



Component Manual

**Electric Wheel
Model: EW 200**



**Document No.: MAN00902W
Revision: -**

This manual is subject to change without prior notice.



TABLE OF CONTENTS

1	INTRODUCTION	3
1.1	Description	3
1.2	Specifications	4
2	INSTALLATION	5
2.1	Mounting	5
3	SETUP AND TESTING	8
3.1	Rudder Order Command	8
3.1.1	Rudder Command Signal Centering	8
3.1.2	Rudder Command Signal Gain Adjustment	8
3.2	Rudder Order Indication (Optional):	9
3.3	Finishing	10
4	MAINTENANCE AND PARTS LISTS	12
5	TROUBLESHOOTING	14

TABLE OF FIGURES

Figure 1	– EW 200 Mounting Arrangement	6
Figure 2	– EW 200 Overall Dimensions	7
Figure 3	– EW 200 Internal Configuration.....	11
Figure 4	– EW 200 Assembly.....	13
Figure 5	– EW 200 Electrical Schematic.....	15



INTRODUCTION

1.1 Description

The Wagner full follow up electric wheel (EW 200) is a waterproof electronic steering input device. Designed specifically for marine service, it provides a precise means for controlling the rudder when used with an amplifier or autopilot.

By simply turning the wheel, the EW 200 provides a command signal for the Steering Control Amplifier to move the rudder to the desired steering position. It provides three turns hardover to hardover and incorporates a slip clutch which protects the internal components from damage due to overturning of the wheel. Wheel tension can be adjusted to suit personal feel.

The EW 200 outputs two different signals. The first type of signal is the rudder command signal. The rudder command signal is used by a full follow-up solenoid controller as a rudder position command. The other type of signal output by the EW 200 is the rudder order indicator signal. The rudder order indicator signal is used to display the rudder command position to the vessel's operator. The EW 200 can output up to three independent rudder command signals when no rudder order indicator signal is needed or up to two rudder command signals and one rudder order signal is used.

To generate the rudder order indicator signal, Wagner's EW 200 operates in "stand alone" mode. The EW contains a circuit board that regulates its own power supply and generates the necessary signals to drive a rudder order indicator. This configuration ensures that all electronic circuitry necessary to develop a rudder order signal is contained within the EW.



1.2 Specifications

Enclosure

All Metal Construction
 Tough Powder Coat Paint
 Stainless Steel Shaft
 Extra Large Shaft Bushing
 Water-Tight Cable Glands with Blanking Plugs
 Neoprene Gasket
 Self Lubricated Internal Mechanism
 Full Signal Shielding Capability
 Total weight: 5.5 lbs.

Command Potentiometer

Quantity	Up to 3
Resistance	1 kOhm \pm 10%
Linearity Tolerance	1.5%
Operating Cycles	2 Million

Rudder Order Indicator Driver Board (Optional)

Potentiometer Device	
Reverse and Over-Voltage Protection	
Power Supply	12-36 VDC \pm 10%, <100 mAmp
Operating Voltage (VCC)	8.2 VDC
Circuit Protection Fuse	250 mA, 250 V, 5 mm x 20 mm
Adjustable Gain	5 mAmp (max.)

Recommended Rudder Order Indicator Specifications

Internal Resistance	200 - 500 Ohm
Current	0.9 mAmp (\pm 45 deg.)
Relative Tolerance	2%

Environmental

Operating Temperature	-20 to +60 deg. C
Splash Proof Enclosure	

CAUTION: All specifications are subject to change without prior notice.



INSTALLATION

1.3 Mounting

WARNING: ALTHOUGH RESISTANCE TO RADIO FREQUENCY (RF) INTERFERENCE HAS BEEN INCORPORATED INTO THE EW'S DESIGN, DO NOT PLACE THE EW AND ITS CABLES IN CLOSE PROXIMITY TO RF TRANSMITTING EQUIPMENT OR HIGH CURRENT OR HIGH VOLTAGE DEVICES.

