



Door Operator:

Closed Loop

Purpose

This product instruction provides a brief description of the features and components of the closed loop door operator. This product instruction also provides Field Personnel with information on installation procedures, operational checks and adjustments, diagnostics, and replacement parts.

F608-001 (3/96)

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DOOR OPERATOR

Closed Loop

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Safety

Participate in the success of the installation of the closed loop door operator — know the safety hazards related to any procedure, know what equipment has been specified for each specific contract, and know what tools and materials you should plan to have available beforehand.

Before connecting electrical wiring, take precautions to prevent accidents from happening to yourself and other people around you. Always consider safety first.

- Wear safety glasses or goggles when using power tools.
- When working on the car canopy, always be aware of where the sides of the car are located.
- If step ladders are used, always support step ladder feet.
- Use properly grounded cords and power equipment (ground fault circuit interrupters).
- Make sure hoistways and work areas are adequately lighted.
- Make sure there are proper clearances in hoistway between the car and other devices.
- Always wear protective gloves when installing or removing access covers, conduits, wireway, or electrical devices.
- Before connecting wiring, cover sharp edges to keep hands and arms from being cut.
- Always disconnect power from all related circuits before proceeding with wiring—treat all circuits as if they are still live.
- Use insulated and grounded tools.
- Clear wiring sites of any unnecessary materials or equipment.
- Always know where other people are and how elevator wiring can affect their safety.

F608-031 (3/96)



Recommended tools & materials

Pre-arrange to have the following available.

- ✓ Service tool
- ✓ 7/16 inch socket
- ✓ 7/16 inch wrench
- ✓ 1/2 inch socket
- ✓ 9/16 inch socket (deep)
- ✓ 12 inch (minimum) socket extension
- ✓ Small hand tools to fit assorted screws, bolts, and nuts
- ✓ Levels
- ✓ Drill with assorted bits
- ✓ Shims
- ✓ Tape measure
- ✓ 0.005 inch feeler gauge
- ✓ Wire cutter/stripper
- ✓ Digital Volt-Ohm meter

F608-S11 (3/96)

Product description

Closed loop door control is a microprocessor-based fully digital elevator door control system, continuously controlling all aspects of door motion including direction, velocity, acceleration and force. Closed loop door control includes following components and controls.

- Main PC board
- Motor control
- Current/torque control

MAIN PC BOARD

Main board contains all user connections, power converter, power supplies, adjustment switches, and an “Overseer” function that monitors door acceleration and control input.

MOTOR CONTROL

Closed loop door control utilizes a low voltage permanent magnet DC Motor powered by a fully controlled PWM (Pulse Width Modulated) converter operating at a very high frequency, (20,000 Hz). High frequency is well out of audible range and provides for quiet motor operation.

Converter also includes full overcurrent sensing and electronic output short circuit protection circuitry.

PWM power delivered to motor is supplied in a series of voltage pulses. Each pulse has same amplitude, but varies in width. Motor responds to average pulse voltage, so by varying width of pulses, average motor voltage is either increased or decreased.

CURRENT/TORQUE CONTROL

Closed loop door control incorporates a closed loop controller continuously measuring current/torque in motor, and adjusting it as necessary to provide for proper acceleration and force required to move doors. It also regulates door closing force, which is adjustable through service tool. Current control also provides full overcurrent sensing, and proper system shutdown when faults occur.

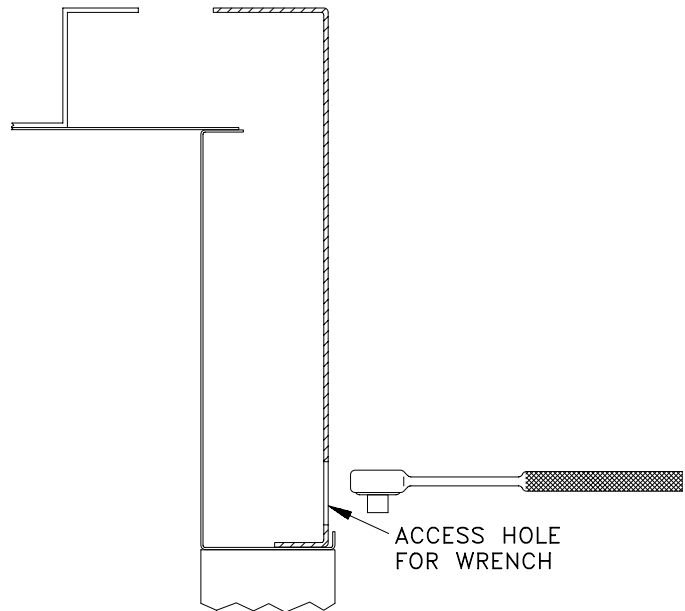
F608-002 (6/98)

Installing car door header (optional)

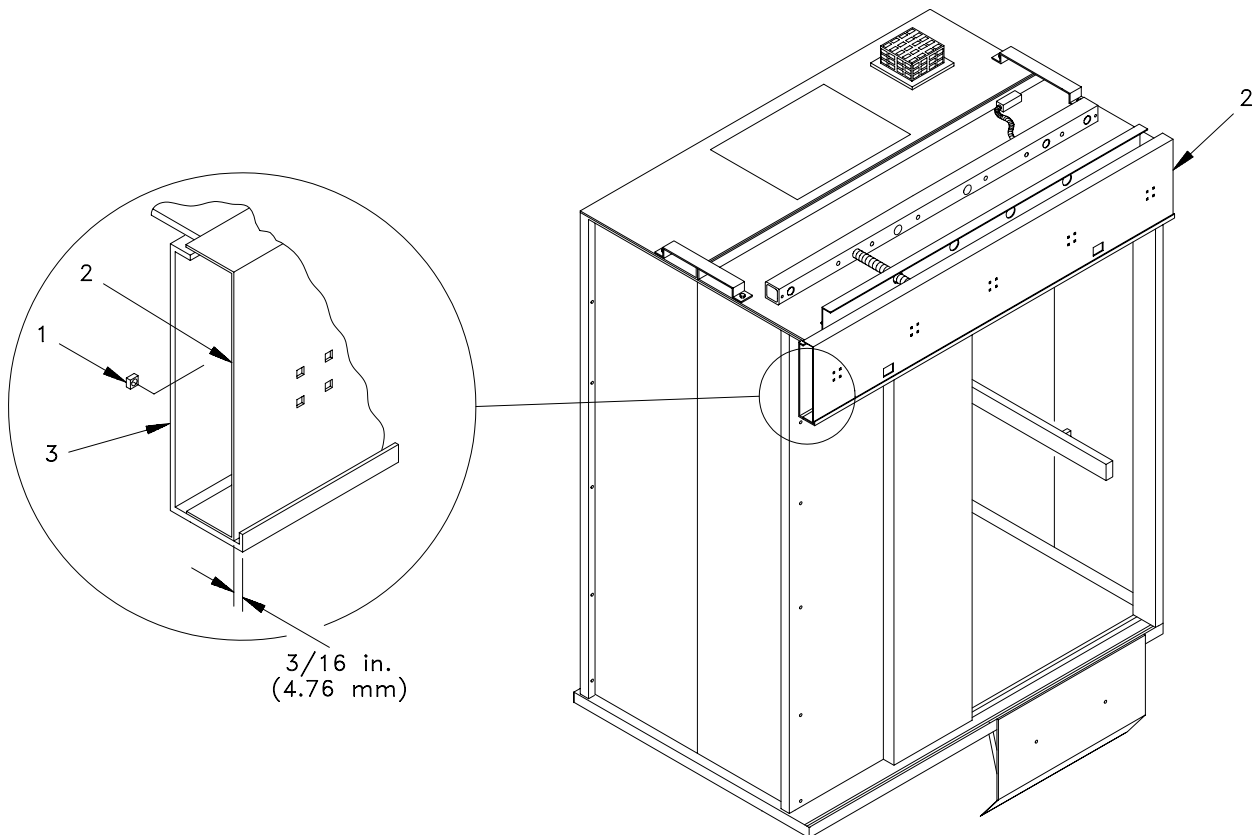
When required, install the car door header as follows.

