



E-Drive Multi-Station Electric Steering System



OPERATION AND INSTALLATION MANUAL

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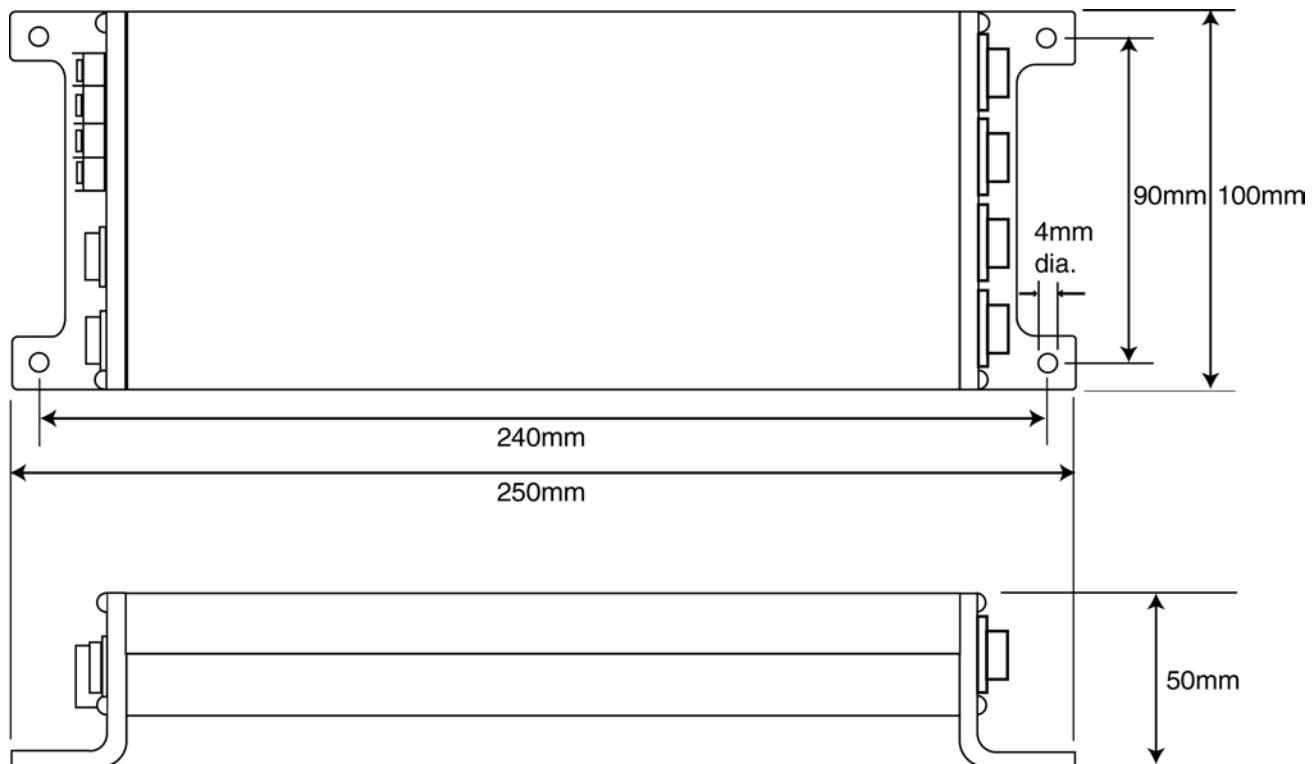
Introduction

Congratulations on your wise choice and purchase of the TMQ E-Drive system. We are sure that you will enjoy the benefits that it offers.

The E-Drive system provides electric steering from multiple steering stations and can provide, with the addition of an indicator, the rudder position. Steering control can be taken from each steering station in any sequence.

When the E-Drive is used in a system containing an autopilot a method of changing between the E-Drive and the autopilot must be installed. The use of a DPDT Relay is recommended, by using this method when the autopilot is engaged the relay will change state. This will disengage the E-Drive and connect the autopilot to the drive motor / pump. Refer to the section 'Connecting with an Autopilot'.

E-Drive Dimensions



E-Drive System

The E-Drive system comprises the following units: -

Essential Electronics:



- E-Drive control unit.
- Rudder feedback unit.
- Steering input (Electric wheel, Electric lever, Remote).
- Drive unit, for example
 - Hydraulic system with solenoid valves.
 - Reversing hydraulic pump system.

The E-Drive requires a supply voltage of 12 - 24 volts DC.

The Rudder Feedback Unit (RFU) must be attached to the steering tiller device in such a way that it can accurately measure the movement of the ship's rudder (see Rudder Feedback Installation diagram). The RFU must also be electrically connected to the E-Drive.

Rudder drive system, this system provides the physical movement to the rudder responding to the direction control signals provided by the E-Drive. Rudder Actuator Systems can comprise of the following: -

- Hydraulic Ram controlled by either: -
 1. Reversing motor and pump unit, connected into an existing hydraulic steering system.
 2. Solenoid valves connected into an existing power steering system.
 3. Solenoid valves connected to a continuous running motor and pump unit.

