



tacktick[®]

Speed Master

User Guide



Congratulations on the purchase of your **Speed Master**. Tacktick have combined technological innovation with feedback from top sailors around the world to bring you the ultimate sailboat instrument.

All Tacktick equipment and accessories are designed to the best industry standards for use in the leisure marine environment. Their design and manufacture is in compliance with CE Mark requirements, this includes electromagnetic compatibility.

Please read this User Guide carefully before using your **Speed Master** and keep it for future reference.

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1. Registering your Speed Master

To register for your international warranty, complete and return the warranty card to Tacktick Limited, PO Box 27, Emsworth P010 8YU, England. Retain your proof of purchase as you will need it in the event of a warranty claim.

We also recommend that you keep a record of your purchase:

Date of purchase:	Place of purchase:	Serial number:
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2. Package Contents

Supplied as standard

Speed Master
 Mounting Cradle
 4 M5 nuts, bolts and washers for the mounting cradle
 Connectors (seven)
 Cap (to protect connector on cradle when the unit is removed)
 Two spare Caps
 Deck Gland
 User guide
 Warranty card

Supplied dependant on packaging option (check outside of box)

Speed transducer (through hull)
 Depth transducer (standard)

Order No.

T900
 T901

Accessories (may be purchased separately)

Single mast bracket
 Double mast bracket
 Deck bracket
 Depth transducer ("V" hull)

T041
 T043
 T050
 T902

3. Features and Benefits

Simple installation, powered for life with Tacktick's unique **solar system**

Portable, yet rugged with the Tacktick snap in cradle

Boat speed display

Log and **trip-log** displays

Water depth display and **audible shallow alarm**

Top speed memory

Easy to use **countdown timer** with **resynchronisation** function

Graphic **water depth** indicator

Backlight with automatic shut off in daylight (patent pending)

Waterproof, submersible to 10m

No need to adjust for **southern hemisphere** effects

Twin displays which are easy to read even when hiking (patent pending)

Full calibration

Automatic power down

Low battery indicator

Tacktick's unique solar system and twin display has patents pending in the UK.

4. Introduction

4.1. What can Speed Master do for me?

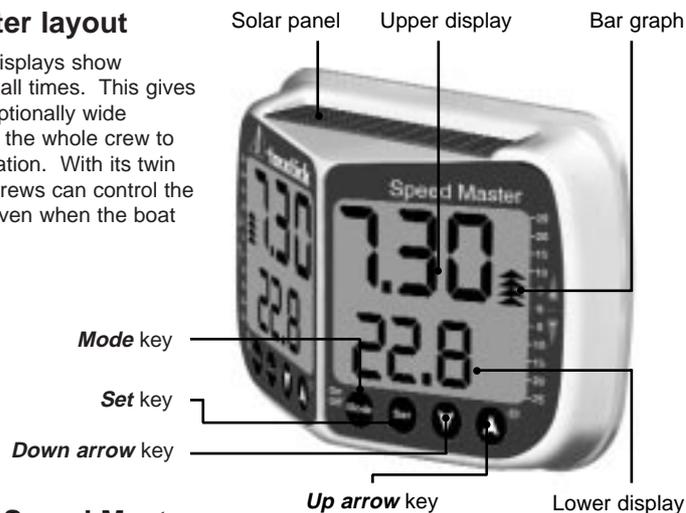
Speed Master gives you precise, clear numerical and graphical readouts of the water depth, your speed, and changes in your speed. **Speed Master** can quickly and easily be set up to display the countdown to the start of a race.

- Water depth
- Boat speed
- Speed trim (changes in speed)
- Countdown to the start (or elapsed time since the start)

Speed Master is simple to operate, and straightforward to install. With Tacktick's unique solar system, connections are reduced to the minimum giving you the ultimate reliability.

4.2. Speed Master layout

Speed Master's twin displays show identical information at all times. This gives the instrument an exceptionally wide viewing angle, allowing the whole crew to see critical race information. With its twin (duplicated) keypads, crews can control the **Speed Master** easily even when the boat is heeling.



55. Using your Speed Master

5.1. Switching ON / OFF

To switch ON	Press and hold down the <i>mode</i> key until the display appears
To switch OFF	Press and hold down the <i>mode</i> key until the display clears (this will take 5 seconds)

If **Speed Master** detects no boat speed for 60 minutes it will power down.

