



DECEMBER 1, 1976

Dwg. 188572, Rev. 2

D-C ELECTRICAL OPERATING SEQUENCE

With the circuit breaker open, the closing springs uncharged, and the control power source energized, and motor disconnect switch closed, operation occurs as follows:

Immediately upon the availability of control power, the spring charging motor (motor) is energized, which in turn charges the closing springs. When the closing springs are charged, limit switch contacts "LSb" are opened, and limit switch contact "LSa" is closed.

2—Operation of the Close Control switch energizes the latch release coil (X) through the circuit breaker auxiliary switch "b" contact, the normally closed lockout relay contact "Yb", and the limit switch contact "LSa". The latch release coil (X) releases the closing latch. The springs then discharge to close the circuit breaker.

3—When the springs discharge, limit switch contacts "LSb" close, and switch contact "LSa" opens.

4—When limit switch contact "LSb" in the motor circuit closes, the spring charging motor is energized, which in turn recharges the closing springs.

5—When the circuit breaker closes, all auxiliary switch "b" contacts open and all auxiliary switch "a" contacts close.

6—When the limit switch contacts "LSb" close, the lockout relay coil (Y) is energized and opens lockout relay contact "Yb", which deenergizes the latch release coil (X). Lockout relay contact "ya" closes, which seals-in the lockout relay coil (Y) as long as the "close" contact is maintained. The purpose of the lockout relay coil (Y) is to prevent pumping of the closing mechanism when closing against a faulted circuit.

7—After the breaker has closed and when the "close" switch is released by the operator, the lockout relay coil (Y) is deenergized. This allows the normally-closed lockout relay contact "Yb" to close, and the normally-open lockout relay contact "Ya" to open.

8—The circuit breaker can be tripped by operation of the trip control switch which energizes the circuit breaker trip coil (TC) through the auxiliary switch "a" contact.

9—The undervoltage device, if furnished, provides a direct acting lock-open and undervoltage tripping feature. This device must be energized to initially close the breaker, and also to maintain the breaker in a closed position.

10—The latch check switch, if furnished, insures that the tripping mechanism must be reset prior to energizing the closing latch release coil (X).

11—The stopping device switch, if applicable, prevents electrical reclosing of the circuit breaker after a manual trip until the stopping device has been manually reset.

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1. Refer to DB-8.2.3.7 Page 10 for legend.
2. Refer to DB-8.2.3.7 Page 4 for operating sequence.

