



MASTER CLOCK SYSTEMS & ACCESSORIES

- GPS
- NTP
- DISPLAYS
- COMPARATORS
- FREQUENCY STANDARDS
- CONVERTERS
- DISTRIBUTION AMPLIFIERS



For over 45 years **ESE** has been meeting the needs of the industry with a line of Master Clocks and related accessories. Providing accurate and cost effective methods for timekeeping, **ESE**'s Master Clock Systems enable one to interface and synchronize all components with the Master Clock. Whether using line frequency, an internal crystal timebase or referencing "UTC" (via GPS, NTP or Modem), **ESE** Master Clocks can be used to drive digital or analog slave clocks, as well as interface with video or computer systems. Also, existing "non-**ESE**" Master Clock systems can be updated or enhanced with **ESE** products. An **ESE** Translator/Converter may be required to interface with existing systems (refer to "Time Code Converters").

Applications

- Government & Military Installations
- Schools & Distant Learning Centers
- Tele-Conferencing Centers
- Financial Institutions
- Broadcast Facilities
- Video Courtrooms
- Public Safety

Features

- GPS Traceability
- Easily Expanded
- Time Zone Offset Option
- Analog / Impulse Clocks
- Time And Date Digital, Analog & Video Displays
- GPS, NTP, Modem & Crystal Timebase Accuracy
- NTP, SMPTE-LTC, IRIG, ASCII, & **ESE** 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 medical industries. In the mid-'70s, the ES-160 which referenced a one second per month crystal time base was introduced... our first Master Clock. Soon after that, a new Master Clock that referenced WWV (NBS/NIST) was introduced. These products widened the market of the **ESE** product lines to include school systems, 9-1-1 dispatch centers and military installations.

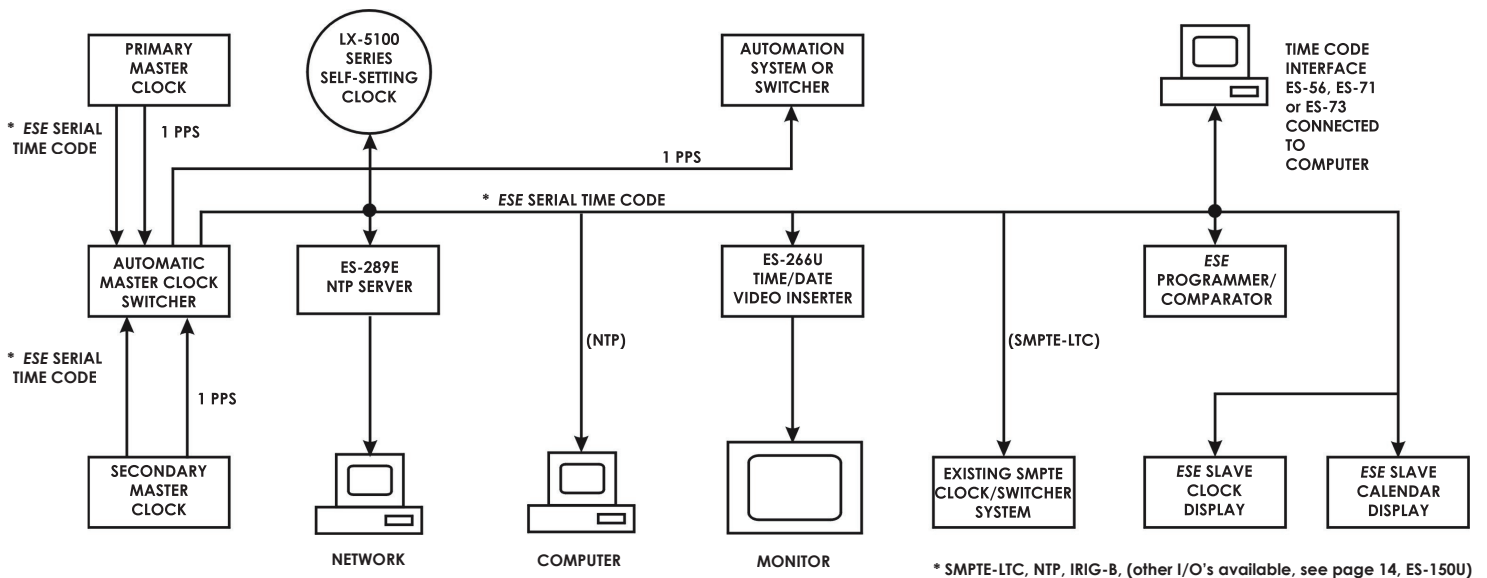
Since then, the Product Family has grown considerably. The Master Clock Family now includes over 50 standard products, highlighted by the ES-185E, GPS referenced Time Code Generator /Master Clock and the "U" Series of multi-code "Universal Time Code Displays".

ESE also works closely with several OEMs, designing and manufacturing products that meet unique requirements. These alliances have found **ESE** manufactured products in a variety of applications including post-production, military, telecommunications and even the Space Shuttle.

As the need for precision timing and time code equipment grows, so does **ESE**. And, with the availability of new technology, so does our product line. With more than 200 standard products, **ESE** is certain to offer a solution to all of your precision timing requirements.

BLOCK DIAGRAM

Below is a Block Diagram showing a complete Master Clock System including Analog, Digital and Video Slaves, Computer Interfaces and an Automatic Master Clock System Switcher. Similar systems using SMPTE-LTC/EBU, IRIG or NTP Time Code are also supported using **ESE** Equipment.



CUSTOM CAPABILITIES

Since 1971, **ESE** has manufactured over 2600 "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.



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ECONOMY GPS MASTER CLOCKS

The **ES-101**, **ES-102U** and **ES-103U** are low-cost yet very accurate GPS Master Clocks/Time Code Generators. All three receive time and date information from Global Positioning System satellites and supply data to the user in several different forms. A twelve-channel receiver is employed that is capable of tracking up to twelve (12) satellites simultaneously, although reception of only one is required for time data to be output.

All three units have ASCII (RS-232C), **ESE-TC89** and **ESE-TC90** Time Code outputs, two (2) One Pulse Per Second outputs and a GPS "Lock" output. Additionally, the **ES-102U** has a 6-digit display (hours, minutes & seconds) of time information and a SMPTE-LTC/EBU time code output. Meanwhile, 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 a Time Code Generator.

Features:

- SMPTE-LTC/EBU, IRIG-B, USB, ASCII (RS-232C) & **ESE** Time Code Outputs
- Automatic Or Manual Daylight Saving Time Correction
- Rugged Desk Top & Rack Mount Enclosures
- Time Zone Offset
- Dual 1 PPS Outputs
- GPS "Lock" indicator
- Leap Second Correction
- Indoor / Outdoor Antenna With 16' Cable
- 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 (**ES-810** or **ES-810N** 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.

