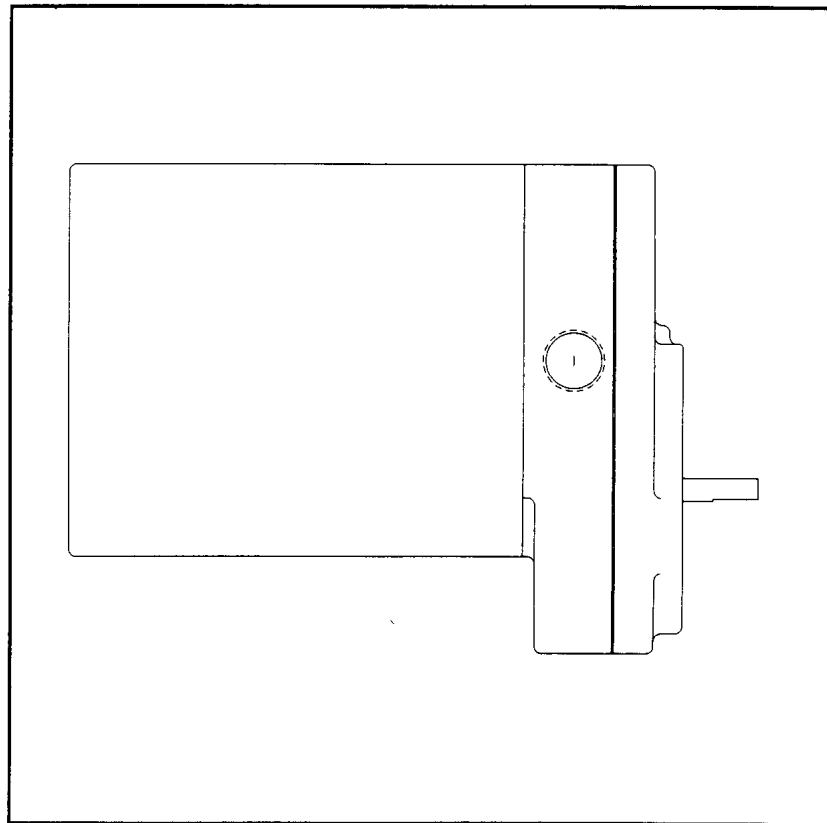


Instruction Manual

THROTTLE ACTUATOR



Due to wide variations in the terminal numbering of actuator products, actual wiring of this device should follow the print supplied with the unit.



GENERAL INFORMATION

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- 1 Cover
- 2 Identification Label
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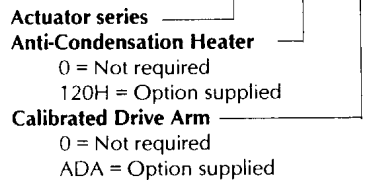
IDENTIFICATION LABEL

An identification label is attached to each actuator cover. The serial number is also stamped on the aluminum housing, directly above the conduit entry. When ordering parts, requesting information or service assistance, please provide all of the label information.

EXAMPLE:

MODEL NUMBER: TA 1200-0-ADA
SERIAL: 1627C92-23456
PH/HZ/V/A: dc/dc/17/2.5

MODEL NUMBER: TA 1200 - 0 - ADA



SERIAL NUMBER: 1627 C 92 - 23456



PH/HZ/V/A: dc/dc/17/2.5
PH=Phase
HZ=Hertz
V=Voltage
A=Amp

RECEIVING

Once you have received the actuator, carefully inspect for shipping damage. Damage to the shipping carton is usually a good indication that it has received rough handling. Report all damage immediately to the freight carrier and Jordan Controls, Inc.

INSPECTION

Carefully unpack the actuator - taking care to save the shipping carton and any packing material, should return be necessary. Verify that the items on the packing list or bill of lading agree with your own.

STORAGE

If the actuator will not be installed immediately, it should be stored in a clean, dry area where the ambient temperature is not less than -20°F. The actuator should be stored in a non-corrosive environment. The actuator is not sealed to NEMA 4 until the conduit entries are properly connected.

EQUIPMENT RETURN

For your convenience, Jordan Controls, Inc., will provide an efficient method of returning equipment for repair.

