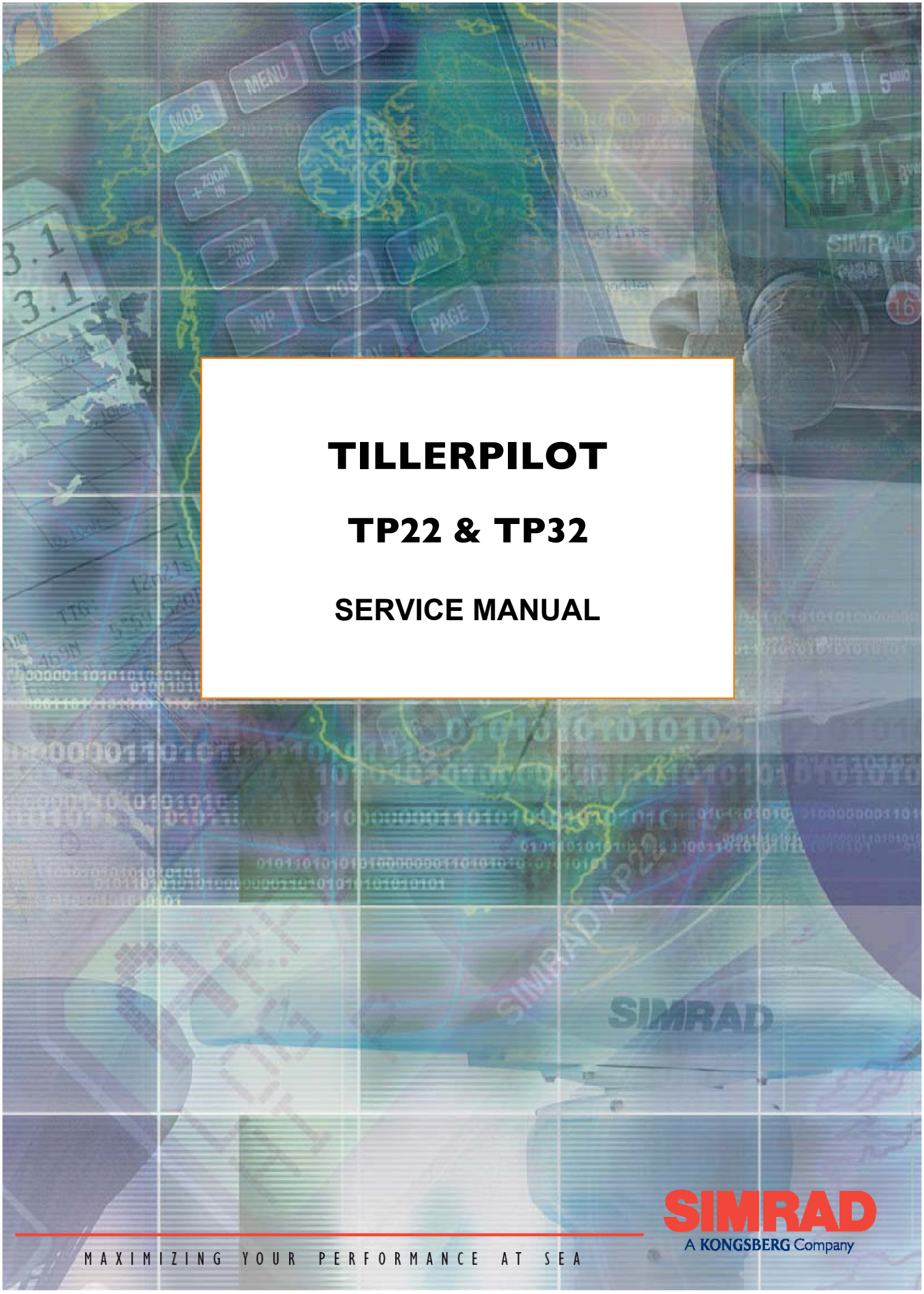


TILLERPILOT

TP22 & TP32

SERVICE MANUAL

MAXIMIZING YOUR PERFORMANCE AT SEA

SIMRAD
A KONGSBERG Company

Simrad Margate Ltd

Star Lane, Margate, Kent CT9 4NP,UK
Telephone +44 (0) 1843 290290
Facsimile +44 (0) 1843 290471

CONTENTS

Tillerpilots TP22 & TP32

Section 1

Introduction

1 INTRODUCTION TO THE TP22 AND TP32 TILLERPILOTS

The TP22 and TP32 Tillerpilots combine highly sophisticated electronics with advanced software and powerful mechanical drive to provide accurate and reliable steering performance under a variety of different conditions with minimal current consumption.

TP22 – is suitable for tiller-steered sailing yachts up to 10m (34 ft) in length and offers a range of sophisticated functions, including additional remote control facilities, Steer to Wind and Nav (Steer to GPS) modes using external equipment linked directly to the Tillerpilot via the SimNet high-speed bus or through the inbuilt NMEA0183 interface.

TP32 – offers the same facilities as the TP22 with an improved re-circulating ball screw drive and is suitable for tiller-steered sailing yachts up to 12.8m (42 ft) in length.

SimNet is an intelligent network system provided to facilitate integration of Simrad products by sharing data. The system is built around CanBus, a true multi-talker bus system with high levels of error protection and all units are interconnected using a standard single cable.

The Pilot can receive navigational information from a Chartplotter for Steer To GPS (Nav mode), and will also accept wind angle data, from the wind transducer for Steer To Wind mode, boat speed data from the speed instrument and heading data from the compass transducer. Additionally, heading data from the Pilot can be displayed on any instrument display capable of showing compass information.

Tillerpilots TP22 & TP32

Section 2

Operation

2 OPERATING INSTRUCTIONS

This Service Manual only contains operating instructions for those features of the Simrad Tillerpilot range that are not normally available to the end user. For details of normal operation please refer to the appropriate Simrad Instruction Manual.

Tillerpilots TP22 & TP32

Section 3

Disassembly / Assembly Instructions

3 DISASSEMBLY / ASSEMBLY INSTRUCTIONS

Tillerpilot : TP22. Refer to Drawing Number E04587.

Disassembly

Remove and retain the 10 case screws 200005 and separate the case halves. Remove the Screw (200139) securing the "Wits" Fixing (200196) and lift the Grommets (190036) retaining the cable loom from their supports to facilitate separation. Fold down the Pivot Pin (E02501) from the recess in the case and lift clear. Remove and discard the Main Case Seal (E02498); seals frequently become distorted and good engineering practice dictates their replacement.

Main PCB. Remove and retain the 6 Screws (200139) securing the Main PCB Cover (E02680:BK) to gain access to the PCB. Remove and discard the Internal Seal (E02499). Remove the Compass Assembly (E02637) by unplugging the connector from the PCB and disengaging the compass housing from the lugs in the PCB Cover. De-solder and remove the cable connections and withdraw the cables through the 2 Grommets (E04534 and E04536).

Feedback PCB. Remove and retain the 2 Screws (200139) and release the Feedback PCB (E03184). De-solder and remove the cable connections.

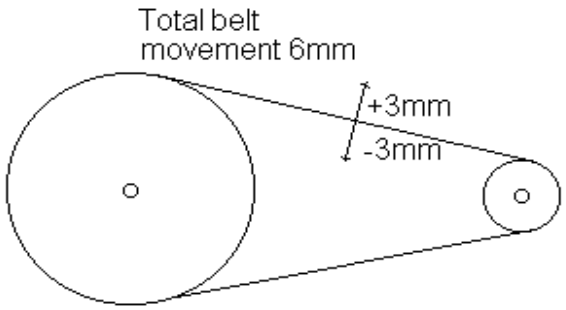
Motor and Drive Assembly

Unscrew and retain the Tiller Connector (E00111) from the end of the Push Rod (E02522). Remove and retain the 2 Screws (200137) securing the Bearing Clamp (E02497:BK) and lift away. Release the top Screw (200082) from the Front Motor Mount (E02502) and remove and retain the Anti Static Strap (E04493). Lift the Motor Assembly (E02788) from its retaining slots, whilst simultaneously disengaging the Drive Belt (280027) from the motor drive pulley. De-solder and withdraw the motor supply cables. Lift the 71-Tooth Pulley (E02505) located on the end of the Drive Assembly (E03264), disengage and remove the Drive Belt and withdraw the Drive Assembly. Remove the 2 End Cap (E02495:BK) retaining Screws (200055) and withdraw the End Cap and seals. The Tillerpilot Cable Assembly (E04584) may be withdrawn through the Grommet (E04533) once the cable ties and fixings have been released.

