



GPS & IRIG TIME CODE PRODUCTS & ACCESSORIES

GENERATORS

GPS

INSERTERS

NTP

READERS

CONVERTERS

DISTRIBUTION
AMPLIFIERS

AIRBORNE



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
- <10ns 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
- ◆ MASTER CLOCK SYSTEMS
- ◆ CLOCKS & TIMERS
- ◆ "SMPTE" TIME CODE PRODUCTS
- ◆ VIDEO & AUDIO PRODUCTS
- ◆ DISTRIBUTION AMPLIFIERS
- ◆ CONVERTERS & TRANSLATORS
- ◆ TIME CONTROL SYSTEMS
- ◆ "IRIG" PRODUCTS (including Airborne)
- ◆ "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.



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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
- Time Delay
- Analog or TTL Input Modes
- Time Code Lock Output
- Optional GPS Receiver



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 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 | 1 PPS Outputs: TTL outputs, positive edge true
50% duty output < 1 mS accuracy, 2 BNCs |
| Mechanical: Rackmount Enclosure 1¾" H x 19" W x 9½" D | Accuracy: Standard VCXCXO >15mS per day
Option OCXO >2mS per day
Option GPS>10nS |
| Time Display: 9-digits, 0.56" yellow LED | Options: DC, EXT, GPS, LED, OCXO, NTP2, UL, Custom |
| 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 | |



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
- USB Set-up Interface & Software
- Automatic Daylight Savings Time Correction
- Loss Of GPS Signal Output
- Leap Second Correction
- Optional NTP Ethernet Port
- 4-Hour Battery Back-Up
- GPS "Lock" Indicator
- 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.



Standard GPS Antenna
with 16' cable



ES-Ant (Optional)
High Performance Antenna
with 19' cable

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.

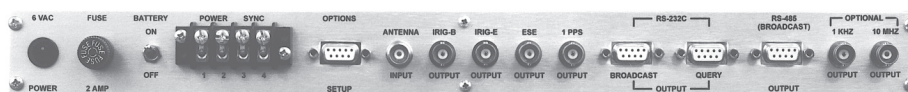
Features

- 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

Accuracy: <10 nS Of UTC When Locked To GPS
Drift: 33 mS/Day (if no GPS signal)
Displays: Six Digits, Yellow LED, .56" High
Power: 15 Watts Maximum
Electrical: 117 VAC, 50/60 Hz Via UL/CSA/CE Approved, External Power Transformer
Mechanical: 1.75" x 19" Rack Mount, 10" Deep
GPS Receiver: Internal 12-Channel
Antenna: Indoor/Outdoor With 16' Cable
Battery: 60 Minute Back-Up (all outputs and displays)

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
- GPS "Lock" indicator
- USB Port
- Indoor / Outdoor Antenna With 16' Cable
- Leap Second Correction
- Optional 6-Digit Or 9-Digit .56" LED Display
- Loss Of GPS Signal Output
- Optional DC Operation for Field and Ground Mobile Applications



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

	ES-101	ES-103U
Electrical:	117 VAC, 50/60 Hz	117 VAC, 50/60 Hz
Power:	5 Watts Typical	15 Watts Typical
Enclosure:	Desk Top	Rack Mount
Mechanical:	1.6" H x 7" W x 5" D	1.75" x 19"; 10" Deep
Displays:	-	Nine Digits, Yellow LED, .56" High
Accuracy:	1 PPS @ <500nS	1 PPS @ <500nS
Drift:	33mS/day (if no GPS signal)	33mS/day (if no GPS signal)
Outputs:	ESE-TC89: drives 100 Slaves @ 4000' ESE-TC90: drives 100 Slaves @ 4000' 1 PPS: TTL, 20% Duty Cycle 1 PPS: TTL, 50% Duty Cycle RS-232C: ASCII Date & Time @9600 Baud 8 Data, No Parity, 1 Stop	ESE-TC89: drives 100 Slaves @ 4000' ESE-TC90: drives 100 Slaves @ 4000' 1 PPS: TTL, 20% Duty Cycle 1 PPS: TTL, 50% Duty Cycle IRIG-B: 3 Vpp(mark amplitude)600Ω RS-232C: Date & Time Output USB: Universal Serial Bus, Date & Time Output
GPS Receiver:	Internal 12-Channel	Internal 12-Channel
Antenna:	Indoor/Outdoor with 16' Cable	Indoor/Outdoor with 16' Cable
Options:	Ant, BBU, DC, EBU, HR, IRIG-B, IRIG-E, J, K*, P, P2, SMPTE(or EBU), UL, 6-Digit, 9-Digit, 10nS	Ant, BBU, DC, HR, J, K*, UL, 10nS