Return Goods Authorization

A Returned Goods authorization (RG) number is required to return any equipment for repair. This must be obtained from the Jordan Controls Service Department. The equipment must be sent to the following address after the RG number is issued:

Jordan Controls, Inc.
5607 West Douglas Avenue
Milwaukee, Wisconsin 53218
Attn: Service Department

To facilitate quick return and handling of your equipment include:

- RG Number
- Your Company Name
- Address
- Repair Purchase Order Number
- Brief description of the problem

INTRODUCTION AND GENERAL DESCRIPTION

INTRODUCTION

Jordan Controls, Inc., designs, manufactures and tests its products to meet many national and international standards. However, for these products to operate within their normal specifications, you must properly install, use and maintain these products. The following instructions must be adhered to and integrated with your safety program when installing, using and maintaining Jordan Controls products.

- Read and save all instructions prior to installing, operating and servicing this product.
- If you do not understand any of the instructions, contact your Jordan Controls representative for clarification.
- Follow all warnings, cautions and instructions marked on and supplied with the product.
- Inform and educate your personnel in the proper installation, operation and maintenance of the product.
- Install your equipment as specified on Jordan Controls installation instructions and per applicable local and national codes. Connect all products to the proper electrical sources.
- Handle, move and install each product using the appropriate number of personnel and moving devices/equipment (dolly, fork-lift, crane, etc.). Failure to do so could cause serious personal injury.
- To ensure proper performance, use qualified personnel to install, operate, update, tune and maintain the product.
- When replacement parts are required, ensure that the qualified service technician uses replacement parts specified by Jordan Controls. Unauthorized substitutions may result in fire, electrical shock, other hazards, or improper equipment operation.
- Keep all actuator protective covers in place, (except when maintenance is being performed by qualified personnel), to prevent electrical shock, personal injury, or damage to the actuator.

CAUTION

Before installing the actuator, make sure the actuator supplied is suitable for the intended application with respect to environmental conditions and the voltage/frequency of available line power. If you are unsure of the suitability of this equipment for your installation, consult Jordan Controls prior to proceeding.

WARNING - SHOCK HAZARD

Installation and servicing must be performed only by qualified personnel. De-energize all sources of power BEFORE removing the actuator cover. KEEP COVER TIGHT WHEN CIRCUITS ARE ALIVE. Failure to follow these precautions may result in serious injury.

DESCRIPTION OF OPERATION

The TA-1200 Throttle Actuator is designed for fast response, precision positioning of an engine throttle in an engine test cell. The actuator motor is a 60 volt DC motor with a tachometer built into the motor. The internal tachometer gives an output voltage of 14 Vdc per 1000 rpm of motor speed. The actuator output shaft has a total rotation of 90° and a shift rate of 0.25 seconds at 45 inch pounds load. The actuator has built-in spring loaded end stops which come in contact with the output shaft sector gear at 42° each side of mid travel.

In operation the motor pinion gear, pinned to the motor shaft, rotates a compound gear assembly. The pinion of the gear assembly rotates the sector gear, which is brazed to the output shaft assembly. As the output shaft sector gear reaches its end of travel it contacts a spring which cushions the stop. Brazed to the output shaft is a spur gear which drives the anti-backlash feedback potentiometer assembly.

The feedback shaft gear is held to the potentiometer shaft with two set screws. As the gear rotates the potentiometer shaft is rotated, causing the wiper arm inside the potentiometer to change position. Attached to the potentiometer shaft is a spring which provides an anti-backlash gearing feature.

WIRING

The actuator needs seven (7) wires for electrical operation with the control amplifier (AD-7530) and an additional wire as a ground. Of the seven control wires, three of the wires should be in a shielded cable. These shielded wires will be used for the potentiometer feedback signal. Refer to the installation wiring print supplied with the actuator.

NOTES:

1. With DC voltage of polarity indicated applied to terminals 1 & 2 output shaft will rotate clockwise (as viewed from shaft end). At the same time terminal 4 is + with respect to terminal 3.
2. CW output shaft rotation (as viewed from shaft end) will cause pot wiper arm to travel in direction of arrow. If two pots are supplied, terminals 10, 11, and 12 are also used.
3. Ground unit to terminal strip bracket mounting screw.
4. Motor power requirement: 24 Vdc, 5.0 AMP maximum.

