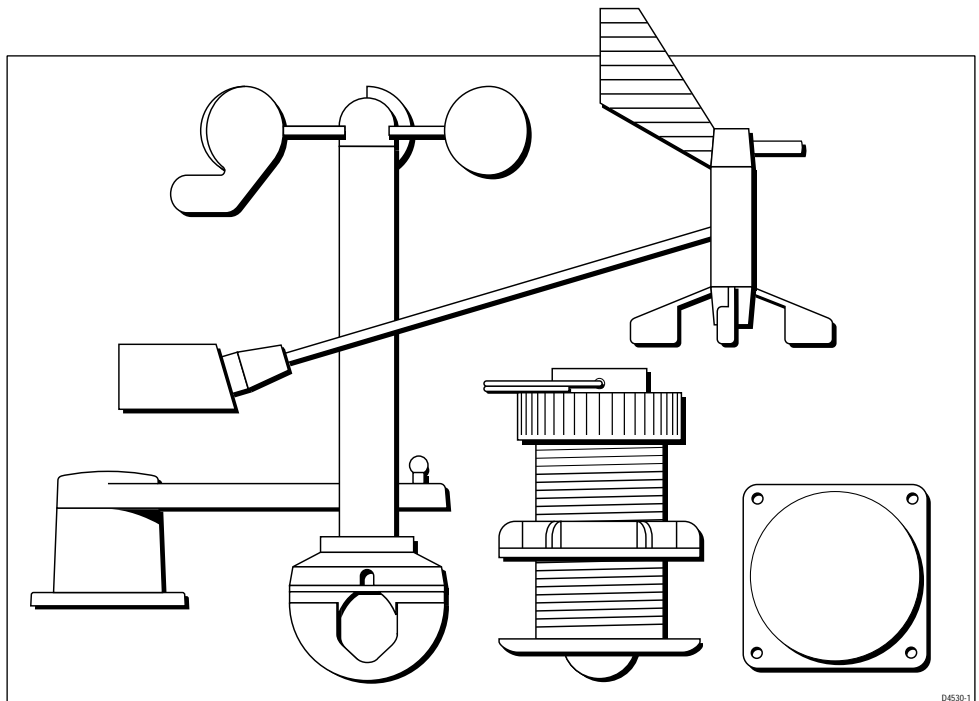


Part 3. ST60 Transducers



D4530-1

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Chapter 1. ST60 Speed transducer

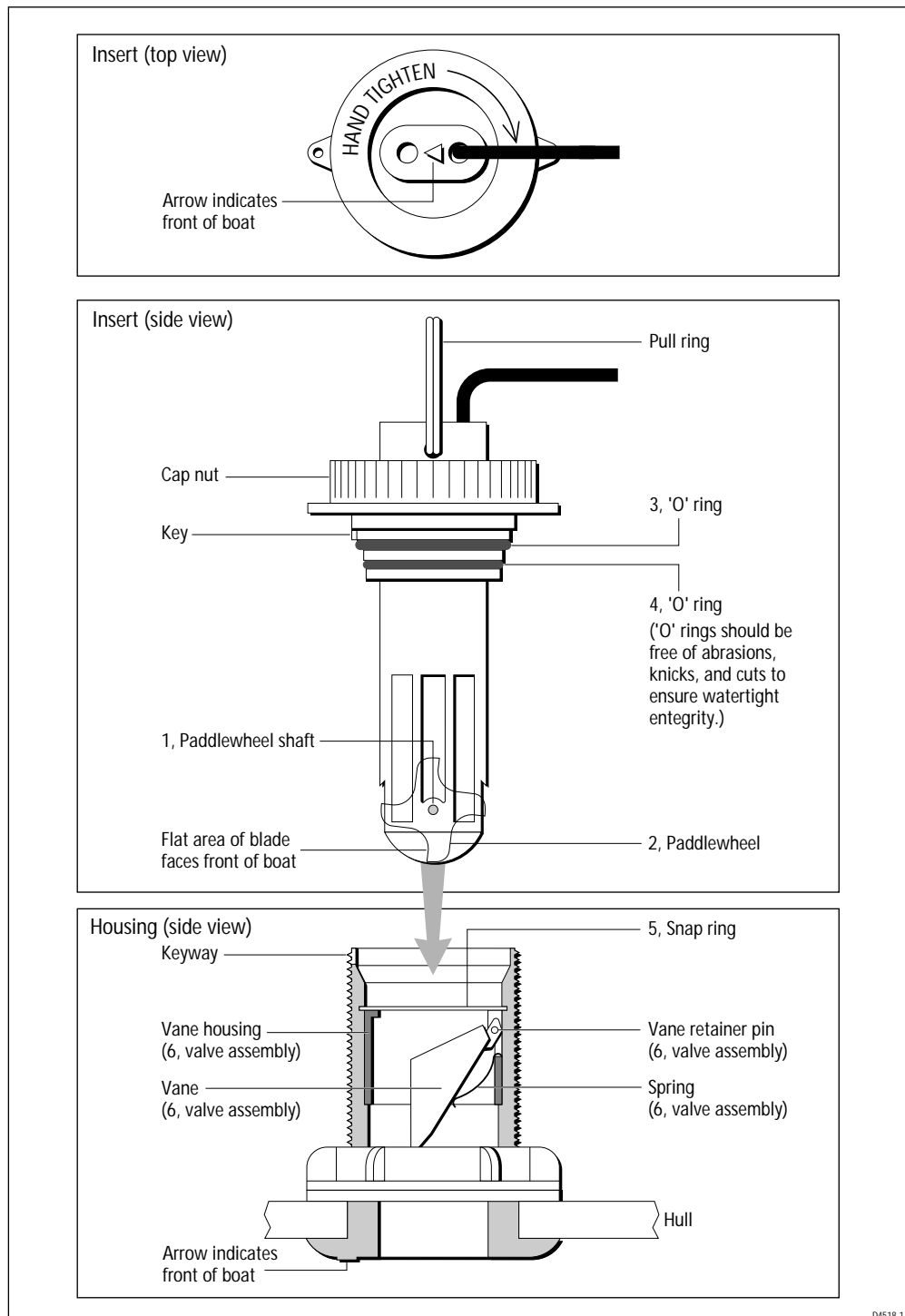


Figure 1: ST60 Speed transducer

Changing a paddlewheel

For the following sequence refer to Figure 1: ST60 Speed transducer.