*requires 10nS option



MASTER CLOCK SYSTEM SWITCHERS

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



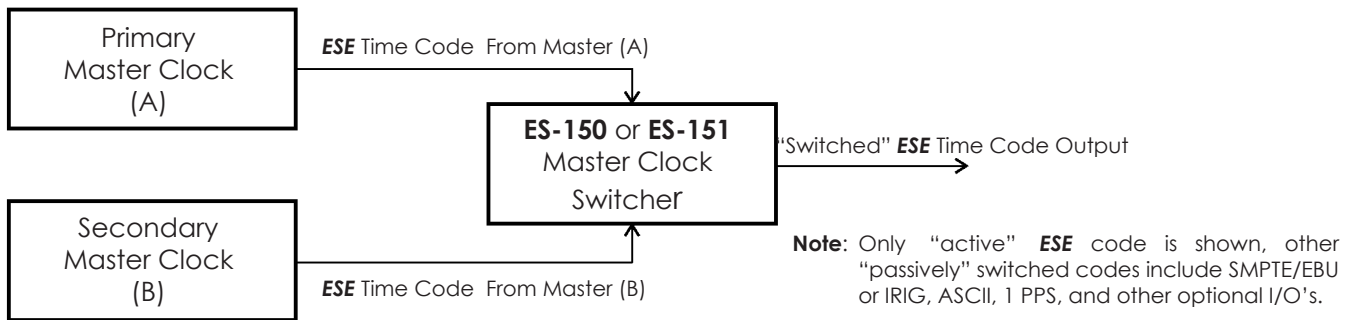
The **ES-150** also provides passive switchover inputs (A & B) and outputs for SMPTE/EBU time code, ASCII a 1PPS signal and an inverted 1 PPS signal. The **ES-151** excludes SMPTE/EBU and includes IRIG-B and IRIG-E. The status of these outputs is controlled by the same circuitry as the **ESE** time code 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

ES-150

- Active I/O Circuits:** **ESE** Time Code
Passive I/O Circuits: SMPTE/EBU, ASCII, 1 PPS (20%), 1 PPS (50%)
- Electrical:** 117 VAC, 50/60 Hz
Power: 2 Watts
- Mechanical:** 1.75" x 19" Rack Mount, 10" Deep
- Optional I/O Circuits:** IRIG-B, 1 KHz, 10 MHz, 12 or 24 VDC Alternating
Options: B, Black, J, UL, I/O Sets

ES-151

- ESE** Time Code
 IRIG-B, IRIG-E, ASCII (RS-232C-Broadcast & Query, RS-422), 1 PPS
 117 VAC, 50/60 Hz
 2 Watts
 1.75" x 19" Rack Mount, 10" Deep
 1 KHz, 10 MHz, 12 or 24 VDC Alternating
 B, Black, J, UL, I/O Sets