1. Insert tinnerman nuts (1) to back side of header (2) with clips on tinnerman nuts installed in the vertical direction.
2. Place header (2) on transom (3), 3/16 inch back from front edge.
3. Insert bolts into header and transom and hand-tighten.
4. Plumb the header (2) and tighten bolts securely.

F608-005 (3/96)



C203-H35(11/95)



C203-H06(11/95)

Installing header

Installing & adjusting car door hanger & car door(s)

Refer to standard door installation instructions to complete the following.

- Install car door hanger
- Install car door panels
- Adjust doors
- Install gibs
- Adjust upthrust eccentric rollers
- Check door closing operation
- Install gate switch

F608-S12 (8/96)

***Installing door operator, long lever,
split link & clutch***

Refer to standard door installation instructions to complete the following.

- Install door operator
- Install long lever and split link
- Align door operator
- Adjust split link
- Install clutch
- Adjust clutch

F608-S13 (8/96)

Wiring closed loop door operator

Closed loop door control requires an input of 115 VAC. When this power is supplied from a transformer, transformer must have a rating of at least 500 VA.

1. Install and secure field wiring conduit (1) to appropriate knockout (2) in operator base.
2. Pull wires from elevator controller and connect to input and output terminals of terminal blocks TB2-TB6 (3).
3. Route switch cable (4) through one of top two knockouts (2) in door operator.

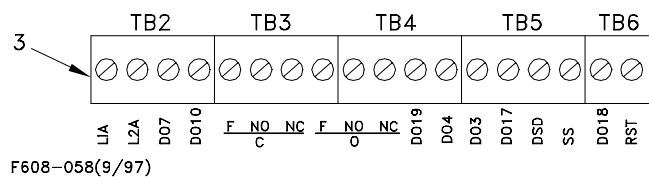
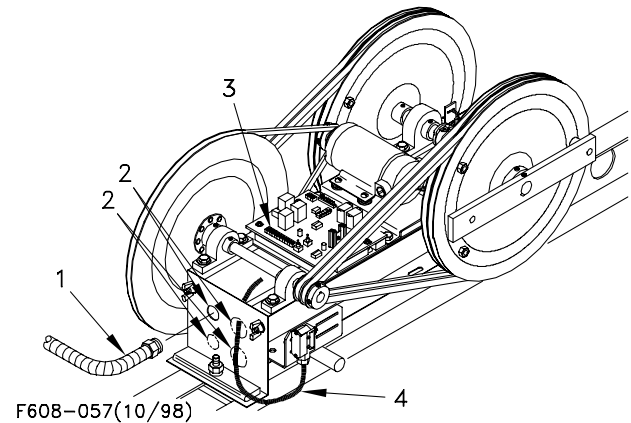
For jobs with front doors only:

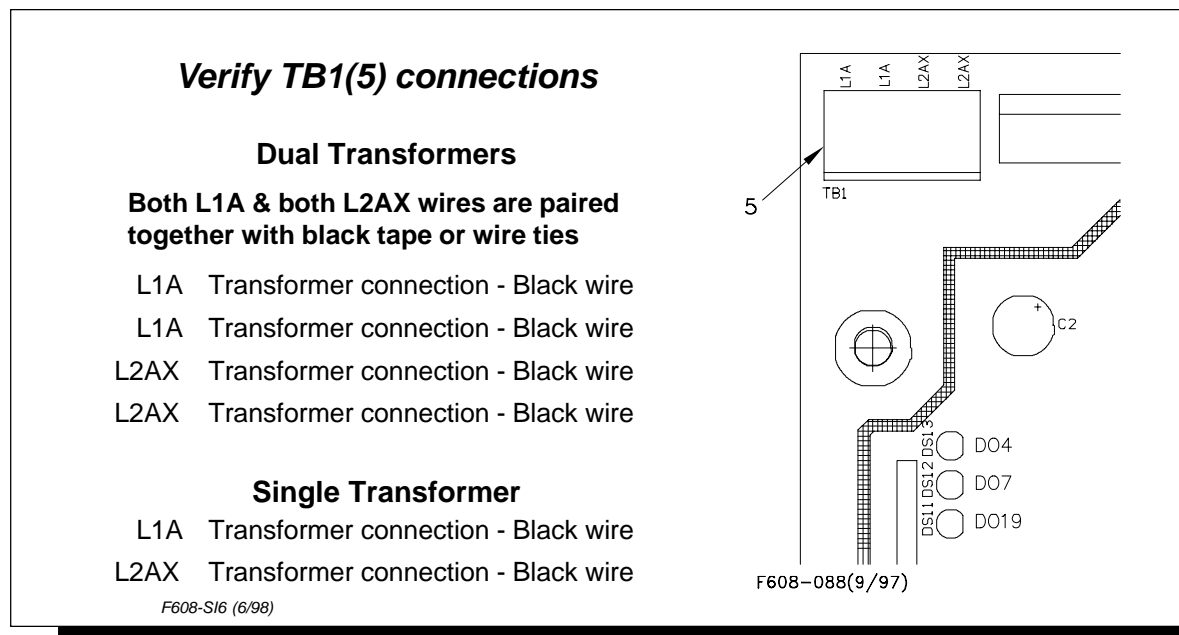
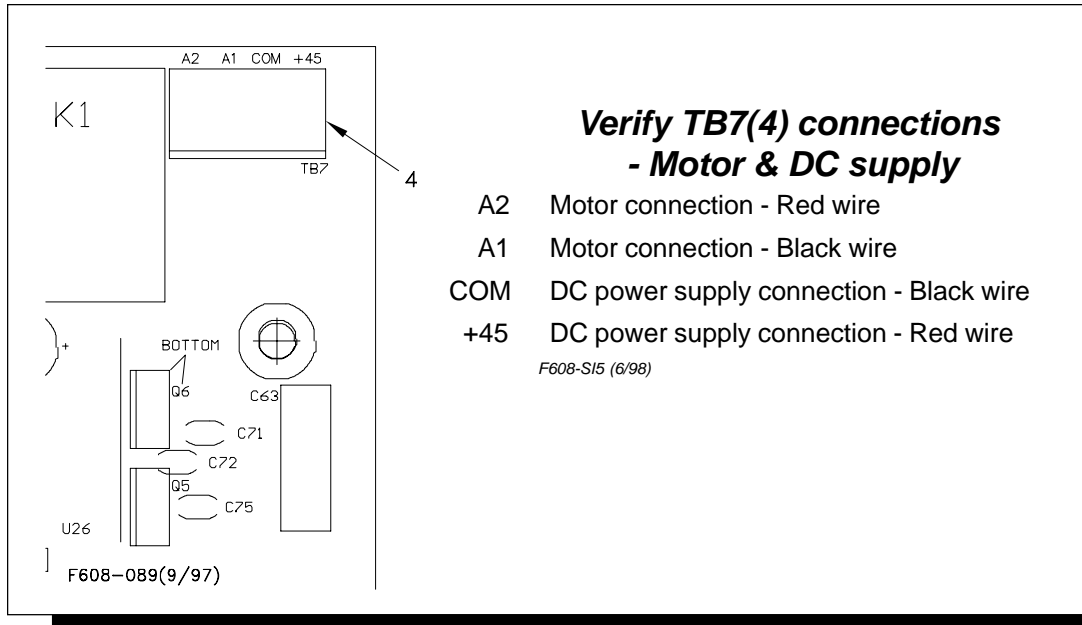
4. Terminate one of wires from switch cable (4) at "SS" terminal on Board 105.
5. Connect other switch cable wire to a spare traveling #18 conductor.
6. Note wire color and number of spare traveling #18 conductor.

