



ELECTROMECHANICAL TRIM TAB SYSTEMS

Manual Leveling Control Installation/Operation



Linear Devices Corporation
dba Lectrotab
11126 Air Park Road, Suite G
Ashland, VA 23005

www.lectrotab.com
Phone: 804-368-8428
Fax: 804-368-8438

Table of Contents

- Introduction.....3
- Safety.....3
- How Do Trim Tabs Work.....4
- Display Panel Installation & Wiring.....5
- Verify Display Settings/Operation.....6
- Programming Display.....8
- Troubleshooting.....10
- Specifications.....10

Introduction

The manual leveling control system incorporates many of the features of the auto leveling control. The operation and LED function is similar to the operation of the auto leveling control operated in manual mode. The manual leveling control is potted and sealed to be waterproof and has a plug for easy installation. Actuators connect directly to the keypad, so no power module box is necessary.

The Lectrotab manual leveling control (MLC) design advantages and features include:

- Improved fuel efficiency and faster speeds
- Control remembers and deploys tabs automatically to last tab setting when ignition key switch is turned off and back on (programmably selected)
- Actuators connect directly to display (MLC-1 for single actuator system does not require a control box)
- Faster planing at slower speeds
- Automatic tab retraction when connected to accessory switch or ignition key switch
- Easy upgrade from rocker switch or Oval control
- Completely sealed and waterproof display
- Automatic dimming of display LED indicators in darkness and brighten in sun light
- Operates on 10 to 30 Volts DC
- 2 Year Warranty
- CE Approved (Compliance with EMC regulations)

Safety

- Failure to follow all instructions listed in this manual may result in equipment failure or serious injury.
- If using trim tabs for the first time, follow the Operation section of this manual to familiarize yourself with the feel and response of your trim tab system.
- Never deploy tabs in a following sea. Keep tabs fully retracted in a following sea.
- Never deploy tabs quickly at high speeds or above cruising speeds. This may cause the boat to turn quickly and become unstable and difficult to control.
- Stay alert, watch what you are doing and use common sense when operating your trim tab system.
- Do not use the trim tab system when under the influence of drugs, alcohol or medication. A moment of inattention while operating the trim tab system may result in serious injury

How Do Trim Tabs Work

Boaters will enjoy many performance and efficiency benefits by adding Lectrotab trim tabs. Lectrotab trim tabs improve fuel efficiency, increase boat speed, accelerate shallow water planing, eliminate porpoising, and enhance the overall boating experience with a more comfortable ride.

- **Improved Fuel Efficiency and Faster Speeds**

Most importantly, the trim tabs may be adjusted to optimize speed and fuel efficiency. Typically, the bow rides high causing the stern to drag in the water at cruising or lower speeds. A boat owner will attempt to correct this problem by trimming his outdrive down to bring the bow down. This adjustment is extremely inefficient and reduces boat speed and increases fuel consumption, because trimming of the outdrive pushes water down to allow the transom to rise and bow to lower. In this scenario, the outdrive is not only propelling the boat forward but it is also pushing the bow down. The most efficient way to operate the boat is to adjust the tabs to maximize boat speed and level. The outdrive may then be adjusted so the prop shaft is parallel to the water to maximize the thrust to push the boat forward.

- **Faster Planing**

For shallow water starts, trim tabs allow the boat to get up on plane faster. Faster planing can be accomplished by lowering the tabs to the fully deployed position. As the boat achieves plane, trim tabs may be raised until the boat is level.

- **Porpoising**

Occasionally, an uneven load distribution or certain speeds will cause the boat to “porpoise”. This problem can easily be corrected by deploying both trim tabs simultaneously a few degrees until the “porpoising” stops.

- **Boat Leveling**

Every boat owner has experienced passengers or equipment moved to one side of the boat, which causes the boat to lean to one side and leads to difficulty in handling the boat as well as an uncomfortable ride. Adding trim tabs to a boat corrects this problem by deploying the tab on the same side as the boat is leaning towards which levels the boat for a more comfortable ride.

- **Head Sea**

Rough sea conditions can also be better managed with trim tabs. Typically in a head sea, the boat speed must be reduced causing the bow to ride high. The waves will pound and beat the boat bottom for an extremely uncomfortable and slow ride. Trim tabs can be deployed to level the boat out and allow the hull to cut through the waves for a smoother and more efficient ride.

- **A Beam Sea or Wind**

A beam sea or wind can lead to a wet ride. To greatly reduce or eliminate the spray caused by waves or wind hitting the boat side, the windward side trim tab may be deployed to raise the windward side of the boat. Also retracting the leeward trim tab side may help.

