EEC3
Electronic Engine Controls
by Glendinning

Installation & Operation Manual v1.0

Glendinning Marine Products, Inc.
740 Century Circle
Conway, SC 29526
(843) 399-6146
Fax: (843) 399-5005
www.glendinningprods.com

Chapters at a Glance

A word about the Symbols used in the Manual

When driving from one destination to another, road signs prove to be invaluable. Road signs are an important source of information. For example, road signs can warn you about potential problems ahead to help divert certain disaster or they can let you know where to turn off for a rest or a meal.

In an effort to help you navigate your way through this manual we will from time to time use the following symbols:

Throughout the manual the NOTES symbol will appear in the margin to support what has been mentioned in the text. A note can be used where further explanation is needed or where something needs highlighting. BE CAREFUL to read all NOTES.

Sometimes it is helpful to take a break and really absorb what you just read. The WARNING symbol will alert the reader to information that needs to be completely understood before you continue on in the reading of the manual. ALWAYS STOP and READ these points.

The TIP symbol will be used when something mentioned in the text need more “light” shed on it. The tip could explain or be a list of do’s and don’ts. Whatever the TIP is, you do not want to miss out on the information it contains.

1.0 System Description & Capabilities

The features at left are available with our 4-button FULL feature keypad control head only!

With the advent of electronically controlled engines in the marine industry, *GLENDINNING* has developed the EEC3 to be compatible with all types of electronically governed engines and will provide the boat operator with total control over the boat's propulsion system. The EEC3 incorporates the following features:

- *Single or dual lever control* — What's your preference? Single lever control, where a single control handle controls both throttle and gear, provides the maximum convenience, but some boat operators prefer dual lever control. We offer you both options!
- *Adjustable control head detent / friction settings* — This feature allows for the setting of the control head detent and /or friction quickly and easily while underway, without disassembling the control head!
- *"Posi-lock" gear lockout* — A dedicated button (WARM) is provided to lockout the gear and allows engine RPM to be increased safely.
- *High idle mode* — Up to 7 idle speeds are available and can be adjusted through system calibration.
- *Bump mode* — Want to make minute adjustments in engine speed (approx. 10-15 RPM)? Simply press the WARM or TROLL buttons!
- *Slow mode* — Limits maximum RPM available to approximately 50% of normal WOT. Very useful for manuevering or slow speed cruising (SLOW).
- *Battery voltage warning indicator* — Our system alerts you when either too low or too high voltage exists. The control system will continue to operate.
- *System diagnostic warning indicator* — The EEC3 monitors many parameters and notifies you when conditions fall outside suitable operating range.
- *Gear position indicating lights* — You know that the transmission has shifted into the appropriate gear with this visual gear position indicator.
- *Audible neutral indicator* — Audible alert sounds when transmission has been shifted into neutral.
- *Control head light dimmer* — Bright lights are great for daylight conditions, but can be distracting at night. This feature allows you to dim the control head lights for each station individually.
- *Two button station transfer* — No more accidental transfer of control from one station to another. Our system's TAKE button must be depressed twice in order to transfer control from one station to another.

1.1 System Components

The EEC3 system consists of 4 separate components. They are:

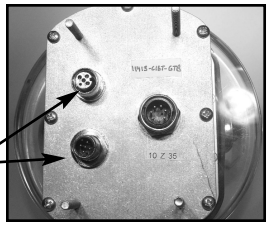
Control Head

The EEC3 control head was designed with a more contemporary, stylish look that is sure to accentuate any console—but good looks isn't all that it has going for it.

The EEC3 control head is by far the most informative control head in the industry today. The control head keypad has inte-

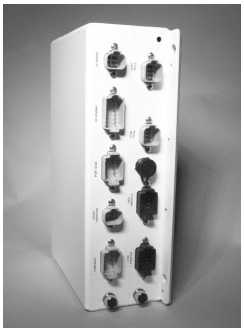
EEC3 KEYPAD
(Close-up)

BOTTOM VIEW OF
CONTROL HEAD
CANBUS CONNECTION
POINTS



grated switches and indicator lights which allow the boat operator to control all aspects of the boat's propulsion system.

Robust, watertight construction is a hallmark at Glendinning — we build our control heads to withstand the extreme conditions that exist in the marine environment.



Control Processor

The control processor is the hub of the EEC3 control system and could be considered it's "brain" (central processing unit). The primary function of the control processor is to receive commands from the control head station that is "active" and position the gear and throttle to the commanded position.

The control processor is completely sealed by a watertight cover to protect the electronics from moisture which could cause system failure.

Plug and play installation means you don't have to spend valuable time trying to figure out how to connect the engine and control heads to the control processor—just plug 'n play!

The Glendinning EEC3 allows the boat owner the ability to connect up to six (6) different control stations to one (1) control processor.

Station Cables

Glendinning's station cables are pre-terminated at the factory for ease of installation, and are completely shielded to eliminate problems caused by electromagnetic interference, complying with the latest and strictest standards in the industry. Both ends of the station cable has a connector which is identical on either end—no mistakes when it comes to plugging in the cable!

Engine / Gear Harnesses

The engine and gear harnesses relay information from the control processor to the engine and gear controls. Connecting your gear and engine to the EEC3 Control Processor has never been easier. Each engine harness and/or gear harness is clearly labelled and simply plugs into the appropriately labelled port on the control processor.

2.0 Operating the EEC3

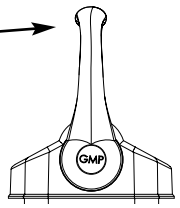
Operating the EEC3 system is just as easy as the installation process. The EEC3 Control Head will constantly monitor various parameters and will alert the boat operator if the system falls outside the normal operating range.

Familiarize yourself with the following functions BEFORE operation of the EEC3.

The functions necessary for operating the EEC3 are:

- System Startup Procedure
- Cruise Mode
- Warm Up Mode
- Slow Mode
- Automatic Synchronization Mode
- Troll Mode
- Station Transfer Process
- Warning Mode
- Alarm Mode

Position control handle to Neutral before starting EEC system



2.1 System Startup

The procedure for starting up the EEC3 system is as follows:

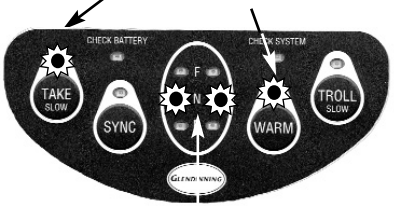
1. Control Handles must be in the NEUTRAL position prior to starting the system.

2. Turn ON the EEC3 enable switch. The system will perform a brief diagnostic test (approx. 1 second), checking various system parameters (indicated by the TAKE light fully illuminated). Control handles should remain in **NEUTRAL** until system is operational.

3. The EEC3 system is operational when the TAKE light and WARM lights are fully illuminated (not blinking). The system is automatically placed in WARM Mode at startup (This feature can be turned OFF if desired, see sec 4.0).

TAKE light ON at startup during diagnostic test

TAKE & WARM lights fully illuminated



(Gear Position Indicators)

If the TAKE light flashes slowly, accompanied by a slow beep, the control handles are not in NEUTRAL. Leave control system enable switch ON and move one control handle at a time to verify that handles are in the neutral position. When both handles are in NEUTRAL, system will automatically complete startup procedure (TAKE light fully ON).

If all four (4) lights on the keypad blink in unison, the EEC system is in Alarm Mode. Restart the system by turning OFF the EEC enable switch and then turning back ON.

2.2 Cruise Mode

Cruise Mode is the normal operating mode for the EEC3. Other functions may be accessed while in Cruise Mode (see below):

The Control Head may respond in one of three ways during Cruise Mode:

1. **ACTIVE STATION** — During normal operation only the active station will be in command. TAKE light will be fully illuminated (not blinking) indicating that the station is “active” and in command of boat’s propulsion system.

2. **INACTIVE STATION** — During normal operation all other stations are “inactive”. The TAKE light and Gear positioning lights on each inactive station will blink every 2 seconds indicating that the control head is an inactive station. The Check Battery/Check System lights will operate.

3. **ALARM MODE** — During normal operation, the EEC system continuously monitors parameters

and will alert operator of alarm conditions when they exist. Alarm Mode is indicated by all four (4) keypad lights blinking in unison, if this happens.

*TAKE light on at **active** station*

***ACTIVE** STATION*

*TAKE light & gear indicator lights blink at **inactive** station*

***INACTIVE** STATION*

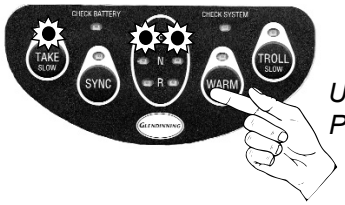
All 4 lights blinking in unison

ALARM CONDITION

Other Functions available from Cruise Mode are:

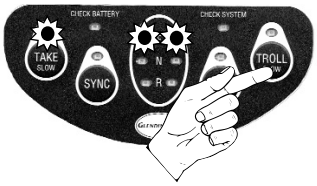
1. **THROTTLE "BUMP" MODE** — During normal operation, small changes in engine speed (approximately 10-15 RPM) may be made by pressing and releasing the WARM (increase speed) or TROLL (decrease speed) buttons.

Engine speed can only be "bumped" when control handles are in gear and above idle speed. Amount of speed change per bump can be adjusted during system calibration



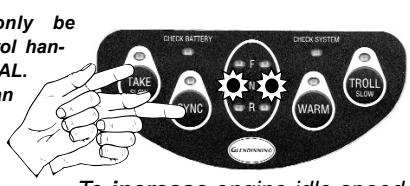
To Increase Engine Speed Using Bump Mode, Press and Release WARM button

To Decrease Engine Speed Using Bump Mode, Press and Release TROLL button

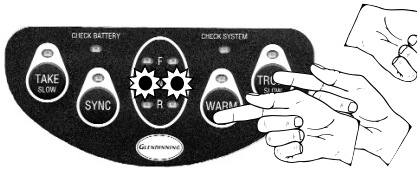


2. **HIGH IDLE MODE** — During normal operation, the boat operator is able to change the engine idle speed up to 7 different idle speed settings.

Idle speed can only be changed while control handles are in NEUTRAL. Idle speed change can be adjusted during system calibration.



*To **increase** engine idle speed, press TAKE & SYNC simultaneously*



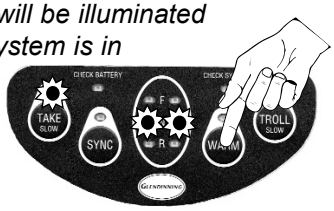
*To **decrease** engine idle speed, press WARM & TROLL simultaneously*

*To **reset** engine idle speed to lowest idle setting, press TAKE and release*

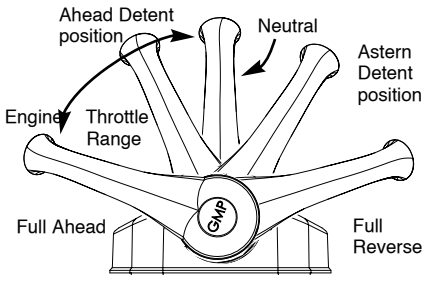
It is STRONGLY RECOMMENDED that the EEC3 system be in Warm Up Mode AT ALL TIMES while boat is at the dock! This safety procedure will prevent the accidental engagement of transmission if the control head handles are inadvertently moved.

2.3 Warm Up Mode

WARM light will be illuminated when EEC system is in Warm Mode



Warm up Mode allows the boat operator to operate the engine throttle by itself, while locking the transmission in NEUTRAL. It is **STRONGLY RECOMMENDED** that the EEC3 system be in Warm Up Mode **AT ALL TIMES** while boat is at the dock! This safety procedure will prevent the accidental engagement of transmission if the control head handles are inadvertently moved.

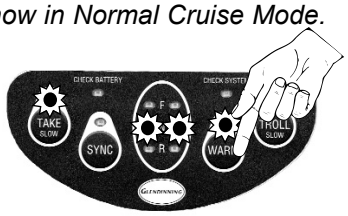


To utilize the Warm Up feature:

1. To engage, press and release the WARM button one time (control handles must be in NEUTRAL position to

engage Warm Up Mode).

WARM light will go out when Warm Mode is turned off—EEC system is now in Normal Cruise Mode.



2. Advance the control lever into and beyond the Ahead detent position. The engine gear will remain in NEUTRAL while engine speed is increased.

3. To disengage, bring handles back to NEUTRAL and press and release the WARM button one time.

2.4 Slow Mode

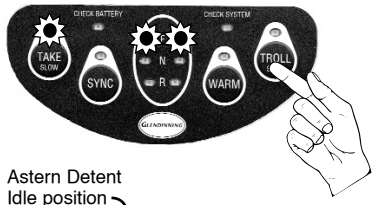
The Slow Mode limits the maximum RPM available to approximately 50% of normal WOT. This feature is very useful for manuevering or slow speed cruising.

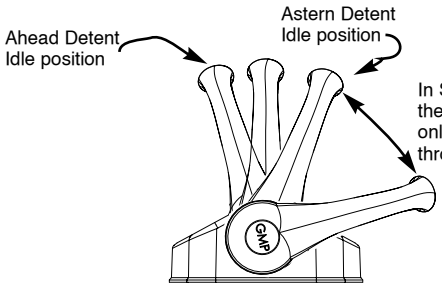
The Slow Mode is activated by:

1. To engage, press and release TAKE and TROLL buttons in unison, one time. Control handles must be in NEUTRAL position or Ahead/Astern detents to engage Slow Mode.

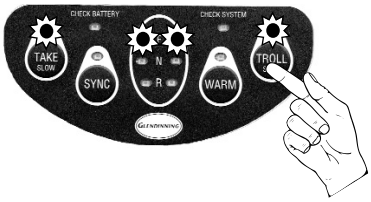
2. To disengage, press and release TAKE and TROLL buttons in unison, one time. Control handles must be in NEUTRAL position or Ahead/Astern detents to disengage Slow Mode.

TAKE and TROLL / SLOW light will blink when EEC system is in SLOW Mode





SLOW light will go out when SLOW mode is turned OFF—EEC system is now in Normal Cruising Mode



A different keypad is used on boats that are not equipped with trolling valves. In this case, Slow Mode is engaged by pressing the SLOW button one time. The SLOW light will be illuminated while the EEC3 system is in this mode.

2.5 Automatic Synchronization Mode

The Automatic Synchronization Mode allows the EEC system to automatically control one engine speed to exactly match speed of the other engine. Think of it as cruise control for your boat. Once underway, follow the instructions below to activate this feature and control both engines' speed with one handle.

To activate the Automatic Synchronization Mode:

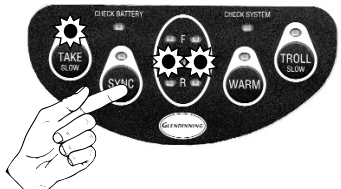
Before the SYNC function can engage, both engines must be in the Ahead gear and handles must be approximately matched — within 10% of total travel.

1. Press and release the SYNC button one time.

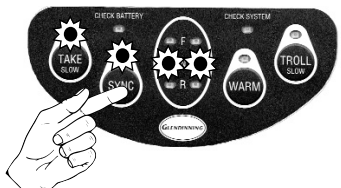
2. When SYNC function is energized, EEC system will automatically control one engine speed to match the speed of the other engine. If engine speed is changed manually by the boat operator, engine speed will automatically be changed to match (NOTE: Slave / Lead engine can be designated during system calibration).

3. To disengage, bring slave handle to match position of lead engine control handle and press and release SYNC button one time. *It is extremely important that the slave handle is brought back*

SYNC light will be illuminated when EEC system is in SYNC mode



SYNC light will go out when SYNC mode is turned OFF—EEC system is now in Normal Cruising mode



1. Synchronization mode will be automatically disengaged if both control handles are moved to NEUTRAL position together.

2. If lead handle is moved to NEUTRAL gear position by itself, synchronization mode will be automatically de-energized. Slave engine operation will continue to match lead engine operation (gear and throttle) until slave control handle is matched to lead control handle position.

Docking while using trolling valves is NOT recommended by most transmission manufacturers. Check with your local transmission dealer if your transmission is suitable for this.

1. BUMP Mode (sec 2.2) is available while troll valve is in operation to make small changes in troll valve modulation.

2. Engine idle speed may be adjusted during troll valve operation (see Cruise Mode sec. 2.2 for more information).

to a position relative to the lead handle prior to disengaging.

2.6 Troll Mode

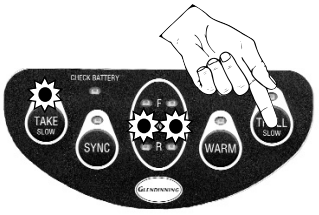
The Troll Mode is available only if the boat has been equipped with trolling valves and allows the boat operator to control the position of the transmission trolling valves.

To activate Troll Mode:

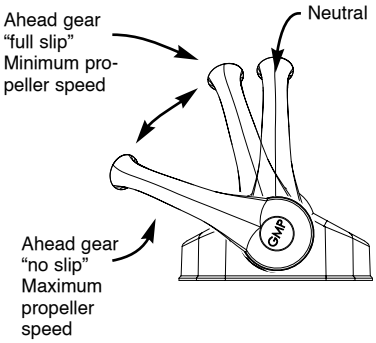
1. With control handles in NEUTRAL, press and release TROLL button one time (control handles must be in NEUTRAL to engage Troll Mode).

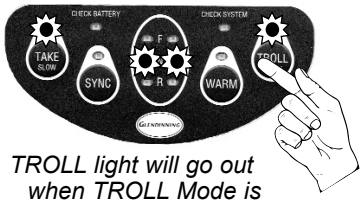
2. Control troll valve position by movement of control handle. Engine throttle speed is maintained at idle while system is in Troll Mode.

3. To disengage, move control handles back to NEUTRAL and press and release TROLL button one time.



TROLL light will be illuminated when EEC system is in TROLL Mode





TROLL light will go out when TROLL Mode is turned OFF—EEC System is now in Normal Cruising Mode

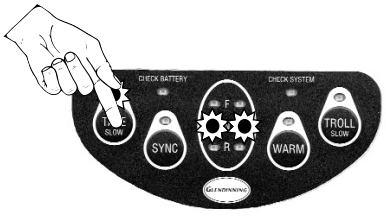
2.7 Station Transfer Process

The Glendinning EEC3 allows the propulsion system control to be transferred from one control station to another control station. This process requires the operator to depress the TAKE button twice in order for the transfer to take effect thus avoiding any inadvertent transfers from taking place without the boat operator's knowledge.

To transfer control follow these steps:

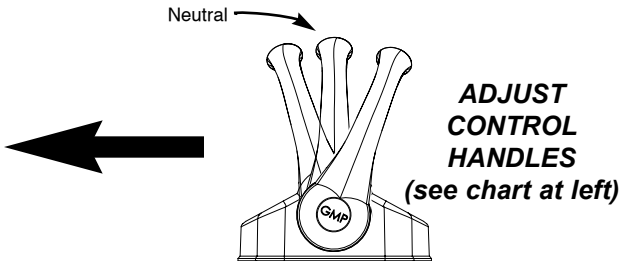
1. Press and release TAKE button one time, at the helm station where you want to take control (TAKE light will begin to blink and control head beeper will begin to sound).

2. At the station where you want to take control, move the control handles to an appropriate throttle position.



INACTIVE STATION
Press TAKE button 1 time to begin process

Active Station Handle Position	Station Taking Control Handle Position
In Neutral	In Neutral
In gear, at Idle	In Neutral, or same gear position at Idle
In gear, above Idle	In Neutral, or same gear position at same or lower speed setting



ADJUST CONTROL HANDLES (see chart at left)

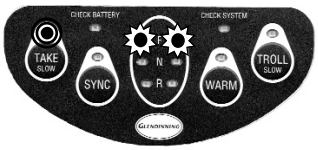
3. Press and release TAKE button a second time. The new control station is now the active station and has control of the engine and transmission.

INACTIVE STATION
Press TAKE button a 2nd time while TAKE light is quick flashing to complete station transfer

1) Prior to pressing button, light blinks 1 time every 2 seconds (Inactive station heartbeat).

Light flashes 1 time every 2 seconds.

2) After pressing button 1 time, TAKE light will blink—blink rate will depend on control handle setting at station taking control.



Slow blink—handles **not** in appropriate position.
Quick blink—handles in appropriate position.

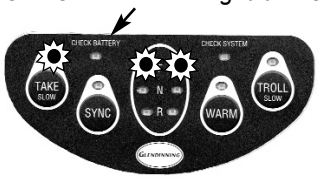
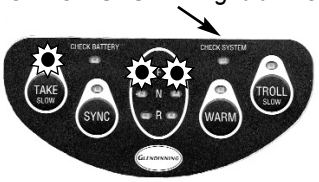
3) Control transfer is complete after pressing TAKE button second time, while TAKE light is quick flashing.

Solid TAKE light indicates transfer is complete. New station is now in control.

See the illustrations at the left for the light sequence at the station taking control.

2.8 Warning Mode

During operation of the EEC3, the system will warn the operator when a problem is detected. System will continue to operate in unaffected functions.

CHECK BATTERY light blinks  **CHECK BATTERY INDICATOR** will blink when battery voltage conditions exist that are questionable.	**SYMPTOM** **1)** *SLOW BLINK*—One battery is either too high or too low. **2)** *QUICK BLINK*—Both batteries are either too high or too low.	**ACTION** **1)** Determine cause of input power problem. **2)** System will continue to operate normally, unless battery exceeds system parameters. If this occurs system will be switched into Alarm Mode (see page 10).
CHECK SYSTEM light blinks  **CHECK SYSTEM INDICATOR** will blink when a possible problem has been detected within the system.	**SYMPTOM** **1)** Diagnostics tests have detected that part of the control system is not functioning normally.	**ACTION** **1)** Restart control system (turn OFF/ON). Move handles to Neutral during system startup. **2)** Determine part of system not operating properly (ie. gear, throttle, troll, etc.). **3)** Utilize alarm code recovery procedure to discover source of problem (see Operations Guide).

2.9 Alarm Mode

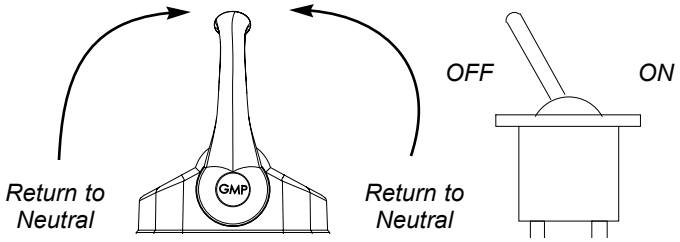
During operation, the EEC3 continuously monitors system functions and will alert operator if a system problem has been detected. When Alarm Mode is activated, control system will not continue to operate. In absence of control
signal from EEC, transmission will normally go to NEUTRAL and engine throttle will normally go to IDLE.

(See illustration on following page!)

All 4 lights blink in unison

ALARM IS INDICATED when all 4 lights are blinking in unison on the control keypad.

Return the main station control handles to NEUTRAL and turn EEC power switch OFF. Restart the EEC system.