1. Use the new paddlewheel shaft from the spare parts kit to push out the old shaft (1) approximately 5mm (1/4inch).
2. Grasp the end of the old shaft (1) with pliers and pull it straight out, releasing the paddlewheel (2).

3. Place the new paddlewheel (2) in the insert assembly cavity.
IMPORTANT: The flat surface of the paddlewheel blades must face the direction of the arrow on top of the insert assembly.

When the insert assembly is installed in the housing, the arrow on the top insert cap and the water exposed flat surface of the housing should both face the front of the vessel.

4. Tap the new shaft (1) into place until it is flush with the housing, being careful that the shaft enters the centre hole of the paddlewheel bearing. Failure to align the bearing before inserting the shaft can result in bearing damage.

Changing the valve assembly

The valve assembly should only be changed when the vessel is out of water.

The transducer incorporates a self-sealing valve which minimizes the flow of water into the vessel should the insert assembly be removed. When the insert assembly is removed, the curved vane is activated by both a spring and water pressure, pushing the vane upward to seal the opening. The valve assembly is held in place with a corrosion resistant snap ring.

Should the valve mechanism fail carry out the following (refer to Figure 1: ST60 Speed transducer).

1. Remove the snap ring (5), using a screwdriver to pry the end of the ring free.
2. Slide the valve assembly upward, out of the housing.
Note: The vane retainer pin is a loose slip-fit and may slide out when the assembly is removed from the housing.
3. The insert assembly can be reinserted into the housing and used conventionally, without the valve assembly.
4. To install a valve assembly, insert it into the housing (vane tongue pointing downward). Install the snap ring (5), making certain that it locks into its groove in the housing wall.

ST60 Speed transducer spare parts list

The **item** numbers refer to Figure 1: ST60 Speed transducer

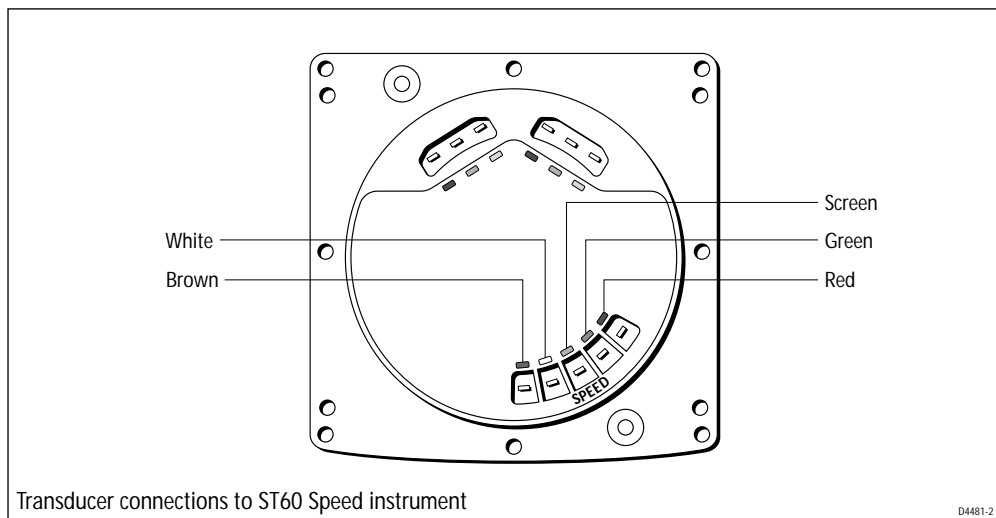
Item	Spare/Accessory Description	Part No.	Comments
	Speed transducer service kit, <i>including</i>	D234	
1	Paddlewheel shaft		
2	Paddlewheel		
3	'O' ring (x2)		
4	'O' ring (x2)		
5	Snap ring		
6	Valve assembly		

Insert assembly installation

When reinstalling the insert assembly, ensure 'O' rings have been inspected and replaced if necessary, then lubricated and the key of the insert assembly locates with the keyway of the housing assembly. Secure with cap nut (hand tighten).

ST60 Speed transducer connections

Cable core colour	Instrument head circuit diagram reference	Description
Red	12V_SPD	Approximately 11.2V DC out
Green	SPD	With transducer attached, spinning paddle-wheel produces pulses approximately 11.2V DC in amplitude at 5.5Hz/Knot.
Screen	OV	OV
White	TEMP	With transducer attached, voltage here is dependant on temperature. Approximately 1.8v at 0 degrees C.
Brown	OVANA	OV



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Chapter 2. ST60 Fluxgate compass transducer

Functional test

Disconnect the Fluxgate from the Autopilot and check continuity as follows:

Cable colour	Resistance
Screen to blue	< 10 ohms
Red to green	< 5 ohms
Red to yellow	< 5 ohms
Red to screen	Open circuit

Magnetic deviation

The Fluxgate Compass requires careful siting if optimum Autopilot performance is to be achieved. The SeaTalk electronics is able to correct the compass for most deviating magnetic fields present when the linearisation procedure is carried out. Any further deviation, introduced after linearisation, will introduce an error between the Fluxgate and the ship's compass. This can be removed by carrying out the linearisation again. If the displayed deviation is greater than +/- 15 degrees the Fluxgate should be resited.

