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- 4 & 8 Channel NMEA Combiners/RS-232 Convertors
- Engine/Exhaust Temp. Monitor & Digital Pyrometer
- NMEA 0183 Remote Data Repeater/w 4 Input Channels

# CruzPro®



## AM60



## Digital Rudder Angle Indicator & Alarm

### NMEA 0183 Sentences

The AM-60 outputs a 4800 BAUD \$IIRSA sentence serial data stream of rudder angle once per second or ten times per second - depending on settings.

The \$IIRSA sentence can be setup for either a Port or Starboard (or single) rudder.

\$IIRSA,075,A,,V\*65 Starboard angle, Starboard (or single) rudder.

\$IIRSA,-57,A,,V\*78 Port angle, Starboard (or single) rudder

\$IIRSA,,V,076,A\*66 Starboard angle, Port rudder

\$IIRSA,,V,-57,A\*78 Port angle, Port rudder

### Introduction

The AM-60 provides an accurate single sensor rudder angle indicator. Rudder angle is displayed in full units between -90 and +90 degrees. Separate alarm limits can be set for port and starboard. The AM-60 provides for sender calibration and zero (rudder center) set. The rudder angle is output on a NMEA 0183 compatible serial data line for data logging or to allow the data to be repeated at a remote location.

The data can be sent at the normal NMEA 0183 rate of once per second or non-standard 10 times per second.

When activated, the built-in 85 dB alarm will sound and the display will flash. Five levels of backlighting can be selected and all set-up, calibration constants and alarm values are saved to non-volatile memory.

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## NMEA Output Rate

The AM60 can output NMEA data once per second (Mode F1) or ten times per second (Mode F2). To toggle between these two modes, press and hold the **+** key for ten seconds (until you hear a long beep). The words "-F1-" or "-F2-" will be displayed to show you the current mode. The damping of the displayed value will be reduced to provide for a faster response to changes in rudder angle when mode F2 is selected.

## Warnings and Notes

1. Screw terminal (G) must be connected to 9.5 VDC minimum in order for the backlights to turn ON. If screw terminal (G) is not connected to at least 9.5 VDC the backlights will turn OFF. This provides remote control of the backlights.

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## Specifications

**Power supply:** 9.5 to 33.0 VDC, .018 amps nominal  
**Operating temperature:** 32 to 122 F ( 0 to 50 C)  
**Size:** 2.5" dia X 4.1" deep (61mm x 104 mm).  
**Accuracy:** Better than +/- 2 degrees  
**Range:** -90 to +90 degrees (sensor permitting)  
**Alarms:** Separate Port and Starboard alarm limits  
**Display:** 4 digit LCD, 5 levels of backlighting.  
**Output:** 4800 Baud Serial Data; \$IIRSA  
output once per second.

This completes the Set-up process and the AM-60 will now be displaying rudder angle. These settings will have been saved to a non-volatile memory.

- Measure the angle with a suitable protractor. Quick press the key repeatedly till the correct Starboard rudder angle is displayed. The display will increment once per key press. If you go past the correct value, press the key for 1/2 second to put the instrument into decrementing mode.

- When the correct Starboard rudder angle is displayed you have a choice of pressing the key for 3 or 10 seconds. If you release the key after the short beep at 3 seconds, the NMEA data output will assume a Starboard (or single) rudder. If you continue to hold down the key until the long beep at 10 seconds, the NMEA data output will assume a Port rudder.

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## Installation

*Before starting the installation, please read this entire section first. Be sure to install the bulkhead gasket before you install the instrument. Finger tighten the screws that mount the instrument bracket - do not use tools.*

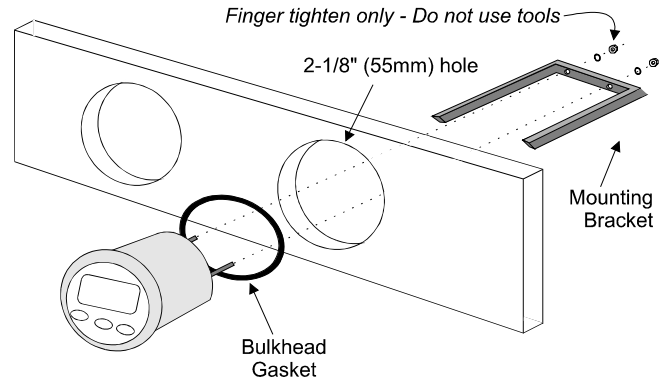


Figure 1

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cRUZ

## Setting Up and Calibrating the Instrument

Before the AM60 can be used to display rudder angle it must be configured to work with your rudder angle sensor. Please read this entire section carefully before proceeding.

