Flex-Tone Series Panel Control Signal Generator
ETH640 & ETH840 RS485 Series
Installation & Maintenance Information

Description and Operation

The Flex-Tone Panel Control Signal Generator is intended for industrial applications where hazardous locations require highly audible signals and microcomputer reliability. The Flex-Tone series are UL and cUL listed as Audible Signal Appliances for use in the following hazardous locations.

<table>
<thead>
<tr>
<th>Catalog Number</th>
<th>Hazardous Locations</th>
<th>Temp. Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>ETH640 Series</td>
<td>Class I, Div. 2, Groups A, B, C, D</td>
<td>T4 (135C)</td>
</tr>
<tr>
<td>ETH840 Series</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The ETH640 & ETH840 Series Panel Control Signal Generator, located in a nonhazardous area, operates from local power. The Flex-Tone may be programmed for any of the 27 different tones listed in Figure 7.

Mechanical Specifications

**Signal Generator, ETH640 & ETH840 Series**

Weight ....................................................... 6 Pounds (2.7 kg)

Hazardous Locations, UL Standard UL 1604
Ambient temp. ...................... +5C to 40C (+41F to 104F)

Non-Hazardous Locations
Variable Ambient Temp. .......... -35C to +66C (-31F to +151F)

Dimensions .............................................................. Figure 1

Electrical Specifications

<table>
<thead>
<tr>
<th>Catalog Number</th>
<th>Voltage</th>
<th>Typical Current (A)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Standby</td>
</tr>
<tr>
<td>ETH840/125R20</td>
<td>125V DC</td>
<td>0.1</td>
</tr>
<tr>
<td>ETH840/250R10</td>
<td>250V DC</td>
<td>0.02</td>
</tr>
<tr>
<td>ETH640/120R31</td>
<td>120V AC</td>
<td>0.1</td>
</tr>
<tr>
<td>ETH640/240R20</td>
<td>240V AC</td>
<td>0.1</td>
</tr>
</tbody>
</table>

Installation

The Flex-Tone may be mounted to any flat surface or may be used as a freestanding unit mounted to a rigid pipe. The Flex-Tone must be installed in accordance with the latest edition of the National Electrical Code or other regulations applicable to the country and locality of installation and by a trained and qualified electrician.

**NOTE:** The increased resistance due to long wire runs needs to be accounted for in sizing wire. Consult Applications Engineering for details.
1. Mount Adaptatone as shown in Figure 2.

   a. **Flat Surface Mounting.** Secure unit to mounting surface using the (4) mounting holes in the mounting plate on the rear of the box. Use the #10 x 3" (76 mm) wood screws (furnished loose) or other hardware (not supplied) suitable for the mounting surface.

   b. **Rigid Pipe Mounting.** Loosen the (4) cover screws from the signal box and lift off signal box cover.

   **NOTE:** Cover screws are captive. Do not remove from cover.

   Remove the appropriate knockout in lower wall of box and mount box to a 1/2" (12.7 mm) conduit pipe using suitable connector.

2. Install wires through the knockout holes in the bottom of the box from a raceway that is, with its connections to the 1/2" (12.7 mm) conduit knockout hole, approved for the same degree of protection and enclosure type needed by the application. Use the provided plastic tie-wrap, on the barrier to the electronics, to separate incoming power leads from signal and tone initiating leads, per NEC (Figures 4, 5, and 6).

3. Wire as follows referring to Figures 4, 5, and 6.

   a. Connect green and yellow-striped earth-ground wires to earth-ground. In addition attach an earth ground wire (not supplied) to RS485 comm board Earth screw terminal to earth ground (Figure 6).

   b. Connect the RS485 wires to terminals +TX/RX and -TX/RX on the RS485 COMM board (Figures 5 & 6).

   c. If using the optional MR201/C relay, connect the relay to +RELAY and -RELAY on the RS485 COMM board (Figure 6).

   d. Connect incoming power to wire leads using a butt splice or other method listed, certified, or otherwise approved by local authorities. Leads are black and white.

   e. Optional. connect external 24V DC battery (not supplied) in series with separate diode assembly part 2600010 (supplied) to TB1 terminals 3 and 4 on the main board as shown in Figures 3 and 4 and marked on the diode assembly.

4. Adjust volume level, if desired, by turning potentiometer located on the main board (Figure 6).

5. Tightly secure the signal box cover using (4) retained cover screws.

6. Torque signal box cover screws to a minimum of 20 in-lbs.

7. For tone selection and operation, refer to (Figure 7) and “protocol” section in instruction.

8. For remote speaker/amplifier connections refer to Figure 5 and instructions for speaker amplifier.

**Maintenance and Test**

**WARNING**

To prevent fire, shock and component damage, NO work, including circuit board removal, should be performed while the circuit is energized.

