

SmarT-Tator

Four Channel Record Annotators

Operation and Technical Manual

SmarT-Tator 4

(Revision 3:01 January 2008)



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Embedded Control Solutions for the high resolution Survey Industry

SmarT-Tator 4 Operation and Technical Manual

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System overview

The SmarT-Tator system is an embedded control approach to graphic line scan recorder annotation.

The System achieves a simple standard "Windows PC" interface to most of the analogue line scan Recorders currently operating within the high resolution survey industry. The annotation output is simply connected in a "T" across the input signal to the line scan recorder.

The System is built around a low cost micro processor controlled hardware interface unit, The interface unit in the SmarT-Tator 4 system contains four separate channels of annotation capability. Each channel has its own trigger input , The trigger input will accept standard TTL pulses or isolated closures.

The entire system comprises of the 1U 19inch rack mounted interface unit with a standard "Windows PC" Program controlling the unit via a standard serial cable (wired one to one) between the PC and Interface unit. There is a second serial port required for the Navigation input strings.

For PC's that lack serial port capability, a dual port USB to Serial Converter box is supplied with each system.

Simple windows set up's with an easy to use GUI program ensure the system will be capable of rapid set up and quick operation together with the addition of non volatile EEPROM storage on each channel within the interface units, ensures that if the unit is powered down for any reason, the channel will be quickly operating at the same settings as before upon power up.

The SmarT-Tator 4 system allows printing of up to 40 characters across the line scan recorder sweep. Instant messages , with or without fix marks , Sweep Right to Left or Left to Right , Top to Bottom and Mirror image of the printed characters.

The controller PC runs the SmarT-Tator 4 PC terminal software

The SmarT-Tator 4 interface unit is powered by a 9-12v Dc wall socket type PSU.

Overall the SmarT-Tator aims to provide a very versatile (software programmable) record Annotation system designed to improve the record appearance and correlation of paper Records.

The system gives easy to set up routines for the Navigation Link and all aspects Of annotation output format to each channel, these set ups can be stored to disk using the windows Registry for quick and reliable recall.

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Technical Specifications

Power Consumption	5v Dc @ 36mA (38mA on serial transmit) (Supplied by the 9-12V DC PSU)
Print output	Full ASCII character set , Solid or Dotted line Fix marks Accepts up to 40 ASCII characters per line Fully Programmable Print Height Width Delay Adjustable Fix Mark Height
Graphics	This feature has been discontinued (3:01 Jan 2008)
Annotation output	5V DC level fixed via Analogue switch both sides switched (Maxim Dual Switch 323)
Trigger Input	5 to 18v level positive or negative going. Polarity is software independent (falling edge detection) Minimum trigger width = 1 micro seconds
RS232 IN	Accepts Data at 19200 baud 8 Data No Parity 1 Stop Tri-States Transmit to Host allows multiple channels to talk on one line.
RS232 OUT	Not Used in Ver 3:01 Jan 2008
SET UP	By fast software command via the serial link

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Connecting up the System

Rear Panel view of SmarT-Tator 4

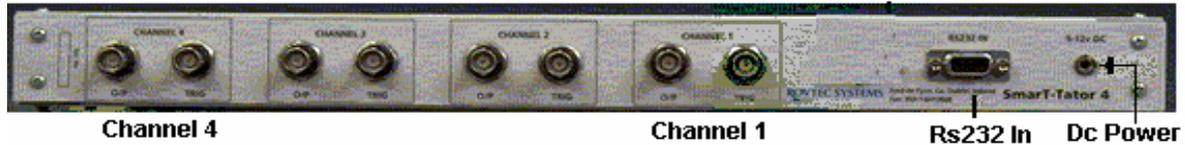


Figure 1

Figure 1 shows the rear panel of the SmarT-Tator 4 interface unit

Connect the standard 3.5 mm plug from the PSU into the far right hand 3.5 mm power socket.

RS232 IN CONNECTION:

Connect the standard 9way D plug to 9 Way D plug (one to one) serial cable from the controller PC To the RS232 Input Socket on the rear panel.

CHANNEL OUT SOCKETS:

Connect the channel OUT BNC to the appropriate line scan recorder Analogue Signal input connection The annotation out put from each channel is applied across the input signal to the line scan recorder by means of a standard BNC "T" connector.

CHANNEL TRIG SOCKETS:

The TRIG (Trigger Input) BNC socket must be connected to the appropriate trigger source for the particular Line scan recorder being annotated.

The Unit is now ready for switch on, after the unit has been switched on run the SmarT-Tator 4 PC package supplied with the system in order to set up the four Channels for correct operation. Connect the Serial Link to the vessels navigation System and proceed to set up the navigation link within the software package.

The system is now ready to annotate.

NB: If there are no Com ports on the PC on which you intend to run the software, Please install the drivers for the USB to serial Converters prior to inserting the devices Or installing the SmarT-Tator4 PC package.

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System hardware Components

Interface unit:

A standard 19 inch rack mount enclosure (1U high) contains the 4 channel microprocessor controlled annotator circuitry, each channel is connected across a common RS232 port, and all units receive the same data sent by the PC controller software. The channels each have two LED's one GREEN to show annotation output and the other RED to show it is waiting on an external trigger, if the RED Led is on all the time there are no detected external triggers applied to the channel.

Cables:

The SmarT-Tator4 interface Unit is connected to the controlling PC using a standard Serial 9 Way D to 9 Way D cables.

This is a standard serial cable (wired one to one 9 ways male to 9 ways female)
 The system is shipped with a 3 meter long lead to facilitate installation on board a vessel.
 The Navigation lead must be supplied by the user and if coming from another computer must naturally have a twist in this cable to ensure data reception on the SmarT-Tator PC com port.

Trigger leads are BNC supplied to each channels external trigger input, from each of the line scan recorder units trigger sources.

Output leads are BNC wired to a simple "T" across the signal inputs of the line scan recorders.

PSU:

The System is powered by a standard AC wall adapter type DC Power supply.
 The Supply should be at least 9V DC and with a Maximum output of 18VDC and be capable Of delivering at least 60mA. It is preferred to have a stabilised supply rather than an unregulated one.

USB Serial Converter:

For PC's Laptops where there is no Serial com ports provided, the SmarT-Tator system comes with a dual USB to Serial converter unit complete with its own windows driver CD
 Please ensure the driver is installed and hardware attached to the PC prior to installing and running The SmarT-Tator4 PC software package..

OVERALL SYSTEM LAY OUT

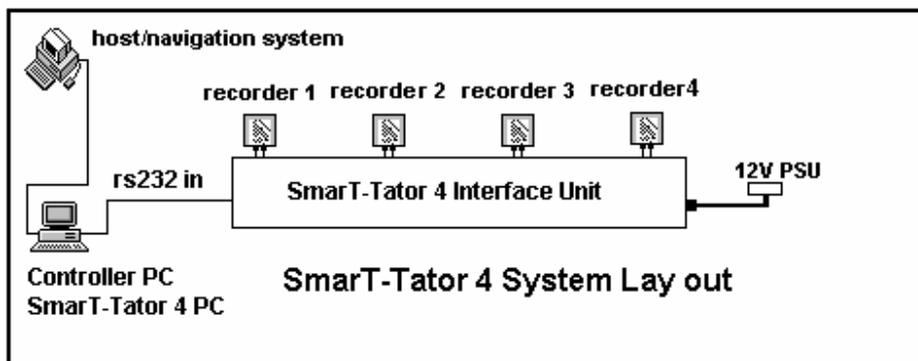


Figure 2 System Layout

SmarT-Tator 4 Operation and Technical Manual

SmarT-Tator 4 PC Software Package Overview

The Following sections of this Manual serve to provide an overview of the system software That runs the SmarT-Tator record annotation system,

It should be read in full before attempting to operate the PC Software.

