

**Solid Start Paralleling Relay
General Instructions**

OPERATIONS

This solid state relay is used to parallel, control or manually position a TAC proportional electric geartrain actuator from a 100 to 1000 ohm transmitting potentiometer.

Parallel

Up to three actuators, each equipped with an AE-504, can be operated from a proportionally controlled actuator equipped with an AM-332 potentiometer kit with a 100 to 135 ohm slidewire for parallel operation of additional valves and dampers, etc.

Control

A TAC proportional electric actuator equipped with an AE-504 can be controlled by a slidewire type proportional temperature, pressure, or liquid level controller.

The AE-504 can be used with a TP-307 microtherm, a potentiometer and actuator for mixed air damper control with remote minimum adjustment. See Figure 5 for wiring details.

Manual

Up to three actuators, each equipped with an AE-504, can be manually positioned from a 100 to 135 ohm remote potentiometer.

DEVICE

Solid state components and circuitry are potted to form a rugged epoxy case. Unit provided with 1/2-inch conduit connector for direct mounting to an actuator knockout and with adhesive pads for panel mounting. Six 8-inch color coded leads are provided. Overall dimensions: 3-1/2 inches high, 2 inches wide, 2 inches deep (adds 2 inches to actuator width when mounted on actuator). Ambient temperature limits: -1.1° to 57.2°C (30° to 135°F).

INPUT

Power, 24 Vac 50/60 Hz 5 VA. Input impedance is 50 ohms at 0 Vac, 350 ohms at 12 Vac.

Input Signal - Produced by a 100 ohm to 1000 ohm potentiometer.

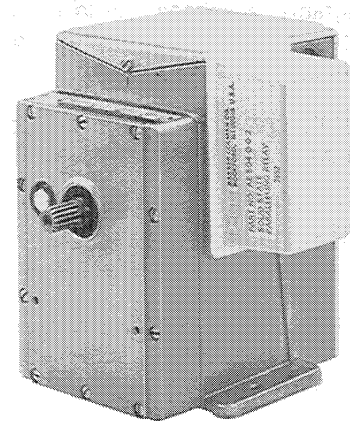
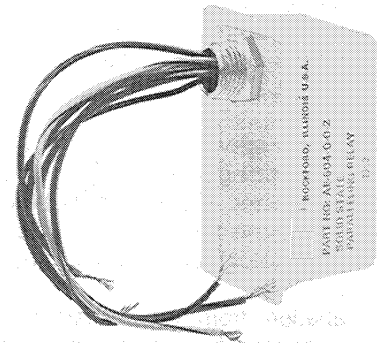


Table-1 Transmitting Potentiometer Wattage Requirements.

Max. Ohms	Watts/ AE-504	Maximum Number of AE-504's per Potentiometer
100 to 135	1.5	3
Over 135 to 1000	3	1

OUTPUT

24 Vac only. Capable of controlling Barber-Colman MP-300, -400, -2000, -4000, and -9700 Series actuators directly. An AM-345 or AE-347 time delay relay is required for use with the MP-9200, -9400, -9600 and -9800 Series actuators.

INSTALLATION

Each relay is supplied with two (2) 680 ohm 1/2W resistors for installation on follow-up actuator and also a 50 ohm resistor for use on 24 Vac follow-up actuators.

Panel Mount

Remove protective strip from adhesive pads and push firmly on a clean panel surface. 8-inch color coded leads provided.

Actuator Mount

Remove one knockout from actuator. Unit can be mounted on either side. For ease in wiring, use one of the front (output shaft end) knockouts. Unit is supplied with 1/2-inch threaded connector and mounting nut.

WIRING

Make all electrical connections per job wiring diagram in accordance with national and local electrical codes. See Figures 3 thru 6 for typical wiring details.

Wire one 680 ohm resistor from 4 to 7 and one from 4 to 8 on all follow-up actuators. These resistors assure continued feedback from the actuator in the event there is a temporary loss of contact between wiper and slidewire.

OPERATION

This device compares the voltage signal from a transmitting potentiometer to that from a follow-up potentiometer. If the voltages between the wipers and ground are the same, the system is in balance and no actuator repositioning is required.

A voltage variation from the transmitting potentiometer signal causes the actuator to reposition, to assume the same voltage level. Wired as per the typical diagrams, a voltage rise in the transmitting potentiometer signal will cause the actuator to run ccw; a voltage drop - cw rotation.

SENSITIVITY

0.05V. The voltage change necessary to cause actuator rotation from a previous balanced condition.