3.0 Installing the EEC3

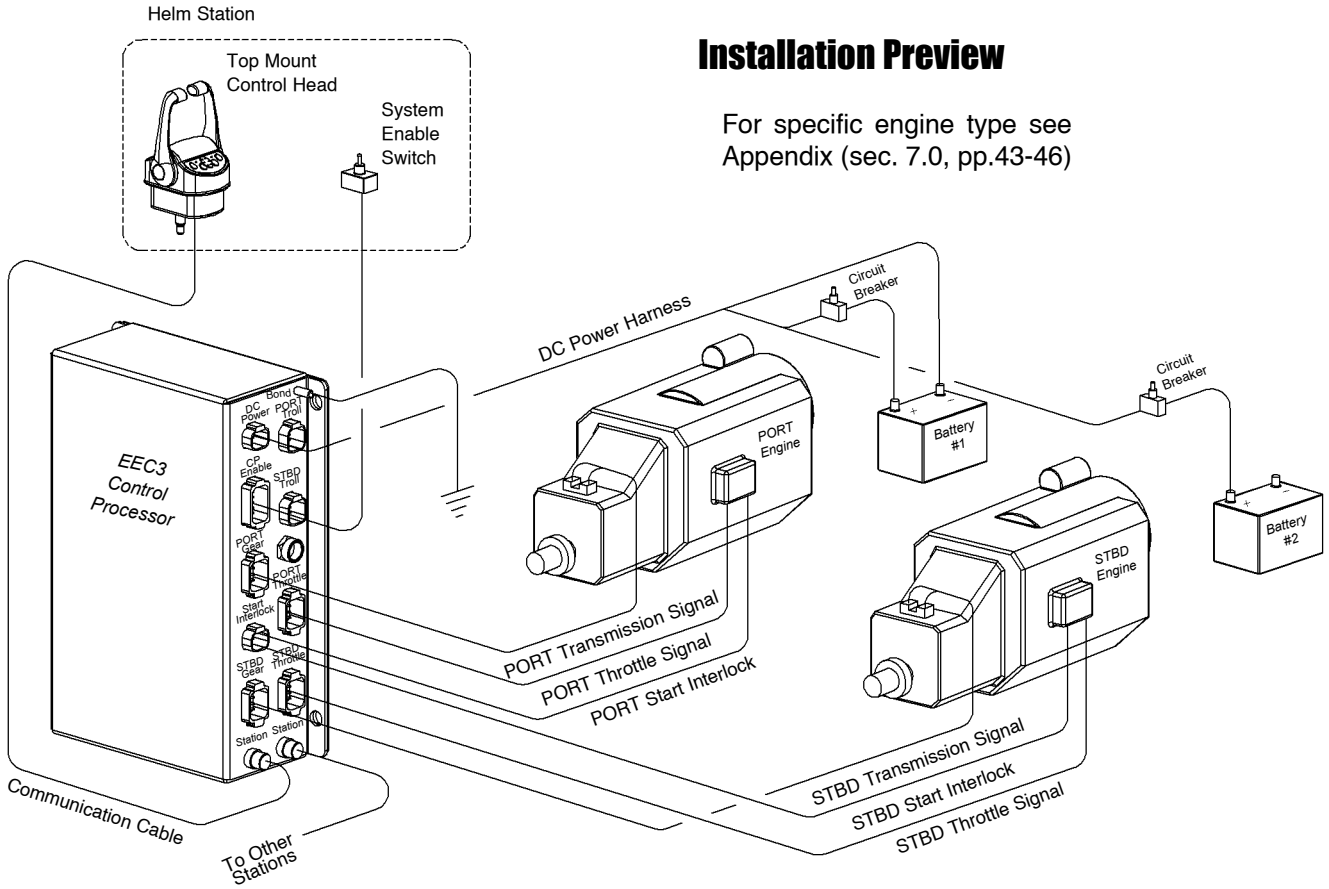
Installing the EEC3 is simple and easy. It is always important that proper care be given when installing any equipment on board your vessel. It is always a wise practice before cutting into the ship's interior to follow the old adage "measure twice, cut (or drill) once!"

The installation process includes the following five steps:

STEP 1: Mount the Control Processor
STEP 2: Control Head(s) Installation
STEP 3: Station Communication Cable Routing
STEP 4: Engine Compartment Wiring
STEP 5: Operational Test

Installation Preview

For specific engine type see Appendix (sec. 7.0, pp.43-46)



Pre-installation Planning

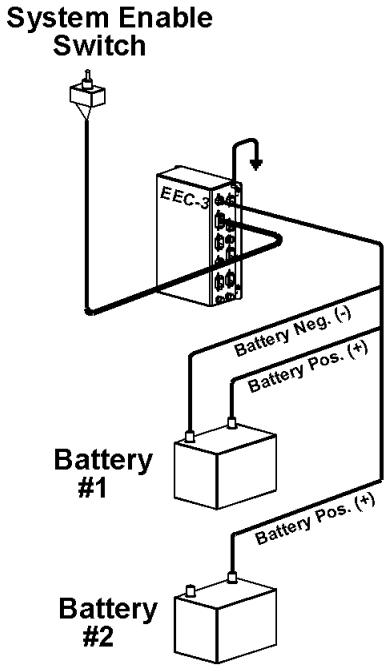
Before beginning the installation of the Glendinning EEC3 System, proper consideration and pre-planning should be given to several very important parts of the EEC3 system. Proper planning of the installation will help to insure that the EEC3 system will operate correctly and within specification. Failing to properly plan out the installation may decrease the reliability of the EEC3 system. The following are the most important things to consider in planning the EEC3 system. Close attention should be given to these issues:

• Control Processor Location

Environmental conditions—The Control Processor should be mounted in an area that is relatively dry and cool. Although the electronic components are reasonably well-sealed from moisture, the product enclosure is not designed for constant, direct contact with water. Since the longevity of electronic components is reduced in high temperature environments it is best to find an area of the engine compartment that is not exposed to temperature extremes. The Control Processor has been designed for installation in the engine compartment, and should be mounted where there is some air movement or ventilation.

Accessibility—During system calibration or troubleshooting, it will be necessary for the installer or repair technician to have access to the connection points of the Control Processor. In view of this, the Control Processor should be mounted in a relatively accessible area.

• Power Supply / Enable Switch



In the installation of any electronic device, the source of power is one of the most important factors to consider during the installation. The EEC3 has a unique and very reliable power supply system which, if the system is properly installed, greatly improves the overall reliability of the engine control system.

Dual Battery Input—The EEC3 Control Processor provides for the connection of two independent sources of DC power. During normal operation, the Control Processor will draw power from both power sources. In a typical boat, the DC power distribution system is designed to take power from a single battery source and then distribute it to the various equipment that require power. Although the Control Processor can be powered off the DC distribution panel, this is NOT RECOMMENDED because it is not able to provide for the supply of power from 2 independent sources to any single device. In other boats, several batteries are arranged in parallel. Obviously, these batteries are not independent—that is, the voltage observed at one battery terminal will be the same at the other battery terminal. It is important that each battery source be completely independent of the other.

Power Source to EEC3 Must be Uninterrupted—It cannot be overemphasized that providing a secure, uninterrupted source of power to the EEC3 is vitally important to the reliable operation of the control system. For this reason, it is best that the EEC3 power be drawn as close as possible to the battery positive terminal, without having various components which may interrupt the flow of current to the control system.

Circuit Protection / Enable Switch—Per the ABYC guidelines, some type of current protection—circuit breaker or fuse—must be installed within 7 inches (17cm) of the connection to the source of power. It is very important to understand that circuit protection is installed for the protection of the wire, not the EEC3. The EEC3 system has its own internal current protection and does not need any external fuse. However, the wire which connects the EEC3 to the boat power must be protected in case of chafing or other damage. In order to not limit power to the EEC sytem during normal operation, a minimum 15 amp fuse or circuit breaker must be installed (if a 30 amp fuse or circuit breaker are used, then it is necessary that 10 AWG wire, or larger, is used to connect the EEC3 system to its power source). Since the fuse or circuit breaker is physically located in the engine compartment, it would be extremely inconvenient to require the boat operator to have to go to the engine compartment to start-up the EEC3 system each time the boat operator wishes to use the

boat. For this reason, Glendinning has allowed for the installation of an enable switch which allows the boat operator to remotely turn ON or OFF the EEC3 system from the helm station. When the enable switch is used, the EEC3 circuit protection is typically left in the ON position. The enable switch only requires a small (2 conductor, 18 gauge) wire to be run from the engine compartment to the helm station. DO NOT APPLY POWER TO THE ENABLE SWITCH—The purpose of the enable switch is only to open or close the circuit which allows power to be applied to the control system.

Battery Ground—The dual battery system requires that the battery positive terminals be at roughly the same voltage. In order for the battery positive terminals to be at the same voltage, it is necessary that the negative terminals of the battereies be connected at some common point. This is normal marine electrical practice and is specified in the ABYC guidelines. Prior to the final electrical hookup of the EEC system, the installer should verify that the battery ground terminals are connected at some common point.

• Cable Routing

Station Communication Cable Routing—When routing Station Cables it is adviseable to inspect the route and make sure surfaces are free of any sharp edges or burrs which could nick the cable and compromise the reliability of the system.
Connectors are pre-terminated at the factory and should NEVER be forced into their proper recepticle. Make sure that the connector is properly aligned prior to insertion into the recepticle. If the connector is properly aligned, only a small amount of force will be necessary to insert the connector into the Control Processor or Control Head. Failure to properly align connector may damage the pins and cause the system to fail.
Connectors are one of the most important parts of the EEC3 system. Keep connectors covered and clean during installation. Most problems occur due to bad connections.
The EEC3 System utilizes CANbus technology to communicate between the Control Processor and the Control Station(s). Simply put, the CAN(Controller Area Network)bus network consists of a series of devices connected by a single wire routed throughout the boat. Station communication connects each system component sequentially which minimizes cable runs and lengths. At each end of the bus network a CANbus terminator (terminating resistor) must be connected in order for the system to perform correctly (see diagram below).

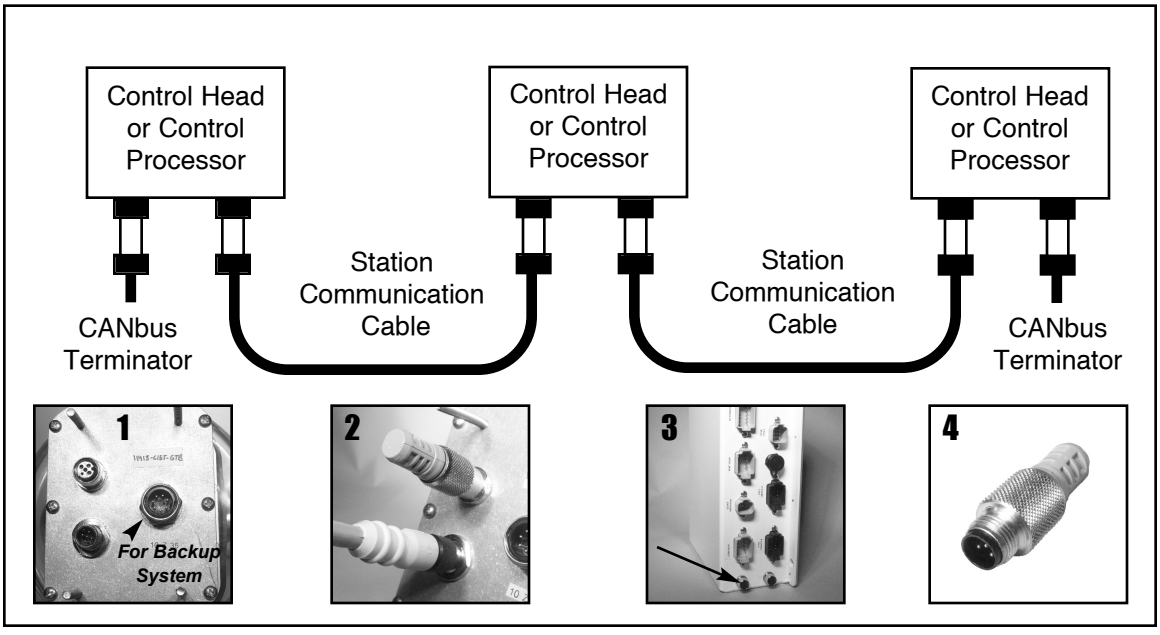


Photo 1 — Control Head connection points (bottom view)

Photo 2 — Control Head connections showing terminating resistor

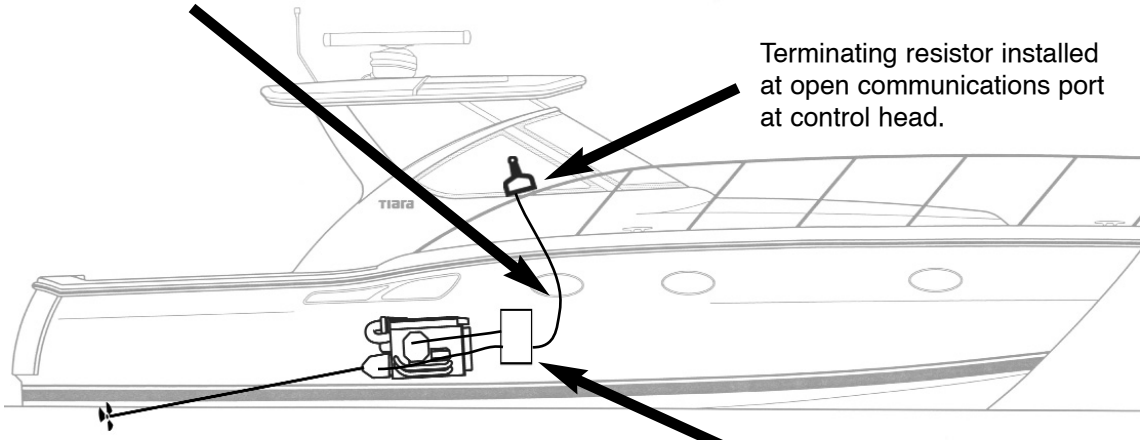
Photo 3 — Control Processor connection points

Photo 4 — Terminating resistor

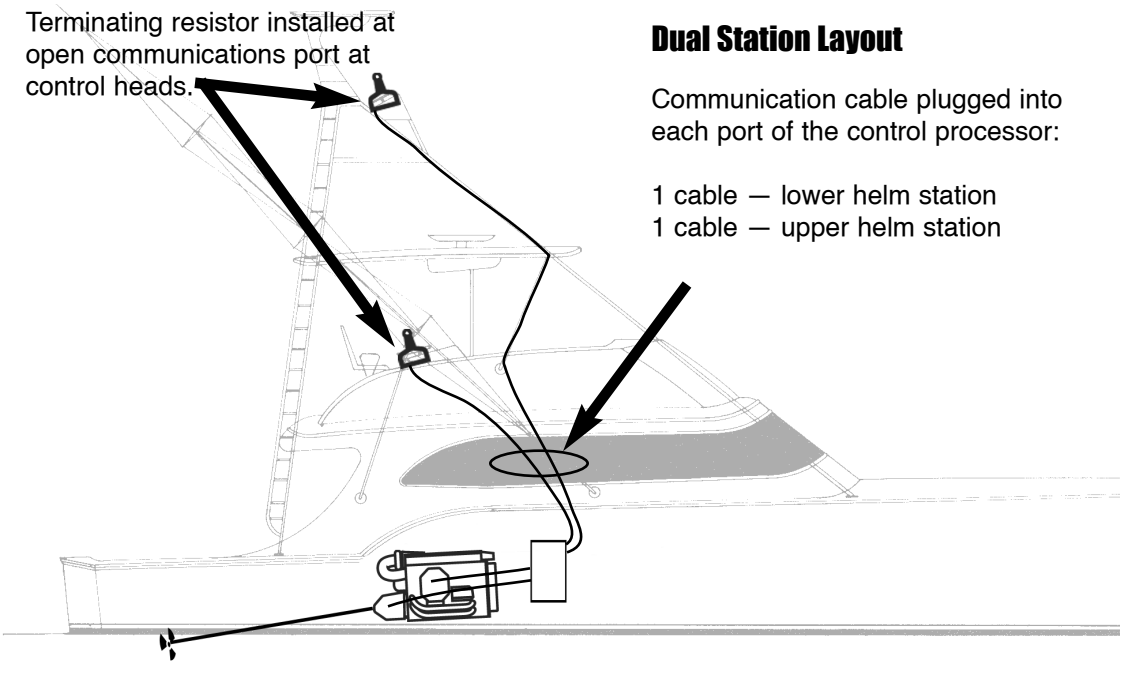
• EEC3 System Layouts

Single Station Layout

Single cable connects control head to control processor.

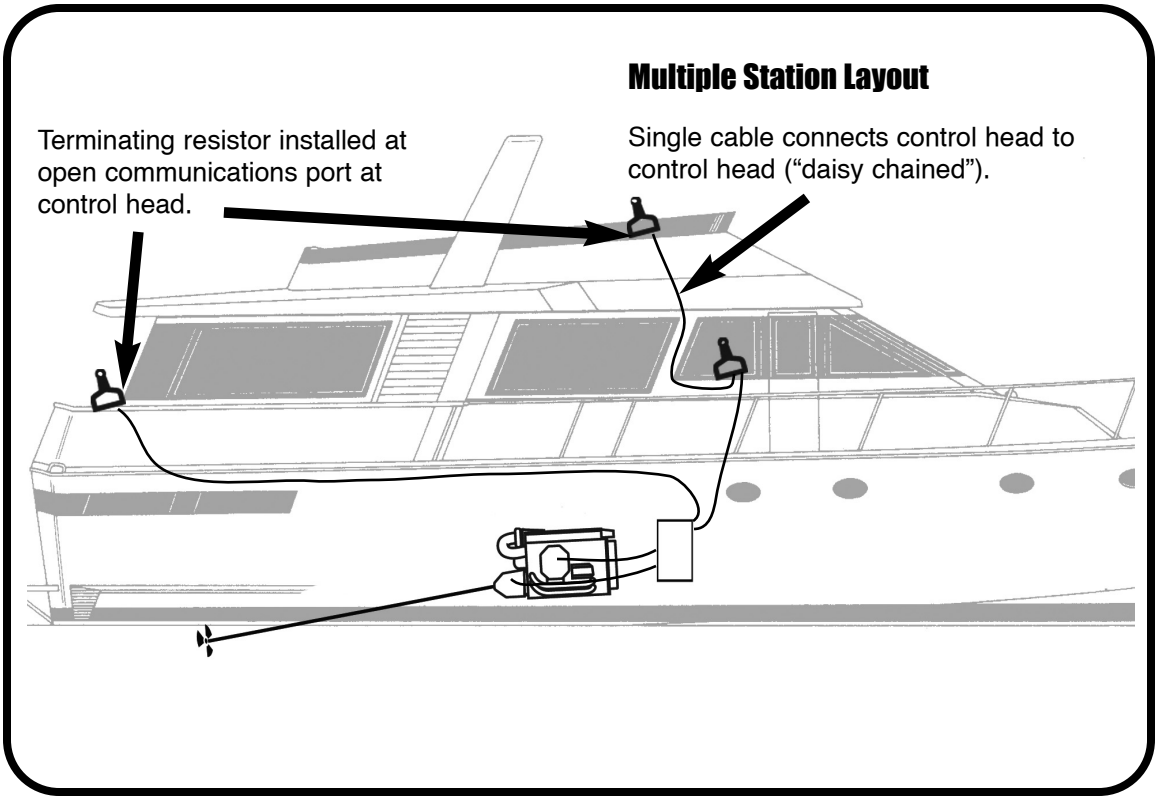


Dual Station Layout



Communication cable plugged into each port of the control processor:

1 cable — lower helm station
1 cable — upper helm station



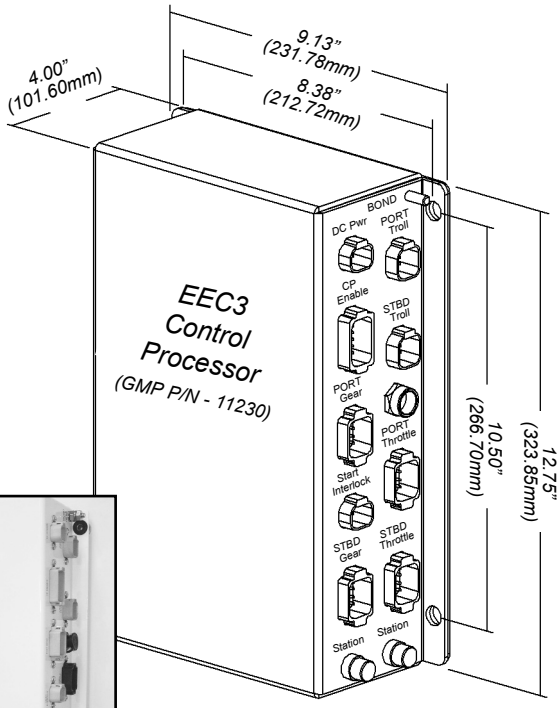
3.1 Mount the Control Processor

The Engine Processor is essentially a digital computer, similar to those used in offices or at home. Although the system has been carefully designed to operate in conditions that are common in recreational yachts, reliability of the system will be enhanced if the engine processor can be mounted in an area external to the engine room, where operating temperatures will be somewhat cooler.

Follow these steps to install the EEC3 Control Processor:

STEP 1: The Control Processor can be mounted anywhere in the engine room providing that the Processor is reasonably accessible so that inspection and/or repairs to the unit may be performed. The Control Processor should NOT be installed in adverse locations subject to saltwater exposure or excessive heat.

STEP 2: Mount the Control Processor using 1/4” (7mm) machine bolts or lag screws. If using lag screws, screw length should be no less than 1” (25mm). If using machine bolts, lockwashers or locknuts MUST be used *(figure 1)*.



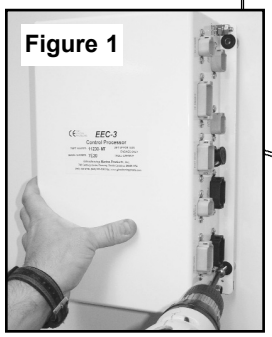


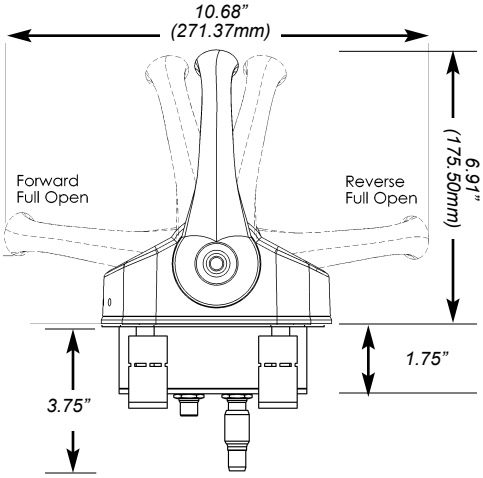
Figure 1

3.2 Mounting the Control Head

3.2.1 Top Mount

One of the most important factors in selecting control head locations is the ability to control the vessel by allowing FULL movement of the control head handles. The area


Top Mount Control Head



around the control head should have proper drainage to eliminate standing water. Although the control heads are sealed to withstand damage from exposure to moisture, they are not designed to be submerged.

STEP 1: Mark the location for the Control Head using the template provided (see pg. 53). Cut the 3-3/8" x 4-7/8" hole.

STEP 2: Place the Control Head assembly into the cutout. The Control Head clamps, which hold the control head against the console, have a break off point indicated by a perforation. For consoles 1/4" to 1" thickness, use bracket as supplied. For 3/4" to 1-5/8" thickness, break off clamp at 3/4" break off point.

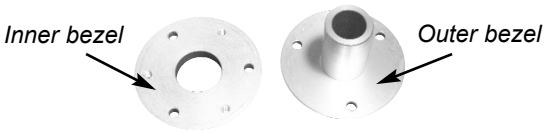
STEP 3: Install Control Head clamps and tighten wing nuts provided. Make sure Control Head is firmly mounted to console.

3.2.2 Sidemount Handle Control Assembly

Before installing the Sidemount Control Head Assembly consider:

Mounting Options — Bezel outside, bezel inside, or no bezel mounting.
The major differences between these types of mounting options are the outside appearance of the console, and the difficulty of installation.
"No bezel mounting" option means the only visible things are the control head shaft and the sidemount handle. For this option use the existing holes in the control head to mount the control head or mounting brackets (supplied by installer) to the inside of the console.
"Outside Console Bezel mounting" is the simpliest method of the three mounting options, but allows a bezel to be seen on the outside of the console. *"Inside Console Bezel mounting"* is perhaps the more difficult installation of the two, and requires careful planning.

• Outside Console Bezel Mounting



STEP 1: Determine location of bezel hole in console by placing bezel on outside of console where desired and mark the 1-1/4" hole and the 1/4" clearance holes, (*see figure 8*) *(NOTE: Clearance for control head needs to be determined on inside of console before cutting holes; Make sure to use the correct control head mechanism PORT or STBD when planning the hole locator. Notice location of friction control adjustment screws in respect to console placement!)*.

STEP 2: Use 1-1/4" hole saw to cut center hole and drill 17/64" holes for outside flange mounting (*see figure 9*).

STEP 3: Place outside flange in 1-1/4" hole and place inside flange over small diameter of outside flange on inside of console. Tighten flanges together with 1/4" x 20 flat head screws (*see figure 10*) *(NOTE: Depending on console thickness, a small diameter of outside flange and 1/4" x 20 flat head screws may need to be shortened)*.

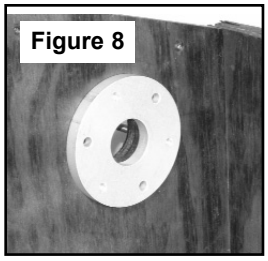


Figure 8

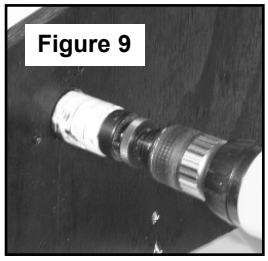


Figure 9

STEP 4: Once Outside Flange and Inside Flange are mounted, install (3) #10 flat head wood screws through Inside Flange. This will hold the Inside Flange in place in case of removal in the future (*see figure 11*) *(NOTE: Wood screws should not be longer than the thickness of the console)*.