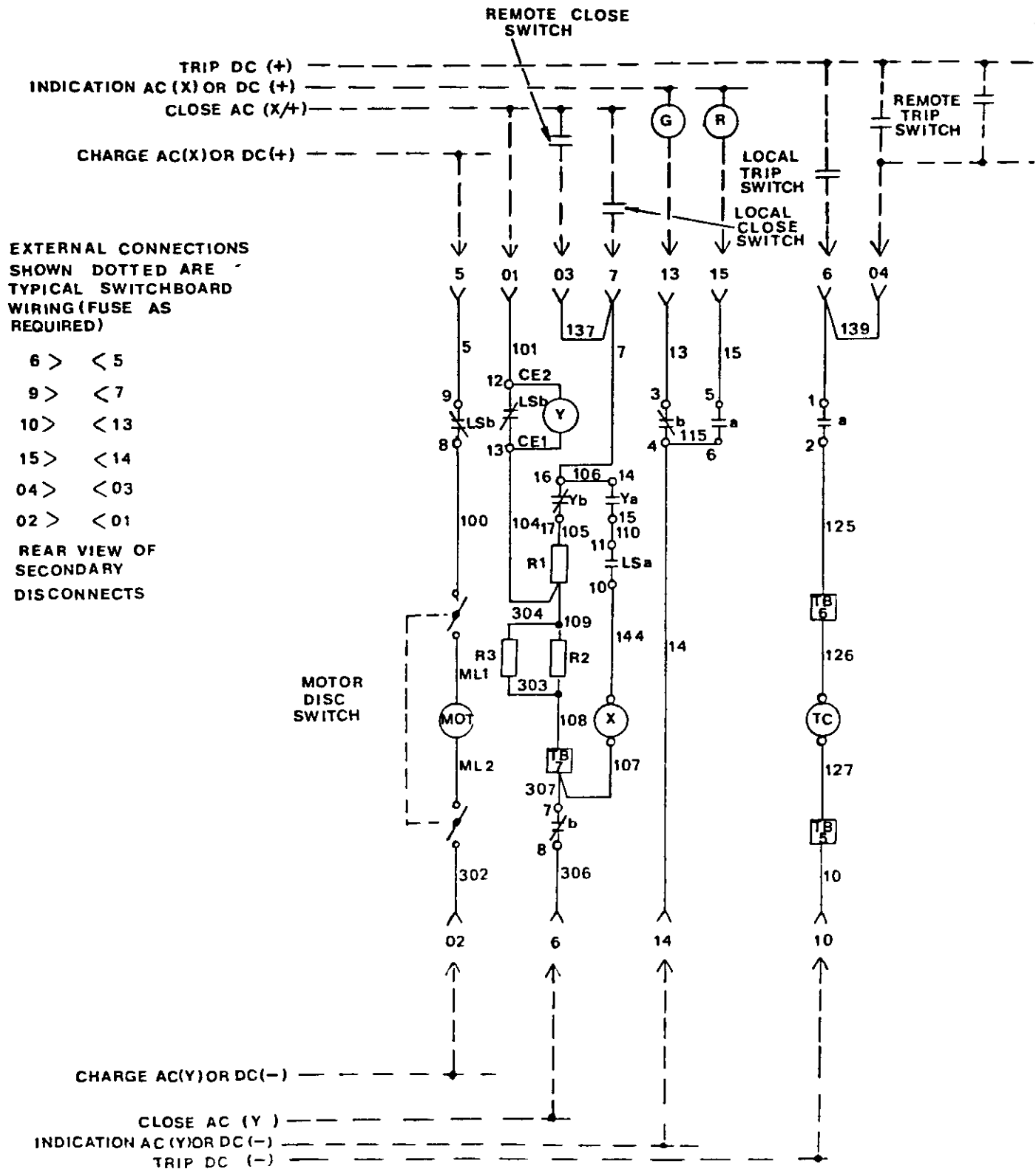


A-C ELECTRICAL OPERATING SEQUENCE

With the circuit breaker open, the closing springs uncharged, and the control power source energized across disconnects 5 and 02 and 01 & 6 and motor disconnect switch closed, operation occurs as follows:

- (1) Immediately upon the availability of control power at secondary disconnects "5" and "02" the spring charging motor (motor) is energized, which in turn charges the closing springs. When the closing springs are charged, limit switch contacts "LSb" are opened, and limit switch contact "LSa" is closed. Also, upon availability of control power at secondary disconnects "01" and "6" and after the closing springs have been charged, the lockout relay coil (Y) will be energized through the circuit breaker auxiliary switch "b" contact and the parallel resistors R2 and R3. The lockout relay will pick up and open contact "Yb" and close contact "Ya".
- (2) Connecting secondary disconnects "03" or "7" to control via operation of the close control switch energizes the latch release coil (X) through the circuit breaker auxiliary switch "b" contact, the normally open lockout relay contact "Ya", and the limit switch contact "LSa". The latch release coil (X) releases the closing latch. The springs then discharge to close the circuit breaker.
- (3) When the springs discharge, limit switch contacts "LSb" close, and limit switch contact "LSa" opens.
- (4) When limit switch contact "LSb" in the motor circuit closes, the spring charging motor is energized, which in turn recharges the closing springs.
- (5) When the circuit breaker closes, all auxiliary switch "b" contacts open and all auxiliary switch "a" contacts close.
- (6) When limit switch contacts "LSb" close, the lockout relay coil (Y) is de-energized and opens lockout relay contact "Ya", which de-energizes the latch release coil (X). Lockout relay contact "Yb" closes, which locks out the lockout coil (Y) as long as the "Close" contact is maintained. This is true because control power maintained on secondary disconnects "03" or "7" with "Yb" contact closed puts resistor R1 in parallel with the "Y" coil. The additional current flow through R2 and R3, and the associated increased voltage drop across R2 and R3 leaves insufficient voltage to pick up the lockout relay. The purpose of the lockout relay coil (Y) is to prevent pumping of the closing mechanism when closing against a faulted circuit.
- (7) After the breaker has closed and when the closing control switch is released by the operator, the lockout relay coil (Y) remains de-energized due to the auxiliary switch "b" contact in the closing circuit being open.
- (8) The circuit breaker can be tripped by operation of the "Remote Trip" switch, which energizes the circuit breaker trip coil (TC) through the auxiliary switch "a" contact.
- (9) The undervoltage device, if furnished, provides a direct acting lock-open and undervoltage tripping feature. This device must be energized to initially close the breaker, and also to maintain the breaker in a closed position.
- (10) The latch check switch, if furnished, insures that the operating mechanism must be reset prior to energizing the closing latch release coil (X).
- (11) The remote mounted capacitor trip feature, if furnished, provides an electrical energy storage network, whereby should a loss of control power occur at the instant of a tripping signal, sufficient energy will be furnished to insure an electrical tripping operation.
- (12) The stopping device switch, if applicable, prevents electrical reclosing of the Circuit Breaker after a manual trip until the stopping device switch has been manually reset.