**NOTE:** Any kind of service or maintenance performed while unit is energized will void the warranty.

The central tone generator units should be tested annually to ensure continuous service.
Figure 3. Wiring to Terminal Block TB1 Input Circuit

Figure 4. Wiring the Adaptatone
NOTE: REFER TO INSTRUCTIONS PROVIDED WITH ETH SIGNAL TONE GENERATOR FOR CONNECTING TO THE INPUT BOARD

Figure 5. Wiring Diagram (Shown connected to Cat. Series ETH645 & ETH845 Speaker/Amplifier)

Figure 6. RS485 PC board locations

*The conduit outlet box, conduit, and nipple must be suitable for the hazardous location application.
## Protocol

### 1.0 Setting Unit Address and Network Baud Rate

1.1 Locate the 8-position dip switch, S1, on the top edge of the RS485 COMM board (Figure 7).

1.2 Unit address range is 00-1F hex. (00-31 decimal). Refer to Table 2.2 for unit address configuration. Set S1 positions 1-5 for the desired unit address configuration.

#### Table 2.2 Unit Address Switch Configuration

<table>
<thead>
<tr>
<th>Unit Address</th>
<th>Hex</th>
<th>Decimal</th>
<th>S1-1</th>
<th>S1-2</th>
<th>S1-3</th>
<th>S1-4</th>
<th>S1-5</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>00</td>
<td>00</td>
<td>OPEN</td>
<td>OPEN</td>
<td>OPEN</td>
<td>OPEN</td>
<td>OPEN</td>
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<tr>
<td>01</td>
<td>01</td>
<td>01</td>
<td>CLOSED</td>
<td>OPEN</td>
<td>OPEN</td>
<td>OPEN</td>
<td>OPEN</td>
</tr>
<tr>
<td>02</td>
<td>02</td>
<td>02</td>
<td>OPEN</td>
<td>CLOSED</td>
<td>OPEN</td>
<td>OPEN</td>
<td>OPEN</td>
</tr>
<tr>
<td>03</td>
<td>03</td>
<td>03</td>
<td>CLOSED</td>
<td>CLOSED</td>
<td>OPEN</td>
<td>OPEN</td>
<td>OPEN</td>
</tr>
<tr>
<td>04</td>
<td>04</td>
<td>04</td>
<td>OPEN</td>
<td>OPEN</td>
<td>CLOSED</td>
<td>OPEN</td>
<td>OPEN</td>
</tr>
<tr>
<td>05</td>
<td>05</td>
<td>05</td>
<td>CLOSED</td>
<td>OPEN</td>
<td>CLOSED</td>
<td>OPEN</td>
<td>OPEN</td>
</tr>
<tr>
<td>06</td>
<td>06</td>
<td>06</td>
<td>OPEN</td>
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<td>CLOSED</td>
<td>OPEN</td>
<td>OPEN</td>
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<tr>
<td>07</td>
<td>07</td>
<td>07</td>
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<td>CLOSED</td>
<td>CLOSED</td>
<td>OPEN</td>
<td>OPEN</td>
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<td>08</td>
<td>08</td>
<td>OPEN</td>
<td>OPEN</td>
<td>OPEN</td>
<td>CLOSED</td>
<td>OPEN</td>
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<tr>
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<td>09</td>
<td>09</td>
<td>CLOSED</td>
<td>OPEN</td>
<td>OPEN</td>
<td>CLOSED</td>
<td>OPEN</td>
</tr>
<tr>
<td>0A</td>
<td>10</td>
<td>10</td>
<td>OPEN</td>
<td>CLOSED</td>
<td>OPEN</td>
<td>CLOSED</td>
<td>OPEN</td>
</tr>
<tr>
<td>0B</td>
<td>11</td>
<td>11</td>
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<td>CLOSED</td>
<td>OPEN</td>
<td>CLOSED</td>
<td>OPEN</td>
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<tr>
<td>0C</td>
<td>12</td>
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<td>OPEN</td>
<td>OPEN</td>
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<td>OPEN</td>
</tr>
<tr>
<td>0D</td>
<td>13</td>
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<td>CLOSED</td>
<td>CLOSED</td>
<td>OPEN</td>
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<td>0E</td>
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<td>CLOSED</td>
<td>CLOSED</td>
<td>OPEN</td>
</tr>
<tr>
<td>0F</td>
<td>15</td>
<td>15</td>
<td>CLOSED</td>
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<td>CLOSED</td>
<td>OPEN</td>
</tr>
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</table>
Table 2.2 Unit Address Switch Configuration (Cont’d)