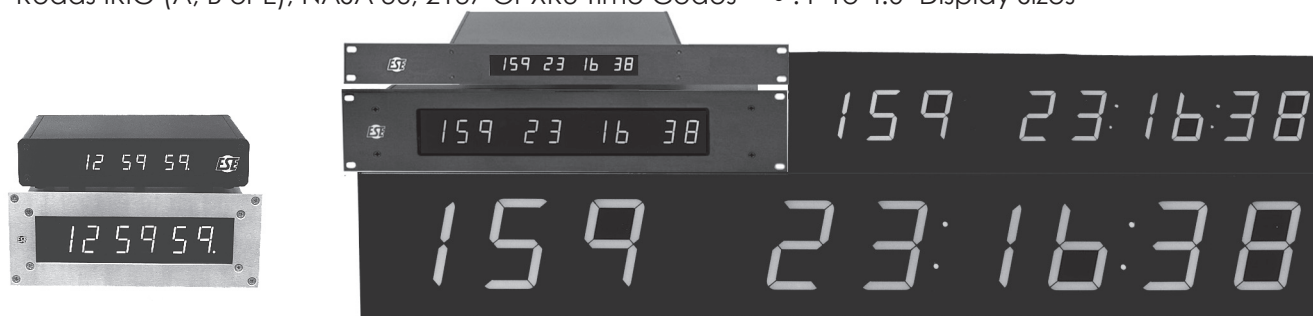
TIME CODE DISPLAYS

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*
- Desk-Top, Console, Wall & Rack Mount Enclosures
- 1/4 - 6x Playspeed
- Automatic Error Detection And Correction
- Display Time Of Year (Day & Time)
- Perfect Synchronization With Master Clock
- Simple Installation & "Hands-Off" Operation
- 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.

SPECIFICATIONS

Model #	Description	Viewing Distance	Power	Options
ES-297	6-digit, .4" Red LED in Console Mount enclosure	10'	6 Watts	J, UL, V
LX-270U/6	6-digit, .56" Amber LED in Desk-Top enclosure	20'	6 Watts	DC, J, Q, UL
LX-270U/6/Q	6-digit, .56" Amber LED in Console Mount enclosure	20'	6 Watts	DC, ESE, J, RS, UL
LX-270U/9	9-digit, .56" Amber LED in Desk-Top enclosure	20'	8 Watts	DC, J, UL
ES-270U/9	9-digit, .56" Amber LED in Rack mount enclosure	20'	8 Watts	DC, ESE, J, PoE, RS, UL
LX-271U/6	6-digit, 1.0" Amber* LED in Desk-Top enclosure	35'	6 Watts	DC, J, UL
ES-271U/9	9-digit, 1.0" Amber* LED in Rack mount enclosure	35'	8 Watts	DC, J, PoE, RS, UL
ES-272U/6	6-digit, 2.3" Red* LED in Wall mount enclosure	70'	8 Watts	DC, J, P, PoE, UL
ES-272U/9	9-digit, 2.3" Red* LED in Wall mount enclosure	70'	10 Watts	CW, DC, J, PoE, UL
ES-279U/6	6-digit, 4.0" Red* LED in Wall mount enclosure	120'	10 Watts	CW, DC, J, PoE, UL
ES-279U/9	9-digit, 4.0" Red* LED in Wall mount enclosure	120'	12 Watts	CW, DC, J, PoE, UL

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

Display Size/Enclosure Plating	Dimensions	Connector
.4" 6-digit Console: Black ABS Plastic	2.2" H x 4.5" W x 4.5" D	BNC
.56" 6-digit Desk: Black Powder Coated Al.	1.7" H x 8" W x 6" D	BNC
.56" 6-digit Console (Q): Anodized Aluminum	3.5" H x 9" W x 8" D	BNC
.56" 9-digit Desk: Black Powder Coated Al.	1.7" H x 9.6" W x 6" D	BNC
.56" - Rack: Anodized Aluminum	1.75" H x 19" W x 10" D	BNC
1.0" - Desk: Black Powder Coated Al.	3.5" H x 12.7" W x 6" D	BNC
1.0" - Rack: Anodized Aluminum	3.5" H x 19" W x 10" D	BNC
2.3" 6-digit Wall: Black Powder Coated Al.	5" H x 15" W x 3.5" D	Terminal Block
2.3" 6-digit Rack (P): Anodized Aluminum	3.5" H x 19" W x 10" D	BNC
2.3" 9-digit Wall: Black Powder Coated Al.	5" H x 24" W x 3.5" D	Terminal Block
4.0" 6-digit Wall: Black Powder Coated Al.	6.6" H x 25.5" W x 3.5" D	Terminal Block
4.0" 9-digit Wall: Black Powder Coated Al.	6.6" H x 42.5" W x 3.5" D	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
- Battery Back-Up
- Error Indicator
- Rack Mount Option
- Optional IRIG-B Input



