LYNX VSI EDITOR INTERFACE MODULE

OPERATING MANUAL

For Firmware Version: V404-42
(V-322 manual plus addendum)
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SUBJECT: Lynx VSI Module Operation Manual addendum, firmware version **V404-42**

Effective this date, TimeLine has released a version of firmware for the Lynx VSI Module, designated **V404-42**. While this firmware version was developed primarily for use with the Lynx Keyboard Control Unit, it should also be fully compatible with a variety of video and audio editing systems using the Lynx VSI Module as a transport interface device. This module firmware version is specifically required when firmware version KCU-0.68 or later is installed in the Lynx Keyboard Control Unit.

Please report any problems and direct any comments or questions to Fred Ridder at TimeLine.

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RESOLVED SPEED PLAY MODE

A fundamental change in the V404-42 firmware version is that the VSI Module now resolves the Play speed of the tape transport whenever the module is Online regardless of how the Play mode is initiated. This function was implemented primarily to allow slave machines in a Lynx KCU system to synchronize normally with master transport that is being operated from its own controls or from an external controller such as an audio console automation computer.

Previously the VSI Module would only resolve the transport's capstan speed when the module had received a Play command from the controller or editor via the RS422 serial bus. Under all other conditions, including when the transport was put into Play from its own control panel, the transport would operate in a fixed speed mode.

With V404-42, once the module is Online and has received a Stop command from the controller it will always resolve the play speed of the transport and lock it to the video reference as if it had been put into Play from the controller regardless of where the Play command actually originated. This is indicated visually on the module by the RESOLVE and LOCK indicators lighting up. In addition, the module will actually report its Play status back to the controller and the Play pushbutton on the KCU will also light.

NOTE: If you need to operate a transport under local control in a non-resolved mode (i.e. fixed speed or internal varispeed mode), it is important to switch the VSI Module Offline in addition to switching the transport's speed mode. Running a transport in an internally-controlled speed mode while the module is Online is likely to "confuse" the module so that it runs the transport at an odd speed when you return the transport to external speed mode.

PLAY TALLY REQUIREMENT

With V404-42 the VSI Module automatically recognizes when a transport is in Play mode and reports that status back to the controller as it resolves the speed of the transport. This means that it is generally not necessary to connect the transport's Play tally signal to the module.

The Play mode status reporting will occur more quickly, however, if the VSI Module does receive Play tally signal from the transport.

Existing Lynx Transport Control Cables do not connect to the transport's Play tally. (This facility will be added to most cable models in future production runs, however.) If you will frequently be operating with a locally controlled Master transport (rather than running from the Lynx controller) you may wish to connect the Play tally to improve the speed of operation. Please contact TimeLine for details.

IMPORTANT NOTE: In order for Sony PCM-3324 and PCM-3348 transports to operate properly under V404-38 it is essential for the transport Play tally to be connected to the module. Existing "PCM-3324" Transport Control Cables with serial numbers below #2972 must be modified for proper operation. Please contact TimeLine for information.

"WILD SPEED" (UNRESOLVED) OPERATING MODE

The V404-42 firmware version supports a "Wild Speed" mode which can be selected on a module-by-module basis from the external controller or editor. This mode allows any tape transport to be operated from the external controller in a non-resolved mode (i.e. not locked to the external video reference). In other words, the VSI Module returns speed control to the transport itself while continuing to send mode commands to it.

Wild Speed mode is indicated on the individual module by a flashing ONLINE light.

The Wild Speed mode facilitates the use of the controller as a basic transport remote control for timecode striping operations. It also makes it possible to play a tape that has no timecode stripe or to operate (but not synchronize) a transport that is in varispeed mode.

Note that firmware version KCU-0.67 or later is required in the Lynx Keyboard Control Unit to initiate Wild Speed mode. A transport running in Wild Speed mode is indicated in the KCU's status display by ">W" rather than ">L".

NOTE: Some transport models must be manually switched from External to Internal mode in order to run at the proper speed in Wild Speed mode. This most notably includes the Otari MTR-10 and MTR-12, both Series I and Series II.

AUTOMATIC DETECTION OF VIDEO REFERENCE TYPE (NTSC or PAL)

When fitted with **V404-38** firmware, the Lynx VSI Module automatically detects the type of video reference signal supplied to it on power-up and sets itself for 29.97 frame (NTSC) or 25 frame (PAL) operation as appropriate. While it is making this determination, the module's window displays "u id dEt". If no valid video reference signal is connected to the module during the power-up sequence, the module will not function and it will continue to display this message until a suitable video reference signal is applied.

The frequency tolerance for the detection routine is ± 0.25%, which should allow the Lynx Module to accept as a valid reference a monochrome (60 Hz) video signal as well as a normal NTSC color (59.94 Hz) signal.

Many previous versions of VSI firmware were dedicated to either NTSC or PAL operation, and generally had either an "N" or a "P" as part of their version number.

ADDITIONAL TRANSPORT MENU SELECTIONS

A number of additional selections have been added to the Transport Menu in the V404 firmware series. Contact TimeLine as necessary for information regarding transport interface cables for any of these machines.

`dr-1200` Setting for the Akai DR1200 12-track digital cartridge recorder.

`uPr-3` Serial interface setting for the Ampex VPR-3 1" VTR. Requires installation of Serial Interface Board (included with the "Serial Transport Control Kit" or "Sony BVH-2000" interface) in the Lynx Module.

`uPr-6` Serial interface setting for the Ampex VPR-6 1" VTR. Requires installation of Serial Interface Board (included with the "Serial Transport Control Kit" or "Sony BVH-2000" interface) in the Lynx Module.

`uPr-80` Serial interface setting for the Ampex VPR-80 1" VTR. Requires installation of Serial Interface Board (included with the "Serial Transport Control Kit" or "Sony BVH-2000" interface) in the Lynx Module.

`dEn-3603` Setting for the Denon DN-3603 RA.

`FoS-d20` Preliminary setting for the Fostex D-20 R-DAT recorder. This setting does not release the transport to self-resolve its speed. (Uses "Fostex E-Series" Transport Control Cable.)

`FoS-E16` Setting for Fostex E-series machines including the E-16 and E-8 multitracks, and the E-2 and E-22 center-channel timecode machines. (Uses "Fostex E-Series" Transport Control Cable.)

`J-610` Setting for the JVC BR-S610 Super-VHS (S-VHS) Recorder/Player. (Uses "JVC Type B" or "JVC 8600" Transport Control Cable. Minor modification to cable may be necessary for Edit mode control; contact TimeLine for details.)

`J-810` Setting for the JVC BR-S810 Super-VHS (S-VHS) Editing Recorder. (Uses "JVC Type B" or "JVC 8600" Transport Control Cable. Minor modification to cable may be necessary for Edit mode control; contact TimeLine for details.)

`J-8600-E` Setting for the JVC BR-8600E VHS Editing Recorder and related machines. Note that this setting is for the European version of the machine; use the standard "`J-8600`" setting for the American BR-8600U and related models. (Uses "JVC Type B" or "JVC 8600" Transport Control Cable.)

`Otr-55` Setting for the Otari MX-55 series. (Uses "Otari Type A" or "MTR-20" Transport Control Cable.)

`Otr-70-L` Setting for the 1" video layback version of the Otari MX-70. This setting assumes the use of Otari's "pre-scaler" box, which converts the standard 9.6 kHz capstan control frequency to produce the correct longitudinal speed for 1"

video tape (9.61 ips), but which does not correspondingly alter the frequency of the tape tachometer signal. (The Otari pre-scaler box uses an "MTR-90-2" Transport Control Cable rather than the"Otari Type A" or "MTR 10/12-2" cable that would normally be used with the MX-70.)

`Otr90-2L` Setting for the 1" video layback version of the Otari MTR-90 Series II. This setting assumes the use of Otari's "pre-scaler" box, which converts the standard 9.6 kHz capstan control frequency to produce the correct longitudinal speed for 1" video tape (9.61 ips), but which does not correspondingly alter the frequency of the tape tachometer signal. (Uses standard "MTR-90-2" Transport Control Cable.)

`Otr90-2u` Alternate setting for the Otari MTR-90 Series II multitrack. Uses the MTR-90's provision for external voltage control of the fast-wind speed to control the transport's deceleration in shuttle (GoTo) mode rather than decelerating by toggling the Rewind and Fast Forward commands.

NOTE: Existing "MTR-90-2" Transport Control Cables do not provide the necessary connections for voltage-controlled search. Contact TimeLine for details on cable modification. New "MTR-90-2" cables with serial numbers above #2201 are already properly configured for voltage-controlled search.

`Otr-100` Setting for the Otari MTR-100 multitrack recorder. (Uses "Otari Type A" or "MTR 20" Transport Control Cable.)

`Otr-100u` Alternate setting for the Otari MTR-100 multitrack recorder implementing voltage-controlled search and locate operations. Minor transport modification required for optimum shuttle performance. (Uses modified "Otari Type A" or "MTR 20" Transport Control Cable; contact TimeLine for modification details.)

`Otr900-A` "Normal sync" setting for the Otari DTR-900 digital multitrack. (Uses "Otari Type A" or "MTR-20" Transport Control Cable.)

`Otr900-d` Alternate "digital dubbing" setting for the Otari DTR-900 digital multitrack. This setting achieves a very tight lock between a pair of digital machines and then releases the Slave allow it to resolve to the "Word Clock" signal from the Master. This provides accurate phase alignment when dubbing individual digital tracks between machines, but may cause longer lock-up times.

`SAturn` Setting for the Saturn 824 (a.k.a. Soundcraft Saturn) multitrack recorder.

`3324-A` Third setting for the Sony PCM-3324 is a non-release setting to allow vari-speed synchronization when using the VSU-3310 Vari Sync Unit. Note that the transport's logic prohibits entering Record mode when operating in external varispeed mode.

NOTE: For the Sony PCM-3324 to operate properly under V404-42 it is <u>essential</u> that the Play tally be connected to the module. Existing "PCM-3324" Transport Control Cables with serial numbers below 2972 <u>must be modified</u> for proper operation. Please contact TimeLine for information.

3348
3348-A
3348-d

Three settings for the new Sony PCM-3348 48-track digital recorder.

"3348" is the normal synchronization setting which releases the 3348 to self-resolve to an external video reference signal at 0 subframes of offset error.

