

**ENGLISH VERSION**



**585CE Manual**  
**MicroCommander**





Effective only for 585CE Actuators with Serial Number B01001 and up.  
Effective only for 813CE Actuators with Serial Number C01001 and up.

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# 1. GENERAL INFORMATION

The design of the Mathers MicroCommander Marine Propulsion Control System (hereafter referred to as MicroCommander or System) is for pleasure and light commercial marine applications on vessels up to approximately 100 feet (30m) in length. The System is electronic requiring a 12 to 32 VDC power Source. One Actuator required per engine and one Control Head per remote station. The MicroCommander commands the vessel's speed and shift using a single Control Head lever.

The Actuator is located in the engine room area and connected mechanically to the vessel's main engine throttle for speed command and to the transmission for shift command.

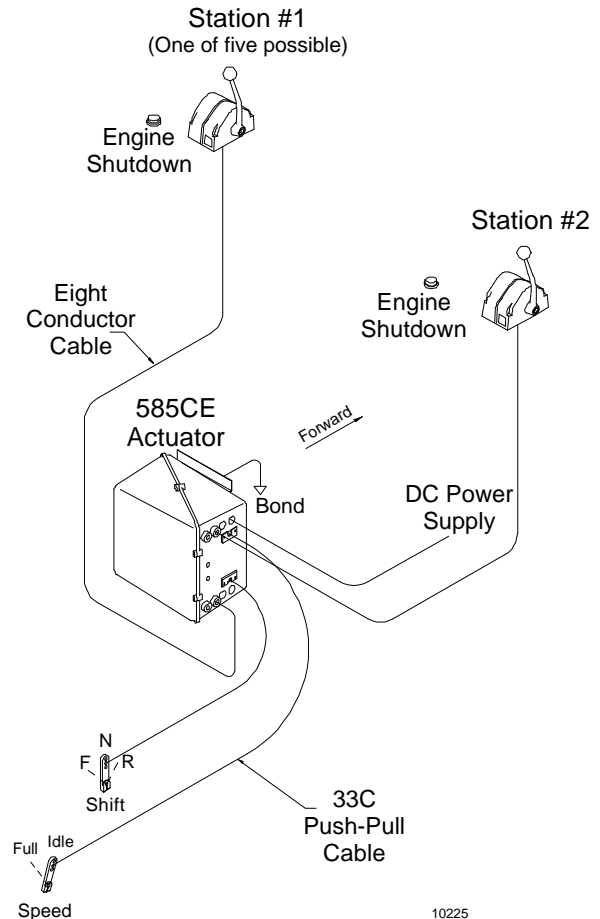
Eight-conductor shielded cable connects the Control Head(s) at the remote station(s) to the Actuator(s). Only one remote station will have command at any time. Station transfer is by push button acknowledgment with Station-in-Command indicated by a red light located on the Control Head.

## 1.1 FEATURES

- Single lever control of speed and direction
- One to five remote stations
- Push button station transfer
- Station-in-Command indication
- Audible system diagnostics and status indication
- Mechanical interface to most engine / transmission combinations
- Easily configured to vessel control requirements
- Proportional pause on through-Neutral shifts
- Clutch oil pressure interlock
- Neutral Fast Idle
- Low / High Idle selection
- Neutral-only start interlock
- System failure alarm contact (optional)

## 1.2 OPTIONS

- Automatic engine synchronization
- Integrated trolling valve control
- Hand Held Remote Control



**ATTENTION**

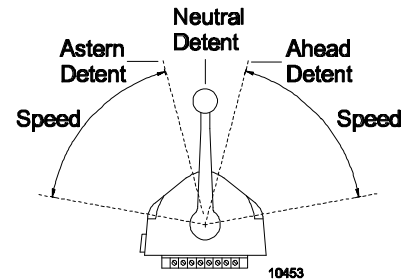
It is important to **KEEP** the 585CE Manual in a safe place for future reference. This manual contains answers to questions that may arise during user operation or installation of MicroCommander Options.

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## 1.3 OPERATION

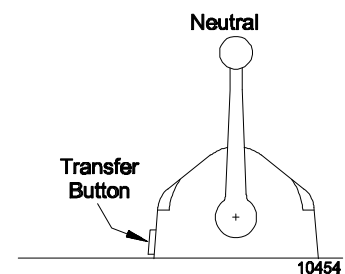
The Control Head has three detents; Astern, Neutral, and Ahead. With the Control Head lever(s) positioned in the Neutral (vertical) detent the System will command Neutral and Idle RPM. Control Head lever movement of 15 degrees to the Ahead or Astern detent will command Ahead or Astern clutch engagement while the engine remains at Idle RPM. Further movement of the Control Head lever will increase the engine RPM in proportion to the Control Head lever position.



## 1.4 INITIALIZATION

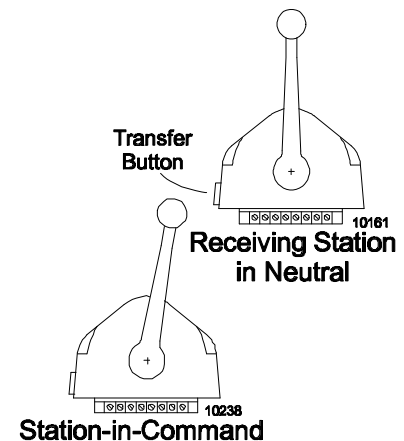
When DC power is supplied to the MicroCommander, the Actuator initializes by positioning the engine throttle lever to Idle and the transmission lever to Neutral. A low repetition tone occurs at all remote stations, indicating the System has initialized and that no remote station has taken command.

Accept command at any remote station by positioning the Control Head lever(s) into the Neutral position and depressing the station transfer button. The red light (s) on the Control Head will become solid red and the low repetition tone will cease, indicating this remote station is in command.



## 1.5 STATION TRANSFER

Each remote station is independent, making only one station able to take command at a time. Solid red light(s) on the Control Head housing indicate Station-in-Command. To transfer command to another remote station while in transit, leave the Station-in-Command's Control Head lever(s) at the last commanded position. At the receiving remote station, move the Control Head lever(s) into the Neutral detent position and press the station transfer button. The operator has one second after the red light(s) becomes solid to position the Control Head lever(s) to the approximate position the previous remote station's lever(s) were set. A smooth transfer of command has been accomplished without interruption of speed.



## 1.6 CONTROL HEAD TONES

There are six patterns of Control Head tone:

- Low Repetition Tone is normal when DC power is first applied to the System. This tone indicates that the System initialization has occurred and the operator can accept command by depressing a Station Transfer Button. If the operator depresses the Station Transfer Button with the Control Head lever at a position other than Neutral, the MicroCommander will command Neutral Fast Idle Mode with a blinking red light. The clutch will remain in Neutral.
- High Repetition Rate Tone signals a jam condition of either the Shift or Throttle cable. The Actuator has stopped when this tone occurs. Moving the Control Head lever away from the position at which the tone began will usually stop this tone; however, the cause of the excessive push-pull cable load must be found. Refer to Appendix A Trouble Shooting Section for recommendations.



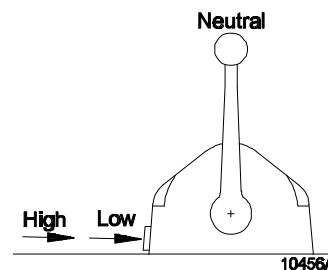
- Steady Tone signals a voltage problem or that a component has failed. Depress the Station Transfer Button; if the tone continues, the Actuator or circuit board may require service. Refer to Appendix A Trouble Shooting Section for recommendations.
- Repetitive Signal - One Long, One Short Tone signals a Shift position feedback error. Refer to Appendix A Trouble Shooting Section.
- Repetitive Signal - One Long, Two Short Tones signals a Throttle position feedback error. Refer to Appendix A Trouble Shooting Section.
- Repetitive Signal - One Long, Three Short Tones signals a Control Head failure of station that was in command at the time tone started. Refer to Appendix A Trouble Shooting Section.

## 1.7 LOW / HIGH IDLE

MicroCommander features an option for two engine Idle settings. The normal Low Idle RPM is set mechanically by the Low Idle stop at the engine throttle. A secondary High Idle RPM may be set within the Actuator at a RPM desirable for maneuvering.

Selection of High or Low Idle is by alternately depressing the station transfer button while the Control Head lever(s) is in the Neutral position.

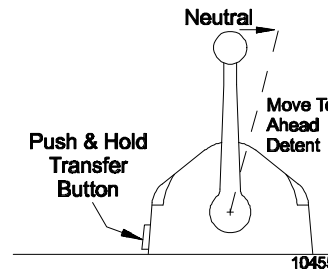
When using the High Idle option, Station 5 cannot be used.



## 1.8 NEUTRAL FAST IDLE (WARM-UP MODE)

This feature allows adjustment for engine start and warm-up of the desired engine throttle RPM with the transmission held in Neutral.

To achieve Neutral Fast Idle, position the Control Head lever(s) in the Neutral detent and depress and hold the station transfer button. Move the Control Head lever(s) to the Ahead detent. The red light on the Control Head housing will blink while the transmission remains in Neutral. Further movement of the Control Head lever(s) will increase engine RPM to the desired level. When the desired engine RPM has been achieved, return the Control Head lever(s) to the Neutral detent, the red light will become steady to indicate



standard command has returned.

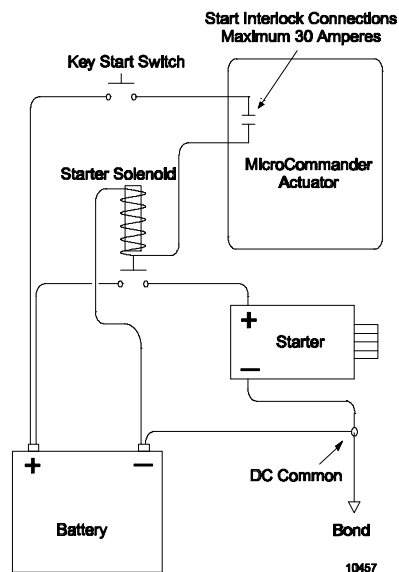
## 1.9 NEUTRAL-ONLY START INTERLOCK

MicroCommander is interlocked to prevent engine Start until power is On, the transmission is in Neutral, and a station is in command. The engine Start signal must be connected through the Actuator to the starter solenoid or relay. The interlock will function with a Start signal up to 50 volts DC and 30 amperes maximum.

**CAUTION:** The circuit board design is for a maximum of 30 amperes starting signal current. Greater current will damage the interlock circuit.

## 1.10 CLUTCH OIL PRESSURE INTERLOCK

The purpose of the Clutch Oil Pressure Interlock is to prevent engine acceleration before clutch engagement. The interlock will block a speed signal to the engine until the hydraulic clutch





pressure has reached a value recommended by the transmission manufacturer that ensures clutch engagement.

If for any reason the clutch oil pressure should fall below the pressure switch setting while operating, the engine speed will drop to Idle RPM

### 1.11 ALARM CAPABILITY (OPTION)

The MicroCommander 585CE Actuator offers an alarm connection that opens with a control power failure or circuit malfunction. The alarm circuit in the Actuator is designed to operate a relay in an alarm system supplied by others.

If this option is used, refer to Appendix C Typical Actuator Connections. The alarm connection point is a single connection block labeled ALARM on the Actuator circuit board and located between potentiometers R7 and R8. The resistance through the Actuator to battery negative is approximately 21 ohms in the Normal condition. Maximum current draw must not exceed 200 milli-amperes.

### 1.12 SYNCHRONIZATION MODE (OPTION)

The System offers the option of automatic engine synchronization for twin screw applications. The MicroCommander 585CE System must be completely installed and thoroughly tested before installing this option.

Synchronization Mode will automatically start when Port and Starboard Control Head levers are:

- commanding Ahead,
- commanding at least 10 percent speed,
- and within 15 percent of each other.

The Starboard Actuator receives a signal from both Lead and Follow engines representing engine RPM. The Starboard Actuator compares the engine signals, then makes the needed adjustments to the Follow engine throttle to match the Lead engine RPM.

The green synchronization light on the Starboard Control Head will blink as the engines are being compared and adjusted. When the green light becomes a steady green, synchronization has completed and the engines are now synchronized.

Synchronization Mode automatically deactivates when one Control Head lever moves beyond the 15 percent window of the other. The green synchronization light turns Off, indicating the System is not in Synchronization Mode.

The operator has the option to disable automatic synchronization while in Synchronization Mode.

- To disable automatic Synchronization Mode, depress the station transfer button for one second when the Control Head levers are above 10 percent throttle.
- To re-enable automatic Synchronization Mode, match the Control Head levers above 10 percent throttle in Ahead, and then depress the station transfer button for one second. Automatic synchronization is again available, and Synchronization Mode is active.

### 1.13 TROLL MODE (OPTION)

By adding an 813CE Actuator to the System, MicroCommander offers integrated trolling valve control. The MicroCommander 585CE System must be completely installed and thoroughly tested before installing this option.

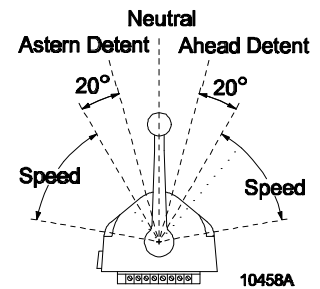
The 813CE Actuator connects electrically with the Port and Starboard 585CE Actuators, linking by push-pull cable with the trolling valve lever on the reverse reduction gear.

A Troll Mode selector switch at the primary remote station allows the operator to select Non-Troll or Troll. When Troll is selected, the MicroCommander System commands clutch direction, engine speed, and trolling valve position by the following schedule:





- A) When the Control Head lever(s) are in the Neutral detent the System will command Neutral and Idle.
- B) The operator positions the Control Head lever (s) to the Idle Ahead detent or Idle Astern detent:
  - Clutch engagement commanded.
  - Throttle limited to Idle RPM.
  - Trolling valve commanded to minimum clutch oil pressure.
  - Propeller shaft turning at minimum RPM.
- C) The operator moves the Control Head lever(s) from the detent through the next 20 degrees:
  - Trolling valve adjusts to increase clutch oil pressure to increase shaft speed.
  - Throttle limited to Idle RPM.
- D) Movement of the Control Head lever(s) past the 20 degrees:
  - Trolling valve positioned to the maximum clutch oil pressure
  - Engine speed increased in proportion to the Control Head lever(s) position
- E) Moving the Control Head lever(s) back to Neutral will reverse the sequence. Operation in Astern is the same as Ahead.



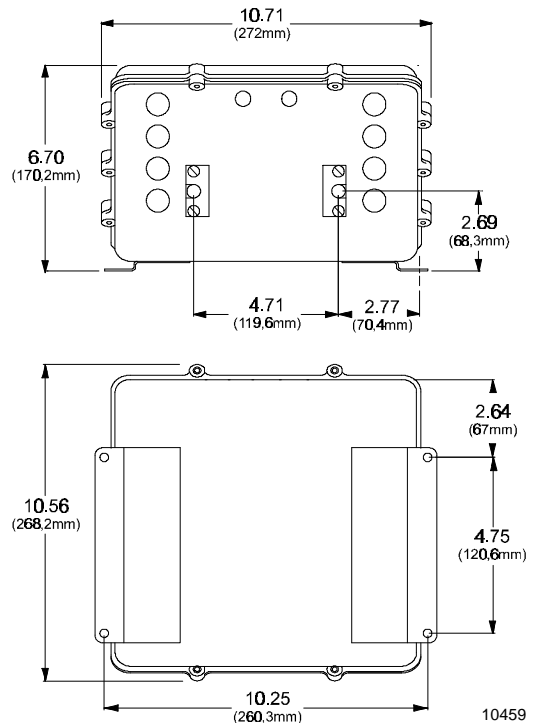
## 2. PLAN THE INSTALLATION

### 2.1 REQUIRED PARTS FROM YOUR MICROCOMMANDER DEALER

**NOTE:** Refer to Appendix A - Parts List for component Part Numbers.

#### 2.1.1 Actuator

- One Actuator required per engine.
- Actuators are spray proof, but must not be immersed.
- Refer to Figure 1 for Actuator dimensions.
- Usually an engine room location of the Actuator is preferred. If the engine room is too small, locate in any area where it is accessible for electrical and push-pull cable connections.
- Bulkhead mounting preferred for ease of access for wiring and adjustments, but the Actuator can be mounted in any attitude. If the clutch cable is connected to an I/O drive outside the hull, the Actuator must be two feet (0,6m) above waterline. Do not mount the Actuator to the engine, to the transmission, or in any location that will subject it to excessive vibration.
- MicroCommander's electronic circuits can be influenced by static charges. Do not mount close to gas engine ignition systems,



Actuator Dimensions  
Figure 1



alternators, or electric motors. Allow two feet (0,6m) of clearance, or more, between the Actuator(s) and such devices.

- Power source must be bonded to the hull in metal-hulled vessels, or to the bonding buss in non-metal vessels. Refer to Appendix A Bonding for specific information.
- Locate each Actuator such that the push-pull cables from it to the engine have large radius bends, with the least total degrees of bend and moderate length. **EXAMPLE:** The minimum bend radius of 10 inches (254mm) for total degrees of bends of less than 270 degrees. Push-pull cable lengths should not exceed 20 feet (6m).
- Locate Actuator(s) away from heat sources, such as engine exhaust manifolds. Allow four feet (1,2m) of clearance, or more, between the Actuator(s) and such heat sources.

### 2.1.2 Control Head

Refer to Appendix A Control Head Dimensions and Variations for specific information.

- The MicroCommander Control Heads are in single or dual lever configurations.
- One Control Head required per remote station. Mathers offers an option of a Hand Held Control as an added remote station. See your MicroCommander Dealer for further information.
- Control Heads are watertight. To maintain watertight integrity use an adhesive gasket to seal the Control Head to the mounting surface. However, below the mounting surface the Control Head needs protection from water or spray.
- Prepare the mounting surface with an opening for the Control Head's projecting terminal block and four screw holes.
- When mounting a Control Head that may be weather exposed from the underside, consider using a Watertight Enclosure. Reference Appendix A Watertight Enclosure for specific information.
- Retrofit applications may require planning for an adapter pad to cover the old Control Head cutout. A variety of adapter and cover pads are available from Mathers Controls Inc.

### 2.1.3 Electric Cable

- Eight-Conductor cable will connect the Control Head(s) with the Actuator(s). One eight-conductor cable required per Control Head lever.
- Two-Conductor power cable will connect the Actuator(s) to the vessel's power distribution panel. It is important to keep the length of power cable short to reduce voltage drop. The 14 gauge twisted pair power cable, should not exceed 20 feet (6m). If individual wires are used for supply (+) and return (-) then the total wire length should not exceed 40 feet (12m).
- Two-Conductor start interlock cable will connect the Actuator to the starter solenoid or relay. Refer to Section 3.2.2 for further information.