The Software package provided to run SmarT-Tator 4 is a Windows PC terminal type program which manages monitors and controls the four channels Within the SmarT-Tator interface unit

The PC software maintains two serial communications lines:

- One to the Vessels Navigation System
- One To the SmarT-Tator 4 interface unit.

NAVIGATION LINK SET-UP

The Navigation Link is set up simply by selecting various groups of information found within the serial string being sent by the navigation system, , it must first be stressed that it is entirely up to the Surveyor or Engineer setting up the system to ensure that **ALL THE INFORMATION** that will be required is sent over on the navigation string, once the information required is contained within the string , the SmarT-Taor4 PC setup allows each individual channel to be annotated with particular pieces of information as and when the user requires.

Once the Navigation Link has been determined , the precise location of each of these various defined groups of information contained within the string coming from the navigation system are stored , each time navigation serial strings arrive at the PC the parameters are parsed from the incoming string.

The most important setting for the Navigation link is the **LENGTH** of string expected from the navigation system.

The **LENGTH** setting is critical as the whole interface is based on the expected number of characters arriving on the Navigation serial port. Nothing happens unless the exact length of the string is entered correctly.

So for example if the surveyor reckons the total length of the string is 84 characters, then enter 84 for the navigation string length in the SmarT-Tator4 PC navigation setup.

(NB: "CR" "LF" string termination characters are not counted)

Channel SET- UP

SmarT-Tator 4 channels are set up with their parameters from stored defaults for each channel; once they are initialised to the stored default parameters the system is ready to print annotation on demand. SOL EOL Messages quick messages etc. etc.

The sequence and format of each units output annotation can be set and stored to Disk as the "**OUTPUT STRING SET UP**" this button can be found on the "REMOTE Channels" Form under **SET UPRemote Channels** menu

The individual parameters that can be set to each Channel are as follows:

Print Height, Width, and Print Delay

Bit-Time in micro Sec's (the bit output rate in micro seconds)

Sweep time of the recorder in milliseconds (affects print width and size)

Fix Mark, height, Solid or Dotted Line (Solid Default)

Print Fix Every 1 or Print Fix every "n" fixes,

Annotation direction, L to R, R to L, Upside down, or even mirror image.

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SmarT-Tator PC Software Package Overview

OUTPUT FIX STRING SET-UP

The setting of the precise order of what information gets printed to what channel and where within each fix mark annotation string is possible with output string set up

The full string that is sent to the individual channel at annotation event time is divided into eight groups, there are also eight definitions of different navigation data groups available, and so the individual groups that can be stored in relation to the data that is sent to each channel is as follows,

Fix String Position one, two, three, four, five, six, seven, and eight

Each position can be set to any of the following

"None"	No parameter printed	
"Fix"	Navigation Fix Number	Fix number defined in Nav String
"Time"	Navigation Time (at Fix event)	
"Vsl Posn"	Vessel Position at Fix event	
"Fish1 Posn"	Acoustic Position of Fish 1 at Fix event	can be set by user
"Fish2 Posn"	Acoustic Position of Fish 2 at Fix Event	can be set by user
"Extra 1"	User Defined	can be set by user
"Extra 2"	User Defined	can be set by user
"Extra 3"	User Defined	can be set by user

The Extra1 to Extra3 parameters can be defined to some other Navigation data group being sent by the navigation system and is user definable. These three group definitions give system flexibility for what ever type of information is present within the navigation string.

There is one further parameter stored for each channel, and that is the number of padding spaces present between each group parameter within the output string.

Each channel can print any combination of groups defined providing that the total string length to any unit is not more than 40 characters long. Units will only annotate up to the first 40 characters sent to them.

All these settings are stored on the Windows Registry within SmarT-Tator PC package.

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SOL EOL MESSAGE STRING SET UP

As well as definitions for the output fix string for each unit it is possible to Pre define START OF LINE MESSAGE STRINGS and END OF LINE MESSAGE STRINGS SOL Message strings and EOL message strings are automatically sent to all units on selection Of the user menu "Print" command. ("SOL Message" / "EOL Message"
 No Fix marks are printed, only the characters contained within the string.
 As with the Fix Output Strings both the SOL and EOL message strings are divided Into eight groups or positions:

SOL String Position one, two, three, four, five, six, seven, and eight
 EOL String Position one, two, three, four, five, six, seven, and eight

Each Group position can be set to any of the twelve following parameters

"None"	No parameter printed
"Fix"	Nav Fix Number
"Time"	Nav Time
"Line"	Line Number
"Hdg"	Line Heading
"Area"	Site Area Name
"Job #"	Job number
"Client"	Company
"Vessel"	Vessel Name
"Date"	Date
"Extra1"	User defined Navigation Parameter
"Extra2"	User defined Navigation Parameter
"Extra3"	User defined Navigation Parameter

In addition to the above, there are two further parameters stored to set The EOL and SOL message string padding space separator between the parameters. SOL EOL Strings can be set using the "**Fix Set up**" **Menu** command

The System provides the user with a simple set up screen to establish Job and client Details which are stored to disk and the system uses these defaults on boot up. Job Details can be set using the "**Fix Set Up**" Menu command
 In addition to setting Job Details the user can also set a MODE OF FIXING as determined By the value of the fix number arriving from the navigation system.

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FIXING MODE

There are three modes of fixing with SmarT-Tator PC

Incrementing	(Fix numbers increasing)	Default
Defined Fix numbers	Defined SOL Fix	Defined EOL Fix
Decreasing	(Fix Numbers decreasing)	

Fix Mode can be set using the "**Fix Set Up**" Menu command

The system allows the user a means of printing a string immediately to any or all units

With or without a fix mark. The user simply types into a text box and presses a button
And the entered text will go to the selected units for immediate annotation.

When user input to this text box exceeds 40 Characters the system will beep and clear
Out the excess characters.

The System allows the user a means of instantly printing a SOL or EOL message strings.
Immediate printing commands are available under the "**Print**" Menu command.

TRIGGERING

Triggering of channels:

The individual channels will not print any annotation if input triggers are not present at the
SmarT-Tator 4 interface unit, if a channel is sent data to print and there are no incoming
Triggers, The unit will indicate the lack of triggers by lighting the RED led (wait on trigger)

There is a mimic of this LED on the PC interface software; the actual time of the external triggers is accurately
Timed within the interface unit and relayed to the GUI program.

When triggers do finally arrive at the channels trigger input, the SmarT-Tator 4 will not print historic
Data, The Normal condition for the RED WAIT TRIG LED is off. This RED LED on means the Channel is
waiting for a trigger.

Where fixing of the units is every "N" fixes its possible to
Determine well before the next fix is due to be printed if triggers are present at the
Remote unit..