5.2. Reading the displays on the main page

When you first power up the Speed Master, the battery level is displayed briefly, indicating the number of hours of charge remaining in the internal cells (a full charge is 199 hours). After showing the battery level, the main page is displayed automatically.

Upper display

The upper display on the main page shows the boat's speed in hundredths of a knot (tenths of a knot when the speed exceeds 10 knots).

Lower display

The lower display on the main page shows the water depth in meters (or in feet, depending of the user setting, refer to the calibration section below). The reference point is normally the bottom of the keel, although this can be adjusted from the appropriate calibration page. When the depth exceeds the maximum sounding range, or when the depth signal is lost, the lower display will flash the last known depth.

Bar graph

The bar graph shows you speed trim, which is the percentage difference between the speed and a reference speed. The reference speed is either:

1. the rolling average of the boat speed over the last 2 minutes, or
2. a target boat speed, set by you (refer to the speed trim section below)

Audible alarm

This sounds when the water depth is shallow. From the factory, the alarm is switched off, however you may change this by adjusting the "shallow water audible alarm" setting in the appropriate calibration page, refer to the calibration section below.

5.3. Reading the log, trip-log and top-speed

To access the log page, press and hold the *mode* key. The log page will time-out after 7 seconds, or can be cleared by pressing the *mode* key. The log is in units of nautical miles, and rolls over to zero after 1999nm. The log is set to zero from the factory, but accumulates each time you sail and does not reset on power down.

To access the trip-log page, first go to the log page, then press the *mode* key. The trip log is in units of hundredths of a nautical mile and does reset on power down.

To access the top-speed page, first go to the trip-log page, then press the *mode* key. The top speed is displayed in knots, and is the maximum speed experienced since power up.

5.4. Setting the race timer

To alternate between the **Main Page** and **Timer Page** in the **lower** display press the *mode* key. In the Timer Page, the units of "m" for minutes or "s" for seconds are displayed to the bottom right.

1. Check you are looking at the Timer page.
2. Adjust the timer by pressing the *up* and *down arrow* keys.
3. Press the set key to start the countdown. Audible beeps will count you down to the start.
4. If the initial gun was not timed accurately, press the *set* key at any subsequent gun to automatically **resynchronise** the timer to the nearest full minute.
5. The main page is automatically displayed once the countdown period has elapsed and the race begins.
6. The timer will now count race time elapsed and is displayed in timer mode (press *mode* key)

You should see an "s" or "m" annunciator at the bottom right of the display, if not press the mode key.

The *up* and *down* arrow keys can be used at any time whilst in timer mode to reset the start time.

The countdown timer can be set up to 40 minutes. Between 20 and 40 minutes the display will alternate between seconds and minutes remaining.

For rolling starts, count the number of fleets ahead of your start, and multiply the start time accordingly. This procedure ensures you have an automatic transition to the main page at the start.

7. Installation

Warnings

1. The notes below are for guidance only. Before installing your transducers, read the installation instructions, which are enclosed separately in the packaging.
2. The depth wires (blue and black) carry a high power signal (400V), which will damage the speed transducer if a connection is accidentally made. **DO NOT PUT YOUR Speed**

Master

INTO ITS CRADLE UNTIL YOU HAVE COMPLETED AND CHECKED THE INSTALLATION.

3. Plastic transducer housings are not suitable for wooden hulled vessels, since the wood can swell causing the housing to crack, leading to the possible sinking of the vessel. For wooden boats, consult your Tacktick dealer and ask for bronze transducer fittings.

7.1. Below decks

Installing your T900 speed transducer (standard installation)

The standard installation does not require specialist skills or tools. Please follow the instructions included with the transducer. The T900 is a low profile fitting, which will have no significant effect on sailboat performance even in the most competitive race fleets.