**CAUTION:** *When more than one Actuator is used, all Actuators must connect to power sources that have a common DC return (-).*

## 2.2 REQUIRED TOOLS AND PARTS FROM YOUR MICROCOMMANDER INSTALLER

### 2.2.1 Push-Pull Cables and Cable Connection Kits

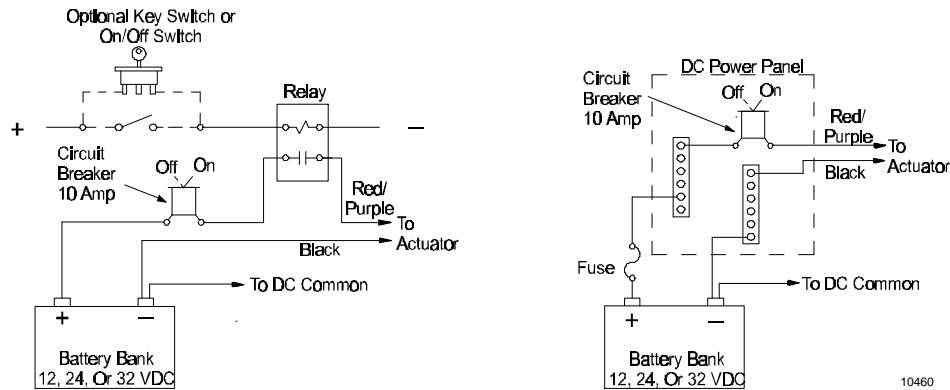
Two Type 33C push-pull cables needed per engine. The cable length is measured from end of thread to end of thread. Cables are usually stocked in one foot (0,3m) increments.

Many engine, transmission, and inboard/outboard (I/O) drives are delivered with factory mounted kits. If factory mounting kit not included, contact the engine dealer for a Factory Cable Connection Kit. Appendix B shows other connection options.



2.2.2 Tools

- Anti-static wrist strap  
(Included with Actuator)
- Wire cutter  
(Thomas & Betts WT-2000 or equal)
- Wire stripper  
(Thomas & Betts WT-2000 or equal)
- Wire crimper  
(Thomas & Betts WT-2000 or equal)
- 7/16-inch Socket and medium extension
- 5/16-inch Wrench - open end
- Screwdriver - medium Phillips head #2
- Screwdriver - medium straight slot
- Screwdriver - small straight slot
- Hole saw - 1-inch (25,4mm)
- Saw: blade suitable for Console Top Panel
- Drills - 9/32-inch (7,2mm) & 7/32-inch (5,6mm)



DC Power Sources  
Figure 2

2.2.3 DC Power Source

The Actuator requires a battery source (12, 24, or 32 volts DC) protected by a 10 ampere circuit breaker. Power should come from the vessel's DC power distribution panel. Do not use engine starting batteries on a 12 volt system, because the cranking voltage may be too low. Refer to Figure 2.

**NOTE:** It is important that the wire size from the battery to the circuit breaker panel is large enough to keep voltage drop due to current flow to less than three percent. The DC return to the battery must be large enough to supply all current requirements with a voltage drop of less than three percent. (See References, Appendix B.)

2.2.4 Engine STOP Switch

An engine STOP switch MUST be located at each remote station.

**CAUTION:** Each remote station must have some method to stop the engine. Warranty canceled if requirement not followed.

2.2.5 Clutch Oil Pressure Interlock Switch

The requirement is a Normally Open (NO) pressure switch with a trip point adjustable to match the transmission manufacturers recommended setting. The hydraulic clutch pressure whether Ahead or Astern must operate the pressure switch.

A two-conductor cable is needed to connect the Clutch Oil Pressure Interlock Switch to the Actuator.

Refer to manufacturer data sheet supplied with switch for specific information.



### 3. INSTALLATION

**NOTE:** Before starting the actual installation of MicroCommander, make sure you have the correct parts and tools on hand. See Sect.2 PLAN THE INSTALLATION. Read ALL the instructions pertinent to each part before beginning the installation of that part.

**WARNING:** Static electricity can destroy electronic components. Connect the wrist strap provided to the Actuator frame whenever working on the Actuator. This will drain any static charge you may have on your person.

#### 3.1 EIGHT-CONDUCTOR CABLE

Install the eight-conductor electric cable between each Control Head location and the appropriate Actuator location. Support the cables using clamps or straps not more than 18 inches (0,5m) apart if not contained in a conduit. Verify cable location protects the cable from physical damage.

Label each eight-conductor cable at both ends with the station it connects, and Port or Starboard.

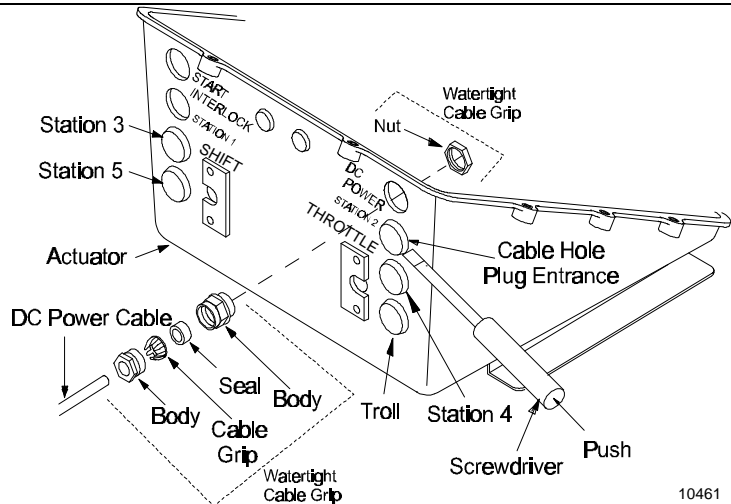
#### 3.2 ACTUATOR

- A) Secure the Actuator using 1/4 inch or M6 fasteners.
- B) Remove the Actuator cover. When not working on the Actuator, keep the cover in place to prevent damage to circuits.
- C) Connect the wrist strap to your person, and the ground connector to the Actuator frame.
- D) Bond each Actuator to the hull or bonding bus. (Refer to Bonding in Appendix A).
- E) Remove only the Hole Plugs needed for remote station cable entry as shown in Figure 3.
- F) Install the watertight cable grips into the open entry holes of the Actuator. Refer to Figure 3 for cable grip installation.

##### 3.2.1 Two-Conductor Power Cable Connection

**NOTE:** When connecting the DC power cable to the Actuator be sure the power is Off.

- A) Run the length of two-conductor power cable between the DC Power Source and the Actuator.
- B) Make the connections at the vessel's DC Power Source.
- C) Install a watertight cable grip into the DC POWER entry hole. Refer to Figure 3 for cable grip installation.
- D) Run the two-conductor power cable through the watertight cable grip.
- E) Strip each wire 3/8-inch (9,5mm), then install crimp terminals.
- F) Connect the two-conductor cable as indicated on the System Drawing - Appendix C.



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**Figure 3**  
**Plug Removal and Cable Grip Installation**



- G) Feed through a little slack cable and tighten the cable grip.
- H) Tie wrap the power cable to the Actuator frame.

**3.2.2 Two-Conductor Start Interlock Cable Connection**

**CAUTION:** *The design of the circuit board is for a maximum of 30 amperes start signal current. Greater current will damage the interlock circuit.*

Run the length of two-conductor start interlock cable between the Starter Solenoid and the Actuator.

**CONNECTIONS AT STARTER SOLENOID**

- A) Remove the remote start switch lead from the Starter Solenoid.
- B) Strip and connect one start interlock cable wire to this lead.
- C) Strip and connect the second start interlock cable wire to the Starter Solenoid

**CONNECTIONS AT ACTUATOR**

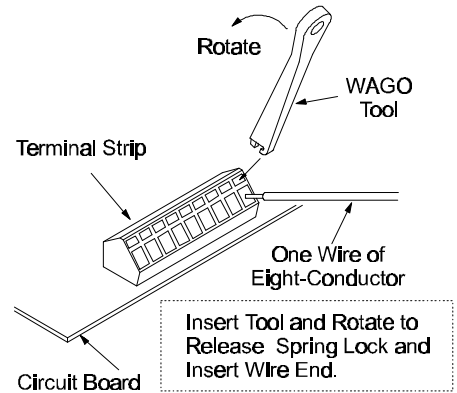
- A) Install a watertight cable grip into the START INTERLOCK entry hole. Refer to Figure 3 for cable grip installation.
- B) Run the two-conductor start interlock cable through the watertight cable grip.
- C) Strip each wire 3/8-inch (9,5mm), then install crimp terminals.
- D) Connect the two-conductor cable as indicated on the System Drawing - Appendix C.
- E) Feed through a little slack cable and tighten the cable grip.
- F) Tie wrap the start interlock cable to the Actuator frame.

**3.2.3 Eight-Conductor Cable Connection**

- A) Run the eight-conductor cable for each remote station through the corresponding watertight cable grip on the Actuator. Do not tighten cable grip at this time.
- B) Strip the PVC jacket and shielding back approximately 2 inches (50,8mm) on the STATION 1 eight-conductor cable.
- C) Bend the Violet wire out of the wire bundle and wrap, or otherwise compact it at the cover; secure with tape for possible use in optional wiring.
- D) Stagger the remaining wire lead lengths to match the STA 1 terminal strip. Wire leads must not touch frame.
- E) Strip the wire 3/8 inch (9,5mm) on each lead.

**NOTE:** *On the Actuator circuit board, all station terminal strips have a jumper between terminals 5 and 6. Remove the jumper only on used terminal strips. Do not remove the jumper on unused terminal strips.*

- F) A WAGO Tool is taped to the relay on the circuit board in each Actuator. Use this tool to depress the spring lock for the individual wire connection to the terminal strip. (See Figure 4) Connect the wire colors to the terminal strip as shown on the System Drawing in Appendix C.
- G) Connect the bare shielding drain wire to Terminal 8 on the terminal strip. The shielding drain wire MUST NOT touch any other components.



**Figure 4**  
**Terminal Connection**

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- H) Feed through a little slack cable, and tighten the cable grip on the eight-conductor cable.
- I) Connect the other station's eight-conductor cables to the appropriate station terminal strips in the same way.

**NOTE: Verify all unused station terminal strips have a jumper between terminals 5 and 6.**

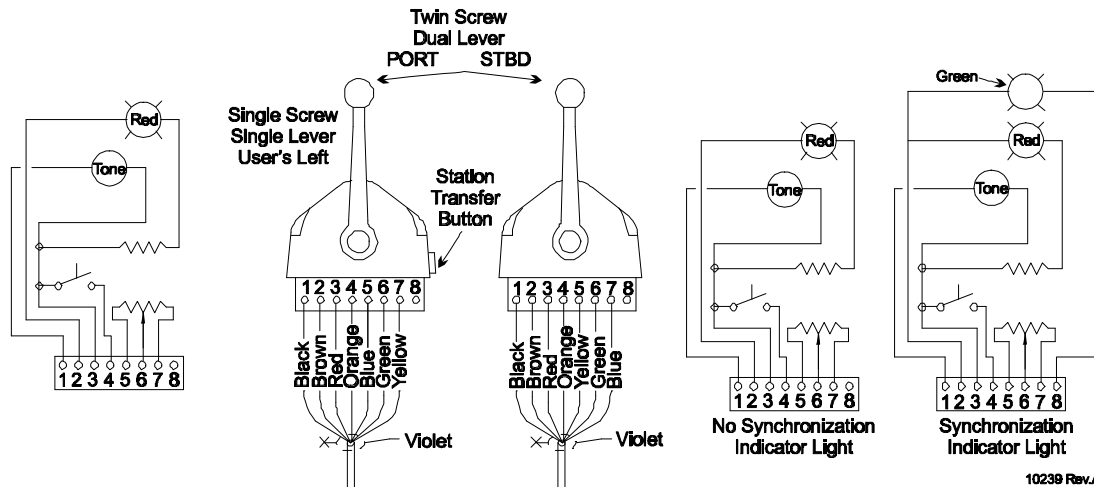
- J) Secure the eight-conductor cables to each other and the Actuator frame, using the tie wraps provided.

### 3.3 CONTROL HEAD

- A) Refer to Appendix A - Control Head Dimensions and Variations for the cutout and mounting hole information.
- B) Drill the screw holes and the corner cutout holes at the chosen location. Using a Saw, complete the rectangular opening for the Control Head terminal block.
- C) The Number 8-32 x 1-inch mounting screws are for a 3/4 inch (19,1mm) maximum thick mounting surface. Verify that the four mounting screws will penetrate the mounting surface and start into the Control Head.
- D) Strip the cover from the adhesive side of the Control Head gasket. Apply the adhesive side to the console.

#### 3.3.1 Eight-Conductor Cable Connection

- A) Run the eight-conductor cable through the Control Head opening of the console to the Control Head.
- B) Strip back the PVC cover on the eight-conductor cable approximately 2-1/2 inches (63,5mm).
- C) Cut off the shielding and drain wire flush with the end of the PVC cover. Do not connect the drain wire at the Control Head to ground.
- D) Bend the Violet wire out of the wire bundle and wrap, or otherwise compact it, at the cover. Secure with tape for possible use as a spare or in optional wiring.
- E) Strip 3/8 inch (9,5mm) insulation off each wire, and install crimp connectors.
- F) Make the connections to the Control Head terminal block(s) as indicated on the System Drawing in Appendix A.



**Figure 5  
Control Head Connections**



- G) Connections 5 and 7 at the terminal block are direction sensitive. The connections must be as follows:
- |                   |                   |
|-------------------|-------------------|
| Port Lever:       | Starboard Lever:  |
| Terminal 5 Blue   | Terminal 5 Yellow |
| Terminal 7 Yellow | Terminal 7 Blue   |

Figure 5 depicts a twin-screw remote station with the Control Head lever for the Port engine on the user's left and the Control Head lever for the Starboard engine on the user's right. Figure 5 also depicts a single-screw remote station with the Control Head lever on the user's left.

For dual lever Control Head stations that have the user facing aft, reverse connections 5 and 7. For single lever Control Head remote stations that have the user facing aft and the single Control Head lever on the user's right, reverse connections 5 and 7.

### 3.4 ENGINE STOP SWITCHES

Required at all Control Head stations are engine STOP switches. Refer to the installation instructions supplied with the switches for manufacture recommended installation.

### 3.5 CLUTCH OIL PRESSURE INTERLOCK SWITCH

#### 3.5.1 If Switch Used

Refer to the information supplied by the switch manufacturer for switch installation. The pressure switch must be installed so the hydraulic clutch pressure of both the Ahead or Astern clutch will operate the pressure switch.

- Run a two-conductor cable from the Clutch Oil Pressure Interlock Switch to the Actuator.
- Connect at the pressure switch as recommended by the manufacturer.
- Remove a Hole Plug from an unused entry hole on the START INTERLOCK side of the Actuator. Refer to Figure 3 for Hole Plug removal.
- Install a watertight cable grip into the entry hole. Refer to Figure 3 for cable grip installation.
- Run the two-conductor cable through the watertight cable grip.
- Strip each wire 3/8-inch (9,5mm), then install crimp terminals.
- Connect the two-conductor cable as indicated on the Single Engine Drawing in Appendix C.
- Feed through a little slack cable and tighten the cable grip.
- Tie wrap the two-conductor cable to the Actuator frame.

#### 3.5.2 If Switch Not Used

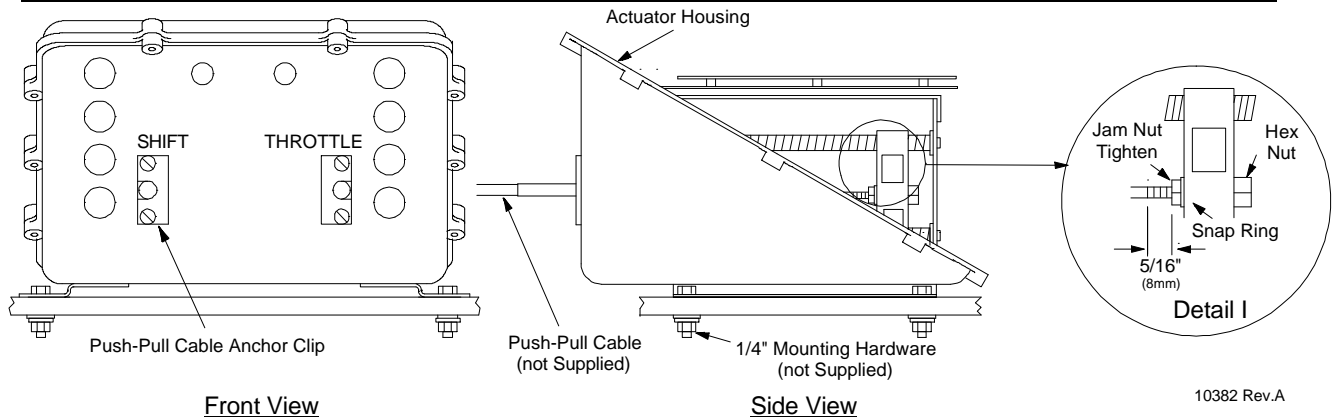
To disable this feature for outboard engines and engines with mechanical clutches, a single insulated wire must be connected to the two clutch oil pressure interlock switch connection points within the Actuator. Refer to Appendix C for reference to these two connection points.

### 3.6 PUSH-PULL CABLE CONNECTIONS

#### 3.6.1 Actuator

Refer to Figure 6.

- Remove the #10-32 jam nut and the two rubber seals from the end of each push-pull cable that is to connect to the Actuator(s) only; discard the seals
- Remove one screw from each Cable Anchor Clip and loosen the other screw. Swing the two Clips clear.
- Insert the SHIFT push-pull cable and THROTTLE push-pull cable according to the labels on the Actuator.



**Figure 6**  
**Actuator Push-Pull Cable Connections**

- D) When the push-pull cable end is visible within the Actuator interior, reinstall the #10-32 jam nut.
- E) Connect the push-pull cables to the hex nuts (See Figure 6, Detail I). Use a 7/16 inch socket to turn the hex nut onto the cable rod end until there is approximately 5/16 inch (7,9mm) of thread showing beyond the jam nut.
- F) Use a 7/16-inch socket wrench and a 5/16-inch open end wrench to tighten the jam nuts.
- G) Position the Cable Anchor Clips to secure the cables to the Actuator housing.
- H) Install the screws removed in step B). Tighten all Cable Anchor Clip screws.

### 3.6.2 Engine and Transmission

- A) Check on the engine and transmission, if push-pull cable anchor brackets installed. If the brackets are not on the engine or the transmission, select from Morse Standard Kits (Appendix B) or fabricate brackets as shown in Universal Mounting Kit (Appendix B).
- B) Use the jam nuts supplied with the cables to secure the cable rod ends in the ball joints.
- C) Do not remove the two rubber seals from this end of the cable.

## 4. ADJUSTMENTS AND TESTS

### 4.1 INITIALIZATION TEST (ENGINES STOPPED)

- A) Apply DC power to the MicroCommander Propulsion Control System.
- B) The Control Head at each station will produce an intermittent tone.
- C) Verify that Control Head lever(s) is at Neutral.
- D) Depress one Station Transfer Button. The red indicator light on the Control Head should light, showing this station has control. (Note that both red indicator lights must be lighted on dual Control Heads.)
- E) Move the Control Head lever full-ahead and full-astern. This will check that the controls are operating.

