeled appliance wiring mat'l.

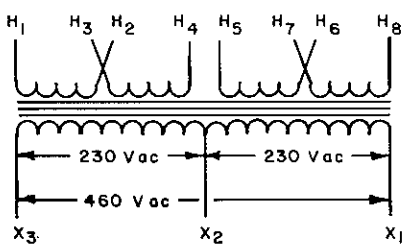
Hertz:
50/60, Single Phase

Insulation:
Class "A", 55°C rise

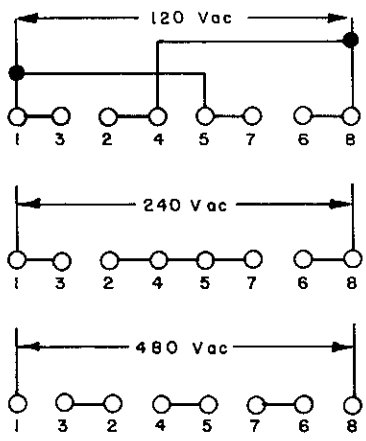
Windings must have dust cover or some other contamination protection.



1 and 2 kva XFMR



4 kva XFMR



PRIMARY INPUT SELECTION

INSTALLATION WIRE SIZING

Table 1 shows the wire gauge necessary for armature leads (terminals 27 & 28) for various Jordan Controls standard actuators according to distance ("D") between the actuator and amplifier. This chart allows for a maximum voltage drop of 4%.

The same chart can be used to size the wiring from the input transformer to the amplifier, by dividing the distance between the amplifier and the transformer by 4, and using this number as the "D" distance.

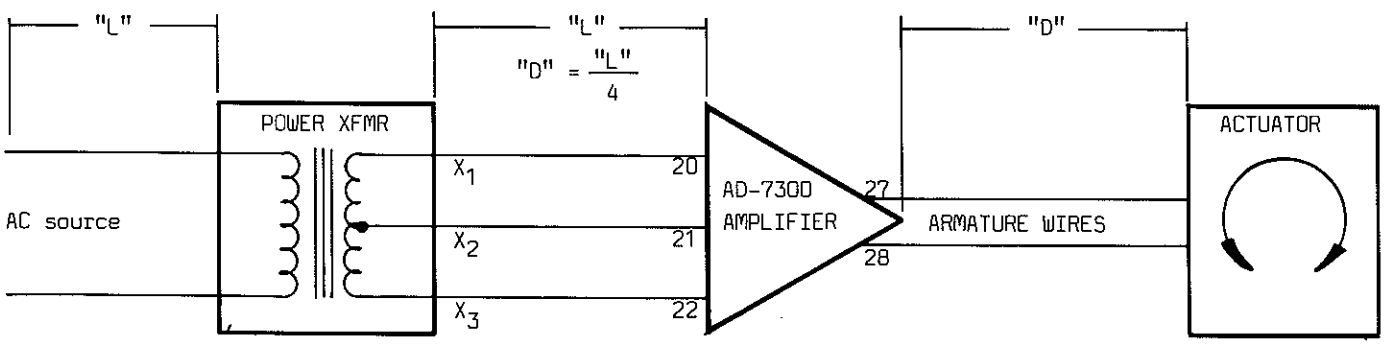
The transformer primary wiring can similarly be determined from the chart if it is realized that sizing of the secondary wiring for 90 V dc units relates to 230 V ac and for 180 V dc units relates to 460 V ac. Doubling voltage will lengthen a given wires usable distance by a factor of 4 and halving the voltage will shorten a given wires usable distance by a factor of 4.

Two (2) seperate shielded cables, 20 gauge wire, nominal, should be run for the command and feedback signals. The shield should be connected to amplifier common (terminals 6, 11 or 19). Limit switch wiring (terminals 6, 7 and 8) should be 18 gauge for runs up to 2000 feet.

For wire runs longer than 2000 feet, consult the factory.

Table 1
Wire Gauge Size

	ACTUATOR CONTROLLED					
"D" Distance (feet)	SM/LA-1160	SM/LA-1560 SM-1760	SM/LA-5160 LA-2460	SM-5460	SM/LA-5260 SM-5480 LA-2860/2280	SM/LA-5360
1 to 200	14	14	14	12	12	10
200 to 300	14	14	14	12	10	8
300 to 400	14	14	14	10	10	6
400 to 500	14	14	14	10	8	6
500 to 600	14	14	12	8	8	4
600 to 800	14	14	12	8	6	4
800 to 900	14	14	12	6	6	2
900 to 1000	14	14	10	6	6	2
1000 to 1200	14	14	10	6	4	2
1200 to 1500	14	14	10	4	4	0
1500 to 1600	14	14	8	4	4	0
1600 to 1700	14	14	8	4	2	0
1700 to 1900	14	12	8	4	2	0
1900 to 2000	14	12	8	2	2	0
Over 2000	---------- Consult Factory ----------					



INSTALLATION WIRING

If the amplifier is supplied with a Jordan Controls actuator, an installation wiring print is supplied with the amplifier, giving point to point interconnect wiring and alignment instructions.

Prior to wiring a given amplifier to an actuator, determine the actuator model number and check the model number ink stamped on the amplifier's Compensation Card, located on the back side of the amplifier, between the upper and lower circuit boards.

COMP CARD FOR
xxxxxxxxxxxx

The amplifier/actuator combination will not function properly with the wrong Comp Card and the amplifier will not operate if the Comp Card is missing.

The amplifier has jumper selectable circuit functions and the proper jumpers will be in place as specified by the customer or to give the required functional characteristics. If it is desired to change some of these jumpers to give different circuit functions, refer to the jumper selection chart on page 18.

NOTE:

It is the responsibility of the installer to ensure the interconnect wiring meets the National Electrical Code standards, as well as any other codes which may apply.

IF THE AMPLIFIER IS BEING WIRED TO A UNIT OTHER THAN WHAT IT WAS ORIGINALLY SET UP TO OPERATE WITH, THE FOLLOWING PROCEDURE SHOULD BE ADHERED TO.

The AD-7300 amplifier works on the principle of a differential input (terminals 1 & 2), and although there are special applications for which the AD-7300 can be modified, this procedure is written with respect to the differential input.

A. STARTING

Before starting this procedure, have all power OFF and remove the top protective cover from the amplifier. All terminals should be free of any interconnect wiring. Verify that the correct Compensation Card is in place. If there is a question as to the correct card, refer to the "Comp Card" information on pages 15 and 19.

B. JUMPER SELECTION

Refer to the JUMPER SELECTION CHART on page 18, to determine if the jumpers are in place for the circuit features desired. These jumpers are on the top board, except as noted. The most important of the jumpers are the INPUT VOLTAGE jumpers LOCATED AT THE BACK OF THE BASE PLATE IN THE AMPLIFIER ON A 4 PIN TERMINAL STRIP.

The INPUT VOLTAGE selection jumpers are labeled A, B, C and D and are on screw terminals.

230 Vac Center Tap Input Power at terminals 20, 21 and 22 will give 90 Vdc motor armature output.
REQUIRES JUMPERS: A to B and C to D

460 Vac Center Tap Input Power at terminals 20, 21 and 22 will give 180 Vdc motor armature output.

REQUIRES JUMPER: C to D only

All other jumpers consist of a spring clip which slides over and connects 2 jumper pins protruding from the circuit board. The circuit boards are silkscreened to identify the jumper locations.

C. COMMAND and FEEDBACK SIGNAL INPUTS

Connect the Command signal as per one of the examples shown in Fig. 2 and the Feedback signal as shown in Fig. 3 on page 9. Any combination of these methods may be used. The maximum input levels to terminals 1 and 2 should not exceed 15 Vdc and for best linearity it is recommended the signal levels not exceed 13.5 Vdc.

When the Command signal is specified to be a Current Command, a shunt resistor of proper value should be installed for resistor 105R. This is used to convert the current to a voltage. Determine the resistors size from the example below. Terminals 17 and 18 are dedicated to this resistor and connected to no other circuitry. When using this resistor, connect terminal 17 to terminal 1 and terminal 18 to terminal 19. The location for the resistor is directly above terminal 18 on the top circuit board.

When the Feedback signal is a Current Feedback, a shunt resistor of proper size is placed across terminals 2 and 19.

To determine the proper value for either shunt resistor: Determine the Maximum Signal Voltage desired and divide by the Maximum Signal Current which will be supplied. The result will be the resistor value in ohms.

EXAMPLE:

Max. signal voltage desired = 10 Vdc
Signal current range = 4 to 20 mA
Max. current is 20 mA or .020 A

$\frac{10 \text{ Vdc}}{.020 \text{ A}} = 500$ (shunt should be 500 ohms)

The input signal voltage range will be:
2 to 10 Vdc for a 4 to 20 mA current signal

When selecting the Max. signal voltage level use a number between 8 and 13.5 Vdc.

When using a 1K pot for the Command signal as shown in Fig. 2, the max. voltage at terminal 1 will be 11.8 Vdc with the pot at 100%. If the Feedback signal is also from a 1K pot as shown in Fig. 3, the max. signal from the pots to both terminals 1 and 2 will be 9.74 Vdc as the ends of both pots are connected in parallel with a 270 ohm resistor in series to the +15 Vdc internal supply.

If signal conditioning (jumper selectable) of the Command or Feedback signal is not used within the amplifier, external trims may be required to balance both the minimum and maximum signal inputs as either of the signals may not be using it's full range.

D. SIGNAL CONDITIONING

When signal conditioning is used, it must be determined from the specifications of Span (35% to 155%) and Elevation (± 4.5 Vdc) whether or not the signals can be conditioned to match.

EXAMPLE:

The Command signal is 4 to 20 mA through a 500 ohm shunt resistor and the Feedback signal range is .5 to 7.5 Vdc from the range used of the Feedback pot. The voltage swing of the Command signal will be (20 mA - 4 mA) x 500 ohms = 8.0 Vdc. The voltage swing of the Feedback signal will be 7.5-.5=7.0 Vdc. The Command 0% reference point is 4 mA or 2.0 Vdc and the Feedback 0% reference point is .5 Vdc.

If the Command signal is conditioned the "Span" required would be the Feedback signal swing (7.0) divided by the Command signal swing (8.0) or 7.0/8.0 = .875 = 87.5%. The"Elevation"required would be the difference between the Feedback signals 0% reference point and the Command signals "Spanned" 0% reference point (since the elevation circuit follows the span circuit within the amplifier), or .5-(2 Vdc x 87.5%) = -1.25 Vdc. These values (87.5% and -1.25 Vdc) are both within the specs for Span and Elevation and the signals would be compatible.

If the Feedback signal is to be conditioned, the "Span" required would be the Command signal swing (8.0 Vdc) divided by the Feedback signal swing (7.0 Vdc) or 8.0/7.0 = 1.14 = 114% and the "Elevation" required would be 2.0 Vdc - .5 Vdc = 1.5 Vdc. Again these would both be within the Span and Elevation range specifications.

Another requirement for signal compatibility is the 0% reference point of the Command signal must coincide with the 0% reference point of the Feedback signal. Both of these signals are positive with respect to signal common (terminal 19) and the Feedback signal must be wired to give an increasing signal when the Command signal is increased or moving toward 100%.

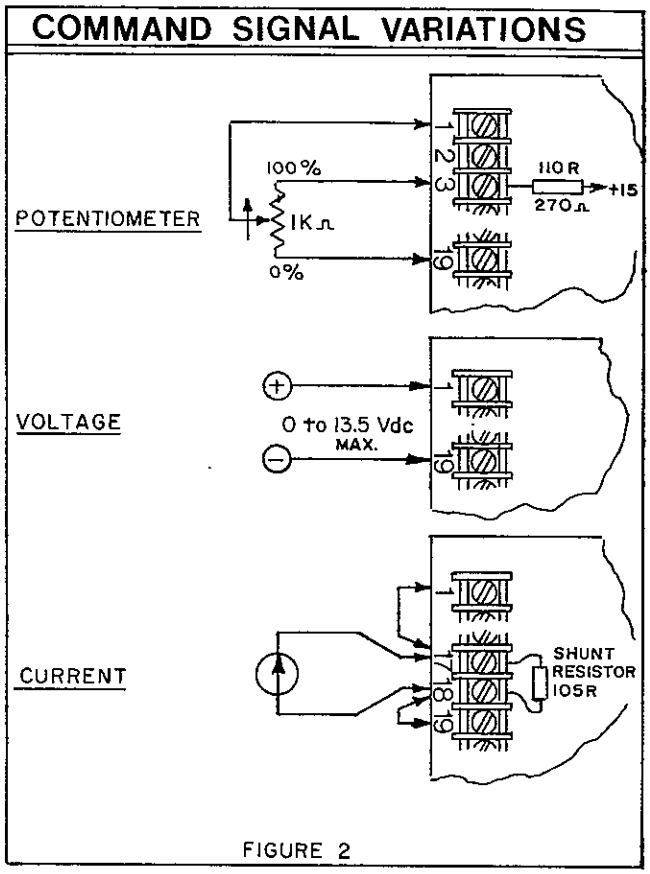


FIGURE 2

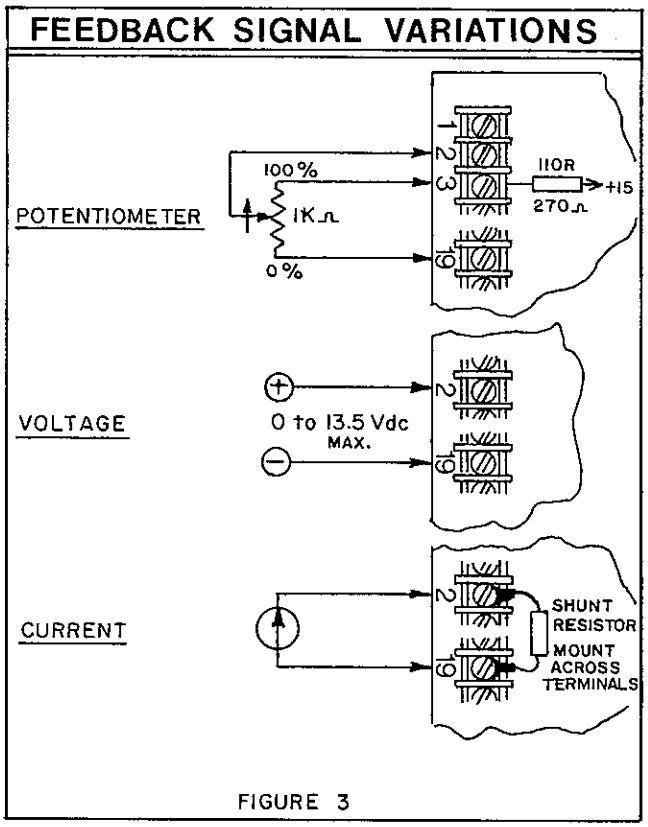


FIGURE 3

E. SIGNAL POWER SOURCES FROM AMPLIFIER

Terminals 3, 4 and 5 are DC voltage sources from regulated power supplies within the amplifier.
Terminal 4 is +15 Vdc.
Terminal 5 is -15 Vdc.
Terminal 3 is connected thru a 270 ohm resistor to the +15 Vdc supply.
Terminals 6, 11 and 19 are all DC common.
Max. Current draw on +15 Vdc and -15 Vdc supplies are 200 mA to common. +15 Vdc includes both terminals 3 and 4 if both are used.