Assembly

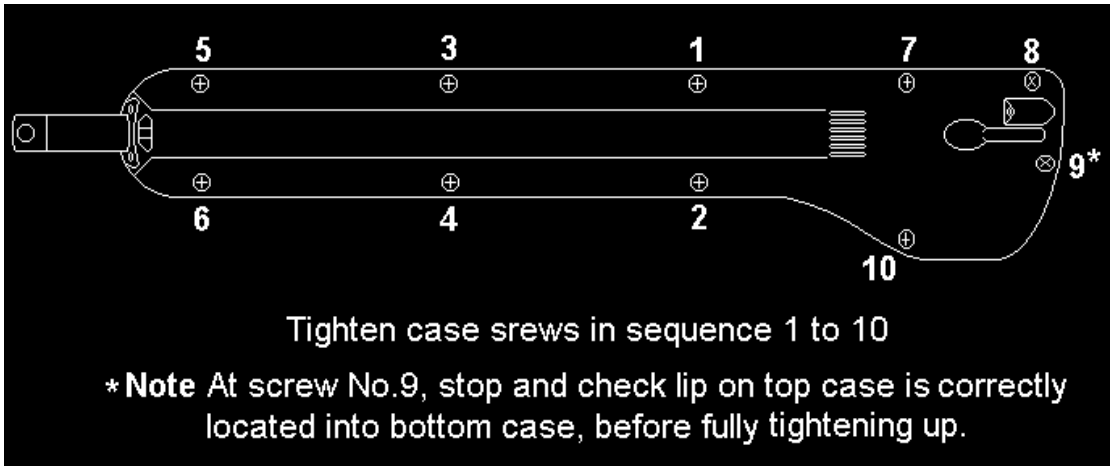
Assembly is the reverse of disassembly but the following points should be noted:

Motor and Drive Assembly. Before fitting the Drive Assembly the "trough" area and the bore which houses the seal, "O" ring and spacer should be lightly greased. The Push Rod Seal (E00747) has a tapered inner bore and should be fitted into the case with the larger bore of the seal facing outwards. Fit "O" Ring 190026, spacer E02870 and End Cap E02495, ensuring that the end cap is pushed fully home before the retaining screws are tightened. After assembly, refer to the sketch below and check that the drive belt tension is within +/- 3mm.



Main PCB. Refer to drawing E04587 and, ensuring that the wires from the compass to the connector lie over the PCB, insert plug into the socket on the PCB. Clip the compass Assembly into the PCB Cover (it can only be fitted one way around), ensuring that the lugs on the compass assembly line up with the 2 holes in the PCB cover.

Final Assembly. Carefully position the case top onto the bottom ensuring that the case seal and Dowel Pin (200322) locate correctly, squeeze the top and bottom halves of the case together and fit the 10 screws (200088). Tighten down evenly all round in the sequence shown below:



Post Assembly Test. Remove the Tiller Connector E00111 and push the Tillerpilot Test Syringe Part No. TP-SRY over the end of the Push Rod E02522. Depress the syringe piston and release, the piston should return to its original position indicating that the integrity of the case seal has not been compromised during fitting. Remove the Test Syringe and refit the Tiller Connector.

Tillerpilot : TP32. Refer to Drawing Number E04581.

Disassembly and assembly are identical to the TP22 with the following exception:

Drive Assembly E02618. The Drive Assembly employs a re-circulating ball screw and the assembly is held in place by the metal mounting plate sitting in the mounting slots in both top and bottom cases.

Tillerpilots TP22 & TP32

Section 4

Mechanical Assembly Drawings

4 MECHANICAL ASSEMBLY DRAWINGS

General Assembly : TP22	E04587
General Assembly : TP32	E04581
Assembly : Tillerpilot Flanged Outlet	E04530
Cable Assembly : Power	E04584