**NOTE: On remote stations that have the user facing aft, ensure Control Head lever direction is correct.**

**WARNING: Keep hands and tools clear of the Actuator when power is On. Turn Off the control system power before disconnecting from the batteries. Do not disconnect battery terminals when engine is operating.**





### 4.2 CONTROL HEAD AND STATION TRANSFER (ENGINES STOPPED)

At each remote station, move the Control Head lever(s) to the Neutral detent position, then press the Station Transfer Button. The indicator light on the Control Head will confirm that station transfer has taken place. Control Head levers are direction-sensitive; to prove that the Control Head wiring connections are correct:

- A) Move the Control Head lever(s) to the Neutral detent position.
- B) Depress and hold the Station Transfer Button, then move the Control Head lever(s) to Ahead detent position. This will put the System in Neutral Fast Idle Mode with the red indicator light on the Control Head blinking. The blinking red light indicates that the clutch is in Neutral and that the Control Head lever(s) will position the throttle only.
- C) Depress and hold the Station Transfer Button, then move the Control Head lever(s) to Astern detent position. The red indicator light on the Control Head should now remain steadily On.

Neutral Fast Idle Mode must operate only in the Ahead direction. If the red indicator light is On in Ahead and blinks in Astern, see Section 3.3.1 and reverse connections 5 and 7 on the Control Head terminal block.

### 4.3 ENGINE AND TRANSMISSION PUSH-PULL CABLE

Verify push-pull cable anchor brackets installed on the engine and transmission, and that cable ball joints are disconnected.

**CAUTION:** *Misadjusted shift and throttle cables cause Actuator servo motor failure. Ensure adjustments are made correctly and completely.*

#### 4.3.1 Direction Shunt Configuration (Engines Stopped)

- A) Refer to Typical Actuator Connections in Appendix C.
- B) As shipped from the factory, Clutch Direction - JMPR 4 is at OFF position and, therefore, the push-pull cable will pull on the transmission shift lever for Ahead. If this is wrong, move the Clutch Direction JMPR 4 to ON, and the push-pull cable will push the transmission shift lever for Ahead.
- C) As shipped from the factory, Throttle Direction - JMPR 3 is at OFF position and, therefore, the push-pull cable will push the throttle lever for full-speed. If this is wrong, move the Throttle Direction JMPR 3 to ON, and the push-pull cable will pull on the throttle lever for full-speed.

#### 4.3.2 SHIFT Cable Adjustment (Engines Stopped)

- A) Position the Control Head lever(s) to the Neutral detent and turn the System On.
- B) With the SHIFT cable disconnected, adjust the SHIFT cable ball joint at the transmission to align with the clutch selector lever in Neutral. The push-pull cable should form a right angle (90 degrees) to the clutch selector lever with the Control Head lever in the Neutral position.
- C) Leave the SHIFT Cable disconnected.
- D) Move the Control Head lever to the Ahead detent. The Actuator can be adjusted for a total clutch movement of 2-inches (51mm) to 3-inches (76mm). Actuators are shipped with switches set for minimum movement
- E) Measure the clutch selector lever movement from Ahead detent to Astern detent. The lever movement must be within the adjustment range of 2-inches (51mm) to 3-inches (76mm).
- F) DIP Switch SW1 (refer to Typical Actuator Connections in Appendix C) will increase the SHIFT cable movement in each direction from Neutral by moving the switches from ON to OFF.




## MicroCommander: 585CE Actuator

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Switch 1:	1/4-inch	(6,4mm)	Approximate Dimensions
Switch 2:	1/8-inch	(3,2mm)	
Switch 3:	1/16-inch	(1,6mm)	

- G) Select the combination of switches to obtain the required additional movement, then check the Astern direction.
- H) Recheck with the SHIFT cable disconnected: Ahead; Neutral; and Astern. Verify that the Actuator will not jam the clutch selector lever against its stops and that Neutral is correct.
- I) Connect SHIFT cable to the clutch selector lever. Ensure that the push-pull cable and clutch selector lever connection point form a 90 degree angle. If the connection is not a 90 degree angle, there will be unequal Ahead and Astern travel.

### 4.3.3 THROTTLE Cable Adjustment (Engines Running)

- A) Refer to Typical Actuator Connections in Appendix C.
- B) Check that potentiometers R7 and R8 are in the fully counterclockwise  position, as shipped from the factory.

**CAUTION:** *Potentiometers can be damaged by turning too hard against the stop.*

- C) Leave the THROTTLE cable disconnected at this time.
- D) Measure the throttle movement at the engine from Idle to Full. It must be within the Actuator range of 1-inch (25,4mm) to 2-7/8-inches (73mm). If the throttle movement is less than 1-inch (25,4mm) or greater than 2-7/8-inches (73mm), change the lever radius to be within range. If possible, throttle movement should be 2-1/2-inches (64mm) Idle to Full.
- E) Place Control Head lever(s) in Neutral, start the engine and run at Idle.
- F) Adjust the ball joint on the THROTTLE cable to match the throttle lever at Idle position.
- G) Stop the engine.
- H) Move the Control Head lever to the Full Ahead position. Manually move the engine throttle lever to the full-speed stop.
- I) Gradually turn potentiometer R7 on the circuit board clockwise  until the push-pull cable ball joint, when connected, will exert a slight amount of pressure against the full-speed throttle stop.
- J) Recheck Idle and Full.
- K) Connect ball joint to throttle lever.
- L) Throttle adjustment is complete.

### 4.4 THROTTLE PAUSE

Refer to Typical Actuator Connections in Appendix C.

Hydraulic-actuated clutches typically require 1/2 second or longer following clutch selector lever movement before there is clutch plate contact. Accordingly, DIP switch SW1-7 in the OFF position allows 1/2 second Idle throttle pause after the Actuator has completed clutch selector movement.

Dog and cone clutches used on some inboard/outboard and outboard drives typically do not require a throttle pause following clutch shift. Accordingly, SW1-7 should be in ON position.

Some clutches may build clutch pressure more slowly; this could mean high engine RPM before clutch engagement. Clutch Oil Pressure Interlock minimizes this possibility. Refer to Section 1.10.



### 4.5 CLUTCH OIL PRESSURE SWITCH SETTING

The pressure switch set point must be set at the value recommended by the transmission manufacturer that ensures clutch engagement. The hydraulic clutch pressure of both the Ahead or Astern clutch must operate the pressure switch.

The clutch pressure may rise to pressure switch set point slowly, and therefore, limit throttle response immediately after clutch engagement.

- When Dip Switch SW1-7 is in the Off position, there is a 5 second delay before the Clutch Oil Pressure Interlock becomes active.
- When Dip Switch SW1-7 is in the On position, clutch oil pressure must be greater than switch set point before throttle will increase above Idle.

### 4.6 HIGH IDLE SELECTION

Refer to Typical Actuator Connections in Appendix C.

Make the following circuit board adjustments, to select the High Idle feature:

- Move JMPR 1 from pins 2 and 3 to pins 1 and 2.
- Move JMPR 2 from one pin to both pins.

#### High Idle Setting (Engines Running)

Refer to Typical Actuator Connections in Appendix C.

Set High Idle with potentiometer R8; when turned fully counterclockwise ↺ High Idle is minimum, and is the same as Low Idle. R8 is set this way at the factory.

To adjust High Idle:

- A) Turn power On to MicroCommander.
- B) Accept command at any remote station by positioning the Control Head lever(s) into the Neutral position and depressing the station transfer button.

**NOTE: Through the entire High Idle adjustment procedure the Control Head lever(s) remains in the Neutral Idle position.**

- C) At the Actuator, rotate potentiometer R8 clockwise ↻ 1/4 turn. The servo should not move as MicroCommander is in Low Idle Mode at initial power up.
- D) Turn on Engine.
- E) To change to High Idle Mode, depress the station transfer button. The servo should move slightly and the Idle should increase, indicating MicroCommander is in High Idle Mode.
- F) Rotate potentiometer R8 clockwise ↻ until desired High Idle RPM is achieved.
- G) Depress station transfer button to change to Low Idle Mode. The servo should move to the Low Idle position. Test High and Low Idle by alternately depressing the station transfer button and observing the Actuator servo movement.

**NOTE: On a twin screw vessel, if High and Low Idle are out of phase, place both engines in the Neutral Fast Idle Mode. Return the Control Head levers into the Neutral Idle position. The system has just reset to Low Idle Mode.**

### 4.7 ADJUSTMENTS TO CHECK AT THE DOCK

**WARNING: Do not attempt to operate the controls away from the dock with any system abnormality.**

Perform the following tests with the vessel moored to the dock. Do all the tests ensuring operation is correct. Only then is the vessel ready to leave the dock.



### 4.7.1 Start Interlock

Verify proper operation of Start Interlock:

- A) Turn DC power to MicroCommander Off; verify that engine(s) can NOT be started.
- B) Turn DC power to MicroCommander On and acknowledge command. Position the Control Head lever(s) to the Ahead detent and verify that engine(s) can NOT be started.
- C) Position the Control Head lever(s) in the Neutral detent and verify that engine(s) CAN now be started.

### 4.7.2 Stop Switches

Start engine(s) and verify that engine Stop switches (normally, push buttons) function correctly at all stations. Refer to Sect. 3.4 if any problems occur.

### 4.7.3 Push-Pull Cables

- A) Check that all push-pull cable connecting fasteners are tightened securely.
- B) Refer to Figure 6, Detail I. In the Actuator(s) check that the push-pull cable Hex Nuts are securely tightened to the Jam Nuts. A loose Hex Nut can back off the push-pull cable threaded end and effectively change the cable length.

### 4.7.4 Control Head

- A) Idle the engine(s) and place one Control Head lever at a time in the Ahead detent and then the Astern detent. Do this at each station to confirm direction control.
- B) Operate Control Head lever(s) to Ahead and Astern detents and verify that push-pull cable direction is correct.
- C) Operate Control Head lever(s) from Idle to Full-Ahead and check push-pull cable movement is correct.
- D) Use Neutral Fast Idle on each engine at each station, one engine at a time, to confirm speed control.

## 4.8 ADJUSTMENTS TO CHECK UNDERWAY

### 4.8.1 Full-Speed Setting

Warm-up the engine and in open water gradually move the Control Head lever to full-speed.

- If the engine RPM is low, check whether the engine throttle lever is against the full-speed stop. Other possibilities are incorrectly set full-speed stops or too great of a propeller load.
- If the engine RPM is high, refer to Sect. 4.6 and turn potentiometer R7 counterclockwise ↺ to obtain desired full speed. For twin screw applications, check that matching Idle, Mid-range, and Full-speed Control Head lever positions cause equal RPM in both engines.

### 4.8.2 Proportional Pause Upon Direction Change

The Proportional Pause feature provides engine deceleration when making a direction change.

- throttle position drops to Idle;
- transmission remains engaged Ahead;
- the pause that follows is in proportion to:
  - The Control Head lever position prior to the reversal.
  - How long the Control Head lever had been in that position prior to the reversal.

Refer to Timing Chart, Figure 7; to configure the Proportional Pause to meet the vessel's requirements. Factory settings at the time of shipment are 4 seconds from full speed.



**NOTE:** *The pause in gear on a through-shift is proportional to the speed commanded and time at that speed. The times listed in Figure 7 are maximum. Shifting from Idle Ahead to Idle Astern, the pause is ZERO. The time required to build to the maximum pause is six times the pause listed in Figure 7. The pause from full-astern to Ahead is half that listed in Figure 7 for full-Ahead to Astern.*

**SW1 Switch: Full-Speed Pause**

Switch SW1-4	OFF	OFF	OFF	OFF	ON	ON	ON	ON
Switch SW1-5	OFF	OFF	ON	ON	OFF	OFF	ON	ON
Switch SW1-6	OFF	ON	OFF	ON	OFF	ON	OFF	ON
Seconds:	0	2	4	5	7	9	10	12

**Figure 7  
Timing Chart**

After pause has expired, the clutch is positioned to Neutral (or Ahead or Astern) depending on the final Control Head position.

**ATTENTION**

It is important to **KEEP** the 585CE Manual in a safe place for future reference. This manual contains answers to questions that may arise during user operation or installation of MicroCommander Options.

**5. MAINTENANCE**

**5.1 ACTUATOR**

The MicroCommander Actuator requires the following annual checks:

- Check all terminal connections for signs of corrosion or loose connections.
- Check mechanical connections within the Actuator, and at the throttle and transmission selector lever.
- Check mechanical movement of the throttle lever from Idle to Full. Ensure that the cable does not jam while positioning the throttle at Idle or Full speed.
- Check mechanical movement of the transmission selector lever from Neutral to Ahead, and Neutral to Astern. Ensure that the cable does not jam while positioning the transmission selector lever at the Ahead or Astern stops.
- Cycle the Actuator and if lead screws are noisy, apply a light coating of silicone grease to the stainless steel lead screw.

**5.2 CONTROL HEADS**

Check the Control Heads annually to insure that the terminals are secure and free of corrosion.





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**Effective only for 585CE Actuators with Serial Number B01001 and up.**

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## MicroCommander: Synchronization

MM12793

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## 1. GENERAL INFORMATION

**NOTE: The MicroCommander 585CE Marine Propulsion Control System must be completely installed and thoroughly tested as a system before installing the Synchronization Option. This option may not be compatible with diesel engines using Speed-limiting Governors.**

### 1.1 OPERATING PRINCIPLES

The theory of engine synchronization requires a Lead engine and a Follow engine. Either Port or Starboard engine could be the Lead engine; however, we have elected to make the Port Engine the Lead engine and the Starboard engine the Follow engine. The drawings, diagrams, and instructions reflect this concept.

The remote stations controlling the Follow engine will have located beside the Starboard Control Head lever a green synchronization light. If you are adding synchronization to an existing system, you may have Control Heads lacking the green light. The system will synchronize without the green light but you will not have the visual indication. (Reference Appendix A - PARTS LIST)

Initial power-up of the MicroCommander System enables the synchronization option. Synchronization Mode will automatically start when Port and Starboard Control Head levers are:

- commanding Ahead,
- commanding at least 10 percent speed,
- and within 15 percent of each other.

The Starboard Actuator receives a signal from both Lead and Follow engines representing engine RPM. The Starboard Actuator compares the engine signals, then makes the needed adjustments to the Follow engine throttle to match the Lead engine RPM.

The green synchronization light on the Starboard Control Head will blink as the engines are being compared and adjusted. When the green light becomes a steady green, synchronization has completed and the System is now synchronized.

Synchronization Mode automatically deactivates when one Control Head lever moves beyond the 15 percent window of the other. The green synchronization light turns Off, indicating the System is not in Synchronization Mode.

The operator has the option to disable automatic synchronization while in Synchronization Mode.

- To disable automatic Synchronization Mode, depress the station transfer button for one second when the Control Head levers are above 10 percent throttle.
- To re-enable automatic Synchronization Mode, match the Control Head levers above 10 percent throttle in Ahead, and then depress the station transfer button for one second. Automatic synchronization is again available, and Synchronization Mode is active.

### 1.2 PARTS REQUIRED

Existing 585CE Actuators  
Dual Control Heads  
Starboard Auxiliary Board (Follow)

Port Auxiliary Board (Lead)  
Engine RPM Pulse Signal  
See Appendix A - PARTS LIST.



## 2. INSTALLATION

Synchronization option installation consists of the following:

- Either installing Dual Control Heads with the green indicator light option or the existing Dual Control Heads.
- Installing Lead Auxiliary Circuit Board in the Port Actuator.
- Installing Follow Auxiliary Circuit Board in the Starboard Actuator.
- Providing a pulse signal representing engine RPM

### 2.1 REMOTE CONTROL HEADS WITH SYNCHRONIZATION LIGHT

- A) Remove the old Control Head from the console.
- B) Disconnect all eight-conductor connections.

**NOTE:** *Review the Control Head Eight-Conductor Cable Installation Section of the main 585CE Manual for cable connections. Do not compact the Starboard eight-conductor Violet wire.*

- C) Connect the Starboard eight-conductor Violet wire to terminal 8 on the Starboard terminal block.
- D) Mount the Control Head to the console.

### 2.2 PORT AUXILIARY BOARD (LEAD)

**WARNING:** *Static electricity can destroy electronic components. Connect the wrist strap provided to the Actuator frame whenever working on the Actuator. This will drain any static charge you may have on your person.*

The Lead Auxiliary Board (P/N 1133) will install in the Port Actuator.

- A) Remove the Port Actuator cover. When not working on the Actuator, keep the cover in place to prevent damage to circuits.
- B) Connect the anti-static wrist strap to your person, and the ground connector to the Actuator frame.
- C) Plug the Lead Auxiliary Board into the plug connector of the Actuator. Refer to Appendix C - Two Engines with Synchronization Drawing for auxiliary board location.

### 2.3 STARBOARD AUXILIARY BOARD (FOLLOW)

The Follow Auxiliary Board will install in the Starboard Actuator.

- A) Remove the Starboard Actuator cover. When not working on the Actuator, keep the cover in place to prevent damage to circuits.
- B) Connect the anti-static wrist strap to your person, and the ground connector to the Actuator frame.
- C) Plug the Starboard Auxiliary Board into the plug connector of the Actuator. Refer to Appendix C - Two Engines with Synchronization Drawing for auxiliary board location.

#### 2.3.1 Starboard Remote Station Connection

**NOTE:** *In the Starboard Actuator only, connect the remote station's eight-conductor Violet wire to the Auxiliary Board.*

- A) Unwrap the Violet wire from the Station 1 eight-conductor cable.
- B) Strip 3/8-inch (9,5mm) off the Violet lead.



C) Use the WAGO Tool supplied with the 585CE System and connect the Station 1 Violet lead to Terminal 1 of TB4 on the Auxiliary Circuit Board. Refer to Appendix A - Two Engines with Synchronization.

