Hays Cleveland
Div. of UniControl Inc.

Models F-00874-K0 & F-00875-K0

Electric Rotary Actuators

Instruction Manual EF-00874/875-K0-1/95

SAFETY WARNINGS

(Safety symbols and terminology per ANSI Z21.)

Failure to comply in full with the following safety requirements can result in equipment damage and personal injury/death.

1. Read the entire manual to become familiar with the use and operation of this device.
2. Only qualified personnel should attempt to install, wire, commission, startup, service or operate this device.
3. This device is not suitable for use in an explosive ambient atmosphere.
4. Before working on this device, be sure that you understand the processes affected by this device completely.
5. Before working on this device, be sure that any process affected by this device is secure and safe for servicing.
6. Take appropriate precautions to avoid electric shock when working with this device near water.
7. Exercise caution while wiring or working on this device. Multiple voltage sources may be present: take appropriate precautions to avoid electric shock.

TABLE OF CONTENTS

PAGE

PRODUCT MODEL NUMBER SELECTION ii

SECTION 1: INTRODUCTION 1
1.1 Major Components 1
1.2 Specifications 2

SECTION 2: INSTALLATION AND START-UP INSTRUCTIONS 3
2.1 Initial Inspection 3
2.2 Mounting and Location 3
2.3 Overview of Operation 3
2.4 Power Connections/Wiring 4
2.5 Linkage Arrangements 4
2.6 End-of-Travel Limit Switches 5
2.7 Direction of Rotation 6
2.8 Position Potentiometer(s) 6
2.9 Dual Solid State Relays (DSSR) 7
2.10 Actuator Controller Driver (ACD) 8
2.11 Feedback Stabilizer Piston(s) 8

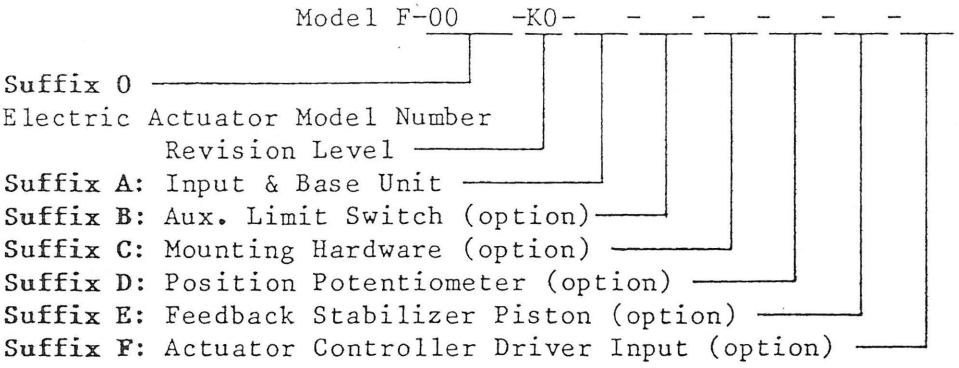
SECTION 3: MAINTENANCE 9

SECTION 4: SPARE PARTS LISTINGS 10

SECTION 5: CUSTOMER SERVICES 11
5.1 Start Up & Maintenance (Field) Service 11
5.2 Parts Ordering Procedure 11
5.3 Repair Service 11

TABLES, DRAWINGS & FIGURES
Table 1: Recommended Spare Parts List 10
Table 2: Numeric Spare Parts List 12
4000-206: Mounting Dimensions 14
D-24209: Linkage Arrangements, Characterizing for Actuators 15
4002-402: Wiring Diagram for Electric Actuator with Dual Solid State Relays, Product Code -A01 16
4002-401: Wiring Diagram for Electric Actuator with Direct 115 VAC Input, Product Code -A02 17
4002-403: Wiring Diagram for Electric Actuator with Actuator Controller Driver, Code -A02-C01-D03-F01 18
: (blank page) 19
Figure 1: Position Potentiometer Mounting 20
Figure 2: Position Potentiometer Assemblies 21
Figure 3: Split Housing Mechanical View 22
Figure 4: Feedback Stabilizer Piston, Assy. & Mtg. Details 23
4002-140: Schematic Diagram, DSSR 24
4002-378: Schematic Diagram, ACD 25

MODEL NUMBER CODES for
Hays Republic Electric Actuators
Models F-00874-K0 and F-00875-K0



Suffix 0: Electric Actuator Model Number.
874: 50 Ft-Lb Actuator 875: 100 Ft-Lb Actuator

Suffix A: Input Selection with Base Unit
(All selections contain End-Of-Travel Limit Switches, and come with a Shaft Output Lever & Linkage Rod Ends.)
-A01: Dual Solid State Relays -A02: without DSSRs

Suffix B: Auxiliary Limit Switch Options: contact pair
-B01: Normally Open -B02: Normally Closed

Suffix C: Mounting Hardware for -D0 and -E0 Options
-C01: Hardware for Position Potentiometer(s) Only.
-C02: Hardware for Single Feedback Stabilizer Piston
-C03: Hardware for Double Feedback Stabilizer Pistons

Suffix D: Position Potentiometer(s) Options

-D01: One 135 ohm	-D09: Three 500 ohm
-D02: One 500 ohm	-D12: One 500 & One 1000 ohm
-D03: One 1000 ohm	-D13: Two 135 & One 1000 ohm
-D05: Two 500 ohm	-D14: Two 500 & One 1000 ohm
-D06: One 135 & One 1000 ohm	-D10: Four 500 ohm
-D07: Two 1000 ohm	-D15: Three 500 & one 1000 ohm

Suffix E: Feedback Stabilizer Piston(s) Options
-E01: Single Piston -E02: Double Piston

Suffix F - Actuator Controller Driver Input Option
(used with -A02-C01-D03, minimally)
-F01: 1 to 5 VDC Input

Example Model Number: F-00874-K0-A02-B01-C01-C02-D03-E01

SECTION 1: INTRODUCTION

1.1 MAJOR COMPONENTS

Hays Republic Electric Actuators (Drive Units) are widely employed to position final elements such as dampers, fuel and feedwater valves, variable speed drives, stoker levers and other similar devices. The Model F-00874-K0 and Model F-00875-K0 provide 50 ft-lb and 100 ft-lb of output torque, respectively. The electric actuators are compact and can be easily installed close to the final elements. A wide variety of linkages can be used to meet site-specific needs.

Each electric actuator can be configured with options to meet any control application with analog and microprocessor based control systems. The major standard and optional features of the electric actuators include (refer to Model Number Codes for HR Electric Actuators, page ii):

- Model F-00874-K0:
  50 ft-lb torque actuator.

- Model F-00875-K0:
  100 ft-lb torque actuator.

Code-A01:
Actuator supplied with Dual Solid State Relay circuitry for use with bi-directional output control devices having low current capability (such as mercury switches). Includes end-of-travel limit switches, and comes with a 10 inch output lever and rod-ends for 1/2" NPT linkage.

Code-A02:
Actuator supplied for use with bi-directional output control devices with outputs rated for 115 VAC, 0.42 Amps for F-00874 -K0, or 0.83 Amps for F-00875 -K0 (such as HR Controllers C-10004-D41, C-84601-C0 and C-84106/07-C0). Includes end-of-travel limit switches, and comes with a 10 inch output lever and rod-ends for 1/2" NPT linkage.

Code-B01:
Auxiliary Limit Switch, Normally Open (Option). A pair of switches for use with other equipment, such as flame safety systems, for proof-of-travel.

Code-B02:
Auxiliary Limit Switch, Normally Closed (Option). A pair of switches for use with other equipment, such as flame safety systems, for proof-of-travel.

Code-C01:
Mounting Hardware for Position Potentiometers. Includes the (output shaft mounted) pot lever arm, adaptor mounting bracket, linkage, bolts and nuts.

Code-C02:
Mounting Hardware for Single Feedback Stabilizer Piston. Includes piston mounting ring, spacers, bolts and nuts. Should also be ordered when re-using an existing Piston for installation on a new Actuator.

Code-C03:
Mounting Hardware for Double Feedback Stabilizer Piston. Description per -C02 (above).

Code-D :
Position Pot (options). A wide selection of potentiometers are available (up to four pots) for use in feedback and feedforward control applications and to provide position indication with a controller or manual/auto station.

Code-E0 :
Feedback Stabilizer Piston(s) Option. One or two pistons can be integrally mounted to produce feedback and feedforward signals for now-obsolete versions of Hays 840 series draft and pressure controls. Not required with with with current versions of 840 controls, such as HR Models C-84106/07-C0.

Code-F01:
Actuator Controller Driver (ACD option). The ACD is a positioning controller that accepts a 1-5 VDC demand input from controllers that do not have motor switching/positioning capabilities. A 250 ohm shunt can be supplied for 4-20 mADC input levels. It is supplied in a seperate enclosure for surface mounting either in a control panel or near the actuator. The ACD is non-indicating and does not include manual controls. It incorporates independent solid state relays, and requires a dedicated 1000 ohm position pot on the actuator (suffix codes -A02-C01-D03). The ACD is similar to the HR Model C-84601-C0 Positioning Controller, and is supplied with a EC-84601-C0 Instruction Manual for control explanations.

1.2 SPECIFICATIONS

Output
- Speed, at output shaft
  - at 60 Hz ..... 0.5 RPM
  - at 50 Hz ..... 0.4 RPM
- Torque, F-00874-K0 .. 50 Ft-Lb
  F-00875-K0 .. 100 Ft-Lb
- Angular Travel (adj.) 90 - 130°

Power Supply ... 115 +10/-5 VAC, 50/60 Hz, Single Phase
- Max Power, F-00874-K0 .. 50 VA
  F-00875-K0 .. 100 VA

Overload Protection .. Impedance Protected

1.2 SPEC'S (continued)

Limit Switches ..... CW & CCW, normally closed. Adjustable at both ends of rotation for adjusting travel of actuator within range of 90 to 130°.

Auxiliary Switches .. Available for both ends, normally open or normally closed (optional).
- Rating ..... 10 Amps @ 115 VAC, non-inductive; 1/8 HP, 115 VAC (inductive).

Potentiometer(s) ....One to Four may be added (optional)
- Resistance ..... 135, 500, 1000 ohm values
- Power Rating ..... 4 W @70°C

Ambient Temperature .. 0 - 140°F (-18 to 60°C)

Dimensions (Overall Maximums with Potentiometers)
- Height ..... 10.1" (26cm)
- Width ..... 15.6" (40cm)
- Length ..... 18.0" (46cm)

Weights ..... 61# (28 kg) net, 70# (32 kg) shipping

Lever and Rod End .. 10" output arm on 3/4" OD shaft, with rod ends for 1/2" NPT pipe (linkage).

Piston ..... Feedback Stabilizer Piston for use with obsolete Hays equipment. One or two pistons (optional).

Actuator Controller Driver (ACD) (optional)
- Control Signal Input . 1-5 VDC (4-20 mADC, w/ 250 ohm shunt)
- Power ..... 115 VAC, 50/60Hz, Single Phase, 100VA
- Indicators
  - Dead Band ..... Red LED
  - Decrease ..... Green LED
  - Increase ..... Yellow LED
- Adjustments
  - Deadband ..... 0 to +/-3%
  - Proportional Band .. +/-2% to +/-20% (80 to 120%)
  - Period ..... 0.1 to 4 Seconds
  - Minimum Step ..... 0 to 100% of Period

SECTION 2: INSTALLATION AND START-UP INSTRUCTIONS

2.1 INITIAL INSPECTION

The electric actuator is carefully packed to reduce the possibility of damage during shipment. If any visible damage to the container is observed, contact the shipper immediately. After unpacking the equipment, check the packing list to make sure that all items listed have been received. Report any missing items to HR immediately.

If there is damage due to improper handling by the carrier, notify the transportation firm. Any damage claims concerning items shipped FOB HR Factory, should be negotiated with the carrier responsible. In such cases, it is advisable to retain the shipping carton and packing for the Claim Adjuster's inspection.

2.2 MOUNTING AND LOCATION

Refer to Drawing 4000-206. The actuator should be mounted in a horizontal position with its base down. It should be located in an area where routine maintenance can be performed and where the ambient temperature is within 0 to 140°F (-18 to 60°C).

The foundation or mounting framework must be sufficiently rigid to withstand the torque developed by the electric actuator. The electric actuator is secured to its mounting with three 5/16" bolts. The overall dimensions for the electric actuator with options is approximately 10"H x 15"W x 18"L. In order to provide access for maintenance, a free clearance of 6" (minimum) is recommended for the removal of the actuator top cover.