Connections

Steering Input 1

Pin 1	Power +5v
Pin 2	Steering Input 1 Signal (Wiper)
Pin 3	Ground 0v
Pin 4	Steering Input Select
Pin 5	Steering Station Selected Indicator, Power (+5v)

Steering Input 2

Pin 1	Power +5v
Pin 2	Steering Input 2 Signal (Wiper)
Pin 3	Ground 0v
Pin 4	Steering Input Select
Pin 5	Steering Station Selected Indicator, Power (+5v)

Remote Input

Pin 1	Power +5v
Pin 2	Remote Steering Signal Input (Wiper)
Pin 3	Ground 0v
Pin 4	Steering Input Select
Pin 5	Remote Station Selected Indicator, Power (+5v)

NMEA

Pin 1	Power +10v
Pin 2	Ground 0v
Pin 3	Display Transmit + (TX+)
Pin 4	Display Receive + (RX+)
Pin 5	GPS+
Pin 6	GPS -
Pin 7	Remote Data Receive + (RX2+)
Pin 8	Remote Data Receive -- (RX2--)

Motor

Pin 1	Motor Output
Pin 2	Motor Output

Bypass Valve / Clutch

Pin 1	Clutch Output --
Pin 2	Clutch Output +

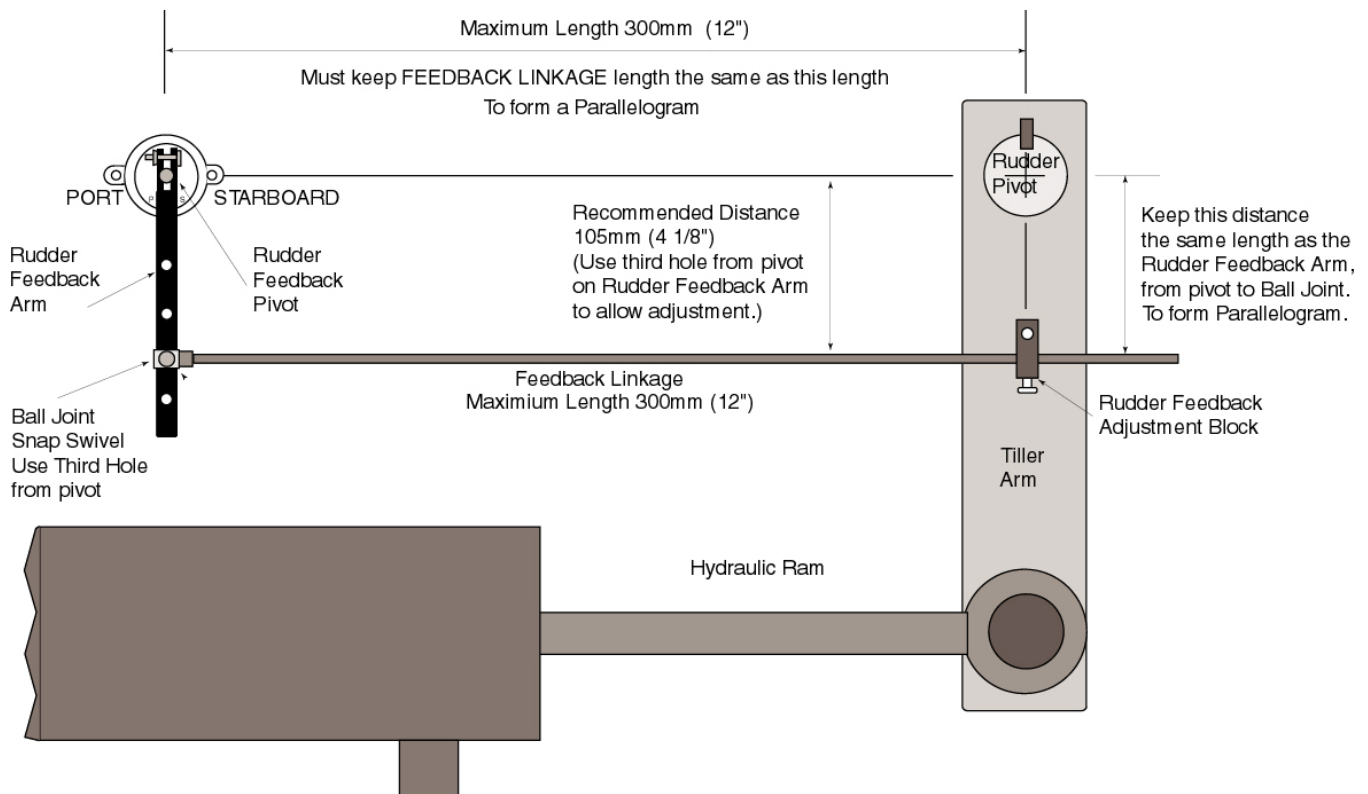
Power

Pin 1	Power IN + 12v / 24v DC
Pin 2	Power IN -- 0v

Rudder Input

Pin 1	Rudder Feedback Signal (Wiper)
Pin 2	+5v Rudder Feedback supply
Pin 3	Rudder Angle Indicator Signal
Pin 4	0v Rudder Feedback Supply
Pin 5	Not Used

Figure 1 **Rudder Feedback Installation Diagram**



Rudder Feedback Installation Notes

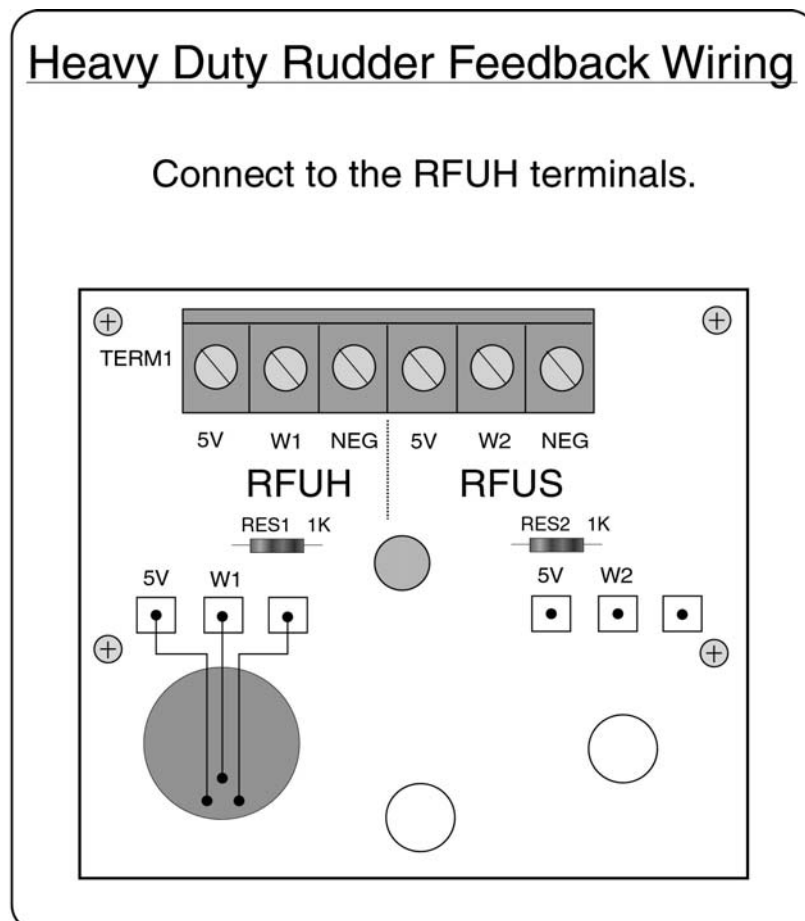
- When the rudder is central and the rudder feedback is central all angles should be 90 degrees.
- Use the snap swivel and ball joint on the rudder feedback arm
- Use the rudder feedback adjustment block on the tiller arm
- Hydraulic ram may be mounted on the other side of the tiller arm
- Ensure that when rudder turns to Port, Rudder Feedback turns to Port as indicated on the rudder feedback unit.
- Rudder feedback unit may be mounted upside down. This would require an electrical change. (Polarity of rudder feedback requires reversing)