D) Connect all Station's Violet leads as follows:

- Station 1 Terminal 1 of TB4
- Station 2 Terminal 7 of TB1
- Station 3 Terminal 2 of TB4
- Station 4 Terminal 8 of TB1
- Station 5 Terminal 3 of TB4

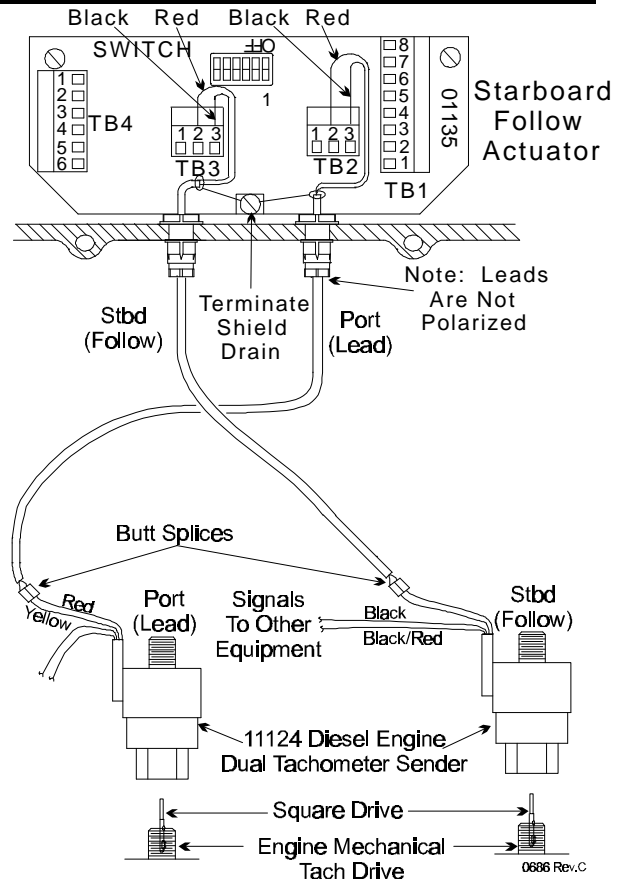


Figure 1 Diesel Engine Signal Input

2.3.2 Engine Signal Connection to Starboard Actuator

1135 AUXILIARY BOARD

The 1135 Starboard Auxiliary Board requires an electric pulse input in proportion to RPM from each Diesel engine. This electric pulse can come from a tachometer pulse generator driven by the engine mechanical tachometer drive, a magnetic pickup mounted in proximity to the flywheel ring gear, or from an alternator's stator AC terminal. Refer to Figure 1.

1135-1 AUXILIARY BOARD

The 1135-1 Starboard Auxiliary Board requires gasoline engine speed signal taken from the point side of the coil. Refer to Figure 2.

CABLE INSTALLATION

- A) In the Starboard Actuator, install the two 1/2-inch watertight cable grips in the central entry holes.
- B) Run cable between the Starboard Actuator and the Lead Engine.
- C) Run cable between the Starboard Actuator and the Follow Engine.
- D) Install the Lead Engine and the Follow Engine cable into the Starboard Actuator through the 1/2-inch cable grips.
- E) Make the following connections using the WAGO Tool supplied with the 585CE System.

Diesel Engines - 1135 Auxiliary Circuit Board (refer to Figure 1):

- Follow Engine cable connection is the Red wire to Terminal 2 of TB3, Black wire

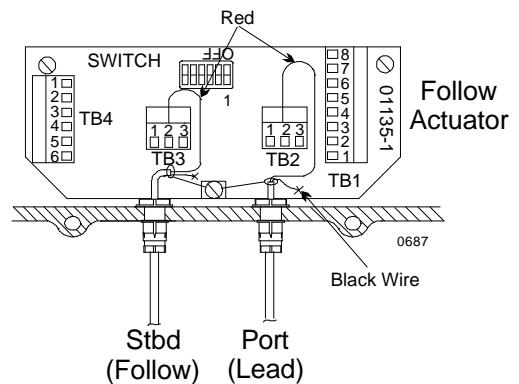


Figure 2 Gasoline Engine Signal Input



to Terminal 3 of TB3, and Shield wire to the Shield Drain.

- Lead Engine cable connection is the Red wire to Terminal 2 of TB2, Black wire to Terminal 3 of TB2, and Shield wire to the Shield Drain.

### **Gas Engines - 1135-1 Auxiliary Circuit Board (refer to Figure 2):**

- Follow Engine cable connection is the Red wire to Terminal 2 of TB3, Shield wire to the Shield Drain, and trim Black wire PVC jacket.
- Lead Engine cable connection is the Red wire to Terminal 2 of TB3, Shield wire to the Shield Drain, and trim Black wire PVC jacket.

F) Tighten watertight cable grip onto cable.

### **2.3.3 Engine Signal Connection to Engines**

#### **Diesel Engines (refer to Figure 1):**

- A) Butt splice cable to the Red and Yellow wire on a Dual Tachometer Sender.
- B) Connect the Dual Tachometer Sender to the Engine Mechanical Tach Drive, a magnetic pickup mounted in proximity to the flywheel ring gear, or from an alternator's stator AC terminal. Refer to the engine manufacturer's data for engine specifics.
- C) Verify the Tachometer Signal at the Starboard Actuator with a volt meter. Check across terminals 2 and 3 of TB2, and terminals 2 and 3 of TB3. The output voltage should be 3 VAC or greater, increasing with RPM.

#### **Gas Engines:**

- A) The cable connects to the negative or point side of the engine coil. Refer to the engine manufacturer's data for cable connection to the engine.
- B) When cable connection is complete, verify 12 volt pulsating signal is present at terminal 2 of TB2 and terminal 2 of TB3 at the Starboard Actuator.

### **2.4 ACTUATOR INTERCONNECTING EIGHT-CONDUCTOR CABLE**

- A) In the Port and Starboard Actuators, install the 3/4-inch watertight cable grip in an unused entry hole on the right hand side of the Actuator. Refer to the main 585CE Manual Figure 3 Plug Removal and Cable Grip Installation.
- B) Run a length of eight-conductor cable between the Actuators, through the 3/4-inch cable grips.
- C) Strip back the PVC cover on each end of the cable approximately 2-1/2-inches (63,5mm). Strip and cut off the shielding flush with the end of the PVC cover
- D) Strip 2/3-inch (9,5mm) insulation off each end of the green wire.
- E) Connect the green lead to Terminal 6 of TB1 in each Actuator.
- F) Connect the solid Drain wire to the Auxiliary Board mounting screw in the Starboard Actuator; do not connect the other end.
- G) Do not cut the remaining wires back to the PVC jacket as they may be required for other installations.

### **2.5 OPERATION CHECKS**

Verify that Synchronization occurs automatically when both Control Head levers are Ahead, above 10 percent of speed range, and within 15 percent of equal RPM.



## MicroCommander: Synchronization

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**DIESEL ENGINES ONLY** - check synchronization operation moored to the dock.

- Disconnect the Shift push-pull cables at the transmission and place the transmission Shift levers in Neutral
- Start the engines
- Move the Station-in-Command Control Head levers Ahead to approximately 1500 RPM. The green light should blink and the engines should synchronize; if they do not, perform the Checks listed below.

**NOTE: Gasoline engines can only be checked when under load.**

### **CHECKS:**

- A) Check wiring connections; refer to Figure 1, Figure 2, and Synchronization System Drawing in Appendix C.
- B) Check that the connections for electric pulse at the Starboard Actuator are: Port engine (Lead) and Starboard engine (Follow).
- C) Check Auxiliary Board 1135 for 3.0 AC volts or greater between Terminals 2 and 3 on TB2 and TB3 when the engines are idling.  
Check Auxiliary Board 1135-1 for pulsating 12 volt signal at Terminal 2 on TB2 and TB3.





Effective only for 813CE Actuators with Serial Number C01001 and up.

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## MicroCommander: 813CE Actuator - Trolling

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# 1. GENERAL INFORMATION

**NOTE:** *The MicroCommander 585CE Engine Control System must be completely installed and thoroughly tested as a system before installing the Trolling Valve Control. Keep the 585CE Manual for 585CE reference during the 813CE Trolling Valve System installation.*

## 1.1 PURPOSE OF A TROLLING VALVE

The Trolling Valve System consists of a single Model 813CE Actuator (hereafter referred to as the 813CE) for single or twin screw applications. The Trolling Valve System modulates clutch oil pressure to the Ahead or Astern clutch plates, allowing the clutch to slip creating a reduced propeller shaft RPM at Idle engine RPM.

The 813CE works together with the Port and Starboard 585CE Actuators, allowing integration of the 585CE functions of Ahead/Astern clutch selection and main engine speed with trolling valve modulation. A single Control Head lever movement accomplishes this.

The 813CE is linked by push-pull cable with the trolling valve lever on the transmission. Consult the transmission dealer for specific engine RPM limitations.

## 1.2 GENERAL REQUIREMENTS

- A new or existing MicroCommander 585CE Engine Control System.
- Trolling valve lever load should not exceed 40 pounds (18kg).
- 813CE requires a reliable battery source of 12 to 32 volts DC.
- A propeller shaft tachometer for trolling valve applications is recommended.

## 1.3 813CE OPERATION

A mode selector switch at the primary remote station will select TROLL or NON-TROLL.

During NON-TROLL operations all stations will operate as a standard single lever control of vessel speed and direction. The trolling valve lever will be at the maximum oil pressure position.

During TROLL operations the trolling valve is integrated with the clutch and speed control. The degree of Control Head lever movement dedicated to command of the trolling valve is 20 degrees.

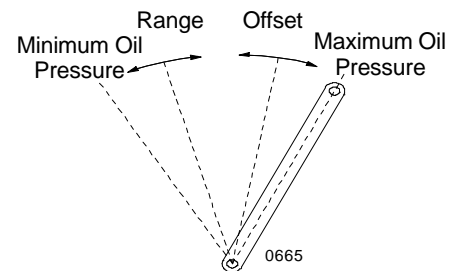
Movement of the Control Head lever to the Ahead or Astern detent will command Ahead or Astern from the 585CE Actuators. The 813CE will command reduced clutch oil pressure and the propeller will begin turning at minimum shaft RPM.

Further movement of the Control Head lever through the next 20 degrees beyond the detent will increase propeller shaft RPM while maintaining Idle engine RPM.

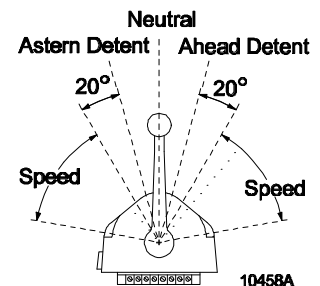
Movement of the Control Head lever beyond the 20 degrees:

- Trolling valve lever positioned to maximum oil pressure.
- Engine RPM increases from Idle to a speed based on Control Head lever position.

Moving the Control Head lever back to Neutral will reverse the sequence. Operation in Astern is the same as Ahead.



**Trolling Valve Lever**





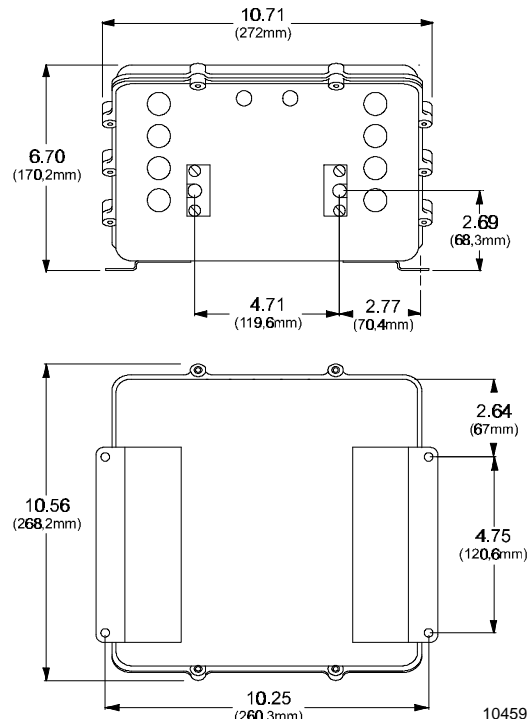
**NOTE:** *It is recommended that a propeller shaft tachometer be installed for indication of propeller speed when in Troll Mode.*

## 2. PLAN THE INSTALLATION

### 2.1 REQUIRED PARTS FROM YOUR MICROCOMMANDER DEALER

#### 2.1.1 813CE Actuator

- Refer to Figure 1 for 813CE Actuator dimensions.
- The 813CE is spray proof but cannot be immersed.
- The 813CE uses electronic circuits that can be influenced by static charges. Do not mount close to gas engine ignition systems, alternators, or electric motors. Allow 4 feet (1,2m) of clearance or more between the 813CE and such devices.
- Locate the Actuator away from heat sources, such as engine exhaust, manifolds. Allow 4 feet (1,2m) of clearance, or more, between the Actuator and such heat sources.
- Bulkhead mount preferred for ease of access for wiring and adjustments, but the 813CE can be mounted in any attitude. Mount the 813CE in any attitude that allows easy connection of push-pull cables to trolling valve. Do not mount to the engine, or transmission, or any location that will allow excessive vibration.
- Locate the Actuator such that the push-pull cable(s) from it to the trolling valve(s) have large radius bends, with the least total degrees of bend and moderate length. **EXAMPLE:** Minimum bend radius 10-inches (254mm); total degrees of bends less than 270 degrees; total length not to exceed 20 feet (6m).
- 813CE power source must be bonded to the hull in metal-hulled vessels, or to the bonding bus in non-metal vessels. Refer to Appendix A Bonding for specific information.



**Figure 1**  
**Actuator Dimensions**

#### 2.1.2 Auxiliary Board Kits (Lead and Follow)

- **Single Screw MicroCommander 585CE System**  
Auxiliary Board P/N 1133 provides trolling valve control and is needed for installation in the 585CE Actuator.
- **Twin Screw MicroCommander 585CE System without Synchronization Option**  
Two Auxiliary Boards are available: P/N 1133 and either P/N 1135 (for diesel engines) or P/N 1135-1 (for gas engines).



It does not matter which 585CE Actuator receives which Auxiliary Board, however for explanation purposes we have elected to have the Port 585CE Actuator receive the P/N 1133 Auxiliary Board and the Starboard 585CE Actuator receive either P/N 1135 or P/N 1135-1 Auxiliary Board. The drawings, diagrams, and instructions reflect this concept.

The Auxiliary Boards provide for trolling valve control and the later addition of the Synchronization Option.

- **Twin Screw MicroCommander 585CE System with Synchronization Option**

Auxiliary Board P/N 1133 and either Auxiliary Board P/N 1135 (for diesel engines) or P/N 1135-1 (for gas engines) have been previously installed during synchronization installation. The Auxiliary Boards provide for synchronization and trolling valve control.

When the existing MicroCommander 585CE System was installed with engine synchronization, it was determined whether the Port or Starboard Actuator would command the Lead engine; however, for explanation purposes we have elected to make the Port Actuator command the Lead (Port) engine and the Starboard Actuator command the Follow (Starboard) engine. The drawings, diagrams, and instructions reflect this concept.

### 2.1.3 Electric Cable

- Eight-Conductor cable will connect the 813CE with the existing 585CE Actuator(s). One eight-conductor cable required for each 585CE Actuator.
- Two-Conductor power cable will connect the 813CE with the vessel's power distribution panel. It is important to keep the length of power cable short to reduce voltage drop. The 14 gauge twisted pair power cable should not exceed 20 feet (6m). If individual wires are used for supply (+) and return (-) then the total wire length should not exceed 40 feet (12m).

**CAUTION: All Actuators (813CE and 585CE) must connect to power sources that have a common DC return (-).**

## 2.2 REQUIRED PARTS FROM INSTALLER

### 2.2.1 Push-Pull Cables and Cable Connection Kits

One type 33C push-pull cable per trolling valve lever are needed. The cable length is measured from end of thread to end of thread. Cables are usually stocked in one foot (0,3m) increments.

### 2.2.2 DC Power Source

The 813CE requires a battery source (12, 24, or 32 volts DC) protected by a 10 ampere circuit breaker. Power should come from the vessel's DC power distribution panel. It is not recommended to use engine starting batteries on 12 volt systems, because the cranking voltage may be too low.

Power can be turned On by a separate switch. Refer to the main 585CE Manual DC Power Source section for recommendation on this option.



### 2.2.3 Troll Mode Switch

- Only one switch used to select Troll Mode. All remote stations will operate in Troll Mode when switch is in the TROLL position. When switch is in the NON-TROLL position the clutch will fully engage.
- Locate the Troll Mode Switch at the Primary Station.

## 3. INSTALLATION

**NOTE:** Before starting the actual installation of the 813CE Trolling Valve System, make sure you have the correct parts and tools on hand. See Sect. 2 PLAN THE INSTALLTION. Read ALL the instructions pertinent to each part before beginning the installation of that part.

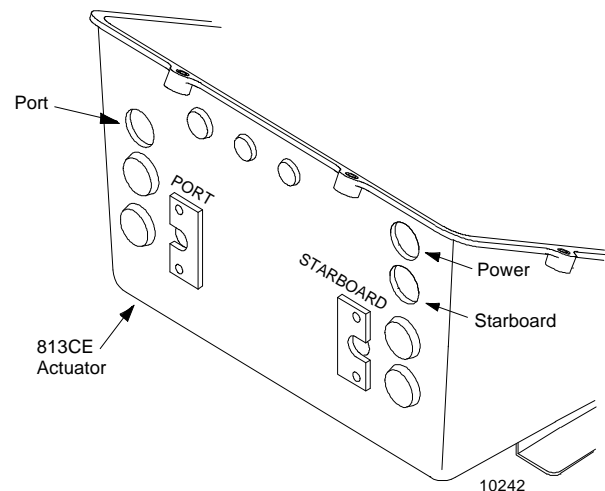
**WARNING:** Static electricity can destroy electronic components. Connect the wrist strap provided to the Actuator frame whenever working on the Actuator. This will drain any static charge you may have on your person.

### 3.1 EIGHT-CONDUCTOR CABLE

- Install the eight-conductor electric cable between each 585CE Actuator and the chosen 813CE location. Support the cable(s) using clamps or straps not more than 18 inches (0,5m) apart if not contained in a conduit. Verify cable location protects the cable from physical damage.
- Label each eight-conductor cable at the 813CE with the 585CE Actuator it will connect to (Port or Starboard).

### 3.2 813CE ACTUATOR

- Secure the 813CE using 1/4 inch or M6 fasteners.
- Remove the 813CE cover. When not working on the Actuator, keep the cover in place to prevent damage to circuits.
- Connect the wrist strap to your person, and the ground connector to the 813CE frame.
- Bond the 813CE to the hull or bonding bus. (Refer to Bonding in Appendix A).
- Remove only the Hole Plugs needed for 585CE eight-conductor cable and the two-conductor power cable as shown in Figure 2.
- Install the watertight cable grips into the open entry holes of the 813CE. Refer to the main 585CE Manual for Watertight Cable Grip installation.



**Figure 2**  
**813CE Actuator Entry**



### 3.2.1 Two-Conductor Power Cable Connection

**NOTE:** *When connecting the DC power cable to the 813CE be sure the power is Off.*

- A) Run the length of two-conductor power cable between the DC Power Source and the 813CE.
- B) Make the connections at the vessel's DC Power Source. Review the information supplied with the DC Power Source for connections.
- C) Run the two-conductor power cable through the watertight cable grip at the 813CE.
- D) Strip each wire 3/8-inch (9,5mm), then install crimp terminals.
- E) Connect the two-conductor cable as indicated on the Two Engine with Troll Drawing in Appendix C.
- F) Feed through a little slack cable and tighten the cable grip.
- G) Tie wrap the power cable to the 813CE frame.

