Other CruzPro Products

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

email: info@cruzpro.com
website: www.cruzpro.com

CruzPro®
RP110

Trainable NMEA 0183 Data Repeater

Table of Contents

```
168 $WIMDA   BAROMETRIC PRESSURE BARS
169 $WIMDA   AIR TEMPERATURE DEGREES CELCIUS
170 $WIMDA   RELATIVE HUMIDITY %
171 $WIMDA   ABSOLUTE HUMIDITY %
172 $WIMDA   DEWPOINT DEGREES CELCIUS
173 $WIMDA   WIND DIRECTION DEGREES TRUE
174 $WIMDA   WIND DIRECTION DEGREES MAGNETIC
175 $WIMDA   WIND SPEED KNOTS
176 $WIMDA   WIND SPEED METERS/SECOND
177 $WIMWD   WIND DIRECTION DEGREES TRUE
178 $WIMWD   WIND DIRECTION DEGREES MAGNETIC
179 $WIMWD   WIND SPEED KNOTS
180 $WIMWD   WIND SPEED METERS/SECOND
181 $WIMWV   WIND ANGLE DEGREES
182 $WIVWR   RELATIVE WIND DIRECTION DEGREES
183 $WIVWR   SPEED KNOTS
184 $WIVWR   SPEED METERS/SECOND
185 $WIVWR   SPEED KM/HOUR
186 $YXDBK   DEPTH BELOW KEEL FEET
187 $YXDBK   DEPTH BELOW KEEL  METERS
188 $YXDBK   DEPTH BELOW KEEL FATHOMS
189 $YXDBS   DEPTH BELOW SURFACE FEET
190 $YXDBS   DEPTH BELOW SURFACE METERS
191 $YXDBS   DEPTH BELOW SURFACE FATHOMS
192 $YXDBT   WATER DEPTH BELOW TRANSDUCER FT.
193 $YXDBT   WATER DEPTH BELOW TRANSDUCER MTRS
194 $YXDBT   WATER DEPTH BELOW TRANSDUCER FATH
195 $YXDPT   DEPTH RELATIVE TO TRANSDUCER MTRS
196 $YXXDR,A ANGULAR DISPLACEMENT DEGREES
197 $YXXDR,C TEMPERATURE DEGREES CELCIUS
198 $YXXDR,D LINEAR DISPLACEMENT METERS
199 $YXXDR,F FREQUECY HERTZ
200 $YXXDR,G GENERIC
201 $YXXDR,H HUMIDITY PERCENT
202 $YXXDR,I CURRENT AMPERES
203 $YXXDR,N FORCE NEWTONS
204 $YXXDR,P PRESSURE PASCAL OR BAR
205 $YXXDR,R FLOW RATE LITRES/SECOND
206 $YXXDR,S SWITCH OR VALVE
207 $YXXDR,T TACHOMETER RPM
208 $YXXDR,U VOLTAGE VOLTS
209 $YXXDR,V CUBIC METERS
210 TO BE DEFINED
```

```
125 $PBVE    T-30 TEMPERATURE DEG. FAHRENHEIT
126 $PBVE    CH-30 WINDLASS BATTERY VOLTAGE
127 $PBVE    CH-30 RHODE OUT
128 $PBVE    CT-30 TIME 24 HOURS
129 $PBVE    OP-30 PRESSURE P.S.I.
130 $PBVE    FU-30 FUEL REMAINING LTRS OR GALS
131 $PBVE    FU-30 FUEL USED LITRES OR GALLONS
132 $PBVE    FU-30 CONSUMPTION LTRS OR GAL./HR
133 $SDDBK   DEPTH BELOW KEEL FEET
134 $SDDBK   DEPTH BELOW KEEL  METERS
135 $SDDBK   DEPTH BELOW KEEL FATHOMS
136 $SDDBS   DEPTH BELOW SURFACE FEET
137 $SDDBS   DEPTH BELOW SURFACE METERS
138 $SDDBS   DEPTH BELOW SURFACE FATHOMS
139 $SDDBT   DEPTH BELOW TRANSDUCER FEET
140 $SDDBT   DEPTH BELOW TRANSDUCER METERS
141 $SDDBT   DEPTH BELOW TRANSDUCER FATHOMS
142 $SDDPT   DEPTH RELATIVE TO TRANSDUCER MTRS
143 $TIROT   RATE OF TURN DEGREES/MINUTE
144 $TIRPM   SPEED RPM
145 $TIRPM   PROPELLER PITCH % OF MAX
146 $VDMTW   WATER TEMPERATURE DEGREES CELCIUS
147 $VDVHW   HEADING DEGREES TRUE
148 $VDVHW   HEADING DEGREES MAGNETIC
149 $VDVHW   SPEED KNOTS
150 $VDVHW   SPEED KM/HOUR
151 $VDVLW   TOTAL DISTANCE N.MILES
152 $VDVLW   DISTANCE SINCE RESET N.MILES
153 $VMMTW   WATER TEMPERATURE DEGREES CELCIUS
154 $VMVHW   HEADING DEGREES TRUE
155 $VMVHW   HEADING DEGREES MAGNETIC
156 $VMVHW   SPEED KNOTS
157 $VMVHW   SPEED KM/HOUR
158 $VMVLW   TOTAL DISTANCE N.MILES
159 $VMVLW   DISTANCE SINCE RESET N.MILES
160 $VWMTW   WATER TEMPERATURE DEGREES CELCIUS
161 $VWVHW   HEADING DEGREES TRUE
162 $VWVHW   HEADING DEGREES MAGNETIC
163 $VWVHW   SPEED KNOTS
164 $VWVHW   SPEED KM/HOUR
165 $VWVLW   TOTAL DISTANCE N.MILES
166 $VWVLW   DISTANCE SINCE RESET N.MILES
167 $WIMDA   BAROMETRIC PRESS. INCH. OF MERCURY
```