The remote channels can return the actual time of their external triggers.

So the SmarT-Tator PC is aware of the triggering times of the remote channels within the
SmarT-Tator 4 interface unit.

More importantly however a channel that is not triggering will not in anyway affect the operation
of the remaining channels annotation output.

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RESETTING AND RE INITIALISATION

If for any reason power is interrupted to the Interface unit, upon power up the interface unit will quickly inform the PC that all channels have been reset and within a very short time the interface unit will rapidly set all channels to the settings that existed prior to power down.

However if changes have been made to the setup as stored on Disk within the windows registry and the PC But these changes have not been stored to the individual channels "EEPROM" within the interface unit, the user will be warned upon attempted program exit, if these settings are to be saved or not, as when ever the PC software boots up the software will reset all the channels hardware forcing it to use stored settings and so any changes in setup would be lost if they were not saved in the interface unit.

There is a **SAVE ALL SETUPS** menu command under the **CHANNELS** MENU which will force all channels to write their current set up to their internal EEPROM ensuring next time that the box powers up, it will be set up exactly as it is now.

SERIAL PORT SET-UP

In order that the system maintain a link with two different serial ports a set-up control is available to determine the exact set up for the Navigation Link and the SmarT-Tator 4 Port and their operating parameters.

These parameters are also stored to disk and will return to their stored defaults on start up. With the SmarT-Tator 4 Port only the port number is selectable. The protocol is fixed at 19200 8 N 1.

The Navigation port however has a full set of parameters for set up Com Port, Baud, Data, Stop, and Parity.

SmarT-Tator PC needs two spare serial ports to operate correctly

Serial port set up is achieved by the "Set-up" Menu Command ("*Serial Ports*")

If an error occurs opening the ports then the Serial Set Up window will show automatically.

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OPERATION OF SOFTWARE

Upon boot up, the system sets both communications ports, for Navigation link and For the SmarT-Tator units. The system will immediately strip any parameters from In-bound strings on the Navigation port, and display these parameters under their various Headings on the Navigation Link display panel. .But Fixing is initially turned off, there Is a NAV ON OFF Button on the Navigation Link display panel, The Mode of Fixing is set by Stored defaults and in the event of Fix numbers incrementing, the system will not output any Fix strings to the remote units until the link is switched on with the NAV ON OFF Button.

SYSTEM START UP

Once communication is established with the SmarT-Tator4 interface unit, each channel in turn has already been initialised with its individual "EEProm" stored parameters. The PC software downloads these settings from the interface unit as well as ascertains if triggers are present at each channel and also the repetition rate of the triggers.

Once The Nav ON OFF button is turned on , the system will first ask the user for the next fix number expected from the navigation system , this is assuming the value in the Next Fix number label is zero, by informing the system what the next fix is , this prevents fix's being output when the system first gets the current navigation string ,the system will there after act on changes observed on the Fix Number being received from the Navigation system.

NAVIGATION LINK DISPLAY

A large format Screen display label is provided to show clearly the value of the last fix (latest) fix number received from the navigation system , this label can be seen from some distance away from the SmarT-Tator PC Screen. This label can be turned on or off, if required. The System will also issue a "**beep**" sound each time a fix string is sent to a remote unit, this feature can also be turned on or off if required.

PRINTING ON LINE

At any time during the survey line menu commands are available by which the user can select an individual channel or all channels to send typed in messages to. These facilities are Available under the "Print" Menu command.

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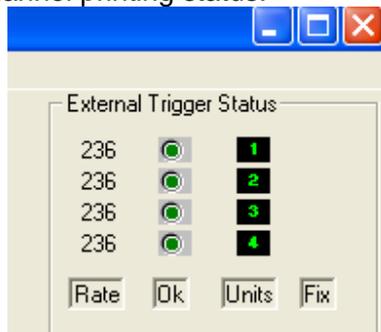
MAKING CHANGES ON LINE

At any time during the survey line the height width and print delay parameters of any Channel may be changed, these changes will become effective immediately and will become the default for these channels as soon as the SAVE ALL SETUPS menu command is issued and This rapid change of any of the annotation channels settings is made available under the "Set-up" Menu Command ("Remote Channels") ,changing of parameters to any one remote unit can be made very quickly without the risk of missing a fix mark output and especially where fixing every tenth fix is selected.

In the settings panel when ever a parameter for a particular channel have been changed , the SEND button becomes visible for that channel , and this needs to be pressed in order to send the new settings to the unit The channel will use the settings immediately. The user must at some time later (and before power down of the interface unit) use the SAVE ALL SETTINGS Menu to make these new settings the default stored settings.

TRIGGER STATUS PANEL

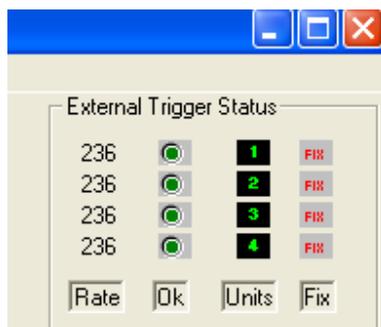
The external trigger status panel is at the top right corner of the SmArT-Tator PC screen window it serves the purpose of giving general trigger and channel printing status.



The trigger status panel shows the rate in milliseconds of the applied external triggers to each channel , If the value is zero then there are no triggers and the OK led will show RED in effect mimicking the WAIT trigger led on the interface unit. Otherwise the status would be GREEN for all values of trigger greater than zero.

The UNIT number will shown green when its actual physical presence has been detected by the software package and red when it has not been detected , if for any reason a channel is not detected at software boot up then the user should issue the **RESET UNITS** menu command under the **CHANNELS** menu in order for the package to pick up the presence of the channel concerned.

When a FIX is being annotated to a channel a FIX ICON is shown to the right of the channel number , as shown below, depending on the print height setting of the particular channel some channels may take longer to complete their fixing, not until the fixing is complete can any further settings or annotation be sent to the unit .

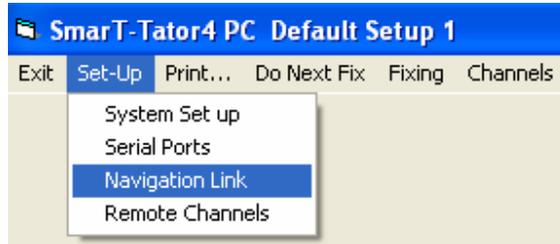


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Menu by Menu Description SETUP

The Setup menu appears as shown below



System Setup

The System Set up Menu brings up the General System Setup form where the following items can be set for saving to the PC windows registry

This form allows for the setting up of the Sonar Channel and the preamble that will come with messages for printing Sonar Cable Out found under **PRINT MENU Print Sonar Cable**, also the general company and vessel fixed information for inclusion in the SOL or EOL messages.

It also allows for setting up of fixed quick messages for each channel, these can be set to what ever the user requires and will save much typing later when it comes to repetitive annotation tasks, the channels can be annotated with a single menu command using the menu **PRINT QUICK MESSAGE**.