DEADBAND

0.3V. The voltage change necessary to cause the actuator to reverse direction of rotation.

FIELD SERVICE

Checkout and service procedure for AE-504: Wiring must be as shown on Figures 4 or 6 and wire continuity verified.

1. **Checkout** - transmitting potentiometer. Read the resistance change with a meter as the transmitting potentiometer is turned from the cw to ccw ends. The resistance change must be continuous.
Service - Replace the transmitting potentiometer if intermittent or if it is not functioning.
2. **Checkout** - Actuator without an AM-345 time delay relay.
 - a. Disconnect the AE-504 leads from actuator terminals 2 and 3 and power actuator.
 - b. Run the actuator to cw limit by making a circuit from terminal X and 2.

- c. Run the actuator to ccw limit by making a circuit from terminal X and 3.

Service - Replace or repair a defective actuator.

3. **Checkout** - Actuator with an AM-345 time delay relay.
 - a. Disconnect the AM-345 leads from actuator terminals 2 and 3 and power actuator.
 - b. Run the actuator to cw limit by making a circuit from terminals L2 to 2 (Caution line voltage.)
 - c. Run the actuator to ccw limit by making a circuit from terminals L2 and 3. (Caution line voltage.)

Service - Replace or repair a defective actuator

4. **Checkout** - Actuator feedback potentiometer. Read the voltage change on a V.O.M. from actuator terminals 4 and X. The voltage must change smoothly from approximately 24 to 12 Vac as the actuator travels from fuel ccw limit to cw limit.

Service - Repair or replace a defective actuator.

5. **Checkout** - AE-504 switching.
 - a. Reconnect leads to terminals 2 and 3 of the actuator.
 - b. Using a V.O.M. read 24 Vac across yel/blk and bl/blk leads with actuator stopped. As the transmitting potentiometer is turned cw the voltage must drop to near zero.
 - c. Read 24 Vac across yel/blk and red/blk leads with the actuator stopped. As the transmitting potentiometer is turned ccw the voltage must drop to near zero.

Service - Replace a defective AE-504.

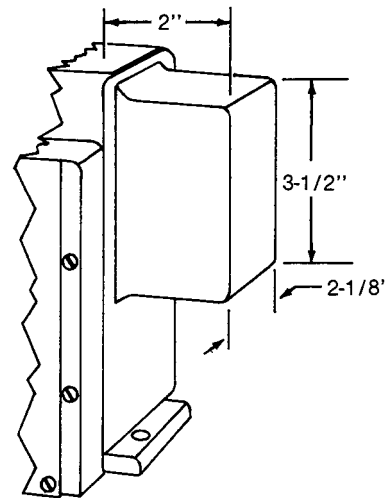


Figure-1 AE-504 Actuator-Mounted Relay.