<table>
<thead>
<tr>
<th>Unit Address</th>
<th>S1-1</th>
<th>S1-2</th>
<th>S1-3</th>
<th>S1-4</th>
<th>S1-5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hex</td>
<td>Decimal</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
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<td>OPEN</td>
<td>OPEN</td>
<td>OPEN</td>
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<tr>
<td>11</td>
<td>17</td>
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<td>OPEN</td>
<td>OPEN</td>
<td>OPEN</td>
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<tr>
<td>12</td>
<td>18</td>
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<td>OPEN</td>
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<td>OPEN</td>
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<tr>
<td>14</td>
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<td>OPEN</td>
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<td>16</td>
<td>22</td>
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<td>CLOSED</td>
<td>CLOSED</td>
<td>OPEN</td>
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<tr>
<td>17</td>
<td>23</td>
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<td>OPEN</td>
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<td>18</td>
<td>24</td>
<td>OPEN</td>
<td>OPEN</td>
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<td>OPEN</td>
</tr>
<tr>
<td>19</td>
<td>25</td>
<td>CLOSED</td>
<td>OPEN</td>
<td>OPEN</td>
<td>OPEN</td>
</tr>
<tr>
<td>1A</td>
<td>26</td>
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<td>OPEN</td>
</tr>
<tr>
<td>1B</td>
<td>27</td>
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<td>OPEN</td>
<td>OPEN</td>
</tr>
<tr>
<td>1C</td>
<td>28</td>
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<td>CLOSED</td>
<td>CLOSED</td>
</tr>
<tr>
<td>1D</td>
<td>29</td>
<td>CLOSED</td>
<td>OPEN</td>
<td>CLOSED</td>
<td>CLOSED</td>
</tr>
<tr>
<td>1E</td>
<td>30</td>
<td>OPEN</td>
<td>CLOSED</td>
<td>CLOSED</td>
<td>CLOSED</td>
</tr>
<tr>
<td>1F</td>
<td>31</td>
<td>CLOSED</td>
<td>CLOSED</td>
<td>CLOSED</td>
<td>CLOSED</td>
</tr>
</tbody>
</table>

1.3 RS485 COMM supports 1200, 2400, 9600 and 19200 baud rate using 8 data bits and one stop bit. Parity is not supported. Refer to Table 1.3 for Baud Rate switch configuration. Set S1 positions 6-7 for the desired Baud Rate configuration.

Table 1.3 Network Baud Rate setting

<table>
<thead>
<tr>
<th>Baud Rate</th>
<th>S1-6</th>
<th>S1-7</th>
</tr>
</thead>
<tbody>
<tr>
<td>1200</td>
<td>OPEN</td>
<td>OPEN</td>
</tr>
<tr>
<td>2400</td>
<td>CLOSED</td>
<td>OPEN</td>
</tr>
<tr>
<td>9600</td>
<td>OPEN</td>
<td>CLOSED</td>
</tr>
<tr>
<td>19200</td>
<td>CLOSED</td>
<td>CLOSED</td>
</tr>
</tbody>
</table>

1.4 Set 100-ohm termination resistor (if required). Network termination is required if the unit is located at the beginning or end of the network bus. Termination reduces unwanted reflections caused by data signal propagation due to long wire runs. Refer to Table 1.4 for switch configuration. Set S1 position 8 for network termination if required.

Table 1.4 Termination setting

<table>
<thead>
<tr>
<th>Termination (100 ohms)</th>
<th>S1-8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enabled</td>
<td>CLOSED</td>
</tr>
<tr>
<td>Disabled</td>
<td>OPEN</td>
</tr>
</tbody>
</table>

2.0 Messaging Format

2.1 The RS485 COMM utilizes the Edwards SigNet ASCII protocol for data messaging. Each unit is capable of consuming and/or producing messages from the master controller. SigNet message format is illustrated below.

\(<\text{STX}> <\text{UA}> <\text{DDDD}> <\text{ZONE}> <\text{ETX}> <\text{CHKSUM}>\)

\(<\text{STX}>\) The \(<\text{STX}>\) character has a value of 2 hexadecimal and is required at the start of every message (1 byte).

\(<\text{UA}>\) Two byte ASCII representation of the hex Unit. Example - If unit address 0A is chosen, the two byte \(<\text{UA}>\) data field would contain ASCII '0’ and ‘A’ written in ASCII format as 0A. Valid data range is ASCII 00 - 1F.