"3348-A" is a non-release setting to allow vari-speed synchronization. Note that the transport's logic normally prohibits entering the Record mode when operating in external varispeed mode.

"3348-d" is a special setting for digital dubbing applications. This setting achieves a very tight lock between a pair of digital machines before releasing the Slave. This provides accurate phase alignment between tracks when dubbing individual digital tracks between machines, but the "tight" lock criterion may cause lock-up times that are longer than normal.

(All three setting use the "PCM-3324" Transport Control Cable.)

NOTE: For the Sony PCM-3348 to operate properly under V404-40 it is essential that the Play tally be connected to the module. Existing "PCM-3324" Transport Control Cables with serial numbers below 2972 must be modified for proper operation. Please contact TimeLine for information.

3402-A

"Normal sync" setting for the Sony PCM-3402 DASH 2-track. Should also work with the PCM-3202. (Uses "Sony Type A" Transport Control Cable.)

3402-d

Alternate "digital dubbing" setting for the Sony DASH 2-track machines. Achieves a tighter lock than the "normal sync" setting and then releases the Slave to self-resolve. This preserves the phase alignment when dubbing between machines, but may cause longer lock-up times.

NOTE: For proper operation of the Sony PCM-3402 on either Lynx Module menu setting, "Memory Position 91" in the Sony must be set to "0", and the "Program TC" switch on the MCK board must be set to "ON".

APr-24

Setting for the new Sony APR-24 analog multitrack recorder. (Uses "Sony Type A" or "APR-24" Transport Control Cable. "APR-24" cable required for implementation of Rehearse mode.)

APr-5000

Setting for the Sony APR-5000 analog recorder series including the APR-5003. (Uses "Sony Type A" Transport Control Cable.)

buU-PAr

Parallel interface setting for Sony BVU-800 series U-matic machines (i.e. BVU-800, BVU-820, BVU-850, BVU-870). Also works with some BVW series machines (e.g. BVW-10 and BVW-40). (Uses "BVU-800" Transport Control Cable.)

NOTE: Parallel interface to BVU machines is not recommended for use with the Lynx Keyboard Control Unit.

buU800-S

Serial interface setting for Sony BVU-800 series machines (i.e. BVU-800, BVU-820, BVU-850, BVU-870). Also works with some BVW series machines (e.g. BVW-15). Requires installation of Serial Interface Board (included with the "Serial Transport Control Kit" or "Sony BVH-2000" interface) in the Lynx Module.

bvU-950 Serial interface setting for newer Sony BVU-series machines, specifically the BVU-950. Requires installation of Serial Interface Board (included with the "Serial Transport Control Kit" or "Sony BVH-2000" interface) in the Lynx Module.

SPECIAL NOTE: Early units of the Sony BVU-950 had a design flaw in the frame servo circuit which caused slow or erratic frame syncing after the Shuttle mode has been used. Sony is aware of this problem and all Sony Service Centers should have service bulletins on how to correct the problem.

d4000-S Serial interface setting for the Sony DMR-4000 Digital Audio recorder (U-matic cassette format). Requires installation of Serial Interface Board (included with the "Serial Transport Control Kit" or "Sony BVH-2000" interface) in the Lynx Module.

StEL-td9 Setting for the Stellavox TD-9.

A-807 Setting for the Studer A807. (Uses "Studer Type A" or "A-810" Transport Control Cable.)

A-812 Setting for the Studer A812. (Uses "Studer Type A" or "A-810" Transport Control Cable.)

A-820-L Setting for the Studer A820-MCH multichannel recorder when the transport is set for the LOW tachometer rate. (J3 on the Tape Deck Counter/Timer PCB in Position "B" produces 32 pulses/second at 15 ips.)
Note that this setting is not a direct equivalent for any A820 settings that appeared in earlier V404-series firmware versions since all previous settings assumed the high tach rate from the transport. (Uses "Studer Type A" or "A-810" Transport Control Cable.)

A-820-H Setting for the Studer A820-MCH multichannel recorder when the transport is set for the HIGH tachometer rate. (J3 on the Tape Deck Counter/Timer PCB in Position "A" produces 512 pulses/second at 15 ips.)
Note that this setting directly replaces the various A820 multitrack settings that appeared in earlier V404-series firmware versions. (Uses "Studer Type A" or "A-810" Transport Control Cable.)

NOTE: Both Studer A820-MCH settings require the latest release version of Studer firmware, which is designated "2089". Please contact your Studer representative if you do not have the "2089" firmware version in your machine.

NOTE: Both A820-MCH settings were optimized at a transport wind speed setting of 10.0 and may exhibit some overshoot if a wind speed setting higher than 12.0 is used.

tASC-60 Setting for Tascam's ATR-60 series and the MS-16. Parameters for this setting are identical to the "tASC-40" setting except for the punch-in and punch-out logic. This setting may benefit from some user adjustment of the "SPd" parameter to optimize cuing performance with particular transports. (Uses "Tascam 40" or "Tascam Type A" Transport Control Cable. "Tascam

Type A" cable is required for implementation of Rehearse function with ATR-60 multitrack versions.)

A complete listing of the Transport Menu for the **V404-42** firmware is included at the end of this documentation.

REVISED TRANSPORT MENU ORGANIZATION

Due to the ever-growing number of choices available in the Lynx Module, the Transport Selection Menu has been re-organized as a hierarchical or tree-structured menu. Rather than stepping sequentially through then entire transport menu, the [•FORW•] and [•BACK•] keys now step through an alphabetical list of transport manufacturers, and the [↑] and [↓] keys then step through an alphabetical listing of transport models under the selected manufacturer. The complete structure of the Transport Selection Menu is summarized in the following chart:

← [•BACK•] key — [•FORW•] key →

AEG	AKAI	AMPEX	DENON	FOSTEX	JVC	3M	MITSUBISHI	OTARI	SATURN	SONY	STELLAVOX	STUDER	TASCAM
AE9-20	dr-1200	Atr-100	dEn-3603	FoS-d20	J-610	79	850-A	Otr10-1	SAturn	3324	StEL-td9	A-80-16	tASC-40
		Atr-124		FoS-E16	J-810		850-d	Otr10-2		3324-A		A-80-18	tASC-50
		Atr-1200			J-850			Otr12-1		3324-d		A-800-1	tASC-60
		uPr-3			J-8250			Otr12-2		3348		A-800-3	
		uPr-6			J-8600			Otr-20		3348-A		A-807	
		uPr-80			J-8600-E			Otr-55		3348-d		A-810	
								Otr-70		3402-A		A-812	
								Otr-70-L		3402-d		A-820	
								Otr90-1		5850		A-820-H	
								Otr90-2		APr-24		A-820-L	
								Otr90-2L		APr-5000			
								Otr90-2u		buU-PAr			
								Otr-100		buU800-S			
								Otr-100u		buU-950			
								Otr900-A		buH-2000			
								Otr900-d		d4000-S			
								5050-3		JH-24			
										JH-114			

REVISED SIGN-ON MESSAGE

The sign-on message (seen whenever the Lynx Module is switched on) now sequentially displays the following information:

1) Lynx version (i.e. "U404-42")
2) Current Transport Menu selection (e.g. "Otr90-2")
3) Current serial address number (e.g. "Addr 001")
4) Current value of the Sync parameter (e.g. "Sync 000")

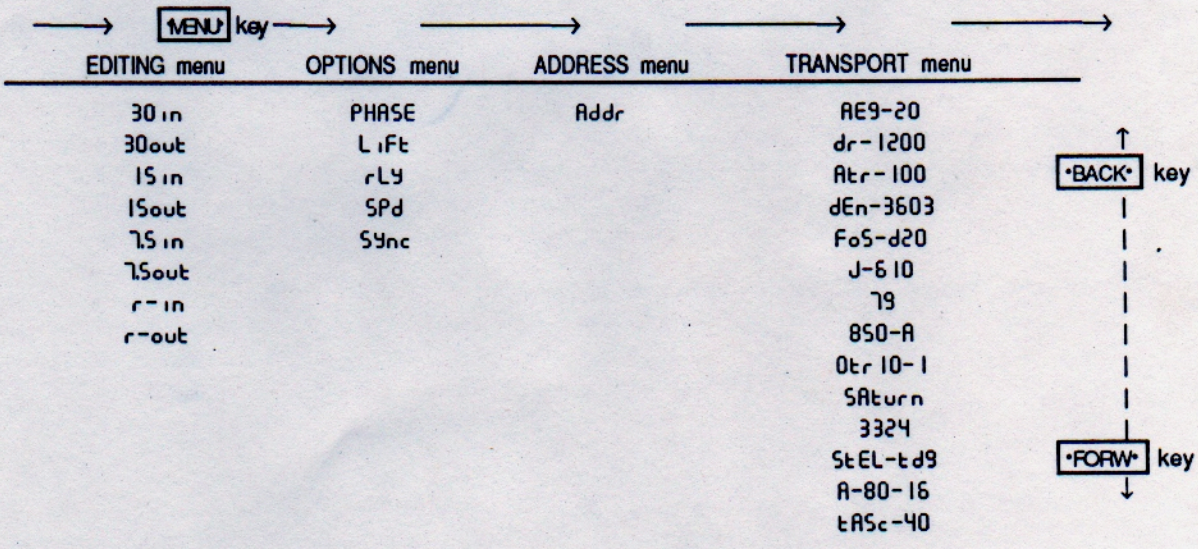
The module will then display "Uid dEt", and then after a few seconds either "ntSc" or "PAL" if there is a suitable video reference signal connected. If there is no video reference signal being supplied to the module, the "Uid dEt" message will remain in the window and the module will not operate.

If the [•SET UP•] key is held down while the power switch is turned on, the existing set-up data will be erased from the non-volatile memory and the module will be ready to be re-initialized for a different transport type and/or serial address. In this case only the firmware version will be displayed before the first transport selection appears in the window as a flashing display. (Note that this procedure is no longer the only way to change the transport selection or serial address, as these items now appear in the Online Setup Menus.)

ADDITIONAL ONLINE SETUP MENUS AND MENU FEATURES

A number of additional items and features have been added to the Online Setup Menus (also sometimes referred to as Supplementary Setup Menus). The Online Setup Menus are accessed as before, by holding the [•SET UP•] key for approximately 5 to 6 seconds.

