

IMPORTANT

**Engineering Bulletin #116
M00352 (AKA T-LIMIT-T) Limit Board
Installation & Adjustment on Existing
Microflite Plus, Ultra, and Ultra 2000
Controllers - M00118 Board
Replacements with no Speed Clamping
on Cars Using Analog Tachometers
(LIMITOT Software)**

Motion Control Engineering

**New York Office
84-00 72nd Drive, Unit F
Glendale NY 11385
(718) 417-3131**

O. Thompson M00352 Limit Board

The O. Thompson M00352 Limit board (MCE part number T-LIMIT-T) is designed to be an exact replacement of the older style M00118 Limit board. The M00352

**© Copyright 2002 O. Thompson Co.
Revised 8/14/12 Motion Control Engineering**

Limit board uses a processor to monitor car speed and the status of the hoistway limit switches. If the car speed exceeds that which is safe for an approach to the top or bottom terminal floor, the Limit board will open the safety circuit, removing power from the brake and hoist motor.

The following is an explanation on installation and adjustment of the board. The board can be installed in one of two ways. If you have an existing MicroFlite installation, you are using an analog tachometer, and you do not wish to activate the speed clamping function, follow the procedure that is outlined for an existing installation. If you wish to activate the clamping, follow the procedure for a new installation (Bulletin #104). If you are using a digital encoder, follow the procedure outlined in Bulletin #104. If you have a Series '90 controller, follow the procedure outlined in Bulletin #110. The board will automatically detect if the speed reference is present and if not, will not clamp the reference, but rather open the fault circuitry.

Limit Board Hardware

The Limit board requires hardware version 2.0 or later. If you have earlier version boards do not use it, as the Limit board may not operate properly.

Limit Board Software

In order to operate properly, the Limit board requires software version named "LIMITOT." The most recent version of this software is dated 6/18/12.

While this software is designed to handle both jobs with analog tachometers and digital encoders, it is the preferred software for all MicroFlite controllers up to and including MicroFlite Ultra 2000, without digital encoders, that have an analog tachometer.

Limit Board Mounting

The mounting holes on the new board are positioned such that the new board will use the existing mounting holes on most controllers.

Position the Limit board so that it is aligned with the existing mounting holes on the right side. Install the mounting screws and stand-offs, securing the new board to the controller.

Limit Board Wiring

Before the Limit board can be adjusted, it must be wired correctly. The board was designed so that the wiring from the existing board will connect to the new board. You may, however, have to re-route or lengthen the wires that connect to some of the terminals. Due to the smaller size of the new board, some of the terminals have been relocated about 5 inches away. Refer to Figure 1 below for the correct terminals.