\(<\text{DDDD}>\) ASCII data field. (4 bytes total). These bytes contain commands, tone/message and timed sequence data.
Programmable unit Zone issued by the master or controlling computer
Range ASCII A-D (1 byte). Note – Zone value is not retained after power loss unless battery backup is installed. Value defaults to Zone A on power up.

The <ETX> character has a value of 3 hexadecimal and is required at the end of every message (1 byte)

Optional two byte Message Block checksum (2 bytes). Refer to Section 4.0 for Block checksum calculation and verification. If checksum is not desired, must pad these two bytes with two ASCII zeros 00.

3.0 Message Command Set

3.1 Tone/Message Command - 00-1F
Send Format:  <STX><UA><TONE> <TIME> <ZONE> <ETX> <CHKSUM>

UA> Unit address characters (2 bytes). See Section 2.0, Messaging Format

TONE> Tone/Message to be played by the unit. Example - If tone 06 is chosen, the two byte <TONE> data field should contain ASCII ‘0’ and ‘6’ written in ASCII format as 06. Range ASCII 00-1F(2 bytes). See Tone Chart for a list of available tones or messages.

TIME> Time sequence for Tone/Message to be played (00-99 seconds). For continuous play of Tone/Message, use ‘00’ in this data field. Range ASCII 00-99 (2 bytes)

ZONE> Units matching this zone field will play Tone/Message indicated in the <TONE> data field for specified time indicated in <TIME> data field. All other zones remain in standby mode.

ETX> The <ETX> character has a value of 3 hexadecimal and is required at the end of every message (1 byte)

CHKSUM> Optional two byte Message Block checksum (2 bytes). Refer to Section 4.0 for Block checksum calculation and verification. If checksum is not desired, must pad these two bytes with two ASCII zeros 00.

Unit Response: None
Example: <STX>410530B<ETX>00
Units programmed with Zone ‘B’ only to play Tone 05 for 30 seconds then shut off automatically. Checksum characters not used in this example.

Note: do not use spaces between message characters in the above example.

3.2 BROADCAST COMMAND - 41
Send Format: <STX> 41 <TONE> <TIME> <ZONE> <ETX> <CHKSUM>

41> In this command type, two byte ASCII ‘41’ replaces <UA> characters. This command is issued to all units containing the identical <ZONE> field.

TONE> Tone/Message to be played by the unit. See tone chart for a list of available tones/messages. Range ASCII 00-1F (2 bytes).

TIME> Time sequence for Tone/Message (00-99 seconds). For continuous play of Tone/Message, use ‘00’ in this data field. Range ASCII 00-99 (2 bytes)

ZONE> Units matching this zone field will play Tone/Message indicated in the <TONE> data field for specified time indicated in <TIME> data field. All other zones remain in standby mode.

ETX> The <ETX> character has a value of 3 hexadecimal and is required at the end of every message (1 byte)

CHKSUM> Optional two byte Message Block checksum (2 bytes). Refer to Section 4.0 for Block checksum calculation and verification. If checksum is not desired, must pad these two bytes with two ASCII zeros 00.

Unit Response: None
Example: <STX>410530B<ETX>00
Units programmed with Zone ‘B’ only to play Tone 05 for 30 seconds then shut off automatically. Checksum characters not used in this example.

3.3 POLL COMMAND and SET UNIT ZONE - 43
Send Format: <STX><UA>43<00><ZONE><ETX><CHKSUM>

UA> Unit address, ASCII Range 00-1F (two bytes)

43> Two byte ASCII Command denoting POLL Command or Zone Assignment (2 byte).
<00> Two byte ASCII '00' used as protocol padding (two bytes)

<ZONE> Programmable unit zone character. Range ASCII A-D. (1 byte)

<ETX> The <ETX> character has a value of 3 hexadecimal and is required at the end of every message (1 byte)

<CHKSUM> Optional two byte Message Block checksum (2 bytes). Refer to Section 4.0 for Block checksum calculation and verification. If checksum is not desired, must pad these two bytes with two ASCII zeros 00.

Unit Response: <STX><UA>43<STATUS><ZONE><ETX><CHKSUM>

<UA> Unit address, ASCII Range 00-1F (two bytes)

<43> Two byte ASCII Command echoed back from receiving unit (2 byte).

<STATUS> Unit's current diagnostic state. Range ASCII A - D. (1 byte)

A = Tone/Message is active and Local Power is absent
B = Tone/Message is active and Local Power is present
C = Tone/Message is not active and Local Power is absent
D = Tone/Message is not active and Local Power is present

<ZONE> Unit's programmed zone character

<ACK> This <ACK> character has a value of 6 hexadecimal and represents acknowledgement of the received command with valid checksum (1 byte).