The actuator is built around a gearbox, with the drive motor mounted to one side. The motor drives the gearbox with a toothed drive belt. All are covered. A handwheel protrudes through the top of the cover (from the gearbox). One end of the gearbox output shaft terminates into the (split) wiring box. The wiring box contains end-of-travel limit switches, auxiliary proof-of-travel limit switches, motor running capacitor/resistor network, and the input wiring terminals (or optional DSSR circuitry). Auxiliary pots and feedback pistons are mounted to the gearbox, and attached with linkage to the (other) end of the output shaft. This end of the shaft is also equipped with the output lever.

DO NOT OPERATE THE ACTUATOR UNLESS IT HAS GREASE IN IT, AND AND IT HAS BEEN VENTED.
Remove the (dust) plug from the cover (next to the handwheel). Remove & discard the (shipping) pipe plug that is in the breather/vent hole of the gearbox. Check to see that the gearbox has grease in it (contact the HR factory or see Section 3, Maintenance, if it does not). Install the breather (vent). Replace the dust plug.

2.3 OVERVIEW OF OPERATION

Each electric actuator provides a rotary, bi-directional movement to open or close a damper, valve, stoker lever or other similar final element. The actuator is electrically connected to a controller and mechanically connected to the final element. The typical signal from the controller will provide 115 VAC power to the actuator causing it to move to the final control position.

The direction of rotation is determined by switching of the controller's relay output.

Selection of the optional (ACD) Actuator Controller Driver will permit operation of the electric actuator when the controller has an output of 4-20mADC or 1-5VDC. Refinements to the control action can also be achieved using the proportional, dead band, minimum step and period adjustments available with ACD.

The electric actuator is connected to the final element by configuring the linkage to meet site-specific requirements. A wide variety of linkage arrangements can be used with the electric actuator. The output lever of the electric actuator is connected to the shaft, and the correct length of 1/2" NPT pipe (user supplied) is threaded between the rod-end mounted on the lever and the rod-end mounted on the lever of the final element. The configuration of the linkage will provide 0 to 90° nominal travel, adjustable up to 130°.

The motor is impedance protected so that the stall loading does not exceed the maximum current rating. Manual control is accomplished with the hand wheel which operates through the gear reducer for ease of positioning. In the event of power failure, the actuator will maintain its last position until either re-powered, or manual changes are made using the handwheel.

2.4 POWER CONNECTIONS/WIRING

The wiring procedure is dependant on one of three methods chosen for control input to the electric actuator.

- The standard input (control and power) to the electric actuator is switched 115 VAC, 50/60 Hz, single phase. Product Code -A02. Refer to Drawing 4002-401 for use when actuator is supplied without DSSR or ACD options.
- When dual solid state relays (DSSR) are used for low current input to the electric actuator from devices such as mercury switches. Product Code -A01. Drawing 4002-402.
- The ACD option allows 4-20mADC or 1-5 VDC control inputs. Product code -F01. Drawings 4002-403 and 4002-401.

Note: A separate 115 VAC supply connection must be provided to the electric actuator whenever the optional DSSR or ACD inputs are selected, refer to appropriate drawings for wiring instructions.

2.5 LINKAGE ARRANGEMENTS

The electric actuator is connected with linkages to the final control element (damper, valve, variable speed drive, etc). Each electric actuator is supplied with a ten (10) inch output lever and two rod-ends. The linkage is supplied by the user. The lever is attached to the shaft of the electric actuator. One of the rod-ends is attached to one of the six locations in the lever arm and the second rod-end is attached similarly to the input arm of the final element. The rod-ends are inter-connected with a piece of 1/2" NPT pipe supplied to meet the distance between the electric actuator and final element. Proper selection of the configuration of the linkage is crucial to the functionality of the final element.

2.5 LINKAGE (continued)

The linkage arrangement should be selected to develop the torque and characterization required to correctly and properly position the final element. The output arm should be firmly attached to the actuator shaft. Upon completion, arms should be drilled and pinned (through the hub and into the shaft), unless arm and shaft are keyway coupled. A high degree of repeatability is required and any looseness or distortion with the linkage must be eliminated to achieve long term reliable operation.

Configurations for arranging the linkage between the lever of the actuator and final element are given in Drawing D-24209. The relationship between air, gas and liquid flow rates and valve or damper positions are shown, as is the relationship with a final element using a variable speed drive.

The flow rate of air, liquid or gas is typically non-linear as the damper or valve opens and closes. As a valve or damper opens from a fully closed position, the flow rate can increase rapidly until the valve or damper reaches approximately 30 to 40% open. In the range of 80 to 100% open position, the flow rate changes can be minor. If this is the case for your damper or valve (consult damper or valve manufacturer's flow curves), it is desirable to set up the linkage so that the control range falls between 30% to 80% open position. Otherwise the high flow rate changes for small changes in valve or damper position will introduce instability below the 30% open position. At 70% or greater open position, the final element position must increase or decrease significantly before the flow rate changes, thus introducing time delays in response to the controlled variable.

So that the controller functions with maximum accuracy and stability throughout the entire range of operation, the linkage for the actuator should be set in accordance with one of the arrangements shown in Drawing D-24209. The actuator travel should be adjusted for 90 to 130 degrees of rotation. The amount of damper or valve opening required can be matched to the movement of the actuator shaft by attaching the rod-end to the proper hole in the lever.

2.6 END-OF-TRAVEL LIMIT SWITCHES

Caution: Limit switches must be set before applying power to the actuator.

The actuators are equipped with a pair of limit switches, operated by pawls located in the (split) wiring box on housing on the side of the actuator. The pawls can be rotated to any position (within 360°) to open the limit switches at each end-of-travel. They are used to properly define the output arm starting and stopping points. These switches are normally closed and are in series with the motor windings.

An additional set of auxiliary limit switches (Option -B01 or -B02) can be installed for interface to other devices.

2.6 Limit Switches (cont.)

Refer to Figure 3.

Field adjustment of the limit switches is per the following:

2.6.1 Remove power from the actuator, and remove the wiring box cover. **Do not adjust the limit switches with power applied.**

2.6.2 Loosen the (optional) pot operating lever while making the limit switch adjustments. This will prevent damaging the pots (caused by over-driving).

2.6.3 Loosen the two set screws on each of the two inside (backmost) limit switch operating pawls. The back-left switch & back pawl limit CW rotation, and the back-right switch & second pawl limit CCW rotation.

Note: Direction of rotation is as viewed from the limit switch side of actuator.

2.6.4 Operate the actuator manually with the handwheel to move the output lever to the required angle for minimum (full decrease) position. Position the appropriate pawl so that it operates its limit switch. Retighten the set screws for that pawl.

2.6.5 In the same manner, move the actuator lever to the maximum (full increase) position. Using the above procedure, set the second limit switch.

2.6.6 Apply the power to the actuator and readjust the switches as necessary.

When a set of auxiliary switches are supplied, they are adjusted in the same manner as the end-of-travel limit switches.

2.7 DIRECTION OF ROTATION

After setting the limit switches, check to make sure that the actuator drives in the correct directions. With the controller in manual, drive the actuator open (increase). If the actuator does not respond in the increase direction, interchange the CW and CCW control wires at the actuator terminal block. Refer to the pertinent wiring diagram.

2.8 POSITION POTENTIOMETER(S)

When position potentiometer(s) are present, mounting is on one end of the actuator, with a linkage connection to the actuator output shaft (refer to Drawing 4000-206 & Figure 2).

For electrical wiring instructions (to the pots), refer to instructions supplied by the controller manufacturer. Up to four pots with a variety of resistances can be incorporated.

After the actuator has been fully stroked (output rotation has been determined and finalized), the movement of the potentiometer must be matched with that of the actuator shaft movement. Use the following procedure:

2.8.1 Temporarily remove the pot connecting linkage. With the handwheel, manually rotate the actuator to its 50% position. Eg, if full travel rotation is 120°, rotate the actuator to 60°

2.8.2 Loosen the set screws for both arms (output shaft arm for pots, and input arm for pots). With both arms pointing down, adjust the length of the connecting linkage so that a 90° angle will be formed by each arm to the linkage. Replace linkage after tightening jam nuts, and tighten set screws on shaft arms. This will assure linearity of pot motion to actuator output.

2.8.3 Loosen the set screws on the hub for each sector gear the drives the pot(s). Rotate the gear to its 50% point (the middle pin on the gear sector aligns to the pinion gear on the pot). Re-tighten the sector gear hub set screws.

2.8.4 Loosen the set screws for the pinion gear on each pot. Rotate the pot(s) to 50% of travel. Eg., if a pot is 1000 ohms, rotate the pot to the 500 ohms postion. Use an ohmmeter connected across the A & C terminals for each pot. Re-tighten the pinion gear set screws.

2.8.5 Position the link in the slotted pot lever to adjust for full pot rotational travel. Slide down in slot to decrease pot rotation (slide up to increase).

Check each potentiometer for its appropriate resistance as the actuator is moved from 0 to 100% position. Repeat the above steps as necessary.

Pots may be retrofitted to existing electric actuators. For example, a second feedback potentiometer could be installed to interface with an oxygen trim controller, refer to Table 2 for spare parts listings.

2.9 DUAL SOLID STATE RELAYS (DSSRs)

When the electric actuator is required to operate with low current handling devices (such as mercury switches), a Dual Solid State Relay Board is installed at the factory. The DSSR is supplied with the -A01 model of the electric actuator. The DSSR board is mounted in the limit switch (split) housing. Refer to Drawing 4002-402 for wiring instructions, and Table 2 for parts lists.

The DSSR input circuitry accepts switched 115 VAC at 1.3 VA. It is optically isolated from the output circuitry and ground. A separate power line feed is required to provide 115 VAC for the two output switching relays (DSSRs).

Note that when the DSSR option is used, the motor may hum. It is caused by a slight amount of power leakage in the DSSRs when the actuator is not driving. This is normal, and will not damage the motor in any way.

Some earlier model HR actuators were equipped with mechanical relays. If a reliable upgrade is desired, DSSR Conversion Kits (P/Ns 3500-099 & 3500-100) are available to replace mechanical relays. Note: These kits are not for use in series F-00874/875-J0 or F-00874/975-K0 Electric Actuators, as they contain parts not used for these series. Consult the HR Parts Department for recommendations.

2.9 DSSRs (continued)

Some early models of Hays 840 series controllers have been re-designed with up-dated technology, and now include integral solid state relays. They do not use actuator mounted relays. Note that it may be more cost effective to install a new positioning controller kit than to replace the relays (and retain an obsolete controller).

2.10 ACTUATOR CONTROLLER DRIVER (ACD)

The electric actuator can be driven using the ACD for applications where the input from a controller is 4-20 mADC or 1-5VDC. It has its own solid state relays, and requires a dedicated 1000 ohm position (feedback) potentiometer. The typical complete model number is F-00874(875)-K0-A02-C01-D03-F01. Extra pots can be added for interfacing with other circuits. Refer to Instruction Manual EC-84601-C0 for a complete control set-up description.

2.11 FEEDBACK STABILIZER PISTON

Typically these piston(s) were used in Hays pressure and draft control applications to provide integral control action with Model C-8410x-B0 and earlier controllers. These feedback stabilizer pistons are not required for use with present HR draft controllers, Models C-84106/07-C0. Single pistons were employed for feedback applications. Double pistons were used for feedforward and feedback applications. Refer to Figure 4 for a schematic of the feedback piston with parts lists. The feedback piston(s) is mounted on the electric actuator at the factory.

Existing pistons may be field mounted on new actuators if the (-C02 or -C03) mounting hardware has been furnished. See Table 2 parts lists for retrofit items.

When the actuator is shipped, it is not known in which quadrant its lever arm is to operate. When this determination is made (look at your old actuator), the piston may have to be relocated on the output shaft. If this is necessary, proceed as follows:

2.11.1 Disconnect copper tubing.
2.11.2 Remove the piston connecting rod from its operating lever.
2.11.3 Remove the bolts from the piston mounting bracket.
2.11.4 Loosen the set screw on the piston operating lever and turn it about 180° on the output shaft.
2.11.5 Remove piston and spacers and install piston on the opposite side of the output shaft using the threaded holes there.
2.11.6 Attach the piston connecting rod to the operating lever.
2.11.7 Operate actuator to minimum position.
2.11.8 Turn the lever on the shaft to cause the piston to be at its minimum.
2.11.9 Tighten the operating lever set screw.
2.11.10 Reconnect the copper tubing and check the operation of the electric actuator from minimum to maximum.

Note: When double pistons are provided, it is only necessary to interchange the tubing leads from the tops of the cylinders to provide proper stabilizing action.