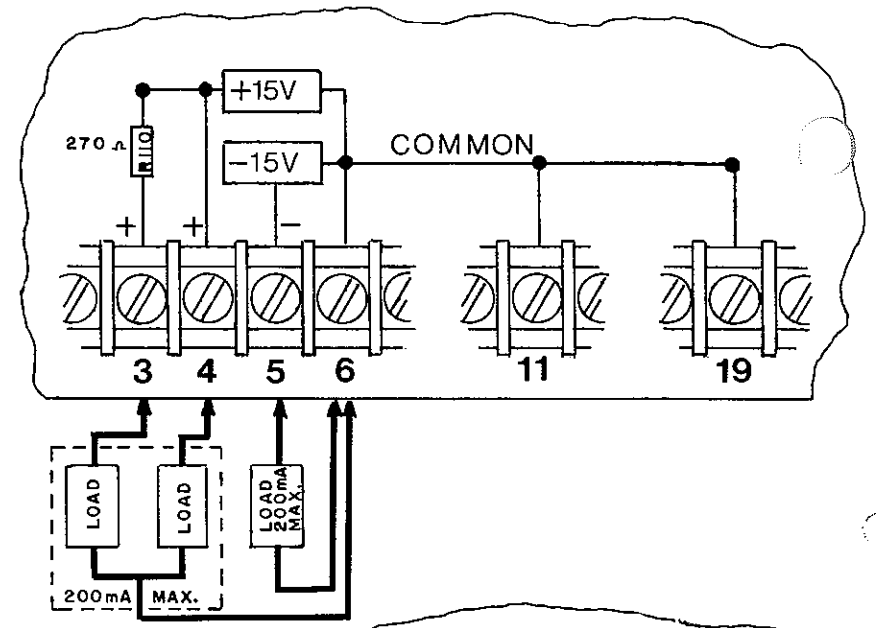
When the Command and/or the Feedback signal is from a 1K ohm potentiometer, terminal 3 is used as the power source for the pots and this will limit the max. signal voltage preventing "clipping" which can occur near +15 Vdc.

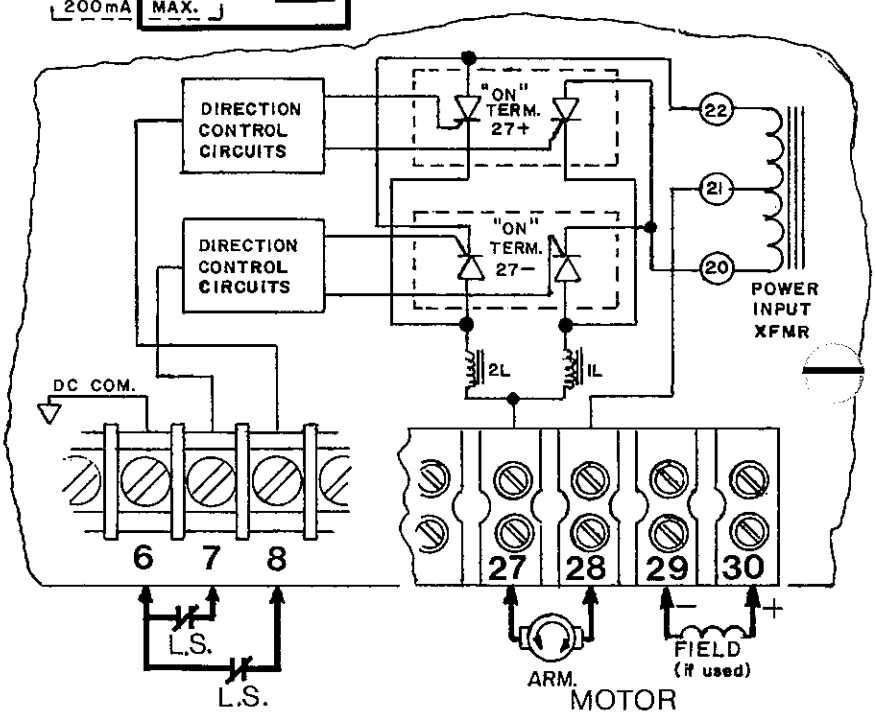
F. LIMIT SWITCH CIRCUITS

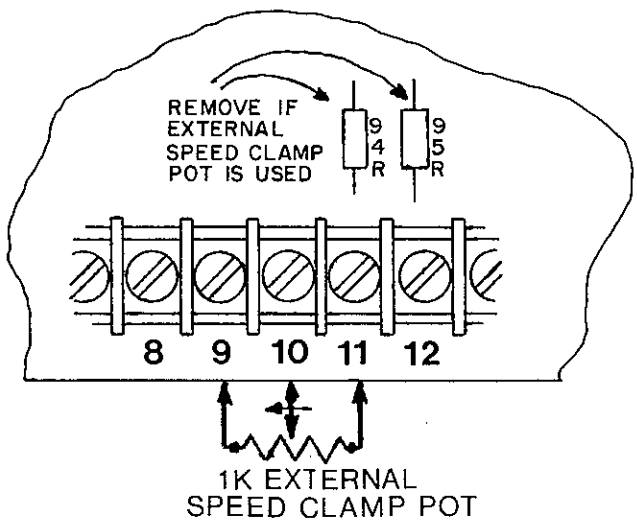
If actuator limit switches are to be used, they are to be connected to terminals 6, 7 and 8. The limit switch circuitry functions such that opening contact between terminals 6 & 7 will prevent the amplifier from producing armature output caused by an increasing Command signal at terminal 1. An increasing Command signal at terminal 1 will cause armature terminal 27 to be (-) and terminal 28 to be (+). Opening contact between terminals 6 & 8 will prevent armature output caused by a decreasing Command signal. A decreasing Command signal causes armature terminal 27 to be (+) and terminal 28 to be (-). Opening the contacts between terminals 6 & 7 abd 6 & 8 at the same time will turn off both directions of the amplifier. However, opening the wires to terminal 6 while leaving a closed circuit thru the switches to terminal 7 & 8 may not turn off the outputs as a floating common will exist between terminals 7 & 8. If limit switches are not used, terminals 7 and 8 must be jumpered to terminal 6.

G. MOTOR SPEED CONTROL

If the use of an adjustable external speed clamp is desired, a 1K ohm pot is to be connected to terminals 9, 10 and 11, with terminal 10 being the wiper. Resistors 94R and 95R must then be removed from the circuit board in order for the speed clamp to work properly. With a voltage of 8 Vdc at terminal 10, the amplifier will be capable of producing full armature output voltage. A lesser voltage at terminal 10 (turning the pot wiper towards terminal 11) will result in a lower voltage output. If the external adjustable speed clamp is not used, 94R and 95R automatically set the voltage at terminal 10 to 8 Vdc and full armature output voltage is possible.







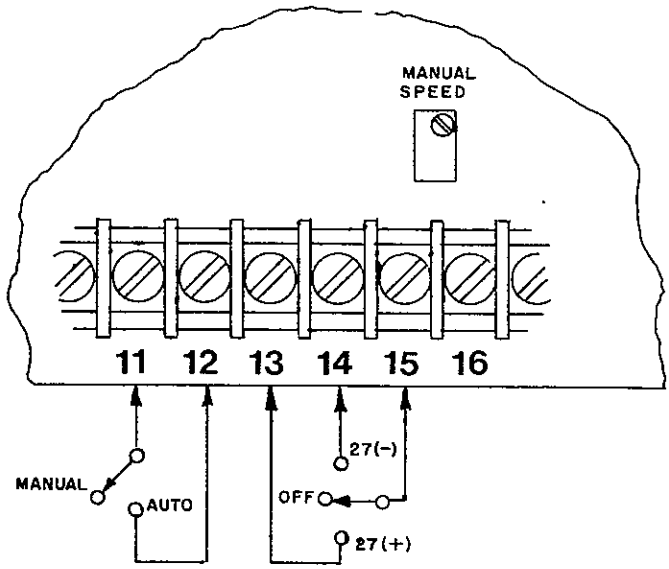
H. AUTO/MANUAL CONTROL

If manual control is not to be used, place a jumper wire across terminals 11 and 12.

If manual control is to be used, connect switches or contacts to terminals 11 thru 15 to provide operation for both "AUTO" and "MANUAL" control. Closing contact between terminals 11 and 12 will put the amplifier into the "AUTO" mode, meaning that control will be by means of Command and Feedback input signals. Opening contact between terminals 11 and 12 will put the amplifier in the "MANUAL" mode and armature output voltage polarity is controlled by manual contacts at terminals 13, 14 and 15.

With contact between terminals 11 and 12 open, closing contact between terminals 13 and 15 will result in armature voltage at terminal 27 to be (+) and terminal 28 to be (-). Closing contact between terminals 14 and 15 will result in the polarities of terminals 27 and 28 to reverse. Do not close the contacts between terminal 13 and 15 and 14 and 15 all at the same time.

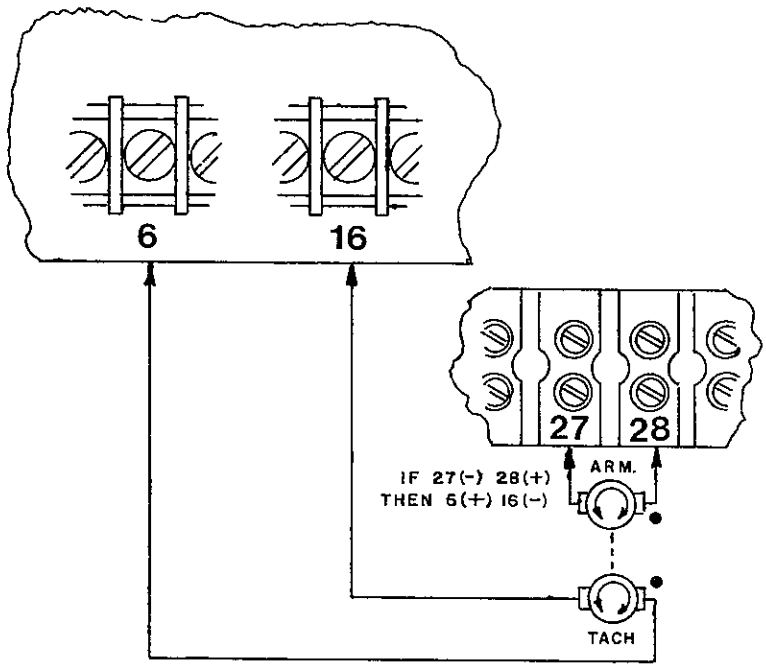
The adjustable "MANUAL SPEED" pot located near terminal 15 on the circuit board sets the armature output voltage when driving in the "MANUAL" mode. When in the "MANUAL" mode and the contacts across terminals 13, 14 and 15 are open, the amplifier should not drive in either direction. If the motor runs or creeps in either direction, there may be a wiring error or the "BUMP" and "ZERO" adjustments on the circuit board may need adjustment.

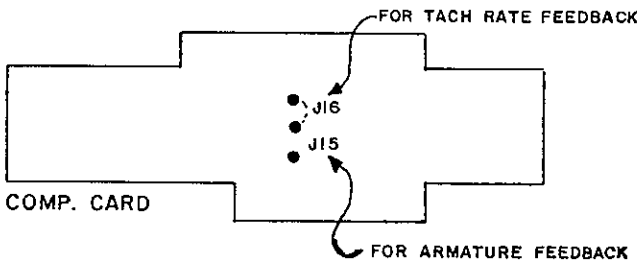


I. TACHOMETER OR ARMATURE -- RATE FEEDBACK

If the feedback reference for the speed circuit is to be from a tachometer mounted on the motor rather than the standard armature feedback, the tach wires are to be connected to terminals 16 and 6. Jumper J16 rather than J15 must be in place on the "Comp. Card". Tachometer polarity is to be such that terminal 16 is negative as referenced to terminal 6 as a result of motor/tachometer rotation caused by armature voltage polarity terminal 28(+) and 27(-). Compensation components on the "Comp Card" must be selected to obtain correct motor response. Refer to the section on "Compensation".

If the standard armature feedback is to be used for speed circuit reference, no connection is to be made to terminal 16 and jumper J15 is to be in place on the "Comp Card".





J. POWER INPUT and OUTPUT SELECTION

Refer to page 6 for input power transformer sizing and connect the secondary winding of the transformer to terminals 20, 21 and 22. DO NOT APPLY POWER AT THIS TIME. Input must be 230 Vac center tapped for 90 Vdc armature output units and 460 Vac center tapped for 180 Vdc armature output units. In either case terminal 21 must be connected to the center tap and the proper jumper selection of terminals A, B, C and D must be in place on the lower chassis of the amplifier.

DO NOT CONNECT THE AMPLIFIER DIRECTLY TO A POWER LINE WITHOUT USING A TRANSFORMER AND DO NOT CONNECT MORE THAN ONE AMPLIFIER TO A TRANSFORMER AS EACH AMPLIFIER REQUIRES IT'S OWN TRANSFORMER.

FAILURE TO PROPERLY JUMPER THE POWER SELECTION TERMINALS A, B, C and D OR IMPROPER WIRING OF POWER TERMINALS 20, 21 and 22 WILL RESULT IN DAMAGE AND POSSIBLE TOTAL DESTRUCTION OF THE AMPLIFIER.
"DOUBLE CHECK ALL CONNECTIONS" !!