Note: In the event that a bad checksum is calculated, by the receiving unit, it will reply with a <NAK> character instead. The <NAK> character has a value of 15 hexadecimal.

<ETX> The <ETX> character has a value of 3 hexadecimal and is required at the end of every message (1 byte)

<CHKSUM> Receiving unit calculates two-byte checksum and returns ASCII value. Refer to Section 4.0 for Block checksum calculation and verification.

Example 1: <STX>014300A<ETX>00
Unit 01 is being polled and programmed to Zone A

Unit Response: <STX>0143DA<ACK><ETX>56
The unit returned a <STATUS> 'D' for its current diagnostic state and an <ACK> character because both message and checksum are valid. The unit is not actively playing Tone/Message. The calculated two-byte message checksum was '56'.

Example 2: <STX>014300A<ETX>00
Unit 01 is being polled and programmed to Zone A. Unit 01 is currently playing a Tone/Message.

Unit Response: <STX>0143BA<ACK><ETX>54
The unit returned a <STATUS> 'B' for its current diagnostic state and an <ACK> character. The unit is actively playing a Tone/Message at the time this command was received. The calculated two-byte message checksum was '54'.

3.4 TIME SEQUENCE, TIME REMAINING COMMAND - 44

Send Format: <STX><UA>44 00 <ZONE> <ETX> <CHKSUM>

<UA> Unit address characters (2 bytes). See Section 2.0, Messaging Format

<44> Two byte ASCII Command denoting a Time Sequence (2 bytes).

<00> Two byte ASCII '00' used as protocol padding (two bytes)

<ZONE> Programmable unit Zone issued by the master or controlling computer Range ASCII A-D (1 byte).

<ETX> The <ETX> character has a value of 3 hexadecimal and is required at the end of every message (1 byte)
Optional two byte Message Block checksum (2 bytes). Refer to Section 4.0 for Block checksum calculation and verification. If checksum is not desired, must pad these two bytes with two ASCII zeros 00.

Unit Response: <STX><UA> 44 <TIME LEFT><ACK><ETX> <CHKSUM>

<UA> Unit address characters (2 bytes). See Section 2.0, Messaging Format

<44> Two byte ASCII Command 43 echoed back from the receiving unit (2 bytes).

<TIME LEFT> Represents seconds left, in hexadecimal format, until the unit stops playing active Tone/Message. Range 00-63 hex (2 bytes). The unit’s internal counter returns the time remaining in seconds represented by a two byte hexadecimal value in the above data field.

**Note:** For non-timed events, the unit returns two ASCII zeros ‘00’.

<ACK> Unit received a complete message and checksum characters are valid.

**Note:** In the event that a bad checksum is calculated, by the receiving unit, it will reply with a <NAK> character instead. The <NAK> character has a value of 15 hexadecimal.

<ETX> The <ETX> character has a value of 3 hexadecimal and is required at the end of every message (1 byte).

<CHKSUM> Receiving unit calculates two-byte checksum and returns ASCII value. Refer to Section 4.0 for Block checksum calculation and verification.

Example 1: Prior to issuing Command 44, the master issues a 99 second timed sequence event for Tone/Message 03 to play on unit address 1F.

Command: <STX>1F0399A<ETX>00

9 seconds after issuing command from above, the master issues the “Time Remaining” Command 44 Command: <STX>1F4400A<ETX>00 and the unit replies with the following message.

Reply: <STX>1F445A<ACK><ETX>5E

Value 5A (90 decimal) is the hexadecimal representation of seconds left before the timed sequence event completes and Tone/Message stops.

3.5 DEVICE TYPE COMMAND - 45

Send Format: <STX><UA>45<00> <ZONE> <ETX> <CHKSUM>

<UA> Unit address characters (2 bytes). See Section 2.0, Messaging Format

<45> Two byte ASCII Command 45 denoting receiving unit’s Device type (2 bytes).

<00> Two byte ASCII ‘00’ used as protocol padding (two bytes)

<ZONE> Programmable unit Zone issued by the master or controlling computer Range ASCII A-D (1 byte).

<ETX> The <ETX> character has a value of 3 hexadecimal and is required at the end of every message (1 byte)

<CHKSUM> Receiving unit’s Firmware version and revision level.

<DEVICE TYPE> Device type is an ASCII string transmitted by the receiving unit that defines the unit family product code. For Millennium devices, the return ASCII string is “M-485”. For Edward’s Visual devices, the return ASCII string is “S-485”.