RFU Wiring:

The cable from the RFU must be connected to the **RUDDER** socket on the E-Drive unit. The RFU is supplied with a standard 14-metre cable but can be extended if required during installation. See Rudder feedback wiring diagrams.

NOTE 1: **THE RUDDER FEEDBACK UNIT IS FACTORY ALIGNED. THE ARM SHOULD NOT BE REMOVED OR LOOSENED AS THE FEEDBACK ARM HOLDS AN O-RING AGAINST THE FEEDBACK BODY TO FORM PART OF THE WATER RESISTANT SEAL.**

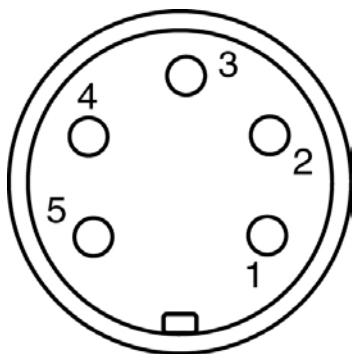
NOTE 2: **IF USING RFUH CONNECT AS SHOWN BELOW. WITHIN THE E-DRIVE INSERT JUMPER IN POSITION J3 'LINK FOR RFUH'.**



Rudder Feedback/Angle Indicator Wiring

Pin connections from rear of plug, solder connection side.

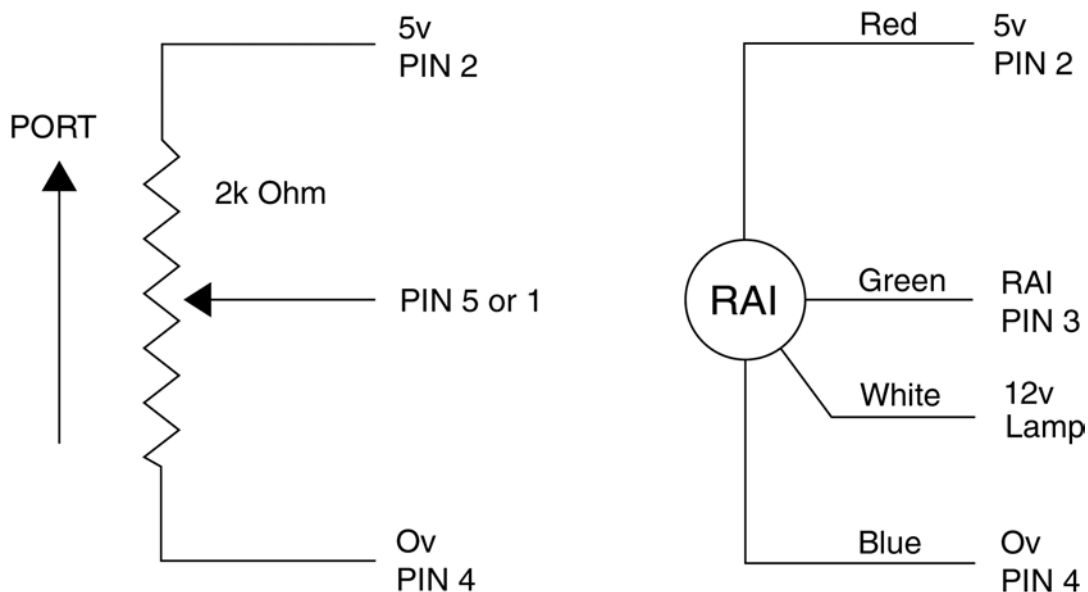
Figure 2 Rudder Feedback Connection Diagram