As with the Transport Selection Menu, the Online Setup Menus are also tree-structured. The [•MENU•] key steps sequentially through the four menu categories, the [•FORW•] and [•BACK•] keys step through the items available under each menu category (or through the list of manufacturers, in the case of the Transport Menu), and the [↑] and [↓] keys set the value for the specific item selected (or selects the transport model in the case of the Transport Menu). The structure of the Online Setup Menus is summarized in the following table:



EDITING Menu:

The first six items under the Editing Menu are the same Record In and Record Out timing adjustments described in Sections 3.4.4 through 3.4.8 of the Lynx VSI Module Operating Manual.

The last two items are new, and allow you to select the type of control signal(s) to be sent by the Lynx Module to parallel-control tape machines to control a "rehearse" or "preview"

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mode. Note that connection to the Lynx Module's Rehearse command line (Pin 12) was phased into production starting at cable serial number 2173; no cables prior to that serial number had Rehearse connections. Please contact TimeLine as necessary for further information about implementing Rehearse mode with your particular transports.

r-in Selects the type of signal to be sent at the InPoint to initiate Rehearse mode:

0 = Rehearse command line latches On (default mode)
1 = Single pulse on Rehearse command line
2 = Single pulse on Rehearse & Play command lines
3 = Single pulse on Rehearse command line & normal Record In command (Rehearse pulse precedes Record command by 10 msec)
4 = Rehearse command line latches On & normal Record In command (Same as Mode 3 except latching rather than momentary)

r-out Selects the type of signal to be sent at the OutPoint to exit the Rehearse mode:

0 = Rehearse command line unlatches (default mode)
1 = Single pulse on the Play command line
2 = Single pulse on the Rehearse command line
3 = Single pulse on Play command line & normal Record Out command

The module reverts to the default settings when initialized by holding the [·SET UP·] key on power-up. All subsequent changes are retained in non-volatile memory until a new transport type is selected.

OPTIONS Menu:

PHASE This is a new item that allows control over the lock mode of the module. Phase Mode On is the normal "resolve after initial lock" mode used by the Lynx Module. Phase Mode Off is a new feature that provides for automatic resynchronization in the event that a frame number difference or offset error develops (due to a tape splice, for example). The Phase Modes are:

000 = Phase Mode Off. After initial synchronization, the module continues to observe frame numbers and corrects for frame number errors if they occur. If such a frame number error (or Offset Error, to use Lynx terminology) occurs, the module will resynchronize at a constant, slow rate which should be audibly undetectable.

001 = Phase Mode On (default mode). After initial synchronization, the module reverts to a phase-lock mode and maintains resolved speed while ignoring the actual frame numbers. This allows the module to free-wheel over any discontinuities or jumps in timecode at resolved speed. The RESOLVE light on the module flashes as an indication if a frame number error occurs.

LIFt This item, which allows the user to select the conditions under which the Lynx Module issue a Lifter Defeat command to the tape machine, has been included in prior versions of Lynx Module firmware but a new mode has been added and two existing modes have been changed slightly. In addition, starting with V404-40 each transport menu selection has its own default for Lifter mode to accommodate transport models with non-standard lifter defeat logic and to assure proper Mute Relay operation with transports that do not have tape lifters (i.e. video transports, which default to Lifter Mode 3). The available modes are:

000 = Lifters never defeated by Lynx. This mode prevents the Lynx Module from defeating the lifters as it approaches the park point to determine the precise location by reading timecode. Use of Mode 0 will almost certainly cause slower lock-up times.

001 = Normal lifter operation. In normal locate or cue operations, the Lynx Module will close its mute relay and issue a Lifter Defeat command as it approaches the destination so that it can determine its precise position and park within a 9 frame window. During a slow speed shuttle, the lifters drop immediately and the Mute relay does not engage.

002 = Lifter defeat mode. In this mode the Lynx Module defeats the lifters and energizes the Mute relay during all fast-wind, cue, locate, and high-speed shuttle operations, allowing high-speed timecode reading. (In slow-speed shuttles the lifters will be defeated but the Mute relay will not be energized.) This lifter mode should be used whenever the tape has discontinuous or spliced timecode to allow accurate location-finding.

003 = Full-time Lifter Defeat command. In this mode the Lifter Defeat command is active whenever the Lynx Module is on-line. This mode should not be used with tape machines that share the same external command line to control lifter defeat and other functions in various transport operating modes.

rLY This is a new item which allows selection of the operating mode for the Lynx Module's Mute relay:

000 = Normal Mute relay mode. The Mute relay is energized according to the Lifter Defeat logic, i.e. muted in Rewind, Fast Forward, Cue and Locate modes when the lifters are defeated by the module.

001 = Mute until resolved. Same as Mode 000 except that an additional muting condition occurs in Play mode until the RESOLVE light lights. The relay opens only when the machine within 20 subframes of lock so that virtually all of the slewing done to achieve lock occurs while the mute relay is closed.

002 = Mute until locked. Same as Mode 001, except that the module waits until the LOCK light comes on at less than 2 subframes offset error before it opens the relay.

003= Mute unless stopped, locked, or jogging.

SPd This is an existing menu item that allows the user to adjust the dynamic approach speed on a given transport to accommodate unusual conditions of tape pack, etc. The default value of the approach speed parameter is part of the pre-programmed setup data for each transport in the Transport Selection Menu, and is set for normal conditions. In unusual circumstances, such as very lightly loaded reels or full 14" reels, it may be desirable to adjust the speed parameter to eliminate any tendency to undershoot or overshoot when approaching a park point. The approach speed is displayed in arbitrary units ranging in value from 020 to 255.

SYnc This is an existing menu item for adjustment of the synchronization between the ATR and the editor as described in Section 3.4.3 of the Lynx VSI Module Operating Manual.

When used with the Lynx Keyboard Control Unit, the Sync parameter should be set to 000.

ADDRESS Menu:

There is only a single item under this menu. It allows you to view and/or change the serial address set on the module.

When used with a video editor that has a separate serial port for each tape machine it controls, the serial address must be set to the correct value for the model of editor as described in Section 3.2.3 of the Lynx VSI Module Operating Manual.

When used with audio editing systems that "daisy chain" several modules on a single serial port, each module must generally have a unique serial address assigned so that the editor may communicate individually with each module and transport.

TRANSPORT Menu:

The Transport Menu has the same tree structure described above. The Transport Menu is presented here in the Online Setup Menus to allow the user to view the selected transport type without having to turn the power off and then on again, and to allow the user to change the transport type without having to totally re-initialize the module by holding the [•SET UP•] key while turning on the module's power switch.

VTR EDIT MODE SELECTION

The Ampex "uPr-3", "uPr-6", and "uPr-80" and Sony "buU800-5", "buU-950", and "bUH-2000" Transport Menu settings now support selection of edit modes from the editor or controller. A1/A2/Video Insert editing or Assembly editing may now be selected remotely on the various serially-controlled VTR and VCR models supported by these Transport Menu settings.

The JVC "J-610", "J-810", "J-8250", "J-8600", and "J-8600-E" and Sony "5850" menu settings also support this edit mode selection, although the Lynx Transport Control Cables for these machines only support the Insert Edit modes; Assembly Edit mode may not be selected via the Lynx Module on these machines.

NOTE: A minor modification to the circuit board in existing Sony 5850 Transport Control Cable is required to allow the Lynx Module to command the VCR to enter and leave the Edit mode. This modification applies to 5850 interface cables with serial numbers below 3000 (cables with serial numbers 3016 and above use a new, corrected circuit board design). Contact TimeLine for instructions on how to perform this modification.

Note that edit mode selection is not supported in the JVC "J-850" and Sony "buU-PAr" menu selections due to limitations of the control interfaces for these machines.

Note that firmware version KCU-0.63 or later is required in the Lynx Keyboard Control Unit to enable this VTR edit mode selection.

RECORD MODE STATUS REPORTING

With V404-42 the VSI Module reports the transport's Record mode status back to the controller based on the Record tally signal it receives from the transport itself. (This applies to Edit mode rather than Record mode in the case of VTRs.) This allows the controller to indicate the correct Record status of each transport even it the Record mode was initiated on the transport's own control panel.

Most TimeLine Transport Control Cable models already provide the necessary connections for the transport Record tally. A notable exception to this generalization is the "Ampex MM-1200" cable since no Record tally signal is available on the appropriate connector on this transport model. Please contact TimeLine if you have any question about the Record tally connection for any of your transports.

NOTE: Early examples of the "JVC 850", "JVC 8600", and "JVC 8250" cable models were miswired in relation to the Edit tally signal. Please contact TimeLine for information if you are using any of these cable models with a VSI Module. Note that the current JVC interface cable models ("JVC Type A", "JVC Type B", and "JVC Type C" respectively) are correctly wired for Edit tally.

USE WITH VITC TRANSLATORS

The timecode reader now properly accepts still frame timecode and displays the actual frame number without the usual +1 frame compensation. This should facilitate the use of Lynx Modules with VITC-to-LTC translators which usually output repeating timecode frame numbers when the VTR is stopped.