### 3.2.2 Eight-Conductor Cable

**NOTE:** *On a Twin Screw 585CE System, ensure the Port eight-conductor cable enters the Port watertight cable grip on the 813CE, and the Starboard in the Starboard entry.*

- A) Run the eight-conductor cable(s) through the watertight cable grip on the 813CE.
- B) Strip back the PVC cover on the eight-conductor cable(s) approximately 2-1/2-inches (63,5mm).
- C) Strip and cut off the shielding flush with the end of the PVC cover.
- D) Strip 3/8-inch (9,5mm) insulation off the end of each wire.
- E) Use the WAGO tool that was supplied with the 585CE Actuator(s) to install each wire. Refer to the main 585CE Manual for reference on use of the WAGO Tool. Install each wire by color code as shown on the Two Engine with Troll Drawing in Appendix C.
- F) Connect the drain wire(s) to Terminal 8 on the terminal block. Do not connect the other ends of the Drain wire(s) at the 585CE Actuator(s).
- G) Feed through a little slack cable and tighten the cable grip.
- H) Tie wrap the eight-conductor cable to the 813CE frame.

### 3.2.3 Troll Mode Switch

**NOTE:** *If Troll Mode Switch is not used, install a jumper between terminals TB5-3 and TB5-4 on the 813CE Circuit Board.*

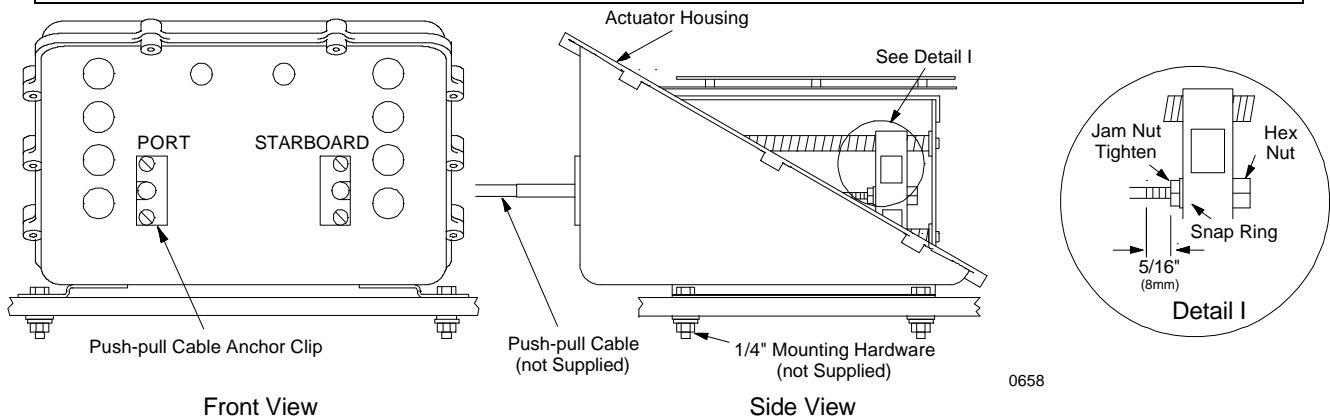
- A) Locate the Troll Mode Switch at the Primary Station. Refer to the information supplied by the switch manufacturer on installation.
- B) Run the electric cable between the Troll Mode Switch and the 813CE Actuator.
- C) Remove a Hole Plug and install a watertight cable grip for electric cable entry.
- D) Refer to Appendix C Two Engine with Troll Drawing for switch connections.



### 3.2.4 Push-Pull Cable Connections

- A) Refer to Figure 3.
- B) Remove the #10-32 Jam Nut and the two Rubber Seals from the end of each push-pull cable that is to connect to the 813CE and discard the seals.
- C) On the 813CE remove one screw from the Cable Anchor Clip and loosen the other. Swing the Cable Anchor Clip clear.
- D) Insert the push-pull cable.

**NOTE: On Twin Screw applications ensure insertions of push-pull cables are into the correct push-pull cable entry. Port cable and Starboard cable should enter according to the labels on the Actuator. See Figure 3**



**Figure 3**  
**813CE Push-Pull Cable Connections**

- E) When the push-pull cable end is visible within the 813CE interior, reinstall the #10-32 jam nut such that there is approximately 5/16 inch (7,9mm) of thread showing beyond the jam nut. Refer to Figure 1, Detail I.
- F) Tighten the jam nut to the hex nut.
- G) Align the push-pull cable sleeve ferrule such that the Cable Anchor Clip will engage the peripheral grooves. Position the Cable Anchor Clip and reinstall the screw removed in Step C).
- H) Tighten both screws.

**NOTE: Do not connect push-pull cables at the trolling valve lever at this time. Connections will be made during trolling cable adjustments.**

### 3.3 AUXILIARY BOARDS

The intention of this section is for 585CE Actuator(s) without Synchronization Option. If the Synchronization Option was installed in the existing 585CE System, skip and go on to Section 3.4 for 585CE cable connections.

#### 3.3.1 Auxiliary Board P/N 1133

- A) At the Port (Lead) or Single Screw 585CE Actuator, remove the Actuator cover. When not working on the Actuator, keep the cover in place to prevent damage to circuits.



- B) Connect the anti-static wrist strap to your person, and the ground connector to the Actuator frame.
- C) Plug the Auxiliary Board P/N 1133 into the plug connector of the Actuator. Refer to Appendix C - Two Engines with Troll Drawing for Auxiliary Board location.
- D) Remove the Hole Plug from the TROLL entry hole and install the 3/4-inch watertight cable grip for the eight-conductor cable. Refer to the main 585CE Manual for Watertight Cable Grip installation.

### 3.3.2 Auxiliary Board P/N 1135 or PN 1135-1

- A) At the Starboard (Follow) 585CE Actuator, remove the Actuator cover. When not working on the Actuator, keep the cover in place to prevent damage to circuits.
- B) Connect the anti-static wrist strap to your person, and the ground connector to the Actuator frame.
- C) Plug the Auxiliary Board into the plug connector of the Actuator. Refer to Appendix C - Two Engines with Troll Drawing for Auxiliary Board location.
- D) Remove the Hole Plug from the TROLL entry hole and install the 3/4-inch watertight cable grip for the eight-conductor cable. Refer to the main 585CE Manual for Watertight Cable Grip installation.

### 3.4 585CE EIGHT-CONDUCTOR

- **Single Screw MicroCommander 585CE System**

- A) At the 585CE Actuator remove the Actuator cover. When not working on the Actuator, keep the cover in place to prevent damage to .
- B) Connect the anti-static wrist strap to your person, and the ground connector to the Actuator frame.
- C) Remove the Hole Plug labeled TROLL.
- D) Install a watertight cable grip into the open entry hole. Refer to the main 585CE Manual for Watertight Cable Grip installation.
- E) Run the eight-conductor cable through the watertight cable grip on the Actuator.
- F) Strip back the PVC cover on the eight-conductor cable(s) approximately 2-1/2-inches (63,5mm).
- G) Strip and cut off the shielding flush with the end of the PVC cover.
- H) Strip 2/3-inch (9,5mm) insulation off the end of each wire.
- I) **Single or Twin Screw MicroCommander System without Synchronization Option-** Bend the green wire out of the wire bundle and wrap, or otherwise compact it at the cover, for possible use in optional wiring.  
**Twin Screw MicroCommander System with Synchronization Option -** Connect green wire to Terminal 6 of TB1 in both Port and Starboard 585CE Actuators.
- J) Cut back the Drain wire to the PVC jacket.
- K) Use the WAGO Tool that was supplied with the 585CE Actuator to install each wire. Refer to the main 585CE Manual for reference on use of the WAGO Tool. Install each wire by color code as shown on Two Engine with Troll Drawing in Appendix C.
- L) Feed through a little slack cable and tighten the cable grip.
- M) Tie wrap the eight-conductor cable to the Actuator frame.



## 4. ADJUSTMENTS

### 4.1 585CE AUXILIARY BOARD DIP SWITCH SETTINGS

On the 585CE Auxiliary Board(s) set the SW1 Dip Switches as follows:

- Dip Switch 1: ON = Allows operator to toggle Trolling Off and On by depressing the station transfer button while Control Head lever(s) is in the 20 degree Troll Range.  
OFF = Operator is unable to toggle Trolling Off and On.
- Dip Switch 3: ON = LED will rapidly flash On and Off while in Troll Mode.  
OFF = LED stays steadily lit while in Troll Mode. (Normal LED display)
- DIP Switch 6: ON = Enables Troll Mode.  
OFF = Disables Troll Mode.

DIP Switch 6 MUST be set to the On position to enable Troll Mode. Reference Appendix C Two Engines with Troll Drawing.

### 4.2 813CE PUSH-PULL CABLE DIRECTION

- A) Verify the trolling valve lever at the transmission is in the maximum oil pressure position.
- B) Apply DC power to the MicroCommander and 813CE Systems.
- C) Take command at the Primary Station.
- D) Put Troll Mode switch into the TROLL position.

**NOTE: If Troll Mode switch not installed, install in the 813CE Actuator a jumper between TB5-3 and TB5-4.**

- E) The 813CE will not be at maximum oil pressure position. Verify the push-pull cable orientation matches the trolling valve lever. If not, change the direction of the push-pull cable movement by doing the following on the 813CE Circuit Board. Refer to Appendix C Two Engines with Troll Drawing:

<ul style="list-style-type: none"> <li>• <b>Starboard Push-Pull Cable Direction</b></li> </ul>	<ul style="list-style-type: none"> <li>• <b>Port Push-Pull Cable Direction</b></li> </ul>
JMPR 3	JMPR4
ON	ON
OFF	OFF
Cable PUSH to maximum oil pressure	Cable PUSH to maximum oil pressure
Cable PULL to maximum oil pressure	Cable PULL to maximum oil pressure

### 4.3 TROLLING VALVE PUSH-PULL CABLE CONNECTION

- A) Verify whether push-pull cable anchor brackets are installed on the trolling valve. If brackets are not provided, refer to Appendix B - Morse Standard Kits or Universal Mounting.
- B) Mechanically adjust the push-pull cable to connect to the trolling valve lever in the maximum pressure position.
- C) Use the jam nuts supplied with the push-pull cables(s) to secure the cable rod end(s) in the ball joints. Do not remove the two Rubber Seals from the push-pull cable.

### 4.4 813CE RANGE AND OFFSET ADJUSTMENTS

Adjustment of Range and Offset are with the shaft RPM with the clutches slipping. Shaft RPM and clutch slippage will vary with the temperature of the clutch oil, and therefore, it is important to warm-up the engines and transmission oil before these adjustments. The





vessel should be moored securely to the dock with only one engine at a time running. Engine warm-up may require an hour or more.

When engine(s) have reached operating temperature (system in Non-Troll, Control Head lever(s) in Ahead with idle RPM), measure and record propeller shaft RPM. This measurement is hereafter referred to as the Normal Shaft RPM.

When the Control Head lever(s) are in the Ahead or Astern Detent position, and the Troll Mode Switch is in the TROLL position:

- Adjust to 30 - 50 Range so the propeller is turning at the slowest controllable speed. This should correspond percent of the Normal Shaft RPM.
- Adjust Offset to give 70 percent of Normal Shaft RPM.

Refer to Appendix C Two Engines with Troll for locations of switches and potentiometers on the 813CE Circuit Board.

**NOTE: To adjust the Range and Offset position accurately, a hand held tachometer is required.**

### 4.4.1 Range

- A) Place SW1-1 in the On position.
- B) SW1-2 must be Off.
- C) Turn potentiometers lightly so as not to damage the potentiometer stops.
- D) Port Range use potentiometer R7 and adjust Range for a shaft RPM that is 30 - 50 percent of Normal Shaft RPM.  
Starboard Range use potentiometer R8 and adjust Range for a shaft RPM that is 30 - 50 percent of Normal Shaft RPM.
- E) Once set, place SW1-1 in the Off position.

**NOTE: It is difficult to use a slipping clutch to control shaft RPM between 70 percent and 100 percent of Normal Shaft RPM. However, it may be desirable to set the Offset position higher than 70 percent RPM, so that added oil pressure is available when maneuvering.**

### 4.4.2 Offset

- A) Place SW1-2 in the On position.
- B) SW1-1 must Off.
- C) Port Offset use Potentiometer R10 and adjust Offset for a shaft RPM that is 70 percent of Normal Shaft RPM, you are looking for the point at which the clutch is still slipping.  
Starboard Offset Use Potentiometer R9 and adjust Offset for a shaft RPM that is 70 percent of normal, you are looking for the point at which the clutch is still slipping.
- D) Once set, place SW1-2 in the Off position.

**NOTE: Following a Sea Trial, you will likely need to fine-tune the above adjustments because the propulsion machinery will be thoroughly warmed up and you may see some change.**

## 5. CONTROL HEAD TONES

There is an error tone-over-tone at all remote stations to warn of a problem with the 813CE. This tone would sound for any of the following reasons:

- 813CE power has not been turned On.
- 813CE component failure.



## **MicroCommander: 813CE Actuator - Trolling**

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- 813CE cannot get to maximum oil pressure. This could be something jamming the push-pull cable.

Once a problem is corrected, push the Station Transfer Button for a reset.

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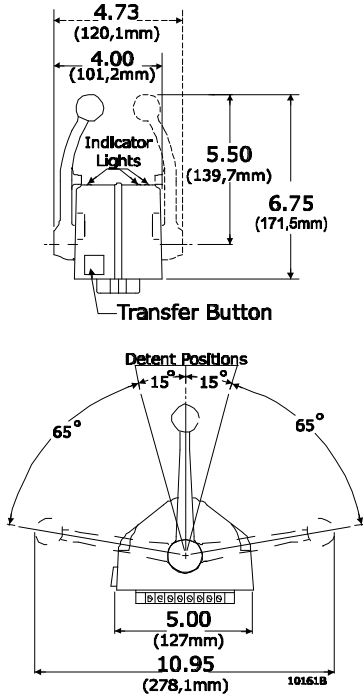


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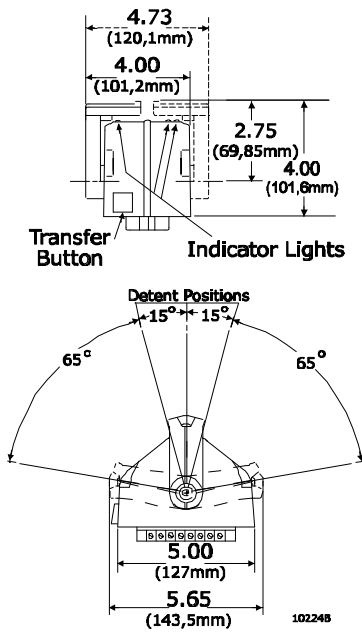
<u>PART NO.</u>	<u>DESCRIPTION</u>	
<u>ACTUATORS</u>		
585CE	Actuator (Shift & Speed)	Multivoltage
813CE	Actuator (Trolling)	Multivoltage
<u>CONTROL HEADS</u>		
<u>SINGLE SCREW</u>		
450-3L	Single Left Hand Standard 'T' Handle	
450-3R	Single Right Hand Standard 'T' Handle	
453-3L	Single Left Hand Chrome Knob Handle	
453-3R	Single Right Hand Chrome Knob Handle	
455-3L	Single Left Hand Black Low Profile Handle	
455-3R	Single Right Hand Black Low Profile Handle	
456-3L	Single Left Hand Chrome Low Profile Handle	
456-3R	Single Right Hand Chrome Low Profile Handle	
750-L	Single Left Hand Control Head, Heavy Duty	
750-R	Single Right Hand Control Head, Heavy Duty	
<u>TWIN SCREW</u>		
460-4	Dual Standard 'T' Handle with Synchronization Indicator Light	
463-4	Dual Chrome Knob Handle with Synchronization Indicator Light	
465-4	Dual Black Low Profile Handle with Synchronization Indicator Light	
466-4	Dual Chrome Low Profile Handle with Synchronization Indicator Light	
760	Control Head, Heavy Duty with Synchronization Indicator Light	
MC2000-1	Black Head, Black Levers	
MC2000-2	Chrome Head, Chrome Levers	
MC2000-4	Black Head, Chrome Levers	
**MC2000 Control Head and Levers are available in Gold**		
<u>CABLE (Electric)</u>		
180	8-Cond. Shielded Cable	Per/ft
350	8-Cond. Shielded Cable	500' Spool
11811	8-Cond. Shielded Cable	1000' Spool
212	2-Cond. Power Cable	Per/ft
349	2-Cond. Power Cable	250' Spool
183	2-Cond. Start Interlock Cable	Per/ft
355	2-Cond. Start Interlock Cable	250' Spool
<u>AUXILIARY CIRCUIT BOARDS FOR OPTIONAL SYNC OR TROLL</u>		
1133	Auxiliary Board	Lead
1135	Auxiliary Board	Follow - Diesel Engines
1135-1	Auxiliary Board	Follow - Gas Engines
<u>SYNCHRONIZATION.</u>		
11124	Tachometer Sender Signal (Dual)	
2241	Tach Wire Shielded	

