

## **Z326, Wheel Autopilot Drive Service Manual**

### **Warning**

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# Chapter 3. Wheel Drive Actuator

## 3.1 Wheel Drive Actuator test

Carry out the passive and active tests detailed in Figure 6.

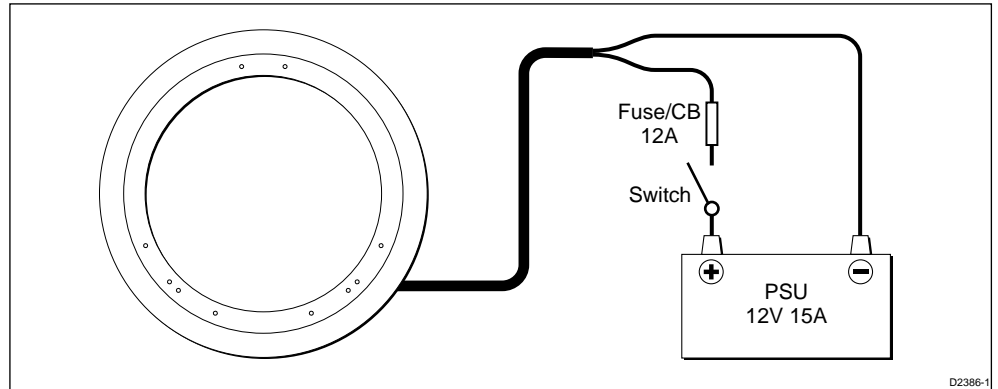


Figure 5. Wheel Drive Actuator test connections

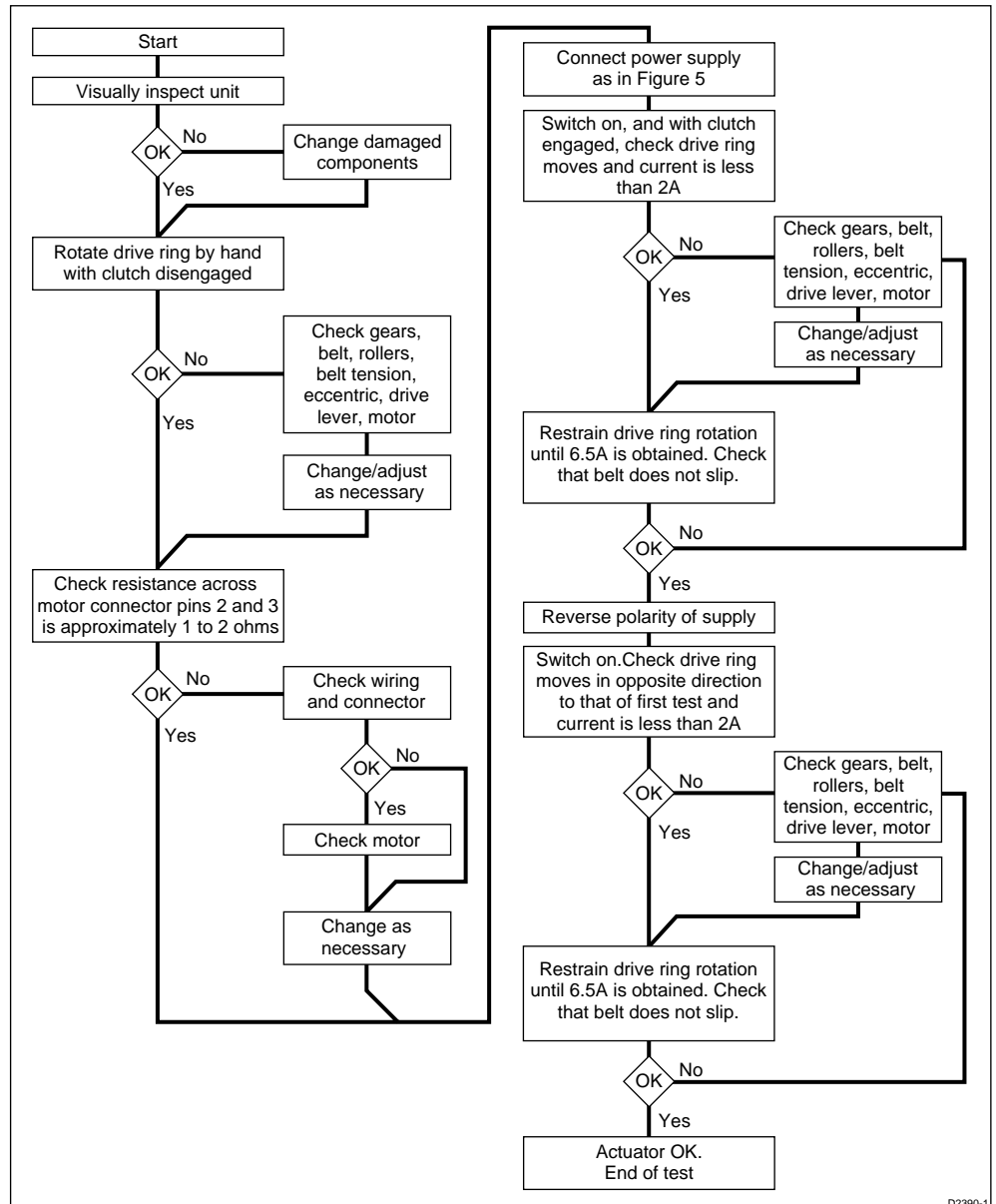


Figure 6. Wheel Drive Actuator test flowchart



## Wheel Drive Actuator spare parts list

The **item** numbers refer to Figure 7: Wheel Drive Actuator exploded view

Item	Spare Description	Part No.	Comments
1	Drive ring	N031	
2	Back mounting plate assembly	N013	<i>Comes fitted with, pre-assembled gearbox, item 23</i>
5	Belt	D169	
	Pinion kit, <i>including</i>	N014	
7	Pinion sprocket		
15	Protection cap		
19	Pin		
20	Shim (x2)		
	Drive lever kit, <i>including</i>	N011	
8	Roll pin		
9	Drive lever		
11	Drive eccentric assembly	N024	
	Gearbox drive shaft/gear carrier 'C' kit, <i>including</i>	N026	
21	Gearbox drive shaft/gear carrier 'C'		See Figure 8, item 3
–	Planet gear (x12)		See Figure 8, item 4
–	Shim		See Figure 8, item 2
–	'O' ring		See Figure 8, item 1
27	Motor	N012	
	Wiring kit, <i>including</i>	Q106	
28	Motor clamp		
29	Motor clamp 'O' ring		
30	Connector		
31	Connector seal		
33	End cap 'O' ring		
34	End cap		
35	Sealing cap		
36	Connector nut		
37	Cable assembly		

## Disassembly

### *Belt removal*

Refer to Figure 7. Wheel Drive Actuator exploded view.

1. Insert a wide flat, non-metallic blade into the gap between the drive ring (1) and the back mounting plate (2). Gently lever the blade to force the drive ring (1) off the rollers (18) of the back mounting plate (2). Repeat this action in three to four places around the drive ring (1) in order to remove.
2. Unscrew and remove the five screws (3). Detach the support plate (4) from the back mounting plate (2).
3. Remove the belt (5).