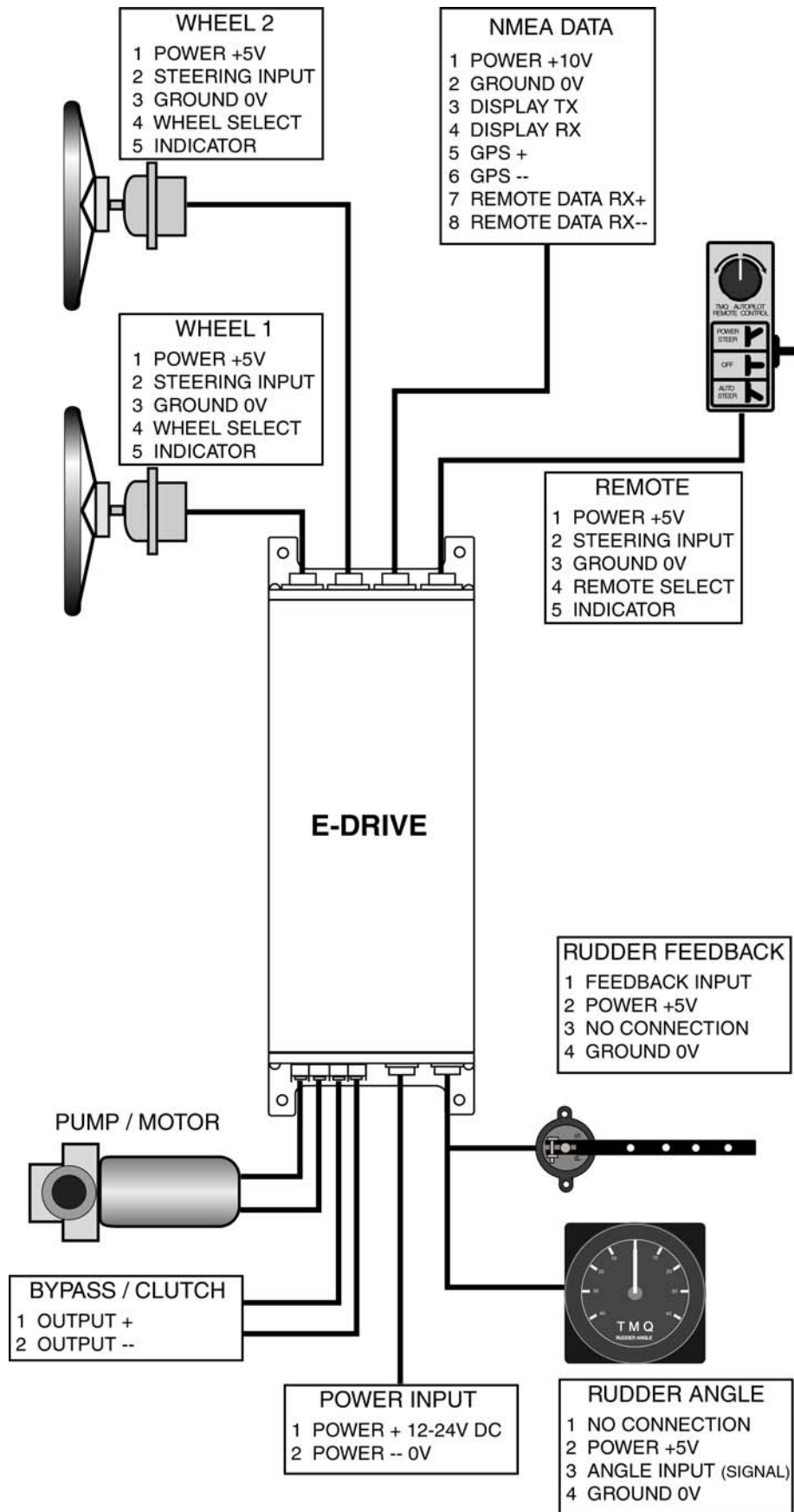
Pin1 Rudder Feedback Signal (Yellow)
Pin2 +5v Rudder Feedback Supply (Red)
Pin3 Rudder Angle Indicator (White)
Pin4 0v Rudder Feedback Supply (Blue)
Pin5 Not Connected

Note: Pin locations are as viewed from the front.

Figure 3 RFU and RAI Wiring Diagram



System Diagram

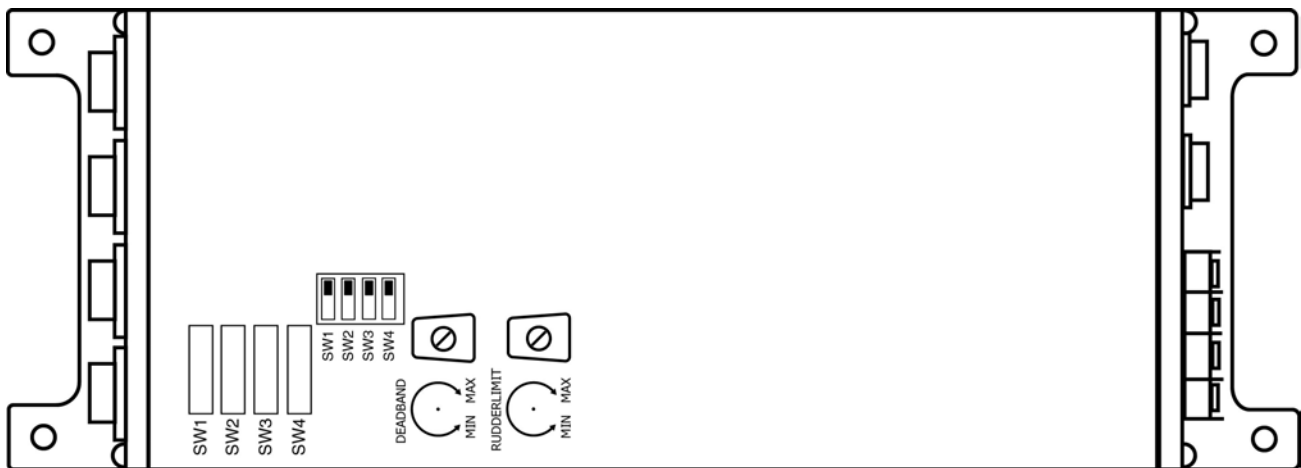


Installation Adjustments

After installation it may be necessary to adjust the Rudder Limits and the Dead band (Sensitivity) of the E-Drive. The 'RudderLimit' and 'Deadband' potentiometers are located within the E-Drive unit.

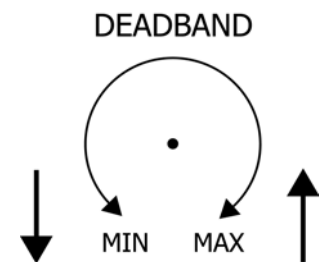
DIP switches are additionally located within the E-Drive Unit. Refer to the information table for each DIP Switch on the circuit board for their function.