**CONTROL HEAD DIMENSIONS AND VARIATIONS**  
**450 - 460 Series**

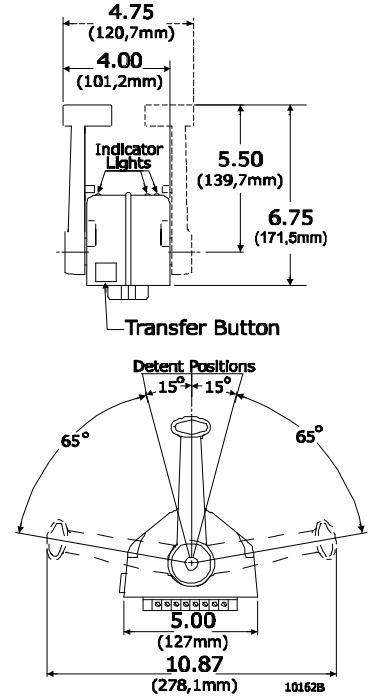
**Chrome Lever with Knob**



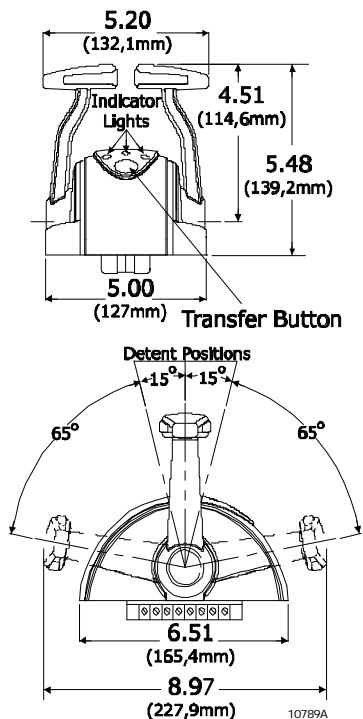
**Low Profile Lever**



**Standard 'T' Handle**



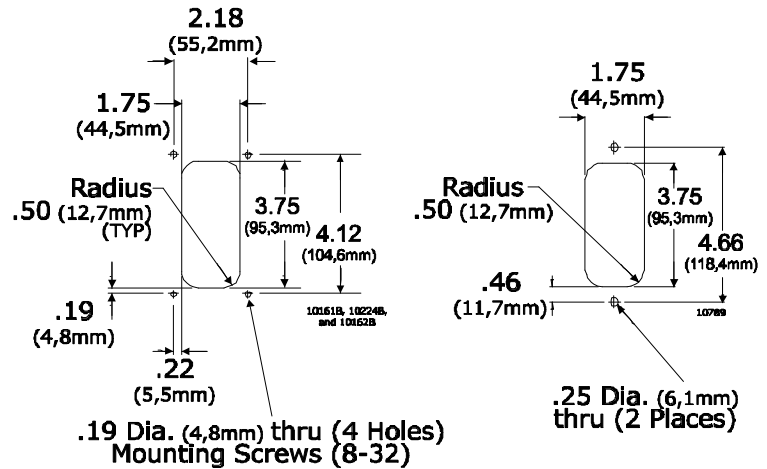
**MC2000 Series**

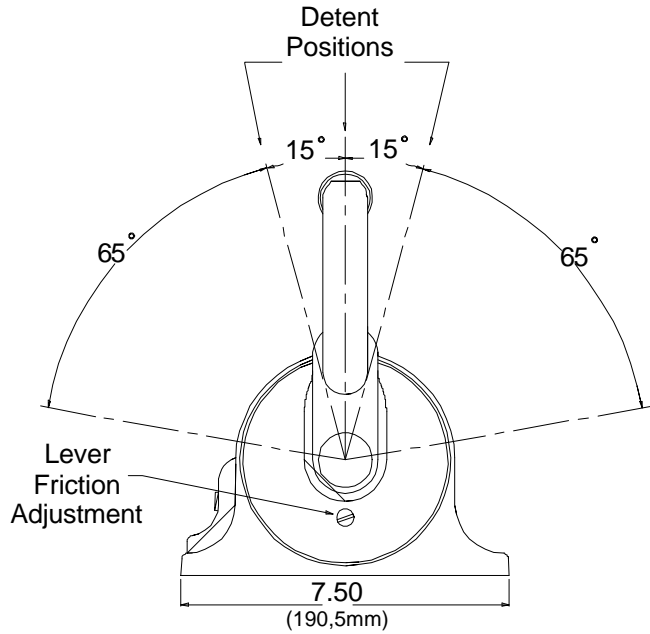
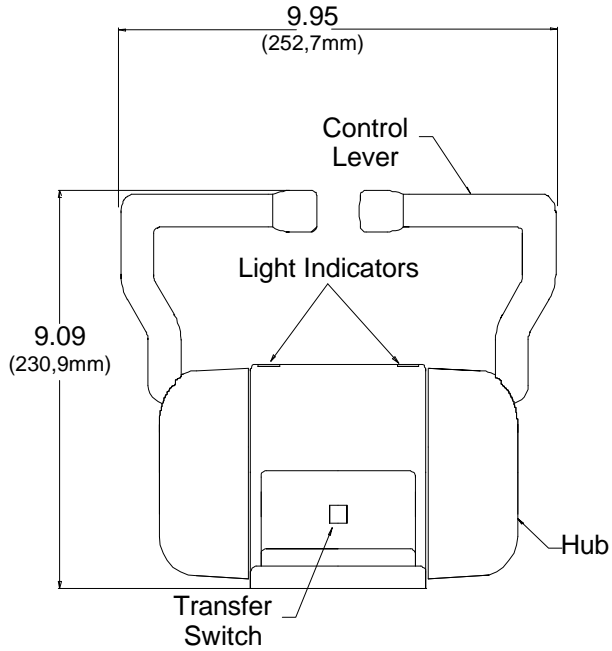


**TEMPLATES**

**450 - 460 Series**

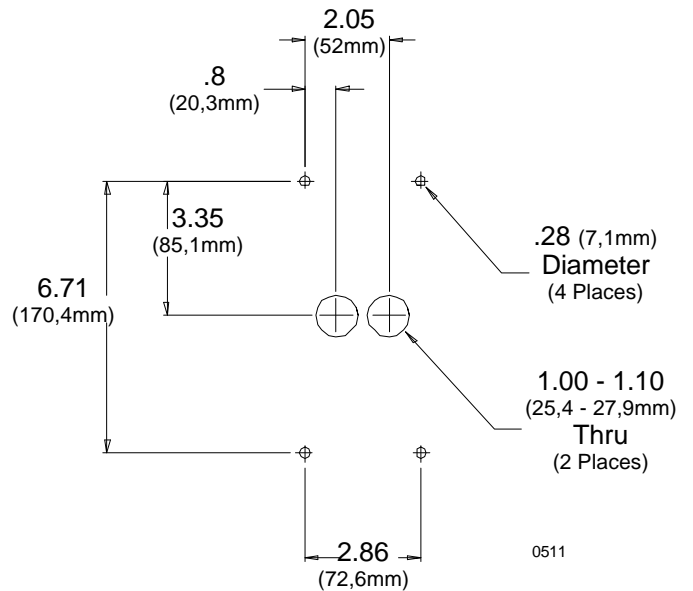
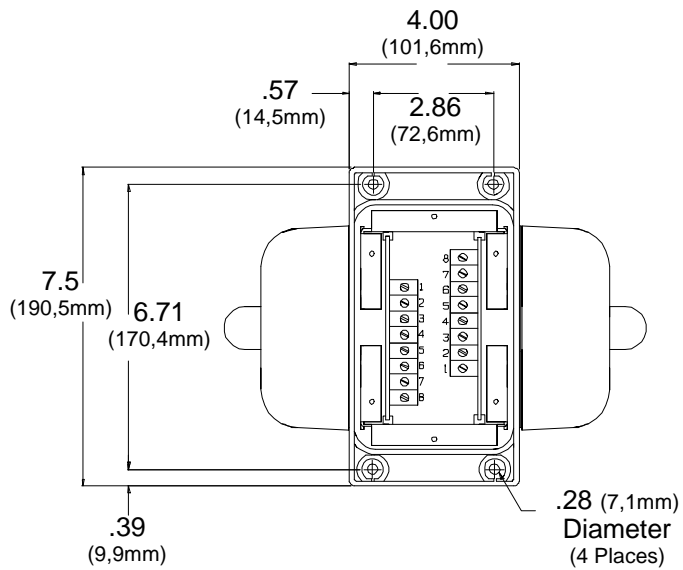
**MC2000 Series**





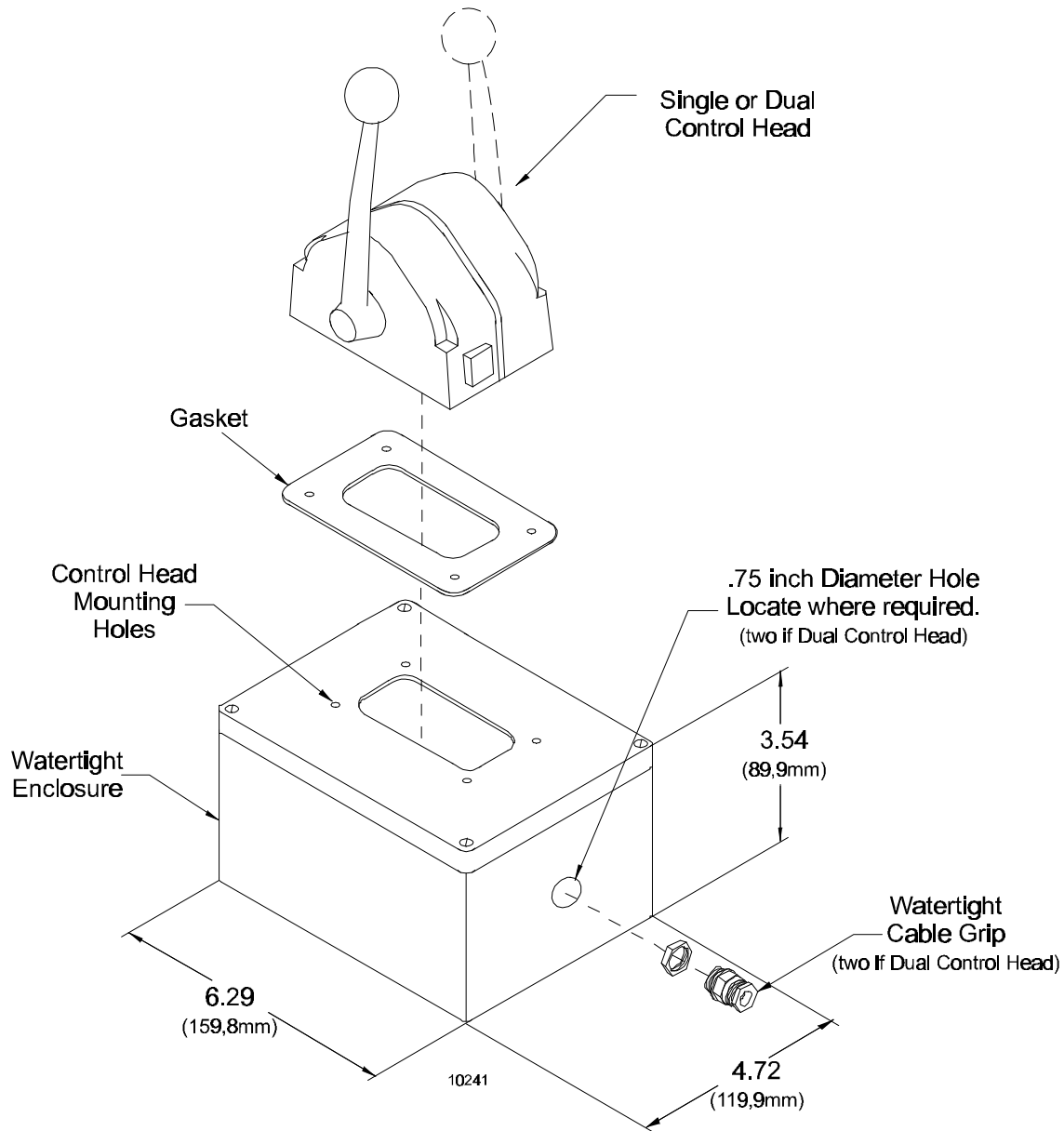
Mounting and Terminal Block Detail  
(shown with Bottom Cover removed)  
Rotated 90°

Control Head Mounting Template  
(scale: none)



Electronic Control Head

**WATERTIGHT ENCLOSURE**



- Deck Mount or Exposed Mount
- Ideal for outside Weather Mount
- To prevent internal condensation and moisture build up the mount is drilled to allow air circulation.
- Part No. 12110

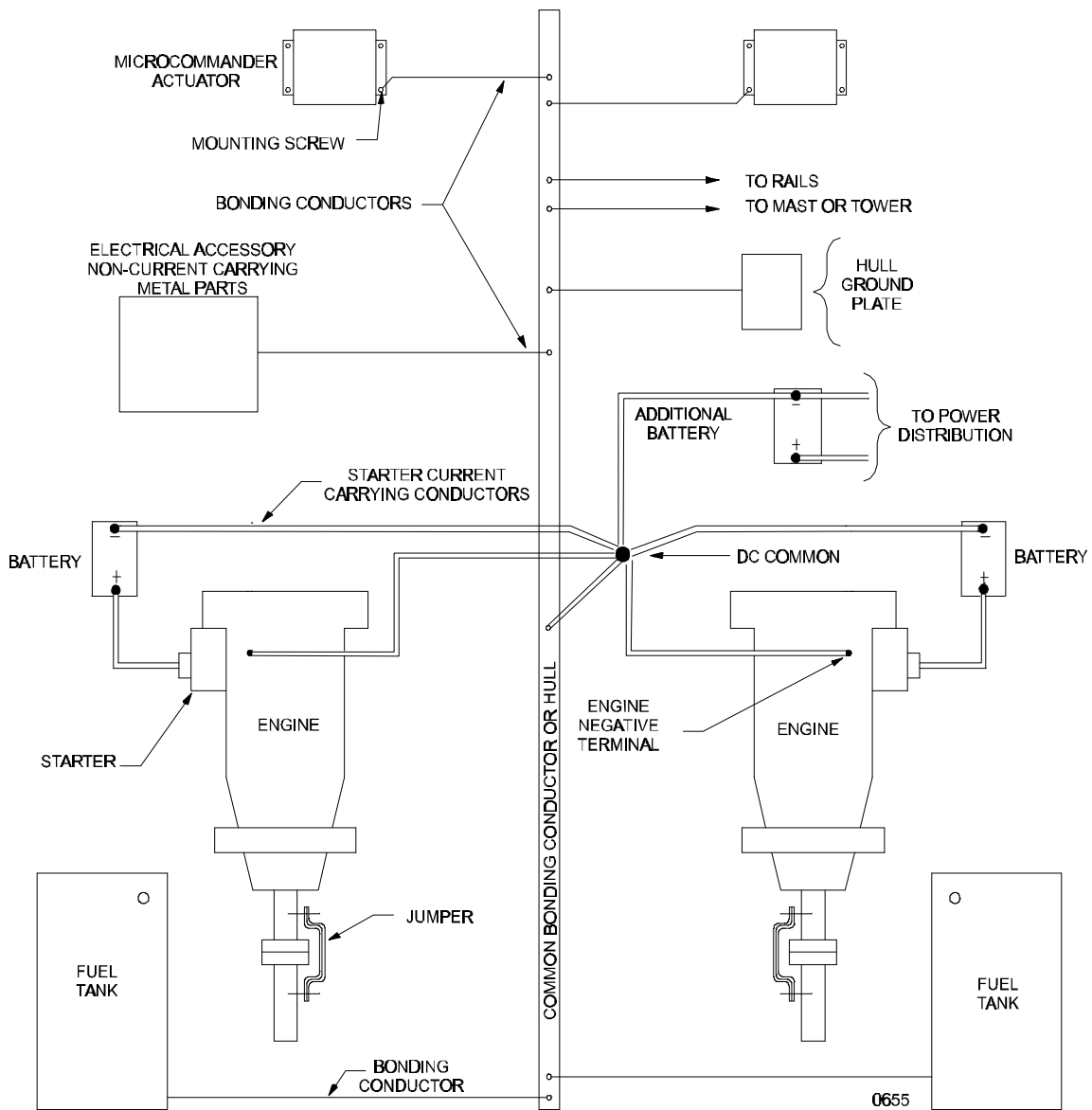


**BONDING A.B.Y.C. E-1 46 CFR 111.05**

All boats equipped with a permanently installed electrical system shall also be equipped with a bonding system. The negative terminal of all batteries should be connected at only one point, the DC common, and from DC common to bond system or hull.

**Metal - Hull Vessels**

The hull of a metal - hull vessel may serve as the common bonding conductor. Any item to be bonded not in contact with the hull requires a bonding conductor to the hull.



## TROUBLESHOOTING

### GENERAL

The MicroCommander Control System consists of one to five Control Heads located at the vessel's remote stations, connected to one or two Actuators located in the engine room area. The Actuator(s) may be configured for main engine speed and transmission direction only, or configured for automatic engine synchronization and trolling valve control.

Before beginning troubleshooting, review the Drawings in Appendix C. Become familiar with the component configuration on your vessel.

Carefully inspect the following:

- DC Power Source
- Component Location
- Component Condition
- Interconnecting Wiring
- Wire Termination's
- Mechanical Connections at the Throttle and Transmission
- Pulse Signal (Synchronization Applications)
- Mechanical Connections at the Trolling Valve

A key in troubleshooting the MicroCommander System is identifying the problem as:

- DC Power Source
- Interconnection wiring or termination
- Mechanical Interface
- Component Calibration
- Component Failure

The MicroCommander System has Station-in-Command indicator lights on each Control Head, as well as audible tone indicators. These indicators will assist in troubleshooting and control system status.

When contacting an authorized MicroCommander servicing dealer, or Mathers Controls Service Department, please be ready with the Actuator Part Number and Serial Number.

**CAUTION:** *Static electricity can destroy electronic components. Any time the Actuator cover is off, wear the wrist strap provided and connect it to the Actuator frame. This will drain any static charge you may have on your person.*

**NOTE:** *Always check the other remote stations, to see if the symptom can be repeated.*

## MicroCommander - Appendix A

MM12793

**1. SYMPTOM Cannot acknowledge command at one remote station (both Port and Starboard for twin screw) when the system is first turned On.**

**CAUSE**

- a) A bad electrical connection.
- b) Incorrectly wired eight-conductor cable.

**REMEDY**

- a) Check the crimps and insure that all the screws are tight at the Control Head. Check the STATION connections at the Actuator. Tighten or re-crimp as necessary.
- b) Check wire termination's at both the Control Head and the Actuator for correct terminal connections. Refer to Drawings in Appendix C.

**2. SYMPTOM On a Twin Screw Application, one Control Head lever of a Dual Control Head will accept command while the other will not initialize.**

**CAUSE**

During initial power up, the MicroCommander System has initialized, although you are unable to acknowledge command, the low repetition tone is present and the red indicator light is not lit.

- a1) Incorrect or poor wire connections at the Control Head or Actuator.
- a2) Faulty Control Head.
- b) Port and Starboard power sources do not have a common ground (only the starboard would be unable to acknowledge command).
- c) Incorrectly wired eight-conductor cable.
- d) Defective Control Head potentiometer.

**REMEDY**

- a1) Check wire termination's at the Control Head and the Actuator. Refer to Drawings in Appendix C.
- a2) Replace Control Head or rebuild with Overhaul Kit (P/N 01154).
- b) The negative terminals of both batteries must be connected to a common point. If not, connect both to a common point.
- c) Wire the cable connections as shown in Appendix C.
- d) Check the voltage between the yellow and the blue wires (pins 5 and 7) at the suspected Control Head; the reading should be 4.80 to 5.00 volts DC. Measure the voltage between the blue and green wires for left-hand Control Heads, and the yellow and green wires for right-hand Control Heads: the measurement should be between 49 - 51 percent of that measured at pins 5 and 7 with the Control Head lever at the Neutral/Idle position. If not, replace the Control Head or install a Control Head Repair Kit (P/N 01564).

**3. SYMPTOM The red light blinks when the Station Transfer Button is depressed, and continues to blink after it is released (Control Head lever is in Neutral/Idle position). Cannot transfer to this station if another station was previously in command.**

**CAUSE**

- a) The Control Head potentiometer is not centered.

**REMEDY**

- a) Replace the Control Head or install a Control Head Repair Kit (P/N 01564).

## MicroCommander - Appendix A

MM12793

**4. SYMPTOM The engine RPM varies, without moving the Control Head lever (synchronization disabled).**

**CAUSE**

- a) Problem with the governor or carburetor.
- b) Erratic command signal.

