CruzPro®

MaxVu110

CE

User Configurable
Multifunction Instrument

Other CruzPro Products

l   Depthsounders/w Keel Offset, Deep/Shallow/Anchor Drag Alarms
l   PC Based DSP Fishfinder for Windows 98, NT, SE, XP, 2000
l   Speed/Temperature/Logs
l   Digital DC Volts Gauge/w Alarms
l   Digital DC Volts Gauge/w Alarms for 3 Battery Banks
l   Digital Amps Gauge
l   DC Volts/Amps/Amp-Hour Monitors
l   AC Volts/Amps/Freq/kW Monitors
l   LPG/Petrol Gas Detectors/Alarms
l   Bilge Water Alarms/w Stainless Steel Water Sensor
l   Intelligent Bilge Pump Controllers/w Stainless Steel Water Sensors
l   Intelligent Windlass Controller/Chain Counters
l   Digital Fuel Gauges & Fuel Consumption Calculator
l   Digital Tank Level Gauges for 1 or 3 Tanks /w Separate Alarms
l   Smart 4 step Alternator Regulator
l   Marine Security System/w Reliable Intrusion Sensors
l   RPM/Engine Hours/Elapsed Time Gauges/w Alarm
l   Digital Engine Temperature Gauge/w Alarms
l   Digital Oil Pressure Gauge/w Alarms
l   Digital Temperature Gauges for 1 or 3 Areas /w Alarms
l   Digital Clock/Watch/Race Timers/w 8 Alarms
l   8 and 16 Amp Light Dimmers / Motor Speed Controller
l   Solar Panel Charge Controllers 6/8/9 & 20 Amps
l   4 & 8 Channel NMEA Combiners/RS-232 Convertors
l   Engine/Exhaust Temp. Monitor & Digital Pyrometer
l   NMEA 0183 Remote Data Repeater/w 4 Input Channels
l   High Pressure Digital Hydraulic Pressure Gauge
l   Engine Hours/Elapsed Trip Time/Engine Maintenance Alarm Gauge

Table of Contents

Introduction

The MaxVu110 user-configurable multifunction instrument will simultaneously display five sets of data on three digital displays and two bar graphs. Data to be displayed can be selected from 34 different "Data Sources" such as Boat Speed, Engine RPM, Tankage Levels or NMEA 0183 data, etc. Independent high and low alarms can be set for each data source (including NMEA 0183 data). All the calibration curves and circuitry to measure the data are inside the MaxVu110 so you do not need a "Brain Box" or "Black Box".

The data being displayed, where it is displayed and the alarm limits for each display is called a "Display Configuration". You can switch between sixteen different predefined display configurations with the front panel key buttons. The display configurations are highly flexible and any particular set of data can be directed to one the digital displays and/or one of the two bar graphs. Each of the sixteen display configurations can be edited to show the data that you want to see from the available data sources. Changes are automatically saved to a nonvolatile memory.

The MaxVu110 can display up to eight separate NMEA 0183 data sentences arriving on four different NMEA 0183 inputs. You can view NMEA 0183 data such as depth, wind speed/direction, GPS bearing and distance to waypoint, exhaust gas temperature, etc. The MaxVu110 recognizes thousands of different NMEA sentences.

Variable display damping (filtering) can be selected for RPM, Boat Speed, Fuel, Tank Level, Trim Angle and four of the eight NMEA 0183 inputs.

You can select from five levels of backlighting and the MaxVu110 works on both 12 and 24 VDC. The internal software can be updated via the internet to add additional features as they become available.

A built-in editor enables you to change alarm levels, calibrate data sources, select different calibration curves and change display damping using the front panel keys.

The MaxVu110 is also supplied with software that runs under Windows 98, WinXP, WinNT, Win2K ,Vista and Win 7 to simplify editing of the Display Configurations, Alarms, set Units of Measure and select Calibration Curves. You can create and edit custom calibration curves for Engine Temperature, Oil Pressure, Fuel and Tankage Levels and Trim Angle. Settings can be quickly uploaded to the MaxVu110 or downloaded from the MaxVu110 using either a RS232 port or USB port.

Table 1 - MaxVu110 Standard Data Sources

The MaxVu110 contains built-in electronic circuitry to measure and display:

1   Engine RPM
2   Engine Temperature (Deg F, Deg C)
3   Engine Oil Pressure (PSI, Bars)
4   Engine Hours
5   Settable Downcounting Maintenance Alarm (Change engine oil or check battery water or change water maker filters, etc.).

6   Fuel Remaining (Gallons, Liters)
7   Trip Fuel Used
8   Total Fuel Used

9   Boat Speed (Knots, MPH, Km/H)
10 Temperature #2 for Seawater, Engine Room, etc. (Deg F, Deg C)
11 Trip Log (Km. Miles, Naut. Miles)
12 Total Log (Km, Miles, Naut. Miles)

13 Time-of-Day Clock (12 or 24 hour format)
14 Elapsed Trip Time
15 Eight settable time-of-day alarms
16 Settable Downcounting Race Timer #1
17 Settable Downcounting Race Timer #2

18 Battery Bank #1 Volts
19 Battery Bank #2 Volts
20 Battery Bank #3 Volts

21 Second Tank Level Display (See Note 1 - Auxiliary Input #1)
22 Third Temperature Input (See Note 1 - Auxiliary Input #1)

23 NMEA 0183 input #1A (Display NMEA Depth, Wind, GPS data, etc)
24 NMEA 0183 input #1B (Display NMEA Depth, Wind, GPS data, etc)

25 NMEA 0183 input #2A (Display NMEA Depth, Wind, GPS data, etc)
26 NMEA 0183 input #2B (Display NMEA Depth, Wind, GPS data, etc)
27 NMEA 0183 input #3A (Display NMEA Depth, Wind, GPS data, etc)
28 NMEA 0183 input #3B (Display NMEA Depth, Wind, GPS data, etc)
29 NMEA 0183 input #4A (Display NMEA Depth, Wind, GPS data, etc)
30 NMEA 0183 input #4B   (Display NMEA Depth, Wind, GPS data, etc)

31 Remote Hardware Data Display #1 (For future expansion options)
32 Remote Hardware Data Display #2 (For future expansion options)

33 Trim Angle (See Note 1 - Auxiliary Input #1)

34 External Backlight ON/OFF control

Note 1 - Auxiliary Input #1. The Yellow #3 wire can be programmed to be:
    a) Additional Tankage input (Water, fuel, holding tank - See Note 3)
    b) Third Temperature input (See Note 4)
    c) Trim Angle input (See Note 2)

Note2 - Engine temperature, oil pressure, trim angle and fuel senders are not supplied. Transducers to measure boat speed, sea water temperature and depth are not supplied but available separately.

Note 3 - Works with any standard resistive tank sender (European or American). Sender not supplied.

Note 4 - Temperature senders (such as seawater temperature, refrigerator temperature, engine room or battery temperature, etc.) not supplied but available separately in a variety of different formats.

Installation and Wiring

Before starting the installation, please read this entire section first. Finger tighten the screws that mount the instrument bracket - It is not necessary or recommended to use tools.

● Drill a 2-1/8" (55mm) mounting hole where you desire to mount the instrument (Figure 1).

● Remove the adhesive backing protection from the bulkhead gasket and carefully align the waterproof bulkhead gasket on the back of the instrument.

● Connect the various wires as shown in Figures 2 and 3.

● Carefully check all your wiring then mount the instrument in the hole. Use only finger tension to tighten the bracket hold-down nuts

Finger tighten only - Do not use tools

2-1/8" (55mm) hole

Mounting Bracket
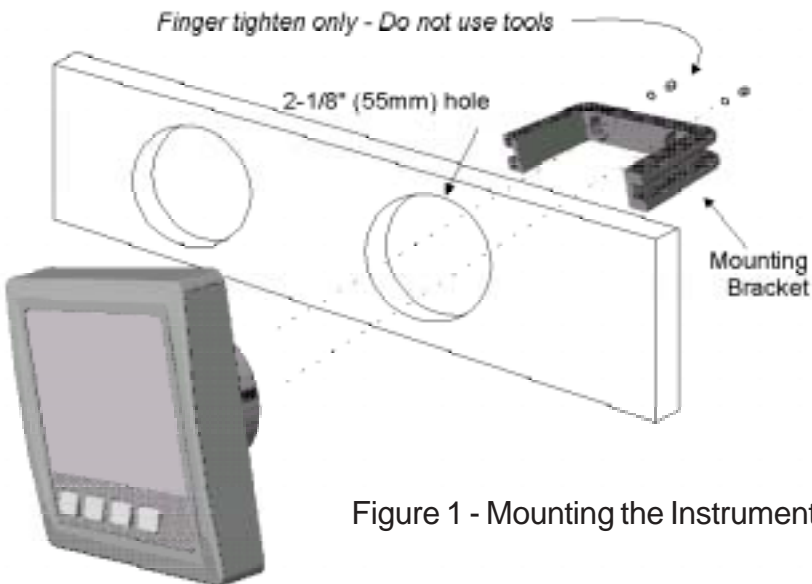
Figure 1 - Mounting the Instrument

Figure 2 - MaxVu110 Screw Terminal Connections

Cables
To MaxVu110

Left (M–X)		Right (A–L)
Battery #2 Volts (12/24V)	M	A Battery #1 Volts (12/24V)
Engine Oil Pressure	N	B NMEA 0183 Input #1
Fuel Sender Input	O	C NMEA 0183 Input #3
AUX Input #1	P	D Engine Temperature
Backlight ON/OFF Control	Q	E Sea Water Temperature
AUX Input #2	R	F Engine RPM
AUX Input #3	S	G NMEA 0183 Input #2
AUX Output #1	T	H Boat Speed Input
AUX Output #2	U	I NMEA 0183 Input #4
Battery #3 Volts (12/24V)	V	J Signal Ground
AUX Output #3	W	K RS232 Input
Power Ground	X	L RS232 Output

DB9 Connector
to PC

Figure 3 - Cable Connections

A   Battery #1 12/24VDC connection (Fuse with 5 amp fuse - supplies power to the instrument).

B   NMEA 0183 #1A and NMEA 0183 #1B inputs (from GPS, Depth Sounder, Wind Sensor, Etc.).

C   NMEA 0183 #3A and NMEA 0183 #3B inputs (from GPS, Depth Sounder, Wind Sensor, Etc.)