SECTION 3: MAINTENANCE

These electric actuators are designed to provide reliable, trouble-free operation. Several routine maintenance checks will ensure their service.

3.1 Maintain the final element so that it will operate over its entire range without binding or sticking. This will eliminate excessive torque on the actuator and linkage.

3.2 Keep all fittings (levers, rod-ends, etc.) TIGHT to eliminate slippage and binding.

3.3 Lubricate any linkages, pillow blocks, valves or dampers equipped with grease fittings.

3.4 Check the drive belt for wear and tightness (motor to gearbox). Re-adjust the drive pulley if the belt is not riding evenly on the gearbox pulley.

3.5 The gearbox should have grease in it. The normal grease level is about 3/4 full, or enough to completely cover all gears. Note that this level is higher than the side drain plugs on the gearbox (1/2 height level).

MOLYKOTE® #BR-2 Plus, or equivalent, is recommended. It is a high viscosity (NLGI 2, 285 w 60) lithium compound, rated for use from -22 to +266°F. Under normal circumstances, this lubrication should never need changing.

MOLYKOTE is a registered product of DOW Chemical, USA.

If you should (instead) elect to follow the recommendations for lubrication stamped on the gearbox data plate (bottom of gearbox), annual lubrication changes will be necessary.

3.6 If the electric actuator is equipped with a feedback stabilizer piston(s), the leather cup seal must be lubricated as follows: Disconnect the 5/16" tubing and drip Neatsfoot Oil in the opening on top of the piston. Replace the tubing and tighten the connection.

SECTION 4 SPARE PARTS LISTINGS

Table 2 contains a numerical list of spare parts for Model F-00874-K0 and Model F-00875-K0 Electric Actuators and their accessories.

Table 1 identifies recommended spare parts.

TABLE 1
RECOMMENDED SPARE PARTS for MODELS F-00874-K0 and F-00875-K0

Part No.	Description
1050-345	Belt, drive (190XL)
3500-263	Kit: Motor with running capacitor and/or resistor for 50 Ft-Lb, F-00874-K0.
3500-264	Kit: Motor with running capacitor and/or resistor for 100 Ft-Lb, F-00875-K0

Note: The Models F-00874/875-K0 Electric Actuators utilize synchronous AC motors that are manufactured by several motor manufacturors for HR. All are of permanent magnet, brushless design, operating at 72 rpm (at 60 Hz, or 60 rpm at 50 Hz). Depending on the manufacturer, different running capacitors and resistors are required to provide proper output torque. Some motors use only a running capacitor (no resistor). The above motor kits include the appropriate motor and capacitor (plus resistor, if used). Always replace these components as sets.

With the motor leads lifted from their terminals, approximate ohm meter readings are 70 ohms from common to either other lead, or 140 ohms across both windings.

SECTION 5: CUSTOMER SERVICES

5.1 START UP & MAINTENANCE (FIELD) SERVICE

Hays Republic can provide the services of a Service Engineer for the purpose of start up, calibration and repair of the instrument. Contact our Service Department at the address listed below.

SERVICE DEPARTMENT
Hays Republic
3695 Interstate Park Way
Riviera Beach, FL 33404-5998

Telephone: 407-842-1900
Facsimile: 407-842-0742

5.2 PARTS ORDERING PROCEDURE

Replacement parts are available direct from the factory. Refer to the Tables and Figures in this manual for part numbers and descriptions.

When placing a parts order, please provide the quantity, part number and description of each part, together with the complete model number for the instrument(s) they are used on. Shipping and billing information must also be included. Contact Hays Republic's Parts Department at the address listed below.

PARTS DEPARTMENT
Hays Republic
3695 Interstate Park Way
Riviera Beach, FL 33404-5998

Telephone: 407-842-1900
Facsimile: 407-842-0742

5.3 REPAIR SERVICE

Hays Republic maintains complete in-house repair and refurbishment facilities as a supplement to its Field Service. Complete information stating the malfunction, person to contact if there are questions, their phone number, shipping address, billing address and purchase order number MUST accompany any instrument returned to the factory for repair or alignment. Repairs are handled from any of several locations. Since not all locations repair all Hays Republic products, contact our Service Department for shipping instructions.

Shipping addresses include:

REPAIR DEPARTMENT
Hays Republic
225 North Roeske Avenue
Michigan City, IN 46360-5080

Telephone: 219-872-0006

- and -

REPAIR DEPARTMENT
Hays Republic
3695 Interstate Park Way
Riviera Beach, FL 33404-5998

Telephone: 407-842-1900

Phone above phone number for shipping instructions.

CUSTOMER SERVICE INFORMATION

Contacts

Hays Cleveland Sales Office

1903 South Congress Avenue

Boynton Beach FL 33426

Telephone: 561.734.9400

Fax: 561.734.8060

email: **salescombustion@unicontrolinc.com**

Hays Cleveland Customer Service Department

1111 Brookpark Road

Cleveland OH 44109

Telephone: 216.398.4414

Fax: 216.398.8556

email: **customerservice@unicontrolinc.com**

Visit us on the WEB!

http://www.hayscleveland.com

Repairs

Damaged or defective units may be returned to the factory for repair. However, factory authorization must be obtained before shipping whether warranty or non-warranty service is required, and all units must be shipped prepaid.
A letter of transmittal that includes the following information should accompany the returned instrument:

1. Location, type of service, and length of time in service of the unit.

2. Description of the faulty operation of the device and the circumstances of the failure.

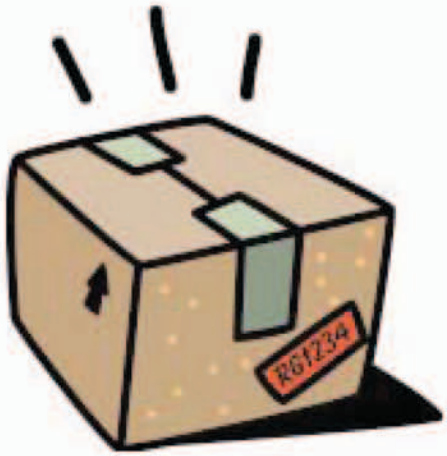
3. Name and telephone number of the person to contact if there are questions about the unit.
4. Indicate whether warranty or non-warranty service is requested.
5. Attach Purchase Order for all out-of-warranty repairs.
6. Complete shipping instructions for the return of the repaired instrument.
7. Original purchase order number and date of purchase.
8. Return Goods Authorization number provided by the factory when you called.

Clearly label the shipping container:

RETURN FOR REPAIR

Model _____

RG # _____



Ship prepaid to:

HAYS CLEVELAND

1111 Brookpark Road

Cleveland OH 44109-5869

216-398-4414

Please follow this procedure. It expedites handling of the returned item, and avoids unnecessary additional charges for inspection and testing to determine the problem before repairing it.

Service

A **Maintenance and Service Contract** can ensure trouble-free, economical operation of **Hays Cleveland** equipment for many years. One-time on-site service by a factory-trained service engineer can also be provided as needed. Contact Hays Cleveland for information on these service options.

TABLE 2 - NUMERIC SPARE PARTS LIST
for MODELS F-00874-K0 and F-00875-K0

PART NO.	DESCRIPTION
Base Unit Components	
2014-328	P.C. Board, Dual Solid State Relay, -A01
1040-038	Key (for Keyway in 2508-218 Output Lever Assy)
1050-343	Pulley, Cogged, Motor
1050-344	Pulley, Cogged, Gearbox
1050-345	Belt (190XL), motor pulley to gearbox pulley
1050-346	Gearbox (complete)
1058-304	Handwheel
2508-212	Clevis Assy for 1/2" NPT linkage, 3/8-16 mounting stud
2508-218	Output Lever Assy, 10" throw (use with 2508-212 Clevis)
3500-263	Kit: Motor with capacitor and/or resistor for F-00874-K0
3500-264	Kit: Motor with capacitor and/or resistor for F-00875-K0
Limit Switch Components	
1046-303	Spacer, 0.375" long (outer, to Auxiliary Pawls)
1046-304	Spacer, 1.250" long (inner, to 1st set of Pawls)
2002-000	Switch Plate Assy with Inner Pairs of NC Contacts, Standard for all Actuators, Motor End-Of-Travel
2002-001	Contact, one, Short Normally Closed (use with 2002-003)
2002-002	Contact, one, Short Normally Open (use with 2500-065)
2002-003	Contact, one, Long Normally Closed (use with 2002-001)
2500-065	Contact, one, Long Normally Open (use with 2002-002)
2508-119	Pawl, Outer (with 3/4" long striker)
2508-120	Pawl, Inner (with 9/16" long striker)
Actuator Controller Driver (ACD) Components	
1080-291	Relay, plug-in solid state for ACD (included with 2014-550)
2000-117	250 ohm Shunt Assy, 4-20 mADC to 1-5 VDC
2014-550	P.C.Board Assy, ACD, for 1-5 VDC control signal input
3030-521	Actuator Controller Driver (ACD), Complete -F01 with housing For 1-5 VDC control input. Order 2000-117 for 4-20 mADC.
Potentiometer Components, -D(all)	
1117-035	Replacement Potentiometer: 500 ohm
1117-050	Replacement Potentiometer: 1000 ohm
1117-051	Replacement Potentiometer: 135 ohm
2012-004	Single Pot Assy: 135 ohm
2012-005	Single Pot Assy: 500 ohm
2012-006	Single Pot Assy: 1000 ohm
2012-008	Dual Pot Assy: Two 500 ohm
2012-009	Dual Pot Assy: One 135 & one 1000 ohm
2012-010	Dual Pot Assy: Two 1000 ohm
2012-012	Triple Pot Assy: Three 500 ohm
2012-013	Four Pot Assy: Four 500 ohm
2012-028	Dual Pot Assy: One 500 & one 1000 ohm
2012-029	Triple Pot Assy: Two 135 & one 1000 ohm
2012-030	Triple Pot Assy: Two 500 & one 1000 ohm
2012-031	Four Pot Assy: Three 500 & one 1000 ohm

Note: Mounting Hardware is required if adding Pot(s) to an Actuator that was not originally supplied with Pots.

TABLE 2 (continued)

PART NO.	DESCRIPTION
Potentiometer Mounting Hardware, -C01 (F-00874/875-K0, only)	
1032-531	Bolt, 1/4-20 x 0.50" long (6 required)
1032-535	Bolt, 1/4-20 x 1.00" long (2 required)
1034-088	Hex Nut, 1/4-20 (2 required)
1036-074	Lockwasher, 1/4" Split (7 required)
1036-076	Lockwasher, 1/4" External Star (1 required)
1052-276	Output Shaft Lever, 2.50", for Pot Operator
1055-171	Mounting Tee-Bracket for Pot Operator
1060-132	Spacer for Uni-Ball, 1/8" long (2 required)
2508-349	Linkage Assembly, 8" long (adjustable 7.5" to 8.5")
Feedback Piston Components, -E01 & -E02	
1016-087	Copper Tubing 5/16"OD (specify length in feet)
1036-044	Washer Plate
1036-045	Cup Spring
1040-010	Pin, 0.125" OD x 1.938 long
1044-060	Cup Spreader
1048-130	Leather Cup (Piston Seal)
1052-258	Lever for Double Stabilizer Piston, -E02
1052-259	Lever for Single Stabilizer Piston, -E01
1062-144	Piston End
2508-066	Connecting Link Assy, Piston to Output Shaft Lever
2520-017	Single Feedback Stabilizer Piston Sub-Assembly
2520-019	Double Feedback Stabilizer Piston Sub-Assembly
NOTE: Mtg. Ring 2510-323 is req'd. for mtg. existing Piston Assys. on F-00874/875-K0. (4) 5/16-18 x 0.75" long mtg.bolts come with gearbox.	
Single Piston Mounting Hardware, -C02 (F-00874/875-K0, only)	
1032-535	Bolt, 1/4-20 x 1.00" long (1 required)
1032-570	Bolt, 5/16-18 x 1.25" long (2 required)
1034-088	Hex Nut, 1/4-20 (1 required)
1036-077	Lockwasher, 1/4" Internal Star (1 required)
1036-081	Lockwasher, 5/16" Split (2 required, +4 for Mounting Ring)
1060-129	Spacer for 5/16 Bolt, 5/8" long (2 required)
1060-132	Spacer for Uni-Ball, 1/8" long (1 required)
1138-293	Male Tube Union, 5/16" flare x 1/4" NPT
1138-294	Flanged Tube Union, 5/16" flare
2510-323	Mounting Ring, adaptor for -K0 actuators
Dual Piston Mounting Hardware, -C03 (F-00874/875-K0, only)	
1032-535	Bolt, 1/4-20 x 1.00" long (2 required)
1032-561	Bolt, 5/16-18 x 0.88" long (2 required)
1034-088	Hex Nut, 1/4-20 (2 required)
1036-077	Lockwasher, 1/4" Internal Star (2 required)
1036-081	Lockwasher, 5/16 Split (2 required, +4 for Mounting Ring)
1060-131	Spacer for 5/16 Bolt, 1/4" long (2 required)
1060-132	Spacer for Uni-Ball, 1/8" long (2 required)
1138-293	Male Tube Union, 5/16" flare x 1/4" NPT
1138-294	Flanged Tube Union, 5/16" flare
2510-323	Mounting Ring, adaptor for -K0 actuators

Standard Terms and Conditions of Sale

TERMS OF SALE: 1% discount if paid in ten (10) days, net amount due and payable in thirty (30) days.

