Applications

- Government and Military Installations
- Schools & Distant Learning Centers
- Tele-Conferencing Center
- Airborne & Ground Mobile
- 9-1-1 Dispatch Centers
- Broadcast Facilities
- Custom Units

Features

- Battery Back-Up
- GPS Traceability
- Easily Expanded
- Long-Life LED Displays
- <10μs GPS Accuracy
- Time Zone Offset Option
- Analog/Impulse Clocks & Drivers
- Time & Date Digital and Video Displays
- IRIG-A, IRIG-B, IRIG-G, ESE, NTP, SMPTE/EBU & ASCII Time Code Outputs
INTRODUCTION

BACKGROUND

 Founded in 1971, ESE’s first products consisted of a line of Digital Clocks and Timers designed specifically to meet the needs of the broadcast and hospital industries. In the mid-70s ESE introduced two Master Clocks, one of which referenced a one second per month crystal time base, and the other WWV (NBS/NIST). These products widened the market of the ESE product lines to include school systems, 9-1-1 dispatch centers and military installations.

 Later in the 70s the ES-270 was introduced, our first IRIG-B Time Code Product. Since then, that Product Family has grown considerably. The IRIG Family now includes more than 50 standard products, highlighted by the ES-295/GPS and ES-185U, GPS referenced Master Clocks/IRIG Time Code Generators, and Airborne Time Code Products.

 Through the years ESE has also worked with several OEMs, designing and manufacturing products that met unique requirements. These alliances have found ESE manufactured products in a variety of applications including teleconferencing centers, military test ranges and the space shuttle.

 As the need for precision timing equipment grows, so does ESE. And, with the availability of more precise timing technology, so does our product line. With nearly 350 standard products, ESE is certain to offer a solution to all of your precision timing requirements.

PRODUCT FAMILIES

 Many ESE products have a tendency to overlap from one “Product Family” to another. The products described in this brochure, in one way or another, deal with IRIG Time Code. If any of our other Product Families are of interest to you, give us a call. Or, send us an email at ese@ese-web.com

 ♦ CS3, CS5 & CS6 TIME CODE
 ♦ DISTRIBUTION AMPLIFIERS
 ♦ MASTER CLOCK SYSTEMS
 ♦ CONVERTERS & TRANSLATORS
 ♦ CLOCKS & TIMERS
 ♦ TIME CONTROL SYSTEMS
 ♦ “SMPTE” TIME CODE PRODUCTS
 ♦ “IRIG” PRODUCTS (including Airborne)
 ♦ VIDEO & AUDIO PRODUCTS
 ♦ “TIME SYNCHRONIZATION” & “9-1-1” PRODUCTS

CUSTOM PRODUCTS

 Since 1971, ESE has manufactured over 2600 different “Specials” (products defined by the customer’s specific requirement... designed and built by ESE). Many of these “Specials” have evolved into “Standard” Products, some of which are mentioned in this brochure. If you have a custom requirement, give us a call and put our “time” and experience to work for you.

CUSTOMER SATISFACTION

 Our goal is to meet and exceed your expectations. All ESE products are made in the U.S.A. and guaranteed to operate according to the descriptions and specifications as described within this brochure. Additionally, all ESE products carry a warranty as described on page 24.
INTRODUCTION

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OPTIONS

142 SIERRA ST., EL SEGUNDO, CA 90245 (310)322-2136 FAX (310)322-8127 www.ESE-WEB.com
IRIG TIME CODE  
GENERATOR/TRANSLATOR

The **ES-295** is an IRIG (A, B or G) Time Code Generator and Translator. When in the Generator (stand-alone) mode, day of year and time are manually set using the front panel controls or the supplied PC software. In the Translator (sync) mode, the unit accepts IRIG-A, IRIG-B or IRIG-G time code. In either mode, the **ES-295** provides an IRIG-A, IRIG-B or IRIG-G time code output (AM & TTL) and a 1pps output. Input and output time code selections are also made using the front panel controls or the supplied PC software.

Available on the **ES-295** is the option GPS. When in the GPS mode, the unit is synchronized to UTC via the internal GPS receiver. The Generator or Translator modes can alternatively be selected when the GPS option is specified.

**Features**

- IRIG-A, B or G Input/Output
- Generates/Translates Time Code
- USB Setup Interface
- Universal Power Supply (90-264 VAC)
- Rack Mount Enclosure
- LCD Setup/Status Display
- Error Bypass/Freeze Modes
- Settings Retained in Battery Backed Ram
- Analog or TTL Input Modes
- Time Code Lock Output
- Optional GPS Receiver
- Time Delay
- Options: DC, EXT, GPS, LED, OCXO, NTP2, UL, Custom

A nine-digit .56” amber LED display (Days, Hours, Minutes & Seconds) provides a readout of the input/output time code. The IRIG time code input and outputs are via rear mounted BNC connectors. There are two outputs of the AM signal and two outputs of the TTL signal. The 1pps signal is also available on a pair of BNC connectors. The **ES-295** is housed in a single height rack mount enclosure which is black anodized.

The **ES-295** incorporates an Error Bypass mode and a Freeze mode. In Error Bypass mode the outputs are continuously generated regardless of whether time code is erroneous or lost. In Freeze mode the outputs stop when errors in the time code input are detected or when time code is lost.

The front panel controls (Menu, Up & Down) allow access to all configuration settings as displayed on the 16 x 2 character “Setup/Status” LCD. The same controls are available on the PC software which is accessible via the rear mounted USB port.

**SPECIFICATIONS**

- **Power:** 90 – 264 VAC, 47 – 63 Hz, 15 Watts max (Option “DC” only) +11 to +35 VDC, 1 Amp max
- **Mechanical:** Rackmount Enclosure 1¾” H x 19” W x 9½” D
- **Time Display:** 9-digits, 0.56” yellow LED
- **Setup/Status Display:** 16 x 2 character LCD
- **IRIG Input:** IRIG-A, IRIG-B or IRIG-G
  - 100 mVPP – 10 VPP AGC input
- **IRIG AM Outputs:** IRIG-A, IRIG-B, or IRIG-G
  - 0.5 – 5 Vpp (mark amplitude), Mark to Space 3 to 1, 600Ω, 2 BNCs
- **IRIG TTL Outputs:** IRIG-A, IRIG-B or IRIG-G
  - ≥ 4.0 V high and ≤ 0.6 V low, 5 Vpp, 2 BNCs
- **1 PPS Outputs:** TTL outputs, positive edge true
  - 50% duty output < 1 mS accuracy, 2 BNCs
- **Accuracy:** Standard VCTCXO >15mS per day
  - Option OCXO >2mS per day
  - Option GPS>10nS
- **Options:** DC, EXT, GPS, LED, OCXO, NTP2, UL, Custom

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142 SIERRA ST., EL SEGUNDO, CA 90245 (310)322-2136 FAX (310)322-8127 www.ESE-WEB.com
GPS MASTER CLOCK / TIME CODE GENERATOR

The ES-185U is a GPS (Global Positioning System) Master Clock and Time Code Generator. The unit displays nine digits (Day of Year, Hour, Minute & Second) of UTC (Coordinated Universal Time) as received via the internal 12-channel GPS receiver. Simultaneously, the ES-185U generates several types of time code (SMPTE/EBU, IRIG-B, ESE-TC89, ESE-TC90, RS232C/ASCII and USB) and an extremely accurate 1PPS signal (+/-10ns). These outputs allow the ES-185U to easily interface with new or existing computer, automation and clock systems. An optional ethernet NTP (Network Time Protocol) port may be specified allowing the clock to be an NTP server and providing clock set-up via a LAN.

Features

- SMPTE/EBU, IRIG-B, USB, ASCII (RS-232C) & ESE Time Code Outputs
- Automatic Daylight Savings Time Correction
- USB Set-up Interface & Software
- Optional NTP Ethernet Port
- 4-Hour Battery Back-Up
- 9-Digit .56" LED Display
- Indoor / Outdoor Antenna And 16' Cable
- Optional DC Operation For Field And Ground Mobile Applications
- Rugged Rack Mount Enclosure
- Time Advance/Retard Feature For Synchronization Purposes
- Dual 1 PPS Outputs
- Time Zone Offset

Included with the ES-185U is an indoor/outdoor antenna which is connected to the unit via the provided 16' cable. If additional cable is required, “low-loss” cable, an “in-line” amplifier (LA-12F or LA-12FN for low-loss cable) or, for extra long cable runs where more than one in-line amplifier is used, an “Antenna Power Supply” (ES-AB1A) may be required. Consult the ESE factory or website for more information.

Software is also supplied with the ES-185U permitting the user to continuously update a computer’s Windows® clock to the time available on the USB port. Other features allow the user to 1) select SMPTE mode (DF, NDF, EBU & Real Time) 2) offset the Time Zone displayed and output by the ES-185U and 3) advance or delay the time output for various synchronizing purposes.

Specifications

- **Electrical:** 117 VAC, 50/60 Hz
- **Power:** 15 Watts Maximum
- **Mechanical:** 1.75" x 19" Rack Mount, 10" Deep
- **Displays:** Nine Digits, Yellow LED, .56" High
- **GPS Receiver:** Internal 12-Channel
- **Antenna:** Indoor/Outdoor Dome with 16' Cable
- **Accuracy:** 1 PPS @ <10ns (20% Duty Cycle)
- **IRIG-B @ 1μS**
- **ESE TC89 & TC90 Time Code @ 17mS**
- **SMPTE, +/- 3 to 12 Frames**
- Adjustable (Video Modes), 0 Frames (Real Time Mode)
- **Drift:** 33mS/day (if no GPS signal)
- **Video Input:** RS-170A Composite Video/Blackburst, 1 Vpp, 75Ω

- **Outputs:** 1 PPS: TTL, 20% Duty Cycle
- 1 PPS: TTL, 50% Duty Cycle
- IRIG-B: 3 Vpp (mark amplitude), 600Ω, AM or TTL selectable
- **ESE Time Code:** drives 100 Slaves @ 4000'
- SMPTE: 600Ω Balanced or Unbalanced
- RS-232C: Date & Time Output
- USB: Universal Serial Bus, Date & Time Output
- Ethernet (optional): 10/100 Base-T, NTP Output
- **Clock Set-up:** USB, RS-232C, Network (Telnet or Windows®)
- **Battery:** 4-Hour Back-Up (displays are blank)
- **Options:** Ant, DC, HR, J, K, NTP, UL
GPS BASED

IRIG TIME CODE GENERATOR

The ES-911E/GPS is a GPS (Global Positioning System) Master Clock and Time Code Generator. The unit displays six digits of time as received via the internal 12-channel GPS receiver. (Date information is also available on all time code outputs.) Simultaneously, the ES-911E/GPS generates several types of time code (IRIG-B, IRIG-E, ESE, RS-485: “Broadcast”, RS232C: “Broadcast” and RS-232C: “Query”) and two 1PPS signals. An optional ethernet NTP (Network Time Protocol) port may be specified allowing the clock to be an NTP server and providing clock set-up via a LAN.