Note: The linearisation procedure should always be carried out if the Fluxgate has been exchanged, removed or moved from its original mounting position.

Disassembly/reassembly

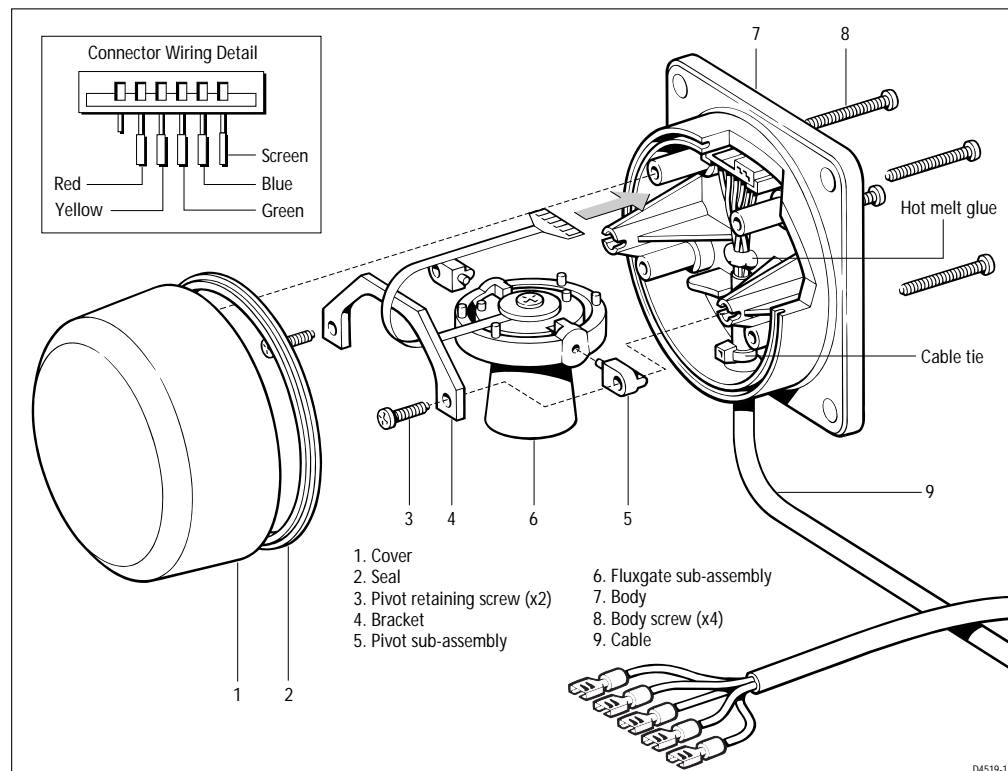


Figure 2: Fluxgate Compass exploded view

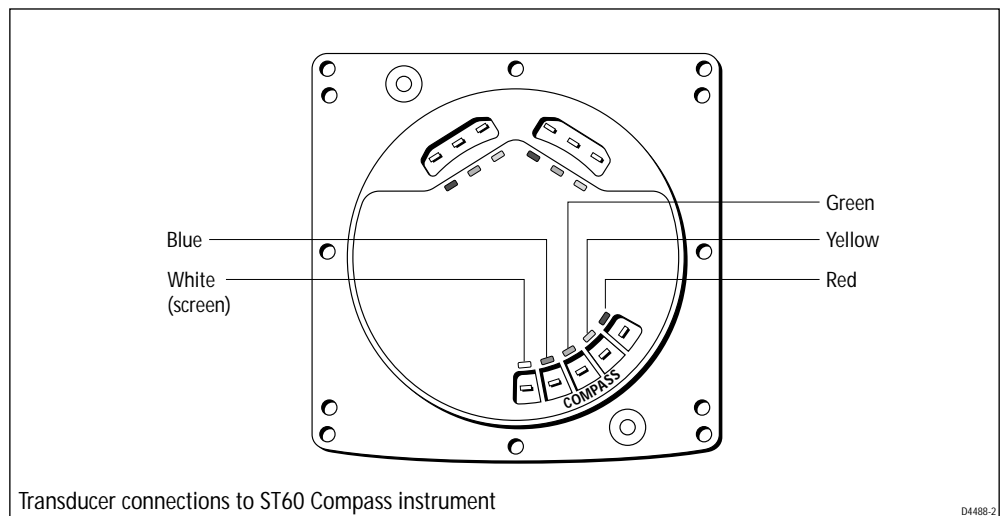
Fluxgate Compass spare parts list

The **item** numbers refer to Figure 2: Fluxgate Compass exploded view

Item	Spare Description	Part No.	Comments
3	Compass base kit, <i>including</i> Pivot retaining screw (x2)	M096	
4	Bracket		
5	Fluxgate sub-assembly, <i>including</i> Pivot sub-assembly (x2)	M022	
6	Fluxgate sub-assembly		

ST60 Fluxgate Compass transducer connections

Cable core colour	Instrument head circuit diagram reference	Description
Red	VREF	Fluxgate 2.5V
Yellow	FGA	Sense A
Green	FGB	Sense B
Blue	FGDRV	Fluxgate drive
White	Screen	Fluxgate OV return



Chapter 3. ST60 Rudder reference transducer

Description

The Rudder Reference transducer (M81105) contains a single-turn 5k ohm plastic potentiometer to provide the autopilot with rudder position information. When the unit is replaced, correct installation is vital to achieve optimum steering performance. Transducer arm movement is limited to +/- 60 degrees. Care must be taken to make sure that the arm is opposite the cable entry when the rudder is amidships. Failure to do this could result in damage to the rudder reference transducer if the arm is driven onto its stops by the steering system.