AGREEMENT OF SALE: Acceptance by Seller of any order placed for goods whether submitted on Buyer's purchase order form or on seller's Sales Order Acknowledgment form, shall be subject to Seller's Standard Terms and Conditions of Sale and is conditioned upon the Buyer's acceptance of these Standard Terms and Conditions.

TERMS OF CONTRACT: Any terms or conditions of the buyer's order which are inconsistent with these terms and conditions shall not be binding on the Seller and shall not be considered applicable to the sale or shipment of goods or materials. Unless buyer shall notify Seller in writing to the contrary within ten (10) days after the mailing of the Sales Contract by Seller, acceptance of the terms and conditions hereof by Buyer shall be indicated and, in the absence of such notification, the sale and shipment by Seller of the goods and materials covered hereby shall be conclusively deemed to be subject to the terms and conditions hereof.

PRICES: All prices and specifications and applicable discounts are subject to change without notice. Sales contracts which call for delivery in the future will be billed at prices in effect at the time of shipment. Shipping weights shown are approximate and subject to change without notice.

SHIPMENT AND PAYMENTS: All prices contained on the Sales Contract are F.O.B. factory in Cleveland, Ohio. No freight is allowed on any shipments. Shipments and deliveries shall at all times be subject to the approval of Seller's Credit Department, and at any time seller may require payment in advance or satisfactory security or guarantee that invoices will be promptly paid when due. If buyer fails to comply with any terms of payment, seller, in addition to its other rights and remedies, but not in limitation thereof, reserves the right to withhold further deliveries or terminate the Agreement, and any unpaid amount thereon shall become due immediately. Terms of payment shall be as set forth on the Sales Contract.

DELAYS AND DEFAULTS: Delays or defaults in delivery by Seller of the goods and materials covered by the Sales Contract shall be excused so far as the same is caused by fire, strikes, accident, governmental regulation, or any delays unavoidable or beyond reasonable control of Seller. In no event shall Seller be liable for any consequential, special, or contingent damages on account of any default or delay in delivery.

NONCANCELLATION: Orders are not subject to suspension, reduction, or cancellation, except on terms that will indemnify Seller against loss.

SPECIFICATIONS: Seller relies on specifications and other data furnished by the Buyer, an architect, contractor, or consulting engineer in all phases of the work covered by the Sales Contract. Seller shall be responsible to check quantities only. Alterations to or changes in specifications, approval of samples, changes in delivery instructions and all other instructions must be submitted in writing to Seller.

In the event Seller performs design or engineering work at the request of Buyer, an architect, contractor, consulting engineer, or representative in any phase of the work covered by the Sales Contract, Seller shall not be responsible for any damages claimed by Buyer as a result of alleged errors or defects in such design or engineering work.

WARRANTY AND LIMITATION OF LIABILITY: Seller warrants that the goods supplied by it have been manufactured in accordance with its standard manufacturing practices and conform to the contract or catalog description set forth in the order. Seller further warrants that the goods supplied by it are fit for the ordinary purpose or purposes specified in its catalog for which such goods are used when installed in accordance with Seller's recommended installation procedures. Except as stated herein, Seller makes no express warranty with respect to goods supplied by it and Seller makes no warranty that the goods are fit for any particular purpose.

When the use of materials not manufactured by Seller is suggested by Seller's recommended installation procedures or otherwise, Seller makes no express warranty with respect to such materials nor that such materials are merchantable or fit for any particular purpose.

Seller will, at its sole option, credit, repair or replace, any goods supplied by it which its examination shall disclose to its satisfaction are defective in workmanship or material and are returned to it within one year from the date of shipment and any claim not made within this period shall conclusively be deemed waived by Buyer. Credit, repair or replacement will be preconditioned upon examination of the goods by Seller, and, if requested by Seller, return of the goods to Seller at its direction and expense. No goods are to be returned to Seller without its written consent. Seller shall not be liable for any expense incurred by Buyer in order to remedy any defect in its goods. Seller shall not be liable for any consequential, special, or contingent damage or expense, arising directly or indirectly from any defect in its goods or from the use of any defective goods. The remedies set forth herein shall constitute the exclusive remedies available to Buyer and are in lieu of all other remedies.

CLAIMS: Claims for shortage of goods or for mistakes or errors in billing must be presented within forty-five (45) days from the date of shipment of goods and must state the packing slip number and container number applicable to the claim. Any claim not so presented will be conclusively deemed waived.

TAXES: Any federal taxes or other government charges on the sale, shipment, or installation of the goods or equipment covered by the Sales Contract shall be added to the price and paid by Buyer, or, in lieu thereof, the Buyer shall furnish the Seller with tax-exemption certificates acceptable to the taxing authority. The procedure also applies to duty and other similar charges on export sales. Seller is not responsible for sales and/or use tax in any state other than Ohio. The purchase made under this Sales Contract must be exempt or paid directly by Buyer. If Seller is required to pay any such tax, there shall be added to the prices quoted herein all such state and local taxes. Buyer agrees to reimburse and save Seller harmless from all such state and local taxes, including interest and penalties thereon, which may at any time be payable to any state or local government unit with respect to the sale of any goods or materials covered by the Sales Contract.

CORRECTIONS: Typographical or clerical errors contained in the Sales Contract, including prices, are subject to correction by the Seller.

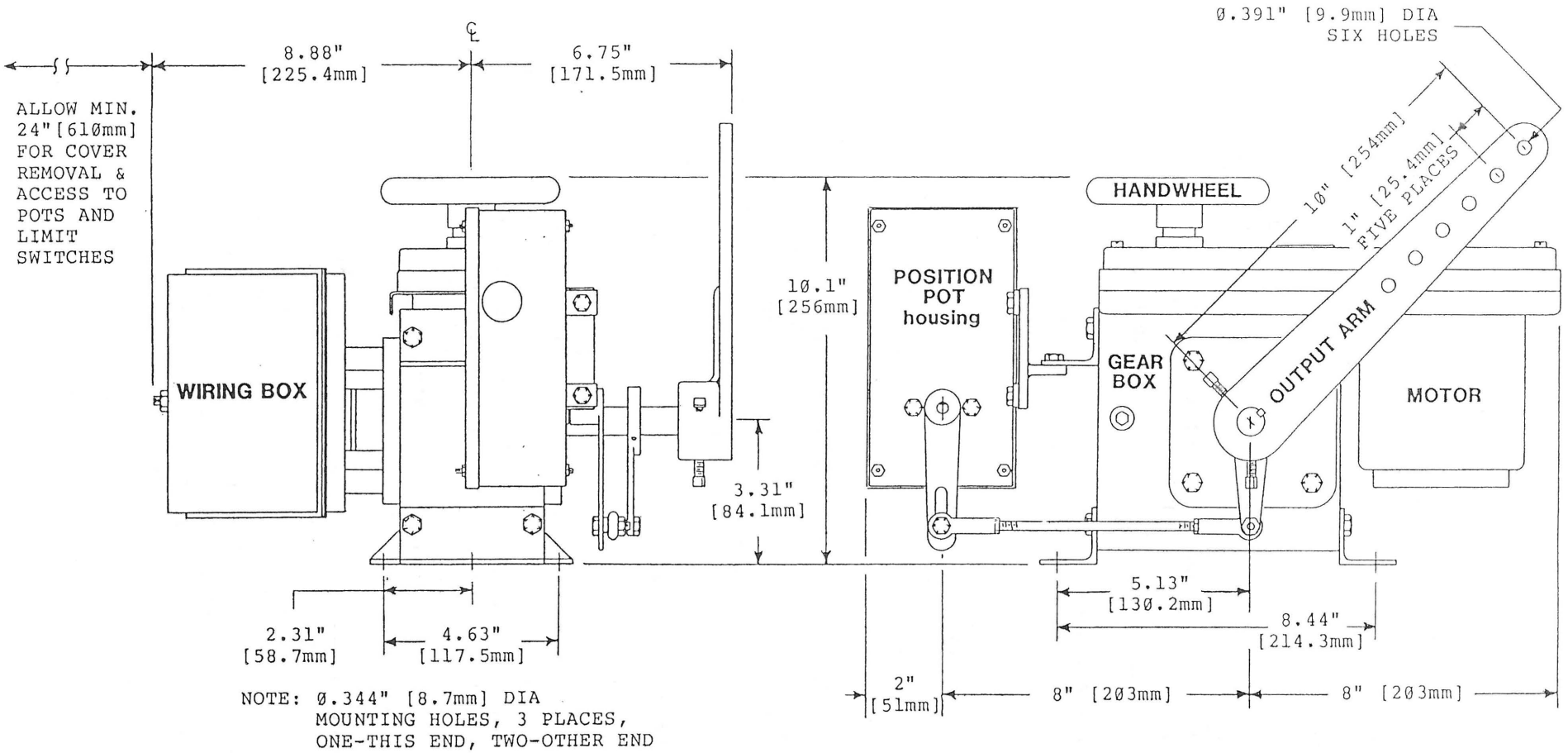
FAIR LABOR STANDARDS: All goods covered by the Sales Contract have been produced in conformity with all applicable provisions of the Fair Labor Standards Act of 1938 as amended.

RENEGOTIATION: Unless advised by Buyer in writing, Seller assumes that Buyer's order and the Sales Contract are not renegotiable under the Renegotiation Act of 1951.

APPLICABLE LAW: All questions arising out of the Sales Contract, which shall be deemed an Ohio contract, shall be governed by the laws of the state of Ohio.

EXCLUSIVE TERMS: The Sales Contract shall constitute the complete contract between the parties, and no one has authority to depart from the terms and conditions set forth therein, nor to make any representations or arrangements other than those printed thereon whether in the execution or in the performance of the Sales Contract, unless the same are written on the face of the Sales Contract or are given in writing with it or in pursuance of it, and are fully approved in writing by an officer or authorized employee of the Seller.

LIMITATION FOR SUITS: Any controversy or claim arising out of or relating to this Sales Contract or the breach thereof, must be commenced within one (1) year after the cause of action accrued.

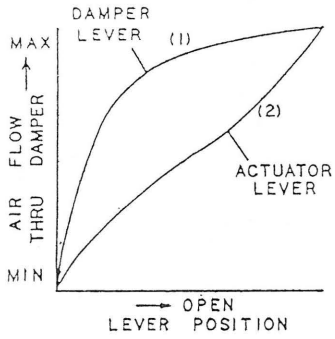


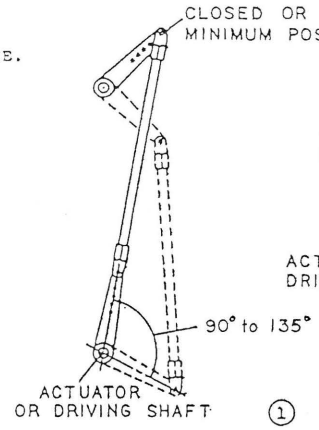
NOTE: Ø.344" [8.7mm] DIA
MOUNTING HOLES, 3 PLACES,
ONE-THIS END, TWO-OTHER END

Hays Republic Division of UniControl Inc. RIVIERA BEACH, FLORIDA 33404 MICHIGAN CITY, INDIANA 46360		
MOUNTING DIMENSIONS Models F-00874/875-K0		
SCALE none SHEET 1 OF 1	DWG. NO. 4000-206B	REV.