K. INDUCTORS

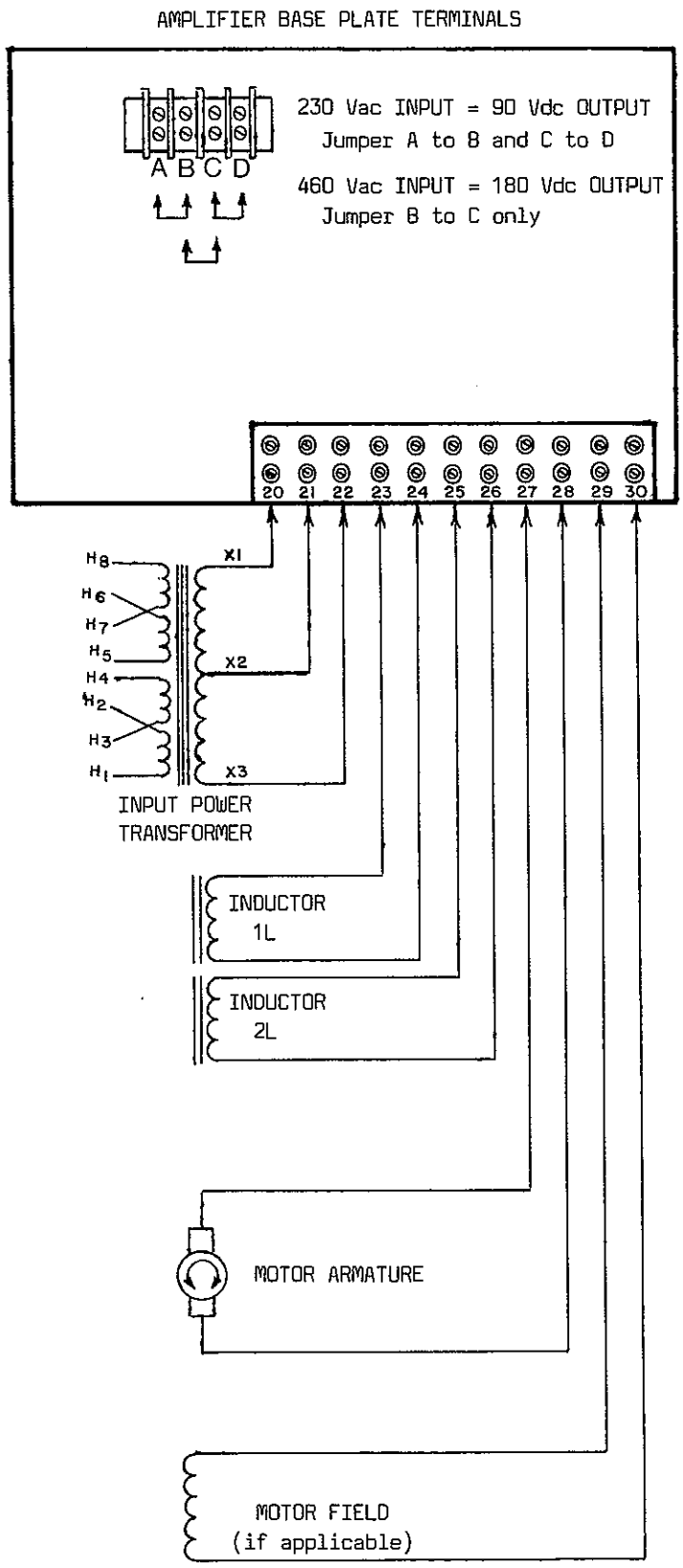
Two (2) inductors are supplied with each amplifier.
Connect inductor 1L across terminals 23 and 24.
Connect inductor 2L across terminals 25 and 26.
The inductors should be mounted close enough to the main chassis so that wire splicing is not required. Extending the lead length of the inductors may affect the performance of the amplifier.

L. MOTOR ARMATURE CONNECTIONS

Connect the motor armature wires to terminals 27 and 28. Armature polarity will be 28(+) and 27(-) for an increasing command signal at terminal 1.

M. MOTOR FIELD CONNECTIONS

Connect the motor field wires (if applicable) to terminals 29 and 30. Field voltage will be 100 Vdc for 90 Vdc armature units and 200 Vdc for 180 Vdc armature units. Polarity will be 30(+) and 29(-).



N. SIGNAL MONITORING CIRCUITS

Monitoring circuits consist of; "Alarm Circuit #1", "Alarm Circuit #2", "Auto/Manual" mode indication and "Power ON" indication. Terminals 31 thru 44 are used for these functions.

Terminals 31 thru 36 provide contact indication for "Alarm Circuit #1". The alarm circuit can monitor one of three (3) signals which are selectable with jumpers; Command signal (J18), Feedback signal (J19) or Deviation (J17).

If the Command or Feedback signal is to be monitored and the signal is too low, a "LOW" indication will be given by the contact between terminals 32 and 33 being opened and contact between terminals 31 and 33 will be closed. LED 1 will turn on giving a visual indication on the board. If the signal is to high, a "HIGH" indication will be given by contact between terminals 35 and 36 opening and contact between 34 and 36 closing with LED 2 being turned on.

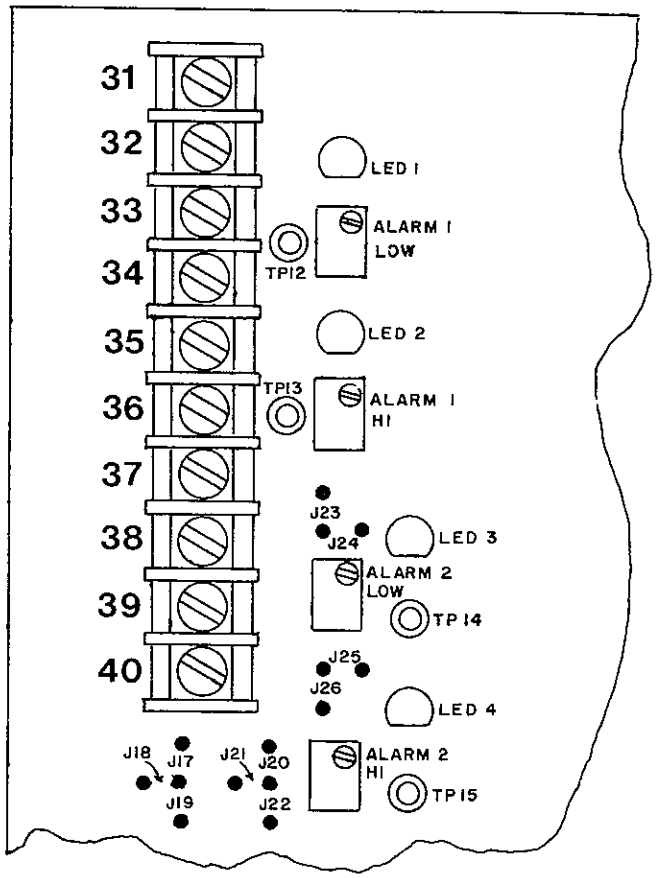
The "LOW" and "HIGH" alarm points are adjustable with "ALARM 1 LOW" and "ALARM 1 HI" pots located on the circuit board. The "LOW" alarm set point can be measured at TP12 and the "HIGH" at TP13.

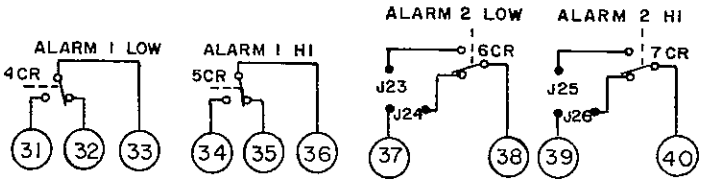
Terminals 37 thru 40 provide contact indication for "Alarm Circuit #2". Alarm Circuit #2 is a duplicate of Alarm Circuit #1 and can independently monitor either the Command signal (J21), Feedback signal (J22) or Deviation (J20). Indication is as with Alarm Circuit #1 except the N.O. or N.C. contacts must be selected with jumpers J23 thru J26.

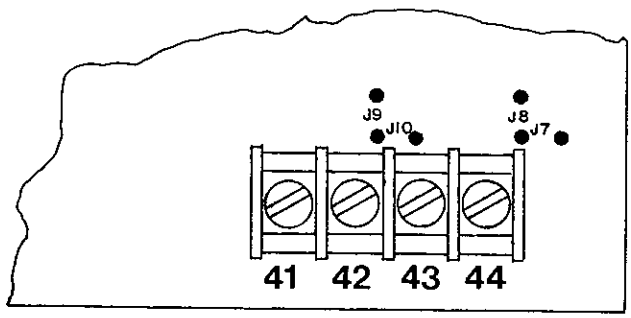
The "LOW" and "HIGH" alarm points are adjustable with "Alarm 2 LOW" and "Alarm 2 HI" pots located on the circuit board. LED 3 will turn on for a "LOW" and LED 4 will turn on for a "HIGH". The "LOW" alarm set point can be measured at TP14 and the "HIGH" alarm set point at TP15.

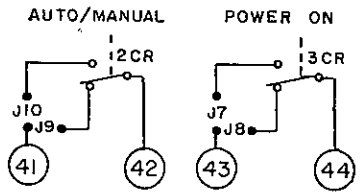
Terminals 41 and 42 provide "AUTO/MANUAL indication. With jumper J9 in place, terminal 41 and 42 will provide contact closure when the unit is in the "MANUAL" mode (contacts opens in "AUTO". With jumper J10 in place, terminals 41 and 42 will provide contact closure when the unit is in the "AUTO" mode (contact opens in "MANUAL").

Terminals 43 and 44 provide "POWER ON" indication. With jumper J7 in place, terminals 43 and 44 will provide contact closure with Power ON and both power supplies (±15 Vdc) functional. With jumper J8 in place, terminals 43 and 44 will provide contact closure for Power OFF, or if one of the power supplies is not functional.









O. SOLDER PAD CONNECTIONS FOR SPECIAL CIRCUITS

Ten (10) solder pads are located on the top board for connection to special external circuits. Connections to these points is accomplished by soldering wires to plated thru holes.

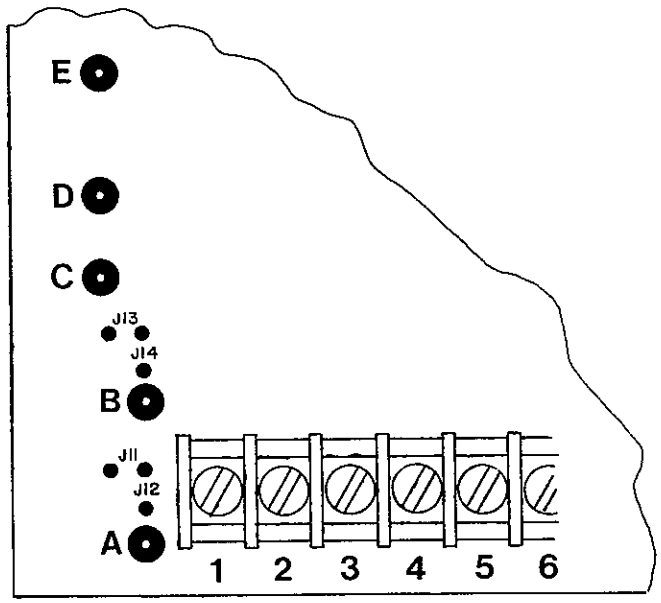
Points A, B and C are for external power input (battery back-up) to power the signal conditioning circuit and terminal 3. Connect +15 Vdc to point A, -15 Vdc to point B and Common to point C. Jumpers J12 and J14 must be in place instead of J11 and J13. Upon loss of amplifier power the "battery back-up" will only keep the signal conditioning circuit operating. The rest of the amplifier will be off.

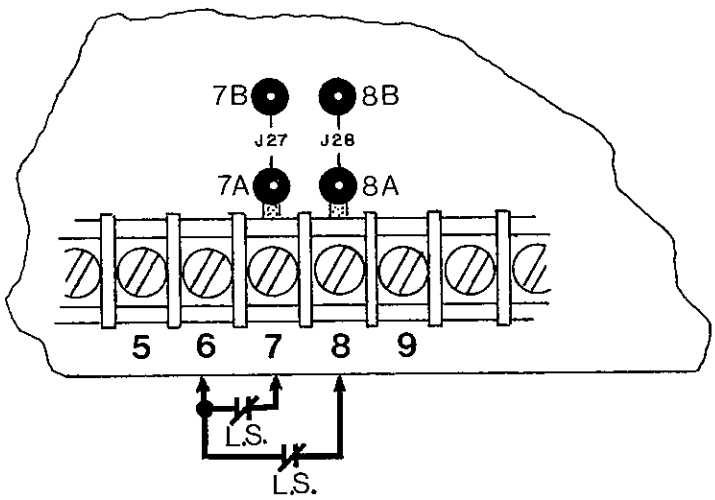
Point D provides input for an "EXTERNAL BIAS". A biasing signal (±10 Vdc max.), referenced to Common (terminals 6, 11 or 19) can be connected to modify the Command signal per customer requirements. The signal must be a voltage and the combination of Command and Bias signals can not exceed the parameters of the Command signal. A positive voltage has the same effect as an increasing Command signal.

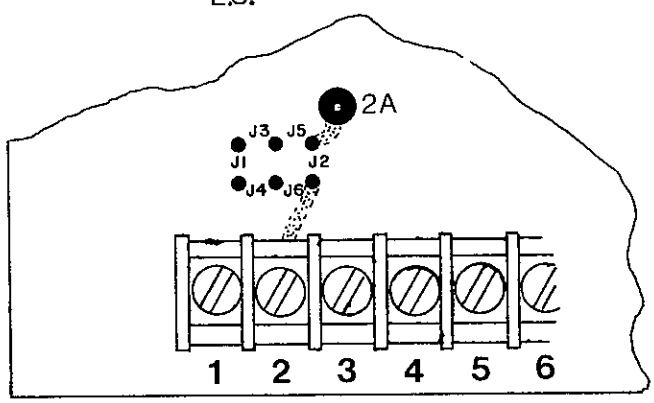
Point E provides a pick off point from which to monitor the Conditioned signal. Any high impedance device can be connected to point E and common to monitor the conditioned signal.

Points 7A and 7B are in series with Limit Switch terminal 7. Normally jumper J27 connects 7A to 7B and only the limit switch contact across terminals 6 and 7 control the circuit. In some cases J27 is removed and contact from 7A to 7B is obtained by some external means which acts as an opened or closed limit switch contact. When this is used a limit switch is still normally connected from terminal 7 to 6 and opening the limit switch or the external contact from 7A to 7B serve the same function and turn off the armature output if the output polarity is 27(-) and 28(+). Points 8A and 8B normally jumpered with J28 are used in the same manner and when controlled externally act as an open or closed limit switch at terminal 8. When using 7A,7B 8A and 8B, terminals 6, 7 and 8 must have actuator limit switches connected or wire jumpers to replace the switches.

Point 2A is used as a modified Feedback signal input, when the original Feedback signal at terminal 2 is conditioned (J6) with Span and Elevation and the Conditioned signal (Point E) is further modified or characterized by other equipment. Jumpers J2 and J5 are not used in this case and the New Feedback signal is inserted at solder pad 2A.







MOTOR COMPENSATION CIRCUIT

The Compensation Circuits consist of resistors and capacitors mounted on the Compensation/Interconnect Card ("COMP CARD"). These components tune the circuitry of the amplifier to provide transient response which is compatible with the motor being controlled. When compensation components are properly sized, actuator/motor response will be fast, stable and accurate. "Comp Cards" with proper components in place are available for all Foxboro/ Jordan actuators. Refer to page 19.

If the amplifier is to be used with a motor not supplied by Jordan Controls,the following procedure will aid in selecting compensation components.

A.

Provide a means for supplying a "STEP" Command input signal which is reversable to terminal 1. This could be two (2) 1K ohm pots connected in parallel to the +15 Vdc supply and a switch to connect either one of the wipers to terminal 1.