Specifications

ES-101

Electrical: 117 VAC, 50/60 Hz
Power: 5 Watts Typical
Enclosure: Desk Top
Mechanical: 1.6" H x 7" W x 5" D
Displays: -
Accuracy: 1 PPS @ <500 η S
Drift: 33mS/day (if no GPS signal)
Video Input: -
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
GPS Receiver: Internal 12-Channel
Antenna: Indoor/Outdoor with 16' Cable
Options: Ant, BBU, DC, HR, IRIG-B, IRIG-E, J, K, P, P2, SMPTE, UL, 6-Digit, 9-Digit, 10 η S

ES-102U

117 VAC, 50/60 Hz
 15 Watts Typical
 Rack Mount
 1.75" x 19"; 10" Deep
 Six Digits, Yellow LED, .56" High
 1 PPS @ <500 η S
 33mS/day (if no GPS signal)
 RS-170A Composite Video/Blackburst,
 1 Vpp, 75 Ω
ESE-TC89: drives 100 Slaves @ 4000'
ESE-TC90: drives 100 Slaves @ 4000'
 1 PPS: TTL, 20% Duty Cycle
 1 PPS: TTL, 50% Duty Cycle
 SMPTE: 600 Ω Balanced or Unbalanced
 -
 -
 RS-232C: Date & Time Output
 USB: Universal Serial Bus, Date &
 Time Output
 Internal 12-Channel
 Indoor/Outdoor with 16' Cable
 Ant, BBU, DC, HR, J, K, UL, 10 η S

ES-103U

117 VAC, 50/60 Hz
 15 Watts Typical
 Rack Mount
 1.75" x 19"; 10" Deep
 Nine Digits, Yellow LED, .56" High
 1 PPS @ <500 η S
 33mS/day (if no GPS signal)
 -
 -
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)600 Ω
 RS-232C: Date & Time Output
 USB: Universal Serial Bus, Date &
 Time Output
 Internal 12-Channel
 Indoor/Outdoor with 16' Cable
 Ant, BBU, DC, HR, J, K, UL, 10 η S



GPS MASTER CLOCK / TIME CODE GENERATOR

The **ES-185E** 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-185E** generates several types of time code (SMPTE-LTC/EBU, IRIG-B, **ESE-TC89**, **ESE-TC90**, RS232C/ASCII and USB) and an extremely accurate 1PPS signal (+/-10ns). These outputs allow the **ES-185E** to easily interface with new or existing computer, automation and clock systems. An optional ethernet NTP (Network Time Protocol) port may be specified (**ES-185E/NTP6**) allowing the clock to be an NTP server and providing clock set-up via a LAN.

Features:

- SMPTE-LTC/EBU, IRIG-B, USB, ASCII (RS-232C) & **ESE** Time Code Outputs
- USB Set-up Interface & Software
- Automatic or Manual Daylight Saving Time Correction
- GPS "Lock" Indicator
- Dual Battery Back-Up
- Optional NTP Ethernet Port
- Leap Second Correction
- Loss of GPS Signal Output
- 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-185E** 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 (**ES-810** or **ES-810N** 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-185E** allowing the user to 1) select SMPTE mode (DF, NDF, EBU & Real Time) 2) offset the Time Zone displayed and output by the **ES-185E**, 3) advance or delay the time output for various synchronizing purposes 4) modify dates for Daylight Saving Time 5) input time & date (when not locked to GPS) and 6) set for 12 or 24 hour display.



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, NTP6, UL



NTP REFERENCED MASTER CLOCK/ TIME CODE GENERATOR

The **ES-188E** is an NTP referenced Master Clock and Time Code Generator. It displays nine digits (Day of Year, Hour, Minute & Second) of time as received via a user selected NTP server. Simultaneously, the **ES-188E** generates several types of time code (SMPTE-LTC/EBU, **ESE-TC89**, **ESE-TC90**, USB, RS232C/ASCII and IRIG-B) and a 1PPS signal. These outputs allow the **ES-188E** to easily interface with new or existing computer, automation and clock systems. An optional ethernet NTP (Network Time Protocol) port may be specified (**ES-188E/NTP6**) allowing the clock to be an NTP server and providing clock set-up via a LAN.

Features:

- **ESE**, USB, ASCII (RS-232C), SMPTE-LTC/EBU & IRIG-B Time Code Outputs
- NTP Ethernet Port
- Automatic or Manual Daylight Saving Time Correction
- NTP Update Output
- 1 PPS Output
- USB Set-up Interface & Software
- Dual Battery Back-Up
- NTP Sync Indicator
- 9-Digit .56" LED Display
- Optional DC Operation for Field and Ground Mobile Applications
- Rugged Rack Mount Enclosure
- Time Advance/Retard Feature for Synchronization Purposes (+/- 15 sec)
- Time Zone Offset



Applications include NPR's ContentDepot in which the **ES-188E** extracts time data from the NPR satellite receiver. Connection is easily made between the units NTP port and the station's Local Area Connection (LAN). Option NPR permits the **ES-188E** to drive legacy equipment.

Software supplied with the **ES-188E** allows the user to select SMPTE mode (DF, NDF, EBU & Real Time), offset the Time Zone displayed and output by the **ES-188E**, input the time & date (when not synched to a server), modify dates for Daylight Saving Time, set for 12 or 24 hour display and 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
Accuracy: Network dependent, generally less than 1mS
Drift: 33mS/day (if no NTP signal)
Input: Ethernet: 10/100 Base-T
Battery: 4-Hour Back-Up (displays are blank)
Video Input: RS-170A Composite Video/Blackburst, 1Vpp, 75Ω

Outputs: **ESE** Time Code: drives 100 Slaves @ 4000'
USB: Universal Serial Bus, Date & Time Output
RS-232C: Date & Time Output
SMPTE: 600Ω Balanced or Unbalanced
IRIG-B: 3 Vpp (mark amplitude), 600Ω, AM or TTL selectable
1 PPS: TTL, 50% Duty Cycle
Clock Set-up: USB, RS-232C, Network (Telnet or Windows®)
Options: DC, HR, J, NPR, NTP6, UL



CRYSTAL CONTROLLED MASTER CLOCK / TIME CODE GENERATOR

The **ES-160E** is a Master Clock/Time Code Generator. The unit employs a voltage controlled/temperature compensated crystal oscillator which provides the **ES-160E** with an accuracy of one second per month. Six .56" yellow LEDs display real time while the unit simultaneously generates several types of time (and date) code (SMPTE-LTC/EBU, **ESE-TC89**, **ESE-TC90** and RS232C/ASCII) and a 1 PPS signal. An optional ethernet NTP (Network Time Protocol) port may be specified (**ES-160E/NTP6**) allowing the clock to be an NTP server and providing clock set-up via a LAN.

Since the **ES-160E** is a completely self-contained unit with no link to GPS, USNO or WWV, it is a practical alternative where users have a concern over the "availability" of such time references. The **ES-160E** is designed as a "primary" Master Clock. However, the unit is an excellent choice for use as a "secondary" Master Clock in a system utilizing an Automatic Master Clock Switcher (**ES-150U**) and any other Master Clock with a SMPTE-LTC/EBU or **ESE** Time Code output.

Features:

- SMPTE-LTC/EBU, ASCII (RS-232C) & **ESE** (TC89 & TC90) Time Code Outputs
- Automatic Daylight Savings Time Correction
- Rugged Rack Mount Enclosure
- Dual Battery Back-Up
- 6-Digit .56" LED Display
- External Time Sync Input
- Simple Operation & Installation
- Several Options Available as well as Custom Modifications
- Optional NTP Output
- One Second per Month "VCTCXO" Crystal Accuracy
- 1 PPS Output
- 12 or 24 Hour Display



Real Time (Hour, Minute & Second) and Gregorian Date (Month, Day & Year) are set via the front panel mounted "Set" switch. A rear mounted "Enable" switch is provided to protect the unit from accidental setting. Once set, the unit can be synchronized "manually" to any source of reliable time via the "Set" switch or "automatically" via the External Sync Input.

Software is also supplied with the **ES-160E** allowing the user to select SMPTE mode (DF, NDF, EBU & Real Time), modify dates for Daylight Saving Time and set the display for 12 or 24 hour format.

