

ALESIS

AI-2

Reference Manual

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CHAPTER 1: INTRODUCTION

1.0 ABOUT AI-2

The AI-2 is an extremely flexible and powerful interface device for the ALESIS ADAT 8-track digital audio tape recorder. The AI-2 is designed and manufactured for ALESIS by TimeLine, the world leader in machine control and synchronization systems.

The AI-2 provides a universal ADAT control interface allowing a bank of ADAT recorders to be controlled from a video editor, a tape machine synchronizer system or in time code chase.

The AI-2 supports four primary input control and two output control modes. The input control modes provide an interface to external controllers, while the output modes allow control of up to 16 ADAT recorders, with or without the Alesis BRC Remote Control.

- **Sample Accurate Syncing Capabilities.** Using ADAT's exclusive Proprietary Synchronization interface, the AI-2 can control up to 16 ADAT's, for a total of 128 tracks, and lock them together in perfect synchronization with other time code controlled devices.
- **Easy And Familiar Front Panel Controls.** The AI-2 is fitted with a Liquid Crystal Display (LCD), 6 keys and a bank of status LED's. The keys are used to setup AI-2 system operation parameters, to select display information and to edit and control AI-2 functions. The 8 LEDs give constant control and communication status, indicating correct operation. The AI-2 controls have been designed to be quick and simple to use and will be familiar to all studio operators.
- **Simple Installation.** AI-2 installation is extremely simple, the AI-2 is a 1 Unit high product which is designed to fit into an industry standard 19" wide rack. All interface connections are made with standard connectors and the AC supply is a convenient wall mounting transformer. Connection to the AI-2 in its basic form is accomplished by a 9-pin sync cable, which connects to the first ADAT in the system and a cable to the selected controller. Successive ADATs are connected in turn -- sync out to sync in -- using the same 9-pin style connector. When the AI-2 is turned on, it automatically becomes the system master and assigns each ADAT an identification number (ID) from first to last, in the chain. The AI-2 then checks to see which machines have tapes installed and automatically locates the slave ADAT tapes to the master position.

- **Storage of Setups.** The AI-2 can read and write setup information to the beginning of each ADAT tape, for later retrieval. This information (tape table of contents) is in the same format as the ALESIS BRC information. The AI-2 can read existing BRC information from the tape and will use only the data that it requires. The AI-2 intelligently handles all the existing tape header data so that it can be restored to tape non-destructively. AI-2 information saved to a new tape can also be used by a BRC in future sessions.
- **Editor and Synchronizer Control.** The AI-2 permits ADAT tape recorders to be directly controlled from a video editor using SONY protocol or to be integrated into a TimeLine machine control system. The AI-2 ensures a transparent interface to the controller and provides features such as editor track mapping.
- **Time Code Chase.** The AI-2 has a built in broadband time code reader and chase unit. The AI-2 will follow SMPTE or EBU time code that is fed into the reader input.
- **Time Code and MIDI.** The AI-2 generates Longitudinal time code and MIDI time code based on the ADAT's position. The time code generated can be 30, DF, 25 or 24 frame code with 30 and DF being generated at a frame rate of either 30 or 29.97 fps (frames per second). The AI-2 generator is user selectable to run in Play, Stop and Wind transport modes.
- **Selectable Sample Clock Rates.** The AI-2 will lock the ADATs to either internal or external digital audio word clocks. When the AI-2 is generating the ADAT sample clock, a nominal sample rate of 48 KHz, 47.952 KHz, 44.1 KHz or 44.056 KHz can be selected by the user. When a sample rate other than 48 KHz is selected, the AI-2 takes care of the frame rate conversions, so the controlling device always sees time code at the correct rate. The AI-2 even includes a variable sample clock option so the ADATs can be run in varispeed if required.

1.1 IMPORTANT NOTES ABOUT THIS MANUAL

The AI-2 is an extremely easy to use interface, and has been designed to automatically configure, depending on the control signals that are detected. Although it is possible and extremely tempting to just plug in and start working, we strongly urge that you read the chapter, Getting Started in this manual, and the sections on Formatting in the ADAT Reference manual before you start using the AI-2. At a later date we recommend that you read the entire manual to acquaint yourself with the many AI-2 features that you'll only discover by reading the manual.