B.

Install trial components or connect resistance and capacitance boxes on the "Comp Card" for the following components: 33R, 34R, 9C, 43R, 44R and 10C Reasonable starting values are:

33R=300K 34R=22K 9C=.022uf
43R=1MEG 44R=18K 10C=.68uf

Values for resistors 41R and 31R must also be sized and depend on motor armature current and voltage.

Resistor 41R sets the current limit and can be determined from the following equation in which I LIM would be the armature current at which the amplifier is to go into current limit. This value is normally the max. motor armature current as labeled on the motor nameplate.

$$I\ LIM = \frac{41R}{1K} \quad \text{or} \quad 41R = I\ LIM \times 1K$$

Resistor 31R sets the maximum armature voltage.
For 90 Vdc output use a 332K ohm resistor.
For 180 Vdc output use a 680K ohm resistor.
If a different maximum output voltage is desired, the following equation selects the resistor value.

$$\frac{vTP2}{32R} = \frac{vA}{31R} \quad \text{or} \quad 31R = \frac{vA}{vTP2} \times 32R$$

vA = maximum armature voltage
vTP2 = 8.0 Vdc
32R = 30.1K ohms

Maximum obtainable voltage is approximately:
140 Vdc for a 90 Vdc unit
280 Vdc for a 180 Vdc unit

C.

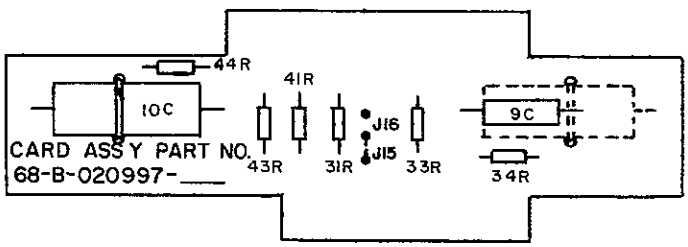
33R, 34R and 9C control the speed of response and positioning accuracy. Adjusting 33R will vary the DC speed gain and deadband error. Increasing 33R will decrease the deadband error and increase speed accuracy. Adjusting 34R will vary the transient speed gain. If 34R is too large, the amplifier response to a current limit situation will be slow. If 9C is too large, it will cause large overshoots and oscillations, because speed of response will be slow. If 9C is too small, fuse blowing may occur.

D.

The values of 43R and 44R should not require any any adjustments. The value of 10C should be adjusted to provide fast response of motor loading.

E.

Compensation resistors should be rated ½ watt and the mylar capacitors (9 and 10C) are rated for 100 Vdc. Component locations are shown below.



START-UP AND CALIBRATION

In the following calibration procedure, the device driven by the amplifier will be referred to as the "actuator", and it will be assumed that the actuator contains the motor, limit switches and feedback signal device, even though they may be seperate components in some systems. It is also assumed the actuator along with it's limit switches and feedback signal device have been pre-aligned with the equipment the actuator is to drive.

At this point every effort must be made to verify the actuator is properly wired and "phased" to the amplifier. If the wiring is not correct, damage can occur to the amplifier, actuator or equipment driven by the actuator.

Before proceeding any further, be sure the proper input power transformer wiring has been done, the correct compensation card is in the amplifier and the motor is the correct voltage.

HOW IT WORKS

NOTE: All terminal numbers referred to are on the AD-7300 amplifier only and no where else.

An increasing Command Signal applied to terminal 1 with respect to terminal 6 will result in a motor armature output polarity of 28(+) and 27(-). Depending on how the motor armature wires (and field wires if used) are wired to the amplifier, the motor will rotate either CW or CCW and cause a change of Feedback Signal applied to terminal 2. The Feedback Signal device must be wired to cause the signal at terminal 2 to increase if the Command Signal at terminal 1 is increased. Once the amplifier output is turned on and the actuator is running, one of two methods is used to stop the actuator. With the Command Signal operating in it's normal range, the actuator should position the Feedback Signal to "null" the amplifier causing the armature output to go to 0 Vdc. If the amplifier is not aligned to the Command and Feedback signals or if the Command is out of range, the actuator may drive to activate an end of travel position limit switch. The switch should then turn off the amplifiers output. Tripping a torque limit switch should do the same. With this in mind, the limit switch which is to stop actuator movement in the direction caused by the increasing Command Signal must be wired across terminals 6 and 7. When the actuator reaches the travel limit caused by an increasing Command Signal, the switch contact across terminals 6 and 7 must open.

A decreasing Command Signal at terminal 1 will result in armature output polarity of 28(-) and 27(+). The motor rotation will reverse and the Feedback Signal at terminal 2 must decrease. The limit switch which is to stop the actuator movement for this direction must be wired across terminals 6 and 8. When the actuator position reaches the travel limit caused by a decreasing Command Signal, the switch contacts across terminals 6 and 8 must open.

NOTE:

If the switches are not wired or phased properly, the armature output power will not turn off when a switch is tripped as the direction of motor rotation will incorrect for the limit switch circuit.

THE AMPLIFIER SHOULD NOW BE READY TO HAVE POWER APPLIED, however, a few precautions should be taken before turning on power !

a.) manually position the actuator to mid-travel.
b.) remove load from actuator, if practical.
c.) temporarily disconnect wires from terminals 7 and 8 (limit switches). DO NOT SHORT WIRES
d.) temporarily remove wire from terminal 12. (places amplifier in manual mode)

A. Apply power to terminals 20, 21 and 22. There should be no power output to the actuators motor armature. If there is, immediately turn off power and determine the problem.

B. Connect the wire to terminal 7 and make momentary contact between terminals 14 and 15. The actuator should run while momentary contact is being made. If the actuator does not run, check for proper limit switch operation and wiring from terminals 6 to 7. Disconnect the wire to terminal 7 and connect the other limit switch wire to terminal 8. Jog the actuator with momentary contact across terminals 13 and 15 to verify proper contact of that limit switch.

C. Connect the other limit switch wire to terminal 7. Make momentary contact across terminals 14 and 15 to run the actuator toward it's limit. As the actuator approaches the limit, jog it by removing and applying contact across terminals 14 and 15 until the position limit switch is tripped. The switch should be across terminals 6 and 7 and should open at the trip point shutting off the amplifier. If the amplifier doesn't shut off chect the wiring and limit switch. In the same manner, run the actuator to the other limit using contact between terminals 13 and 15 instead of 14 and 15, to verify operation of the limit switch across terminals 6 and 8. (Actuator speed in this mode of operation may be adjusted with the "Manual Speed" pot. Reffered to on page 11).

D. Apply the Command Signal and adjust it to it's minimum level. If external power (battery back-up) is being used, it also must be applied. Make contact (or install a wire) across terminals 11 and 12 ("AUTO" mode). Allow the actuator to run and stabilize. If Span and Elev. signal conditioning is being used, adjust the "ELEV" pot on the amplifier so the amplifier nulls just as it reaches the "ZERO" limit switch. The "ZERO" limit being the one which coincides with the minimum Command Signal. It may be necessary to adjust the "ELEV" pot so the actuator runs away from the limit, and then slowly adjust it back to the limit if the actuator ran until the limit switch tripped instead of the amplifier nulling prior to the limit switch tripping.

Set the Command Signal to it's maximum level. The actuator should now run toward it's "MAX" limit. If it doesn't, check for proper phasing of the Feedback Signal. Adjust the "SPAN" pot on the amplifier to obtain "null" at the limit. SPAN may have to be adjusted to bring the actuator off of it's limit switch and slowly adjusted back to the limit so null occurs at the limit switch trip.

NOTE: If "ELEV" and "SPAN" are adjusted for nulls beyond the limit switch settings, the actuator position will not be linear with the Command Signal settings.

Repeat the adjustments of this step until the amplifier nulls out within the actuator limit switch settings.

If neither the Command or Feedback Signal is being conditioned with ELEV and SPAN, the signal inputs at terminals 1 and 2 must be equal at the minimum and maximum levels and adjusted to these equal levels with trim pots or by some other means external to the amplifier.

E. Adjust the "GAIN" pot to obtain the loop response and accuracy required. A gain setting which is too high will result in an unstable loop. A gain setting which is too low will result in slow response.

F. The purpose of the "DEADBAND" is to eliminate motor chattering and stalling at null. Adjust the "DEADBAND" pot so that whenever power is being applied to the motor armature, the motor rotates and causes a change of Feedback Signal. SPAN and ELEV. should be checked and re-adjusted as needed after the "DEADBAND" has been adjusted.

Referring to Figure 1 on page 4, it can be seen that DEADBAND nullifies small differential inputs (noise) until the point where corresponding armature voltage is great enough to produce actuator movement. When properly adjusted to ignore noise or unwanted changes it will not dampen response and prevents power from being applied to the motor when it can't be put to use.

G. The "MANUAL SPEED" pot can be adjusted to provide the actuator speed desired when in the "MANUAL" mode of operation. The adjustment range is 5% to 100% of full speed.

H. If the "ALARM" circuits are being used, they can now be calibrated. Adjustments are fairly simple. For instance, if an alarm signal contact is to occur for a LOW Command Signal, apply a Command Signal which is slightly lower than the minimum (Example: 3.9mA for a 4 to 20mA Command Signal). Adjust the "LOW" set point pot for the alarm circuit being used, such that the relay trips at this point. This is also indicated by the LED near the pot being adjusted turning on at the trip point. Other alarm signals can be set similarly by simulating the condition which is to provide alarm.

NOTE: The alarm circuits will not detect a "LOW" condition for a signal with a minimum of 0 Vdc (such as a 0 to 10 Vdc range) unless this signal is used with SPAN and ELEV. to raise the 0 Vdc level above 0 Vdc, as there is no difference between 0 Vdc, no signal or an open wire condition.

I. The "ZERO", "BUMP", "30° ADJUST" and "MAXIMUM FIRING ANGLE" pots are factory set and should only be adjusted by trained personnel with the proper equipment.

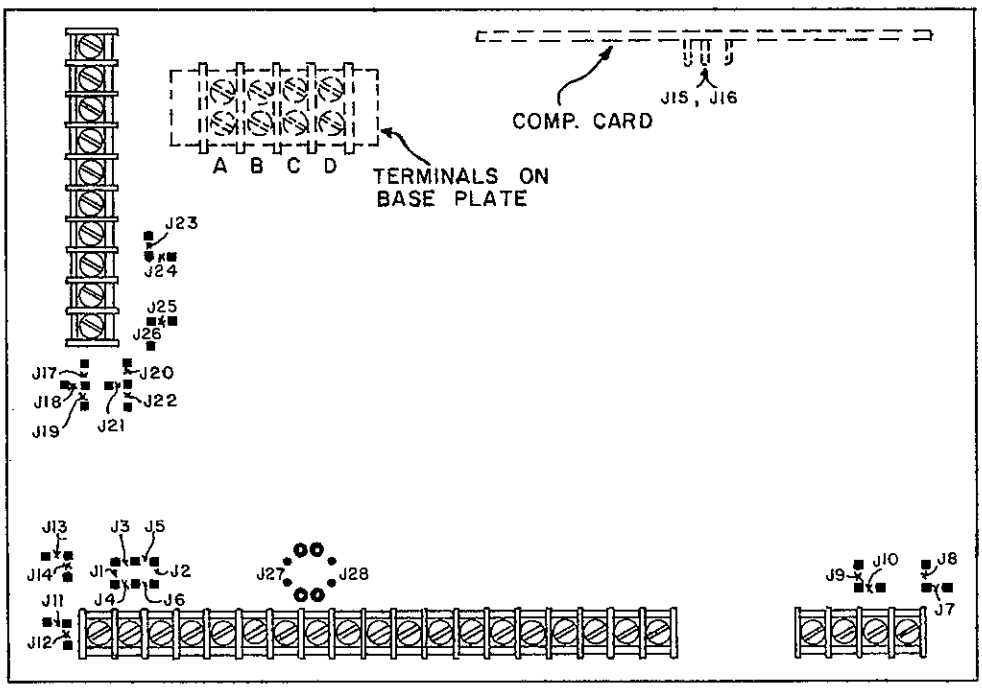
This completes the alignment and calibration. If it has been done properly the actuator should respond to Command Signal changes without hunting, stalling or jittering. The actuator output shaft should move to the position the Command Signal tells it to go to, whether it be a linear function or characterized function. If the "DEADBAND" adjustment had to be opened up (widened) beyond what your system can tolerate, the cause is most likely noise on the Command or Feedback Signal lines or an unstable Command Signal. These signals should be "cleaned up" for proper amplifier/actuator performance.

JUMPER SELECTION CHART

FUNCTION	CONDITION	JUMPER POSITIONS	SPECIAL INSTRUCTIONS
Output Voltage	90 Vdc	A to B & C to D*	Requires 230 Vac C.T. xfmr
	180 Vdc	B to C*	Requires 460 Vac C.T. xfmr
Span & Elev. Circuit	Not used	J1, J2	Opt. 2K HI-TRIM avail. (replaces 110R)
	Conditioned Command	J2, J3, J4	Use with std. 270 fixed HI-TRIM 110R
	Conditioned Feedback	J1, J5, J6	Use with std. 270 fixed HI-TRIM 110R
HI-TRIM (term 3)	Std. 270		Fixed resistor 110R
	Opt. 2K pot		Not avail. for use with Span & Elev. Cir.
Power ON Indication	Contact CLOSE for Power ON	J7	Terminals 43 & 44
	Contact OPEN for Power ON	J8	Terminals 43 & 44
AUTO-MANUAL Indication	Contact CLOSE in AUTO	J10	Terminals 41 & 42
	Contact CLOSE in MANUAL	J9	Terminals 41 & 42
Battery Backup for Sig. Cond. Cir.	Required	J12, J14	Customer Input A(+15), B(-15), C (com)
	Not Required	J11, J13	Uses Internal ±15 Vdc power supplies
Speed Circuit Reference	Armature (std.)	J15 **	Motor Armature supplies signal
	Tach Rate (Opt.)	J16 **	Motor Tachometer supplies signal
ALARM Circuit #1	Loss of Command Indication	J18	Terminals 31, 32, 33 LOW ALARM Terminals 34, 35, 36 HI ALARM
	Loss of Feedback Indication	J19	
	Deviation Indication	J17	
ALARM Circuit #2	Loss of Command Indication	J21	Terminals 37 & 38 LOW ALARM Terminals 39 & 40 HI ALARM
	Loss of Feedback Indication	J22	
	Deviation Indication	J20	
ALARM Circuit #2 Contacts	Contact CLOSE on "LOW" ALARM	J23	Terminals 37 & 38
	Contact OPEN on "LOW" ALARM	J24	Terminals 37 & 38
	Contact CLOSE on "HI" ALARM	J25	Terminals 39 & 40
	Contact OPEN on "HI" ALARM	J26	Terminals 39 & 40

All jumpers on TOP P.C. BOARD except * on BASE PLATE and ** on COMP CARD

Remove Top Circuit Board, to access terminals A,B,C,D and Comp Card jumpers J15 J16.



