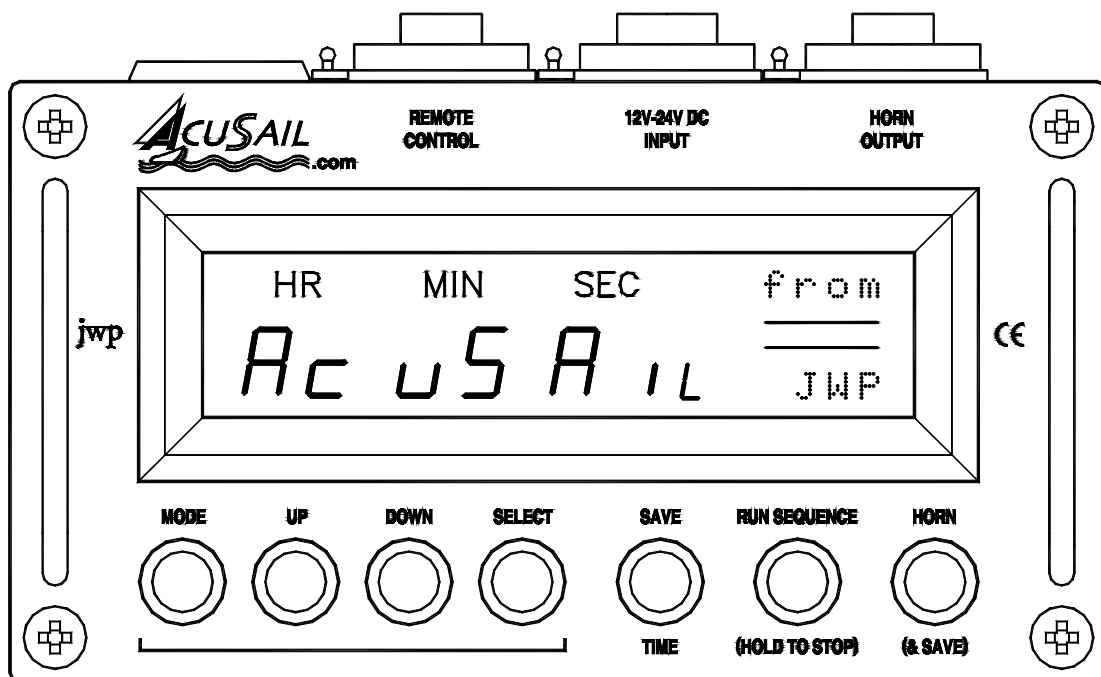


User Manual



Manual Version: 1.0

Software Version: 1.0

If the software version of your product differs from the number shown above, please download the appropriate manual from:



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What Should I Read?

This manual is divided into three main sections together with an appendix. Each section covers the features offered by **AcuSail** to a different depth.

Everyone should read Section 1, which is aimed at the basic user, or those who don't want (or need) to have an in-depth understanding of all the possibilities **AcuSail** can provide. Having read this short section, you should understand how to get the unit up and running with the minimum of fuss and be able to start races with ease.

If you then wish to expand your knowledge (to cover the memory functions and other operational facilities of the product) you should read Section 2, which is aimed at Advanced Users. Once you have digested this additional information you will understand how **AcuSail** saves timing data and how to retrieve it (either locally or from a PC) as well as how to select different starting sequences from memory.

Anyone interested in programming timing sequences or configuring the unit to suit particular club preferences, should also read Section 3, which is intended for perhaps only one individual per club, who will then be responsible for customising the product configuration. We will later refer to this individual as '*Club Programmer*'.

The appendix covers technical details, such as connector pin-outs, wiring details, file transfer protocols and the product specifications. Whoever will be responsible for the external connections to the unit (particularly the first time the product is used) will need to refer to this information.

Section 1 – Basic Operation

If you don't have the unit with you whilst reading this document, you may find it useful to refer to the drawing on the front of this manual to clarify the text.

Connecting the Unit

All the **AcuSail** connectors are fully waterproof. Each socket is polarised, so you will need to correctly align the locating lug on the cable connector to the one on the box. Once this is done, simply push the connector fully home and then rotate the outer ring so that the rubber seal is compressed. Reverse the procedure to remove the connector.

You must tighten the connectors to compress the rubber seal in order to ensure that all the connections are fully waterproof.

The *Remote Control* socket has a protective cap that unscrews in a similar manner to the connector outer rings. Do not remove this cap (leaving the connector exposed) unless you intend to connect something to this socket.

Assuming that your club has a typical unit configuration, **AcuSail** requires just two connections to the outside world to get the unit up and running (non-standard configurations, where high-powered horns are fed via the optional relay unit or from a separate battery, are detailed in the appendix).

Start by plugging the battery into the *12-24v DC Input* and then plug the external horn(s) into the *Horn Output*.

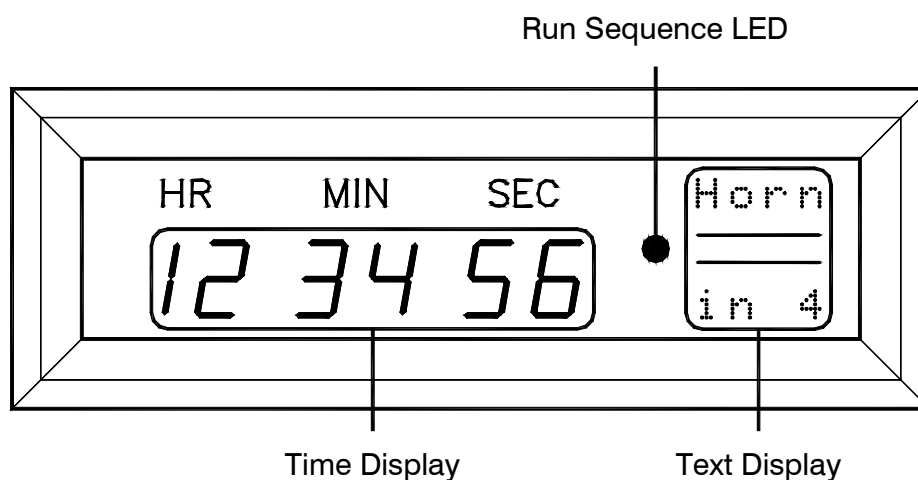
In addition to the two main connections you may have ancillary devices (remote switches or a PC connection for example), which should be connected to the *Remote Control* socket. This connection is optional; **AcuSail** is fully functional without these extra additions.

As soon as **AcuSail** is connected to a battery, it will display a sign-on message for three seconds, followed by the software version for a second.