The four screws retaining the top cover are required to be removed to gain access.



Deadband 'Sensitivity'

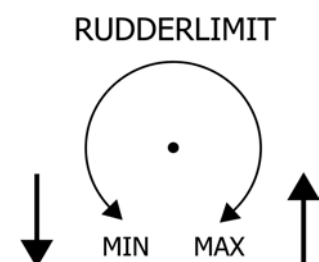
Rotate the 'Deadband' potentiometer clockwise, toward 'MAX' to increase the sensitivity and anticlockwise toward 'MIN' to reduce the sensitivity of the E-Drive.



Rudder Limits

To avoid mechanical damage to the steering system, it is recommended that the Rudder Limits are set to prevent the E-Drive from driving the rudder into its mechanical stops.

Rotate the 'RudderLimit' potentiometer clockwise, toward 'MAX' to increase the travel and anticlockwise toward 'MIN' to reduce the travel of the rudder.



E-Drive Operation

At turn on the E-Drive selects Steering Input 1 (Wheel 1) to be the active input.

To select a different steering input the 'Select Button' for the required steering input should be pressed.

If a remote is connected to the E-Drive 'Remote' input, the mode required can be selected from the remote.

Connection Diagrams

The E-Drive can be connected to either a Pump / Drive unit or via Solenoid Valves.

Figure 4 E-Drive connection to Pump / Motor

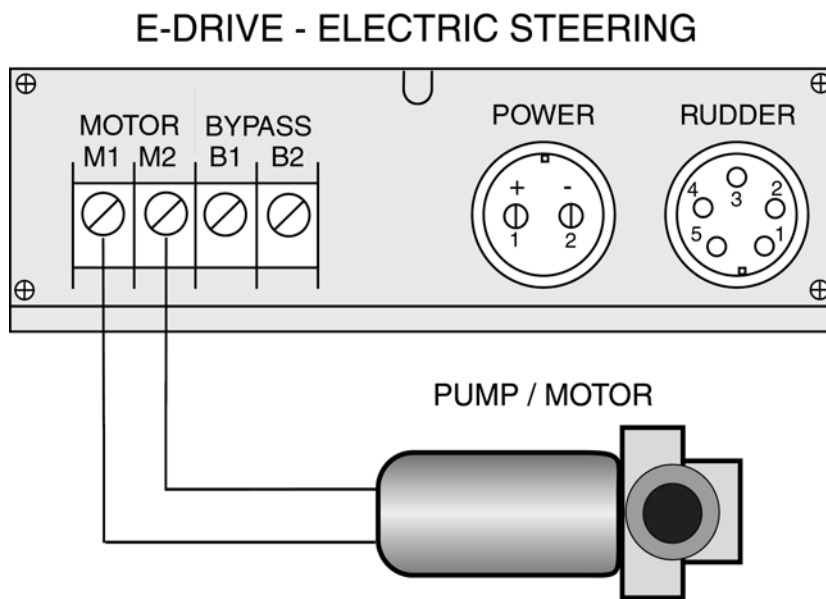
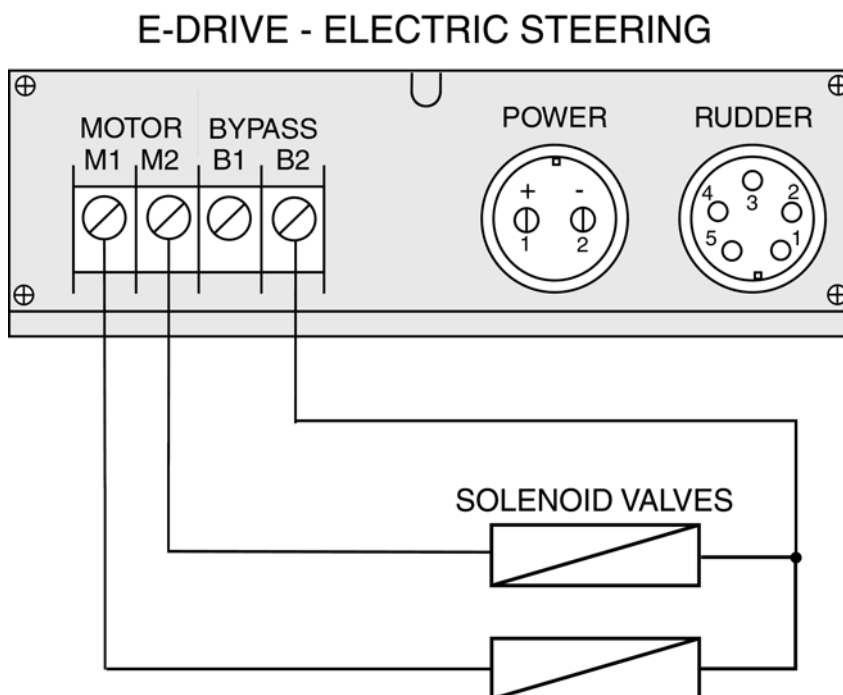