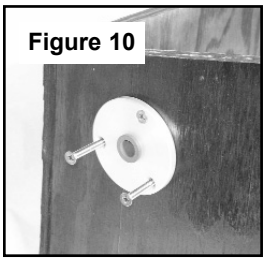


Figure 10

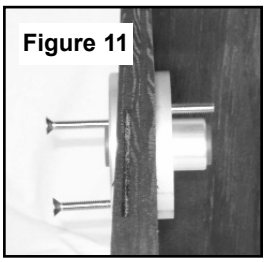


Figure 11

STEP 5: Install the Control Head mechanism in flange (*see figure 12*) *(NOTE: The control heads are marked Port and Stb.; Adjustment screws should face forward)*.

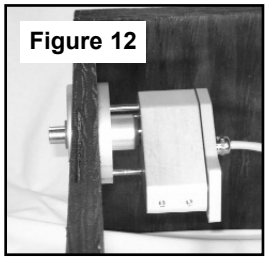


Figure 12

STEP 6: Establish the desired control head angle according to the clearance in the console (*see figure 13*).

STEP 7: Threaded rod with ball joints are to be attached to head and console at this point (*see figure 13*) *(NOTE: Angle of 90 degrees is best for most support)*.

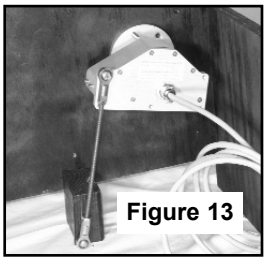


Figure 13

STEP 8: Install control handle and key (where applicable) and tighten set screw down to mark shaft. Fine alignment of handles may be adjusted by shortening or lengthening threaded rod (*see figure 14*) *(NOTE: Shaft end play between handle and console should be less than 1/8" [see figure 15])*.

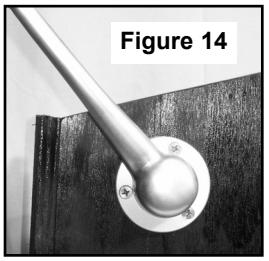


Figure 14

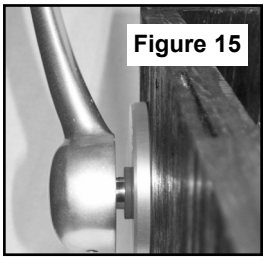


Figure 15

STEP 9: Remove set screw and handle and divot shaft using same size drill as the set screw.

STEP 10: Reinstall control handle and use two set screws, on top of each other.

• Inside Console Bezel Mounting

STEP 1: To determine location of inside bezel mount, caution should be exercised to ensure proper placement of bezel prior to cutting hole in the console *(NOTE: This is determined by the clearance of the control head on the inside of the console)*.

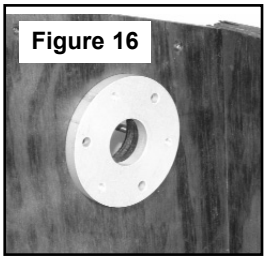


Figure 16

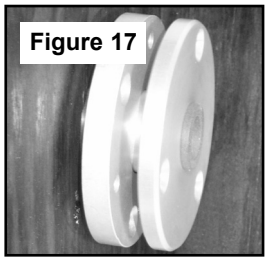


Figure 17

STEP 2: Using the "inner bezel" as a template, trace the 1-1/4" center hole onto the inside wall of the console (*see figure 16*).

STEP 3: Cut out the 1-1/4" center hole and drill (3) #10 starter holes being careful NOT to drill through the wall of the console.

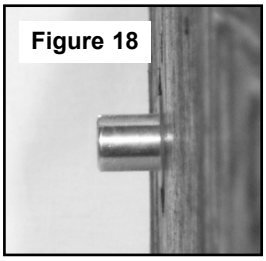


Figure 18

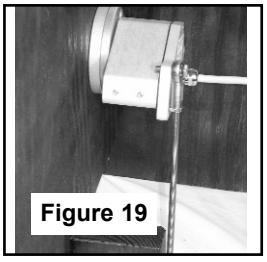


Figure 19

STEP 4: Place inner bezel onto the outer bezel shaft and insert assembly into the 1-1/4" cutout hole. Tighten (3) #10 wood screws into flange where indicated (*see figure 17*) *(NOTE: make sure to use screw lengths that DO NOT exceed the thickness of the console)*.

STEP 5: Bezel outside of console can now be marked flush so the excess can be removed. This allows no bezel to be seen on outside of console. Remove bezel from console. Remove red bushing from inside of bezel and trim bezel.

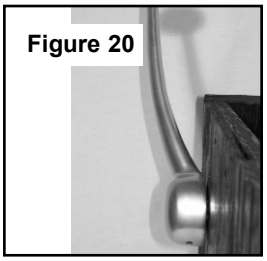


Figure 20

STEP 6: Reinstall red bushing in bezel and insert bezel into hole in console. Tighten (3) #10 wood screws into flange where indicated (*see figure 18*) *(NOTE: make sure to use screw lengths that DO NOT exceed the thickness of the console)*.

STEP 7: Install the control head shaft into the flange assembly.

STEP 8: Establish the desired control head angle according to the clearance in the console.

STEP 9: Threaded rod with ball joints are to be attached to head and console at this point *(NOTE: Angle of 90 degrees is best for most support)* (*see figure 19*).

STEP 10: Install control handle and key (where applicable) and tighten set screw down to mark shaft. Fine alignment of handles may be adjusted by shortening or lengthening threaded rod *(NOTE: Shaft end play between handle and console should be less than 1/8")* (*see figure 20*).

STEP 11: Remove set screw and handle and divot shaft using same size drill as the set screw.

STEP 12: Reinstall control handle and use two set screws, on top of each other.

To mount control handles without Bezel mounting kit:

STEP 1: The control head has one face opposite handle shaft with 1/4 threaded holes to mount to inside face of console.

STEP 2: The 1/4 threaded holes can also be used to mount the control head to a bracket of your design, to attach head to some other locations in console.

STEP 3: When method of mounting is determined, keep a these things in mind—The length of shaft outside of console and the free movement of the shaft.

3.2.3 Sidemount Keypad Assembly

Before mounting the Sidemount Keypad Assembly, inspect the surface that the Keypad is to be mounted to. It should be flat and reasonably strong enough to support the Keypad securely.

STEP 1: Mark the location for the Keypad Assembly using the full size template (pg. 59) provided in the last section of this manual. Cut the 1-3/4" x 4" keypad assembly cutout.

STEP 2: Insert the connection cable from the Sidemount Control Handle pod and the Station Cable (that leads to the Control Processor) through the console cutout and attach to the keypad assembly. The control head pods are marked PORT and STBD and must be installed in the proper connector.

STEP 3: Install Control Head clamps and tighten wing nuts provided. Make sure Keypad Assembly is firmly mounted to console.

3.3 Station Communication Cable Routing

*When routing and connecting station communication cables **DO NOT:***

- ***DO NOT** route cables past any sharp edges!*
- ***DO NOT** cut the cable or splice it. If the cable is damaged during installation, it must be completely replaced!*
- ***DO NOT** use pliers or other tools to tighten the cable nut — handtight is sufficient.*

Review comments made in Pre-Installation Planning, paragraph ?, for determining proper routing of cables. Cables are manufactured in 10' increments and are available from 10 - 100 feet.

When routing and connecting station communication cables, BE SURE TO DO THE FOLLOWING:

- Use a terminating resistor at each end of the bus (see diagram pg. 11).
- Align the cables before connecting them to the proper connector on the Control Head and/or Control Processor.

REMEMBER:

—Connectors are pre-terminated at the factory and should NEVER be forced into their proper recepticle.
—Make sure that the connector is properly aligned prior to insertion into the recepticle.
—If the connector is properly aligned, only a small amount of force will be necessary to insert the connector into the Control Processor or Control Head.
—Failure to properly align connector may damage the pins and cause the system to fail.

3.4 Connecting the Throttle and Transmission Harnesses

Port and Starboard throttle and transmission cables are attached to the EEC3 Control Processor at the appropriately labelled connector (see below).

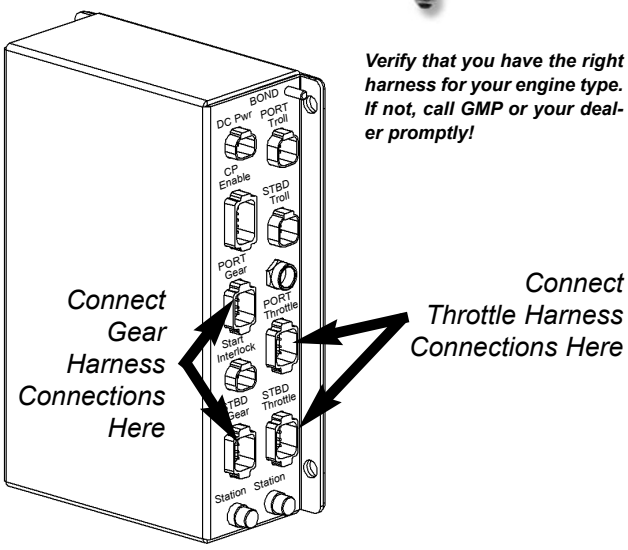
To attach the throttle and transmission cables to the Control Processor:

1. Find the appropriately labelled connector for the cable you wish to connect to the CP (ie. THROTTLE / PORT or STBD; GEAR / PORT or STBD).

2. Insert the cable connector fully until you hear a “click” from the locking tab. This assures that the connector is fully inserted.

When all connectors are properly connected to the Control Processor you may proceed to connect the other end of the cable to the engine’s appropriate recepticle (whether for Port or Stbd, or Throttle or Transmission).

Verify that you have the right harness for your engine type. If not, call GMP or your dealer promptly!



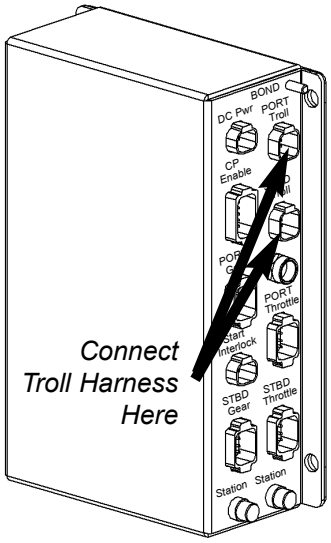
3.5 Connecting the Troll Harness

Port and Starboard TROLL cables are attached to the EEC-2001 Control Processor at the appropriately labelled connector of the Control Processor (see right).

To attach the TROLL cables to the Control Processor:

1. Find the appropriately labelled connector for the cable you wish to connect to the CP (ie. TROLL Stbd / TROLL Port).

2. Insert the cable connector maintaining correct pin alignment.



3.6 DC Power Input and Bonding Wire

In the installation of any electronic device, the source of power is one of the most important factors to consider during the installation. The Glendinning Electronic Engine Control has a unique and very reliable power supply system which, if the system is properly installed, greatly improves the overall reliability of the engine control system. *NOTE:The EEC can use 12 or 24V DC power, however, see the specific wiring diagram (see sec 7.1, or supplied by GMP technician) for the correct power to use. In some installations it is required to use 24V DC instead of 12V DC.*

The Glendinning EEC-2001 system is equipped with a sophisticated power management system that allows it to receive power from two (2) independent batteries (normally the port and starboard engine start batteries). In normal operation, the EEC3 will receive power from both battery sources, taking power from each battery proportionate to the voltage from level available. In the event of loss or reduction of voltage from one battery source, such as during engine start, the EEC3 system will continue to function normally by receiving power from the other battery with normal voltage.

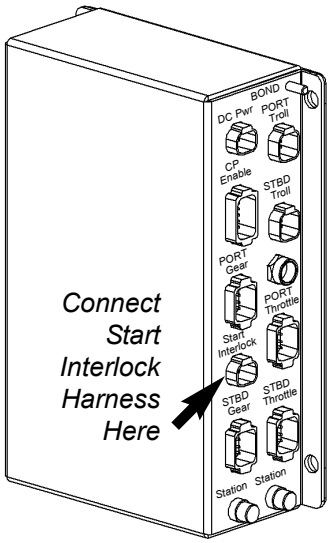
1) Connect the EEC3 DC Power Cable (supplied) to two (2) independent battery sources, (normally the port and starboard engine start batteries). On the positive side of these two runs, install a 10amp circuit breaker near each battery or power source (follow ABYC standards which require a circuit protection device within 7" of the wire connection to the power source — NOTE: If the total wire run is longer than 15 feet from the battery to the Control Processor, install an approved junction box that the DC Power Cable may be connected to).

2) Make sure that the breakers are in the OFF position and then connect the "DC Power" to the Control Processor where indicated (see detail above).

3) Run a bonding wire (#12 AWG, green jacket) from the Control Processor bonding stud (1/4") located top right on the connector side of the Control Processor.

3.7 Start Interlock

The EEC3 system includes a "start interlock" safety feature — this feature verifies that the transmission control lever is in Neutral prior to starting the engines. In order to utilize this product feature, the signal wire from the helm station start switch to the engine starter solenoid must be intercepted and run through the control switches within the Control Processor.

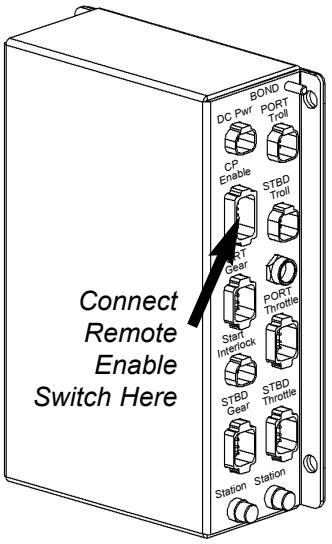


To install the Start Interlock system:

1) Identify the Start Interlock wiring on the "Start Interlock harness".

2) Route these wires to the engine distribution box and connect using appropriate connectors (see wiring diagram).

3.8 Remote Enable Switch



- ***DO NOT connect battery power to the remote enable switch!***
- ***DO NOT connect an indicator light to the remote enable switch (the TAKE light provides an indication to the boat owner when the control system is operational)!***
- ***MAKE SURE that the enable switch is not located in a position that would allow it to be accidentally turned OFF while the boat is operational.***

While the boat is tied up at the dock and not in use, it is recommended that the EEC system be turned off. Since power is normally supplied directly to the Engine Processor from power sources in the engine room, turning power ON and OFF in the engine room may be difficult to do each time the system is started up. For this reason, a remote enable switch is available for use with the EEC control system. This enable switch allows power to the system to be turned ON or OFF at the Main station.

The EEC System Enable Switch is installed as follows:

1. Make sure the circuit breakers that control the power to the Control Processor are turned off before starting this installation.

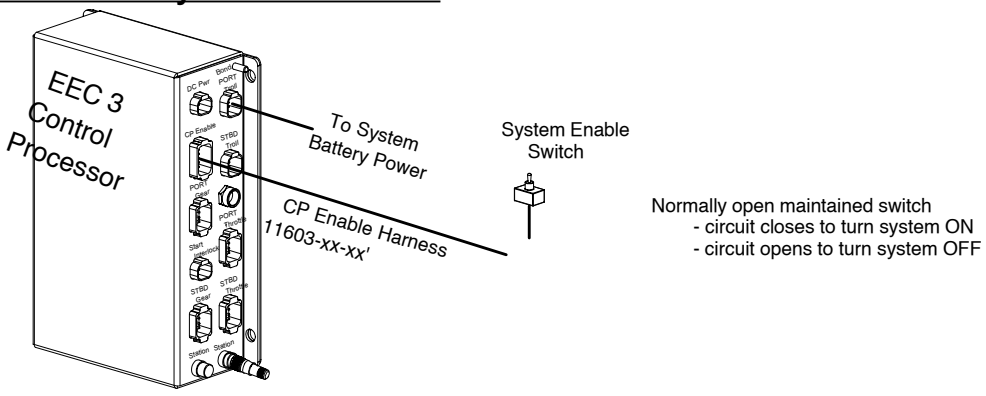
2. Install a Single Pole, Single Throw (SPST) switch in the instrument panel. A water resistant rocker switch or toggle switch is available from GMP. *NOTE: Locate the switch in an area where it will not be inadvertantly turned OFF during operation.*

3. Connect switch to harness provided.

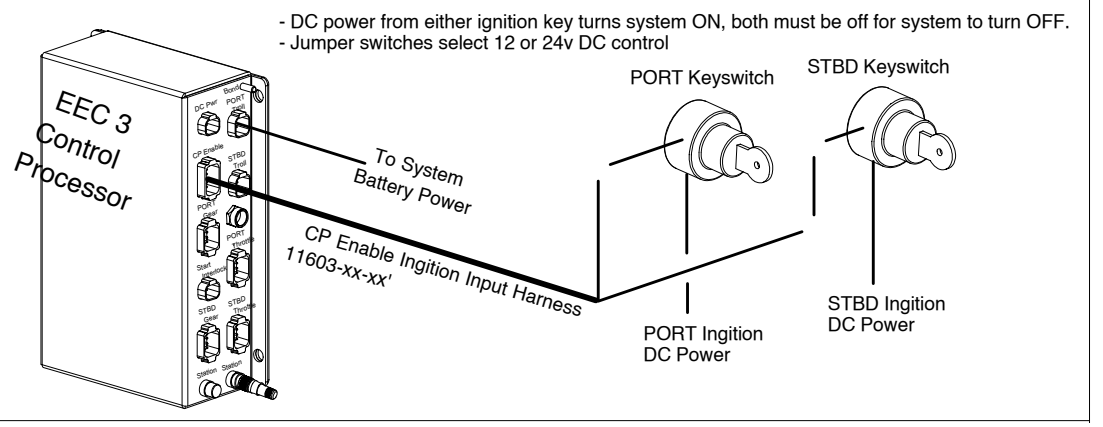
NOTE: Do not connect an indicator light to the remote enable switch connections.
NOTE: A "jumper" can be installed in the place of wires on the connector at CP. Power may then be turned OFF and ON by using the 10amp breakers installed at battery input.

EEC 3 Control System Wiring Diagram - CP Enable Wiring

Standard - "Dry Contact" ON/OFF

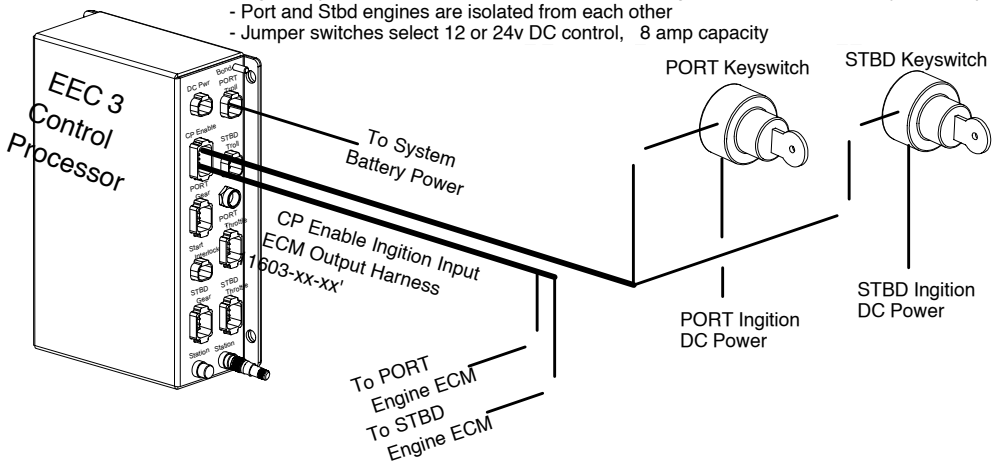


Ignition Activated - DC Power from both ingnition keys



Ignition Activated w/Output - DC Power from ingnition key starts engine ECM

- DC power from either ignition key turns system ON , both must be off for system to turn OFF
- Ingnition power which enters EEC3 CP routes to engine ECM's once EEC3 system is up a running
- Port and Stbd engines are isolated from each other
- Jumper switches select 12 or 24v DC control, 8 amp capacity



4.0 System Configuration

Introduction

System configuration customizes the EEC-3 system to suit operator preference.

Procedure Overview

Configuration of the EEC-3 system was performed at GMP from the information the ship operator gave at the time the order was placed. Changes to the configuration are entered from the **control head keypad.** Follow the instructions for each option when making changes.

To Enter Configuration Mode

The configuration of the system can be best described by 3 steps:
Preparing the system, Choosing the feature to change, and Saving the selection.

• Enter Configuration Mode (Fig. 1 & 2)

STEP 1 — **Move the handles out of neutral** at the main station (that is the station that is in control when the system is first turned ON).

STEP 2 — **Turn system ON.**

STEP 3 — **Press and release the WARM button three (3) times.** All the LEDs will start flashing indicating that you have entered the configuration mode (Fig. 2).

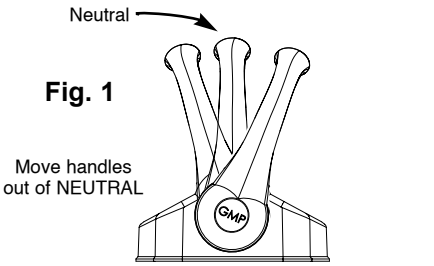


Fig. 1

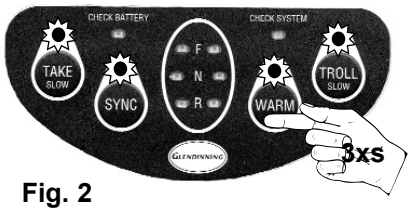


Fig. 2

• Selecting the Feature to Configure

STEP 4 — Once in configuration mode, you can **advance through the configuration features by pressing and releasing the SYNC button.** The LEDs will indicate which feature you have selected (Fig. 3). For more information on configuration features, see pgs. 22-32.

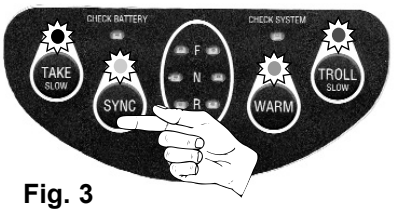


Fig. 3

• Saving the Selection (Fig. 4)

STEP 5 — To store your configuration selection, **press and release the WARM button.** By pressing the WARM button, your selection will be recorded and you will be able to make another feature selection or exit calibration mode (Fig. 4).

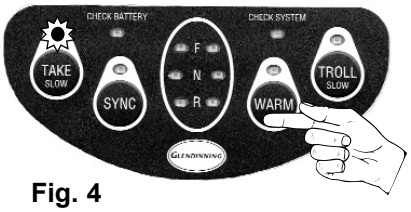


Fig. 4

Configuration Options

If you purchased a complete system, configuration and handle identification was performed at the factory. If changes need to be made to the configuration settings, follow 4.0 instructions.

If you purchased a control head separately, you will NEED to set the handle identifier for that control station.

To enter Control Head Processor Configuration Mode:
1) Move both handles to full astern.
2) Turn system ON.
3) Press and hold the 2 center buttons (Sync & Warm) for approximately 2 seconds until LEDs start flashing.
4) Release the buttons. You are now ready to select handle identifier.

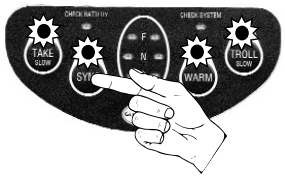
To select Handle IDentifier:
1) Press Sync button once — Take LED will flash.
2) Press Warm button once — you have now selected handle ID configuration.
3) Press Sync button until the desired handle ID is displayed on the LEDs as follows (binary combination):
ID 1 — TAKE LED
ID 2 — SYNC LED
ID 3 — TAKE & SYNC
ID 4 — WARM LED
ID 5 — TAKE & WARM
ID 6 — SYNC & WARM
4) Press WARM button to store selection.
5) Mark the handle ID on tag attached to bottom of handle.

Continue with 4.0 instructions if necessary.

4.1 Troll Type Options

The Troll Type Option allows you to configure the EEC3 system for the particular type of troll you have on your boat.

1

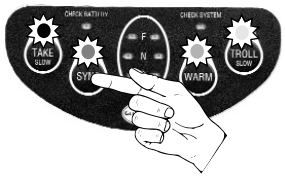


Press SYNC for Troll Type Options (TAKE LED will begin to flash)

2

Press WARM to activate selection

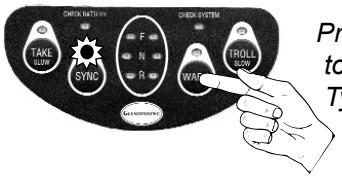
3



Press SYNC to cycle through Troll Type Options

(see ...In Depth below for more information about various options)

4



Press WARM to save Troll Type Option selection

Or you may choose to EXIT CONFIGURATION MODE by turning system OFF, moving control handles back to NEUTRAL, and then turn system ON again.

Notes

The actual troll speed values will be set by using the Control Head handles.

Troll Types In Depth

NO Troll — No LEDs ON (default) > Choose this selection if your boat is NOT equipped with trolling valves.

For engines equipped with ZF troll valves

Increase 500ma — TAKE LED ON > Choose this selection if your trolling valve requires anywhere from 0ma to 500ma for the trolling valve to enter full lockup.