*If the software version of your unit does not match this manual's version, you may find that the product performs in a different manner. If this is the case, either download the correct manual from **AcuSail.com**, or, for older releases (which are no longer supported), get your Club Programmer to contact **jwp** to discuss a software upgrade.*

Understanding the Display

The display has three main parts;



Times are always shown in the *Time Display* area although occasionally (whilst setting the date for example), this area is used for other functions.

The *Run Sequence LED* illuminates whenever a sequence is running.

The *Text Display* area is used for user prompts and general messages.

Setting the Date

If the date is presented in European format (DD/MM/YY) and you would prefer it presented in U.S. format (MM/DD/YY), ask your Club Programmer to change the relevant setting.

Setting the date requires you to set three, two-digit values. You will first be prompted to 'Set Year'. The relevant digits will flash to indicate the current value.

Use the *Up* and/or *Down* button to set the correct value. Holding either button will cause the value to change repeatedly. Holding both buttons together will increase the repeat rate (the first held button determines the direction of change).

Once you have set the correct year, press the *Mode* button to move to 'Set Mnth'. Repeat the setting procedure to set the current month.

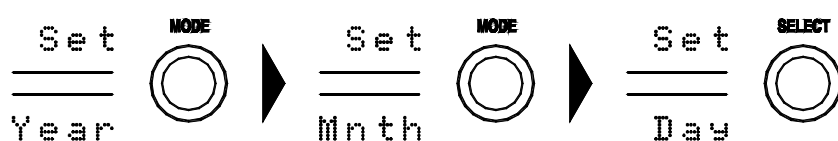
Finally, press the *Mode* button again to move to 'Set Day' and set the correct day using the same method.

If you now press the *Mode* button again, you will move back to 'Set Year' (allowing you to loop around the entire setting procedure until you are happy with the displayed value).

Invalid days (for any month/year) are changed to the nearest valid number (if you change the month/year after setting the day).

To exit the procedure at any point (and move to setting the time) press the *Select* button. **AcuSail** will beep to confirm the date is stored. Once stored, the only way to change the date is to remove the battery supply.

This graphic summarises the date setting procedure:



Setting the Time

If the time is presented in 24-hour format and you would prefer it in 12-hour format, ask your Club Programmer to change the relevant setting.

Setting the time requires you to set three, two-digit values.

You will first be prompted to 'Set Hrs'. The relevant digits will flash to indicate the current value.

Use the *Up* and/or *Down* button to set the desired value. Holding either button will cause the value to change repeatedly. Holding both buttons will increase the repeat rate (the first held button determines the direction of change).

Once you have set the desired hour value, press the *Mode* button to move to 'Set Min'. Repeat the setting procedure to set the desired minute.

Finally, press the *Mode* button again to move to 'Set Sec' and set the desired value for seconds.

If you now press the *Mode* button once more, you will move back to 'Set Hrs'. (Allowing you to loop around the entire setting procedure until you are happy with the displayed value).

When the time you have set matches the real time, press the *Select* button to start the clock running. **AcuSail** will beep to confirm the time is stored and the clock will start immediately.

This graphic summarises the time setting procedure:



If you are subsequently unhappy with how well the **AcuSail** time display matches the real time (say for example because you pressed the *Select* button late), simply hold the *Select* button for at least three seconds (which will cancel the clock and allow you to repeat the setting procedure). Note that this function is disabled once you have run any sequence.

To stop inadvertent clock resetting, your Club Programmer may have disabled the 'hold to reset' ability of the Select button. If this is the case, you will have to unplug the unit from the battery in order to reset the clock.

Running a Sequence (to Start a Race)

Once the clock is running, you can choose to start a sequence at any time.

Sequences always start with a ten-second beep count and are synchronised with the next whole minute.

In order to start a sequence on the required minute, there is a 'window' during which you need to press the *Run Sequence* button. This is best illustrated by a specific example;

Let's say you wanted to start a sequence at 13:00.00.

To achieve this, the *Run Sequence* button would need to be pressed at some point between 12:58.50 and 12:59.49. Any earlier would start the sequence at 12:59.00, whilst any later would result in a start at 13:01.00.

The easiest way to visualise this is to remember that you will start a timing sequence on the next minute if you press the *Run Sequence* button at least 11 seconds before that minute.

Once you press the *Run Sequence* button the *Run Sequence LED* will light. **AcuSail** will beep to confirm acceptance of the operation and display details of the upcoming sequence.

The top line of the text display shows the sequence number in the form 'SeqX', where X=0-9 (**AcuSail** has 10 user-programmable sequences to choose from). The bottom line contains a user-programmable name for the sequence, intended purely as an aide-memoir.

The sequence information is displayed until ten seconds before the first sequence starts, at which point **AcuSail** will switch to displaying a countdown to the first sequence event. In addition to the visual countdown, each second is punctuated with an audible beep.

Stopping a Sequence

AcuSail can run both infinite loop sequences (where, once started, a particular set of events is repeated continually until the user intervenes) and set length sequences (where, once all the events have been completed, the sequence comes to an end on it's own).

Your *Club Programmer* or indeed any advanced user should know if the currently active sequence has an end or not. If an end is programmed, **AcuSail** will automatically stop the sequence and cancel the *Run Sequence LED* when all the pre-programmed events have happened.

Irrespective of the sequence type, you can, of course, manually stop a sequence at any time. To do this, simply hold the *Run Sequence* button for at least three seconds. Once the button has been held for the correct duration, **AcuSail** will beep, cancel the sequence and display the current sequence number (SeqX) together with 'STOP'.

The *Run Sequence LED* will turn off immediately; The displayed 'STOP' message will blank once the *Run Sequence* button is released.

Sounding Manual Horns

You can sound a manual horn at any point by pressing the *Horn* button.

If your Club has an external Horn button (which is connected via the *Remote Control* socket) it will function in an identical manner to the one on the main unit.

Section 2 – Advanced Operation

Saving Times

Each time **AcuSail** sounds a horn (either as part of a sequence or via a manual press of the *Horn* button) the time is automatically saved in the unit's non-volatile memory.

Times are also saved (without any horn being heard but with a short internal beep) whenever the *Save Time* button is pressed (this feature is intended for storing class lap times, where horns are not normally sounded).

Times are not stored in memory until the first sequence of the day has started; This allows you to test that the horn is correctly connected (or to reset an incorrectly timed clock) without saving unnecessary information.

