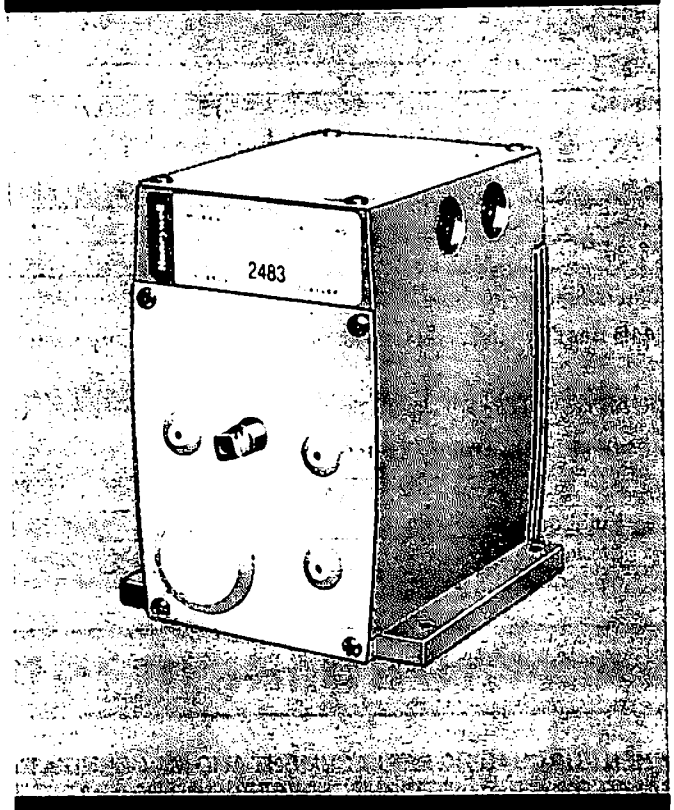
Honeywell

MODUTROL MOTORS



M644A-E

THE M644 TWO-POSITION MODUTROL MOTORS OPEN AND CLOSE DAMPERS AND VALVES ACCORDING TO THE DEMANDS OF AN SPDT, SNAP-ACTING CONTROLLER.

- ☐ M644A,B,C,D,E require a 24 V controller.
- ☐ M644D has 2 internal auxiliary switches; M644E has 1 internal auxiliary switch.
- ☐ Models available with 90 or 160 degree stroke.
- ☐ Dual stroke models allow selection of 90 or 160 degree stroke.
- ☐ Timing range is 30 seconds to 4 minutes for a 160 degree stroke.
- ☐ Sturdy, lightweight die-cast aluminum housing.
- ☐ Oil-immersed motor and gear train.
- ☐ Weatherproofing kit, explosion-proof housing, auxiliary switches, and linkages available as accessories.

G.P.
REV, 11-83●

Form Number 60-2038—5

SPECIFICATIONS

TRADELINE MODELS

TRADELINE models are selected and packaged to provide ease of stocking, ease of handling, and maximum replacement value. TRADELINE model specifications are the same as those of standard models except as noted below.

TRADELINE MODEL AVAILABLE: M644A Modutrol Motor.

ELECTRICAL RATINGS:
Voltage—24 Vac.
Frequency—50/60 Hz.
Power Consumption—15 W, 0.7 A.

STROKE: 160 degrees.

TIMING: 60 seconds.

ADDITIONAL FEATURES: TRADELINE pack with cross-reference label.

STANDARD MODELS

MODEL	VOLTAGE (volts at 50/60 Hz)	POWER CONSUMPTION W	POWER CONSUMPTION A	TIMING (sec)	MAXIMUM OPERATING TORQUE lb.-in.	MAXIMUM OPERATING TORQUE N•m	STROKE (degrees)
M644A	24	15	0.7	30	150	17.0	90
				60	150	17.0	160
M644B	120	20	0.2	30	75	8.5	160
M644C	24	15	0.7	15 or 30	75	8.5	90 or 160[a]
				2 or 4 min	150	17.0	
M644D[b]	24	15	0.7	60	150	17.0	90 or 160[a]
M644E[b]	24	15	0.7	60	150	17.0	90

[a]Stroke is field adjustable.

[b]M644D has 2 auxiliary switches; M644E has 1 auxiliary switch.

AUXILIARY SWITCH RATINGS (in amperes):

M644E (1 spdt auxiliary switch)—

	120 V	240 V
Full Load	7.2	3.6
Locked Rotor	43.2	21.6

UNDERWRITERS LABORATORIES INC. LISTED (M644B,D,E only): File No. E4436, Guide No. XAPX.

NOTE: Only line voltage models and models with auxiliary switch are listed by Underwriters Laboratories Inc.