For jobs with front and rear doors:

4. Terminate one of wires from switch cable (4) at "SS" terminal on Board 105.
5. Route and connect other switch cable wire to one of cable wires on rear door operator closure switch.
6. Connect other wire on rear door operator closure switch to a spare traveling #18 conductor.
7. Note wire color and number of spare traveling #18 conductor.

F608-012 (10/98)





INPUT & OUTPUT TERMINALS: TB2 - TB6

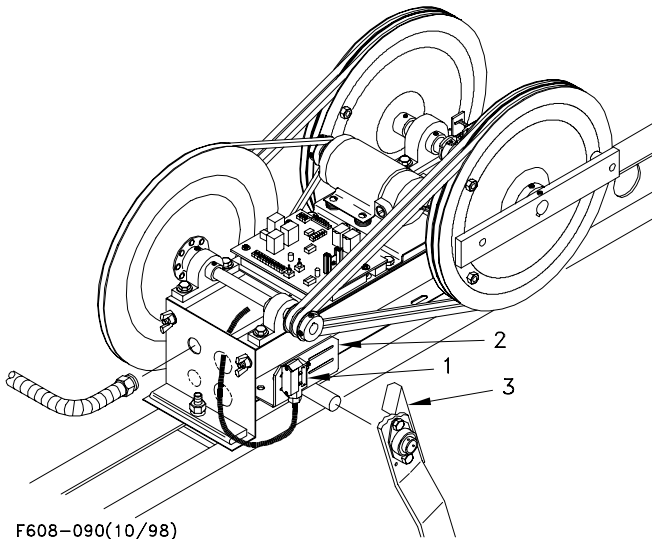
L1A to L2A	120 VAC @ 500 VA. If one of the input lines is grounded, it should be connected to L1A.	<u>F NO NC</u> C	Auxiliary Signal to Close relay switching contact. Designates a Form "C" contact on a relay that follows Signal to Close input, DO7.
DO7 to L1A	Signal to Close. When a relay contact across these terminals is made up, the doors close.	<u>F NO NC</u> O	Auxiliary Signal to Open relay switching contact. Designates a Form "C" contact on a relay that follows Signal to Open input, DO10.
DO10 to L1A	Signal to Open. When a relay contact across these terminals is made up, the doors open. NOTE: this signal always overrides the Signal to Close.	DO19 to L1A	Auxiliary door profile. When a relay contact across these terminals is made up, doors open and close using heavy door profile.
DO17 to L1A	Close limit signal. A relay connected across these terminals de-energizes when the close limit microswitch is actuated. Relay is energized at all other times.	DO3 to L1A	Open limit signal. A relay connected between these terminals de-energizes when open limit microswitch is actuated. Relay is energized at all other times.
DO3 to DO10	Opening relay. A relay connected across these terminals is energized only when the doors are opening.	DSD to SS	Optional. Used on some projects for load balancing or other customer requirements.
DO7 to DO17	Closing relay. A relay connected across these terminals is energized only when the doors are closing.	DO18 to L1A	Future use. Do not connect anything to this input.
DO4 to DO7	Reduced Speed closing signal. When doors have a signal to close and a relay contact is made up across these terminals, the door closes at a reduced speed.	RST to L1A	Reset. A close switch contact between RST and L1A resets door operator.

F608-S14 (9/98)

Adjusting door closure switch

1. With doors fully closed, adjust door closure switch (1) on mounting plate (2) until switch actuator (3) trips closure switch (1).
2. Tighten hardware to secure switch.

F608-046 (10/98)



F608-090(10/98)

Checking operation

Complete operational checks as follows.

- Check switches
- Run "Learn" trip

CHECK SWITCHES

SW1 (1) RUN - TEST switch.
Puts door operator in RUN or TEST mode.
Use for LEARN mode and to run doors manually

SW2 (2) OPEN - STOP - CLOSE switch
Switch is active ONLY when RUN-TEST is in TEST position.

SW3 (3) Configuration for door operator.
Dip switches are only read at power-up or during a board reset.

RH - Down for a right-hand door,
up for a left-hand door
(looking out from inside cab.)

LRN - Up for normal operation, down for learn mode. (Used for initial door operator setup to learn open distance and closed position.)

Blank - Future use. Does not matter if switch is up or down.

CEN - Down for center opening doors,
up for side-opening

F608-036 (6/98)

RUN "LEARN" TRIP

Before running "Learn" trip, manually open car door(s) 3 - 4 inches [76 - 102 mm]. Recheck all wiring and connections.