Faulty rudder reference transducers should be replaced as a complete unit.

Functional Test

Disconnect the rudder reference transducer from the autopilot and check for continuity.

Cable colour	Arm position	Resistance
Green/red	Any position	5k ohm +/- 5%
Blue/green	Anti clockwise stop	1.66k ohm +/- 10%
Blue/green	Clockwise stop	3.3k ohm +/- 10%

Balljoint replacement

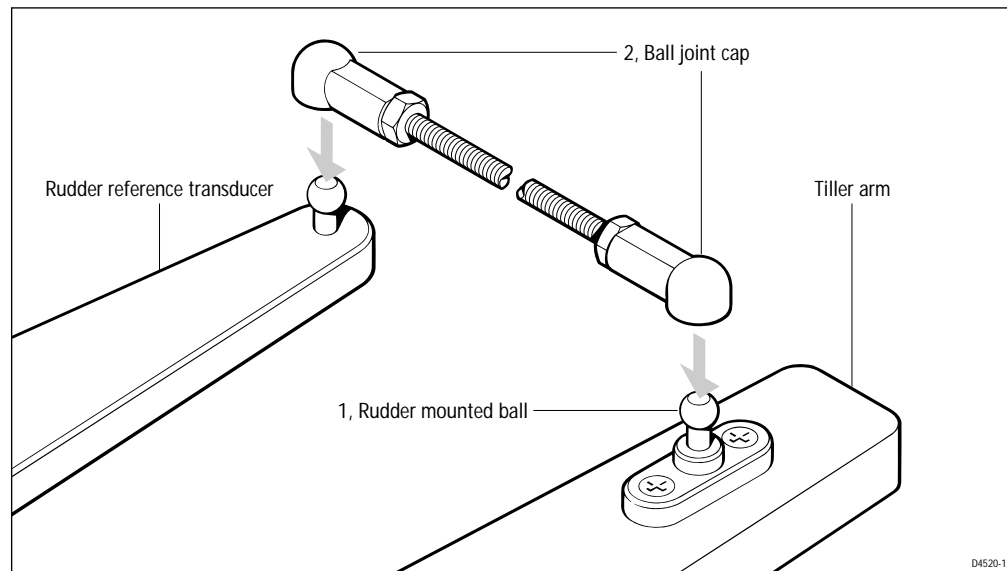


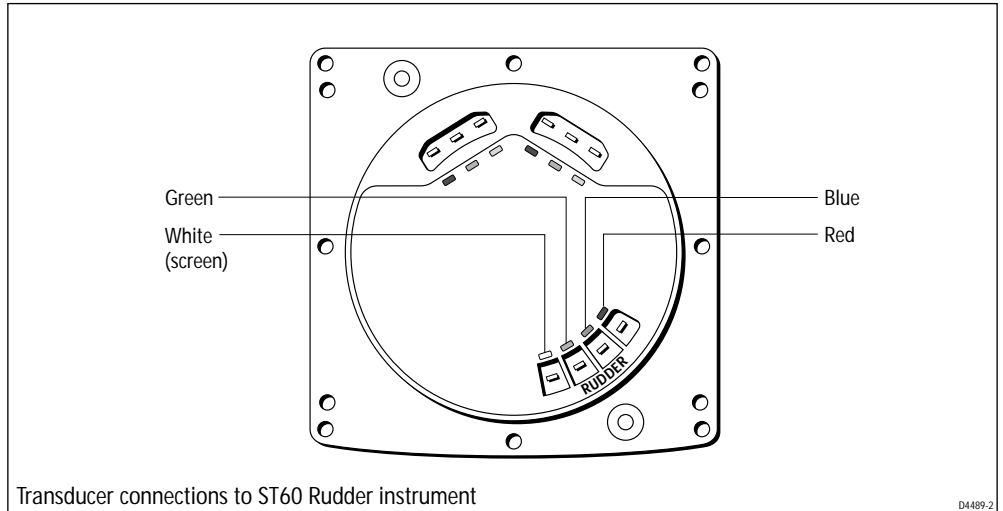
Figure 3: Balljoint kit exploded view

The **item** numbers refer to Figure 3: Ball joint kit exploded view

Item	Spare/Accessory Description	Part No.	Comments
	Ball joint kit, <i>including</i>	D143	
1	Rudder mounted ball		
2	Ball joint cap (x2)		

ST60 Rudder reference transducer connections

Cable core colour	Instrument head circuit diagram reference	Description
Red	5V	Transducer +V supply
Blue	VRUD	Transducer output
Green	0V	Transducer 0V return
White	Screen	Transducer screen



