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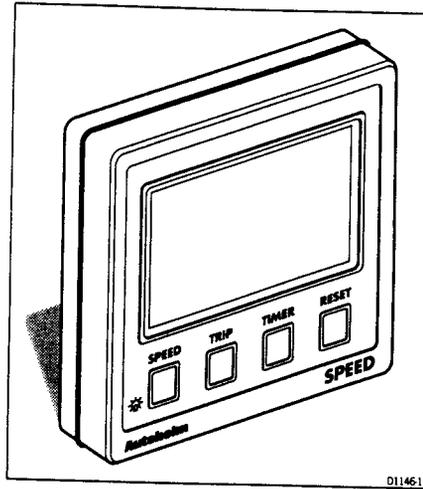are owned by the
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ST 50
PLUS

SPEED
Operation and
Installation

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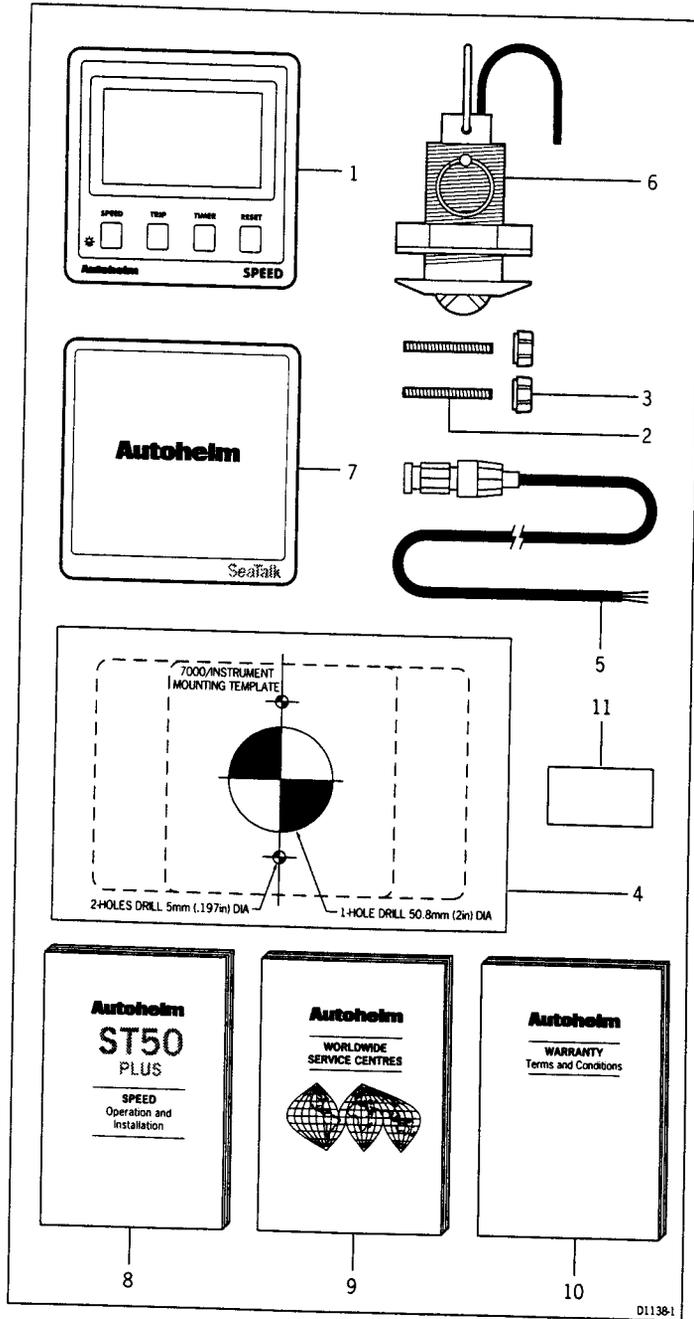
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Package Contents

The following items are included in the ST50 Plus Speed package:

1. ST50 Plus Speed control head
2. Fixing studs (2 off)
3. Thumb nuts (2 off)
4. Fitting template
5. Power cable
6. Paddle transducer (through hull) with 14m (45ft) of cable
7. Control head cover
8. Operation and Installation handbook
9. Worldwide Service Centre handbook
10. Warranty document
11. Security sticker

D1138-1

Contents

Introduction

The ST50 Plus Speed is a powerful SeaTalk compatible multi-function instrument providing comprehensive speed, distance, sea temperature and timing information.

The instrument can be configured to operate as a master unit or a dedicated repeater, with settings such as log, speed, and temperature units stored in permanent memory and retained when the power source is disconnected. The log function can be calibrated automatically over a measured distance or by simple entry of a calculated calibration factor.

The ST50 Plus Speed also incorporates a security feature to protect instruments mounted in vulnerable areas such as the cockpit, helm or mast.

Thank you for purchasing an Autohelm product. May we take this opportunity to wish you years of trouble free operation.

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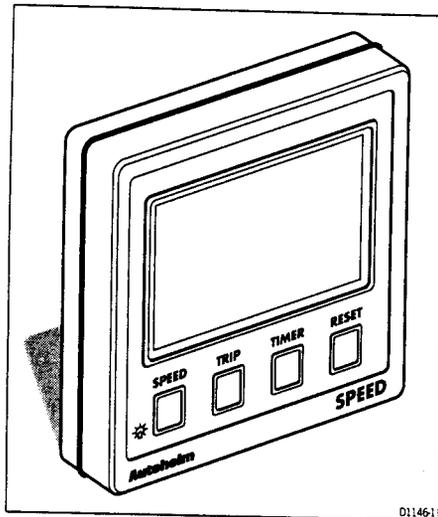
Chapter 1: Control Head Installation
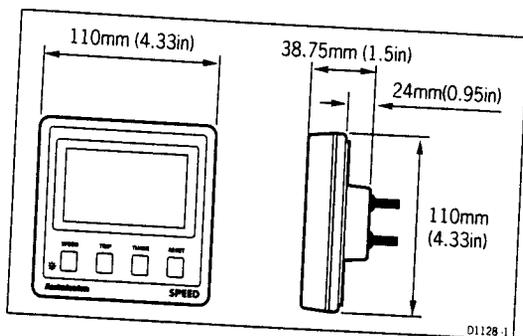
1.1 Siting

The ST50 Plus Speed is designed for above or below deck installation where it is:

- Easily read by the helmsman
- Protected against physical damage
- At least 230mm (9in) from a compass
- At least 500mm (20in) from radio receiving equipment
- Accessible from behind for ease of installation and cable running

Caution: To prevent moisture forming on the display window, the ST50 Plus Speed 'breathes' through a small vent in the cable boss. Therefore, the control head must be sited where the rear case is protected from contact with water.