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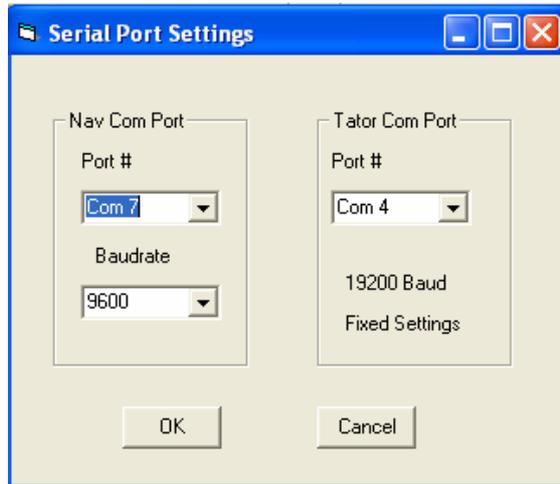
SmArT-Tator PC Software Package Overview

Menu by Menu Description SETUP

Set Serial Ports

This form allows for the setting of the two ports Navigation And SmArT-Tator

As can be seen below the port only can be changed for the SmArT-Tator as the baud rate etc is fixed for this device at 19200 8 n 1



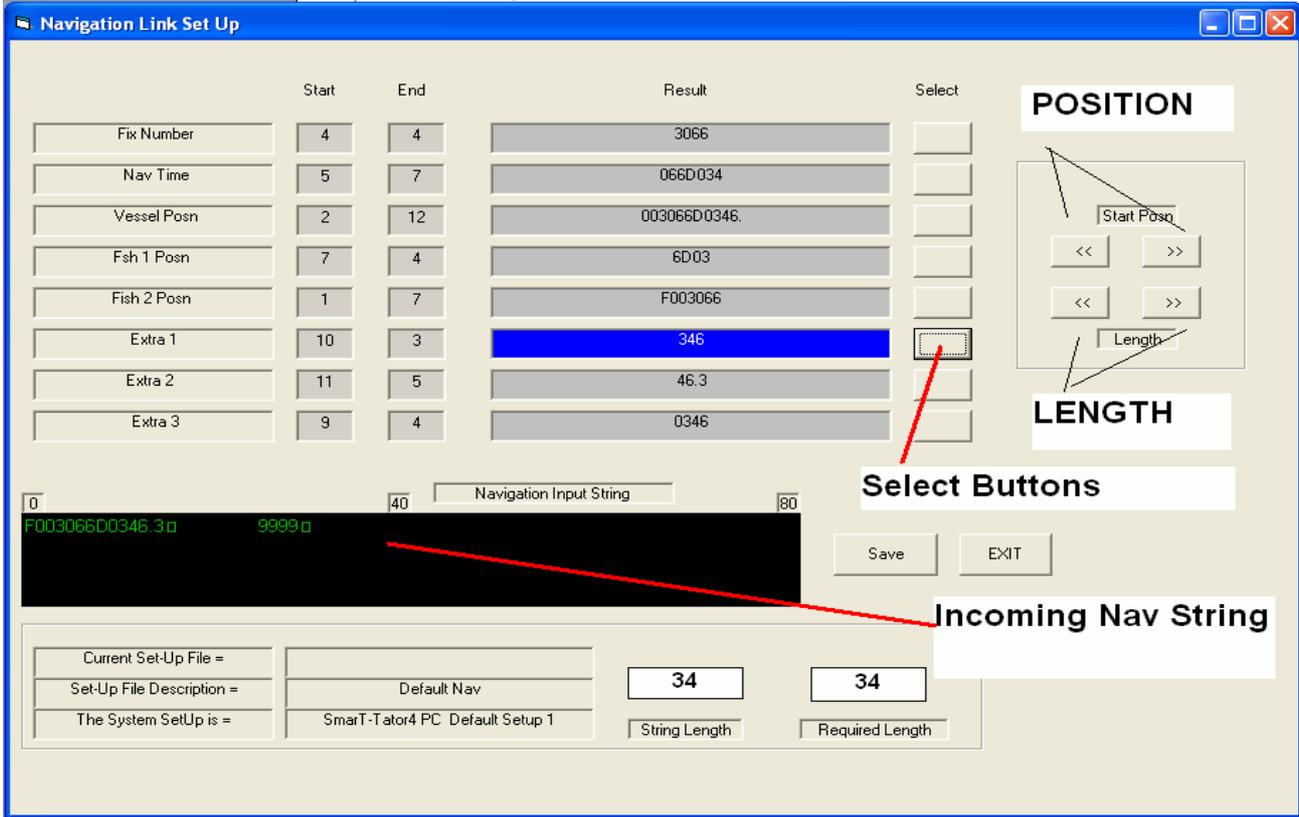
Both Com ports can be set from 1 – 20 , the drivers for the dual USB to serial converter supplied with the system should be installed prior to running the SmArT-Taator4 PC software package.

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SmarT-Tator PC Software Package Overview

Menu by Menu Description SETUP

Setup Navigation Link



This form is accessed under the **SETUP** menu and **NAVIGATION LINK** menu command

There are 8 separate possible navigation parameters listed on the left side of the screen, they each have a STRING START STRING END position, these are set by first selecting the SELECT BUTTON for the particular parameter, the resultant string shown in the RESULT Column will go blue to show it's the one currently being edited, the user can then by simple use of the SART and LENGTH buttons move the pointers for this parameter along the incoming navigation string to produce the correct desired result.

The most critical setting is the overall input navigation STRING LENGTH, this is shown at the bottom of the screen, the required length must be set to match this number as only when this setting is correct will the navigation interface work correctly, the triggering of navigation data reception is dependant on this figure being correct, the trigger should only occur when the navigation computer has sent the EXPECTED "String length" number of characters.

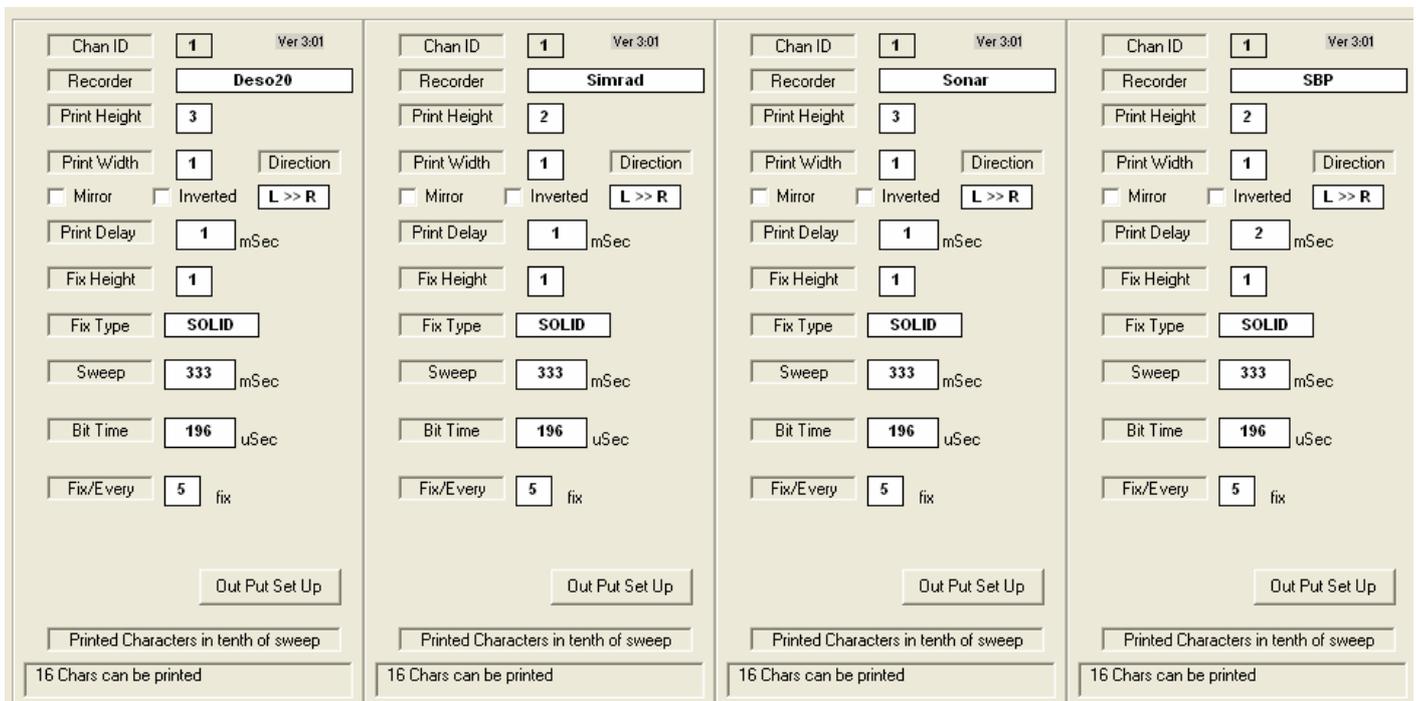
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SmArT-Tator PC Software Package Overview