The unit is specifically designed to meet the NENA (National Emergency Number Association) Standard NENA-04-002 for a PSAP (Public Safety Answering Point) Master Clock and is capable of “Time Synchronizing” all components of a PSAP. This assures that all equipment such as CAD, ANI/ALI Controllers, Voice Recorders and Radio Consoles can easily interface with and be synchronized to the ES-911E/GPS. The ES-911E/GPS can also synchronize other computers and digital/analog clock systems.

Features
• IRIG-B, IRIG-E, RS-232C (Broadcast & Query) And ESE Time Code Outputs • UL Approved Power Supply
• IRIG Codes Are Switchable Between Modulated And TTL • Automatic Daylight Savings Time Correction
• Internal 60 Minute Battery Back-Up
• Rugged Rack Mount Enclosure
• “Time Sync” Indicator
• GPS “Lock” Indicator
• 6-Digit, .56” LED Display
• Signature Control (“ON/OFF”)
• +/- 10 Nanosecond Accuracy • Legally Traceable to UTC (Universal Coordinated Time)
• 1 PPS Output • Time Zone Offset • Meets Or Exceeds NENA-04-002 Master Clock Specifications
• Digital, Video & Analog Slave Clocks Available • Loss Of Power & Loss Of Time Sync Relay Outputs
• Loss of GPS Signal Output • Switchable Between 12 & 24 Hr • Indoor/Outdoor Antenna With 16’ Cable

Included with the ES-911E/GPS is an indoor/outdoor antenna that is connected to the unit via the provided 16’ cable. If additional cable is required, “low-loss” cable, an “in-line” amplifier (LA-12F or LA-12FN for low-loss cable) or, for extra long cable runs where more than one in-line amplifier is used, an “Antenna Power Supply” (ES-AB1A) may be required. Consult the ESE factory for more information.

Software is supplied with the ES-911E/GPS permitting the user to continuously update a computer’s clock to the GPS time available on the ASCII output. (Software is also available via our Web-site.)

SPECIFICATIONS

**Outputs:**
- 1 PPS - TTL, 20% Duty Cycle
- 1 PPS - TTL, 50% Duty Cycle (regenerated)
- IRIG-B - 3 VPP (mark amplitude) (AM or TTL), 600Ω
- IRIG-E - 3 VPP (mark amplitude) (AM or TTL), 600Ω
- ESE Time Code - Drives 100 Slaves @ 4000’
- RS-232C - ASCII Date & Time @ 1200-9600 Baud, 8 Data, No Parity, 1 Stop; Broadcast & Query
- RS-485 - (same as RS-232C: no Query)

**Options:**
- Ant, HR, J, K, NTP. (The ES-911E/GPS/NTP must be specified when requesting the ‘NTP’ option.)
ECONOMY
GPS MASTER CLOCKS

The ES-101 and ES-103U are low-cost yet very accurate GPS Master Clocks/Time Code Generators. Both receive time and date information from Global Positioning System satellites and supply the data to the user in several different forms. A twelve-channel receiver is employed that is capable of tracking up to twelve satellites simultaneously, although reception of only one is required for time data to be acquired.

Both units have ASCII (RS-232C), ESE-TC89 and ESE-TC90 Time Code outputs, two One Pulse Per Second outputs and a GPS “Lock” output. Additionally, the ES-103U has a 9-digit display (day of year, hours, minutes & seconds) and an IRIG-B time code output.

Several Options are available that allow the unit to meet most any demand required of a Master Clock or Time Code Generator.

Features
- IRIG-B, USB (ES-103U only), ASCII (RS-232C) & ESE Time Code Outputs
- Automatic Daylight Savings Time Correction
- Rugged Desk Top & Rack Mount Enclosures
- Time Zone Offset
- Dual 1 PPS Outputs
- USB Port
- Indoor / Outdoor Antenna With 16’ Cable
- Optional 6-Digit Or 9-Digit .56” LED Display
- Optional DC Operation for Field and Ground Mobile Applications
- GPS “Lock” indicator
- Leap Second Correction
- USB Port
- Loss Of GPS Signal Output

Included is an indoor/outdoor antenna which is connected to the unit via the provided 16’ cable. If additional cable is required, “low-loss” cable, an “in-line” amplifier (LA-12F or LA-12FN for low-loss cable) or, for extra long cable runs where more than one in-line amplifier is used, an “Antenna Power Supply” (ES-AB1A) may be required. Consult the ESE factory for more information.

Software is also supplied permitting the user to continuously update a computer’s clock to the time available on the serial or USB port.

Specifications

<table>
<thead>
<tr>
<th>ES-101</th>
<th>ES-103U</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Electrical:</strong></td>
<td>117 VAC, 50/60 Hz</td>
</tr>
<tr>
<td><strong>Power:</strong></td>
<td>5 Watts Typical</td>
</tr>
<tr>
<td><strong>Enclosure:</strong></td>
<td>Desk Top</td>
</tr>
<tr>
<td><strong>Mechanical:</strong></td>
<td>1.6” H x 7” W x 5” D</td>
</tr>
<tr>
<td><strong>Displays:</strong></td>
<td>-</td>
</tr>
<tr>
<td><strong>Accuracy:</strong></td>
<td>1 PPS @ &lt;500ηS</td>
</tr>
<tr>
<td><strong>Drift:</strong></td>
<td>33mS/day (if no GPS signal)</td>
</tr>
<tr>
<td><strong>Outputs:</strong></td>
<td>ES-TC89: drives 100 Slaves @ 4000’</td>
</tr>
<tr>
<td></td>
<td>ESE-TC90: drives 100 Slaves @ 4000’</td>
</tr>
<tr>
<td></td>
<td>1 PPS: TTL, 20% Duty Cycle</td>
</tr>
<tr>
<td></td>
<td>1 PPS: TTL, 50% Duty Cycle</td>
</tr>
<tr>
<td></td>
<td>RS-232C:ASCII Date &amp; Time @9600 Baud</td>
</tr>
<tr>
<td>GPS Receiver:</td>
<td>Internal 12-Channel</td>
</tr>
<tr>
<td>Antenna:</td>
<td>Indoor/Outdoor with 16’ Cable</td>
</tr>
<tr>
<td>Options:</td>
<td>Ant, BBU, DC, EBU, HR, IRIG-B, IRIG-E, J, K*, P, P2, SMPTE(or EBU), UL, 6-Digit, 9-Digit, 10ηS</td>
</tr>
</tbody>
</table>

*requires 10ηS option
The ES-150 and ES-151 are Automatic Time Code Switchover units. They are designed to provide a simple/automatic method for switching between a Primary Master Clock and a Secondary Master Clock. The units receive ESE time code from two different sources (A & B) and if a fault is detected from the Primary Clock (A), the ES-150 or ES-151 automatically switches to the Back-up Clock (B). Once a fault is detected, the unit remains in the “B” state until manually reset. Front panel mounted LED’s indicate status and a toggle switch allows manual switching between A and B.

**Features**
- Up to Four Additional (optional) Input/Output Circuit Switchovers
- Automatic Time Code Switchover
- Rack Mount Enclosure
- LED Status Indicators
- Simple Installation & Operation
- Five Standard Input/Output Circuit Switchovers

The ES-150 also provides passive switchover inputs (A & B) and outputs for SMPTE/EBU time code, ASCII a 1PPS signal and an inverted 1 PPS signal. The ES-151 excludes SMPTE/EBU and includes IRIG-B and IRIG-E. The status of these outputs is controlled by the same circuitry as the ESE time code and will therefore switch from A to B whenever the ESE time code is switched. Optionally, the ES-150 or ES-151 can be specified to include passive I/O circuitry for switching many other signals common to a Master Clock System. These include IRIG-B time code, 1 KHz, 10 MHz and a 12 or 24 VDC Alternating I/O (Analog Clock signal of the ES-162A and Favag Systems). Also optionally available is a Parallel BCD output derived from the ESE time code being output.

**Simplified Master/Switcher Arrangement**

**Specifications**

<table>
<thead>
<tr>
<th></th>
<th>ES-150</th>
<th>ES-151</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active I/O Circuits:</td>
<td>ESE Time Code</td>
<td>ESE Time Code</td>
</tr>
<tr>
<td>Passive I/O Circuits:</td>
<td>SMPTE/EBU, ASCII, 1 PPS (20%), 1 PPS (50%)</td>
<td>IRIG-B, IRIG-E, ASCII (RS-232C-Broadcast &amp; Query, RS-422), 1 PPS</td>
</tr>
<tr>
<td>Electrical:</td>
<td>117 VAC, 50/60 Hz</td>
<td>117 VAC, 50/60 Hz</td>
</tr>
<tr>
<td>Power:</td>
<td>2 Watts</td>
<td>2 Watts</td>
</tr>
<tr>
<td>Mechanical:</td>
<td>1.75” x 19” Rack Mount, 10” Deep</td>
<td>1.75” x 19” Rack Mount, 10” Deep</td>
</tr>
<tr>
<td>Optional I/O Circuits:</td>
<td>IRIG-B, 1 KHz, 10 MHz, 12 or 24 VDC Alternating</td>
<td>1 KHz, 10 MHz, 12 or 24 VDC Alternating</td>
</tr>
<tr>
<td>Options:</td>
<td>B, Black, J, UL, I/O Sets</td>
<td>B, Black, J, UL, I/O Sets</td>
</tr>
</tbody>
</table>
TIME CODE DISPLAYS

ESE offers a wide variety of IRIG “type” Time Code Readers. Display sizes range from .4” high to 4.0” high and the enclosures available include Desk-Top, Console Mount, Wall Mount and Rack Mount. Larger size displays as well as custom enclosures are available as “Specials”.