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LYNX VSI MODULE TRANSPORT MENU

Firmware Version **V404-42**

LYNX DISPLAY	TRANSPORT TYPE(S)		NOTES
AE9-20	AEG/Telefunken	M-20 series	
dr-1200	Akai	DR-1200	
Atr-100	Ampex	ATR100, ATR102, ATR104	
Atr-124	Ampex	ATR124	
Atr-1200	Ampex	MM1100, MM1200	
uPr-3	Ampex	VPR-3	1
uPr-6	Ampex	VPR-6	1
uPr-80	Ampex	VPR-80	1
dEn-3603	Denon	DN-3603 RA	
FoS-d20	Fostex	D-20	2
FoS-E16	Fostex	E-16, E-8, E-2, E-22	2
J-610	JVC	BR-S610	3
J-810	JVC	BR-S810	3
J-850	JVC	CR-850, CR-600 (parallel control)	4
J-8250	JVC	CR-8250, CR-6650	5
J-8600	JVC	BR-8600U, BR-7700U (USA versions)	3
J-8600-E	JVC	BR-8600E (European version)	3
79	3M	M79	6
850-A	Mitsubishi	X-850, X-86, X-400 (normal sync)	7,8
850-d	Mitsubishi	X-850, X-86, X-400 (digital dubbing)	7,8
Otr10-1	Otari	MTR-10 series I	9
Otr10-2	Otari	MTR-10 series II	10
Otr12-1	Otari	MTR-12 series I	9
Otr12-2	Otari	MTR-12 series II	10
Otr-20	Otari	MTR-20	11
Otr-55	Otari	MX-55	11
Otr-70	Otari	MX-70, MX-80	12
Otr-70-L	Otari	MX-70 1" Layback (with Otari "pre-scaler")	13
Otr90-1	Otari	MTR-90 series I	
Otr90-2	Otari	MTR-90 series II	
Otr90-2L	Otari	MTR-90-II Layback (w/ Otari "pre-scaler")	13
Otr90-2u	Otari	MTR-90 series II (w/ voltage-control search)	14
Otr-100	Otari	MTR-100	15
Otr-100u	Otari	MTR-100 (w/ voltage-controlled search)	15
Otr900-A	Otari	DTR-900 (normal sync)	7
Otr900-d	Otari	DTR-900 (digital dubbing)	7
5050-3	Otari	MX5050 MkIII-4, MkIII-8	16
SAturn	Saturn	824 (a.k.a. Soundcraft Saturn)	
3324	Sony	PCM-3324 (normal sync)	17
3324-A	Sony	PCM-3324 (non-release, vari-speed)	17
3324-d	Sony	PCM-3324 (digital dubbing)	17
3348	Sony	PCM-3348 (normal sync)	17

3348-A	Sony	PCM-3348 (non-release, vari-speed)	17
3348-d	Sony	PCM-3348 (digital dubbing)	17
3402-A	Sony	PCM-3402, 3202 (normal sync)	7,18
3402-d	Sony	PCM-3402, 3202 (digital dubbing)	7,18
5850	Sony	VO-5850, VO-5800	
APr-24	Sony	APR-24	19
APr-5000	Sony	APR-5000, APR-5003	18
buU-PAr	Sony	Parallel control of BVU-800 series (including BVU-820, BVU-850, BVU-870), BVW-10, BVW-40	
buU800-S	Sony	Serial control of BVU-800 series, BVW-15	1
buU-950	Sony	BVU-950 (serial control)	1
buH-2000	Sony	BVH-2000, BVH-2800, BVH-3000	1
d4000-S	Sony	DMR-4000 (serial control)	1
JH-24	Sony (MCI)	JH-24, JH-16, JH-110A (late), JH-110B, JH-110C, JH-114 (late)	20,21
JH-114	Sony (MCI)	JH-114 (early), JH-110	20,21
StEL-td9	Stellavox	TD-9	
A-80-16	Studer	A80VU (16 Hz tach)	22
A-80-18	Studer	A80VU (18 Hz tach)	22
A-800-1	Studer	A800 Mark 1	23
A-800-3	Studer	A800 Mark 3, A800 Mark 4	23
A-807	Studer	A807	24
A-810	Studer	A810, Revox C270 series	24
A-812	Studer	A812	24
A-820	Studer	A820 small format (not 2")	24
A-820-H	Studer	A820 MCH (multitrack), High tach rate	24
A-820-L	Studer	A820 MCH (multitrack), Low tach rate	24
tASC-40	Tascam	40 Series (42, 44, 48)	24
tASC-50	Tascam	50 Series (52, 58)	
tASC-60	Tascam	ATR-60 Series, MS-16	25

NOTES:

Except where noted, all listed machines use TimeLine Transport Control Cables with the same designation as the Transport Menu selection.

1. Uses "Serial Transport Control Kit" or "Sony BVH-2000" cable. Serial Interface circuit board (included with interface cable) must be installed in Lynx Module.
2. Uses "Fostex E-Series" cable.
3. Uses "JVC Type B" or "JVC 8600" cable.
4. Uses "JVC Type A" or "JVC 850" cable.
5. Uses "JVC Type C" or "JVC 8250" cable.
6. 3M Selectake II unit required. Selectake and/or machine modifications are necessary (instructions included with interface cable). Dealer installation (at extra cost) highly recommended.
7. The "A" setting is for normal, fully synchronized operation of digital machines. The "d" setting achieves a very "tight" lock between a matching pair of digital machines and then releases the Slave to allow it to resolve to the "word clock" signal from the Master. This

provides accurate phase alignment between tracks when dubbing individual digital tracks between machines, but may cause longer lock-up times.

8. X-850 uses "X-850" cable. X-86 uses "X-86" cable.
9. Uses "MTR 10/12-1" cable.
10. Uses "Otari Type A" or "MTR 10/12-2" cable.
11. Uses "Otari Type A" or "MTR-20" cable.
12. MX-70 uses "Otari Type A" or "MTR 10/12-2" cable. MX-80 uses "Otari Type A" or "MTR-20" cable.
13. Otari pre-scaler box uses "MTR-90-2" cable (rather than "Otari Type A" or "MTR 10/12-2" cable normally used with MX-70).
14. Existing "MTR-90-2" cables with serial numbers below 2200 must be modified to implement voltage-controlled search. Contact TimeLine for details. Cables with serial numbers above 2201 already have the necessary connections.
15. MTR-100 uses "Otari Type A" or "MTR-20" cable. Cable modification required to implement voltage-controlled search, and minor transport modification required for optimum search performance. Contact TimeLine for details.
16. Earlier machines require cables with 16-pin connectors, while later machines use 34-pin connectors. Both cable versions are available from TimeLine; please specify.
17. PCM-3324 requires installation of Sony V-CLOCK board when used with synchronizers. Normal Sync setting releases machine to self-resolve to external video reference signal at 0 subframes. The "d" setting achieves a very tight lock before releasing transport to self-resolve. This preserves the phase alignment between tracks when dubbing between machines, but may cause longer lock-up times. The "A" setting is a non-release mode that allows synchronization at non-standard speeds (i.e. in vari-speed mode) using Sony Vari Sync Unit. Both PCM-3324 and PCM-3348 use "3324" cable.
    NOTE: Existing PCM-3324 cables with serial numbers below 2972 must be modified to access the transport's Play tally for proper operation with V404-38 firmware. Contact TimeLine for modification details.
18. Uses "Sony Type A" cable.
19. Uses "Sony Type A" or "APR-24" cable. "APR-24" cable is required for implementation of Rehearse mode.
20. MCI/Sony remote control box must be modified when remote control is to be used at same time as a synchronizer or else synchronizer (and potentially the tape machine) will be damaged. Modification instructions included with interface cable.
21. All Sony/MCI JH-series transports use either "JH-110" cable (with 21-pin autolocator connector) or "JH-24" cable (with 12-pin autolocator connector) as appropriate.
22. Both A80 versions use standard "A-80" cable.
23. Both A800 versions use standard "A-800" cable.
24. Uses "Studer Type A" or "A-810" cable.
25. Uses either "Tascam Type A" or "Tascam 40" cable. Rehearse function on MS-16 and ATR-60 multitrack versions only implemented in "Tascam Type A" cable model.

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6.0 DIGITAL AUDIO TRANSPORTS

7.0 APPENDIX

1.0 OVERVIEW

The LYNX/VPR3 editor interface is a high performance synchronizer which can be used to directly connect an audio tape machine to a video editing system. It is an enhanced version of the LYNX stand-alone chase synchronizer system.

Each module features the following:

- SMPTE or EBU time code generator.
- SMPTE / EBU time code reader (wide band)
- Transport synchronizer / resolver.
- RS-422 port for editor control.

One Lynx module is required for each ATR that is to connect to the editor. It connects to the transport with a supplied transport interface connector and a user supplied timecode audio cable. The editor connects to the Lynx module through a user supplied standard 9 pin RS422 connector and transmits and receives normal VPR-3 serial messages.

The editor requires no modifications.

The Lynx module is characterized by a lack of internal adjustments necessary for configurations to different transport types. Changeover from one transport type to another is accomplished by menu selection from the front panel. This action automatically reconfigures:

- Logic input levels.
- Logic input polarities.
- Tach rates
- Analog outputs
- Frequency outputs
- Toggle rates
- Ballistics information

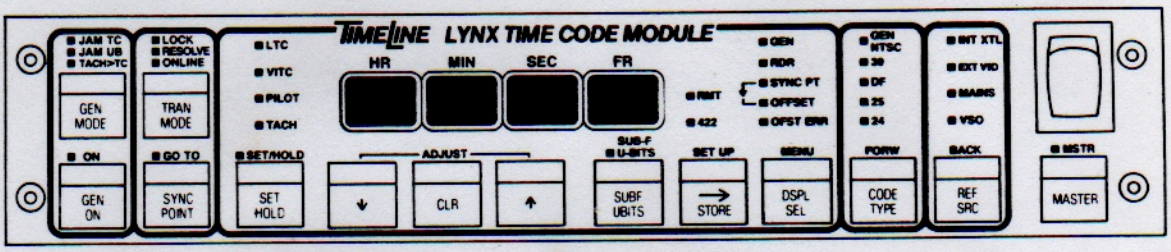
Because this information is contained within the system and is selected by menu, the Lynx module wakes up with much of the information necessary to operate immediately. Typically, the only "learned" information necessary for proper operation is the tape speed (i.e. 15/30 ips) which is determined by reading time code for 10 seconds before first use.

1.1 INITIALIZATION

A first initialization procedure allows the user to check synchronization, and check and adjust edit accuracy to match the particular ATR in use. All system information is then permanently maintained in battery backup RAM.

2.0 FEATURES AND CONTROLS

2.1 Front Panel Description



2.1.1 TRAN MODE

Selects whether or not the LYNX transport in ONLINE or OFFLINE. When OFFLINE the LYNX module will relinquish all control over the transport, and reports back LOCAL to the editor.

Must be ONLINE for control by the editor.

ON LINE light

Indicates the LYNX module is under editor control.

When not lit, the Lynx module relinquishes all control over the transport, except that the SYNC POINT button can be used as a single point search-to-cue to the last sync point.

RESOLVE Light

Indicates that the transport is in 'play' and its timecode is resolved to within 20 "subframes". (20/100 frame) of house reference.