1.2 OVERVIEW OF MAIN FUNCTIONS

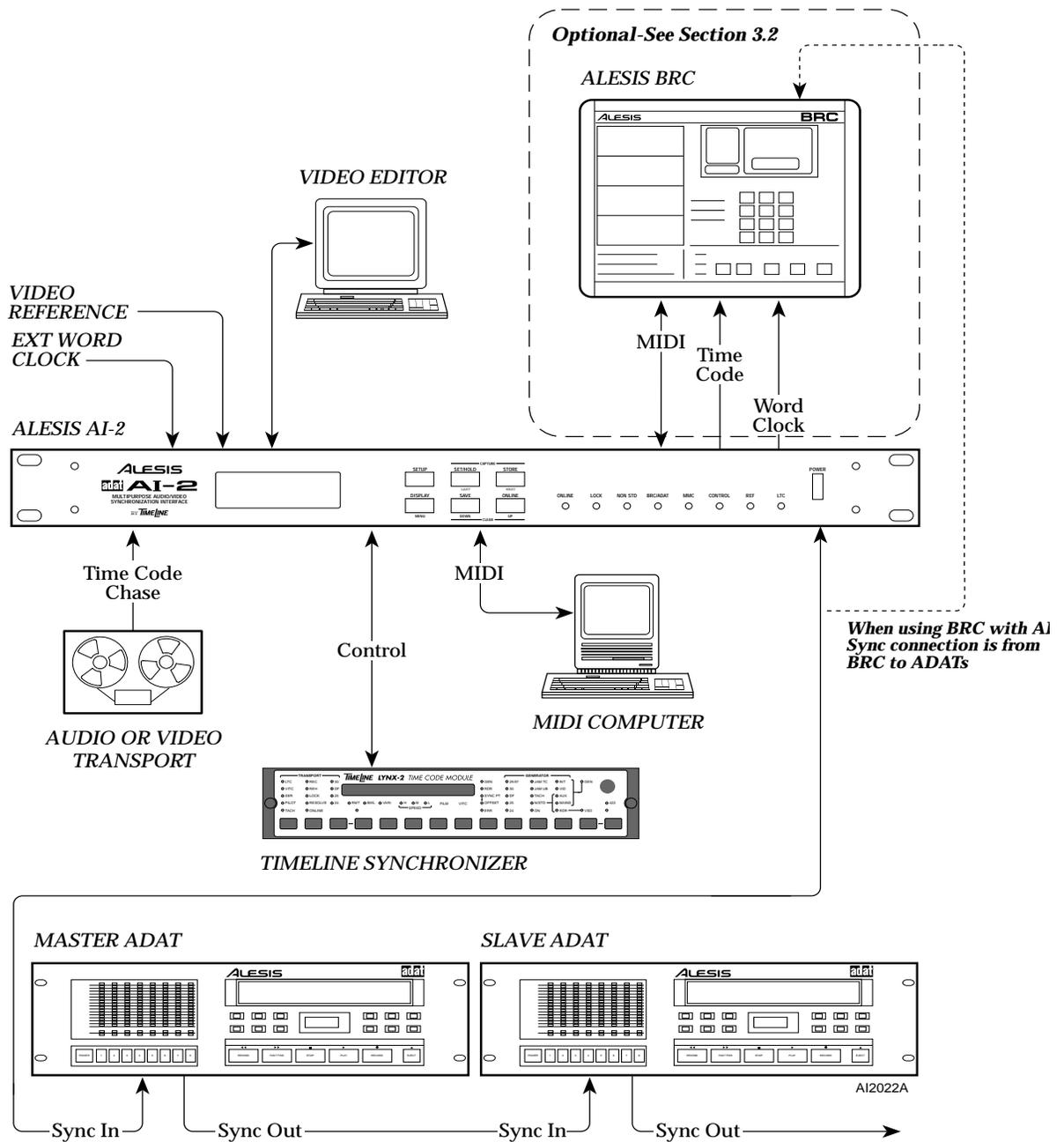
The AI-2 is an extremely complex and sophisticated interface that has been designed to handle the demands of multitrack studio recording and the post production process. Here is a brief rundown of the AI-2's main functions.

1.2A Multiple Control Methods

The AI-2 allows multiple ADAT transports to be operated by a number of external controls or synchronization devices. The AI-2's Control menu lets you select the controller, or if set to AUTO, will detect which controllers are connected and communicating and automatically switch. The AI-2 also allows simultaneous communication with a MIDI sequencer or controlling device.

1.2B Control of ADAT Functions

The AI-2 lets an external controller take control of many of the ADAT functions. All basic transport functions, including Digital input, All input and Auto input, can be controlled from the AI-2. The AI-2 also allows remote control of all 128 possible Track enables and when used with a video editor the AI-2 TRACKS menu provides comprehensive track mapping functions.