Compensation Card Identification

Compensation Cards are identified with a Part Number and a Motor Code Number. The Motor Code Number represents the Model Number of a particular Jordan Controls electric actuator. Compensation components were selected for best Amplifier/Actuator performance. See page 15 for selecting other compensation values. Card assembly part numbers start with 68B-020997- and the last three numbers (dash number) change as components and applications change.

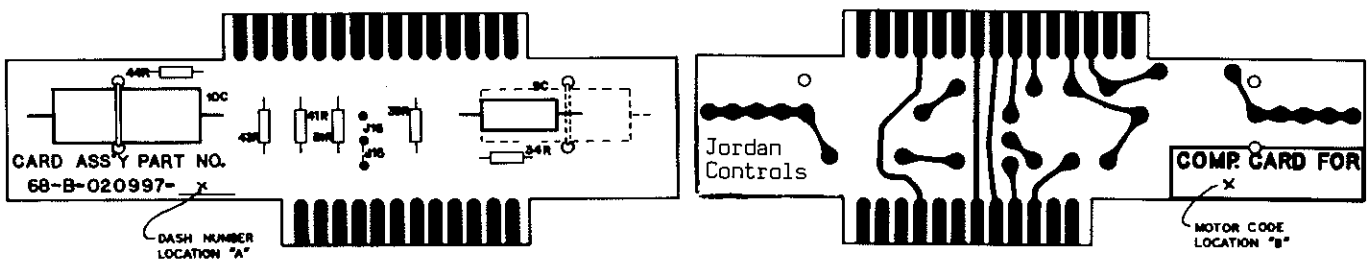
Compensation Card Part Number	MARKING		Application "WHERE USED" ACTUATOR SERIES
	LOCATION "A"	LOCATION "B"	
68B-020997-001	001 B	5160 1/5 HP	SM-5160, LA-5160, LA-2460
68B-020997-002	002 B	5260 1/2 HP	SM-5260, LA-5260, LA-2860
68B-020997-003	003 B	5360 1 HP	SM-5360, LA-5360
68B-020997-004	004 B	5460 1.5 HP	SM-5460
68B-020997-005	005 B	5480 2 HP	SM-5480, LA-2280 (180 Vdc)
68B-020997-006	006 B	1160	SM-1160, LA, MC, VA-1160
68B-020997-007	007 B	1560	SM,LA,VA-1560, SM-1660, SM-1760

COMPENSATION CARD PARTS LIST

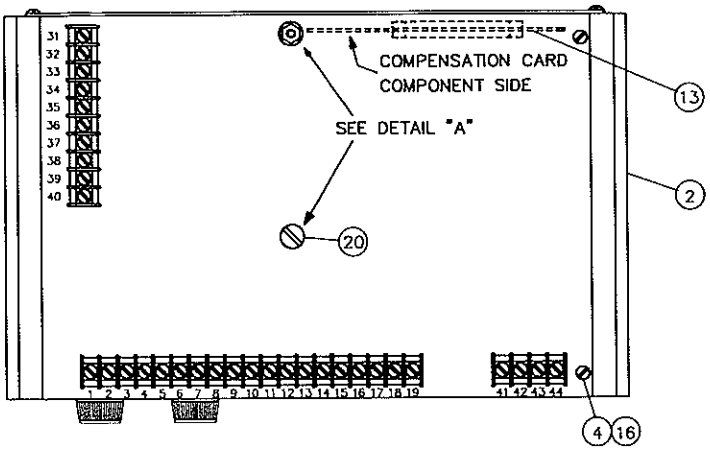
68B-020997-							PART NUMBER	DESCRIPTION
007	006	005	004	003	002	001		
1	1	1	1	1	1	1	50B-020519-001	Circuit Board
3	3	3	3	3	3	3	43B-003909-025	Jumper Pins (solder to board)
1	1	1	1	1	1	1	43B-003909-026	Jumper Clip
1	1	1	1	1	1	1	35B-012319-188	Capacitor .68uf 100V -10C-
1	1	1	1	1	1	1	33B-018157-304	Resistor 300K ¼W 2% -33R-
1	1	1	1	1	1	1	33B-003628-360	Resistor 1 MEG ¼W 10% -43R-
1	1	1	1	1	1	1	33B-018157-183	Resistor 18K ¼W 2% -44R-
1	1			1		1	35B-012319-175	Capacitor .068uf 100V -9C-
					1		35B-012319-168	Capacitor .022uf 100V -9C-
			1				35B-012319-169	Capacitor .027uf 100V -9C-
		1					35B-012319-165	Capacitor .012uf 100V -9C-
1	1			1	1	1	33B-008543-435	Resistor 332K ¼W 1% -31R-
		1	1				33B-008543-465	Resistor 681K ¼W 1% -31R-
1	1			1		1	33B-018157-223	Resistor 22K ¼W 2% -34R-
		1	1		1		33B-018157-273	Resistor 27K ¼W 2% -34R-
1						1	33B-018157-222	Resistor 2.2K ¼W 2% -41R-
					1		33B-018157-512	Resistor 5.1K ¼W 2% -41R-
				1			33B-018157-103	Resistor 10K ¼W 2% -41R-
			1				33B-018157-912	Resistor 9.1K ¼W 2% -41R-
		1					33B-018157-123	Resistor 12K ¼W 2% -41R-
	1						33B-018157-102	Resistor 1K ¼W 2% -41R-

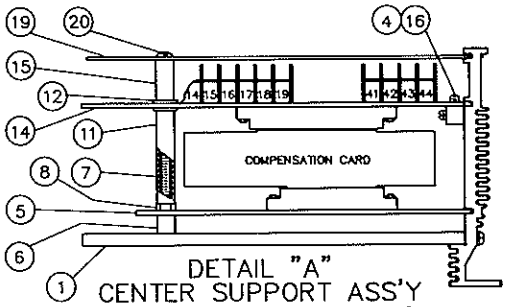
NOTE: When using Comp. Cards 006 or 007, the following modifications must be done on the Lower Board Ass'y.

1. Remove 39 ohm 2 watt resistors 85R, 86R, 90R and 91R.
2. Install 120 ohm 2 watt resistors part no. 33B-018159-121 for 85R and 90R. (86R and 91R not used)
3. Install .01uf 1000V capacitor part no. 35B-003885-027 across terminals 27 and 28.

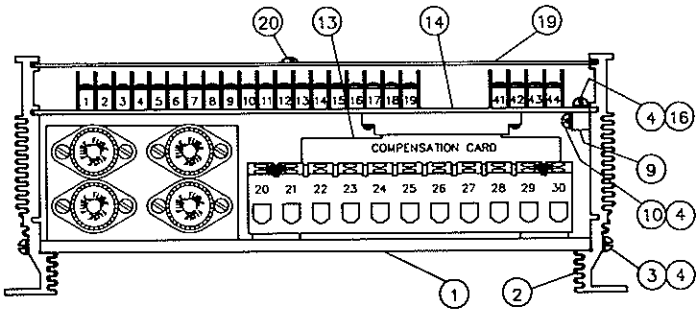


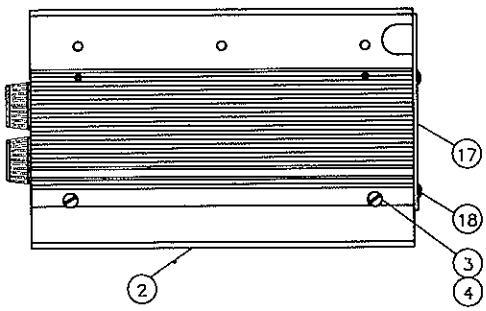
AD-7300 AMPLIFIER ASSEMBLY





DETAIL "A"
CENTER SUPPORT ASS'Y
SUPPORT NEAREST COMP CARD IS SIMILAR EXCEPT ITEM 15 REPLACED BY #10-32 NUT AND ITEM 20 NOT USED

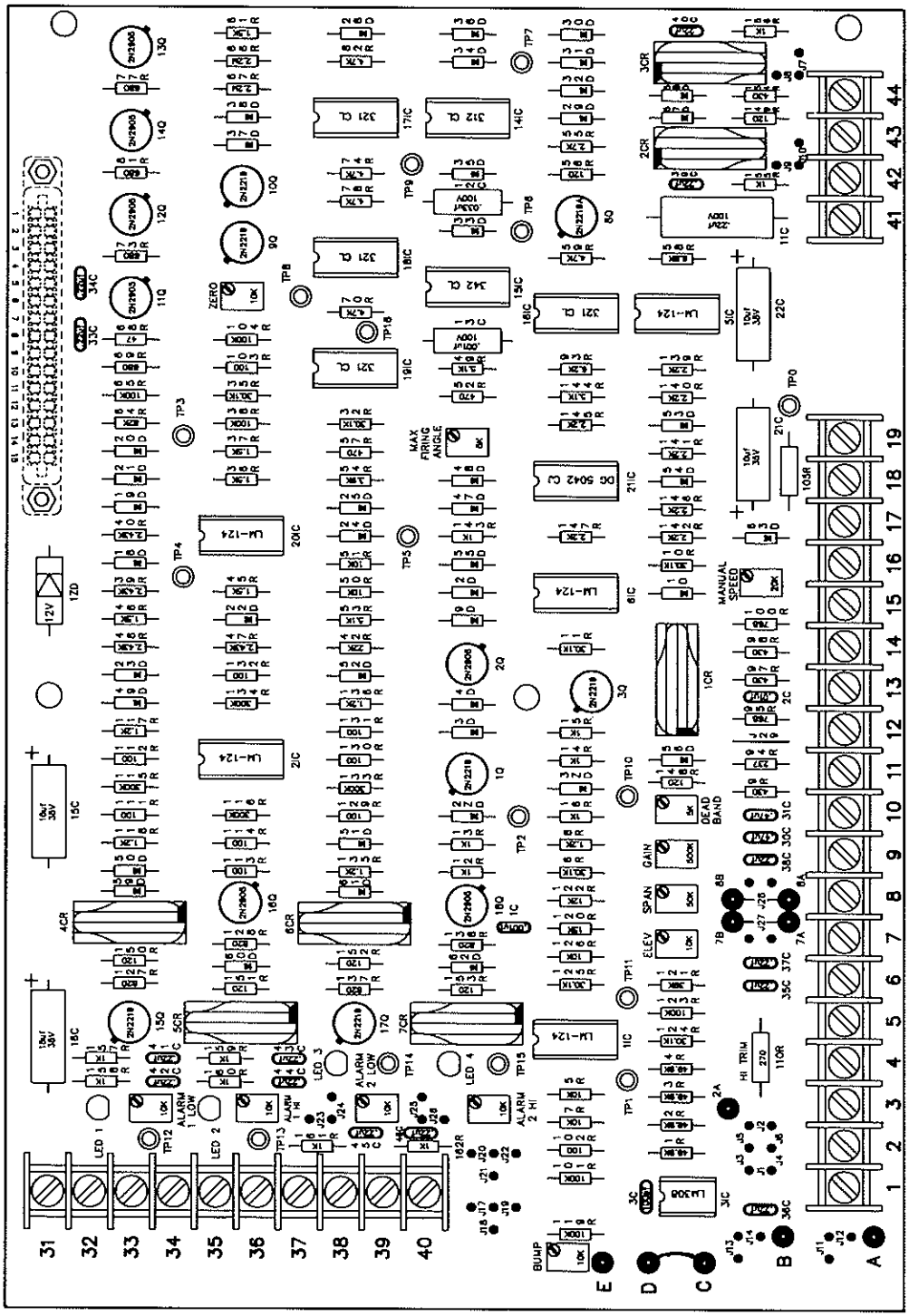




PARTS LIST

ITEM	DESCRIPTION	PART NUMBER	QTY
1	Base Plate Ass'y	68B-020597-001	1
2	Side Plate	61C-010246-001	2
3	Screw 8-32 x .50 lg.	54A-015033-050	4
4	#8 Lockwasher	56A-015190-002	8
5	Lower Board Ass'y	SEE PAGE 23	1
6	Spacer .38 lg.	61B-SP1324-120	2
7	Thread Stk. 10-32 x 3.25 lg.	54A-004927-032	2
8	#10-32 Nut	55A-015058-001	3
9	Board Support	12B-020902-001	1
10	Screw 8-32 x .62 lg.	54A-015033-062	2
11	Spacer 2.0 lg.	61B-SP1324-049	2
12	Fiber Washer	56B-005479-003	4
13	Compensation Card	SEE PAGE 19	1
14	Top Circuit Board	68D-020999-001	1
15	10-32 Threaded Spacer	55A-020995-001	1
16	Screw 8-32 x .38 lg.	54A-015033-038	2
17	Back Cover	61B-020993-001	1
18	Screw 6-32 x .25 lg.	54A-015022-025	4
19	Top Cover	61B-020994-001	1
20	Screw 10-32 x .25 lg.	54A-015052-025	1