- a) Refer to Figure 1 for EW mounting arrangement and Figure 2 for EW overall dimensions and hole pattern. Note the clearances required.
- b) Mount the EW 200 so that the rear cover can easily be removed for adjustment of the potentiometers and ROI driver.
- c) The EW 200 should be mounted with the label "DOWN" facing downward, for ease of making adjustments. However, if the EW 200 is being accessed from the top, it might be beneficial to install it upside down.
- d) See Figure 1 for location of the EW 200 shaft friction adjustment.
- e) Ensure that cable shielding is grounded to ship's bonding system.
- f) Refer to Figure 5 EW 200 Electrical Schematic for wiring the EW.

WARNING: CABLE WIRES MUST BE SECURELY CONNECTED. A LOOSE WIRE OR SHORT CIRCUIT MAY CAUSE AN ERRONOUS STEERING COMMAND.

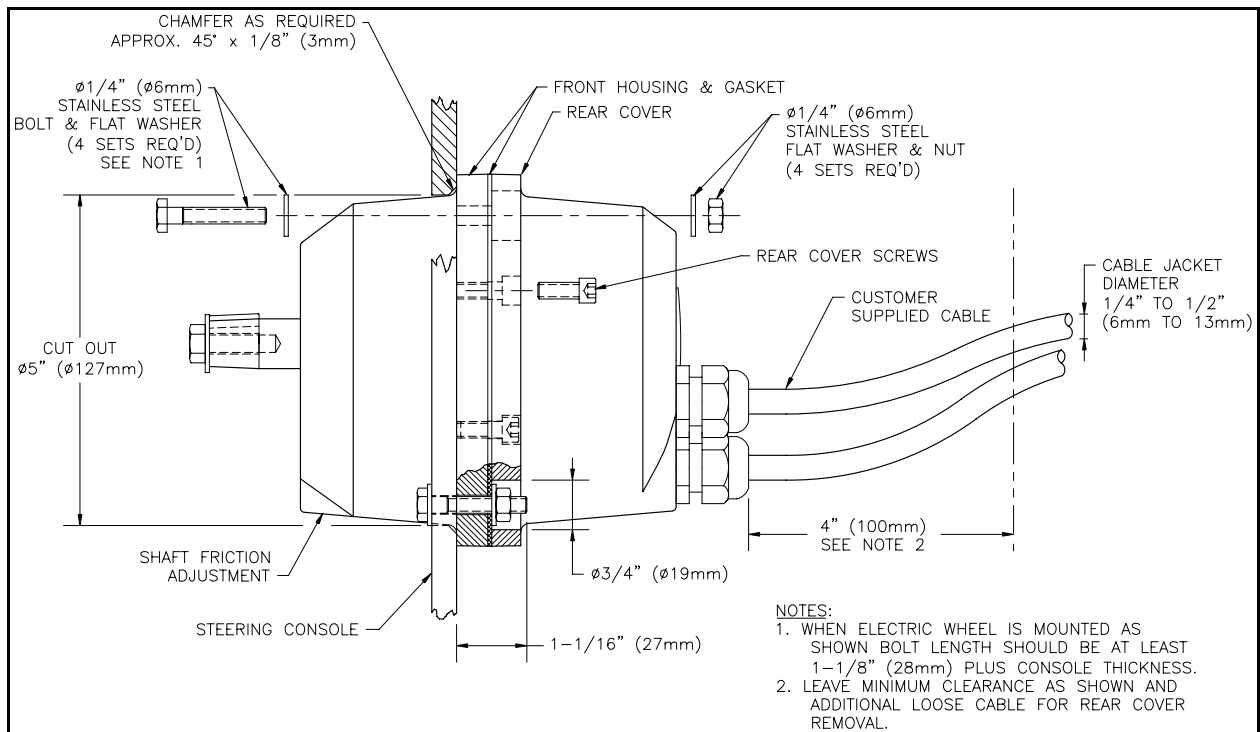


Figure 1 – EW 200 Mounting Arrangement

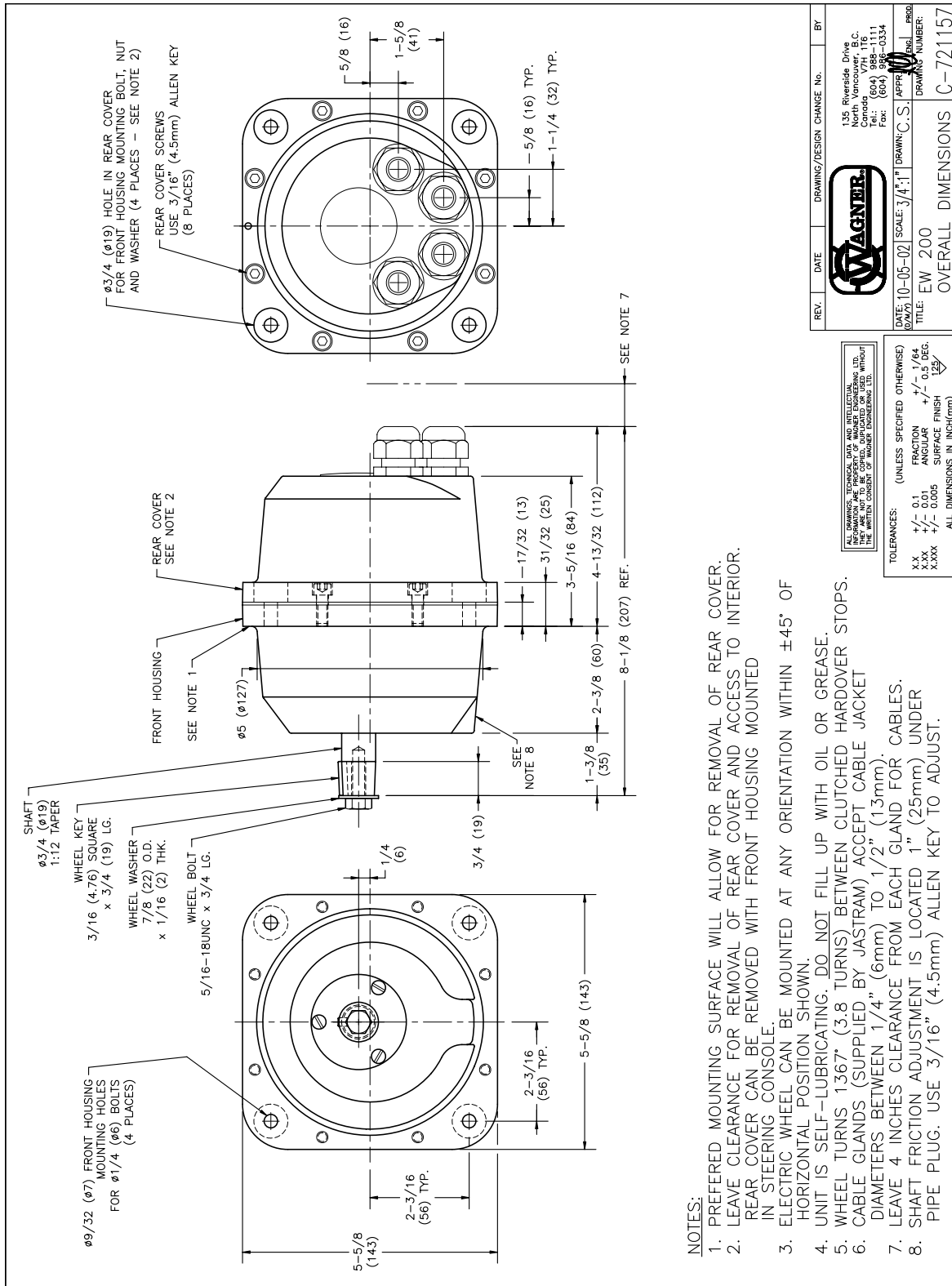


Figure 2 – EW 200 Overall Dimensions

REV.	DATE	DRAWING/DESIGN CHANGE No.	BY

		135 Riverside Drive North Vancouver, B.C. Canada V7H 1T6 Tel: (604) 996-0334 Fax: (604) 996-0334	
DATE: 10-05-02	SCALE: 3/4" = 1"	DRAWN: C.S.	APPROVED: [Signature]
TITLE: EW 200		DRAWING NUMBER: C-721157	