The rear case is fitted with a foam gasket to form a water-tight seal between the instrument and the selected installation face.
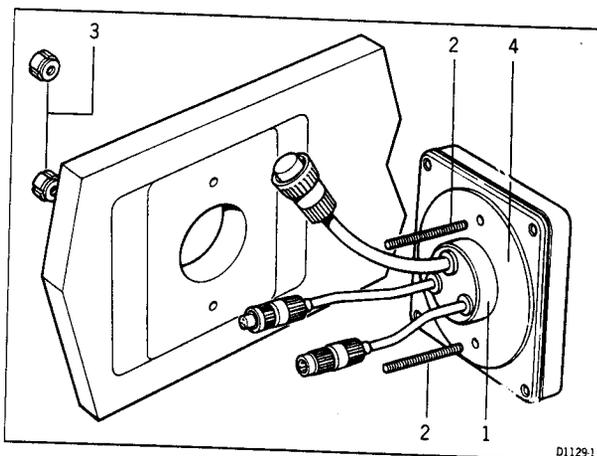
1 Cable boss **2** Fixing studs **3** Thumb nuts **4** Gasket

1.2 Mounting Procedure

1. Make sure that the selected location is clean, smooth and flat.

2. Apply the self-adhesive template (supplied) to the selected location and mark the centres for the fixing studs (2) and the cable boss (1).

3. Drill two 4mm (5/32in) clearance holes for the fixing studs (2) through the bulkhead. Remove the template.

4. Cut the clearance hole for the cable boss (1) using a 50mm (2in) diameter cutter.

5. Screw the two fixing studs (2) into the control head.

6. Pass the SeaTalk cable and transducer tails through the cable-boss (1) clearance hole.

7. Assemble the control head to the bulkhead and secure from behind using the thumb nuts (3).

Bracket Mounting

The ST50 Plus Speed can, as an alternative, be bracket mounted using the Autohelm Mounting Kit.

D1130-1
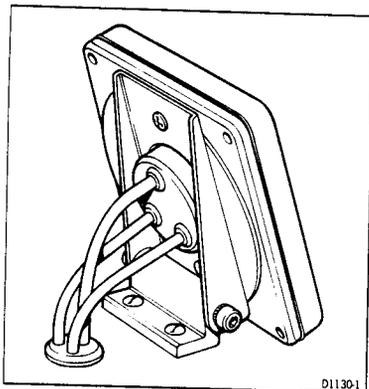
Note: Because the instrument breathes through the vent in the rear case, this bracket is for interior use only.

Flush Mounting

A flush mounting kit is available for installations where a flush mount is required or more desirable. Full installation instructions are provided with the kit.

D1137-1
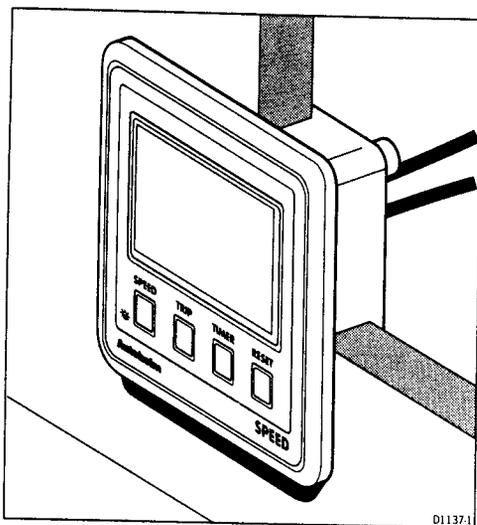
1.3 Power Supply (stand-alone operation)
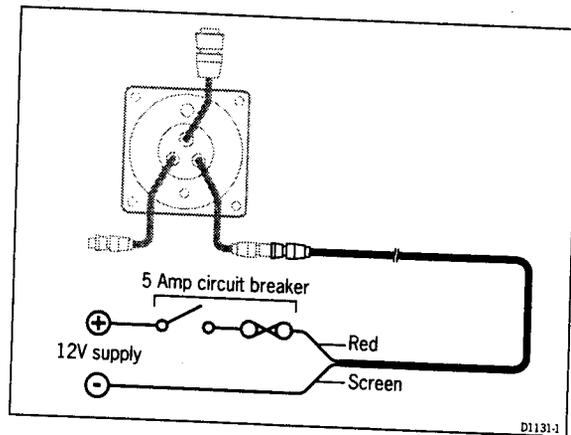
1. Connect the 2m (6ft.) power supply cable directly to the distribution panel.

2. Cut the cable to length and connect the red wire to the +12V terminal and screen to the 0V terminal.

3. Cut back and insulate the yellow wire.

4. Protect the circuit with a 5A circuit breaker.

Note: Longer runs to the power supply can be made using one of the SeaTalk Extension Cables.

1.4 Power Supply (SeaTalk operation)

All instruments in a SeaTalk system receive power and information from the SeaTalk bus. Each instrument has two SeaTalk connectors (3 pin) on 150mm (6in) tails. To supply power and information to the instrument simply plug the tails from adjacent instruments into the ST50 Speed tails.
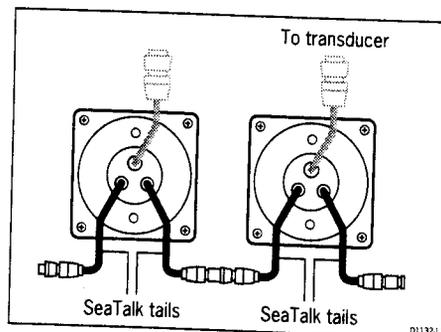
1.5 Connection of Separated Instruments

Separated instruments can be connected using one of the range of SeaTalk Extension Cables. These cables are supplied with a SeaTalk connector fitted to each end. A junction box can be used to join the cable if it is cut for easier routing or shortening.

If preferred, any 2 core, screened cable conforming to the following specification may be used instead of the SeaTalk cable.

- 22 AWG, 2 core screened cable with a minimum copper area of $0.5mm^2$.
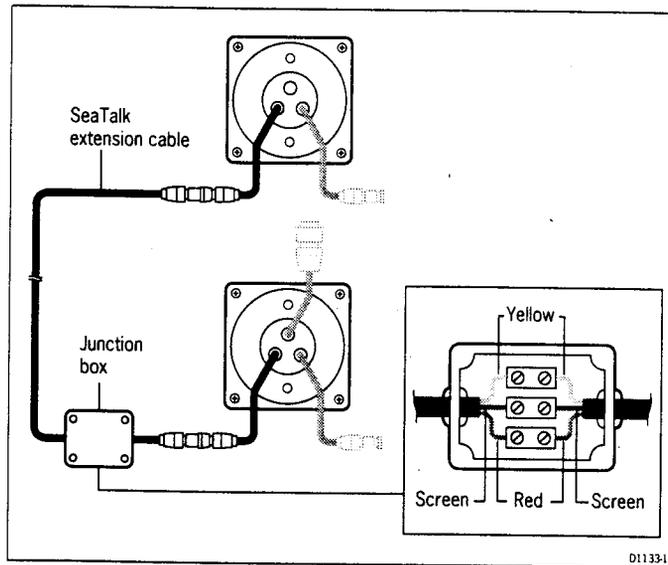
1.6 Ring Connection

Installations with a large number of instruments on a SeaTalk bus may require a second ring-main connection to the power supply breaker to prevent excessive voltage drops. Whether a second ring main is required can be determined from the following:

Cable run upto 10m (33ft)

Single connection: 13 instruments maximum

Second connection: 26 instruments maximum

Cable run upto 20m (66ft)

Single connection: 7 instruments maximum

Second connection: 13 instruments maximum

The second ring-main should be connected to the spare lead on the last instrument in the chain and directed back to the circuit breaker.

