Honeywell

220736A,B Internal Auxiliary Switches

220736A, B Internal Auxiliary Switch kits can be installed in TRADELINE models of Modutrol IV Motors to control auxiliary equipment as a function of motor shaft position.



- The 220736A includes one Spdt Micro Switch V3 precision switch.
- The 220736B includes two Spdt Micro Switch V3 precision switches.
- Either kit can be installed in any Tradeline Modutrol IV Motor.
- Kits provide switch mounting bracket for easy installation internal to motor.
- The auxiliary switches are actuated by adjustable cams inside the motor. These cams can be set to

actuate the switches at any angle within the stroke of the motor. Only Modutrol IV TRADELINE models are equipped with the cam assemblies for actuating field-addable auxiliary switches. Switch adjustment procedures are the same as that for switches that come factory installed in Modutrol IV Motor models.

- Switch differentials of 1° or 10° can be selected.
- Leadwires color coded to ease correct wiring of auxiliary equipment.

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Specifications

- MODELS: 220736A,B Internal Auxiliary Switches for TRADELINE Modutrol IV Motors. Switches are actuated by cams in the motor. The cams can be set to operate the switches at any point in the motor stroke. 220736A—Includes one Spdt Micro Switch V3
 - snap acting switch, mounted on left side and operated by outer cam.
 - 220736B—Includes two Spdt Micro Switch V3 snap acting switches.
- SWITCH DIFFERENTIAL (difference between switch make and break points): Approximately 1 or 10 degrees, determined by cam setting.
- MOUNTING: Switches factory-installed on bracket designed for mounting inside motor.

WIRING: Color-coded, 15 in. [381 mm] leadwires.

ELECTRICAL RATINGS:

One Contact ^a	120 V	240 V
Full Load	7.2	3.6
Locked Rotor	43.2	21.6

^a40 VA pilot duty, 120/240 Vac on opposite contact.

Installation



Disconnect power supply before beginning installation to prevent electrical shock or equipment damage.

- NOTE: The wire colors of the 220736A,B auxiliary switches are different from those of factory installed auxiliary switches. See Tables 1-3 and Fig. 2.
 - 1. When replacing a Modutrol motor determine origi-

nal motor model number and refer to Tables 1-3.

2. From the appropriate table, determine switch leadwire color coding and configuration (N.O. and N.C. contacts).

3. For wiring convenience, make note of the difference between the replaced motor and field addable switch color coding.

4. Disconnect and remove the motor to be replaced.

5. Remove the cover from the wiring box of the TRADELINE Modutrol IV motor.

6. Check motor for proper stroke setting. Adjust stroke as needed. Refer to motor specification sheet.

7. Position the switch assembly above the motor as shown in Fig. 1.

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.

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 and Building Controls Division Sales Office. (Check white pages of your phone di-

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8. Lower the switch assembly into place and tighten the two mounting screws, making sure the switch followers are properly aligned with the inner and outer cams in the motor. The 220736A includes only the switch for the outer cam.

9. Run all switch leadwires through slots to line voltage section (at auxiliary end of motor), where connections to auxiliary equipment should be made with solderless connectors.

CAUTION

The auxiliary switches in the Series 91 low and medium torque TRADELINE Modutrol IV Motors operate opposite to those in the Modutrol motors listed in Tables 1 and 2, page 4. When wiring the switches, connect the new switches to the controlled equipment as shown in the appropriate table.

Fig. 1—Position of auxiliary switch(es) in motor.



TABLE 1—AUXILIARY SWITCH LEADWIRE COLORS FOR LOW AND MEDIUM TORQUE SERIES 91 MOTORS WITH ONE AUXILIARY SWITCH.

	Factory-Instal	Replace with 220736A,B Leadwire				
Left Auxiliary Switch N.O.	Yellow	W/Yellow				Orange
N.C.	Blue	W/Blue				Purple
Com.	Red	W/Red				Red
Right Auxiliary Switch N.O.			B/Yellow		B/Yellow	B/Orange
N.C.			B/Blue	B/Yellow		B/Purple
Com.			B/Red	B/Red	B/Red	B/Red
Motor	M9171B1012 M9171B1020 M9174B1019 M9174B1027 M9174B1035 M934D1026 M934D1059	M734D1053 M9164B M934A1565	M7161B M7164B M734J1072 M934A1433	M9171B1004 M9174B1001 M9174B1043 M934D1000	M9172W M9175W M975B1021 M975B1039	M9164D1009 M9174D1007 M9175D1014 Motors with 220736A,B Auxiliary Switch Kit

^a Wiring should be NEC Class 1 unless power supply meets Class 2 requirements. Tape unused leads. Make certain the current draw of the external circuit is less than contact rating of switch.