Menu by Menu Description SETUP

Setup Remote units

This setup form is accessed under the **SETUP** menu with the **REMOTE CHANNELS** menu command. The Setup Remote units form shows four identical panels as shown below. Each panel represents one channel in the SmArT-Tator interface unit and is addressed individually by software and setup commands sent from the SmArT-Tator4 PC software package. Each unit stores its important setup parameters within its own non volatile EEPROM storage. Print Height Width Delay Fix Height type and Bit time direction of printing etc. All other settings are stored on the PC in the windows registry.



The picture shows the four setup panels, tick boxes are used to select print direction mirror is back to front. Inverted selects upside down printing, while the L>>R alternately shows R>>L naturally reverses the sweep.

Changing the sweep parameter will adjust the BIT TIME parameter to allow 16 characters into a tenth of the sweep speed assuming a print width of 1, the print width can be changed from 1 to 9, where 1 will allow 16 characters to be printed in one tenth of the sweep and a width of 9 would only allow for 3 or 4 characters to be printed in the same period. (See Table of print width / & bit time versus sweep timings in appendix C)

The Fix Every setting allows for units to print every N fixes, the units can be synchronised by selecting DO NEXT FIX MENU command. All units will thereafter print the same fix numbers assuming of course they are all set to the same value of FIX EVERY parameter.

Any changes on these panels will cause the SEND command to appear for that panel and this button must be pressed in order to commit the changes to particular channel in the SmArT-Tator remote interface unit.

In order to determine what actually gets printed with a FIX MARK for each channel the **OUT PUT SETUP** button must be pressed, see next page.

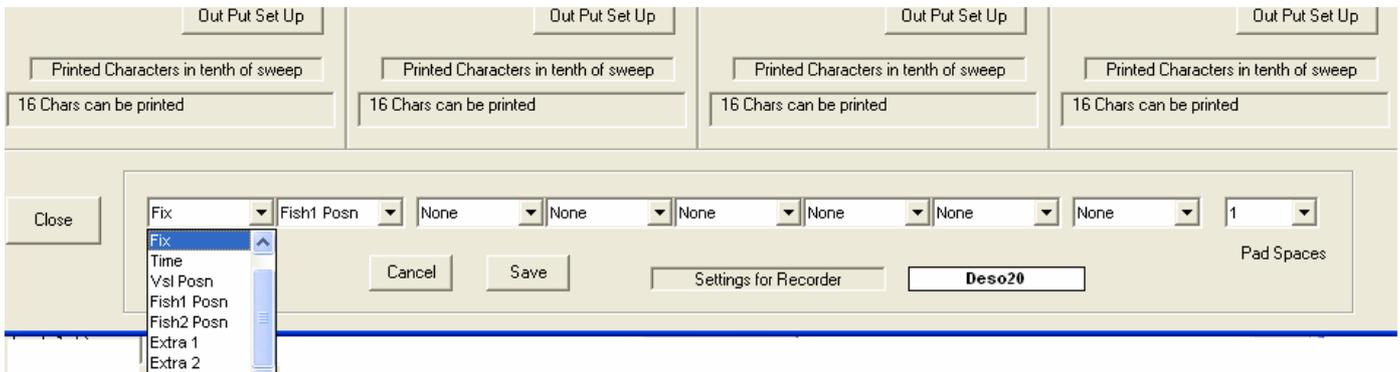
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SmArT-Tator PC Software Package Overview

Menu by Menu Description SETUP

**Setup Remote units
Out Put Setup**

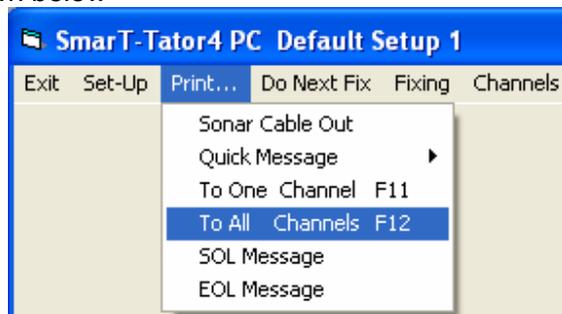
By pressing the **Out put Setup** button on any of the remote units panels as shown on previous page The following sub form shows , there is one form for all channels, but it always displays the different set ups for each channel , there is a label on this panel to show which channel it is displaying the out put set up for. This will naturally depend on which of the four **Out Put Setup** buttons were pressed.



There are eight separate positions defined by the system within each output annotation string in this incidence we have selected FIX followed by Fish1 Position, and one padding space between the items. Each time this channel outputs a fix it will only print FIX Number followed by FISH1 position. It is possible to select any of the 8 possible options (or none) as required. In this manner its possible to set up completely different output strings for each annotation channel. These output string settings are all stored on the PC windows registry. It is important to bear in mind that strings that contain more than 40 characters due to their particular make up , the system will only output the first 40 characters of any string sent for annotation.

Menu by Menu Description PRINT

The Print menu appears as shown below



Print Sonar Cable Out

A very simple command which brings up the output text box for entering individual messages to particular channels, the pre preamble for this particular message is previously set in the System Set up form. The unit number is set by the Sonar Channel definition in System set up. Entering Return or pressing Send button will send the cable out message to the channel defined as the sonar unit. This feature can be useful for repetitive annotation tasks relating to sonar cable out printing.