### *Pinion sprocket removal*

Refer to Figure 7. Wheel Drive Actuator exploded view.

1. Perform actions as described in *Belt removal*.
2. Lift the pinion sprocket (7) off the gearbox drive shaft/gear carrier 'C' (21).

### *Drive lever and eccentric removal*

Refer to Figure 7. Wheel drive actuator exploded view.

1. Perform actions as described in *Pinion sprocket removal*.
2. Place a block with a suitable clearance hole under the drive lever/shaft (9) to provide support and prevent the shaft bending when the roll pin is driven out.
3. Drive out the roll pin (8).
4. Pull the drive lever (9) off the drive eccentric shaft (11).
5. Lift the drive eccentric assembly (11) and drive wheel assembly (10) off the back mounting plate (2).

### *Motor removal*

Refer to Figure 7. Wheel Drive Actuator exploded view.

1. Unscrew and remove the connector nut (36).
2. Remove the sealing cap (35).
3. Grip the gearbox (23), unscrew and remove the sleeve (32) ensuring the connector does not rotate.
4. Withdraw motor (27)/location peg (26) disengaging it from the gearbox (23). Slide off the flux ring (25).

**Note:** Although given separate item numbers, the gearbox (23) is an integral part of the back mounting plate assembly (2) and the location peg (26) is part of the motor (27).

5. Desolder connector wires from the motor tags.

### *Gearbox removal*

Refer to Figure 7. Wheel Drive Actuator exploded view.

1. Perform actions as described in *Pinion sprocket removal*, and 1, 2, 3 and 4 in *Motor removal*.
2. Unscrew and remove the four gearbox retaining screws (22).
3. Separate the gearbox ( 23) from the back mounting plate assembly (2) leaving the gearbox drive shaft/gear carrier 'C' (21) in place.
4. Support the gearbox drive shaft/gear carrier 'C' (21) and drive out the pin (19).
5. Withdraw the gearbox drive shaft/gear carrier 'C' (21) from the back mounting plate assembly (2).