Chapter 4. ST60 Wind rotavecta

Disassembly/reassembly

Transducers

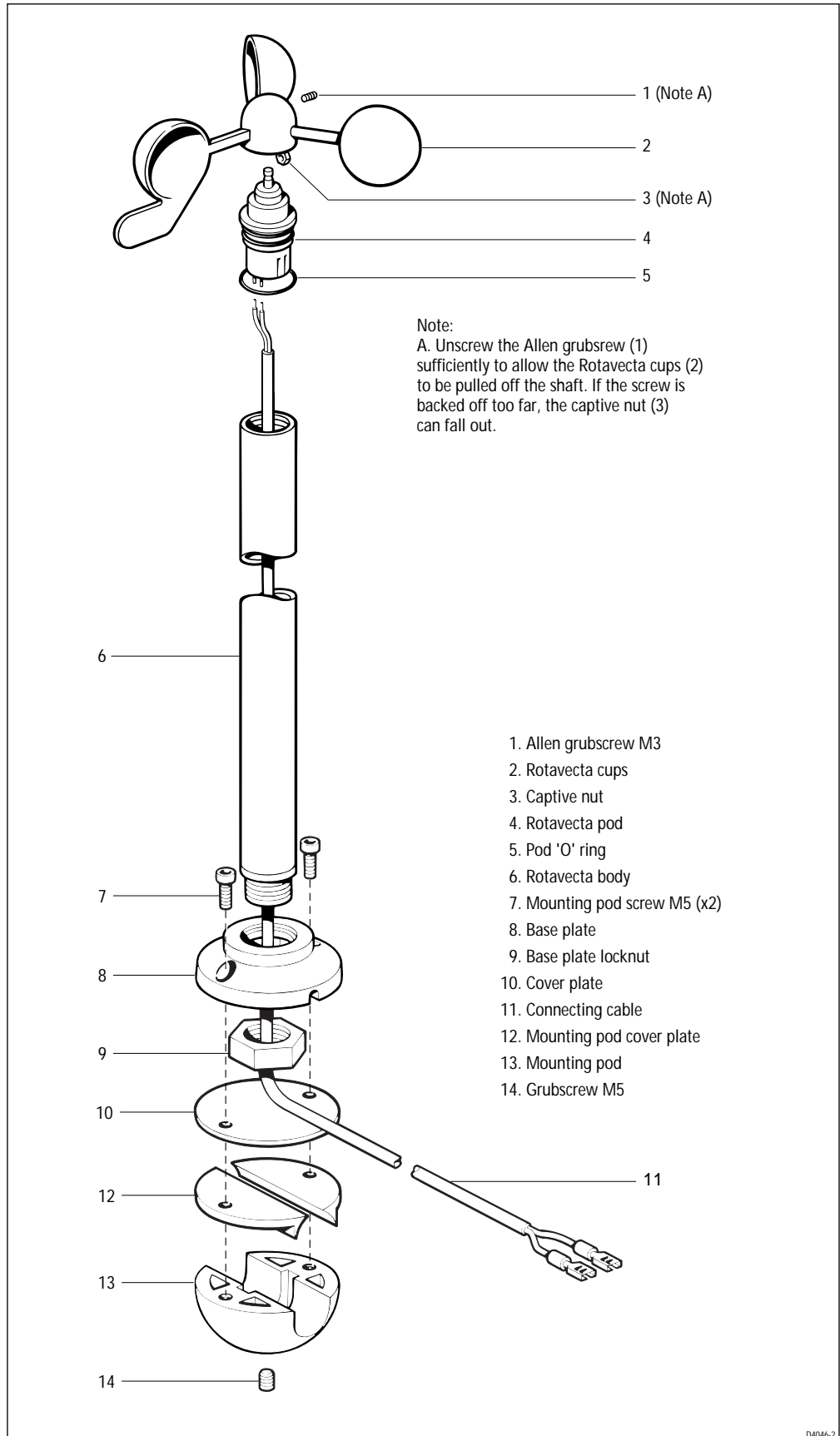


Figure 4: Wind rotavecta exploded view

Wind rotavecta spare parts list

The **item** numbers refer to Figure 4: Wind rotavecta exploded view

Item	Spare/Accessory Description	Part No.	Comments
1	Rotavecta transducer kit, <i>including</i> Allen grubscREW M3	D240	
2	Rotavecta cups		
3	Captive nut M3		
4	Rotavecta pod assembly, <i>including</i> Rotavecta pod	Q113	
5	Pod 'O' ring		
7	Rail mounting kit, <i>including</i> Mounting pod screw M5(x2)	D316	
8	Base plate		
9	Base plate locknut		
10	Cover plate		
11	Connecting cable		
12	Mounting pod cover plate		
13	Mounting pod		
14	GrubscREW M5		

Wind rotavecta PCB details

Input/Output signals

(refer to Figure 5: Wind Rotavecta circuit diagram)

Cable core colour	Transducer circuit diagram reference	Description
Red	P1	Current source
Blue	P2	0V

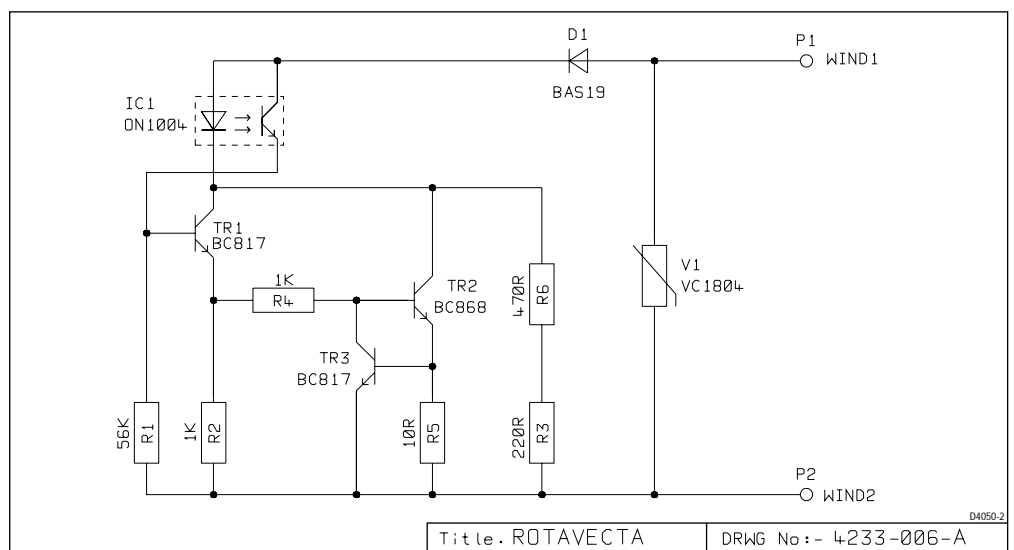
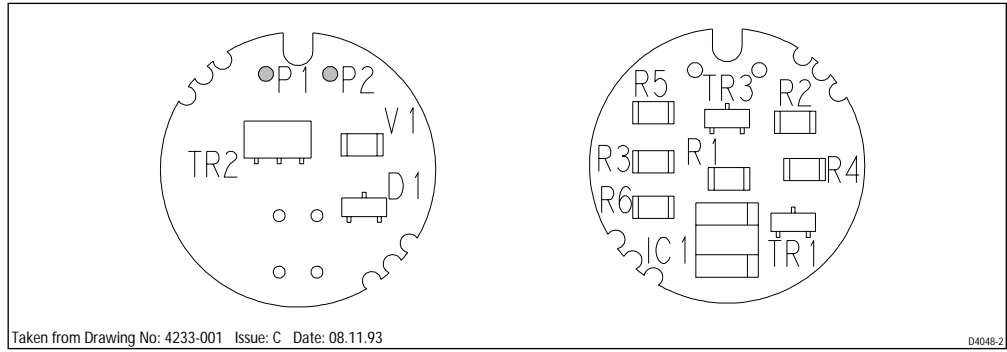