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

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

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 • Brightness Control
- 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

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



HD-275/SD/1

TIME CODE READER / VIDEO INSERTER

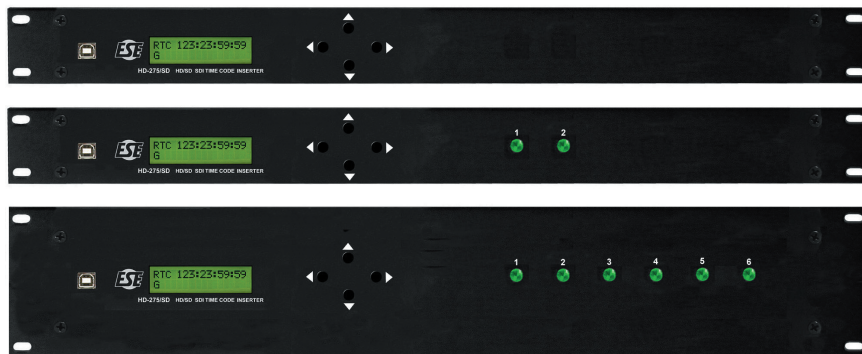
The **HD-275/SD/1** is an HD & SD Timecode Reader/Video Inserter. The unit reads IRIG-A, -B, & -G, D-VITC or RP-188 and inserts that timecode onto an SDI video signal. The timecode can also be embedded into the D-VITC or RP-188. Additionally, up to 30 characters of user defined text may be inserted into 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-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
- USB Setup Interface
- User Friendly Control
- Color Fonts
- Universal Power Supply (90-264 VAC)
- Accepts Multiple HD Formats
- Time Zone Offset
- LCD Setup/Status Display
- Numerous Options Available
- Dual LTC Output



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
- GPS Master Clock (w/GPS option)
- IRIG Sourced NTP Server (w/NTP & IRIG options)
- Drive New or Existing Remote Displays with Time of Day
- Transcode IRIG A/B/G to IRIG-B or SMPTE Codes (w/IRIG option)
- IRIG-B Generator (w/IRIG option)

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.

SPECIFICATIONS

Power:	90 – 264 VAC, 47 – 63 Hz, 15 Watts max	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
Mechanical:	Rackmount Enclosure 1¾" H x 19" W x 10" D	Analog Input:	1 Vpp, terminated
Time & Setup/Status Display:	16 x 2 character LCD	Color Frame Input:	Vertical interval negative TTL/CMOS pulse
Time Code Input:	SMPTE (100 mVpp-10 Vpp; 10kΩ input impedance) Optional-IRIG (100 mVpp-10 Vpp)	Options:	ESE, GPS, IRIG, NTP, NTP-C, OCXO, RS, UL

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	1 PPS Outputs: TTL outputs, positive edge true 50% duty output < 1 mS accuracy, 2 BNCs
Mechanical: Rackmount Enclosure 1¾" H x 19" W x 9½" D	Accuracy: Standard VCXCO >15mS per day Option OCXO >2mS per day Option GPS >10nS
Time Display: 9-digits, 0.56" yellow LED	Options: DC, EXT, GPS, LED, OCXO, UL, Custom
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	