(continued on page 3)

ORDERING INFORMATION

WHEN PURCHASING REPLACEMENT AND MODERNIZATION PRODUCTS FROM YOUR TRADELINE WHOLESALER OR YOUR DISTRIBUTOR, REFER TO THE TRADELINE CATALOG OR PRICE SHEETS FOR COMPLETE ORDERING NUMBER, OR SPECIFY—

1. **Order number.**
2. **Motor stroke.**
3. **Dc input signal range.**
4. **One or two auxiliary switches, if applicable.**
5. **Accessories, if desired.**

IF YOU HAVE ADDITIONAL QUESTIONS, NEED FURTHER INFORMATION, OR WOULD LIKE TO COMMENT ON OUR PRODUCTS OR SERVICES, PLEASE WRITE OR PHONE:

1. **YOUR LOCAL HONEYWELL RESIDENTIAL SALES OFFICE (CHECK WHITE PAGES OF YOUR PHONE DIRECTORY).**
2. **RESIDENTIAL CUSTOMER SERVICE**
   HONEYWELL INC., 1885 DOUGLAS DRIVE NORTH
   MINNEAPOLIS, MINNESOTA 55422-4386 (612) 542-7500

   (IN CANADA—HONEYWELL LIMITED/LIMITEE, 740 ELLESMERE ROAD, SCARBOROUGH, ONTARIO M1P 2V9)
   INTERNATIONAL SALES AND SERVICE OFFICES IN ALL PRINCIPAL CITIES OF THE WORLD.

CANADIAN STANDARDS ASSOCIATION CERTIFIED: M644B,D,E,F. File LR1620, Guide No. 400-E—O.

DEAD WEIGHT LOAD ON SHAFT: Power end—200 lb. [90.8 kg]; auxiliary end—100 lb. [45.0 kg].

TERMINAL CONNECTIONS: M644A-E—screw terminals; M644F—leadwires.

AMBIENT TEMPERATURE RATING: Maximum—130 F [54 C] at 25 percent; minimum—minus 40 F [minus 40 C].

STROKE: Fixed—90 or 160 degrees, factory-set; dual—90 or 160 degree field selectable (factory-set). See MODELS.

DIMENSIONS: See Fig. 1.

CRANK SHAFT: Double-ended shaft, 3/8 in. [10 mm] square.

ACCESSORIES:

Q607 Auxiliary Switch—controls auxiliary equipment as a function of motor position.

Q605 Damper Linkage—connects motor to damper.

Transformers—mounted internally. Include mounting screws and barrier.

7640PK—120 Vac; 50/60 Hz.

7640PL—220 Vac; 50/60 Hz.

7640PN—120/208/240 Vac; 50/60 Hz.

Q601 Linkage—connects Modutrol motor to water or steam valve.

Q100 Linkage—connects Modutrol motor to butterfly valve.

Q455 Linkage—connects Modutrol motor to water or steam valve.

Q618 Linkage—connects Modutrol motor to water or steam valve.

7640JS Weatherproofing Kit—weatherproofs the M644 Modutrol Motor.

7640PP Screw Terminal Adapter—use to convert quick-connect terminals to screw terminals.

7616BR Motor Crank Arm—included with the Q605 Linkage but not with the motor.

DHE94 Explosion-Proof Housing—encloses Modutrol motor for use in explosive atmospheres. Not for use with Q601 and Q455 Linkage. Order from Crouse Hinds Co. Requires Honeywell 7616DM Coupling.