1.2C Reading and Saving Data

The AI-2 can read and save session data to the ADAT tape header or to external MIDI devices. This means that each time a new ADAT tape is put in the machine the AI-2 will be able to read all the associated Cue or Song times and you will be able to synchronize the tapes, effortlessly.

1.2D Reference Select

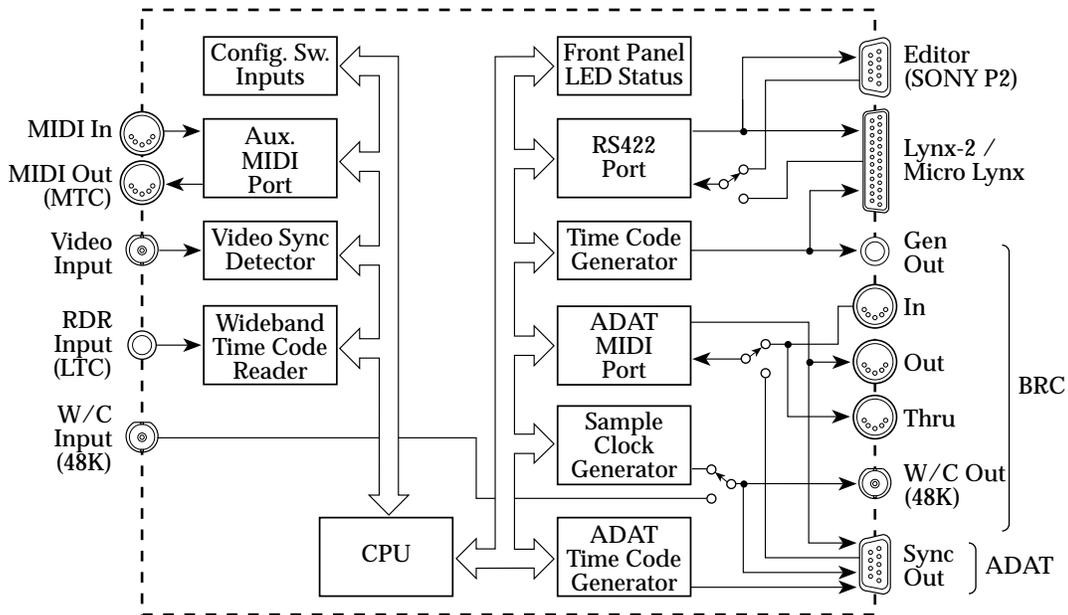
The AI-2 has comprehensive reference select options, which have been structured to accommodate any possible combination of reference source, time code and sample rate. Each of the variables can be set in the REFERENCE menu. The AI-2 effortlessly handles the conversions and controls the ADAT at the correct speed.

1.2E Status LEDs and Messages

The AI-2 front panel has eight LEDs that constantly indicate system status. In addition these LEDs are programmed to flash and warn the operator if there is a problem. The AI-2 also has a display message system which gives tape status, system status and error or warning messages when they occur

1.2F Block Diagram

The following AI-2 block diagram shows how the functional blocks in the AI-2 and the physical connectors are related.



AI2001A

1.3 INPUT CONTROL MODES

The AI-2 can be controlled by one of four methods.

1. The AI-2 and the attached ADATs are controlled by a video editor, or similar device, via a RS422 cable using standard Sony protocols. The AI-2 emulates the functionality of the Sony PCM-7030 digital audio tape recorder.
2. The AI-2 and the attached ADATs are controlled by a TimeLine Lynx-2, Micro Lynx, or other synchronizer, using an interface cable supplied by the synchronizer manufacturer. This cable carries both control and time code information between the two devices.
3. The AI-2 and the attached ADATs chase (follow) SMPTE or EBU time code, which is fed into the AI-2's time code reader input.
4. The AI-2 and the attached ADATs are controlled by MIDI Machine Control (MMC) commands presented at the AI-2's Control MIDI Input.

1.4 OUTPUT CONTROL MODES

The AI-2 can control ADAT transports by one of two methods.

1. The AI-2 directly controls up to 16 ADAT recorders using the proprietary Alesis daisy-chain cabling technique used when multiple ADAT's are connected. The BRC Remote Control is not used. The digital audio sample rate clock (word clock) for the ADAT is generated by the AI-2.
2. The AI-2 controls the ALESIS BRC Remote Control, which is then used to directly control up to 16 ADATs. The AI-2 controls the BRC, using MIDI, word clock and time code signals.

1.5 "ENGAGED" VS. "DISENGAGED" TAPES

Analog audio recorders typically move tape past the heads between 1-7/8 and 30 inches per second. Higher play speeds result in a higher bandwidth, or the ability to record high-frequency signals on tape.