The units described below are designed to automatically detect, decode and display “IRIG” Time Codes. An error detection/correction feature assures continuous operation. The time code may originate from any ESE Master Clock/Time Code Generator with an IRIG output or any other source of IRIG-A, IRIG-B, IRIG-E, NASA 36, XR3 or 2137 Time Code (AM or TTL).

Features

- Time Zone Offset
- Brightness Control
- CS3, CS5 & CS6 Readers are also available - contact ESE
- 1/4 - 6x Playspeed
- Desk-Top, Console, Wall & Rack Mount Enclosures
- Automatic Error Detection And Correction
- Display Time Of Year (Day & Time)
- Perfect Synchronization With Master Clock
- Reads IRIG (A, B or E), NASA 36, 2137 Or XR3 Time Codes
- .4” To 4.0” Display Sizes

Each unit requires only a single pair of wires (although coax is recommended in certain environments) between itself and the Master Clock (or other source of time code). The wiring arrangement may be parallel, serial or both. Applications requiring extra long cable runs or signal isolation may require a Distribution Amplifier, refer to pages 22 & 23.

Other IRIG time codes are available on a “Custom” basis. Please contact the Factory with your specific requirement.

<table>
<thead>
<tr>
<th>Model #</th>
<th>Description</th>
<th>Viewing Distance</th>
<th>Power</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>ES-297</td>
<td>6-digit, .4” Red LED in Console Mount enclosure</td>
<td>10’</td>
<td>6 Watts</td>
<td>J, UL, V</td>
</tr>
<tr>
<td>LX-270U/6</td>
<td>6-digit, .56” Amber LED in Desk-Top enclosure</td>
<td>20’</td>
<td>6 Watts</td>
<td>DC, J, Q, UL</td>
</tr>
<tr>
<td>LX-270U/6/Q</td>
<td>6-digit, .56” Amber LED in Console Mount enclosure</td>
<td>20’</td>
<td>6 Watts</td>
<td>DC, ESE, J, RS, UL</td>
</tr>
<tr>
<td>LX-270U/9</td>
<td>9-digit, .56” Amber LED in Desk-Top enclosure</td>
<td>20’</td>
<td>8 Watts</td>
<td>DC, J, UL</td>
</tr>
<tr>
<td>ES-270U/6</td>
<td>6-digit, 1.0” Amber* LED in Desk-Top enclosure</td>
<td>35’</td>
<td>6 Watts</td>
<td>DC, J, UL</td>
</tr>
<tr>
<td>ES-271U/6</td>
<td>9-digit, 1.0” Amber* LED in Rack mount enclosure</td>
<td>35’</td>
<td>8 Watts</td>
<td>DC, J, PoE, RS, UL</td>
</tr>
<tr>
<td>ES-272U/6</td>
<td>6-digit, 2.3” Red* LED in Wall mount enclosure</td>
<td>70’</td>
<td>8 Watts</td>
<td>DC, J, P, PoE, UL</td>
</tr>
<tr>
<td>ES-272U/9</td>
<td>9-digit, 2.3” Red* LED in Wall mount enclosure</td>
<td>70’</td>
<td>10 Watts</td>
<td>CW, DC, J, PoE, UL</td>
</tr>
<tr>
<td>ES-279U/6</td>
<td>6-digit, 4.0” Red* LED in Wall mount enclosure</td>
<td>120’</td>
<td>8 Watts</td>
<td>CW, DC, J, PoE, UL</td>
</tr>
<tr>
<td>ES-279U/9</td>
<td>9-digit, 4.0” Red* LED in Wall mount enclosure</td>
<td>120’</td>
<td>10 Watts</td>
<td>CW, DC, J, PoE, UL</td>
</tr>
</tbody>
</table>

*Amber, Blue, Green or Red LED display color can be specified

Display Size/Enclosure Plating

- .4” 6-digit Console: Black ABS Plastic
- .56” 6-digit Desk: Black Powder Coated Al.
- .56” 9-digit Desk: Black Powder Coated Al.
- .56” - Rack: Anodized Aluminum
- 1.0” - Desk: Black Powder Coated Al.
- 1.0” - Rack: Anodized Aluminum
- 2.3” 6-digit Wall: Black Powder Coated Al.
- 2.3” 9-digit Wall: Black Powder Coated Al.
- 4.0” 6-digit Wall: Black Powder Coated Al.
- 4.0” 9-digit Wall: Black Powder Coated Al.

Dimensions

- 2.2” H x 4.5” W x 4.5” D
- 1.7” H x 8” W x 6” D
- 3.5” H x 9” W x 8” D
- 1.7” H x 9.6” W x 6” D
- 1.75” H x 19” W x 10” D
- 3.5” H x 12.7” W x 6” D
- 3.5” H x 19” W x 10” D
- 5” H x 15” W x 3.5” D
- 3.5” H x 19” W x 10” D

Connector

- BNC
- BNC
- BNC
- BNC
- Terminal Block
- BNC
- Terminal Block
- Terminal Block
- Terminal Block
SELF-SETTING
5”, 12” & 16” ANALOG CLOCKS

The LX-5105, LX-5112 and LX-5116 are Self-Setting Analog Clocks with 5”, 12” and 16” viewing diameters, respectively. The units are designed to operate as Time Code Readers (Slaves), Stand-Alone Clocks or Impulse Clocks. All three can read, decode and display time information from most any Master Clock or other source of time code. A rear-mounted DIP switch permits the clock to display time as received from a source of ESE, SMPTE/EBU or ASCII time code (IRIG-B is optional). After a very simple “set-up” procedure and receipt of time code, the clock automatically sets itself to the exact time and continuously slaves to the time code. (If time code is lost, an error indicator is lit and the clock continues counting while referencing an internal crystal time base.)

Other user defined modes of operation allow the clocks to be synchronized to a Master Clock with a 1 PPS alternating 12 VDC/24 VDC output or to be set to real time and allowed to run based on their internal crystal oscillators. The second hand is completely silent and can be programmed for “Sweep” mode or “Step” mode.

Features
- Silent
- Reads ESE, ASCII, SMPTE Or EBU Time Code
- Simple Installation & “Hands-Off” Operation
- 5”, 12” or 16” Dials
- Stand-Alone, Impulse & Reader Modes
- Self-Setting
- Lighted-Dial Option
- Time Zone Offset
- Sweep Or Step Second Hand
- Error Indicator
- Rack Mount Option
- Optional IRIG-B Input
- Battery Back-Up

The initial set-up allows each clock to have the hours (and/or minutes) offset to that of another time zone. Also, since the unit can continuously track time code, there is no need to twice annually compensate for daylight savings time, assuming the Master Clock automatically adjusts itself accordingly.

SPECIFICATIONS

<table>
<thead>
<tr>
<th>Power:</th>
<th>5 Watts Maximum (15 Watts with Light option)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical:</td>
<td>117 VAC, 50/60 Hz</td>
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<tr>
<td>Battery:</td>
<td>9 v, Maintains CPU for up to 60 Hours</td>
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<tr>
<td>Mechanical:</td>
<td>Desk Mount Enclosure (LX-5105); Wall Mount Enclosure (LX-5112 &amp; LX-5116)</td>
</tr>
<tr>
<td>Dimensions:</td>
<td>LX-5105: 8.73” Wide x 6.95” High x 3.45” Deep;</td>
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<tr>
<td></td>
<td>LX-5112: 13.95” x 13.95” x 3.45” Deep;</td>
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<tr>
<td></td>
<td>LX-5116: 17.45” x 17.45” x 3.45” Deep</td>
</tr>
<tr>
<td>Inputs:</td>
<td>SMPTE/EBU: 10k Ω, Balanced or Unbalanced, 100 mVPP to 10 VPP;</td>
</tr>
<tr>
<td></td>
<td>ESE: TC76, TC89 or TC90, 120k Ω, Unbalanced;</td>
</tr>
<tr>
<td></td>
<td>ASCII: 120k Ω, Unbalanced;</td>
</tr>
<tr>
<td></td>
<td>Impulse: Alternating 12 VDC (or optional 24 VDC)</td>
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<tr>
<td>Viewing Distance:</td>
<td>20, 60 &amp; 80 feet, respectively</td>
</tr>
<tr>
<td>Options:</td>
<td>IRIG, J, Light, NTP-C, NTP-C/PoE, P, P2, PoE, UL</td>
</tr>
</tbody>
</table>
**GENERATOR / READER / TRANSLATOR**

The **ES-276U** is an IRIG-B Time Code Generator / Reader that encodes 9-digits of time data (0-365 Days, Hours, Minutes and Seconds) on a 1000 Hz carrier signal. The unit can also lock to an external IRIG-B input at play speed. In this mode the unit may be used as a Reader or a Translator (Regenerator).

**Features**
- Nine Digits of .56” Yellow LED Displays (Days Thru Seconds)
- Generates IRIG-B Or Reads and Regenerates IRIG-B
- IRIG-B Time Code Output
- Easy Installation
- Simple Single Switch Setting Control
- Several “Standard” Options Available

The rack mount enclosure and rear-mounted Input and Output Connectors (BNC) allow for a quick and simple installation. A single, front panel-mounted toggle switch permits easy setting of Time and Day of Year.

**CHARACTER INSERTER / READER**

The **ES-275U** is an IRIG-B Time Code Reader / Video Inserter. The unit decodes 9-digits of IRIG-B (0-365 Days, Hours, Minutes, Seconds and Milliseconds and superimposes the data upon a video signal looped thru the unit.

**Features**
- “Selectable” Milliseconds Display
- Superimposed or Keyed Video Characters
- Optional RS-232 Interface
- NTSC Or PAL
- Multiple Mask Selection
- Rack Mount Enclosure
- Automatic Error Detection And Correction
- Vertical And Horizontal Size & Position Controls

A display setting mode allows the user to view the time and date side by side, stacked, time blanked or date blanked. On-screen programming features include setting of date, position, size, brightness, mask selection, daylight savings time, and 12/24 hour mode selection. Optional RS-232 interface (option R) and software can be specified.