Installing your T900 speed transducer (flush to the hull)

Some qualified boat builders mount speed transducers flush to the bottom of the hull. This involves modifying the transducer to remove the flange, drilling the hull, then bonding the transducer from the inside of the hull. This operation requires **SPECIALIST SKILLS**, since failure to achieve a good bond may result in the transducer becoming dislodged, resulting in the possible sinking of the vessel. **If you require your speed transducer to be flush mounted, you must employ a qualified boat builder who ALREADY HAS EXPERIENCE with this operation.**

Choosing your depth transducer and its installation

For most installations, the T901 (standard) depth transducer is the most suitable. The T901 can be mounted either THROUGH-HULL or IN-HULL. The advantage of an in-hull installation, where the transducer is bonded to the inside of the hull, is that no hole is required in the hull. Note that for foam sandwich boats the inner skin and foam core must be removed since depth signal cannot travel through foam. The advantage of a through-hull installation, where the transducer is in direct contact with the water, is that the operation of the sounder is not dependent upon the installation (i.e. the construction of the hull). **If you need to core out the foam or in any way alter your hull, you must employ a qualified boat builder who ALREADY HAS EXPERIENCE with this operation.**

For deep V hulls (i.e. hulls with dead-rise exceeding 15°), the T902 ("V" hull) depth transducer should be fitted. Alternatively, the T901 can be mounted skew to ensure the transducer points directly at (or within 15° of) the sea-bed.

Installing your T901 depth transducer through the hull

Follow the instructions supplied with the transducer.

Installing your T901 depth transducer from inside the hull

Check that the hull is made from a dense material (fibreglass is sufficiently dense but a foam core is not). Where the hull is constructed with foam or other such materials, you must core out a diameter sufficient to take the transducer, removing material from the inside and stopping at the outer skin. Note that you may wish to file or saw away the outer flange of the T901, in order to reduce the diameter of the core.

6. Adjusting the Calibration

Your **Speed Master** is designed to operate correctly from the factory and there should be no need to alter the calibration. This section is included only for customers with unusual boat types or other special requirements.

1. To **enter** calibration press and hold the *mode* and *set* keys simultaneously for 2 seconds. The upper display will show "CAL".
2. To **move through** each of the following calibration pages, press the *mode* key.
3. To **exit** calibration and save the new inputs press the *mode* key repeatedly until you return to your normal display. Any changes you have made will then be stored, even if you power down.

The calibration pages are grouped as follows:

d: depth settings	L: log settings
C: compass settings	U: user interface settings

d1 - Units for displaying water depth (m or ft)

Note that this only affects the numerical displays, the bar graph is always calibrated in meters. The maximum depth displayed on the bar graph is 20m (60 ft).

Switch the units by pressing the *up* and *down* arrow keys.
Press the *mode* key to move to the next page.

The two settings are "M" for meters and "ft" for feet. The factory setting is "M".

d2 - Adjusts for the keel depth

If you want to display water depth below the keel, you need to apply a negative offset equal to the distance between the transducer siting point and the bottom of the keel, typically about 1.2m (3.6ft). If you prefer to display actual water depth, then you will need to dial in a positive offset equal to the distance from the water surface to the transducer, typically about 0.4m (1.3ft).

Increase or decrease by pressing the *up* or *down* arrow keys.
Press the *mode* key to move to the next page.

The units are as defined above, meters or feet. The factory setting is "-1.2 meters" or "-3.6 feet".

d3 - Shallow water audible alarm

You may adjust the depth at which the audible alarm starts to sound.

Increase or decrease by pressing the *up* or *down* arrow keys.
Press the *mode* key to move to the next page.

The units are as defined above, meters or feet. The factory setting is "OFF".

L1 - Responsiveness of the speed display

You may adjust the speed of response of the display between slow (1), medium (2) and fast (3). If the responsiveness is too high, you may find that the speed readout never settles down when in a heavy sea, however if it is too low the display may be slow to respond to real changes in boat speed.

Increase or decrease by pressing the *up* or *down* arrow keys.
Press the *mode* key to move to the next page.

Adjustment range: 1 (slowest), 2 and 3 (fastest). The factory setting is "2 (medium)".

L2 - Speed calibration

*On some installations the speed may over or under read. You can apply a correction factor, either (1) by adjusting the displayed speed until it matches an accurate speed reference e.g. a GPS, (2) by adjusting the correction factor itself or (3) you can sail up and down a measured mile and **Speed Master** will **auto-calibrate** for you. The L2 - speed calibration page starts at method 1, to access method 2 you must press the *set* key, and to access method 3 you must press the *set* key twice.*



Method 1: adjusting the displayed speed until it matches an accurate reference

Using a GPS or other reference, directly adjust the displayed speed using the *up* and *down* keys. Press the mode key to exit speed calibration.

Each key press adjusts the displayed speed by 1%.

Method 2: adjusting the correction factor directly

Press the *set* key once. You can now view the correction factor, and adjust it by pressing the *up* or *down arrow* keys. Press the mode key to exit speed calibration.