LOCK Light

Indicates that the tranport is in 'play' and its timecode is resolved to within 2 suframes (2/100 frame) of house reference.

NOTE:
In the special case when the LYNX is controlling a video or digital audio transport, the transport is brought into lock, and then completely released to its own servo reference. At this time the transport may cause itself to re-frame. The lock/resolve lamps will stay lit under these conditions as long as the machine does not lose lock and stays within one frame of the correct

position.

See section 6.1 for a more complete description of video or digital audio slave operation.

2.1.2 GEN MODE

Selects the GENERATOR MODE. This key can be used to PRESET the generator mode by making a mode selection before the generator is started.

If the generator is already running, this key is used to momentarily "jam sync" once to the reader time code. That is to say, the generator will continue generating code but will instantaneously reproduce the timecode number present in the reader at the moment the GEN MODE key is touched, and will then continue running sequentially, locked to house reference.

If no generator mode lights are on, the generator will generate continuous time code locked to house reference, while running, and can be started and stopped with the GEN ON key. This is the "normal mode".

JAM TC Light

Indicates that generator will automatically jam sync to the reader input after three valid, consecutive reader frames are read. The transfer from reader to generator will re-occur if reader timecode is discontinuous when three new valid, consecutive frames are received. Otherwise the generator will produce consecutive frames.
This mode is used to re-generate code when making tape copies, or for reconstructing code that is poorly recorded or has dropouts. See section 4.5.

JAM UB Light

Indicates that simultaneously while generating normal timecode, the "user bits" (spare) portion of the timecode is being filled with the present reader time.

The user bits will faithfully follow the current reader time, whether the reader is stopped or moving.

NOTE:
The user-bits portion of the timecode is permanently set to 00:00:00:00 unless intentionally entered by means of the front panel or during the jam sync process.

TACH > TC LIGHT
Not used.

2.1.3 GEN ON

This toggles the generator on/off. The light directly above the key indicates that the generator is running. When the light is not lit it indicates that generator is off, ready to resume at the last frame transmitted. There is no output from the generator when it is in the off/hold mode.

2.1.4 SYNC PT

When touched and released, cues to the current sync point, and the GOTO light flashes. The key operates only when OFFLINE. The light will also flash when executing an editor Search, Cue, or Shuttle command.

2.1.5 SET/HOLD

Used to preset the generator, reader, or other displays.

When first touched, holds (or "freezes") the display, and causes the set/hold light to flash. At first, the hours column will flash. This will allow the hours value to be adjusted and set. When touched again, moves the flashing column to the right, allowing each succeeding column to be adjusted.

To release the display from hold mode, hold this key again until the set/hold light goes out. This will allow the display to resume counting.

The set/hold mode does not affect the generator or reader input or outputs while the columns are being adjusted, unless the value is actually "stored" as described below.

2.1.6 ADJUST KEYS

These keys are used while in the SET HOLD mode.

↓	Subtracts one from the flashing column.
↑	Adds one to the flashing column.
CLR	When held, will clear the display to 00:00:00:00.

When the ↑ or ↓ keys are touched numbers will increase or decrease one integer at a time. HOLDING these keys will cause the numbers to scroll automatically.

The CLR key can also be used to clear a permanent error message from the display, such as the "NO VIDEO" message which appears if loss of video sync is encountered.

2.1.7 SUBF/UBITS

In the GEN and RDR modes, causes the display to show the user-bit of the time code. The UBITS light will flash when user bits are being displayed. To resume showing timecode, touch this key again.

In the OFFSET and OFST ERR modes not operational.

2.1.8 STORE

Allows you to store a timecode number when SET HOLD is flashing. The displayed value is stored into the selected display location indicated by the DSPL SEL light.

2.1.9 DISPLAY SELECT

Toggles through display to the various LYNX display registers. The display select also operates the CODE TYPE and REF SRC displays, as described elsewhere.

GEN: Indicates that the generator time is being displayed. The CODE TYPE and REF SRC lights show the current generator status.

RDR: Indicates that reader time is being displayed. If actual time code is being read, the LTC light is on and the actual incoming timecode value appears in the display. If timecode is not present, the display is then continually updated by tach time. The CODE TYPE lights show the current reader time code type.

SYNC PT: Shows the point which is to be synchronized by the editor, and to which the SYNC POINT button will cue to. The CODE TYPE lights show the current reader time code type.

OFFSET: Displays the intended number of frames difference between the transport and the editor timeline. Shown for troubleshooting purposes only. The CODE TYPE lights show the current reader time code type.

OFST ERR: Indicates the actual number of frames difference between the editor timeline the current tape position. When the transport is in 'lock' this value goes to zero. The CODE TYPE lights show the current reader time code type.

2.1.10 CODE TYPE

When displaying the generator, the code type key selects the type of code being generated. This button only operates in the NTSC version of the system, to select between 30 and 30DF code.

WHEN DISPLAYING THE GENERATOR, the code type display shows the type of time code being generated.

NTSC: This is a generator SPEED indicator, and is on in the NTSC version of the system indicating that the code being generated is running at a speed of 29.97 frames per second.

In the PAL version, the lamp is extinguished.

WHEN DISPLAYING ANYTHING OTHER THAN THE GENERATOR, the code type display shows the type of time code being read by the time code reader.

2.1.11 REF SRC

This key is not used in the VPR3 interface. The reference source lights always indicates EXT VID as the reference source for the generator.

2.1.12 MASTER

Not used in the VPR3 interface.

2.1.13 POWER SWITCH

Controls AC power to the LYNX module. It is highly recommended that power not be turned on or off while tape is threaded and the attached transport is in 'ready' mode.

2.1.14 RMT LIGHT

Not used.

2.1.15 422 LIGHT

Indicates that the LYNX is either transmitting or receiving RS 422 to/from the edit system. This will normally be ON after the editor has been booted.

2.1.16 NUMERIC DISPLAY

Time Code/Message Display. Normally displays time code and user bits in hours, minutes, seconds and frames.

Displays all menus and error messages.

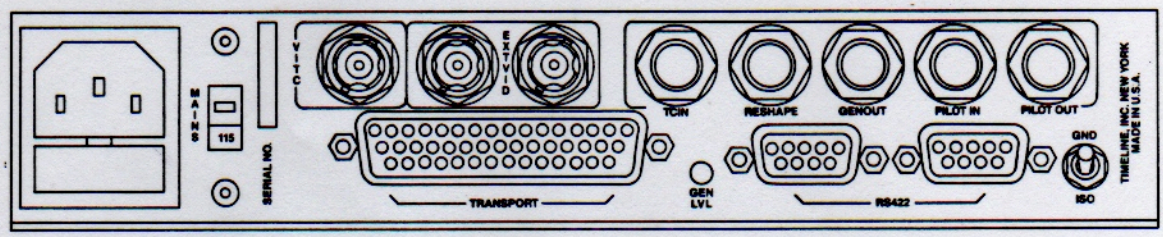
2.1.17 READER SOURCE INDICATORS

These indicators are active regardless of other information being displayed on the panel.

When all lights are out, it indicates that the source of the timecode showing in the RDR display was last received from incoming time code, not tach or pilot.

LTC:	Indicates that valid time code is present at the reader input.
VITC:	Not used.
PILOT:	Not used.
TACH:	Indicates that transport tach pulses are being used to drive the reader display.

2.2 REAR PANEL DESCRIPTION



2.2.1 POWER AND FUSE INFORMATION

Accepts factory supplied power cord. Switch to the right of male power socket selects voltage on which the LYNX will safely operate. This switch has two positions, 115 and 230.

Contains fuse drawer which holds the AC power fuse. The drawer is accessed by inserting the blade of a small screwdriver into the slot at the lower front of the power cord receptacle opening and twisting the blade. The fuse drawer will slide out. There are two positions in the drawer. The one nearest to the back panel is for a spare.

WARNING:

The LYNX is supplied with the proper fuse for operation on the voltage for which it is set at the factory. If you wish to change the voltage setting you MUST also change the fuse.

Operation of LYNX with main switch in the wrong position can cause irreparable damage to the unit. This damage is not covered by the factory warranty. Be very sure this switch is in the correct position and the proper fuse is installed before applying power to the unit.

VOLTAGE SETTING	FUSE TYPE
115	1/4 Amp GMA
230	1/8 Amp GMA

2.2.2 SERIAL NO.

Individual LYNX serial number. Always refer to this number when consulting your dealer about your LYNX. These numbers are recorded at the factory to determine the software, hardware, and other engineering changes.

2.2.3 VITC Connector

Not used.

2.2.4 External video reference input

Either one of the two identical female BNC type connectors must be used to receive a reference signal for the generator and synchronizer. They are hardwired together so that the unused plug becomes an extension, used either to loop the video through the LYNX or terminate the video by attaching a 75 ohm terminating plug.

2.2.5 Reader timecode input connector

Electrically balanced, standard female 1/4" phone jack, tip-ring-sleeve type, used as the input for the reader time code. Time code output of transport is connected to this input. An UNBALANCED input configuration is recommended, with the RING tied to ground.

2.2.6 Reader RESHAPE output (code or pilot)

Electrically unbalanced, standard female 1/4" phone jack, tip-sleeve type, provides reshaped reader time code for dubbing. This can alternately supply a reshaped pilot signal derived from the incoming timecode. See section 3.5.2.

2.2.7 Generator timecode output Connector

Electrically balanced, standard female 1/4" phone jack, tip-ring-sleeve type. Provides output of generator time code when the generator is on.

2.2.8 Reader Pilot input connector

Not used.

2.2.9 Generator Pilot out Connector

Electrically balanced, standard female 1/4" phone jack, tip-ring-sleeve type. Provides a 59.94 or 50 Hz shaped square wave locked to the generator clock. The frequency of this signal is always 2X the frame rate of the time code being generated. It is always

present, whether or not the generator is on or off. Normally not used.

2.2.10 TRANSPORT Connector

50 pin D style connector which accepts factory supplied transport interface cables.

2.2.11 GEN LVL. Adjustment

Adjusts the output level of the generator from -10 to +6 dbm.

2.2.12 RS 422 Connectors

Standard 9pin female RS 422 connectors used to connect the LYNX module to the editor. These jacks may be used interchangeably, but one MUST always be disconnected.

Make sure that pin 5 is not connected in the editor cable.