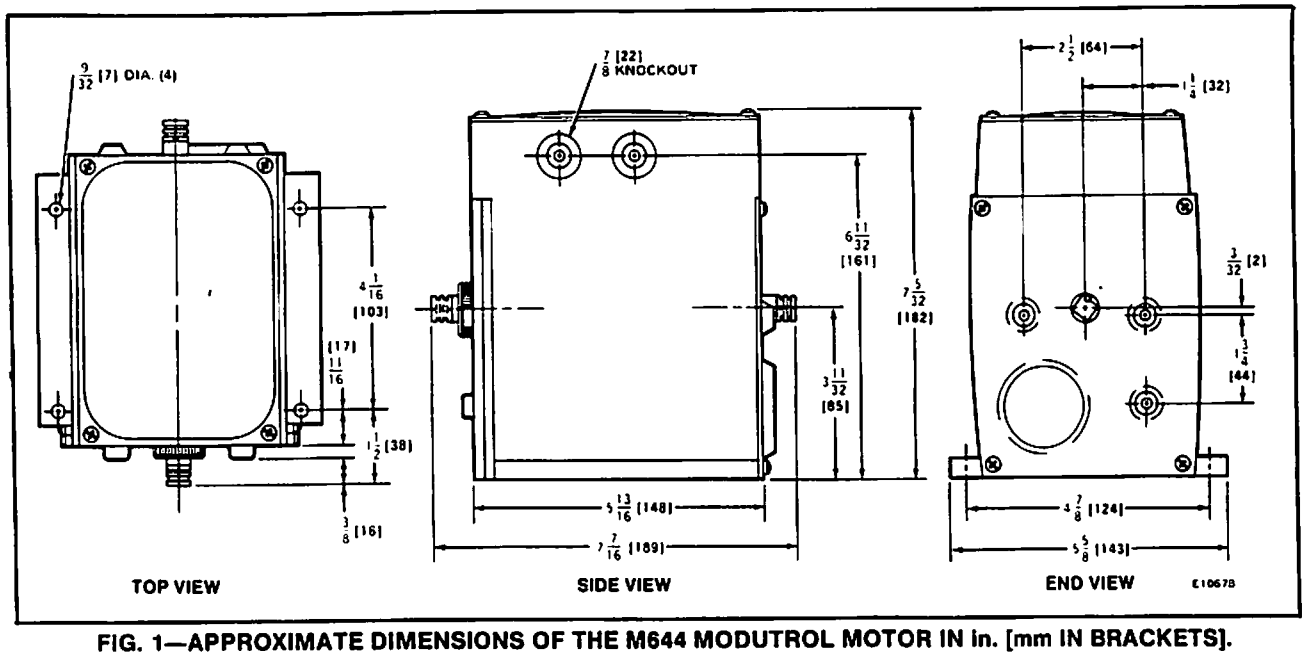


FIG. 1—APPROXIMATE DIMENSIONS OF THE M644 MODUTROL MOTOR IN in. [mm IN BRACKETS].

INSTALLATION

WHEN INSTALLING THIS PRODUCT . . .

1. Read these instructions carefully. Failure to follow them could damage the product or cause a hazardous condition.

2. Check the ratings given in the instructions and on the product to make sure the product is suitable for your application.

3. Installer must be a trained, experienced service technician.

4. After installation is complete, check out product operation as provided in these instructions.

CAUTION

1. Disconnect power supply before beginning installation to prevent electrical shock or equipment damage.
2. Never turn the motor shaft by hand or with a wrench, as damage to the gear train will result.
3. Valve linkages must be connected to the motor shaft at the power end only.
4. Voltage and frequency of the power source must be the same as that shown on the nameplate of the motor.

LOCATION

Install the Modutrol motor in any location except where acid fumes or other deteriorating vapors might attack the exposed metal parts of the motor, or where escaping gases or other explosive mixtures might create a fire hazard.

When choosing a location for the motor, be sure to allow enough space for mounting auxiliary equipment and servicing the motor.

MOUNTING

The motor has a flange on the bottom for mounting. The mounting holes are sized for 1/4 inch machine screws or bolts. The motor may be mounted in any position provided the shaft is horizontal.

All M644 Modutrol motors are shipped in the closed position. The closed position for the 160 degree motor is the limit of counterclockwise ↶ rotation as viewed from the power end of the motor. See Fig. 2.

LINKAGES

The motor comes without a crank arm. The 7616BR Motor Crank Arm is included in the Q605 Linkage or may be ordered separately.

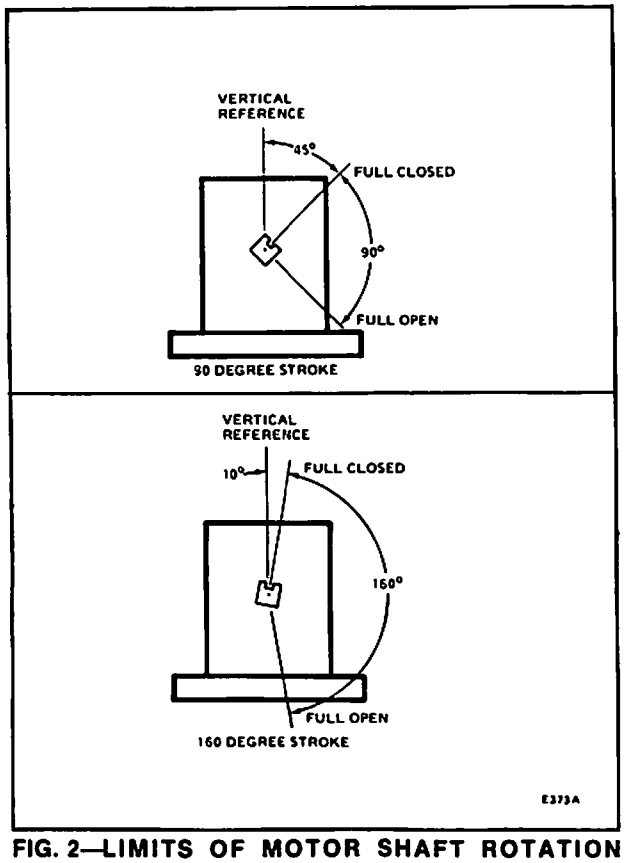


FIG. 2—LIMITS OF MOTOR SHAFT ROTATION VIEWED FROM POWER END.

For detailed instructions on the assembly of specific linkages, refer to the instruction sheet packed with each individual linkage.

When planning for and installing a motor and linkage, check the following points of operation:

1. Attach the valve or damper linkage to the motor crank arm so that the motor crank arm travels through its full range while the drive mechanism moves through only its required maximum distance.

2. The motor shaft must travel through its full angular stroke while opening or closing a valve or damper. This holds true even though the full stroke is not required to drive the valve or damper through its required stroke.

