

# ES-450SP

## 9-Pin Machine Controller



Users Manual

**J/COOPER ELECTRONICS**

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*ES-450SP User's Manual, Third Edition*

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*142 Arena Street, El Segundo, CA 90245 USA*

*+1 (310) 322 9990*

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# Description

The ES-450SP is a self-contained machine controller for professional and semi-professional VTRs, audio decks and computer based editing systems that support the industry standard Sony 9-pin protocol. This is also known as Sony “P2” or RS-422 protocol.

ES-450SP features include:

- Timecode display
- Sony-type Jog/Shuttle wheel
- Transport control
- Frame Bump forward and reverse
- Seven Locate points
- Remote Track arming
- Direct timecode entry
- Support for 24/25/29.97/30 frames per second
- Support for Drop and non-Drop timecode
- Support for VITC/LTC and CTL Timecode

## **Setting up the ES-450SP**

The ES-450SP can operate in either of two modes: as a stand-alone master controller for VTRs and decks that respond to the Sony 9-pin protocol or, as a slave device meant to be attached to a host that directly supports the ES-450SP. See your system documentation for details. As shipped from the factory, the ES-450SP is normally configured as a deck controller.

### ***Controlling a Machine***

As a deck controller the ES-450SP requires little in the way of setup to use it with a VTR or audio deck.

1. Connect the 9-pin D-sub connector from the rear of the ES-450SP to your machine or computer.
2. Connect the supplied power supply to the end of the cable attached to the ES-450SP
3. Select Frame Rate by pressing SHIFT + EJECT

Your machine must be set for remote operation. Please consult your Operators Manual for details.

### ***Using with a Host Computer***

Using the ES-450SP with a host computer requires the unit to be changed to slave mode. To do so, you will need the following tools: a 5/64" hex wrench, and a small flat-blade screwdriver.

1. Remove the four Allen screws from the front panel.
2. Carefully remove the front panel from the bottom chassis.
3. On the small circuit board, remove the 8-pin IC, which is inserted into U3 "To Mach." socket, and move it to the "To Host" socket. Make sure orientation is preserved.
4. Remove the jumper JB1.  
(In case the unit might be changed back in the future, you can re-plug in the jumper to only on pin of JB1.)
5. Reassemble the front panel to the bottom chassis.

# Configuration

Before using the ES-450SP, we recommend setting it up for the various ways you may need to use it in.

## ***Step Mode***

This setting is used to set how the ES-450SP performs the Frame+1 and Frame-1 operations. This determines how the ES-450SP behaves at whole second boundaries. This is toggled by pressing SHIFT+STOP. The two options are:

- **Cue Up Step Mode** (Default)  
This configures the ES-450SP to send a Cue Up with Data command when the Frame+1 (or Frame-1) button is pressed. This essentially commands the machine to locate to the next frame (or previous frame).
- **SloMo Step Mode**  
This configures the ES-450SP to send a Shuttle command when the Frame+1 (or Frame-1) button is pressed. This essentially commands the machine to shuttle forward (or reverse) until the next frame (or previous frame) is encountered.

## ***Frame Rate***

This setting is used to set the frame rate used in Frame+1 and Frame-1 calculations. This is done by pressing SHIFT + EJECT. This will switch between the following frame rates:

- **24** (Film)
- **25** (PAL)
- **30** (NTSC)

## **Track Arming Mode**

This determines how the audio track arming is handled. This is toggled by pressing SHIFT+R-PLAY. The options are:

- **Type 1 (Default)**

Older decks with 2 analog tracks.

A1 = Analog Audio 1 (This is sometimes interpreted as Digital Audio 1 in some decks)

A2 = Analog Audio 2 (This is sometimes interpreted as Digital Audio 2 in some decks)

Shift + A1 = Analog Audio 3 (TC in some decks)

Shift + A2 = Analog Audio 4 (Sync in some decks)

- **Type 2**

Sends a 2 byte track arm message with the A1 & A2 bits copied from the D1 & D2 bits. Tally back uses byte 5 of the Status message.

