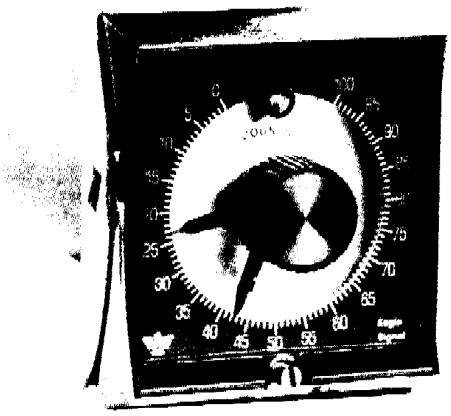
COUNT CONTROL

HZ170

HZ170 SERIES CYCL-FLEX® COUNTER
HZ170/172 - Model 11
HZ171 - Model 8



The HZ170 Series is an electromechanical counter housed in the standard CYCL-FLEX® case. The unit is available in three count ranges, 12, 40, and 100. The count set point is adjustable by a knob on the front of the unit.

All three count ranges use a solenoid operated pawl feed count motor and an electromechanical clutch.

A progress pointer, indicating the count progression, advances clockwise, from set point to zero.

Output sequences are controlled by two sets of SPDT instantaneous contacts and two delayed SPDT switches. The delayed switches transfer at count out.

The instantaneous and delayed contacts may be interconnected to supply output sequences shown elsewhere in this bulletin.

As an option, the HZ170 is available with a reverse action clutch. Units with reverse action clutch do not reset on power failure.

OPERATION

The HZ170 Series Counter is an impulse motor driven unit with standard or reverse clutch operation.

When power is applied to the clutch terminals on standard units, the clutch engages and instantaneous contacts transfer, enabling the counter to receive and register counts. A 40ms pulse to the count motor will register a count by moving the count progress pointer toward the zero point on the dial. When the progress pointer reaches zero the unit is counted out and a set of delayed switches transfer. Additional counts will not be registered until the unit is reset. Removal of power from the clutch terminals resets the counter.

Units with 40 count and 100 count ranges have two delayed action switches. By adjustment of set screws on the switch trip lever, a transfer differential between the two switches can be obtained. The 40 count range switch differential can be adjusted for one count early transfer before count out. The 100 count range differential is two counts.

On reverse action clutch operation, removal of power from the clutch terminals enables the counter to receive counts.

SPECIFICATIONS

Count Ranges

Symbol	Count Range	Minimum Setting
0	2 - 100	2
1	1 - 12	1
2	1 - 40	1

Count Speed
500 counts per minute maximum

Accuracy
100%

Reset Time
500 ms at maximum setting

Input Requirements
Stepping motor - 40 ms "ON" time; 80 ms "OFF" time
Clutch coil - 50 ms Pull in

Voltage and Frequency
120 VAC (+10 -15%) 50/60Hz
240 VAC (+10 -15%) 50/60Hz

Burden
Stepping motor - 26 V.A., Inrush
Clutch coil - 16 V.A. Inrush Maintained, 10.5 V.A.

Output Rating
10 Amperes 120 Volt 50/60Hz
5 Amperes 240 Volt 50/60Hz

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

Laboratory Testing
U.L. Recognition E-96337
C.S.A. Certification LR-26861

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A Mark IV Industries Company
8004 Cameron Road, Austin, Texas 78753 U.S.A.

COUNTER OPERATION

INSTANTANEOUS CONTACTS 6-7 A-C are open and 6-8 A-B closed when the counter is in reset. Contacts 6-8 A-B are open and 6-7 A-C closed when the counter is in the counting or counted out position.

DELAYED CONTACTS 4-3 and 9-10 close, 4-5 and 9-11 open when the red progress pointer reaches zero. Contacts 4-5 and 9-11 close, 4-3 and 9-10 open when the counter is reset.

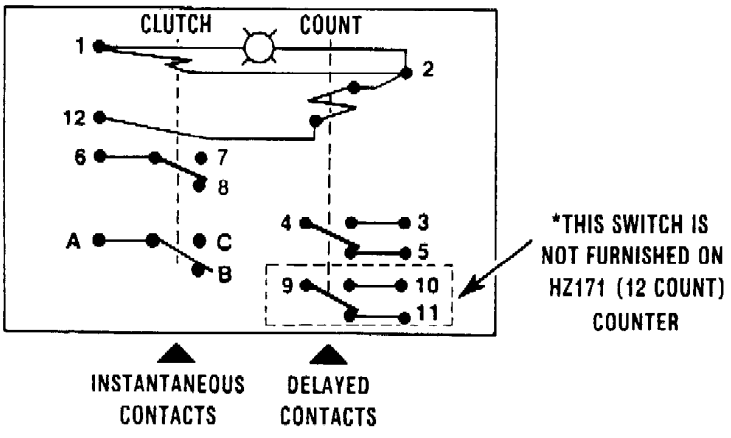
NEON PILOT LIGHT is built into dial to indicate counter clutch coil is energized.