3. The motor must be stopped at the end of its stroke by the limit switch and must not be stalled by the damper or valve.

WIRING

Disconnect power supply before connecting wiring to prevent electrical shock or equipment damage. All wiring must comply with local codes and ordinances. See Figs. 3-7 for typical hookups.

When using a low voltage motor, make certain that the voltage and frequency stamped on the transformer correspond to the characteristics of the power supply.

NOTE: Blue (B) and white (W) connections at the motor may be interchanged if necessary to obtain proper motor action on a temperature (or pressure) change at the controller.

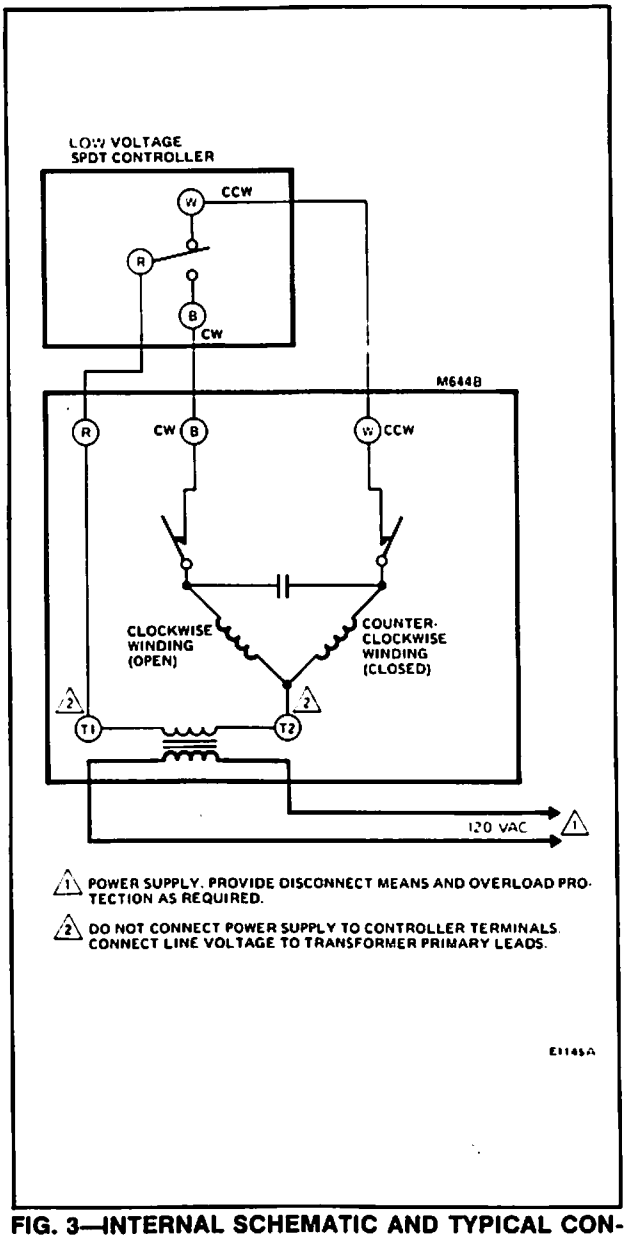


FIG. 3—INTERNAL SCHEMATIC AND TYPICAL CONNECTIONS FOR M644B.

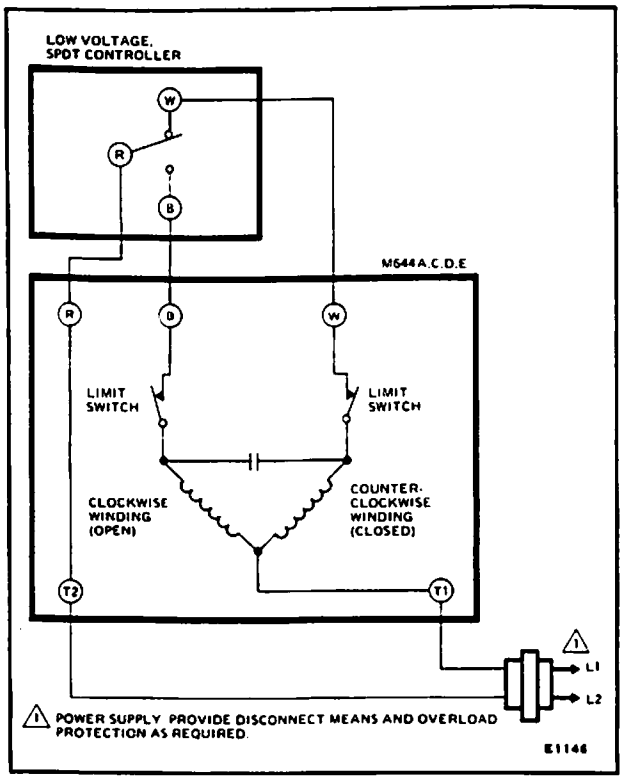


FIG. 4—INTERNAL SCHEMATIC AND TYPICAL CONNECTIONS FOR M644A,C,D,E.