INSTALLATION

PHYSICAL:

The TA-1200 Throttle Actuator may be mounted in any position desired using the six (6) face mount holes. The six face mount holes are drilled and tapped to accept 1/4-20 mounting bolts. Using grade 5 or better bolts with lockwashers mount the actuator, allowing sufficient clearance around the output shaft, and torque the mounting bolts to (8) ft. lbs.

NOTE: Torque on mounting bolts is based on at least 5 full threads of engagement into the mounting face. Avoid using bolts which are too long and which will bottom in the bolt hole. The mounting holes will accept 3/8" of thread.

If a calibrated drive arm is to be mounted to the output shaft, slide the drive arm onto the shaft, locating the bottom set screw on the flat side of the shaft. In the mid travel position the drive arm body should be approx. 90° or perpendicular to the drive linkage. (see figs. 1 & 2)

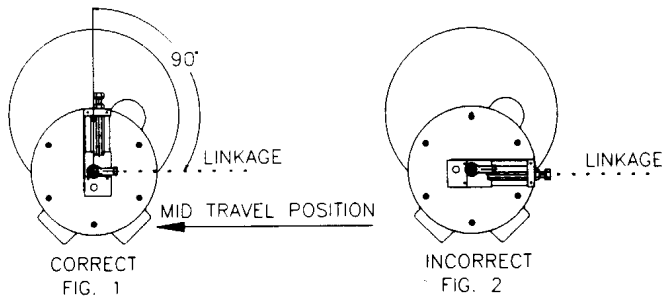


Figure 1

Figure 2

ACTUATOR ALIGNMENT

NOTE: As supplied from the factory, the TA-1200 is pre-calibrated. The following procedure is provided for field re-calibration.

1. Apply 24 Vdc across terminals 1 and 2 of the actuator. The voltage at terminal 1 should be + and terminal 2 -. With polarity applied as specified the output shaft should rotate clockwise, looking at the shaft end. (NOTE: When the actuator reaches its CW end it will stall). To drive the shaft CCW reverse the polarity. If the output shaft rotates in the wrong direction when + is applied to terminal 1, reverse the motor wires at terminals 1 and 2.
2. Connect a DC volt meter across terminals 3 and 4. With + applied to terminal 1 and the motor running the tachometer will generate terminal 4 positive to terminal 3. If the polarity is backward, reverse the tachometer wires at terminals 3 and 4.
3. Connect an ohm-meter across terminals 7 and 9. You should read 1000 ohms $\pm 5\%$.
4. Remove the ohm-meter and connect a 10 Vdc supply across terminals 7 and 9. Connect a DC voltmeter across terminals 7 and 8. Run the actuator in the CW direction and the voltmeter should decrease its reading. If the meter increases its reading, reverse the potentiometer wires at terminals 7 and 9.

5. Run the actuator to its center of travel and center the potentiometer by loosening the pot housing retaining screw and rotating the housing until the voltage reading from terminal 7 to 8 matches the reading from terminal 8 to 9. Tighten the housing screws.
The actuator is now aligned to itself and can be interconnected with a properly configured Jordan Controls AD-7530 control amplifier.

CALIBRATED DRIVE ARM ADJUSTMENT

The calibrated drive arm is used to adjust for different throttle linkage strokes within the range of 0.5 to 4.0 inches. If the actuator is aligned to travel 90° for the full range of the input command and the drive arm is set at 1.5, the throttle will move 1.5 inches as the actuator rotates from 0 to 90°. To increase the throttle travel, loosen the adjusting bolt lock nut on the drive arm and turn the adjusting bolt until the mark on the adjusting block lines up with the inch mark on the scale wanted for total throttle travel. For a 4 inch travel, adjust the arm to 4.0 on the scale. The throttle linkage would now move 4.0 inches for 90° actuator rotation.