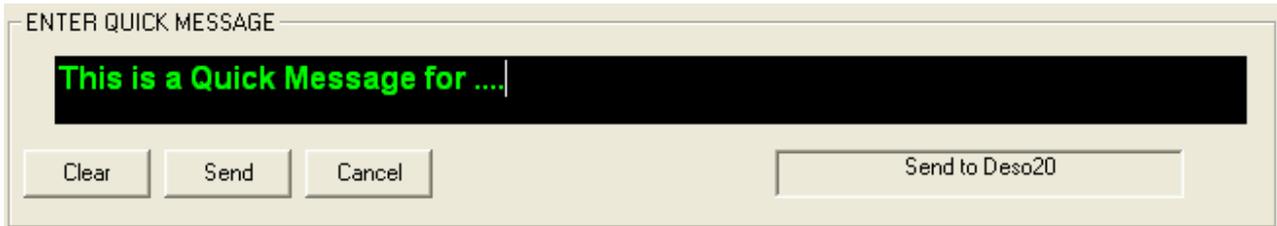
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Menu by Menu Description PRINT

Quick Message

The Quick Message menu allows for entering and sending (without fix mark normally) a quick message to any of the four channels, there are four sub menus which pre define the address to which the message will go. The Input text box comes up and the user enters the string and presses ENTER (RETURN) or presses the SEND BUTTON as shown below and the channel concerned will annotate the message.



The Input Text box is used for random user generated messages that need to be entered and sent to a particular channel.

Entering more than 40 characters will put up the "Max" flag (Small Red Label will appear on the panel) and only the first 40 characters will be actually sent to the channel. Pressing the send or the Cancel button will remove the input text panel from the screen. The user must select another Quick Message menu command to send another message.

To One Channel ..

This print menu command brings up a selection panel with the option of selecting a fix mark or if indeed all channels will be annotated with the same message.

The channel selection panel is shown below.



Selecting any of the buttons with the channels ID, will bring up the input text panel as shown on the previous menu but will allow the selection of possible printing of a FIX mark or the possibility of sending the string to all channels if required. As before 40 characters maximum and pressing send or cancel will clear the input text panel but in this case the selection panel stays on screen allowing for the quick selection of another channel for message printing if required. Pressing Cancel on the selection panel, removes this panel from the screen.

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Menu by Menu Description PRINT

To All Channels.

As for the previous menu except that all channels is selected and when SEND or RETURN is pressed the annotation string will be sent to all four channels.

SOL /. EOL message

These last two PRINT Menu commands SOL Message and EOL Message both bring up the text panel but there is no SEND Button visible on the panel this time , as these start and end of line messages are pre-defined under the **FIXING** menu with **Setup line Fixing** menu command , so the messages are printed to the screen but are sent immediately to all channels .

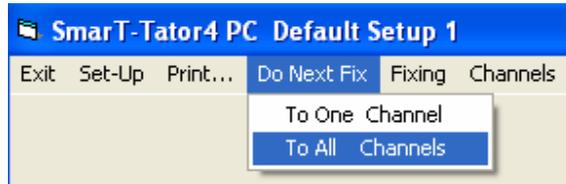
The user can simply press the Cancel button to remove the text panel.

PRINT Channel Setup

Brings up an input panel where the channel number is entered then a form is brought up showing the entire channels setup, this forms contents can be sent to the PC printer or simply closed after viewing.

Menu by Menu Description DO NEXT FIX

The Do Next Fix Menu command is as shown below

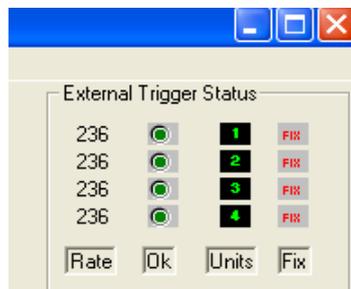


To One Channel ..

Do next fix to one channel will force the selection panel to come up where the user selects the channel for which they wish the next fix number to be printed and when the user selects the button for a particular channel that channel will have a fix ICON shown on the trigger status panel , each of the channels have a fix counter Which counts down to the next time they will print a fix , its set by the Fix Every parameter and some times its necessary to synchronise channels so all channels print at the same fix number , this menu allows this to happen.

To All Channels ..

Do next fix to all channels simply resets the fix counters for all channels and sets the fix icon on for all channels on the trigger status panel and all channels will print the next fix



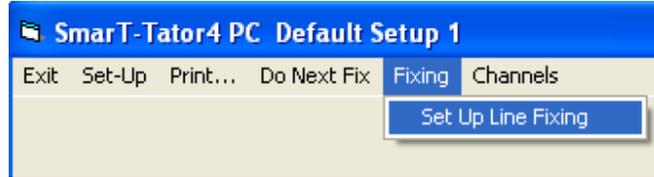
The trigger status panel shown with a FIX ICON present for all channels, indicating that all channels will print the next fix number.

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Menu by Menu Description FIXING

The Fixing Menu as shown below



Set Up Line Fixing

This menu is used to set the Fixing MODE of which there are three separate modes

Normal mode or the default mode is **Increment** incrementing fix numbers cause the system to print fix marks and strings when the fix every number parameter is met by the incoming fix number

The second mode is **Fixed SOL EOL** where the user sets a particular range of input fix numbers that occur for each line, START and END (assumed incrementing fix numbers) the system starts outputting fixes only when the range is met by incoming fix numbers .

The third mode is **Decrement** which is of course the reverse of increment , fixes count down or its expected that the incoming numbers will be doing so

These separate modes are provided to in order to try and cope with various navigating fixing schema.

The Menu brings up the Line Fixing form as shown below

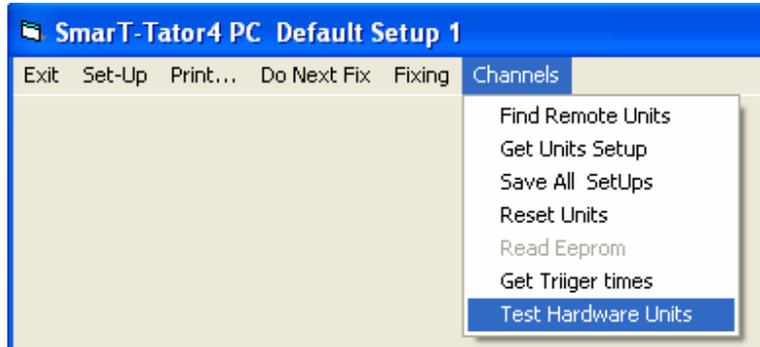
The Line Fixing form allows the setting of SOL & EOL Messages for all channels, and the line and general job information, SOL & EOL messages can have six separate parameters as selected by the six drop down list boxes which each have 14 options to chose from ranging from General job or line information or navigation parameters.

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Menu by Menu Description CHANNELS

Channels menu as shown below



Find Remote units:

This menu is useful if the box has been switched on and off or the software started while the box is switched off and the trigger status panel has some or all of the unit numbers shown in RED I . e the channels have not been detected , this menu will force all of the channels to reply with a response to say they are present on the serial line.

Get Units Setup:

This menu gets all the units to reply with the setup as stored inside their own EEPROM storage. This is normally achieved when the software boots assuming the box has been switched on before the software is run.

Reset Units:

Forces all units to reset and re load their setup from internal EEPROM storage the LEDs will all flash for half a second prior to the units returning to normal operation.