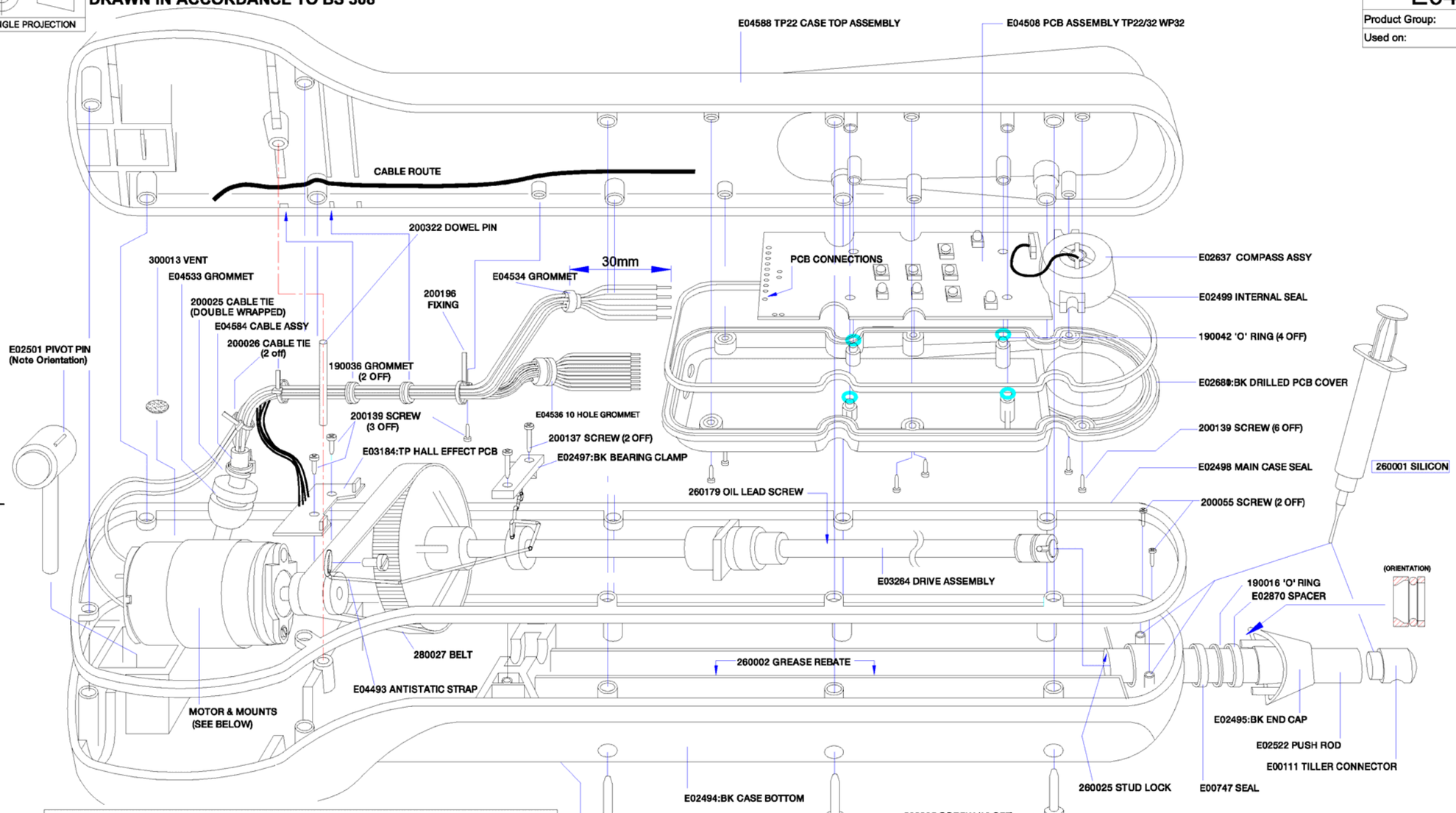
DRAWN IN ACCORDANCE TO BS 308

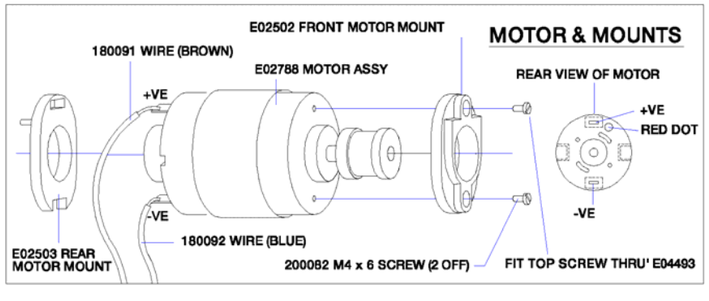
3rd ANGLE PROJECTION

Drg No.: E04587

Product Group: 810

Used on: TP22





DO NOT SCALE | IF IN DOUBT ASK

SIMRAD A KONGSBERG Company

STAR LANE, MARGATE, KENT CT9 4NP
TEL: 01843 290290 FAX: 01843 290471
+44 1843 290290

Mod.No.	Issue	Date	Modifications

Drawn: NG/BM Date 10:02:04 | Checked: Date | Approved: Date

Tolerances + & -: 0. = 0.50; 0.0 = 0.25; 0.00 = 0.10; ANG. = 0.5°

ALL DIMENSIONS mm

Material: SEE ABOVE

Finish: -

COMPUTER GENERATED DRAWING
MANUAL MODIFICATION INVALIDATES CAD FILE

Model: TP22

SHT. 1 OF 1

Date: 19:03:04 | Original Scale: NTS

Title: GENERAL ASSEMBLY

Drg No.: E04587 | Issue 1

SIZE A3:420 X 297
LANDSCAPE

DRAWN IN ACCORDANCE WITH BS 308

3rd ANGLE PROJECTION

DRG No.: E04581

PRODUCT GROUP : 810

USED ON : TP32

E04582 TP32 CASE TOP ASSEMBLY

E04508 PCB ASSEMBLY TP22/32 WP32

CABLE ROUTE

300013 VENT

200322 DOWEL PIN

30mm

E04533 GROMMET

E04534 GROMMET

PCB CONNECTIONS

E02637 COMPASS ASSY

200025 CABLE TIE (DOUBLE WRAPPED)

200196 FIXING

E02499 INTERNAL SEAL

E04584 CABLE ASSY

190042 'O' RING (4 OFF)

E02501 PIVOT PIN (Note Orientation)

200026 CABLE TIE (2 off)

190036 GROMMET (2 OFF)

E02680: BK DRILLED PCB COVER

200139 SCREW (3 OFF)

E04536 10 HOLE GROMMET

200139 SCREW (6 OFF)

E03184 HALL EFFECT PCB

E02498 MAIN CASE SEAL

260001 SILICON

260179 OIL LEAD SCREW

200055 SCREW (2 OFF)

E02618 DRIVE ASSEMBLY

190016 'O' RING

E02870 SPACER

(ORIENTATION)

280027 BELT

260002 GREASE REBATE

E04494 ANTISTATIC STRAP

MOTOR & MOUNTS (SEE BELOW)

E02495: BK END CAP

E02522 PUSH ROD

E00111 TILLER CONNECTOR

E02494: BK CASE BOTTOM

260025 STUD LOCK

E00747 SEAL

200005 SCREW (10 OFF)

TP30 SERIAL LABEL

MOTOR & MOUNTS

E02502 FRONT MOTOR MOUNT

180091 WIRE (BROWN)

E02788 MOTOR ASSY

REAR VIEW OF MOTOR

+VE

+VE

RED DOT

-VE

-VE

180092 WIRE (BLUE)

E02503 REAR MOTOR MOUNT

200082 M4 x 6 SCREW (2 OFF)

FIT TOP SCREW THRU' E04494

ISSUE 2 25/01/99

DO NOT SCALE IF IN DOUBT ASK

Mod.No.	Iss.	Date:	Modifications

SIMRAD — A KONGSBERG Company

STAR LANE, MARGATE, KENT CT9 4NP

TEL: 01843 290290 | FAX: 01843 290471

+44 1843 290290

Drawn:	Checked:	Approved:	Tolerances	ALL DIMENSIONS
BPL			+ & -	■
Date: 3/3/99	Date:	Date:	0. = 0.50	© SIMRAD MARGATE 2004
			0.0 = 0.25	
			0.00= 0.10	SHT. 1 OF 1
			ANG. = 0.5°	

Material:	Model:	Title:	Drg No.:	Issue
SEE ABOVE	TP32	GENERAL ASSEMBLY	E04581	1

COMPUTER GENERATED DRAWING
MANUAL MODIFICATION INVALIDATES CAD FILE.