ALL DIMENSIONS, TOLERANCES, KEY AND KEY SECTIONS, INFORMATION ARE PROPERTY OF WAGNER ENGINEERING LTD. THE WAGNER COMPANY OF WAGNER ENGINEERING LTD.	(UNLESS SPECIFIED OTHERWISE) FRACTION ± 0.01 DECIMAL ± 0.005 SURFACE FINISH 125
TOLERANCES: XXX ± 0.01 XXXX ± 0.005 XXXX SURFACE FINISH 125	
ALL DIMENSIONS IN INCH(mm)	



SETUP AND TESTING

1.4 Rudder Order Command

The EW 200's Rudder Order Command potentiometers are factory preset and normally require no adjustment. If the EW's commanded port and starboard hard over positions do not match, an adjustment can be made at the potentiometer gear assembly. Refer to Figure 3 EW 200 Internal Configuration.

1.4.1 Rudder Command Signal Centering

- a) Turn the EW 200 to port hardover and note the commanded port rudder position.
- b) Turn the EW 200 to stbd hardover and note the commanded stbd rudder position.
- c) Calculate the difference between the port and starboard positions. Add half of the difference to the smaller of the port or stbd rudder positions. This calculated rudder position is the new rudder command the potentiometer must be adjusted to.
- d) While holding the pot body and keeping the pot gear fully engaged with the main gear, loosen the appropriate rudder command pot nut until the pot body can just turn.
- e) Carefully turn the pot body until the commanded rudder position reaches the value calculated in step (c).
- f) Re-tighten the pot nut and check to ensure that no backlash is present between the pot gear and the main gear.
- g) Re-check the port and starboard commanded rudder positions and repeat steps (a) through (g) as required and for each additional rudder command pot.

1.4.2 Rudder Command Signal Gain Adjustment

Attenuation to the rudder command signals can be made at the gain adjustment trimmer potentiometers (trim pot) if required. Refer to Figure 3 for trim pot locations. If command signals gain adjustments are not required proceed to section 3.2.

The following is the factory pre-setting on the command gain trim pots:

COMMAND GAIN set at CW maximum.



NOTE: Multi-turn trim pots do not have hard stops at the end of their 25 turns of travel. They do, however, emit a "clicking" noise when the end of screw travel is reached.

1.5 Rudder Order Indication (Optional):

If optional rudder order driver board is not installed then proceed to section 3.3.

Adjustments to the Rudder Order Indicator signals are made at the trim pot located on the rudder order indicator driver circuit board. Refer to Figure 3 for trim pot location.

WARNING: TO AVOID POSSIBLE ELECTRIC SHOCK OR DAMAGE TO THE COMPONENTS CARE MUST BE TAKEN WHEN MAKING ADJUSTMENTS TO THE RUDDER ORDER INDICATOR DRIVER BOARD. WHEN POWER IS SUPPLIED TO THE EW ONLY TOUCH THE SCREW HEAD OF THE TRIM POT.

The following is the factory pre-setting on the rudder order indicator trim pot:

ROI GAIN set at 10 turns CW from CCW maximum.

NOTE: Multi-turn trim pots do not have hard stops at the end of their 25 turns of travel. They do, however, emit a "clicking" noise when the end of screw travel is reached.

Application of Power

- a) Check all connections on the power supply, EW and ROIs.
- b) Do not turn hydraulic power unit (HPU) on. Do not apply the ship's DC power supply to the solenoid controller.
- c) Apply the ship's DC power supply for ROI.
- d) If a voltmeter is available, check that 12-36 VDC rudder order indicator power supply is present at terminal block number 1, terminals 1 (TB1-1) and 4 (TB1-4) with positive on terminal 1.