^b W/color= white wire with colored tracer. B/color=black wire with colored tracer.

color = solid color wire.

TABLE 2—AUXILIARY SWITCH LEADWIRE COLORS FOR LOW AND MEDIUM TORQUE SERIES 91 MOTORS WITH TWO AUXILIARY SWITCHES.

	Factory-Instal	Replace with 220736A,B Leadwire			
Left Auxiliary Switch					
$\frac{N.O.}{N.G}$	Yellow	W/Blue	W/Yellow	W/Yellow	Orange
N.C.	Blue	XX/D - 1	W/Blue	W/D - 1	Purple
Com.	Red	W/Red	W/Red	W/Red	Red
Right Auxiliary					
Switch N O	B/Blue		B/Vellow	B /Vellow	B/Orange
$\frac{\mathbf{NO.}}{\mathbf{NC}}$	B/Vellow	B/Vellow	B/Rlue	D/ I Chow	B/Purnle
Com.	B/Red	B/Red	B/Red	B/Red	B/Red

^a Wiring should be NEC Class 1 unless power supply meets Class 2 requirements. Tape unused leads. Make certain the current draw of the external circuit is less than contact rating of switch.

b W/color= white wire with colored tracer.
B/color=black wire with colored tracer.
color = solid color wire.

TABLE 3—AUXILIARY SWITCH LEADWIRE COLORS FOR ALL MOTOR SERIES EXCEPT LOW AND MEDIUM TORQUE SERIES 91 (See Tables 1 and 2).

		Factor	Replace with 220736A,B Leadwire					
Left	N.O.	Blu	ie	Blu	e		W/Yellow	Purple
Auxiliary	N.C.	Yel	llow	Yel	low		W/Blue	Orange
Switch	Com.	Ree	d	Rec	1		W/Red	Red
Right	N.O.			B/B	lue	B/Yellow		B/Purnle
Auxiliary	N.C.			B/Y	ellow			B/Orange
Switch	Com.			B/R	led	B/Red		B/Red
Motor		M445A M644E M644L M845A M845E M941C M944B M944C M944G M944G M944H M954C M955C M955E	M4182B M4185B M4185E M4186H M4186L M6161B M6184B M6194B M6194E M6282B M6282E M6284B M6284B M6285B M6294B M8182B M8182B M8185B M9181B M9184E M9184E M9185E M9194E M9481E M9484E	M644D M744T M744Y M745T M745Y M941D M944D M944D M944E M944S M945C M945D M954B M954D M955F	M6181F M6182F M6184F M6194F M6281F M6284C M6284C M6284C M7281Q M7281Q M7284Q M7284Q M7284Q M7285C M7285Q M9181C M9182C M9184C M9184F M9185C M9481F M9484F	M9182W	M8175B M865B	M6184D1035 M6194D1017 M6284D1000 M6285A1005 M6285A1013 M6294D1008 M8185D1006 M9184D1013 M9184D1021 M9185D1004 M9194D1003 Motors with 220736A,B Auxiliary Switch Kit

^a Wiring should be NEC Class 1 unless power supply meets Class 2 requirements. Tape unused leads. Make certain the current draw of the external circuit is less than contact rating of switch.

b W/color = white wire with colored tracer.
B/color = black wire with colored tracer.
color = solid color wire.

WIRING

Disconnect all power supplies to de-energize auxiliary switch before servicing.

All wiring must comply with local codes and ordinances. Do not exceed switch ratings of auxiliary switches.

Fig. 2—Auxiliary Switch Wiring Diagram.



Setting and Adjustments

AUXILIARY SWITCHES

The auxiliary switches are spdt switches that are actuated by adjustable cams. The cams are factory mounted on the motor shaft at the power end of the motor. The settings of the cams determine the point in motor shaft rotation at which the auxiliary equipment will be switched on or off. These cams can be set to actuate the switches at any angle within the stroke of the motor. All TRADELINE motors include auxiliary switch cams which permit installation of this auxiliary switch kit (220736A, 220736B).