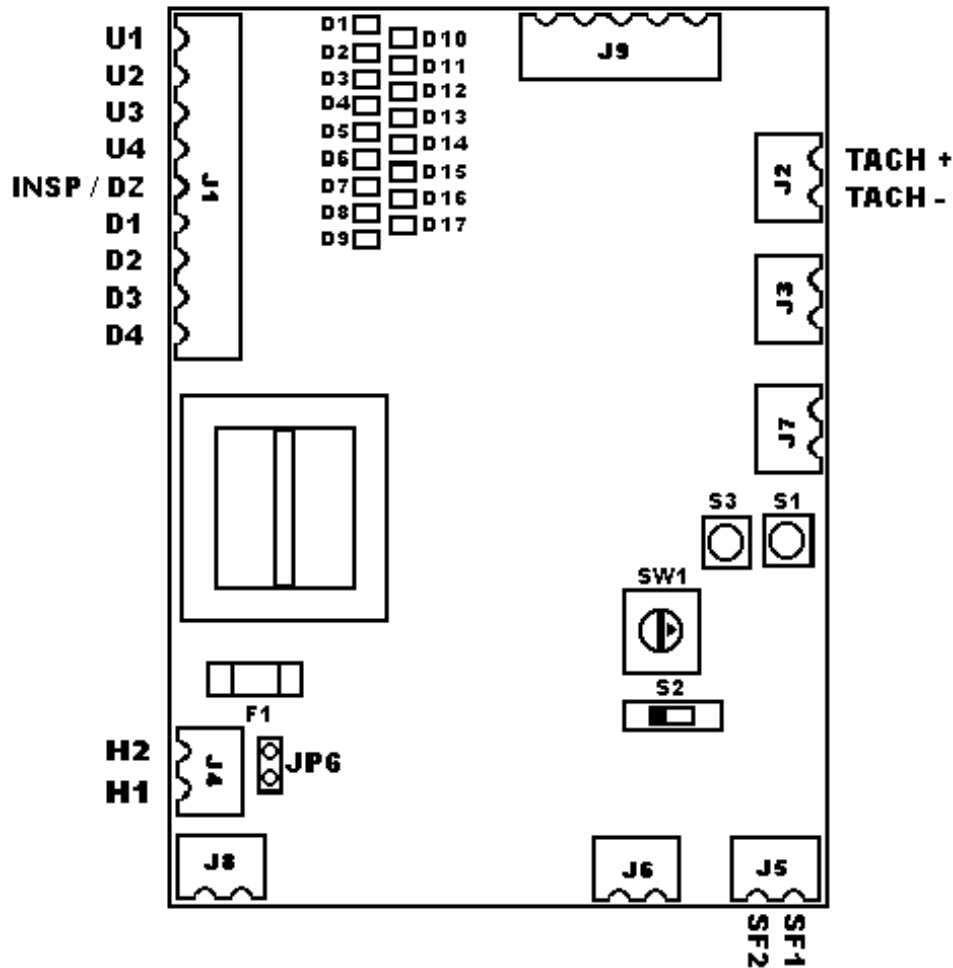
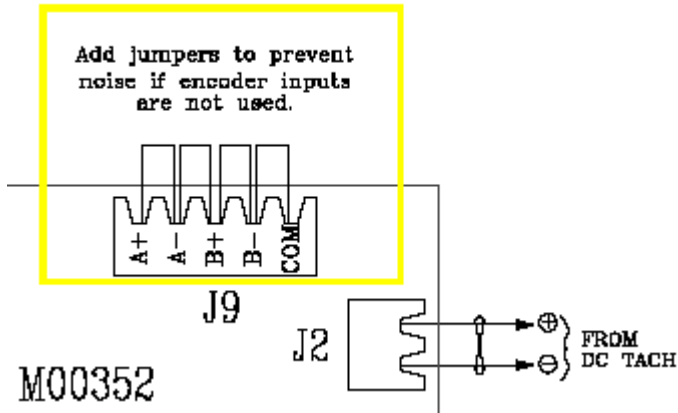


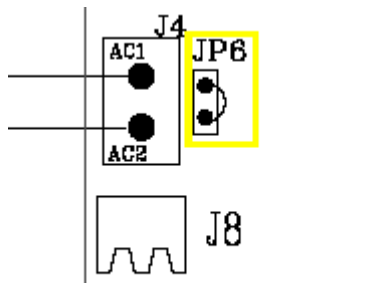
Figure 1

Attention: When replacing the M00118 limit board, you must invert the wires going into the J2 connector on the new limit board. In other words, on the M00118 board the TACH - input is at the top and the TACH + is at the bottom, whereas on the M00352 (AKA T-LIMIT-T) board, the TACH + input is at the top of connector J2 and the TACH- input is at the bottom.

When a DC tachometer is used the encoder inputs need to be connected to the common on the J9 connector to avoid noise problems.



Make sure there is a jumper on JP6.



Please Note: Not all limit switch input terminals may be used on your application. If there were no wires on the existing board on U1, U2, U3, D1, D2, or D3, nothing should be connected to the new board. If AC2 is the power supply to the limit switches, then AC1 is common. Put jumper JP6 in place on the Limit board. If the jumper is not present, terminals J8-1 and J8-2 must be wired to the low side of the line supplying the switches.

Limit Board Set Up

Before the Limit board is adjusted, it is necessary to program the car speed. Locate the rotary switch “SW1” on the board. Using the chart below, locate the contract speed of the car. SW1 will be set based on the car speed. If the contract speed of the car is not divisible by 100 (for example, 350 FPM), S2 will be used to add 50 FPM to the programmed car speed.

| <u>Car Speed</u> | <u>SW1</u> | <u>Car Speed</u> | <u>SW1</u> | <u>Car Speed</u> | <u>SW1</u> |
|------------------|------------|------------------|------------|------------------|------------|
| 100 | 1 | 600 | 6 | 1100 | B |
| 200 | 2 | 700 | 7 | 1200 | C |
| 300 | 3 | 800 | 8 | 1300 | D |
| 400 | 4 | 900 | 9 | 1400 | E |
| 500 | 5 | 1000 | A | 1500 | F |

Set SW1 to the value specified above. If 50 FPM needs to be added, place S2 in the right most position. If not, S2 must remain in the left most position. If the SW1 or S2 settings have been modified while the board was powered up, you must cycle power to the board.

