

EchoRange™ App Notes 1.0

The EchoRange™ is a powerful depth sounding device that may be successfully operated in most open water applications using the factory default settings. However, in other applications (such as when deployed in enclosures, or when using multiple devices, or when using with battery power) the user has options to enhance and optimize the EchoRange™ performance by changing one or some combination of the factory default settings.

The NMEA 0183 interfaces and the transmitted NMEA 0183 sentences are documented in the EchoRange™ Technical Manual. Answers to questions regarding those features will be found in sections 2 and 2.1 of the EchoRange™ Technical Manual Revision 1.001.

The intent of this document is to outline those user selectable options that modify how the EchoRange™ functions. These functions are accessed in EchoRange™ by using the NMEA 0183 commands **\$PAMTC,BAUD** and **\$PAMTC,OPTION**

Using \$PAMTC,BAUD command the user may change the baud rate for both the transmitting and receiving signals.

Using \$PAMTC,OPTION command the user can change the factory default settings that control how EchoRange™ performs the depth measurement. The ability to control such attributes as the ping rate, pulse length, filters, and range can enhance performance in certain situations.

Using \$PAMTC,BAUD command the user may alter the following:

- 1.) Baud rate (BAUD) – *the defaults setting is 4800.*

Using \$PAMTC,OPTION command the user may alter any of the following options.

- 2.) Speed of sound through water (SOSTW) – *the defaults setting is 1500.0m/s.*
- 3.) Depth offset (DOFFSET) – *the default setting is 0.000m.*
- 4.) Operational Depth Range (RANGE) – *the default setting is AUTO.*
- 5.) Ping command (PING) – *the default setting is ON.*
- 6.) Pings per second (PINGSPS) – *the default setting is AUTO.*
- 7.) Pulses per ping (PULSESPP) – *the default setting is AUTO.*
- 8.) Depth filter command (DFILTER) – *the default setting is no depth averaging.*
- 9.) Sample filter command (SFILTER) – *the default setting is IIR filtering of successive pings (¾ of last ping plus ¼ of new ping.)*

(Complete summaries and syntax for implementing the various NMEA 0183 commands including all of the \$PAMTC,OPTION commands are found in section 2.2 of the EchoRange™ Technical Manual.)

If the user chooses to alter settings, it is critical that the user save the changes so that the changes do not reset when EchoRange™ is power cycled.

It is also possible to reset the EchoRange™ to the factory default settings by using the **\$PAMTC,RESET** command.

Considerations that may necessitate changing the factory default settings using \$PAMTC,OPTION

- 1.) **Speed of sound through water** – in order to obtain the most accurate depth sounding results the correct speed of sound through water should be used if that information is known. Methods for obtaining the speed of sound through water may be by direct measurement, calculation, or by bar check. If the speed of sound through water information is known and that value is other than 1500.0m/s, then the user may change this by using the SOSTW command under \$PAMTC,OPTION.
- 2.) **Depth offset** – in some applications the EchoRange™ may be permanently or temporarily mounted (either on a vessel or structure) and in these cases it may be useful to employ the DOFFSET command to correct for the offset distance between the surface of the water and the face of the EchoRange™ device.
- 3.) **Operational depth range** – in cases where the user believes that the water depth being measured will be no greater than, say, 70% of the EchoRange™ maximum detectible distance of 200m, it may be advantageous for the user to select an alternate maximum range using the RANGE command. This tactic could be helpful if environmental factors (such as high ambient noise, high scattering and absorption by the seawater, and low seafloor target strength) degrade the acoustic signal strength more than usual.
- 4.) **Ping commands** – the ability to control when the EchoRange™ pings, the ping rate, and the ping length may be very useful to overcome sounding situations where several EchoRange™ devices are used together or when environmental factors induce reverberation. Using the PING command, the user may set the EchoRange™ to either ping, ping once, or not ping.
- 5.) **Pings per second** – this may also be considered “ping rate” and allows the user to select how many times the EchoRange™ will ping per second. When using multiple EchoRange™ devices it may be useful to select different ping rates for each device using the PINGSPS command as this may minimize the potential for interference between devices.
- 6.) **Pulses per ping** – the PULSESPP command is used to control the length of the pulse and it also may be used control the transmitted signal strength. A single pulse is defined as a complete sine wave or “cycle” as shown in Figure 1.

