O. Thompson Co.
Absolute Encoder Replacement Manual

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Section 1 - Hardware

The O. Thompson Absolute Encoder Board replacement kit includes the following parts:

OT Part Number	Description
M00378	Absolute Encoder PCB
320419	1024 PPR Digital Encoder
710509	Toothed Encoder Pulley
265205	Encoder Cable Strain Relief

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Section 2 – Transducer Replacement Procedure

1. Remove power from the controller.

2. Remove the transducer from the machine room tape sheave assembly.

3. Disconnect the cable from the transducer and cut the connector off. Strip approximately 2 inches off of the jacket to expose the conductors and select 3 pairs of wires (6 conductors) to connect to the digital encoder. The following are the suggested connections:

Twisted Pair 1	Signal Name	Encoder Marking
Red	+5V	+VB
Black	Common	⊥

Twisted Pair 2	Signal Name	Encoder Marking
Yellow	A	A
Black	A not or A-	$\overline{A}$

Twisted Pair 3	Signal Name	Encoder Marking
Blue	B	B
Black	B not or B-	$\overline{B}$

4. Remove the foil covering from the wiring and cut the shield (drain) wires off. Cut off all unused conductors

5. Install the toothed pulley on the digital encoder shaft. **Make sure that the new pulley matches the diameter of the old pulley or the output ratio of the encoder will be different from the old transducer.** If the pulley diameter is different, contact O. Thompson Technical Support for assistance.

6. Install the cable strain relief on the encoder. Route the cable through the strain relief device and connect it to the terminal block located inside the digital encoder.

7. Install the digital encoder to the machine room tape sheave. A bracket may be fabricated like that shown in Figure 1 below. The encoder will be mounted on the outside of the bracket with the gear facing in toward the side of the tape sheave assembly.

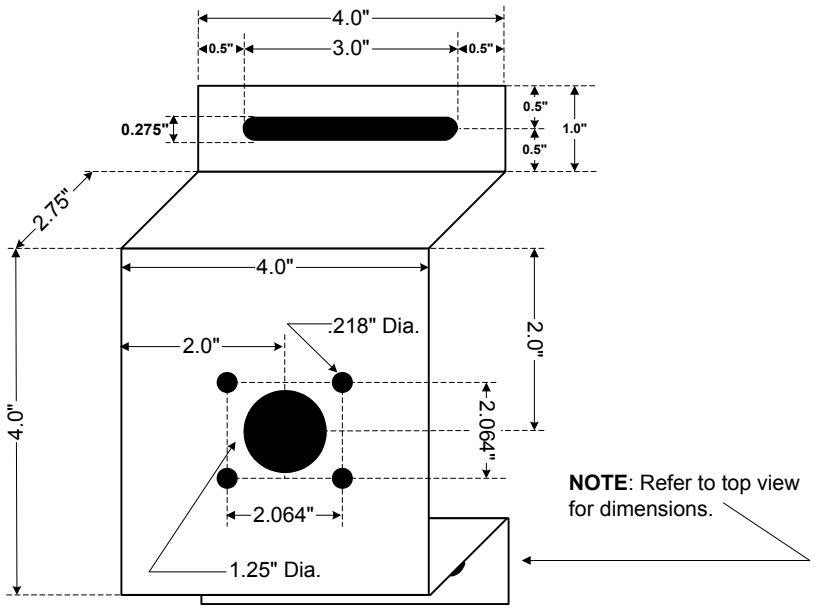

Figure 1

8. Route the toothed belt over both pulleys and align it so the centerline of the belt is centered on the pulleys. Make sure the belt is not too tight or excessive wear may occur to the encoder.

Section 3 – Encoder Replacement Procedure

1. Remove the old encoder board or assembly from the controller.

2. The new Absolute Encoder replacement PCB will mount to the existing holes from the old board. Install the new board so the LCD display is at the top edge of the PCB. Refer to Figure 2 below for proper orientation.