Decrease 500ma — SYNC LED ON > Choose this selection if your trolling valve requires anywhere from 0ma to 500ma for the trolling valve to enter full slip.

For engines equipped with TwinDisc troll valves

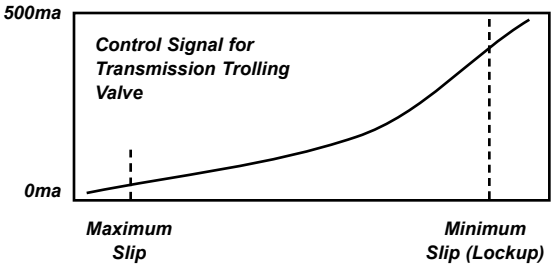
Increase 1000ma — TAKE & SYNC LED ON > Choose this selection if your trolling valve requires anywhere from 0ma to 1000ma for the trolling valve to enter full lockup.

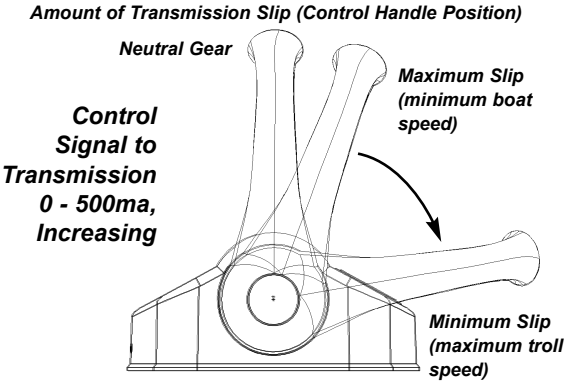
Decrease 1000ma — WARM LED ON > Choose this selection if your trolling valve requires anywhere from 0ma to 1000ma for the trolling valve to enter full slip.

NO Troll

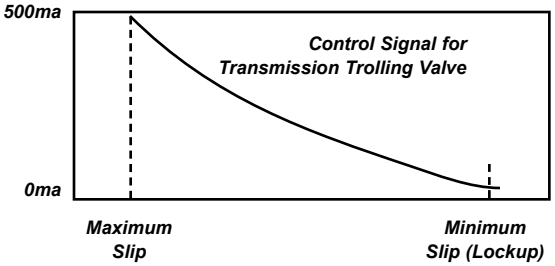
Choose this selection if your boat is NOT equipped with trolling valves.

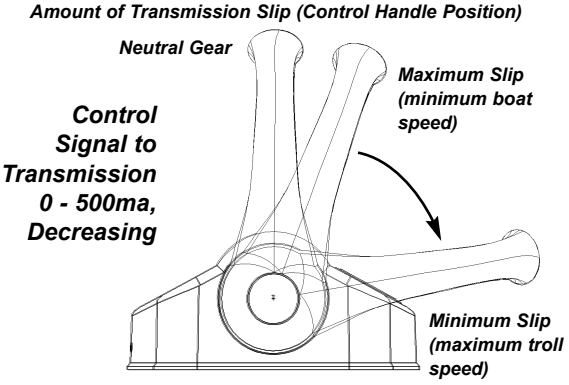
Increase 500ma





Decrease 500ma





Increase 1000ma

Same as *Increase 500ma* pictured above only measurements are 0ma - 1000ma.

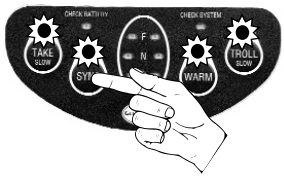
Decrease 1000ma

Same as *Decrease 500ma* pictured above only measurements are 0ma - 1000ma.

4.2 Throttle on Top of Troll Options

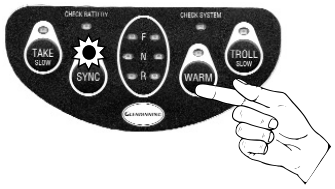
The Throttle on Top of Troll Option allows you to configure the EEC3 system to give approximately 1/3 of throttle range after reaching troll full lock-up.

1



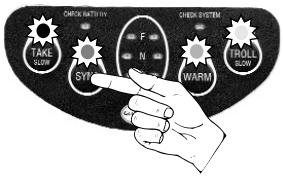
Press SYNC 2 times for Throttle on Top of Troll Option
(SYNC LED will begin to flash)

2



Press WARM to activate selection

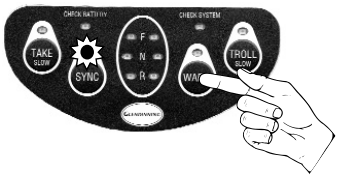
3



Press SYNC to cycle through Throttle on top of Troll Options

(see ...In Depth below for more information about various options)

4



Press WARM to save Throttle on top of Troll Option selection

Or you may choose to EXIT CONFIGURATION MODE by turning system OFF, moving control handles back to NEUTRAL, and then turn system ON again.

Throttle on Top of Troll Option In Depth

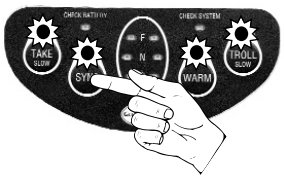
NO Throttle on Top of FULL Lockup (default) — No LEDs ON > Choose this selection if you DO NOT want to allow 1/3 throttle output after reaching full lockup on the trolling valve outputs.

Throttle on Top of FULL Lockup (1/3 throttle range) — TAKE LED ON > Choose this selection if you want to allow 1/3 throttle output after reaching full lockup on the trolling valve outputs.

4.3 Troll Delay Options

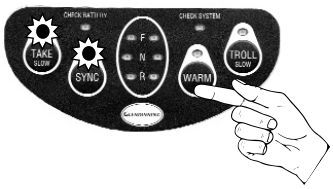
The Troll Delay option allows you to configure the EEC3 system to delay troll modulation as the system goes from gear shift fo troll modulation.

1



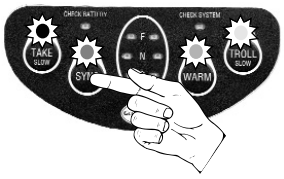
Press SYNC 3 times for Troll Delay Options (TAKE & SYNC LEDs will begin to flash)

2



Press WARM to activate selection

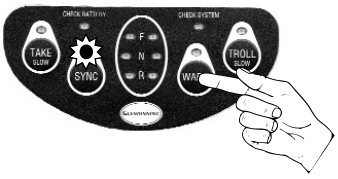
3



Press SYNC to cycle through Troll Delay Options

(see ...In Depth below for more information about various options)

4



Press WARM to save Troll Delay Option selection

Or you may choose to EXIT CONFIGURATION MODE by turning system OFF, moving control handles back to NEUTRAL, and then turn system ON again.

Troll Delay Options In Depth

NO Troll Delay (default) — No LEDs ON > Choose this selection if you DO NOT have trolling valves or DO NOT want a delay to occur before re-entering TROLL Mode.

1.0 Second Troll Delay — TAKE LED ON > Choose this selection if you want to allow a 1 second delay before re-entering TROLL Mode.

2.0 Second Troll Delay — SYNC LED ON > Choose this selection if you want to allow a 2 second delay before re-entering TROLL Mode.

3.0 Second Troll Delay — TAKE & SYNC LED ON > Choose this selection if you want to allow a 3 second delay before re-entering TROLL Mode.

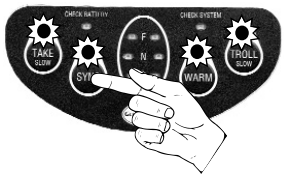
4.0 Second Troll Delay — WARM LED ON > Choose this selection if you want to allow a 4 second delay before re-entering TROLL Mode.

5.0 Second Troll Delay — TAKE & WARM LED ON > Choose this selection if you want to allow a 5 second delay before re-entering TROLL Mode.

4.4 Throttle Delay Options

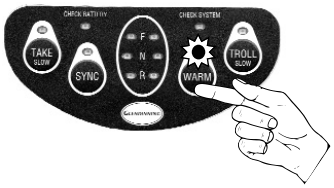
The Throttle Delay Option allows you to configure the EEC3 system to delay throttle output as you shift from ahead / astern detents into the throttle range.

1



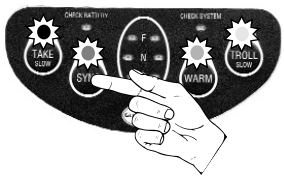
Press SYNC 4 times for Throttle Delay Option
(WARM LED will begin to flash)

2



Press WARM to activate selection

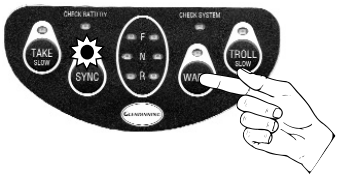
3



Press SYNC to cycle through Throttle Delay Options

(see ...In Depth below for more information about various options)

4



Press WARM to save Throttle Delay Option selection

Or you may choose to EXIT CONFIGURATION MODE by turning system OFF, moving control handles back to NEUTRAL, and then turn system ON again.

Throttle Delay Options In Depth

NO Throttle Delay (default) — No LEDs ON > Choose this selection if you DO NOT want a delay when moving from ahead/astern gear detent into the throttle range.

1.0 Second Throttle Delay — TAKE LED ON > Choose this selection if you want a 1 second delay before the engine's rpms increase when moving control handles beyond the ahead / astern detents into the throttle range.

2.0 Second Throttle Delay — SYNC LED ON > same as above with a 2 second delay.

3.0 Second Throttle Delay — TAKE & SYNC LED ON > same as above with a 3 second delay.

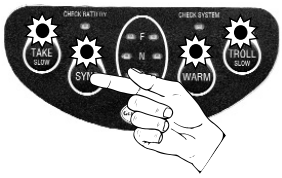
4.0 Second Throttle Delay — WARM LED ON > same as above with a 4 second delay.

5.0 Second Throttle Delay — TAKE & WARM LED ON > same as above with a 5 second delay.

4.5 Gear Delay Options

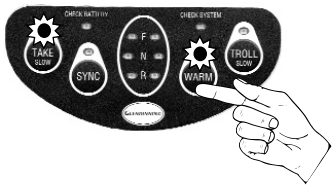
The Gear Delay Option allows you to configure the EEC3 system to delay gear shift when the system goes from ahead / astern with throttle to neutral, to allow throttle to reach idle before shifting gear.

1



Press SYNC 5 times for Gear Delay Options
(TAKE & WARM LEDs will begin to flash)

2



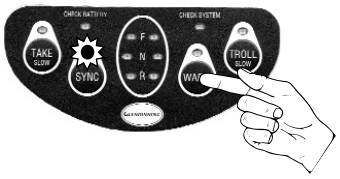
Press WARM to activate selection

3

Press SYNC to cycle through Gear Delay Options

(see ...In Depth below for more information about various options)

4



Press WARM to save Gear Delay Option selection

Or you may choose to EXIT CONFIGURATION MODE by turning system OFF, moving control handles back to NEUTRAL, and then turn system ON again.

Gear Delay Options In Depth

NO Gear Delay (default) — No LEDs ON > Choose this selection if you DO NOT want to allow a delay when shifting from the throttle range to ahead/neutral/astern gear detents.

1.0 Second Gear Delay — TAKE LED ON > Choose this selection if you want a 1 second delay when shifting from the throttle range to ahead/neutral/astern gear detents.

2.0 Second Gear Delay — SYNC LED ON > Choose this selection if you want a 2 second delay when shifting from the throttle range to ahead/neutral/astern gear detents.

3.0 Second Gear Delay — TAKE & SYNC LED ON > Choose this selection if you want a 3 second delay when shifting from the throttle range to ahead/neutral/astern gear detents.

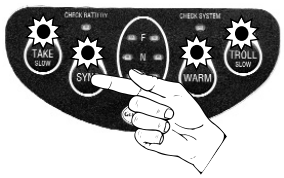
4.0 Second Gear Delay — WARM LED ON > Choose this selection if you want a 4 second delay when shifting from the throttle range to ahead/neutral/astern gear detents.

5.0 Second Gear Delay — TAKE & WARM LED ON > Choose this selection if you want a 5 second delay when shifting from the throttle range to ahead/neutral/astern gear detents.

4.6 High-Idle Step Size (Pt. 1) Options

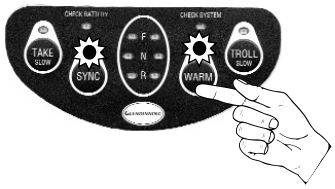
The High-Idle Step Size (Pt. 1) Option allows you to configure the EEC3 system to remove “dead band” in the throttle command signal allowing immediate response of throttle output (from .5% to 30%).

1



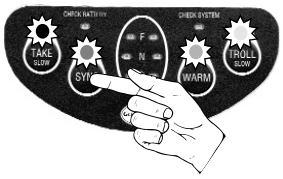
Press SYNC 6 times for 1st High Idle Step Size Option
(SYNC & WARM LEDs will begin to flash)

2



Press WARM to activate selection

3



Press SYNC to cycle through 1st High Idle Step Size Options

(see ...In Depth below for more information about various options)

4

Press WARM to save 1st High Idle Step Size Option selection

Or you may choose to EXIT CONFIGURATION MODE by turning system OFF, moving control handles back to NEUTRAL, and then turn system ON again.

High-Idle Step Size (Pt. 1) Options In Depth

0.5% of Throttle Range — No LEDs ON > Choose this selection if you want to allow for a higher idle setting of 0.5% of throttle range.

1% of Throttle Range — TAKE LED ON > Choose this selection if you want to allow for a higher idle setting of 1% of throttle range.

2% of Throttle Range (default) — SYNC LED ON > Choose this selection if you want to allow for a higher idle setting of 2% of throttle range.

3% of Throttle Range — TAKE & SYNC LED ON > Choose this selection if you want to allow for a higher idle setting of 3% of throttle range.

4% of Throttle Range — WARM LED ON > Choose this selection if you want to allow for a higher idle setting of 4% of throttle range.

5% of Throttle Range — TAKE & WARM LED ON > Choose this selection if you want to allow for a higher idle setting of 5% of throttle range.

10% of Throttle Range — SYNC & WARM LED ON > Choose this selection if you want to allow for a higher idle setting of 10% of throttle range.

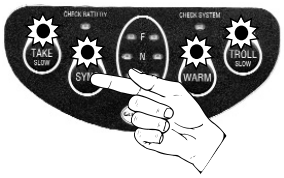
20% of Throttle Range — TAKE, SYNC, & WARM LED ON > Choose this selection if you want to allow for a higher idle setting of 20% of throttle range.

30% of Throttle Range — TROLL LED ON > Choose this selection if you want to allow for a higher idle setting of 30% of throttle range.

4.7 High-Idle Step Size (Pt. 2) Options

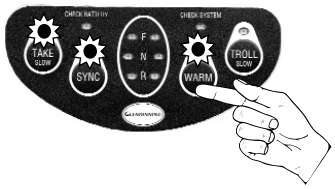
The High-Idle Step Size (Pt. 2) Option allows you to configure the EEC3 system to change idle speed beyond the High-Idle Step (Pt. 1) Option range (from .5% to 5%).

1



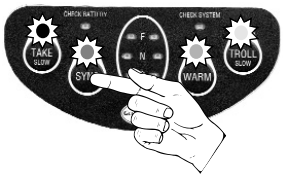
Press SYNC 7 times for Remaining High Idle Step Size Options
(TAKE, SYNC, & WARM LEDs will begin to flash)

2



Press WARM to activate selection

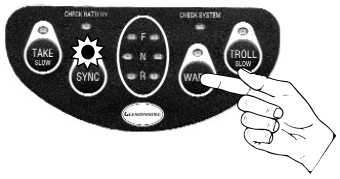
3



Press SYNC to cycle through Remaining High Idle Step Size Options

(see ...In Depth below for more information about various options)

4



Press WARM to save Remaining High Idle Step Size Option selection

Or you may choose to EXIT CONFIGURATION MODE by turning system OFF, moving control handles back to NEUTRAL, and then turn system ON again.

High-Idle Step Size (Pt. 2) Options In Depth

0.5% of Throttle Range — No LEDs ON > Choose this selection if you want to allow for a higher idle setting of 0.5% of throttle range..

1% of Throttle Range — TAKE LED ON > Choose this selection if you want to allow for a higher idle setting of 1% of throttle range.

2% of Throttle Range (default) — SYNC LED ON > Choose this selection if you want to allow for a higher idle setting of 2% of throttle range.

3% of Throttle Range — TAKE & SYNC LED ON > Choose this selection if you want to allow for a higher idle setting of 3% of throttle range.

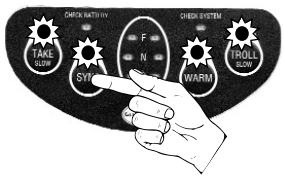
4% of Throttle Range — WARM LED ON > Choose this selection if you want to allow for a higher idle setting of 4% of throttle range.

5% of Throttle Range — TAKE & WARM LED ON > Choose this selection if you want to allow for a higher idle setting of 5% of throttle range.

4.8 System Startup Options

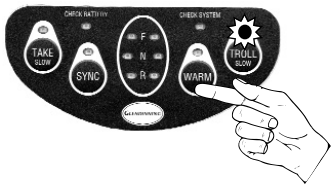
The System Startup Option allows you to configure the EEC3 system to enter WARM Mode or Normal Run Mode at startup (power ON).

1



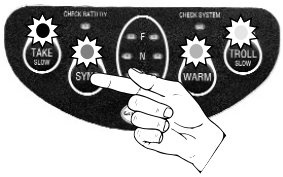
Press SYNC 8 times for System Startup Options
(TROLL LED will begin to flash)

2



Press WARM to activate selection

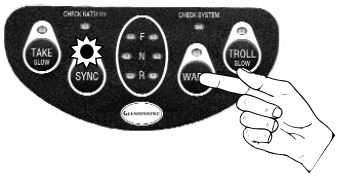
3



Press SYNC to cycle through System Startup Options

(see ...In Depth below for more information about various options)

4



Press WARM to save System Startup Option selection

Or you may choose to EXIT CONFIGURATION MODE by turning system OFF, moving control handles back to NEUTRAL, and then turn system ON again.

System Startup Options In Depth

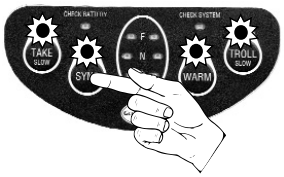
WARM MODE / GEAR LOCKOUT (default) — No LEDs ON > Choose this selection if you want the EEC3 system to startup in WARM (Gear Lockout) Mode.

NORMAL RUN MODE — TAKE LED ON > Choose this selection if you want the EEC3 system to startup in normal RUN Mode.

4.9 Station Transfer Options

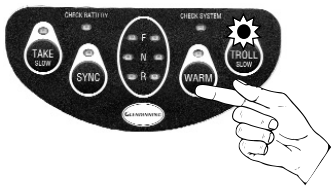
The Station Transfer Option allows you to configure the EEC3 system to transfer station control “on the fly” or at a neutral station only.

1



Press SYNC 9 times for Station Transfer Options
(TAKE & TROLL LEDs will begin to flash)

2



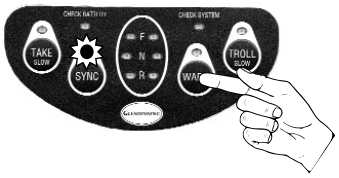
Press WARM to activate selection

3

Press SYNC to cycle through Station Transfer Options

(see ...In Depth below for more information about various options)

4



Press WARM to save Station Transfer Option selection

Or you may choose to EXIT CONFIGURATION MODE by turning system OFF, moving control handles back to NEUTRAL, and then turn system ON again.

Station Transfer Options In Depth

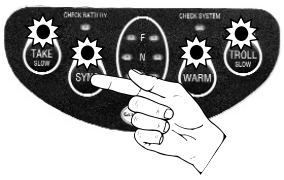
TRANSFER AT ANY MATCHED HANDLE POSITION (default) — No LEDs ON > Choose this selection if you want to be able to transfer station control to any other station by approximately matching control station handle position before engaging.

TRANSFER AT NEUTRAL ONLY — TAKE LED ON > Choose this selection if you want to transfer station control only when control stations are in NEUTRAL.

4.10 Return System Settings to Defaults Option

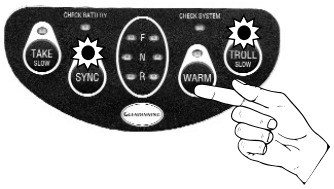
The Return System Settings to Defaults Option allows you to return the system to it's factory default settings.

1



Press SYNC 10 times to Return Configuration Settings to Factory Defaults
(SYNC & TROLL LEDs will begin to flash)

2



Press WARM to save "Return to Configuration Settings to Factory Defaults" selection

To EXIT CONFIGURATION MODE:
Turn system OFF
Move control handles back to NEUTRAL
Turn system ON again.

5.0 System Test & Checkout

System test and checkout consists of 2 steps:

1) ***Component installation checks*** — verify that the components appear to be correctly mounted and installed.
2) ***Operational tests*** — make sure the system is operating correctly.

5.1 Component Installation Checks

A. Control Processor

1.1	Verify Control Processor is securely fastened to boat structure.
1.2	Verify electrical power connections: *Battery Negatives*—Negatives from both batteries should be connected (not at Control Processor. It is vital that there be zero voltage potential between battery negative terminals. Battery negative terminals should be connected to Bonding system also. *Negative Lead*—Negative wire from EEC system is connected to single battery negative. *Positive Leads*—Power should be connected from Battery positive terminal or disconnect switch (battery side of switch) to CP via 10 amp fuse / circuit breaker. Check that all battery connections are tight. Verify that Bonding Wire is properly connected to Bonding stud (see sec. 3.6).
1.3	Verify that all connectors are properly inserted into their recepticles (Station Cables, Transmission Cables, Throttle Cables, and Troll Cables). DO NOT FORCE connectors into recepticles!. All wires should be secured with tie-wraps along route.

B. Control Head(s)

2.1	Verify Control Head(s) are securely fastened to boat structure.
2.2	Verify that Control Handles have an unobstructed freedom of movement (full ahead and full reverse).
2.3	Return all handles to NEUTRAL.

5.2 Operational Checks

A. General Functions

System checks may be performed WITHOUT the engines running!

NOTE: While performing system checks, verify that the “Check System” LED stays OFF. If it comes ON, the system is in Alarm Mode (see pg.) and alarm condition must be checked and corrected before proceeding.

3.1	Turn System ON (see sec. 2.1).
3.2	Verify at the main station various functions: Warm up, Slow, Troll, Sync.
3.3	Transfer control to other stations (see pg.) and verify proper operation of functions at each station.

B. Start Interlock

4.1	Move Starboard Control Handle out of NEUTRAL position. Attempt to start engine. ***(NOTE: Be prepared to immediately shutdown engine if start interlock has been wired incorrectly!)***
4.2	Engine should NOT start; if it does, start interlock has not been wired correctly. Fix wiring and re-check.
4.3	Move Starbord Control Handle back to NEUTRAL position. After handle is moved to NEUTRAL position, then try to start engine. Engine should start.
4.4	Perform same check for Port engine.

C. Power Inputs

5.1	To verify separate power inputs, turn ON individual breakers one at a time and verify that DC power (12 or 24 VDC) is supplied to the Control Processor.

D. Engine Room Checks

6.1	Gear Operation — Verify that transmission solenoid valves are turning ON and OFF as you move Control Handles into and out of gear. Make sure that transmission shifts into appropriate direction — pushing handle forward causes forward boat motion, etc.

E. Trolling Valve (if equipped)

7.1	

6.0 Troubleshooting Mode

Whenever the EEC3 system goes into Alarm Mode, a code is stored in the system memory which indicates the diagnostic alarm that was encountered. This error code may be retrieved from the system at any time from the Main Station Control Head's LED indicators.

Before entering the Troubleshooting Mode, fill in your boat's information and system information below:

BOAT INFORMATION:	
Date	
Boat Make/Model	
Owner	
SYSTEM INFORMATION:	
Serial Number	
Software Version	
Throttle Type	
Transmission Type	
Troll Type	
Throttle on Top?	YES or NO (circle selection)
Station Count?	1 2 3 4 5 6 (circle selection)

6.1 Entering Handle Troubleshoot Mode

1. Turn system power OFF (see Fig. 1).
2. Move one control handle out of NEUTRAL position at the main station (see Fig. 2).
3. Turn system power ON (the TAKE LED will flash slowly and the buzzer will beep).
4. Press the two center buttons (SYNC and WARM) on the main station handle 3 times (see Fig. 3).
5. You are now in Handle Troubleshoot Mode.