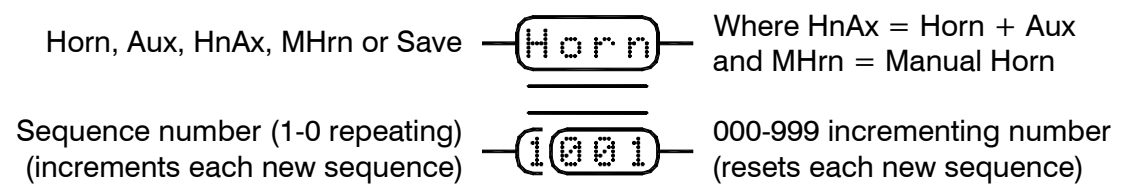
If **AcuSail** is in normal mode (displaying the real time) when a 'time save' event occurs, the unit's display will automatically freeze, in order to give you enough time to manually note down both the **AcuSail** display and the associated boat number(s). Once the 'freeze' period has elapsed, **AcuSail** will return back to displaying the real time.

The 'freeze' duration can be altered (or indeed disabled) by your Club Programmer (five seconds is the default, thirty seconds is the maximum). To indicate that the clock is still running whilst the time is 'frozen', the decimal point between the 'MIN' and 'SEC' digits will continue to flash each second.

If **AcuSail** is not displaying the real time when a 'time save' event occurs (for example if you are in memory mode - looking at a previously stored time), the display does not alter to show the new saved time (to avoid confusion). Regardless of this, the new time is always saved for later viewing/retrieval.

AcuSail shows times to the nearest $1/10^{\text{th}}$ of a second but, to keep the power consumption to a minimum, the $1/10^{\text{th}}$ of a second digit is only displayed for saved times. If your club does not require this level of accuracy, you may find your Club Programmer has disabled the $1/10^{\text{th}}$ of a second digit altogether.

As each time is saved, it is given an event type (Horn, Save etc) together with a unique four-digit number.



In the above example, the recorded time was a sequence-controlled horn, event #001, which occurred during sequence/race #1. If the next event to happen was you pressing the horn button, the result would be 'MHrn 1002', meaning a manual horn, event #002, during sequence/race #1.

Whilst at first glance this may seem quite complicated, there is actually a fairly simple logic to the entire displayed message;

The top line of the text display contains one of five key words (dependant upon the action that caused the time to be saved).

*Horn, Aux and HnAx are all associated with times saved automatically by **AcuSail** (as part of a sequence). 'Mhrn' will be saved each time you press the manual *Horn* button and 'Save' will be recorded when you press the *Save Time* button.*

***AcuSail** has two 'horn' outputs the second of which we refer to as an 'Aux output' (and can only be used as part of a sequence). 'Aux' and 'HnAx' are saved/displayed when this output is triggered (either singularly – 'Aux' or in combination with the main Horn output - HnAx).*

The first digit of the bottom text display only changes when you start a completely new sequence/race. This visually groups a set of race times together (as they will all start with the same number). Although, due to display space limitations this can only be a single digit, **AcuSail** 'knows' that once the display has advanced from 9 to 0 you are actually running your tenth sequence/race of the day (and so on for the next multiple). When transferring data to a PC, **AcuSail** restores the '10s digit' and sends this information as a two-digit number - 01-99.

*The sequence number is only reset after the unit is powered down and a different date (to the last time the unit was used) is entered. If, for example, you power down **AcuSail** at lunchtime and then restart the unit later in the afternoon (I.E. with the same date), the sequence number will increment from where you left off.*

The right-hand three digits of the bottom text display increment with each save, so that each saved time has a unique number within any sequence. This number is reset whenever a new sequence is started.

Once you get the hang of how **AcuSail** stores times, you may find it sufficient to manually record boat numbers against the unique four digit number generated during each sequence (rather than recording the actual time). This is generally more efficient when later collating the information on a PC.

Manually Retrieving Times

When at least one race time has been stored in memory you can view it (and any others that are stored) by pressing the *Mode* button once (which switches you to memory mode). **AcuSail** will beep to indicate the mode change.

*If a sequence is running and a horn is about to sound, **AcuSail** will not change to memory mode (to avoid confusion over flag timing).*

Once in memory mode, **AcuSail** will start by displaying either the most recently stored time or the last stored time you looked at (whichever is the most recent of the two).

Use the *Up* and/or *Down* button(s) to move to later or earlier race times. Holding either button will cause the stored data to change repeatedly. Holding both buttons together will increase the repeat rate (the first held button determines the direction of change).

AcuSail will automatically wrap the displayed data; going past the last stored time will take you back to the first stored time and vice versa.

*If **AcuSail** is in memory mode (displaying a stored time) when a 'time save' event occurs, the display does not alter to show the new saved time (to avoid confusion). Regardless of this, the new time is always saved for later viewing/retrieval. In contrast, if a sequence is running when **AcuSail** is in memory mode and a horn event becomes due, **AcuSail** will immediately exit the memory mode in order to display the event countdown.*

To manually exit from memory mode press the *Mode* button (a confirmation beep will sound). Alternatively, **AcuSail** will automatically return to displaying the real time if left idle on a stored time for greater than the 'mode' time.

The automatic 'mode' switching time can be altered by your Club Programmer (ten seconds is the default, five seconds the shortest display period and thirty seconds is the maximum).

*In order to prevent user errors, it is not possible to look at stored times from different race days manually. To download and look at retrospective timing data you will need to link **AcuSail** to a PC and follow a special procedure.*

Changing the Sequence

AcuSail has ten user-programmable sequences (numbered 0-9).

To select a new sequence you must first be in normal mode (displaying the real time). You then need to hold the *Select* button for at least three seconds.

*If a sequence is running and a horn is about to sound, **AcuSail** will ignore your request to change the sequence until after the horn has sounded. If you are setting a sequence whilst one is already running and a horn event becomes due, **AcuSail** will immediately exit the sequence setting mode in order to display the horn event (I.E. any incomplete sequence change request will be ignored).*

Once your request to change the sequence has been acknowledged, **AcuSail** will beep and display 'SEt SEq' in the time display area (as a clear indication of what you are about to do). The current active sequence will be displayed in text display area.

Use the *Up* and/or *Down* button(s) scroll through the available sequences. Holding either button will cause the sequence information to change repeatedly. Holding both buttons together will increase the repeat rate (the first held button determines the direction of change).

When the sequence you require is showing in the text display, you can store it as the current sequence by holding the *Select* button again for three seconds. Once this time has elapsed, **AcuSail** will beep (to confirm your action) and revert to normal mode (displaying the real time), at which point you can release the *Select* button. Holding the *Select* button for less than three seconds does nothing.

You can exit the sequence setting mode at any time, by pressing the *Mode* button (a beep will sound). Alternatively if you do nothing for five seconds **AcuSail** will exit the mode (without saving any change) automatically.

To stop inadvertent sequence changing, your Club Programmer may have disabled the 'hold to change sequence' ability of the Select button. If this is the case only the Club Programmer will be able to change the sequence.