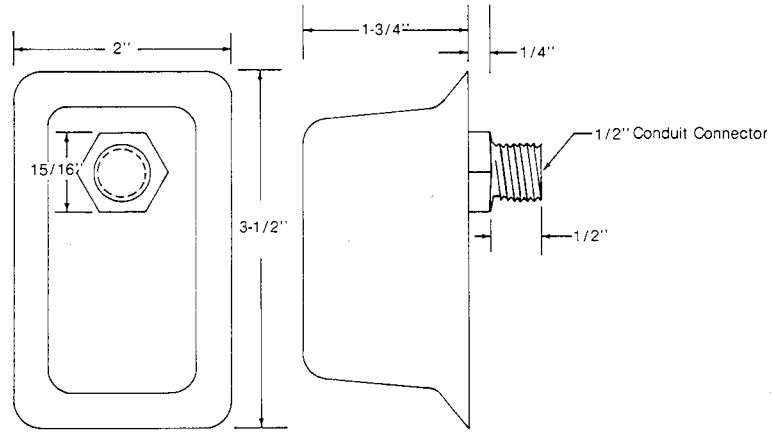


Figure-2

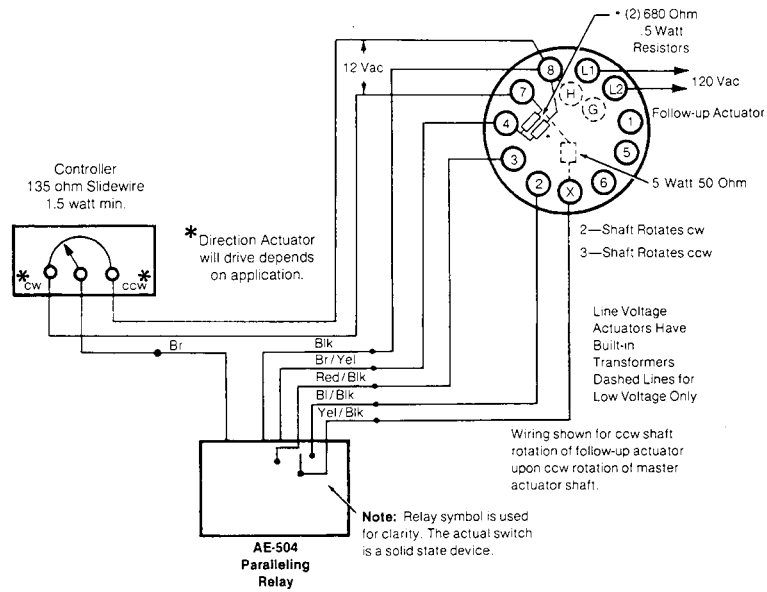


Figure-3 Solid State Paralleling Relay used with 135 ohm Slidewire Controller.

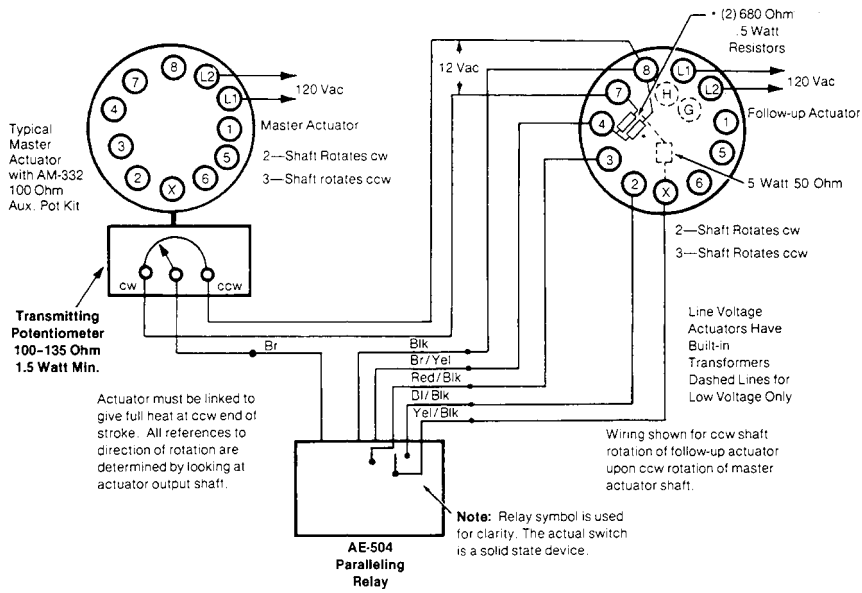


Figure-4 Field Wiring of Actuators to Paralleling Relay.