**SPECIFICATIONS**

<table>
<thead>
<tr>
<th></th>
<th>ES-276U</th>
<th>ES-275U</th>
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<tbody>
<tr>
<td><strong>Power</strong></td>
<td>10 Watts maximum</td>
<td>10 Watts maximum</td>
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<tr>
<td><strong>Electrical</strong></td>
<td>117 VAC, 50/60 Hz</td>
<td>117 VAC, 50/60 Hz</td>
</tr>
<tr>
<td><strong>Enclosure</strong></td>
<td>1.75” x 19” Rack Mount, 10” Deep</td>
<td>1.75” x 19” Rack Mount, 10” Deep</td>
</tr>
<tr>
<td><strong>Connectors</strong></td>
<td>2-BNC</td>
<td>3-BNC</td>
</tr>
<tr>
<td><strong>Display</strong></td>
<td>9 Digits, .56” Yellow LED</td>
<td>9 Digits Keyed or Superimposed on Video, Adjustable Size</td>
</tr>
<tr>
<td><strong>IRIG-B Input Impedance</strong></td>
<td>25 KΩ</td>
<td>25 KΩ</td>
</tr>
<tr>
<td><strong>Input Mark Amplitude</strong></td>
<td>10 VPP maximum, 0.3 VPP minimum</td>
<td>10 VPP maximum, 0.3 VPP minimum</td>
</tr>
<tr>
<td><strong>IRIG-B Output Impedance</strong></td>
<td>600Ω</td>
<td>N/A</td>
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<tr>
<td><strong>Output Mark Amplitude</strong></td>
<td>3 VPP, adjustable 0.5 to 5 VPP</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Mark to Space Ratio</strong></td>
<td>3:1 Nominal</td>
<td>3:1 Nominal</td>
</tr>
<tr>
<td><strong>Video In/Out</strong></td>
<td>N/A</td>
<td>1 VPP, 75 ohms</td>
</tr>
<tr>
<td><strong>Timebase Accuracy</strong></td>
<td>+/- .2 Seconds per Week</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Options</strong></td>
<td>DC, ESE, HR, J, RS, TTL, UL, 1pps</td>
<td>Black, D, DC, J, L2, L4, P2, R, SV, UL, 1pps</td>
</tr>
</tbody>
</table>
IRIG-B VIDEO INSERTER SERIES

The LX-275U series is a family of IRIG-B Time Code Readers / Video Inserters. The units decode 12-digits of IRIG-B (0-365 Days, Hours, Minutes, Seconds and Milliseconds) via a single BNC connector and superimpose the data upon a video signal(s) looped thru the unit.

Models in the LX-275U series are available with one channel up to twelve channels. Units that contain one to four channels have a 1¾" rackmount enclosure and models with five to twelve channels have a 3½" rackmount enclosure.

Features

- "Selectable" Milliseconds Display
- Multiple Mask Selection
- Automatic Error Detection and Correction
- Universal Power Supply (120/240 VAC)
- Operates With NTSC or PAL Video
- Brightness Control
- Vertical and Horizontal Size & Position Controls
- On-Screen Programming
- Superimposed or Keyed Video Characters

With the ease of on-screen programming, setting the LX-275U could never be easier. Settings include Size, Position, Brightness, Millisecond Blanking, and Mask Mode. Mask Mode enables the user to select between several styles of background masks which include solid characters on video, solid characters on a solid mask, translucent characters on video or translucent characters on a translucent mask. Front panel Character Contrast and Mask Contrast potentiometers allow variations of black, white and gray.

Specifying option “Text” allows the user to add unique text insertion for each channel, up to 3 lines and as many as 30 characters per line. The optional “Text” feature provides the flexibility of inserting text information in as many as three different methods in combination with the supplied software. The “Text-USB” option provides a USB port for inserting the text information, the “Text-Net” option provides the ability to enter information either via an Ethernet port or a USB port.

SPECIFICATIONS

- **Power:** 2-25 (/1-/12) Watts Max.
- **Electrical:** 90-264 VAC, 47-63 Hz
- **IRIG-B Time Code Input:** 1-BNC (per unit)
- **IRIG-B Input Impedance:** 25 Ω
- **Input Mark Amplitude:** 10 VPP Max., 0.3 VPP Minimum
- **Mark to Space Ratio:** 3:1 Nominal
- **Video In/Out:** 1 VPP, 75 ohms
- **Options:** DC, GPS, SV, Text-USB, Text-Net, UL

**Video Connectors:** 2-BNC (per channel)

**Display:** 9 Digits (12 Digits if milliseconds) Keyed or Superimposed on Video, Adjustable Size

**Enclosure:** 1.75" x 19" Rack Mount, 10" Deep (LX-275U/1, 2, 3, 4)

3.50" x 19" Rack Mount, 10" Deep (LX-275U/5, 6, 7, 8, 9, 10, 11, 12)
The **HD-275/SD/1** is an HD & SD Timecode Reader/Video Inserter. The unit reads IRIG-A, -B, & -G, D-VITC or RP-188 and inserts that timecode onto an SDI video signal. The timecode can also be embedded into the D-VITC or RP-188. Additionally, up to 30 characters of user defined text may be inserted into the video. Two independent character windows are available and can be used to insert Time, User Bits, Time & User Bits or User Defined Text. Ten different font sizes are available and the characters may be located anywhere on the video using the horizontal & vertical controls. Included font colors are Grayscale along with six solid colors (Red, Orange, Yellow, Green, Blue & Violet).

The unit is easily configured using the front panel controls or the front panel mounted USB port with the supplied PC software. The front panel controls consist of four push buttons used to navigate the various setup menus that are displayed on a 16 x 2 character LCD display. The USB port and the PC software provide a user-friendly GUI (Graphical User Interface) used to configure the unit.

The **HD-275/SD/1** may be ordered with up to six independent video channels (options /2, /3, /4, /5, /6). Additionally, versions that read other timecodes are available (HD-266/SD/1 reads ESE timecode, HD-455/SD/1 reads SMPTE/EBU LTC timecode & HD-277/SD/1 reads IRIG timecode for Airborne applications).

**Features**

- Reads IRIG-A, -B, & -G, D-VITC & RP-188
- Two Independent Character Windows
- 1 to 6 Independent Video Channels Available
- Embeds Timecode into D-VITC or RP-188
- LCD Status & Setup Display
- Automatically detects SD or HD Format
- Accepts All Common HD & SD SDI Signals
- Inserts Timecode onto SDI Video Signal
- Universal Power Supply (86-264 VAC)
- Several Options & Custom Features Available

**SPECIFICATIONS**

- **Power:** 85 – 264 VAC, 47 – 63 Hz, 15 Watts max
- **Mechanical:** Black anodized aluminum enclosure 1.6” H x 8” W x 7.3” D
- **Time & Setup/Status Display:** 16 x 2 character LCD
- **Time Code Input:** IRIG-A, -B, & -G
- **SD SDI Input:** SMPTE 259M-C (270Mb/s), 525 line and 625 line 4:2:2
- **HD SDI Input/Output:** 1080i/60, 1080i/59.94, 1080i/50, 1080p/30sF, 1080p/29.97sF, 1080p/25sF, 1080p/24sF, 1080p/23.98sF, 720p/59.94
- **Options:** DC, P, P2, UL, /2, /3, /4, /5, /6

**HD-275/SD/1/P**

**HD-275/SD/2**

**HD-275/SD/6**
**HD-488E**

**HD TIME CODE READER/GENERATOR/INSERTER**

The **HD-488E** is a Time Code Reader, Generator and Inserter for HD (High Definition) Serial Digital Interface (SDI) video. Linear Time Code (LTC) and RP-188 Time Code are both read and generated by the **HD-488E**. The unit also accepts a multitude of HD formats. SD (Standard Definition) is available by specifying the model **HD-488E/SD**, this will allow the unit to also accept 4:2:2 (525 and 625 line) digital video signals. The inserter mode provides the ability to superimpose time and/or user bits onto video with alphanumeric characters. As many as thirty characters of text may also be superimposed onto the video. Flexibility is also provided to the user, allowing for selection of the information to be displayed (time, time and user bits or text) on up to three different windows with multiple lines of text per window. The three windows are independent of each other and may be blanked. The **HD-488E** also features color fonts and backgrounds and time code in closed caption.

**Features**
- Generates/Inserts Time Code
- Universal Power Supply (90-264 VAC)
- LCD Setup/Status Display
- Time & Setup/Status Display
- Numerous Options Available
- Dual LTC Output
- USB Setup Interface
- Accepts Multiple HD Formats
- Time Zone Offset
- Modern User Friendly Control
- Color Fonts
- Universal Power Supply (90-264 VAC)
- Accepts Multiple HD Formats
- Time Zone Offset

**Uses**
- Time Code / Time of Day / User Text Window burn
- Transcode SMPTE Codes to IRIG-B (w/IRIG option)
- Transcode RP-188 to LTC
- Transcode LTC to RP-188
- GPS Sourced NTP Server (w/NTP & GPS options)
- NTP Sourced Master Clock (w/NTP-C option)
- Master Time Code Generator
- Drive New or Existing Remote Displays with Time of Day
- IRIG Sourced NTP Server (w/IRIG options)
- Drive New or Existing Remote Displays with Time of Day
- IRIG-B Generator (w/IRIG option)

**Specifications**

**Power:** 90 – 264 VAC, 47 – 63 Hz, 15 Watts max

**Mechanical:** Rackmount Enclosure 1¾" H x 19" W x10" D

**Time & Setup/Status Display:** 16 x 2 character LCD

**Time Code Input:** SMPTE (100 mVpp-10 Vpp; 10kΩ input impedance) Optional-IRIG (100 mVpp-10 Vpp)

**Analog Input:** 1 Vpp, terminated

**Color Frame Input:** Vertical interval negative TTL/CMOS pulse

**Options:** ESE, GPS, IRIG, NTP, NTP-C, OCXO, RS, UL

The video input and output are accessible via rear mounted BNC connectors. Time code input and output connectors on the rear panel are XLR (When option IRIG is specified the IRIG-B input is via a BNC connector). The **HD-488E** is housed in a single height rack mount enclosure which is black anodized.