Adjustment range: 0.2 to 2.5, if in doubt, set to 1.00 The factory setting is "1.00".

Method 3: auto-calibration by travelling a known distance

You need to locate two fixed marks or transits, which are a known distance apart. Often in coastal waters, a measured mile can be accurately located from transits ashore. Determine the distance between the marks before you start the procedure. You need to make a double run to cancel the effect of tide, and ensure that any tidal current is running mainly from one mark to the other - cross current will reduce the accuracy of the auto-calibration procedure. It is always best to calibrate during slack water.

Press the *set* key twice. Use the *up* and *down arrow* keys to enter the distance between the two marks in nautical miles

The flashing number indicates the distance between the two marks in nautical miles.

Sail directly towards the second mark and as you pass the first mark, press the *set* key.

The lower display will change to show 0.00, then it will count up in hundredths of a nautical mile.

When you reach the second mark, press the *set* key.

The calibration value will automatically be calculated and displayed.

Turn the boat around then sail directly towards the first mark.

This time you will be moving in the opposite direction.

As you pass the second mark, press the *set* key. Continue towards to the first mark

The display will count up in hundredths of a nautical mile.

Press the *set* key when you reach the first mark

The display will show the averaged calibration value based on both runs.

The calibration is now complete. Press the *mode* key to move to the next calibration page.

If the run was unsuccessful, you must start again - exit calibration and re-enter.

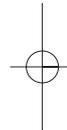
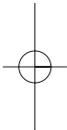
U1 - Adjusts the speed trim range and precision

The normal range is $\pm 25\%$ with a precision of 2.5%, however this can be adjusted to, for example, $\pm 10\%$ with a precision of 1%. Since the display has only 10 segments, when the range is adjusted, the precision automatically adjusts accordingly, to one tenth of the range. Note that the printed label is marked up for a range of $\pm 25\%$, the removal or alteration of this label will invalidate your warranty.

Adjust the range by pressing the *up* and *down arrow* keys.

Adjustment range: 5 to 50. The factory setting is "25".

To **exit** calibration and save the new inputs press the *mode* key.



5.5. Controlling the speed trim display

The speed trim graph is normally displayed in increments of 2.5%, up to a maximum of $\pm 25\%$, however the precision and maximum range can be adjusted, refer to the calibration section below.

There are two reference speeds, either the rolling average of the last two minutes of boat speed, or a speed defined by you.

To set a speed reference:

1. press the *set* key
2. Adjust the target speed to the desired value with the *up* and *down arrow* keys
3. To revert to the normal depth display, press the *mode* key

Speed Master takes the current speed to be the target and displays it on the lower screen

The lower screen displays the target value - hold the keys to scroll the changes

After 7 seconds, the lower screen will automatically revert to a depth display

To revert to a rolling average speed reference:

1. press and hold the *set* key for 2 seconds

Speed Master returns to a rolling average

5.6. Controlling the backlighting

To turn the backlighting on:

1. Press and hold the *up arrow* key - the display shows L1
2. Adjust the light intensity with the *up* and *down* arrow keys with a range from L1 - L2

If the battery power is not sufficient to power the backlighting, bAt will appear on the display screen

To turn the backlighting off:

As above and press the *down arrow* key to adjust the level to LOFF

Daylight Detection: If daylight is sensed for over 4 minutes the backlighting will automatically switch off

Note: Backlighting will use stored battery power, turn off when not needed and recharge during the day after use.

5.7. Reading the battery status

The battery status is shown for 5 seconds after the **Speed Master** is switched on. The bar graph shows the charge level (a full bar graph indicates a full charge of 199 hours). The charge level is also displayed numerically in hours remaining (assuming the backlighting will not be turned on). If the backlighting is turned on see the table below.

Effect of backlighting on battery level (assuming a full charge initially)

Backlighting off 199 hours remaining
 Backlighting level 1 30 hours remaining
 Backlighting level 2 15 hours remaining

See maintenance section for recharging times.

The backlighting uses battery power heavily. If using backlighting ensure that the **Speed Master** is recharged before using again by leaving on a windowsill facing out towards the sun until the battery charge shows 199 hours.

If the battery level falls below 50 hours then the battery status will appear on the display screen for 2 seconds every 4 minutes and the backlighting will automatically be turned off.