1.7 Connection to SeaTalk Compatible Autopilots

If the installation includes a SeaTalk compatible Autopilot the ST50 Plus instruments may be connected to the SeaTalk bus at any point. No independent connection to the 12V power supply is necessary as the instruments receive power from the Autopilot course computer.

To autopilot
SeaTalk BUS
Connection

To any further
ST50 Instruments
or Autopilot
Control Units

D1134-1
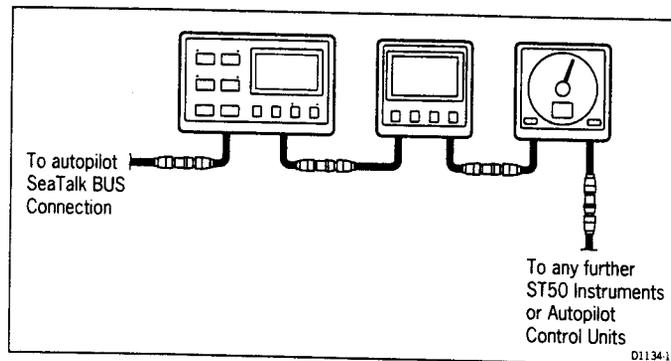
Chapter 2: Transducer Installation

2.1 Connection to the Control Head

The ST50 Plus Speed is supplied with a transducer cable tail and connector. The transducer has a 14m (45ft) cable fitted with a connector, which simply plugs into the control head cable-tail.
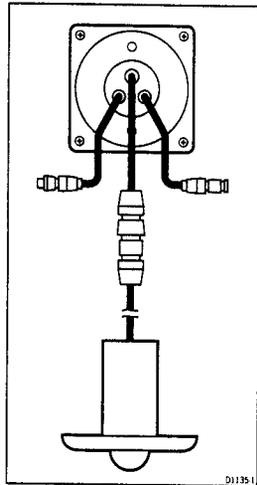
2.2 Transducer Selection

The type of speed transducer used is dependent on the hull material. The following list shows the appropriate transducer for hull type.

Transducer Type	Hull Material
Z092 Through Hull Plastic:	GRP (Glass Reinforced Plastic), Steel and Aluminium
Z116 Through Hull Bronze:	Wood

2.3 Transducer Installation

All speed transducers are supplied with detailed installation and maintenance instructions.

These instructions, together with the following notes, should be read thoroughly before attempting to install the transducer.

Siting

For accurate speed readings the transducer should be sited within the shaded clear flow areas.
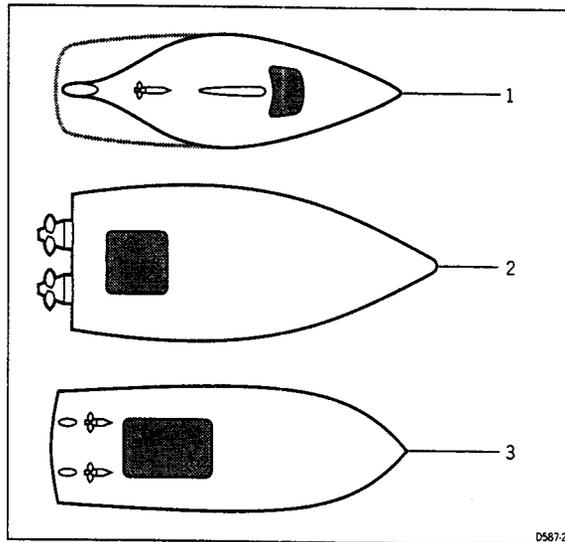
1 Sail **2** Planning power **3** Displacement power

The transducer should also:

- be ahead of the propellers (10% W.L. length minimum)

- be at least 150mm (6in) away from the keel (ideally ahead of the keel if a sailing yacht)

- be as near as possible the centreline of the vessel

- be clear of other through-hull fittings or projections

- have sufficient clearance inside the hull to fit the nut

- have 100mm (4in) of headroom to allow for withdrawal

Cabling

1. Run the cable back to the control head.

Note: Avoid fluorescent lights, engines, radio transmitting equipment etc. as these may cause interference. Also, keep the transducer cable clear of bilges and secure at regular intervals.

2. Fit the transducer and instrument cable connectors together. To lock the connectors, push and rotate the ring on the transducer cable connector towards the instrument connector.

Chapter 3: Fault Finding and Maintenance

3.1 Fault Finding

All Autohelm products are, prior to packing and shipping, subjected to comprehensive test and quality assurance programmes. However, if a fault arises with the ST50 Plus Speed, the following table will help to identify the probable cause and provide the most likely cure.

Fault	Cause	Action
Instrument display blank.	No supply.	Check supply.
		Check cabling and security of SeaTalk connectors.
		Check fuse/breaker.
		Return unit for repair.
Instrument displays 'CODELOCK set', ENTER CODE	The 'Code Lock' feature has been set.	Enter correct code number.
No speed or temperature information.	Transducer cabling problem.	Check cabling and security of transducer connector.
No speed information.	Transducer paddlewheel fouled.	Clean paddlewheel.
No exchange of information between SeaTalk instruments.	SeaTalk cabling problem.	Check security of SeaTalk connectors.
		Disconnect instruments one by one to isolate faulty unit.
Failure of a group of instruments in SeaTalk chain.	SeaTalk cabling/connector problem.	Check security of SeaTalk connectors and non-functioning units.

T100-1

3.2 Maintenance

Instrument

Certain atmospheric conditions may cause condensation to form on the control head window. This will not harm the instrument and can be cleared by increasing the illumination setting to Level 3.

Chemical and abrasive materials must not be used to clean the ST50 Plus Speed instrument; if it is dirty, clean with a soft, damp cloth.

Transducer

Refer to the Installation and Maintenance instructions supplied with the transducer.

Cabling

Examine all cables for chafing or damage to the outer shield and, where necessary, replace and resecure.

Advice

For advice, or further information regarding the installation of this product, please contact the Autohelm product Support Department or your own National Distributor.

Chapter 4: Operation

As it leaves the factory the ST50 Plus Speed is set to:

- display speed in knots
- display distance in Nm
- master mode
- 'CODE Lock' switched off

These settings can be changed in calibration, Chapter 6.

When the unit is powered-up for the first time boat speed will be displayed. However, from this point onwards the last active screen will be displayed when the unit is powered-up.