### ***Gearbox disassembly***

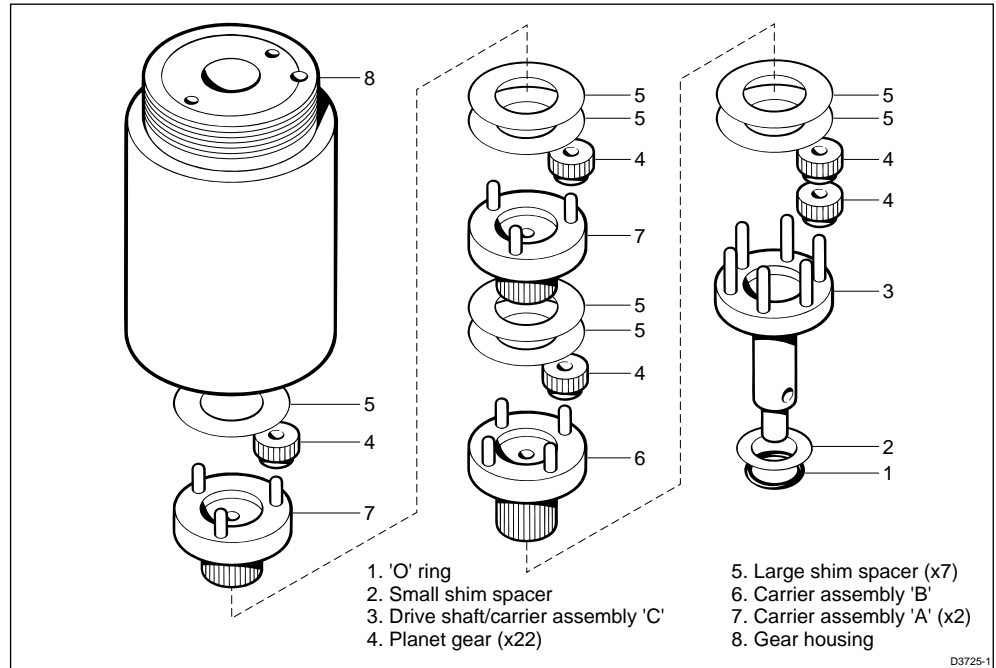


Figure 8. Gearbox exploded view



## Assembly

In all cases, assembly is a straight reversal of the steps described in *Disassembly*.

### *Gearbox assembly*

Refer to Figure 7. Wheel Drive Actuator exploded view.

1. Rebuild gearbox. Refer to Figure 8. Gearbox exploded view
2. Fix the gearbox (23) to the back mounting plate assembly (2) using the four gearbox retaining screws (22).
3. Slide the two shims (20) over the gearbox drive shaft/gear carrier 'C' (21) and hard up against the back mounting plate assembly (2).
4. Support the gearbox drive shaft/gear carrier 'C' (21) and refit the pin (19).

**Note:** If the original pin (19) is bent or damaged a replacement pin can be obtained from pinion kit, part no. N014.

### *Motor assembly*

Refer to Figure 7. Wheel Drive Actuator exploded view.

1. Fit the red motor seal (24) over the threaded end of the gearbox (23).
2. Insert the connector wires through the motor clamp (28), and solder the connector wires to the motor tags – red lead to the tag with a red spot, black lead to the other motor tag.
3. Slide flux ring (25) on the motor (27) and fit onto the gearbox (23) ensuring that the motor drive gear is fully engaged with the gear train and the motor location peg (26) is engaged correctly into the gearbox (23).
4. Fit the 'O' ring (29) onto the motor clamp (28).
5. Place the connector seal (31) over the connector (30).
6. Screw the sleeve (32) with fitted 'O' ring (33) and end cap (34) onto the gearbox (23).
7. Place the sealing cap (35) over the connector (36) and secure with the connector nut (37).

### *Adjustment eccentric assembly*

Refer to Figure 7. Wheel Drive Actuator exploded view.

1. Assemble the adjustment wheel assembly (13), adjustment eccentric assembly (12), adjustment lock nut (14) with its chamfered edge facing outwards, and protection cap (15) to the back mounting plate assembly (2).

**Note:** Ensure that the drive lever (9) is in the slack (declutched) position and the adjustment eccentric assembly (12) is in its lowest position, so that the belt (5) is at its slackest.

### *Drive lever and eccentric assembly*

Refer to Figure 7. Wheel Drive Actuator exploded view.

1. Assemble the drive eccentric assembly (11) and drive wheel assembly (10) to the back mounting plate assembly (2).
2. Slide the drive lever (9) onto the drive eccentric assembly (11). Support the drive lever (9) and insert the roll pin (8).

**Note:** Always use a new roll pin (8) on refit.

### *Pinion sprocket and belt assembly*

Refer to Figure 7. Wheel Drive Actuator exploded view.