Use **epoxy-resin** to bond the T901 directly to the hull from the inside (note that a **RTV/silicon** bond will absorb too much sound energy for the transducer to perform properly). Ensure that the mixing process does not introduce air bubbles into the liquid, or that the air bubbles have settled out before setting down the transducer.

When considering the optimum siting arrangement, the following background information may be helpful. Depth transducers send and then receive an ultra-sonic sound wave, which reflects off density boundaries (normally between the sea and the seabed). Their operation can be impaired where other density boundaries occur, for example air bubbles in the prop wash of a passing vessel. In the case of an in-hull installation, porosity or air pockets in the fibreglass laminate or in the epoxy used to bond the transducer to the hull will significantly impair performance. Consult an experienced boat builder if you are in doubt about your installation.

Installing your T902 ("V" hull) depth transducer from inside the hull

Follow the instructions supplied with the transducer.

Working with other transducers (for example transducers already in your boat)

Tacktick Limited can only guarantee operation when using a transducer supplied by Tacktick, however:

- Speed transducers are generally compatible, so long as they are based on the three-wire system. Look for the "Airmar" logo on the transducer cable - if this is present then the transducer will almost certainly be compatible.
- Depth transducers are generally compatible so long as they operate at 200kHz.

7.2. Above decks

There are 2 options for installation.

1. Mast mounting with the T041 mast bracket and the mounting cradle

- i. Drop the slug into the mast groove. Use the centre bolt to secure the slug at the correct height. Loosely fit the two outer bolts.
- ii. Fit the cradle to the bracket using the four nuts/washers/bolts provided
- iii. Offer the bracket assembly to the mast, dropping the assembly over the key-way, then tightening the bolts with a posidrive screwdriver through the holes in the cradle.
- iv. Fit the two velcro straps for additional rigidity if required.
- v. Now clip your **Speed Master** to the cradle each time you race



Cradle

Mast Bracket

2. Bulkhead mounting with the mounting cradle

- i. Fit the cradle to the bulkhead using M5 countersunk bolts (supplied) and a sealant to ensure the cradle is sealed to the surface. **WARNING:** take care to avoid damage to existing wiring.
- ii. Now clip your **Speed Master** to the cradle each time you race.

7.3. Cabling

Cable gland

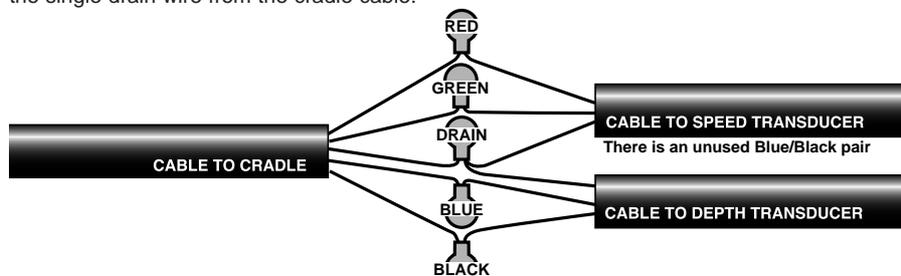
Use the cable gland provided, and pass the single cable from the mast down through the gland. Tighten the gland to obtain a watertight seal.

Cable lengths

For the T900 speed transducer, you may cut or extend the cable to any length. For the T901 and T902 depth transducers, the Tacktick circuit has been engineered to allow cable lengths of between 2m (6ft) to 8m (24ft).

Joining the cables

Simply join the transducer cables colour to colour with the cable from the cradle. Both the unshielded "drain" wires from the two transducers must be twisted together, then joined with the single drain wire from the cradle cable:



When joining the wires, use the connectors supplied (there are two spares). The connectors are loaded with silicon grease to prevent water ingress. DO NOT STRIP THE COLOURED SHEATH, it will be displaced automatically when the connector is closed and ensures ALL the strands are taken into the connector. Close the connector with pliers AFTER PUSHING THE WIRES ALL THE WAY home into the connector. You should inspect each connector from the rear after closing, looking to see that both the coloured wires have been pushed fully home.

Where a depth transducer is not installed, ensure that the blue and black wires are properly insulated. The depth signals are high power, and will permanently damage your speed transducer if they short across.

8. Maintenance

The **Speed Master** is totally sealed against water and is not serviceable. Any attempt to take the **Speed Master** apart will invalidate the warranty.