**REMEDY**

- a) Watch the push-pull cable at the governor or carburetor; if the push-pull cable is moving, go to step b). If not, contact a certified mechanic.
- b) At the Actuator, measure the DC voltage at the yellow and green wires (pins 5 and 6) of the Station-in-Command; the reading should be a stable voltage (no variations). If not, check for a loose connection between the Actuator and the Control Head. If the connections are tight, and no corrosion is present, replace the Control Head or install a Control Head Repair Kit (P/N 01564)

**5. SYMPTOM The engine RPM drops to Idle, transmission to Neutral, the Control Head red indicator light turns Off, and a slow repetitive tone is heard at all remote stations after repositioning the Control Head lever.**

**CAUSE**

- a) A drop in battery voltage (12 volt systems only) at the Actuator.
- b) Defective Control Head.

**REMEDY**

- a) Measure the voltage at the battery without the engine or charger running; the reading should be a minimum of 12.4 volts. If not, the battery needs charging or possibly replacing. Measure the voltage at the Actuator(s) BATT+ and BATT- terminals; this reading should be no less than 0.20 volt below the measured battery voltage.
- b) Replace the Control Head or install a Control Head Repair Kit (P/N 01564) if the voltage at the Actuator tested good.

**6. SYMPTOM No audible tone at a Control Head when power is first turned On, but otherwise works perfectly.**

**CAUSE**

- a) Incorrectly wired eight-conductor cable.
- b) Defective sound transducer.

**REMEDY**

- a) Verify that the black wire is connected to pin 1 in the Actuator, and to pin 1 at the Control Head. The brown wire must be connected to pin 2 in the Actuator, and to pin 2 at the Control Head. In addition, the LED will not light if the brown wire is loose or connected incorrectly. Check for loose or corroded connections.
- b) Measure the voltage at Control Head at pins 1 and 2 (do not depress the Station Transfer Button); the voltage should fluctuate at a steady rate. If an unsteady fluctuating voltage is measured, replace the Control Head or install a Control Head Repair Kit (P/N 01564).

**7.**     SYMPTOM     **The Control Head red indicator light does not light when in command, but everything else works perfectly.**

**CAUSE**

- a) Incorrectly wired eight-conductor cable.
- b) Defective LED

**REMEDY**

- a) Verify that the brown wire is connected to pin 2 of the Actuator and to pin 2 of the Control Head.
- b) Measure the DC voltage between pins 2 and 3 at the Control Head; the reading will be 1.00 to 2.00 volts in normal operation. If 4.00 volts is measured, the LED is open. Replace the Control Head or install a Control Head Repair Kit (P/N 01564).

**8.**     SYMPTOM     **Cannot obtain Neutral Fast Idle Mode while moving the Control Head lever in the Ahead direction, only in the Astern direction.**

**CAUSE**

- a) The Actuator is sensing Control Head lever movement in the Astern direction.

**REMEDY**

- a) Depress the Station Transfer Button while moving the Control Head lever to the Astern detent. If the LED now blinks, the Actuator is incorrectly set up. This will be corrected by performing the following:
  - Check the eight-conductor wiring.
  - For **right-hand** Control Heads, the yellow wire should go to pin 5 at both the Actuator and Control Head.
  - For **right-hand** Control Heads, the blue wire should go to pin 7 at both the Actuator and Control Head.
  - For **left-hand** Control Heads, the yellow wire should go to pin 7 at the Control Head and pin 5 at the Actuator.
  - For **left-hand** Control Heads, the blue wire should go to pin 5 at the Control Head and pin 7 at the Actuator.

If any changes to the wiring are necessary, the shunt at JMPR 4 may need to be changed to the opposite two pins.

Check all Stations for Ahead and Astern operation.

## MicroCommander - Appendix A

MM12793

**9.      SYMPTOM      No tones or indicator lights at the Control Head, and no LEDs lit on the circuit board.**

**CAUSE**

- a) No power to the Actuator.
- b) Polarity of the battery voltage reversed.
- c) Fuse (Part No. GDC-1A) on the circuit board blown.

**REMEDY**

- a) Check the power source to the Actuator.
- b) Connect the red/purple wire to the Actuator terminal labeled BATT+ and the black wire to the terminal labeled BATT-.

Measure the battery voltage at the Actuator. If the voltage exceeds 40 volts, the power source must be corrected. Replace the fuse with the spare, which is taped to the relay on the circuit board. If the fuse again blows, the circuit board needs to be serviced or replaced with a Circuit Board Kit (P/N 01154).

**10.     SYMPTOM      The engine starter will not engage.**

**CAUSE**

- a) The MicroCommander System is not turned On.
- b) The Control Head lever(s) are not at the Neutral position.
- c) Low battery voltage.
- d) Faulty start interlock circuit in the Actuator.

**REMEDY**

- a) Turn power On to the MicroCommander System.
- b) Place the Control Head lever(s) in the Neutral position and depress the Station Transfer Button.
- c) Check the battery voltage. If the voltage is low, charge or replace the battery.
- d) Temporarily connect the two start interlock wires (yellow with red stripe) at the Actuator to the same START INTERLOCK terminal. If the engine can now be started, the Actuator needs to be serviced.

**11.     SYMPTOM      Steady tone is heard from all remote stations. Cannot gain command at any remote station.**

**CAUSE**

- a) Low battery voltage at the Actuator.
- b) Component failure on the circuit board.

**REMEDY**

- a) Check the battery voltage at the Actuator. If the measurement is less than 8 volts, the battery needs to be replaced or the source of the voltage drop needs to be corrected.
- b) If the voltage tested good, the circuit board needs to be repaired or replaced with Circuit Board (P/N 11983). The Actuator may require service by an authorized MicroCommander servicing dealer or Mathers Controls.

## MicroCommander - Appendix A

MM12793

<b>12.</b>	<b><u>SYMPTOM</u></b>	<b><i>Rapid tone at all remote stations.</i></b>
------------	-----------------------	--

	<b><u>CAUSE</u></b>	
--	---------------------	--

- |  |                      |  |
|--|----------------------|--|
|  | <b><u>REMEDY</u></b> |  |
|--|----------------------|--|
- a) Incorrectly adjusted push-pull cable.
  - b) Defective push-pull cable.
  - c) Low battery voltage at the Actuator (12 volt systems).
  - d) Defective servo unit in the Actuator.

- a) Disconnect the push-pull cable from the shift lever at the transmission. Disconnect the push-pull cable from the throttle lever at the carburetor or governor. Operate the Control Head(s). If the rapid tone is no longer present, follow the Push-Pull Cable Adjustment and Tests Section in the main 585CE manual.
- b) One-by-one, remove the push-pull cables from the Actuator and operate the Control Head(s). If the rapid tone is no longer present, replace the defective push-pull cable.
- c) Measure the battery voltage at the Actuator. If the measured voltage is 8 to 12 volts, the power source needs to be checked.
- d) If a), b), and c) tested good, the entire Actuator needs to be repaired or replaced.

<b>13.</b>	<b><u>SYMPTOM</u></b>	<b><i>The engine starts to turn over while starting, and then stops. A slow repetitive tone is heard from all remote stations.</i></b>
------------	-----------------------	--

	<b><u>CAUSE</u></b>	
--	---------------------	--

- |  |                      |  |
|--|----------------------|--|
|  | <b><u>REMEDY</u></b> |  |
|--|----------------------|--|
- a) The voltage to the Actuator has dropped too low, due to the starter's current requirements.
  - b) Battery charge is low.

- a) Supply power to the Actuator from a battery other than the starting battery.
- b) Recharge or replace the battery.

<b>14.</b>	<b><u>SYMPTOM</u></b>	<b><i>One long, one short tone from all remote stations.</i></b>
------------	-----------------------	--

	<b><u>CAUSE</u></b>	
--	---------------------	--

- |  |                      |  |
|--|----------------------|--|
|  | <b><u>REMEDY</u></b> |  |
|--|----------------------|--|
- a) Shift position feedback error.

- a) Depress the Station Transfer Button twice. The Actuator will need to be serviced at the first opportunity.

<b>15.</b>	<b><u>SYMPTOM</u></b>	<b><i>One long, two short tones from all remote stations.</i></b>
------------	-----------------------	---

	<b><u>CAUSE</u></b>	
--	---------------------	--

- |  |                      |  |
|--|----------------------|--|
|  | <b><u>REMEDY</u></b> |  |
|--|----------------------|--|
- a) Throttle position feedback error.

- a) Depress the Station Transfer Button twice. The Actuator will need to be serviced at the first opportunity.

## MicroCommander - Appendix A

MM12793

<b>16.</b>	<b><u>SYMPTOM</u></b>	<b>Tone-over-Tone from all remote stations.</b>
------------	-----------------------	---

	<b><u>CAUSE</u></b>	
--	---------------------	--

- |    |   |   |
|----|---|---|
|    |   | <b><u>REMEDY</u></b>  |
| a) | 813CE power has not been turned On.                 | a) Turn power On to the 813CE Actuator.   |
| b) | 813CE Actuator not working correctly.               | b) Verify that push-pull cable movement is correct and moving freely. If tone continues, the 813CE may need to be replaced or serviced. |
| c) | Tone is heard only from Port or from the Starboard. | c) Verify that Port or Starboard push-pull cable movement is correct and moving freely. Make any needed adjustments.                    |



<b>17.</b>	<b><u>SYMPTOM</u></b>	<b>One long, three short tones from all remote stations</b>
------------	-----------------------	---

	<b><u>CAUSE</u></b>	
--	---------------------	--

- |    |                         |   |
|----|-------------------------|---|
|    |                         | <b><u>REMEDY</u></b>  |
| a) | Defective Control Head. | a) Depress the Station Transfer Button twice. Change Stations if possible. Have Control Head serviced at the first opportunity. |



**Mathers Controls Inc.  
THREE YEAR LIMITED WARRANTY**

Applies to Actuators with Serial Numbers 25000 and higher.

Your Mathers product has been designed and manufactured by experienced engineers and craftsmen. Mathers Controls Inc., warrants for the period indicated below, each product to be free from defect in material and workmanship. Repair or replacement, at Mathers option, will be provided if the product, upon Mathers Controls inspection, is found to be properly installed and operated in accordance with Mathers Controls Manual. This warranty does not apply to malfunction caused by damage, unreasonable use, misuse, repair or service by unauthorized persons or normal wear and tear.

**COVERAGE UNDER WARRANTY**

Three years from the date of purchase by the original end user.

**YEAR ONE**

No charge for equipment repair, parts and labor. Up to three hours labor toward troubleshooting and replacement of defective equipment.

**YEAR TWO AND THREE**

No charge for equipment repair, parts and labor. No allowance for troubleshooting and replacement of defective equipment.

**NO COVERAGE UNDER WARRANTY**

The following will not be covered under warranty.

Adjustment or calibration of any Mathers equipment.

Adjustment or calibration of any associated equipment which may include but not limited to push-pull cables, engine governor or carburetor, transmission or trolling valve.

Damage due to accidents, improper installation or handling and or improper storage.

Damage due to faulty repairs performed by an unauthorized service representative.

Damage due to conditions, modifications or installation contrary to published specifications or recommendations.

Original installation charges or start-up costs.

Battery service including labor charges related to battery service.

Rental of equipment during performance of warranty repairs.

Unauthorized repair shop labor, without prior approval from Mathers Service Department.

Shop supplies such as connectors, wire, cable, etc.

**WARRANTY SERVICE**

Call 1-800-546-5455 or 1-360-757-6265 for your nearest Mathers Factory Authorized Dealer.

Prior to returning any product to the factory, you must contact Mathers Service Department for a Material Return Authorization (MRA) number. Return the product freight prepaid, marked clearly with the MRA number and a description of the malfunction.

If there is a defect covered by warranty, Mathers will, at its option, either repair or replace the defective part or product. If after inspection, Mathers determines that the product is not defective, it will return the product to the sender, freight collect.

Repair or replacement during the warranty period will not extend the warranty period.

***THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED. EXCEPT TO THE EXTENT PROHIBITED BY APPLICABLE LAW, MATHERS HEREBY DISCLAIMS ALL OTHER IMPLIED OR EXPRESS WARRANTIES OF ANY KIND, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. UNDER NO CIRCUMSTANCES SHALL MATHERS BE LIABLE FOR ANY CONSEQUENTIAL DAMAGES SUSTAINED IN CONNECTION WITH THE PRODUCT OR ITS USE, INCLUDING ANY COSTS OR DAMAGES WHICH RESULT FROM LOSS OF USE OF THE PRODUCT OR ANY ENGINE OR BOAT WITH WHICH IT IS USED. MATHERS DOES NOT AUTHORIZE ANY REPRESENTATIVE OR AGENT TO ASSUME FOR IT ANY OBLIGATION OR LIABILITY OTHER THAN THOSE EXPRESSLY SET FORTH ABOVE. Some states do not allow limitations on how long an implied warranty lasts or the exclusion or limitation of incidental or consequential damages, so the above limitation may not apply to you. All implied warranties, if any, are limited to the duration of this express warranty. This warranty gives you legal rights, and you may have other rights which may vary from State to State.***



**MICROCOMMANDER  
WARRANTY REGISTRATION**

Actuator, Serial # \_\_\_\_\_ Serial # \_\_\_\_\_

Number of Control Stations \_\_\_\_\_

Purchase Date \_\_\_\_\_

Dealer's Name \_\_\_\_\_

Installer's Name \_\_\_\_\_

Phone Number ( ) \_\_\_\_\_

Purchaser's Name \_\_\_\_\_

Street Address \_\_\_\_\_

City, State, Zip \_\_\_\_\_

Phone Number ( ) \_\_\_\_\_

**YOUR VESSEL:**

Engine, Make & Model \_\_\_\_\_

Length \_\_\_\_\_

Manufacturer \_\_\_\_\_

Mathers Controls Inc. Product First Seen At:

- Boat Show     Dealer     Magazine     Friend



Mathers Controls Inc.  
675 Pease Road  
Burlington, WA 98233-3101

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**UNIVERSAL MOUNTING KIT ..... 3**



**REFERENCES**

- 1) American Boat & Yacht Council (ABYC)  
Box 806  
Amityville, NY 11701  
E-1 Bonding of Direct Current Systems  
E-3 Wiring Identification on Boats  
E-9 DC Electrical Systems on Boats  
H-2.4e or 32.4g  
Ambient Temp. 50 degrees C
- 2) Code of Federal Regulations  
33 CFR 183 Subpart I - Electrical Systems  
183, 410 Ignition protection  
183, 415 Grounding  
183, 425 Conductors: General  
183, 430 Conductors in circuit of less than 50 Volts  
183, 445 Conductors: Protection  
183, 455 Overcurrent & Protection: General  
46 CFR 111.01 - 15(b) Ambient Temp.  
Machinery Spaces 50 degrees C  
111.05 - System Grounds
- 3) Society of Automotive Engineers  
400 Commonwealth Drive  
Warrendale, PA 15096  
J917 Marine Push-Pull Cables  
J1171 External Ignition Protection  
J1428 Marine Circuit Breakers  
J378 Marine Engine Wiring
- 4) National Marine Manufacturers Association  
401 North Michigan Avenue  
Chicago, IL 60611
- 5) Underwriters Laboratories

**PARTS SOURCE**

Anti-Static Wrist Strap - Thomas & Betts (P/N AWCC)	Part Number 517
Circuit Breaker - E-T-A Manufacturer (P/N41-2-514-LN2-10) UL Approved	Part Number 810
Fuse - Bussman (P/N GDC-1A)	Part Number 1030
Wago Tool - Wago (P/N 236-332)	Part Number 397
Relay 12 VDC - Potter-Brumfield (P/N KRPA5D6-12)	Part Number 1114
Relay 24 VDC - Potter-Brumfield (P/N KRPA5D6-24)	Part Number 1122

**MORSE CLUTCH AND THROTTLE KIT SELECTION**

**PRE-ENGINEERED THROTTLE CONNECTION KITS**

MAKE	ENGINE MODEL	KIT NO.
Caterpillar	3208NA	300172
	3208TA	305403
	334, 3304, 3306	36680
	3406 & 343	36680
	3408	36680
Cummins	A11 w/MVSGOV AFC Fuel Pump	36680
	V504M, V555M, V903M, VT903M, VTA903M, NT855M, VT1710M, VTA1710M, KT & KTA 1150M, KT & KTA 2300M, 1975 and later	300580
General Motors	3, 4, & 6-71 w/var.sp.gov.	41736
	6, 8, 12 V-71 & 6, 8 V-92 w/var.sp.gov.	41736
	6-71 inclined	36680
	2, 3, 4-53 w/left hand gov.	36680
	Right hand gov.	36680
	6V-53 Rear entry	36680
	6V-53 Front entry	36680
	6, 8V-71 Front entry 12, 16V-149	36680
Perkins	4, 236M	48931
	6, 3544M; T6, 3544M; ST6, 3544M; SST6, 3544M	302026
	4, 108 W/shut off	303878

**PRE-ENGINEERED CLUTCH CONNECTION KITS**

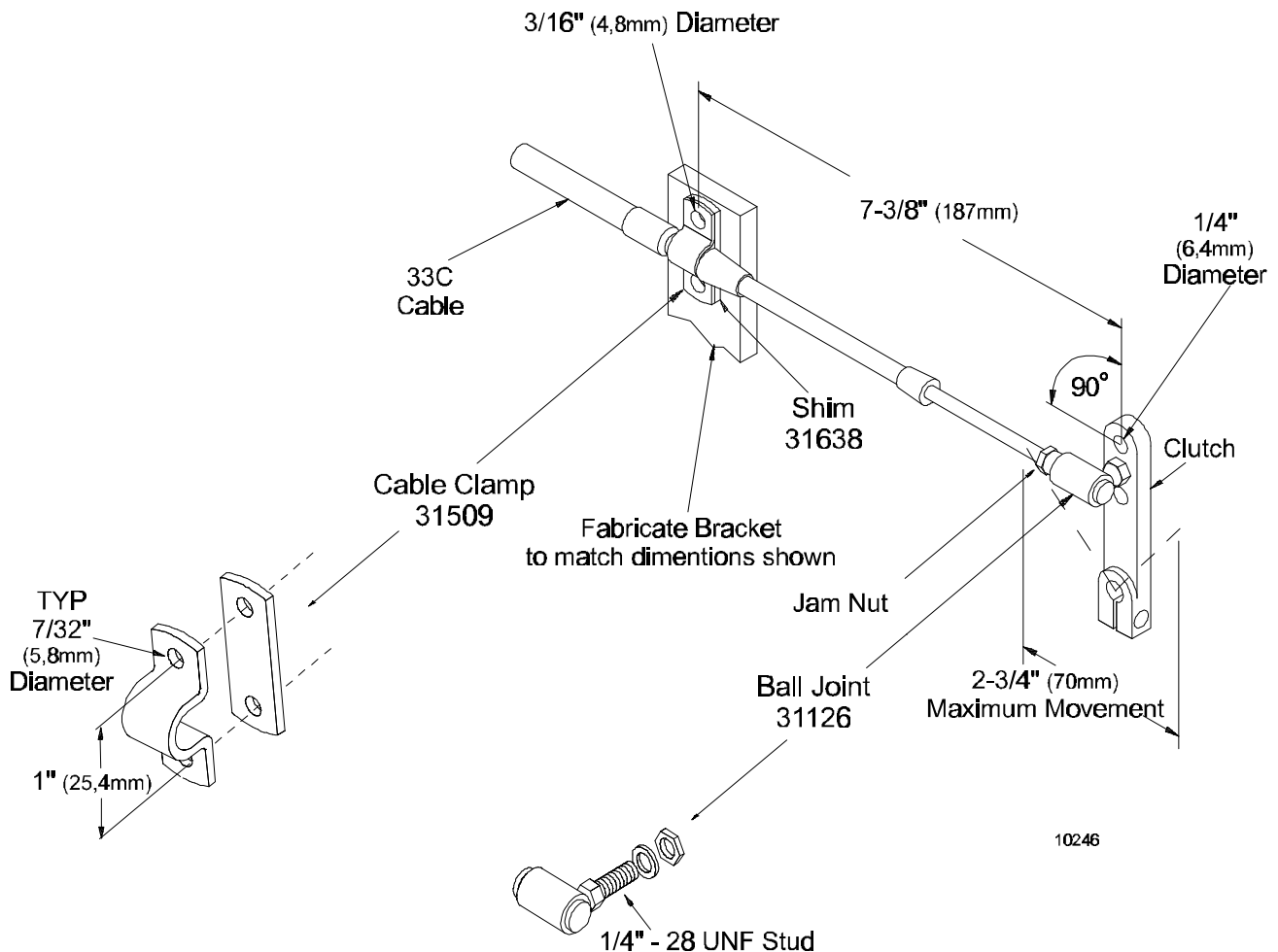
MAKE	TRANSMISSION MODEL	KIT NO.
Allison	M & MH	41482
Borg Worner	70, 71, 72 In line w/red gear rear entry	301474
Capital	12400	36680
	2, 3, & 4 HD & HE	36680
MerCruiser	Inboard w/o Warner red gear	62355
Paragon	HF-7	36680
Twin Disc	MG508, 509, 510, 510A, 512, 514C, 514CHP, 518, 521, 527, 530, 540	42577
	MG502, 506, 507, W/x9994, xA7022, A7048 Valves	63696
Twin Disc Trolling Valve	MG509, 510A, 511A, 514C	307171