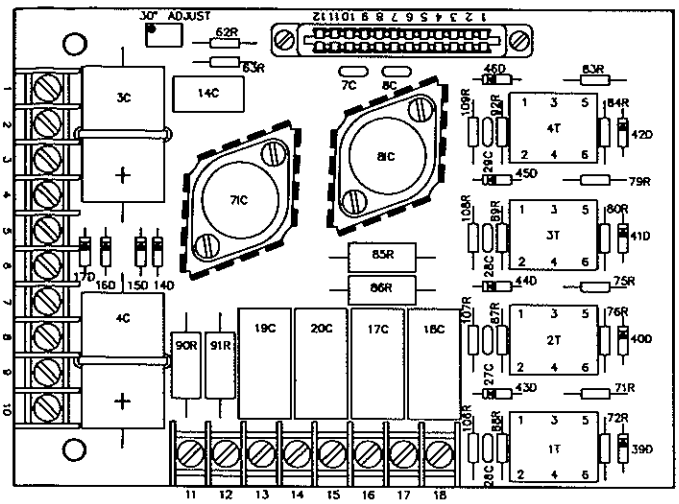
AD–7300 TOP BOARD ASS'Y

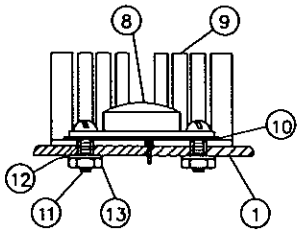


AD-7300 TOP BOARD PARTS LIST

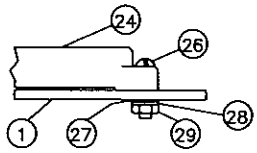
ITEM	DESCRIPTION	PART NUMBER	QTY
1	P.C.Board	50D-020398-001	1
2	Cap .001uf,50V (1C)	35B-020594-101	1
3	Cap .01uf,50V (2C)	35B-018340-103	1
4	Cap .22uf,100V (11C)	35B-012319-181	1
5	Cap .033uf,100V (12C)	35B-012319-170	1
6	Cap .001uf,100V (13C)	35B-012319-151	1
7	Cap 15uf,35V (15 & 16C)	35B-018313-156	2
8	Cap 10uf,35V (21 & 22C)	35B-018313-106	2
9	Cap .47uf,50V (30 & 31C)	35B-018340-474	2
10	Cap .22uf,50V (33-46C)	35B-018340-224	14
11	Relay, 12Vdc (1,2,4-7CR)	27B-020143-003	6
12	Relay, 24Vdc (3CR)	27B-020143-004	1
13	Diode 1N4004 (1-4,9,18-25,28-38,47-63D)	30B-018004-004	41
14	LM-124 (1,2,5,6 and 20IC)	31A-016674-001	5
15	312CL (14IC)	31B-016629-001	1
16	342CL (15IC)	31B-016631-001	1
17	321CL (16-19IC)	31B-016630-001	4
18	DG5042CJ (21IC)	31B-021974-001	1
19	LM-308 (3IC)	31B-016671-001	1
20	Buss Wire (J27,J28,J29)		3
21	Jumper Pins	43B-003909-025	36
22	L.E.D. red (LED 1-4)	30B-011696-001	4
23	Transistor 2N2219A (1,3,8-10,15 & 17Q)	31B-016634-001	7
24	Transistor 2N2905A (2,11-14,16 & 18Q)	31B-016635-001	7
25	Res 49.9K,¼W,1% (1-4R)	33B-008543-356	4
26	Res 10K,¼W,1% (5,7,50,51 & 126R)	33B-008543-289	5
27	Res 30.1K,¼W,1% (6,10,11,32,35,124 & 125R)	33B-008543-335	7
28	Res 1.2K,¼W,2% (8,117,118,135 & 136R)	33B-018156-122	5
29	Res 430 ,¼W,2% (9,97,98 & 154R)	33B-018156-431	4
30	Res 1K,¼W,2% (12-16,143 & 155-162R)	33B-018156-102	14
31	Res 1.5K,¼W,1% (36,37,45,46 & 61R)	33B-008543-210	5
32	Res 100K,¼W,1% (38,65,101,104,123, 119R)	33B-008543-385	6
33	Res 2.43K,¼W,1% (39,40,47 &48R)	33B-008543-230	4
34	Res 22K,¼W,2% (42R)	33B-018156-223	1
35	Res 5.1K,¼W,2% (49,53,144R)	33B-018156-512	3
36	Res 470 ,¼W,2% (52 & 57R)	33B-018156-471	2
37	Res 3.9K,¼W,2% (54R)	33B-018156-392	1
38	Res 2.7K,¼W,2% (55R)	33B-018156-272	1
39	Res 120 ,¼W,2% (56 and 148-153R)	33B-018156-121	7
40	Res 6.8K,¼W,2% (58R)	33B-018156-682	1
41	Res 4.7K,¼W,2% (59,70,74,78 and 82R)	33B-018156-472	5
42	Res 82K,¼W,2% (64R)	33B-018156-823	1
43	Res 2.2M,¼W,2% (66 & 67R)	33B-008022-542	2
44	Res 47 ,¼W,2% (68R)	33B-018156-470	1
45	Res 680 ,¼W,2% (69,73,77 and 81R)	33B-018156-681	4
46	Res 6.2K,¼W,2% (93R)	33B-018156-622	1
47	Res 237 ,¼W,1% (94R)	33B-008543-133	1
48	Res 768 ,¼W,1% (95 & 100R)	33B-008543-182	2
49	Res 100 ,¼W,1%(102 & 103R)	33B-008543-097	2
50	Res 270 ,½W,2% (110R)	33B-018157-271	1
51	Res 100 ,¼W,2% (111-114 & 129-132R)	33B-018156-101	8
52	Res 300K,¼W,2% (115,116,133 & 134R)	33B-018156-304	4
53	Res 15K,¼W,2% (120R)	33B-018156-153	1
54	Res 39K,¼W,2% (121R)	33B-018156-393	1
55	Res 12K,¼W,2% (122R)	33B-018156-123	1
56	Res 820 ,¼W,2% (127,128,137 & 138R)	33B-018156-821	4
57	Res 2.2K,¼W,2% (139-142,145-147R)	33B-018156-222	7
58	Pot 5K (Max firing angle and Deadband)	34B-015794-502	2
59	Pot 50K (Span)	34B-015794-503	1
60	Pot 10K (Elev,Bump,Zero Alarm 1 & 2 Hi & Low)	34B-015794-103	7
61	Pot 500K (Gain)	34B-015794-504	1
62	Pot 20K (Manual Speed)	34B-015794-203	1
63	Cap 100pf,100V (3C)	35B-006960-013	1
64	Diode 1N3022B,12V (1ZD)	30B-003753-413	1
65	Diode 1N748A,3.9V (2-3ZD)	30B-003753-418	2
66	Transistor Mtg. Pads	32B-003755-005	14
67	Terminal Strip 4 Pin	43B-011955-034	1
68	Terminal Strip 10 Pin	43B-011955-040	1
69	Terminal Strip 19 Pin	43B-011955-049	1
70	Test Jack (TP0-TP16)	43B-021758-001	17
71	Edge Connector 15 Pin	45B-020590-004	1
72	Screw 4-40x.50 lg.	54A-015013-050	2
73	#4-40 Hex Nut	55A-015018-001	2
74	#4 Lockwasher	56A-015170-002	2
75	Jumper Clips	43B-003909-026	11

AD-7300 LOWER BOARD ASS'Y





7IC & 8IC MOUNTING



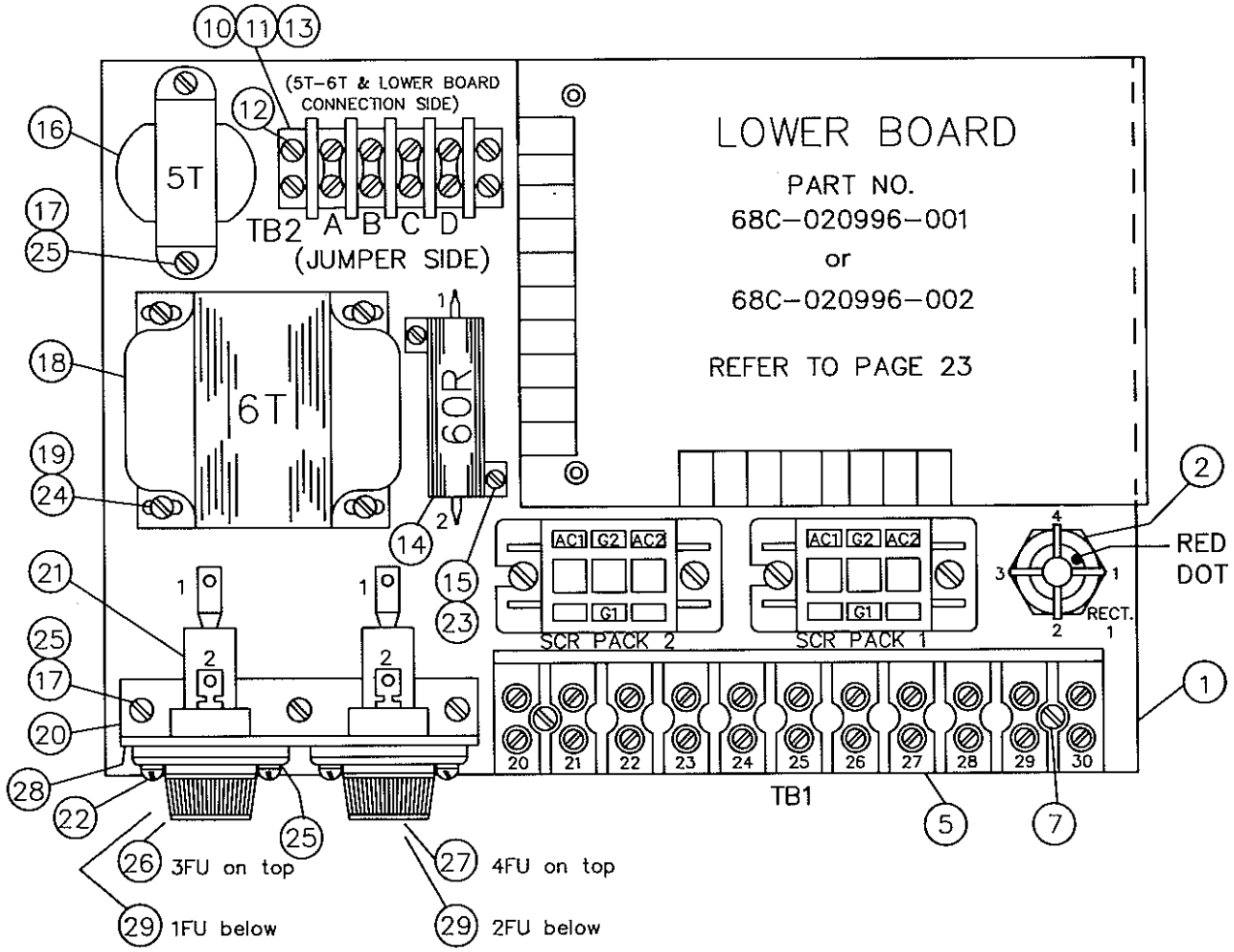
CONNECTOR MOUNTING

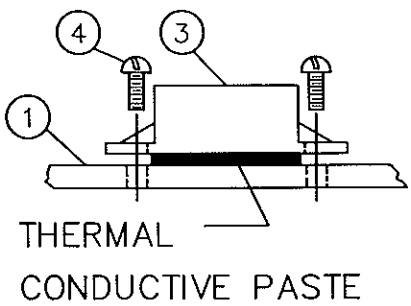
Part No. 68C-020996-001 (used with SM and LA-5000 series actuators and LA-2860)
Part No. 68C-020996-002 (used with SM/LA-1160, 1560, 1660, 1760, and 2460)
* Item 17 used on 68C-020996-001 and Item 18 used on 68C-020996-002

PARTS LIST

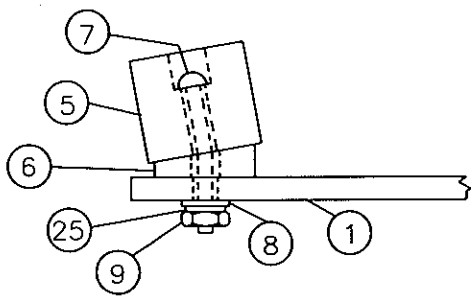
ITEM	DESCRIPTION	PART NUMBER	QTY
1	P.C. Board	50C-020510-001	1
2	Capacitor 500uF. 50V (3 & 4C)	35A-016627-001	2
3	Capacitor .22uF, 50V (7 & 8C)	35B-018340-224	2
4	Capacitor .15uF, 200V (14C)	35B-017990-001	1
5	Cap. .47uF, 600V (17,18,19 & 20C)	35B-021218-021	4
6	Cap. .002uF,1KV (26,27,28 & 29C)	35B-003885-030	4
7	Diode 1N4004 (14-17 & 39-46D)	30B-018004-004	12
8	Voltage Reg. "7815" (7 & 8IC)	31B-018947-003	2
9	Heat Sink Therm#6015B (7 & 8IC)	32B-021217-001	2
10	Insulator (7 & 8IC)	32B-021235-001	2
11	Screw 6-32x.50 lg. (7 & 8IC)	54A-015023-050	4
12	#6 Star Washer (7 & 8IC)	56A-023922-005	4
13	#6-32 Hex Nut (7 & 8IC)	55A-015028-001	4
14	Resistor 2.4K, 1/2W, 2% (62 & 63R)	33B-018157-242	2
15	Res. 27 ohm,.5W,2% (71,75,79 & 83R)	33B-018157-270	4
16	Res. 330 ohm,.5W,2% (72,76,80 & 84R)	33B-018157-331	4
17*	Res. 39 ohm 2W,2% (85,86,90 & 91R)	33B-018159-390	4*
18*	Res. 120 ohm,2W,2% (85 & 90R)	33B-018159-121	2*
19	Res. 82 ohm .5W,2% (87,88,89 & 92R)	33B-018157-820	4
20	Res. 47 ohm,.5W,2% (106,107,108 & 109R)	33B-018157-470	4
21	Pulse Transformer (1T-4T)	26B-016623-001	4
22	Terminal Strip 8 Pin	43B-011955-038	1
23	Terminal Strip 10 Pin	43B-011955-040	1
24	Edge Connector 12 Pin	45B-020590-003	1
25	Pot 5K (30 deg. Adjust)	34B-015794-502	1
26	Screw 4-40x .50lg.	54A-015013-050	2
27	#6 Fiber Washer	58B-024244-078	2
28	#4 Lockwasher	56A-015170-002	2
29	#4-40 Hex Nut	55A-015018-001	2

AD-7300 BASE PLATE ASSEMBLY





SCR PACK MTG.