<00> Receiving Unit’s Firmware version and revision level.

<ETX> The <ETX> character has a value of 3 hexadecimal and is required at the end of every message (1 byte).
Receiving unit calculates two-byte checksum and returns ASCII value. Refer to Section 4.0 for Block checksum calculation and verification.

Example:

Command: \texttt{<STX>014500A<ETX>00}

Response: \texttt{<STX>01M-485v1.0<ETX>84}

Unit address 01 returns “M-485” string and is configured with version 1, rev.0 firmware. Calculated two-byte checksum is ‘84’.

3.6 RELAY ENERGIZE COMMAND - 31

Send Format: \texttt{<STX><UA>31<TIME> <ZONE> <ETX> <CHKSUM>}

- \texttt{<UA>}: Unit address characters (2 bytes). See Section 2.0, Messaging Format
- \texttt{<31>}: ASCII Command 31 denoting Relay Energize (2 bytes).
- \texttt{<TIME>}: Time sequence for relay ‘ON’ duration (00-99 seconds). For Continuous ‘ON’, use ASCII ‘00’ in this data field. Range ASCII 00-99 (2 bytes)
- \texttt{<ZONE>}: Programmable unit Zone issued by the master or controlling computer. Range ASCII A-D (1 byte).
- \texttt{<ETX>}: The \texttt{<ETX>} character has a value of 3 hexadecimal and is required at the end of every message (1 byte).
- \texttt{<CHKSUM>}: Optional two byte Message Block checksum (2 bytes). Refer to Section 4.0 for Block checksum calculation and verification. If checksum is not desired, must pad these two bytes with two ASCII zeros 00.

Response: \texttt{<STX><UA>31<TIME> <ACK> <ETX> <CHKSUM>}

Example: \texttt{<STX>1F3105<ACK><ETX>00}

Unit address 1F energizes relay for 5 seconds then shuts off automatically. Checksum characters not used in this example.

- \texttt{<UA>}: Unit address
- \texttt{<31>}: Two byte ASCII Command 31 echoed back from receiving unit.
- \texttt{<TIME>}: Received two byte ASCII time value
- \texttt{<ACK>}: Unit received valid message and checksum
- \texttt{<ETX>}: The \texttt{<ETX>} character has a value of 3 hexadecimal and is required at the end of every message (1 byte).
- \texttt{<CHKSUM>}: Receiving unit calculates two-byte checksum and returns ASCII value. Refer to Section 5.0 for Block checksum calculation and verification.

Note: Relay output commands are only valid when there is no tone/voice message actively playing. Any tone/voice messages automatically overrides any relay output commands sent to the unit.

3.7 RELAY DE-ENERGIZE COMMAND - 30

Send Format: \texttt{<STX><UA>30<00> <ZONE> <ETX> <CHKSUM>}

- \texttt{<UA>}: Unit address characters (2 bytes). See Section 2.0, Messaging Format
- \texttt{<30>}: ASCII Command 30 denoting Relay De-Energize (2 bytes).
- \texttt{<00>}: Two byte ASCII ‘00’ used as protocol padding (two bytes)
- \texttt{<ZONE>}: Assigned unit Zone. Range ASCII A-D (1 byte)
- \texttt{<ETX>}: The \texttt{<ETX>} character has a value of 3 hexadecimal and is required at the end of every message (1 byte).
- \texttt{<CHKSUM>}: Receiving unit calculates two-byte checksum and returns ASCII value. Refer to Section 4.0 for Block checksum calculation and verification.

Response: \texttt{<STX><UA>3000 <ACK> <ETX> <CHKSUM>}

Example: \texttt{<STX>1F3000<ACK><ETX>43}

Unit address 1F de-energizes relay output

- \texttt{<UA>}: Unit address
Two byte ASCII Command 30 echoed back from receiving unit.

Two byte ASCII ‘00’ used as protocol padding (two bytes)

Unit received valid message and checksum

The <ETX> character has a value of 3 hexadecimal and is required at the end of every message (1 byte).

Receiving unit calculates two-byte checksum and returns ASCII value. Refer to Section 4.0 for Block checksum calculation and verification.

4.0 Verify and Calculate Message Block Checksum

4.1 Message Block checksum can be verified by adding up all the hexadecimal characters in the received message string, excluding the first character <STX> and the very last two checksum characters.