If triggers are present then the RED led's will stay out but if there are no triggers to a particular channel then after about 4 seconds the Wait Trigger LED will come on indicating no triggers are present at that channel

Read Eeprom Debug only

Get Trigger Times:

Again this function is normally achieved during a normal software package boot up where a start up timer first determines all channels are present then gets the unit set ups and then the individual trigger times.

Forces an update of the trigger times as shown on the External Trigger Status panel in the top right corner of the display screen .

Test Hardware Units:

This command brings up a form for individually setting each channels annotation output to ON And also tests the GREEN Led for each channel, it is useful for confirming annotation output for each channel See **TESTING HARDWARE** for further details

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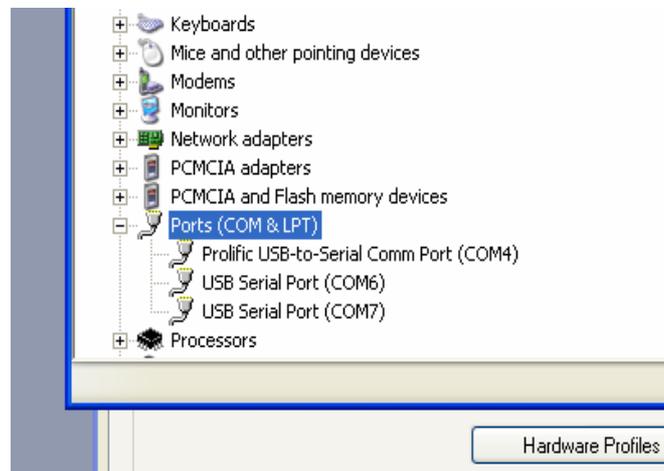
Software Installation

When the software is first installed the software package will generally report that in the absence of a recognised windows registry set up for SMarT-Tator4 PC package , the system will alert the user that it will install a temporary setup to the registry , this will involve creating quite an amount of registry entries for later use by the system.

It is important to make sure that if no serial ports are present on the PC (as is quite commonly the case these days) the user must install the drivers for the dual USB to serial Converters, then by looking in control panel Under hardware determine what port numbers the new ports have been mapped into.

Control Panel System ICON then Hardware Tab and Device Manager button will bring up the display as shown below , click on PORTS (COM & LPT) to open up and see what ports are available on the PC.

SERIAL PORT SET UP



Windows Control Panel

The new com ports should be labelled USB Serial Port (with the com port number shown in brackets)
 Select one port for the SmArT-Tator interface unit and one for the Navigation link

Then slowly go through each of the SET UP menus in turn setting the parameters as required .

Once the output fixing and general system job and line set up information has been entered its best to select Navigation set up and ensure the navigation system is sending strings , and as soon as the Navigation set up form comes up it will attempt to display the navigation strings its receiving , the port will be opened and data will be displayed It is however very important to know the total length of the navigation string being sent by the navigation computer. Its best to have strings coming every one or two seconds with more information than is needed. Its better to get this sorted from the beginning rather than having to keep adjusting the length of the string from job to job.

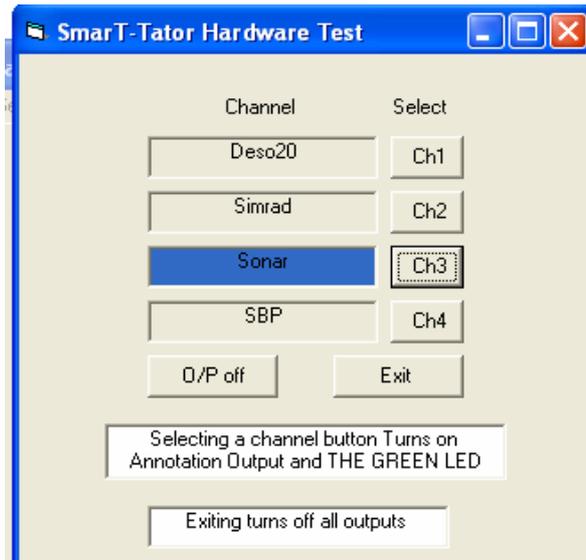
Once the navigation string is set up one can then turn on the “Nav” link on the main screen

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HARDWARE TESTING OF THE CHANNELS

By selecting CHANNELS menu and **TEST HARWARE UNITS** menu command its possible to individually turn on or off the output annotation switch of each channel within the interface unit , this is useful for confirming each units output voltage and annotation capability. Lights on the Front panel will also confirm this operation (**Output Green Led**)



By closing this form all the outputs previously set to on will switch off
 Useful for confirming annotation output and the operation of the GREEN LED for each channel
 Both the GREEN and RED LED's Should flash for half a second when a system reset is issued by the menu command **RESET UNITS**. The main function of this form is to test the annotation out put of each channel

Exit..Menu

Unloads the program closing all the opened serial ports. If changes are not saved to the interface box for any of the channels , the user is prompted to **SAVE** or **NOT** these settings before exit
 Selecting **YES** will send a command to the interface box forcing a save of all channel settings to their respective EEPROM devices .

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NAVIGATION LINK PANEL CONTROLS

The Navigation link panel has several controls most of which are TICK boxes for turning on and off certain features of the link panel.

The screenshot shows the 'Navigation Link' control panel. It contains several input fields and checkboxes. The 'Nav fix' field contains '0093', 'Nav Time' contains '093D034', 'Vsl Posn' contains '000093D0345', and 'Fish1 Posn' contains '3D03'. There are three checkboxes: 'Fix Label Off' (unchecked), 'Sound off' (unchecked), and 'SQL Fix Same every line' (checked). A central button with a lightning bolt icon and the text 'ON' is also present.

Fix Label on off tick box

Simply turns off the large GREEN FIX Number label that can be seen on the screen showing the last fix number.

Sound Off tick box

Simply turns off the BEEP sound that happens when ever a fix string is sent to the interface unit

Sol FIX same Every line tick box

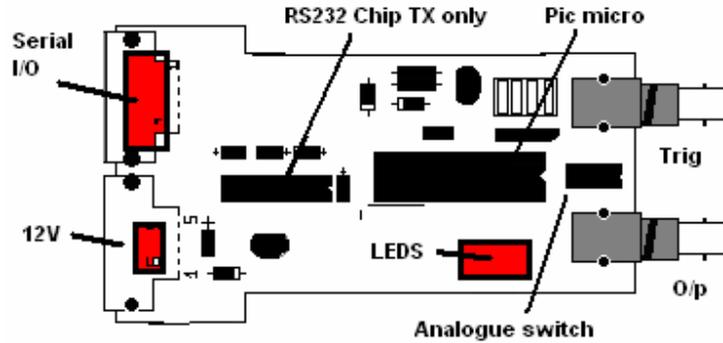
Sets up the system that once a fist fix value has been entered, one doesn't have to keep entering the fix Number if the SOL fix is always the same number for each line. Turning on the nav link will simply set the next fix to one below the first fix that was entered previously, and the system will wait for the first fix value to arrive!

Nav Of OFF Button

Turns on or off the nav link , when the link is on , navigation strings coming in are represented in the various text boxes on display on the Nav Link Panel , changes to the Nav Fix number panel cause the system to print annotation and fix marks when the right conditions are met for annotation. Such as FIX EVERY Fixes have occurred or we are at the predefined SOL or EOL fix number value.