4.1 Speed Key
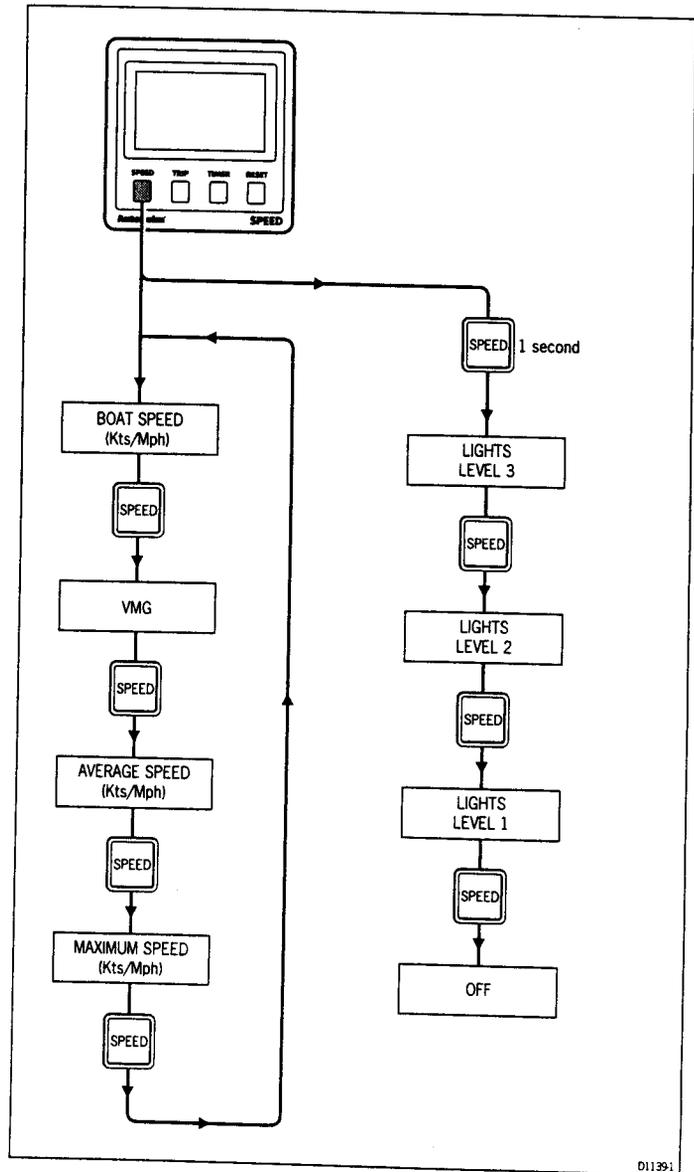
Speed Notes

VMG (Velocity Made Good) is only available if a SeaTalk wind instrument is included in your system.

Maximum speed can be reset by pressing **RESET**.

Average speed may be reset by pressing **RESET**.

4.2 Trip Key

D11401
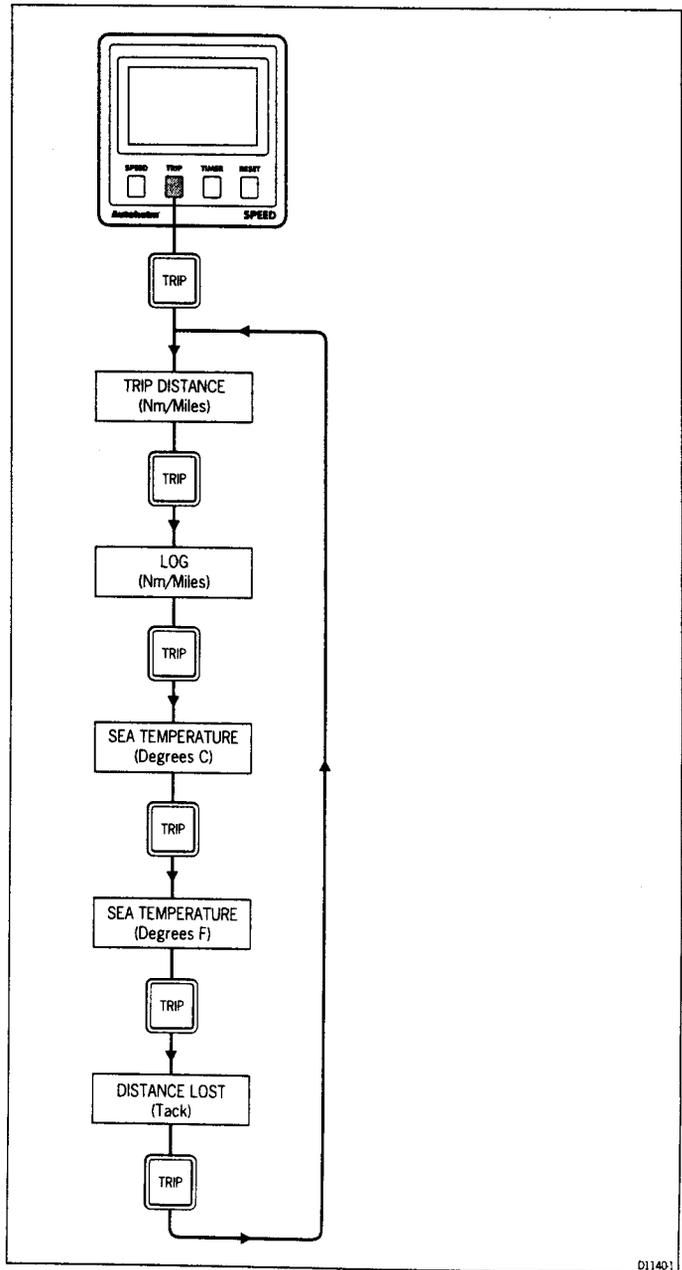
Trip Notes

Trip distance can be set to zero by pressing **RESET** for 3 seconds.

Note: The display will flash until it changes to zero.

Distance lost (Tack) calculates the distance lost during a tack as a result of the reduction in boat speed. The distance lost is based on the average boat speed over 30 seconds prior to selection of the distance lost display.

If **RESET** is pressed while 'TACK' is selected, the display will change to show an alternating message 'DISTANCE/LOST FT' or DISTANCE/LOST MTR' depending on the units selected in calibration.

Distance lost will count up until the vessel reaches the average speed of the previous tack.

Press **RESET** to set 'TACK' to zero in readiness for the next tack.

Note: The tack function should be reset at least 30 seconds before tacking so that the average speed can be accurately calculated.

4.3 Timer Key

D1141-1
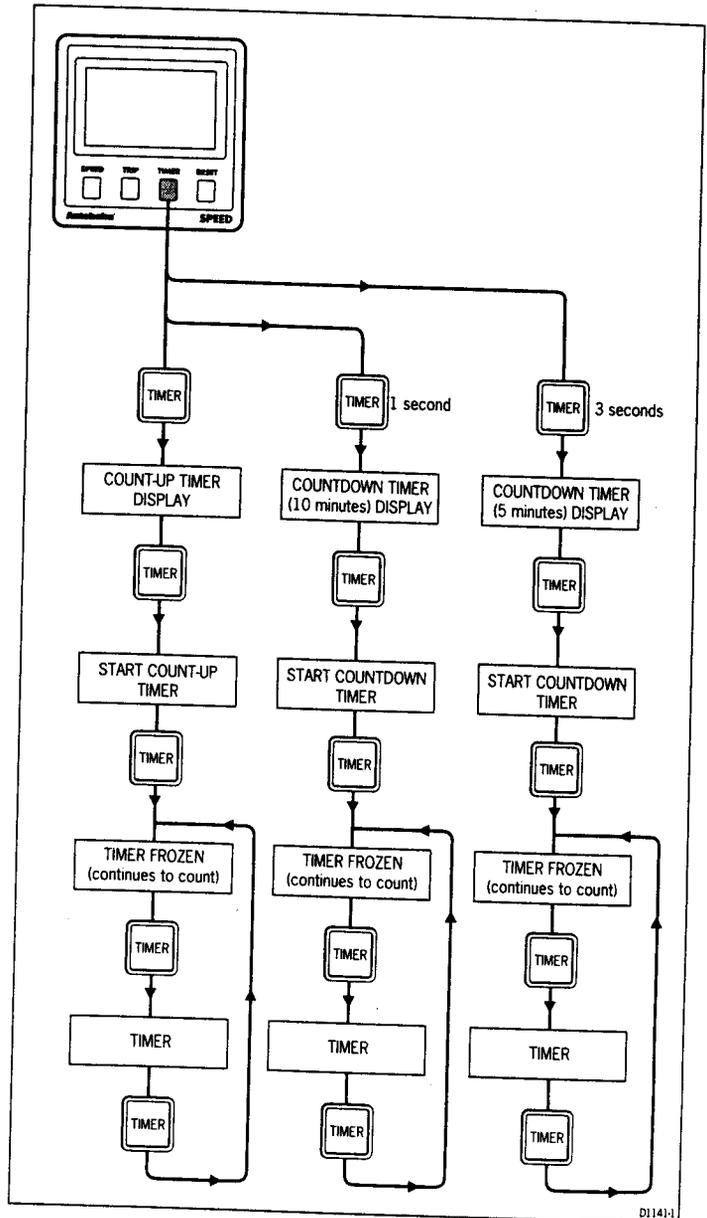
Note: The timer can be reset by pressing the **RESET** key while the timer is running.