SWITCH	RESET	COUNTING	COUNT OUT
6 - 7	O	X	X
6 - 8	X	O	O
A - C	O	X	X
A - B	X	O	O
4 - 5	X	X	O
4 - 3	O	O	X
9 - 11*	X	X	O
9 - 10*	O	O	X
HZ170A6 Clutch Coil	Deener.	Ener.	Ener
HZ170A601 Clutch Coil	Ener.	Deener.	Deener.
Switches trip to count-out position on last deenergized stroke of count solenoid.			

X — Switch Closed O — Switch Open

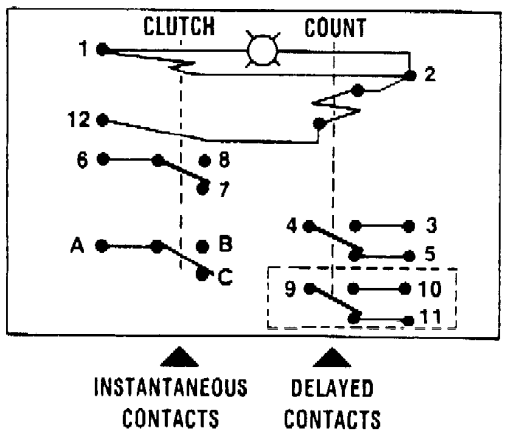
SCHEMATIC DIAGRAM

Standard Clutch



*THIS SWITCH IS NOT FURNISHED ON HZ171 (12 COUNT) COUNTER

Reverse Clutch (01)



NOTE: Counter has a positive toothed clutch. Setting adjustments must be made with clutch released.

WIRING DIAGRAMS

Bold Lines are Internal Wiring

STANDARD HZ170 & HZ172 CYCL-FLEX® COUNTER

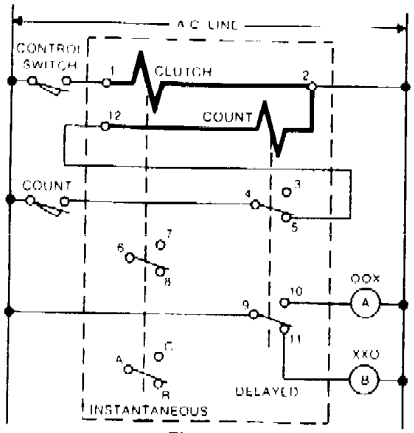


Figure 1

Sustained Control Switch. Close to Start, Open to Reset — Simple delayed closing and opening of load circuits.

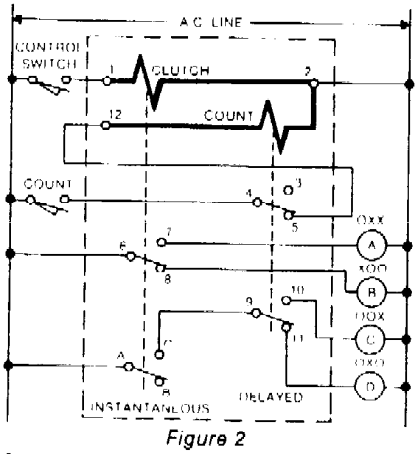


Figure 2

Sustained Control Switch. Close to Start, Open to Reset — Additional load circuit operations.

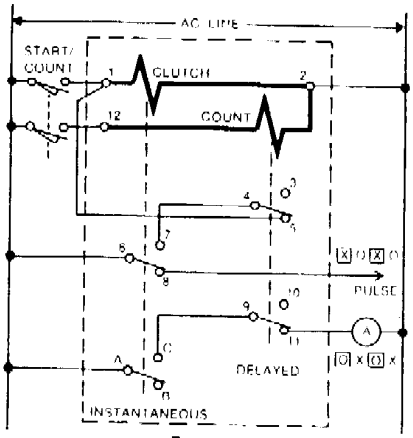


Figure 3

Automatic Repeat Cycle — Started by incoming count switch. Resets automatically. Provides a pulse to start a timer or other device every pre-selected number of counts.

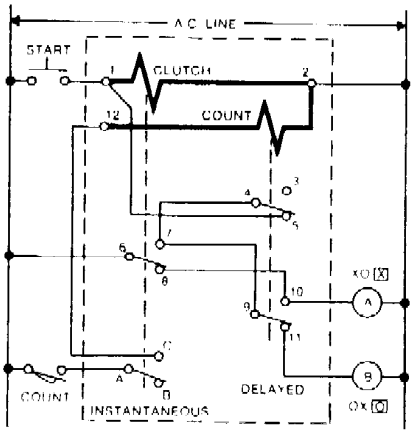


Figure 4

Momentary Start — Close to start, resets automatically.