TYPICAL WIRING DIAGRAM AC CLOSE

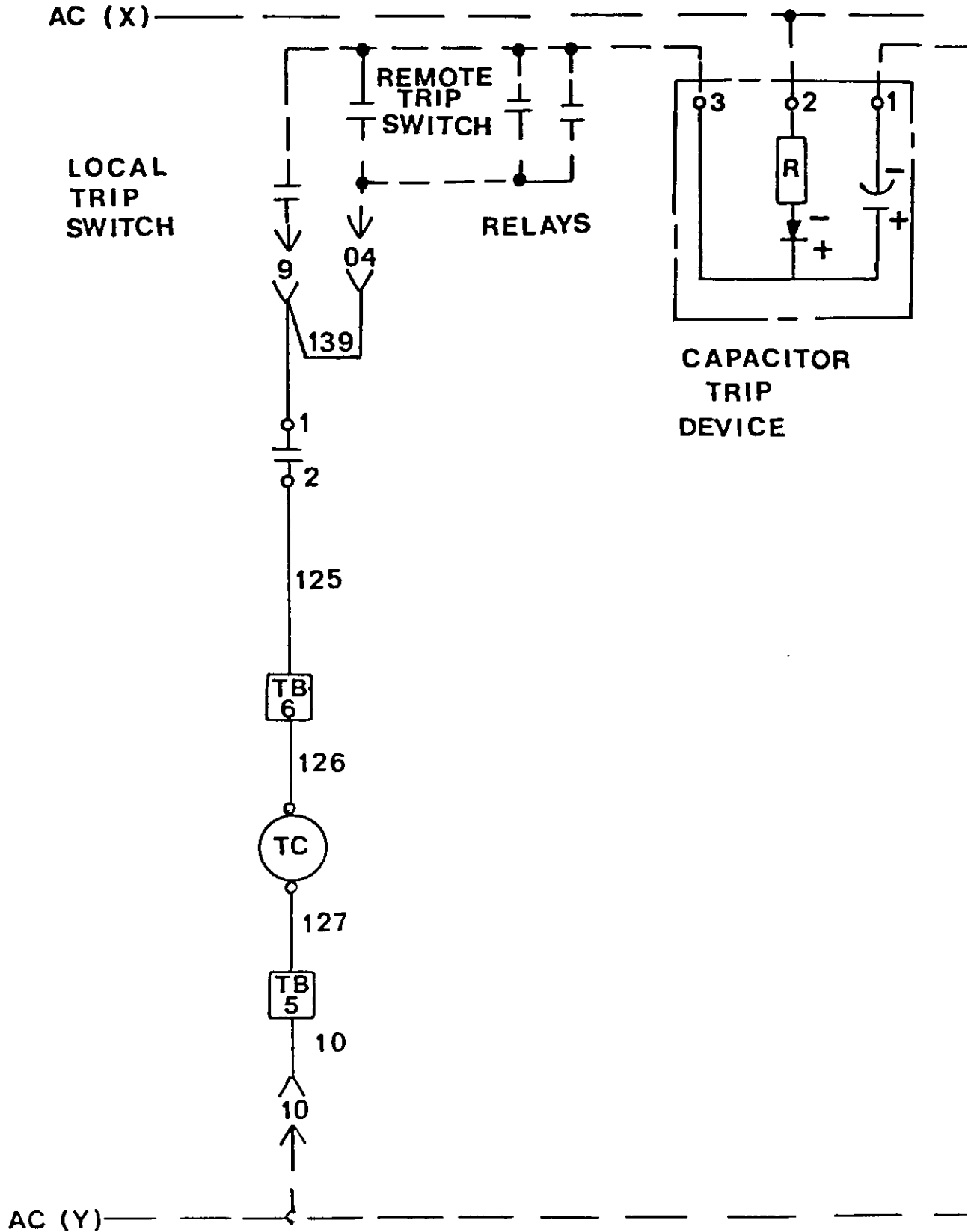


NOTES.

1. Refer to DB-8.2.3.7 Page 10 for legend
2. Refer to DB-8.2.3.7 Page 6 for operating sequence



TYPICAL WIRING DIAGRAM REMOTE MOUNTED CAPACITOR TRIP



NOTES:

1. Refer to DB-8.2.3.7 Page 10 for legend.
2. Refer to DB-8.2.3.7 Page 7 for operating sequence



5, 7.5 & 15HK SCHEMATIC DIAGRAMS

In the development of the HK line of circuit breakers*, the schematic diagrams have changed three times as follows:

00 Interchange — These diagrams used two sets of separable contacts and a 6-stage auxiliary switch on the breakers.

01 Interchange — These diagrams use only one set of separable contacts and only one 4-stage auxiliary switch.

02 Interchange — These diagrams use only one set of separable contacts with the motor control an independent circuit as will be the closing coil circuit and the trip coil circuit.

03 Interchange — Same diagrams as 02. All changes are mechanical improvements.

*Does not include Type 15HK1000 or Vacuum.

Dwg. 188571, Sheet 1, Rev. 2

HK & HKV LEGEND

- a - Auxiliary Switch Contact Closed When Breaker Is Closed.
- b - Auxiliary Switch Contact Open When Breaker Is Closed.
- LCb - Latch Check Switch Contact Closed When Breaker Operating Mechanism is Rest.
- LSa - Limit Switch Contact Open When Springs Are Discharged, Closed When Springs Are Charged.
- LSb - Limit Switch Contact Closed When Springs Are Discharged, Open When Springs Are Charged.
- TC - Shunt Trip Coil.
- X - Closing Latch Release Coil.
- Y - Control Relay Lockout Coil.
- Ya - Normally Open Control Relay Contact.
- Yb - Normally Closed Control Relay Contact.
- TB - Terminal Block Point.
- ML - Motor Lead.
- CE - Coil Lead End.
- C1,C2 - Terminal Jumper (Control Device)
 - Female Secondary Disconnect Contact.
- UV - Undervoltage Trip Device.
- UVb - Normally Closed Undervoltage Trip Device Contact.
- 69 - Permissive Control Switch.
- BL - Blocking Lever Switch (Open When Ground Switch is Locked in Ground Position.)