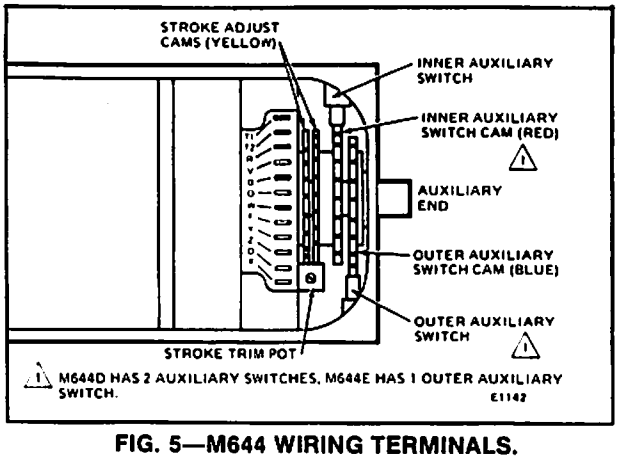


FIG. 5—M644 WIRING TERMINALS.

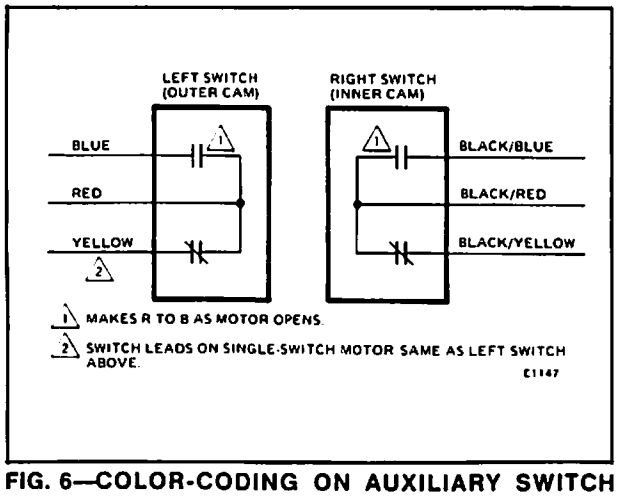


FIG. 6—COLOR-CODING ON AUXILIARY SWITCH LEADS.

REPLACING A THERMOSTAT-CONTROLLED M204 MODUTROL MOTOR

When the M644 is used to replace a thermostat-controlled M204 Modutrol Motor, the thermostat must also be replaced to provide correct cycling rate. Use a T87F, T8082A or similar with the low voltage M644. The circuit can be wired with or without a relay. The relay will provide better heat anticipation. (Heat anticipation acts to anticipate changes in space temperature before they actually occur in order to enable the system to react more smoothly to space temperature changes. The result is less overshooting of set point temperature and fewer temperature swings within the space.) For electrical hookup with the heat anticipation relay, see Fig. 7. If it is determined that the accurate heat anticipation provided by the relay is not necessary, refer to Fig. 8 for electrical hookup. If using a spdt controller which does not have heat anticipation capability, refer to Fig. 3 for electrical hookup.