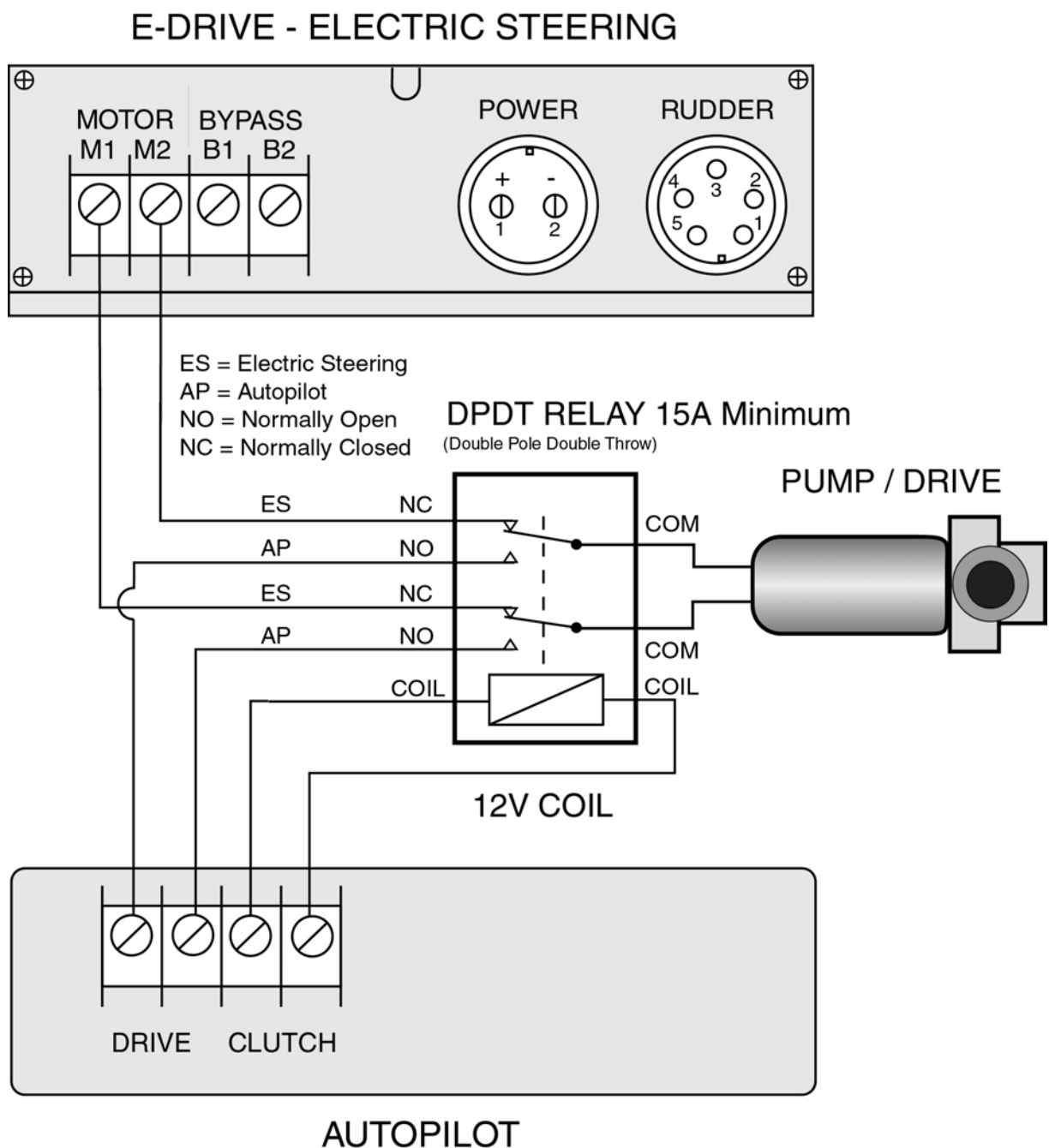
Figure 5 E-Drive connection to drive Solenoid Valves



Connecting with an Autopilot

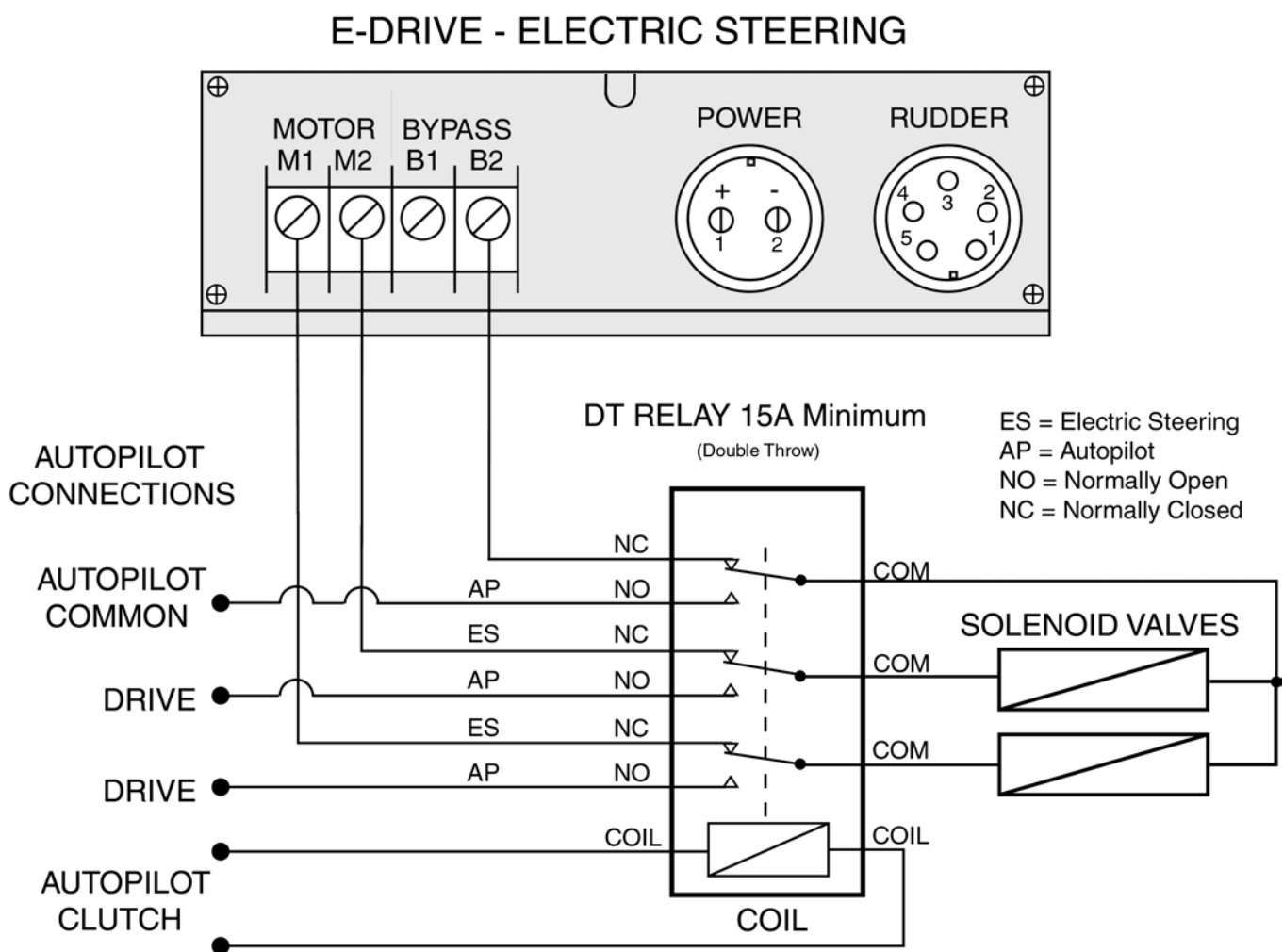
When there is an Autopilot on the vessel and the E-Drive will be connected to the same drive motor or pump the addition of a changeover relay is required. This can be obtained through TMQ or its dealers if required. Connect as shown below.