Linking Sequences Together

If you change the sequence whilst a sequence of a set length (I.E. one with an end) is running, **AcuSail** will run the first sequence until it completes and then seamlessly continue to the new sequence.

A couple of examples of where you might find this useful are;

- You have a set length sequence containing a standard number of starts appropriate to the classes of your club, onto which you can add 'on the fly' a further sequence to cope with any false start(s) that might (and will!) occur.
- You want to run a 'call to order' sequence prior to your standard start sequence.

Obviously if the sequence currently running is not of a set length (I.E it is an infinite loop), **AcuSail** will not move to the new sequence until the current sequence is manually stopped and the *Run Sequence* button is pressed again.

*If you run one sequence into another (without stopping), **AcuSail** will not increment the sequence/run display digit (which groups race times together) when the second sequence starts, as linked sequences are deemed to be one race.*

Transferring 'Real Time' Data to a PC

Assuming you have correctly connected your PC to the **AcuSail** remote socket (refer to the appendix for connector pin-out information) and your *Club Programmer* has not disabled this facility, every time an event is saved to the **AcuSail** memory, it is also output from the remote socket via RS232.

Refer to the appendix for details of the file formats and transmission protocols used to transmit data to the PC.

Your Club Programmer will have chosen a communication format appropriate to the way your Club processes race results.

Transferring Current Day Stored Data to a PC

In addition to the real time data transfer method of passing information to your PC covered above, groups of times or indeed a whole day's racing results can be transferred to your PC in a single action.

It's even possible to further breakdown the stored timing data into times recorded when a horn sounded, times recorded with the *Save Time* button or a combination of both. This flexibility enables you to strip out class lap timing data from general times (so you can process the lap times separately).

To transfer stored data to your PC you must first be in normal mode (displaying the real time). Refer to the following table to ascertain which button(s) you then need to hold to achieve the data you desire;

<u>Button Combination</u>	<u>Resultant Data</u>
<i>Up</i>	Sequence/Race Horn Times
<i>Down</i>	Sequence/Race <i>Save Time</i> Times
<i>Up + Down</i>	Sequence/Race Horn + <i>Save Time</i> Times
<i>Up + Select</i>	Entire current day Horn Times
<i>Down + Select</i>	Entire current day <i>Save Time</i> Times
<i>Up + Down + Select</i>	Entire current day Horn + <i>Save Time</i> Times

Hold the correct combination of button(s) for at least three seconds, after which **AcuSail** will give a confirmation beep and commence the data transfer. Once the confirmation beep has sounded you can safely release the buttons.

Data is transferred oldest time first, newest time last, in the order it was saved. If a real-time 'time save' event occurs during a data transfer it will be appended to the end of the transmission rather than interrupting the data flow.

If you do not intervene, **AcuSail** considers any times saved to memory since you ran a sequence (started a race), to be the data you wish transferred under a 'Sequence/Race' transfer.

It may be however, that you wish to transfer the results from an earlier race. To do this, follow the following procedure (prior to transferring the data)...

- Change to 'memory' mode (with the *Mode* button) and select any time that falls within the past race you wish to transfer (refer to the above section, 'Manually Retrieving Times' if you do not know how to do this).
- Press the *Select* button (**AcuSail** will beep to confirm the selection) to set the saved race time as part the particular sequence you want to transfer.
- Exit 'memory' mode (with the *Mode* button).

Until you start a new sequence, **AcuSail** will now use this earlier race data (selected with the above procedure) in any Sequence/Race data transfer.

Transferring Retrospective Stored Data to a PC

AcuSail has a non-volatile memory capable of storing up to 1000 different race times, even in the absence of power. Timing data is saved in a first in, last out rolling buffer, which means that the most recently stored times always overwrite the very oldest times.

The memory is divided into racing days, of which there can be anything between one and fourteen. The more saved events your club averages in any particular day (I.E. the busier it is), the less 'old' days you are likely to have available retrospectively.

It is our estimation that even the busiest club running a full-on regatta is unlikely to store more that 350 times a day, whilst the quietest may only store 80 or so. Using these figures, the busiest club could store around two/three days racing in the 1000 event memory ($350 \times 3 = 1050$), whilst the quietest may get over twelve days ($80 \times 12 = 960$).

Whatever the size of your club, the onus is on you to retrieve old data before it is overwritten. Note that **AcuSail** will only show retrospective results where the full day's data is available; partial day results (where some of the old data has been overwritten by the latest results) cannot be accessed.

To display retrospective data, follow this specific procedure...

- Unplug the **AcuSail** battery supply and any horn(s).
- Hold the *Save Time* button and re-apply the battery supply.

- Once the '*Set Date*' message appears, release the *Save Time* button.
- Use the *Up* and *Down* buttons to cycle through the available racing dates. Holding either button will cause the information to change repeatedly. Holding both buttons together will increase the repeat rate (the first held button determines the direction of change).
- When **AcuSail** is showing the date you wish to transfer, press the *Select* button. **AcuSail** will change the text display to read 'Race Date' and give a short beep to confirm the operation.

With **AcuSail** set to a particular date, you can transfer the information to your PC as described earlier (refer to the above section, 'Transferring Current Day Stored Data to a PC' if you do not know how to do this).

Note that if you wish to repeat this procedure (to access another set of stored results), you can hold the *Save Time* button for three seconds (rather than removing the battery supply) to get the 'Set Date' message to re-appear.

Once you have finished with your data transfer(s), you will need to unplug the **AcuSail** battery supply and then re-apply the battery in order to get the unit to operate normally.

Section 3 – Programming

*This section is aimed at the person within your club who will be responsible for programming how **AcuSail** operates - the 'Club Programmer'.*

Entering the Club Programmer Password

As shipped, **AcuSail** employs a six-digit factory set numeric password to protect both the variable system settings and the sequences from modification by unauthorised users. Whilst it is possible to deactivate this protection, we strongly recommend you leave it in place to avoid inexperienced users altering settings they do not understand.

To enter either of the programming modes, follow this specific procedure...

- Unplug the **AcuSail** battery supply and any horn(s).
- Hold either the *Mode* button (to access the system variables) or the *Select* button (to access the sequences) and re-apply the battery supply.

In either case (assuming that password protection has not been removed) you will now need to enter the Club Programmer Password to get any further.

*You can exit from any of the programming routines by holding the Horn button for at least three seconds. **AcuSail** will beep and perform a normal power-up start.*

Setting the password requires you to set three, two-digit values. You will first be prompted to 'Pass SetH'. The relevant digits will flash to indicate the current value.

Use the *Up* and/or *Down* button to set the desired value. Holding either button will cause the value to change repeatedly. Holding both buttons will increase the repeat rate (the first held button determines the direction of change).