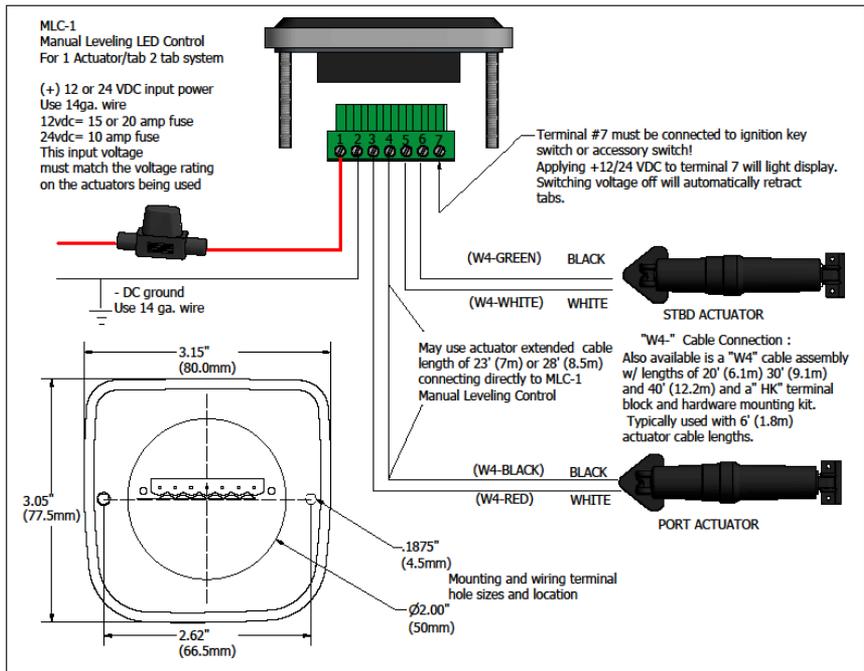
Display Panel Installation & Wiring MLC-1

For MLC-1 (single actuator, single station display only)

Mounting Display Panel:

1. Locate the display panel at the helm where it is convenient to access and view the LED indicators.
2. The mounting hole diagram has two 3/16" (4.5mm) holes and one 2" (50mm) as shown below for the two mounting studs and display connector.
3. Mount the display with the washers and nuts provided.

Important: For retrofit installations, always disconnect the wires from the original control panel before connecting to the MLC. Switch off the main dc circuit breaker before starting the connection



Wiring Display Panel:

1. Refer to wiring diagram as shown above for the MLC-1 wiring connections.
2. The red (+12vdc or +24vdc) wire from the boat's fuse panel and black battery negative wires should be a minimum size of 14 AWG (2.5mm²).
3. **Important:** DC voltage source connected to MLC switch must match actuator voltage (first letter in actuator serial A, C or S =12vdc, B or D = 24vdc).
4. Terminal 7 must be connected to ignition key run position or accessory switch to automatically retract the tabs when key is switched to OFF.

Verify Display Settings and Operation MLC-1 (Single actuator, Single station)

Photo sensor to automatically brighten and dim LEDs

LEDs indicate tab position

Adjust Bow Down or Bow Up Buttons. Adjusts both tabs simultaneously

Adjust Port or Starboard sides up or down



MLC-1 Display

Set Actuator Deployment Time:

Follow the programming chart and instructions on page 7 to program keypad to match the actuator deployment time.

Verify Connection and Operation:

1. Press the "Bow Down" button (top button), and both actuators/tabs deploy simultaneously.
2. Press the "Bow Up" button (bottom button), and both actuators/tabs will retract simultaneously.
3. If the tab or tabs are moving in the opposite direction as described, switch the two actuator wires from the actuator that moves in the wrong direction ((move 3 to position 4 and 4 to position 3 for port actuator) at the 7 pin plug, and switch 5 and 6 in the same manner for the starboard actuator and repeat the testing process).
4. Press the "Starboard Side Down" button (right button), and the starboard actuator will retract until fully retracted at which point the port actuator will deploy.
5. Press the "Port Side Down" button (left button), and the port actuator will retract until fully retracted at which point the starboard actuator will deploy.
6. If the wrong tab is moving as described in step 4 and 5, exchange wires 3 and 4 with 5 and 6 at the green 7 pin plug and repeat the testing process.

LED Position Indicators:

When retracting actuators/tabs, the top LED indicator will flash to show tabs are retracting. When deploying actuators/tabs, the lowest lit LEDs will flash to show tabs are deploying.

Automatic Tab Retraction:

There are a couple options for automatically retracting the trim tabs. You may connect the accessory terminal of the ignition key switch to terminal #7 at the MLC keypad. When the ignition key switch is turned off, the tabs will retract automatically, and the display will turn off. Another option is to connect terminal #7 to an accessory switch, so the tabs will only retract when this switch is turned off.