D   Connect to engine temperature sender. Both American and European senders supported.
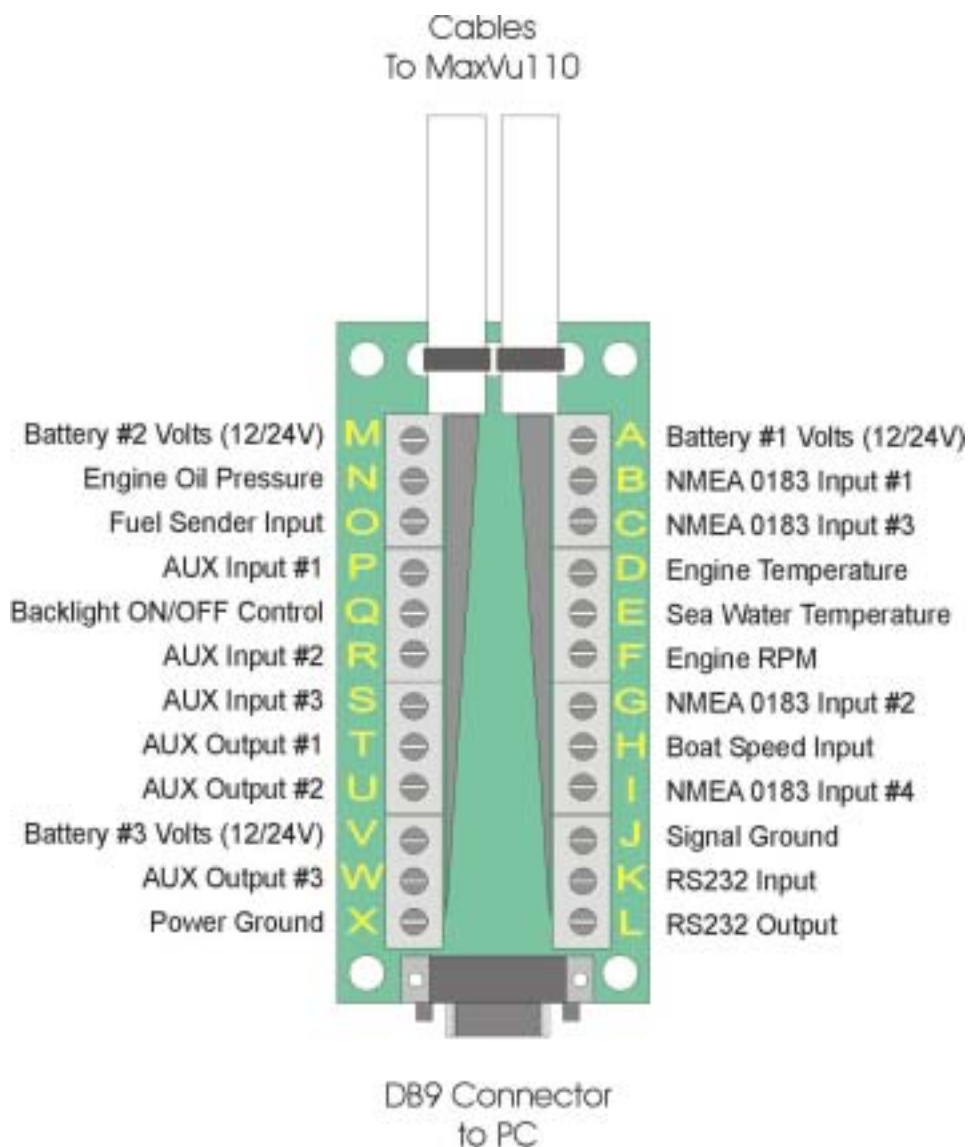
E   Connect to sea water temperature sensor usually located in speed/log transducer.

F   Connects to engine RPM sensor such as alternator tacho output or gear tooth sensor.

G   NMEA 0183 #2A and NMEA 0183 #2B inputs (from GPS, Depth Sounder, Wind Sensor, Etc.)

H   Connects to speed output from speed/log transducer.

I   NMEA 0183 #4A and NMEA 0183 #4B inputs (from GPS, Depth Sounder, Wind Sensor, Etc.)

J   Connect to signal ground from speed log, oil pressure sender, fuel sender, etc.

K   RS232 input from computer used for uploading and downloading new display configurations.

L   RS232 output to computer used for uploading and downloading new display configurations.

M   Battery #2 6/12/24VDC connection.

N   Connect to engine oil pressure sender. Both American and European senders supported.

O   Connect to fuel tank level sender. Both American and European senders supported.

P   AUX Input #1 - Connect to trim angle sender, 2nd pressure/ tank level or third temp. sender.

Q   Connect to a switch and +12/24VDC to remotely turn ON/OFF the instrument's backlights.

R   AUX Input #2 - Not currently used - for future use.

S   AUX Input #3 - Not currently used - for future use.

T   AUX Output #1 - Not currently used - for future use.

U   AUX Output #2 - Not currently used - for future use.

V   Battery #3 6/12/24VDC connection.

W   AUX Output #3 - Not currently used - for future use.

X   Connect to battery power ground bus.

Operation of the MaxVu110

Key Functions

The t, : , ꙅ and ✳ keys are used to select and set backlight levels, select/edit display configurations, view/set alarm values, calibrate the instrument and select engine/fuel sender types, etc. Changes are automatically saved to a nonvolatile memory. A complete summary of all the possible key functions are shown in Appendix C.

Turning Display ON/OFF

Press and hold the ✳ key for five seconds to turn the MaxVu110 display OFF - the clock will keep running. Press and hold the ✳ key for three seconds to re-enable the display. If you remove power from screw terminal "A", the Time-Of-Day clock will have to be set again.

Changing and Controlling Backlight Intensity

Press the : key 1/2 second to adjust the backlight level for night viewing. Each time you press the : key for 1/2 second, the level will get brighter 1, 2, 3, 4, OFF, 1, 2, ... etc. The Red #3 wire provides external backlight ON/OFF control and this wire must be switched to +12/24V for the backlights to work.

Selecting a Display Configuration

Simultaneously press both the ꙅ and ✳ keys or press both the t and ✳ keys to cycle between the sixteen different display configurations. All sixteen display configurations are programmed at time of manufacture with the sixteen default configurations shown in Figures 5 to 21. You may change these configurations to suit your own preferences. Each time you select a new display configuration the Current Display Configuration number (in this case #1) is displayed for one second as shown in Figure 4. After one

second the display shows the data for display configuration #1 as shown in figure 5. All 16 of the factory default display configurations are shown in figures 5-20. Note that the two bar graphs can be configured to display only a single arrow as shown in figure 6 or a full bar graph as shown in figure 5. However, once selected, the same type of bar graph is displayed for all display configurations. Figures 7 through 21 all use the full bar graph method.

Figure 4 - Current Display Configuration

"L" Display

Display #1

"R" Display

Figure 5
Default display configuration 1

Engine RPM (Display #1)
Boat Speed (Display #2)
Depth on NMEA#2A (Display #3)
Oil Pressure ("L" Display)
Engine Temperature ("R" Display)
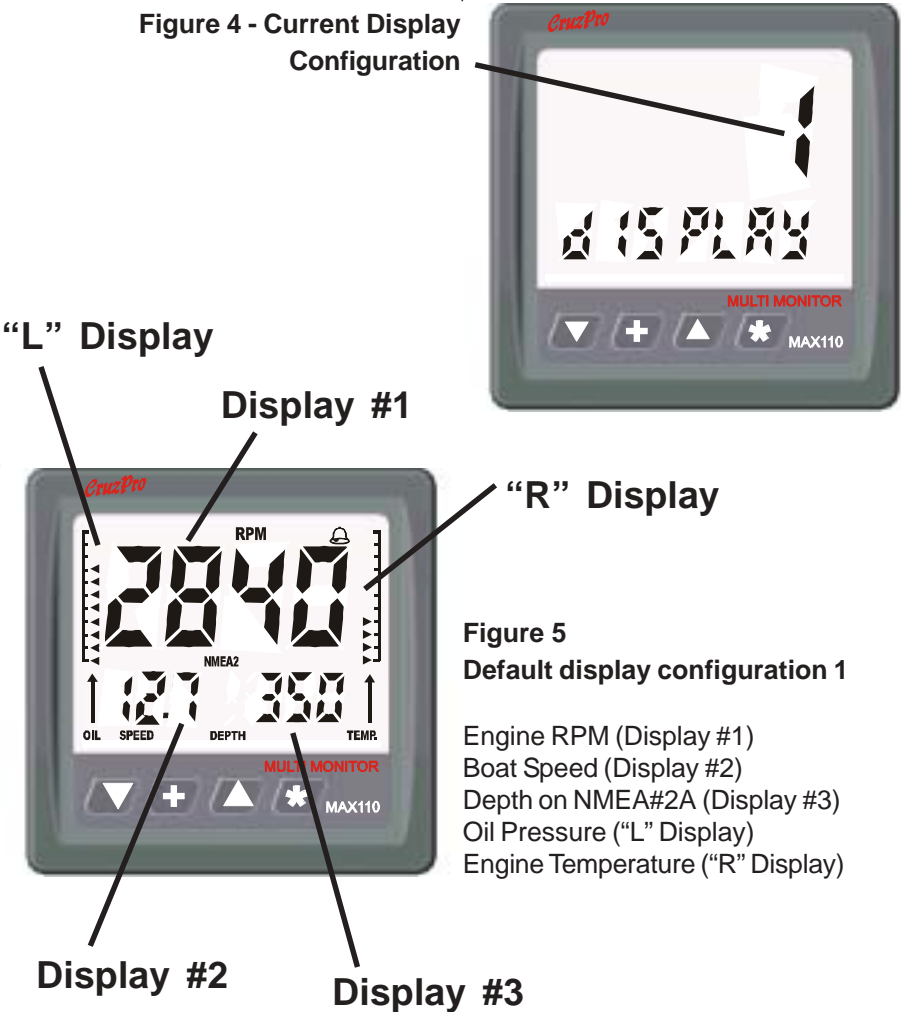
Display #2

Display #3

Figure 6
Default display configuration 2

Engine RPM
Boat Speed
Fuel Remaining
Oil Pressure
Engine Temperature

Figure 7
Default display configuration 3

Engine RPM
Boat Speed
Sea Water Temperature
Oil Pressure
Engine Temperature

Figure 8
Default display configuration 4

Depth (On NMEA input #2A)
Boat Speed
Engine RPM
Oil Pressure
Engine Temperature

Figure 9
Default display configuration 5

Depth (On NMEA#2A input)
Boat Speed
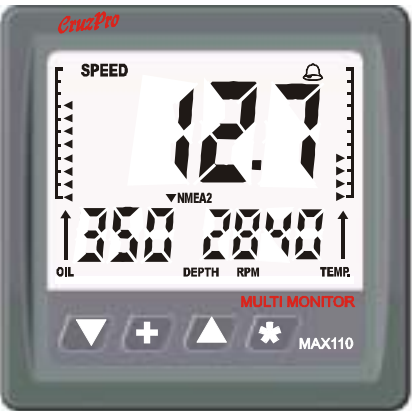Fuel Remaining
Oil Pressure
Engine Temperature

Figure 10
Default display configuration 6

Depth (On NMEA input #2A)
Boat Speed
Sea Water Temperature
Oil Pressure
Engine Temperature

Figure 11
Default display configuration 7

Boat Speed
Depth (On NMEA input #2A)
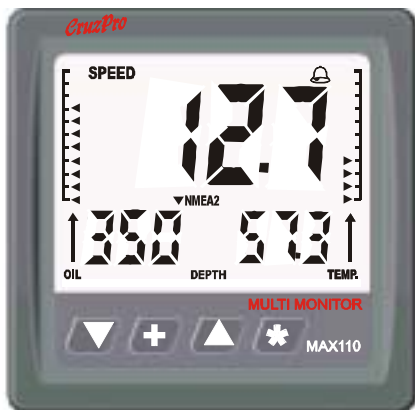Engine RPM
Oil Pressure
Engine Temperature

Figure 12
Default display configuration 8

Boat Speed
Depth (On NMEA input #2A)
Sea Water Temperature
Oil Pressure
Engine Temperature

Figure 13
Default display configuration 9

Boat Speed
Depth (On NMEA#2A input)
Fuel Remaining
Oil Pressure
Engine Temperature

Figure 14
Default display configuration 10

Engine RPM
Bearing to Waypoint (GPS On NMEA #4A)
Distance To Waypoint (GPS On NMEA #4B)
Oil Pressure
Engine Temperature

Figure 15
Default display configuration 11

Depth (On NMEA input #2A)
Bearing to Waypoint (GPS On NMEA #4A)
Distance To Waypoint (GPS On NMEA #4B)
Oil Pressure
Engine Temperature

Figure 16
Default display configuration 12

Boats Speed
Bearing to Waypoint (GPS On NMEA #4A)
Distance To Waypoint (GPS On NMEA #4B)
Oil Pressure
Engine Temperature

Figure 17
Default display configuration 13

Depth (On NMEA input #2A)
Battery Bank #1 Volts
Time of Day
Trim Angle on Aux#1 Input
EGT Pyrometer (On NMEA #3A)
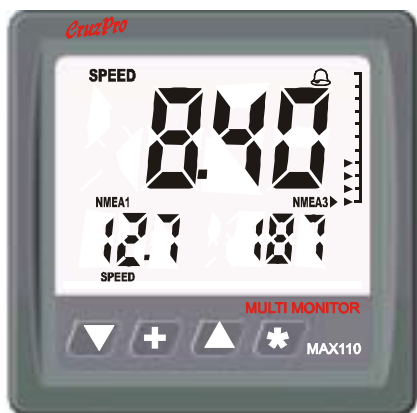
Figure 18
Default display configuration 14

Boats Speed
Wind Speed (On NMEA #1A)
Wind Direction (On NMEA #1B)
None
Depth (ON NMEA#2A)

Figure 19
Default display configuration 15

Battery Bank #1 Volts
Battery Bank #2 Volts
Battery Bank #3 Volts
Fuel Remaining
Water Tank Level (On NMEA #2B)

Figure 20
Default display configuration 16

None
None
None
None
None

Turning Alarms ON/OFF

To "arm" the alarms, press and hold the ▲ key 1/2 second. The Bell symbol will be displayed when the alarms are "armed". To disable the alarms press and hold the ▼ key for 1/2 second. Any press between 1/2 and 2 seconds will work. A press of less than 1/2 second or longer than 2 seconds will be ignored.