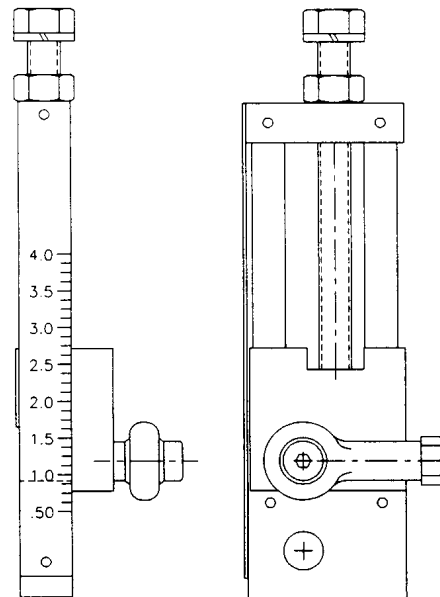


Figure 3

PARTS REPLACEMENT

POTENTIOMETER REPLACEMENT

1. Remove three pan head screws which hold feedback assembly to the gear housing.
2. Hold the feedback assembly around the spring and pull the entire assembly from the gear housing. (Holding by the spring, with fingers on each side of it will prevent the spring from rapid unwinding which could damage the gear teeth as you remove the feedback assembly.)
3. Grasp the gear and slowly let the spring unwind.
4. Record the distance from the outer face of gear to the bottom of the feedback frame so the gear can be located onto the new pot shaft in the same position.
5. Remove gear by loosening two set screws.
6. Loosen set screws in spring collar.
7. Loosen the pot nut which holds the pot body to the feedback frame and let the nut lay freely on the pot shaft.
8. Slide the pot out of the frame from the pot body end.
9. Slide the new pot into the frame, placing the pot lockwasher, nut, spring collar and spring onto the pot shaft as it is being inserted.
10. Tighten the pot nut and check the pot shaft for free turning. If the shaft does not turn freely either the pot is not mounted flat or the frame is sprung. Correct as needed to make the shaft turn freely.
11. Locate the spring in the frame on the spring collar and tighten the collar set screws. The spring collar must not drag on the bushing.
12. Place gear onto the pot shaft to the dimension measured in step 4 and tighten the set screws.
13. Looking at the output shaft of the actuator, turn the shaft to the full clockwise position.
14. Holding the feedback frame in one hand turn the gear 1/4 turn counterclockwise, pre-loading the coil spring.
15. Hold the frame and spring collar in the pre-load position and insert the assembly into the housing, retaining it with the pan head screws.
16. Wire and align the potentiometer.

MOTOR REPLACEMENT

1. Remove motor and tachometer wires from terminals 1, 2, 3, and 4. When removing, label wires so the new motor is wired to the same terminals.
2. Remove the bridge plate holding motor to gear case. Remove motor.
3. Mount and wire the motor, torquing retaining nuts to 20 in. lbs. $\pm 10\%$.

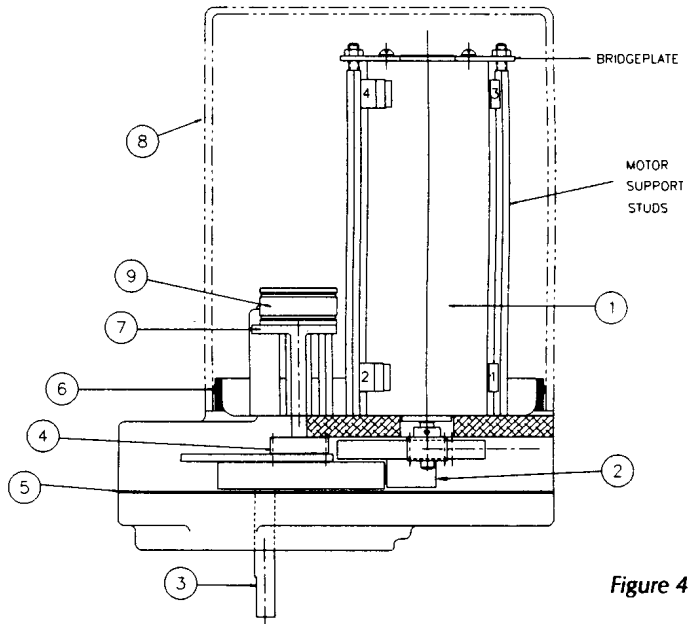
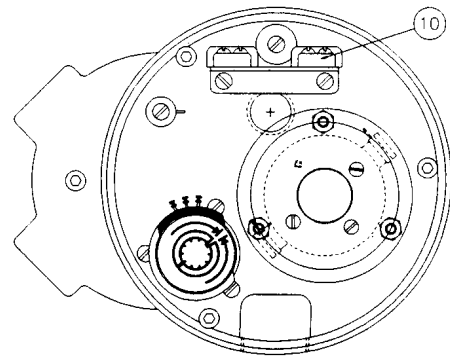