NOTE: When the slow-rise portion of the cam is used, the switching differential is approximately 10° of rotation. When the fast-rise portion of the cam is used, the switch differential is approximately 1° of rotation. Do not use the fast rise portion of the cam if fast cycling of auxiliary equipment is undesirable.

AUXILIARY SWITCH ADJUSTMENT PROCEDURE



FIRE OR EXPLOSION HAZARD CAN CAUSE SEVERE INJURY OR DEATH

When auxiliary switches control combustion equipment, incorrect wiring of the switches can allow the burner to come on at high fire. Check auxiliary switch wiring and cam adjustment before turning on the system. Watch the controlled equipment through one complete cycle. Shut the system down immediately if switches do not correctly sequence the equipment .

CAUTION

- 1. Live circuits are exposed during auxiliary switch adjustment procedure. Always turn off power before adjusting switch cams.
- 2. Do not turn motor shaft by hand or with wrench as damage to the motor can result.

NOTE: The following instructions are for normally closed motors (motor shaft rotates clockwise, as viewed from the power end of the motor, on an increase in signal).

Exact adjustment procedures vary for different TRADELINE motor models. Find your model on the following list. Then proceed to the correct section for that model.

Motor Model	Section
M8185	А
M9164, M9174, M9175	В
M9184, M9185, M9194	С
M6284, M6294	D
M6285	E
M6184, M6194	F

Additional instructions may also be found in the Auxiliary Switch Adjustment section in the specification sheet included with the Modutrol IV Motor.

Review Table 4 and Fig. 3 before adjusting cams. Table 4 applies to both the left and right switches.

TABLE 4—AUXILIARY SWITCH POSITION WITH MOTOR SHAFT ROTATED TO EITHER SIDE OF AUXILIARY SWITCH OPERATING POINT, AS VIEWED FROM POWER END.

			Auxiliary Switch Contact Positions			
			N.O. Contact ^a		N.C. Contact ^a	
			(Red and Purple Leads)		(Red and Orange Leads)	
			Shaft	Shaft	Shaft	Shaft
			Rotated	Rotated	Rotated	Rotated
			ccw of	cw of	ccw of	cw of
			Switch	Switch	Switch	Switch
Motor	Cam	Switch	Operating	Operating	Operating	Operating
Туре	Arrangement	Differential	Point	Point	Point	Point
TRADELINE,	Red inner	1°	Closed	Open	Open	Closed
low and	cam, blue					
medium	outer cam	10°	Open	Closed	Closed	Open
torque, series 91						
All other	Blue inner	1°	Open	Closed	Closed	Open
TRADELINE	cam, red					
motors	outer cam	10°	Closed	Open	Open	Closed

^a cw = clockwise

ccw = counterclockwise

To turn the cams, insert small screwdriver (1/8" or 3 mm blade) through wiring box into slot on cam and move the screwdriver at the top. Refer to Fig. 3. Each division on the cam represents 15° of motor rotation.

A) Two position motors (M8185):

1. Turn off power and remove cover of wiring box.

2. Determine amount of shaft rotation, in degrees, desired before switch is energized.

3. Note the position of the cam slots and, with screwdriver, rotate the cam to the desired position for switch

Fig.. 3—Auxiliary switch adjustment.

action. Each division on the cam represents 15° of motor rotation. Therefore, if 60° of motor rotation is desired before switch operates, rotate the cam 4 divisions from the reference point.

4. Connect auxiliary equipment to auxiliary switch leads. See Wiring section.

5. Turn on power and check for proper switch differential and switching of auxiliary equipment by driving the motor through full stroke (in both directions). If necessary repeat steps 3 and 5 until correct switching action is obtained.

6. Replace cover of wiring box.



NOTE: Cams shown separately to provide better view of inner cam.



Fig. 4—Auxiliary switch adjustment for low and medium torque, Series 91 motors.



ed

M 851

B) Low and Medium Torque, Series 91 Modulating (Proportional) Motors (M9164, M9174, M9175):

1. Turn off power and remove cover of wiring box.

2. Disconnect controller from motor.

MOTORS

3. Connect 135 ohm potentiometer to terminals R,W, and B as shown in Fig. 4. Restore power.

4. Adjust potentiometer to drive motor to the position where auxiliary equipment is to be switched.

5. For switch differential of 1°, check continuity of auxiliary switch N.O. (Red to Purple) contacts and, with screwdriver, rotate cam as follows:

- a. If contacts are open, rotate cam counterclockwise until N.O. (Red to Purple) contacts close.
- b. If contacts are closed, rotate cam clockwise until N.O. (Red to Purple) contacts open.