A1 = Analog Audio 1 and Digital Audio 1

A2 = Analog Audio 2 and Digital Audio 2

Shift + A1 = Digital Audio 3

Shift + A2 = Digital Audio 4

- **Type 3**

Same as Type 2, except Tally back uses the Edit Preset Sense message.

A1 = Analog Audio 1 and Digital Audio 1

A2 = Analog Audio 2 and Digital Audio 2

Shift + A1 = Digital Audio 3

Shift + A2 = Digital Audio 4

- **Type 4**

Same as Type 2, except the A1 & A2 bits are set to zero.

A1 = Digital Audio 1

A2 = Digital Audio 2

Shift + A1 = Digital Audio 3

Shift + A2 = Digital Audio 4

## ***Timecode Select***

This sets the timecode that the ES-450SP displays in its timecode window. This is toggled by pressing SHIFT+FFWD. The options are:

- **VITC/LTC Timecode**
- **CTL Timecode**

## ***CTL Timecode Reset***

The ES-450 can reset the CTL timecode. This is done by pressing SHIFT+REWIND.



## Controls

The ES-450SP was laid out in an ergonomic manner. It was designed to be used by left- or right-handed operators. With the operators hand resting on the JOG/SHUTTLE WHEEL, the most commonly used transport buttons are in easy reach.

### ***Jog/Shuttle Wheel***

The JOG/SHUTTLE WHEEL has two modes. The mode can be changed by simply pressing the wheel.

In the *Shuttle Mode*, the wheel has a detent in the center and at the two extreme positions. In the center position, The ES-450SP places the machine into *Shuttle Still* or *Pause* mode. As the wheel is turned clockwise, the machine will start shuttling forward. Conversely, as the wheel turned counterclockwise, the machine will start shuttling in the reverse direction. The two arrow LEDs indicate the direction the tape is moving. When both arrow LEDs are illuminated, the machine is in *Shuttle Still* or *Pause* mode. Below are typical shuttle speeds from the center detent to the extreme ends of rotation:

Still 1/8x 1/4x 1/2x 3/4x 1x 1 1/4x 1 1/2x 2x 3x 4x 5x 6x 10x 13x 16x

In the *Jog Mode*, the wheel turns freely without any detents or stops. Turning the wheel clockwise moves the tape forward. While turning the wheel counterclockwise moves the tape in the reverse direction. The two arrow LEDs indicate the direction the tape is moving. When the Jog wheel is not being turned, both arrow LEDs will be off indicating that the machine is in *Jog Still* or *Pause* mode.

### ***Transport Controls***

The Transport Controls are positioned above the JOG/SHUTTLE WHEEL. These functions include: STOP, PLAY, REVERSE

PLAY, FAST FORWARD and REWIND. Additionally, there is an EJECT button in the upper left hand corner of the front panel.

Typically, pressing the STOP button places the machine into *Still* or *Pause* mode so the operator can view the image on tape. Pressing FAST FORWARD and REWIND place the machine into *Shuttle Forward* and *Shuttle Reverse* respectively. These functions may be implemented differently in your machine or editing software.

## **Track Arming**

Above the Transport Controls are the Track Arming buttons, which select tracks to be overwritten when the machine is placed in *Record*. Pressing the ASM button will place the machine in to *Assemble* mode where the video and audio tracks are written. To insert new material over existing material, the *Insert* mode is used. To initiate *Insert* mode, press the INS button and any tracks you wish to record.

LEDs above the Track Arming buttons indicate the tracks that are armed or being recorded on.

*Record* is initiated by pressing REC/SHIFT and F-PLAY.

## **Editing Controls**

Located around the JOG/SHUTTLE WHEEL are the Editing Controls. At the top center just above the JOG/SHUTTLE WHEEL is the SHUTTLE SELECT button. The SHUTTLE SELECT button allows the machine to return to a shuttle operation after it has been interrupted by a *Stop*, *Frame+1*, *Frame-1* or *Goto* command. The direction arrows indicate the direction of the pending shuttle. In *Jog* mode, this button has no effect.