4.2 The sum of these characters will produce a three-byte hexadecimal value. The higher order byte is not used and should be dropped. The lower two bytes are used for comparison to the received checksum characters. See example Message String received below:

Message String Received:

<STX> 0 1 4 3 D A <ACK> <ETX> 5 6

Not included in calculation
Message characters included
Two byte ASCII checksum data field not included in calculation, but used for comparison to calculated results

4.3 Calculating the checksum is done by first converting each ASCII character, found in the message string, to the hexadecimal equivalent and then summing these characters. See below.

<table>
<thead>
<tr>
<th>ASCII</th>
<th>HEXADECIMAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0x30</td>
</tr>
<tr>
<td>1</td>
<td>0x31</td>
</tr>
<tr>
<td>4</td>
<td>0x34</td>
</tr>
<tr>
<td>3</td>
<td>0x33</td>
</tr>
<tr>
<td>D</td>
<td>0x44</td>
</tr>
<tr>
<td>A</td>
<td>0x41</td>
</tr>
<tr>
<td>✓ (ACK)</td>
<td>0x06</td>
</tr>
<tr>
<td>✓ (ETX)</td>
<td>0x03</td>
</tr>
</tbody>
</table>

0x156 hexadecimal total

4.4 Dropping the upper hexadecimal byte from the above total yields a final result of 56 hexadecimal. The calculated hexadecimal checksum value should match the ASCII value received in the message string. If it does not match, a possible error occurred during transmission and the message is considered unreliable. The master or controlling computer should try to resend the message again.

Example of a POLL Command 43 issued to unit 05, Zone B

<STX>054300B<ETX>

<table>
<thead>
<tr>
<th>ASCII</th>
<th>HEXADECIMAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0x30</td>
</tr>
<tr>
<td>5</td>
<td>0x35</td>
</tr>
<tr>
<td>4</td>
<td>0x34</td>
</tr>
<tr>
<td>3</td>
<td>0x33</td>
</tr>
<tr>
<td>0</td>
<td>0x30</td>
</tr>
<tr>
<td>0</td>
<td>0x30</td>
</tr>
<tr>
<td>B</td>
<td>0x42</td>
</tr>
<tr>
<td>✓ (ETX)</td>
<td>0x03</td>
</tr>
</tbody>
</table>

0x171 hexadecimal total
The calculated Message Block checksum are appended to the message string. Two bytes, ASCII 7 and ASCII 1, consume these two checksum data fields. See below.

Send format: \(<\text{STX}>054300A<\text{ETX}>71\)

5.0 Wiring applications

**RS-232 to RS-485 Multi or Single drop**

![Diagram of RS-232 to RS-485 Multi or Single drop wiring](image)

**PLC to RS-485 Multi or Single drop**

![Diagram of PLC to RS-485 Multi or Single drop wiring](image)
RS-485 Multi or Point to Point

RS-485 Port

PLC Controller
or
IBM PC with
RS485 Serial Port

RS-485 cable
(up to 4000 ft)

Tone Generator
5540M-48SY6 or
5540MV-48SY6

Up to 32 units
(maximum)

Suggested Network Topology Node Schemes

(a)  

(b)  

(c)  