Once you have set the desired high value, press the *Mode* button to move to 'Pass SetM'. Repeat the setting procedure to set the correct value.

Finally, press the *Mode* button again to move to 'Pass SetS' and set the correct value.

If you now press the *Mode* button once more, you will move back to 'Pass SetH'. (Allowing you to loop around the entire setting procedure).

When the password is correct, press the *Select* button to move to the next menu. If the password is incorrect, **AcuSail** will abort the programming mode and perform a normal power-up start.

*If you cannot remember your password (it will be on your purchase invoice) you will have to contact **jwp**. Passwords are factory set and cannot be changed (they contain a specially encoded serial number for each unit).*

Setting System Variables

To enter the System Variable setting mode, follow this specific procedure...

- Unplug the **AcuSail** battery supply and any horn(s).
- Hold the *Mode* button and re-apply the battery supply.
- Enter the Club Programmer Password (if prompted) - (refer to the above section, 'Entering the Club Programmer Password' if you do not know how to do this).

Assuming your password is valid, you will now be in the correct mode, if not, **AcuSail** will abort the current mode and perform a normal power-up.

The following table lists all of the options that can be altered and the range of settings you can choose;

<u>Text Prompt</u>	<u>Time Display</u>	<u>Default</u>	<u>System Parameter/Meaning</u>
'UKUS Date'	Sample Date	UK	UK or US style date format?
'1224 Time'	12 or 24	24	Is default time format 12 or 24 hr?
'Time SRst'	Y or N	Y	Holding <i>Select</i> resets time?
'Time to12'	Y or N	N	Time resets to 12 or current time?
'Frze Time'	0-30 (sec)	5	Display 'Freeze' time on data save
'1/10 Digi'	Y or N	Y	Is 1/10 th Sec Digit displayed?
'Mode Time'	5-30 (sec)	10	Time before 'normal' mode restore
'User Seq#'	Y or N	Y	Can user set a sequence number?
'Live Seq#'	0-9	0	Current live sequence number
'Coms Frmt'	1-2	1	Comms Format (see appendix)
'Coms CDly'	0 to 90 (mS)	0	Comms chr delay (see appendix)
'Coms LDly'	0 to 90 (mS)	0	Comms line delay (see appendix)
'Real TiTx'	Y or N	Y	Real time Data Transfer enabled?
'Aux+ Horn'	Y or N	N	Aux & Horn can be used together?
'SeqX Lock'	Y or N	Y (0-4)/N	Is SeqX Locked? (where X=0-9)
'Syst Pass'	Y or N	Y	Password needed for Variables?
'Seq Pass'	Y or N	Y	Password needed for Sequences?

In each case, you can alter the setting of the variable currently on display by using the *Up* and/or *Down* button.

To move to a different variable press the *Mode* button.

Once you are happy with all the modifications you have made, hold the *Save Time* button for at least three seconds. This deliberate action confirms your wish to store your changes semi-permanently in the non-volatile memory. **AcuSail** will beep, display the message '*Data Save*' and, once the data is stored, perform a normal power-up start.

*You can exit the system variable setting mode at any point (without saving your changes) by holding either the Run Sequence or Horn buttons for at least three seconds. **AcuSail** will beep and perform a normal power-up.*

Creating a Sequence

AcuSail has ten user-programmable sequences (numbered 0-9), any or all of which can be used to store a custom-timed event sequence, tailored to your club's requirements. Each sequence can have up to 50 individual steps and has a four-character user-programmable name as an aide memoir.

Sequences can be either an infinite loop (where, once started, a particular set of events is repeated continually until the user intervenes) or a set length (where, once all the events have been completed, the sequence comes to an end on it's own).

Sequence Elements

Sequences are made up of a combination of eight different elements;

<u>Display</u>	<u>Meaning</u>	<u>Valid Values</u>
<i>Wait</i>	A Wait (in silence)	From 1sec to 59min 59sec in 1 sec steps
<i>Horn</i>	A Horn is sounded	From 1/2 sec to 7 sec in 1/2 sec steps *
<i>Aux</i>	An Aux event	From 1/2 sec to 7 sec in 1/2 sec steps *
<i>HnAx</i>	A Horn & Aux event	From 1/2 sec to 7 sec in 1/2 sec steps *
<i>Loop</i>	The start of a loop	
<i>LpXX</i>	The end of a loop	XX= 00 (infinite) or 01-31 (#of passes)
<i>Beep</i>	A Beep Countdown	From 1 sec to 16 sec in 1 sec steps
<i>STOP</i>	The sequence end	

* Whilst Horns and/or Aux outputs can be sounded at 1/2 second intervals, the actual step lasts till the next complete second. For example, a 3 1/2-second Horn step would comprise a 3 1/2-second blast followed by a 1/2-second of silence (4 seconds in total).

Each element you use takes one step in the sequence, with the exception of a wait time, which requires two steps for any length above 59 seconds.

Whatever the makeup of a sequence, it will always start with a ten-second beep count (which, since it cannot be changed, we call step#0).

From step#1 onwards **AcuSail**, intelligently evaluates the preceding step when deciding the valid options for the current step you are programming. This results in a selective offering of the above sequence elements, determined by what is appropriate at each step. You will not, for example, be offered the option to insert a *Wait* immediately after a *Beep* count (as you would not want a count down to a period of silence) or be allowed to start a second looped section without ending the first (loops cannot be nested).

Within this structure, it is possible to generate wait times that are longer than the maximum for a single step (59m 59s) by either combining two adjacent sequence steps (to produce the total duration needed) or using the *Loop* function to run a *Wait* element a number of times.

A Sequence Example

Shown in the table below is the factory-programmed data for sequence '0', which is supplied with **AcuSail** when you first get the product and is set as the default sequence ('Seq0').

This is a continuously looping five-minute sequence conforming to the RYA racing rule 26 (Hence the aide memoir used - 'R26L' - Rule 26, looping);

<u>Step</u>	<u>Seq</u>		<u>Time</u>		<u>Dur</u>	<u>Action</u>	<u>Meaning</u>
0	<i>Beep</i>	↓	-00:10		00:10	Beep Count	
1	<i>Horn</i>	↓	00:00		00:03	Horn (3 sec)	Class Flag @ 5
2	<i>Loop</i>		00:03		00:00	Loop Start	Repeat till end
		↶ ↷					
3	<i>Wait</i>	↓	+0:03	↶	00:47	Wait (47 sec)	
4	<i>Beep</i>	↓	+0:50		00:10	Beep Count	
5	<i>Horn</i>	↓	+1:00	↑	00:03	Horn (3 sec)	Prep Flag @ 4
6	<i>Wait</i>	↓	+1:03		02:47	Wait (2m47s)	
8	<i>Beep</i>	↓	+3:50	L	00:10	Beep Count	
9	<i>Horn</i>	↓	+4:00	O	00:03	Horn (3 sec)	Prep Flag @ 1
10	<i>Wait</i>	↓	+4:03	P	00:47	Wait (47 sec)	
11	<i>Beep</i>	↓	+4:50		00:10	Beep Count	
12	<i>Horn</i>	↓	+5:00		00:03	Horn (3 sec)	Class Flag(s) @ 0/(5)
13	<i>Lp00</i>	↓	+5:03	↷	00:00	Loop End	Loop 00 times (I.E. Infinitely)
		↶ ↷					

Note that no *STOP* element is needed in this case, as the Loop is infinite.