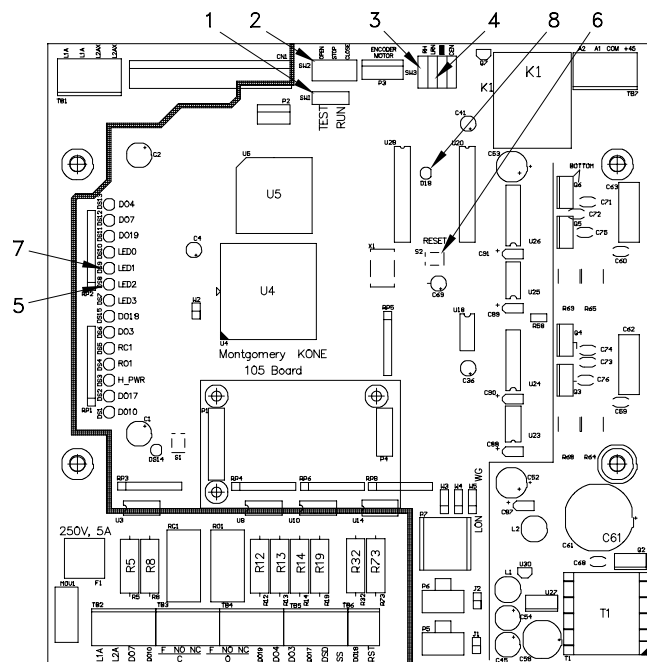
1. Move SW1 (1) into TEST position.
2. Move SW2 (2) into STOP position.
3. On SW3 (3), move dipswitch LRN (4) into DOWN position.
4. Make sure other dip switches on SW3 (3) are configured for door operator.
5. Apply power to board.
6. Check to see if LED 1 (7) and/or D18 (8) are on.
If they **are not** on, continue procedure.
7. LED 2 (5) flashes at approximately 1 hertz.
8. Move SW2 (2) to CLOSE position.
9. LED 2 (5) goes out.
10. Doors go to closed position.
11. LED 2 (5) flashes twice as fast when door(s) are at closed position.
12. Move SW2 (2) to OPEN position.
13. LED 2 (5) goes out.
14. Door(s) go to open position.
15. LED 2 (5) comes on and stays on when door(s) are at open position.
16. On SW3 (3), move LRN (4) to UP position.
17. Move SW2 (2) to STOP position.
18. Move SW1 (1) to RUN position.
19. Press S2 (6) to reset door operator.
20. Door operator is ready for operation.

F608-037 (10/98)

If LED 1 (7) and/or D18 (8) are on.

1. Press S2 (6) to reset board.
2. If LED 1 (7) or D18 (8) come on after reset, check all wiring.
3. If LED 1 (7) or D18 (8) are still on after checking all wiring, contact Montgomery KONE Research & Development.

F608-S17 (6/98)



F608-065(9/98)

Adjusting closed loop door control

Clear Error Log after making all set-up adjustments.

For Clear Error Log procedure, refer to section titled: Using Error Log.

Adjust Closed Loop door control with service tool as follows.

- Login & logout
- Display door inputs/outputs
- Adjust door
- Run single door test
- Run continuous door test
- Heavy door adjustment

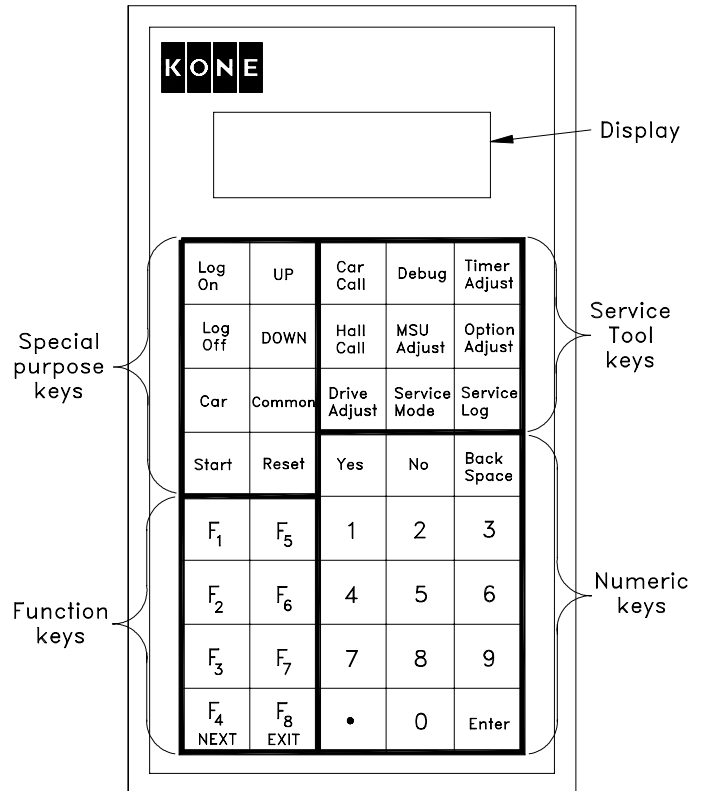
F608-038 (9/98)

Closed Loop Settings

Distance — Value range = 1 to 255
 Units = counts

Acceleration — Value range = 1 to 10
 Units = units

F608-S18 (9/98)



S201-054(10/95)
 71K-102(12/00)

LOGIN & LOGOUT (SERVICE TOOL VERSION 6.06.2)

Login

1. To login, plug the coiled Service Tool cable into service tool port on door operator PC board.
2. Turn ON the power switch on top of the Service Tool. The Service Tool Level & Serial Number screen displays the Service Tool level and serial number.

KONE INC.
SERVICE TOOL V6.06.2
LEVEL 3 or 4 SN 12345678
Good to Month, Day, Year

S201-067 (2004-11)

Service Tool Level & Serial Number screen

3. Press Next (F4) for more selections when first Target screen appears.

```
PRESS NEXT FOR MORE
F1 MIPROM 21 CPU
F2 AC DRIVE
F3 ESCALATOR
```

S201-062 (11/95)

First Target screen

4. Press F2 to select DOOR OPERATOR when Second Target screen appears.

```
F1 LON HYDRO/NETWORK
F2 DOOR OPERATOR
F3 MONITOR
```

S201-068 (5/96)

Second Target screen

5. Next screen is Initial Menu screen.

```
F5 DISPLAY I/O
F6 ADJUST DOOR
F7 ERROR LOG
F8 EXIT
```

F606-057 (9/95)

Initial Menu screen

Logout

1. Press F8 - Exit until the screen displays the prompt, READY TO LOGOFF?.
2. IF READY TO LOGOUT, press the Yes key, and the display screen changes to show the Logout screen for about two seconds. The screen displays TURN ME OFF, and indicates the Service Tool is logged out.
3. Turn OFF the battery power switch, and unplug the Service Tool cable from the board.
4. IF NOT READY TO LOGOUT when the READY TO LOGOFF? prompt appears, press either the No key for no or the F8 - Exit key again.

```
READY TO LOGOFF?
```

S201-052 (11/94)

Ready to Logoff screen

```
TURN ME OFF
```

S201-053 (11/94)

Turn Me Off screen

Make sure you logout as described above.