Introduction

The RP110 remote data repeater is capable of displaying over 200 standard NMEA 0183 and proprietary sentences. The RP110 can monitor up to 4 separate data channels and can be trained to learn new sentences.

The RP110 is trainable to recognize and display new NMEA 0183 sentences not currently defined. Up to ten new sentence formats can be downloaded into non-volatile memory using the RS-232 serial data port of a PC compatible running Windows 95, 98, NT, SE, ME or 2000. A program is supplied on floppy diskette and the latest versions can always be downloaded from the CruzPro website.

Up to 12 sentence ID's can be stored in a list of often viewed sentences. You can select a sentence from this list quickly using the ▼ and ▲ keys to scroll through the selections. You can add and delete sentences to/from this list as often as desired.

Five levels of backlighting can be selected and remotely switched ON/OFF. All settings are automatically saved to non-volatile memory.

The RP110 works on both 12 and 24 VDC systems and with its large display digits draws only .035 amps and only .075 amps with full backlighting.

Specifications

Power supply: 9.5 to 33.0 VDC, .035 amps nominal

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: 4 digit LCD, 5 levels of backlighting.

Input Format: NMEA 0183, standard and proprietary sentences.

Baud Rate: 4800

Input Channels: 4

Data Input voltage range: 0 to 5 V Nominal, -20V to +20V maximum.