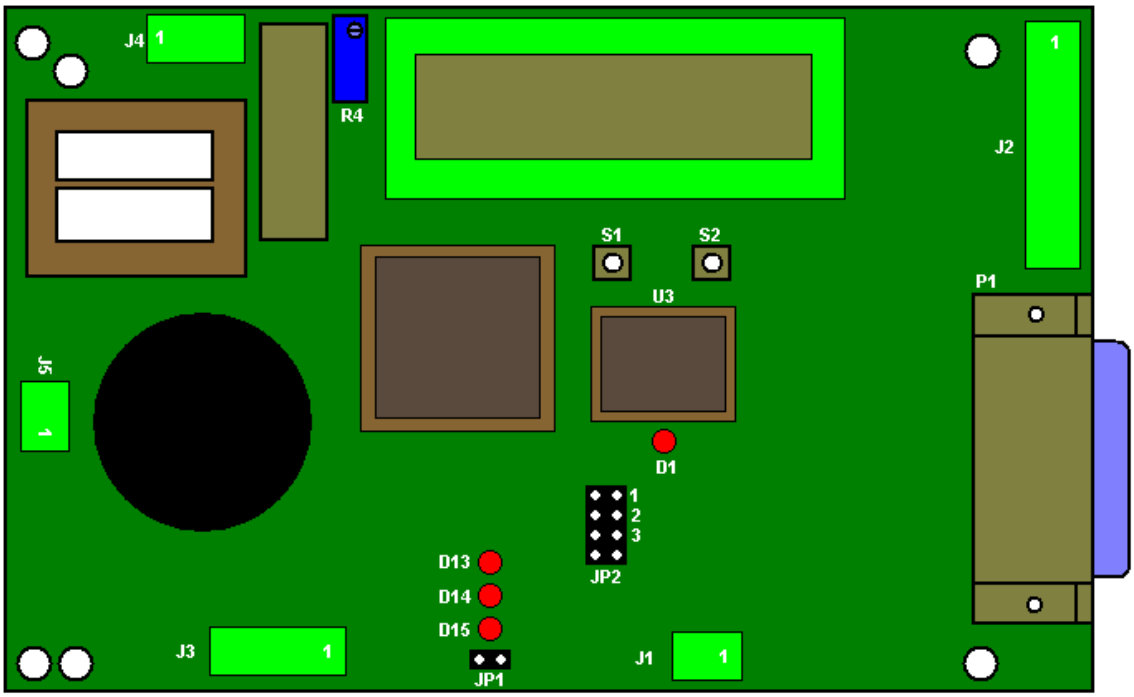

Figure 2

3. Plug the 25-pin ribbon cable to the MPU card into P1 on the new board.

4. Locate the cable coming from the machine room tape sheave assembly. Cut the connector off of the cable, strip approximately 3 inches off the jacket and separate the twisted pairs coming from the digital encoder. Cut off all unused conductors.
5. The encoder will be connected to header J2 on the PCB. Refer to the following table for the proper encoder connections. Make sure that the shield is properly grounded on one end.

J2-1	J2-2	J2-3	J2-4	J2-5	J2-6	J2-7	J2-8
+5V	COM	A	$\overline{A}$		B	$\overline{B}$	

6. Referring to the wiring diagrams for the controller, locate a 110 VAC supply for the new Absolute Encoder PCB. This will be the power source for the board, so the supply should be independent of other devices.

There is a fuse on the Absolute Encoder board so it is not necessary to add a fuse to the controller.

7. Wire the 110 VAC supply into connector J4 of the new board. J4-1 will be the fused side, so this needs to be the hot lead. J4-3 will be wired to 110 VAC common.

8. Connector J3 is the input to the new board for the door zone and top and bottom slowdown signals. The board will need these signals to operate properly. Referring to the controller wiring diagrams, locate the limit switches closest to the top and bottom of the hoistway. The top limit switch will be wired to J3-2. The bottom limit switch will be wired to J3-3. The common (low) side of the power supply for these signals will need to be wired to J3-4.

9. Referring to the controller wiring diagrams, locate the signal for the 3-inch door zone. If this signal has a different common than the signals for the top and bottom limit switches, locate a spare contact on the DZ relay or add an additional DZ relay to the controller.

10. Referring to Figure 3 on the following page, wire one side of a normally open contact from the DZ relay to the same supply as the top and bottom limit switches. Wire the other side to J3-1 on the new Absolute Encoder board.