Figure 5: Wind Rotavecta circuit diagram

PCB component layout



PCB component list

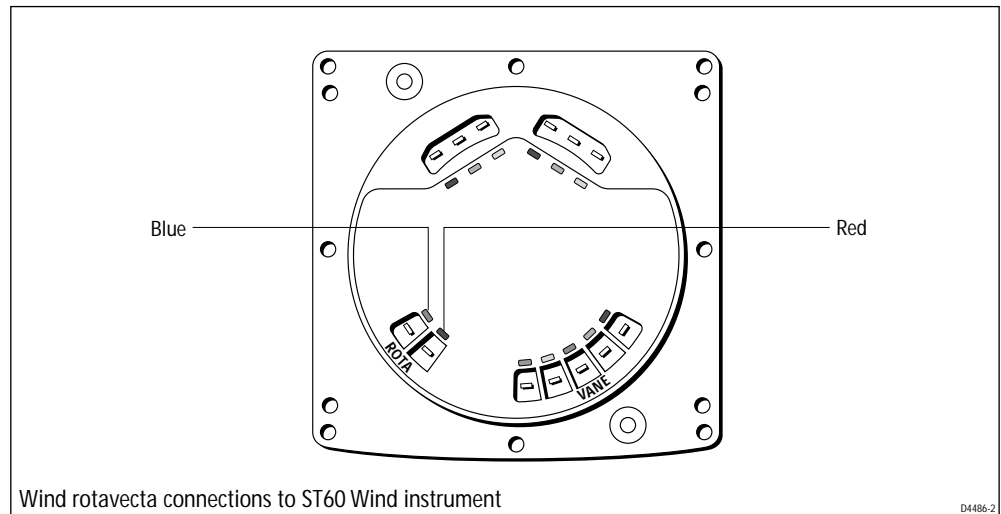
9501BC868	BC868	TR2
9500BC817	BC817	TR1, TR3
9200BAS19	DIODE SOT23 BAS19	D1
9108VC180400	TRANSIENT VOLTAGE SUPPRESSOR	V1
910656K	RESISTOR 1206 56K	R1
910647470R	RESISTOR 1206 470R	R6
9106220R	RESISTOR 1206 220R	R3
910310R	RESISTOR 1206 10R	R5
91031K	RESISTOR 1206 1K	R2, R4
24010	B* VERO SOLDER PIN 18-0223K	P1, P2
06027	OPTO SWITCH	IC1
3015-074	ST30 WIND TRANS PCB	

Taken from Drawing No: 4233-001 Issue: C Date: 08.11.93

D4049-2

ST60 Wind Rotavecta connections

Cable core colour	Instrument head circuit diagram reference	Description
Red	ROTA+	Rotavecta current constant
Blue	ROTA-	Rotavecta 0V



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Chapter 5. ST60 Windvane transducer