1. Slot the pinion sprocket (7) over the gearbox drive shaft (21) and pin (19).
2. With the drive lever (9) in its slack (declutched) position and the adjustment eccentric assembly (12) is in its lowest position fit the belt (5) around the pinion sprocket (7), drive wheel assembly (10) and adjustment wheel assembly (13).
3. Position the support plate (4) with fitted bearing (6) onto the gearbox drive shaft (21), drive eccentric assembly (11), adjustment eccentric assembly (12) and over the screw pillars. Insert the five screws (3) and secure the support plate (4).

**Note:** Take care not to cut new threads in the screw pillars when securing the support plate (4).

### *Drive ring closure*

Refer to Figure 7. Wheel Drive Actuator exploded view.

1. Rest the drive ring (1) over the rollers (18).
2. Locate the rollers (18) nearest the gearbox (23) into the groove of the drive ring (1). Push down and around the drive ring (1) to progressively snap the drive ring (1) over the remaining rollers (18).
3. Spin the drive ring (1) in both directions, two or three times, too ensure the assembly is fully seated and free running.

### 3.3 Setting Belt Tension

The purpose of the belt tensioning procedure is to ensure that:

1. The belt is sufficiently tight to transmit the normal maximum drive torques.
2. The belt is not over-tightened, as this will increase the backdrive load to a level where it can be felt on the vessel's wheel.

Tools required:

4000 Drive unit torque fixture

Service tool number - T033

4000 Drive unit torque adjuster

Service tool number - T032

Motor drive box and ammeter

Motor drive box

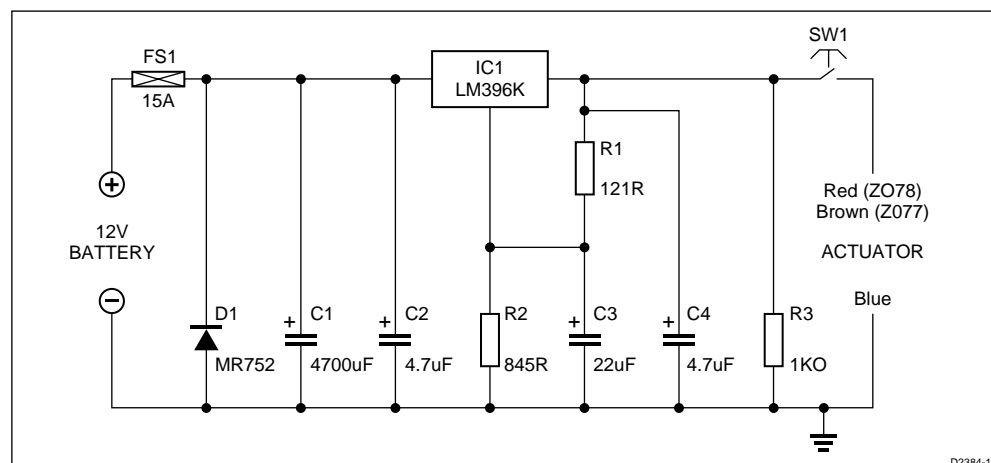


Figure 9. Motor drive box circuit diagram

### *Motor drive box parts*

<b>Component</b>	<b>Description</b>	
R1	Resistor	121R 0.1% metal film
R2	Resistor	845R 0.1% metal film
R3	Resistor	1k0 0.5W
C1	Capacitor	4700uF 20% electrolytic 25V
C2	Capacitor	4.7uF 10% solid tantalum 35V
C3	Capacitor	22uF 10% solid tantalum 35V
C4	Capacitor	4.7uF 10% solid tantalum 35V
D1	Diode	MR 752
IC1	LM396K	High power 10A regulator
F1	Fuse	15A quick blow
	Fuseholder	1.1/4 inch
SW1	Switch	Single pole single throw
	TO3	Insulating kit
	Diecast box	

### Procedure

1. Screw the drive ring clamp to the front ring. Use the group of two holes on their own, not two holes in a group of four. Screw the torque restraint pin into the back mounting plate
2. Connect the motor to the motor drive box, using an in - line ammeter (0 - 10 amps) to measure current
3. Connect the motor drive box to a 12V battery. The drive box provides a regulated 10.5V supply to the motor
4. Engage the drive unit clutch
5. Use the eccentric adjuster to loosen (anti - clockwise) the locking nut and allow the eccentric to move to the minimum tension position
6. Switch on the drive to the motor and, using a 1.5mm Allen key, rotate the eccentric anticlockwise (as viewed from above) to increase belt tension until the belt just stops slipping (motor stalled)
7. Check that the motor current is approximately 6.5 amps
8. Tighten the locking nut, apply Loctite to retain the setting and switch off the motor drive.