F606-046 (2004-11)

DISPLAY DOOR INPUTS/OUTPUTS

Display outputs

1. After pressing F2, the "Initial menu " screen appears. Press F5 key, Display I/O.
2. Press F1 to display the door outputs. Cycle Cnt is the number of door operations since the board was installed.
3. *The next screen displays the door outputs and dipswitch settings. Press F8 to Exit.
 DO17 = Front door close limit
 DO3 = Front door open limit
 RO1 = Energized with door in open position
 RC1 = Energized with door in closed position
 Dipsw = Dipswitch settings
 1 = closed 0 = open

```
F5 DISPLAY I/O
F6 ADJUST DOOR
F7 ERROR LOG
F8 EXIT
```

F606-057 (9/95)

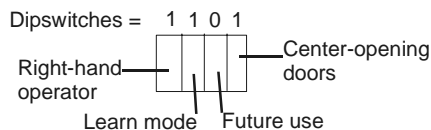
Initial Menu screen

```
F1 DOOR OUTPUTS
F2 DOOR INPUTS
CYCLE CNT: 0
F3 CLR CNT F8 EXIT
```

F606-058 (6/97)

```
D017 1 D03 0
R01 0 RC1 0
Dipswitch: 1101
```

F606-043 (9/97)



F608-087 (9/97)

Display inputs

1. Press F2 to display the door inputs. Cycle Cnt is the number of door operations since the board was installed.
2. The next screen displays the door inputs, encoder reading and heatsink temperatures.
 DO4 = Nudging
 DO7 = Door close pilot
 DO10 = Front door open pilot
 DO19 = Auxiliary door profile
 DO18 = Future use
 Encoder = Door position count
 Hsinks = Degrees Centigrade

F606-025 (9/98)

```
F1 DOOR OUTPUTS
F2 DOOR INPUTS
CYCLE CNT: 0
F3 CLR CNT F8 EXIT
```

F606-058 (6/97)

```
DO4 0 DO7 0 DO10 1
DO19 0 DO18 0
Encoder = 3129
Hsinks: 150 C
```

F606-043 (9/97)

ADJUST DOOR

Run/Test switch must be in “Run” position to make adjustments.

1. After pressing F2, the “Initial menu” screen appears. Press F6 for Adjust Door.
2. Press F1 for Door Adj.
3. Press F3 for Normal Door Adj.
4. Next screens list door adjustments. Use F8 to Exit at anytime.

At the end of the list, the menu choices wrap around and start from the top.

F606-029 (2004-11)

F5 DISPLAY I/O
F6 ADJUST DOOR
F7 ERROR LOG
F8 EXIT

F606-057 (9/95)

Initial Menu screen

F1 DOOR ADJ

F8 EXIT

F630-010 (2004-11)

F1 SINGLE DOOR TEST
F2 CONT DOOR TEST
F3 NORMAL DOOR ADJ
F4 NEXT

F608-080 (5/97)

F1 CLOSE MAX SPEED
F2 CLOSE MIN SPEED
F3 CLOSE SLOW DOWN
F4 NEXT

F608-074 (5/97)

F1 CLOSE FAULT SPEED
F2 CLOSE CURR LIMIT
F3 OPEN MAX SPEED
F4 NEXT

F608-075 (5/97)

F1 OPEN MIN SPEED
F2 OPEN SLOW DOWN
F3 OPEN FAULT SPEED
F4 NEXT

F608-076 (5/97)

F5 RELOAD DEFAULTS

F8 EXIT

F608-078 (5/97)

F1 ACCELERATION
F2 NUDGE SPEED
F3 CLUTCH PICKUP
F4 NEXT

F608-077 (5/97)

Adjusting close max speed

Run/Test switch must be in “Run” position to make adjustments.

For information on selecting a door adjustment, refer to section titled: Adjust door.

1. From this adjustment screen, press F5 to adjust Close MAX Speed

All door adjustment options have a screen that lists minimum, maximum and current settings.

2. The next screen lists the minimum, maximum and current Max Close Speed. Press F1 to increase Max Close Speed of door.
3. Press F2 to decrease Max Close Speed of door.
4. Press F8 to exit the screen.

F606-031 (9/98)

```
F1 CLOSE MAX SPEED
F2 CLOSE MIN SPEED
F3 CLOSE SLOW DOWN
F4 NEXT
```

F608-074 (5/97)

```
CLOSE MAX SPEED
Min: 0.04 Max: 1.60
Cur: 0.80 ft/sec
F1-Inc F2-Dec F8-Ex
```

F608-088 (1/98)

CLOSED LOOP DOOR OPERATOR - DEFAULT PARAMETER VALUES

Parameter	Minimum Value	Maximum Value	Default Value	Remark
Close max speed	0.04 ft/sec [0.012 m/sec]	1.60 ft/sec [0.49 m/sec]	0.80 ft/sec [.24 m/sec]	Speed during close
Close min speed	0.02 ft/sec [0.006 m/sec]	0.5 ft/sec [0.15 m/sec]	0.22 ft/sec [0.07 m/sec]	Speed at clutch pick up
<input type="checkbox"/> Close slow down	1.00 count	255.00 counts	110.00 counts	Location to begin slowing doors during close
Close fault speed	0.02 ft/sec [0.006 m/sec]	0.60 ft/sec [0.18 m/sec]	0.30 ft/sec [0.09 m/sec]	After detecting error, door speed during close
Close current limit	0.08 amps	20.4 amps	6.40 amps	Maximum current to motor while doors close at full speed
Open max speed	0.04 ft/sec [0.012 m/sec]	2.00 ft/sec [0.61 m/sec]	1.00 ft/sec [0.30 m/sec]	Speed during open
Open min speed	0.04 ft/sec [0.012 m/sec]	1.00 ft/sec [0.305 m/sec]	0.20 ft/sec [0.06 m/sec]	Speed during open slow down distance
Open slow down	1.00 count	255.00 counts	120.00 counts	Location to begin slowing doors during open
Open fault speed	0.02 ft/sec [0.006 m/sec]	0.60 ft/sec [0.18 m/sec]	0.30 ft/sec [0.09 m/sec]	After detecting error, door speed during open
Acceleration	1.00 unit	10.00 units	1.00 unit	Acceleration level
Nudge speed	0.04 ft/sec [0.012 m/sec]	1.60 ft/sec [0.49 m/sec]	.32 ft/sec [0.10 m/sec]	Speed during nudge mode
Clutch pick up	66.00 counts	255.00 counts	66.00 counts	Distance doors open at slow speed to ensure clutch is engaged before reaching high speed

F608-T22 (1/98)

Reloading Defaults

Run/Test switch must be in “Run” position to make adjustments.

For information on selecting an option, refer to section titled: Adjust door.