(d)
## Figure 7. Tone Programming

<table>
<thead>
<tr>
<th>Tone</th>
<th>Description</th>
<th>Switch</th>
<th>HEX</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Tone</td>
<td></td>
<td>00</td>
<td></td>
</tr>
<tr>
<td>Ding-Dong</td>
<td>Percussive pairs of 700 and 570 Hz tones, each damped to zero</td>
<td>01</td>
<td></td>
</tr>
<tr>
<td>Warble</td>
<td>575 and 770 Hz alternately, 87 ms each</td>
<td>02</td>
<td></td>
</tr>
<tr>
<td>Siren</td>
<td>600-1250 Hz up and down sweep in 8 seconds and repeat</td>
<td>03</td>
<td></td>
</tr>
<tr>
<td>Stutter</td>
<td>Percussive 470 Hz, 83 ms on, 109 ms off</td>
<td>04</td>
<td></td>
</tr>
<tr>
<td>Slow Whoop</td>
<td>600-1250 Hz upward sweep in 4 seconds and repeat</td>
<td>05</td>
<td></td>
</tr>
<tr>
<td>Beep</td>
<td>470 Hz, 0.55 seconds on, 0.55 seconds off</td>
<td>06</td>
<td></td>
</tr>
<tr>
<td>Chime 1</td>
<td>700 Hz percussive repeat at 1 Hz</td>
<td>07</td>
<td></td>
</tr>
<tr>
<td>Fast Whoop</td>
<td>600-1250 Hz upward sweep in 1 second and repeat</td>
<td>08</td>
<td></td>
</tr>
<tr>
<td>Hi/Lo</td>
<td>780 to 600 Hz alternately, 0.52 seconds each</td>
<td>09</td>
<td></td>
</tr>
<tr>
<td>Rapid Siren</td>
<td>600-1250 Hz up and down sweep in 0.25 seconds and repeat</td>
<td>0A</td>
<td></td>
</tr>
<tr>
<td>Yeow</td>
<td>1250-600 Hz downward sweep in 1.6 seconds and repeat</td>
<td>0B</td>
<td></td>
</tr>
<tr>
<td>Horn</td>
<td>470 Hz continuous</td>
<td>0C</td>
<td></td>
</tr>
<tr>
<td>Air Horn</td>
<td>370 Hz continuous</td>
<td>0D</td>
<td></td>
</tr>
<tr>
<td>Dual Tone</td>
<td>450-500 Hz, 0.4 to 0.5 second cycle</td>
<td>0E</td>
<td></td>
</tr>
<tr>
<td>Chime 2</td>
<td>575 Hz percussive repeat at 1 Hz</td>
<td>0F</td>
<td></td>
</tr>
<tr>
<td>Westminster</td>
<td>Two measures, 411 Hz, 520 Hz, 407 Hz, 312 Hz</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Three Blind Mice</td>
<td>Four measures, 787 Hz, 714 Hz, 625 Hz, 952 Hz, 333 Hz</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Phasor</td>
<td>416-625 Hz up and down sweep in 13 ms and repeat</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Telephone</td>
<td>570 and 770 Hz alternately, 50 ms each for 1.2s, 1.5s delay and repeat</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Staircase</td>
<td>440-2000 Hz up and down steps, 750 ms delay and repeat</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>3 Tone Alert</td>
<td>463, 641 and 896 Hz, 200 ms each, 1 second delay and repeat</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Presignal Chime</td>
<td>470 Hz percussive repeat at 1.5 Hz, followed by Message 1</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>Message 1</td>
<td>Field recorded voice message</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>Message 2</td>
<td>Field recorded voice message</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>Message 3</td>
<td>Field recorded voice message</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>Message 4</td>
<td>Field recorded voice message</td>
<td>1A</td>
<td></td>
</tr>
<tr>
<td>NFPA Whoop</td>
<td>Three 422-775 Hz upward sweeps, 850 ms each, 1 s delay and repeat</td>
<td>1B</td>
<td></td>
</tr>
</tbody>
</table>
| 3 Pulse Horn    | 470 Hz, 3.05 second pulses separated by 0.5 seconds followed by a 1.5 second delay and repeat---- 
**For Evacuation Use Only** | 1C     |
| 3 Pulse Air Horn| 370 Hz, 3.05 second pulses separated by 0.5 seconds followed by a 1.5 second delay and repeat---- 
**For Evacuation Use Only** | 1D     |
| 3 Pulse Dual Tone| 450-500 Hz, 0.4 to 0.5 second cycle, 3.05 second pulses separated by 0.5 seconds followed by a 1.5 second delay and repeat---- 
**For Evacuation Use Only** | 1E     |
| 3 Pulse Chime 2 | 575 Hz, 3.05 second pulses separated by 0.5 seconds followed by a 1.5 second delay and repeat---- 
**For Evacuation Use Only** | 1F     |

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**CAUTION**

The use of evacuation signals on this product, that is not specifically Listed for Fire Alarm Use, is subject to the approval of the Authority Having Jurisdiction.
Wiring to RS-232/485 Convert Box (MCN485CB2EOLT)

All statements, technical information and recommendations contained herein are based on information and tests we believe to be reliable. The accuracy or completeness thereof are not guaranteed. In accordance with Crouse-Hinds "Terms and Conditions of Sale", and since conditions of use are outside our control, the purchaser should determine the suitability of the product for his intended use and assumes all risk and liability whatsoever in connection therewith.
OFFSET SPEC
INSTALLATION INSTRUCTIONS FOR ADAPTATONE FLEX-TONE SPEAKER/AMP.

8 1/2" X 11" SHEETS PRINTED BOTH SIDES. SADDLE STITCH TWO PLACES AS SHOWN IN DETAIL.

MATERIAL: STANDARD WHITE OFFSET STOCK
CHARACTERS: TO BE BLACK ON WHITE BACKGROUND
NOTE: MECHANICALS HAVE ALREADY BEEN REDUCED TO ACTUAL SIZE.

APPROVED: AA
ISSUE: 1
FILE: 3100884
ECN:

FOLD DETAIL REFERENCE ONLY