REVERSE START HZ170-01 SERIES CYCL-FLEX® COUNTER

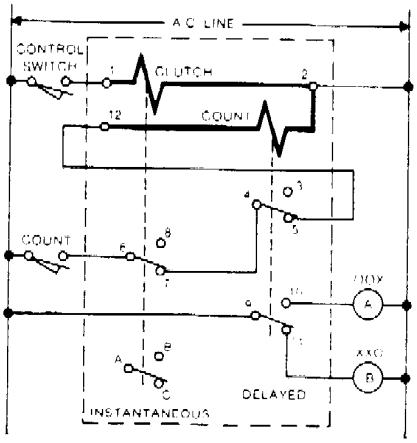


Figure 5

Open Control Switch to Start — Close for one-half second minimum to reset. Simple delayed closing and opening of load circuits.

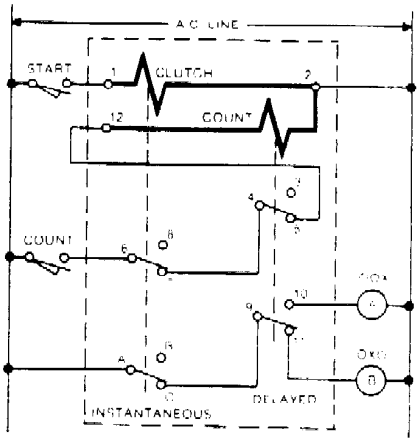
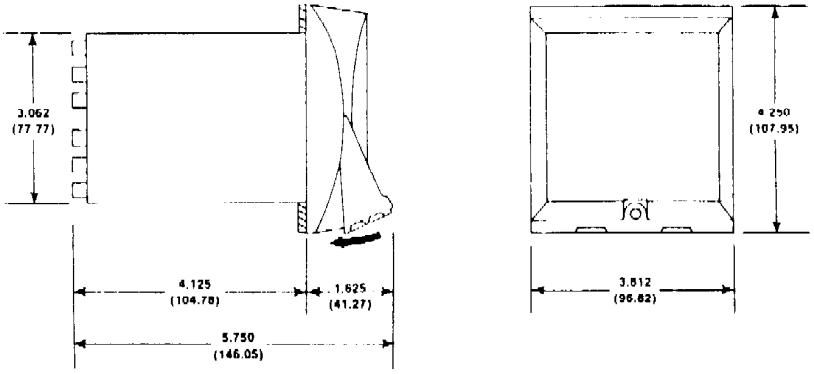


Figure 6

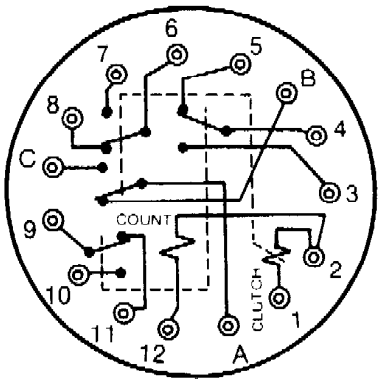
Open Control Switch to Start — Close for one-half second minimum to reset. Additional load circuit operations.

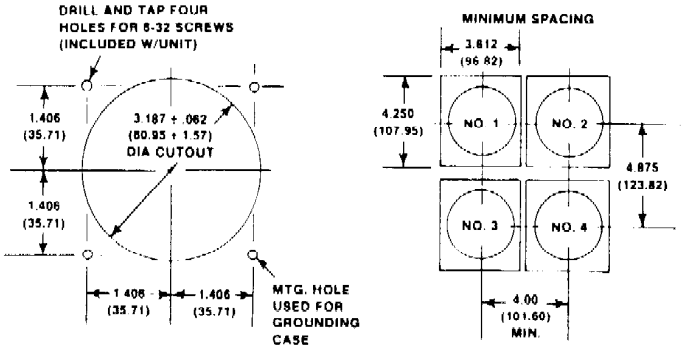
COUNT CONTROL

MOUNTING DIMENSIONS



TERMINALS AND WIRING DIAGRAM ON REAR OF CASE





ORDERING INFORMATION

HZ17 0 A6 01

BASIC UNIT

SYMBOL	COUNT RANGE
0	2 - 100
1	1 - 12
2	1 - 40

VOLTAGE/FREQUENCY

SYMBOL	VOLTAGE & HZ
A6	120 VAC 50/60 Hz
B6	240 VAC 50/60 Hz

FEATURES

SYMBOL	DESCRIPTION
01	Reverse Clutch
02	Revised for Mounting in NEMA VII Explosion Proof Enclosure HN384
05	Chrome Plated Bezel
07	Dial Lock
15	Stainless Steel Handle and Housing Plate
92	Enclosed in HN384 Explosion-Proof Cabinet

Request Bulletin 726E for counter parts list.