The Limit board requires a learn procedure for calibration. With the car on inspection, place it somewhere near the center of the hoistway, away from all terminal floor slowdown switches. Prior to doing the learn procedure the inspection speed must be set up to its highest possible setting, as allowed by the inspection speed potentiometer adjustment (e.g. Ultra 2000). Confirm that all of the switches are turned on by checking the LED on the board. Use the chart below to determine which LED corresponds to which limit.

| <u>Limit</u> | <u>LED</u> | <u>Limit</u> | <u>LED</u> |
|--------------|------------|--------------|------------|
| U1 | D1 | D1 | D5 |
| U2 | D2 | D2 | D6 |
| U3 | D3 | D3 | D7 |
| U4 | D4 | D4 | D8 |

LED D9 should be turned off. It will come on when the car is on Automatic operation with the doors closed. Due to the circuit, when placing some controllers on inspection operation, while the door is closed, LED D9 will not turn off. If this is the case on your controller, disconnect the INSP/DZ wire (pin 5 on connector J1) for the time being.

To place the board in the learn mode, press S3 and then press and release S1. Release S3. LED D25 (DIAGNOSTIC LED) will be blinking rapidly (on 1/8 second, off 1/8 second). Also, the D10, D11, and D17 LED’s will be lit.

Run the car up and down on inspection. Confirm that the car speed does not exceed 100 FPM.

Run the car up on inspection about 5 feet. With the car running, press and release S3. D10 will turn off.

Run the car down on inspection about 5 feet. With the car running, press and release S3. D11 will turn off. D25 will now be on continuously, indicating that the inspection learn procedure was done correctly, and the board is in normal operation.

Lower the inspection speed back to its original, desired setting. If you had to disconnect the INSP/DZ wire (pin 5 on connector J1), please reconnect it at this time.

Attention: The high-speed learn trip must be done following the inspection learn and not the other way around. If you have to redo the inspection learn, then please make sure to also follow it by a high-speed learn. If your inspection learn has already been completed and there is no need to redo it, you can repeat the high-speed learn trip as many times as needed, without having to redo the inspection learn.

Next, the Limit board must be set up for high-speed operation. Bring the car to the lowest landing door zone on inspection operation. Disable the doors, and place the car on Automatic operation. Make sure that LED D9 is turned on when the doors are closed. **Cycle power to the board, else the high speed learn will most likely not complete successfully, and will have to be repeated.** Press and hold S3. Press and release S1. Release S3. D25 (DIAGNOSTIC LED) will begin blinking rapidly (on 1/8 second, off 1/8 second), and D10 and D11 will be illuminated.

Do a high-speed run to the top floor. After the car stops, D10 will turn off.

Do a high-speed run to the bottom floor. After the car stops, D11 will turn off, and D25 will be on continuously, indicating that the high speed learn procedure was completed successfully, and the Limit board is in normal operation.

The Limit board set up is now complete.

Limit Board Testing

BEFORE THE BOARD IS TESTED, IT MAY BE NECESSARY TO PREVENT THE CAR SAFETY AND/OR COUNTERWEIGHT SAFETY FROM APPLYING.

To do this, disable the safety devices by tying the safety arm down so it will not apply if the car or counterweight strikes the buffer.

If the customer is not doing this then they are running the risk that the mechanical safety could apply, and if it is the type that requires the car to be moved up to reset, they may be in a position where the car cannot be moved. In this situation, releasing the mechanical safety can be quite a problem.

After the safeties have been disabled to confirm that the board will function correctly, remove the J1 connector. Run the car in the up direction on automatic. As soon as the car speed reaches about 100 – 150 FPM, the Limit board will trip, stopping the car. Repeat the test with the car running in the down direction. Reconnect the J1 connector.

With the car on door disable operation start the car from the lower part of the shaft and place a car call one floor (two floors away for high-speed cars) away from the top landing. When the car reaches full speed, pull the up limit wires from J1 connector, one at a time, starting with the limit farthest away from the terminal. Make sure that the board trips and self-resets 3 seconds after the car comes to a stop. LEDs D10 – D13 will show the limit status when the board tripped for the direction the car was running in. LEDs D14 and D15 will indicate that the car was moving in the up, respectively the down direction when the trip occurred. Repeat the test in the down direction.

With all the limits made, run the car at full speed and pull out the tachometer connector J2, prior to the car breaking any limits. Shortly after the car breaks the first limit, the board will trip on a non-resettable failure. LED D16 will turn on. Reconnect the tachometer input and reset the limit board. Repeat the same test in the opposite direction. Reconnect the tachometer input, reset the limit board and run the car to the middle of the shaft.