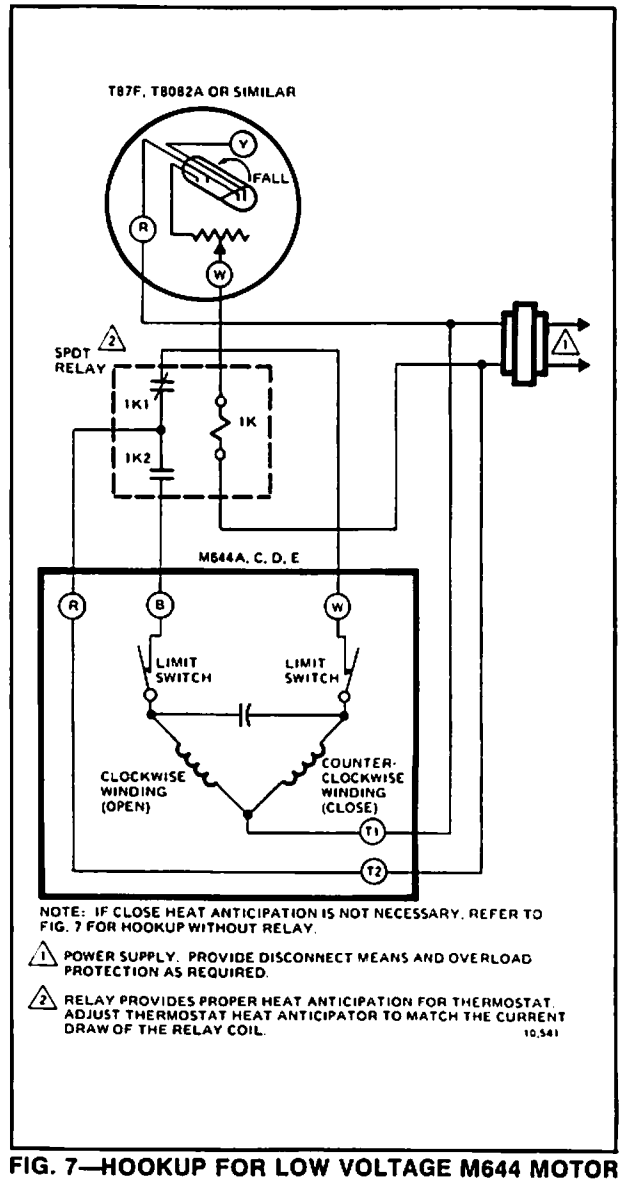


FIG. 7—HOOKUP FOR LOW VOLTAGE M644 MOTOR WHEN CONTROLLED BY A THERMOSTAT AND WHEN PRECISE HEAT ANTICIPATION IF DESIRED.

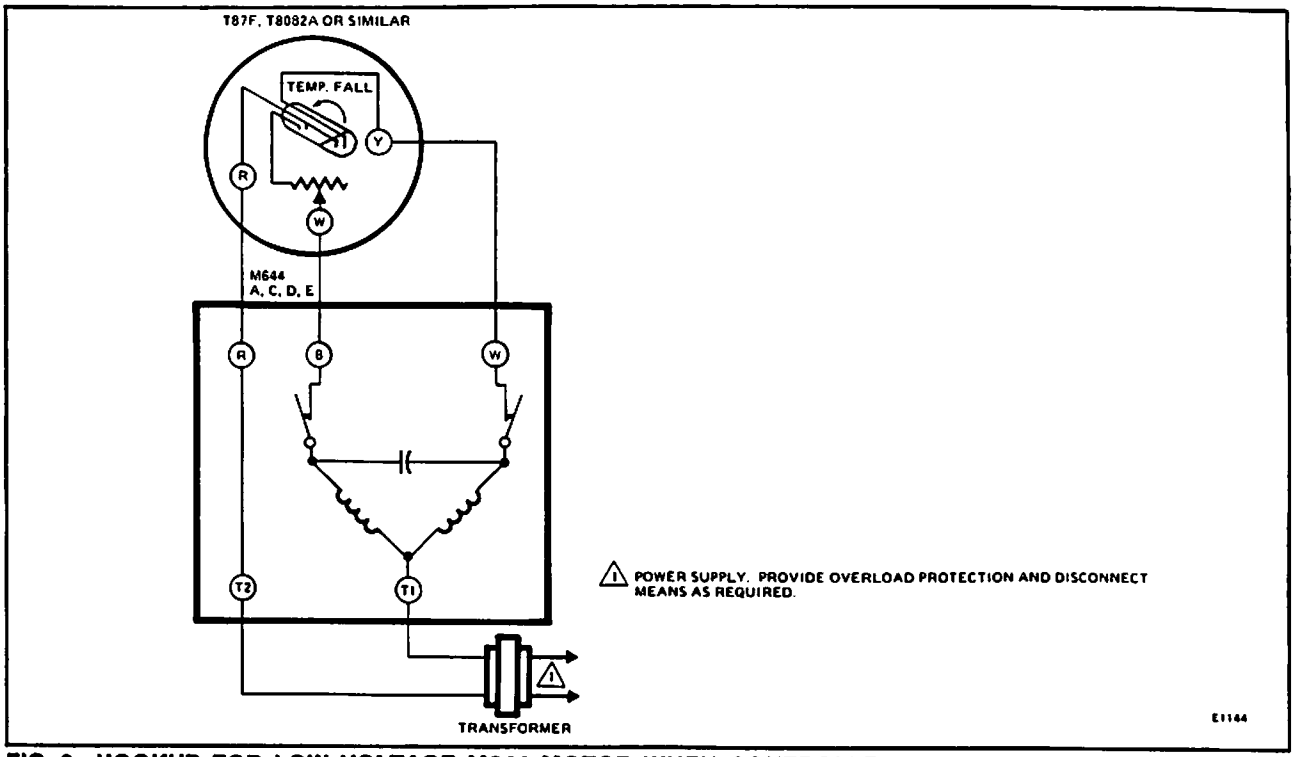


FIG. 8—HOOKUP FOR LOW VOLTAGE M644 MOTOR WHEN CONTROLLED BY A THERMOSTAT AND WHEN PRECISE HEAT ANTICIPATION IS NOT DESIRED.

SETTINGS AND ADJUSTMENTS

STROKE SETTING

The stroke of M644C,D motors is field-selectable and can be set for 90 degrees (as shipped) or 160 degrees. In order to set stroke, both mechanical and electrical adjustments are required. The mechanical adjustments (cams) establish the full open and full closed positions of the motor shaft. The electrical adjustment (limit pot) provides sufficient total stroke angle to ensure that cams will actuate both limit switches.

STROKE SETTING PROCEDURE

CAUTION

Detach linkage from motor before adjusting stroke.