Please take a little time trying to understand the above table, as it uses a good selection of the main timing elements that are available to you and shows exactly how **AcuSail** processes a sequence. To construct your own sequences you will need to fully grasp the concepts shown here.

Entering Sequence Programming Mode

To enter the Sequence Programming mode, follow this specific procedure...

- Unplug the **AcuSail** battery supply and any horn(s).
- Hold the *Select* button and re-apply the battery supply.
- Enter the Club Programmers Password (if prompted) - (refer to the above section, 'Entering the Club Programmer Password' if you do not know how to do this).

Assuming your password is valid, **AcuSail** will beep and change the display to read 'Seq Pro' in the time display area, with the current active sequence displayed in text display area. If your password is invalid, **AcuSail** will abort the Sequence Programming mode and perform a normal power-up.

Choosing the Sequence Number

As soon as the 'Seq Pro' message is displayed, you can use the *Up* and/or *Down* button(s) to access the sequence you wish to programme, by scrolling through the available sequences (don't worry about the current name at this point, just choose the correct sequence number (Seq0-Seq9)).

As you scroll through the sequences you will see that any protected (locked) sequences will have their name replaced with 'LOCK' (refer to the above section 'Setting System Variables' for more information). You will not be able to programme these sequences without first removing the protective lock.

When the sequence you require is showing in the text display, press the *Select* button to accept it. **AcuSail** will beep to confirm your action and the first character of the sequence name will now start to flash.

If you tried to select a locked sequence, your button press will have been ignored. Remove the relevant lock prior to attempting this exercise.

Setting the Sequence Name

Once the first character of the sequence name is flashing, you can use the *Up* and/or *Down* button(s) to access a suitable letter/number/graphic from the available font options.

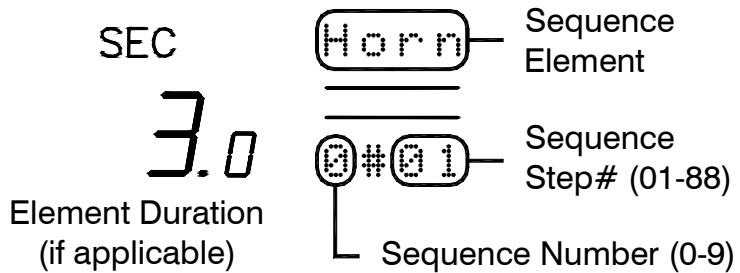
Holding either button will cause the value to change repeatedly. Holding both buttons will increase the repeat rate (the first held button determines the direction of change).

To move to the next display character, press the *Mode* button. Pressing the *Mode* button when you are on the last character will return you to the first.

Once you are happy with the sequence name press the *Select* button. **AcuSail** will beep to confirm acceptance and move you to the first step of the sequence you are about to programme.

Programming a Sequence Element

The diagram on the right shows a typical sequence step as presented by **AcuSail** during sequence programming.



In this example you can see that step#01 in sequence 0 is currently a 3 second horn (we've lifted this from the earlier 'R26L' sequence example).

Pressing the *Mode* button will move you in a cyclical fashion round the three display/data areas. You will move from the Step#, to the Element Duration and then to the Element Type. A further press of the *Mode* button will take you back to the Step# once again. In each case, the current active area of the display will flash.

If the element on display is either a STOP or a LOOP you will simply move back and forwards between the Step# and the Element Type (neither a STOP nor LOOP start have a duration or a number value).

Once the area you wish to look at/modify is active, you can change the value using the *Up* and/or *Down* buttons. If you do this whilst the Step# is active, you can go backwards and forwards through the sequence.

AcuSail will only show you the full fifty steps of a sequence, if you have not programmed a STOP or Lp00 (an infinite loop) at any point in the sequence. All elements after a STOP or a Lp00 are deemed irrelevant (as they have no effect on a sequence).

*If you use every sequence step, **AcuSail** will automatically stop after the 50th step. Any unclosed Loop will be ignored.*

Once you have changed the value of any step in the sequence, you must press the *Select* button if you want to store the change. **AcuSail** will beep to acknowledge the change and automatically take you to the next sequence step.

If you move to another step without pressing the Select button (by say moving through the sequence with Up and/or Down) your change(s) will be ignored.

Testing the Sequence and Saving

When you have entered your sequence, **AcuSail** allows you to debug and test it without leaving the sequence-programming mode.

To do this, you simply run the sequence exactly as you would normally (using the *Run Sequence* button).

You will notice that in this 'debug' mode, the clock displays the elapsed time from step#01 (as opposed to the 'real' time) and, where appropriate, the sequence step remains on display as a guide to your sequence position.

To stop the sequence (again as you normally would), hold the *Run Sequence* button for three seconds. Once stopped, you can continue to make changes and correct any timing/element errors.

When you are sure you have everything correct, to commit the sequence to the non-volatile memory, you must hold the *Save Time* button for at least three seconds. This deliberate action confirms your wish to store your changes. **AcuSail** will beep, display the message 'Data Save' and, once the data is stored, perform a normal power-up start.

*You can exit the sequence-programming mode at any point (without saving your changes) by holding the Horn button for at least three seconds. **AcuSail** will beep and perform a normal power-up.*

Restoring the Factory Defaults

To restore the Factory Defaults, follow this specific procedure...

- Unplug the **AcuSail** battery supply and any horn(s).
- Hold both the *Mode and Select* buttons and re-apply the battery supply.
- Enter the Club Programmer Password - (refer to the above section, 'Entering the Club Programmer Password' if you do not know how to do this).

If your password is valid, the factory defaults will then be reloaded ('Data Save' is displayed to indicate this), if not, **AcuSail** will abort the current mode and perform a normal power-up.

This procedure resets all of the system variables back to their Factory Default states (as they were when the product was first shipped to you) and overwrites sequences 0-4 inclusive. Sequences 5-9 are not overwritten. Once the settings have been reset, **AcuSail** will perform a normal power-up start.