Timer Notes

During the 5 or 10 minute countdown the following audible alarms will sound:

- double beep every minute

- beep three times at 30 seconds to zero

- beep every second from 10 seconds to zero

- beep twice when the timer reaches zero and begins to count-up.

You can, once the 5 or 10 minute countdown timer has been activated, return to one of the main speed displays. The timer will continue to operate in the background sounding the alarms described above.

These alarms can be switched off if required (refer to para. 6.1, Initial Calibration for procedures).

4.4 Display Contrast

The contrast can be adjusted to achieve optimum legibility at any angle.
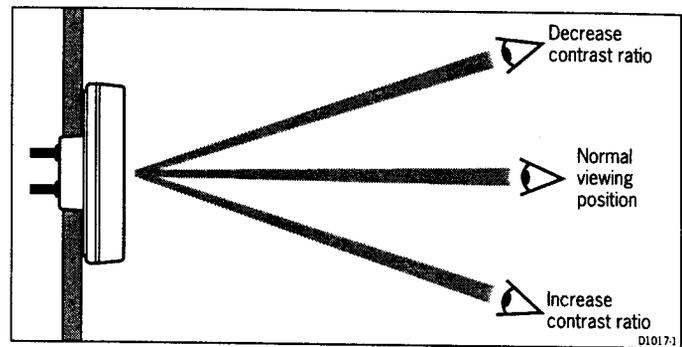
1. Momentarily press **SPEED** and **TRIP** together.

2. Press **TIMER** or **RESET** to increase or decrease the contrast setting (the range being between 1 and 15).

Note: A high setting will suit installations where the control head will be viewed from above.

3. Press **SPEED** and **TRIP** together momentarily to store the contrast setting.

Chapter 5: CODE Lock Security

The ST50 Plus range incorporates an anti-theft feature called 'CODE Lock'. Designed to protect individual instruments or complete systems in vulnerable areas, 'CODE Lock' is a four digit number that you programme into the permanent memory of a selected 'master' instrument.

Note: A 'master' instrument is a digital unit on which the code number can be entered, and then, if part of an integrated system, transmitted to other ST50 Plus intruments.

This facility means that, should a CODE Locked instrument be removed from the vessel without your permission, it cannot be operated without the four digit security number.

'CODE Lock' can be used in one of three modes:

Mode 1: Off

As it leaves the factory 'CODE Lock' is set to off. In this mode the instrument will operate normally when it is switched on, however, the unit will not be protected by the anti-theft feature.

Mode 2: 'CODE Lock' Once-Only Entry (page 23)

This mode is designed for systems with a digital ST50 Plus instrument in a safe, below-decks location. This instrument can then be used as a 'master' to enter the four digit code number and, when the power is switched on, automatically transmit the code to all the instruments in the system. The advantage of this mode is that, with the master safely below deck, code entry via the keypad is a once-only operation on installation.
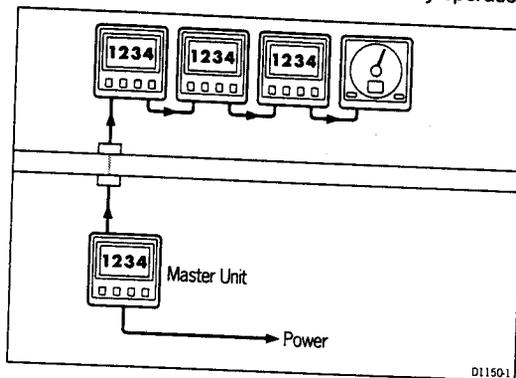
Once 'CODE Lock' is set the system will operate normally as soon as the power is switched on. In other words, the 'CODE Lock' security number is invisible.

Mode 3: 'CODE Lock' input at Power-On (page 24)

In the 'Power-On mode', the ST50 Plus is configured so that you have to enter the four digit number on a 'master' digital instrument every time the system is switched on. **Until this number is entered the instrument(s) will not operate.**

This mode is particularly useful when you are unable to position a 'master' instrument below decks and, therefore, all the vessels valuable instrumentation is left in a vulnerable area.

Should a CODE Locked instrument be removed from the system, it will not operate until the correct four digit security number is entered or received.
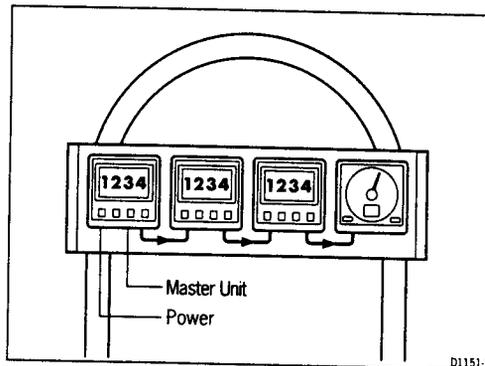
If your selected master instrument fails for any reason, the security code number can be entered via another ST50 Plus instrument in the system. However, until another instrument is set as a master or the existing master is replaced, the security code will have to be entered every time the system is switched on.

Note: A warning sticker is provided with each instrument. If you have set 'CODE Lock', position this warning sticker in a prominent location to deter potential thieves.

Setting Up the Security Code

When the ST50 Plus Speed is switched-on for the first time the security feature is set to off. To turn the 'CODE Lock' feature on, proceed as follows:

Once Only Entry

	Action	Display Shows
1	Press and SPEED and TRIP together for 4 seconds	CAL after 2 seconds and VER X.X after 4 seconds
2	Press SPEED twice	CODELOCK Cal. Off
3	4 seconds after 'CODELOCK Cal. Off'	ENTER CODE
4	Press TRIP	_ _ _ _
5	Press TIMER or RESET to select first number	1 _ _ _
6	Press TRIP to accept number	1 _ _ _
7	Press TIMER or RESET to select second number	1 2 _ _
8	Press TRIP to accept number	1 2 _ _
9	Press TIMER or RESET to select third number	1 2 3 _
10	Press TRIP to accept third number	1 2 3 _
11	Press TIMER or RESET to select fourth number	1 2 3 4
12	Press TRIP to accept code	'1 2 3 4'
13	Press TRIP	PWR ON?
14	Leave PWR ON? flashing for 10 seconds	CODELOCK Cal. set
15	To exit CODELOCK, press SPEED and TRIP together for 2 seconds	Normal operation, eg. speed display

T102-1

If you do not exit 'CODELOCK Cal. set' within 10 seconds the display will change to CANCEL CODE. You now have the option of cancelling the code, by pressing **TRIP** to return to the _ _ _ _ display, or exit as described in action 15 above.