Rudder Order Indicator Centering & Gain Adjustment

- a) After applying power to the EW 200, turn the wheel to port hardover.



- b) Confirm that the ROI is displaying an angle to port. If this is not the case, a reverse polarity condition exists at that indicator.
- c) Adjust the **ROI GAIN** trim pot on the rudder order indicator driver board until the angle shown on the ROI matches the desired angle of the rudder command. Note the angle displayed on the ROI.
- d) Turn the wheel to stbd hardover and note the stbd angle displayed on the ROI.
- e) If the port and stbd hardover angles displayed on the ROI are equal then proceed to section 3.3.
- f) If the port and stbd hardover angles displayed on the ROI are not equal then calculate the difference between the port and stbd angles. Add half of this difference to the smaller of the port or stbd ROI angles. This calculated angle is the new ROI angle the ROI potentiometer must be adjusted to.
- g) Locate the ROI potentiometer. If improved access to the potentiometer is desired, the terminal block may be removed from the potentiometer mounting plate while maintaining all of the electrical connections.
- h) While holding the pot body and keeping the pot gear fully engaged with the main gear, loosen the pot nut until the pot body can just turn.
- i) Carefully turn the pot body until the angle displayed on the ROI reaches the value calculated in step (f).
- j) Re-tighten the pot nut and check to ensure that no backlash is present between the pot gear and the main gear.
- k) Re-check the port and stbd ROI angles and repeat steps (a) through (k) as required.

1.6 Finishing

- a) When all adjustments have been made and system performs satisfactorily, ensure that all potentiometer nuts are tight.
- b) Ensure that the cable glands have either a cable or the plastic shipping plug in place to prevent moisture from entering the unit. Tighten all cable glands with a wrench.
- c) Confirm that the rudder order indicator and command cable's shielding is terminated on only one end of the cable.
- d) Replace the EW cover and tighten hold down bolts until the gasket is half compressed.