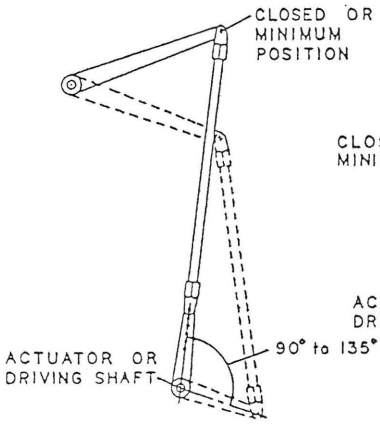
Hays Republic Division of UniControl Inc. RIVIERA BEACH, FLORIDA 33404 MICHIGAN CITY, INDIANA 46360	LINKAGE ARRANGEMENTS CHARACTERIZING FOR ACTUATORS	REV. b
SCALE none SHEET 1 OF 1	DWG. NO. D-24209	

(A) CURVES SHOWING RELATIONSHIP BETWEEN AIR FLOW THROUGH A VALVE OR DAMPER AND (1) THE DAMPER LEVER POSITION OR (2) THE ACTUATOR LEVER POSITION WHEN CONNECTED BY RECOMMENDED LINKAGE.

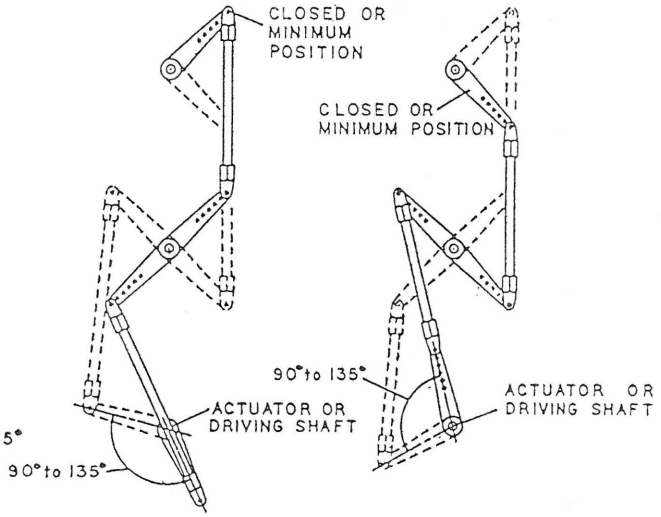




(1) ARRANGEMENTS USED FOR DAMPERS

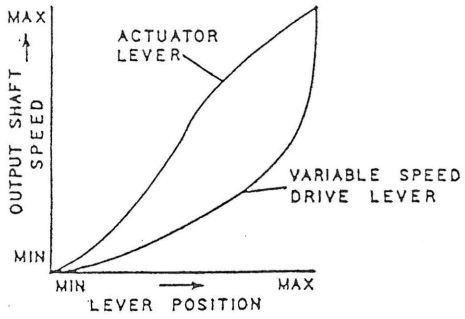


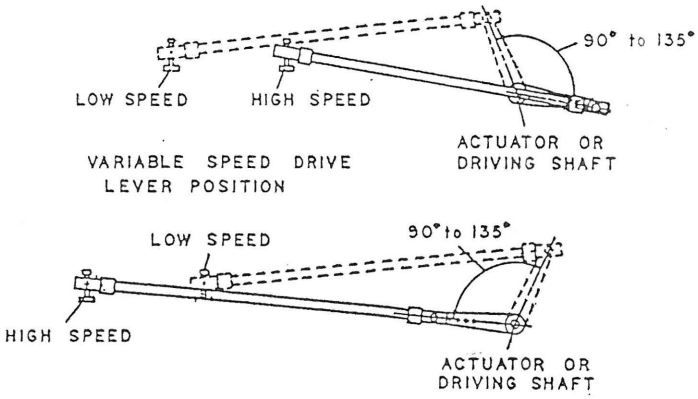
(2) ARRANGEMENTS USED FOR LEVER OPERATED VALVES



(3) ARRANGEMENTS USED WHEN DAMPER IS 15 FEET OR MORE ABOVE ACTUATOR. SELF COUNTERBALANCING LINKAGE.

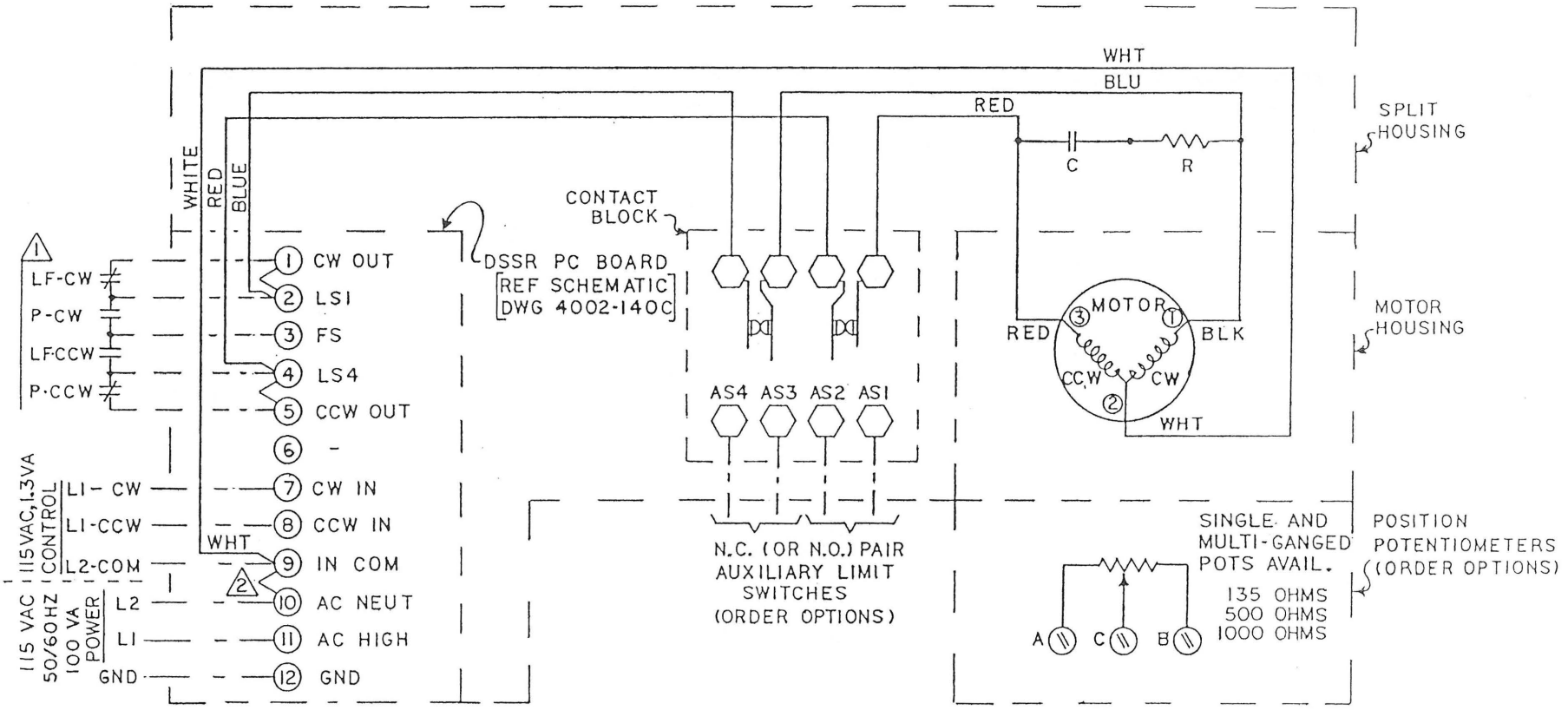
(B) CURVES SHOWING RELATIONSHIP BETWEEN OUTPUT SHAFT SPEED OF A MECHANICAL VARIABLE SPEED DRIVE AND ITS LEVER, AND OUTPUT SHAFT SPEED AND ACTUATOR LEVER POSITION WHEN CONNECTED APPROXIMATELY AS SHOWN TO RIGHT.





(4) ARRANGEMENT USED FOR VARIABLE SPEED MECHANICAL DRIVES

DIRECTION OF ROTATION (CW-CCW) IS AS VIEWED FROM END OF SHAFT IN SPLIT HOUSING AT LIMIT SWITCHES (NOT OUTPUT ARM END).



1 FOR OPTIONAL WITH FLAME SAFETY SYSTEM CONTROL OVERRIDES, REMOVE JUMPERS BETWEEN TERMINALS 1&2 AND 4&5. USE PURGE (P) AND LOW FIRE (LF) RELAY LOGIC (SHOWN).

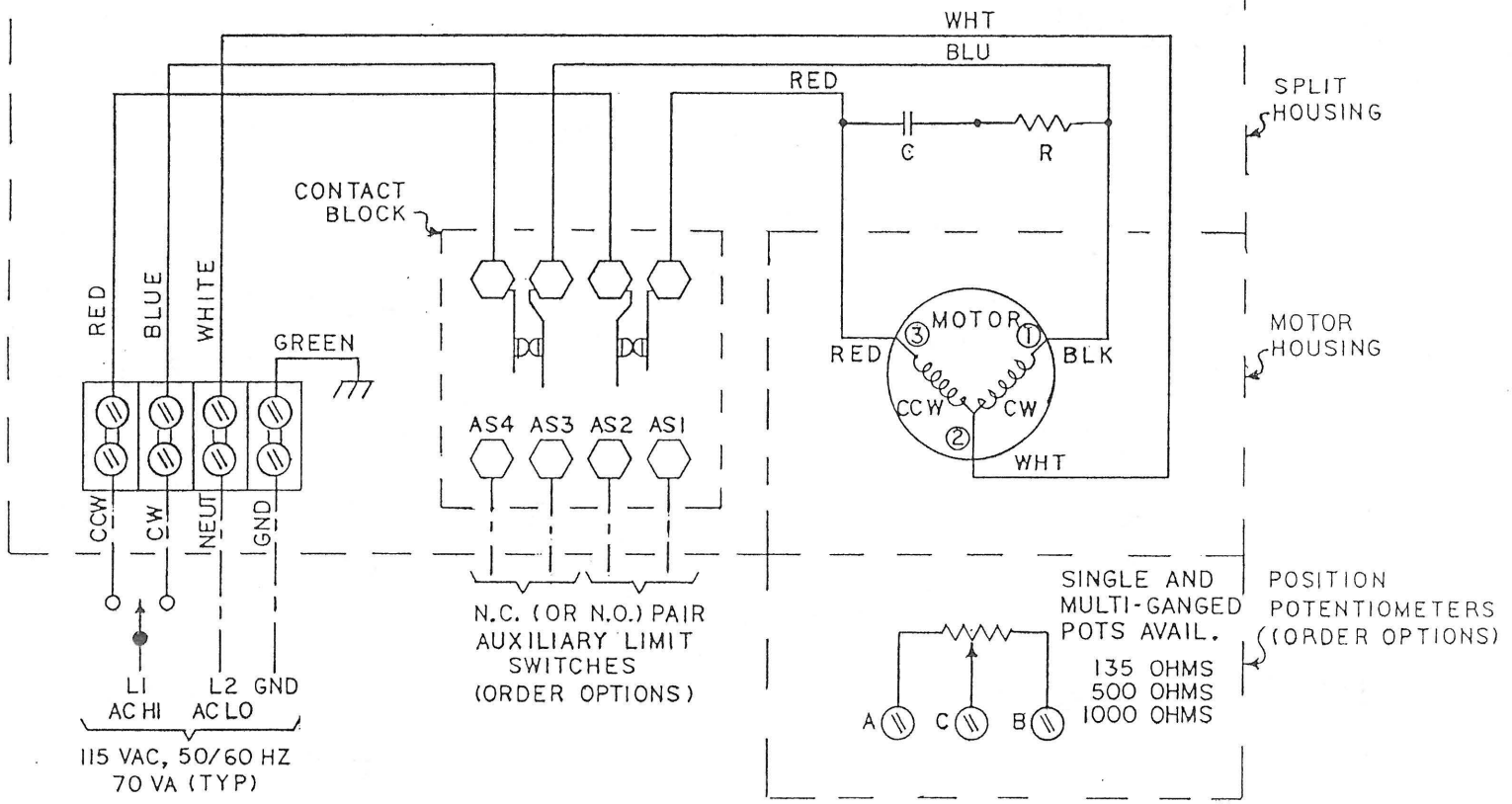
2 REMOVE JUMPER BETWEEN TERMINALS 9&10, IF POWER INPUT (TERMINALS 10& 11) IS ISOLATED FPOM CONTROL INPUT (TERMINALS 7, 8 & 9).