Your Code Number

For future reference, enter your chosen code number into the box below.

For obvious reasons, please store this handbook in a safe place.

Operation

Once only 'CODE Lock' entry is invisible once it has been set.

On Power-Up

	Action	Display Shows
1	Press and SPEED and TRIP together for 4 seconds	CAL after 2 seconds and VER X.X after 4 seconds
2	Press SPEED twice	CODELOCK Cal. Off
3	4 seconds after 'CODELOCK Cal. Off'	ENTER CODE
4	Press TRIP	' ' _ _ _ _
5	Press TIMER or RESET to select first number	1 _ _ _
6	Press TRIP to accept number	1'_ _ _
7	Press TIMER or RESET to select second number	1 2 _ _
8	Press TRIP to accept number	1 2'_ _
9	Press TIMER or RESET to select third number	1 2 3 _
10	Press TRIP to accept third number	1 2 3'_'
11	Press TIMER or RESET to select fourth number	1 2 3 4
12	Press TRIP to accept code	'1 2 3 4'
13	Press TRIP	PWR ON?
14	Press TRIP within 10 seconds	CODELOCK Cal. set
15	To exit CODELOCK, press SPEED and TRIP together for 2 seconds	Normal operation, eg. speed display

T101-1

If you do not exit 'CODELOCK Cal. set' within 10 seconds the display will change to CANCEL CODE. You now have the option of cancelling the code, by pressing **TRIP** to return to the _ _ _ _ display, or exit as described in action 15 above.

Your Code Number

For future reference, enter your chosen code number into the box below.

For obvious reasons, please store this handbook in a safe place.

Operation

When the unit is powered on you are prompted to enter the code number. To enter the number, carry out actions 4 to 12 above and press **TRIP**.

Chapter 6: Calibration

As it leaves the factory the ST50 Plus Speed is set to display speed in knots, distance in Nm and distance lost in feet. These settings, together and other navigational features, can be changed (e.g., Kts to Mph) as described in this section.

6.1 Initial Calibration
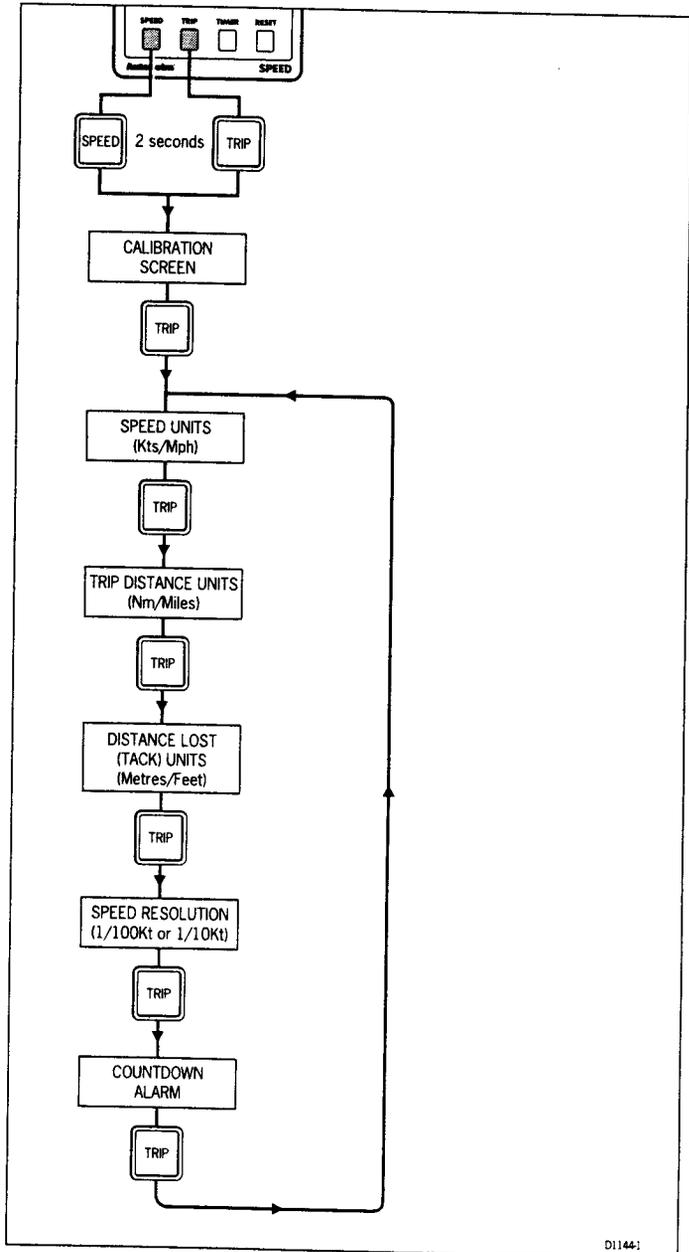
Press **SPEED** and **TRIP** for 2 seconds to exit, store the initial calibration settings, and return to the speed display.

Initial Calibration Notes

Press **RESET** to select the required speed, distance, and distance lost units.

The countdown alarm can be turned on or off using the **RESET** key:

1 = Alarm on (enabled)
0 = Alarm off (disabled)

Press **SPEED** momentarily to exit initial calibration without storing the new settings.

Note: Initial calibration cannot be accessed when the unit is configured as a repeater.

6.2 Log Calibration

The ST50 Plus Speed should not be used for navigational purposes until the transducer paddlewheel has been calibrated to the vessel. This is a simple operation that can be carried out automatically over a measured distance or by manually entering a calibration factor.

Automatic Calibration

Automatic calibration should be carried out when tidal flow is at a minimum. Locate an easily identified, marked and measured distance on a chart and enter this distance into the instrument (**3**).

Note: The measured distance should, ideally, be between 1 and 2.5 Nm/Miles

Proceed from object 1 to object 2 (measured distance), pressing the **SPEED** key at the start and finish of the run (**4** and **5**). The calibration factor is calculated and displayed at the end of each run (**6**).