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
- NTP Primary Time Server (**ES-104E**)
- Several Options Available
- Platform Independent
- Simple Installation & Hands-Free Operation
- 10/100BaseT - NTP Data Port (RJ-45)
- Rugged Desktop Enclosure
- **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	Drift: 33ms/Day (if no GPS signal)
Outputs: ESE Time Code™ TC89 or TC90, Drives 100 Slaves @ 4000', BNC	Configuration: Web page or Telnet
GPS Receiver: Internal 12-Channel (ES-104E only)	Enclosure: Desk-Top, Black Anodized Aluminum
Antenna: Indoor/Outdoor with 16' Cable (ES-104E only)	Dimensions: 1.6" H x 7" W x 5" D
Antenna Input: L1, 1.57542 GHz, TNC (ES-104E only)	Electrical: 117 VAC, 50/60 Hz
Time Code Input: ES-289E: ESE (TC-90), SMPTE or EBU Time Code with Date data, BNC	Power: 5W maximum
ES-299E: IRIG (A,B or E), NASA 36, BNC	Options: Ant (ES-104E Only), BBU, J, P, P2, UL
ES-911E/NTP: ASCII (RS-232C): NENA (format "1"), ESE ("A"), or NMEA 0183 (GPRMC), DB-9 ESE (TC-90) via BNC	



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 x 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



Shown with Rackmount option ES-110P

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:** Internal 12-Channel
- Accuracy:** 1 x 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

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

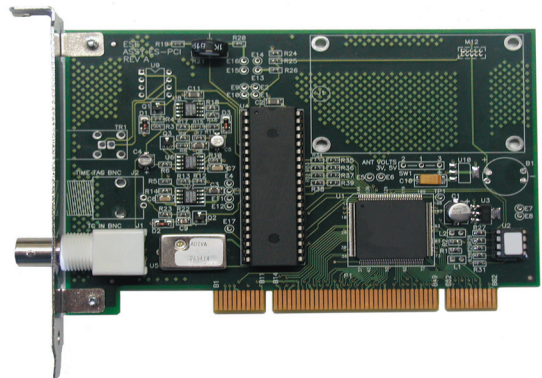
Power: 5 Watts max.
Electrical: 117 VAC, 50/60 Hz
Enclosure: Rack Mount
Dimensions: 1.75" H x 19" W x 10" D
Time Code Input: IRIG-B
Input Impedance: 25K Ω min.

Mark Amplitude: 100 mVpp to 10 Vpp, unbalanced
Mark to Space Ratio: 3:1 nominal
Time Code Output: SMPTE - 0 db into 600 Ω , balanced
Video In/Out: 1 - 2 Vpp, loop-thru, unterminated
Color Frame Input: TTL or CMOS Field #1 Negative Pulse
Options: DC, EBU, J, UL, 1pps

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

Dimensions: 5.25" D x 3.75"H
Time Code Input: IRIG-A, B, E, G, NASA36, XR3/2137, ASCII 0, 1, A, NMEA-0183 GPRMC

Input Impedance: 20K Ω
Mark Amplitude: .3 Vpp to 10 Vpp
Mark to Space Ratio: 3:1 nominal
Options: GPS



AIRBORNE & PORTABLE IRIG-B Time Code Generators



ES-290



ES-291



ES-292

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.