Figure 4

ACTUATOR ASSEMBLY

ITEM	DESCRIPTION	PART NUMBER	QTY.
1	Motor/Pinion Assembly.....	68B-034663-001	1
2	Gear Assembly	65A-016918-001	1
3	Output Assembly.....	65B-016915-001	1
4	Feedback Gear	16B-003803-065	1
5	Gasket	13C-016924-001	1
6	"O" Ring	74B-004108-001	1
7	Feedback Assembly*.....	68B-017412-001	1
8	Rear Cover.....	11B-SM1197-007	1
9a	Potentiometer 1K	34B-033104-001	1
9b	Potentiometer 1K/1K Tandem....	34B-003956-160	1
10	Terminal Strip.....	43B-003888-105	2

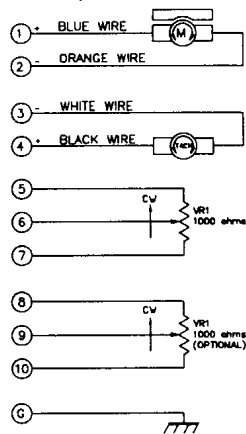
*includes items 4 & 9a

REPLACING GEARS OR BEARINGS

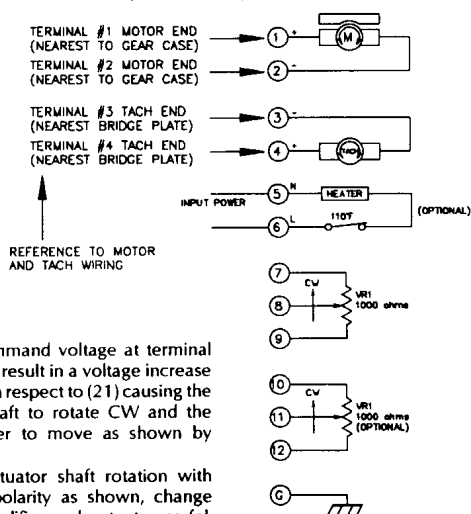
1. Remove cover.
2. Remove cap screws and lockwashers which hold the two halves of the gear case together.
3. Remove gear housing.
4. Remove output shaft assembly and gear assembly. Inspect gears for wear. Inspect gear shafts for wear and check bearings. Replace any worn parts.
5. To re-assemble the gear case, first insert springs into the motor housing. Be sure the springs are put in properly so the spring cushions the shock of the output gear.
6. Insert gear assembly.
7. Load the feedback shaft spring, (see "Potentiometer Replacement") and insert the output shaft assembly being sure all gears are in full mesh.
8. Re-lubricate the gears with Amoco-Rykon Premium Grease No. 2® or Shell-Darina EP-0®. (Coat the output shaft lightly so it will slide into the gear case bearing and front seal).
9. Replace gasket with a new one and place it over the locating dowel pins.
10. Slide the gear housing over the output shaft and locate properly on the dowel pins.
11. Install the three cap screws and washers into the holes inside the motor-feedback area and the shorter cap screw and washer into the external hole. Torque the cap screws to approx. 5 ft. lbs.
12. Put cover in place securing it with four screws.