Finish:	Date:	Original Scale:
-	19:03:04	NTS

SIZE A3 : 420 x 297
LANDSCAPE

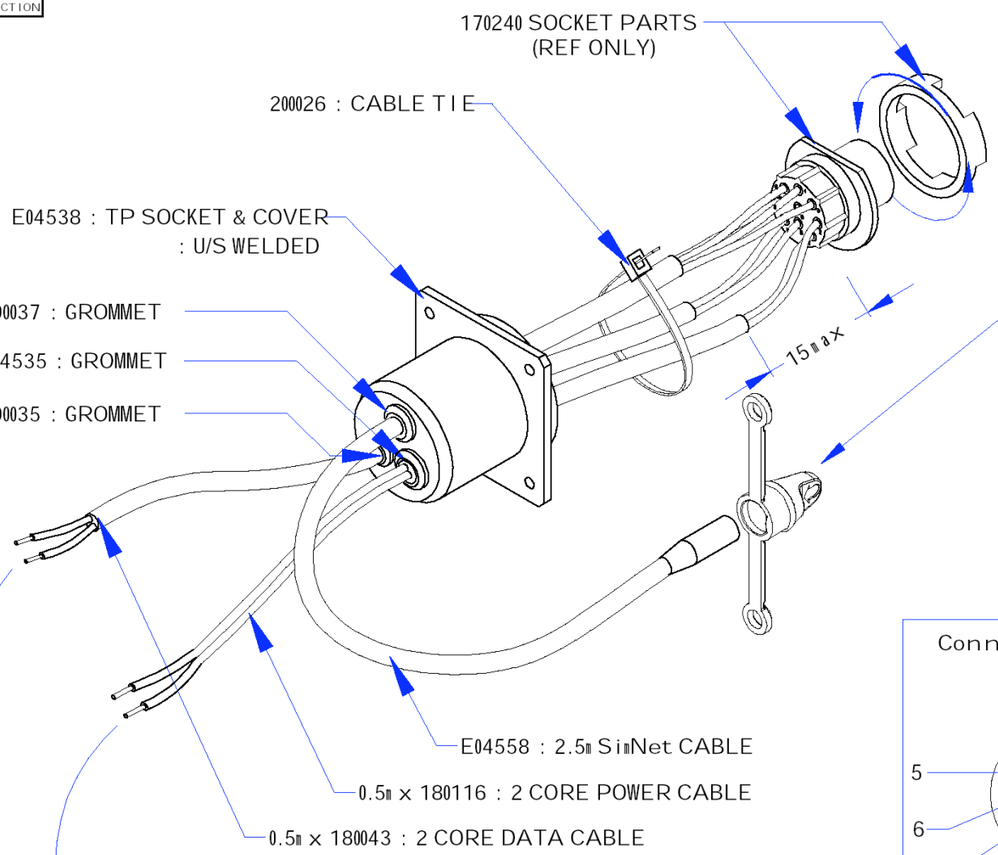
DRAWN IN ACCORDANCE WITH BS 308

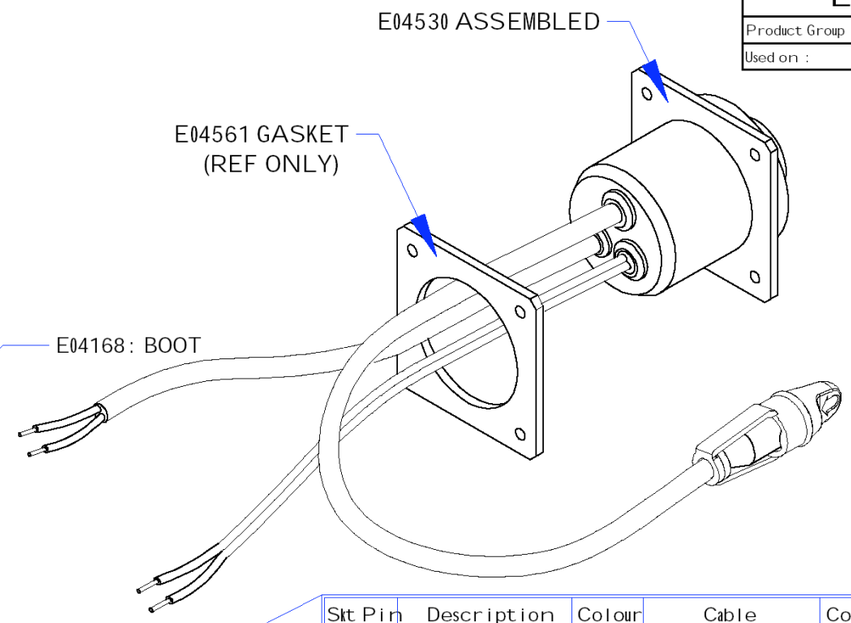
3rd ANGLE PROJECTION

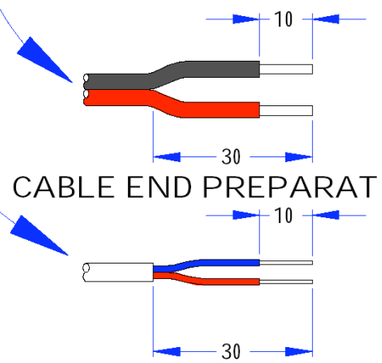
Drg. No.: E04530

Product Group : 811

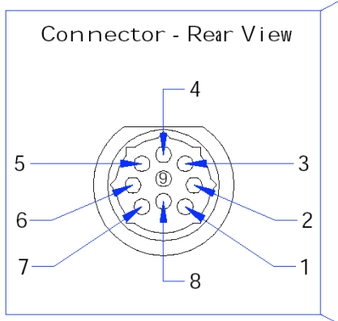
Used on : E04580







CABLE END PREPARATION



Skt Pin	Description	Colour	Cable	Core
1	Pilot Power +12V	Red	180116 Pwr Cable	44/0.19
2	Pilot Power 0V	Black		44/0.19
3	SimNet +V	Red	E04558 SimNet Cable	21/0.2
4	SimNet 0V	Black		21/0.2
5	SimNet Data	Yellow		7/0.2
6	SimNet Data	Blue		7/0.2
7	NMEACommon	Blue	180043 NMEA Data Cable	7/0.2
8	NMEA Data	Red		7/0.2
9	NC	-	-	-

NOTE: CONNECTIONS 1 & 2 MUST BE SOLDERED

DO NOT SCALE | IF IN DOUBT ASK

Mod.No.	Iss.	Date:	Modifications

SM RAD
A KONGSBERG Company

STAR LANE, MARGATE, KENT CT9 4NP
TEL: 01843 290290 | FAX: 01843 232903
+44 1843 290290

Material: SEE ABOVE

Finish: ———

Date: 23:03:04

Original Scale: NTS

Drawn: BPL Date 05/12/03

Checked: Date:

Approved: Date:

COMPUTER GENERATED DRAWING
MANUAL MODIFICATION INVALIDATES CAD FILE:

Model: TP22 / TP32

Title: ASSY : TILLERPILOT FLANGED OUTLET

Drg No.: E04530

Issue: 1

Tolerances
+ & -
0. = 0.50
0.0 = 0.25
0.00 = 0.10
ANG. = 0.5°

ALL DIMENSIONS mm

Sht. 1 of 1

ISSUE 2 25.01.99

SIZE A3 : 420 x 297
LANDSCAPE

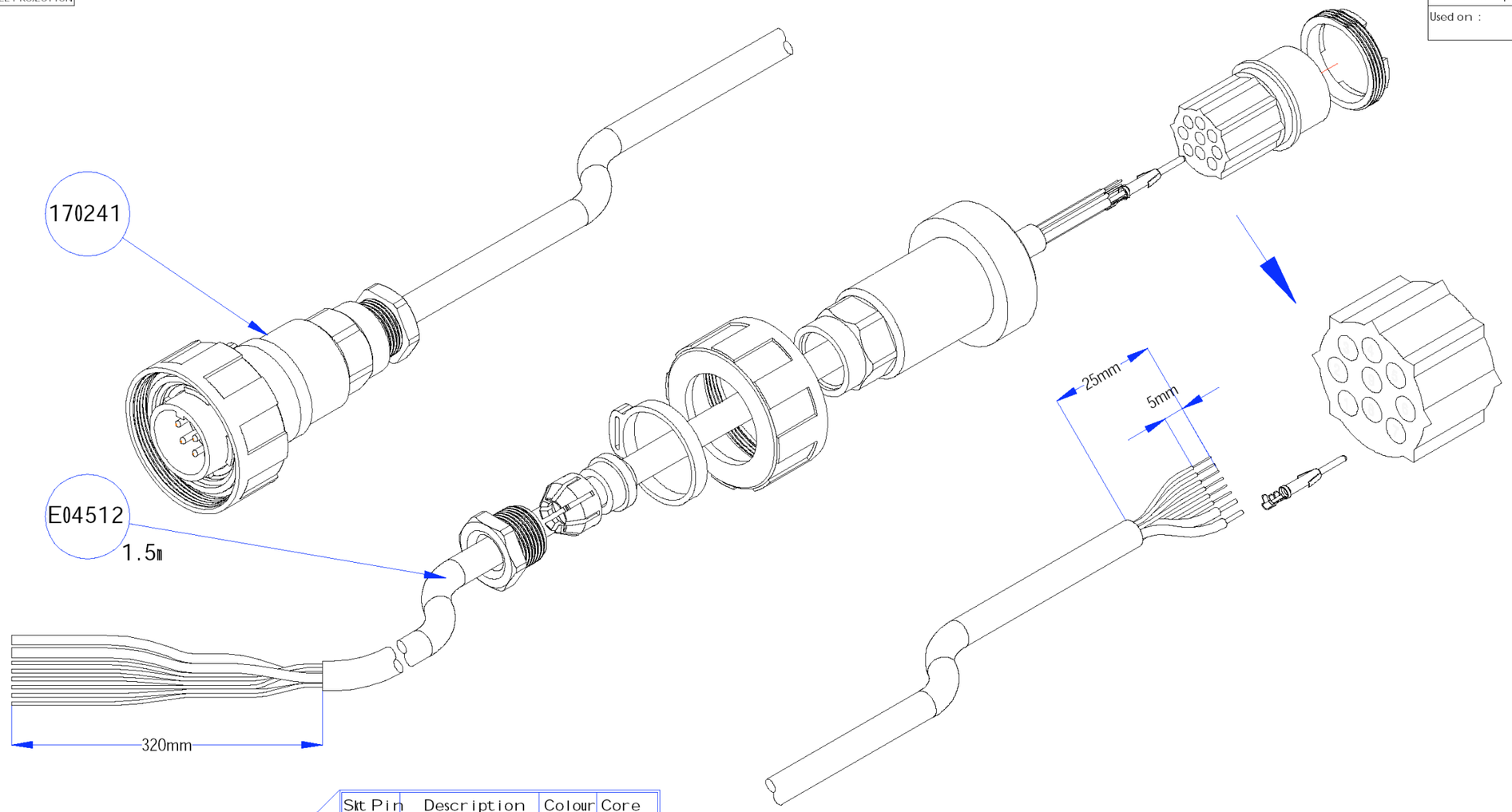
DRAWN IN ACCORDANCE WITH BS 308

3rd ANGLE PROJECTION

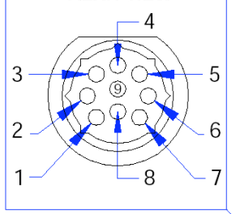
Drg. No.: E04584

Product Group : 681

Used on : E04581
E04587



CONNECTOR - REAR VIEW



Skt Pin	Description	Colour	Core
1	Pilot Power +12V	Red	24/0.2
2	Pilot Power 0V	Black	24/0.2
3	SimNet +V	Red	7/0.2
4	SimNet 0V	Black	7/0.2
5	SimNet Data	Yellow	7/0.2
6	SimNet Data	Blue	7/0.2
7	NMEACommon	Green	7/0.2
8	NMEA Data	White	7/0.2
9	NC	-	-

