MODEL 852 DIGITAL ECHO SOUNDER

SERIAL INTERFACE SPECIFICATION (v1.04)

OVERVIEW

The Model 852 Digital Echo Sounder communicates over a 2-wire differential RS-485 serial data transmission line or optionally a half-duplex RS-232 data line. To interrogate the echo sounder and receive echo data, a Switch Data Command string is sent via a serial command program at a baud rate of **115200 bps, No Parity, 8 Data Bits and 1 Stop Bit**. When the Switch Data command is accepted, the echo sounder transmits, receives and sends its return data back to the commanding program.

SWITCH DATA COMMAND

The echo sounder accepts up to 27 bytes of switch data from the serial interface and must see the switch data header (2 bytes: **0xFE** and **0x44** HEX) in order to process the switches. The echo sounder will stop accepting switch data when it sees the termination byte (**0xFD** HEX). The termination byte must be present for the echo sounder to process the switches.

> **Note: the Termination Byte is the only switch value allowed to have a value of 0xFD. All other switches should be set higher or lower than 0xFD (253 Decimal) so they are not interpreted as a termination byte!**

Byte #	Description							
0 – 7	**0xFE**	**0x44**	Head ID	Range	Reserved 0	Reserved 0	Master/ Slave	Reserved 0
8 – 15	Start Gain	Reserved 0	Absorp-tion	Reversed 0	Reserved 0	Reserved 0	Pulse Length	Profile MinRange
16 – 23	Reserved 0	Reserved 0	External Trigger	Data Points	Reserved 0	Reserved 0	Profile	Reserved 0
24 – 26	Switch Delay	Freq-uency	Term. **0xFD**					

Table 1   Model 852 Switch Data Command To Echo Sounder

SWITCH DATA COMMAND (con't)

BYTE DESCRIPTIONS

Note: All Byte values are shown in decimal unless noted with a '0x' (hexadecimal) prefix.

Byte 0   **Switch Data Header (1st Byte)**
                Always **0xFE** (254 decimal)

Byte 1   **Switch Data Header (2nd Byte)**
                Always **0x44** (68 decimal)

Byte 2   **Head ID**
                0x11, 0x12, 0x13, 0x14 or 0x15

Byte 3   **Range**
                5 to 50 Meters
                5,10,20,30,40,50 Meters supported

Byte 4   **Reserved**
                Always 0

Byte 5   **Reserved**
                Always 0

Byte 6   **Master / Slave**
                The echo sounder can be operated as a master or as a slave. The default
                mode on power-up is Slave mode (Bit 6 = 1). Slave mode allows the user
                to command the unit to transmit then send its return data at any given time.
                Currently, the echo sounder only supports slave mode operation.

                Bit 0   - 1 = Transmit if Bit 6 = 1 (Slave Mode)
                Bit 1   - 1 = Send Data if Bit 6 = 1 (Slave Mode)
                Bit 2   - 0
                Bit 3   - 0
                Bit 4   - 0
                Bit 5   - 0
                Bit 6   - 0 = Master, 1 = Slave
                Bit 7   - 0

Byte 7   **Reserved**
                Always 0

SWITCH DATA COMMAND (con't)

Byte 8   **Start Gain**
                0 to 40dB in 1dB increments

Byte 9   **Reserved**
                Always 0

Byte 10   **Absorption**
                20 = 0.2 dB/m   675 kHz

Byte 11   **Reserved**
                Always 0

Byte 12   **Reserved**
                Always 0

Byte 13   **Reserved**
                Always 0

Byte 14   **Pulse Length**
                Length of acoustic transmit pulse.
                1-255 → 1 to 255 μsec in 1 μsec increments

Byte 15   **Profile Minimum Range**
                Minimum range for profile point digitization
                0 – 250 → 0 to 25 meters in 0.1 meter increments
                Byte 15 = min range in meters / 10

Byte 16   **Reserved**
                Always 0

Byte 17   **Reserved**
                Always 0

SWITCH DATA COMMAND (con't)

The following External Trigger Control byte is valid only for 852 Echo Sounders supplied with the External Trigger Hardware Option. The external trigger must be a 0 to 5 volt TTL pulse with a minimum length of 100 microseconds.

Byte 18　　**External Trigger Control**
　　　　　　Bit0:　Trigger Edge: 0 = NEG, 1 = POS
　　　　　　Bit1:　Trigger Enable: 0 = Disable, 1 = Enable
　　　　　　Bit 2:　Trigger Mode:

　　　　　　　　0 = Manual
　　　　　　　　- in manual mode, the unit must be "armed" every ping by sending a Switch Data Command with Trigger Enable= 1. When a valid trigger pulse is detected, the echo sounder will transmit, send data (if Send Data in Byte 6 = 1), then wait for the next Switch Data Command. If a trigger pulse is not detected within 100 milliseconds of being armed, the unit will transmit as normal then wait for the next Switch Data Command.

　　　　　　　　1 = Automatic
　　　　　　　　- in automatic mode, the unit is "armed" with a single Switch Data Command (with Trigger Enable = 1). When a valid trigger pulse is detected, the echo sounder will transmit, send data (if Send Data in Byte 6 = 1) and then automatically re-arm itself and wait for the next trigger pulse. A Switch Data Command can be sent at any time to change parameters such as range, gain, pulse length, etc.