The Reload Defaults option resets all door parameters to the original default values.

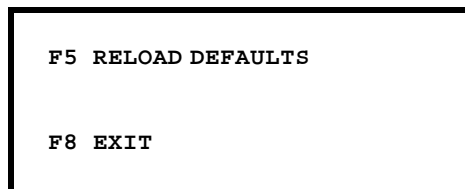
1. Press function key next to Restore Defaults.

CAUTION:
Make sure no one operates the elevator while reset is running.

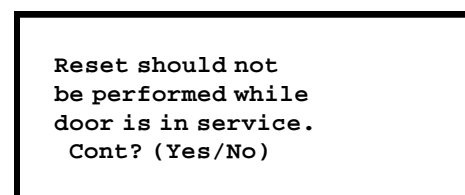
2. The next screen is a verification screen. Press Yes key on service tool to continue.
3. After pressing Yes, door motion stops, door is disabled and Resetting screen appears.

4. After a short delay, this screen appears. The PC board reboots after another brief delay.
5. Turn off service tool. After the reboot, the default parameter values are in effect.

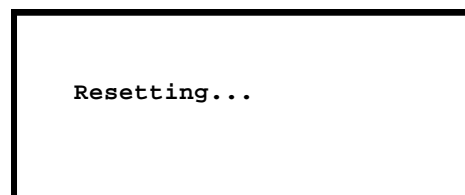
F611-005 (9/98)



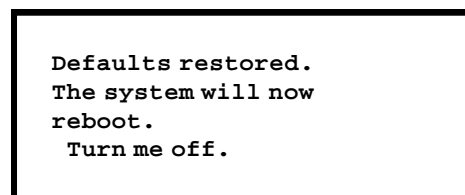
F608-078 (5/97)



F606-095 (7/96)



F606-096 (7/96)



F606-097 (7/96)

Adjust Close current limit

Run/Test switch must be in “Run” position to make adjustments.

For information on selecting a door adjustment, refer to section titled: **Adjust door.**

1. Log-in with service tool. After pressing F2, “Initial menu” screen appears. Press F6 for Adjust Door.

```
F5 DISPLAY I/O
F6 ADJUST DOOR
F7 ERROR LOG
F8 EXIT
```

F606-057 (9/95)

Initial Menu screen

2. Press F1 for Door Adj.

```
F1 DOOR ADJ

F8 EXIT
```

F630-010 (2004-11)

3. Press F3 for Normal Door Adj.
4. Next screens list the door adjustments. Use F8 to Exit at anytime.

```
F1 SINGLE DOOR TEST
F2 CONT DOOR TEST
F3 NORMAL DOOR ADJ
F4 NEXT
```

F608-080 (5/97)

5. Press function key next to Close Curr Limit adjustment.

```
F5 CLOSE FAULT SPEED
F6 CLOSE CURR. LIMIT
F7 OPEN MAX SPEED
F4 MORE
```

F608-073 (5/97)

CAUTION:

Make sure no one operates elevator while Close current limit is being adjusted.

6. Next screen is a “caution” screen. Adjust current only if door is not in service. Press Yes key to continue test and No key to stop.

```
Current should not
be adjusted while
door is in service.
Cont? (Yes/No)
```

F608-083 (5/97)

7. Next screen asks you to wait while door opens.

Please wait while
door opens

F8 - Exit

F608-070 (5/97)

8. After doors fully open, next screen appears.
9. Move to position where you can block doors with pressure gauge.
10. Press F4, doors should begin closing and next screen appears.
11. When doors are 1/3 closed, block doors with pressure gauge.
12. Press F1 or F2 until desired amps display.
13. Release doors, allow them to close completely and press F8 to exit and save current value.

Press F4 to begin
closing doors

F8 - Exit

F608-071 (5/97)

**If doors close before you finish
adjustment, press F8 to exit and repeat
adjustment procedure.**

F608-039 (2004-11)

Close Curr. Limit
Min: 0.08 Max: 20.4
Curr: 5.0 amps
F1-Inc F2-Dec F8-Exit

F608-072 (5/97)

RUN SINGLE DOOR TEST

1. After pressing F2, the "Initial menu" screen appears. Press F6 key for Adjust Door screens.

```
F5 DISPLAY I/O
F6 ADJUST DOOR
F7 ERROR LOG
F8 EXIT
```

F606-057 (9/95)

Initial Menu screen

2. *Press F1 for Single door test. The single door test opens and closes the door(s) once.

```
F1 SINGLE DOOR TEST
F2 CONT DOOR TEST
F3 NORMAL DOOR ADJ
F4 NEXT
```

F608-080 (5/97)

CAUTION:
Make sure no one operates the elevator while the single door test is running.

```
This test should not
be performed while
door is in service.
Cont? (Yes/No)
```

F606-047 (9/95)

3. Next screen is a "caution" screen. Continue the test only if the door is not in service. Press Yes key to continue test and No key to stop.
4. After pressing the Yes key, the next screen tells you that the Single door test is in progress.

F606-026 (9/98)

```
Single Test in
Progress
```

F606-048 (9/95)

RUN CONTINUOUS DOOR TEST

1. After pressing F2, the "Initial menu" screen appears. Press F6 for Adjust Door.

```
F5 DISPLAY I/O
F6 ADJUST DOOR
F7 ERROR LOG
F8 EXIT
```

F606-057 (9/95)

Initial Menu screen

2. *Press F2 for Cont Door Test. The continuous door test opens and closes the door(s) until you exit the test.

```
F1 SINGLE DOOR TEST
F2 CONT DOOR TEST
F3 NORMAL DOOR ADJ
F4 NEXT
```

F608-080 (5/97)

CAUTION:
Make sure no one operates the elevator while the continuous door test is running.

```
This test should not
be performed while
door is in service.
Cont? (Yes/No)
```

F606-047 (9/95)

3. Next screen is a "caution" screen. Continue the test only if the door is not in service. Press Yes key to continue test and No key to stop.
4. After pressing the Yes key, the next screen tells you that the Continuous door test is in progress. Test: Cycle Count is the number of times the door(s) opens and closes during the test.
5. Press F8 to Exit and end the Continuous door test.

F606-027 (9/98)

```
Continuous Test
in Progress.
F8 EXIT
Cycle Count: 4
```

F606-049 (12/95)

Diagnostics

- Door operator error codes
- Verifying microswitch cam settings
- Using Error log
- 1Ø5 Board LED's

F608-042 (9/98)

DOOR OPERATOR ERROR CODES

Each error category causes a specific board reaction. 1Ø5 Board recognizes four error categories during operation. When error occurs, numeric error code is added to non-volatile error log on 1Ø5 Board. Use Service Tool to view error log.