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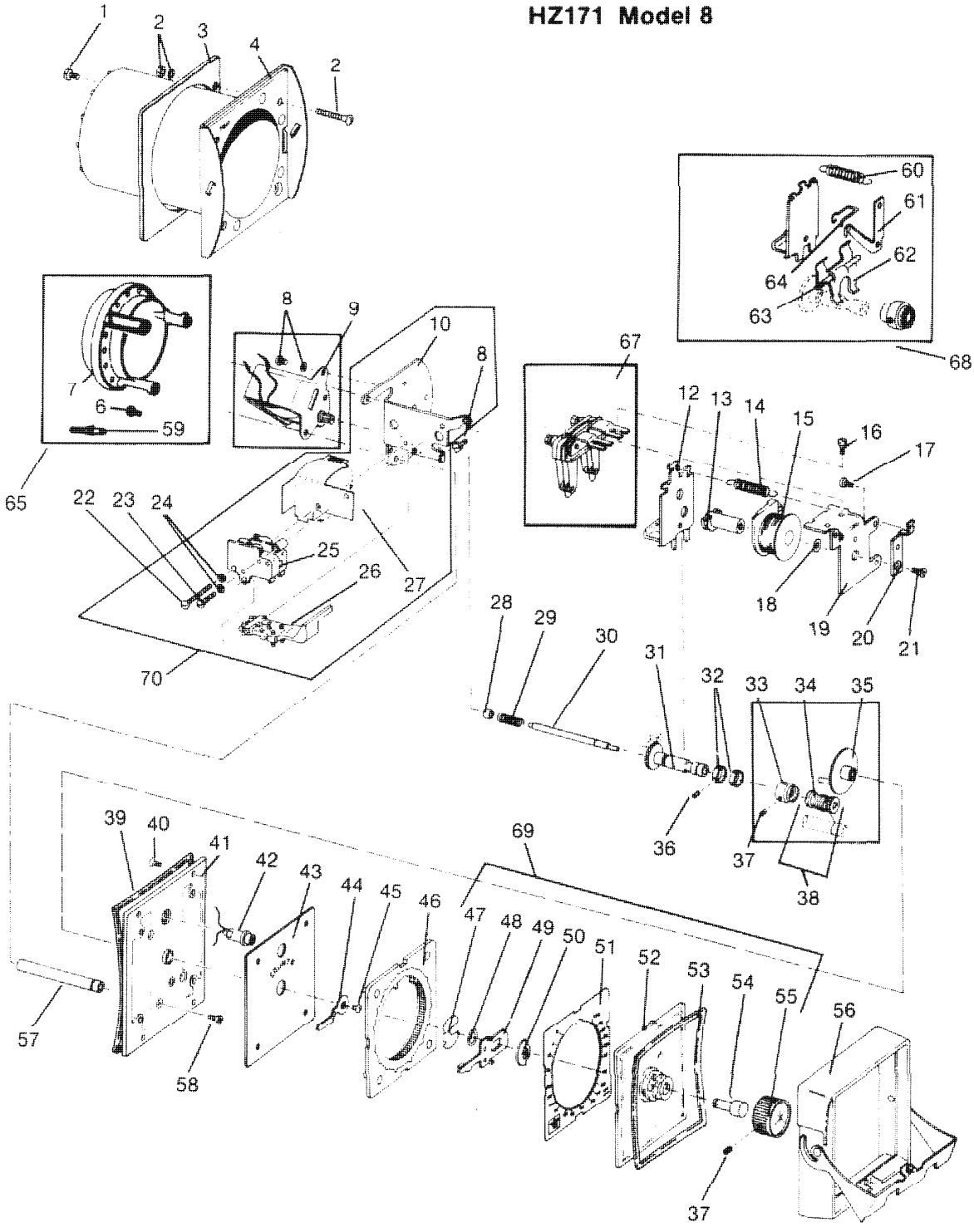
PARTS LIST
HZ170/HZ172 Model 11
HZ171 Model 8