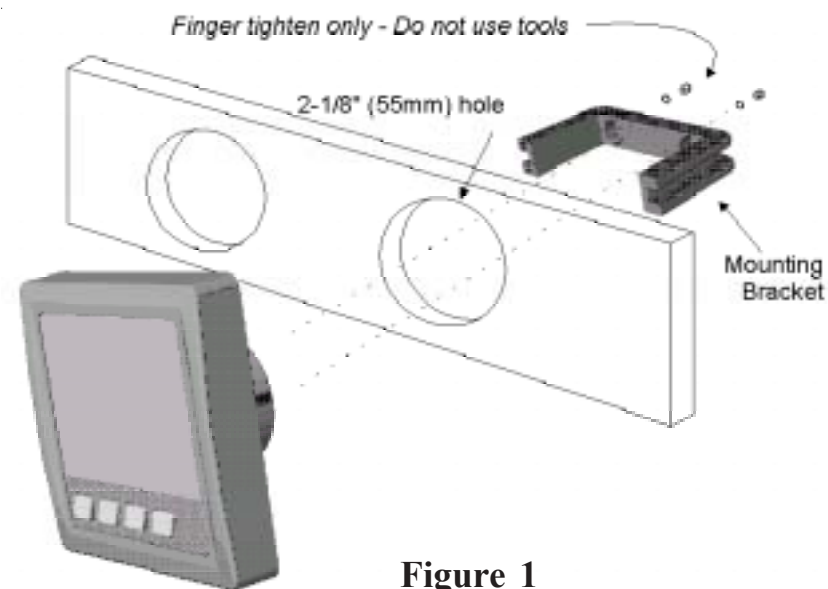**Data Memory:** Storage for 10 new sentences (may be overwritten).

```
83  $DFHDT    HEADING DEGREES TRUE
84  $DFWCV    WAYPOINT CLOSURE VELOCITY KNOTS
85  $DFWNC    DISTANCE WAYPT TO WAYPT N.MILES
86  $DFWNC    DISTANCE WAYPOINT TO WAYPOINT KM
87  $GPBWC    BEARING WAYPT TO WAYPT DEG. TRUE
88  $GPBWC    BEARING WAYPT TO WAYPT DEG. MAG.
89  $GPBWC    DISTANCE NAUTICAL MILES
90  $GPBWR    BEARING WAYPT TO WAYPT DEG. TRUE
91  $GPBWR    BEARING WAYPT TO WAYPT DEG. MAG.
92  $GPBWR    DISTANCE NAUTICAL MILES
93  $GPRMB    CROSS TRACK ERROR NAUTICAL MILES
94  $GPRMB    RANGE TO DESTINATION NAUT. MILES
95  $GPRMB    BEARING TO DESTINATION DEG. TRUE
96  $GPRMB    DESTINATION CLOSING VELOCITY KTS
97  $GPRMC    SPEED OVER GROUND KNOTS
98  $GPRMC    COURSE OVER GROUND DEGREES TRUE
99  $HCBOD    BEARING TRUE
100 $HCBOD    BEARING MAGNETIC
101 $HEBOD    BEARING TRUE
102 $HEBOD    BEARING MAGNETIC
103 $HNBOD    BEARING TRUE
104 $HNBOD    BEARING MAGNETIC
105 $IIXDR,A ANGULAR DISPLACEMENT DEGREES
106 $IIXDR,C TEMPERATURE DEGREES CELCIUS
107 $IIXDR,D LINEAR DISPLACEMENT METERS
108 $IIXDR,F FREQUENCY HERTZ
109 $IIXDR,G GENERIC
110 $IIXDR,H HUMIDITY PERCENT
111 $IIXDR,I CURRENT AMPERES
112 $IIXDR,N FORCE NEWTONS
113 $IIXDR,P PRESSURE PASCAL OR BAR
114 $IIXDR,R FLOW RATE LITERS/SECOND
115 $IIXDR,S SWITCH OR VALVE
116 $IIXDR,T TACHOMETER RPM
117 $IIXDR,U VOLTAGE VOLTS
118 $IIXDR,V VOLUME CUBIC METERS
119 $INBOD    BEARING TRUE
120 $INBOD    BEARING MAGNETIC
121 $PBVE     RH-30 ELAPSED TIME HOURS
122 $PBVE     RH-30 ELAPSED TIME MIN. AND SEC.
123 $PBVE     RH-30 ENGINE HOURS AND MINUTES
124 $PBVE     RH-30 ENGINE RPM
```

```
41  $APAPB   BEARING PRESENT TO DESTINATION
42  $APAPB   HEADING TO STEER TO DESTINATION
43  $APBEC   BEARING DEGREES TRUE
44  $APBEC   BEARING DEGREES MAGNETIC
45  $APBEC   DISTANCE NAUTICAL MILES
46  $APBOD   BEARING TRUE
47  $APBOD   BEARING MAGNETIC
48  $APBWC   BEARING TO WAYPOINT DEGREES TRUE
49  $APBWC   BEARING TO WAYPOINT DEGREES MAG.
50  $APBWC   DISTANCE NAUTICAL MILES
51  $APBWR   BEARING TO WAYPOINT DEGREES TRUE
52  $APBWR   BEARING TO WAYPOINT DEGREES MAG.
53  $APBWR   DISTANCE NAUTICAL MILES
54  $APBWW   BEARING WAYPOINT TO WAYPOINT TRUE
55  $APBWW   BEARING WAYPOINT TO WAYPOINT MAG.
56  $APHSC   COMMANDED HEADING DEGREES TRUE
57  $APHSC   COMMANDED HEADING DEGREES MAG.
58  $APVBW   LONGITUDNAL WATER SPEED KNOTS
59  $APVBW   TRANSVERSE WATER SPEED KNOTS
60  $APVBW   LONGITUDNAL GROUND SPEED KNOTS
61  $APVBW   TRANSVERSE GROUND SPEED KNOTS
62  $APWCV   WAYPOINT CLOSURE VELOCITY KNOTS
63  $APWNC   DISTANCE WAYPT TO WAYPT N.MILES
64  $APWNC   DISTANCE WAYPOINT TO WAYPOINT KM
65  $DEDCN   POSITION UNCERTAINTY N.MILES
66  $DFAPB   BEARING ORIGIN TO DISTANCE
67  $DFAPB   BEARING PRESENT TO DESTINATION
68  $DFAPB   HEADING TO STEER TO DESTINATION
69  $DFABE   BEARING DEGREES TRUE
70  $DFBEC   BEARING DEGREES MAGNETIC
71  $DFBEC   DISTANCE NAUTICAL MILES
72  $DFBOD   BEARING TRUE
73  $DFBOD   BEARING MAGNETIC
74  $DFBWC   BEARING TO WAYPOINT DEGREES TRUE
75  $DFBWC   BEARING TO WAYPOINT DEGREES MAG.
76  $DFBWC   DISTANCE NAUTICAL MILES
77  $DFBWR   BEARING TO WAYPOINT DEGREES TRUE
78  $DFBWR   BEARING TO WAYPOINT DEGREES MAG.
79  $DFBWR   DISTANCE NAUTICAL MILES
80  $DFBWW   BEARING WAYPOINT TO WAYPOINT TRUE
81  $DFBWW   BEARING WAYPOINT TO WAYPOINT MAG.
82  $DFHDG   MAGNETIC SENSOR HEADING DEGREES
```