Disassembly/reassembly

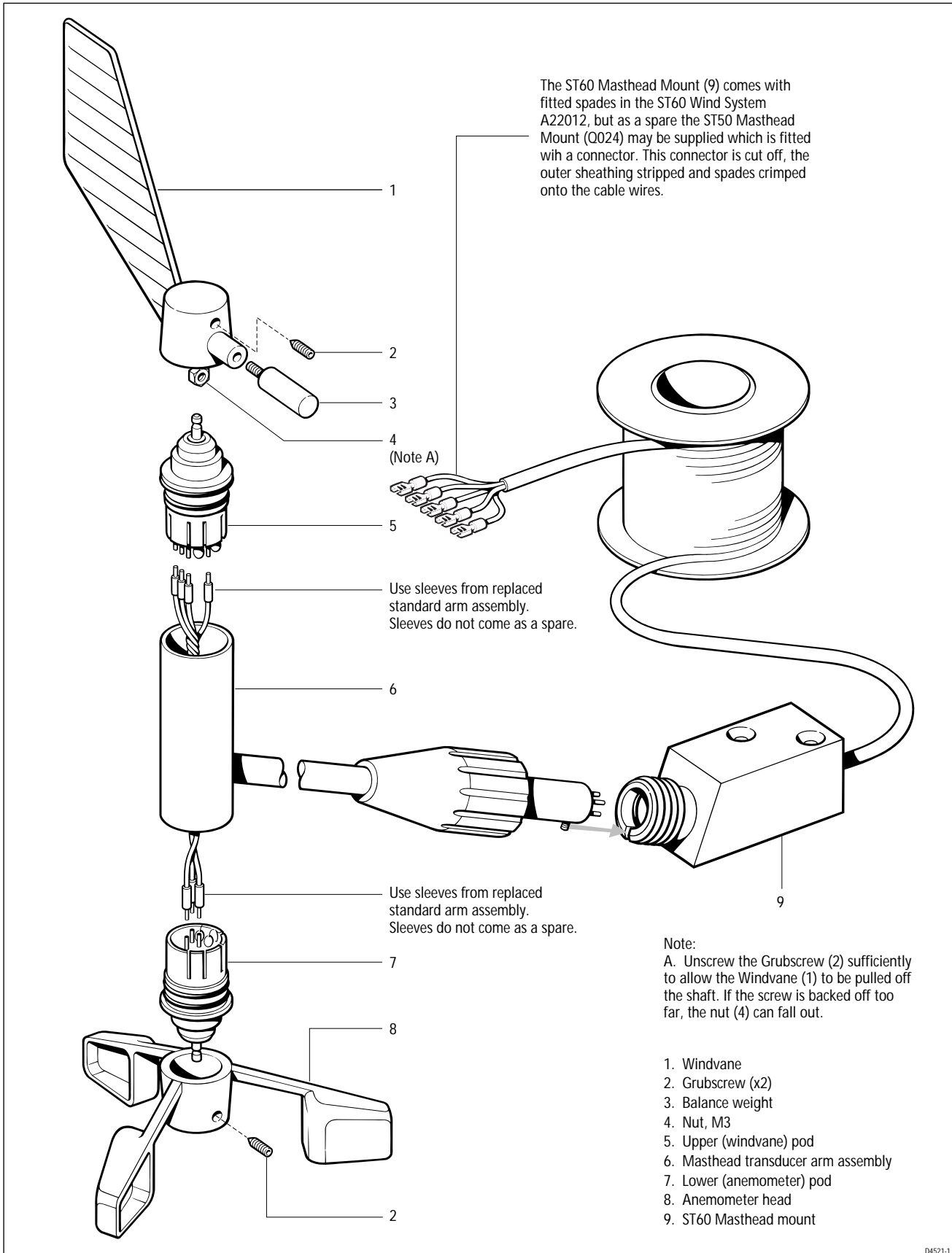


Figure 6: ST60 Windvane exploded view

Windvane (standard arm) spare parts lists

The **item** numbers refer to Figure 6: Windvane exploded view

Item	Spare/Accessory Description	Part No.	Comments
	Masthead transducer service kit, <i>including</i>	D139	
1	Windvane		
2	Grubscrew, M3 (x2)		
3	Balance weight		
4	Nut, M3		
8	Anemometer head		
5	Upper (windvane) pod	Q001	
6	Masthead transducer arm assembly	Q025	Standard arm
7	Lower (anemometer) pod	Q002	
9	Masthead mount assembly	Q024	30 metres of cable. May be supplied with a connector. This connector is cut off, sheathing stripped and spades crimped onto the cable wires.
	Masthead transducer	D168	Masthead mount assembly not supplied

Also available is the ST60 Wind Masthead Mount incorporating 50 metres of cable (A28042).

Long arm masthead transducer

On the Long Arm Masthead Transducer Unit (D225) the masthead arm (carbon fibre) assembly is not available as a spare.

Functional test

The operation of the Masthead Mounted Windvane can be checked using the following procedure:

1. Connect +8V dc to the red core and 0V to the screen.
2. Connect a digital volt meter across the screen and the green core.
3. Rotate vane head through 360 degrees and check that the meter reading oscillates sinusoidally. The maximum reading must be between 6V and 5.5V. The minimum reading must be between 2V and 2.5V.
4. Repeat section 3 with the meter connected across the blue core and screen.

The anemometer transducer can not easily be tested and a replacement pod should be fitted if suspected to be faulty.

Windvane head PCB details

Input/Output signals (refer to Figure 7: Windvane head circuit diagram)

Cable core colour	Transducer circuit diagram reference	Description
Red	P1	8V supply
Green	P2	Sin output
Blue	P3	Cos output
Black	P4	0V supply