Repeat the run over the measured distance in the opposite direction. Once again the calibration factor will be displayed. This represents the average for the two runs. A further two runs can be made if required. **Don't forget to store the log calibration factor.**

Note: The log calibration range is from 0.25 to 2.00. Calibration factors outside of this range cannot be stored.
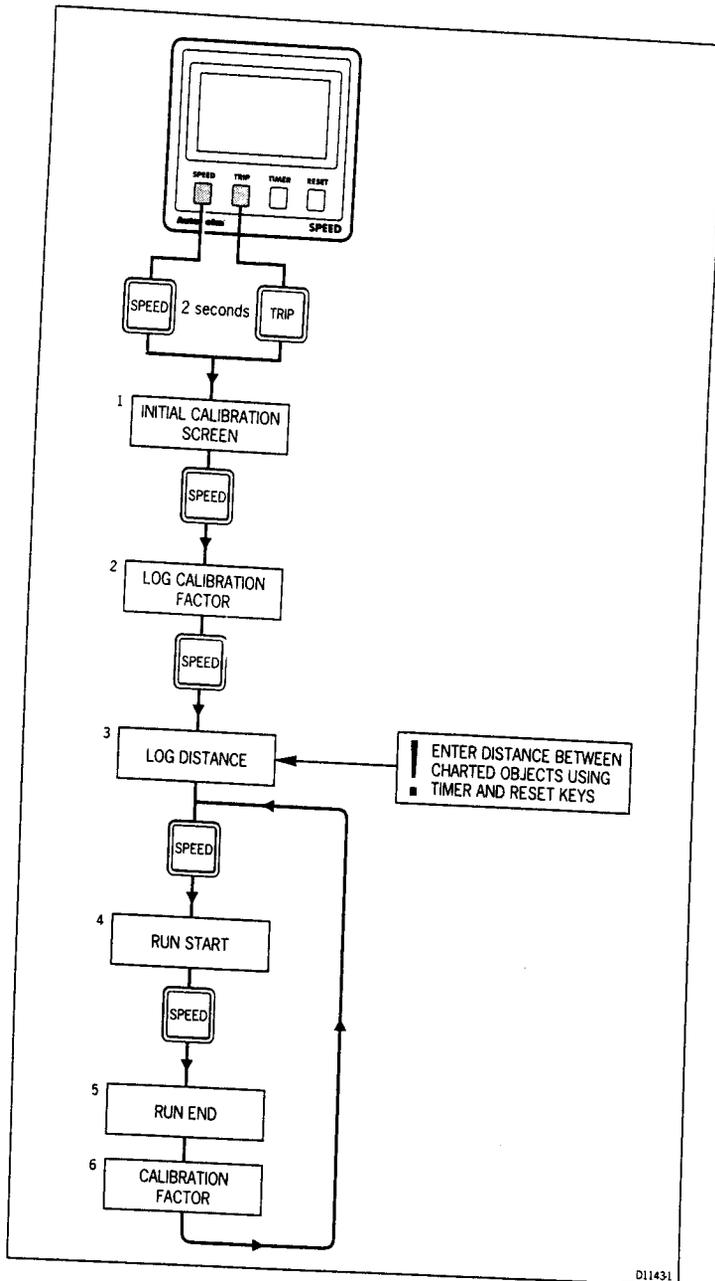
Note: Once you have completed the runs, store the calculated calibration factor by pressing **SPEED** and **TRIP** together until the displays returns to normal mode (approximately 2 seconds).
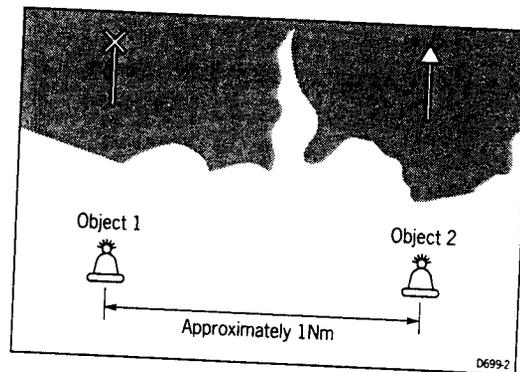
Manual Log Calibration

The following calculation must be used when carrying out Manual Log Calibration:

F (Correction Factor) = **Known** Distance/**Measured** Distance

The **Known** distance is the distance between two charted objects (e.g., two buoys).

The **Measured** distance is the distance recorded by the speed instrument, allowing for tidal flow.

To obtain the correction factor (**F**) proceed from object 1 to object 2 and then object 2 to object 1. The measured distance in each case must be noted, added together, and then divided by 2 to obtain the average distance.

To obtain the correction factor, divide the known distance by the average distance. Once the correction factor has been calculated it can be entered into the instrument as described in the flowchart on the following page. **Do not forget to store the correction factor.**

Note: The log calibration range is from 0.25 to 2.00. Calibration factors outside of this range cannot be stored.

D11421
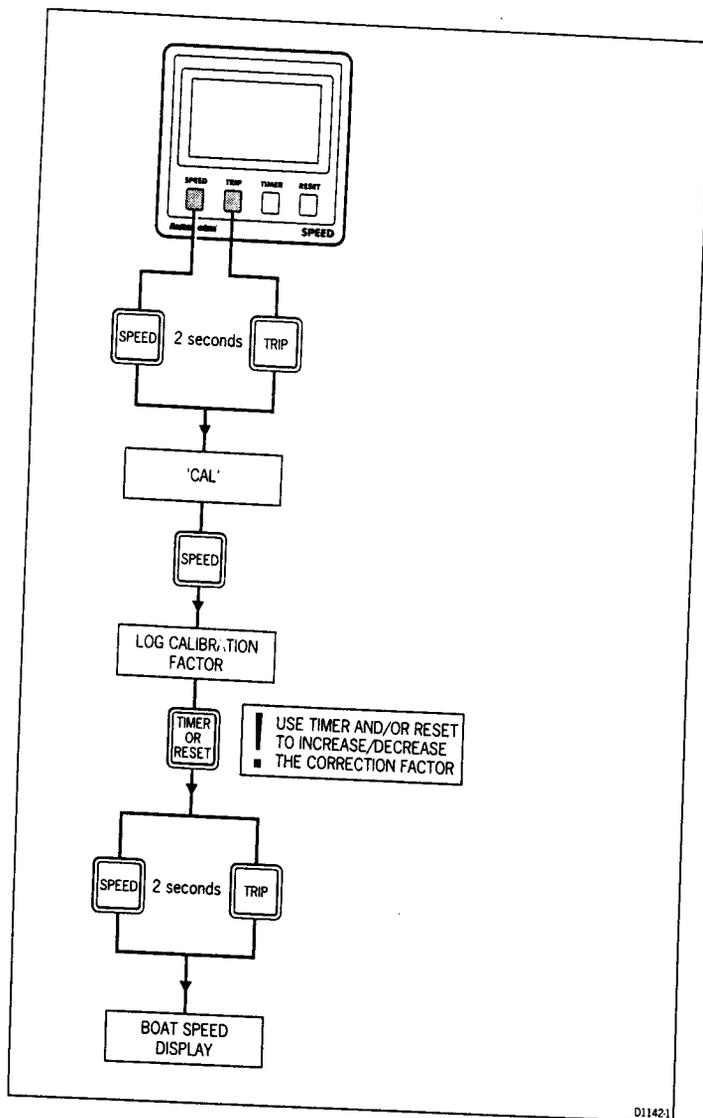
Note: The correction factor must be saved once it has been entered. This is achieved by pressing **SPEED** and **TRIP** together until the display returns to its normal mode (approximately 2 seconds).