Installation

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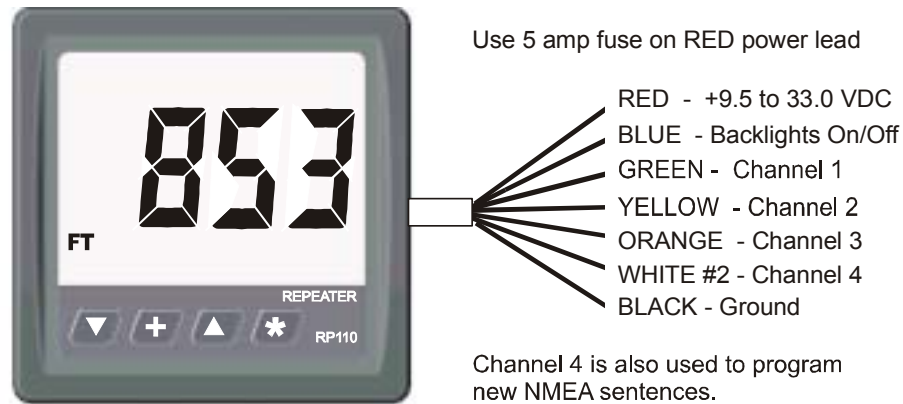
● Drill a 2-1/8" (55mm) mounting hole where you desire to mount the instrument (Figure 1).

● Connect the various wires as shown in Figure 2

● Carefully check all your wiring against figures 2 and then mount the instrument in the hole. Use only finger tension to tighten the bracket hold-down nuts

Figure 1

Figure 2 - Wiring Diagram

Use 5 amp fuse on RED power lead

RED - +9.5 to 33.0 VDC
BLUE - Backlights On/Off
GREEN - Channel 1
YELLOW - Channel 2
ORANGE - Channel 3
WHITE #2 - Channel 4
BLACK - Ground

853

FT

REPEATER

▼ + ▲ *   RP110

Channel 4 is also used to program
new NMEA sentences.