Setting High and Low Alarm Values

To View and/or Set the High Alarm value for any of the five current digital displays and bar charts, press and hold the ▲ key for ten seconds (until you hear a long beep). To View and/or Set the Low Alarm value for any of the displays press and hold the ▼ key for ten seconds. The alarm value, display identifier (1, 2, 3, L or r) and the word "HiAL" or "LoAL" will be displayed as shown in Figure 21. Quick press the ✚ key to select the desired display identifier (1, 2, 3, L or r). Press and hold the ▼ and ▲ keys to change the alarm value. Press the ✚ key for 1 second (until the long beep) to accept the new alarm value, save it to memory and leave the Alarm Editor mode.

Figure 21 - Alarm Editor

Editing the Hi alarm
for display #3

To prevent confusion, the High and Low alarm values are unique for each Data Source (i.e. RPM or Fuel level, etc.). For example, if you change the high alarm value for RPM in one display configuration, then the high alarm value for RPM will automatically change for each display configuration where RPM is displayed. **Be sure to read the warnings about alarms in the *Important Notes and***

Warnings **section about which Data Sources and conditions will sound an audible alarm**.

Setting Clock, Time-Of-Day Alarms and Race Timers

Press and hold the ▼ and ▲ keys for ten seconds (until you hear a long beep) to view and/or set the clock, time-of-day alarms and Race Timer1/Race Timer2. You will see the display shown in Figure 22.   The Hours will blink showing which is being changed.   Press the ✳ key to switch between changing the Hours or Minutes. Press (or hold) the ▼ and ▲ keys to change the value. Press the ✚ key to cycle through the eight Time of Day alarms and Race Timers. Press the + key for 1 seconds when you are done to save the results to memory.

Figure 22 - Clock/Alarm Editor
Setting Time-Of-Day Clock

Figure 23 shows what you will see when setting the Time-Of-Day alarms. These are set the same way as the clock. Press the + key for 1 seconds when you are done to save the results to memory.

Figure 23 - Clock/Alarm Editor
Setting the eight Time-Of-Day Alarms

The figure below shows what you will see when setting Race Timer2. The race timers are set the same way as the clock. Only the minutes can be set for the race timers. Press the + key for 1 seconds when you are done to save the results to memory.

To start Race Timer 1 quick press both the ▼ and ✚ keys. To start Race Timer 2 quick press both the ✚ and ▲ keys. You do not have to be viewing the race timers for them to work - they will work in the background. The race timers will start counting down from their assigned values and beep as each minute is counted down. When the race timers reach 10 seconds each second will be sounded off with a short beep. When the race timers reach zero you will hear a long beep.

In order to prevent confusion, only one race timer can be running. Starting Race Timer 2 will stop Race Timer1 and vice-versa. Once a race timer has been started it can also be stopped the same way. Restarting the race timers will cause them to reset and start from their original values not from where they were stopped.

Note: The Clock, Time-Of-Day alarms and Race Timers can also be set using the Windows software.

Calibrating a Data Source

Calibrating the displayed data is possible for many of the Data Sources. Press and hold the ✚ and ✳ keys for ten seconds to enter the Calibration Editor (until you hear a long beep).   The data source value, display identifier (1, 2, 3, L or r) and the word "CAL" will be displayed as shown in Figure 22. Quick press the ✚ key to select the desired display identifier (1, 2, 3, L or r). Press and hold the ▼ and ▲ keys to change the calibration value. Press the ✚ key for 1 second (until the long beep) to accept the new value, save it to memory and leave the Calibration Editor mode.

Figure 24 - Calibration Editor

Editing the calibration for the Data Source shown on digital display #2

When calibrating the Time-Of-Day clock a Clock Calibration value between 0 and 100 (nominal value is 50) will be shown on Display #1 and the time of day shown on Display #3.   Increase the Clock Calibration value to speed up the clock, decrease the Clock Calibration value to slow down the clock.   Increasing the Clock Calibration value by one will increase the clock speed by 1 second per day.   Decreasing the Clock Calibration value by one will decrease the clock speed by 1 second per day.

If the selected data source cannot be calibrated (such as data read from an NMEA 0183 string or Elapsed Trip Time) then "---" will be displayed for the Data Source value as shown here.

Figure 25 - Calibration Editor

Sample display when attempting to calibrate a Data Source that cannot be calibrated.

Setting Display Damping

It is possible to slow down how fast the numbers on the display change by adding "Display Damping" to the following data sources: RPM, Boat Speed, Fuel, Tank Level, Trim Angle, NMEA 0183 channels 2A, 2B, 3A and 3B. Filter values between 0 (No damping) and 250 (Extremely slow response) are allowed.

Press and hold the ▼ and ✳ keys for ten seconds to enter the Display Damping Editor (until you hear a long beep).   The filter value, display identifier (1, 2, 3, L or r) and the word "Filt" will be displayed as shown in Figure 26. Quick press the ➕ key to select the desired display identifier (1, 2, 3, L or r). Press and hold the ▼ and ▲ keys to change the calibration value. Press the ➕ key for 1 second (until the long beep) to accept the new value, save it to memory and leave the Display Damping Editor mode.

If the selected data source cannot be filtered (such as Engine Hours or Elapsed Trip Time) then "---" will be displayed for the Filter value.

Figure 26 - Display Damping Editor

Setting the Damping Value to "7" for the Data Source shown on digital display #3

Setting Units of Measure

Units of Measure are factory set to Feet, Knots, Degrees F and PSI. These can be changed using the Windows software only. It is not possible to change the Units of Measure using the front panel keys of the MaxVu110. Changing Units of Measure for one data source will change the Units of Measure for all other similar data sources (e.g. if you change from Degrees F to Degrees C for engine temperature then all other Data Sources that display temperature such as se water temperature, etc. will also be shown in Degrees C). The exception is for NMEA 0183 signals. The Units of Measure used by NMEA 0183 sentences is selected by using the appropriate data field in the NMEA sentence (See *Selecting an NMEA Sentence to Display*).

Setting Tachometer Sensitivity

Five different values of tachometer sensitivity can be set using the Windows software or on the MaxVu110 instrument itself. Press and hold the ▲ and ✳ keys for ten seconds to enter the Tachometer Sensitivity Editor (until you hear a long beep). RPM will be shown on Display #1, the sensitivity value 1 to 5 on Display #2 and the word "tACH" on Display #3 as shown in Figure 27. Quick press the ▼ or ▲ key to decrease or increase the tachometer sensitivity. Press the ✚ key for 1 second (until the long beep) to accept the new value, save it to memory and leave the Tachometer Sensitivity Editor mode.

Figure 27 - Tachometer Sensitivity

Setting Tachometer Sensitivity to a value of 1 to 5.

Setting Tachometer Pulley Ratio

The tachometer can be rough calibrated to use a pulley ratio between 1:1 to 200:1 (for geartooth sensors) in seven steps. Final fine calibration is done on the MaxVu110. Pulley Ratio cannot be set on the MaxVu110 itself and must be done using the Windows configuration software

Clearing Trip Fuel , Trip Distance and Trip Time

Press and hold the ✚ key for 10 seconds (until the long beep) to clear Trip Fuel, Trip Distance and Trip Time logs to zero.

Operation of the Windows Software

Software Installation

Place the distribution CD into your CD/DVD drive and the install program should launch automatically. If it does not, click on "Start", "Run" and type "D:\setup.exe" (substitute your CD ROM drive letter for "D" if your CD ROM is on another drive than "D").


Click OK and follow the instructions. Use the defaults unless you have a good reason not to. If the installation was successful, you should see:
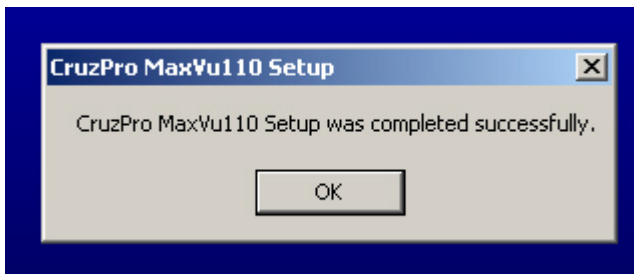
If you connect to the MaxVu110 to your PC using a RS232 serial port then you can skip the following USB Driver Installation section and proceed directly to the "Connecting to the MaxVu110" section.
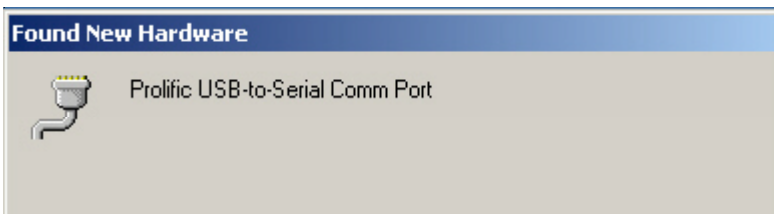
USB Driver Installation

If you plan to connect to the MaxVu110 with a USB cable you will first need to install the USB driver BEFORE you plug the supplied USB cable into your PC. Place the distribution CD in the CD ROM drive and navigate to the "DRIVERS" directory. Double click and run the program: HL-2303.EXE. After a few seconds you will see the following screen:
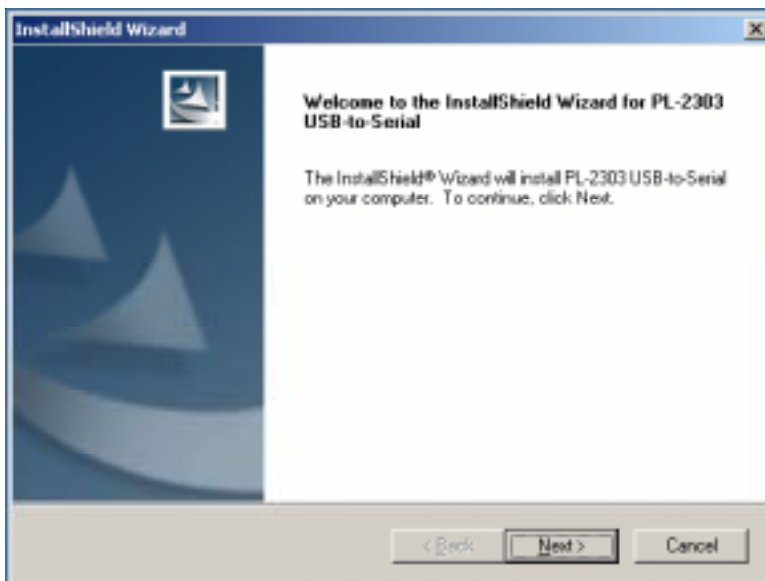
Click "Next" and click "Finish" when you see the following screen:
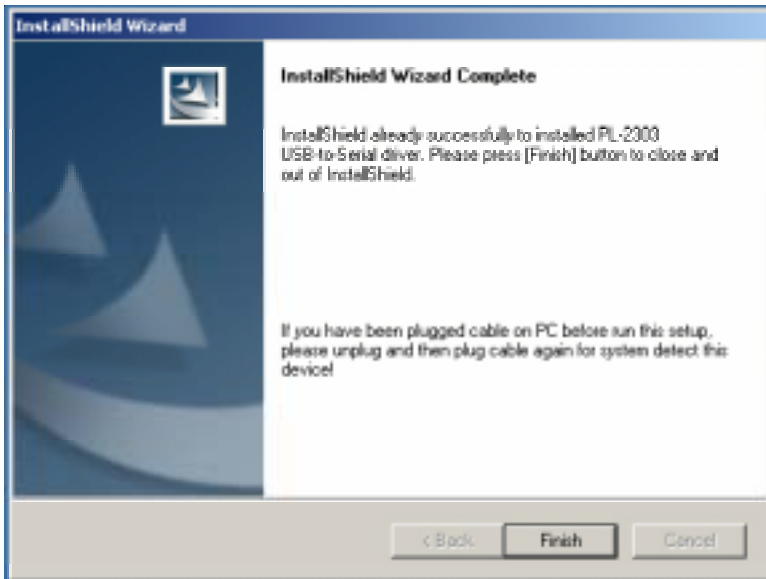
Now plug the supplied USB/RS232 cable into the MaxVu110 instrument and your PC USB port. The first time you plug the USB cable into your PC Windows will detect the new hardware and install the correct driver. Depending on your version of Windows after a few seconds you will see a message similar to:


Your USB cable is now ready to use.