Specifications

ES-290

IRIG-B Input:	100 mVpp – 10 Vpp, 25 K Ω input impedance, play speed
IRIG-B Output:	Mark to space 3.3 to 1 AM: 2 – 7 Vpp (mark amplitude), BNC, 600 Ω DC: \geq 4.0 V high and \leq 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" ASCII @ 9600 baud, 8 data, no parity, 1 stop MM-DD-YY<SPACE><SPACE>DDD:HH:MM:SS<CR> Transmission is once per second and ends 7 ms before Time True.
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 Gell 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:	Mark to space 3.3 to 1 AM: 2 – 7 Vpp (mark amplitude), BNC, 600 Ω (optional) DC: \geq 4.0 V high and \leq 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" ASCII @ 9600 baud, 8 data, no parity, 1 stop MM-DD-YY<SPACE><SPACE>DDD:HH:MM:SS<CR> Transmission is once per second and ends 7 ms before Time True.
1 PPS Outputs:	TTL outputs, positive edge true, I/O Connector #1 - 20% duty output, < 10 ns accuracy if "locked", directly from receiver #2 – 50 % duty output, < 1 ms accuracy, regenerated
GPS "Lock" Output:	TTL output, logic "1" when "locked" to GPS, logic "0" otherwise, I/O Connector
Accuracy:	1 PPS (20% duty cycle) @ < 10 ns (if "locked") IRIG-B @ 70 μ s (if "locked")
Drift:	+/- 150 ms per day (no "lock")
Power:	+11 to +40 VDC, 100 mA
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:	Mark to space 3.3 to 1 AM: 2 – 7 Vpp (mark amplitude), BNC, 600 Ω (optional) DC: \geq 4.0 V high and \leq 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" ASCII @ 9600 baud, 8 data, no parity, 1 stop MM-DD-YY<SPACE><SPACE>DDD:HH:MM:SS<CR> Transmission is once per second and ends 7 ms before Time True.
1 PPS Outputs:	TTL outputs, positive edge true, I/O Connector #1 - 20% duty output, < 10 ns accuracy if "locked", directly from receiver #2 – 50 % duty output, < 1 ms accuracy, regenerated
GPS "Lock" Output:	TTL output, logic "1" when "locked" to GPS, logic "0" otherwise, I/O Connector
Accuracy:	1 PPS (20% duty cycle) @ < 10 ns (if "locked") IRIG-B @ 70 μ s (if "locked")
Drift:	+/- 150 ms per day (no "lock")
Power:	+11 to +40 VDC, 100 mA, 110 VAC Adapter is included
Battery:	Rechargeable Gell 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

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

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 K Ω 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
 Textured-Black Powder-Coated Aluminum
Weight: 1 1/2 pounds
Options: AC, F, J

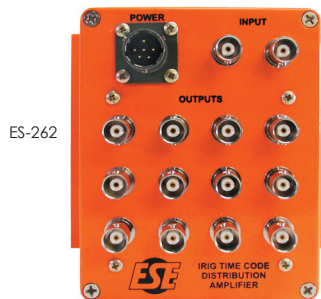
AIRBORNE & PORTABLE

1 x 12 IRIG TIME CODE DISTRIBUTION AMPLIFIERS

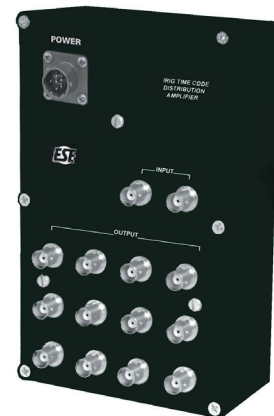
The **ES-262** and **ES-282** are 1 x 12 IRIG-A, B, E & G time code distribution amplifiers. The units provide a loop-thru time code input and 12 time code outputs. All time code inputs and outputs are accessible via BNC connectors. The **ES-262** is housed in a rugged box enclosure with mounting plate 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



ES-262



ES-282

SPECIFICATIONS

Time Codes: IRIG-A, B, E & G, AM codes
Gain: Unity Gain
Input: BNC loop-thru; 50k Ω input impedance
 +14 dbu (11 vpp) maximum input level
Output: BNC; 100 Ω 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
- LED Status Indicators
- 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 1 cycle
- Options:** UL

TIME CODE ISOLATION & DISTRIBUTION AMPLIFIERS

Since the early '80s, **ESE**'s Audio and Video Distribution Amplifiers have been recognized for their quality and durability. Using very similar technology, **ESE** presents a line of Distribution Amplifiers (DAs) capable of isolating and distributing most any type of Time Code. The basic idea for each model is the same... provide the ability to distribute time code and compensate for lengthy cable runs while isolating each unit in the Master Clock System.

Described below are units capable of handling any of the IRIG time codes, **ESE** Time Code or ASCII time code. If you're in need of a DA not mentioned here refer to our *DISTRIBUTION AMPLIFIERS* Brochure available on our website or contact the **ESE** Factory.



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

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.