A 16 x 2 character LCD shows the current time and status of the **HD-488E**. The front panel controls allow access to all configuration settings as displayed on the 16 x 2 character LCD, including front panel text entry. The same controls are available on the PC software which is accessible via the rear mounted USB port.
IRIG TIME CODE
GENERATOR/TRANSLATOR/NTP TIME SERVER

The ES-295/NTP2 is an IRIG (A, B or G) Time Code Generator and Translator, which includes the NTP2 option. When in the Generator (stand-alone) mode, Day of Year and Time are manually set using the front panel controls or the supplied PC software. In the Translator (sync) mode, the unit accepts IRIG-A, IRIG-B or IRIG-G time code, or GPS time from the internal GPS receiver. In either mode, the ES-295 provides an IRIG-A, IRIG-B, or IRIG-G time code output (AM & TTL) and a 1pps output. Input and output time code selections are also made using the front panel controls or the supplied PC software. The NTP2 feature provides an NTP time server and function control via ethernet (10/100Base-T, RJ-45).

Specifications

Power: 90 – 264 VAC, 47 – 63 Hz, 15 Watts max
(Option “DC” only) +11 to +35 VDC, 1 Amp max
Mechanical: Rackmount Enclosure 1¾” H x 19” W x 9½” D
Time Display: 9-digits, 0.56” yellow LED
Setup/Status Display: 16 x 2 character LCD
IRIG Input: IRIG-A, IRIG-B or IRIG-G
100 mVPP – 10 V PP AGC input
IRIG AM Outputs: IRIG-A, IRIG-B or IRIG-G
0.5 – 5 Vpp [mark amplitude], Mark to Space 3 to 1, 600Ω, 2 BNCs
IRIG TTL Outputs: IRIG-A, IRIG-B or IRIG-G
≥ 4.0 V high and ≤ 0.6 V low, 5 Vpp, 2 BNCs

1 PPS Outputs: TTL outputs, positive edge true
50% duty output < 1 ms accuracy, 2 BNCs
Accuracy: Standard VCTCXO >1.5ms per day
Option OCXO >2ms per day
Option GPS>10ns
Options: DC, EXT, GPS, LED, OCXO, UL, Custom

NTP TIME SERVERS

ESE’s line of NTP (Network Time Protocol) Time Servers provides a simple method of putting accurate time information onto a network. NTP is arguably the most reliable method for sharing time information on a network (LAN, WAN or Internet, etc.). And, each of these four NTP Time Servers offers a perfect solution for providing accurate and synchronized time throughout a network.

Features

• Create NTP From Most Any “Non-NTP” Master Clock
• Simple Installation & Hands-Free Operation
• NTP Primary Time Server (ES-104E)
• 10/100BaseT - NTP Data Port (RJ-45)
• Several Options Available
• Rugged Desktop Enclosure
• Platform Independent
• ESE Time Code Output

The ES-104E employs an internal GPS Receiver as its time reference. This provides the user a source of UTC (Universal Coordinated Time) from an NTP Primary (Stratum 1) Time Server. In contrast, ES-289E, ES-299E and ES-911E/NTP receive their time reference from external sources of time code. They are in essence time code translators, each receiving time code and “outputting” NTP.

Specifications

I/O Connection: Network: 10/100BaseT Ethernet, RJ-45
Outputs: ESE Time Code™ TC89 or TC90, Drives 100 Slaves @ 4000’, BNC
GPS Receiver: Internal 2-Channel (ES-104E only)
Antenna: Indoor/Outdoor with 16’ Cable (ES-104E only)
Antenna Input: L1, L1.57542 GHz, TNC (ES-104E only)
Time Code Input: ES-289E: ESE [TC-90], SMPTE or EBU Time Code with Date data, BNC
ES-299E: IRIG (A,B or E), NASA 36, BNC
ES-911E/NTP: ASCII (RS-232C): NEN (format “1”), ESE (“A”), or NMEA 0183 (GPRMC), D8-9
ES-TC90 via BNC

Specifications

Drift: 33ms/Day (if no GPS signal)
Configuration: Web page or Telnet
Enclosure: Desk-Top, Black Anodized Aluminum
Dimensions: 1.6” H x 7” W x 5” D
Electrical: 117 VAC, 50/60 Hz
Power: 5W maximum
Options: Ant (ES-104E Only), BBU, J, P, P2, UL
GPS BASED FREQUENCY GENERATOR

The **ES-110** generates a stable source of 10 MHz and 1 PPS using GPS (Global Positioning System) satellites as a reference. The unit provides 10 MHz in both Sine Wave and Square Wave (5 volt logic) form. The 1 PPS output is a 50% duty cycle 5 volt logic signal with a positive-edge coinciding with the UTC seconds change. An ESE TC90™ Time Code output is also provided for driving remote time displays. Internal DIP switches allow configuration of the Time Zone, antenna cable length compensation, and the satellite tracking mode.

If frequency distribution is needed, we offer the **ES-210** a Quad 1x6 1/5/10 MHz Distribution Amplifier. The **ES-210** provides four independent 1x6 Frequency DAs in a single rack-mount enclosure (see page 23).

**Features**

- Disciplined Temperature-Compensated Crystal Oscillator
- GPS Timing Reference With $1 \times 10^{-8}$ Accuracy
- Two 10 MHz Outputs (1 - Sine & 1 - Square)
- Ruggedized Desk-Top Enclosure
- Phase Coherent 1 PPS Output
- Several Options Available
- **ESE** Time Code Output

**Applications**

- Radio And TV Broadcast
- Test And Measurement
- Range Instrumentation
- Telecommunications

**Specifications**

- **Outputs:**
  - 10 MHz Sine Wave, BNC, 4 VPP into 50 ohms
  - 10 MHz Square Wave, 5 VPP CMOS/TTL, BNC
  - 1 PPS, 50% Duty, 5 VPP CMOS/TTL, BNC
  - **ESE** Time Code™ (TC90), Drives 100 Slaves @ 4000’, BNC

- **GPS Receiver:**
  - **Accuracy:** $1 \times 10^{-8}$
  - **Antenna:** Indoor/Outdoor with 16’ Cable

- **Antenna Input:**
  - L1, 1.57542 GHz, TNC

- **Enclosure:** Desk-Top, Black Anodized Aluminum

- **Dimensions:** 1.6” H x 10” W x 4.8” D

- **Electrical:**
  - 117 VAC, 50/60 Hz

- **Power:** 5W maximum

- **Options:** Ant, BBU, DC, J, P, UL

**142 SIERRA ST., EL SEGUNDO, CA 90245 (310)322-2136 FAX (310)322-8127 www.ESE-WEB.com**
IRIG-B to SMPTE
TIME CODE CONVERTER

The **ES-274U** is a Time Code Converter that automatically synchronizes (Jam Syncs) to IRIG-B Time Code and outputs SMPTE Time Code. EBU Time Code is optionally available. The unit allows video tape (previously striped with IRIG-B) to be more easily edited using SMPTE (EBU) editing equipment.

Drop-Frame or non-Drop-Frame is selectable via a front panel mounted switch. The four rear-mounted BNC connectors accept the IRIG-B Time Code, the Color Frame input (for synchronizing the color frame orientation) and a Video Sync Loop-thru input (for synchronizing the time code frame crossing to video). The SMPTE time code output is accessible on the rear-mounted XLR connector.

SPECIFICATIONS

<table>
<thead>
<tr>
<th>Power:</th>
<th>5 Watts max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical:</td>
<td>117 VAC, 50/60 Hz</td>
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<tr>
<td>Enclosure:</td>
<td>Rack Mount</td>
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<tr>
<td>Dimensions:</td>
<td>1.75” H x 19” W x 10” D</td>
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<td>Time Code Input:</td>
<td>IRIG-B</td>
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<tr>
<td>Input Impedance:</td>
<td>25KΩ min.</td>
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<tr>
<td>Mark Amplitude:</td>
<td>100 mVpp to 10 Vpp, unbalanced</td>
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<tr>
<td>Mark to Space Ratio:</td>
<td>3:1 nominal</td>
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<tr>
<td>Time Code Output:</td>
<td>SMPTE - 0 db into 600Ω, balanced</td>
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<tr>
<td>Video In/Out:</td>
<td>1 - 2 Vpp, loop-thru, unterminated</td>
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<tr>
<td>Color Frame Input:</td>
<td>TTL or CMOS Field #1 Negative Pulse</td>
</tr>
<tr>
<td>Options:</td>
<td>DC, EBU, J, UL, 1pps</td>
</tr>
</tbody>
</table>

IRIG / ASCII INTERFACE CARD

The **PC-273PCI** is a “PC” card designed to plug into any computer with a vacant PCI slot. The unit continuously reads Time Code (selectable IRIG A, B, E, G, NASA36, XR3/2137, in either Modulated or TTL form, or ASCII Formats 0, 1, A and NMEA 0183-GPRMC). Windows® (98/NT/2000/XP) compatible software is provided which synchronizes the PC clock. The software also allows selection of Time Code, Update Rate and Time Zone Offset.

Specifying option ‘GPS’ replaces the IRIG/ASCII input with an on board 12 channel GPS receiver. Included with option ‘GPS’ is an indoor/outdoor antenna which is connected to the unit via the provided 16’ cable.

SPECIFICATIONS

<table>
<thead>
<tr>
<th>Dimensions:</th>
<th>5.25” D x 3.75”H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time Code Input:</td>
<td>IRIG-A, B, E, G, NASA36, XR3/2137, ASCII 0, 1, A, NMEA-0183 GPRMC</td>
</tr>
<tr>
<td>Input Impedance:</td>
<td>20KΩ</td>
</tr>
<tr>
<td>Mark Amplitude:</td>
<td>3 Vpp to 10 Vpp</td>
</tr>
<tr>
<td>Mark to Space Ratio:</td>
<td>3:1 nominal</td>
</tr>
<tr>
<td>Options:</td>
<td>GPS</td>
</tr>
</tbody>
</table>
AIRBORNE & PORTABLE
IRIG-B Time Code Generators

Features

- 11-40 VDC Power Input
- IRIG-B & ASCII (RS-232C) outputs
- Dual 1 PPS Output (20% and 50% Duty)
- External Time Code “Lock” Indicator & Output
- Automatic Daylight Savings Time Correction (ES-291 & ES-292)
- Time Zone Offset (ES-291 & ES-292)
- Rugged Powdercoated Aluminum Enclosure
- Internal Rechargeable Battery (ES-290 & ES-292)
- GPS “Lock” Indicator & Output (ES-291 & ES-292)
- Indoor/Outdoor Antenna With 16’ Cable (ES-291 & ES-292)
- Carrying Handle (ES-290 & ES-292)
- Jam-Syncable To External IRIG-B (ES-290)

The **ES-290** is a portable Time Code Generator which outputs IRIG-B and ASCII (RS-232C) Time Codes. Two (2) One Pulse Per Second outputs and an external Time Code “Lock” output are also standard features. The unit may be synchronized to an external source of IRIG-B, then will free-run using its internal TCXO when the external signal is removed.