BEFORE SETTING STROKE:

1. Remove top cover from motor.
2. Disconnect controller from motor.

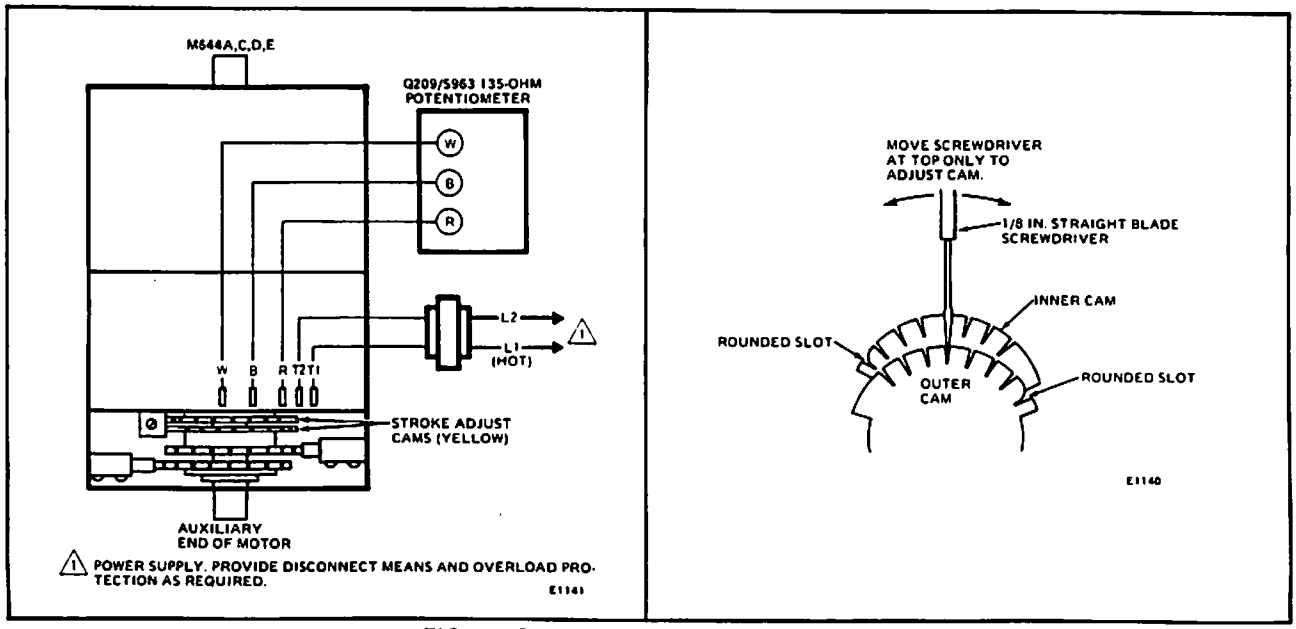


FIG. 9—STROKE ADJUSTMENT SETUP.

SETTING 160 DEGREE STROKE (Fig. 9)

1. Drive motor to midposition by shorting R-B.
2. Insert 1/8 in. screwdriver blade into slot on inner cam and MOVE TOP OF SCREWDRIVER as far as possible counterclockwise ↶. Repeat in successive cam slots until inner cam is against counterclockwise stop.

IMPORTANT

Set cams by moving top of screwdriver only. Pressing screwdriver against sides of cam slots could cause damage to motor end switches.

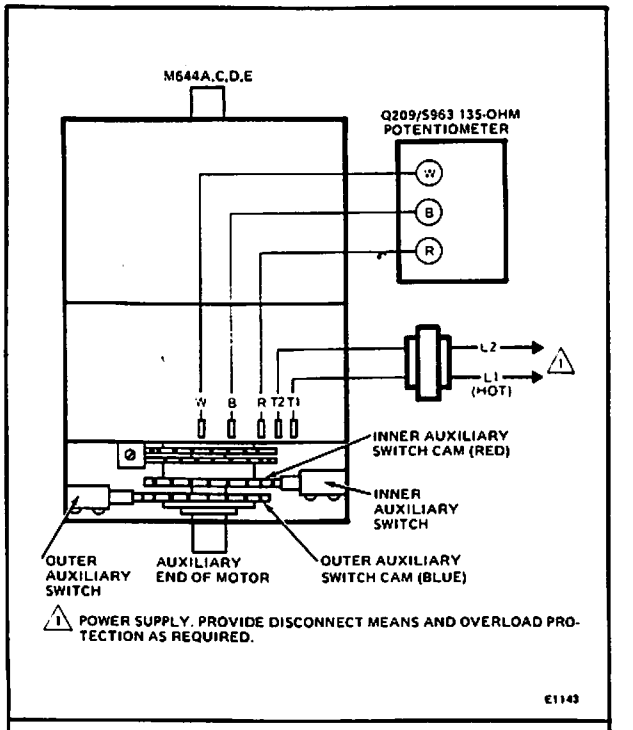
3. Insert 1/8 in. screwdriver blade into slot on outer cam and MOVE TOP OF SCREWDRIVER as far as possible clockwise ↷. Repeat in successive cam slots until outer cam is against clockwise stop.