Specifications

Electrical: 117 VAC, 50/60 Hz
Power: 15 Watts Maximum
Mechanical: 1.75" x 19" Rack Mount, 10" Deep
Displays: Six Digits, Yellow LED, .56" High
Accuracy: +/-33mS/day
Video Input: RS-170A Composite Video/Blackburst, 1 Vpp, 75Ω
Time Sync Input: TTL, 1 PPS or Slower

Outputs: 1 PPS: TTL, 50% Duty Cycle
ESE Time Code: drives 100 Slaves @ 4000'
 SMPTE: 600Ω Balanced or Unbalanced
 RS-232C: ASCII Date & Time @ 9600 Baud, 8 Data, No Parity, 1 Stop
Battery: 10-Hour Back-Up of CPU (displays are blank)
Options: DC, HR, J, NTP6, UL



ECONOMY MASTER CLOCKS

Designed as an economical alternative to the more "sophisticated" Master Clocks, the **ES-192U/ES-194U** and the **LX-192U/LX-194U** have proven their value time and time again. These units feature a .56" six-digit yellow LED display and an **ESE** Serial Time Code output (capable of driving up to 100 Slaves at a distance of up to 4000 feet). Accessible on the rear mounted 9-pin D-sub connector are a 1 PPS Output, remote access to the two setting controls (Set and Select) and an External Sync Input (capable of synchronizing the unit with an external time reference).

These units provide a cost-effective solution whether the need is for the first building block of an economical Master Clock System or for a "secondary" clock used with an ES-150 (Automatic Master Clock "Switcher").

Features:

- **ESE** Time Code Output
- AM/PM Indicator (12 Hr Mode Only)
- 6-Digit .56" LED Display
- Simple Installation & Operation
- Auto DST Correction
- External Sync Input
- 1 PPS Output
- Optional Rack Mount Enclosure
- Optional 4-Hour Battery Back-Up
- Time and Date



ES-192U



ES-192UP



LX-192U

The **LX-192U** (12 Hour) and the **LX-194U** (24 Hour) are mounted in the "LX-" Series enclosure. This sleek design is engineered with the "high-tech" studio or editing suite in mind. The all aluminum enclosure is black texture coated and certain to fit perfectly into any environment where form as well as function is an issue.

The **ES-192U** (12 Hour) and the **ES-194U** (24 Hour) are housed in a black desk mount enclosure. Options 'P' (Rack Mount) and 'Q' (Console Mount) are available with the "ES-" models. And when the Rack Mount is specified, an optional battery back-up is also available.

The accuracy of these units is dependent entirely upon the power company's line frequency, an external sync input or the optional crystal time base. Time is set via two setting controls (Set and Select).

Specifications

Electrical: 117 VAC, 50/60 Hz

Power: 8 Watts Maximum

Mechanical: Desk Mount (LX-), 8" W x 1.7" H x 6" D
Desk Mount (ES-), 8" W x 2.8" H x 6" D

Displays: Six Digits, Yellow LED, .56" High

Accuracy: Dependent upon Line Frequency
Option 'C': ~2-3 Seconds per Week

Outputs: 1 PPS: TTL, 80/20% Duty Cycle

ESE Time Code (TC90): drives 100 Slaves @ 4000'

Options: BBU, C, D, HR, J, P, P2, Q, RS, UL



MODEM INTERFACE MASTER CLOCK / TIME CODE GENERATOR

The **ES-181U** is a Master Clock that receives updated time information via an internally mounted modem. The unit supplies time information to the user in a variety of forms, including the nine-digit yellow LED display (Julian Day, Hours, Minutes and Seconds). Time codes available via rear-mounted connectors are SMPTE/EBU, ASCII (RS-232C), IRIG-B and **ESE** (TC89 or TC90). The unit also outputs two "1 PPS" signals (one "positive" and one "negative") and an "External Reference Input" is also provided that allows the clock's time base to be referenced to that of either a 10 MHz or a 5 MHz source (10 MHz is default).

Software is also supplied with the **ES-181U** permitting the user to select SMPTE mode (DF, NDF, EBU & Real Time), offset the Time Zone, input the time & date (when not locked), modify dates for Daylight Saving Time, set for 12 or 24 hour display and advance or delay the time output for various synchronizing purposes.

Features:

- SMPTE-LTC/EBU, IRIG-B, ASCII & **ESE** Time Code Outputs
- Auto Update Via Modem From USNO
- Optional 10 MHz & 1 KHz Outputs
- Automatic Re-dial
- Auto Daylight Savings Time



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
Accuracy: +/-50ms of UTC (after update)
Drift: One Second per Month (without Update)
Video Input: RS-170A Composite Video/Blackburst-1 Vpp, 75Ω
Reference Input: (10 MHz or 5 MHz), 500mVpp, 75Ω
Modem: TinyModem™ 300 to 56kbps

Outputs: 1 PPS: TTL, 50% Duty Cycle
 IRIG-B: 3 Vpp (mark amplitude), 600Ω
ESE Time Code: drives 100 Slaves @ 4000'
 SMPTE: 600Ω Balanced or Unbalanced
 RS-232C: ASCII Date & Time @ 9600 Baud,
 8 Data, No Parity, 1 Stop
Battery: 4-Hour Back-Up of CPU
 (displays are blank)
Options: DC, HR, J, UL

"DIGITAL" TIME & DATE DISPLAY

ESE offers two different size displays of the Digital Clock/Calendar displays. The **ES-126U** is a twelve-digit Time Code Reader (**ESE**-TC90, ASCII, SMPTE or EBU) that displays six digits (Hours, Minutes & Seconds) of time and six digits (Month, Day & Year or optionally Day, Month & Year) of date. The displays are .56" high yellow LEDs and the unit is mounted in a 1 3/4" Rack Mount enclosure. The **ES-127U** is identical to the **ES-126U** except that it has 1.0" high LED displays and its Rack Mount enclosure is 3 1/2" high.

Features:

- Perfect Synchronization With Master
- Long-Life Yellow LED Displays
- Optional Time Zone Offset
- Reads **ESE**, ASCII, SMPTE-LTC or EBU Time Code
- Rack Mount Enclosure



ES-126U



ES-127U

These units are designed to read the serial data from any Master Clock, Converter or Calendar that has a **ESE**-TC90 Time Code output (properly formatted ASCII, SMPTE-LTC or EBU can also be read by either unit). TC90 contains time and date data and is available on the ES-101, ES-102U, ES-103U, ES-160E, ES-181U, ES-185E, ES-188E, ES-192U/194U, ES-195 & ES-206U. All other **ESE** Master Clocks are capable of driving either the **ES-126U** or **ES-127U** only if an ES-195 (Master Calendar) is used to convert their code (TC76 or TC89) into TC90 time code. (Masters with TC76 time code must be in 24 hour format.)

Specifications

ES-126U
Input: **ESE** TC90, ASCII, SMPTE-LTC or EBU
Electrical: 117 VAC, 50/60 Hz, 10 W
Mechanical: 1.75" x 19" Rack Mount 10" Deep
Displays: 12 digits, .56" High Yellow LED (20' Viewing Distance)
Options: Black, **ESE**, J, TZ(DIP), UL, W

ES-127U
Input: **ESE** TC90, ASCII, SMPTE-LTC or EBU
Electrical: 117 VAC, 50/60 Hz, 10 W
Mechanical: 3.5" x 19" Rack Mount 10" Deep
Displays: 12 digits, 1.0" High Yellow LED (35' Viewing Distance)
Options: Black, Blue, **ESE**, Green, J, Red, TZ(DIP), UL, W



TIME CODE READERS

These six-digit (or four-digit) displays are designed to be "Universal" Time Code Readers. All models described below are able to auto-detect, read and display SMPTE-LTC,EBU, **ESE** (TC76™, TC89™ or TC90™), ASCII (format A, 0 or 1 @ 9600 baud; RS-232C, RS-422A or RS-485). Optionally NTP-C or NTP-C/PoE may be specified.

Setup Features allow the unit to display time in either 12 or 24 hour format and if reading **ESE** Time Code to display "Date" information and if reading SMPTE/EBU to display "User Bits". An Error Detection and Correction Feature maintains flicker-free operation in the event of poor quality or loss of time code. An Error Detection Indicator is also included and the Error Correction Feature may be turned-off via an internal DIP switch.