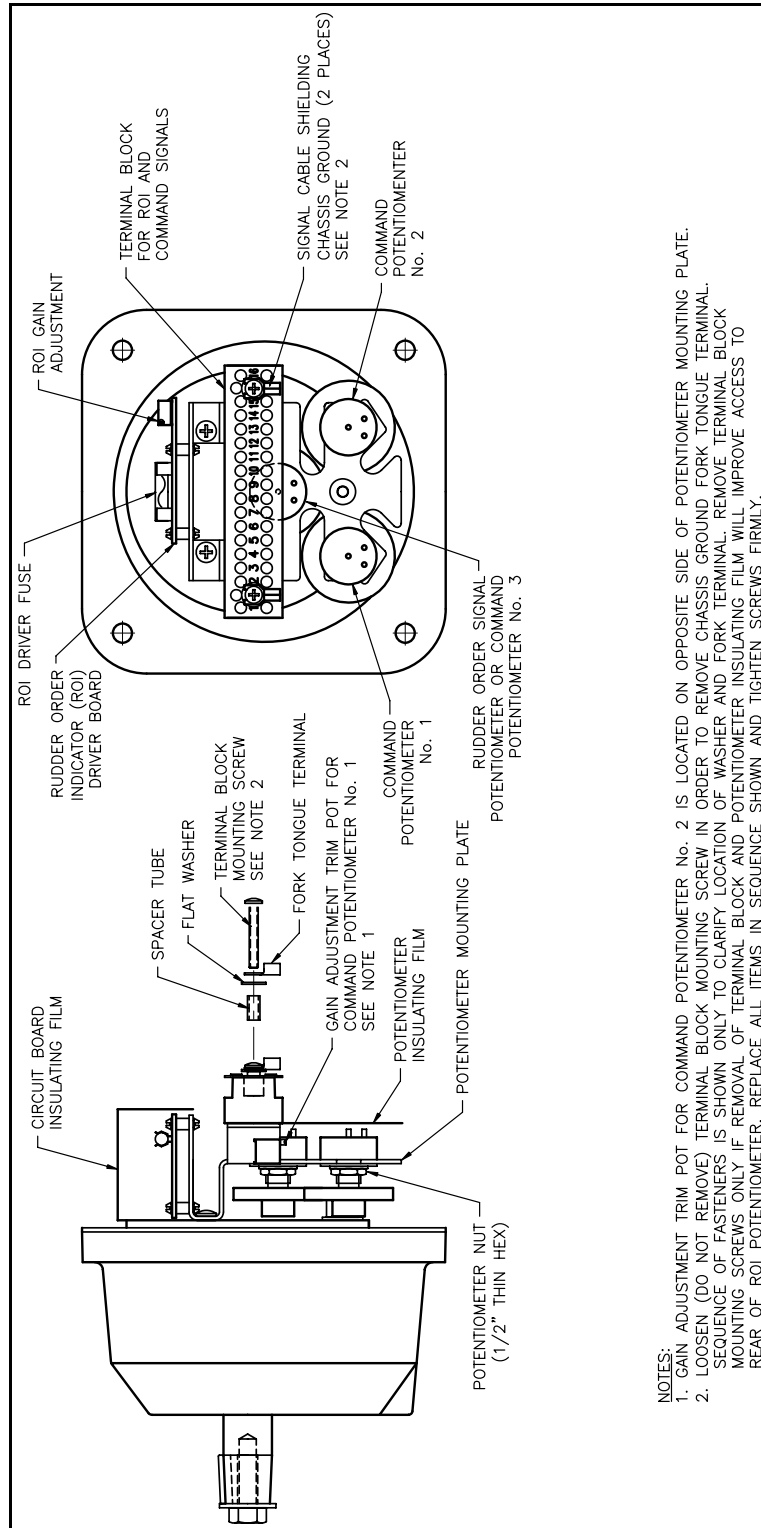


Figure 3 – EW 200 Internal Configuration



MAINTENANCE AND PARTS LISTS

WARNING: ALL INSPECTION AND MAINTENANCE MUST BE PERFORMED WHILE THE VESSEL IS STATIONARY AND NOT UNDERWAY.

The wearing parts on the EW 200 are the shaft bushings and potentiometers.

Shaft Bushings

The shaft bushings used by Wagner incorporate a material that is impregnated with oil. This eliminates the requirement for periodic lubrication over the life of the bushings. If excessive play is felt during operation of the EW then it is likely the bushing needs replacement. It is recommended that the shaft bushing and shaft O-ring be replaced by qualified Wagner personnel.

Rudder Order Indicator Driver Printed Circuit Board (PCB)

This unit should not require replacement unless it has been damaged by corrosion or by excessive current or voltage. Its replacement is simple and no special tools are required. Care must be taken to ensure the working environment is free of excessive moisture and metal particles or chips. Make sure the wiring harness is re-inserted with its pins in their proper positions in the PCB terminal block.

Potentiometers

A potentiometer contains a signal wiper that wears against its resistive element to produce a varying voltage. Although Wagner selects potentiometers with very high cycle life these devices will wear in time. Signs of wear are most often seen in the rudders midship position as flickering in the rudder angle indicator or control system. Potentiometers and gear assemblies are available from Wagner with or without their associated wiring harnesses. We strongly recommend that at the first sign of wear of any one potentiometer a complete replacement set be purchased. It is recommended that potentiometers be replaced by qualified Wagner personnel.

These components are available from any of our distributors.