1. 0123214 Terminal Screw
2. 0196403 Screw Pack
3. PBG-58 Gasket
4. HP50-130 (15 Pin) Housing
6. 0128717 6-32 x 7/16 Pan Head Screw
7. PDM-590 (15 Pin) Terminal Ring
8. 0144930 4-40 x 1/4 Sems
9. HZ170-50 120V 50/60Hz HZ170/HZ172 Count Motor
   HZ171-50 120V 50/60Hz HZ171 Count Motor
   HZ170-51 240V 50/60Hz HZ170/HZ172 Count Motor
   HZ171-51 240V 50/60Hz HZ171 Count Motor
10. H-11535 Motor Mounting Plate
12. HP50-62 Armature and Fork
13. HP50-6 Coil Core Assembly
14. PES-166 Armature Spring
15. HP50-4 120V 50/60Hz Clutch Coil
    HP50-22 240V 60Hz Clutch Coil
    HP50-86 240V 50Hz Clutch Coil
16. 0123213 6-32 x 3/16 Binding Head Screw
17. 0132709 6-32 x 3/8 Taptite Screw
18. H-1282 Washer
19. H-7634 Magnet Frame
20. H-7521 Spring Holder
21. 0119006 8-32 x 3/8 Brass Screw
22. 0116013 2-56 x 13/16 RHMS
23. 0116014 2-56 x 1/2 RHMS
24. 0157001 #2 Shakeproof Washer
25. PAS-561 HZ170/HZ172 Switch
    PAS-562 HZ171 Switch
26. HP50-108 HZ170/HZ172 Switch Actuator
    HZ171-12 HZ171 Switch Actuator
27. PZA-79 Insulation
28. H-8833 Bushing
29. PES-167 Spring
30. H-8942 Clutch Shaft
31. HZ170-116 HZ170/HZ172 Clutch Spool Assy
    HZ171-115 HZ171 Clutch Spool Assy
32. H-7649 Collar
33. HZ170-17 Clutch Disc Assy
34. PES-312 Spring
35. HZ170-104 HZ170 Pointer Shaft & Gear Assy
    HZ171-108 HZ171 Pointer Shaft & Gear Assy
    HZ172-104 HZ172 Pointer Shaft & Gear Assy
36. 0135307 2-56 x 3/32 Spline Set Screw
37. 0140113 5-40 x 1/8 Set Screw
38. HZ170-15 HZ170 Reset Clutch Assy
    HZ171-7 HZ171 Reset Clutch Assy
    HZ172-7 HZ172 Reset Clutch Assy

LUBRICATION GUIDE

Light instrument oil on all bearings and count plunger/ratchet assembly.
Clean and Lubricate:
Light Duty: Every 6 months
Heavy Duty: Every 3 months

39. 1105-0281 Gasket
40. 0118817 6-32 x 1/4 FHMS
41. HP50-17 Plate
42. PFP-118 120V 50/60Hz Lamp Assy
    PFP-119 240V 50/60Hz Lamp Assy
43. PAN-1055 Background Dial
44. H-10443 Progress Pointer
45. 0123212 6-32 x 1/8 Binding Head Screw
46. H-11789 HZ170 Index Ring
    H-11791 HZ171 Index Ring
    H-11790 HZ172 Index Ring
47. PES-306 Index Spring
48. H-9161 Phos. Bronze Washer
49. H-8859 Setting Pointer
50. H-8863 Disc
51. PAN-1058 HZ170 Dial
    PAN-1056 HZ171 Dial
    PAN-1057 HZ172 Dial
52. H-12194 Window
53. PBG-83A Gasket
54. H-8862 Setting Pointer Shaft
55. PBK-83 Knob
56. HP50-290 Bezel Assy
57. H-7621 Post
58. 0118817 6-32 x 1/4 FHMS
59. PAT-148 Terminal Insert
60. PES-253 Spring (Armature)
61. H-7655 Bracket
62. H-7823 Lift Fork
63. H-7656 Shaft
64. PES-339 Spring Clip
65. HP50-128 Terminal Ring Kit

NOTE: When soldering leads to PAT-148 terminals, do not allow solder to creep into barrel. This will counteract the purpose of the free floating terminal.

67. HP50-140 Contact Stack without wires. For replacement with wires, order HP50-129.
68. HZ170-12 Reverse Clutch -01
69. HZ170-96 Window, Knob and Pointer Assembly
70. Replacement Switch Kit
    HZ170-101 HZ170/HZ172 (Bulletin 726C-1)
    HZ171-13 HZ171 (Bulletin 726C-2)

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A Mark IV Industries Company
8004 Cameron Road, Austin, Texas 78753 U.S.A.

Cycl-Flex Counter HZ17____
"01" Feature Installation Instructions

1. Change position of collars on clutch shaft, as shown in Figure 1, using #2 Bristol, PST-24 wrench.
2. Install parts 1 - 4 shown in Figure 2 in the conventional manner as on the Cycl-Flex timer.
3. Install part #5 as shown in Figure 3.
4. The instantaneous contact block may require adjustment for proper contact operation. (Loosen 2 exposed screws on top of counter to accomplish this adjustment.)