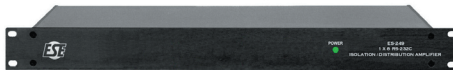
ES-242
Quad 1x6 IRIG(AM) DA

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 unbalanced single ended outputs.



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

The **ES-243** is designed to accept any **ESE** time code signal or any IRIG time code in its "TTL" form and output up to 24 identical copies. The unit has four separate and isolated channels, each with six available outputs. Inputs and outputs are via rear mounted BNC connectors and each output is capable of driving up to 4000' of cable.



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

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.



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

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.



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

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

	ES-210	ES-242	ES-243	ES-249	ES-250	ES-251
Electrical:	110-120 VAC, 50/60 Hz	110-120 VAC, 50/60 Hz	117 VAC, 50/60 Hz	117 VAC, 50/60 Hz	110-120 VAC, 50/60 Hz	110-120 VAC, 50/60 Hz
Power:	5 Watts Maximum	5 Watts Maximum	2 Watts Maximum	2 Watts Maximum	2 Watts Maximum	2 Watts Maximum
Mechanical:	1.75" x 19"; 5" Deep	1.75" x 19"; 5" Deep	1.75" x 19"; 5" Deep	1.75" x 19"; 5" Deep	1.75" x 19"; 5" Deep	3.25" x 19"; 5" Deep
Time Code-	10 KHz-15MHz +/- .5db,	IRIG (A, B or E) NASA 36,	ESE (TC76, TC89 or TC90)	ASCII (RS-232C)	ASCII (RS-232C)	ASCII (RS-232C)
Input/Output:	1 Vpp nominal, 50 ohm	XR3, 2137 & CS3	or IRIG(A, B or E)AM Form	-	-	-
Connectors:	BNC	BNC	BNC	9-Pin D-Sub	Terminal Block	9-Pin D-Sub
Configuration:	Quad 1 x 6 (1 x 24)	Quad 1 x 6 (1 x 24)	Quad 1 x 6 (1 x 24)	Single 1 x 8	1 x 24	1 x 24
Options:	J, UL	J, UL	J, UL	J, UL	J, UL	J, UL



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.