Connecting to the MaxVu110

Connect the MaxVu110 to your PC using either a RS232 cable or the supplied USB cable (See USB Driver Installation FIRST). The Windows software will look for the MaxVu110 instrument when you wish to upload or download information to or from the instrument.

Main Screen

The Main Screen is divided into 4 areas: Pulldown Menus, Display Configurations, Data for Current Display Configuration and an ICONS area.
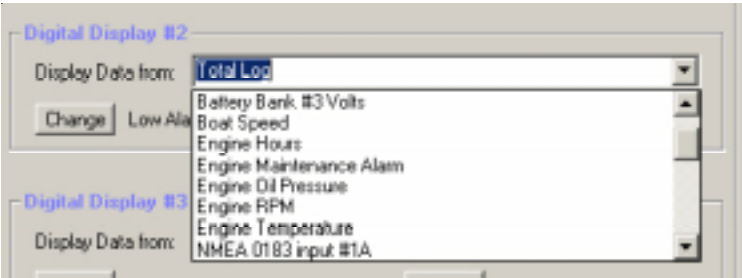
Pulldown Menu Area   **Current Display Configuration Area**

Display Configurations Area   **ICONS Area**
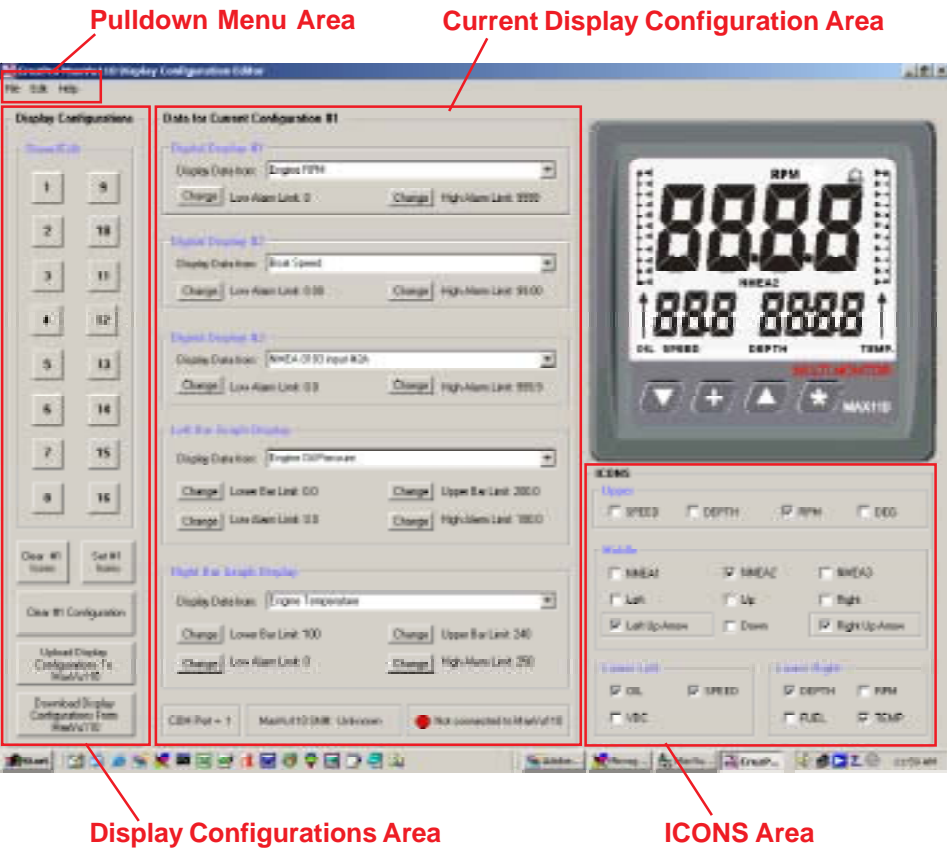
Display Configurations Area

The data being displayed, where it is displayed and the alarm limits for each display is called a "Display Configuration". The Display Configurations Area shows 16 buttons numbered 1 to 16 corresponding to each of the 16 possible display configurations. When you click on one of the 16 buttons all the information in the "Current Display Configuration" area and the "ICONS" area will be updated to show the correct information for that Display Configuration.

In addition to the 16 display configuration buttons, there are 5 buttons that will clear or set all the icons for the current display configuration or completely clear both the current display configuration and all the icons for the current display configuration. The two remaining buttons in the Display Configuration area are used to upload display configurations to the MaxVu110 and download display configurations from the MaxVu110 (See "Uploading and Downloading Display Configurations").

Current Display Configuration Area

Data Sources: All the information that specifies what data sources to display in each of the three digital displays and the two bar charts, the alarm limits and the upper and lower bar chart limits are defined in the Current Display Configuration area. Each of the three digital displays and two bar charts show what Data Source is going to be shown on the MaxVu110 LCD. Clicking the ▼ button in one of these areas results in a pulldown menu listing all the Data Source options available for that display as shown below. You can scroll through the list of up to 34 different Data Sources and select the item you wish to see.

High and Low Alarm Values: The High and Low alarm values assigned to the data source for each of the five displays (1, 2, 3, L, R) are shown in the Current Display Configuration area with a "change" box next to each.   Clicking the "Change" box allows you to change the High and Low alarm limits as shown below. **Be sure to read the warnings about alarms in the *Important Notes and Warnings* section about which Data Sources and conditions will sound an audible alarm**.
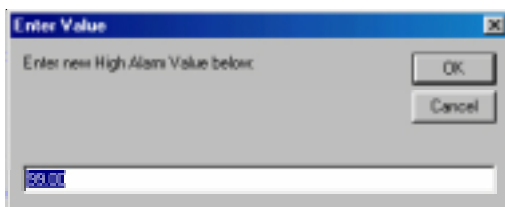
High and Low Limit Values for Bar Charts: Similarly the High and Low Limit values of the two bar charts are shown in the Current Display Configuration area along with "Change" boxes.   Clicking on the "Change" box allows you to change the High and Low Limit values for the two bar charts.   The high limit is the value that displays at the top of the bar chart and the low limit is the value that displays at the bottom of the bar chart.

A data source with a value equal to or greater than the High Limit is shown here on the bar chart.

A data source with a value between the Low Limit and High Limit will be displayed in this area of the bar chart.

A data source with a value equal to or less than the Low Limit is shown here on the bar chart.
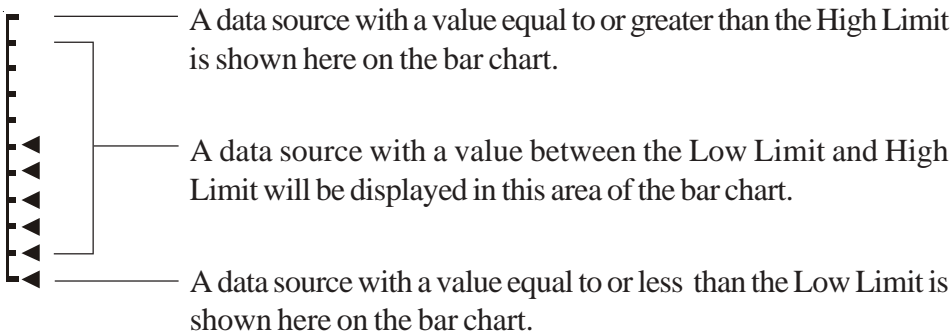
Selecting the High and Low Limit values appropriately allows you to scale the data or "zoom" into the area of interest to you. For example if you direct the battery voltage of a 12V battery to one of the bar charts you can set the Low Limit value at 11.8 V and the High Limit value to 12.2V providing an expanded scale for battery voltage.   The High and Low Limit values are completely independent of the high and low alarm limits.

ICONS Area

Icons are words or symbols like the word "RPM" or "FUEL" that help remind you what data is being displayed. The ICON area contains numerous checkboxes - one for each possible display icon. Checking a box will cause that icon to be "On". Unchecking the box will clear that icon from the display. The icons are not specifically tied to any data source. You have the freedom to check or uncheck any or all the icons you want. Each of the 16 different display configurations has its own set of icons that you can set or clear.

Pulldown Menu Area

There are standard Windows pulldown menus to save/recall files, edit various parameters such as Units of Measure, select and edit sender calibration curves and set the communications port to talk to the MaxVu110. Clicking on some pulldown menus can result in a second pulldown menu being displayed which may offer additional choices.

Files Menu: The Files menu shown below enables you to save and recall complete sets of Display Configurations along with the associated High and Low Alarm settings, High and Low bar chart limits, Icons, Units of Measure selections and other data such as Calibration Curves. Clicking "Save" will save the
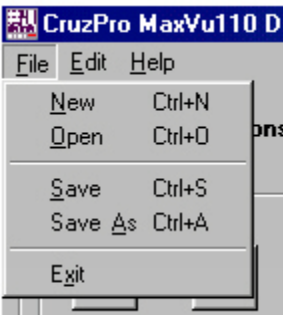
current set of display configurations into the default file which is loaded when the program starts. Clicking "Save As" will enable you to save the current set of display configurations into a new named file for later recall using the "Open" menu item. Clicking on "New" will clear the current display configurations to the factory defaults.