Hays Republic Division of UniControl Inc.
RIVIERA BEACH, FLORIDA 33404 MICHIGAN CITY, INDIANA 46360

ELECTRIC ACTUATOR WIRING
DUAL SOLID STATE RELAY OPTION
Models F-00874/875-K0-A01

SCALE none	DWG. NO. 4002-402B	REV.
SHEET 1 OF 1		

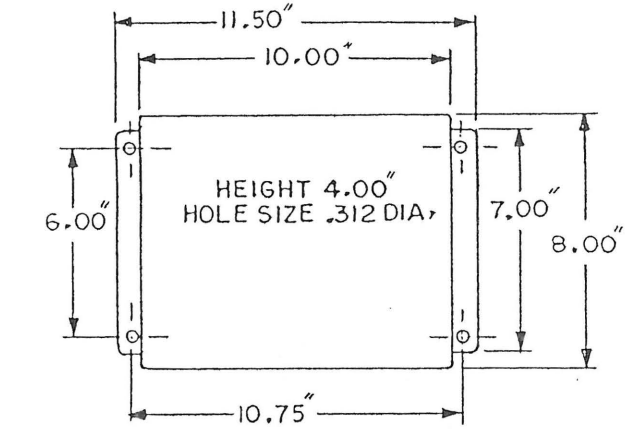
DIRECTION OF ROTATION (CW-CCW) IS AS VIEWED FROM END OF SHAFT IN SPLIT HOUSING AT LIMIT SWITCHES (NOT OUTPUT ARM END).



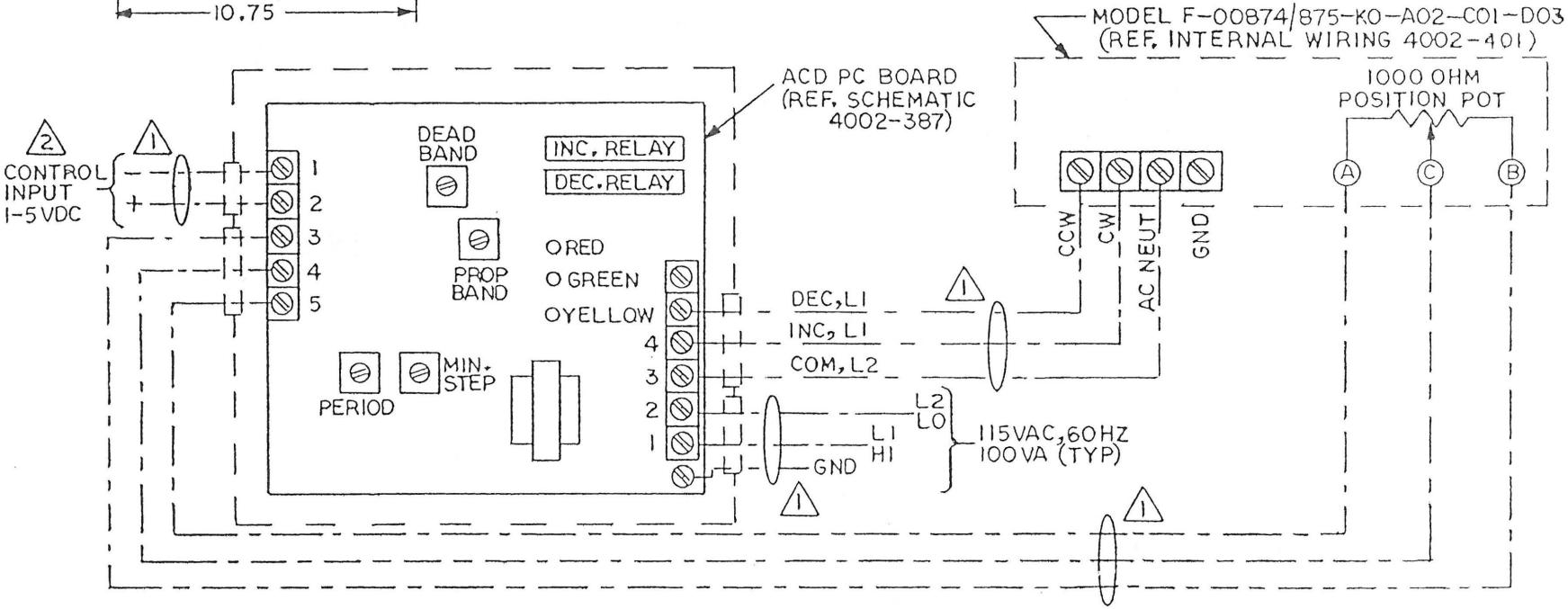
Hays Republic Division of UniControl Inc.
RIVIERA BEACH, FLORIDA 33404 MICHIGAN CITY, INDIANA 46360

ELECTRIC ACTUATOR WIRING
DIRECT 115 VAC INPUT OPTION
Models F-00874/875-K0-A02

SCALE none	DWG. NO. 4002-401B	REV.
SHEET 1 OF 1		



1. USE CONDUIT AS REQUIRED. DO NOT RUN SIGNAL OR POTENTIOMETER WIRING WITH POWER WIRING.
2. USE 250(249)OHM RESISTOR ACROSS TERMINALS 1&2 FOR 4-20MADC INPUT. REMOVE FOR 1-5 VDC INPUT.



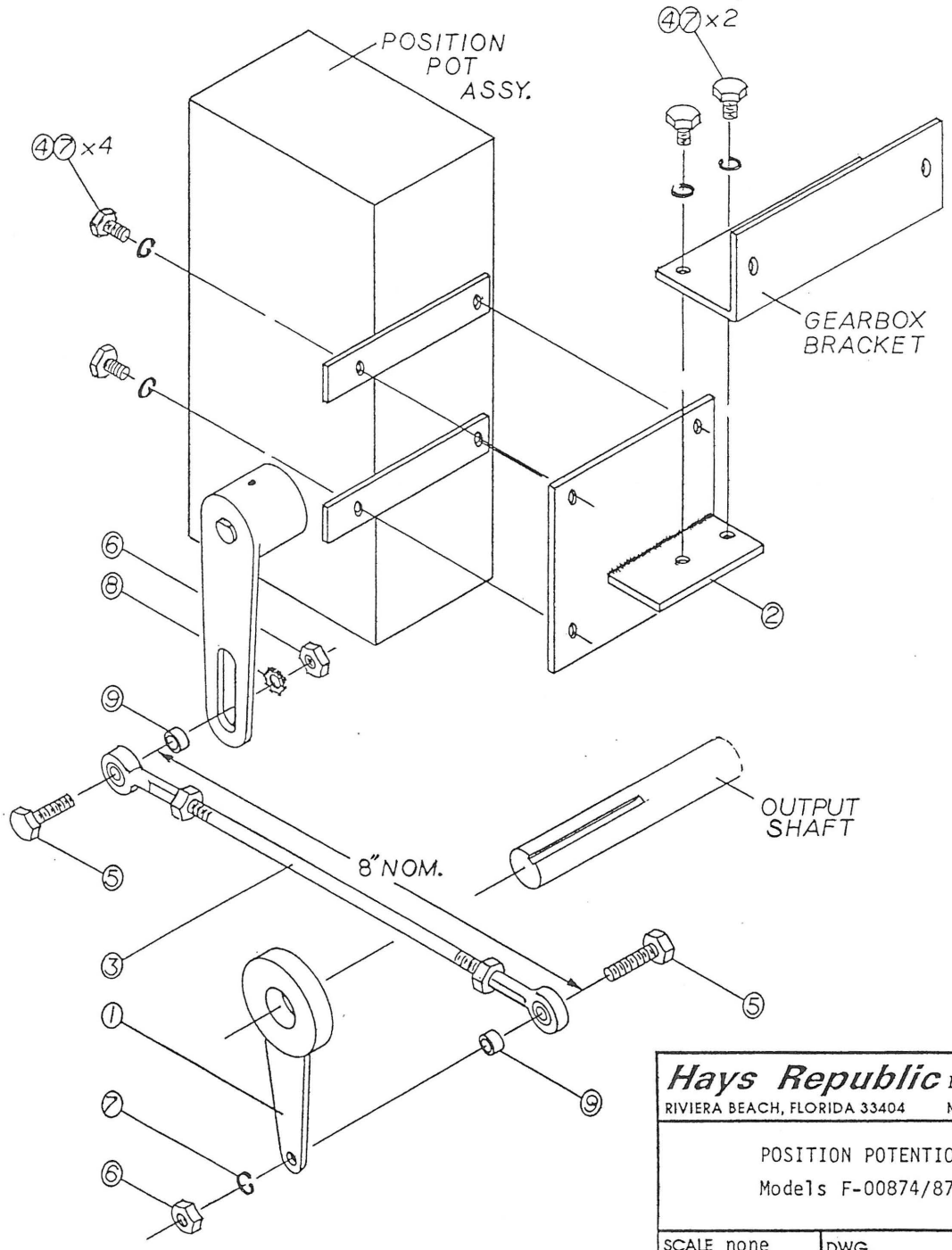
Hays Republic Division of UniControl Inc.
RIVIERA BEACH, FLORIDA 33404 MICHIGAN CITY, INDIANA 46360

ELECTRIC ACTUATOR WIRING
WITH ACTUATOR CONTROLLER DRIVER OPTION
Models F-00874/875-K0-A02-C01-D03-F01

SCALE none	DWG. NO. 4002-403B	REV.
SHEET 1 OF 1		

This page intentionally blank.

ITEM	DESCRIPTION	QTY	PART NO.
-	POSITION POTENTIOMETER ASSEMBLY WITH LEVER ARM, OPTION SUFFIX -Dxx	1	2012-VAR
1	LEVER, 3/4" SHAFT, 2.5" LONG	1	1052-276
2	MOUNTING TEE BRACKET	1	1055-171
3	LINKAGE ASSY, 8" NOM.(7.5 to 8.5")	1	2508-349
4	BOLT, HEX, 1/4-20 X 0.50" LONG	6	1032-531
5	BOLT, HEX, 1/4-20 X 1.00" LONG	2	1032-535
6	NUT, HEX, 1/4-20	2	1034-088
7	LOCKWASHER, 1/4" SPLIT	7	1036-074
8	LOCKWASHER, 1/4" EXTERNAL STAR	1	1036-076
9	SPACER, 1/4" BOLT X 0.125" LONG	2	1060-132



Hays Republic Division of UniControl Inc.
RIVIERA BEACH, FLORIDA 33404 MICHIGAN CITY, INDIANA 46360

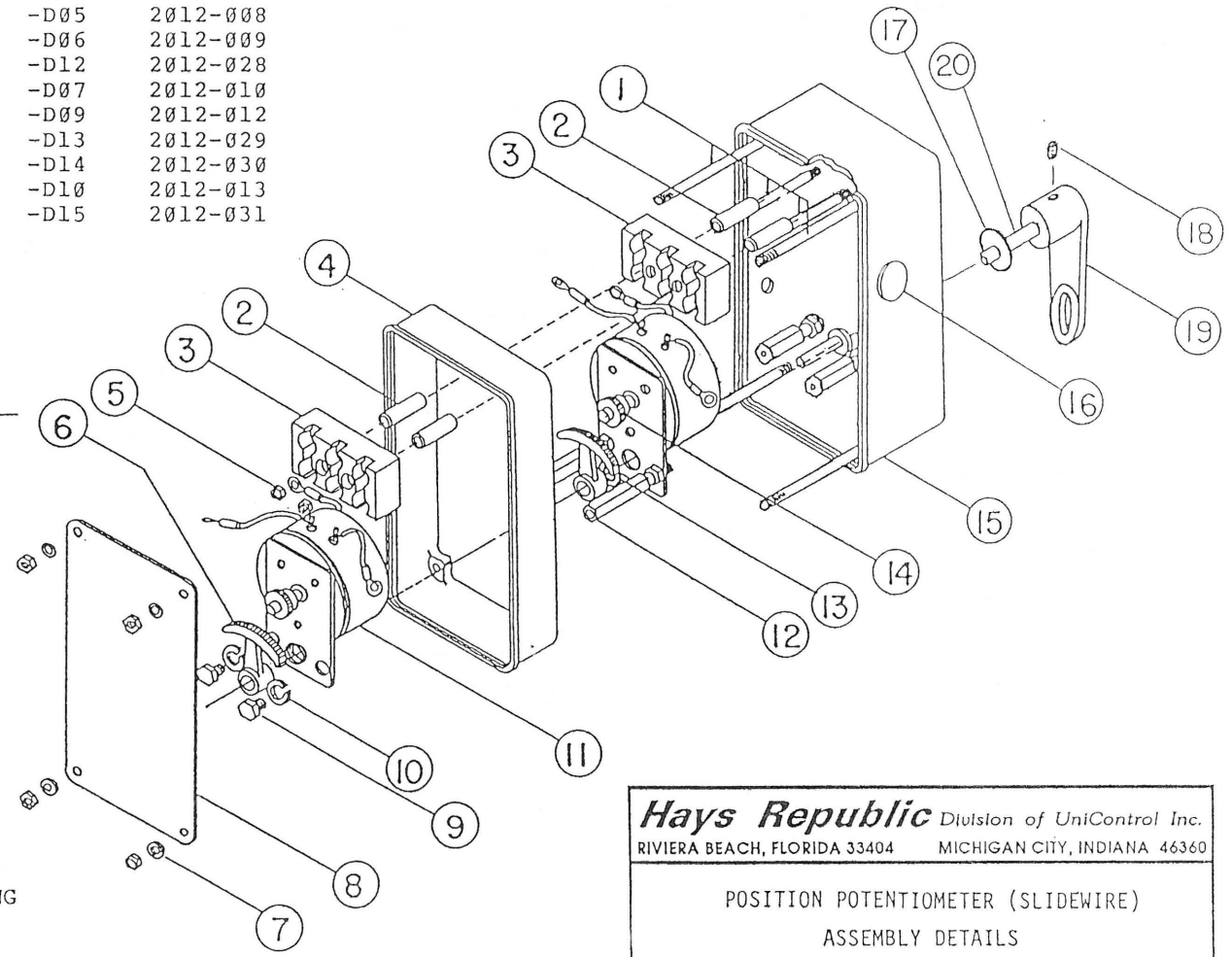
POSITION POTENTIOMETER MOUNTING
Models F-00874/875-K0-C01-Dxx