2.2.13 GND/ISO Switch

This toggle switch determines whether the chassis is grounded to the transport.

In the GND position, the transport is grounded to the chassis.

In the ISO position, the chassis is electrically isolated from the transport to preserve system grounding.

> WARNING:
> The EXT VID and RS422 connectors share the same ground, and are always ground isolated from both transport AND chassis ground. This means there may be a ground potential between the video BNC and the transport cables.

3.0 INSTALLATION and SIMPLIFIED OPERATION

It is strongly suggested that you save the factory supplied shipping carton as it is specially designed to protect your LYNX module if it ever requires re-shipment.

3.1 RACK MOUNTING INSTRUCTIONS

LYNX modules are designed to rack mounted side by side, if desired. Each module comes with a single rack "ear". To assemble two units for rack mounting:

- Remove the top covers of the two units. Install the rack "ear" on right hand side of one LYNX and the left hand side of its associated pair. Use the 8-32 flat head hex screws provided, and the #8 self locking nuts, required only on the left unit.

- To join two LYNX modules together at the center, temporarily lift up the small circuit card on the right unit by removing its four mounting screws.

- Using the the front and back mounting holes in the lift side of the Lynx chassis, screw the right unit to the left unit using the two 8-32 pan head phillips screws, and two split ring lock washers provided.

- Replace the reader card on the right unit.

- Replace the top covers on both units. The pair is now ready for mounting in a standard 19" rack.

3.2 FIRST INITIALIZATION

The blue labels on the front panel refer to the setup functions of the controls. They are referred to here in (parentheses).

3.2.1 ERASING BATTERY RAM

When the LYNX is powered on for the first time, it is necessary to erase any information in the battery memory. This is done by holding the (SETUP) key WHILE the power switch is being turned on. At this time a transport name will start flashing in the display.

3.2.2 MENU 1: TRANSPORT

- Use the (FORW) and (BACK) keys to step through the transport menu to find the transport name that corresponds to the transport which the LYNX will control. The transport menu is explained in APPENDIX Section 7.1.

- When the desired transport name appears in the display touch STORE (SETUP). The display will stop flashing.

- Verify that the correct transport name appears in the display.

- Touch the (MENU) key to step to the next menu selection.

3.2.3 MENU 2: EDITOR ADDRESS

- Use the (FORW) and (BACK) keys to step through the VPR3 serial addresses. These are set according to the edit system in use:

  AMPEX ACE: Addr 0
  CMX: Addr 2
  GVG/ISC: Addr 1

- When the desired address appears in the display touch STORE '(SETUP). The display will stop flashing.

- Verify that the correct address appears in the display.

- Touch the (MENU) key to step to the next menu selection.

3.2.4 MENU 3: "DONE"

- If there are no setup mistakes, hit the STORE (SETUP) key once more, and the system will be fully initialized.

- (If it is desired to go through the procedure again, hitting the (MENU) key will return you to the first menu.)

The transport parameters are now automatically stored in the LYNX memory. The display will now read 00:00:00:00, initialize to the RDR display, and the unit is now ready for operation.

3.2.5 SIGNON

The system will sign on by showing the following information, in sequence, on the front panel display:

VPR-017	(Version number)
NTSC	(System type)
Sync000	(Synchronization value) See: "test edits"

3.3 INITIAL SETUP

The primary function of the LYNX module is to synchronize a transport to an editing system. The synchronizer is totally dependent on the timecode reader as its source of transport position information, so in order to synchronize an ATR time code must be present at the reader input.

Be sure the RDR IN connection is made from the LYNX to the transport before trying any synchronization operations.

The LYNX module controls the search mode of the transport by using the transport's spooling motors, and achieves play-lock by controlling the capstan motor speed. This means that if a transport has an "external capstan" switch it must be in the "external position.

> The ability to synchronize a transport is ABSOLUTELY dependent upon selecting the correct transport at power up.

3.3.1 INTERCONNECTIONS

- Connect the Lynx module to the editor with a standard RS422 machine control cable. Make sure pin5 is not connected or has no connection going to it.
- Connect appropriate transport control cables from the LYNX to its associated transport.
- Do NOT yet connect time code to the RDR IN jack.

3.3.2 TACH AND CABLE CHECKOUT

- Load time coded tapes on the ATR. If no time coded tapes are available see Section 4 for instructions on how to generate and record time code.
- Make sure that the TCIN (reader input) is DISCONNECTED at this time.
- Make sure the RDR display is active. If it is not, touch the DISPLAY key until the RDR light is lit.
- Operate the transport manually to verify that when the transport is moving that the TACH light is on and the display is counting. The the display must count correctly in both forward and reverse.
- If the transport is running at 30ips, the display will count in 'clock time'. At 15ips, it will count 1/2 'clock time'.

3.3.3 READING TIME CODE

- Connect an audio line from the code output channel of the transport to the TCIN of the LYNX module.

- Play the transport for 10 seconds and verify that time code is counting on the display and that the green LTC light is lit. This will also detect and internally set the transport play speed.

3.3.4 INITIAL EDITOR CONTROL

- Reset the editor.

- The editor should commence communications with the Lynx module, indicated by the "422" light on the module front panel. This indicates that the module is addressed, and receiving valid instructions.

- If this does not occur, try resetting the editor again, check the editor cable, and/or double check the Lynx module editor address setup.

- When the 422 lamp is on, it should be possible to control the ATR with the standard editor transport command keys.

3.4 TEST EDITS

The purpose of the test edit process is to adjust and qualify the Lynx module's synchronization with the controlling editor, and to adjust the record entry/exit timing of the Lynx module to the particular audio recorder in use.

This process is only done once, whereafter the information is held in battery ram.

3.4.1 ENTERING AND LEAVING EDIT SETUP MODE

All test edit adjustments are made in the edit SETUP mode which is accomplished as follows:

- The Lynx module is put ONLINE.
- The (SETUP) key is held continuously for five seconds, until the timecode extinguishes and the test setup display appears.

SETUP MODE will now be active.

After setups have been performed, normal operation is restored by by holding the (SETUP) key again for five seconds until timecode reappears on the display.

For convenience, test edits may be performed while leaving the Lynx module in the test setup mode.

3.4.2 MAKING ADJUSTMENTS

Making adjustments is done in the same manner, using the same blue-labelled keys, as the system "first initialization". The first of these adjustments is used to adjust system synchronization, the other six are used to set record timing for the three machine speeds.

The MENU key will be used to step through the seven menu selections. Adjustments to any menu selection are made using the (FORW) and (BACK) keys.

Name	Range	Typ setting	Description
Sync	0-3	Ampex: 0 CMX: 3 GVG/ISC: 2	Adjusts for correct synchronization between ATR and editor.
30in	0-255	Adjust for transport.	30ips entry delay
30out	0-255		30ips exit delay
15in	0-255	"	15ips entry delay
15out	0-255	"	15ips exit delay
7.5in	0-255	"	7.5ips entry delay
7.5out	0-255	"	7.5ips exit delay

3.4.3 CHECKING THE SYNCHRONIZATION ADJUSTMENT

- Directly dub the timecode and audio track off a source VTR to the audio machine, with both machines in LOCAL.
- Set up the audio machine as the R-VTR and the video machine as the A source.
- Preview a cut to "A" with identical entry points, while listening to the audio channels of BOTH machines, either in stereo, or combined to mono. Be sure to set equal playback levels.
- If the SYNC value is set correctly, the two machines will synchronize precisely without delays or echos.
- The SYNC value should match the table above for the type of editing system in use.

3.4.4 RECORD TIMING ADJUSTMENT

The entry/exit timing adjustments are made once, when the system is installed with a new machine. The adjustment is held permanently in battery RAM until a new machine type is selected.

The values indicated on the front panel correspond with the delay inherent in the audio transport between the issuance of a command and its actual execution. This is expressed in milliseconds, and represents various factors, including erase/record head spacing, microprocessor scanning, bias ramp circuitry, etc.

For example, if the machine had an actual delay of 120ms going into record, and 145ms going out of record at 15ips, the following would be set up:

15in 120 (15ips entry timing 120ms)
15out145 (15ips exit timing 145ms)

This would cause the Lynx to issue the entry command 120ms ahead of real time, and the exit 145 ms ahead of real time. The resulting on-tape edit would then be correct.

Some ATR manufacturers supply this information in their service manuals, others do not. We suggest using the manufacturers information as a guide, if available, and performing test-edits to qualify the results.

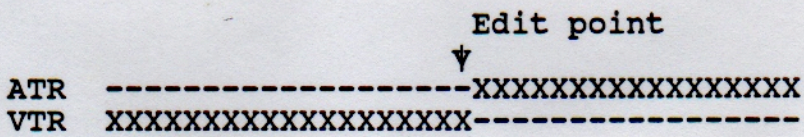
Due to design variances in the particular ATR, such as varying microprocessor scan times, there may be a slight variance in record timings from one edit to the next. This will be on the order of up to plus and minus 4ms (1/8 frame) on some machines.

3.4.5 SETTING RECORD ENTRY/EXIT TIMINGS

The entry/exit timings can be adjusted by using the VTR as an accurate edit timing source, making match frame ATR edits, and monitoring for gaps or overlaps. The timings are adjusted for the best results with the ATR in use.

> The ATR must be in "SEL-SYNC" mode while doing any editing or edit timing checks.

3.4.6 ENTRY TIMING ADJUSTMENT



VTR EDIT

- FIrst set up the video machine as the R-VTR, and use a disposable source reel with audio source material pre-recorded on it already.
- Set up a 10 second duration edit with an entry point at some even numbered time, such as 2:00:00, to BLK.
- Perform an edit on the video machine. This will leave the VTR audio track audio ending at precisely 2:00:00.

ATR EDIT

. Set up the audio machine R-VTR, the video machine as the A-source.

. Set up entry points on both machines at the same timecode as the previous edit.

. Perform an edit on the audio machine, with the A-vtr as the source.

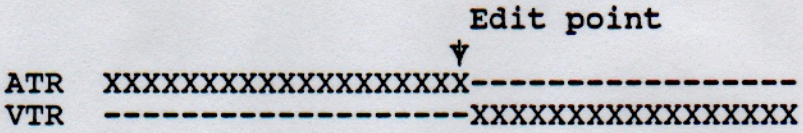
ADJUST TIMING

. Replay the audio machine.