Edit Menu: The Edit menu is where you make changes to the Units of Measure (such as Degrees F or C), select 12 or 24 hour time format, select from two different bar graph formats, set display damping for different Data Sources and select/create sender calibration curves, etc. A summary of the Edit Menu choices are shown here:
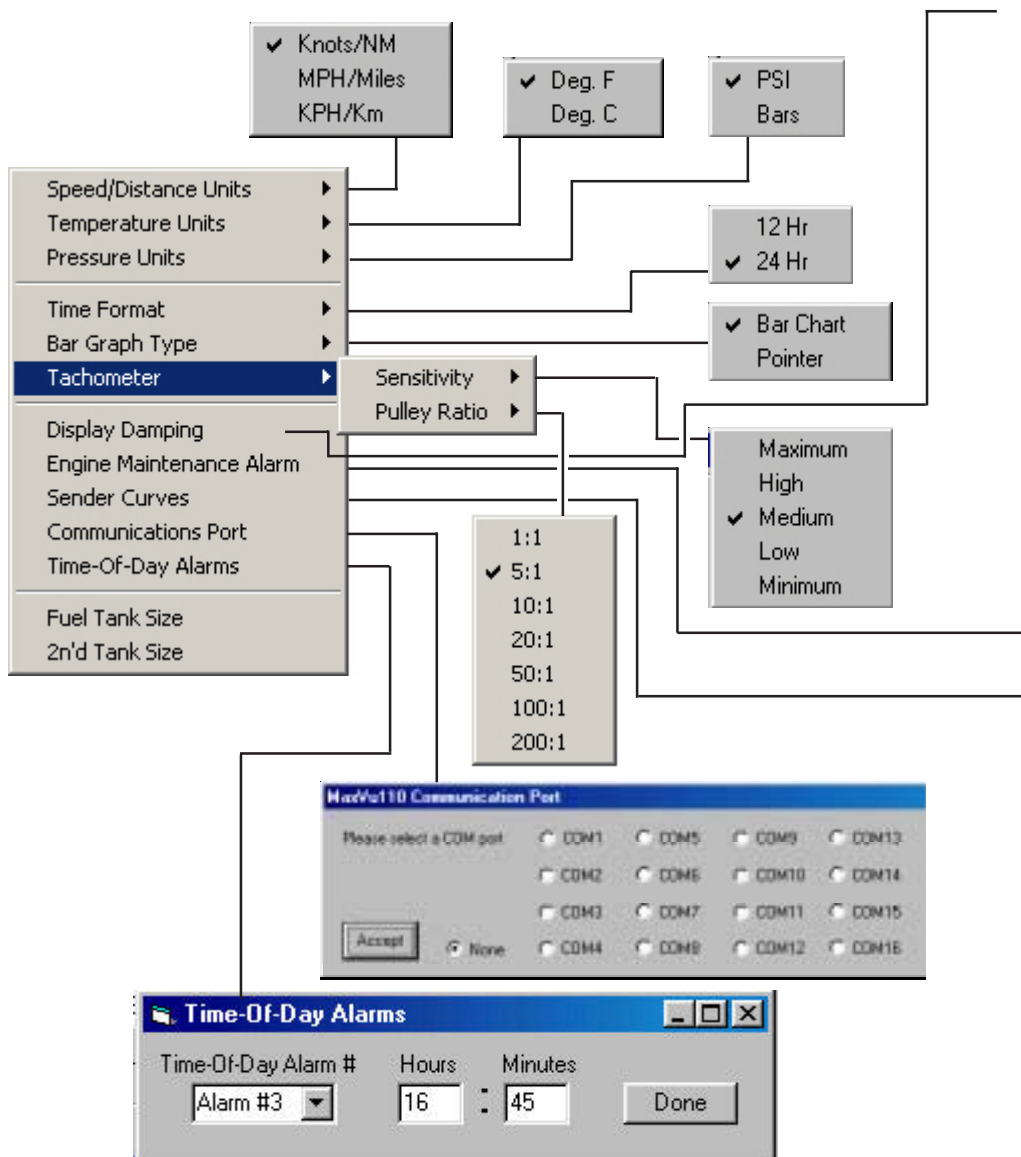
View/Set Display Damping

Display Function

Damping Value

Boat Speed ▼

| 3 |

| Done |

Boat Speed	▲
Engine RPM	
NMEA Channel 2A	
NMEA Channel 2B	
NMEA Channel 3A	
NMEA Channel 3B	
Tank1 - Fuel Remaining	
Tank2 - Option	▼

View/Set Engine Maintenance Alarm ☒

Enter a value between 0 and 1000 hours.
0=OFF

| OK |

| Cancel |

| 200 |

View / Select sender types & edit user defined calibration curves

Engine Temperature | 3: VDO type 1: 10–180 ohm. 275–60 deg F | ▼

Fuel Tank | 7: Linear: USA 10–180 ohm | ▼

Oil Pressure | 16: User defined Oil Pressure curve | ▼

Optional Trim Angle | 17: Linear: USA 10–180 ohm | ▼

Optional 2'nd Tank Level | 23: Linear: USA 10–180 ohm | ▼

Units of Measure

Temperature: Deg F   Pressure: PSI

View/Edit User Defined Sender Curves

| Engine Temp. | Fuel Tank | Oil Pressure | Trim Angle | 2'nd Tank Level |

Commands

| View Graph | Done / Exit |

View/Set Sender Curves: The Edit- View/Set Sender Curves menu is where you select sender calibration curves for Engine Temperature, Fuel, Oil Pressure, Optional Trim Angle and Optional Second Tank Level senders. For each data source there are a number of sender options to select from using the pull down menus.
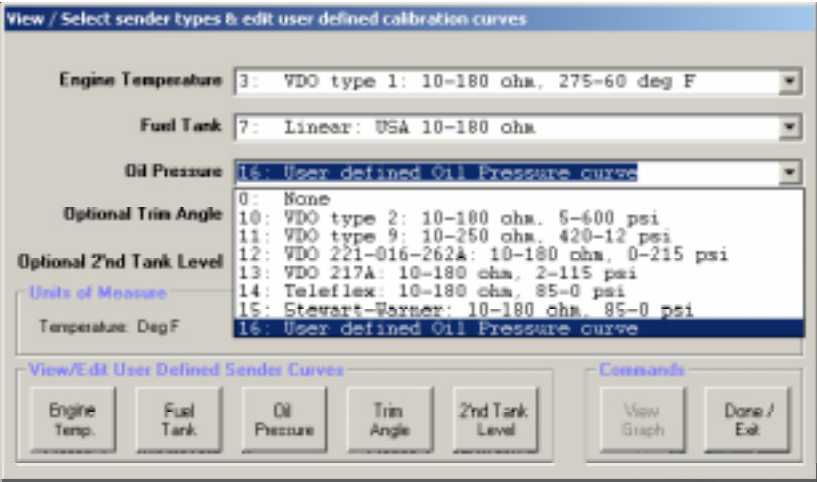
There is also an option to select a User Defined calibration curve. Click on one of the five user-definable sender buttons and create your own calibration curve using the built-in editor. This is very useful if your sender is not listed or if you have odd shaped tanks but still need an accurate display.

| Index	Ohms	Value
19	108	58.0
20	114	61.2
21	119	64.5
22	125	67.7
23	130	70.9
24	136	74.1
25	141	77.4
26	147	80.6
27	152	83.8
28	158	87.0
29	163	90.3
30	169	93.5
31	174	96.7
32	180	100.0

You can use the "View Graph" command to see a plot of the User Defined sender display as a function of sender resistance as shown in the graph below.

Help Menu: Click on the Help Menu to see the version number of the Windows software, the instrument internal firmware version and serial number.

Selecting an NMEA Sentence to Display

The MaxVu110 can display up to eight different sets of NMEA 0183 data coming in on one of the four NMEA 0183 compatible input channels (up to two different sentences per data line). The selected data can be displayed on one of three digital displays or one of the bar charts. The NMEA data to be displayed is selected on the "Current Configuration" screen using the pull down menus.
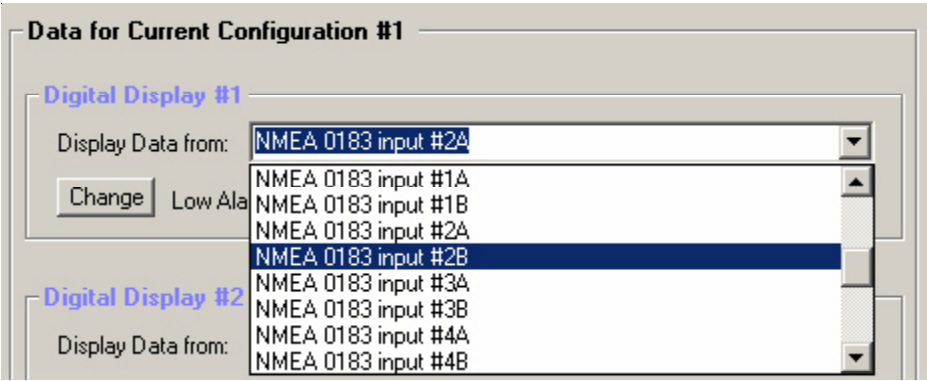
When you click on one of the eight possible input channels (#1A to #4B) another pull down menu lets you select the NMEA 0183 string to search for as shown here:
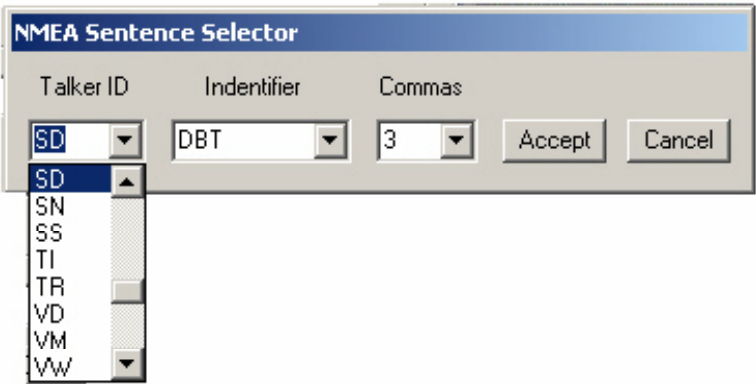
You can select from 48 different "Talker ID's" and 78 different sentence "Formatters". You must also specify the correct data field to display by counting the number of commas. For example, a typical NMEA 0183 depth sentence output by many depth sounders is the $SDDBT sentence shown here:

$SDDBT,015.7,f,004.8,M,002.6,F*0D

The first two characters after the $ symbol "**SD**" (Sounder Depth) is called the Talker ID and the next three characters "**DBT**" (Depth Below Transducer) is called the Sentence Formatter. The complete list of NMEA 0183 Talker ID codes and Sentence Formatters is shown in Appendix F along with some limitations of what can and cannot be displayed on the MaxVu110.

In the above sample NMEA sentence the first field "015.7" is located after the first comma and contains the depth in Feet. The second field "004.8" is located after the third comma and contains the depth in Meters. By selecting the appropriate field and counting commas we can display depth in Feet, Meters or Fathoms on the MaxVu110.

Uploading and Downloading Display Configurations

To upload and download display configuration data to and from the MaxVu110 instrument you must connect it to your PC using either the RS232 serial connector or to a USB port using the supplied RS232/USB converter. ***Switch off the power to the MaxVu110 "A" terminal*** and click the "Upload Display Configurations to MaxVu110" box or the "Download Display Configurations From MaxVu110" box in the display configurations area of the Windows software.

Click here to send data to the MaxVu110

**Click here to get data from the MaxVu110**
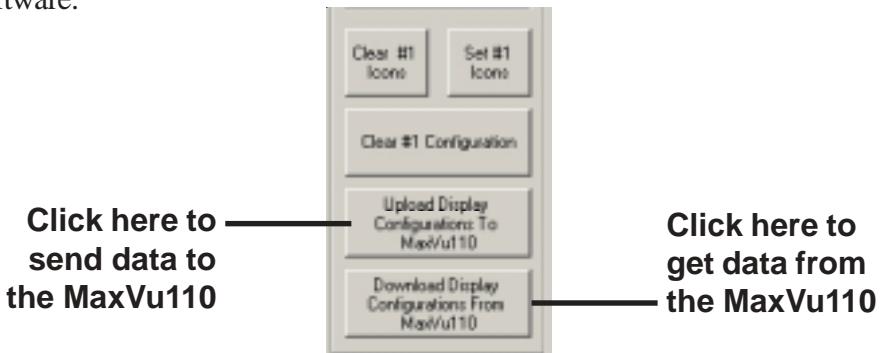
You will be shown a warning box and presented with the following choices when *uploading* data:
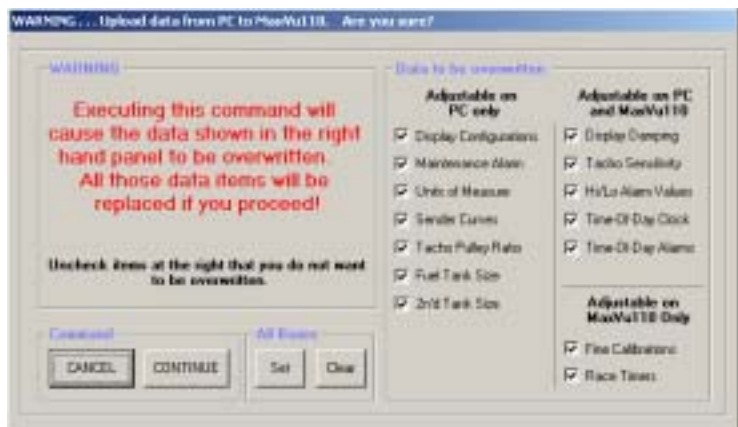
Uncheck the items that you do NOT want to transfer to the MaxVu110 and click CONTINUE.