*You can exit the factory default setting mode at any point (without saving your changes) by holding the *Run Sequence* or *Horn* buttons for at least three seconds. **AcuSail** will beep and perform a normal power-up.*

Appendix

Connectors and Pin-outs

AcuSail uses Bulgin Buccaneer® standard series connectors for all connections to and from the unit. These connectors are robust and waterproof (to IP68). Each pin within the connector has a screw terminal (you will need a small flat-headed screwdriver to wire up your own cable).

In order to disassemble a connector, you can use the protective cap that covers the *Remote Control* socket (when not in use) as a form of ‘spanner’.

12V-24V DC Input

The Battery input requires a two-pin cable-mount male connector, which is supplied with your **AcuSail** unit. The pins are assigned as follows;

Pin ‘L’	Battery Positive
Pin ‘N’	Battery Negative

Although **AcuSail** is fully polarity protected (to prevent any issues arising from faulty wiring), you must ensure that the voltage applied to this socket never exceeds 36 Volts DC.

*Unless you have set **AcuSail** (internally via JMP1) to have an isolated Horn output, the incoming voltage is switched to the Horn/Aux output. In normal operation, if you are using a 12V battery, you should employ a 12V Horn.*

Horn Output (Standard version)

The Standard *Horn Output* requires a three-pin cable-mount female connector, which is supplied with your **AcuSail** unit (if you have this output version). The pins are assigned as follows;

Pin ‘L’	<i>Horn Output</i> (switched battery positive or closure)
Pin ‘N’	Common (battery negative or closure)
Pin ‘E’	<i>Aux Output</i> (switched battery positive)

Internally, you can jumper-link select (via *JMP1*) whether the main relay (controlling the *Horn Output*), switches the incoming positive battery supply to the ‘L’ Pin (factory default) or whether the ‘L’ and ‘N’ pins are a completely isolated switch closure. If the later is the case, the Aux Output is redundant (there is no common battery negative in this case).

Both outputs are each internally fused at 10A, which is the maximum that **AcuSail** can switch, either per output or in total.

A (default) software setting prevents both outputs switching together (your *Club Programmer* can change this if you are absolutely sure that you will not exceed the total load limit).

If you require to switch Horns with a higher current than 10A, you will need to arrange an external relay box (or purchase our optional high-power - 32A relay unit). See later in this appendix for wiring information.

Horn Output (Dual Output version)

The 'special' dual output version *Horn Output* requires a four-pin cable-mount female connector, which is supplied with your **AcuSail** unit (if you this output version). The pins are assigned as follows;

Pin 1	<i>Horn Output</i> (switched battery positive or closure)
Pin 2	Common for <i>Horn Output</i> (battery negative or closure)
Pin 3	<i>Aux Output</i> (switched battery positive or closure)
Pin 4	Common for <i>Aux Output</i> (battery negative or closure)

Internally, you can jumper-link select (via *JMP1/2*) whether each output receives the incoming positive battery supply (relay switched) or is a completely isolated switch closure. If applicable, one output can be isolated whilst the other is a switched battery supply (they are completely independent).

Both outputs are each internally fused at 6A, which is the maximum that a four-pin Buccaneer® standard series connector can support.

A (default) software setting prevents both outputs switching together (your *Club Programmer* can change this if you are absolutely sure that you will not exceed the total combined load limit of 10A).

Remote Control Socket

The Remote Control socket requires a six-pin cable-mount male connector. The pins are assigned as follows;

Pin 1	Logic +5V (100mA max)
Pin 2	Logic Ground (OV)
Pin 3	<i>Save Time</i> Remote Switch Input
Pin 4	<i>Horn</i> Remote Switch Input
Pin 5	Aux Tally (@ RS232 levels)
Pin 6	RS232 Output

Pin 1 is a (100mA resetable fused) +5V Logic supply for powering of additional external Logic and for use by simple external switches.

Pin 2 is the Logic Ground. Internally, you can isolate this Ground from the main battery negative by removing jumper-link *LK1*.

Pins 3 and 4 are remote control lines that duplicate the *Save Time* and *Horn* switches. These lines are not directly connected to the internal switches and are processed separately. To get these lines to function they should be connected to Pin 1, or to a PC at RS232 levels (where Logic + = active).

Pin 5 is a direct 'Tally' (copy) of the Aux Output at RS232 levels (+/-12V - where Logic - = active). It is possible to disable the Aux relay output (by removing internal jumper-link *LK2*) and to use this output to trigger a PC (with custom software). Contact **jwp** for more information on this specialist application.

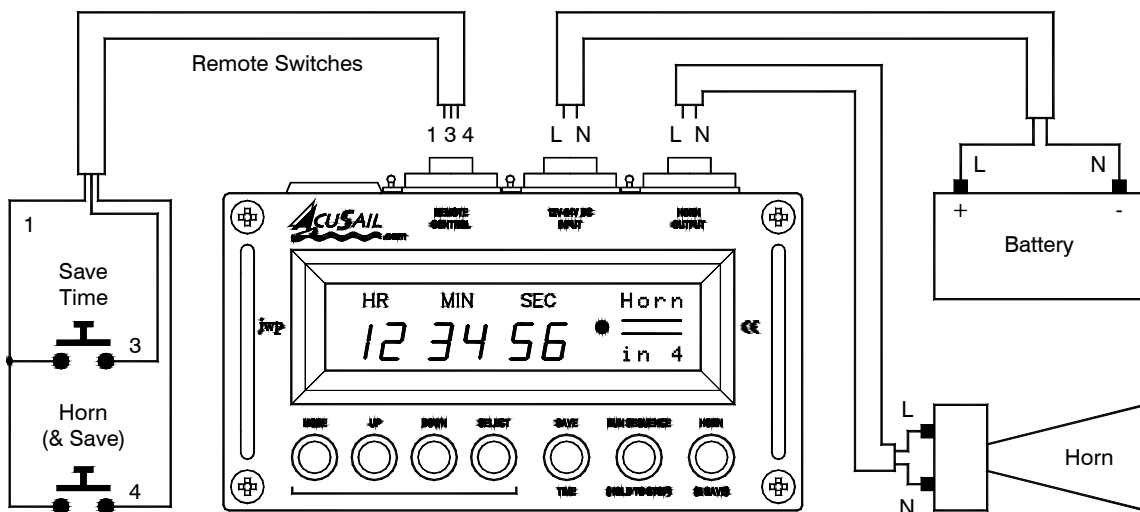
Pin 6 is the RS232 output for transferring timing data to a PC.