6. For switch differential of 10°, the cams must be rotated with screwdriver approximately 180° prior to setting switching action. Refer to Fig. 3. Check continuity of the N.O. (Red to Purple) contacts and, with screwdriver, rotate cam as follows:

- a. If contacts are open, rotate cam clockwise until N.O. (Red to Purple) contacts close.
- b. If contacts are closed, rotate cam counterclockwise until N.O. (Red to Purple) contacts open.

Fig. 5—Auxiliary switch adjustment for high and extra high torque Series 91 motors.



7. Check for proper switch differential and switching of auxiliary equipment by driving the motor through full stroke (in both directions) using the potentiometer. If necessary repeat steps 5 and 7 for 1° differential, or 6 and 7 for 10° differential until correct switching action is obtained.

8. Turn off power and disconnect potentiometer.

9. Connect auxiliary equipment to auxiliary switch leads. See Wiring section.

10. Reconnect controller and power supply to motor.

11. Replace cover of wiring box. Turn on power.

C) High and Extra High Torque, Series 91 Modulating (Proportional) Motors (M9184, M9185, M9194):

1. Turn off power and remove cover of wiring box.

2. Disconnect controller from motor.

3. Connect 135 ohm potentiometer to terminals R,W, and B as shown in Fig. 5. Restore power.

4. Adjust potentiometer to drive motor to the position where auxiliary equipment is to be switched.

5. For switch differential of 1°, check continuity of auxiliary switch N.O. (Red to Purple) contacts and, with screwdriver, rotate cam as follows:

- a. If contacts are open, rotate cam clockwise until N.O. (Red to Purple) contacts close.
- b. If contacts are closed, rotate cam counterclockwise until N.O. (Red to Purple) contacts open.

6. For switch differential of 10°, the cams must be rotated with screwdriver approximately 180° prior to setting switching action. Refer to Fig. 3. Check continuity of the N.O. (Red to Purple) contacts and, with screwdriver, rotate cam as follows:

Fig. 6—Auxiliary switch adjustment for M6284, M6294 motors



a. If contacts are open, rotate cam counterclockwise until N.O. (Red to Purple) contacts close.

b. If contacts are closed, rotate cam clockwise until N.O. (Red to Purple) contacts open.

7. Check for proper switch differential and switching of auxiliary equipment by driving the motor through full stroke (in both directions) using the potentiometer. If necessary repeat steps 5 and 7 for 1° differential, or 6 and 7 for 10° differential until correct switching action is obtained.

8. Turn off power and disconnect potentiometer.

9. Connect auxiliary equipment to auxiliary switch leads. See Wiring section.

10. Reconnect controller and power supply to motor.

11. Replace cover of wiring box. Turn on power.

D) Series 62 Floating Control with Feedback Non-Spring Return Motors (M6284, M6294):

1. Turn off power and remove cover of wiring box.

2. Disconnect controller from motor.

3. Connect 24 Vac power through switches or directly to quick-connect terminals to drive motor to position where auxiliary equipment is to be switched. Refer to Fig. 6. Turn on power. Connecting power to terminals 2 and 3 will drive motor in the open direction, connecting power to terminals 3 and 1 will drive the motor in the closed direction. To stop the motor at desired position, remove power from motor. Motor will remain at this position until power is restored.

4. For switch differential of 1° , check continuity of auxiliary switch N.O. (Red to Purple) contacts and, with screwdriver, rotate cam as follows:

- a. If contacts are open, rotate cam clockwise until N.O. (Red to Purple) contacts close.
- b. If contacts are closed, rotate cam counterclockwise until N.O. (Red to Purple) contacts open.

5. For switch differential of 10° , the cams must be rotated with screwdriver approximately 180° prior to setting the switching action. Refer to Fig. 3. Check continuity of the N.O. (Red to Purple) contacts and rotate cams as follows:

- a. If contacts are open, rotate cam counterclock
 - wise until N.O. (Red to Purple) contacts close.
- b. If contacts are closed, rotate cam clockwise until N.O. (Red to Purple) contacts open.

6. Check for proper switch differential and switching of auxiliary equipment by driving the motor through full stroke (in both directions). If necessary repeat steps 4 and 6 for 1° differential, or 5 and 6 for 10° differential until correct switching action is obtained.