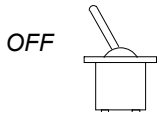


Fig. 1

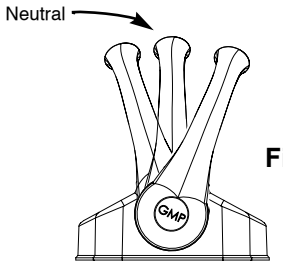


Fig. 2

Move handles out of NEUTRAL

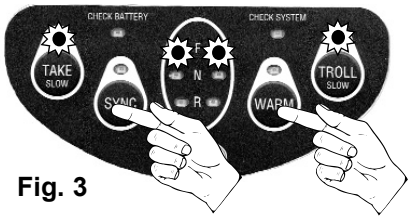


Fig. 3

6.2 Retrieve Alarm Count and / or Alarm Codes

While in Handle Troubleshoot Mode the system will show the alarm code by illuminating the LEDs on the keypad in two (2) sets of 4 lights indicated by the Control Head beeping at a fast and slow rate every 4 seconds. It is important to write down the flashing light sequence in order to retrieve the alarm codes (see pg. ??).

1. Once in Handle Troubleshoot Mode, the flashing LEDs will indicate alarm count. Press the SYNC button to retrieve the most recent alarm/warning code.
2. Record the alarm code(s) in the appropriate space on the following chart and press

the SYNC button again to retrieve the next previous alarm code.
3. Repeat step 2 until all alarm codes have been read and recorded (NOTE: Only 16 most recent alarm codes will be stored in the system memory. If all 16 alarm codes have been filled the system will repeat the process and display the most recent alarm code again).
4. With all the alarm codes recorded, consult the Alarm Code Troubleshoot Table to determine the cause of the problem.

Check the 4 boxes below to match the handle LEDs while the handle is beeping and flashing at a slow or fast rate. Remember to record each alarm code before moving on to the next alarm.

	@ SLOW RATE				@ FAST RATE				RECORD ALARM CODE
	TAKE	SYNC	WARM	TROLL	TAKE	SYNC	WARM	TROLL	
1	☐	☐	☐	☐	☐	☐	☐	☐	
2	☐	☐	☐	☐	☐	☐	☐	☐	
3	☐	☐	☐	☐	☐	☐	☐	☐	
4	☐	☐	☐	☐	☐	☐	☐	☐	
5	☐	☐	☐	☐	☐	☐	☐	☐	
6	☐	☐	☐	☐	☐	☐	☐	☐	
7	☐	☐	☐	☐	☐	☐	☐	☐	
8	☐	☐	☐	☐	☐	☐	☐	☐	
9	☐	☐	☐	☐	☐	☐	☐	☐	
10	☐	☐	☐	☐	☐	☐	☐	☐	
11	☐	☐	☐	☐	☐	☐	☐	☐	
12	☐	☐	☐	☐	☐	☐	☐	☐	
13	☐	☐	☐	☐	☐	☐	☐	☐	
14	☐	☐	☐	☐	☐	☐	☐	☐	
15	☐	☐	☐	☐	☐	☐	☐	☐	
16	☐	☐	☐	☐	☐	☐	☐	☐	

6.3 Delete Alarm Codes and Exit Handle Troubleshoot Mode

1. To delete all 16 most recent alarm codes and reset the alarm count to zero, press the two (2) center buttons (SYNC and WARM) at any time after entering Handle Troubleshoot Mode.
2. All the keypad LEDs will flash to indicate that the alarms have been deleted.
3. To exit Handle Troubleshoot Mode, move the Main Station Control Handles to NEUTRAL and turn the system OFF.

6.4 Alarm Code Troubleshoot Table

When these alarms occur, the system WILL NOT operate:

LEGEND

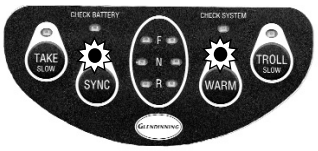
☼ = *indicates light is illuminated.*

ALARM INDICATOR	ALARM DESCRIPTION	COMMENTS
Keypad Lights ***Slow Beep***  ***Fast Beep*** 	**CODE #1** Detected multiple handles with the same handle ID at startup. *(Same Handle ID alarm)*	Make sure each control head station has a different handle ID (from 1-6). Restart system.
Keypad Lights ***Slow Beep***  ***Fast Beep*** 	**CODE #2** Combined battery voltage is too low for system operation (<9.0 V for 12V system or <18.0 V for 24V system) *(Low Battery alarm)*	System will SHUT DOWN. Make sure battery voltage goes back to within proper range. Restart system.
Keypad Lights ***Slow Beep***  ***Fast Beep*** 	**CODE #31** The Control Processor lost communication with handle #1. *(Communication Fault alarms #31 - #36)*	System will SHUT DOWN. Determine which handle caused communication fault and correct. Restart system.
 	**CODE #32** The Control Processor lost communication with handle #2.	
 	**CODE #33** The Control Processor lost communication with handle #3.	
 	**CODE #34** The Control Processor lost communication with handle #4.	
 	**CODE #35** The Control Processor lost communication with handle #5.	
 	**CODE #36** The Control Processor lost communication with handle #6.	

When these alarms occur, the system WILL CONTINUE to operate. The affected control head handle will not operate, however, the unaffected control head handle will control both engines. Control head handle affected will immediately go to NEUTRAL if both handles are inoperable:

Keypad Lights			
Slow Beep	***Fast Beep***		
		**CODE #11** Handle #1 PORT side potentiometer failure. *(Handle 1 PORT Pot Fault alarm)*	Handle #1 PORT side will follow STBD side as long as it continues to operate. Transfer control to alternate control station if available. Check control station.
		**CODE #12** Handle #2 PORT side potentiometer failure.	Same as above for Handles #2 thru #6.
		**CODE #13** Handle #3 PORT side potentiometer failure.	
		**CODE #14** Handle #4 PORT side potentiometer failure.	
		**CODE #15** Handle #5 PORT side potentiometer failure.	
		**CODE #16** Handle #6 PORT side potentiometer failure.	

When these alarms occur, the system WILL CONTINUE to operate. The affected control head handle will not operate, however, the unaffected control head handle will control both engines. Control head handle affected will immediately go to NEUTRAL if both handles are inoperable:

Keypad Lights			
Slow Beep	***Fast Beep***		
		**CODE #21** Handle #1 STBD side potentiometer failure. *(Handle 1 STBD Pot Fault alarm)*	Handle #1 STBD side will follow PORT side as long as it continues to operate. Transfer control to alternate control station if available. Check control station.
		**CODE #22** Handle #2 STBD side potentiometer failure.	Same as above for Handles #2 thru #6.
		**CODE #23** Handle #3 STBD side potentiometer failure.	
		**CODE #24** Handle #4 STBD side potentiometer failure.	
		**CODE #25** Handle #5 STBD side potentiometer failure.	
		**CODE #26** Handle #6 STBD side potentiometer failure.	

NOTES: If any alarm occurs, the cause of the alarm must be determined as soon as possible after returning to the dock. The alarm codes may be recovered to assist in troubleshooting. Contact Glendinning Marine Products for assistance.

Days (843) 399-6146 **Evenings (843) 477-6630**

The above number is a digital pager available during evening hours and/or weekends. Enter your phone # after you hear 3 beeps. Service personnel will return your call.

7.0 Appendix / Reference

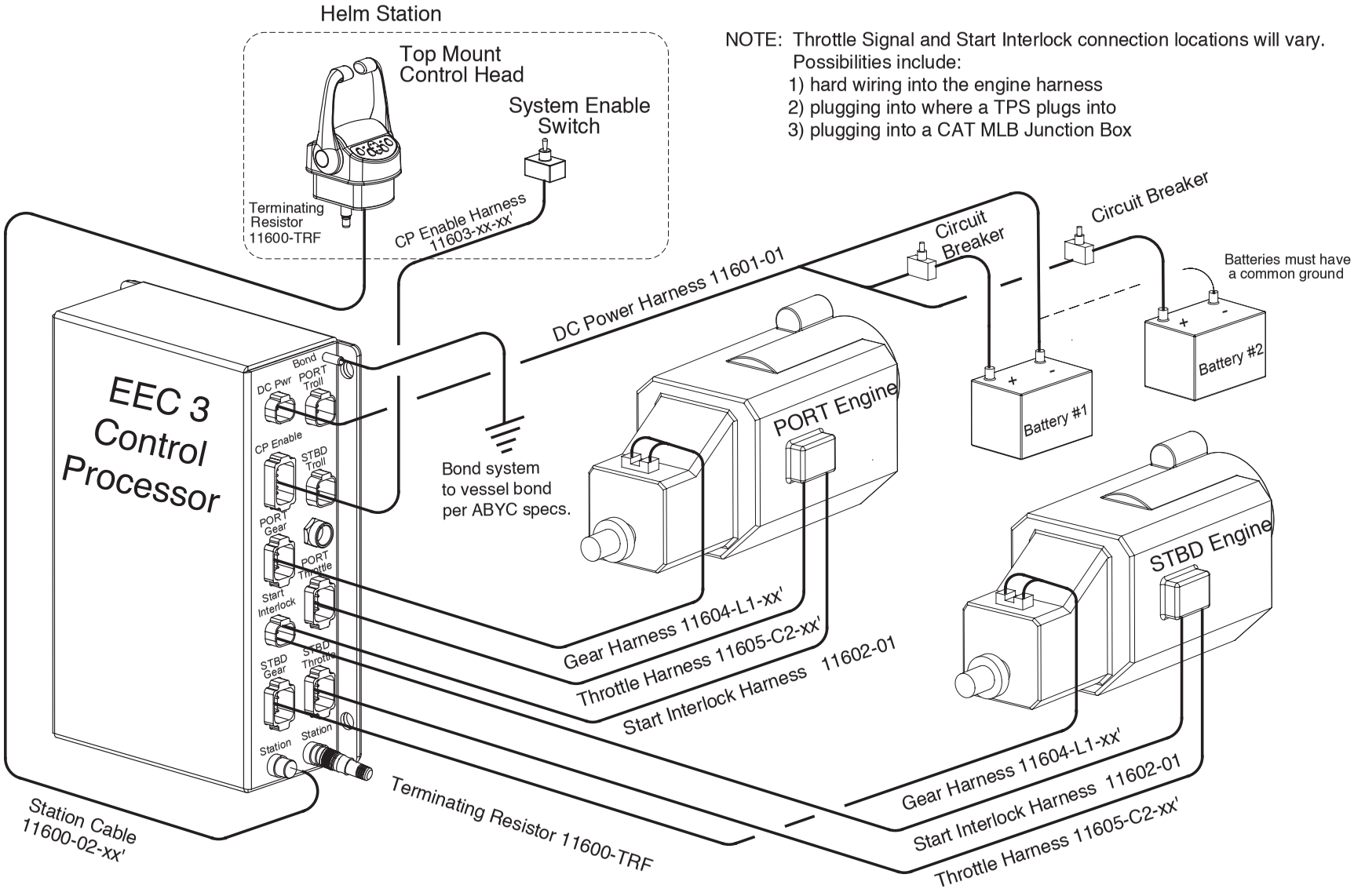
The Appendix / Reference section is divided as follows:

7.1 Wiring Diagrams (many other enigne layouts available, contact GMP)

7.2 Dimensional Drawings / Cutout Templates

7.3 EEC3 Gear / Throttle Backup Instructions

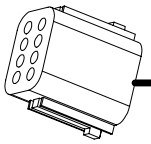
EEC 3 Control System Wiring Diagram - CAT Engine with ZF IRM Transmisions



EEC 3 Control System Harnesses - CAT Engine with ZF IRM Transmisions

Throttle Signal Harness
Part # 11605-C1-xx' has 3 pos. Deutsch Connector which plugs into where a CAT TPS plugs into
Part # 11605-C2-xx' has a blunt cut end for wiring into harnesses
Part # 11605-C3-xx' had a 12pos. Deutsch for plugging into a CAT MLB Junction Box

Cat Engine End



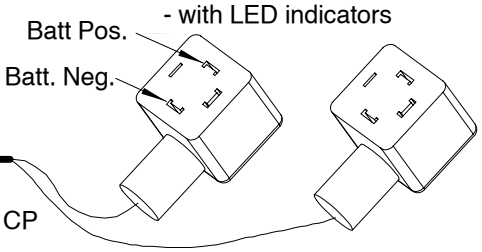
(5'- 30' lengths avail. in 5' increments)
xx' in part number represents length of harness

Red wire - Batt. Pos.
White wire - Throttle Output PWM Signal
Green wire - Batt. Neg.

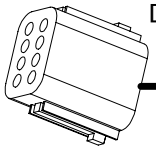
Control Processor End
Duetsch 8 pos. Black

Transmission Harness
Part # 11604-L1-xx' with LED indicators

ZF Solenoid Valve Connectors - with LED indicators



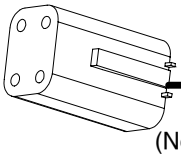
Control Processor End
Duetsch 8 pos. Grey



(5'- 30' lengths avail. in 5' increments)
xx' in part number represents length of harness

NOTE: Voltage output will be the same as input to CP

DC Power Harness
Part # 11601-01 (30' long std.)



Control Process End
Duetsch 4 pos. Black

Battery Positive #1 (Red wire)
Battery Positive #2 (Red wire)
Battery Negative (yellow wire)

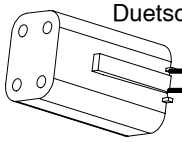
(Noise Supression devices)

NOTE: Power wires are 30' long standard (custom lengths available)

Start Interlock Harness
Part # 11602-01 (30' long std.)

NOTE: N.C. circuit between wires for PORT and STBD
Circuit OPENS when system is ON and is NOT in Neutral position
8 amp max current

Control Process End
Duetsch 4 pos. Black



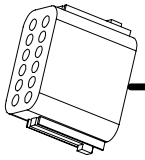
NOTE: Each start interlock wire is 30' long standard (custom lengths available)

PORT
STBD

NOTE : All wires are yellow with red stripe

CP Enable Harness
Part # 11603-12-xx' 12v DC system
Part # 11603-24-xx' 24v DC system
Part # 11603-02-xx' 12 or 24v DC system- pinned in the field

CP Enable Switch End
- installer provided switch or
- GMP can provide a waterproof rocker switch with switch namepate



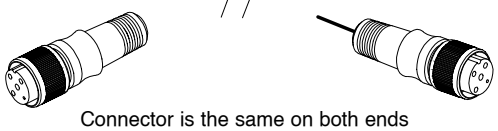
(10' - 100' lengths avail. in 10' increments)
xx' in part number represents length of harness

White
Black

Control Process End
Duetsch 12 pos. Grey

NOTE: DO NOT provide power to this end, only close the circuit using a N.O. switch

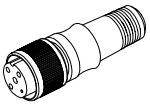
Station Cable
Part # 11600-02-xx' (available 20' - 100' in 20' increments)



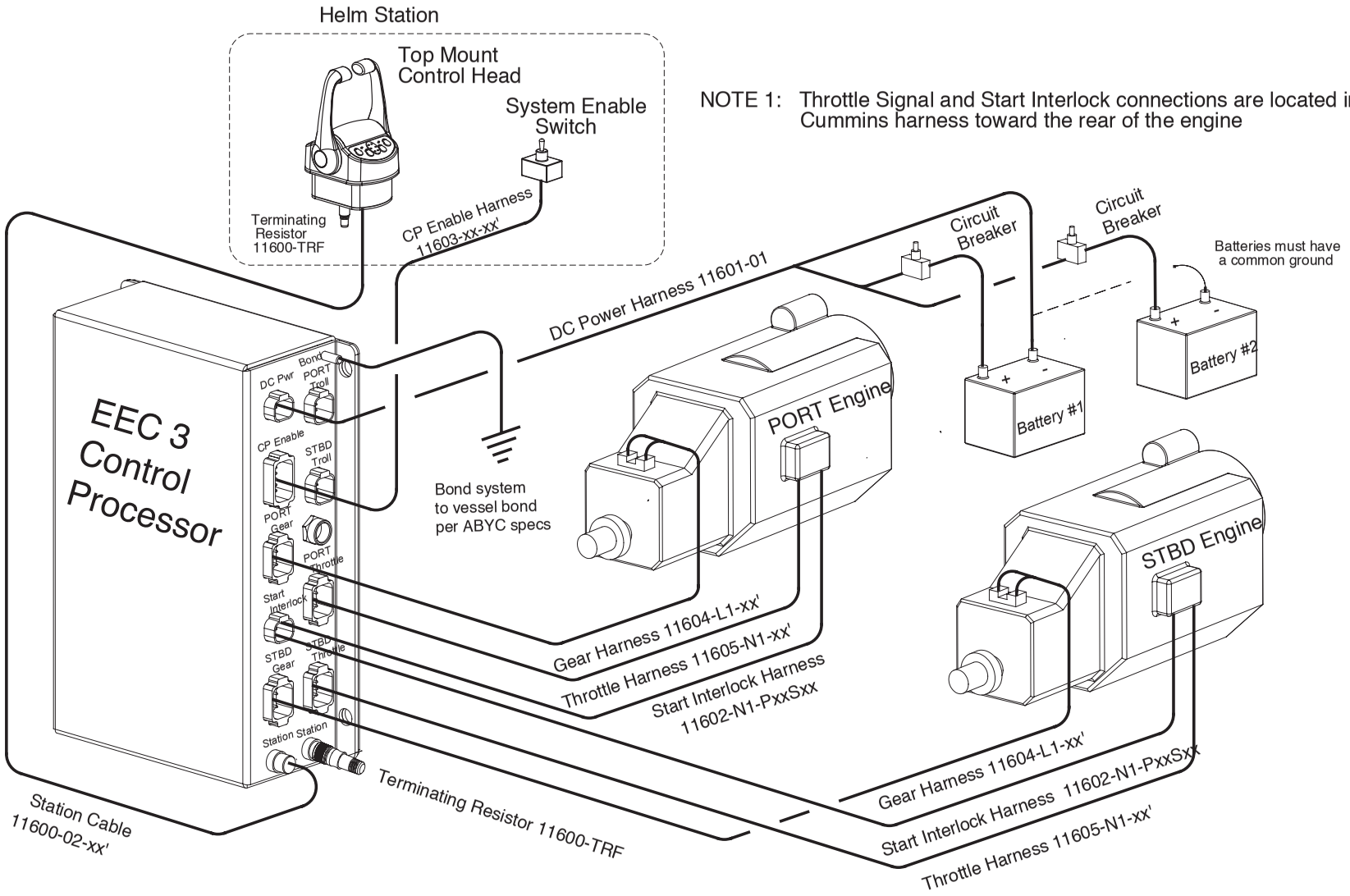
Connector is the same on both ends

Terminating Resistor
Part # 11600-TRF

Two required per system



EEC 3 Control System Wiring Diagram - Cummins QSM11 with ZF IRM Transmisions

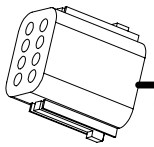


EEC 3 Control System Harnesses - Cummins QSM11 with ZF IRM Transmisions

Throttle Signal Harness
Part # 11605-N1-xx'

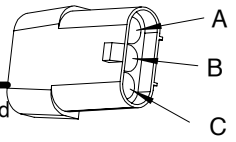
Packard Weatherpack
3 pos. Connector

Connections
A Throttle Reference Voltage - (Green wire)
B Throttle Voltage Signal (White Wire)
C Throttle Reference Voltage + (Red wire)



(5'- 30' lengths avail. in 5' increments)
xx' in part number represents length of harness

Control Process End
Duetsch 8 pos. Black

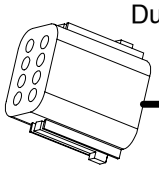


NOTE : A,B,C is molded into the connector

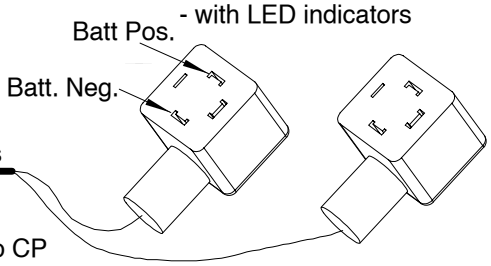
Transmission Harness
Part # 11604-L1-xx' with LED indicators

ZF Solenoid Valve Connectors
- with LED indicators

Control Process End
Duetsch 8 pos. Grey



(5'- 30' lengths avail. in 5' increments)
xx' in part number represents length of harness

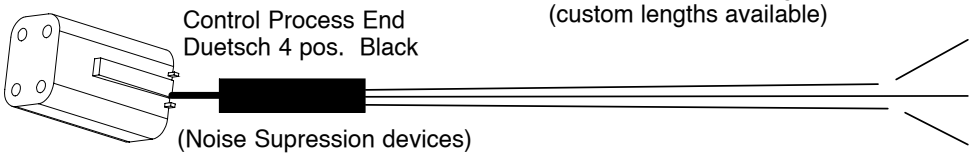


NOTE: Voltage output will be the same as input to CP

DC Power Harness
Part # 11601-01 (30' long std.)

NOTE: Power wires are 30' long standard
(custom lengths available)

Control Process End
Duetsch 4 pos. Black



(Noise Supression devices)

Battery Positive #1
(Red wire)

Battery Positive #2
(Red wire)

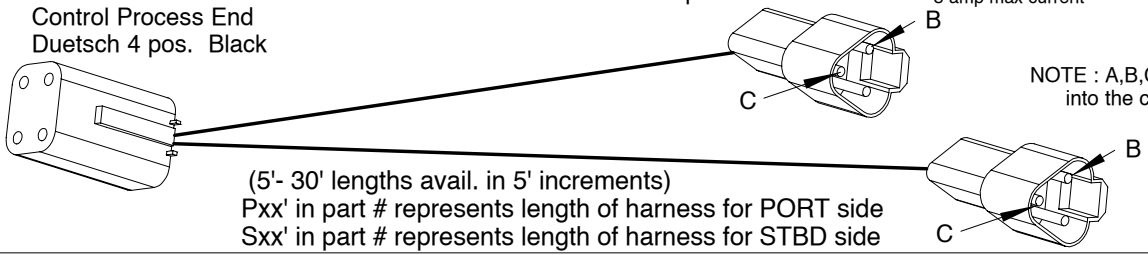
Battery Negative
(yellow wire)

Start Interlock Harness
Part # 11602-N1-PxxSxx

Cummins Start
Interlock Connector
Deutsch 3 pos.