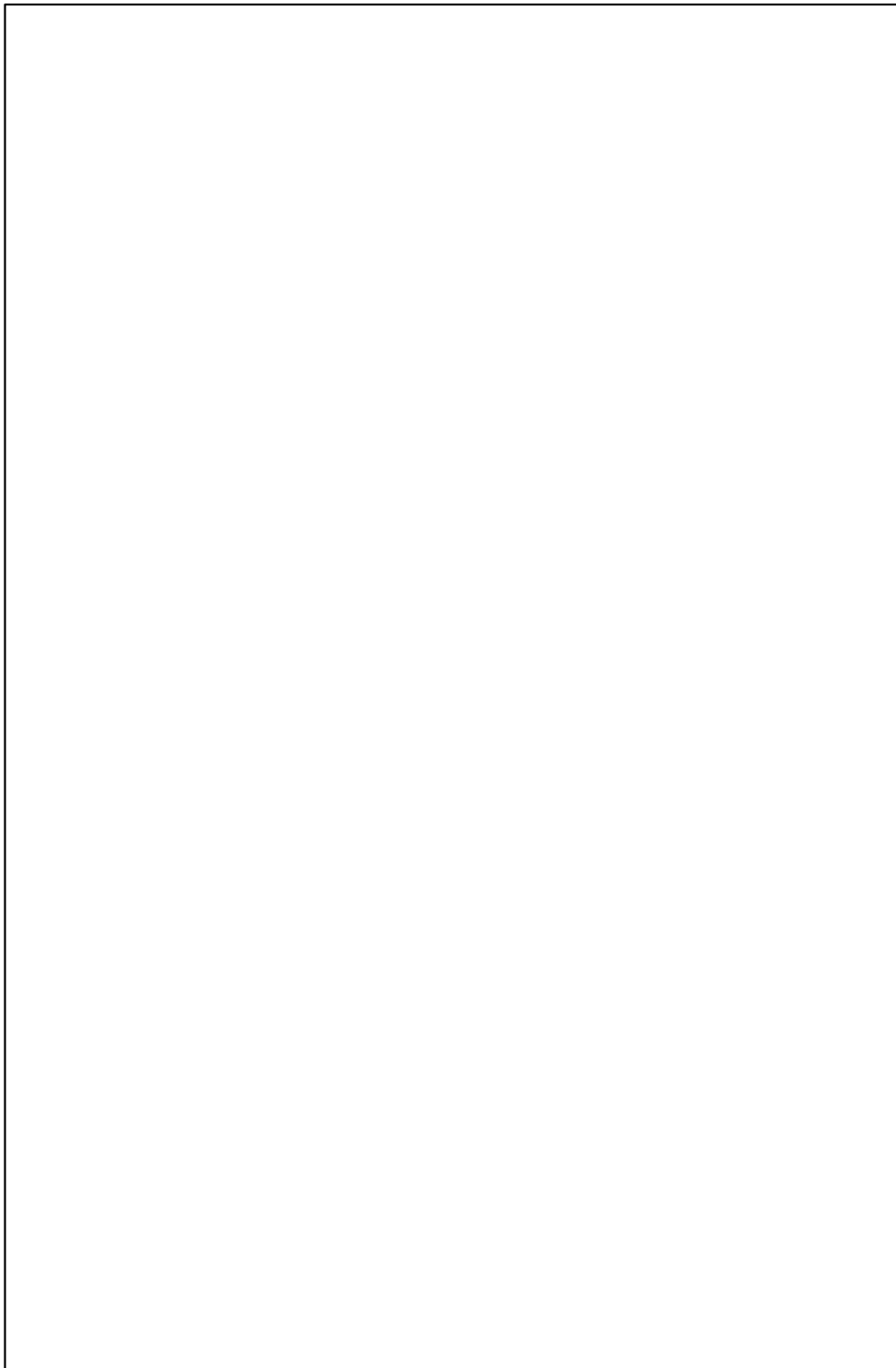


Figure 4 – EW 200 Assembly



TROUBLESHOOTING

WARNING: FAILURE TO CORRECT ANY PROBLEM CAN CAUSE SUDDEN LOSS OF STEERING.

The table below gives some general solutions for simple problems. If a problem cannot be resolved, contact the factory.

SYMPTOM	CAUSE	CORRECTION
EW 200 operates steering in wrong direction	Wires reversed.	Reverse +V and -V wires. Refer to Fig. 5.
Hardover angles are not the same	Potentiometer incorrectly centered.	Refer to Set Up procedure
EW 200 does not function.	Wiring incorrect.	Refer to Fig. 5 and amplifier or autopilot manual.
EW 200 operates steering erratically.	Potentiometer worn.	Replace potentiometer.