The **ES-291** is a very accurate GPS Time Code Generator. The unit receives time and date information from Global Positioning System satellites and outputs IRIG-B and ASCII (RS-232C) Time Codes. Two (2) One Pulse Per Second outputs and a GPS “Lock” output are also standard features. A 12-channel receiver is employed that is capable of tracking up to twelve satellites simultaneously, although reception of only one is required for time data to be output.

The **ES-292** is a very accurate portable GPS Time Code Generator. The unit receives time and date information from Global Positioning System satellites and outputs IRIG-B and ASCII (RS-232C) Time Codes. Two (2) One Pulse Per Second outputs and a GPS “Lock” output are also standard features. A 12-channel receiver is employed that is capable of tracking up to twelve satellites simultaneously, although reception of only one is required for time data to be output. Unit free-runs using internal TCXO in absence of GPS signal. A separate GPS receiver power switch is provided for conserving battery power during free-run operation.
ES-290

IRIG-B Input: 100 mVpp – 10 Vpp, 25 kΩ input impedance, play speed
IRIG-B Output: Mark to space 3.3 to 1
AM: 2 – 7 Vpp [mark amplitude], BNC, 600 Ω
DC: ≥ 4.0 V high and ≤ 0.6 V low, 5 Vpp, I/O Connector
RS-232C Output: ASCII date and time, sent once per second, I/O Connector
RS-232C Format: ESE Format “A”
1 PPS Output: TTL output, positive edge true, 50 % duty output, I/O Connector
“Lock” Output: TTL output, logic “1” when “locked” to an external source of time code, logic “0” otherwise, I/O Connector
Drift: +/- 150 ms per day.
Power: +11 to +40 VDC, 100 mA, 110 VAC Adapter is included
Battery: Rechargeable Gel Cell Battery with 12 hour operation.
Mechanical: 3.45” H x 4.00” W x 6.00” D
Operating Temperature: 0° to +70°C
Storage Temperature: -55° to +105°C
Humidity: @95% non-condensing (+30°C to +60°C).
Options: B, Display, F, HQ(In), J, SMPTE/EBU, 810F

IRIG-B Output:
Mark to space 3.3 to 1
AM: 2 – 7 Vpp [mark amplitude], BNC, 600 Ω (optional) DC: ≥ 4.0 V high and ≤ 0.6 V low, 5 Vpp
RS-232C Output: ASCII date and time, sent once per second, I/O Connector
RS-232C Format: ESE Format “A”
1 PPS Output: TTL outputs, positive edge true, I/O Connector
“Lock” Output: TTL output, logic “1” when “locked” to GPS, logic “0” otherwise, I/O Connector
Drift: 1 PPS (20% duty cycle) < 10 ns (if “locked”)
Power: +11 to +40 VDC, 100 mA
Battery: Rechargeable Gel Cell Battery with 4 - 12 hour operation depending on receiver configuration.
Mechanical: 3.45” H x 4.00” W x 6.00” D
Operating Temperature: 0° to +70°C
Storage Temperature: -55° to +105°C
Humidity: @95% non-condensing (+30°C to +60°C).
Options: AC, Ant, B, Display, F, HQ(Out), J, Jam, Moto, SMPTE/EBU, TTL, 810F

ES-292

GPS Receiver: Motorola 12-channel
IRIG-B Output: 100 mVpp – 10 Vpp, 25 kΩ input impedance, play speed
IRIG-B Output: Mark to space 3.3 to 1
AM: 2 – 7 Vpp [mark amplitude], BNC, 600 Ω (optional) DC: ≥ 4.0 V high and ≤ 0.6 V low, 5 Vpp
RS-232C Output: ASCII date and time, sent once per second, I/O Connector
RS-232C Format: ESE Format “A”
1 PPS Output: TTL outputs, positive edge true, I/O Connector
“Lock” Output: TTL output, logic “1” when “locked” to GPS, logic “0” otherwise, I/O Connector
Drift: 1 PPS (20% duty cycle) < 10 ns (if “locked”)
Power: +11 to +40 VDC, 100 mA
Battery: Rechargeable Gel Cell Battery with 4 - 12 hour operation depending on receiver configuration.
Mechanical: 3.45” H x 4.00” W x 6.00” D
Operating Temperature: 0° to +70°C
Storage Temperature: -55° to +105°C
Humidity: @95% non-condensing (+30°C to +60°C).
Options: Ant, B, Display, F, HQ(Out), J, Moto, SMPTE/EBU, TTL, 810F

Specifications

ES-290

IRIG-B Input: 100 mVpp – 10 Vpp, 25 kΩ input impedance, play speed
IRIG-B Output: Mark to space 3.3 to 1
AM: 2 – 7 Vpp [mark amplitude], BNC, 600 Ω
DC: ≥ 4.0 V high and ≤ 0.6 V low, 5 Vpp, I/O Connector
RS-232C Output: ASCII date and time, sent once per second, I/O Connector
RS-232C Format: ESE Format “A”
1 PPS Output: TTL output, positive edge true, 50 % duty output, I/O Connector
“Lock” Output: TTL output, logic “1” when “locked” to an external source of time code, logic “0” otherwise, I/O Connector
Drift: +/- 150 ms per day.
Power: +11 to +40 VDC, 100 mA, 110 VAC Adapter is included
Battery: Rechargeable Gel Cell Battery with 12 hour operation.
Mechanical: 3.45” H x 4.00” W x 6.00” D
Operating Temperature: 0° to +70°C
Storage Temperature: -55° to +105°C
Humidity: @95% non-condensing (+30°C to +60°C).
Options: B, Display, F, HQ(In), J, SMPTE/EBU, 810F

ES-291

GPS Receiver: Motorola 12-channel
IRIG-B Output: 100 mVpp – 10 Vpp, 25 kΩ input impedance, play speed
IRIG-B Output: Mark to space 3.3 to 1
AM: 2 – 7 Vpp [mark amplitude], BNC, 600 Ω (optional) DC: ≥ 4.0 V high and ≤ 0.6 V low, 5 Vpp
RS-232C Output: ASCII date and time, sent once per second, I/O Connector
RS-232C Format: ESE Format “A”
1 PPS Output: TTL outputs, positive edge true, I/O Connector
“Lock” Output: TTL output, logic “1” when “locked” to GPS, logic “0” otherwise, I/O Connector
Drift: 1 PPS (20% duty cycle) < 10 ns (if “locked”)
Power: +11 to +40 VDC, 100 mA
Battery: Rechargeable Gel Cell Battery with 4 - 12 hour operation depending on receiver configuration.
Mechanical: 3.45” H x 4.00” W x 6.00” D
Operating Temperature: 0° to +70°C
Storage Temperature: -55° to +105°C
Humidity: @95% non-condensing (+30°C to +60°C).
Options: AC, Ant, B, Display, F, HQ(Out), J, Jam, Moto, SMPTE/EBU, TTL, 810F

ES-292

GPS Receiver: Motorola 12-channel
IRIG-B Output: 100 mVpp – 10 Vpp, 25 kΩ input impedance, play speed
IRIG-B Output: Mark to space 3.3 to 1
AM: 2 – 7 Vpp [mark amplitude], BNC, 600 Ω (optional) DC: ≥ 4.0 V high and ≤ 0.6 V low, 5 Vpp
RS-232C Output: ASCII date and time, sent once per second, I/O Connector
RS-232C Format: ESE Format “A”
1 PPS Output: TTL outputs, positive edge true, I/O Connector
“Lock” Output: TTL output, logic “1” when “locked” to GPS, logic “0” otherwise, I/O Connector
Drift: 1 PPS (20% duty cycle) < 10 ns (if “locked”)
Power: +11 to +40 VDC, 100 mA
Battery: Rechargeable Gel Cell Battery with 4 - 12 hour operation depending on receiver configuration.
Mechanical: 3.45” H x 4.00” W x 6.00” D
Operating Temperature: 0° to +70°C
Storage Temperature: -55° to +105°C
Humidity: @95% non-condensing (+30°C to +60°C).
Options: Ant, B, Display, F, HQ(Out), J, Moto, SMPTE/EBU, TTL, 810F
AIRBORNE INSERTERS
IRIG-B TIME CODE READER / VIDEO INSERTER SERIES

The ES-277U Series is a family of IRIG-B Time Code Readers / Video Inserters. Designed and built for airborne and ground mobile use, these products assure reliable performance regardless of the application. The “GPS” Option replaces the internal IRIG-B Time Code Reader with a GPS Receiver, assuring the ultimate in time accuracy.

Features
- Rugged Compact Design For Airborne And Ground Mobile Use
- One, Two, Three, Four Or Five Independent Video Channel Versions
- Operates With RS170A And RS343 (FLIR) Video Signals
- Variable Size, Position And Brightness Controls
- Low Power Consumption
- 12 & 28 VDC Power
- Locking Power Switch
- Wide Operational Temperature Range
- Translucent White Characters
- Character Mask Feature
- Optional GPS Receiver

Models in the ES-277U Series are available in one, two, three, four and five channel configurations. The units accept IRIG-B Time Code and inserts it into independent video signals. All time code and video inputs and outputs are via front panel mounted BNC connectors. Each video loop accepts either RS-170A or RS-343 composite video. Days, Hours, Minutes, Seconds and Milliseconds are inserted onto each video stream. (Milliseconds can be omitted, if desired.) A supply voltage of +12 to +35 VDC is received via an ITT Cannon #KPT02E-10-98P connector, mating connectors are not supplied.

With the ease of on-screen programming, setting the ES-277U could never be easier. Settings include Size, Position, Brightness, Millisecond Blanking, and Mask Mode. Mask Mode enables the user to select between several styles of background masks which include solid characters on video, solid characters on a solid mask, translucent characters on video or translucent characters on a translucent mask. Separate Character Contrast and Mask Contrast potentiometers allow variations of black, white and gray.