INSTALLATION COMPLETE

Parts included in HZ170-12 reverse clutch kit:

1. H-7655 Support Bracket
2. H-7823 Lift Fork
3. H-7656 Shaft
4. PES-253 Spring
5. PES-339 Spring Clip
6. #2 Bristol PST-24 Wrench
7. Instruction Sheet
8. PBD-426 Wiring Label (HZ170, HZ172)
   PBD-1007 (HZ171)
9. 0132713 #6-32 x ½ Phillips Taptite Screw

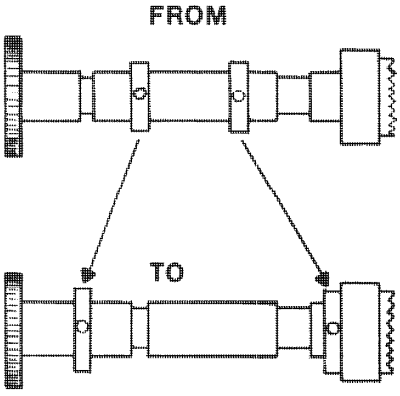

Figure 1

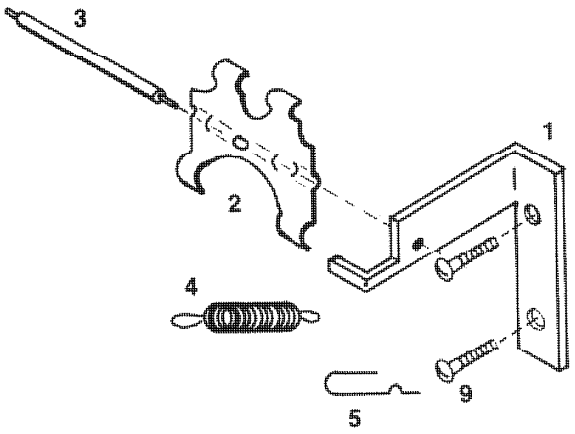

Figure 2

Adjust lower collar to provide maximum of .005" clearance between collar and end of clutch fork tabs.

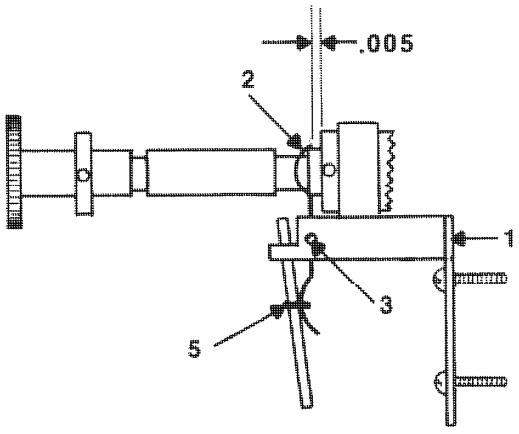

Figure 3

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HZ170-101 REPLACEMENT SWITCH KIT INSTALLATION INSTRUCTIONS

The following instructions apply to the installation of HZ170-101 Replacement Switch Kit.

The HZ170-101 Replacement Switch Kit contains the following parts:

Part No.	Description	No. Req'd
PAS-561	Switch Module	1
H-11535	Motor and Switch Mounting Plate	1
PZA-79	Insulator	1
HP50-108	Switch Actuator Assembly	1
0116013	2-56 x 13/16 RHMS	1
0116014	2-56 x 1/2 RHMS	1
0157001	#2 Shakeproof Lockwasher	2
PAT-167	Terminal	6
PET-12	Vinyl Tubing	.2 Ft.

REPLACEMENT PROCEDURES

To Remove Old Switch (Figure 1)

1. Remove HZ170 counter from case.
2. Rotate pointer to minimum setting of 20 counts.
3. Remove 3 screws securing terminal ring (15) to motor plate (2).
4. Remove 2 screws securing stepping motor (13) and remove motor from plate.
5. Remove (2) 3/4" screws and 2 lockwashers securing switches to motor and switch plate.
6. Remove switch plate, 2 switches, 3 insulators and switch actuator from unit.
7. Remove screw (12) securing motor and switch plate to front casting.
8. Remove screw (11) securing motor and switch plate to post. Remove and discard old motor and switch plate (2).

NOTE: When removing the motor and switch plate, hold clutch shaft to prevent spring (17) from unwinding and clutch shaft sleeve (18) from popping out.

To Install New Switch Kit. (Figure 1)

1. Assemble switch insulator (1) to new motor and switch plate (2) and install into unit.

NOTE: Make sure sleeve (18) on clutch shaft is still in place. If spring (17) on clutch shaft is unwound, it must be re-wound. (See "To Re-wind Clutch Shaft Spring") Secure motor and switch plate (2) to post (19) with flat head screw (11) and to front casting with pan head screw (12).