**OUTBOARD AND I/O CABLE CONNECTION KITS**

ENGINE MAKE	KIT NO.
Chrysler 1975 & later	300465
Evinrude/Johnson 55-235 H.P. 1978 to date	301729
Mercury 40-300 H.P.	301901
Mercruiser I/O	302123
OMC Sterndrive I/O	300557
Volvo I/O	Engine and out drive brackets are provided by Volvo

**UNIVERSAL MOUNTING KIT**



**Engine Push-Pull Cable Connections**



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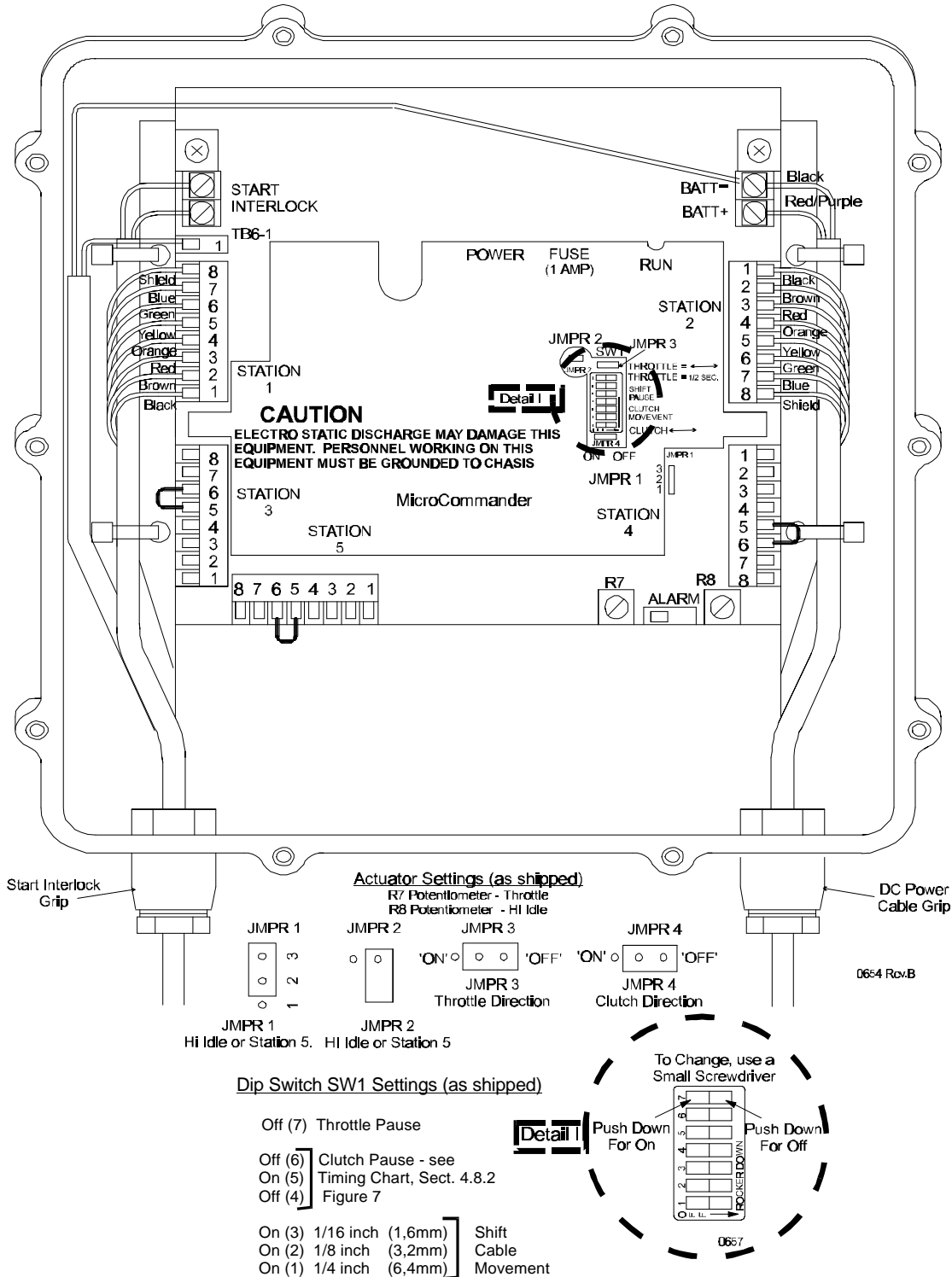
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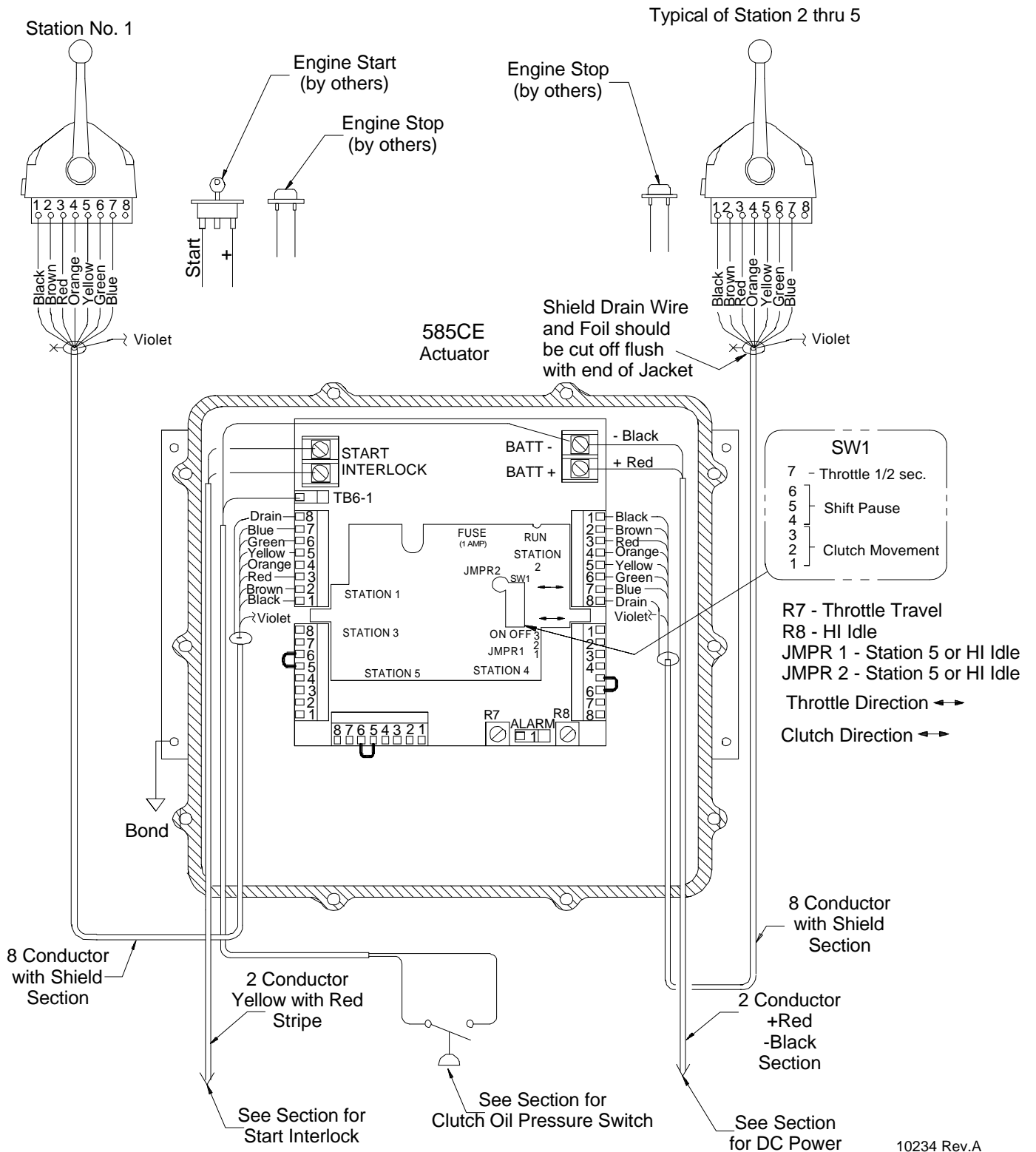


TYPICAL ACTUATOR CONNECTIONS





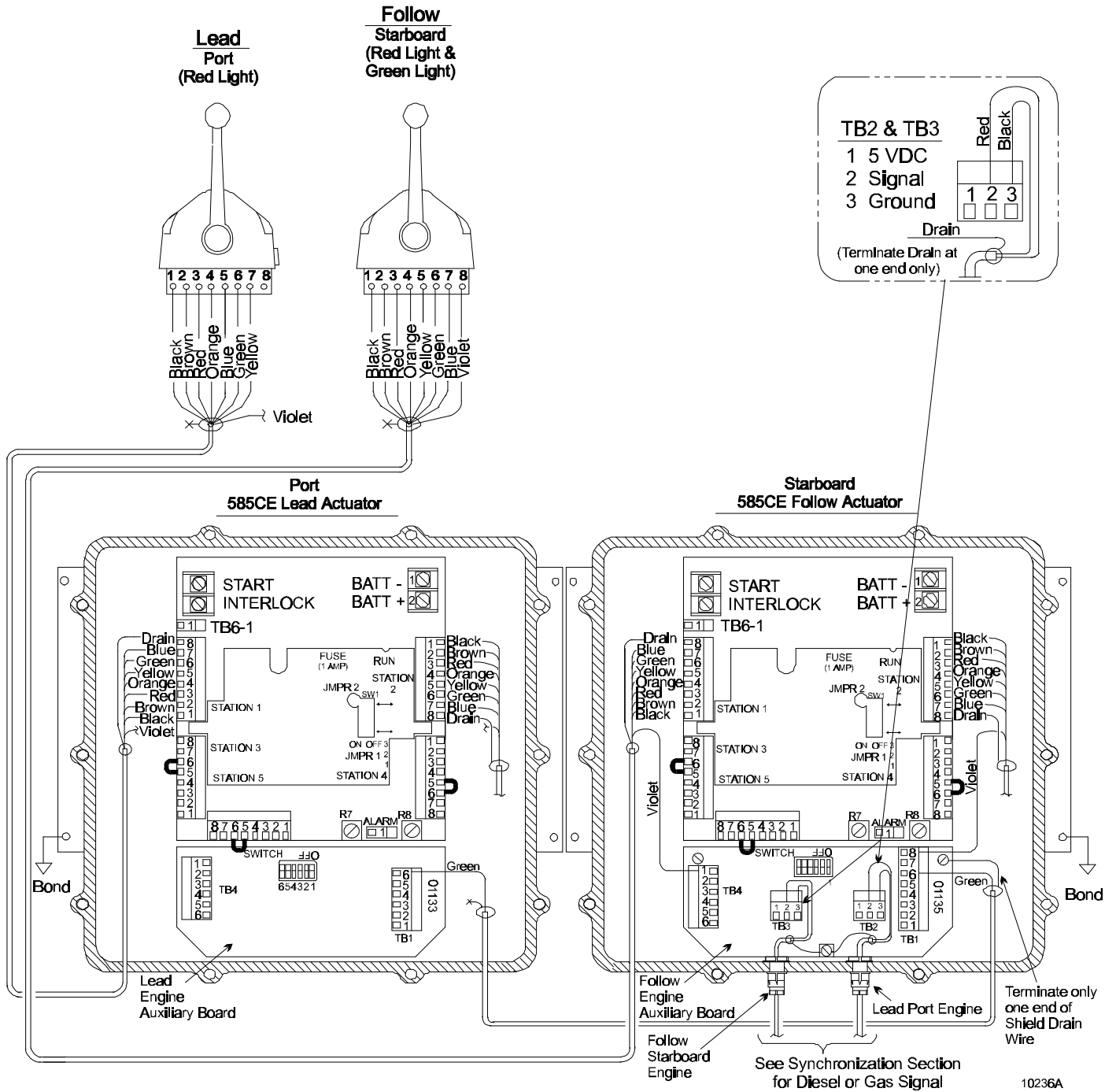
**SINGLE ENGINE**





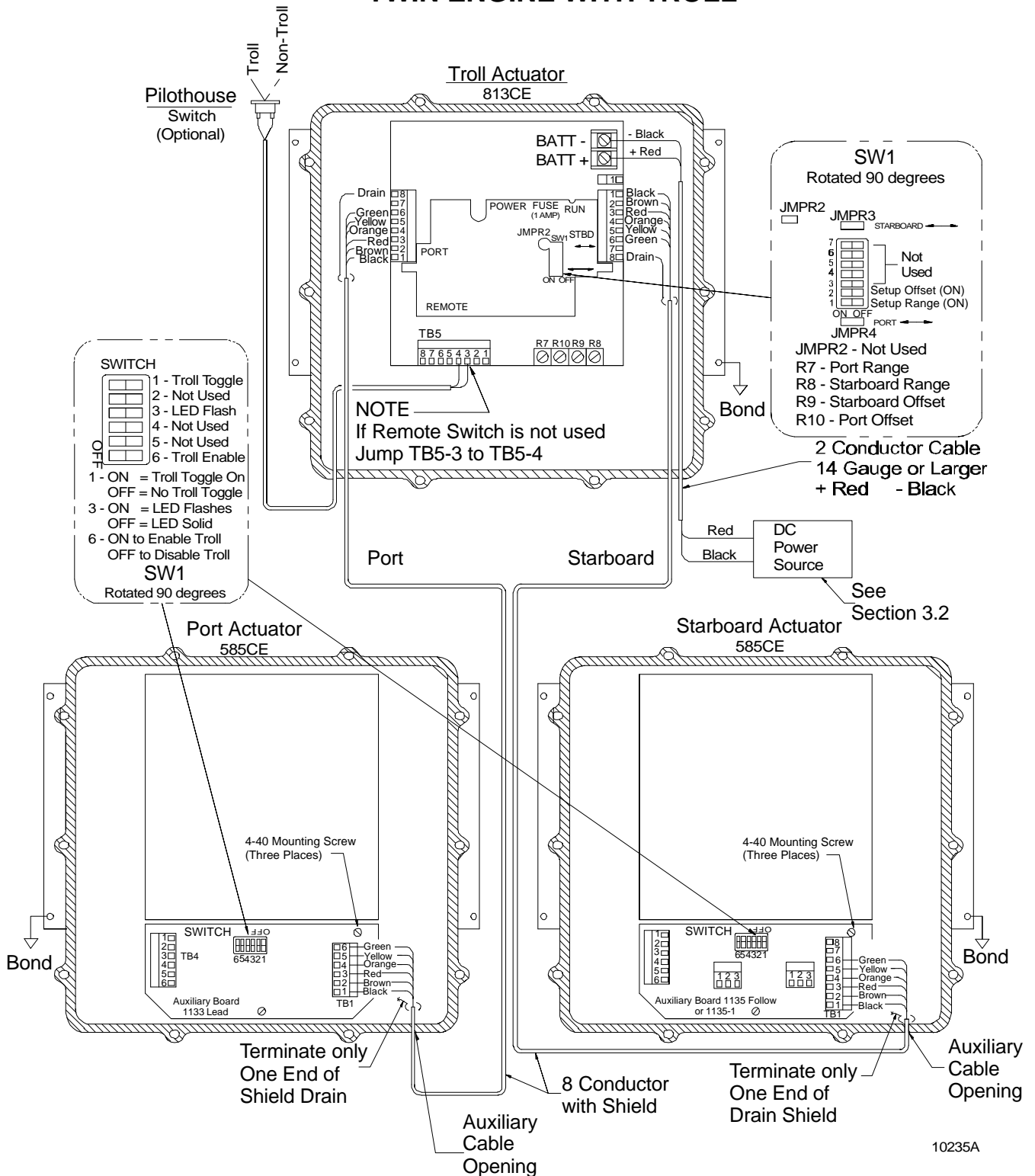


TWO ENGINES WITH SYNCHRONIZATION





TWIN ENGINE WITH TROLL



**SWITCH**

1 - Troll Toggle  
2 - Not Used  
3 - LED Flash  
4 - Not Used  
5 - Not Used  
6 - Troll Enable

OFF

1 - ON = Troll Toggle On  
OFF = No Troll Toggle  
3 - ON = LED Flashes  
OFF = LED Solid  
6 - ON to Enable Troll  
OFF to Disable Troll

**SW1**  
Rotated 90 degrees

**NOTE**  
If Remote Switch is not used  
Jump TB5-3 to TB5-4







*American Bureau of Shipping (ABS)  
Certificate number 93-S20958-X*



**DNV**

*Det Norske Veritas (DNV),  
Certificate number A-6342.*



*Registro Italiano Navale (RINA),  
Certificate number ELE / 53796 / 1.*



*Bureau Veritas (BV),  
Certificate number 4451-6723-A0 0 1.*



*CE Mark*



*Germanischer Lloyd (GL)*

*Approval is pending on ISO-9001*

**Mathers Controls Inc.**  
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**MM12793**