NOTE: CONNECTIONS 1 & 2 MUST BE SOLDERED

DO NOT SCALE IF IN DOUBT ASK

Mod.No.	Iss.	Date :	Modifications

SM RAD
A KONGSBERG Company

STAR LANE, MARGATE, KENT CT9 4NP
TEL: 01843 290290 | FAX: 01843 232903
+44 1843 290290

Drawn: BM Date 02:03:04 | Checked: Date | Approved: Date

Material: SEE ABOVE

Finish: ——

Date: 23:03:04

Original Scale: 1 : 1

Tolerances + & -
0. = 0.50
0.0 = 0.25
0.00 = 0.10
ANG. = 0.5°

ALL DIMENSIONS mm

COMPUTER GENERATED DRAWING
MANUAL MODIFICATION INVALIDATES CAD FILE.

Model: TP22 / TP32

Sht. 1 of 1

Title: CABLE ASSY: POWER

Drg No.: E04584

Issue: 1

ISSUE 2 25.01.99

SIZE A3 : 420 x 297
LANDSCAPE

Back to top

Tillerpilots TP22 & TP32

Section 5

Circuit Descriptions

5 CIRCUIT DESCRIPTIONS

Common PCB Assembly

Introduction. The PCB Assembly is a common item to all Wheelpilots and Tillerpilots. Refer to Drawing No. E04506.

Supply and Regulation. The Tillerpilots are designed to work from a 12V source. Protection against incorrect polarity is provided by D1 and D4. Capacitors C1and C3 are used as reservoirs to hold up the supply voltage and reduce any supply dips. Protection against over-voltage spikes is provided by Resistor R2 and Zener Diode ZD1 and Regulator REG1 provides a 5V regulated supply. Transient Voltage Suppresser TVS1 protects the MOSFET drive transistors, TR10 to TR13, from voltage spikes greater than +16V.

Microprocessor Port Allocations. The microprocessor IC2 port allocations are given in the table below. The 'Port Reference' column is split into two for all I/O pins, the left section is the general purpose I/O reference and the right section is the alternate function. The alternate function is highlighted when used. All pins not given a 'Signal Name/Description' should be left unconnected.

Port Reference		Pin Number	Signal Name	Signal Description
P0.0	ST0.0	54	TP1	
P0.1	ST0.1	53	TP2	
P0.2	ST0.2	52	TP3	
P0.3	ST0.3	51	TP4	Test Points
P0.4	ST0.4	50	TP5	
P0.5	ST0.5	49	TP6	
P0.6	ST0.6	48	TP7	
P0.7	ST0.7	47	TP8	
P1.0	ST1.0	46	MUXSELA	MUX Select A (IC9/10)
P1.1	ST1.1	45	MUXSELB	MUX Select B (IC9/9)
P1.2	ST1.2	44	MUXINH	MUX Inhibit (IC9/6)
P1.3	ST1.3	43	PULLCAL	Pulled Cal Drive (R49)
P1.4	ST1.4	42		
P1.5	ST1.5	41		
P1.6	ST1.6	40	COILB	Drive for FLUXGATE, phase B (R41)
P1.7	ST1.7	39	COILA	Drive for FLUXGATE, phase A (R40)
P2.0	ST2.0	62	TP1	
P2.1	ST2.1	61	TP2	
P2.2	ST2.2	60	TP3	
P2.3	ST2.3	59	TP4	Test Points
P2.4	ST2.4	58	TP5	
P2.5	ST2.5	57	TP6	
P2.6	ST2.6	56	TP7	
P2.7	ST2.7	55	TP8	
P3.0	ST3.0	38	NAVLED	Drive for NAV LED (TR5)
P3.1	ST3.1	37	HRSYNC	Sync for HR200 controller (R18/R19)
P3.2	ST3.2	36	AUTOLED	Drive for STBY/AUTO LED (TR4)
P3.3	ST3.3	35	STBDLED	Drive for STBD LED (TR3)
P3.4	ST3.4	34	PORTLED	Drive for PORT LED (TR2)
P3.5	ST3.5	33	BEEP	Drive for BUZZER (R59/R60)
P3.6	ST3.6	32		
P3.7	ST3.7	31		
P4.0		30		
P4.1	CTX	29	CANTX	CAN TX Output (IC1/4)
P4.2	CRX	28	CANRX	CAN RX Output (IC1/1)
P4.3		27		
P4.4		26		

P4.5		25		
P4.6		24		
P4.7		23		
P5.0	KW0	22	TACKKEY	TACK Key (S4)
P5.1	KW1	21	PORTKEY	PORT Key (S1)
P5.2	KW2	20	STBDKEY	STBD Key (S2)
P5.3	KW3	19	AUTOKEY	STBY/AUTO Key (S3)
P5.4	KW4	18	NAVKEY	NAV Key (S5)
P5.5	KW5	17		
P5.6	KW6	16		
P5.7	KW7	15		
P6.0		10		
P6.1		9		
P6.2	INT0	6	FB1	Hall Effect Feedback (PIN 2)
P6.3	INT1	5	FB2	Hall Effect Feedback (PIN 3)
P6.4	TX0	4		
P6.5	CNTR0	3	FLUXCOS	FLUXGATE COS Input (IC7/1)
P6.6	CNTR1	2	FLUXSIN	FLUXGATE SIN Input (IC7/7)
P6.7	PWM	1		
P7.0	AN0	80	DRIVEA	Drive for MOTOR, phase A (R62)
P7.1	AN1	79	DRIVEB	Drive for MOTOR, phase B (R71)
P7.2	AN2	78		
P7.3	AN3	77		
P7.4	AN4	76	LK0	Debug Mode Select (New link)
P7.5	AN5	75	LK1	Model Select 1 (LK1)
P7.6	AN6	74	LK2	Model Select 2 (LK2)
P7.7	AN7	72	LK3	Model Select 3 (LK3)
P8.0	SIN1/RXD1	70	NMEA	NMEA Input (TP15)
P8.1	SOUT1/RXD1	69		
P8.2	SCLK1/CTS1	68	0V	Connected to 0V Rail
P8.3	SRDY1/RTS1	67		
P8.4	SIN2/RXD2	66	NVMDO	NVM Data Output DO (IC3/4)
P8.5	SOUT2/RXD2	65	NVMDI	NVM Data Input DI (IC3/3)
P8.6	SCLK2/CTS2	64	NVMSK	NVM Serial Clock SK (IC3/2)
P8.7	SRDY2/RTS2	63	NVMCS	NVM Chip Select CS (IC3/1)
RESET		8	RESET	Reset Input (R15)
VSS		11	0V	Connected to 0V Rail
XIN		12	XTAL	Crystal (XTAL1)
XOUT		13	XTAL	Crystal (XTAL1)
VCC		14	5V	Connected to 5V Rail
AVSS		71	0V	Connected to 0V Rail
VREF		73		*No Connection*
CNVSS		7	0V	Connected to 0V Rail

Microprocessor Reset. Integrated Circuit IC6 is an integrated reset generator for the microprocessor which produces a reset LOW pulse of approximately 50mS duration at switch on and whenever a 5v supply failure occurs. In addition to the reset provided by IC6, the microprocessor has a built-in watchdog timer, which will create a reset if a software crash occurs for any reason.

Non-Volatile Memory (NVM). Integrated Circuit IC3 provides 1Kbit of E^2 memory for the retention of important data after power down.