2. Remove wires from two old switches, noting connections prior to removal. If wires were soldered to switches, solder terminals supplied (PAT-187) (9) to wires, or use Eagle Signal No. PST-21 hand tool to secure.
3. Place vinyl tubing (PET-12) (10) over terminals connected to pins 3 and 10 of terminal ring (15). (Use Hercules 12501 Dilator, if desired).
4. Connect wires with "FASTON" terminals to appropriate terminals on switch module.

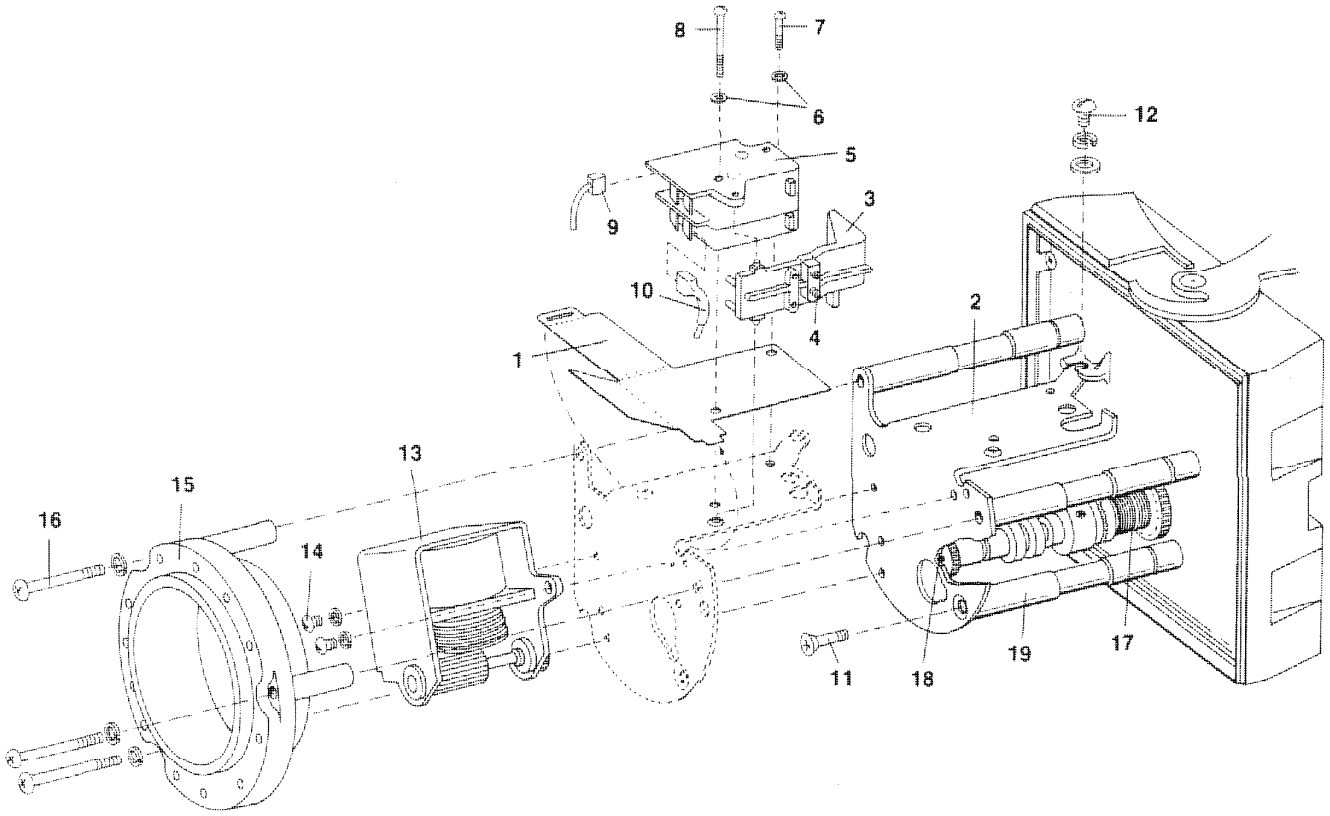
NOTE: Refer to Eagle Signal Bulletin 726 for HZ170 Series wiring diagrams for correct connections.

5. Install replacement switch actuator (3) and switch module (5) onto motor and switch plate (2) and secure with 1/2" (7) and 13/16" screws (8) and lockwashers (6).
6. Secure stepping motor (13) to motor and switch plate (2) with 2 screws (14).
7. Install terminal ring (15) and secure with 3 screws (16).
8. Adjust the switch actuation using the following procedure:
   For the HZ172 (40 ct.) unit: Use a No. 3 Allen wrench (.050" across flats) to adjust 2 screws (4) in actuator to set trip point of switches. Adjust screws so that switches trip and re-set when the rust pointer is between 1 and 0 on the dial.
   For the HZ170 (100 ct.) unit: Adjust screws so that switches trip when the rust pointer is between 1 and 0 and resets between 0 and 2.
   If switch 9-10-11 is to trip one count early (Feature 11), the adjusting screw for the inside switch is turned in so switch trips with the rust pointer between 2 and 1 on the dial.