. Adjust the entry timing adjustment until the out-edit point of the VTR is just heard in the ATR edit.

. Repeat for each speed of operation.

3.4.7 EXIT TIMING ADJUSTMENT



VTR EDIT

. Reset the video machine as the R-VTR.

. Set up a 10 second duration edit with an EXIT point at some even numbered time, such as 3:00:00, to black.

. Perform an edit on the video machine. This will leave the audio track starting precisely at 3:00:00.

ATR EDIT

. Set up the audio machine R-VTR, the video machine as the A-source.

. Set up entry points on both machines at the same timecode as the previous edit, and make sure the R-VTR exit point is 3:00:00.

. Perform an edit on the audio machine, with the A-VTR as the source.

ADJUST TIMING

. Replay the audio machine.

. Adjust the entry timing adjustment until the out-edit point of the VTR is just heard in the ATR edit.

. Repeat for each speed of operation.

After each trial ATR edit, it is suggested that the ATR audio be manually erased so that each edit starts on a blank audio track. Initially adjustments may be coarse adjusted in 25ms increments to get in the proper timing "range", and then fine adjusted until satisfactory.

3.4.8 GAPLESS INSERT EDITING

Some ATR transports do not have the timing systems and associated record circuitry to perform gapless insert editing. Use in insert mode will cause and entry overlap and an exit gap in the resulting audio program.

This desireable feature is known as "timed record", "gapless record", etc. Consult your ATR users manual for details.

3.5 ADJUSTMENTS AND JUMPERS

3.5.1 Output level adjustments

There are three output level adjustments:

- Generator code output level (on rear panel).
- Reader reshaped code output level (under top cover).
- Reader reshaped pilot output level (under top cover).

A normal setting for any of these output levels would be approximately -5 Vu. The range of the outputs is -10 to +6 Dbm.

3.5.2 Reshaped time code / reshaped pilot option

There is an internal option to select either reshaped timecode or reshaped pilot output from the rear panel RESHAPE jack. This selection is a small jumper plug, marked on the reader circuit card, labelled P5.

The two positions of this jumper are marked as follows:

RESHAP = Reshaped code output
PILOT = Reshaped pilot output

This jumper is factory installed in the "reshaped code" position.

The reshaped timecode is a squared-up version of the reader input signal. No reclocking, or other changes to the incoming code are made, and this signal can be used for direct timecode dubbing when desired.

The reshaped pilot output is extracted from the time code coming into the reader input, and is equal to 2x the incoming frame rate. The following nominal frequencies result:

INCOMING CODE	EXPECTED PILOT OUT
SMPTE non-color speed	60 Hz
SMPTE color speed	59.94 Hz
EBU	50 Hz

3.5.3 Reshape output level pots

The individual level pots for reshaped timecode and reshaped pilot outputs are located on the reader card, and are designated R22 and R23.

3.6 KEY SENSITIVITY: TOUCH/HOLD EXPLAINED

Because certain keys, namely, SET/HOLD, CLR, and STORE, may cause an unwanted effect if bumped accidentally, they are programmed with a slight delay. When referring to these keys, the following terms will be used:

TOUCH = Depress for less than 1/4 second.
HOLD = Depress for at least one second.

3.7 ENTERING NUMBERS INTO THE DISPLAY

The ability to enter time code numbers into the eight digit display is a necessary part of many LYNX operations. This will normally be used to enter generator starting times, tach times, and offset and sync point values.

3.7.1 SET HOLD MODE

- Touching the SET/HOLD button will freeze the display. A flashing digit (cursor) will appear in the HR column, and the set/hold light will also flash.

3.7.2 CLEARING AND MODIFYING THE DISPLAY

- The display can be cleared to 00:00:00:00, if desired, by holding CLR.
- Touch ↓ to subtract one from the cursor column, or touch↑ to add one.
- Touching SET/HOLD again will move the flashing cursor to the next column to the right.
- Repeating the above procedure will allow you to enter numbers into all the columns.

3.7.3 STORING A NUMBER

- When the desired time code number appears in the display it can be stored by holding the STORE key. The register to which the number will be stored is indicated by current position of DSPL SEL.
- The set/hold light will go out, and the display will now resume normal counting.

4.0 GENERATOR

Each LYNX module contains an independent Jam Sync time code generator. SMPTE drop and non-drop code or EBU 25 frame code are available from the LYNX. In addition to the time code output signal, the LYNX provides a generator pilotone output signal.

The timecode is not color framed, so it is not recommended for use with other than ATR's.

4.1 GENERATOR REFERENCE

The Lynx generator is permanently set to lock to an external video source.

If the video reference is lost, the Lynx module becomes inoperative and the "no video" messages appears on the front panel. This error will automatically reset if video is re-applied.

4.2 GENERATOR CODE TYPE

The time code frame rate is selected using the CODE TYPE key. The generator must be stopped to change this setting. This prevents accidental change of the frame rate by a single inadvertent key stroke.

- If generator is running, touch GEN ON to stop the generator.
- Touch CODE TYPE until the light adjacent the desired position is lit.

This feature is only available with NTSC modules.

4.3 GENERATOR ON/OFF (HOLD)

Touching the GEN ON will begin generating time code from 00:00:00:00 or will continue generating from the last number displayed prior to stopping the generator. The ON Light above the GEN ON key will light.

4.4 SETTING THE GENERATOR

- Press DISPLAY key until light adjacent GEN is lit.
- Touch the SET/HOLD key. This will freeze the display and the cursor will flash.
- Enter the TIME CODE Point at which you want the generator to begin counting. See section 3.7 for an explanation of accessing the display if you are unfamiliar with the numeric entry procedure.
- Press STORE. The generator will now begin generating from that point. The display automatically leaves the SET/HOLD mode.

4.5 GENERATOR MODE

The GEN MODE key selects the four generator modes.

4.5.1 NORMAL GENERATOR MODE

When the LYNX is powered on, it automatically selects the normal generate mode. In this mode, when the generator is started, it runs sequentially from the starting number visible in the GEN display.

4.5.2 JAM SYNC MODE (MANUAL)

The generator can be loaded momentarily from the reader timecode input by touching the GEN MODE key while the generator is running. The light adjacent JAM TC will momentarily light.

Subsequently, the generator will continues to generate sequential code locked to house sync. It does not reload the reader code again unless the GEN MODE key is touched again.

4.5.3 CONTINUOUS JAM SYNC MODE (AUTOMATIC)

The automatic jam sync mode can be selected by depressing the GEN MODE key before the generator is started.

This is identical to the manual jam sync mode, except that the reader value is made to load automatically if the timcode goes out of sequence for more than three frames.

If the timecode input stops, the generator will continue to free run as described above. It only does an "autmoatic" jam when continuous new code is present, for more than three frames.

4.5.4 JAM SYNC TO GENERATOR USER BITS

This mode is normally not used.

In this mode, the reader number is recorded into the spare "user bits" portion of the timecode waveform. Normal generator operation is not affected while in this mode.

If reader code stops, the last time code value will be repeated in the generator user bits.

4.6 SLAVED GENERATOR PRINCIPLES

The LYNX generator is a slaved generator which always emits timecode at normal play speed, correctly locked to house video. In order for the reader and generator frames to be running synchronously during jam-sync operation, it is necessary for the incoming timecode coming into the reader be resolved to the generator reference. This is accomplished by putting the transport into play from the EDITOR.

4.7 RECORDING TIME CODE

The output signal from the generator appears at the GEN OUT connector on the rear panel. To record time code, connect an audio cable from the GEN OUT connector to the appropriate audio input of the recorder.

4.7.1 GENERATOR OUTPUT LEVEL

The generator output level is adjustable with a rear panel trimpot. A typical code level would be -5 Vu.

4.7.2 PILOT OUTPUT

The pilot output is a shaped square wave output which is always 2 times the frame rate of the code being generated. This signal appears at the PILOT OUT connector on the rear panel, and can be recorded on a separate track along with the generator time code.

The PILOT OUT signal is continuously present at its output jack, even when the generator is off.

Code type	Pilot frequency
30 NTSC	59.94Hz
30-DF NTSC	59.94Hz
25	50Hz

5.0 READER SECTION

Each LYNX contains a wide band time code reader. It will read all SMPTE and EBU code formats as well as 24 frame "film" code from 1/10 to 60x speed. The reader is also an integral part of the LYNX synchronizer.

5.1 READER DISPLAY

To access the reader display, press the DISPLAY select key until the RDR light is illumnated. The numeric display will now indicates the incoming value, either from incoming time code or tach.

Time code will automatically be displayed if there is valid time code present on the rear panel. If no code is present, the display will indicate tach time updated from prior LTC.

5.2 READER SOURCE INDICATORS

When in RDR mode, the source of code being displayed is indicated immediately to the left of the eight segment display. (See section 2.1.17 for a complete explanation of these indicator lights.)

5.3 RATE OF CODE INDICATORS

In Reader mode, the bank of lights immediately above the Code Type key indicate the type of time code being read.

5.4 RESHAPED CODE / RESHAPED PILOT

See section 3.5 for selecting reshaped code or pilot output.

Reshaped Code is used for dubbing (copying) timecode directly from one machine to another. This code is identical to the code being read with the square wave edges restored to their original exactness.

However, any inconsistancies in the code such as wow and flutter will be passed down from the original to the copy, and in some cases the original may be poor enough that a reshaped copy cannot be used. If possible, it is advised to use the generator jam sync feature to copy code.

6.0 DIGITAL AUDIO TRANSPORTS

The LYNX may be used to synchronize a video or digital audio transport. The procedure is essentially the same as synchronizing an analog audio or film transport except for the fact that a video sync reference must be supplied to both the LYNX AND the transport being sychronized.

In this special case the transport is brought into lock, and then completely released to its own servo reference. At this time the transport may cause itself to re-frame. The lock/resolve lamps will stay lit under these conditions as long as the machine does not lose lock and stays within one frame of the correct position.

At this point the machine will 'self resolve' to the video sync reference it is receiving. This must be the same video reference being supplied to the LYNX video reference input.

This use of house sync allows synchronization to be maintained after initial lockup, while releasing the video machine's capstan and drum servos to their internal servo control systems which is required for a stable picture.