NOTE 1: *If the Absolute Encoder board is being installed on a controller with a D/A (Digital to Analog convertor) speed card then the door zone signal must turn off after the car stops at the floor. If the door zone signal remains on with the car stopped level with the floor the Absolute Encoder board will assume that the controller uses an LU and LD signal to level the car at the floors and will not operate properly.*

NOTE 2: *If the Absolute Encoder board is being installed on a controller that uses an LU and LD signal to level the car at the floors then the door zone signal must remain on after the car stops at the floor. If the door zone signal turns off with the car stopped level with the floor the Absolute Encoder board will assume that the controller uses a D/A speed card and will not operate properly.*

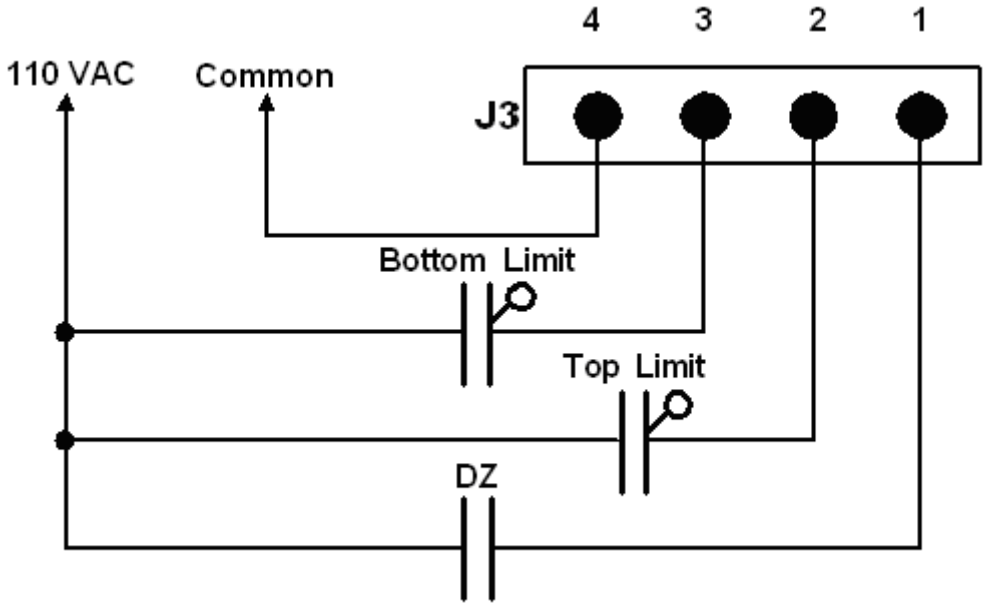

Figure 3

WARNING! *The Absolute Encoder board will only accommodate a maximum of 110 VAC or VDC. If the voltage of the existing circuitry is higher, then the power source must be changed to a lower voltage. Use the 110 VAC power source that was located in Step 5.*

11. The new Absolute Encoder board is now wired.

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Section 4 – Absolute Encoder Power Up and Test

1. After all wiring is complete the Absolute Encoder board is ready to be powered up. Apply power to the controller.

2. Upon power up the Absolute Encoder board will display the initial encoder position and the amount of counts per inch. These values will each be displayed for about 1.5 seconds. After that, the board will display present car speed and the present encoder position.

3. Pot 4 sets the contrast of the LCD display. Adjust it as necessary for viewing the information on the screen.

4. LED D1 will be illuminated on the board when power is applied and the processor is operating. If this LED does not come on confirm that power is applied to the board at J4 and that the proper software is installed in socket U3.

5. It is now necessary to confirm the status of the inputs to the Absolute Encoder board. LED D13 is an indicator light for the door zone signal. Move the car on inspection into a door zone so the DZ relay picks up. When it does, D13 will illuminate. If not, confirm the wiring to J3 connector on the board.

6. Confirm that with the car stopped at a floor the door zone signal is off for cars using a D/A Speed card and on for cars using an LU and LD signal to level the car.

WARNING! *If the door zone signal does not operate as described above the Absolute Encoder board will not function correctly. This could cause the elevator to stop off level with the floor. Confirm that the door zone signal operates as described above before proceeding.*

7. LED D14 is an indicator light for the top limit switch. With the car away from the top floor it should be illuminated. When the car is approximately 3 feet away from the top floor it must be off. If not, confirm the wiring to the J3 connector.

8. LED D15 is an indicator light for the bottom limit switch. With the car away from the bottom floor it should be illuminated. When the car is approximately 3 feet away from the bottom floor it must be off. If not, confirm the wiring to the J3 connector.