WIRING DIAGRAMS

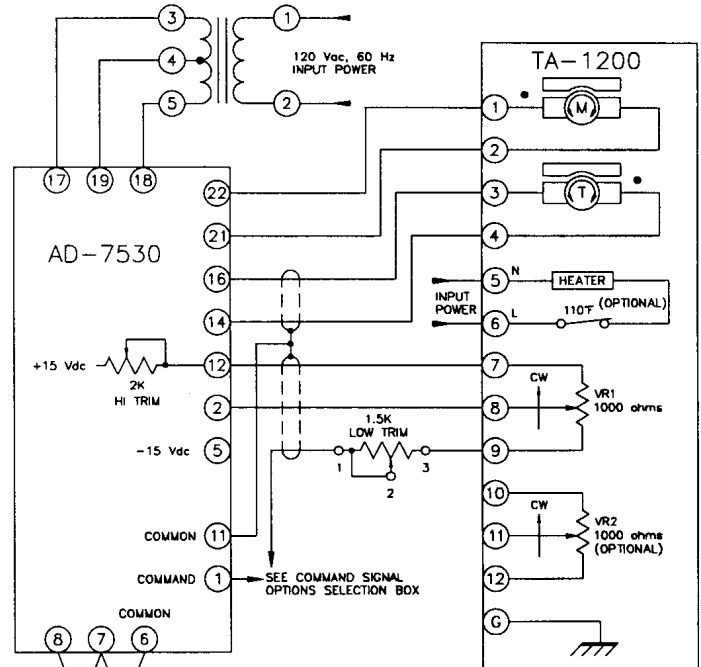
MC-10596 WIRING
(REFERENCE)



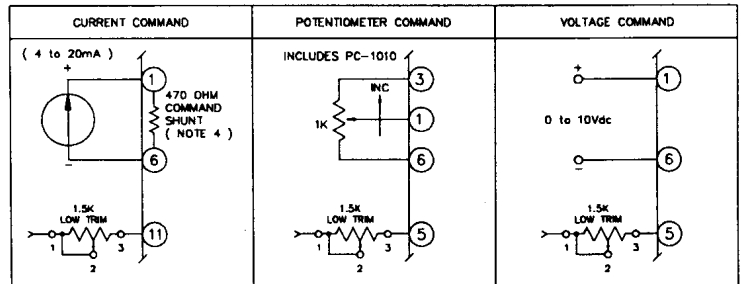
TA-1200 WIRING
(REFERENCE)



TA-1200 WIRING
INTERCONNECT



COMMAND SIGNAL OPTIONS



NOTE: SHIELDED WIRE IS RECOMMENDED ON WIRING ANY COMMAND SIGNAL. SHIELDING IS TO BE GROUNDED AT SOURCE COMMON.

NOTES:

1. An increase in command voltage at terminal (1) of AD-7530 will result in a voltage increase at terminal (22) with respect to (21) causing the actuator output shaft to rotate CW and the feedback pot wiper to move as shown by arrow.
2. To reverse the actuator shaft rotation with respect to input polarity as shown, change wires between amplifier and actuator as follows:
Reverse wires to terminals 1 & 2 (arm)
Reverse wires to terminals 3 & 4 (tach)
Reverse wires to terminals 7 & 9 (pot)
3. For command input range of less than 0 to +10 Vdc change low trim pot to 2.5K.

Figure 5

ACTUATOR - AMPLIFIER ALIGNMENT

TA-1200/AD-7530

NOTE: Before proceeding, read instruction manual for AD-7530 amplifier and follow safety and installation instructions.

1. Interconnect the actuator to the amplifier per the installation wiring on the preceding page.
2. Adjust the command input to zero volts.
3. Adjust the "low trim" pot on AD-7530 to position the output shaft to its maximum CCW end.
4. Adjust the command input to 10V DC, terminal 1 to terminal 6 on AD-7530.
5. The actuator should be run clockwise. Adjust the "hi trim" on the amplifier top board to position the output shaft to its maximum CW position.
6. Adjusting the "hi trim" will interact with the "low trim" therefore steps 2 through 5 will have to be repeated until the desired output shaft positions are achieved.
7. Adjust the input command in small increments through its range and observe the actuator positioning. Adjust the "gain" pot for maximum sensitivity without the actuator oscillating and adjust the "speed clamp" for the desired output shift time.
8. If the actuator is allowed to oscillate it will drive the amplifier into automatic current limiting and the actuator will not perform properly. The output current of the amplifier will drop from its maximum of 5 amps to a factory setting of 1.5 amps output after a period of about 15 seconds of oscillating or running the actuator to a stall condition. If this happens, turning the "gain" pot counter-clockwise will reduce the oscillations.