Connectors on Optional Items

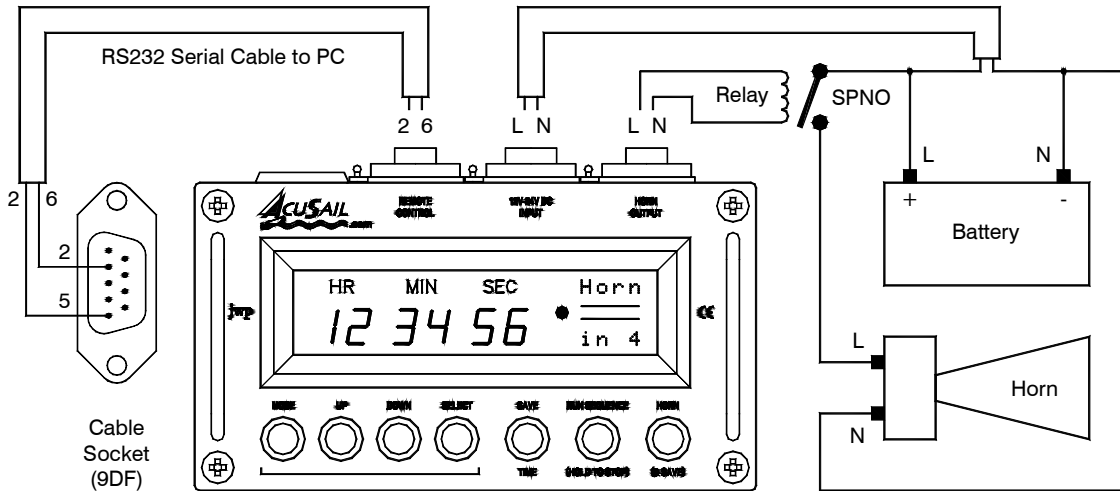
The above pin-outs are standard for the entire **AcuSail** system. Although our high-powered relay unit uses Bulgin Buccaneer® 900 series connectors, (for the higher 32A rating they offer) the actual pin connections are named identically to those used on **AcuSail**.

All accessories that bolt directly to the main **AcuSail** unit (Horn Unit/Battery Unit/Relay Unit) are supplied with integral cables (flying leads) which plug directly into the relevant sockets.

Typical Wiring Diagram (Horn <=10A)



High-powered Horn Wiring Diagram



*As an alternative to undertaking this wiring yourself, a high-powered (32A) relay unit, providing all of the necessary connectivity shown in this diagram (excluding the RS232 PC connection), is available. This accessory is supplied in a similar box to **AcuSail**, is splash proof (to IP65) and bolts underneath the main **AcuSail** unit.*

Data Transfer

Baud Rates and Timing

AcuSail serial data is 8 bit and is transmitted to a PC at 9600 baud, with no parity and with one stop bit. CTS/DTR/RTS/DSR and other handshaking lines are not implemented.

Should character over-run occur on the receiving PC, it is possible to insert a 0-90 millisecond (in 10mS steps) inter-character delay by altering the 'Coms CDly' system variable. In addition to this, the 'Coms Ldly' performs the same function at the end of each full line. Refer to the above section 'Setting System Variables' for details on how to change these values (default 0mS).

File Protocols

The file protocol used for PC transfer is selected by altering the 'Coms Frmt' system variable. Refer to the above section 'Setting System Variables' for details on how to change this value (default 1).

Irrespective of the chosen protocol, all transfers utilise delimited data, with each saved time transmitted on a separate line (terminated with a carriage return/line feed).

The following examples illustrate the communications formats available. In each example the data presented describes the same event - a Horn sounded at precisely midday on the 1st of January 2002;

Coms Frmt=1...

```
"37257.49999982"[TAB]"Horn"[TAB]"01"[TAB]"001"[CrLf]
```

This format is designed for directly importing into Microsoft Excel™.

Once you have written a data file to your PC, Excel™ should be able to open it with minimal user intervention (We have used tabs and double quotes to delimit the fields, as per the Excel™ defaults).

"37257.49999982" is the date and time in Microsoft 1900 time format. For more detail of how to decode this, refer directly to the help in Excel™.

Coms Frmt=2...

```
12,00,00,0,01,01,02,Horn,01,001[CrLf]
```

This format has a generic comma-delimited structure. The first four sets of numbers are the time (Hr,Min,Sec,10th), The next three sets are the date (DD,MM,YY or MM,DD,YY).

The transmitted date format will follow the UK/US convention as set by your Club Programmer. The 10th of a second information will always be present (even if AcuSail is set to not display this data).

In both cases above, *Horn* describes the timing event which caused the data to be saved (this could be *Horn*, *HnAx*, *Aux*, *Save* or *Mhrn*), *01* is the sequence/race number and *001* is the three-digit number assigned to each timing event (Refer to the earlier section 'Saving Times' for more information).

Default Sequences

All of the ten available user-programmable sequences (0-9) are supplied factory programmed with data (which can be overwritten as required).

As covered earlier, (refer to 'A Sequence Example') *Seq0* complies with Racing Rule 26 and loops continuously around a five-minute sequence.

Seq1-9 also contain a valid Racing Rule 26 sequence, but in each case the sequence lasts for 1 to 9 starts (as per the sequence number used). The name in each case is R26X – where X= 1-9.

Specifications and Guarantee

Electrical (Standard Version)

Supply Voltage (DC)	9V (min) to 36V (max), polarity protected
Supply Current (ex Horn)	85mA (avg), 180mA (peak), running RR26
Supply Current (inc Horn)	170mA (avg), 3.25A (peak), running RR26
Horn Outputs/Current	2 x 10A (cannot be used jointly @ >5A)
Horn Switching	2 x Supply voltage or 1 x isolated contact
Timing Accuracy	Better than 1/20 th of a second in 12 hours
Memory Type	8Kb EEprom; Data retention > 100 years

Mechanical

Size – AcuSail only	219mm (L) x 144mm (W) x 104mm (H)
Size – with Horn/Battery	219mm (L) x 144mm (W) x 264mm (H)
Weight – AcuSail only	1.7Kg
Weight – with Horn/Battery	5.8Kg
Water Resistance	IP65 (enclosures), IP68 (connectors/switches)

Guarantee

AcuSail and any other system components are guaranteed against electrical and mechanical failure for one year from the date of purchase. This guarantee does not cover any unit that has been subject to misuse, negligence or accident, or that has in anyway been modified without the prior consent of **jwp**.

AcuSail is designed and manufactured in the UK by The JWP Group.

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Visitors are seen strictly by appointment.

For more information on **AcuSail**, visit www.AcuSail.com (or .co.uk). You can also access the site at www.SailTimer.com (or .co.uk).