Several Options are available with "U" Series Readers. LED color options of Amber, Blue, Green and Red can be specified on the .56", 1", 2", 4" and 7" units. Option "TZ" allows the unit to be "offset" to other time zones via an internal set of DIP switches. **ESE** and ASCII (RS-232C) time code outputs are also optionally available. Most units are available with a rack mount enclosure, option "P". Other options are listed below.

Each Reader requires only a single pair of wires (or coax) between itself and the Master Clock (or other source of time code). The wiring arrangement can be parallel, serial or both. Please note that extra long cable runs may require a Distribution/Isolation Amplifier, refer to page 15 (ES-243) for more information.

Features:

- Reads SMPTE/EBU, ASCII or **ESE** Time Code
- Error Detection & Correction
- Optional Time Zone Offset
- Optional **ESE**, & RS-232C Time Code Outputs
- Display Date or Time
- 0.4" To 7.0" Display Sizes
- 12/24 Hour Format
- Simple Installation & "Hands-Off" Operation
- Long-Life LED Displays
- Desk Top, Console, Wall & Rack Mount Enclosures
- Perfect Synchronization With Master Clock



SPECIFICATIONS

| Model Number | Description | Viewing Distance | Time Code Input | Options |
|--------------|--|------------------|-----------------------|---|
| ES-171U | 6-digit, 0.4" Red LED in Console mount enclosure | 10' | ESE, SMPTE/EBU | J, V, UL, W |
| LX-161U | 6-digit, .56" Amber LED in "LX-" enclosure | 20' | ESE, SMPTE/EBU, ASCII | J, RS, TZ, UL |
| ES-161U | 6-digit, .56" Amber LED in Desk mount enclosure | 20' | ESE, SMPTE/EBU, ASCII | ESE , J, NTP-C, NTP-C/PoE, P, P2, PoE, Q, RS, TZ, UL |
| LX-166U | 6-digit, 1.0" Amber* LED in "LX-" enclosure | 35' | ESE, SMPTE/EBU, ASCII | J, RS, TZ, UL |
| ES-166U | 6-digit, 1.0" Amber* LED in Desk mount enclosure | 35' | ESE, SMPTE/EBU, ASCII | ESE , J, NTP-C, NTP-C/PoE, P, P2, PoE, Q, RS, TZ, UL, Wall |
| LX-991U | 4-digit (Hr, Min), 2.3" Amber* LED in "LX-" enclosure | 70' | ESE, SMPTE/EBU, ASCII | J, NTP-C, NTP-C/PoE, PoE, TZ, UL |
| ES-991U | 4-digit (Hr, Min), 2.3" Amber* LED in Desk mount enclosure | 70' | ESE, SMPTE/EBU, ASCII | J, NTP-C, NTP-C/PoE, P, PoE, TZ, UL, Wall |
| LX-993U | 6-digit, 2.3" (1" Sec) Amber* LED in "LX-" enclosure | 70' | ESE, SMPTE/EBU, ASCII | J, TZ, UL |
| ES-993U | 6-digit, 2.3" (1" Sec) Amber* LED in Wall mount enclosure | 70' | ESE, SMPTE/EBU, ASCII | J, P, TZ, UL, W |
| ES-996U | 6-digit, 2.3" Red* LED in Wall mount enclosure | 70' | ESE, SMPTE/EBU, ASCII | CW, J, NTP-C, NTP-C/PoE, P, PoE, TZ, UL, W |
| ES-941U | 4-digit (Hr, Min), 4.0" Red* LED in Wall mount enclosure | 120' | ESE, SMPTE/EBU, ASCII | J, NTP-C, NTP-C/PoE, PoE, TZ, UL, W |
| ES-943U | 6-digit, 4.0" Red* LED in Wall mount enclosure | 120' | ESE, SMPTE/EBU, ASCII | J, NTP-C, NTP-C/PoE, PoE, TZ, UL, W |
| ES-971 | 4-digit (Hr, Min), 7.0" Red* LED in Wall mount enclosure | 250' | ESE, SMPTE/EBU, ASCII | CW, NTP-C, NTP-C/PoE, PoE, TZ, UL, W |
| ES-976 | 6-digit, 7.0" Red* LED in Wall mount enclosure | 250' | ESE, SMPTE/EBU, ASCII | CW, NTP-C, NTP-C/PoE, PoE, TZ, UL, W |

*Amber, Blue, Green or Red LED display color can be specified, Amber not available on ES-971 or ES-976

| Display | Power | Electrical | Enclosure Style | Dimensions |
|-----------|------------|----------------------|--|---------------------------|
| 0.4" LED: | 5 Watts | 117 VAC, 50/60 Hz | 0.4" - Console: Black ABS Plastic | 2.2" H x 4.5" W x 4.5" D |
| .56" LED: | 5 Watts | 117 VAC, 50/60 Hz | .56" - LX: Black Texture (High-Tech) | 1.7" H x 8" W x 6" D |
| 1.0" LED: | 5 Watts | 117 VAC, 50/60 Hz | .56" - Desk: Black Plastic / Aluminum | 2.8" H x 8" W x 6" D |
| 2.3" LED: | 8-10 Watts | 117 VAC, 50/60 Hz | 1.0" - LX: Black Texture (High-Tech) | 3.5" H x 10" W x 6" D |
| 4.0" LED: | 8-10 Watts | 117 VAC, 50/60 Hz | 1.0" - Desk: Black Plastic/ Aluminum | 5.5" H x 10.4" W x 6.6" D |
| 7.0" LED: | 20 Watts | 90-264 VAC, 50/60 Hz | 2.3" - LX: Black Texture (High-Tech) | 3.5" H x 12" W x 6" D |
| | | | 2.3" 4-digit Desk: Black Plastic/ Aluminum | 5.5" H x 10.4" W x 6.6" D |
| | | | 2.3" 6-digit Wall: Black Textured Aluminum | 5" H x 12" W x 3.5" D |
| | | | 2.3" 6-digit Wall: Black Textured Aluminum | 5" H x 15" W x 3.5" D |
| | | | 4.0" 4-digit Wall: Black Textured Aluminum | 7" H x 19" W x 3.5" D |
| | | | 4.0" 6-digit Wall: Black Textured Aluminum | 7" H x 26" W x 3.5" D |
| | | | 7.0" 4-digit Wall: Black Textured Aluminum | 9" H x 29" W x 3.5" D |
| | | | 7.0" 6-digit Wall: Black Textured Aluminum | 9" H x 43" W x 3.5" D |

SELF-SETTING 5", 12" & 16" ANALOG CLOCKS

The **LX-5105U**, **LX-5112U** and **LX-5116U** 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 BNC connector auto-detects and displays time as received from a source of SMPTE-LTC/EBU, **ESE** or ASCII time code (IRIG-B or NTP inputs are 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" or "Step" mode.

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, provided the Master Clock automatically adjusts itself accordingly.