On either side of the SHUTTLE SELECT button are the FRAME+1 and FRAME-1 buttons. Pressing either of these buttons will move or *bump* the tape forward or backwards one frame. This is performed by using the timecode returned to the

ES-450SP by the machine. The frame rate must be set for this function to operate properly. To set the frame rate, press SHIFT + EJECT. This setting is stored in nonvolatile memory.

There are two ways to perform this based on the ballistics of the controlled deck: “Cue Up” mode and “Slo Mo” mode. These can be selected by pressing SHIFT + STOP. This setting is also stored in nonvolatile memory.

The default method is “Cue Up” mode. In this mode, the ES-450SP sends a Locate command that is incremented or decremented by one frame. This works well for hard disk based systems and newer decks.

The alternate method is “Slo Mo” mode. In this mode, the ES-450SP sends a shuttle slow command in the appropriate direction. The ES-450SP sends a STILL command when the machine responds with timecode that is incremented or decremented by one frame. This is better suited for older decks that have trouble with locating a short distance.

Note:

*If the machine does not use the timecode it sends out of the remote connector as the locate reference, the machine will locate to the wrong point. An example of this would be a machine that sends VITC timecode to the remote, but uses LTC to locate.*

MARK IN and MARK OUT buttons send *Mark In* and *Mark Out* commands to the machine. These are used to set points used in *Preview* and *Autoedit* operations.

The PREVIEW button sends a *Preview* command to the machine. This allows the operator to preview an edit. Typically, this command causes the machine to perform the following actions:

1. Locate to the *Mark In* point minus the pre roll
2. Enter *Play* mode

3. Switch to input monitor at the *Mark In* point
4. Revert to tape monitor at the *Mark Out* point
5. Stop the tape at the *Mark Out* point plus the post roll

The AUTOEDIT button sends an *Auto Edit* command. This allows the operator to perform an edit with frame accuracy. Typically, this command causes the machine to perform the following actions:

1. Locate to the *Mark In* point minus the preroll
2. Enter *Record Ready* mode
3. Switch to *Record* mode at the *Mark In* point
4. Revert to *Record Ready* mode at the *Mark Out* point
5. Stop the tape at the *Mark Out* point plus the postroll

## **Timecode Window**

The Timecode Window displays the timecode that the machine sends via the 9-pin interface. This is usually the longitudinal timecode of the media. Some machines will send timecode derived from VITC, a dedicated timecode track or the control track. The timecode is displayed in hours:minutes:seconds:frames format. Drop frame timecode is indicated by a small dot or period between “LTC” and the hours field.

TC= 01:25:36:12

Non-Drop frame timecode

TC=.01:25:36:12

Drop frame timecode

The Timecode Window can also display the control track counter or CTL timecode. This is toggled by pressing SHIFT+FFWD. The ES-450 can reset the CTL timecode. This is done by pressing SHIFT+REWIND.

CT= 01:25:36:12

CTL timecode

## ***Locate Functions***

The ES-450SP can store up to seven locate points internally. These locate points are stored as long as the unit is powered.

The locate buttons are secondary functions of the Editing Controls. The locate buttons are identified in the following table:

Mark In	Locate 1
Preview	Locate 2
Frame-1	Locate 3
Shuttle Select	Locate 4
Frame+1	Locate 5
Autoedit	Locate 6
Mark Out	Locate 7

Locate points are set by pressing and holding REC/SHIFT then the desired locate button. Locate points are recalled by pressing GOTO then the desired locate button. Locate points are stored in memory as long as the unit is powered.

## ***Direct Numeric Entry***

The ES-450SP can also command the machine to locate to an arbitrary timecode position. This is initiated by pressing the GOTO button. The display will show:

GoTo	:	:	:
------	---	---	---

Using the Transport and Track Arming Buttons, key in the desired timecode then press ENTER. The machine will immediately go to the entered timecode.