INSTALLATION OF UPGRADE KIT TO CHANGE FROM MC-10596 TO TA-1200

NOTE: UPGRADE REQUIRES COMPONENT CHANGES TO BOTH THE ACTUATOR AND THE AD-7530 AMPLIFIER.

ACTUATOR CONVERSION

1. Turn off power to actuator and lock out service supply.
2. Loosen three screws and remove actuator cover. Cover will not be re-used.
3. Remove the motor and tachometer wires from terminals 1, 2, 3, and 4. Remove three screws that fasten the upper retaining plate to gear case which holds the motor. Pull motor free of gear case. (See reference wiring on page 6.)
4. Wipe clean the gear case machined surface where the new motor will be placed.
5. Install three motor support studs. Notice that one end of each stud has a shorter thread length. Screw the shorter threaded length into the gear case, using the supplied LocTite® compound. Apply only one drop to each male thread of shorter threaded end of stud and tighten stud into gear case using 10 ft. lb. of torque. Discard remaining LocTite®.
6. Install the transition bushing into the motor hole so that the smaller diameter side fits into the hole in the gear case. This will be a slip-fit.
7. Place the motor, with the pinion installed, into the hole in the transition bushing. This will be a slip-fit.
8. Orient the bridgeplate as shown in Figure 4 on page 5, locating the three smaller holes in the position shown. Then fit the bridgeplate over the threaded ends of the three studs.
9. Turn the motor so that the wire terminals point toward the terminal strip. Then turn the motor slightly to align the three smaller holes in the bridgeplate with threaded holes in the motor. Install three screws into these holes and tighten. Do not use LocTite®.
10. Using three locking nuts supplied, fasten bridgeplate to studs with 20 ft. lb. of torque. Do not use LocTite®.

11. Wire motor, tach and VR1/VR2 to terminal strip using wire supplied in accordance with the wiring diagram shown.
12. Install new cover, tightening three screws. Insure nameplate is affixed to cover.

AD-7530 AMPLIFIER CONVERSION

1. Turn-off power to amplifier and lock-out service supply. Measure input voltage on amplifier terminals 17 & 18. Voltage should read zero when power is disconnected.
2. Carefully replace the following components located on the top of the amplifier and mounted on solder terminals.

5R with a 47K resistor (color code YELLOW, VIOLET, ORANGE, GOLD or BROWN)

12R with a 100K resistor (color code BROWN, BLACK, YELLOW, GOLD or BROWN)

13R with a 100 K resistor (color code BROWN, BLACK, YELLOW, GOLD or BROWN)
3. Install two six-position terminal strips provided in place of the five-position strip. Wire per the TA-1200 wiring diagram in Figure 5 on page 6
4. Install the identification tag provided, indicating the amplifier is compensated for TA-1200 actuators.

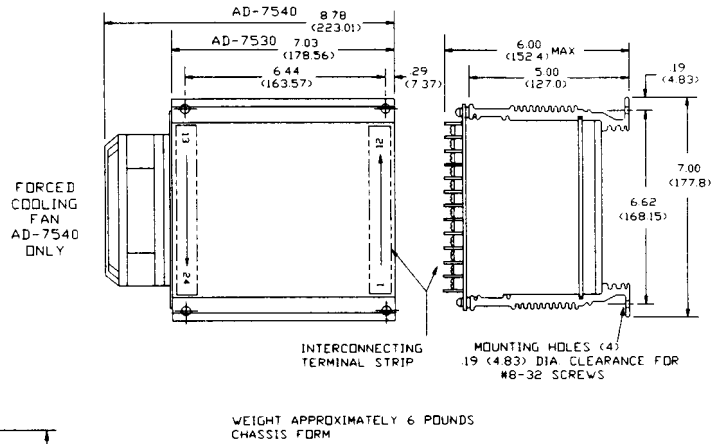
RECALIBRATION

Recalibration of the actuator and amplifier is required prior to use. Refer to the appropriate sections of the respective instruction manuals for directions on recalibration of each product.