SPECIFICATIONS

<table>
<thead>
<tr>
<th>Electrical:</th>
<th>12 - 35 VDC, 200 mA Max, 5 Channels</th>
</tr>
</thead>
<tbody>
<tr>
<td>IRIG Input Impedance</td>
<td>25 KΩ minimum</td>
</tr>
<tr>
<td>Mark Amplitude</td>
<td>100 mVPP - 10 VPP AGC Input</td>
</tr>
<tr>
<td>Mark Space Ratio</td>
<td>3:1 nominal</td>
</tr>
<tr>
<td>Input/Output Amplitude</td>
<td>1 Vpp, 75 Ω</td>
</tr>
<tr>
<td>Signal Format</td>
<td>Composite Video RS-170A Or RS-343</td>
</tr>
<tr>
<td>Video Connectors</td>
<td>BNC</td>
</tr>
<tr>
<td>Size:</td>
<td>4.0”W x 3.45”H x 6.0”D (ES-277U/1, /2, /3, /4 ) 4.2”W x 4.35”H x 6.0”D (ES-277U/5, ES-277U/4/GPS and all /S’s)</td>
</tr>
<tr>
<td>Mounting Plate:</td>
<td>5.20”W x 0.125”H x 5.75”D</td>
</tr>
<tr>
<td>Enclosure:</td>
<td>Textured-Black Painted Aluminum</td>
</tr>
<tr>
<td>Weight:</td>
<td>2.0 lbs. (ES-277U/1), 2.25 lbs (ES-277U/2) 2.50 lbs (ES-277U/3), 2.75 lbs (ES-277U/4)</td>
</tr>
<tr>
<td>Operating Temperature:</td>
<td>0° to +70°C</td>
</tr>
<tr>
<td>Storage Temperature:</td>
<td>-55° to +105°C</td>
</tr>
<tr>
<td>Humidity:</td>
<td>@95% non-condensing (+30°C to +60°C)</td>
</tr>
<tr>
<td>Options:</td>
<td>AC, ANT, GPS, IRIG, J, RP, SV, 810F</td>
</tr>
</tbody>
</table>

Others codes available on a custom basis, please consult factory.
AIRBORNE DISPLAY

IRIG-B TIME CODE READER / COCKPIT DISPLAY

The **ES-278** is a six-digit IRIG-B Time Code Reader. The unit receives time code and displays Hours, Minutes and Seconds on bright red 0.4" LED displays. A front panel brightness control and glare resistant filter allow the display to be viewable in a wide range of light conditions. Designed and built for airborne/cockpit environments, the **ES-278** assures reliable performance even in the most demanding environments.

**Features**

- 12 & 28 VDC Power
- Six-digit .4" Red LED Display
- Low Power Consumption
- Long-Life LED Displays
- Front Panel Brightness Control
- Simple Installation And Operation
- Rugged Compact Design For Airborne And Ground Mobile Use
- Automatic Error Detection And Correction
- Wide Operational Temperature Range

The **ES-278** receives +10 to +40 VDC via a rear-mounted ITT Cannon #KPT02E-10-98P connector. IRIG-B is received on a rear-mounted BNC connector. Although the unit is intended for real time applications, it is capable of reading IRIG-B from 1/4x to 6x normal speed and includes an error detection and correction feature. The optional “AC” adapter accommodates easy “bench testing” of the **ES-278**.

**SPECIFICATIONS**

**ELECTRICAL**

- Power Requirement: +10 to +40 VDC, 350 mA maximum
- IRIG-B Input Impedance: 25 kΩ minimum
- Mark Amplitude: 10 VPP maximum, 0.3 Vpp minimum
- Mark To Space Ratio: 3:1 nominal

**MECHANICAL**

- Front Panel: 5.75" Wide x 1.6" High x 1/8" Thick
- Chassis: 5.00" Wide x 1.6" High x 5.50" Deep
- Weight: 1 1/2 pounds
- Options: AC, F, J

AIRBORNE & PORTABLE

1 x 12 IRIG TIME CODE DISTRIBUTION AMPLIFIERS

The **ES-262** and **ES-282** are 1 x 12 IRIG-A, B, E & G time code distribution amplifiers. The units provide a loop-thru time code input and 12 time code outputs. All time code inputs and outputs are accessible via BNC connectors. The **ES-262** is housed in a rugged box enclosure with mounting plate for airborne applications while the **ES-282** is housed in a portable rugged box enclosure. Both units are powered by +28 VDC and use a transformerless design which takes a single unbalanced input and provides twelve unbalanced single ended outputs.

**Features**

- IRIG-A, B, E & G Distribution
- +28 VDC Power Input
- Rugged Enclosure
- Unity Gain
- BNC Loop Thru IRIG Time Code Input
- 12 BNC IRIG Time Code Outputs

**SPECIFICATIONS**

**Time Codes:** IRIG-A, B, E & G, AM codes
**Gain:** Unity Gain
**Input:** BNC loop-thru; 50kΩ input impedance
+14 dbu (11 vpp) maximum input level
**Output:** BNC; 100Ω output impedance
+14 dbu (11 vpp) maximum output level

**Response:** 20 Hz – 100 kHz, +/- 0.25 dB
**Power Required:** +28 VDC, 0.75 W maximum
**Mechanical:** 3.7” x 4.7” x 2.2” (ES-262)
4.7” x 7.4” x 2.2” (ES-282)
**Mounting Plate:** 5.1” x 4.45” x .125 (ES-262)
TIME CODE & FREQUENCY DISTRIBUTION AMPLIFIER

The **ES-242U** is a 2 x 12 Time Code and Frequency Distribution Amplifier with an Automatic Switchover feature. It is designed to provide a simple/automatic method for switching between a Primary Source and a Secondary Source. The unit receives time code (AM or TTL) or a frequency reference (100hz to 100Khz) from two different sources (A & B) and if a fault is detected from the Primary Source (A), the **ES-242U** automatically switches to the Back-Up Source (B). Once a fault is detected, the unit remains in the “B” state until manually reset. Front panel mounted LEDs indicate status and a toggle switch allows manual switching between inputs A and B.

**Features**
- IRIG(A, B, E or G), NASA-36, XR3, 2137, CS3 Or Frequency Reference
- Rack Mount Enclosure
- Simple Installation & Operation
- Automatic Time Code Switchover
- Loop-thru Inputs For Easy Cascading Applications
- BNC Connector Inputs And Outputs

The unit also features front panel LED indicators for Power, Output Selection and Time Code Status. An internal audible alarm and external relay contact closure can be used to alert the user when an error is detected from the primary source causing the unit to switch to the “Back-Up” source. A front panel locking toggle switch allows the audible alarm to be disabled and a front panel “Alarm Reset” push button allows the user to reset the relay closure and the input source back to the primary input when the error has been corrected.

**Specifications**

- **Electrical:** 90-260 VAC, 50/60 Hz
- **Power:** 30 Watts
- **Mechanical:** 1.75” x 19” Rack Mount, 5” Deep
- **Inputs:** BNC Connectors, Loop-thru
- **Outputs:** BNC Connectors
- **Codes:** IRIG(A, B, E, or G), NASA-36, XR3, 2137, CS3, or 100hz - 100Khz
- **Switchover Threshold:** Adjustable 100 mVpp - 1Vpp, 500mVpp Nominal.
- **Switching Time:** Switchable 100 ms, 500 ms, or 1cycle
- **Options:** UL
The adjustment of -1.6 to +3.4 db. Unused provides an overall signal level front of the case. The Gain control. Gain controls are provided on the connectors. Screwdriver-adjustable outputs, all accessible via BNC has loop-thru inputs and six isolated rack-mount enclosure. Each DA 1x6 Frequency DAs in a single

The ES-210 provides four independent 1x6 Frequency DAs in a single rack-mount enclosure. Each DA has loop-thru inputs and six isolated outputs, all accessible via BNC connectors. Screwdriver-adjustable Gain controls are provided on the front of the case. The Gain control provides an overall signal level adjustment of -1.6 to +3.4 db. Unused outputs need not be terminated.

The ES-242 is a quad, 6-output IRIG Time Code DA. Each amplifier provides a loop-thru input & six 600 ohm outputs. The inputs/outputs are connected via rear mounted BNC connectors. The unit distributes IRIG A, B, E, NASA36, XR3, 2137 & CS3 time codes it has a transformerless design that takes a single unbalanced input and provides six single ended outputs.

The ES-249 is designed to accept RS-232C/ASCII and output up to eight identical copies. The unit has a single input and eight outputs that are accessible on rear mounted 9-pin D-sub connectors. Due to the nature of RS-232C, if long cable runs are required, it may be necessary to utilize other time code that is later translated into RS-232C. The unit is rack mounted.

The ES-250 is an RS-232C Isolation and Distribution Amplifier. Three 1 x 8 amplifier circuits allow the incoming signal to be distributed via the 24 outputs. The unit receives RS-232C and buffers the signal so that each of the 24 outputs can drive a single “user” at a distance of up to 50 feet (per output). All inputs and outputs are via rear mounted terminal block connectors.

The ES-251 is an RS-232C Isolation and Distribution Amplifier. Three 1 x 8 amplifier circuits allow the incoming signal to be distributed via the 24 outputs. The unit receives RS-232C and buffers the signal so that each of the 24 outputs can drive a single “user” at a distance of up to 50 feet (per output). All inputs and outputs are via rear mounted terminal DB-9 connectors.

Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>Input/Output</th>
<th>Power</th>
<th>Mechanical</th>
<th>Time Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>ES-210</td>
<td>1 x 24 RS-232C/ASCII</td>
<td>5 Watts Maximum</td>
<td>1.75” x 19”</td>
<td>10 KHz-15MHz</td>
</tr>
<tr>
<td>ES-242</td>
<td>1 x 24 ASCII</td>
<td>2 Watts Maximum</td>
<td>6” Deep</td>
<td>IRIG (A, B or E) NASA36, XR3, 2137 &amp; CS3</td>
</tr>
<tr>
<td>ES-249</td>
<td>9-Pin D-Sub</td>
<td>2 Watts Maximum</td>
<td>1.75” x 19”</td>
<td>TC76, TC89 or TC90</td>
</tr>
<tr>
<td>ES-250</td>
<td>9-Pin D-Sub</td>
<td>117 VAC, 50/60 Hz</td>
<td>9-Pin D-Sub</td>
<td>ASCII (RS-232C)</td>
</tr>
<tr>
<td>ES-251</td>
<td>9-Pin D-Sub</td>
<td>110-120 VAC, 50/60 Hz</td>
<td>9-Pin D-Sub</td>
<td>117 VAC, 50/60 Hz</td>
</tr>
</tbody>
</table>

ES-210 quad 1x6 1/5/10 MHz DA

ES-242 Quad 1x6 IRIG (AM) DA

ES-243 Quad 1x6 ESE DA (or IRIG-'TTL')

ES-249 1x8 RS-232C/ASCII DA

ES-250 1 x 24 RS-232/ASCII DA

ES-251 1 x 24 RS-232/ASCII DA
OPTIONS

Options listed below are available only on certain products and descriptions are relative to products described in this brochure. Refer to product “Specifications” or the Price Schedule for option availability. Features neither listed as a Standard Feature nor available as an Option may be available on a “Custom” basis. Please consult the ESE Factory with your specific need.

### AVAILABLE OPTIONS

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC</td>
<td>AC Adapter: An AC Adapter with mating connector is provided.</td>
</tr>
<tr>
<td>Amber</td>
<td>Amber Display: Replaces the standard colored LED’s with Amber LED’s.</td>
</tr>
<tr>
<td>Ant</td>
<td>GPS Antenna: High Performance GPS Antenna for harsh RF Environments.</td>
</tr>
<tr>
<td>B</td>
<td>Parallel BCD Output: Provides A Parallel BCD (CMOS Compatible) output.</td>
</tr>
<tr>
<td>BBU</td>
<td>Battery Back-Up: An internal Gel-Cell battery is provided for maintaining the unit’s microprocessor up to a 4-hour power outage.</td>
</tr>
<tr>
<td>Black</td>
<td>Black Anodized Front Panel: Available on most rack mount units.</td>
</tr>
<tr>
<td>Blue</td>
<td>Blue Display: Replaces the standard colored LED’s with Blue LED’s.</td>
</tr>
<tr>
<td>CW</td>
<td>Ceiling / Wall Mount Bracket: A ceiling/wall mount bracket is supplied allowing mounting to a ceiling or wall. The viewing angle can be adjusted if desired.</td>
</tr>
<tr>
<td>D</td>
<td>Remote Control: This option consists of a connector wired to switches on a control panel via a six foot cable. Extra cable is available.</td>
</tr>
<tr>
<td>DC</td>
<td>DC Operation: Requires the unit to be powered from a DC source exclusively. Typically +10 to +40 VDC.</td>
</tr>
<tr>
<td>Display</td>
<td>Six Digit Display: Provides a six digit .4” red LED display.</td>
</tr>
<tr>
<td>ESE</td>
<td>ESE Time Code: An ESE Time Code output (TC-90) allows ESE slaves to be driven.</td>
</tr>
<tr>
<td>EXT</td>
<td>External Sync Input: Provides external sync input (1.5 or 10MHz) via rear mounted BNC connector.</td>
</tr>
<tr>
<td>F</td>
<td>Fuse: A panel mounted fuse is supplied. An internally mounted fuse is standard.</td>
</tr>
<tr>
<td>GPS</td>
<td>GPS Receiver: A GPS receiver replaces the IRIG-B Time Code Reader.</td>
</tr>
<tr>
<td>Green</td>
<td>Green Display: Replaces the standard colored LED’s with Green LED’s.</td>
</tr>
<tr>
<td>HR</td>
<td>Hour and 1/2 Hour Relay Closure: A contact closure occurs each hr and 1/2 hr (1/2 hr can be defeated). 4 programmable relay times on certain models.</td>
</tr>
<tr>
<td>HQ (In)</td>
<td>“Have Quick” Time Code Input: Allows unit to be synced to External Source of HQ.</td>
</tr>
<tr>
<td>I/O Sets</td>
<td>Additional Input &amp; Output Sets: Specify L-IRIG, L-1KHz, L-10MHz and/or L-VDC.</td>
</tr>
<tr>
<td>IRIG</td>
<td>IRIG-B Time Code Output: Provides an IRIG-B time code output. Option GPS must be specified. (ES-277U series)</td>
</tr>
<tr>
<td>IRIG(5100)</td>
<td>IRIG-B Time Code Input: Allows the unit to synchronize with a source of IRIG-B.</td>
</tr>
<tr>
<td>IRIG-B</td>
<td>IRIG-B Time Code Output: Provides an IRIG-B time code output.</td>
</tr>
<tr>
<td>J</td>
<td>220 VAC/50 Hz Operation: The unit is configured to operate from 220 VAC line voltage. 117 VAC 50/60 Hz is standard.</td>
</tr>
<tr>
<td>L</td>
<td>Precision Frequency Outputs: 10 MHz and 1 kHz outputs are provided.</td>
</tr>
<tr>
<td>LED</td>
<td>Code Lock LED: Front panel mounted “Time Code Lock” green LED.</td>
</tr>
<tr>
<td>L2</td>
<td>Video Input / Output Sets: Two additional Video input/output sets.</td>
</tr>
<tr>
<td>L4</td>
<td>Video Input / Output Sets: Four additional Video input/output sets.</td>
</tr>
<tr>
<td>Light</td>
<td>Lighted Dial: Only on the LX-5100 Series Analog Clocks. A brightness control is included.</td>
</tr>
<tr>
<td>MOTO</td>
<td>Motorola Output: This output is from the receiver and contains Time, Latitude, Longitude and Altitude.</td>
</tr>
<tr>
<td>NMEA1</td>
<td>NMEA GPZDA Format: NMEA GPZDA (time &amp; date) format for the RS output.</td>
</tr>
<tr>
<td>NTP-C</td>
<td>NTP Client Display: NTP Client Display will synchronize exclusively with an NTP Server.</td>
</tr>
<tr>
<td>NTP2</td>
<td>NTP Time Server Output: NTP Time Server Output &amp; Network Control Input via Ethernet (10/100Base-T, RJ-45)</td>
</tr>
<tr>
<td>NTP-C/PoE</td>
<td>NTP Client/PoE over Ethernet: NTP Client Display that includes electrical power along with data over Ethernet cabling.</td>
</tr>
<tr>
<td>OCXO</td>
<td>Oven Controlled Crystal Oscillator: Replaces standard crystal with Oven Controlled Crystal Oscillator.</td>
</tr>
<tr>
<td>OR</td>
<td>Orange Powder Coat: Provides Orange Powder Coat Enclosure.</td>
</tr>
<tr>
<td>P</td>
<td>19” Rack Mount: The unit is equipped with rack-ears for 19” panel mounting.</td>
</tr>
<tr>
<td>P2</td>
<td>Dual Rack Mount: Allows specific units to be mounted side-by-side.</td>
</tr>
<tr>
<td>PoE</td>
<td>Power over Ethernet: Provides the ability to pass electrical power along with data over Ethernet cabling.</td>
</tr>
<tr>
<td>Q</td>
<td>Console Mount: The unit is housed in an enclosure 8” deep, front panel is 3.5” x 9”, 1/8” clear anodized aluminum.</td>
</tr>
<tr>
<td>R</td>
<td>Remote Control: Provides a remote control input.</td>
</tr>
<tr>
<td>Red</td>
<td>Red Display: Replaces the standard colored LED’s with Red LED’s.</td>
</tr>
<tr>
<td>RP</td>
<td>Rear Panel: Provides access holes for rear panel control.</td>
</tr>
<tr>
<td>RS</td>
<td>RS-232C Output: Computer Interface allows the time code data to be shared with a computer. RS-422A may be specified.</td>
</tr>
<tr>
<td>SV</td>
<td>5-VHS Connectors: 5-VHS connectors are provided and the unit becomes 5-VHS compatible.</td>
</tr>
<tr>
<td>SMPTE/EBU</td>
<td>SMPTE(or EBU) Time Code: SMPTE or EBU time code outputs may be specified (not available with IRIG).</td>
</tr>
<tr>
<td>Text-USB</td>
<td>Text Insertion via USB: Offers text insertion of up to 3 lines and up to 30 characters per line via USB input.</td>
</tr>
<tr>
<td>Text-Net</td>
<td>Text Insertion via Ethernet: Offers text insertion of up to 3 lines and up to 30 characters per line via Ethernet input &amp; includes USB input.</td>
</tr>
<tr>
<td>TTL</td>
<td>IRIG-B TTL Output: Panel Mounted BNC connector that provide an IRIG-B TTL output.</td>
</tr>
<tr>
<td>TZ</td>
<td>Time Zone Offset: Internal DIP switch allows the hours (and half-hour) to be offset to any time zone.</td>
</tr>
<tr>
<td>UL</td>
<td>UL “UL” Approved Power Supply: A Wall Mount “UL” approved power supply is provided.</td>
</tr>
<tr>
<td>V</td>
<td>DC Power: Input voltage of the unit becomes 12VDC.</td>
</tr>
<tr>
<td>1pps</td>
<td>1 PPS Output: Provides a one pulse per second output synchronized to the time code output.</td>
</tr>
<tr>
<td>6-Digit</td>
<td>6-Digit Display: A 6-digit (Hr, Min, Sec) front panel mounted display (.56” LED) is included.</td>
</tr>
<tr>
<td>9-Digit</td>
<td>9-Digit Display: A 9-digit (Days, Hr, Min, Sec) front panel mounted display (.56” LED) is included.</td>
</tr>
<tr>
<td>10nS</td>
<td>10nS Accuracy: The accuracy of the unit is improved to 10nS.</td>
</tr>
<tr>
<td>810F</td>
<td>MIL-STD-810F: Manufactured to meet the stringent MIL-STD-810F Test Standard. Increases width of enclosure approximately 1”.</td>
</tr>
</tbody>
</table>

### FIVE YEAR WARRANTY

All products described in this brochure are warranted free of mechanical and electrical defects, and will be replaced or repaired without charge if found defective under normal operating conditions when used as intended. Assembled products must be returned for adjustment within five years (Airborne products one year) of purchase. Before returning goods, please write or call for shipping instructions.

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