When *downloading* data from the MaxVu110 you will be shown a slightly different warning box. Uncheck the items that you do NOT want to transfer from the MaxVu110 to the PC and click CONTINUE.
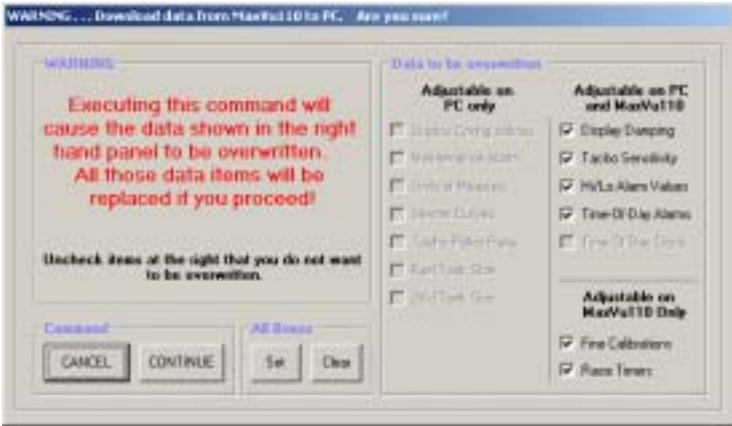
If this is the first time that you have transferred data between the MaxVu110 and the PC you will be asked which communications port to use to connect to the MaxVu110:

Select the port that connects to the MaxVu110 and the following information box is displayed while the PC tries to find the MaxVu110 instrument:
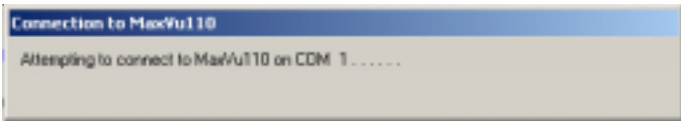
Switch ON power to the MaxVu110 instrument and a progress screen is displayed while the data is being transferred between the instrument and the PC.

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Connected to MaxVu110
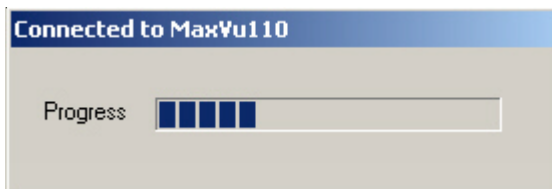
Progress ▮▮▮▮▮

Progress screen displayed while data is being transferred between MaxVu110 and PC.

If you do not know which communications port the MaxVu110 is connected to you can use the Windows Device Manager to show you the hardware configuration of the COM ports.

Device Manager

Action   View   ← →   🖳 🔳 📑   🔃

- 🖳 BERT-PC-2
  - 💻 Computer
  - 💽 Disk drives
  - 🖥 Display adapters
  - 🔆 DVD/CD-ROM drives
  - 🖴 Floppy disk controllers
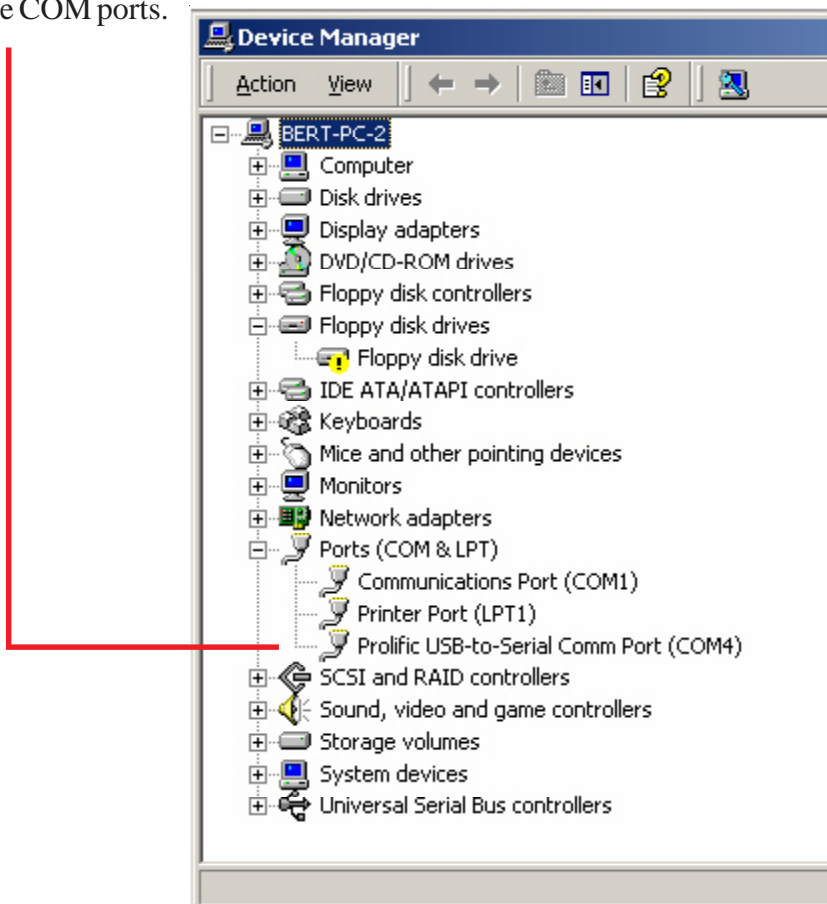 - 🖴 Floppy disk drives
    - 🖴 Floppy disk drive
  - 🖴 IDE ATA/ATAPI controllers
  - ⌨ Keyboards
  - 🖱 Mice and other pointing devices
  - 🖥 Monitors
  - 🖧 Network adapters
  - 🖭 Ports (COM & LPT)
    - 🖭 Communications Port (COM1)
    - 🖭 Printer Port (LPT1)
    - 🖭 Prolific USB-to-Serial Comm Port (COM4)
  - 🖴 SCSI and RAID controllers
  - 🔊 Sound, video and game controllers
  - 🖴 Storage volumes
  - 🖥 System devices
  - 🖧 Universal Serial Bus controllers

Appendix A - Specifications

Power supply: 12/24 VDC (9.5 to 33.0), 0.10 A to 0.15 A

Operating temperature: 32 to 122 F (0 to 50 C)

Size: 4.3" x 4.3" x 3.5" deep (110 x 110 x 89 mm).

Display: LCD, 3 digital, 2 bar charts, 16 different configurations

Backlighting: 5 levels (including OFF), plus external backlight
On/Off control.

Alarms: Individual high and low alarms for each of 5 displays
Engine Maintenance Alarm (Change oil, filters, etc.)
8 Time of Day alarms (Fax & radio schedules, etc.)

Data Sources/Inputs:

Battery voltage #1
Battery voltage #2
Battery voltage #3
Boat speed
Clock (12/24 hour format)
Engine Hours
Engine oil pressure
Engine RPM
Engine temperature (Temperature #1)
Fuel tank level (Tank #1)
Maintenance Alarm
Sea water temperature (Temperature #2)
NMEA 0183 serial data input lines (8 channels)
Programmable auxiliary input to measure Tank #2 or
Trim Angle
Race Timers (2)
Temperature #3
Time of Day Alarms (8)
Trip Fuel Used
Total Fuel Used

Trip Log
Total Log
Trip Time

Outputs: External alarm output.

Memory: Nonvolatile memory for alarms, display configurations, calibrations, backlight levels, etc.
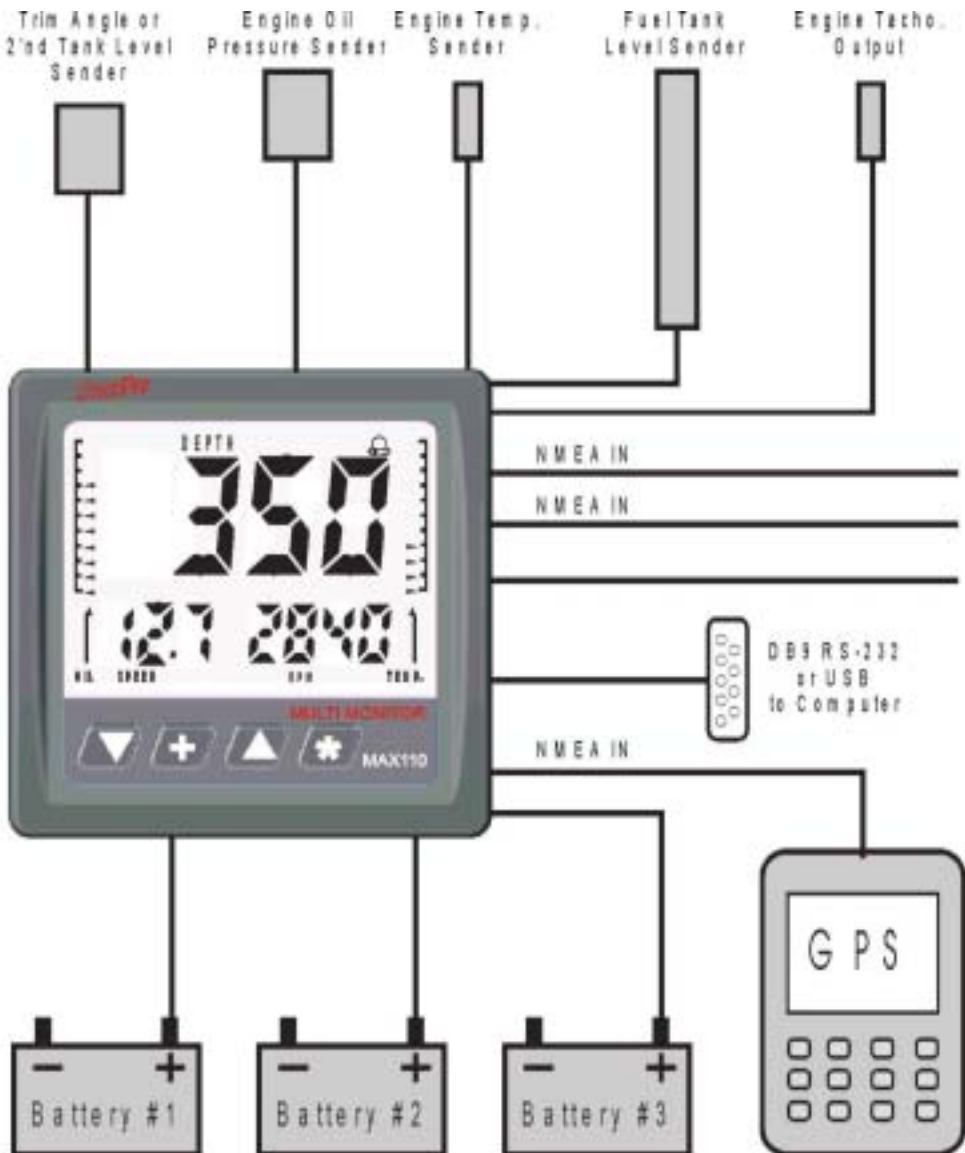
Calibration Curves:

25 curves for Engine Temperature, Oil Pressure, Fuel Level, Optional Trim Angle and Optional 2n'd tank Level, including five user definable calibration curves.
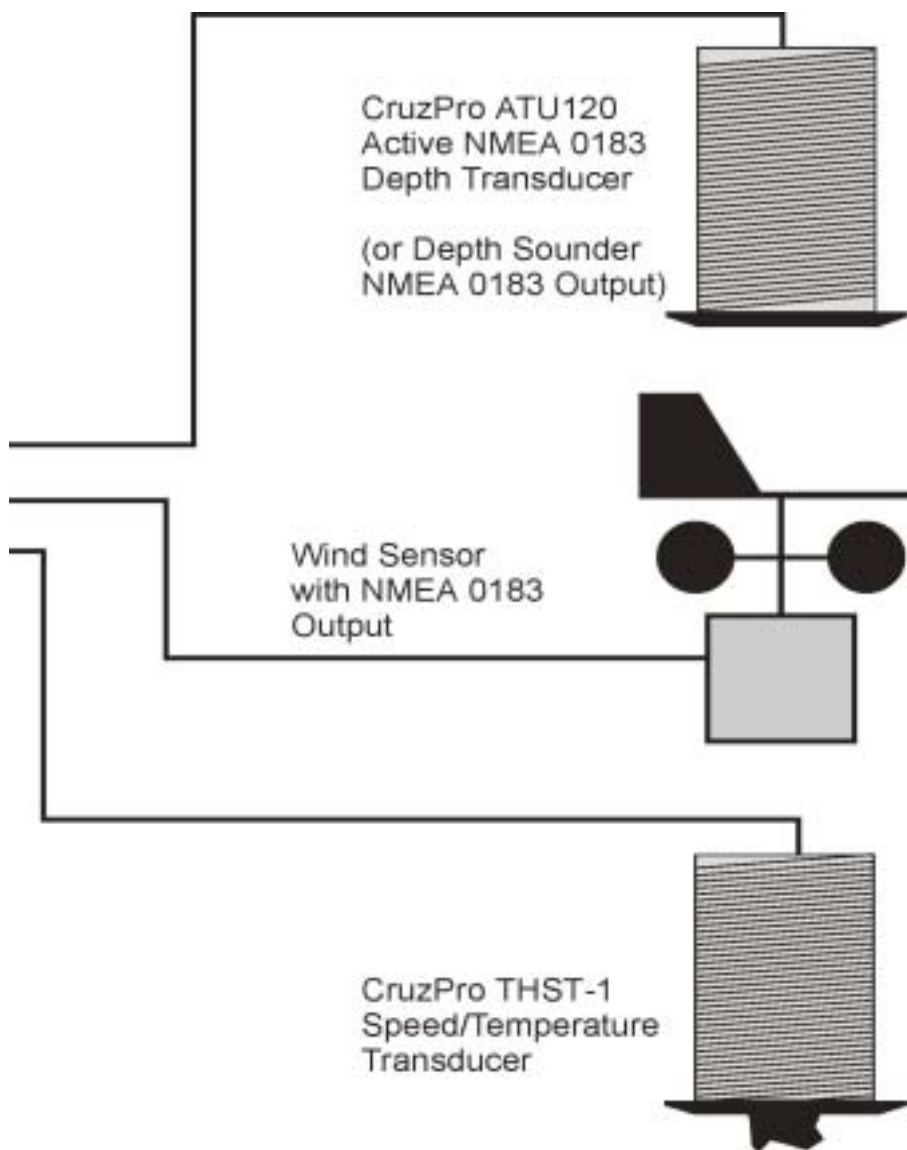
Appendix B -   Packing List

The MaxVu110 package is supplied with the following items:

1) MaxVu110 instrument with DB9 RS232 connector.
2) Dust/rain cover.
3) Closed cell foam waterproof bulkhead gasket (adhesive one side).
4) RS232/USB converter to plug into PC USB port.
5) Printed user manual.
6) CD with MaxVu110 Windows software for Win98, Win NT, Win2K, WinXP, Vista, Win 7 and USB drivers. Please check "README.TXT" file for the latest updates and also check on our website "www.cruzpro.com" for the latest version of the software and user manual.
7) Warranty card.

Appendix C -   Typical Setup

Trim Angle or
2'nd Tank Level
Sender

Engine Oil
Pressure Sender

Engine Temp.
Sender

Fuel Tank
Level Sender

Engine Tacho.
Output

DEPTH

350

12.7 2840

OIL   SPEED   RPM   TEMP.

MULTI MONITOR

MAX110

NMEA IN

NMEA IN

DB9 RS-232
or USB
to Computer

NMEA IN

GPS

Battery #1

Battery #2

Battery #3

CruzPro ATU120
Active NMEA 0183
Depth Transducer

(or Depth Sounder
NMEA 0183 Output)

Wind Sensor
with NMEA 0183
Output

CruzPro THST-1
Speed/Temperature
Transducer

Appendix D -   Important Notes and Warnings

1)   The NMEA 0183 serial data output from Other CruzPro instruments can be sent to the MaxVu110 to display additional functions on the MaxVu110 display such as:

    a)   Extra water and fuel tanks
    b)   Battery charge remaining, battery amps
    c)   Exhaust gas pyrometers
    d)   Rudder Angle
    e)   Refrigerator, freezer, bait tank, room temperatures, etc.
    f)   AC volts, frequency, amps, Kilowatts

2)   The CruzPro NC20/4 and NC20/8 NMEA 0183 combiners can be used to add additional NMEA 0183 input lines to the MaxVu110 beyond the 4 lines already contained in the MaxVu110. This way you can expand the number of NMEA 0183 instrument lines from 4 up to a maximum of 32.

3)   The front of the MaxVu110 can get splashed. The back is not sealed and must be protected from water.

4)   The nonvolatile memory in the MaxVu110 will retain data for a minimum of 10 years without power.

5)   Lines connecting to Battery #1, #2 and #3 should be protected from shorts by placing a 5 amp fuse near the battery side of the connection. The Battery #3 input line is used to run the engine hours log and engine maintenance timer and should be connected to the ignition line.

6)   The factory default for the Engine Maintenance Alarm value is 200 hours and can only be changed using the Windows Software. When the Engine Maintenance Alarm value has counted down to zero the Engine Maintenance Alarm will sound and the value will then restart from the original setting (i.e. 200 hours or whatever you selected.)   If the alarm value is changed using the Windows Software, the new value will be used when the existing alarm value has finished counting down to 0 hours.

7) If you want an alarm to sound for a particular Data Source:
   a) The alarms must be "armed" (i.e. the Bell symbol must be lit).
   b) The Data Source value must fall outside the Low or High Alarm limits.
   c) Only the following Data Sources will activate the alarm:
      1) Data Sources being viewed on the display (fast alarm beep)
      2) Critical background alarm functions (See list in Appendix E).

8) The displayed value will show "----" or "---" if that Data Source cannot be displayed or modified. For example - while you can "Calibrate" engine temperature you cannot "Calibrate" the total log or "Calibrate" a NMEA Data Source. While you can change "Display Damping" on Boat Speed or "Battery Voltage" fluctuations, you cannot change "Display Damping" on the total log. "---" or "----" will be also be shown if the displayed number is larger than will fit on the display (e.g. the four digit number 1734 will not fit on 3 digit display).

9) The Auxiliary input #1 cannot be used for more than one function at a time (e.g. Optional Tank Level #2 or Optional Trim Angle Display but not BOTH).

10) Calibration curves are NOT overwritten when "New" is selected off the File Menu. All Calibration Curve data is retained. Calibration Curves can only be uploaded to the MaxVu110 from the PC, they cannot be downloaded to the PC from the MaxVu110 or edited on the MaxVu110.

11) The default Units of Measure are Feet, Knots, Nautical Miles, degrees Fahrenheit and PSI. Units of Measure can only be changed using the Windows software. Once a unit of measure is selected it will be used for all Data Sources using that unit (i.e. deg F for all temperature displays). Tankage is unitless - i.e. the displayed units for fuel are the same for which the tank was calibrated (gallons if calibrated in gallons, liters if calibrated in liters, etc.).

12) When Units of Measure are changed, the alarm values are not modified. You must set the Units of Measure first, then set the alarm values or change alarms values manually after you change the Units of Measure.

13) NMEA channels 2A, 2B, 3A and 3B can have display damping (filtering). Assign NMEA 0183 sentences that might require display damping to these channels (i.e. depth, wind speed, wind direction, etc.).

14) Turning Power ON/OFF. The MaxVu110 draws very little power and is intended to have power ON at all times. Press and hold the ✳ key to turn the MaxVu110 *display* OFF. The clock will keep running. Press and hold the ✳ key again to enable the display. The Time-Of-Day clock will have to be set again *if you remove power to the MaxVu110 "A" terminal* but all other data is saved to a nonvolatile memory and not lost.

15) NMEA 0183 channel 2A is monitored in the background as one of the "Critical Alarm" functions (See list in Appendix E). You should assign an important NMEA sentence to this channel such as Depth. If depth is connected to another NMEA channel it will not be monitored in the background. Depth will still be monitored if it is being viewed on the current display configuration however.

16) After settings are changed it can take up to 30 seconds to save the data to the nonvolatile memory. If power is removed from the MaxVu110 during this time the changes may not be saved to memory and the older settings will be used when power is reapplied.

17) Both High and Low alarms for NMEA 0183 data can only be set in full units (i.e. full Degrees not tenths of a Degree, etc.).

18) When using the t and s keys to change a value, holding them down will cause the value to scroll fast after three seconds and very fast after ten seconds.

19) Engine Hours and the Maintenance Alarm only run when the ignition line is On. Battery #3 is used to determine if the ignition is On so wire Battery #3 to the ignition line.

20) When creating User defined calibration curves for Fuel/Tanks, Oil Pressure, and Engine Temperature it is important that the resistance and displayed values change between each of the 32 calibration points and that the curves either rise or fall but do not double back (e.g. start to rise then fall or vice-versa).

Appendix E - Critical Background Alarm Functions

In addition to sounding the alarms for the functions currently being displayed, the MaxView110 always monitors the following "Critical" functions *if the alarms are armed*.

	Alarm Code	
Priority	Source #	Function (See Table of Standard Data Sources, Page 7)
1	25	Depth (Must be programmed on NMEA channel 2A !)
2	2	Engine Temperature
3	3	Oil Pressure
4	1	RPM
5	6	Fuel
6	18	Battery #1 Volts
7	19	Battery #2 Volts
8	20	Battery #3 Volts
9	9	Boat Speed
10	15	Time-Of-Day alarms (Up to 8 different)
11	5	Engine Maintenance alarm

If one of these critical functions go outside the alarm limits a slow alarm signal will sound and the alarm bell icon will blink. Quick press the ✱ key to silence the alarm and view which alarm is breached. The display will vary depending on the function as shown in the following examples. Quick press the ✱ key again to view the previous display configuration. The alarm bell icon will continue to blink until you disarm the alarms. If multiple critical alarms are breached the one with the highest priority will be displayed. The critical alarm function and value stay in memory until cleared.

You can continue to toggle between viewing the critical alarm function display and the current display configuration. Once the alarms have been disabled the critical alarm function memory is cleared and viewing is disabled.

Alarm Source # 25 - Depth

**Sample Critical
Alarm Displays**

AL.02

255

**Alarm Source # 02
Engine Temperature**

AL.20

bA3 1583

**Alarm Source # 20
Battery #3 Volts**

AL. 15

tod 12:30

**Alarm Source # 15
Time-Of-Day**

Appendix F - Key Function Summary

In normal display mode

Keys			Secs	Function
▼		✳	0.1	Scroll DOWN display configurations
	▲	✳	0.1	Scroll UP display configurations
		✳	0.1	Toggle between view Critical Alarms screen and view current display configuration .
▼	✚		0.1	Start/Stop Race Timer #1
✚	▲		0.1	Start/Stop Race Timer #2
✚		✳	0.1	Display Version and Serial Number for 5 seconds
▼			0.5	Disable Alarms (Turns off BELL symbol)
✚			0.5	Scroll UP through 5 backlight levels
	▲		0.5	Enable alarms (Turns on BELL symbol)
	✳		5	Turn Power OFF/ON (Disable/Enable Display)
▼			10	Enter "Set Low Alarm Values" Mode
✚			10	Clear Trip Fuel, Trip Distance and Trip Time
	▲		10	Enter "Set High Alarm Values" Mode
▼		✳	10	Enter "Set Display Damping" Mode
✚		✳	10	Enter "Calibrate Display" Mode
	▲	✳	10	Enter "Set Tachometer Sensitivity" Mode
▼	▲		10	Enter "Set Time-Of-Day/Alarms/Race Timer" Mode

In "Set Low/High Alarm Values" Mode

Keys		Secs	Function
✚		0.1	Scroll through Display Number (1, 2, 3, L, R)
▼		0.1	Decrease displayed reading
	▲	0.1	Increase displayed reading
✚		1.0	Save new calibration value(s) to memory

In "Set Display Damping" Mode

Key Presses		Sec.	Function
✚		0.1	Scroll through Display Number (1, 2, 3, L, R)
▼		0.1	Decrease selected display damping
	▲	0.1	Increase selected display damping
✚		1.0	Save new value(s) to nonvolatile memory

In "Calibrate Displays" Mode

Keys		Secs	Function
✚		0.1	Scroll through Display Number (1, 2, 3, L, R)
▼		0.1	Decrease displayed reading
	▲	0.1	Increase displayed reading
✚		1.0	Save new calibration value(s) to memory

In "Set Tachometer Sensitivity" Mode

Keys	Secs	Function
▼	0.1	Decrease sensitivity
▲	0.1	Increase sensitivity
✚	1.0	Save new calibration value to memory

In "Set Time-Of-Day/Alarms/Race Timer " Mode

Keys	Secs	Function
✚	0.1	Select Time-Of-Day, Alarm1, Alarm2, etc.
✳	0.1	Switch between setting Hours and Minutes
▼	0.1	Decrease value
▲	0.1	Increase value
✚	1.0	Save new value(s) to memory

Appendix G - NMEA 0183 search string handling

Each NMEA input #1-4 can be programmed to search for two different NMEA 0183 strings. Each NMEA search string is identified with a one digit "Talker" index which point to a talker identifier such as "GP" for GPS, a one digit "Search String" index which points to a 3 character search string such as "RMC" and a one digit "Comma Counter". The talker index, identifier and comma counter are stored as part of the Display Configuration.