TB1 MOUNTING

BASE PLATE ASSEMBLY PARTS LIST

ITEM	DESCRIPTION	PART NUMBER	QTY
1	BASE PLATE	61C-020587-001	1
2	BRIDGE RECTIFIER, 1N4437	30B-016278-002	1
3	SCR PACK 1 & 2	31B-020592-001	2
4	10-32x.31 Lg. Screw	54A-015053-031	4
5	TERMINAL, 11 PIN (TB1)	43B-020589-011	1
6	BEVEL WASHER	56A-020966-001	2
7	8-32x 1.62 Lg. Screw	54A-015033-162	2
8	#8 Flat Washer	56A-015192-001	2
9	#8-32 Hex Nut	55A-015038-001	2
10	TERMINAL, 4 PIN (TB2)	43B-003888-304	1
11	INSULATOR for TB2	32A-014123-008	1
12	8-32x.50 Lg. Screw	54A-015033-050	4
13	JUMPERS for TB2	43B-003909-027	2
14	Resistor .05 ,50W (60R)	33B-007922-010	1
15	4-40x.31 Lg. Screw	54A-015013-031	2

ITEM	DESCRIPTION	PART NUMBER	QTY
16	XFMR, 230/460 Vac (5T)	26B-014720-001	1
17	8-32x.25 Lg. Screw	54A-015033-025	5
18	XFMR, 230/460 Vac (6T)	26B-020588-001	1
19	6-32x.25 Lg. Screw	54A-015023-025	4
20	FUSE MOUNTING PLATE	12B-021291-001	1
21	FUSEHOLDER, BUSS #HPF	38B-021302-001	4
22	8-32x.38 Lg. Screw	54A-015033-038	8
23	#4 Lockwasher	56A-015170-002	2
24	#6 Lockwasher	56A-015180-002	4
25	#8 Lockwasher	56A-015190-002	15
26	FUSE KTK 5 Amp (3FU)	37B-003832-712	1
27	FUSE KTK 2 Amp (4FU)	37B-003832-709	1
28	NAMEPLATE-FUSE I.D.	53A-022797-001	1
29	FUSE KTK 15 Amp (1 & 2FU)	37B-003832-716	2

BASE PLATE WIRING CHARTS

COMPONENT INTERCONNECT WIRING

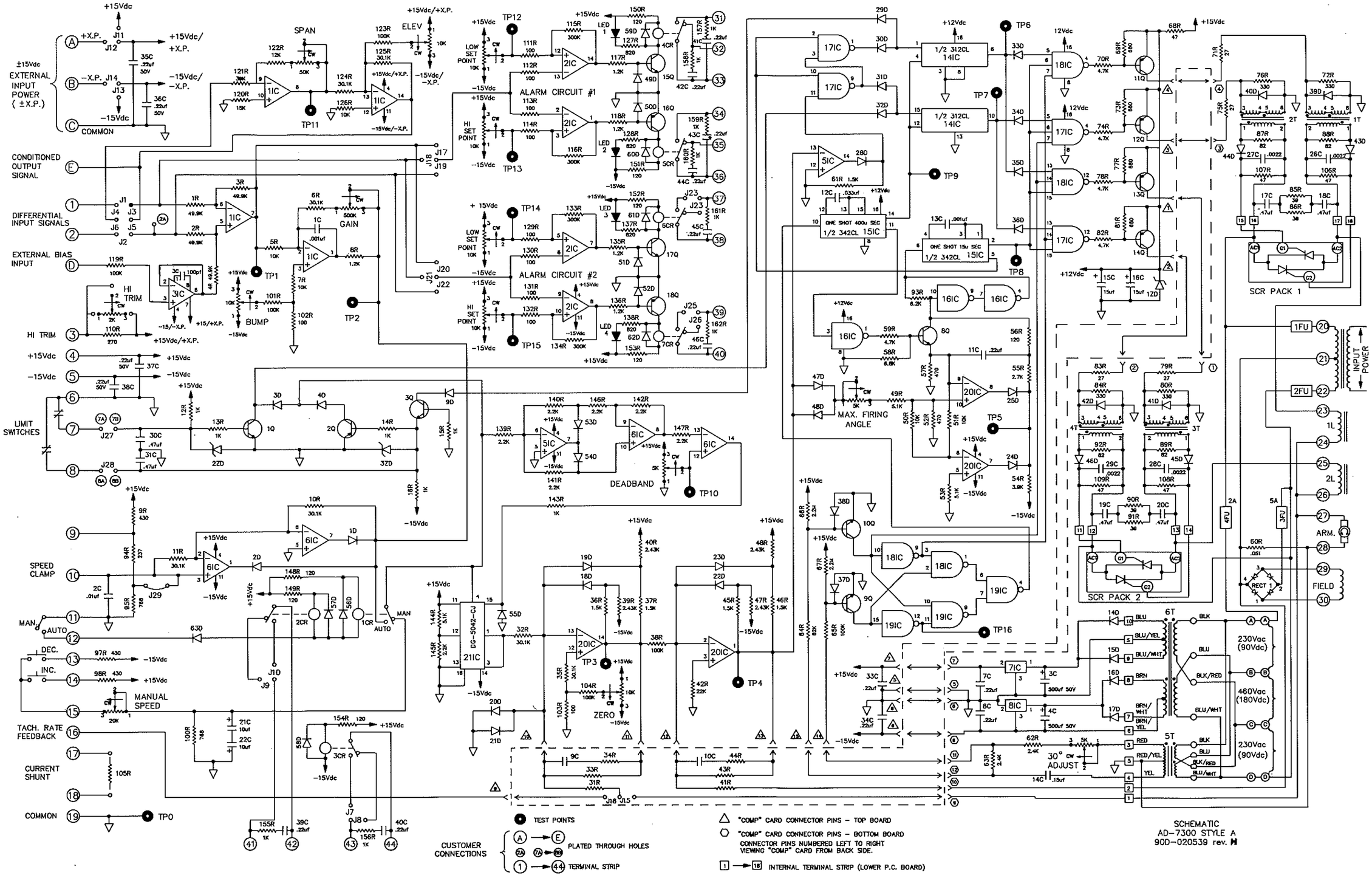
FROM	TO	COLOR	SPECIAL INSTRUCTIONS
RECT1-1	TB1-30	GRY	
RECT1-2	3FU-2	BLK	
RECT1-3	TB1-29	GRY	
RECT1-4	LBT-2	BRN	COMBINE AT LBT-2 WITH
60R-1	LBT-2	BRN	ONE CRIMP TERMINAL
60R-2	TB1-28	VLT	
SCR1-AC1	LBT-16	GRN	TWISTED PAIR
SCR1-G1	LBT-15	YEL	
SCR1-AC2	LBT-17	BLU	TWISTED PAIR
SCR1-G2	LBT-18	VLT	
SCR2-AC1	LBT-12	BRN	TWISTED PAIR
SCR2-G1	LBT-11	BLK	
SCR2-AC2	LBT-13	RED	TWISTED PAIR
SCR2-G2	LBT-14	ORG	
1FU-1	TB1-20	BLK	
1FU-2	4FU-1	BLK	
1FU-2	LBT-16	GRN	
2FU-1	TB1-22	BLK	
2FU-2	TB2-D	BLK	COMBINE AT JUMPER SIDE OF TB2-D
LBT-12	TB2-D	BRN	WITH ONE RING TYPE TERMINAL
TB1-21	LBT-2	BRN	
TB1-23	LBT-17	BLU	
TB1-24	TB1-26	ORG	
TB1-25	LBT-13	RED	
TB1-26	TB1-27	ORG	
TB1-27	LBT-1	WHT	
TB1-28	LBT-5	VLT	
3FU-1	2FU-2	BLK	
4FU-2	TB2-A	BLK	

ALL INTERCONNECT WIRES ARE 16 AWG

5T & 6T TRANSFORMER WIRING

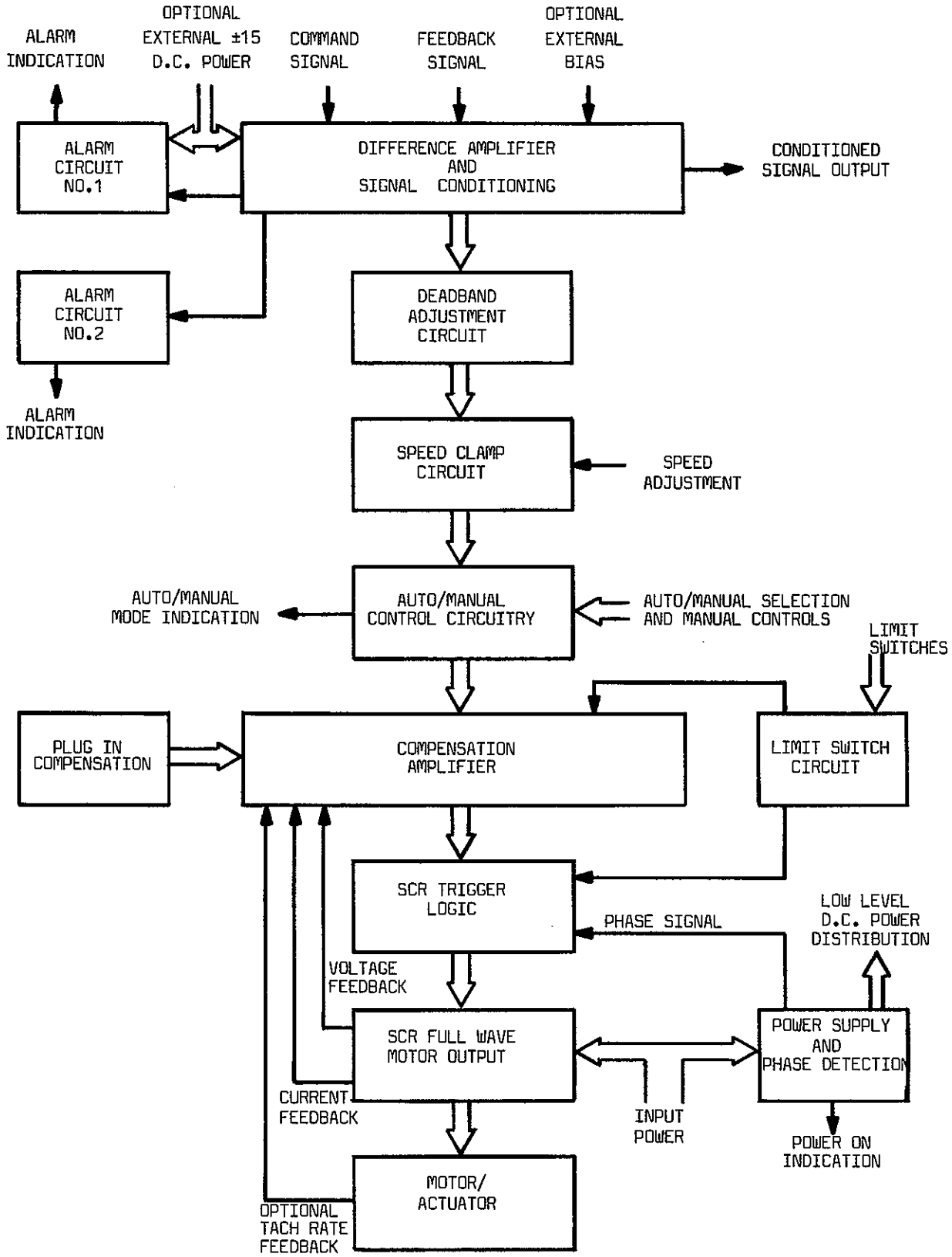
TRANSFORMER LEAD	TO
6T-Primary-BLK	TB2-A
6T-Primary-BLU	TB2-B
6T-Primary-BLK/RED	TB2-C
6T-Primary-BLU/WHT	TB2-D
6T-Secondary-BLU	LBT-10
6T-Secondary-BLU/WHT	LBT-9
*6T-Secondary-BLU/YEL	LBT-5
6T-Secondary-BRN	LBT-8
6T-Secondary-BRN/WHT	LBT-7
6T-Secondary-BRN/YEL	LBT-6
5T-Primary-BLK	TB2-A
5T-Primary-BLU	TB2-B
5T-Primary-BLK/RED	TB2-C
5T-Primary-BLU/WHT	TB2-D
5T-Secondary-RED	LBT-3
*5T-Secondary-RED/YEL	LBT-5
5T-Secondary-YEL	LBT-4

*COMBINE THESE TWO LEADS WITH ONE CRIMP CONNECTOR.
LBT= LOWER BOARD TERMINALS.