- Warning error
- Serious recoverable error
- Serious non-recoverable error
- Fatal error

Warning error

- ✓ Causes LED 1 to come on solid
- ✓ LED 1 remains on until start of next door operation
- ✓ Routine logging error may take further action (running doors at fault speed)
- ✓ Effects of warning errors are cleared at start of next door operation

Serious recoverable error:

- ✓ Stops door motion immediately
- ✓ Door obeys commands normally
- ✓ Error occurs on three consecutive open/close cycles
- ✓ Logs serious non-recoverable error code - **104**
- ✓ Door behaves as it does with a serious non-recoverable error

Serious non-recoverable error:

- ✓ Stops door motion immediately
- ✓ Ignores all further close commands
- ✓ If open command is received, doors open at fault speed
- ✓ After doors are fully open, board is shutdown
- ✓ LED 1 blinks opposite LED 0
- ✓ Board is in "close disallowed" condition
- ✓ Rebooting clears serious error

Fatal error:

- ✓ Causes shutdown
- ✓ Prevents all further door operations
- ✓ Disengages motor relay from H-bridge
- ✓ Shuts off H-bridge
- ✓ LED 1 blinks in step with LED 0
- ✓ Board is in "retry disallowed" condition
- ✓ Ignores Open/close commands
- ✓ Rebooting clears fatal error

F608-041 (9/98)

Pulse Width Modulation (PWM) monitor circuit

In addition to errors in Closed Loop Error Categories table, there is a PWM monitor circuit.

- Circuit is designed to prevent dangerous closing speed during total CPU failures.
- PWM monitor circuit is external to CPU, and disconnects motor if it detects an excessive PWM during a close.
- If circuit trips, LED 18 lights and motor relay drops.
- Resetting board is ONLY way to clear this condition.
- Any trip of PWM monitor circuit indicates a serious system failure.
- More than one trip indicates bad board or corrupt firmware.

F608-043 (9/98)

VERIFYING MICROSWITCH CAM SETTINGS

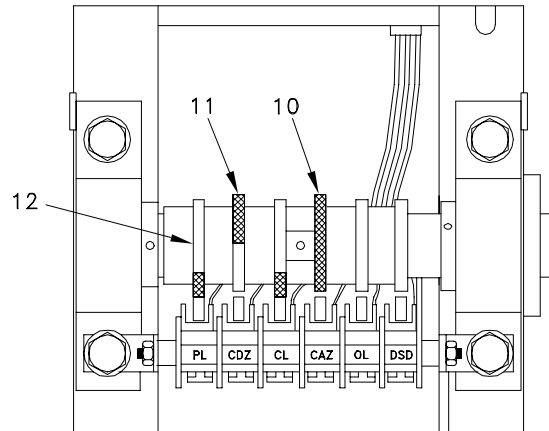
Closed loop door control requires only two switches on the door operator microswitch CAM. Verify the microswitch cams are set as follows.

- CL** CAM actuates CL (Close Limit) microswitch when the doors are in the desired fully closed position.
- OL** CAM actuates OL (Open Limit) microswitch when the doors are in the desired fully open position.

OPTIONAL CAM

- DSD** CAM actuates DSD microswitch when doors are approximately 4 to 6 inches from fully closed position when used with load balancing. CAM can also be set for other customer requirements.

F608-024 (9/98)



F608-059(3/96)
F608-028(3/96)

USING ERROR LOG

1. On initial screen press F7 Error log.
2. Next screen lists options for Full Error List, Non-Crit Error Smry, and Clear Error Log.
3. Press F1 for Full Error List or F2 for Non-Crit Error Smry or F3 for Clear Error Log.
4. Full Error List screen - Err: is list from 1 to 100. Memory stores up to 100 errors. Second number is ERROR CODE! Press F4 for More errors, or F8 to Exit.
5. Non-crit Err Smry displays non-critical errors and number of times each error occurred. First number is ERROR CODE! Num is number of times error occurred.
Press F4 for More non-critical errors, or F8 to Exit.
6. Clear Error Log - After pressing F3, next screen is Are you sure? Press Yes button to clear error log.
7. Next screen is Clearing Log....
8. Next screen is Log Cleared. Press F8 to exit screen.

F608-044 (9/98)

```
F5 DISPLAY I/O
F6 ADJUST DOOR
F7 ERROR LOG
F8 EXIT
```

F606-057 (9/95)

Initial Menu screen

```
F1 FULL ERROR LIST
F2 NON CRIT ERR SUMRY
F3 CLEAR ERROR LOG
F8 EXIT
```

F608-079 (5/97)

```
ERR 100: 14
ERR 99: 103
ERR 98: 118
F4-MORE F8-EXIT
```

F611-003 (7/97)

```
ERR: 14 Num = 100
ERR: 109 Num = 66
** End of Log **
Press F8 to EXIT
```

F611-004 (7/97)

```
Are you sure?
```

F608-084 (5/97)

```
Clearing log ...
```

F608-085 (5/97)

```
Log Cleared

Press F8
```

F608-086 (5/97)

CLOSED LOOP ERROR CATEGORIES	
Error code	Definition
Warning Errors	
1	Door fails to reach position after an open or close command.
2	Open/close/stop switch is defective
3	EEPROM parameter set 1 has incorrect checksum.
4	EEPROM parameter set 2 has incorrect checksum.
5	EEPROM parameter set 1 corrupt and could not be restored.
6	EEPROM parameter set 2 corrupt and could not be restored.
7	Value in EEPROM parameter set 1 could not be written.
8	Value in EEPROM parameter set 2 could not be written.
9	Encoder count stopped changing while doors were moving.
10	IIC bus was stuck busy and had to be reset.
11	EEPROM is not responding.
12	Encoder count is changing in wrong direction during a close.
Serious Recoverable Errors	
51	Current sensing circuitry has failed.
52	Measured current exceeds torque limit.
53	Current sensed when door was not moving.
54	Encoder count far from full open distance when open limit engaged.
55	Encoder count far from 0 when close limit engaged.
Serious Non-Recoverable Errors	
101	DAC is not responding
102	IIC bus is stuck busy, and cannot be reset.
103	Close limit engaged while opening.
104	Three or more serious recoverable errors occurred in a row.
105	Relay failed to disengage.
106	Relay failed to engage.
107	H-bridge or relay has failed.
Fatal Errors	
151	Checksum of current parameters in RAM does not match value calculated at boot-up.
152	H-bridge enable line is stuck.
153	H-bridge direction control line is stuck.
154	12 V power supply is low.
155	Main power supply is low.
156	Dip switch values could not be read consistently.
157	Both open and close limit switches are engaged.
158	Open limit engaged while closing.
159	Motor relay control line is stuck.
160	Encoder count changed in wrong direction during an open

F608-T21 (4/97)