- Remove power to the AM-60
- Center the rudder (Angle = 0 degrees)
- Hold down the **+** key and while down, apply power to the AM-60. The buzzer will beep once. Let up the key after the beep. The display will show "P 20".
- Move the rudder to the desired Port alarm limit

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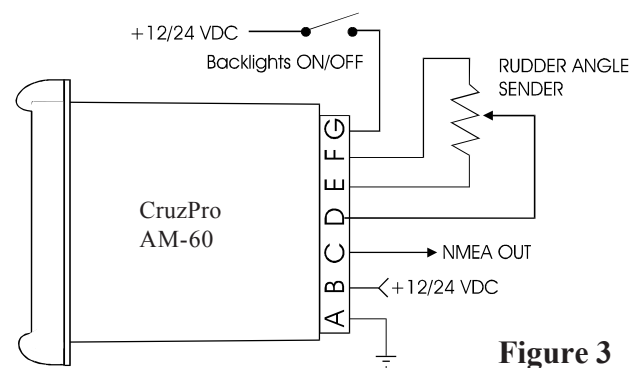


Figure 3

- Carefully check all your wiring against those shown in Figures 2 and 3. If everything is wired correctly you can mount the AM60 in the instrument hole. Be sure the bulkhead gasket is in place and use only finger tension to tighten the bracket hold-down nuts. *Do not overtighten the bracket or you may damage the case - do not use tools to tighten the nuts.*

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- Drill a 2-1/8" (55mm) mounting hole where you desire to mount the instrument (Figure 1).
- Bring the wires out the mounting hole and make the connections to the screw terminal on the instrument case back as shown in Figure 2 and Figure 3.

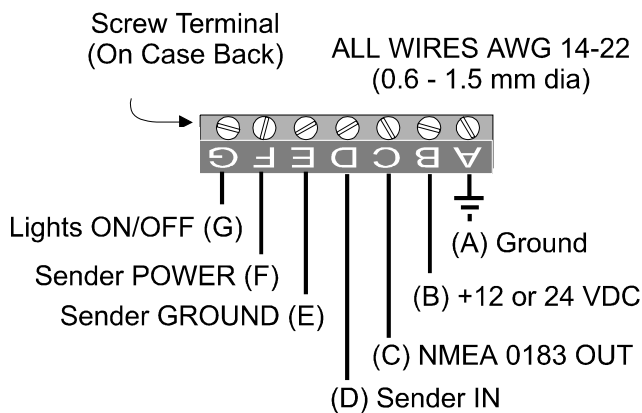


Figure 2

(this is where the AM60 will sound the alarm if the rudder exceeds this value).

- Measure the angle with a suitable protractor. Quick press the key repeatedly till the correct Port rudder angle is displayed. The display will increment once per key press. If you go past the correct value, press the key for 1/2 second to put the instrument into decrementing mode. Pressing the key for 1/2 second will swap between increment mode and decrement mode.
- When the correct port rudder angle is displayed, hold down the key for 3 seconds (until you hear another short beep). The display will now show "S 20".
- Move the rudder to the desired Starboard alarm limit.

## Key Functions **Operation**

The **+** key is used to calibrate the instrument, change backlight levels, arm/disarm the alarms and select other operational modes. New information is automatically saved to memory.

### Backlight Intensity

Press and hold the **+** key for 1/2 second to adjust the backlight level for night-time viewing. Each time you press the key 1/2 second, the level will get brighter 1, 2, 3, 4, OFF, 1, 2, ... etc. Screw terminal pin (G) must be switched ON for the backlights to work.

### Turning Alarms ON/OFF

Press the **+** key for 3 seconds (until you hear a short beep) to toggle the alarms between "armed" and "disarmed". The display will flash "On" or "OFF" briefly to show you the state of the alarms. When activated by an out-of-alarm condition, the audible alarm buzzer can be silenced with a quick press the **+** key. The display will continue to flash.