NOTE: Excessive force will damage end switch.

4. Check motor stroke before connecting linkage.
5. Reconnect controller, replace top cover on motor.
6. Attach linkage to motor.

SETTING 90 DEGREE STROKE (Fig. 9)

NOTE: Motor factory-set at 90 degree stroke.



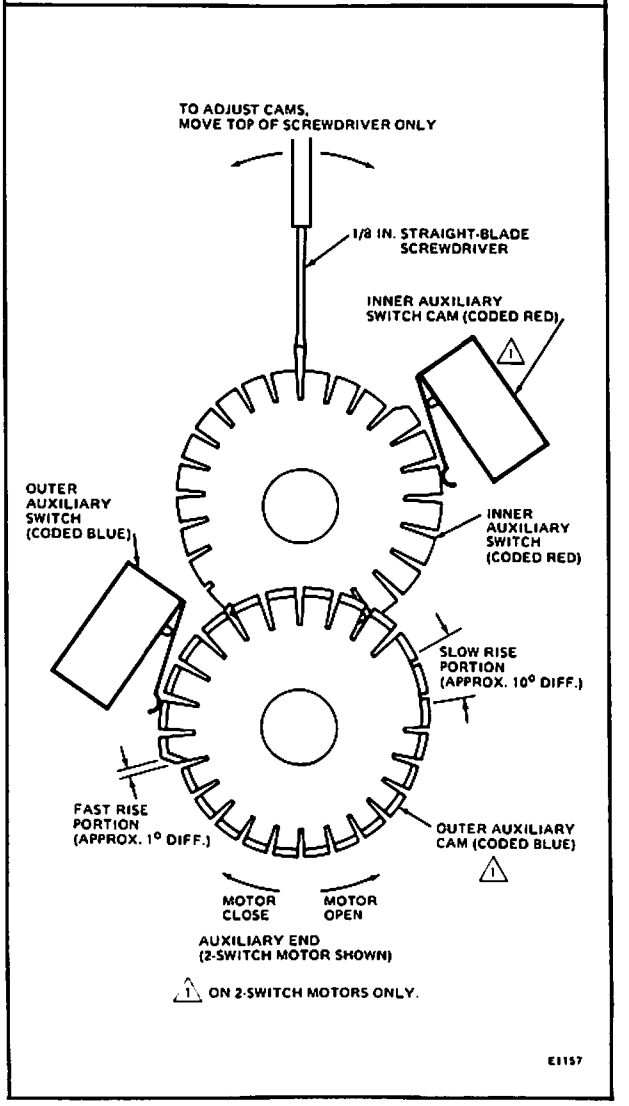


Fig. 10—AUXILIARY SWITCH ADJUSTMENT.

AUXILIARY SWITCH ADJUSTMENT PROCEDURE

The auxiliary switches in these motors are actuated by adjustable cams. The cams can be set to actuate the switches at any angle within the stroke of the motor. Also, switch differentials of 1 degree or 10 degrees can be selected.

Motors are shipped in the closed position with auxiliary cams set to actuate switches 30 degrees from the closed position, and to provide 1 degree switch differential. With motor in closed position, auxiliary switch R-B contacts are open and R-W contacts are closed.

To change auxiliary switch settings and differentials, use the following procedure.

1. Remove motor top cover and auxiliary end cover to gain access to motor terminals and auxiliary cams (Fig. 10).
2. Make sure motor is in full closed position. (Jumper motor terminals R-B to run motor closed, then remove jumper.)
3. To set auxiliary switch to operate at more than 30 degrees (as supplied), rotate associated cam clockwise ↷ beyond 30 degrees setting to desired angle. To set auxiliary switch to operate at less than 30 degrees, rotate associated cam counterclockwise ↶ to desired angle. Cam slots are 15 degrees apart (Fig. 10).

NOTE: If 10 degree differential is desired, rotate cam to 10 degree differential portion of cam (approximately 1/2 turn), and perform cam adjustment procedure, step 3.

4. Make continuity check of auxiliary switching while running motor full open, then full closed. Switch contacts should make R-B and break R-W after motor passes desired auxiliary switching position.
5. Replace top cover and auxiliary end cover on motor.

CHECKOUT

After installation and linkage adjustment, check out the entire installation. Make sure that—

—the motor operates properly,

—the motor responds to the controller properly,

—the motor operates the valve or damper as it should.

Energize the motor by setting the controller so its contacts close R to B or by placing a jumper wire across terminals R and B. The motor should run smoothly and drive the valve or damper to the end of its stroke. If it does not, check the source of power to be sure there is voltage and that it is at least 85 percent of the rated voltage stamped on the nameplate of the motor.

OPERATION

Whether the M644 is used with a line voltage or low voltage controller, the operation is the same.

Refer to Figs. 3 and 4 for internal schematic diagrams of the M644.

When the controller R-B contacts make, the motor will run open. The motor will continue to run open until the limit of rotation is reached and the limit switch opens, or until the controller makes R-W.

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