NMEA 0183 Sentences - TABLE 1
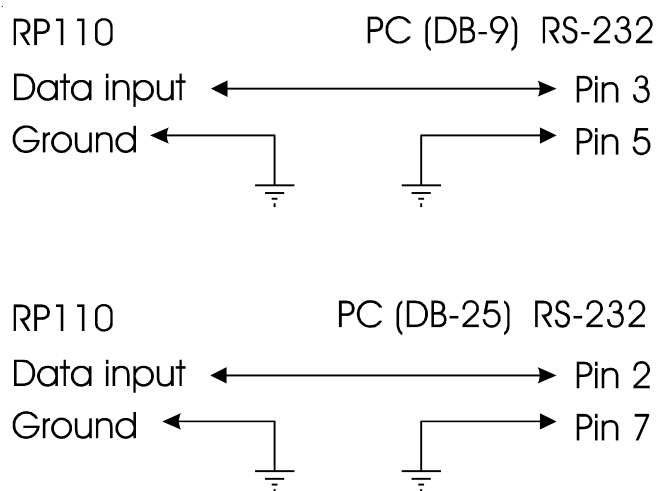
```
1   USER PROGRAMMED
2   USER PROGRAMMED
3   USER PROGRAMMED
4   USER PROGRAMMED
5   USER PROGRAMMED
6   USER PROGRAMMED
7   USER PROGRAMMED
8   USER PROGRAMMED
9   USER PROGRAMMED
10  USER PROGRAMMED
11  $AGAAM    WAYPOINT ARRIVAL ALARM RADIUS
12  $AGAPB    MAGNITUDE OF CROSSTRACK ERROR
13  $AGAPB    BEARING ORIGIN TO DESTINATION
14  $AGAPB    BEARING PRESENT TO DESTINATION
15  $AGAPB    HEADING TO STEER TO DESTINATION
16  $AGBEC    BEARING DEGREES TRUE
17  $AGBEC    BEARING DEGREES MAGNETIC
18  $AGBEC    DISTANCE NAUTICAL MILES
19  $AGBOD    BEARING TRUE
20  $AGBOD    BEARING MAGNETIC
21  $AGBWC    BEARING TO WAYPOINT DEGREES TRUE
22  $AGBWC    BEARING TO WAYPOINT DEGREES MAG.
23  $AGBWC    DISTANCE NAUTICAL MILES
24  $AGBWC    BEARING TO WAYPOINT DEGREES TRUE
25  $AGBWR    BEARING TO WAYPOINT DEGREES MAG.
26  $AGBWR    DISTANCE NAUTICAL MILES
27  $AGBWW    BEARING WAYPOINT TO WAYPOINT TRUE
28  $AGBWW    BEARING WAYPOINT TO WAYPOINT MAG.
29  $AGHSC    COMMANDED HEADING DEGREES TRUE
30  $AGHSC    COMMANDED HEADING DEGREES MAG.
31  $AGVBW    LONGITUDNAL WATER SPEED KNOTS
32  $AGVBW    TRANSVERSE WATER SPEED KNOTS
33  $AGVBW    LONGITUDNAL GROUND SPEED KNOTS
34  $AGVBW    TRANSVERSE GROUND SPEED KNOTS
35  $AGWCV    WAYPOINT CLOSURE VELOCITY KNOTS
36  $AGWNC    DISTANCE WAYPT TO WAYPT N.MILES
37  $AGWNC    DISTANCE WAYPOINT TO WAYPOINT KM.
38  $APAAM    WAYPOINT ARRIVAL ALARM RADIUS
39  $APAPB    MAGNITUDE OF CROSSTRACK ERROR
40  $APAPB    BEARING ORIGIN TO DESTINATION
```

Execute the program called RP110.EXE on the supplied floppy diskette. Check www.cruzpro.com for any later versions.