Features:

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



Specifications

- Power:** 5 Watts Maximum (15 Watts with Light option)
- Electrical:** 90-264 VAC, 47-63 Hz
- Mechanical:** Desk Mount (LX-5105U); Wall Mount (LX-5112U & LX-5116U)
- Dimensions:** LX-5105U: 6.95" High x 8.73" Wide x 3.45" Deep;
LX-5112U: 13.95" x 13.95" x 3.45" Deep;
LX-5116U: 17.45" x 17.45" x 3.45" Deep
- Inputs:** SMPTE/EBU: 10k Ω , Balanced or Unbalanced, 100mVpp to 10 Vpp;
ESE: TC76, TC89 or TC90, 120k Ω , Unbalanced;
ASCII: 120k Ω , Unbalanced;
- Battery:** Coin Cell, Maintains CPU for up to 8 years
- Viewing Distance:** 20, 60 & 80 feet, respectively
- Options:** IRIG, Light, NTP-C*, NTP-C/PoE*, P, P2, PoE*, UL

*option not available on the LX-5105U



SELF-SETTING DIGITAL / ANALOG CLOCK

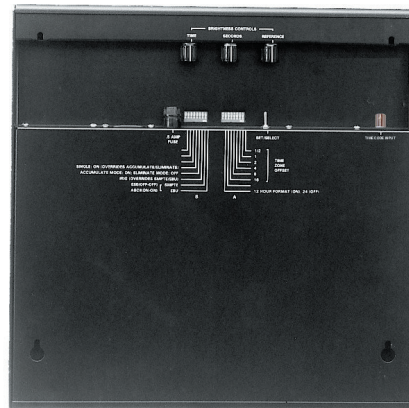
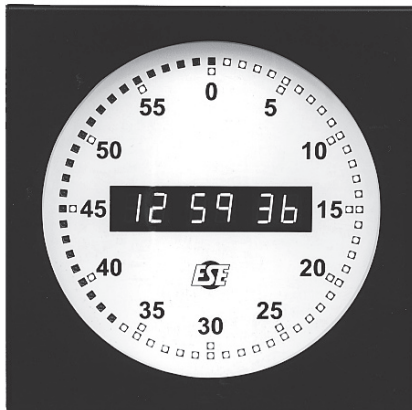
The **LX-5212U** is a 12" Digital / Analog Clock. The unit is designed to read and display time as received from most any source of time code. Alternatively, the clock may be manually set and operated in stand-alone mode. Six 1" high LEDs display hours, minutes and seconds. Simultaneously, 60 discrete LEDs simulate the "analog" sweep of the Second Hand. Twelve other discrete LEDs, located around the dial at 5-second increments, stay lit continuously and serve as reference indicators. Three Brightness controls allow the intensity of the three "sets" of LEDs to be set independently.

The unit accepts several types of input data: SMPTE-LTC/EBU time code, IRIG-B (optional) time code, **ESE** Time Code (or **ESE** "Timer" Code) or ASCII time code on a rear mounted BNC connector. If the time code source should fail, the decimal point located between hours and tens of minutes flashes to alert you of the failure, and the clock will continue to keep time using its internal crystal.

The LED Second Hand may be configured in any one of three modes (Accumulate, Eliminate and Single) and is switchable on-the-fly. If receiving 24 hour format time code (or 12 hour format with an AM/PM bit), the unit may be configured for 12 or 24 hour format. The **LX-5212U** also provides a Time-Zone offset feature that adds a selected number of hours to the incoming time code value.

Features:

- Reads **ESE**, ASCII, EBU Or SMPTE-LTC Time Code
- 12 Hour & 24 Hour Modes
- Error Indicator
- Trailing, Leading And Single "Second-Hand" Modes
- Also Able To Read **ESE** "Timer" Code
- Stand - Alone & Reader Modes
- Self Setting
- Completely Silent
- 12" Dial
- Three Separate Brightness Controls
- Simple Installation & "Hands-Off" Operation
- Various Options
- Time Zone Offset
- Amber, Blue, Green or Red Digital Display



LX-5212U can also receive "Timer" code from any **ESE** "Up" or "Up/Down" Timer (with or without tenths of seconds) and display Timer information with Second-Hand fully operational. When counting "Down", a minus sign "-" appears to the left of the minutes display. If displaying tenths of seconds, the minus sign is omitted.

Specifying NTP-C allows the **LX-5212U** to be synced with an NTP Server, if the ability to pass electrical power over the ethernet connection is desired option PoE is also available. Optional rack-mounting side flanges may be specified as well as an external UL-approved wall-mount transformer; when this option is ordered, the usual AC line & internal transformer are eliminated.

Specifications

Inputs: SMPTE / EBU: 10k Ω , Balanced Or Unbalanced, 100mVpp to 10 Vpp
ESE / ASCII: 120k Ω , Unbalanced, **ESE** Time (Timer) Code or RS-232C ASCII
 IRIG-B: Impedance: 25K Ω Minimum; Mark Amplitude: 10 Vpp Maximum, 0.3 Vpp Minimum;
 Mark To Space Ratio: 3:1 Nominal

ESE Format: **ESE** "TC89" or "TC90"

ASCII Format: 9600 Baud, 8 Data, No Parity, 1 Stop HHMMSS<CR>
 (HH=Hours MM=Minutes SS=Seconds <CR> = Carriage Return)

Power Required: 90-264 VAC, 47-63 Hz, 15 Watts Max.

Mechanical: 13.95" H x 13.95" W x 3.45" D, Wall Mount Enclosure; 11.5" Diameter Face

Options: Blue, Green, IRIG-B, J, NTP-C, NTP-C/PoE, P, PoE, Red, UL



ANALOG VIDEO INSERTER SERIES

The **LX-266U** series is a family of Reader/Video Inserters which decode ESE or SMPTE timecode via a single BNC connector and superimpose the data upon a video signal(s) looped through the unit.

Models in the **LX-266U** series are available with one channel up to twelve channels.

Features

- Wide Range (100mVPP-5 VPP) AGC Input
- Multiple Mask Selection
- On-Screen Programming
- Automatic Error Detection and Correction
- Vertical and Horizontal Size & Position Controls
- Operates With NTSC or PAL Video
- Superimposed or Keyed Video Characters
- Brightness Control



The on-screen programming in setting the **LX-266U** could never be easier. Settings include Size, Position, Brightness, 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.

SPECIFICATIONS

| | |
|---|---|
| Power: 2-25 (/11-/12) Watts Max | Enclosure: 1.75" x 19" Rack Mount, 10" Deep (LX-266U/1, /2, /3, /4) |
| Electrical: 90-264 VAC, 47-63 Hz | 3.50" x 19" Rack Mount, 10" Deep (LX-266U/5, /6, /7, /8, /9, /10, /11, /12) |
| Video Connectors: 2-BNC (per channel) | ESE/SMPTE Time Code Input: 1-BNC (per unit) |
| Display: 12 Digits Keyed or Superimposed | Options: DC, SV, Text-USB, Text-Net, UL |

The **ES-266U** is a Video Time and Date Inserter which receives and decodes either **ESE** or SMPTE Time Code (selectable via an internal DIP switch). Six digits of Time (Hr, Min, Sec) and six digits of Date (Month, Day, Year) are then superimposed onto a video signal looped-thru the unit.

On-screen menus allow adjustment of the **ES-266U**

display Size and Position, Mask Mode (black background on/off and transparent or solid display), Display Mode (side-by-side / stack / time only / date only), 12/24 Hour mode, and Time Zone offset. The brightness of the characters and background may be individually set via front-panel controls. Two BNC video outputs are provided. An RS-232 interface & Windows® Control Panel software are included.



SPECIFICATIONS

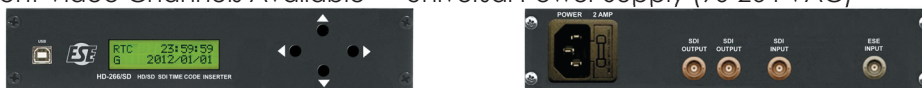
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|--------------------------------------|--|
| Electrical: 117 VAC, 50/60 Hz | Mechanical: 1.75" x 19" Rack Mount, 10" Deep |
| Power: 7 Watts Maximum | Input: Any ESE Time Code (TC76 must be 24 Hr) |
| | Options: Black, D, DC, J, L2, L4, P2, R, SV, UL |

HD/SD SDI VIDEO TIME & DATE INSERTER

The **HD-266/SD/1** is an HD & SD Time code driven Time & Date Video Inserter. The unit reads ESE Time Code, SMPTE/EBU LTC, D-VITC or RP-188 and synchronizes its internal real-time clock to the time code reference. The time is inserted onto an SDI video signal. 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, Date, Time & Date and/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).