Limitations on NMEA string decoding:

a) Numbers larger than 9999 will display as "----" on a 4 digit display
b) Numbers larger than 999 will display as "---" on a 3 digit display
c) Negative numbers smaller than (less than) -999 will display as "----" on a 4 digit display
d) Negative numbers smaller than (less than) -99 will display as "---" on a 3 digit display
f) The bar charts will display both positive and negative NMEA 0183 numbers as positive.

Talker
Index   Talker ID Code

0   None - not used
1   AG   Autopilot - General
2   AP   Autopilot - Magnetic
3   CC   Computer - Programmed Calculator (outdated)
4   CD   Communications - Digital Selective Calling (DSC)
5   CM   Computer - Memory Data (outdated)
6   CR   Data Receiver
7   CS   Communications - Satellite
8   CT   Communications - Radio-Telephone (MF/HF)
9   CV   Communications - Radio-Telephone (VHF)
10   CX   Communications - Scanning Receiver
11   DE   DECCA Navigation (outdated)
12   DF   Direction Finder

13	EC	Electronic Chart Display & Information System (ECDIS)
14	EP	Emergency Position Indicating Beacon (EPIRB)
15	ER	Engine Room Monitoring Systems
16	GP	Global Positioning System (GPS)
17	HC	Heading - Magnetic Compass
18	HE	Heading - North Seeking Gyro
19	HN	Heading - Non North Seeking Gyro
20	II	Integrated Instrumentation
21	IN	Integrated Navigation
22	LA	Loran A (outdated)
23	LC	Loran C
24	MP	Microwave Positioning System (outdated)
25	OM	OMEGA Navigation System (outdated)
26	OS	Distress Alarm System (outdated)
27	RA	RADAR and/or ARPA
28	SD	Sounder, Depth
29	SN	Electronic Positioning System, other/general
30	SS	Sounder, Scanning
31	TI	Turn Rate Indicator
32	TR	TRANSIT Navigation System
33	VD	Velocity Sensor, Doppler, other/general
34	VM	Velocity Sensor, Speed Log, Water, Magnetic
35	VW	Velocity Sensor, Speed Log, Water, Mechanical
36	WI	Weather Instruments
37	YC	Transducer - Temperature (outdated)
38	YD	Transducer - Displacement, Angular or Linear (outdated)
39	YF	Transducer - Frequency (outdated)
40	YL	Transducer - Level (outdated)
41	YP	Transducer - Pressure (outdated)
42	YR	Transducer - Flow Rate (outdated)
43	YT	Transducer - Tachometer (outdated)
44	YV	Transducer - Volume (outdated)
45	YX	Transducer
46	ZA	Timekeeper - Atomic Clock
47	ZC	Timekeeper - Chronometer

48	ZQ	Timekeeper - Quartz
49	ZV	Timekeeper - Radio Update, WWV or WWVH

String
Index   Sentence Formatter

0	None - not used
1	AAM - Waypoint Arrival Alarm
2	ALM - GPS Almanac Data
3	APA - Autopilot Sentence "A"
4	APB - Autopilot Sentence "B"
5	ASD - Autopilot System Data
6	BEC - Bearing & Distance to Waypoint - Dead Reckoning
7	BOD - Bearing - Waypoint to Waypoint
8	BWC - Brg and Dist. to Wypt, Lat., N/S, Long.,E/W,UTC, Status
9	BWR - Brg and Dist. to Wypt,Rhumb Line, Lat, N/S, Long,E/W,UTC,Status
10	BWW - Bearing - Waypoint to Waypoint
11	DBK - Depth Below Keel
12	DBS - Depth Below Surface
13	DBT - Depth below transducer
14	DCN - Decca Position (obsolete)
15	DPT - Depth
16	DRU - Dual Doppler Auxilary Data
17	DSC - Digital Selective Calling Information
18	DSE - Extended DSC
19	DSI - DSC Transponder Initiate
20	DSR - DSC Transponder Response
21	DTM - Datum Reference
22	FSI - Frequency Set Information
23	GBS - GPS Satellite Fault Detection
24	GDA Dead Reckoning Position
25	GGA - Global Positioning System Fix Data, Time, Position and fix
26	GLA - Loran-C Positions
27	GLC - Geographic Position, Loran-C

28	GLL - Geographic Position - Latitude/Longitude
29	GNS - GNSS fixed data
30	GOA - OMEGA Positions
31	GRS - GNSS Range Residual
32	GSA - GPS DOP and active satellites
33	GST - GNSS Pseudorange Error Statistics
34	GSV - Satellites in view
35	GTD - Geographic Location in Time Differences
36	GXA - TRANSIT Pos.,Lat./Long.,Loc/time of TRANSIT fix at wypt (obs.)
37	HCC - Compass Heading
38	HCD - Heading and Deviation
39	HDG - Heading - Deviation & Variation
40	HDM - Heading - Magnetic
41	HDT - Heading - True
42	HSC - Heading Steering Command
43	HVD - Magnetic Variation, Automatic
44	HVM - Magnetic Variation, Manually Set
45	IMA - Vessel Identification
46	LCD - Loran-C Signal Data
47	MDA - Standard Meteorological Composite
48	MHU - Humidity
49	MMB - Barometer
50	MSK - MSK Receiver Interface (for DGPS Beacon Receivers)
51	MSS - MSK Receiver Signal Status
52	MTW - Water Temperature
53	MWD - Wind Direction & Speed
54	MWV - Wind Speed and Angle
55	OLN - Omega Lane Numbers (obsolete)
56	OSD - Own Ship Data
57	ROO - Waypoints in active route
58	RMA - Recommended Minimum Navigation Information
59	RMB - Recommended Minimum Navigation Information
60	RMC - Recommended Minimum Navigation Information
61	ROT - Rate Of Turn

62	RPM - Revolutions
63	RSA - Rudder Sensor Angle
64	RSD - RADAR System Data
65	RTE - Routes
66	SFI - Scanning Frequency Information
67	SNU - Loran - C SNR Status
68	STC - Time Constant
69	STN - Multiple Data ID
70	STR - Tracking Reference
71	SYS - Hybrid System Configuration
72	TEC - TRANSIT Satellite Error Code & Doppler Count
73	TEP - TRANSIT Satellite Predicted Elevation
74	TGA - TRANSIT Satellite Antenna & Geoidal Heights
75	TIF - TRANSIT Satellite Initial Flag
76	TLL - Target latitude and longitude
77	TRF - TRANSIT Fix Data (obsolete)
78	TRP - TRANSIT Satellite Predicted Direction of Rise
79	TRS - TRANSIT Satellite Operating Status
80	TTM - Tracked Target Message
81	VBW - Dual Ground/Water Speed
82	VDC - Current at Selected Depth
83	VDR - Set and Drift
84	VHW - Water speed and heading
85	VLW - Distance Traveled through Water
86	VPE - Speed, Dead Reckoning Parallel to True Wind
87	VPW - Speed - Measured Parallel to Wind
88	VTA - Actual Track
89	VTG - Track made good and Ground speed
90	VTI - Intended Track
91	VWE - Wind Track Efficiency
92	VWR - Relative Wind Speed and Angle
93	VWT - True Wind Speed and Angle
94	WCV - Waypoint Closure Velocity
95	WDC - Distance to Waypoint - Great Circle
96	WDR - Distance to Waypoint - Rhumb Line

Appendix H - Expansion With Optional Accessories

A generous number of spare input and output lines are provided to enable additional connections with external hardware in the future. At this time the following optional accessories are under consideration:

1)   Chain Counter
2)   Data Logger
3)   NMEA 0183 Output
4)   Alarm Fault Log
5)   Security Alarm

Your suggestions for additional accessories are welcomed.   Please email suggestions to support@cruzpro.com.

Appendix I - Updating the Internal Firmware

The internal software that runs the MaxVu110 instrument (firmware) can be updated via the USB connector or RS232 serial port as new versions become available. Each firmware update is supplied with complete instructions. Be sure to return the MaxVu110 registration card and/or send your contact details to support@cruzpro.com to insure that you will be informed of new updates as soon as they become available.

Your suggestions for improvements and new features are welcomed. Please email suggestions to support@cruzpro.com.

Appendix J - Display Firmware Ver. and Serial Number

Quick press both the ✚ and ✳ keys to display the current Firmware Version and the product Serial Number for five seconds.

Appendix K - Error Codes

The internal software that runs the MaxVu110 instrument can detect and display some software and hardware errors. A listing of those error codes and their meaning as shown below.

0   Contents of internal nonvolatile memory are corrupted and factory defaults are being used. Please check and set/reset all alarm values, etc.

1   Unable to communicate with micro U101 - contact dealer

2   Unable to communicate with micro U201 - contact dealer

3   Unable to communicate with micro U301 - contact dealer

4   Unable to communicate with micro U401 - contact dealer

5   Contents of nonvolatile memory corrupted and factory defaults are being used. Please check and set/reset Engine Hours, Maintenance Alarm, Total Log and Total Fuel used.

6   Supply voltage below the minimum 11.2 VDC required to update Engine hours, logs, fuel used, etc. data to the nonvolatile memory. Check power.

7   Unable to program or read nonvolatile memory - contact dealer.

8   Error reading Current Configuration Data from nonvolatile memory. Contact dealer if unable to reprogram.

9   Not used

10 Not used

11 Not used

12 Error reading Engine Hours and logs from nonvolatile memory - contact dealer.

13. Activation code error - contact dealer.

Appendix L -   Optional Items

A number of different transducer options are available for the MaxVu110:

Depth Transducer Options:

1) ATB120A - 450 ft bronze thru-hull ACTIVE NMEA 0183 transducer.
2) ATB120B - 1000 foot bronze thru-hull ACTIVE depth NMEA 0183 transducer.
3) ATT120A - 450 foot transom mount ACTIVE depth NMEA 0183 transducer.
4) ATT120B - 1000 foot transom mount ACTIVE depth NMEA 0183 transducer.
5) ATU120A 450 foot thru-hull mount ACTIVE depth NMEA 0183 transducer.
6) ATU120B 1000 foot thru-hull mount ACTIVE depth NMEA 0183 transducer.

Speed/Temperature Transducer Options:

1) THST-2 Retractable Plastic Thru-Hull Speed/Temp Transducer with 30' cable and 5 pin Fuji connector.
2) THST-3 Retractable Bronze Thru-Hull Speed/Temp Transducer with 30' cable & plug with 5 pin Fuji connector.
3) TMST-2 Transom Mount Speed/Temp Transducer with 25' cable with 5 pin Fuji connector.

Temperature Transducer Options:

1) THT-1 Bronze Thru-Hull Water Temp Transducer with 30' cable.
2) TMT-1 Plastic Transom water Temp with 30' cable.
3) BOL-1 Bolt-On temperature sensor with 30' cable (suitable for bolting onto items such as batteries or into the engine room).

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