Digital audio machines utilize the same type of operation, except that they release their capstan servo systems to the "word clock" of the digital audio pulse train. Until lock is achieved, the digital audio outputs will typically be muted.

6.1.1 SET UP PROCEDURE (Video/Digital Audio)

Follow the same procedure as for sychronizing any transport as described in section 6.1. Be sure that LYNX has been initialized to the correct transport type after power-up, and sync is applied.

Make sure that the digital audio transport has its sync jumpering correct for the type and rate of sync applied. If this is improperly set, the machine may drift out of synchronism after initial synchronization is achieved.

7.0 APPENDIX

7.1 TRANSPORT MENU (LYNX VSI SOFTWARE VERSIONS V-322 & V-323G)

LYNX DISPLAY	TRANSPORT TYPE(S)		NOTES
Atr-100	Ampex	ATR100, ATR102, ATR104	
Atr-124	Ampex	ATR124	
Atr-1200	Ampex	MM1100, MM1200	
8250	JVC	CR-8250U, CR-6650U	
79	3M	M79	1
850-A	Mitsubishi	X-850 (normal sync)	2
850-d	Mitsubishi	X-850 (digital dubbing)	2
Otr10-1	Otari	MTR-10 series I	3
Otr10-2	Otari	MTR-10 series II	4
Otr12-1	Otari	MTR-12 series I	3
Otr12-2	Otari	MTR-12 series II	4
Otr-20	Otari	MTR-20	
Otr90-1	Otari	MTR-90 series I	
Otr90-2	Otari	MTR-90 series II	
Otr-70	Otari	MX-70, MX-80	5
5050-3	Otari	MX5050 MkIII-4, MkIII-8	6
3324	Sony	PCM-3324	7
bvU-800P	Sony	BVU-800 (parallel control), BVU-820, BVU-850, BVU-870 BVW-10, BVW-40	
JH-24	Sony (MCI)	JH-24, JH-16, JH-110A(late), JH-110B, JH-110C, JH-114(late)	8,9
JH-114	Sony (MCI)	JH-114(early), JH-110	8,9
A-80-16	Studer	A-80 (16Hz tach)	10
A-80-18	Studer	A-80 (18Hz tach)	10
A-800	Studer	A-800 Mark 2, A-800 Mark 3	
A-810	Studer	A-810	
A-820	Studer	A-820 small format (not 2")	11
tASC-40	Tascam	40 Series (42, 44, 48)	
tASC-50	Tascam	50 Series (52, 58)	

NOTES:

Except where noted, all listed machines use TimeLine interface cables with the same designation as the Transport Menu selection.

1. 3M Selectake unit required. Selectake and/or machine modifications are necessary (instructions included with interface cable). Dealer installation (at extra cost) highly recommended.

2. The "A" setting is for normal, fully synchronized operation of Mitsubishi digital machines. The "d" setting achieves a very "tight" lock between a pair of digital machines and then allows the slave to resolve to the master "word clock" signal on the dubbing connector. This provides accurate phase alignment between tracks when dubbing individual digital tracks between machines, but may cause longer lock-up times.
3. Uses MTR 10/12-1 cable.
4. Uses MTR 10/12-2 cable.
5. MX-70 uses MTR 10/12-2 cable. MX-80 uses MTR-20 cable.
6. Earlier machines require cables with 16-pin connectors, while later machines use 34-pin connectors. Both cable versions avail-able from TimeLine.
7. PCM-3324 requires installation of V-CLOCK board when used with synchronizers. Lynx Module releases machine to self-resolve at 0 subframes.
8. Autolocator MUST be modified or else Lynx Module (and potentially the tape machine) will be damaged. Instructions included with interface cable.
9. All Sony/MCI JH-series transports use either JH-110 cable (21-pin autolocator connector) or JH-24 cable (12-pin autolocator connector) as appropriate.
10. Both A-80 versions use standard A-80 cable.
11. A-820 uses A-810 cable.

7.2 SUMMARY OF COMMON ERROR MESSAGES

no codE

Message is displayed when a Lynx Module is ONLINE in PLAY mode, but is receiving neither time code nor pilot. This occurs most often when the time code is not patched into the module, when the wrong track is connected on the recorder, or when the time code runs out on the tape.

This error message identifies the most common operator error which will prevent the system from functioning.

This message is self-resetting and will disappear when time code is restored.

tAPE OUt

Message is displayed when a Lynx Module issues a motion command to the connected transport and sees no response in the form of transport tach pulses. This occurs most often when the transport runs out of tape, but may also occur if the machine's interface cable is disconnected.

When a TAPE OUT condition occurs, the Lynx Module displays the error message for a few seconds and then automatically goes OFFLINE for operator safety when rethreading a tape machine.

no vIdEo

Message is displayed when a Lynx VSI Module is not receiving House Sync or other suitable video reference signal on its EXT VID connectors. Sync is always required for operation of Lynx VSI Modules.

This message is NOT self-resetting as a safety feature. Even if the interruption of the video reference was only temporary, the error message will continue to show in the display until manually cleared to alert the operator that the time code generator was not locked to video for the entire period. The NO VIDEO error message is cleared by pressing the CLR key.

E SY

The SYNC ERROR message is displayed when the Lynx VSI Module is unable to synchronize properly with the editor. Check that the proper SYNC setting has been made in the Edit Set-Up Menus. See Sections 3.4.1 through 3.4.3 of this manual for details.

7.3 PROBLEM SOLVING

There are basically two things that will cause the unit to function incorrectly, especially in "chase" mode:

1. Bad tach source, caused by a bad transport cable.

2. No code source, caused by a bad patch, or running out of code.

Checking the code source

- Look for the green LTC light when the transport is in "play".

- If the light is out or flickering the code is either not present or intermittently unreadable.

Checking the tach

- Turn OFF the code signal and run the machine in PLAY at 30ips. The tach should count in real time, in the right direction.

- Try rewinding, making sure the direction changes correctly in the display.

- If the LYNX will not read tach you probably have a bad control cable or your transport is not properly transmitting tachometer and/or direction information.

  Once the system has been set up, the LYNX module will sense the tape speed automatically and change the tach rate to the speed in use automatically after reading five seconds of code.

Transport Capstan Reference switch

To allow external synchronization, the "capstan reference" switch on the ATR must be set to the EXTERNAL position.

7.4 REAR PANEL CONNECTOR PIN DESIGNATIONS

Indexed by pin number

1. GROUND
2. Tran. gnd. sense
3. Stop [still] cmnd
4. Capst. freq collector
5. Capst. freq emitter
6. Lifter drop cmnd
7. Forward [dir] cmnd
8. Record tally
9. Reserved
10. Reserved
11. Reserved
12. Warning o/c out
13. Servo relay-A n/c
14. Servo relay-B COM
15. Servo relay-B n/o
16. Reserved
17. Reserved

18. +5v (5 ma max)
19. Rec-off cmnd +
20. Search cmnd +
21. 1k pullup to +5v
22. Reserved
23. Tran cmnd common
24. Rewind cmnd
25. Reserved
26. Tach direction sense
27. Reserved
28. Tran-ready o/c out
29. Servo relay-A n/o
30. Servo relay-A COM
31. Servo relay-B n/c
32. Reserved
33. Reserved

34. GROUND
35. Rec-off cmnd -
36. Search cmnd -
37. Play cmnd
38. Search volts out
39. Capst. volts out
40. Rec-on cmnd.
41. Reserved
42. Tach pulse in
43. Reserved
44. -12v (5 ma max)
45. +12v (5 ma max)
46. Mute relay n/o
47. Mute relay n/c
48. Mute relay com
49. Reserved
50. Reserved

Indexed by function

POWER AND GROUND

GROUND	1, 34
Tran. gnd. sense	2
+5v (5 ma max)	18
-12v (5 ma max)	44
+12v (5 ma max)	45

TRANSPORT LOGIC COMMANDS

Tran cmnd common	23
Stop [still] cmnd	3
Rewind cmnd	24
Forward [dir] cmnd	7
Play cmnd	37
Rec-on cmnd	40
Lifter drop cmnd	6
Rec-off cmnd -	35
Rec-off cmnd +	19
Search cmnd -	36
Search cmnd +	20

These command outputs are opto-isolator collectors, capable of 80v/30ma. Emitters are all tied to 'tran cmnd common'.

These are opto-isolators which have both collectors and emitters available. Normally, the emitters would be connected to 'tran cmnd common'.

CAPSTAN CONTROL AND SEARCH OUTPUTS

Capst. freq collector	4
Capst. freq emitter	5
1k pullup to +5v	21
Capst. volts out	39
Search volts out	38

Opto-isolator output, pin 4 normally requires a pullup resistor to +5v, available on pin 21. These outputs are referenced to tran ground sense, pin 2.

MUTE AND SERVO RELAYS

Mute relay com	48
Mute relay n/c	47
Mute relay n/o	46

gray wire on cable pigtail

violet wire on cable pigtail (open on mute)

white wire or cable pigtail (closed on mute)

Servo relay-A COM	30
Servo relay-A n/c	13
Servo relay-A n/o	29
Servo relay-B COM	14
Servo relay-B n/c	31
Servo relay-B n/o	15

'A' and 'B' are the two poles of the same servo relay. This relay transfers control of servo speed to the LYNX module.

TACH AND TALLY INPUTS

Tach pulse in	42	Max freq approx 250Khz.
Tach direction sense	26	
Record tally	8	

ANNUNCIATOR OUTPUTS

		RELEASE 4.10:
Warning o/c out	12	Indicates loss of sync.
Tran locked o/c out	28	Indicates locked.

7.5 CIRCUIT BOARD INTERFACE COMPONENTS BY FUNCTION

OPTOISOLATORS

STOP	U27	All H11-G2
PLAY	U26	(GE, Motorola, Siemens)
RW	U9	
FF	U10	
LIFTER	U18	
SEARCH	U26	
REC IN	U19	
REC OUT	U35	

RELAYS

MUTE	K1	Aromat DS2
SERVO ENA	K2	

TACH/DIRECTION INPUTS

TACH	U4 pin 5	LM-339
DIR	U4 pin 7	
REC tally	U4 pin 11	

ANALOG OUTPUTS

Search Volt	U25 pin 1	TL084
Capstan volt	U25 pin 14	