Features

- Automatically detects SD or HD Format
- Inserts Time & Date onto SDI Video Signal
- Two Independent Character Windows
- Reads ESE, SMPTE/EBU, D-VITC & RP-188
- LCD Status & Setup Display
- Accepts All Common HD & SD SDI Signals
- Ability to display Timer data from ESE Time code signal
- 1 to 6 Independent Video Channels Available
- Universal Power Supply (90-264 VAC)



The unit is easily configured using the front panel controls or the front panel mounted USB port with the supplied PC software. The **HD-266/SD/1** may be ordered with up to six independent video channels.

SPECIFICATIONS

| | |
|--|---|
| Power: 90-264 VAC, 47 - 63 Hz, 20 Watts maximum | Time Code Input: ESE Time or Timer Code |
| Mechanical: Desktop Enclosure 1.6" H x 8" W x 6.7" D | SMPTE (100 mV - 10 Vpp; 10k ohm input impedance, unbalanced), |
| Time & Setup/Status Display: 16 x 2 character LCD | DVITC, RP-188 |
| Options: DC, P, P2, UL, /2, /3, /4, /5, /6 | |

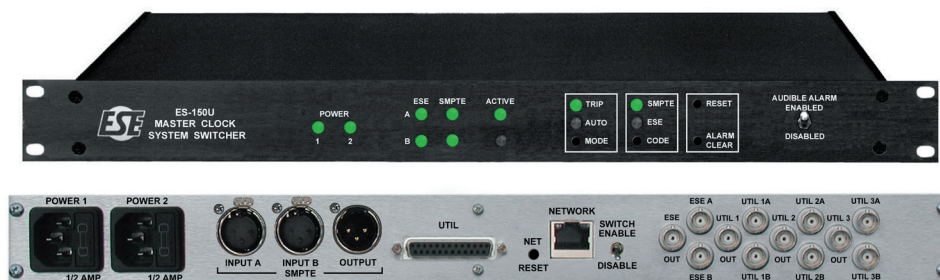


MASTER CLOCK SYSTEM SWITCHERS

The **ES-150U** and **ES-151U** 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. These units monitor one or two Primary Clock (A) inputs and if a fault is detected, the **ES-150U** or **ES-151U** automatically switches to the Back-up Clock (B). Front panel mounted LEDs indicate Mode and Input/Output status. The **ES-150U** has two actively switched time code inputs: SMPTE/EBU LTC and **ESE**. The **ES-151U** also has two active time code inputs: IRIG (A, B, or E)-AM and IRIG (A, B, or E)-TTL.

Features

- Automatic Time Code Switchover
- Simple Installation & Operation
- Rack Mount Enclosure
- Universal Power Supply (90-264 VAC)
- LED Status Indicators
- Various Options Available



ES-150U Rear Shown with options DPS and NET.

The **ES-150U** provides active switchover inputs and outputs for SMPTE/EBU LTC and **ESE** time code. Alternatively, the **ES-151U** provides IRIG-A, IRIG-B and IRIG-E instead of SMPTE/EBU and **ESE**. Other time codes and reference signals can be passively switched using either the three I/O circuits available on BNC connectors or the five I/O circuits available on the DB-25 Connector. These can be used for different signals such as IRIG, 10 MHz, 1 kHz and 1 PPS. The units can be set to operate in one of four modes: 1) all outputs use the primary 'A' inputs, 2) all outputs use the secondary 'B' inputs, 3) Auto mode which switches all outputs over to the 'B' inputs if a fault is detected and then automatically return to the primary 'A' inputs after they are determined to be valid again and 4) Trip mode which will have all outputs switch over to the 'B' inputs if a fault is detected but the units will not switch back to the 'A' inputs until the reset button is pushed.

Notable options include option DPS which provides a second power supply in the event one power supply fails and option NET which allows the user to control and monitor the status of the unit via a web page.



ES-151U Rear Shown with options DPS and NET.

SPECIFICATIONS

ES-150U

- Electrical:** 90-264 VAC, 47-63 Hz
Power: 60 Watts Maximum
Mechanical: 1.75" x 19" Rack Mount, 10" Deep
Active Time Code I/O: ESE, BNC Connectors
 SMPTE/EBU, XLR Connectors
Passive Time Code I/O: 3, BNC Connectors
 5, DB-25 Connector
Options: Clear, DPS, NET, UL

ES-151U

- 90-264 VAC, 47-63 Hz
 60 Watts Maximum
 1.75" x 19" Rack Mount, 10" Deep
 IRIG-A, IRIG-B, IRIG-E, AM /TTL, BNC Connectors
 -
 3, BNC Connectors
 5, DB-25 Connector
 Clear, DPS, NET, UL

TIME CODE ISOLATION & DISTRIBUTION AMPLIFIERS

Since the early '80s, **ESE**'s Audio and Video Distribution Amplifiers have been recognized for their broadcast 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, SMPTE/EBU 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.



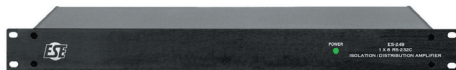
ES-243
Quad 1x6 ESE DA (or IRIG-'TTL')

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. The unit is rack mounted.



ES-245
Quad 1x6 SMPTE/EBU DA

The **ES-245** is a Distribution Amplifier designed to distribute and isolate most any audio signal including SMPTE and EBU time code. Four channels, each with six outputs, provide up to 24 identical copies. Inputs and outputs are available on the rear mounted terminal blocks (optional XLR connectors are available). The unit is rack mounted.



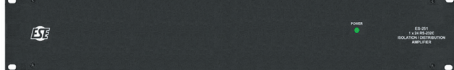
ES-249
1x8 RS-232C/ASCII DA

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-243 | ES-245 | ES-249 | ES-250 | ES-251 |
|-----------------------|------------------------|------------------------------------|----------------------|----------------------|-----------------------|-----------------------|
| Electrical: | 110-120 VAC, 50/60 Hz | 117 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 | 2 Watts Maximum | 5 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, | ESE (TC76, TC89 or TC90) or | SMPTE/EBU (balanced | SMPTE/EBU (balanced | ASCII (RS-232C) | ASCII (RS-232C) |
| Input/Output: | 1 Vpp nominal, 50 ohm | IRIG (A, B or E) In AM Form | or un-balanced) | - | - | - |
| Connectors: | BNC | BNC | Terminal Block | 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 | Black, J, UL, XLR | J, UL | J, UL | J, UL |



TIME CODE CONVERTERS

All too often communication between various equipment is impossible due to a "language barrier". When time information must be shared, a Time Code Converter (Translator) may be a very simple solution. With more than a dozen "standard" Time Code Converters (and at least that many "Custom" Time Code Converter products), **ESE** is certain to offer a solution to any language barrier.

Described below are several Time Code Converters that have solved many Time Code "communication" problems. If a problem exists that is not addressed in this brochure, please contact the **ESE** factory for a simple solution to your "communication" needs.