NOTE: N.C. Circuit between B & C positions.
Circuit OPENS when system is ON and
NOT in Neutral position
8 amp max current

Control Process End
Duetsch 4 pos. Black

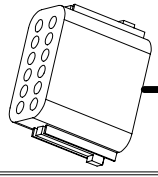


NOTE : A,B,C is molded into the connector

(5'- 30' lengths avail. in 5' increments)
Pxx' in part # represents length of harness for PORT side
Sxx' in part # represents length of harness for STBD side

CP Enable Harness
Part # 11603-12-xx' 12v DC system
Part # 11603-24-xx' 24v DC system
Part # 11603-02-xx' 12 or 24v DC system- pinned in the field

CP Enable Switch End
- installer provided switch or
- GMP can provide a waterproof rocker switch with switch namepate



(10' - 100' lengths avail. in 10' increments)
xx' in part number represents length of harness

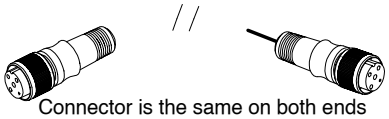
White

Black

Control Process End
Duetsch 12 pos. Grey

NOTE: DO NOT provide power to this end, only close the circuit using a N.O. switch

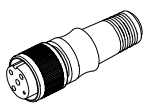
Station Cable
Part # 11600-02-xx' (available 20' - 100' in 20' increments)



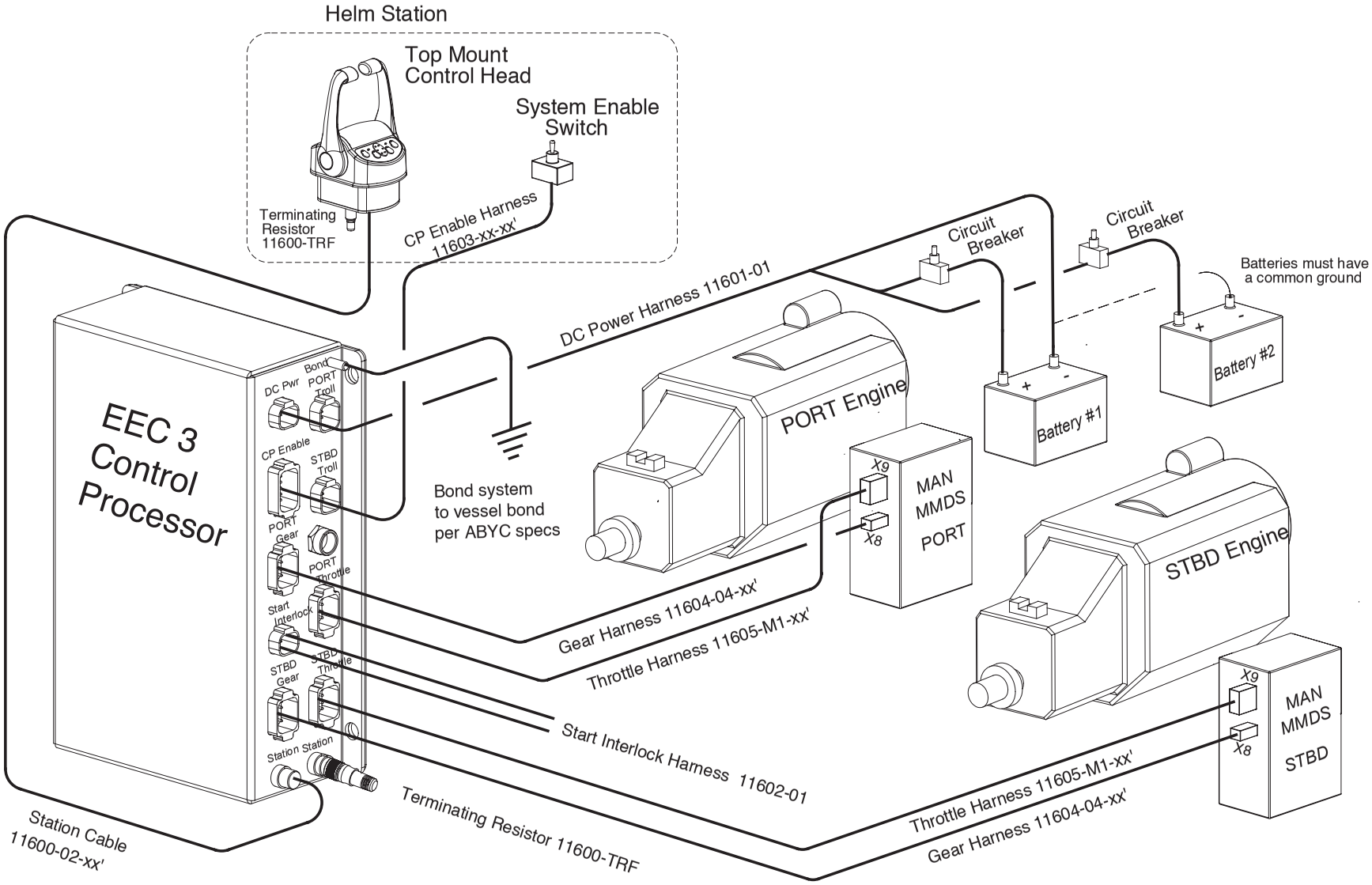
Connector is the same on both ends

Terminating Resistor
Part # 11600-TRF

Two required per system



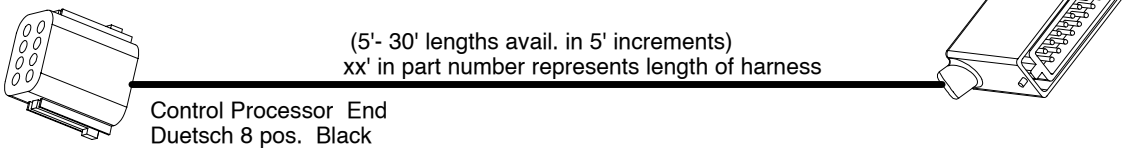
EEC 3 Control System Wiring Diagram - MAN Engine with ZF IRM Transmisions



EEC 3 Control System Harnesses - MAN Engine MMDS with ZF IRM Transmisions (using gear connections at the X8 MAN MMDS Box)

Throttle Signal Harness
Part # 11605-M1-xx' For MAN MMDS Box Connections
Plus into the MAN X9 connection

MAN MMDS Box End
Harting 16 pos. connector
X9 connection

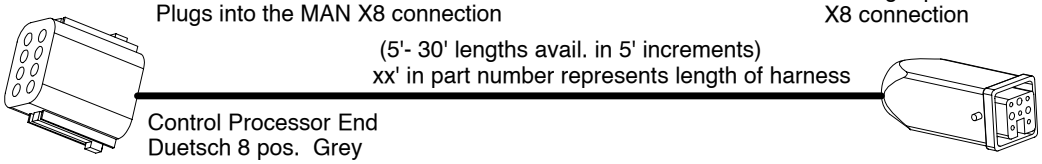


(5'- 30' lengths avail. in 5' increments)
xx' in part number represents length of harness

Control Processor End
Duetsch 8 pos. Black

Transmission Harness
Part # 11604-04-xx' For MAN MMDS Box connection
Plus into the MAN X8 connection

MAN MMDS Box End
Harting 8 pos. connector
X8 connection



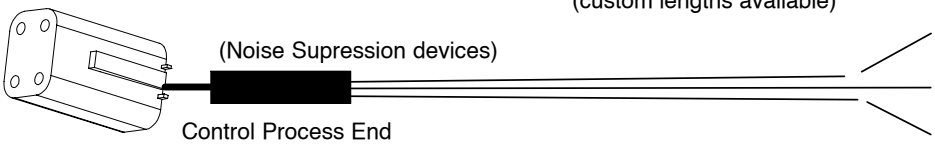
(5'- 30' lengths avail. in 5' increments)
xx' in part number represents length of harness

Control Processor End
Duetsch 8 pos. Grey

NOTE: Voltage output will be the same as input to CP

DC Power Harness
Part # 11601-01 (30' long std.)

NOTE: Power wires are 30' long standard
(custom lengths available)



(Noise Supression devices)

Battery Positive #1
(Red wire)

Battery Positive #2
(Red wire)

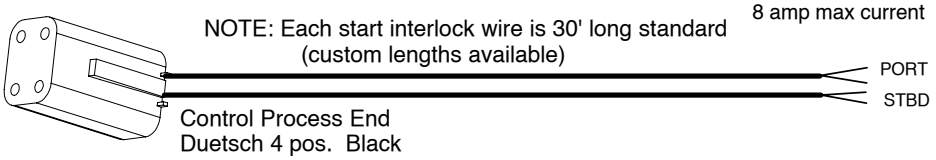
Battery Negative
(yellow wire)

Control Process End
Duetsch 4 pos. Black

Start Interlock Harness
Part # 11602-01 (30' long std.)

NOTE: N.C. circuit between wires for PORT and STBD
Circuit OPENS when system is ON and
is NOT in Neutral position
8 amp max current

NOTE: Each start interlock wire is 30' long standard
(custom lengths available)



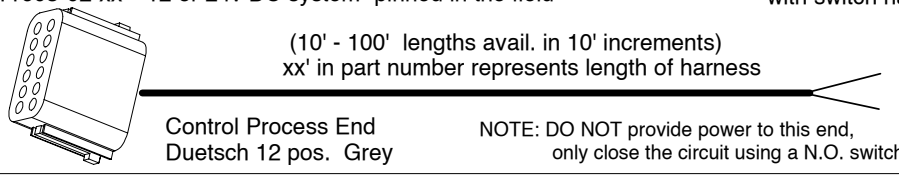
PORT
STBD

NOTE : All wires are yellow
with red stripe

Control Process End
Duetsch 4 pos. Black

CP Enable Harness
Part # 11603-12-xx' 12v DC system
Part # 11603-24-xx' 24v DC system
Part # 11603-02-xx' 12 or 24v DC system- pinned in the field

CP Enable Switch End
- installer provided switch or
- GMP can provide a waterproof rocker switch
with switch namepate



(10' - 100' lengths avail. in 10' increments)
xx' in part number represents length of harness

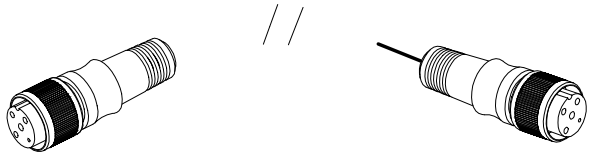
White

Black

Control Process End
Duetsch 12 pos. Grey

NOTE: DO NOT provide power to this end,
only close the circuit using a N.O. switch

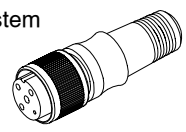
Station Cable
Part # 11600-02-xx' (available 20' - 100' in 20' increments)



Connector is the same on both ends

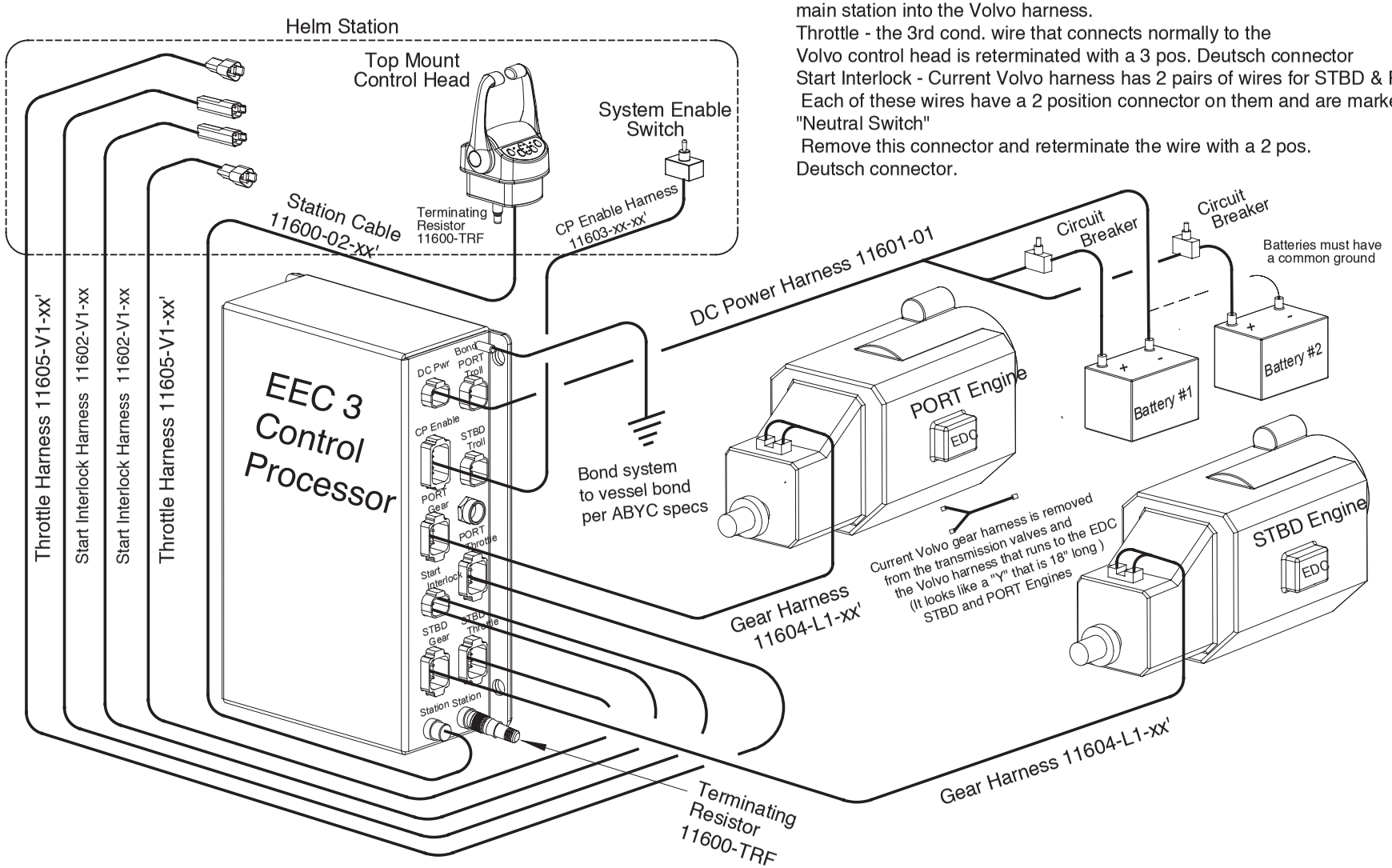
Terminating Resistor
Part # 11600-TRF

Two required per system



EEC 3 Control System Wiring Diagram - Volvo EDC with ZF IRM Transmisions

NOTE 1: Throttle Signal and Start Interlock connections are made at the main station into the Volvo harness.
Throttle - the 3rd cond. wire that connects normally to the Volvo control head is reterminated with a 3 pos. Deutsch connector
Start Interlock - Current Volvo harness has 2 pairs of wires for STBD & PORT. Each of these wires have a 2 position connector on them and are marked "Neutral Switch"
Remove this connector and reterminate the wire with a 2 pos. Deutsch connector.



EEC 3 Control System Harnesses - Volvo EDC with ZF IRM Transmisions

Throttle Signal Harness
Part # 11605-V1-xx'

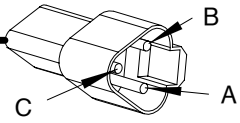
Control Process End
Duetsch 8 pos. Black

(5'- 30' lengths avail. in 5' increments)
xx' in part number represents length of harness

NOTE : A,B,C is molded into the connector
See next page for Volvo Harness connections

Volvo Harness End Duetsch 3 pos. Connector
- note see next page for wiring harness connections

Connections
A Throttle Reference Voltage - (Green wire)
B Throttle Voltage Signal (White Wire)
C Throttle Reference Voltage + (Red wire)



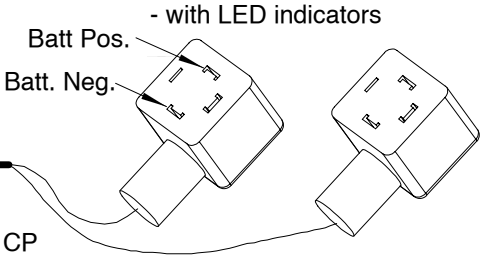
Transmission Harness
Part # 11604-L1-xx' with LED indicators

Control Process End
Duetsch 8 pos. Grey

(5'- 30' lengths avail. in 5' increments)
xx' in part number represents length of harness

NOTE: Voltage output will be the same as input to CP

ZF Solenoid Valve Connectors
- with LED indicators



DC Power Harness
Part # 11601-01 (30' long std.)

Control Process End
Duetsch 4 pos. Black

(Noise Supression devices)

NOTE: Power wires are 30' long standard
(custom lengths available)

Battery Positive #1
(Red wire)

Battery Positive #2
(Red wire)

Battery Negative
(yellow wire)

Start Interlock Harness
Part # 11602-V1-xx

Control Process End
Duetsch 4 pos. Black

(5'- 30' lengths avail. in 5' increments)
xx' in part # represents length of harness

Volvo Harness End
Deutsch 2 pos. Connector

NOTE: N.C. Circuit between pins
Circuit OPENS when system
is ON and NOT in Neutral position
8 amp max current

NOTE : See next page for Volvo Harness connections

CP Enable Harness
Part # 11603-12-xx' 12v DC system
Part # 11603-24-xx' 24v DC system
Part # 11603-02-xx' 12 or 24v DC system - pinned in the field

Control Process End
Duetsch 12 pos. Grey

(10' - 100' lengths avail. in 10' increments)
xx' in part number represents length of harness

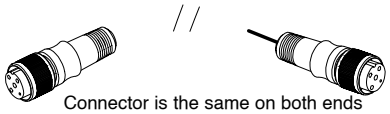
White

Black

NOTE: DO NOT provide power to this end,
only close the circuit using a N.O. switch

CP Enable Switch End
- installer provided switch or
- GMP can provide a waterproof rocker switch
with switch namepate

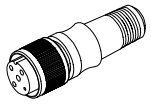
Station Cable
Part # 11600-02-xx' (available 20' - 100' in 20' increments)



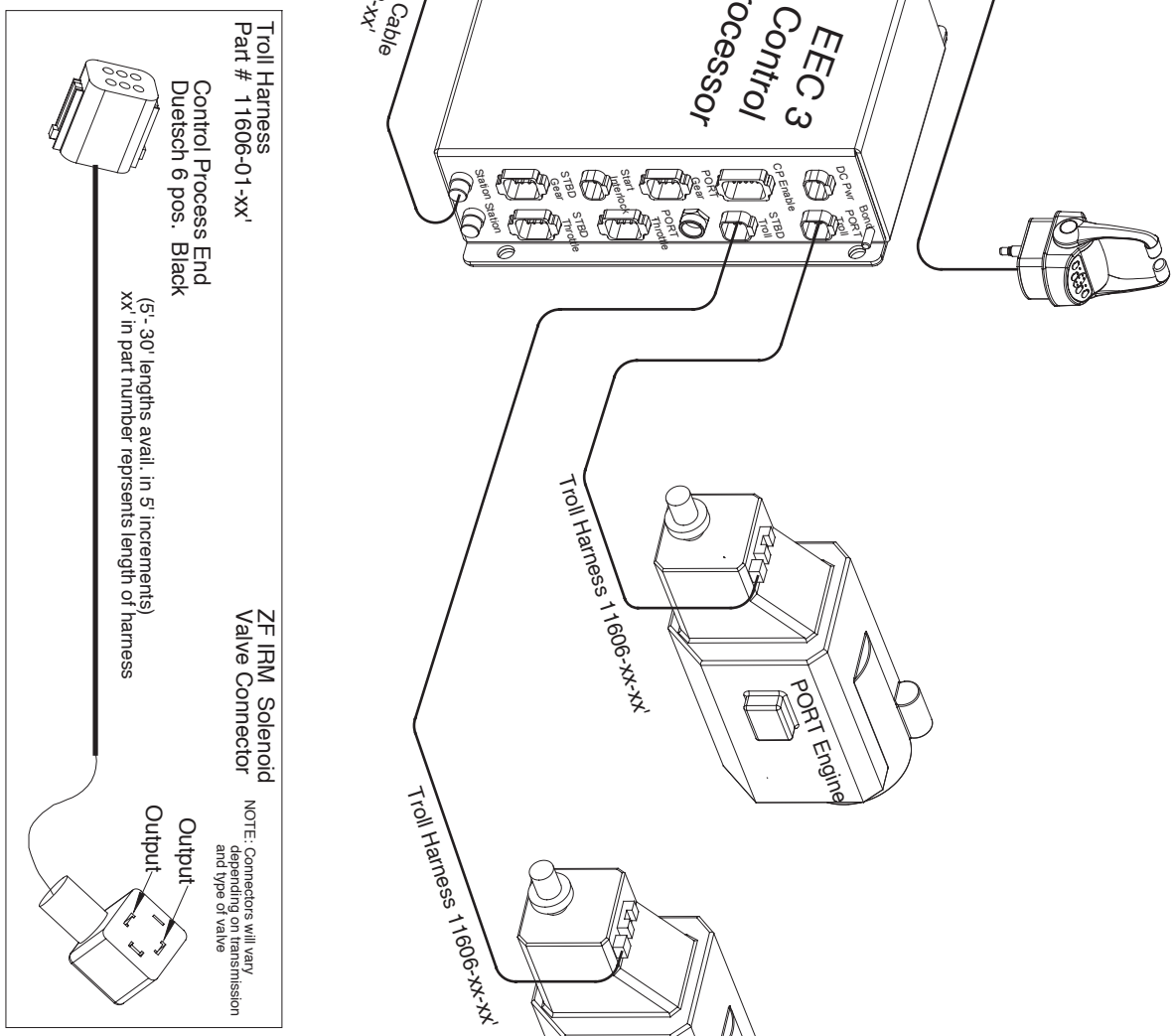
Connector is the same on both ends

Terminating Resistor
Part # 11600-TRF

Two required per system



EEC3 Troll Harness Connections (other harnesses available—contact GMP for details)



DC Power Connector (4 pin-Gray)

(1) Battery Positive 1
(2) Battery Positive 2
(3) Battery Ground 1
(4) Battery Ground 2 (optional, if required)

CP Enable/Spare Connector (12 pin-Gray)

(1) Ign. input 1/Spare output 1 (COM1)
(2) Ign. input 2/Spare output 1 (COM2)
(3) Spare output 2 (COM)
(4) Switch select - Ignition
(5) Voltage select -12V*
(6) Voltage select - (COM)*
(7) Voltage select - 24V*
(8) Switch select - dry switch*
(9) Switch select - (COM)*
(10) Spare output 2 (NO)
(11) Ign. output 2/Spare output 1 (NO2)
(12) Ign. output 1/Spare output 1 (NO1)

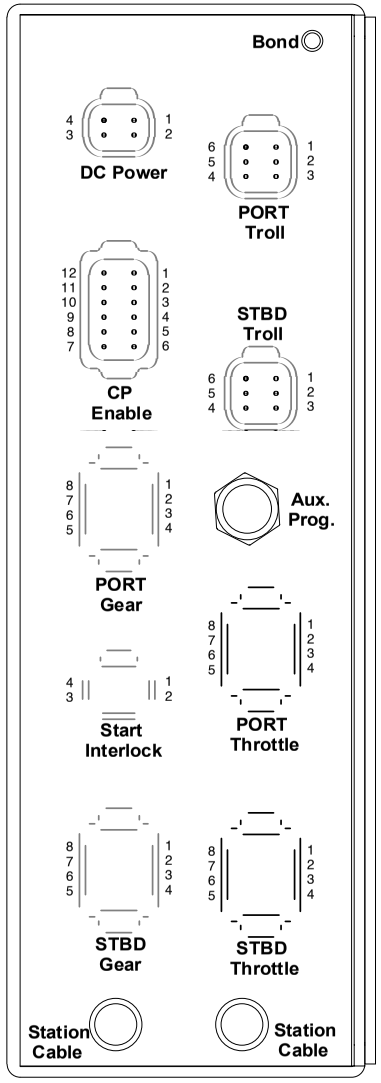
Note:
* references commonly used pins for this connector.
12V -(pins: 5,6) (8,9 - jumper), 24V -(pins: 6,7) (8,9 - jumper)

Start Interlock Connector (4 pin-Gray)

(1) PORT Start Interlock 1
(2) PORT Start Interlock 2
(3) STBD Start Interlock 1
(4) STBD Start Interlock 2

PORT/STBD Gear Connectors (8 pin-Gray)

(1) FWD Battery Positive +
(2) FWD Switch (COM)
(3) FWD Switch (NO)
(4) FWD Battery Negative -
(5) REV Battery Negative -
(6) REV Switch (NO)
(7) REV Contact (COM)
(8) REV Battery Positive +



PORT/STBD Troll Connectors (6 pin-Gray)

(1) Adj. current Pos. +
(2) Sec. coil Pos. (+12/24VDC)
(3) Not Used
(4) Chassis Ground
(5) Sec. coil Neg. (GND)
(6) Adj. current Neg. -

Throttle Connections - 4 available Types

PORT/STBD Throttle Connectors- Voltage Type (8 pin-Black)

(1) Not used
(2) Ref. voltage Pos.+
(3) Ref. voltage Neg.-
(4) Voltage signal
(5) Not Used
(6) Not Used
(7) Not used
(8) Chassis ground

PORT/STBD Throttle Connectors- PWM Type (8 pin-Black)

(1) Batt./PWM Pos. +
(2) PWM output signal
(3) Batt./PWM Neg. -
(4) Not used
(5) Not used
(6) Not used
(7) Not used
(8) Chassis ground