6.3 Intermediate Calibration
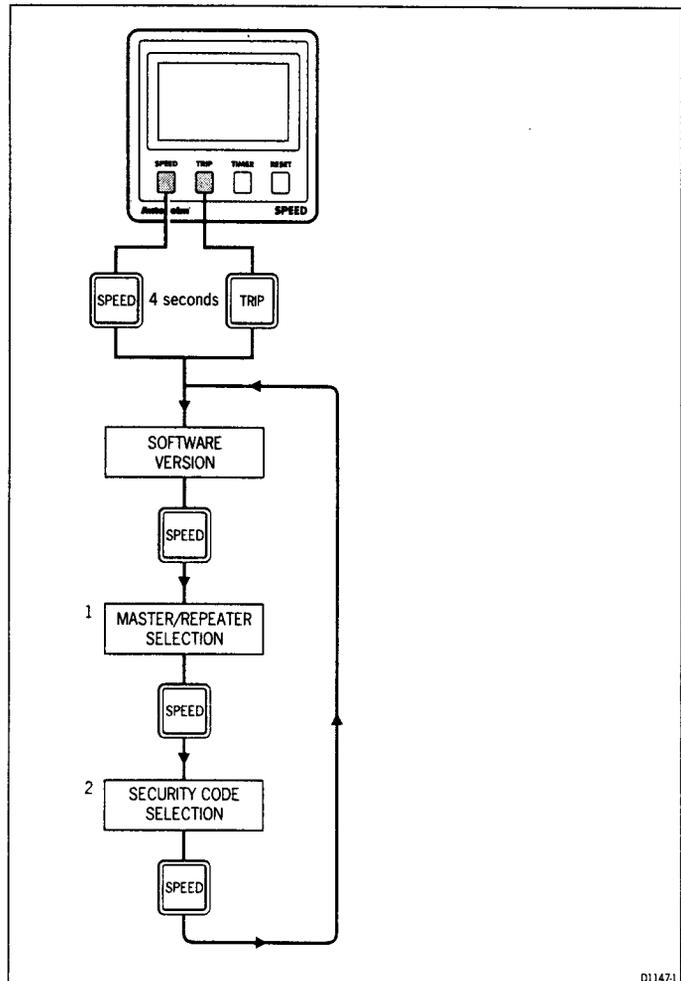
- To exit intermediate calibration and store the new settings, press **SPEED** and **TRIP** for 2 seconds.

Note: Initial calibration cannot be accessed when the unit is configured as a repeater.

Intermediate Calibration Notes

(1) Master/Repeater Selection

The ST50 Plus Speed is factory set as a master unit - normally connected to a speed transducer. It can, however, be set to repeat speed related information received via the SeaTalk bus:
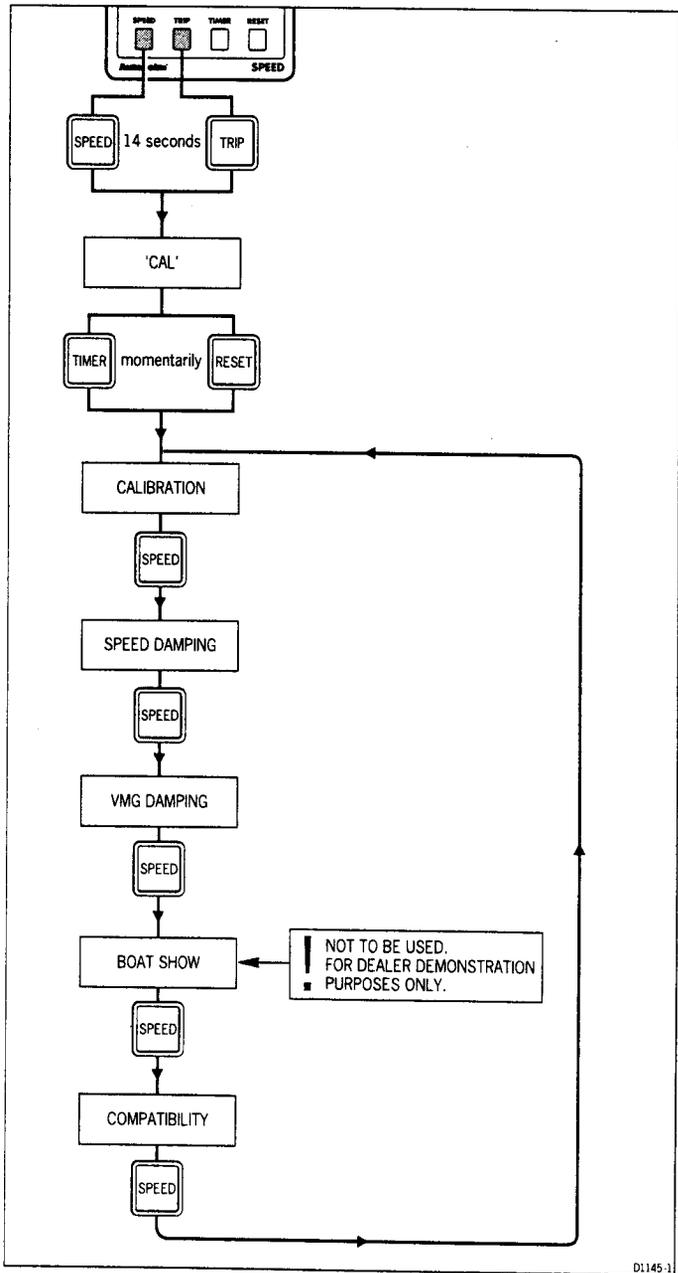
0 = master mode
1 = repeater mode

The following functions are not available when set to repeater mode:

- Log calibration

- Trip distance reset

- Average speed reset

(2) Security Code

Full details on how the 'CODE Lock' security feature works, is set-up, and stored are given in Chapter 5.

6.4 Extended Calibration

Extended calibration settings are stored by pressing **SPEED** and **TRIP** for 2 seconds.

Extended Calibration Notes

All of the extended calibration screens are adjusted using the **TIMER** and/ or **RESET** keys.

Calibration allows you to protect your selected settings against accidental change. When lock is enabled the initial and intermediate calibration settings cannot be modified.

CAL 1 = Calibration unlocked, i.e. normal access

CAL 0 = Calibration locked, i.e. no access

Once locked, calibration can be unlocked by entering extended calibration and selecting calibration unlocked.

Speed and VMG damping adjusts the rate at which these displays are updated. The damping range is 1 to 15 seconds, with the factory default set at 4 seconds.

Speed damping is displayed as 'DAMP A' and VMG damping as 'DAMP B'.

Compatibility is set to BOTH and should not be changed.

Caution: The 'Boat Show' mode is a dealer demonstration program only. Under no circumstances must this program be engaged when this unit is installed on-board your vessel. The display must, therefore, be left set to 'BSHOW 0'.

Chapter 7: General Specification

Dimensions:	110 x 110mm (4.33 x 4.33in)
Power supply:	10 to 16V
Power consumption:	30ma (normal) 100ma (illumination on)
Temperature range:	0 to 70 deg.C
Speed through water:	0 to 99.9 Kts or Mph (0.1 or 0.01 increments)
Trip distance:	0 to 999 Nm or Miles (0.01 increments from 0 to 9.99, 0.1 increments to 99.9 and 1.0 increments to 999)
Log:	0 to 99999.9 Nm or Miles (0.1 increments)
Average speed:	0 to 99.9 Kts or Mph (0.1 or 0.01 increments)
Maximum speed:	0 to 99.9 Kts or Mph (0.1 or 0.01 increments)
Sea Temperature:	-10 to +40 °C (14 to 104°F) (0.1 increments)
Units:	Software programmable
Repeater capability:	Software programmable
Illumination:	3 levels plus off
Manual log calibration:	0.25 to 2.00 (correction factor)
Transducer speed range:	0.8 to 40 Knots (1 to 46 Mph)