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Appendix B: PCB LAYOUT DIAGRAM

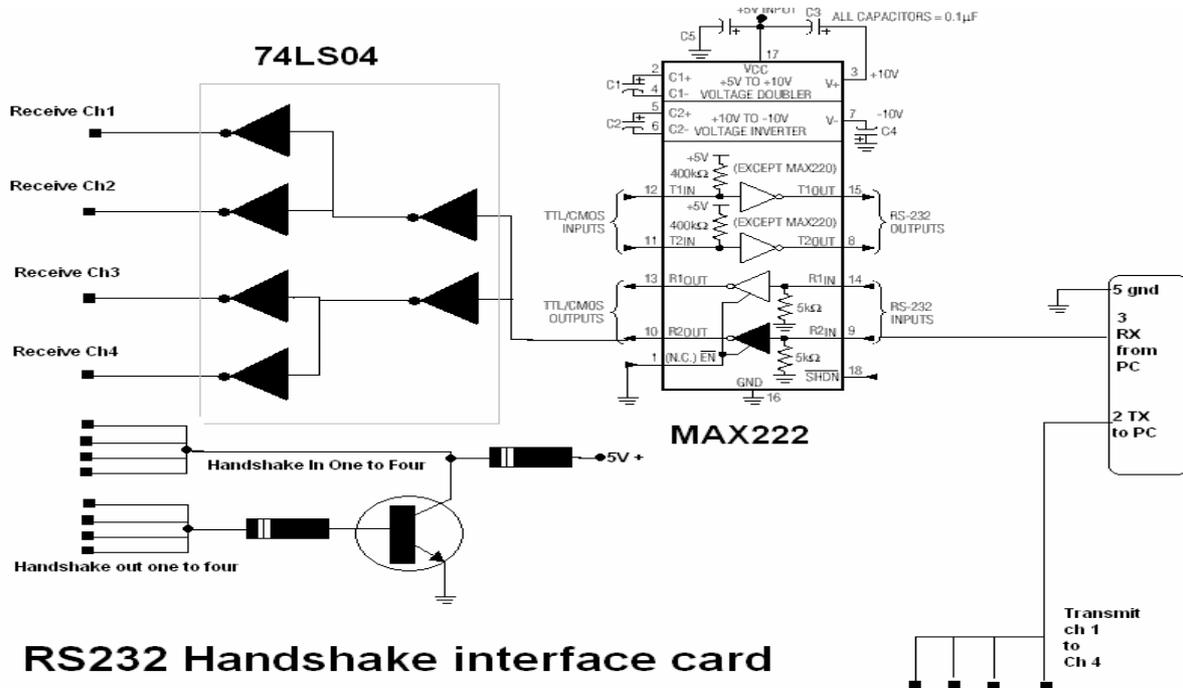


The PCB layout is revised for Ver 3:01 Jan 08

There is only one RS232 interface chip on each PCB as the received RS232 is converted and buffered to all four channels by a single MAX222 and 74LS04 hex inverter buffer on the separate RS232 interface PCB (see cct below)

All channels output a hand shake on PIN1 of their RS232 I/O connector which is fed from PIN 13 of their MAX 222 Which is normally held in the TRI STATE off condition by the processor
 These four outputs are diode fed together at the Base of the single transistor on the RS232 interface card
 And the collector of the same transistor is fed to the handshake input connected to PIN 4 of the RS232 I/O connector

The channel waits until there is no other board transmitting by monitoring the HANDSHAKE input line and then asserts the MAX222 enable line which puts out a LOW signal into all the other boards handshake input preventing them from transmitting



RS232 Handshake interface card

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Appendix C: Time base ranges

The Bit times calculated by the system as a function of a SWEEP time entered by the user is based on the presumption that the system will try at a print width of 1 (minimum width)
 To attempt to place 16 characters inside one tenth of the sweep period

The Bit time which the SmarT-Tator4 PC system comes up with is in fact a bit time that when added to 64uS will provide the basic bit time for a print width of one , as it can be seen from the tables below for each print width setting of 1 to a possible maximum of 9 , an additional 64 micro seconds is added to the bit time for each increase in the print width setting. But the initial calculations are based on the attempt to try and get 16 printed characters inside one tenth of the sweep time ,. So it can be seen that every time the user changes the sweep time the SmarT-Tator4 PC system will re calculate the new bit time based on trying to always get 16 characters inside the one tenth of that particular sweep period.

So the only way one can experiment with print widths is to actually change the BIT TIME without changing the sweep time , this way the system allows the user to change the print widths independent of the built in pre set formula which attempts to control print width setting of bit times for each channel as a function of sweep period. The inbuilt formulaic approach is outlined in the table on the next page giving an example sweep period of 125 milliseconds

The actual units in the interface box only know of the BIT TIME , the sweep time is stored in the PC
 So the only way to send a change in print width that is not auto calculated by the PC is to change the BIT TIME after you have set the SWEEP Time and then send the values to the channel.

Its possible to enter a different BIT TIME but if the user attempts to change the Sweep time once more the system will do an auto calculate, trying to fit 16 characters in one tenth of the new sweep time and will change the BIT TIME once more.

The Print Width is therefore arranged to give maximum characters at Width = 1 (nominally 16 characters)
 And at a width of 9 (maximum width) nominally only 3 to 5 characters will be printed within one tenth of the sweep.

Sweep	Base Bit time	+64uSec Print width=1	Char Width *8	*16
500mSec	326uS	390uS	3.120mSec	16 characters
250mSec	131uS	195uS	1.560mSec	16 characters
125mSec	033uS	097uS	0.776mSec	16 characters

Print Width of 1 gives exactly 16 characters for one tenth of the sweep period
 As shown in chart above 50mS, 25mS, and 12.5mS respectively

Sweep	Base Bit time	+9* 64uSec Print Width=9	Char Width *8	1/10 sweep
500mSec	326uS	902uS	7.216mS	6 characters
250mSec	131uS	707uS	5.655mS	4 characters
125mSec	033uS	609uS	4.872mS	2 characters

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Appendix C: Time base ranges contd.

For the same sweep and bit times for a Print Width of 9 (maximum size of characters)
 Print Width of 9 gives approx 6 to 2 characters for one tenth of the sweep periods
 As shown in chart above

When the Bit Time is set to a figure of say 033uSec for 125ms sweep the base bit time is added to 64uSec for print width of 1, so we can see in the table below what size of printed characters we get for 125mSec sweep
 And print widths from 1 to 9

Sweep = 125mS

Base Bit time	Print width	Actual bit time +64uSec	Char Width * 8	1/10 sweep
033uS	1	097uS	0.776 mS	16 chars
	2	161uS	1.288 mS	9 chars
	3	225uS	1.800 mS	7 chars
	4	289uS	2.312 mS	6 chars
	5	353uS	2.824 mS	4 chars
	6	417uS	3.336 mS	3 chars
	7	481uS	3.848 mS	3 chars
	8	545uS	4.360 mS	2 chars
	9	609uS	4.872 mS	2 chars

It can be seen that for each increase in the PRINT WIDTH parameter , the actual printed character bit rate increases by 64uSec.

The sweep speeds given in the above chart are only for reference and give an indication of speed of the PIXEL OUTPUT rate for that Sweep Period.



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