105 BOARD LEDS

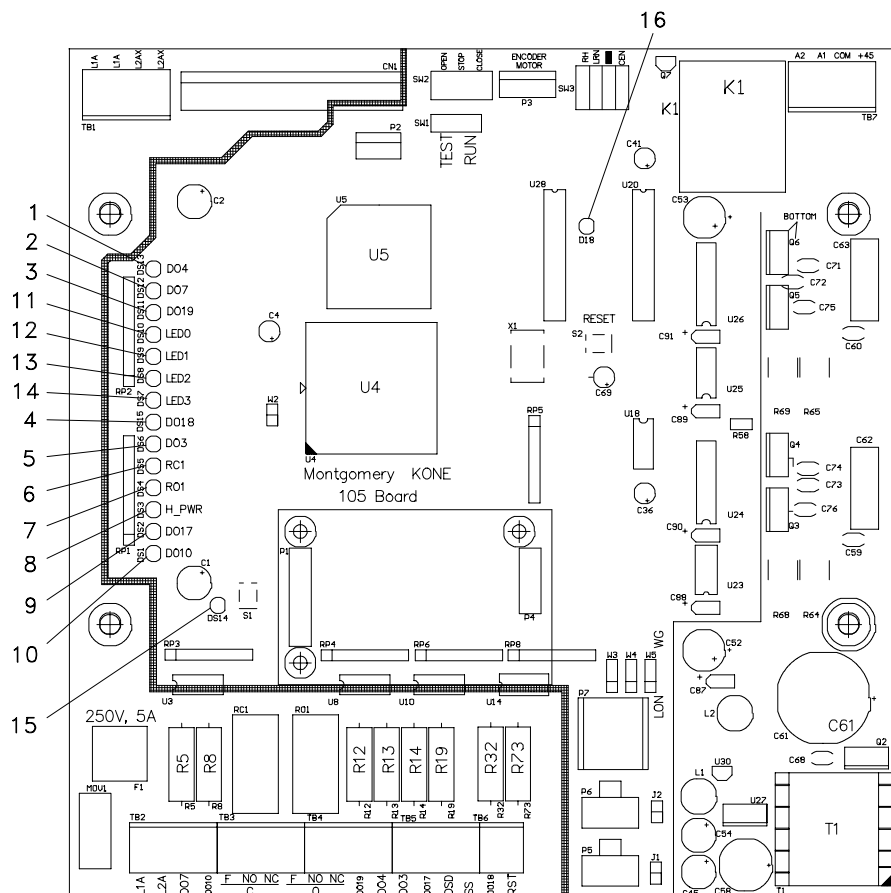
Most of LEDS on 105 Board display current state of board inputs and outputs. These LED's are green and labeled with name of corresponding Input/Output.

Six LEDs serve special purposes.

**For more information, refer to table titled:
 105 Board - Special purpose LED's On-Board Indicators (LED's)**

DO4 (1)	"ON" - Doors close at reduced speed for nudging	DO3 (5)	"OFF" - Doors are fully opened
DO7 (2)	"ON" - Controller sending door close command	RC1 (6)	"ON" - Doors fully closed
DO19 (3)	"ON" - Controller sending ALT PROFILE command	RO1 (7)	"ON" - Doors fully open
DO18 (4)	"ON" - Controller sending SQUEEZE command (Canada)	H_PWR (8)	"ON" - H-bridge power relay (K1) energized
		DO17 (9)	"OFF" - Doors are fully closed
		DO10 (10)	"ON" - Controller sending door open command

F608-045 (9/98)



F608-067(9/98)

105 BOARD SPECIAL PURPOSE LEDS			
<i>Item</i>	<i>LED</i>	<i>Color</i>	<i>Description</i>
11	LED 0	Green	System heartbeat indicator. Flashes during normal operation to indicate CPU is running. If LED stops flashing, system has crashed.
12	LED 1	Red	Error indicator. 1) Warning or serious-recoverable error. LED lights solid. LED goes out during start of next door operation. 2) Serious non-recoverable error. LED flashes opposite of LED 0. Reset board to extinguish LED. 3) Fatal error. LED flashes in sync with LED 0. Reset board to extinguish LED.
13	LED 2	Green	At-position LED. Lights when doors are fully open or fully closed. Extinguished when doors are between fully open or fully closed. Note: Doors may drift slightly off limit switch, but remain at-position
14	LED 3	Green	Communications indicator. Flashes when CPU communicates with Service Tool or internal bus.
15	DS14	Red	Neuron service pin. Present/valid ONLY on boards containing a Neuron. Indicates state of Neuron service pin.
16	D18	Red	PWM watchdog shutdown. During normal operation, LED should remain extinguished. If illuminated, internal PWM motor speed monitor circuit detected excessive speed during close operation and shut down motor. Reset board to clear condition.

□ F608-T20 (4/97)

Replacement parts

CLOSED LOOP DOOR OPERATOR

KEY	PART NO.	PARTNAME	REMARK
1	USP31947001	Door operator, Closed loop	Complete assembly; RH
	USP31947002	Door operator, Closed loop	Complete assembly; LH
2	US19502029	Sheave, single	15-1/4 in. diameter
3	US19501021	Belt	4L 550 Frac hp V-type (A53)
4	US19502031	Sheave, single	1.7 in. pitch for reduction
5	USP22442001	Motor & encoder	Encoder shaft magnet
6	USP22444001	Encoder service kit	Includes encoder, centering tool, spacer tool, hardware and instructions
7	US25078	Cam, door operator	5 or 6 required
8	US38351	Pillow block	1 in. bore
9	US100165	Switch, micro	For PMSSC door operators
10	USP31872003	PC board	Main board; Closed loop door control
11	US19502028	Sheave, double	15-1/4 in. diameter
12	US19501022	Belt	4L 680 Frac hp V-type (A66)
13	US19502030	Sheave, double	1.7 in.
14	US58819	Shaft	3/4 in. for reduction
15	US58820	Shaft	Door operator camshaft
16	USP24187	Shaft, pivot ass'y	
17	US25082***	Crank arm, door operator	Per listing information
18	US19500032	Pillow block	3/4 in. dia. bore
19	USP24186	Cover, door operator	
20	US95468001	Bracket, stop angle	
21	US95467001	Spacer, drive sheave	
22	USP35015001	Microswitch assembly	Door closure switch
23	US102022001	Fitting, mounting, closure switch	
NS	US46208	Transformer	32V 250VA; 2 required for high performance option
NS	US46217020	Rectifier, bridge	25A 200V
NS	US49732	Capacitor, electrolytic	41000 uF, 50 WV for high performance power supply
NS	USP31364	Switch & cam assembly	Used for adding a switch
NS	US91651002	Cable, motor encoder	Length = 24 inches

NS = Not shown

Version history

Checked by: Mark Witkowski
Approved by: John Brill

Date: 2005-01-05
Date: 2005-01-05

Issue	Date	Description of Change	PCR	Approved by
R0	1998-11	Creation date		Dwight Dolliver
R1	2005-01-05	Update Adjusting section and logo		John Brill