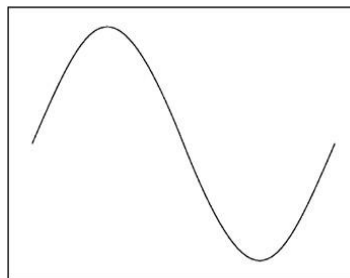


Figure 1. Ideal sine wave, one complete cycle (one pulse.)

The ability of the user to choose the number of electrical pulses (or cycles) per ping is how the user may control the length of each pulse. Another point to consider is that several electrical pulses (cycles) are required in order for the piezoceramic inside the EchoRange™ to achieve maximum amplitude (maximum transmit signal strength.) See Figure 2.

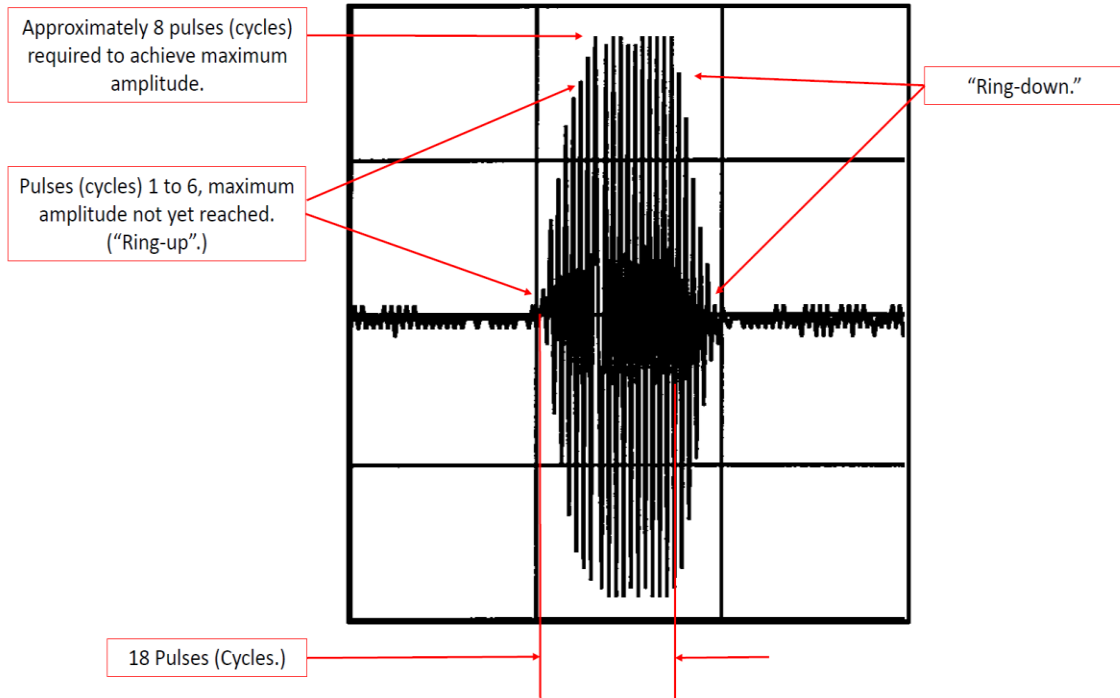


Figure 2. Idealized EchoRange™ transmit pulse.

This means that the user has some level of control over the amount of transmitted energy output using the PULSESPP command. Such a tactic may be useful in conditions where the range is short (just a few meters and / or the seafloor has very high target strength and / or where there is potential for reverberation.