When a beep is heard check the display for the status of the transfer, if "good" is displayed, the process was successful. If "bAd" is displayed, the process was unsuccessful, try the download process again.

RP110   PC (DB-9) RS-232

Data input ←——————→ Pin 3
Ground ←———┐   ┌————→ Pin 5

RP110   PC (DB-25) RS-232

Data input ←——————→ Pin 2
Ground ←———┐   ┌————→ Pin 7

Figure 3 - RP110 to PC Connections

Note: Check for possible newer versions of this software on our website **www.cruzpro.com**

Operation

Key Functions

The ▼, ✚ and ▲ keys are used to select and set backlight levels, and set/change constants such as which NMEA sentences to display, select a data channel, save and delete NMEA sentences from the favorites list and prepare the instrument to receive new sentences from a PC.   New information is automatically saved to non-volatile memory.

Backlight Intensity

Press ✚ the key 1/2 second to adjust the backlight level for night viewing. Each time you press the ✚ key 1/2 second, the level will get brighter 1, 2, 3, 4, OFF, 1, 2, ... etc.   The blue backlight ON/OFF control wire must be switched to +12/24V for the backlights to work and offers external backlight ON/OFF control. If ON/OFF control is not required, connect the blue wire to +12/24VDC permanently.

Selecting a NMEA Sentence to Display

Up to 12 sentences can be stored in a list of often viewed sentences. You can select a sentence from the list using the ▼ and ▲ keys.   The RP110 comes pre-programmed with the following list:

```
142   $SDDPT   DEPTH RELATIVE TO TRANSDUCER MTRS
163   $VWVHW   SPEED KNOTS
160   $VWMTW   WATER TEMPERATURE DEGREES
98    $GPRMC   COURSE OVER GROUND DEGREES TRUE
```

```
36    $AGWNC   DISTANCE WAYPT TO WAYPT N.MILES
125   $PBVE    T-30 TEMPERATURE DEG. FAHRENHEIT
129   $PBVE    OP-30 PRESSURE P.S.I.
124   $PBVE    RH-30 ENGINE RPM
```

You can add and delete sentences to/from this list as often as desired. Pressing the ▼ or ▲ key will step you through the list. "- - - -" will be displayed until the selected sentence is found on one of the channels.

Adding A Sentence To the List

Press and hold the ✚ and ▲ keys for 10 seconds until a long beep is heard. "c011" is displayed. Use the ▼ and ▲ keys to select a sentence from Table 1. Once the desired table entry is displayed, hold down the ✚ key for 1/2 second to save the sentence to the list. The RP110 will immediately start searching for the new sentence on all four channels.

If "FULL" is displayed in place of "c011", a sentence will first have to be deleted from the list (see "Deleting A Sentence From the List").

Deleting A Sentence From the List

If all 12 list positions are full, one sentence will have to be deleted. Press and hold the ▼ and ✚ keys for 10 seconds. Use the ▼ and ▲ keys to scroll through the list. When the sentence to be deleted is displayed, press the ✚ key for 1/2 second.

Manually Selecting A Data Channel

The RP110 searches each of the four data channels for the desired sentence. When a matching sentence is found the RP110 stops at that channel and displays the data. To select between two or more data channels containing the same sentence, press and hold the ✚ key for 3 seconds. The RP110 will search the other channels for the sentence. If the sentence is only available on the one channel, it will return back to the original.

Selecting Different Sentences With Identical ID's

Some CruzPro instruments (such as the V30 triple volts gauge and the TL30 triple tank level gauge) transmit more than one sentence with the same identifier but different data. The TL30 Digital Tank Level Gauge for three tanks transmits one sentence per tank but each have the same NMEA identifier "$IIXDR". When viewing data from one of these CruzPro instruments you can step through the different values with a quick press the ✚ key.

Downloading New NMEA Sentences

You can add up to 10 new sentences to Table 1 using a PC and a serial data cable connected to channel 3 on the back of the RP110 as shown in Figure 4. To upload a new sentence to the RP110, press and hold the ▼ and ▲ keys for 10 seconds. The instrument is ready for data transfer when "rdY" is displayed.