*Note: The ES-450SP does not check for the validity of the entered timecode. It merely passes the entered timecode to the deck. This can cause unpredictable results if an invalid timecode is entered.*

*This can occur in a few instances:*

- 1. An hour, minute or second value that doesn't exist.*

*Example: 00:00:73:00*

- 2. A frame greater than the current frame rate is entered.*

*Example: In 24fps mode, entering 00:00:00:29*

- 3. In Drop Frame operation, a dropped frame is entered.*

*Example: 00:12:00:00.*

# Technical Reference

## ***Electrical Interface***

The ES-450SP uses the EIA RS-422A protocol over a 9 pin D-Sub connector. The pinout is listed in the table below:

1	Ground
2	Receive A
3	Transmit B
4	Ground (Transmit)
5	not used
6	Ground (Receive)
7	Receive B
8	Transmit A
9	Ground

The ES-450SP sends data at 38.4 kbits/sec. The data format is 1 start bit, 8 data bits, 1 stop bit and 1 parity bit. The parity is odd. That is, the sum of the data bits and the parity bit is an odd number.

$$D7 + D6 + D5 + D4 + D3 + D2 + D1 + D0 + P = \text{odd number}$$

## ***Command Reference***

When the ES-450SP is powered up, the unit constantly queries the deck for timecode and status:

## ***Troubleshooting***

If for some reason the ES-450SP does not give you the expected results, take a moment to do some investigating. The most important concept is that you have your ES-450SP connected properly as outlined in *Setting up the ES-450SP*. Take a minute to double check this setup.

Double check with the manufacturer of the deck you are controlling to see if an external controller is supported. As long as your cable connections are setup properly, everything should be working.

Make sure your machine is set to "Remote" and not "Local" control. This will insure that your ES-450SP is communicating with your machine.

## ***Care and Service***

If properly cared for, your ES-450SP should provide years of troublefree performance. Avoid dropping the ES-450SP or banging hard on the controls.

Clean with a soft, damp cloth. Do not allow liquids to get inside the unit.

There are no user-serviceable parts in the ES-450SP. Please refer to the JLCooper Electronics Limited Factory Warranty for detailed warranty and service information.



## **JLCooper Electronics Limited Factory Warranty**

JLCooper Electronics ("JLCooper") warrants this product to be free of defects in materials or workmanship for a period of 12 months from the date of purchase. This warranty is non-transferable and the benefits apply to the original owner. Proof of purchase in the form of an itemized sales receipt is required for warranty coverage. To receive service under this warranty, customers in the United States should contact the JLCooper factory at (310) 322-9990 and talk to a service technician. If necessary, a Return Authorization number may be issued. For our customers outside the United States, it is recommended that you first contact your Dealer or Distributor, since they may offer their own service or support policy. If local support is not obtainable, please send a FAX to JLCooper's Service Department at +1 310 335 0110 with a detailed description of the service required. Upon issuance of return authorization, the product should be properly packed and shipped to: Service Department, JLCooper Electronics, 142 Arena Street, El Segundo, CA 90245. Please include the following: copy of the sales receipt, your name and address (no P.O. Boxes, please), a brief description of the problem, and any other related items discussed with the service department and considered necessary to evaluate the product or effect a repair. The return authorization number must be clearly written on the outside of the package. JLCooper will at its option, without charge for parts or labor, either repair or replace the defective part(s). Shipping costs are not covered by this warranty. JLCooper's normal repair turn around time at the factory is approximately 15 business days from receipt of product to shipping. Your actual turn around time will include return shipping. Actual turn around time will vary depending upon many factors including the repeatability of the customer's reported complaint, the availability of parts required for repair, the availability of related products needed to evaluate the product if necessary. Priority services are available at additional cost. These should be discussed with the service technician at the time the return authorization is issued. This warranty provides only the benefits specified and does not cover defects or repairs needed as result of acts beyond the control of JLCooper including but not limited to: abuse, damage by accident/negligence, modification, alteration, improper use, unauthorized servicing, tampering, or failure to operate in accordance with the procedures outlined in the owner's manual; nor for natural or man-made events such as, but not limited to flooding, lightning, tornadoes, earthquake, fire, civil unrest, war, etc.

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