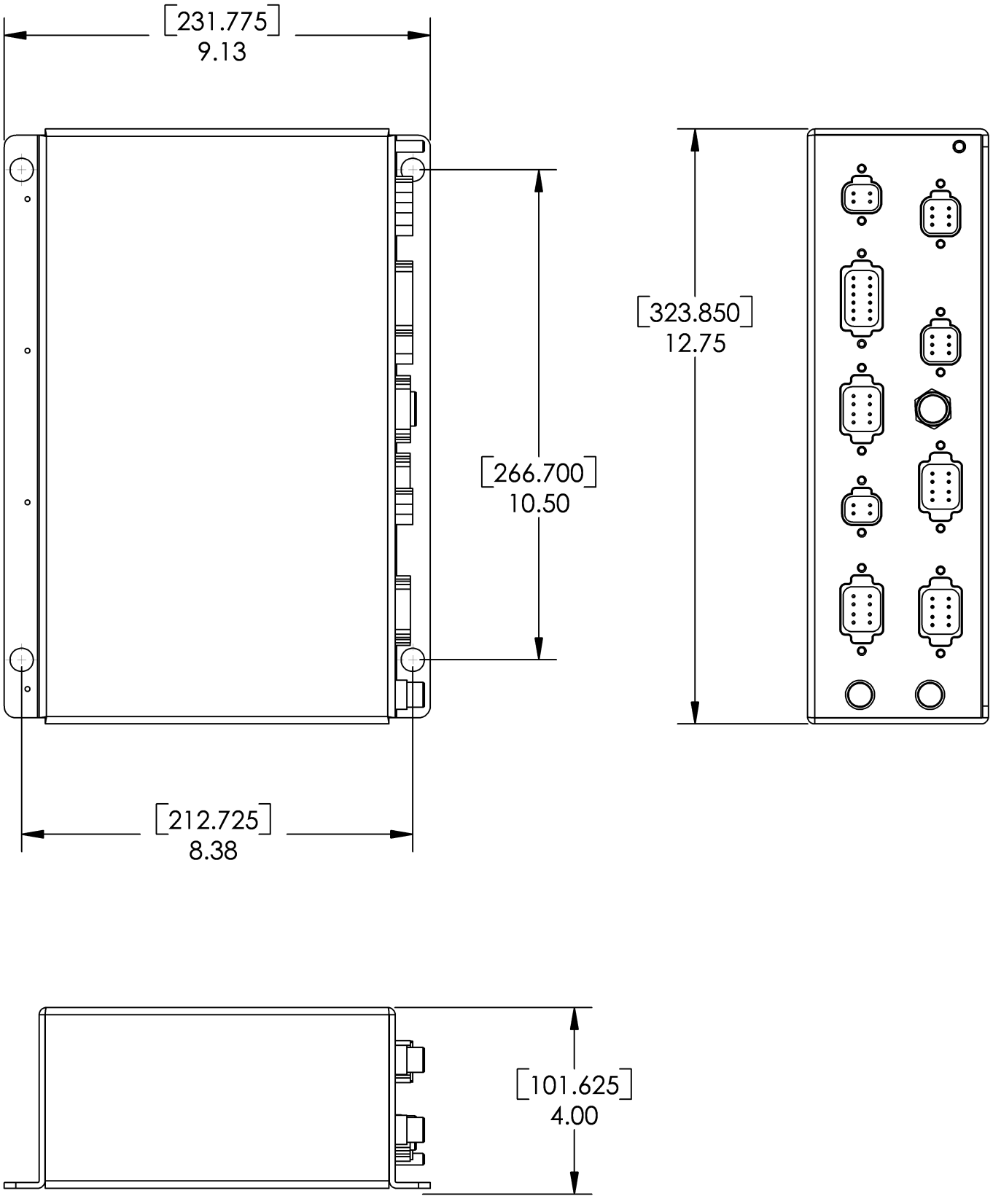
PORT/STBD Throttle Connectors- 4-20mA Type (8 pin-Black)

(1) Not used
(2) Speed sig. input Pos. +
(3) Not used
(4) Not used
(5) 4-20mA output Pos. +
(6) 4-20mA output Neg. -
(7) Speed sig. input Neg. -
(8) Chassis ground

PORT/STBD Throttle Connectors- MEFI Type (8 pin-Black)

(1) Ref. voltage 2 Pos. +
(2) Ref. voltage 1 Pos. +
(3) Ref. voltage 1 Neg. -
(4) Output signal 1
(5) Output signal 2
(6) Ref. voltage 1 Neg. -
(7) Not used
(8) Chassis ground

Control Processor Dimensions



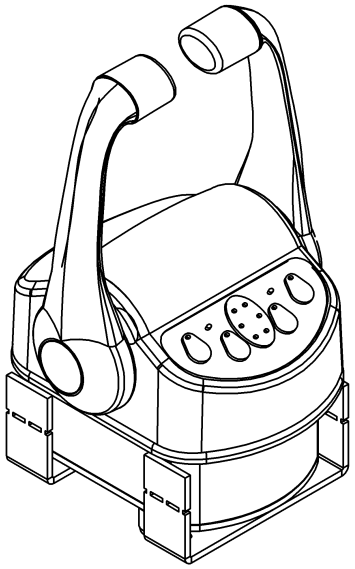
EEC3 CONTROL PROCESSOR

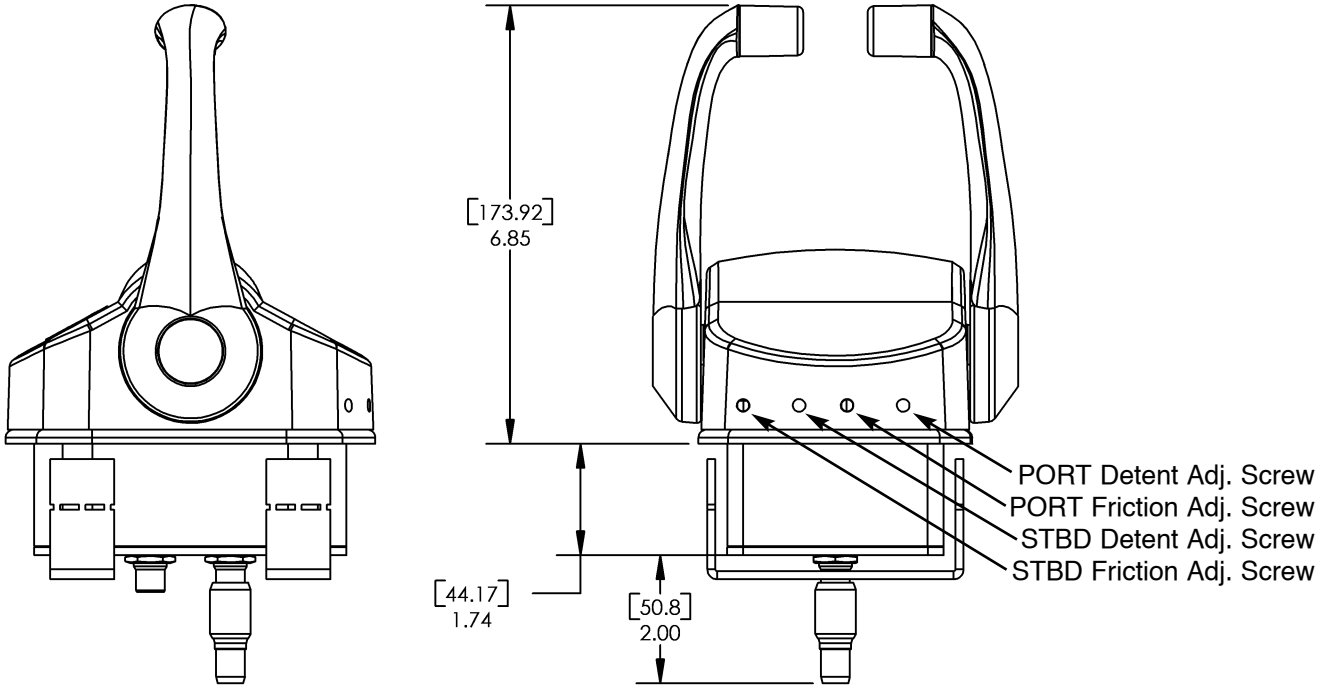
GMP PART# 11230

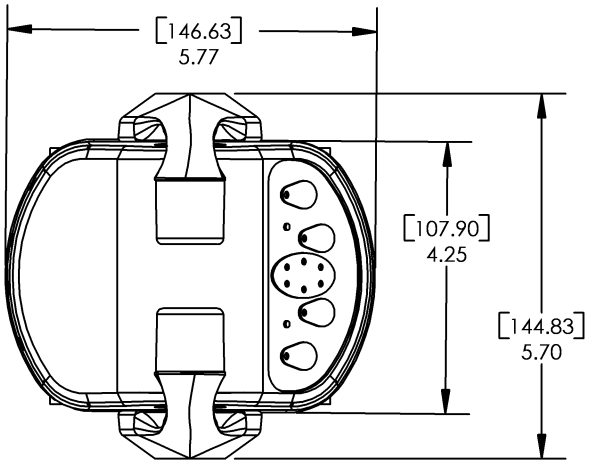
Control Head Dimensions (Top Mount)

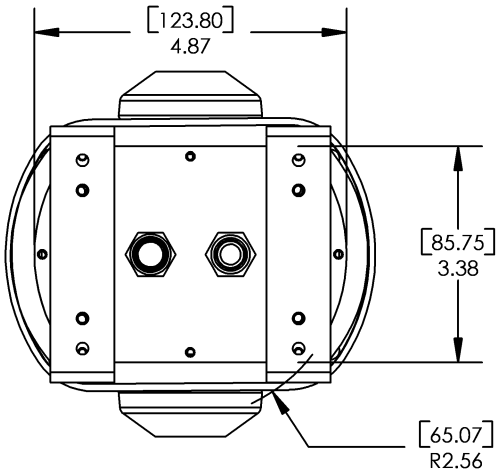
EEC3 CONTROL HEAD (TOP MOUNT)

GMP PART# 11413-C15T

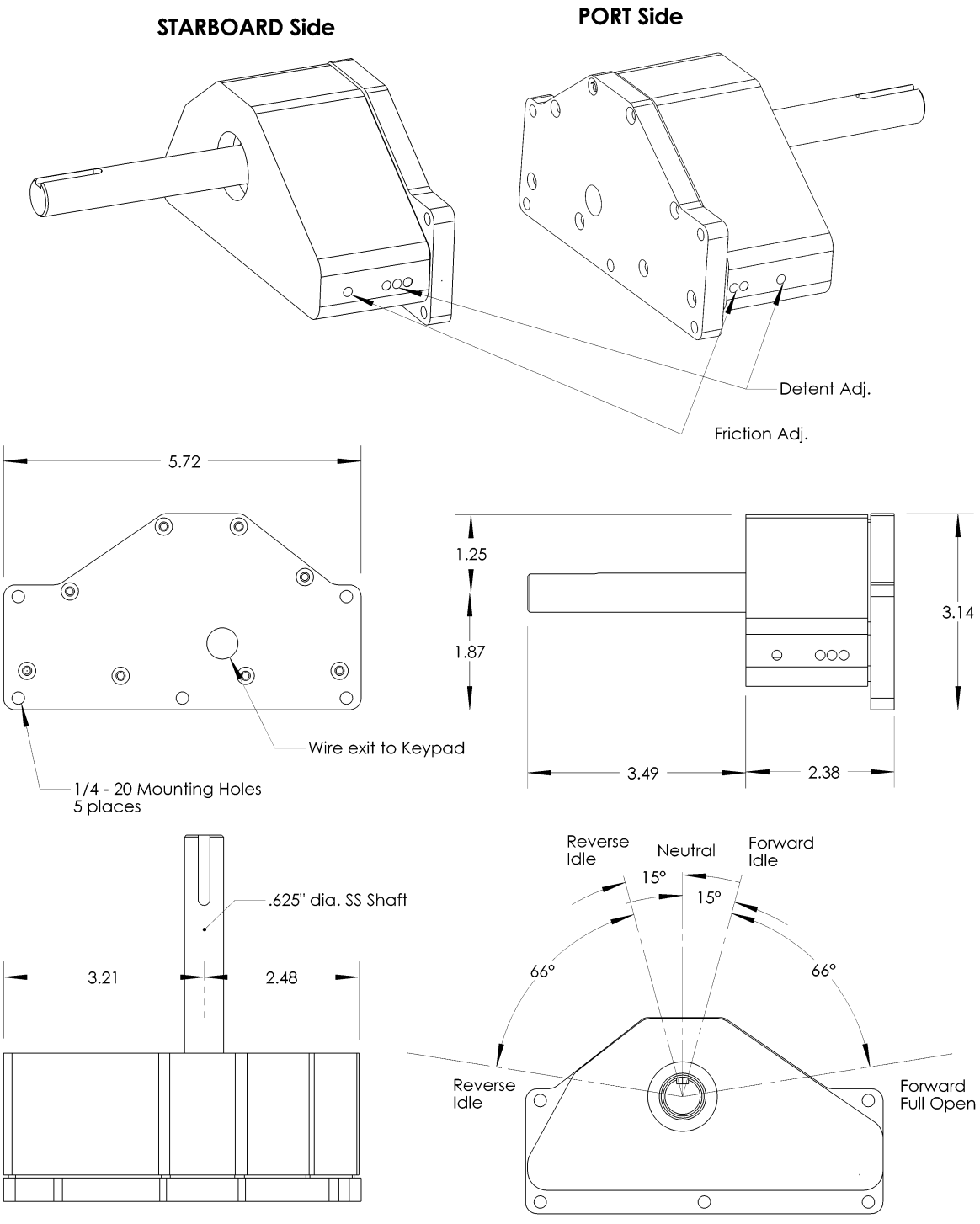








Sidemount Handle Control Dimensions

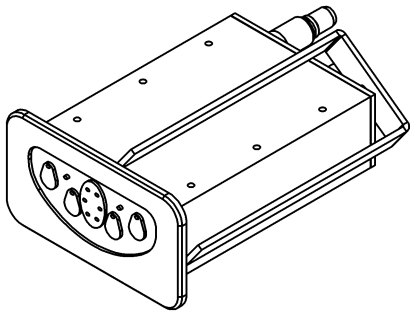


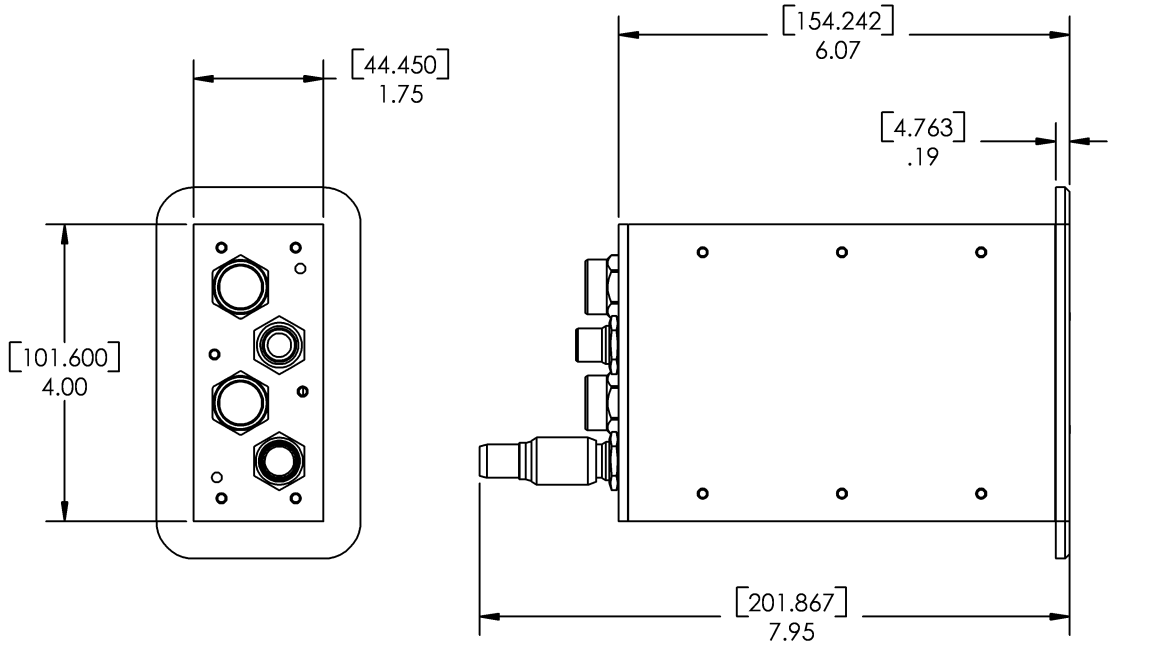
(STARBOARD Side Handle Shown)

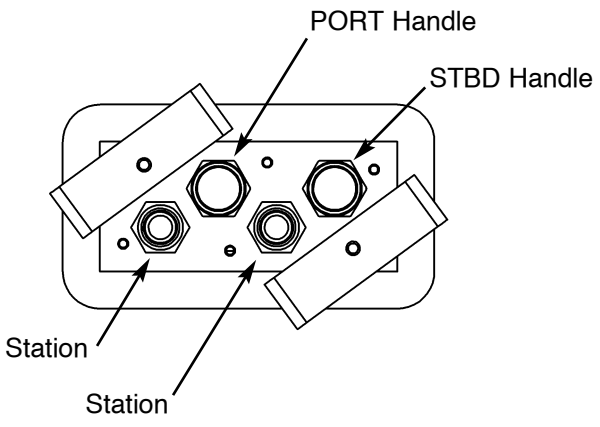
Sidemount Keypad Assembly Dimensions

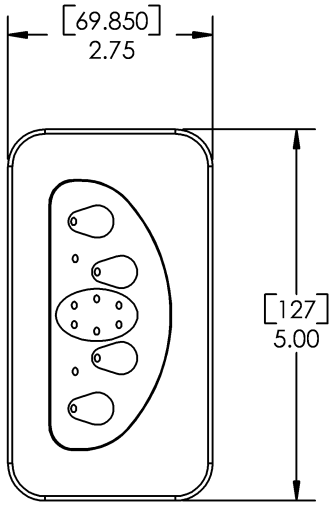
EEC3 SIDEMOUNT KEYPAD ASSEMBLY

GMP PART#

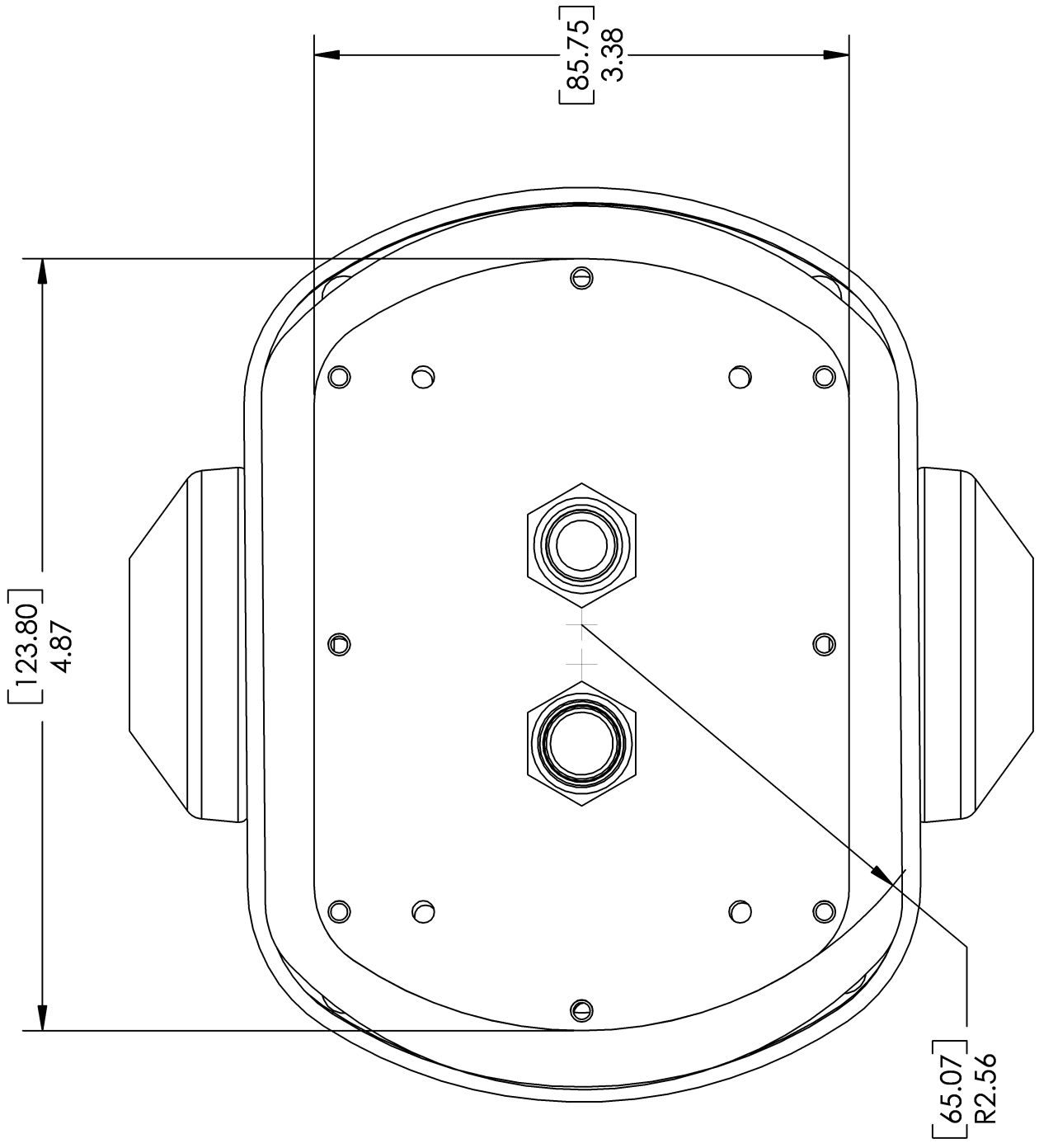




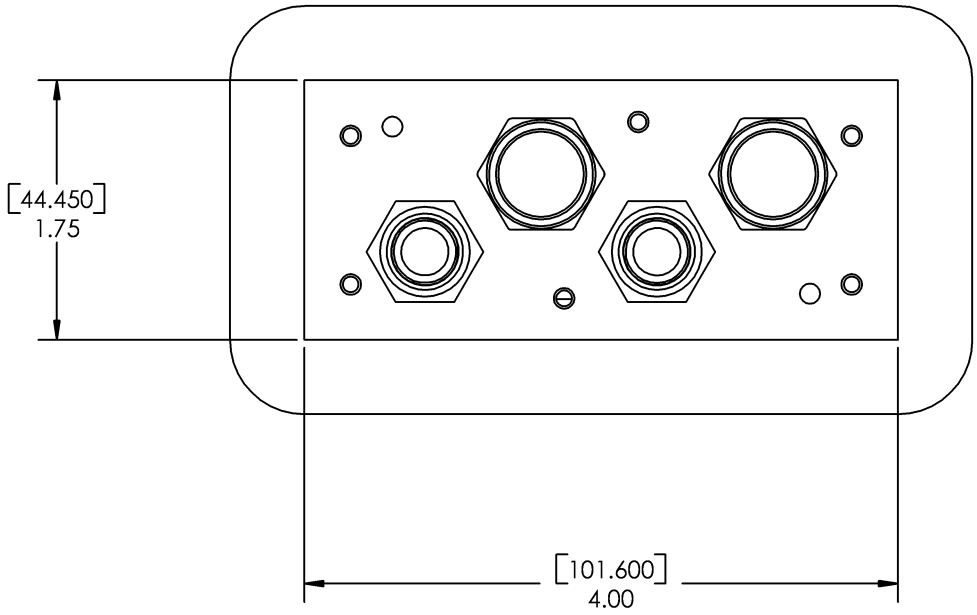




Cutout Template for Control Head (Top Mount)



Cutout Template for Sidemount Keypad Assembly



7.3 EEC3 Gear / Throttle Backup System

A. Description

The EEC Gear / Throttle Backup System allows the control of the transmission solenoid valves, as well as engine throttle through separate potentiometers other than the EEC Control System in the event of a failure. These separate potentiometers are mounted in one of the EEC Control Heads installed in the vessel. The switchover from the normal operation to backup operation is actuated by an Enable Switch mounted in the console. This Enable Switch turns on the Transfer Box which transfers control of the gear / throttle from the EEC Control System to the backup system. Presently this backup system is only for the gear / throttle and not for the trolling valves. In failure conditions the trolling valve will default to full lockup when power is removed.

B. Operation

Under normal operations, the gear and throttle are controlled by our EEC Control Processor (CP). This signal runs through the normally closed contacts of a relay in the Backup Transfer Box.

Once there is a failure of the control system, (noted by all four mode LED's blinking and a tone is heard from the Control Head) the vessel captain would switch the backup system switch on. (Note, we recommend that this on/off enable switch be protected so it cannot be accidentally energized.) This would energize all the relays in the Transfer Box and the gear / throttle would then be controlled by the backup potentiomenters that are mounted in one of the boat Control Heads. One other feature that is still operational in the backup mode is the start interlock function. This function will not allow the captain to start the engines when the transmissions are in forward or reverse gear. They must be in neutral in order to start the engines.

Backup System Items

There are three main components of the Backup System.

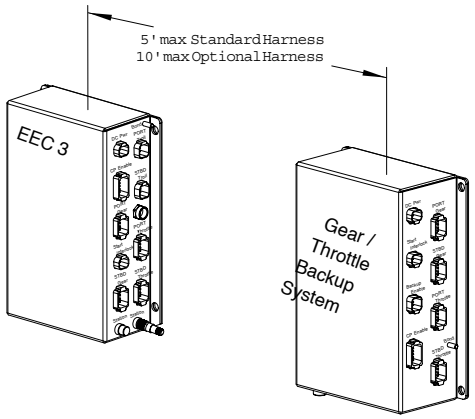
EEC Control Head with Backup potentiometers - Externally this looks like a normal control head but internally it has extra potentiometers mounted. These potentiometers control the port and starboard gear / throttle when the backup system is activated. Underneath this control head also has two wire exit holes on the bottom cover instead of one. One exit hole is for the normal station cable that runs to the CP and the other hole is for the cable that runs to the Backup System Transfer Box. Once the bottom cover is removed there is an instruction label inside that explains the connections and shows the model and part #.