Option	Description	Option	Description
AC	AC Adapter: An AC Adapter with mating connector is provided.	Light	Lighted Dial: Only on the LX-5100 Series Analog Clocks. The dial of the clock can be illuminated. A brightness control is included.
Amber	Amber Display: Replaces the standard colored LED's with Amber LED's.	MOTO	Motorola Output: This output is from the receiver and contains Time, Latitude, Longitude and Altitude.
Ant	GPS Antenna: High Performance GPS Antenna for harsh RF Environments.	NMEA1	NMEA GPZDA Format: NMEA GPZDA (time & date) format for the RS output.
B	Parallel BCD Output: Provides A Parallel BCD (CMOS Compatible) output. ES-169B may be substituted when option "B" is not available.	NTP	NTP Server: Provides an NTP (Network Time Protocol) Server. Allows for synchronization of computer networks.
BBU	Battery Back-Up: An internal Gel-Cell battery is provided for maintaining the unit's microprocessor up to a 4-hour power outage.	NTP-C	NTP Client Display: NTP Client Display will synchronize exclusively with an NTP Server.
Black	Black Anodized Front Panel: Available on most rack mount units.	NTP2	NTP Time Server Output: NTP Time Server Output & Network Control Input via Ethernet (10/100Base-T, RJ-45)
Blue	Blue Display: Replaces the standard colored LED's with Blue LED's.	NTP-C/PoE	NTP Client/Power over Ethernet: NTP Client Display that includes electrical power along with data over Ethernet cabling.
CW	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.	OCXO	Oven Controlled Crystal Oscillator: Replaces standard crystal with Oven Controlled Crystal Oscillator.
D	Remote Control: This option consists of a connector wired to switches on a control plate via a six foot cable. Extra cable available.	OR	Orange Powder Coat: Provides Orange Powder Coat Enclosure.
DC	DC Operation: Requires the unit to be powered from a DC source exclusively, typically +10 to +40 VDC.	P	19" Rack Mount: The unit is equipped with rack-ears for 19" panel mounting.
Display	Six Digit Display: Provides a six digit .4" red LED display.	P2	Dual Rack Mount: Allows specific units to be mounted side-by-side.
ESE	ESE Time Code: An ESE Time Code output (TC-90) allows ESE slaves to be driven.	PoE	Power over Ethernet: Provides the ability to pass electrical power along with data over Ethernet cabling.
EXT	External Sync Input: Provides external sync input (1.5 or 10MHz) via rear mounted BNC connector.	Q	Console Mount: The unit is housed in an enclosure 8" deep, front panel is 3.5" x 9", 1/8" clear anodized aluminum.
F	Fuse: A panel mounted fuse is supplied. An internally mounted fuse is standard.	R	Remote Control: Provides a remote control input.
GPS	GPS Receiver: A GPS receiver replaces the IRIG-B Time Code Reader.	Red	Red Display: Replaces the standard colored LED's with Red LED's.
Green	Green Display: Replaces the standard colored LED's with Green LED's.	RP	Rear Panel: Provides access holes for rear panel control.
HR	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.	RS	RS-232C Output: Computer Interface allows the time code data to be shared with a computer. RS-422A may be specified.
HQ (In)	"Have Quick" Time Code Input: Allows unit to be synced to External Source of HQ.	SV	S-VHS Connectors: S-VHS connectors are provided and the unit becomes S-VHS compatible.
HQ (Out)	"Have Quick" Time Code Output: Meets the ICD-GPS-060 Standard.	SMPTE/EBU	SMPTE(or EBU) Time Code: SMPTE or EBU time code outputs may be specified (not available with IRIG).
I/O Sets	Additional Input & Output Sets: Specify L-IRIG, L-1KHz, L-10MHz and/or L-VDC.	Text-USB	Text Insertion via USB: Offers text insertion of up to 3 lines and up to 30 characters per line via USB input.
IRIG	IRIG-B Time Code Output: Provides an IRIG-B time code output. Option GPS must be specified. (ES-277U series)	Text-Net	Text Insertion via Ethernet: Offers text insertion of up to 3 lines and up to 30 characters per line via Ethernet input & includes USB input.
IRIG(5100)	IRIG-B Time Code Input: Allows the unit to synchronize with a source of IRIG-B.	TTL	IRIG-B TTL Output: Panel Mounted BNC connector that provide an IRIG-B TTL output.
IRIG-B	IRIG-B Time Code Output: Provides an IRIG-B time code output.	TZ	Time Zone Offset: Internal DIP switch allows the hours (and half-hour) to be offset to any time zone.
IRIG-E	IRIG-E Time Code Output: Provides an IRIG-E time code output.	UL	"UL" Approved Power Supply: A Wall Mount "UL" Approved power supply is provided.
J	220 VAC/50 Hz Operation: The unit is configured to operate from 220 VAC line voltage. 117 VAC 50/60 Hz is standard.	V	DC Power: Input voltage of the unit becomes 12VDC.
JAM	Jam Sync: IRIG-B Jam Sync Input for the ES-291.	1pps	1 PPS Output: Provides a one pulse per second output synchronized to the time code output.
K	Precision Frequency Outputs: 10MHz and 1 KHz outputs are provided.	6-Digit	6-Digit Display: A 6-digit (Hr, Min, Sec) front panel mounted display (.56" LED) is included.
LED	Code Lock LED: Front panel mounted "Time Code Lock" green LED.	9-Digit	9-Digit Display: A 9-digit (Days, Hr, Min, Sec) front panel mounted display (.56" LED) is included.
L2	Video Input / Output Sets: Two additional Video input/output sets.	10ns	10ns Accuracy: The accuracy of the unit is improved to 10ns.
L4	Video Input / Output Sets: Four additional Video input/output sets.	810F	MIL-STD-810F: Manufactured to meet the stringent MIL-STD-810F Test Standard. Increases width of enclosure approximately 1".

Extended Warranty Available, please consult factory

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.