Keypad. Light Emitting Diodes LED1 to LED4 are driven from Ports P3.3 to P3.0 and turn OFF when the line goes HIGH via the transistor switches TR2 to TR5. When the transistors are off, resistors R32, R34, R36 and R38 provide a low current path for the LEDs to provide low-level night illumination. The Audio Resonator AR1 is self-resonating and switches ON when Port P3.4 goes HIGH via the transistor switch TR1 and resistors R59 and R60. The control key lines on Ports P5.0

to P5.4, normally pulled to +5V via resistors R7 to R11, are “scanned” by the microprocessor to detect if any of the switches have been operated and pulled the line LOW.

NMEA Data In. NMEA data is optically isolated by IC5 and then fed into Port P8.0 of the microprocessor.

SimNet Interface. SimNet is an intelligent network system provided to facilitate integration of Simrad products. The system is built around CanBus, a true multi-talker bus system with high levels of error protection. The bus protocol is encoded and decoded by a dedicated circuit built into the micro-controller. The CanBus driver IC1 provides the physical layer interface to the interconnection between Simrad products.

The micro-controller is completely isolated from the CanBus by high-speed opto-couplers IC4 and IC12. The CanBus side of these devices and the driver IC1 are powered from the CanBus supply provided by REG2 and associated components.

Configuration Links. The Links, L1, L2 and L3, are used to configure the Microprocessor to either Wheelpilot or Tillerpilot operation and to model versions 10, 22 or 32 in accordance with the table below:

1 Model	Link 1	Link 2	Link 3
TP 10	N / C	N / C	N / C
WP 10	N / O	N /C	N / C
TP 22	N / C	N / O	N / C
TP 32	N / C	N / O	N / O
WP 32	N / O	N / O	N / O

LEGEND N / C Normally Closed (soldered)
N / O Normally Open (unsoldered)

Fluxgate (Compass). Two anti-phase signals are provided from microprocessor Ports P0.6 and P0.7. These signals are buffered by TR15 and TR16 to provide a higher current drive to the excitation coil of the fluxgate. A reference voltage level of +2 volts is provided by R46 and R53 decoupled by C53. The 2 coils, mounted at right angles, provide output signals proportional to the sine and cosine of the Earth’s magnetic field. These signals are fed via the electronic switch IC9 to 2 dual-slope integrating analogue-to-digital converters IC7 and IC 8, plus associated components. The outputs of the comparator IC7 are fed to the microprocessor Ports P6.5 and P6.6, which provide input-capture facilities. Accurate timing of the conversion is kept by the microprocessor to provide simultaneous precision analogue to digital conversion of both sine and cosine signals to avoid errors created by multiplexing the inputs.

Motor Drive. The motor drive signals (MDRIVE_A and MDRIVE_B) are generated from the microprocessor at Ports P7.0 and P7.1, these lines being LOW when there is no drive and HIGH to drive. The drive outputs control IC10 and IC11, which are comparators set at threshold levels of +4V and +1V produced by the resistor network R71, R72 and R73. The comparators invert the signals and provide the current to switch the MOSFETs in stages, which prevents both P and N channel MOSFETs on the same side of the “H-bridge” configuration (i.e. TR10 and TR11, or TR12 and TR13), being partially switched on at the same time. When there is no drive, both N-channel MOSFETs TR11 and TR13 are switched on giving a direct short across the motor to the 0V line, thus providing active braking.

EMC. Capacitors with values of 100pF, 100nF and 1nF are extensively used to decouple noise from switched data lines. Two A.C. coupled connections labelled “CHASSIS”, routed via capacitors C63 and C64, where provided for interconnection to the internal metalwork for EMC purposes. Tests have confirmed that connection is not required.

Hall Effect PCB.

Introduction. The Hall Effect PCB is a generic item, which can be used for both Tillerpilots TP10, TP22 and TP32 and Wheelpilots WP10 and WP32. For Tillerpilots, the Hall Effect devices are mounted vertically into the PCB and horizontally for Wheelpilots. The circuit diagram for the Hall Effect PCB is given in Drawing No. E03182.

Feedback. Two Hall Effect sensors HE1 and HE2 are mounted on the Hall Effect PCB and sense the rotation of 2 small bar magnets mounted 180^0 apart in the pulley wheel. This produces a quadrature feedback output, at logic levels, FB1 and FB2. The PCB is powered from the host unit +5V regulated supply, the line being filtered by C1, and signals FB1 and FB2 are fed back to the microprocessor Ports P6.2 and P6.3 via pull-up resistors on the host unit PCB.

Tillerpilots TP22 & TP32

Section 6

Circuit Diagrams

6 CIRCUIT DIAGRAMS

Circuit Schematics

Common PCB Circuit Diagram	E04506
Hall Effect PCB Circuit Diagram	E03182

Component Lists and Layouts

Common PCB Assembly Detail	E04508
Hall Effect PCB Assembly Detail	E03184

DRG No: E04506

LINK INFORMATION TO SELECT PRODUCT TYPE
NOTE: 'X' DENOTES THE LINK IS MADE

	TP18	TP22	TP32	WP18	WP32
LK1	X	X	X		
LK2	X			X	
LK3	X	X		X	

Note: The following components are for R&D use only, do not place.
R16, R17, C38, D5, D7, TR7, RLY2

DRAWN BY:	CHECKED:	APPROVED:
WAC 11/02/04		

DO NOT SCALE | IF IN DOUBT ASK

No	ISS	DATE	MODIFICATIONS

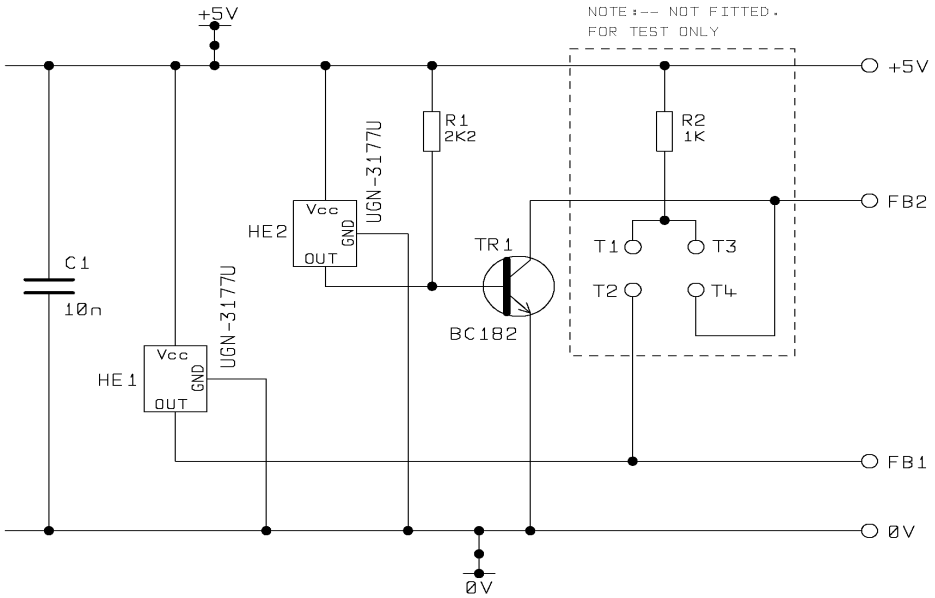
SIMRAD A KONGSBERG Company
STAR LANE, MARGATE, KENT CT9 4NP
TEL: 0184-3 290290 44 1843 290290 FAX: 01843 232903

THIS DRAWING IS COMPUTER GENERATED
ANY MANUAL MODIFICATION WILL INVALIDATE THE C.A.D. FILE

LIMITS MET	LIMITS IMP
+ & -	+ & -
0. = .50	FRAC = .015
0.0 = .25	.00 = .010
.00 = .10	.000 = .005
ANG = 0.5	

MATERIAL:
MODEL: TP22/32 / WP32
DATE: 11/02/04
SCALE:
TITLE: CCT DIAGRAM
DRG No: E04506
ISSUE: 1

DRG No: E03182



DO NOT SCALE	IF IN DOUBT ASK	L735 L368	3 2	31-07-03 1-9-99	SEE MOD SHEET L735 DRAWING MODEL & TITLE CHANGED
		No	ISS	DATE	MODIFICATIONS