To Rewind Clutch Shaft Spring (If Necessary)

Set pointer to 0 count. With clutch shaft gear unmeshed with the pointer gear, wind spring until resistance is felt (approximately 5 to 7 turns) then loosen one turn and mesh with gear on pointer shaft.

If this is required on the HZ170 (100 ct.) unit, then clutch may need adjustment after stepping motor has been installed. To adjust clutch, loosen two set screws on rear side of clutch. Slide clutch shaft forward and, while holding clutch full closed, tighten the two set screws. Check clutch tooth mesh while removing backlash between clutch shaft and motor pinion in both directions. Clutch engagement at point of contact must be in center half of tooth. Readjust if necessary.



LEGEND

1. Switch insulator
2. Motor and switch plate
3. Switch actuator
4. Screws (2)
5. Switch module
6. Lockwashers
7. 1/2" Screw
8. 13/16" Screw
9. Terminals
10. Vinyl tubing
11. Flat Head screw
12. Pan Head screw
13. Stepping motor
14. Screws (2)
15. Terminal ring
16. Screws (3)
17. Clutch shaft spring
18. Clutch shaft sleeve
19. Post

Figure 1

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INSTALLATION INSTRUCTIONS
HP50-129 Relay Contact Stack Replacement Kit for HZ170 Series

The following instructions present the procedure for replacing the contact stack on the HZ170, HZ171 and HZ172.

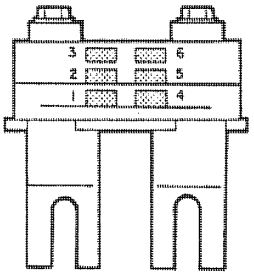

Figure 1

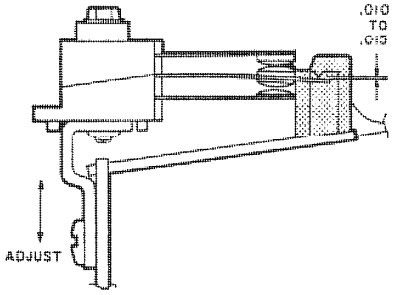

Figure 2

Procedure:

1. Remove the unit from the CYCL-FLEX® case.
2. Remove and retain the black insulating tape wrapped around the terminals of the terminal ring.
3. Cut wires attached to terminals 6, 7, and 8 of the terminal ring. Also, terminals A, B and C if 15 position terminal ring.
4. Remove and retain the armature return spring.
5. Remove and retain 2 screws securing contact stack to clutch coil frame.
6. Remove the contact stack with attached wires.
7. Install new HP50-129 contact stack with 2 retaining screws.
8. Position the movable contact fingers of the contact stack under the shoulder of nylon block (Figure 2).
9. Re-install armature return spring.
10. With the coil deenergized, adjust the contact stack to measure a minimum of .010 clearance between the movable contact finger and the nylon block. Normally open contacts should have .015 minimum clearance.
11. To check closing of normally open contacts, place a .010 feeler gauge between the armature and top of the coil core. The normally open contacts should close when the armature is depressed against the feeler gauge. Contact pressure should be 25 to 35 grams.
12. Tighten the 2 contact stack retaining screws (Figure 2).
13. Remove wires 1, 2 and 3 from the contact stack: also 4, 5 and 6 if 15 terminal ring (Figure 1).

14a. Standard clutch wiring.
Solder wire 6 to exposed end of terminal #8 of terminal ring.
Solder wire 5 to exposed end of terminal #6 of terminal ring.
Solder wire 4 to exposed end of terminal #7 of terminal ring.
On Counter with 15 position terminal ring:
Solder wire 3 to exposed end of terminal #B of terminal ring.
Solder wire 2 to exposed end of terminal #A of terminal ring.
Solder wire 1 to exposed end of terminal #C of terminal ring.

b. "01" Reverse Clutch wiring:
Solder wire 6 to exposed end of terminal #7 of terminal ring.
Solder wire 5 to exposed end of terminal #6 of terminal ring.
Solder wire 4 to exposed end of terminal #8 of terminal ring.
On Counter with 15 position terminal ring:
Solder wire 3 to exposed end of terminal #C of terminal ring.
Solder wire 2 to exposed end of terminal #A of terminal ring.
Solder wire 1 to exposed end of terminal #B of terminal ring.

15. Dress wires around terminal ring and re-apply black insulation tape.
16. Check for correct wiring and wire dress.

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