Automatic Tab Adjustment to Last Setting:

When the accessory switch or ignition key switch (connected to keypad terminal #7) is turned off, the tabs will automatically retract. When the accessory switch or ignition key switch is turned back on, the tabs will adjust to the last know position before key switch was turned off. Follow the instructions on page 7 to program the keypad for this feature.

Programming MLC-1 (Single actuator, Single station)



MLC-1 Display

Automatic Tab Adjustment to Last Setting:

When the accessory switch or ignition key switch (connected to keypad terminal #7) is turned off, the tabs will automatically retract. When the accessory switch or ignition key switch is turned back on, the tabs will adjust to the last know position before key switch was turned off. You may enable this feature by adjusting program setting #1 to a value showing LED R2 from the programming chart (see programming chart). Turning the main power supply or battery selector switch to the off position will erase or reset the last tab setting, so a new setting will be saved for the next trip.

Set Actuator Deployment Time:

Follow the programming chart below to program the MLC keypad to match the actuator deployment time. Actuators that begin with part number or serial number "A or B" have an 8 second deployment time. This is the default time and no programming is necessary. Actuators that begin with "C or D" have a 4 second deployment time and must be programmed to 4 seconds. Actuators that begin with "S" have a 6 second deployment time and must be programmed to this.

Change LED Indicator Tracking:

The LED indicators are set to show the approximate tab angle and movement which is the default setting. This setting may be changed to show what direction the port and starboard side is moving. This setting can be changed by following the program chart below and changing setting L3 to R2.

Enter, Adjust and Exit Program Mode:

- Before entering program mode, 12vdc or 24vdc must be applied to MLC terminals 1, 2 and 7 (see wiring)
- Press and hold Bow Down (top) button and Bow Up (bottom) button for 4 seconds to enter program mode
- LED L1 (top left LED) will begin flashing and LED R1 (top right LED) will be lit constantly
- Press and release the Port Side Down (left) button to cycle through the three settings under “Setting”
- Press and release the Starboard Side Down (right) button to change the “Setting Value”
- Press and hold Bow Down (top) button and Bow Up (bottom) button for 4 seconds to exit and save new value

Program Mode Sequence						
Setting	Enter	Change Setting	Change Setting Value	Setting Value	Default	Program Details
(1L) Auto Retract Last Setting	Press Bow Down and Bow Up 4 sec.	Press/Release Port Bow Side Down	Press/Release Stbd Bow Down	R1 = Standard R2 = Last Tab Set	R1	R1=Standard Auto Retract R2=Return to last tab position before key switch off
(2L) Actuator Stroke Time	Press Bow Down and Bow Up 4 sec.	Press/Release Port Bow Side Down	Press/Release Stbd Bow Down	R1=4sec, R2=5sec., R3=6s, R4=7s, R5=8s	R5	Change setting value to match actuator stroke time to fully deploy
(3L) Swap LED tracking	Press Bow Down and Bow Up 4 sec.	Press/Release Port Bow Side Down	Press/Release Stbd Bow Down	R1 = LEDs track tab position R2 = LEDs track button press	R1	R1==LEDs track angle of tab position R2=LEDs track same side as button being pressed

MLC-1 Troubleshooting

- Error Code:**

If the MLC control senses a fault, an LED indicator will show a quick repetitive flash. See display below for flashing LED error code

Quick flashing LED indicates trim tab actuators are not connected properly (see wiring diagram). Shorted or open wire or actuator.

Quick flashing LED indicates short circuit on supply connection 1 and 2

Quick flashing LED indicates short circuit to ground



LEDs do not light:

- 1) If terminal #7 is connected to a switched 12/24vdc source from the ignition key switch accessory terminal or a spare accessory switch. Make sure this switch is on.
- 2) Test voltage at terminal 7 (green plug) which should be 12 or 24vdc. This terminal must be connected to the ignition key switch or accessory switch. Turn key switch or accessory switch to ON and make sure battery selector switch is turned on.
- 3) Measure voltage at terminal 1 (green plug) (+12 or +24vdc) and terminal 2 (battery negative) for proper voltage (see wiring diagram). Replace fuse or repair poor connection if battery voltage is not measured at terminals 1 and 2.

Specifications

Model Number	Display Color	Number of Stations/Actuators	Overall Width	Overall Height/Thickness	Mounting Hole Cutout (Diameter)	DC Voltage	Fuse Size Power Input (1 Actuators per Tab)	Fuse Size Terminal 7 (MUST CONNECT)
MLC-1	Black	Single Station/ 1 Actuator/tab (2 tab system)	3.15"/ 80mm	3.0"(77mm)/ 4.37"(111mm)	2.0"/50mm	12/24	12vdc = 15 or 20 amp 24vdc = 10amp	1 to 2 amp