9. On inspection operation, run the car in the up direction. As the car is running up, confirm that the counts on the monitor in the controller are

increasing. If not, stop the car and remove power from the controller. Confirm all wiring between the digital encoder and the J2 connector. If the counts were decreasing as the car was moving up, reverse the wires at terminals J2-6 and J2-7 on the Absolute Encoder board. Restore power to the controller and run the car up again. The count should now be increasing.

10. If the counts are not changing while the car is running in the up direction, stop the car and run it in the down direction. If the counts are still not changing, check the voltage from J2-1 to J2-2. It should be +5 VDC, ± .25 volts. If not, the Absolute Encoder board will need to be replaced. If the voltage is present then the digital encoder or the wiring may be bad. Replace the digital encoder and re-confirm the wiring.

11. Run the car in the down direction. Confirm that as the car moves down the counts are decreasing. If not, go to step 6.

12. The Absolute Encoder board is operating properly and is now ready for the floor landing learn procedure.

Section 5 – Absolute Encoder Set Up Procedure

1. On inspection operation, bring the car to the bottom floor and put it absolutely level.

2. Remove power from the Absolute Encoder board.

3. Apply power to the board. As it is powering up, the board will display the number of counts per inch. If it is set to 16 counts per inch go to Step 10. If not, got to Step 4.

4. Referring to Figure 4 below, install a jumper in position 3 of header jumper JP2.

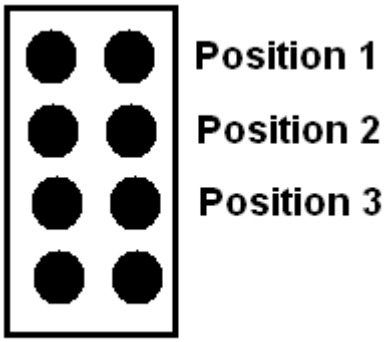

Figure 4

5. Press and release button S1 on the Absolute Encoder board. The number of counts per inch will now be displayed.

6. Press and release button S2 until the number of counts per inch is 16 or the value that the controller was set up for. Confirm the controller's counts per inch value by accessing the controller's set up menu.

7. Remove the jumper from JP2 position 3.

8. Press and release button S1.

9. The bottom floor value of the encoder must now be set to correspond with the floor value programmed into the controller's processor. Typically this value is 2000 counts. Confirm the bottom floor value by accessing the controller's floor height values.

10. If the bottom floor value does not need to be modified, go to Step 15. If it needs to be modified go to Step 11.

11. Referring to Figure 4, install a jumper in position 2 of header jumper JP2.

12. Press and release button S1 on the Absolute Encoder board. The bottom floor value will now be displayed.

13. Press and release button S2 until the bottom floor value corresponds to the number programmed in the controller.

14. Remove the jumper from JP2 position 2.

15. On inspection operation, move the car so it is absolutely floor level at the bottom floor.

16. Referring to Figure 4, install a jumper in position 1 of header jumper JP2. This position puts the board into the learn mode for the floor landings.

17. If the Absolute Encoder board is being installed on a controller that uses a D/A Speed card then go to Step 18. If the board is being installed on a controller that uses LU and LD to level the car at the floors then go to Step 19.

18. The Absolute Encoder board requires the door zone signal to be turned on to initiate the learn procedure. Controllers that use a D/A Speed card will require a **TEMPORARY** jumper from terminals J3-1 to J3-2 be installed to turn the door zone signal on.

19. Press and release button S1 on the Absolute Encoder board.

20. The board will now display a message to run the car to the bottom floor and press S2.

21. Press and release button S2.

22. The Encoder will now display “FLR 01 VAL 02000”. After about 5 seconds a message will be displayed to run the car to the next floor.

NOTE: *If the bottom floor value from Step 9 is different than 2000 counts the proper value will be displayed.*

23. If the controller uses a D/A Speed card and a jumper was installed in Step 19 remove it now.

24. Place the car on automatic operation.

25. From the controller, run the car to the next floor.

26. Confirm that the car has stopped in the door zone. The display on the Absolute Encoder will display a message to run the car to the next floor. **Do not move the car to the next floor until the message is displayed!**

27. Repeat Steps 25 and 26 until the car reaches the top floor. When the car is at the top floor the Absolute Encoder board will display "**LEARN COMPLETE REMOVE JUMPER**".