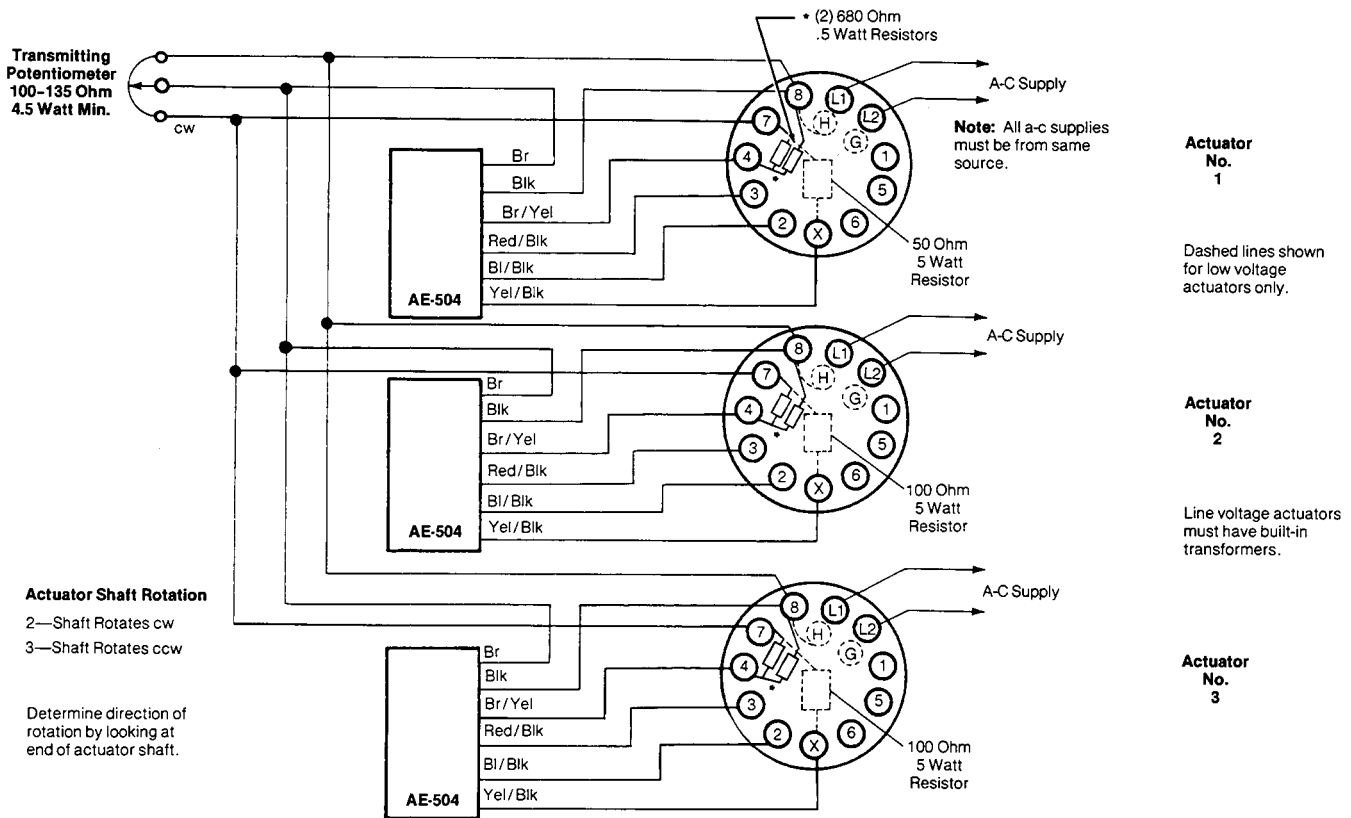


Figure-5 Solid State Paralleling Relay Low or Line Voltage Proportional MP-300, 400, 2000, 4000, 9300, and 9700 Series Actuator (Max. 3) Positioned from Potentiometer.

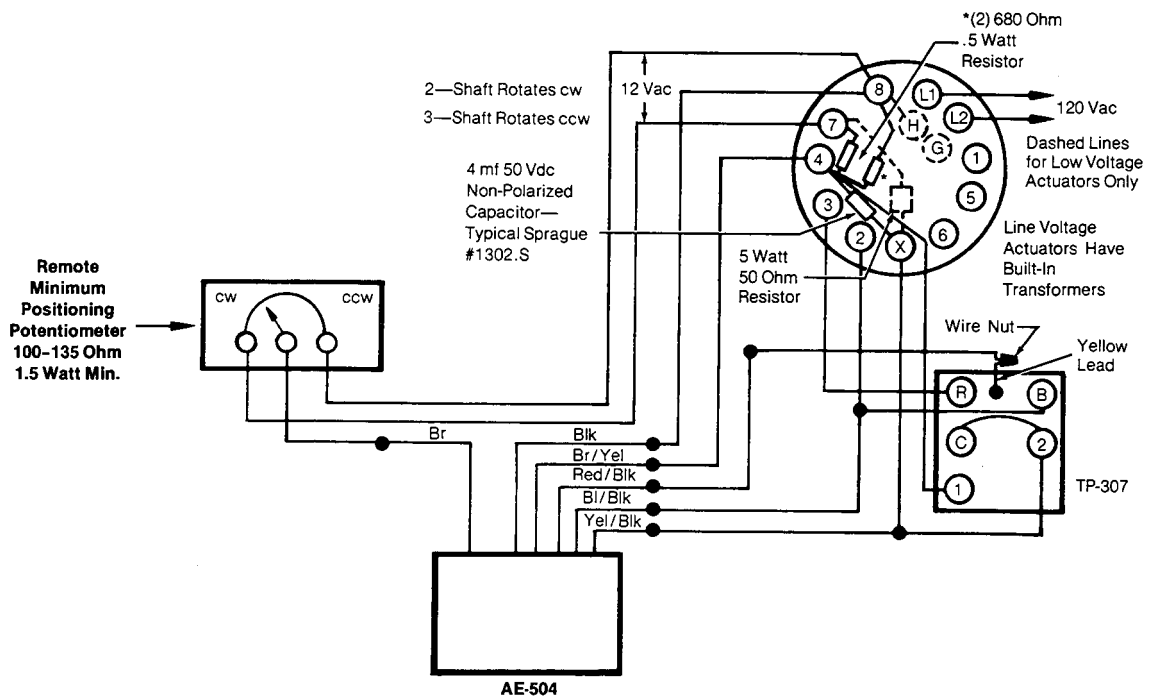


Figure-6 Solid State Paralleling Relay Used with TP-307 Bulb Microtherm for Remote Minimum Positioning.