Figure 6 E-Drive / Autopilot Changeover Relay



When there is a Autopilot on the vessel and the E-Drive will be connected to the same solenoid valves the addition of a changeover relay is required. This can be obtained through TMQ or its dealers if required. Connect as shown below.

Figure 7 E-Drive / Autopilot Changeover Relay to drive Solenoid Valves



Testing Procedure

Initial Inspection and Testing



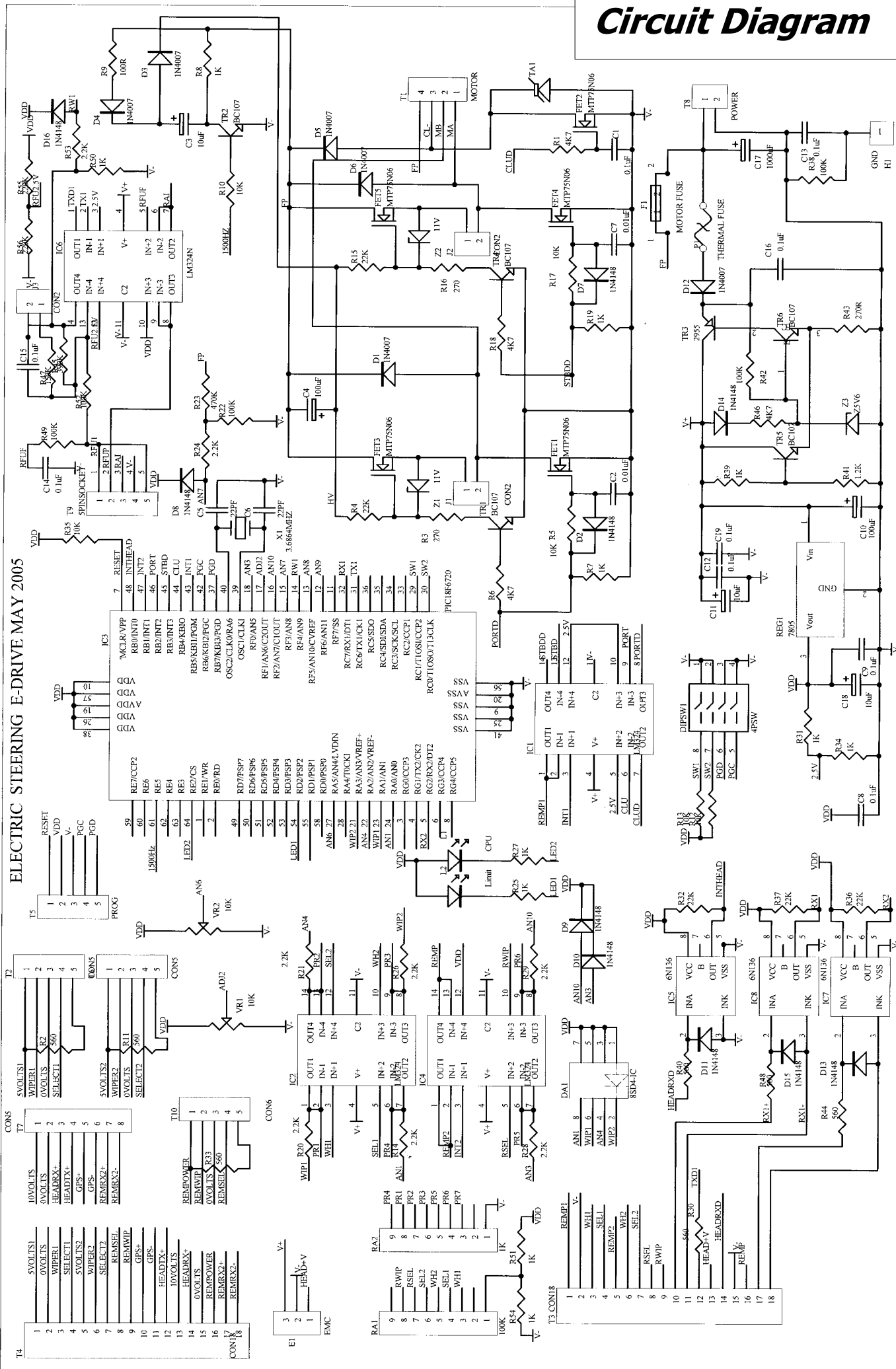
1. Confirm power to be connected is the required DC voltage.	
2. Power Supply 12v DC / 24v DC	
3. Ensure polarity of the voltage supply is correct.	
4. All electrical connections are correct.	
5. Loose cables are clipped or tied up.	