ADAT digital audio signals require a much higher bandwidth than analog audio. To provide the increased bandwidth required, the ADAT uses a VHS mechanism, which has a head drum that rotates at very high speeds and records the digital audio on diagonal tape tracks. This has the same effect, as far as the head is concerned, as moving the tape at a much faster speed.

With ADAT, the tape is "engaged" if the tape is not moving, but is in contact with the rotating head. This allows the ADAT to go into Play or Record, instantaneously. When the AI-2 puts the system into Still or Stop, the head remains spinning and the tape is not disengaged.

When the tape is "disengaged", the ADAT head stops rotating and the tape moves away from the head -- to prolong both tape and head life. If the tape is disengaged, the ADAT will take slightly longer to go into Play or Record as the tape has to engage. This type of transport operation is identical to the operation of a normal video tape transport.

The AI-2 will disengage the ADAT tape if it receives an Allstop command and will engage the tape on receiving any transport command, including Stop. The ADAT transport will automatically disengage the tape to minimize wear if no transport activity occurs after a period of 4 minutes.

CHAPTER 2: INSTALLATION

The AI-2 is a 1 unit high 19" Rack mount device. We recommend that you install the AI-2 in the same rack or close to the ADAT transports, permitting connection to the first ADAT transport with a standard ALESIS 9-pin sync cable. If it is not possible to locate the AI-2 adjacent to the ADAT, then the sync cable should be kept as short as possible because the cable carries a high frequency sample clock signal (48.000 KHz) which will degrade over distance.

The AI-2 rear panel provides connectors for the system timing reference, controllers, the BRC and the ADAT machine chain.

Hook up the wall mounting power supply and control cables and power on the AI-2, check that the front panel LCD backlight illuminates.

2.0 POWER CONNECTION

Power for the AI-2 is provided by a 10 volt AC, 7.5 VA wall mounting transformer, connect the output from the transformer to the 2.5 mm jack socket marked POWER. The AI-2 power input circuitry is designed to accept 9-12V AC. It will also accept a 9-12V DC input voltage of either polarity.

2.1 CONFIGURATION SWITCH

Next to the power connector is an eight position dip switch, which is used to configure default setups and the AI-2 MIDI IDs.

DS #1	25 Frame initialization default
DS #2	Extended play tape times
DS #3	Defeat power up sequence
DS #4	Enable Setup mode Read Only option
DS #5	Midi device ID#
DS #6	Midi device ID#
DS #7	Reserved
DS #8	Reserved

It is not necessary to alter any of these dip switches now, except for dip switch one (DS #1), which is used to default the AI-2 for 25 Frame operation after a system ram clear. If you are using the AI-2 in Europe or will always be working with EBU time code then we suggest that you set dip switch one ON.

2.2 REFERENCE CONNECTION

The AI-2 reference connections are used to connect an external speed reference. Connectors are provided for time code, word clock and video signals. These signals are used to control the speed the ADAT machines will run at when in Play.

2.2A RDR IN

The RDR IN connector is a 1/4" TRS jack. The reader input is differential with an input impedance >10k ohms and an input range of -20 to +10 dBm. Connect a Longitudinal Time Code (LTC) feed to this input when it is required to resolve the speed of the system to time code or use the AI-2 as a time code chase synchronizer for the ADATs.

2.2B W/C IN

The W/C IN connector is a female BNC socket. The word clock input is 5 volt TTL. Connect a word clock reference source to this input when it is required to resolve the speed of the system to an external digital sample rate signal (word clock). The AI-2 word clock input range is greater than the ADAT control range of 40.363-50.854 KHz. Input signals with a 50% duty cycle are recommended.

2.2C VID IN

The VID IN connector is a female BNC socket. The video input is single ended with an input impedance >2k ohms and an input signal range of 0.5-8.0 Vpp. Connect a video signal to this input when it is required to resolve the speed of the system to video sync. The video input will accept properly terminated Black burst, Color bars or Composite sync. We do not recommend connecting the output of a video tape transport.

The AI-2 video in connector can also be used as a video output if the TimeLine Video Sync Generator card (VSG) is fitted inside the AI-2. The VSG, can be used to generate composite sync at black level, which is locked to the ADAT system reference. This ability is extremely useful when a video deck needs to be locked to an ADAT system and for some reason it is not possible to lock the entire system to external video sync.