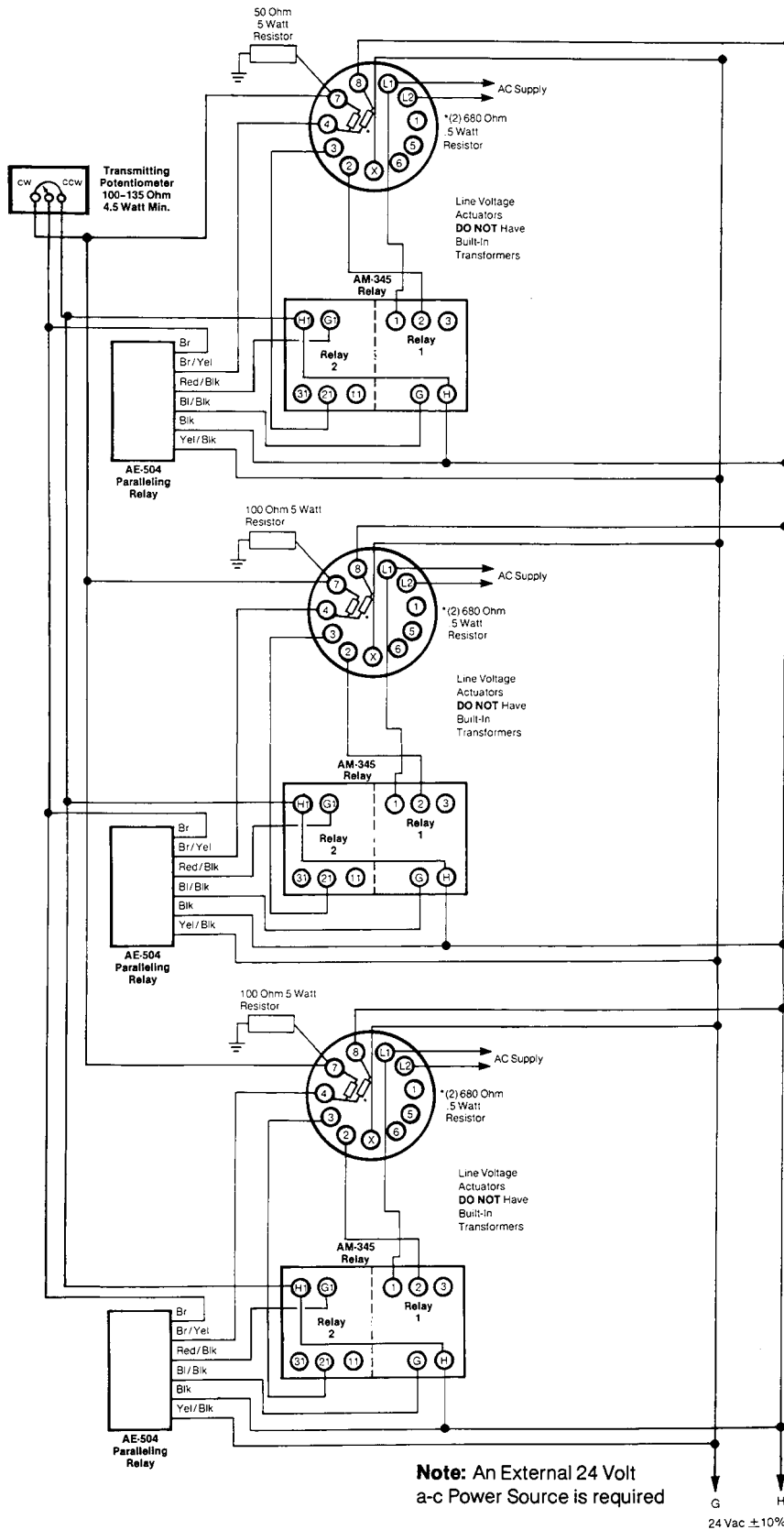


Figure-7 Solid State Paralleling Relay Line Voltage Proportional M-9200, 9400, 9600, 9800 Series Actuators (Max. 3) Positioned from Potentiometer.

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