EEC-GT Backup System Transfer Box - The Transfer Box is mounted near (within 10 feet) of the EEC Control processor. This transfer box is comprised of relays which control the gear / throttle when the system is in backup mode. Externally this box has watertight connectors that the harnesses plug into. The power for this Transfer Box is normally run from the same source that the Control Processor is connected to. The backup system can be powered by 10 - 40volts DC.

Backup System Harnesses - These are pre-terminated harnesses which redirect the start interlock, power switch, gear and throttle signals to run through the transfer box before running to the various connections on the boat.

C. Installation

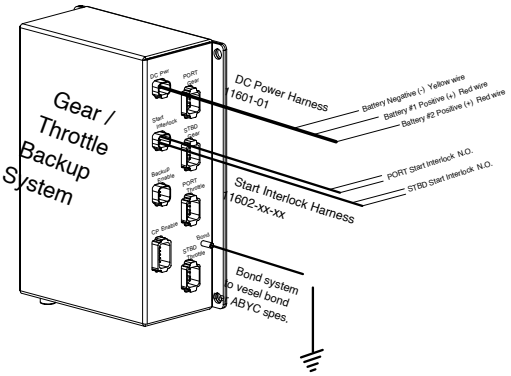
1)Mount the Transfer Box within 10 feet of the EEC 2001 Control Processor which is normally mounted in the engine room. (Note: the harnesses which run from the CP to the



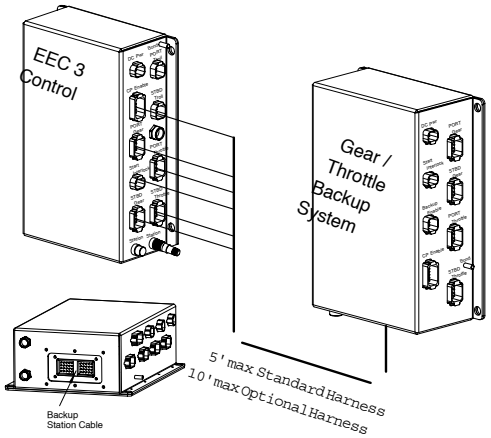
Transfer Box come in 5' standard or 10' optional lengths.)

2) Install the various harnesses which run from the CP to the Transfer Box and to the engine.

a. DC Power and Start Interlock and Bond Wire - This harness has brown connectors (8 position) on each end and a set of wires which run to the DC power and the start interlock connections. This harness feeds DC power to the Transfer Box. It also sends the Start Interlock signals to the Transfer Box so that in backup mode the start interlock function will still operate. The backup system operating voltage range is 10-36 volts and is low current so the breaker that supplies power to the EEC system is adequate for the Backup System.

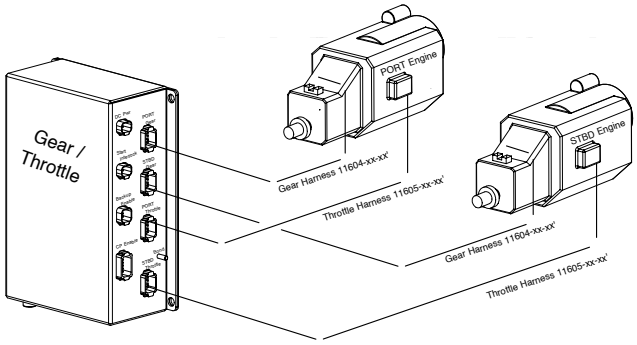


b. Interconnect Harness - This harness has six various connectors on one end and a large (40 pos.) connector on the other end. The harnesses' six various connector are plugged into the CP's CP enable, Port & Stbd Gear, Port & Stbd Throttle, and Start Interlock con-

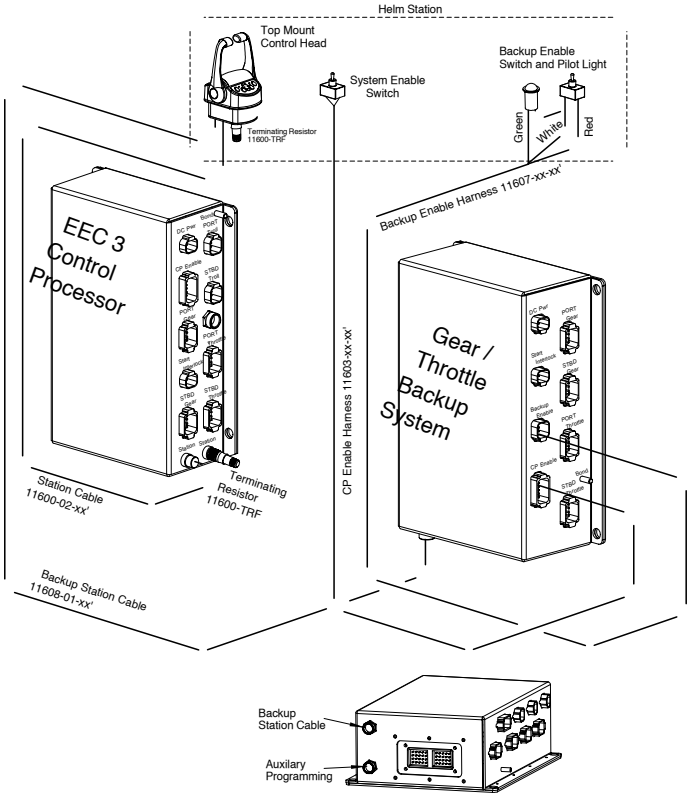


nectors. The large (40 pos) connector is plugged into the bottom of the GTB Box (NOTE: The socket head screw must be tightened which will seat the connector into it's receptacle). The connector that is currently plugged into the CP's CP enable connector is plugged into the Transfer Box's 12 pos. connector marked CP Enable.

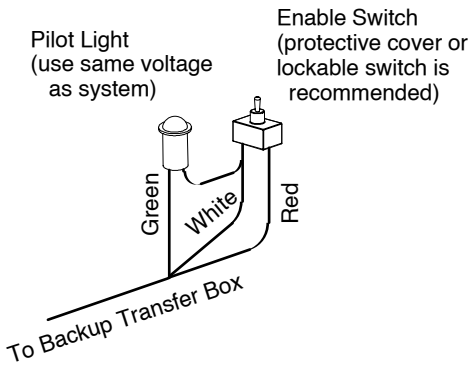
c. Gear & Throttle Harness - These harnesses have grey & black (8 pos.) connectors on one end. These route the gear & throttle to each engine and transmission. Unplug the 2 connectors that are plugged into the CP's connectors marked STBD and PORT Gear STBD and PORT THROTTLE and plug them into their respective connectors on the GTB Backup Box.



3) Backup Control / Enable Switch Harnesses - This harness has two wires strapped together. One wire has one large black connector (8 position) on one end and a small 6 pos. connector on the Control head end. The other wire in only stripped back so the installer can attach a switch and pilot light to it. This harness brings the signals from the backup control switches in the control head to the transfer box. It also, through the enable switch, turns on or off the Backup System and also controls the backup system pilot light. Install this harness from the Transfer Box to the control station that has the backup control head installed. Plug in this harness into the black connector on the transfer box marked Enable Switch.



Backup Enable Switch and Pilot Light



4) **Install the Backup System Enable switch and pilot light** in the console and attach them to the Backup Control/Enable Switch harness. (This switch and light are normally provided by the installer.) This switch needs to be a normally open SPST switch. Because this switch turns on and off the backup system, it is must be highly reliable and also protected which would prevent accidental actuation from happening. Some switches have protection covers but this protection could be simply in where you mount the switch. It should be near the backup Control Head and yet mounted so the it would not be accidentally turned on (i.e. when another switch near it is being turned on.) The pilot light should be wired as per the diagram below. It should be a 12v or 24v DC low current light.

D. Installation Checkouts

Once the system has been installed the system must be checked for the proper operation. The basic checks are as follows:

1) **Backup System in General** - Once the normally EEC system is up and running and in neutral, turn the backup system enable switch on (NOTE: Do NOT have engines running!). At this point the Backup System light should come on, all the LED's on the Control head should go out. You are now in Backup Mode. Shift the Control Head levers to forward and reverse. You should hear the transmission solenoids "clicking" as you shift the transmission.

2) **Start Interlock Operation** - With the Control Head in neutral (or even put the system in Warm mode by pushing the WARM button) try to start the engine. NOTE: The checkout can be done at the dock, but care must be taken when shifting gears at the dock. Make sure that dock lines are tight and adequate. (NOTE: You do not have to start it, just try to turn over the engine with the starter.) The engine should start cranking while the Control head levers are in neutral.
Next push the Port engine control lever into forward gear. Try to start the PORT engine. You should not be able to start the engine. Put the PORT control lever back to Neutral and then try the STBD side. Make sure you do one side at a time. If you cannot start in gear but can start the engines in neutral then the Backup system start interlock function is working correctly.

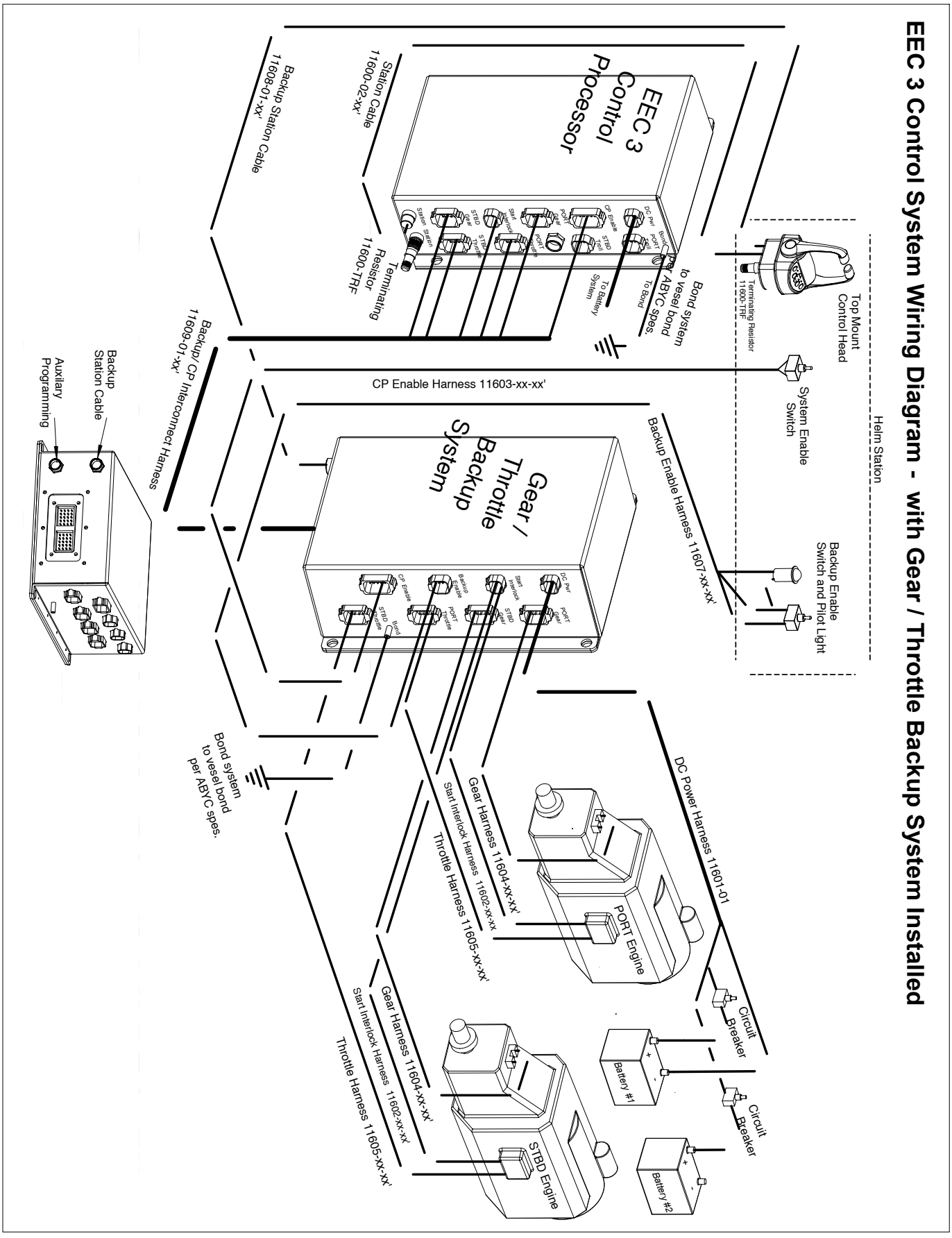
3) **Gear Operation** - NOTE: The checkout can be done at the dock, but care must be taken when shifting gears at the dock. Make sure that dock lines are tight and adequate. Once step 1 and 2 above have been checked, you can start the engines. Carefully move one Control Lever at a time in and out of gear. Check for proper direction and operation of the transmissions.

4) Now bring the Control levers to neutral and stop the engines. At this point turn off the Backup System enable switch and the lights on the Control Head should come on and the EEC system should be in normal operation.

5) At this point make sure that in normal operation , with the EEC turned on, you have proper gear operation. Carefully move one Control Lever at a time in and out of gear. Check for proper direction and operation of the transmissions.

6) You are now fully tested . Make sure that all operators of the vessel know about the Backup System's operation and where the backup switch is located.

E. EEC3 Backup Gear / Throttle Backup System Wiring Diagram



F. EEC3 Backup Gear / Throttle Backup Pinning Description

DC Power Connector (4 pin-Gray)

(1) Battery Positive 1
(2) Battery Positive 2
(3) Battery Ground 1
(4) Battery Ground 2 (optional if required)

Start Interlock Connector (4 pin-Gray)

(1) PORT Start Interlock 1
(2) PORT Start Interlock 2
(3) STBD Start Interlock 1
(4) STBD Start Interlock 2

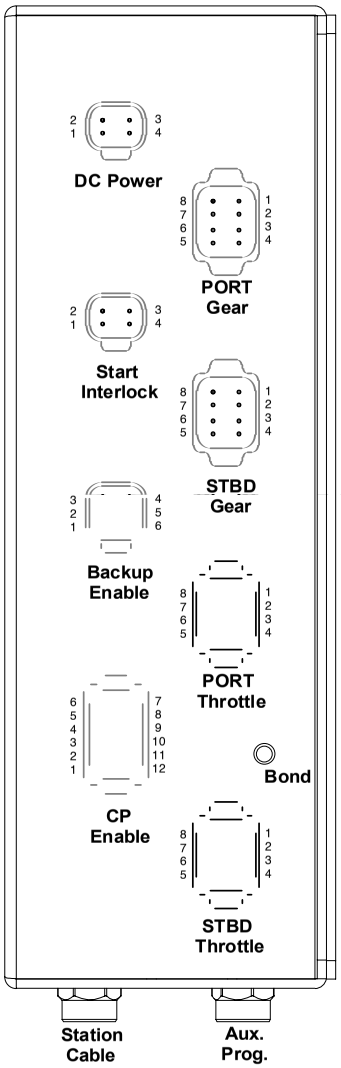
Backup Enable Connector (6 pin-Gray)

(1) Switch COM (+12/24VDC)
(2) Switch (NO) 24V(enable light Pos.)
(3) Switch (NO) 12V(enable light Pos.)
(4) Batt. Neg.(enable light Neg.)
(5) Startup select jumper 1
(6) Startup select jumper 2

CP Enable/Spare Connector (12 pin-Gray)

(1) Ignition input 1
(2) Ignition input 2
(3) Backup spare output 1 (COM)
(4) Switch select - Ignition
(5) Voltage select -12V*
(6) Voltage select - (COM)*
(7) Voltage select - 24V*
(8) Switch select - dry switch*
(9) Switch select - (COM)*
(10) Backup spare output 1 (NO)
(11) Ignition output 2
(12) Ignition output 1

Note:
* references commonly used pins for this connector.
12V -(pins: 5,6) (8,9 - jumper), 24V -(pins: 6,7) (8,9 - jumper)



PORT/STBD Gear Connectors (8 pin-Gray)

(1) FWD Battery Positive +
(2) FWD Switch (COM)
(3) FWD Switch (NO)
(4) FWD Battery Negative -
(5) REV Battery Negative -
(6) REV Switch (NO)
(7) REV Contact (COM)
(8) REV Battery Positive +

Throttle Connections - 4 available Types

PORT/STBD Throttle Connectors- Voltage Type (8 pin-Black)

(1) Not used
(2) Ref. voltage Pos.+
(3) Ref. voltage Neg.-
(4) Voltage signal
(5) Not Used
(6) Not Used
(7) Not used
(8) Chassis ground

PORT/STBD Throttle Connectors- PWM Type (8 pin-Black)

(1) Batt./PWM Pos. +
(2) PWM output signal
(3) Batt./PWM Neg. -
(4) Not used
(5) Not used
(6) Not used
(7) Not used
(8) Chassis ground

PORT/STBD Throttle Connectors- 4-20mA Type (8 pin-Black)

(1) Not used
(2) Not used
(3) Not used
(4) Not used
(5) 4-20mA output Pos. +
(6) 4-20mA output Neg. -
(7) Not used
(8) Chassis ground

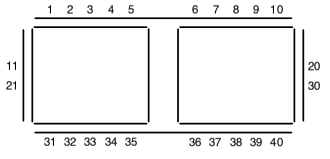
PORT/STBD Throttle Connectors- MEFI Type (8 pin-Black)

(1) Ref. voltage 2 Pos. +
(2) Ref. voltage 1 Pos. +
(3) Ref. voltage 1 Neg. -
(4) Output signal 1
(5) Output signal 2
(6) Ref. voltage 2 Neg. -
(7) Not used
(8) Chassis ground

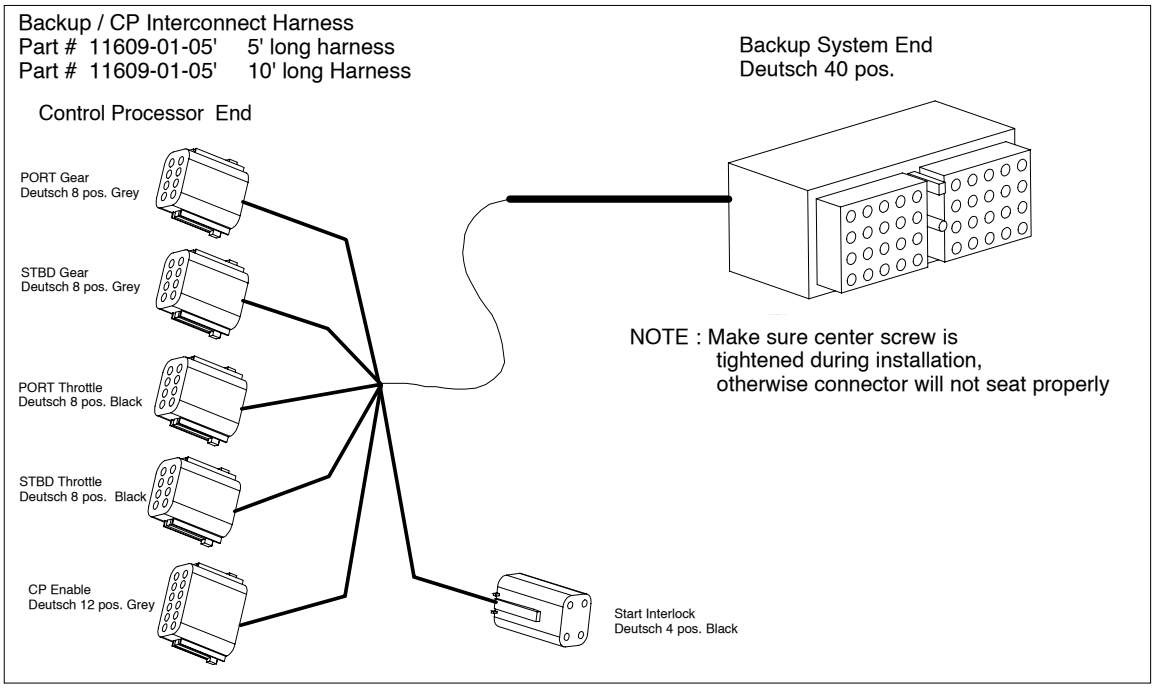
Backup to CP Connector (40 pin-Black)

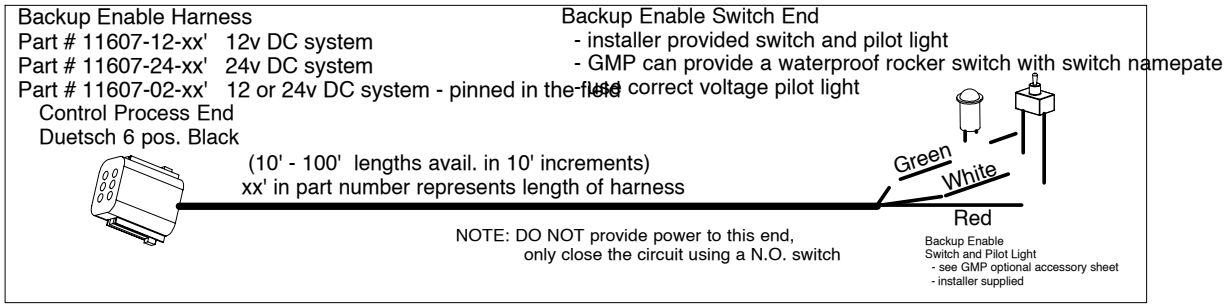
(1) CP port throttle 1
(2) CP port throttle 2
(3) CP port throttle 3
(4) Chassis Ground
(5) CP Enable volt. select - 12V
(6) CP Enable volt. select - (COM)
(7) CP Enable volt. select - 24V
(8) CP port Start Interlock 1
(9) CP port FWD Gear 1 (COM)
(10) CP stbd FWD Gear 1 (COM)
(11) CP port throttle 4
(12) CP port throttle 5
(13) CP port throttle 6
(14) Chassis ground
(15) CP Enable switch select - (COM)
(16) CP Enable switch select - dry switch
(17) CP Enable switch select - ign. switch
(18) CP port Start Interlock 2
(19) CP port FWD Gear 2 (NO)
(20) CP stbd FWD Gear 2 (NO)
(21) CP stbd throttle 1
(22) CP stbd throttle 2
(23) CP stbd throttle 3
(24) Chassis ground
(25) Not used
(26) Ignition input 1 to CP
(27) CP ignition output 1
(28) CP stbd Start Interlock 1
(29) CP port REV Gear 1 (COM)
(30) CP stbd REV Gear 1 (COM)
(31) CP stbd throttle 4
(32) CP stbd throttle 5
(33) CP stbd throttle 6
(34) Chassis ground
(35) Not used
(36) Ignition input 2 to CP
(37) CP ignition output 2
(38) CP stbd Start Interlock 2
(39) CP port REV gear 2 (NO)
(40) CP stbd REV gear 2 (NO)

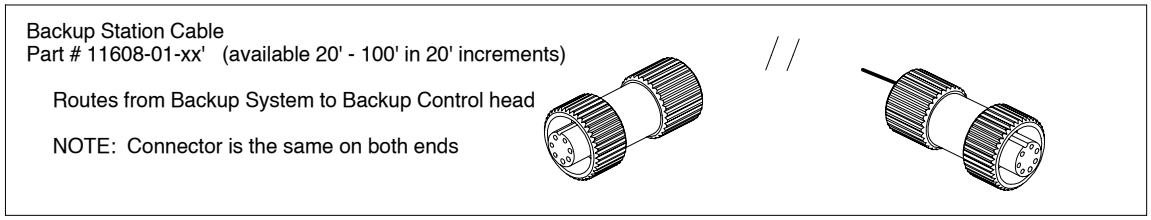
Backup to CP Interconnect

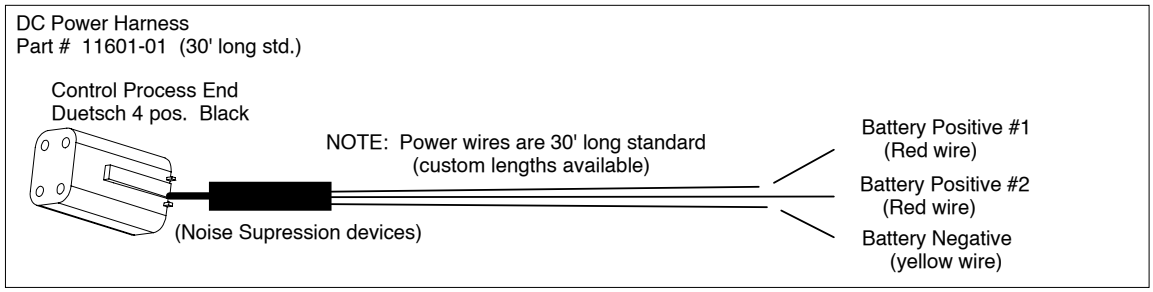


G. EEC3 Backup Gear / Throttle Wiring Harness









H. EEC3 Backup Gear / Throttle System Dimensions