To clean, use only a damp soft cloth. No detergents, solvents or abrasives should be used.

To avoid damaging the **Speed Master**, we recommend storing in the Speed Master soft pack (T042)

When sailing in bright sunlight it should not be necessary to recharge your **Speed Master** after use. If the battery level falls below 100 hours, recharge by leaving on a windowsill facing outside towards the sun until the battery level is recharged to 199 hours.

Approximate recharging times

Bright sun	2 days
Cloudy days	5 days
Dull days	10 days

It is not possible to recharge batteries with electric lighting - sunlight must be used.

Ensure the mounting bracket is secure and check that the security bolts are tight before each race.

9. Problem Solving

Problem	Possible cause	Action required
Speed Master turns itself off	Speed Master has no speed input and the depth is not changing	Turn Speed Master on again. Speed Master will automatically power down in a completely static environment after 60 minutes.
	Low battery power	Check battery status screen (battery status section). If battery is close to zero recharge batteries (maintenance section).
Backlighting turns itself off or will not turn on	Daylight detected	No action required. Speed Master is designed to turn the backlighting off when light is detected to save battery power.
	Battery power is not sufficient for backlighting	Check battery status (battery status section). If charge level is below 50 hours recharge batteries (maintenance section).
Speed reads low or reads zero	Weed or calibration error	First remove the paddle-wheel and fit the bung. Check for weed and clean if required. If the reading is still low, refer to the calibration section and follow the procedure for speed calibration.
Depth indication (lower display) shows a “-”	This happens when the Speed Master cannot detect a transducer connection	Check the transducer wiring and connections.
Depth indication (lower display) flashes	No depth echo detected within 40m range	This is normal when in deep water, or when passing over the aerated wake of a power boat.
Depth alarm does not sound	In calibration, the audible depth alarm is set to OFF	Go to the appropriate calibration page and set the activation depth, as you require.
Depth alarm only sounds for 10 seconds	This is normal operation	In order to save battery power, and to avoid the distraction of a continuous alarm when sailing in shallows to avoid the tide, the alarm only sounds for 10 seconds after first entering shallow water.
Speed responds slowly	Speed response needs increasing in calibration	Go to the appropriate calibration page (page 7) and increase the speed response to 3 (fast)

If you still experience problems contact your local Tacktick dealer.

Note:

If your Speed Master appears to malfunction, leave on a window ledge facing the sun for 2 days to fully recharge the batteries. Remove from sunlight when the battery charge reaches 199 hours.

10. Speed Master Specification

Character Height	30mm on upper display. 20mm on lower display
Backlighting	Yes
Calibration	Fully adjustable
Mounting plane	Vertical (or fore-aft tilt of less than 15°)
Waterproofing	Submersible to 10m
Depth range	40m (120ft) - the bar graph displays to a maximum of 20m (60ft)
Depth resolution	0.18m (0.5ft)
Shallow depth alarm	Sounds for 10s after water depth falls below set point
Speed range	0.5 to 25 knots
Speed resolution	0.01 knots
Speed accuracy	Calibration dependant
Timer	1 second resolution, 1 to 40 minutes
Countdown alarms	Audible tones indicate time to start
Size	165 x 120 x55mm
Weight	430g (15oz) plus 300g (11oz) per transducer
Battery Charging	Solar power
Battery Life	199 hours (20 with backlighting) automatic solar recharging

11. Warranty and After Sales Service

Tacktick Limited or its authorised Distributors will repair or replace a Tacktick product free of charge where a manufacturing fault becomes apparent within two years of the purchase date provided:

- No unauthorized attempt has been made to repair the product
- The product has not been misused, operated outside of its intended environment or operated in a manner which is incompatible with the written instructions supplied on purchase

Proof of purchase date is required for the warranty to be valid.

Failure *within* the Warranty Period:

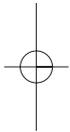
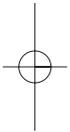
Simply return your **Speed Master** to your nearest authorised Tacktick Distributor, together with proof of purchase date.

Failure *outside* the Warranty Period:

Simply return your **Speed Master** to the nearest authorised Tacktick Distributor and an estimation for repair will be provided.

Authorised Tacktick Distributor details can be found on:

<http://www.tacktick.com>, the back of Tacktick brochures, or contact Tacktick Limited in England +44 (0)1243 379331 for your nearest dealer.



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