7. Disconnect power from switches or quick-connect terminals.

8. Connect auxiliary equipment to auxiliary switch leads. See Wiring section.

- 9. Reconnect controller and power supply to motor.
- 10. Replace cover of wiring box.





E) Series 62 Floating Control with Feedback Spring Return Motors (M6285):

- 1. Turn off power and remove cover of wiring box.
- 2. Disconnect controller from motor.

3. Connect 24 Vac power and switches to drive motor to position where auxiliary equipment is to be switched. Refer to Fig. 7. Turn on power. Jumpering terminals 4 and 2 will drive motor in the open direction, jumpering terminals 4 and 1 will drive the motor in the closed direction. To stop the motor at desired position, disconnect jumpers. Motor will remain at this position until connection is restored. Removing power at this point will cause motor to spring return to closed position.

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4. For switch differential of 1°, check continuity of auxiliary switch N.O. (Red to Purple) contacts and, with screwdriver, rotate cam as follows:

- a. If contacts are open, rotate cam clockwise until N.O. (Red to Purple) contacts close.
- b. If contacts are closed, rotate cam counterclockwise until N.O. (Red to Purple) contacts open.

5. For switch differential of 10° , the cams must be rotated with screwdriver approximately 180° prior to setting the switching action. Refer to Fig. 3. Check continuity of the N.O. (Red to Purple) contacts and, with screwdriver, rotate cam as follows:

- a. If contacts are open, rotate cam counterclockwise until N.O. (Red to Purple) contacts close.
- b. If contacts are closed, rotate cam clockwise until N.O. (Red to Purple) contacts open.

6. Check for proper switch differential and switching of auxiliary equipment by driving the motor through full stroke (in both directions). If necessary, repeat steps 4 and 6 for 1° differential, or 5 and 6 for 10° differential until correct switching action is obtained.

7. Disconnect power from switches or quick-connect terminals.

8. Connect auxiliary equipment to auxiliary switch leads. See Wiring section.

9. Reconnect controller and power supply to motor.

10. Replace cover of wiring box.

F) Series 61 Floating Control Non-Spring Return Motors (M6184, M6194):

1. Turn off power and remove cover of wiring box.

2. Disconnect controller from motor.

3. Connect 24 Vac power and switches to drive motor to position where auxiliary equipment is to be switched. Refer to Fig. 8. Turn on power. Jumpering terminals R and B will drive motor in the open direction, jumpering terminals R and W will drive the motor in the closed direction. To stop the motor at desired position, disconnect jumpers. Motor will remain at this position until connection is restored.

4. For switch differential of 1° , check continuity of auxiliary switch N.O. (Red to Purple) contacts and rotate cams as follows:

- a. If contacts are open, rotate cam clockwise until N.O. (Red to Purple) contacts close.
- b. If contacts are closed, rotate cam counterclockwise until N.O. (Red to Purple) contacts open.

Fig. 8—Auxiliary switch adjustment for M6184, M6194 motors.



5. For switch differential of 10° , the cams must be rotated approximately 180° prior to setting the switching action. Refer to Fig. 3. Check continuity of the N.O. (Red to Purple) contacts and rotate cams as follows:

- a. If contacts are open, rotate cam counterclockwise until N.O. (Red to Purple) contacts close.
- b. If contacts are closed, rotate cam clockwise until N.O. (Red to Purple) contacts open.

6. Check for proper switch differential and switching of auxiliary equipment by driving the motor through full stroke (in both directions). If necessary repeat steps 4 and 6 for 1° differential, or 5 and 6 for 10° differential until correct switching action is obtained.

7. Disconnect 24 V power and switches.

8. Connect auxiliary equipment to auxiliary switch leads. See Wiring section.

- 9. Reconnect controller and power supply to motor.
- 10. Replace cover of wiring box.

Checkout

WARNING

FIRE OR EXPLOSION HAZARD CAN CAUSE SEVERE INJURY OR DEATH

When auxiliary switches control combustion equipment, incorrect wiring of the switches can allow the burner to come on at high fire. Check auxiliary switch wiring and cam adjustment before turning on the system. Watch the controlled equipment through one complete cycle. Shut the system down immediately if switches do not correctly sequence the equipment. Use the controller to run the motor fully open and then fully closed. Make sure that the auxiliary equipment starts and stops at the desired points in motor rotation. When checkout is complete, return the controller to the desired setting.

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