SCALE none	DWG. NO. FIGURE 1	REV.
SHEET 1 OF 1		

THE FOLLOWING ASSEMBLIES ARE AVAILABLE WHICH INCLUDE ALL PARTS, EXCEPT HARDWARE AND LINKAGE FOR MOUNTING/CONNECTING TO ACTUATOR

DESCRIPTON	MODEL CODE SUFFIX	PART NUMBER
SINGLE POT ASSY: 135 OHM	-D01	2012-004
SINGLE POT ASSY: 500 OHM	-D02	2012-005
SINGLE POT ASSY: 1000 OHM	-D03	2012-006
DUAL POT ASSY: 500 & 500 OHM	-D05	2012-008
DUAL POT ASSY: 135 & 1000 OHM	-D06	2012-009
DUAL POT ASSY: 500 & 1000 OHM	-D12	2012-028
DUAL POT ASSY: 1000 & 1000 OHM	-D07	2012-010
TRIPLE POT ASSY: 500, 500, & 500 OHM	-D09	2012-012
TRIPLE POT ASSY: 135, 135, & 1000 OHM	-D13	2012-029
TRIPLE POT ASSY: 500, 500, & 1000 OHM	-D14	2012-030
FOUR POT ASSY: 500, 500, 500, & 500 OHM	-D10	2012-013
FOUR POT ASSY: 500, 500, 500, & 1000 OHM	-D15	2012-031

ITEM	DESCRIPTION
1	MOUNTING STUD
2	SPACER
3	TERMINAL BLOCK
4	EXTENSION HOUSING
5	HEX NUT, #8-32
6	GEAR SEGMENT
7	LOCKWASHER, #8 SPLIT
8	END COVER
9	BOLT, 1/4-20 x 3/8" LONG
10	LOCKWASHER, 1/4" SPLIT
11A	135 OHM POTENTIOMETER: P/N 1117-051
11B	500 OHM POTENTIOMETER: P/N 1117-035
11C	1000 OHM POTENTIOMETER: P/N 1117-050
12	THREADED SPACER
13	FLAT WASHER, 3/8"
14	PINION GEAR
15	BASE HOUSING
16	CONDUIT PLUG, SNAP-IN
17	FIBER WASHER
18	SET SCREW, INT.HEX, #10-32 x 3/8" LONG
19	LEVER
20	SHAFT



Hays Republic Division of UniControl Inc.
RIVIERA BEACH, FLORIDA 33404 MICHIGAN CITY, INDIANA 46360

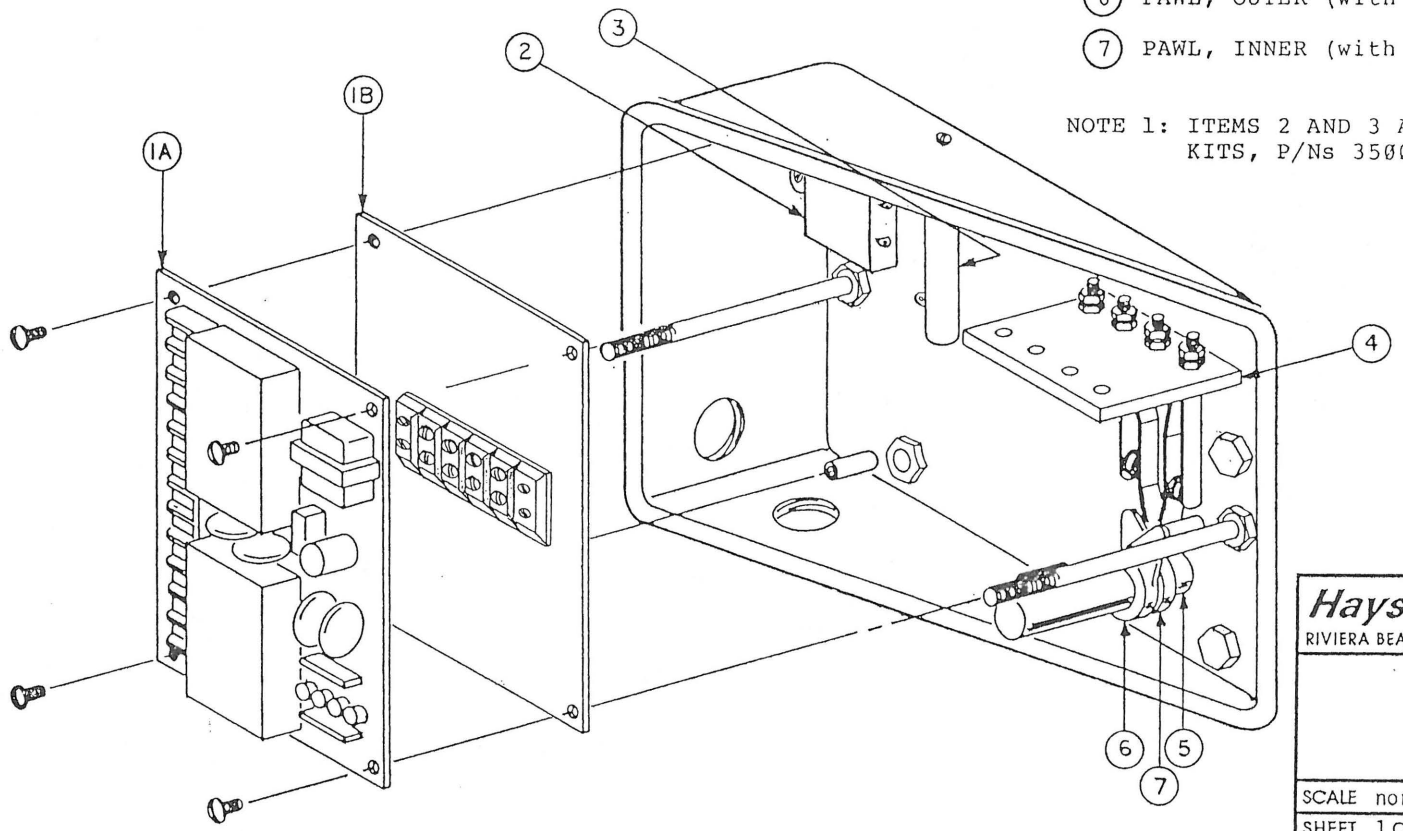
POSITION POTENTIOMETER (SLIDEWIRE)
ASSEMBLY DETAILS

SCALE none	DWG. NO. FIGURE 2	REV. a
SHEET 1 OF 1		

ITEM	DESCRIPTION	PART NO.
(1A)	DSSR P.C.BOARD, OPTION -A01	2014-328
(1B)	PLATE & TERMINAL STRIP, OPTION -A02 ..	---
(2)	CAPACITOR (value optional w/ motor) ..	(note 1)
(3)	RESISTOR (value & use opt. w/ motor) .	(note 1)

ITEM	DESCRIPTION	PART NO.
(4)	SWITCH PLATE ASSY WITH TWO PAIRS OF N.C. CONTACTS (motor end-of-travel) .	2002-000
-	SWITCH CONTACT, ONE, SHORT N.C., (use with 2002-003 for N.C. pair) ...	2002-001
-	SWITCH CONTACT, ONE, LONG N.C., (use with 2002-001 for N.C. pair) ...	2002-003
-	SWITCH CONTACT, ONE, SHORT N.O., (use with 2500-065 for N.O. pair) ...	2002-002
-	SWITCH CONTACT, ONE, LONG N.O., (use with 2002-002 for N.O. pair) ...	2500-065
-	SPACER, 0.375" LONG (added for use with Auxiliary contact pawls)	1046-303
(5)	SPACER, 1.250" LONG	1046-304
(6)	PAWL, OUTER (with 0.750" long striker)	2508-119
(7)	PAWL, INNER (with 0.563" long striker)	2508-120

NOTE 1: ITEMS 2 AND 3 ARE ONLY AVAILABLE WITH MOTOR KITS, P/Ns 3500-263 & 3500-264. SEE TABLE 1.



Hays Republic Division of UniControl Inc.
RIVIERA BEACH, FLORIDA 33404 MICHIGAN CITY, INDIANA 46360

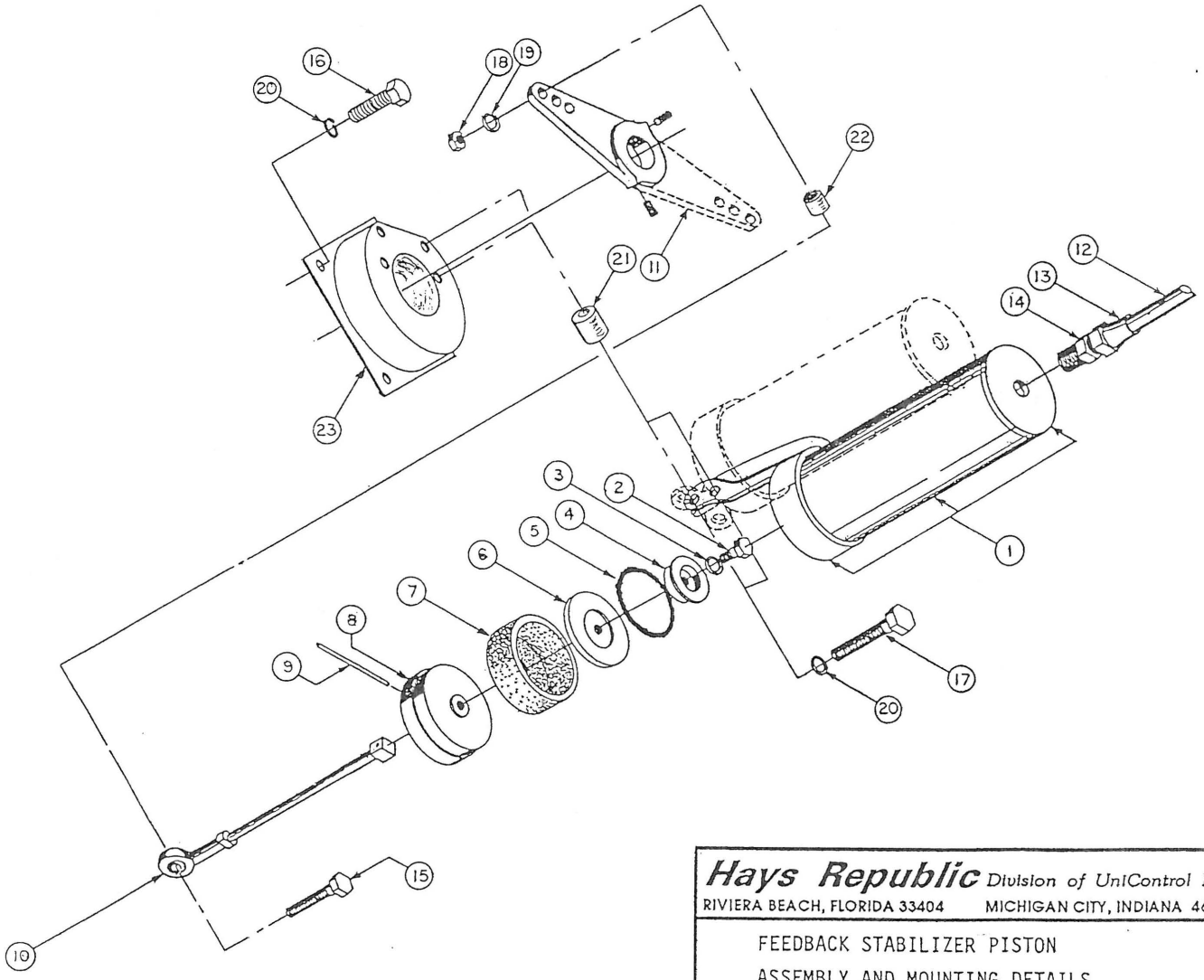
SPLIT HOUSING MECHANICAL VIEW
Models F-00874/875-K0