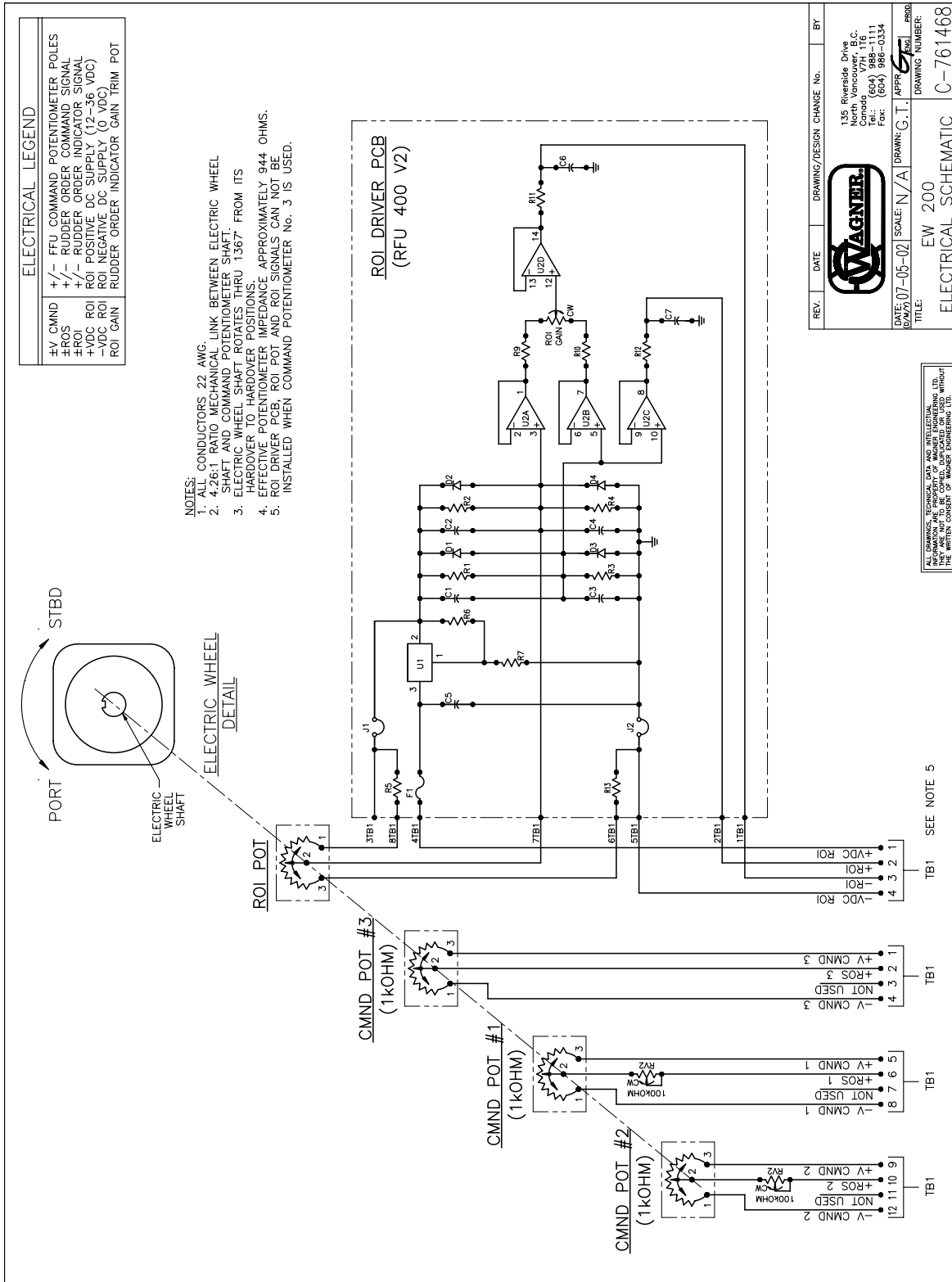


Figure 5 – EW 200 Electrical Schematic