Byte 19　　**Data Points**
　　　　　　25　　- 250 data points are returned by the echo sounder
　　　　　　　　　The return data will have an ASCII '**IMX**' header.
　　　　　　50　　- 500 data points are returned by the echo sounder
　　　　　　　　　The return data will have an ASCII '**IGX**' header.

Byte 20　　**Reserved**
　　　　　　Always 0

Byte 21　　**Reserved**
　　　　　　Always 0

Byte 22　　**Profile**
　　　　　　0 = OFF
　　　　　　1 = ON --> The return data will have an ASCII '**IPX**' header.

SWITCH DATA COMMAND (con't)

Byte 23   **Reserved**
               Always 0

Byte 24   **Switch Delay**
               The echo sounder can be commanded to pause (from 0 to 510 msec)
               before sending its return data to allow the commanding program
               enough time to setup for serial reception of the return data.
               0 to 255 in 2 msec increments
               Byte 24 = delay_in_milliseconds/2
               Do not use a value of 253!

Byte 25   **Frequency**
               0   =   675 kHz

Byte 26   **Termination Byte**
               The echo sounder will stop looking for Switch Data when it sees this byte.
               Always **0xFD** (253 decimal)

ECHO SOUNDER RETURN DATA

Every ping, the echo sounder returns a 12 Byte header, up to 500 points of echo data (depending on the Switch Data command that was sent) and a terminating byte value of 0xFC. The **total number of bytes** (**N**) returned will be 13, 265 or 513.

Byte #	Description					
0 to 5	ASCII 'I'	ASCII 'M','G' or 'P'	ASCII 'X'	Head ID	Serial Status	Reserved 0
6 to 11	Reserved 0	Range	Prof Rng (LO)	Prof Rng (HI)	Data Bytes (LO)	Data Bytes (HI)
12 to (N-2)	Echo Data 0, 252, 500 Data Bytes					
N-1	Term. **0xFC**					

Table 2   Model 852 Echo Sounder Return Data

BYTE DESCRIPTIONS

Note: All Byte values are shown in decimal unless noted with a '0x' prefix.
N = total number of return bytes

Byte 0 - 2   **Imagenex Return Data Header**
ASCII '**IMX**', '**IGX**' or '**IPX**'
'I' = 0x49, 'M' = 0x4D, 'G' = 0x47, 'P' = 0x50, 'X' = 0x58

ASCII '**IMX**'
In response to a Switch Data Command with Data Points = 25
N = 265, (252 Data Bytes, 252 Points)

ASCII '**IGX**'
In response to a Switch Data Command with Data Points = 50
N = 513, (500 Data Bytes, 500 Points)

ASCII '**IPX**'
In response to a Switch Data Command with Profile = ON
N = 13, (0 Data Bytes, 0 Points)

Byte 3   **Head ID**
0x11, 0x12, 0x13, 0x14 or 0x15

ECHO SOUNDER RETURN DATA (con't)

Byte 4   **Serial Status**
              Bit 0   - 1 = Echo sounder
              Bit 1   - 0
              Bit 2   - 1 = Automatic External Trigger Mode available
              Bit 3   - 0
              Bit 4   - 0
              Bit 5   - 0
              Bit 6   - 1 = Switches Accepted
              Bit 7   - 1 = Character Overrun

Byte 5   **Reserved**
              Always 0

Byte 6   **Reserved**
              Always 0

Byte 7   **Range**
              Echo Sounder Range: 5 to 50 Meters

Byte 8 - 9   **Profile Range**
              First digitized range value above threshold in centi-meters
              Prof Rng (LO), Prof Rng (HI)

Byte 8								Byte 9							
7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
0	Prof Rng (LO)							0	Prof Rng (HI)						L

Prof Rng High Byte = (Byte 9 & 0x7E)>>1
Prof Rng Low Byte = [((Byte 9 & 0x01)<<7) | (Byte 8 & 0x7F)]
Profile Range = (Prof Rng High Byte<<8) | Prof Rng Low Byte

Byte 10 - 11 **Data Bytes**
              Number of Echo Data Bytes returned
              Data Bytes (LO), Data Bytes (HI)

Byte 10								Byte 11							
7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
0	Data Bytes (LO)							0	Data Bytes (HI)						L

Data Bytes High Byte = (Byte 11 & 0x7E)>>1
Data Bytes Low Byte = [((Byte 11 & 0x01)<<7) | (Byte 10 & 0x7F)]
Data Bytes = (Data Bytes High Byte<<8) | Data Bytes Low Byte

Byte 12   **Start of Echo Data**

If Header is ASCII **'IMX':**
N = 265, (252 Data Bytes, 252 Points)
1st Range Point = Byte 12
2nd Range Point = Byte 13
3rd Range Point = Byte 14
4th Range Point = Byte 15

If Header is ASCII **'IGX':**
N = 513, (500 Data Bytes, 500 Points)
1st Range Point = Byte 12
2nd Range Point = Byte 13
3rd Range Point = Byte 14
4th Range Point = Byte 15

If Header is ASCII '**IPX**':
There is no echo data and this byte is the termination
byte **0xFC** (N = 13). Use Profile Range Bytes from the Header.

Byte (N-2)   **End of Echo Data**

Byte (N-1)   **Termination Byte**
0xFC