SCALE none	DWG. NO. FIGURE 3	REV. a
SHEET 1 OF 1		

ITEM	DESCRIPTION	PART NO.
1	CYLINDER BODY	(not avail)
2	BOLT, 1/4-20 x 0.50" LONG	1032-531
3	LOCKWASHER, 1/4"	1036-074
4	CUP SPREADER	1044-060
5	CUP SPRING	1036-045
6	WASHER PLATE	1036-044
7	LEATHER CUP (SEAL)	1048-130
8	PISTON END	1062-144
9	PIN, 0.125"O.D. x 1.938" LONG	1040-010
10	CONNECTING LINK ASSEMBLY	2508-066
11A	LEVER FOR DOUBLE STABILIZER PISTON	1052-258
11B	LEVER FOR SINGLE STABILIZER PISTON	1052-259
--	SINGLE STABILIZER PISTON SUB-ASSEMBLY, consisting of items 1 to 10 & 11B	2520-017
--	DOUBLE STABILIZER PISTON SUB-ASSEMBLY, consisting of items 1 to 10 & 11A	2520-019

BELOW ITEMS ARE FOR MOUNTING STABILIZER PISTON ASSEMBLIES TO THE F-00874/875-K0 ACTUATOR.
(Note: Tubing does not come with assys. or kits.)

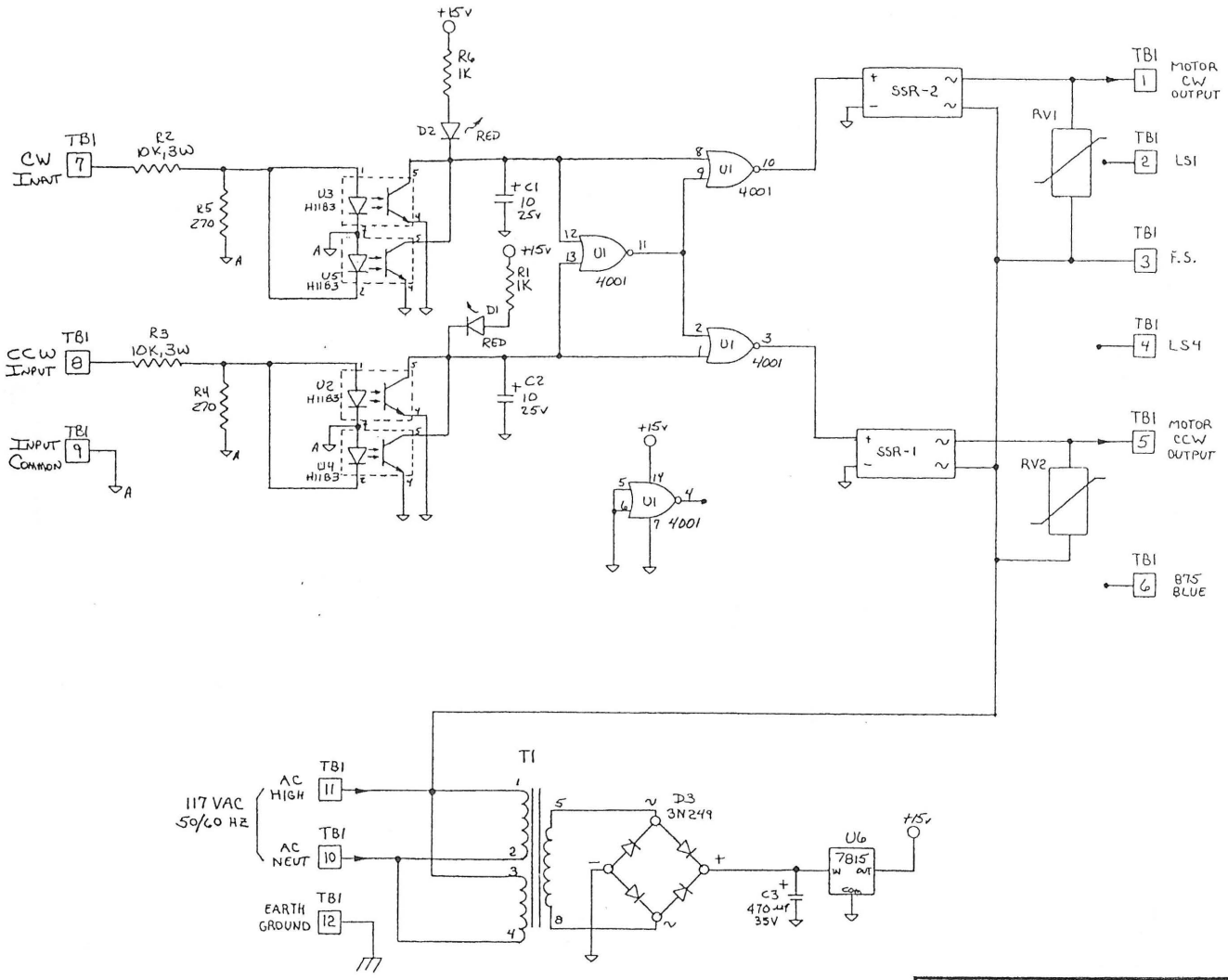
ITEM	DESCRIPTION	PART NO.
12	COPPER TUBING, 5/16"O.D. x LENGTH (FT)	1016-087
13	FLANGED HALF TUBE UNION, 5/16"FLARE	1138-294
14	MALE TUBE UNION, 5/16"FLARE x1/4"NPT	1138-293
15	BOLT,HEX, 1/4-20x1.00"LG (1 per piston)	1032-535
16	BOLT,HEX,5/16-18x0.75"LG (4 installed in gearbox)	
17A	BOLT,HEX,5/16-18x1.25"LG (2,sing.pistn)	1032-570
17B	BOLT,FLT,5/16-18x0.88"LG (2,dual pistn)	1032-561
18	NUT, HEX, 1/4-20 (1 per piston)	1034-088
19	LOCKWASHER,INT.STAR,1/4" (1 per piston)	1036-077
20	LOCKWASHER,SPLIT,5/16" (6 used)	1036-081
21A	SPACER,5/16",5/8"LONG (2,sing.pistn)	1060-129
21B	SPACER,5/16",1/4"LONG (2,dual pistn)	1060-131
22	SPACER, BALL LINK,1/8"LG (1 per piston)	1060-132
23	MOUNTING RING, -K0 only (1 used)	2510-323



Hays Republic Division of UniControl Inc.
RIVIERA BEACH, FLORIDA 33404 MICHIGAN CITY, INDIANA 46360

FEEDBACK STABILIZER PISTON
ASSEMBLY AND MOUNTING DETAILS
Models F-00874/875-K0-C02/C03-E01/E02

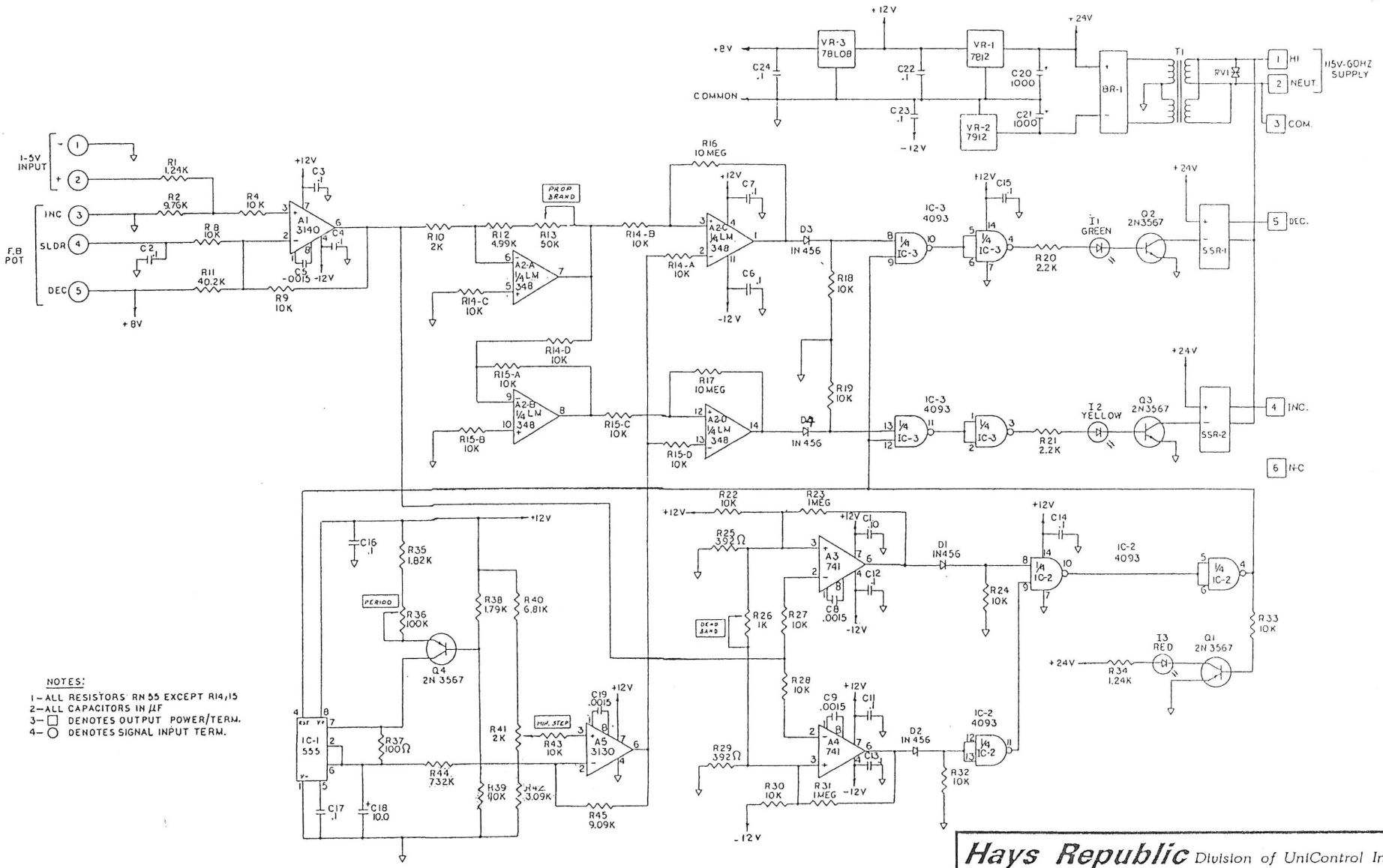
SCALE none	DWG. NO. FIGURE 4	REV. a
SHEET 1 OF 1		



NOTES:

1. ALL CAPACITORS IN MICROFARADS
2. ALL RESISTORS IN OHMS

Hays Republic Division of UniControl Inc. RIVIERA BEACH, FLORIDA 33404 MICHIGAN CITY, INDIANA 46360		
SCHEMATIC DIAGRAM DSSR P.C.BOARD		
SCALE none SHEET 1 OF 1	DWG. NO. 4002-140C	REV.



NOTES:
1 – ALL RESISTORS RN 55 EXCEPT R14,15
2 – ALL CAPACITORS IN μF
3 – □ DENOTES OUTPUT POWER/TERM.
4 – ○ DENOTES SIGNAL INPUT TERM.

Hays Republic Division of UniControl Inc.
RIVIERA BEACH, FLORIDA 33404 MICHIGAN CITY, INDIANA 46360

SCHEMATIC DIAGRAM
ACD P.C.BOARD

SCALE none	DWG. NO. 4002-387E	REV. a
SHEET 1 OF 1		

This page intentionally blank.

Hays Cleveland
Div. of UniControl Inc.
1111 Brookpark Road
Cleveland OH 44109