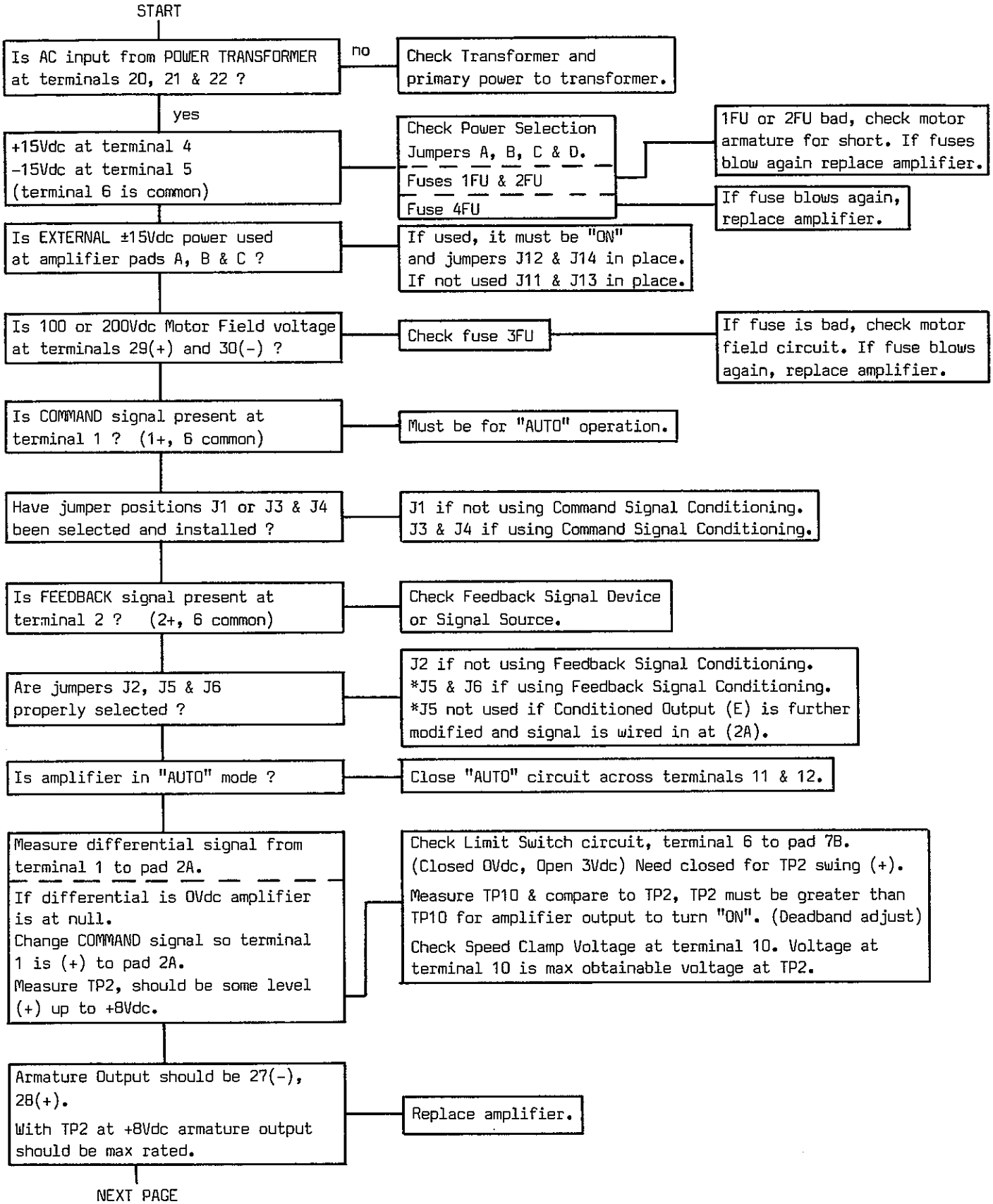


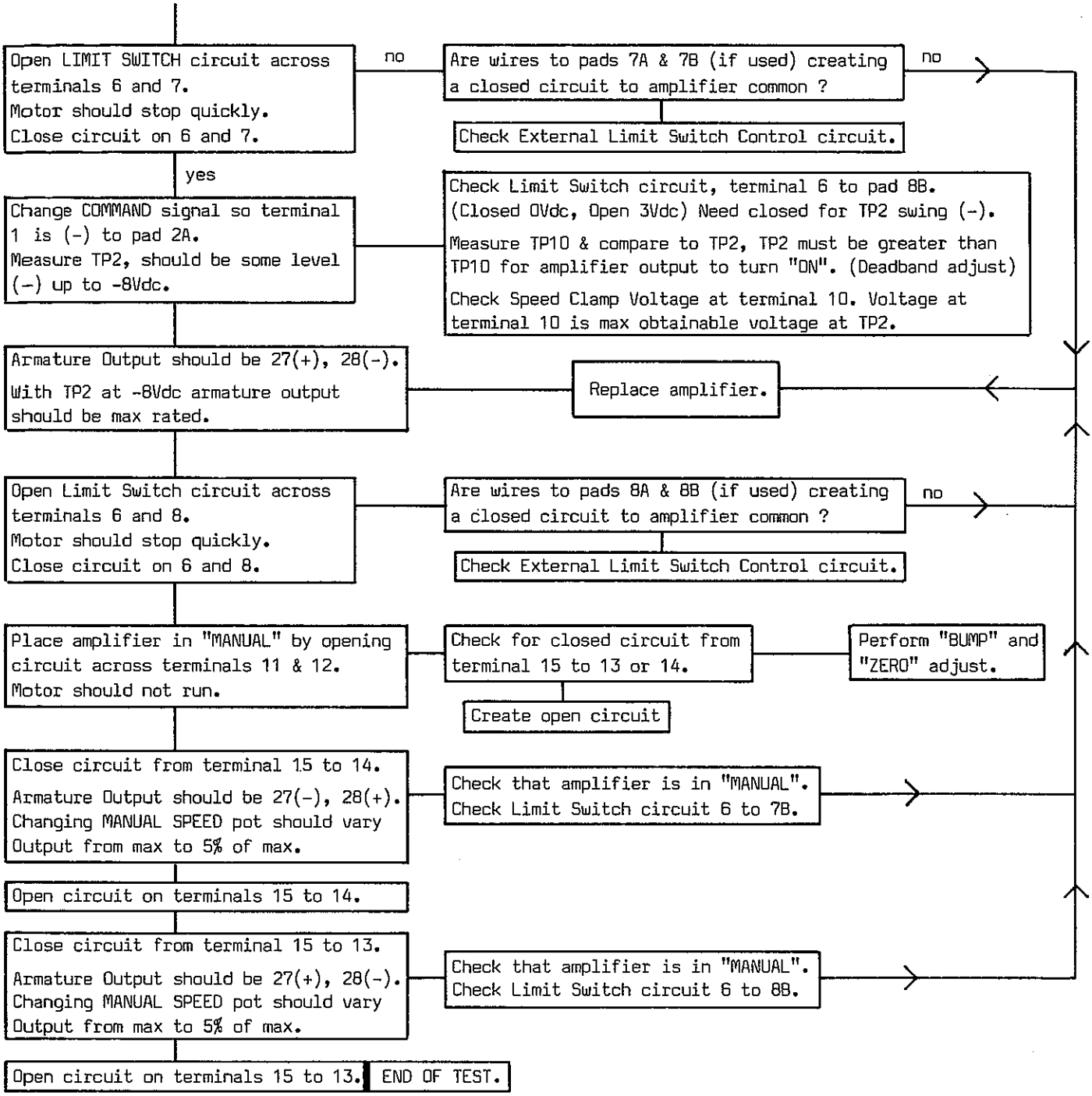
SCHEMATIC
AD-7300 STYLE A
90D-020539 rev. H

AD-7300 STYLE A
FUNCTIONAL BLOCK DIAGRAM



AMPLIFIER CHECK PROCEDURE

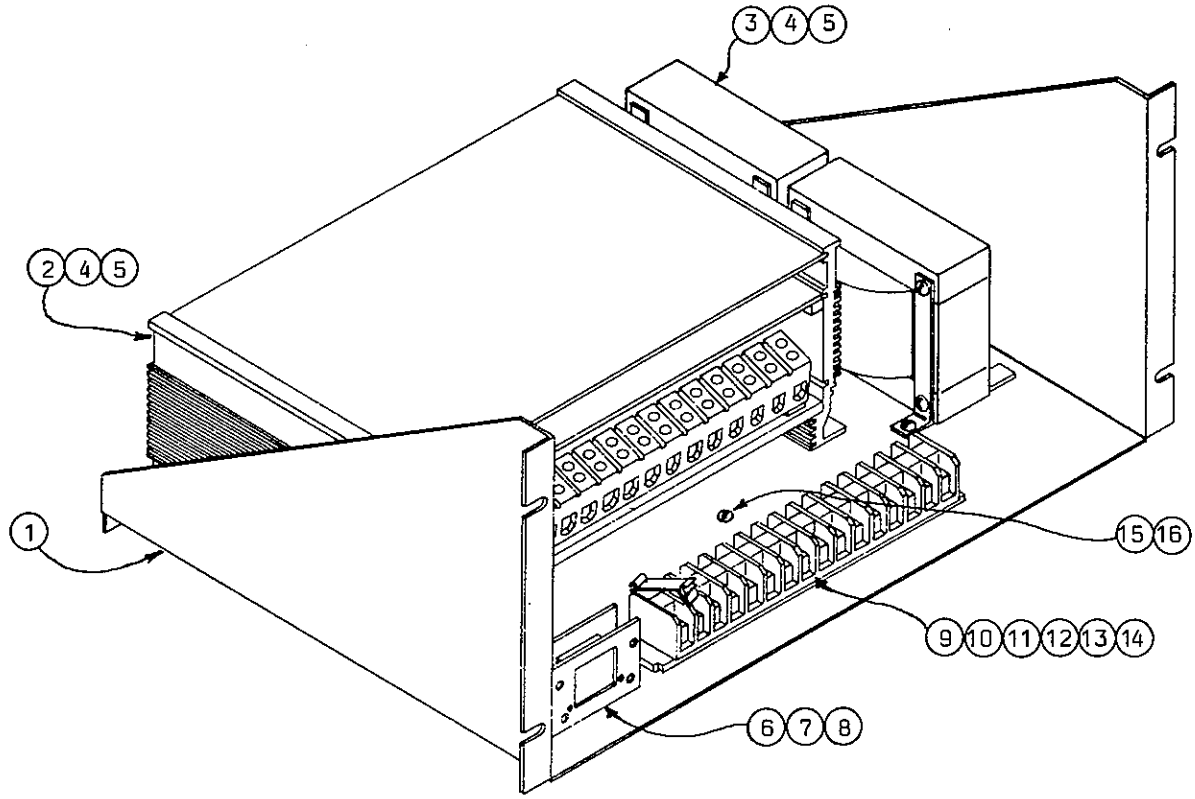




NOTES:

1. "BUMP" and "ZERO" adjust. Install jumpers J1 and J2, vacate terminals 1, 2 & External Bias (D) if used. Short term 1,2,7 & 8 to 6, Short 11 to 12, Adjust "BUMP" for 0Vdc at TP2, Adjust "ZERO" for 0Vdc at TP3.
2. COMMAND and FEEDBACK signals are both (+) with respect to terminal 6 (common).
3. If terminal 1 is (+) to pad 2A, the Armature Output is 27(-), 28(+).
4. If terminal 1 is (-) to pad 2A, the Armature Output is 27(+), 28(-).
5. The FEEDBACK signal must be wired to reduce the differential from terminal 1 to pad 2A with motor running.
6. LIMIT SWITCH across terminals 6 & 7 will only control output polarity of 27(-), 28(+).
7. LIMIT SWITCH across terminals 6 & 8 will only control output polarity of 27(+), 28(-).

EC-10671
RACK MOUNTED AD-7300



PARTS LIST

ITEM	DESCRIPTION	PART NUMBER	QTY
1	PANEL	12D-022115-001	1
2	AMPLIFIER **	70D-021000-xxx	1
3	INDUCTORS	26B-014666-001	2
4	10-32x.38 SCREW	54A-015053-038	14
5	#10 LOCKWASHER	56A-015200-002	14
6	CONNECTOR ASS'Y	68B-022125-001	1
7	8-32x.25 SCREW	54A-015033-025	2
8	#8 LOCKWASHER	56A-015190-002	5
9	TERMINALS	43B-022126-001	16
10	END SECTION	43B-022126-002	1
11	TERMINAL COVER	43B-022126-003	16
12	MARKING STRIP	43B-022126-004	1
13	STRIP END PLUG	43B-022126-005	1
14	8-32x.31 SCREW	54A-015033-031	3
15	8-32x.25 GRN SCR	54A-015033-025	1
16	#8 STARWASHER	56A-023922-006	1

** JUMPERS REQUIRED ON AD-7300A J1,J6,J8, J12,J14,J19,J21,J23,J25 ON TOP BOARD. J15 ON COMPENSATION CARD.

** AMPLIFIER P/N 70D-021000-002 USED WITH SM-5000 SERIES ACTUATORS. AMPLIFIER P/N 70D-021000-003 USED WITH SM-1760 ACTUATOR.

CONNECTOR WIRING

PIN	to AD-7300
1	TERMINAL 1
2	SOLDER PAD 2A
3	SOLDER PAD A
4	SOLDER PAD B
5	SOLDER PAD C
6	SOLDER PAD E
7	TERMINAL 43
8	TERMINAL 44
10	TERMINAL 9
11	TERMINAL 10
12	SOLDER PAD D
13	TERMINAL 12
14	TERMINAL 11
16	TERMINAL 14
17	TERMINAL 13
18	TERMINAL 15
20	TERMINALS 31 & 34
21	TERMINALS 33 & 36
23	TERMINALS 37 & 39
24	TERMINALS 38 & 40
27	SOLDER PAD 7B
28	SOLDER PAD 7A
29	SOLDER PAD 8B
30	SOLDER PAD 8A

PINS 9,15,19,22,25 and 26 are not used.
WIRES are 20AWG, 300V marked with PIN No.

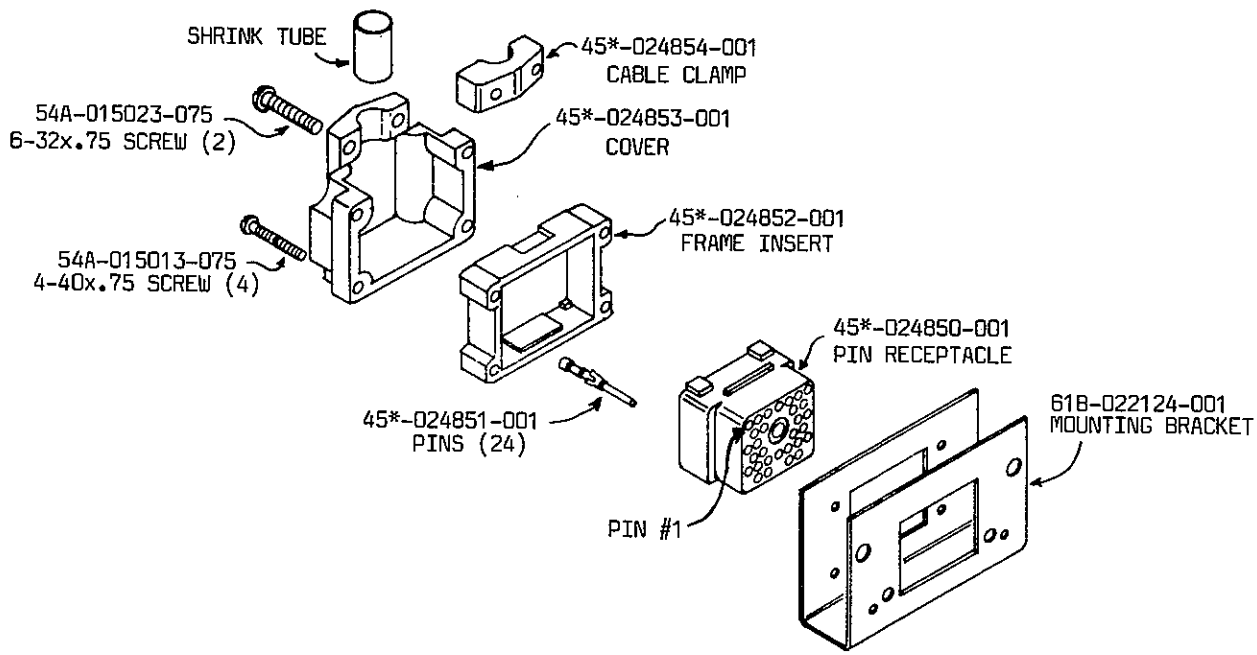
PANEL TERM. TO AMP TERM. WIRING

PANEL TERMINAL	AD-7300 TERMINAL	WIRE GA. & COLOR
1	PANEL (GND)	#14 GREEN
2	20	#14 BLACK
3	21	#14 BLACK
4	22	#14 BLACK
5	29	#14 BLACK
6	30	#14 BLACK
7	27	#10 BLACK
8	28	#10 BLACK
9	19	#14 BLACK
10	3	Shielded*
11	2	Shielded*
12	to PANEL TERM 9	#14 BLACK
13	7	#18 ORANGE
14	6	#18 ORANGE
15	8	#18 ORANGE
16	6	#18 ORANGE

* Use BELDEN #8762 or Equal. Connect SHIELD to PANEL TERM 9.

SHIELDED Cable Terminations are insulated with SHRINK TUBE.

CONNECTOR ASSEMBLY
P/N 68B-022125-001, USED ON EC-10671



EXTERNAL INTERFACE THRU CONNECTOR WILL AFFECT OPERATION OF AMPLIFIER.

FOR NORMAL "AUTO" OPERATION, THE FOLLOWING CONDITIONS MUST BE PRESENT AT THE CABLE CONNECTOR.

1. Command Signal at PIN 1.
2. Conditioned Feedback Signal (from AD-7300 Solder Pad.E) at PIN 6 goes to External Circuit (2AC-M2 DUAL CONTROL MODULE) and is returned to PIN 2.
3. Contact Closure PINS 13 to 14 (AUTO).
4. Contact Closure PINS 27 to 28 (Limit Switch Inhibit INC circuit).
5. Contact Closure PINS 29 to 30 (Limit Switch Inhibit DEC circuit).
6. External DC power at PINS 3, 4 and 5 (if used).

FOR OPERATION IN "MANUAL".

1. OPEN Circuit PIN 13 to 14.
2. CLOSE Circuit :

   PIN 18 to 17 (Drive DECREASE)
   PIN 18 to 16 (Drive INCREASE)

   (Also need Limit Switch circuit CLOSURES at PIN 27 to 28 and 29 to 30).

PINS 7 to 8 monitor AMPLIFIER POWER "ON".
PINS 20, 21, 23 and 24 are ALARM circuit monitors.
PIN 12 is used for EXTERNAL BIAS INPUT.
PINS 10 and 11 are for EXTERNAL SPEED CLAMP.

Jordan Controls, Inc.

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