Features:

- Translate SMPTE/EBU, NPR, NTP, **ESE**, ASCII & IRIG
- Optional 220 VAC and/or "UL" Operation
- Simple Installation & "Hands-Off" Operation
- Synchronization Of Automation Equipment

| Model Number | Translates Time Code | | Digital Display |
|----------------|--|---|-----------------------|
| | From | Into | |
| ES-56 | SMPTE/EBU, ESE (TC76, TC89 or TC90) | PC compatible interface | No |
| ES-71 | SMPTE/EBU, ESE (TC76, TC89 or TC90) | PC compatible interface | No |
| LX/ES-161U/NPR | NPR (SOSS) | ESE (TC90) | Yes (.56" Yellow LED) |
| LX/ES-161U/RS | ESE (TC76, TC89 or TC90) | ASCII (formats '0', '1' or 'A') | Yes (.56" Yellow LED) |
| ES-198 | NTP | ESE (TC90) | Yes (.56" Yellow LED) |
| ES-223 | ESE (TC90) | IRIG (B & E) & ASCII (RS-232C & RS-485) | No |
| ES-225A | ESE (TC76, TC89 or TC90) | ASCII (RS-232C & RS-485) | No |
| ES-226 | ASCII (formats '0' or '1') | ESE (TC90) & (IRIG-B or IRIG-E) | No |
| ES-267 | LTC | VITC | No |
| ES-269 | VITC | LTC | No |
| ES-274U | IRIG-B | SMPTE/EBU | No |
| LX/ES-453U/ESE | SMPTE/EBU | ESE (TC89) | Yes (.56" Yellow LED) |
| LX/ES-453U/RS | SMPTE/EBU | ASCII (formats '0', '1' or 'A') | Yes (.56" Yellow LED) |
| ES-462U | ESE (TC76, TC89 or TC90) | SMPTE/EBU | No |

| Model Number | Enclosure | Applications |
|----------------|---------------------------|--|
| ES-56 | Black ABS plastic dongle | Interface existing Time Code Equipment with Computer |
| ES-71 | Black ABS plastic dongle | Interface existing Time Code Equipment with Computer |
| LX/ES-161U/NPR | LX or ES (desk top) | NPR Radio Code (SOSS) can drive ESE Clock System |
| LX/ES-161U/RS | LX or ES (desk top) | Interface ESE Clock System with Computer |
| ES-198 | Black Anodized Rack Mount | NTP referenced Time Code Generator can drive ESE Clock System |
| ES-223 | Clear Anodized Rack Mount | Synchronize Voice & Data Loggers with ESE Master, TZ Option |
| ES-225A | Black Anodized Desk Top | Interface ESE Clock System with Computer |
| ES-226 | Black Anodized Desk Top | Synchronize ESE Slaves, Voice & Data Loggers from "ASCII" Master Clock |
| ES-267 | Black Anodized Desk Top | Convert Longitudinal Time Code (LTC) to Vertical Interval Time Code (VITC) |
| ES-269 | Black Anodized Desk Top | Convert Vertical Interval Time Code (VITC) to Longitudinal Time Code (LTC) |
| ES-274U | Black Anodized Rack Mount | Stripe (for editing) Video Tape previously encoded with IRIG-B |
| LX/ES-453U/ESE | LX or ES (desk top) | Interface non- ESE Master System (outputting SMPTE) with ESE Equipment |
| LX/ES-453U/RS | LX or ES (desk top) | Interface existing SMPTE/EBU with Computer System |
| ES-462U | Black Anodized Rack Mount | Interface older ESE Master Clocks with SMPTE/EBU equipment |

NOTE: Due to space limitations, not all features, options and specifications are described above. Contact the **ESE** Factory for more detailed information.



GPS BASED FREQUENCY STANDARD

The **ES-110** and **ES-410** generate a stable source of 10 MHz and 1 PPS using GPS satellites as a reference. The units provide 10 MHz in both Sine Wave and Square Wave (5 volt logic) form. The **ES-110** provides two 10MHz outputs (1-Sine & 1-Square), the **ES-410** produces eight 10MHz outputs (4-Sine & 4-Square). Each unit also provides a 1 PPS output that is a 50% duty, 5 volt logic signal, 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 Code, 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 page15).

Features

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



ES-110 Rear



ES-410 Rear



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

Accuracy: 1×10^{-8}
GPS Receiver: Internal 12-Channel
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

TIME CODE TO USB CONVERTERS

ESE's "TCUSB" line of Time Code to USB converters offers a simple and quick solution for synchronizing a computer to your existing time code equipment. When a serial port or a PCI slot for a Time Code Card is not available or these solutions are undesirable, an **ESE** "TCUSB" is the ideal alternative.

Features

- Error Detect and Correction (Switchable)
- DIP Switch/Software Configuration
- Time Sync Software Provided
- Dongle measures 5" L x 1.2" W x 1" H
- Powered via USB Interface
- USB Interface Cable Included (2')
- Linux Real Time Mode

ES-56

Edit Code



The **ES-56** converts SMPTE/EBU LTC code or **ESE** Time Code to a USB interface. The device is powered by the USB interface and may be used for computer time synchronization or for obtaining LTC data for editing purposes (when using SMPTE/EBU). The unit features five modes of operation which may be selected by DIP switch or by software: **ESE** Time Code, LTC Forward/Reverse with Frames, or LTC Real Time with 3 selectable date formats (**ESE**, Leitch or SMPTE 309M).

ES-71

Real Time



The **ES-71** converts SMPTE/EBU LTC code or **ESE** Time Code to a USB interface. The device is powered by the USB interface and is intended for computer time synchronization. The unit features four modes of operation which may be selected by DIP switch or by software: **ESE** Time Code, or LTC Real Time with 3 selectable date formats (**ESE**, Leitch or SMPTE 309M).



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 IPv4/IPv6 NTP Time Servers offer a perfect solution for providing accurate and synchronized time throughout a network. The concept is as simple as plugging the Server into the network, configuring the unit and allowing any client to request "highly accurate" time from the NTP Time Server.

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
- IPv4/IPv6 10/100BaseT - NTP Data Port (RJ-45)
- Rugged Desktop Enclosure
- **ESE** Time Code Output



Applications

- Telephone & Radio Dispatch Time Stamps
- Manufacturing Process Control
- Broadcast Facilities
- Financial Institutions
- Securities Exchanges
- Military Installations
- Digital Signatures

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. The **ES-289E** accepts either SMPTE/EBU time code (must include Date data) or **ESE** Time Code™, while the **ES-299E** references either IRIG (A,B or E) or NASA 36. Designed to accept ASCII time code, the **ES-911E/NTP** accepts any of the formats that follow: NENA (Format "1"), **ESE** (Format "A"), or NMEA 0183, and also accepts **ESE** (TC-90).

All four units include an **ESE** Time Code™ output which is capable of driving up to 100 **ESE** Slave Clocks at a distance of up to 4000 feet. A rear mounted DB-9 connector allows access to the GPS / Time Code Lock status output. All configuration is accomplished via the 10/100BaseT network connection (RJ-45).

Specifications

- I/O Connection:** IPv4/IPv6 Network: 10/100BaseT Ethernet, RJ-45
- Outputs:** **ESE** Time Code™ TC89 or TC90, Drives 100 Slaves @ 4000', BNC
- GPS Receiver:** Internal 12-Channel (**ES-104E** only)
- Antenna:** Indoor/Outdoor with 16' Cable (**ES-104E** only)
- Antenna Input:** L1, 1.57542 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): NENA (format "1"), **ESE** ("A"), or NMEA 0183 (GPRMC), DB-9
 - ESE** (TC-90) via BNC
- 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



TIME CODE COMPARATORS

The ES-700 Series is a family of programmable event controllers that provide a number of contact closure outputs at predetermined times. These controllers allow the user to automate multiple events with simple programming.

Features:

- Reads & Compares **ESE** Time Code
- PC Programmable
- Custom Modifications Available
- Easily Expanded
- Simple Installation & Programming For "Hands-Off" Operation



ES-716

The **ES-716** is an **ESE** & SMPTE/EBU Time Code Comparator. The unit reads Hours, Minutes and Seconds and compares Hours and Minutes (jumperable to Minutes and Seconds) and includes two contact closure outputs. The two event times are set using the front panel thumbwheel switches. The duration of each contact closure output is one second and may be disabled if desired by using a rear-mounted toggle switch.