28. Remove the jumper from JP2.

29. The board will re-initialize and will display the present car speed in feet per minute and the present car position in encoder counts.

NOTE: *The car speed value shown on the display of the Absolute Encoder board will vary as the car is in motion. This is normal and should be ignored. If the gear on the tape sheave is not sized to provide 16 counts per inch feedback then the speed displayed on the Absolute Encoder board will not be accurate.*

30. The Absolute Encoder board is now set up. Ride the car and confirm that the floor levels are correct and the car is operating properly. The car may now be returned to service.

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Section 6 – Troubleshooting

The following information has been provided to assist in troubleshooting common problems with the Absolute Encoder board. If you are experiencing any of these or other problems and cannot resolve them please contact O. Thompson's Technical Support Department at (718) 417-3131.

Problem:
LCD display too dark or too bright.

Solution:
Pot 4 on the Absolute Encoder board adjusts the contrast of the LCD display.

Problem:
When the Absolute Encoder board is placed in the learn mode and is at the bottom floor pressing the S2 button causes an error message to be displayed.

Solution:
The Absolute Encoder board requires the door zone signal to be turned on, the top floor signal to be turned on and the bottom floor signal to be turned off before a learn procedure can be initiated. On control systems using a D/A Speed card the door zone signal is shut off after the car stops. To initiate a learn procedure on elevators using these control systems a **TEMPORARY** jumper must be installed to turn on the door zone signal before pressing the S2 button. Refer to Section 5 for the proper procedure.

Problem:
After the car stops at a floor the position value from the Absolute Encoder changes by a few counts.

Solution:
On control systems utilizing an LU and LD signal to level the car at a floor the Absolute Encoder board will correct the position to the value that was learned during the set up procedure. Correcting by a few counts is normal and should be ignored. If the correction is greater than 4 or 5 counts then the board should be re-learned.

Problem:
The position from the Absolute Encoder 'jumps'.

Solution:
The Absolute Encoder provides a 16-bit interface to the MPU board to give position information to the control system. If any of the conductors in the 25-pin cable are open or shorted the position data seem by the MPU will 'jump'. Replace the ribbon cable. If the problem persists replace the MPU or the Absolute Encoder board until corrected.

Problem:
The Absolute Encoder board does not provide consistent position information to the control system. The board seems to lose or gain counts, causing the car to stop off level. This seems to get worse the longer the car is running.

Solution:
The Absolute Encoder will work properly with a Microflite controller using either a D/A Speed card or LU and LD signals to level the car at the floors. The board will operate differently for the different applications. Most problems with losing or gaining counts are related to the board not receiving the correct door zone signal. Confirm that when the car is stopped at a floor on Automatic Operation the door zone signal is off for cars using a D/A Speed card and on for cars using an LU and LD signal to level the car. After the door zone signal has been corrected the board will need to be re-learned.

Another common problem that could cause inconsistent position information is having the encoder drive belt improperly installed. Check the belt and make sure that it is not too loose. The belt should be installed so that you are able to squeeze it together so that it touches in the middle between the drive gear and the encoder gear. If the belt is too tight or too loose it can cause the encoder to lose or gain counts when the car changes direction.

Confirm that the tape hitch at the top and bottom of the car are secure. If the tape can float the position of the car will not be consistent with that of the encoder.

Confirm that the cable to the encoder mounted on the tape sheave is properly connected and shielded. False or missing pulses from the encoder can cause erratic position information.

Problem:
When power is lost to the Absolute Encoder board it requires a resynchronization.

Solution:
Replace the Absolute Encoder board. The retentive memory is not functioning or the power loss detection circuitry is not operating properly.

Problem:
The speed displayed on the Absolute Encoder does not match the actual speed of the car.

Solution:
The car speed value shown on the display of the Absolute Encoder board will vary as the car is in motion. This is because the speed detection circuitry on the Absolute Encoder board “samples” the pulses coming from the encoder. This variation in displayed speed is normal and should be ignored.

If the gear on the tape sheave and the gear on the encoder are not sized to provide 16 counts per inch feedback to the Absolute Encoder board then the speed displayed on the Absolute Encoder board will not be accurate. This was done on some jobs with long travel because the Absolute Encoder cannot provide more than about 60,000 counts.

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