With all the limits made, run the car to the first stop after just past the first limit the up direction. After the car comes to a stop, remove the tachometer input and run the car to the top floor. The board will trip on a non-resettable failure after the last limit breaks. . Reconnect the tachometer input, reset the limit board and run the car to the middle of the shaft. Repeat the test in the down direction. Reconnect the tachometer input, reset the limit board and run the car to the middle of the shaft.

Enable door operation on the controller and run the car. Observe how LED D9 turns off any time the car opens up the door and turns on when the car moves out of the door zone. Make sure that the board does not trip when the door opens. If the board

trips only when the door opens it is recommended that the set-up learn procedure, both inspection and high-speed, be repeated.

RE-ENABLE THE SAFETIES DISABLED AT THE BEGINNING OF THIS TEST. Cycle power to the controller and the car can be returned to service.

Limit Board LED Indicators

The LED's on the Limit board are divided into two columns. The first column, D1 - D9 are limit input diagnostic LED's. They each correspond to a specific limit switch input.

| | |
|-----------|----------------------------------|
| D1 | Up Limit 1 |
| D2 | Up Limit 2 |
| D3 | Up Limit 3 |
| D4 | Up Limit 4 |
| D5 | Down Limit 1 |
| D6 | Down Limit 2 |
| D7 | Down Limit 3 |
| D8 | Down Limit 4 |
| D9 | Inspection Operation / Door Open |

The LED will be illuminated when the limit switch is closed. The limits will open as the car passes them traveling toward the terminal floor. D9, Inspection Operation / Door Open, turns off to indicate that car is on inspection, or the gate switch or door locks are open.

LED's D10 - D17 are diagnostic or fault indicators. On normal operation, all the LED's will be off, with the exception of D10 and D11. These LED's indicate the direction of the car's motion, up or down.

Normal Operation

On normal operation, if a fault has not occurred, LED D10 will turn on when the car runs up and LED D11 will turn on when the car runs down. Sometimes when running on very low inspection speeds, it is possible to notice a flicker on these LEDs.

On normal operation, if a fault has occurred, the board will save the last fault. It will indicate the direction the car was traveling and which limit switch opened to initiate the slowdown into the terminal floor. The LED's are:

- D10** Status of Up/Down Limit 1 during Trip
- D11** Status of Up/Down Limit 2 during Trip
- D12** Status of Up/Down Limit 3 during Trip
- D13** Status of Up/Down Limit 4 during Trip
- D14** Up Direction Detected during Trip
- D15** Down Direction Detected during Trip
- D16** Tachometer Speed Feedback Failure
- D17** Not Used

As shown above, when a failure occurs, LED D14 or D15 will indicate the car's direction of travel, and D10 - D13 will indicate which limit opened to initiate the trip. Both D14 and D15 LEDs on indicate that the board detected no up and down slowdown limits at all, while LED D9 was turned off (car not on inspection and door not opening). D16 indicates that the board has lost the speed feedback input, preventing the board from being able to monitor the speed of the car. LED25 will blink (1/2 second on, 1/2 second off) while the board is tripped. The Tachometer Speed Feedback Failure is not self-resettable. The other faults, specifically all limits missing (both D14 and D15 turn on), or the up/down overspeed faults (D14 on, respectively D15 on), self-reset 3 seconds after the car has come to a complete stop, as long as there are no more than 5 trips within a 1.5 minute time interval.

Set Up Mode

While the board is in set up mode, D10 - D17 indicate the status of various functions the board monitors.

- D10** Learn Up
- D11** Learn Down
- D12** Not Used
- D13** Not Used
- D14** Limit Opening at High Speed during Set Up
- D15** Not Used
- D16** Not Used
- D17** Car on Inspection

D10 and D11 indicate that the learn up or learn down operations have not been completed. They will turn off after these operations have been performed.

D14 indicates that the car had not gone into slow down when the first limit switch opened. The limit switches need to be moved closer to the floor for proper operation of the board.

D15 indicates that an encoder has been detected for the speed feedback.

D16 indicates that the Limit board has detected that the speed reference input is present, and pattern clamping will be enabled.

D17 indicates that the car is on inspection operation.

D25 blinks rapidly (1/8 second on, 1/8 second off), indicating that the board is in set-up (learn) mode.

If you have any questions about this or any other O. Thompson device, please contact our Technical Support Department at (718) 417-3131.