Each event activates a one second internal audible alarm which may be disabled via a rear-mounted toggle switch.

ES-737

The **ES-737** is an **ESE** time code comparator. The ES-737 reads TC89 and TC90 Time Code. The unit compares the Day, Hours, Minutes and Seconds when reading TC90 time code (Hours, Minutes and Seconds when reading TC89 time code). Up to 100 events are possible, with up to 10 relay contact closure outputs. Each event may be assigned to the desired output. Programming is accessible on the front panel keypad entry system.

Each event activates a one second internal audible alarm which may be disabled via a rear-mounted toggle switch.

ES-747

The **ES-747** is a PC programmable **ESE** Time Code Comparator. The unit reads and compares Hours, Minutes & Seconds and includes up to 100 programmable events via up to 10 relay contact closure outputs. Each event may be assigned to the desired output. Software is provided to program the event times and relays. A USB port is located on the rear panel to interface with a PC.

Each event activates a one second internal audible alarm which may be disabled via a rear-mounted toggle switch.

*Various models are available in the ES-700 series from Time Code Readers (ESE, SMPTE/EBU & IRIG) to Stand-Alone Clocks and Elapsed Timers with Thumbwheel, Keypad or PC Interface programmability. Please contact the **ESE** factory for more detailed information.

SPECIFICATIONS

| | ES-716 | ES-737 | ES-747 |
|----------------------|-----------------------|-----------------------|-----------------------|
| Time Code: | ESE & SMPTE/EBU | ESE (TC89 & TC90) | ESE (TC89 & TC90) |
| Input Level: | 100 mVPP to 10 VPP | CMOS Compatible | 100 mVPP to 10 VPP |
| Impedance: | 2kΩ | 2kΩ | 2kΩ |
| Relays: | 2 Reed | 10 Reed | 10 Reed |
| Relay Rating: | 10 W @ 500 mA | 10 W @ 500 mA | 10 W @ 500 mA |
| Mechanical: | 1.75" x 19", 10" Deep | 3.5" x 19", 10" Deep | 1.75" x 19", 10" Deep |
| Electrical: | 110-120 VAC, 60 Hz | 110-120 VAC, 60 Hz | 110-120 VAC, 60 Hz |
| Power: | 15 Watts | 15 Watts | 15 Watts |
| Options: | BBU, DC, J, UL | BBU, DC, J, Relay, UL | BBU, DC, J, NTP, 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 List 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.

| | | | |
|-------------------|---|------------------|---|
| Amber | Amber Display: Replaces standard colored LEDs with Amber LEDs. | NTP6 | NTP Server: Provides an NTP Server. Allows for synchronization of computer networks and LAN control. IPv6 Compatible. |
| Ant | GPS Antenna: High Performance GPS Antenna for harsh RF Environments. | NTP-C | NTP Client: Provides an NTP Client Display. Allows for synchronization with an NTP server. |
| B | Parallel BCD Output: Provides a Parallel BCD (CMOS Compatible) output. ES-169B may be substituted when option "B" is not available. | NTP6-C | NTP Client: Provides an NTP Client Display. Allows for synchronization with an NTP server. IPv6 Compatible. |
| BBU | Battery Back-Up: An internal battery with built-in charger is supplied. | P | 19" Front Panel (Rack Mount): Designed for mounting into a standard equipment rack. Panel is 1/8" clear or black anodized Aluminum and chassis is 5" - 10" deep. |
| Black | Black Anodized Front Panel: Available on most rack mount units. | P2 | Dual Rack Mount: Allows specific units to be mounted side-by-side on a single Rack Mount panel. |
| Blue | Blue Display: Replaces standard colored LEDs with Blue LEDs. | PoE | Power over Ethernet: Provides the ability to pass electrical power over Ethernet. |
| C | Crystal Timebase: A .002% crystal is employed for those applications requiring independence from the line frequency. A trimmer is included for greater accuracy (2-3 seconds/week). | Q | Console Mount: The unit is housed in an enclosure 8" deep, front panel is 3.5" x 9". |
| CW | Ceiling / Wall Mount Bracket: A ceiling/wall mount bracket is supplied allowing mounting to a ceiling or wall. | R | Remote Input: Rear-mounted connector for Remote Control. |
| D | Remote Control: This option provides a connector wired to switches on a control plate via a six foot cable. Extra cable available. | Red | Red Display: Replaces standard colored LEDs with Red LEDs. |
| DC | DC Power: Unit is operated exclusively from an external "DC" supply (+11 to +35 VDC is required). | RS | RS-232C Output: An RS-232C ASCII Computer Interface is supplied (RS-422A can alternatively be specified). |
| DPS | Dual Power Supply: Provides a second power supply, if one power supply fails, the other automatically provides power. | SMPTE/EBU | SMPTE(or EBU) Time Code: SMPTE or EBU time code outputs may be specified (not available with IRIG) |
| EBU | EBU Time Code: The unit is configured to read and/or output EBU Time Code instead of SMPTE. | SV | S-VHS Connectors: S-VHS connectors are provided and the unit becomes S-VHS compatible. |
| ESE | ESE Time Code Output: An ESE Time Code output (TC90) is provided allowing the unit to drive ESE Time Code Slaves. | Text-Net | Text Insertion: Text Insertion of up to 3 lines and up to 30 characters per line via Ethernet input & USB input. |
| Green | Green Display: Replaces standard colored LEDs with Green LEDs. | Text-USB | Text Insertion: Text Insertion of up to 3 lines and up to 30 characters per line via USB input. |
| HR | Hour & 1/2 Hour Relay Closure: A contact closure occurs each hour and 1/2 hour (1/2 hour can be defeated). | TZ | Time Zone Offset: Internal DIP switch allows the hours (and half-hour) to be independently offset to any time zone. |
| IRIG(5100) | IRIG-B Time Code Input: Allows the unit to synchronize with a source of IRIG-B. | UL | UL Power Supply: The unit is supplied with a UL/CSA approved wall mount power supply. |
| IRIG-B | IRIG-B Time Code Output: Provides an IRIG-B time code output. | W | 3-Wire Power Cord: Recommended where static charges can occur. Standard on many units, otherwise a 2-wire cord is supplied. |
| IRIG-E | IRIG-E Time Code Output: Provides an IRIG-E time code output. | Wall | Wall Mount Enclosure: Black powder-coated enclosure replaces standard housing. |
| J | 220 VAC, 50/60 Hz Operation: Required on many overseas applications. | XLR | XLR Connectors: The rear mounted terminal block is replaced with XLR connectors (the chassis is 3 1/2" high). |
| K | Precision Frequency Outputs: 10 MHz and 1 KHz Outputs are provided. | 1pps | One Pulse Per Second: A TTL Pulse is output once per second. |
| L2 | Two Additional Video Input/Output Sets: Available on most Video Inserters. | 6-Digit | 6-Digit Display: A 6-digit (Hr, Min, Sec) front panel mounted display (.56" LED) is included |
| L4 | Four Additional Video Input/Output Sets: Available on most Video Inserters. | 9-Digit | 9-Digit Display: A 9-digit (Days, Hr, Min, Sec) front panel mounted display (.56" LED) is included. |
| Light | Lighted Dial: Available only on LX-5100 Series Analog Clocks. The dial of the clock can be illuminated. A brightness control is included. | 10ηS | 10ηS Accuracy: The accuracy of the unit is improved to 10ηS. |
| NET | Network Control: Provides user ability to control and monitor status via a webpage interface. | | |
| NPR | National Public Radio: The NPR option on the LX/ES-161U provides a NPR time code input allowing the unit to read & display time code as received from NPR and includes an ESE time code output. The NPR option on the ES-188 provides an NPR time code output. | | |

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 of purchase. Before returning goods, please write or call for shipping instructions.