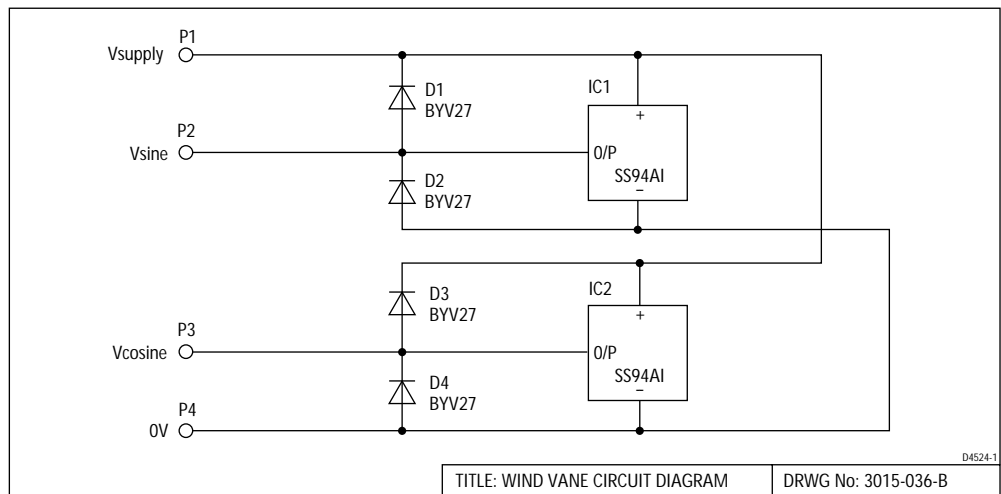
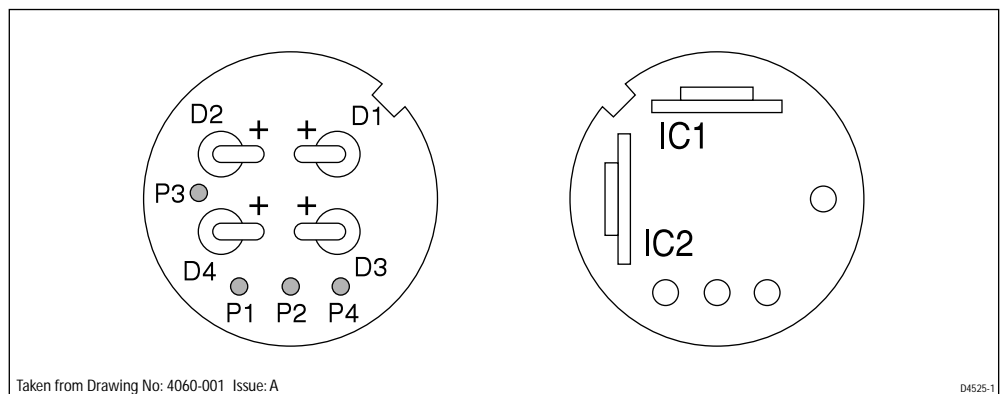


Figure 7: Windvane head circuit diagram

PCB component layout



PCB component list

24010	PIN	
04047	ANALOGUE POSITION SENSOR SS94A1 HONEYWELL	IC1, IC2
02038	DIODE (FAST RECOVERY) BYV27-100 MULLARD	D1, D2, D3, D4
3015-036	WINDVANE PCB	

Taken from Drawing No: 4060-001 Issue: A

D4526-1

Anemometer head PCB details

Input/Output signals (refer to Figure 8: Anemometer head circuit diagram)

Cable core colour	Transducer circuit diagram reference	Description
Red	P1	8V supply
Yellow	P2	Anemometer output
Black	P3	0V supply

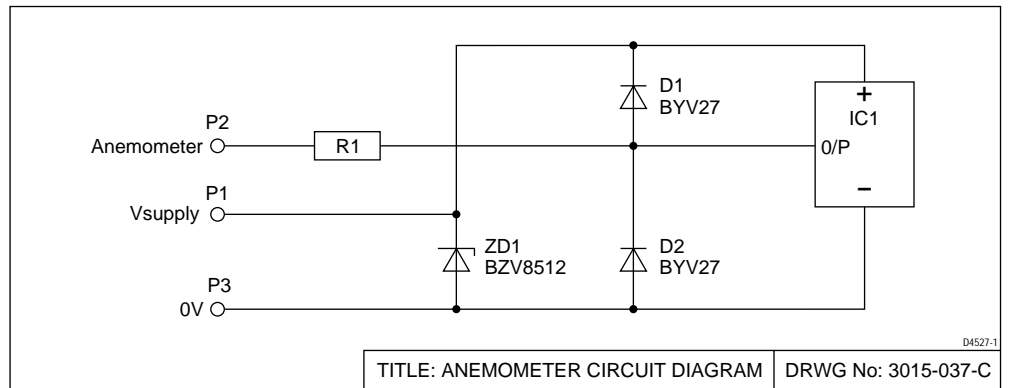
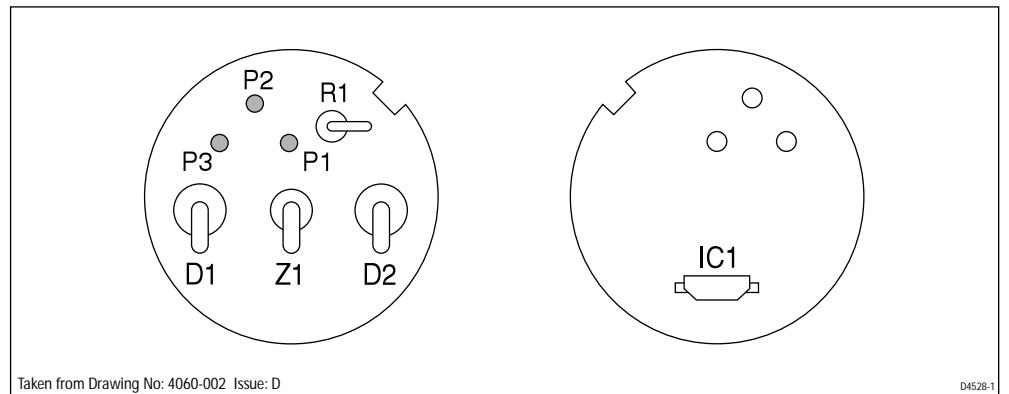


Figure 8: Anemometer head circuit diagram

PCB component layout



PCB component list

24010	PIN	
04046	ANALOGUE POSITION SENSOR SS41 HONEYWELL	IC1
02038	DIODE (FAST RECOVERY) BYV27-100 MULLARD	D1, D2
02040	ZENER DIODE BZV85C12	Z1
01108	RESISTOR 1K5 10% 0.125W	R1
3015-037	PCB DETAIL	

Taken from Drawing No: 4060-002 Issue: D

D4529-1

ST60 Windvane connections

Cable colour core	Instrument head circuit diagram reference	Description
Red	8V	Vane supply
Green	SIN	sin output
Blue	COS	cos output
Yellow	ANN	annemometer
White	SCREEN	Transducer OV return