Initial Power Up

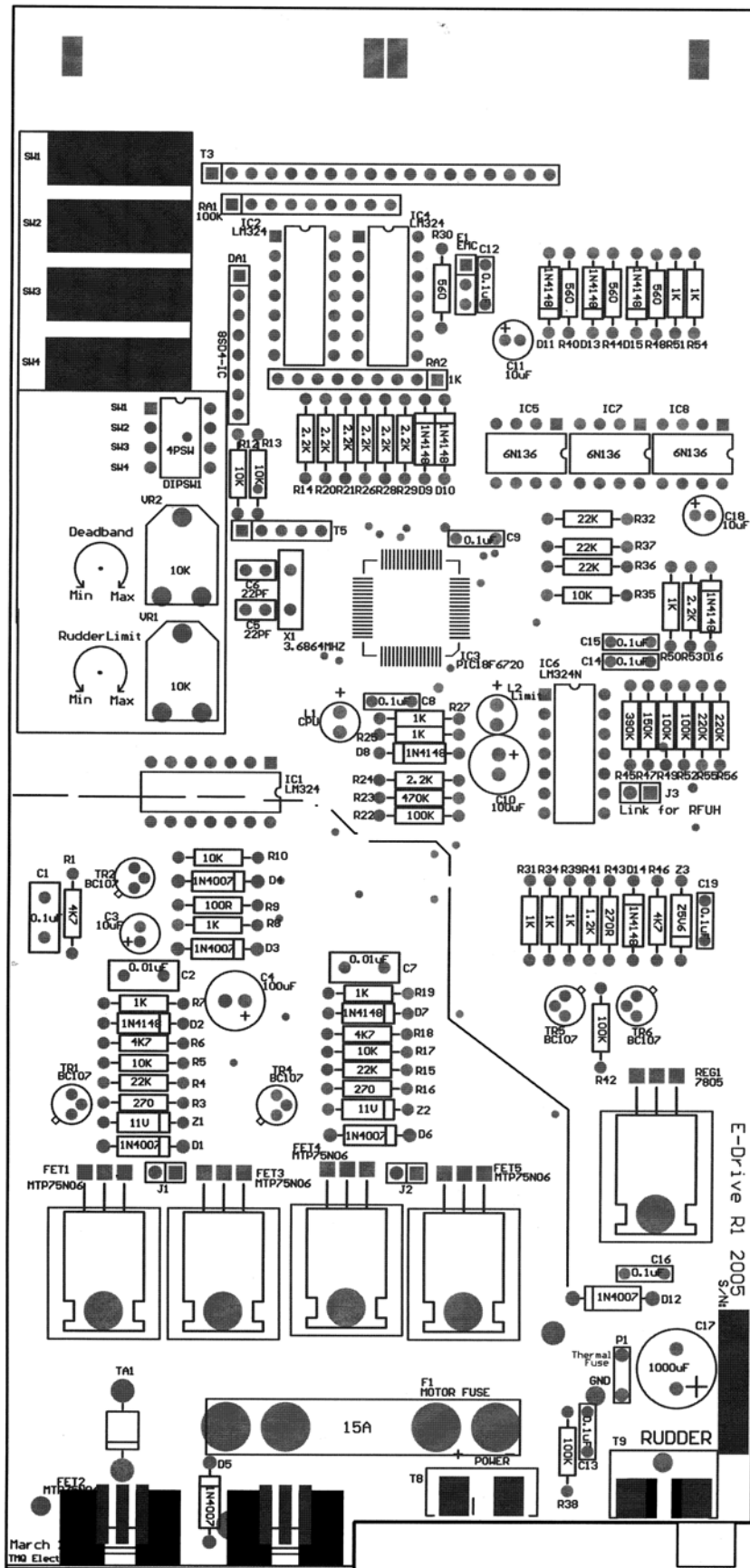
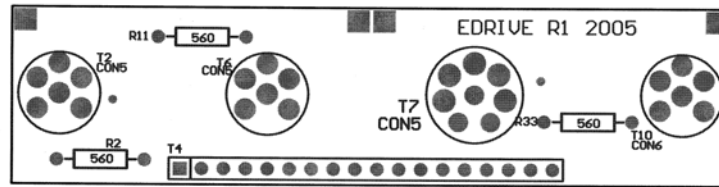
1. Centre Wheel 1.	
2. Switch Power On.	
3. Ensure the rudders drive to the centre. (If rudder does not drive to the centre reverse the motor wiring – Then recheck)	
4. Return wheel to centre and ensure RFU is at centre.	
5. Check Wheel 2 as in step 3 and 4 for Wheel 1. (Wheel 2 is selected by pressing the Wheel 2 select button)	
6. Adjust Rudder Limits if required. (Required if the mechanical rudder stops are met or the hydraulic pump labours)	
7. Adjust Dead band if required. (Required if the system hunts)	

Circuit Diagram

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PCB Layout



Optional Extras

Rudder Angle Indicator



The rudder angle indicator is a flush mounted instrument providing a clear indication of rudder position, which is critical when docking or manoeuvring in close quarters.

(Note: Connect with the RFU to the 'Rudder' socket on E-Drive)

Electric Wheel



The Electric steering wheel provides precise, light steering on any vessel with a power steering system installed. It simplifies vessel fit out by eliminating long hydraulic lines to the helm position

(Note: Connect to the 'Wheel 1', 'Wheel 2' or 'Remote' sockets on E-Drive)

Hand Remote



Hand remotes and Active remotes provide the freedom to maintain full control of the autopilot and steering while moving around the vessel.

(Note: Connect to the 'Remote' socket on E-Drive)

Steering Lever



Levers allow single handed control of any size vessel with power steering. Movement to port or starboard causes the rudder to follow proportionally.

(Note: Connect to the 'Wheel 1', 'Wheel 2' or 'Remote' sockets on E-Drive)