INSTALLATION DIMENSIONS

AD-7500 AMPLIFIER

Figure 6



TRANSFORMER

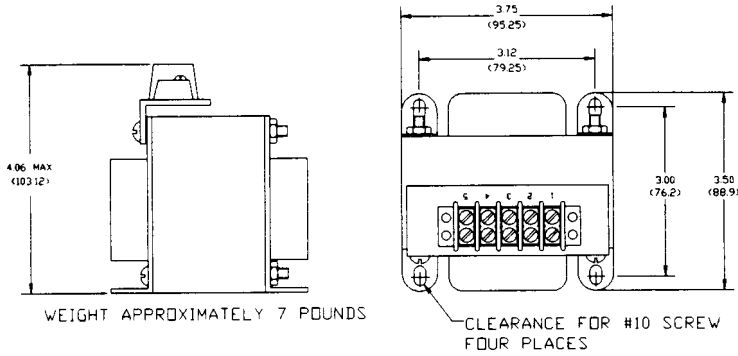


Figure 7

DIMENSIONS: $\frac{\text{INCHES}}{\text{(MILLIMETERS)}}$

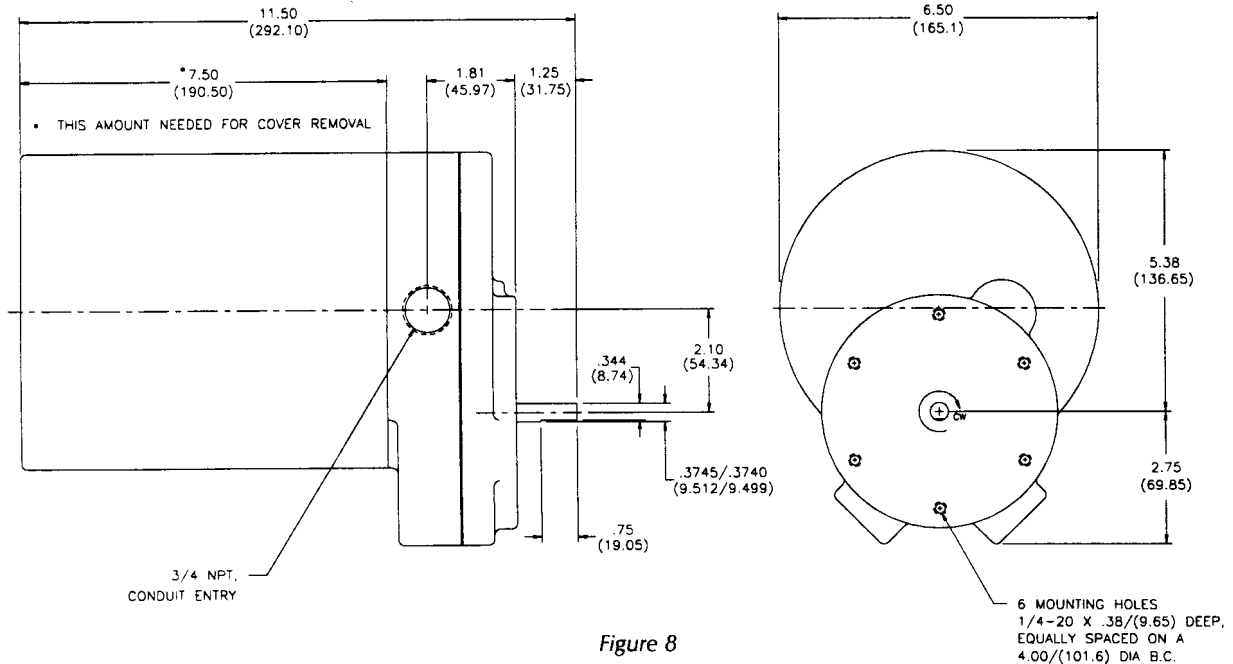


Figure 8

Jordan Controls, Inc.

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IM-0600 2/95

Jordan Controls reserves the right to institute changes in design, materials, or specifications without notice in keeping with our policy of continued product improvement.