SIMRAD A KONGSBERG Company

STAR LANE, MARGATE, KENT CT9 4JP
TEL: 0843 208208 FAX: 0843 208751

THIS DRAWING IS COMPUTER GENERATED
ANY MANUAL MODIFICATION WILL INVALIDATE THE C.A.D. FILE

LIMITS MET	LIMITS IMP
+ & -	+ & -
0. = .50	FRAC = .015
0.0 = .25	.00 = .010
.00 = .10	.000 = .005
ANG = 0.5	ANG = 0.5

DRAWN BY:	CHECKED:	APPROVED:
R.F.		
DATE: 30-9-97	DATE:	DATE:

MATERIAL:

MODEL: WP/TP10/30
(NAVICO WP/TP300/100)

DATE: 31-07-03

SCALE:

TITLE: HALL EFFECT PCB CIRCUIT DIAGRAM

DRG No: E03182

ISSUE: 3

DRG No:
E04508
E04508:SM

E04508:SM SM COMPONENTS

ITEM	QTY	PART No.	COMP REF	DESCRIPTION
1	6	100163	R33. R35. R37. R39. R44. R45	0805 Resistor 220R
2	1	100175	R13	0805 Resistor 470R
3	1	100231	R2	0805 Resistor 4R7
4	1	100330	R53	0603 Resistor 220R
5	1	100332	R46	0603 Resistor 330R
6	4	100333	R1. R3. R4. R5	0603 Resistor 390R
7	5	100338	R15. R23. R25. R26. R66	0603 Resistor 1k
8	3	100342	R51. R56. R57	0603 Resistor 2k2
9	13	100346	R12. R22. R27. R40. R41. R42. R43. R54. R55. R59. R60. R65. R67	0603 Resistor 4k7
10	19	100350	R7. R8. R9. R10. R11. R18. R19. R58. R61. R62. R63. R64. R68. R69. R70. R71. R73. R74. R75	0603 Resistor 10k
11	1	100355	R72	0603 Resistor 27k
12	1	100356	R47	0603 Resistor 33k
13	3	100358	R34. R36. R38	0603 Resistor 47k
14	1	100362	R49	0603 Resistor 100k
15	1	100363	R50	0603 Resistor 120k
16	2	100372	R48. R52	0603 Resistor 680k
17	1	100377	R32	0603 Resistor 20k
18	1	110102	C18	SM Elect 33µF
19	3	110169	C8. C25. C53	SM Elect 4µ7
20	19	110194	C9. C10. C11. C12. C13. C19. C21. C24. C26. C28. C34. C35 C36. C37. C40. C41. C42. C50. C51	0603 Capacitor 1nF
21	2	110195	C46. C47	0603 Capacitor 4n7
22	2	110196	C54. C59	0603 Capacitor 10nF
23	16	110199	C2. C4. C5. C6. C7. C14. C17. C20. C27. C45. C48. C60. C61. C62. C63. C64	0603 Capacitor 100nF
24	2	110218	C15. C16	0603 Capacitor 39pF
25	9	110223	C22. C23. C29. C30. C31. C32. C33. C39. C49	0603 Capacitor 100pF
26	2	110225	C43. C44	0603 Capacitor 150pF
27	2	110245	C1. C3	SM Elect 470µF
28	1	120036	D2	BAS16
29	1	120038	ZD1	Zener BZV49-C30V
30	1	120040	D4	LL4001G
31	1	120082	D1	MBRS340T3
32	1	120093	TVS1	SMCJ16CA
33	1	120094	D6	LL4448
34	3	120095	LED1. LED3. LED4	Red LED KM2520SURCK3
35	1	120096	LED2	Green LED KM2520MGC03
36	1	130028	TR1	BC846
37	2	130029	TR15. TR16	BCW70T
38	2	130055	TR11. TR13	NDT455N
39	2	130056	TR10. TR12	NDT456P
40	4	130064	TR2. TR3. TR4. TR5	DTA123YUAT106
41	1	140068	IC8	ICL7621 Op-amp
42	3	140069	IC7. IC10. IC11	BA10393F Comparator
43	1	140070	IC9	74HC4052 Multiplexor
44	1	140075	IC5	PC357 Opto-isolator
45	1	140077	IC3	NMC9346 EEPROM
46	1	140092	REG2	TA78L05F Regulator
47	1	140147	IC6	V6300F-SOT23 Reset generator
48	1	140187	IC1	TJA1050T CAN driver
49	1	140195	REG1	MC78M05CDT/RK 5V REG SM
50	2	140197	IC4. IC12	HPCL6061 Opto-coupler
51	1	160080	XTAL1	XTAL 10.0MHz
52	5	210019	S1. S2. S3. S4. S5	Push button
53	1	E04507		PCB
54	1	E04585	IC2	PROG'D MICRO: TP/WP/HR

E04508 CONVENTIONAL MOUNT COMPONENTS

ITEM	QTY	PART No.	COMP REF	DESCRIPTION
55	1	160028	AR1	Buzzer
56	0.25	170078	SK1	20Way Skt Strip

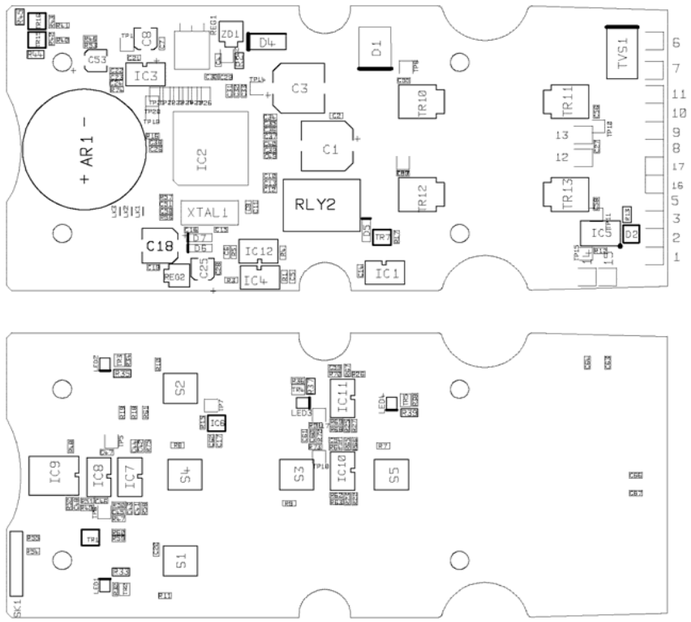


TABLE 1: WIRING INFORMATION

IDENT	COLOUR	DESCRIPTION
6	RED	PILOT POWER 24/0.2mm CABLE
7	BLACK	PILOT 0V 24/0.2mm CABLE
11	GREEN	NMEA (-)
10	WHITE	NMEA (+)
9	YELLOW	SIMNET
8	BLUE	SIMNET
17	BLACK	SIMNET 0V
16	RED	SIMNET +V
5	GREEN	FEEDBACK
3	WHITE	FEEDBACK
2	BLUE	FEEDBACK
1	YELLOW	FEEDBACK
13	BROWN	MOTOR +V 24/0.2mm CABLE
12	BLUE	MOTOR 0V 24/0.2mm CABLE

TABLE 2: LINK INFORMATION

NOTE: 'X' DENOTES THE LINK IS MADE

	TP10	TP22	TP32	WP10	WP32
LK1	X	X	X		
LK2	X			X	
LK3	X	X		X	

DO NOT SCALE | IF IN DOUBT ASK

No	ISS	DATE	MODIFICATIONS

SIMRAD
A KONGSBERG Company

STAR LANE. MARGATE. KENT CT9 4NP
TEL: 01843 290290 | FAX: 01843 232933
+44 1843 290290

THIS DRAWING IS COMPUTER GENERATED
ANY MANUAL MODIFICATION WILL
INVALIDATE THE C.A.D. FILE

LIMITS MET	LIMITS IMP
+ & -	+ & -
0. = .50	FRAC = .015
0.0 = .25	.00 = .010
.00 = .10	.000 = .005
ANG = 0.5	ANG = 0.5

MATERIAL:

MODEL: TP22 / TP32
WP32

DRAWN BY:	CHECKED:	APPROVED:
I.J.Q		
DATE: 11-03-04	DATE:	DATE:

DATE: 11-03-04

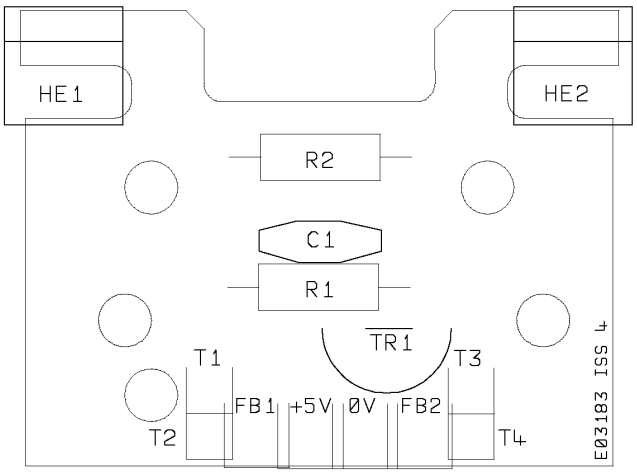
SCALE:

TITLE: PCB ASSEMBLY DETAIL

DRG No: E04508
E04508: SM

ISSUE: 1

DRG No: E03184



CONVENTIONAL MOUNT COMPONENTS

ITEM	QTY	PART No	COMP REF	DESCRIPTION
1	1	E03183	-	PCB DRILLED
2	1	100040	R1	0.25W 2K2
3	1	110001	C1	100n CERAMIC DISC
4	1	130000	TR1	BC182
5	2	140010	HE1,HE2	UGN3177U

NOTE:- R2 NOT FITTED
PART No. E03184:TP. HE1,HE2 MOUNTED VERTICALLY.
PART NO. E03184:WP. HE1,HE2 MOUNTED HORIZONTALLY.

No	ISS	DATE	MODIFICATIONS
1735	3	15-08-03	PCB REDESIGNED
1368	2	1-9-99	:TP,:WP DIFFERENCE NOTES ADDED
			DRAWING MODEL & TITLE CHANGED

DO NOT SCALE | IF IN DOUBT ASK

SIMRAD A KONGSBERG Company

STAR LANE. MARGATE. KENT CT9 4NP
TEL: 0843 290290 | TELEX 965093 NAVICO G
+44 843 290290 | FAX: 0843 290471

THIS DRAWING IS COMPUTER GENERATED
ANY MANUAL MODIFICATION WILL
INVALIDATE THE C.A.D. FILE

LIMITS MET + & -	LIMITS IMP + & -
0. = .50	FRAC = .015
0.0 = .25	.00 = .010
.00 = .10	.000 = .005
ANG = 0.5	ANG = 0.5

MATERIAL:

MODEL: WP/TP10/30
(NAVICO WP/TP300/100)

DRAWN BY:	CHECKED:	APPROVED:	DATE:	SCALE:	TITLE:	DRG No:	ISSUE:
R.F.			15-08-03		HALL EFFECT PCB ASSEMBLY DETAIL	E03184	3
DATE: 30-9-97	DATE:	DATE:					

Back to top

Tillerpilots TP22 & TP32

Section 7

Programming and Configuration

7 PROGRAMMING AND CONFIGURATION

This Service Manual only contains programming and configuration information for those features of the autopilot, which are not normally available to the end user. For details of normal programming and configuration please refer to the appropriate user manual.

Tillerpilots TP22 & TP32

Section 8

Fault Finding

8 FAULT FINDING

Common User Faults. Common user faults are included in the Diagnostics Guide in the user manual.

Common Technical Faults. None yet identified.

Tillerpilots TP22 & TP32

Section 9

Spare Parts Detail

9 SPARE PARTS DETAIL

Spares Packs

TPPK6	FLUXGATE ASSEMBLY
TPPK8	MOTOR ASSEMBLY
TPPK10	DRIVE BELT
TPPK22	TP32 MECHANICAL ASSEMBLY
TPPK26	FEEDBACK KIT
TPPK321	TP22/TP32 PACKING KIT
TPPK322	TP22 MECHANICAL ASSEMBLY
TPPK323	TP22 TOP CASE
TPPK324	TP22/TP32 BOTTOM CASE
TPPK325	TP22/TP32 MAIN PCB COVER
TPPK326	TP22/TP32 CASE SCREW PACK
TPPK327	TP22/TP32 PUSH ROD SEAL KIT
TPPK328	TP22/TP32 MAIN CASE SEAL
TPPK329	TP22/TP32 MAIN CASE SEAL
E04586	TP22/TP32 USER MANUAL

9.2 Accessories

TB30	TILLER BRACKET 30mm
TB60	TILLER BRACKET 60mm
TB90	TILLER BRACKET 90mm
TB120	TILLER BRACKET 120mm
PB30	PEDESTAL BRACKET 30mm
PB60	PEDESTAL BRACKET 60mm
PB90	PEDESTAL BRACKET 90mm
CB1	CANTILEVER BRACKET
PRE30	PUSH ROD EXTENSION 30mm
PRE60	PUSH ROD EXTENSION 60mm
PRE90	PUSH ROD EXTENSION 90mm
PRE120	PUSH ROD EXTENSION 120mm
PRE150	PUSH ROD EXTENSION 150mm
PRE300	PUSH ROD EXTENSION 300mm
SKT22/32	WATERPROOF BULKHEAD SOCKET & CABLE ASSEMBLY

9.3 Service Aids

TP-SRY	TILLERPILOT TEST SYRINGE

Tillerpilots TP22 & TP32

Section 10

Technical Notes

10 TECHNICAL NOTES

Technical Bulletin PS184 Dated 26/04/2004 SimNet Data Source Selection

TECHNICAL BULLETIN

NO. PS184 DATE: 26/04/2004

SimNet Data Source Selection

IS12 & SimNet Enabled Cockpit Pilots

Background

One of the features of SimNet is that the user can select specific data sources when multiple sources are present. For example a system with an IS12 Compass and AP25 will have two sources of SimNet Compass information. SimNet IS12 is capable of selecting either source. This facility is available on IS12 Wind, Data, Mega and Compass and on the new Cockpit Pilots.

The first time that any one of these products is connected to a data source it locks on such that the data source becomes assigned to the product. If at a later date the user wants to use the product with a different data source then the product needs to be reset. If an Instrument does not recognise the attached data source it will display three bars and will need to be reset. If a Cockpit pilot does not recognise the attached data source it will behave as if there is no data source present.

The Depth, Speed and Combi IS12 do not have this facility and will only ever read data from the transducer that they are directly connected to.

Procedure

IS12

To reset and select a specific local SimNet data source is a simple matter

With the power off ensure that only the specific data source required is connected to the network.

Press and hold the right hand key of the instrument (Wind, Data, Mega or Compass as required) then powerup continuing to press and hold until the display appears.

The instrument will lock onto the correct local data source and any secondary sources can now be connected.

Cockpit Pilots, TP22, TP32 and WP32

To reset and select the correct local SimNet data source is also a simple matter.

With the power off ensure that only the specific data source required is connected to the network.

Press and hold the Tack and Starboard keys and then powerup continuing to press and hold until all LED's light up.

The instrument will lock onto the correct local data source and any secondary sources can now be connected.

Procedure following servicing

Prior to returning serviced units to customers they will need to be cleared down to ensure that the unit locks onto the customer's local data source on first power up without the need for the customer to go through the reset procedure.

The Instruments and Pilots are cleared down by following the relevant steps above but without any SimNet data connected, just power.

Contact Information

If you have any further queries, please contact :

Duncan Riddle
Manager, Customer Support
Duncan.riddle@simrad.com

Simrad Margate
Star Lane, Margate, Kent
CT9 4NP, United Kingdom
Tel +44 (0) 1843 290290Fax +44 (0) 1843 290471

Yyyy/mm/dd/Initials	
Please circulate to:	