2.3 CONTROL CONNECTION

The AI-2 control connections are used to connect an external controller. Connectors are provided for a video editor or similar controller, the TimeLine Lynx-2 or Micro Lynx synchronizers, and MIDI. These inputs are used to control connected ADATs through the AI-2. The reader input can also be considered a control source when the AI-2 is operating in time code chase mode.

2.3A EDITOR

The EDITOR connector is a 9-pin D type socket. The editor connector conforms to the standard RS422 configuration and operates asynchronously at a standard transmission rate of 38.4 Kbits per second. The editor port communications are Sony serial protocol. Connect a 9-pin RS422 cable from an editor port to this socket when it is required to control the AI-2 from a video editor. The AI-2 emulates the SONY PCM-7030 digital audio tape recorder, for best results select this device driver in the editor.

2.3B LYNX-2/MICRO LYNX

The LYNX-2/MICRO LYNX connector is a 25-pin D type socket. The Lynx-2/Micro Lynx connector is an integral synchronizer connector that contains RS422 communications, time code and a system frame reference. Connect a TimeLine ADAT interface cable from the Lynx-2 or Micro Lynx transport connector to this socket when it is required to synchronize ADATs in a TimeLine machine control system.

2.3C MIDI IN

The MIDI IN connector is a 5-pin din socket. The MIDI input is used for MIDI Machine Control (MMC), external MIDI commands to the AI-2, and feed through commands to the BRC, when connected. Connect a MIDI cable to this socket when it is required to control the AI-2 from an external MIDI device or controller.

2.3D MIDI OUT

The MIDI OUT connector is a 5-pin din socket. The MIDI output is used for MIDI Machine Control responses (MMC), AI-2 responses and BRC responses to external commands, and for MIDI Time Code (MTC). Connect a MIDI cable to this socket when using an external MIDI controller that requires MIDI responses.

2.4 BRC CONNECTION

The AI-2 BRC connections are used to connect a BRC to the AI-2. Connectors are provided for MIDI, time code and word clock. These signals are used to control the BRC which in turn controls the connected ADATs.

2.4A MIDI IN

The MIDI IN connector is a 5-pin din socket. Connect a MIDI cable to this input from the BRC MIDI output. BRC MIDI responses to AI-2 or external requests are returned via this cable.

2.4B MIDI OUT

The MIDI OUT connector is a 5-pin din socket. Connect a MIDI cable from this output to the BRC MIDI input. AI-2 or External MIDI commands are sent to the BRC and ADATs via this cable.

2.4C MIDI THRU

The MIDI THRU connector is a 5-pin din socket. Connect a MIDI cable to this socket if MIDI output responses from the BRC are required.

2.4D GEN OUT

The GEN OUT connector is a 1/4" TRS jack. The generator output is an unbalanced, longitudinal time code feed with a fixed level of 1.0 Vpp. Connect a 1/4" to 1/4" audio jack cable from this output to the BRC SMPTE IN connector. The BRC uses the AI-2 time code output as it's time code chase input. When ADATs are controlled directly by the AI-2 the generator outputs the LTC value for the current ADAT position.

2.4E W/C OUT

The W/C OUT connector is a female BNC socket. The word clock output is a 5V TTL signal. Connect a BNC to BNC cable from this output to the BRC 48 KHz input. This connector feeds either external word clock or the AI-2 sample clock generator output to the BRC.

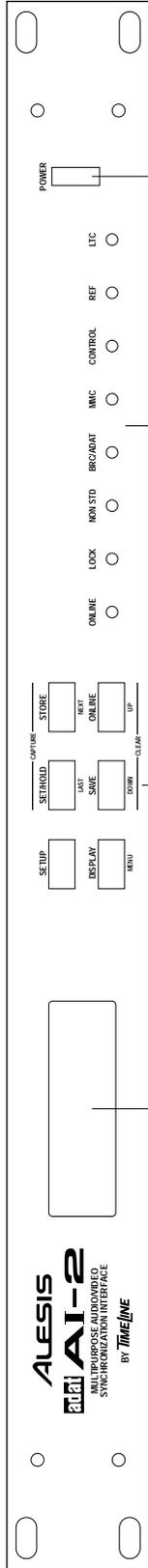
2.5 ADAT CONNECTION

The AI-2 ADAT connection is used to connect the AI-2 to the first ADAT machine, Successive ADATs are connected in turn, sync out to sync in. This connector is not used when a BRC is configured as part of the system.

2.5A SYNC OUT

The SYNC OUT connector is a 9-pin D type socket. The sync out connector is used for direct connection to the ADAT machine chain. Connect a male 9-pin D type cable from this connector to the sync in connector on the first ADAT machine. This connector supplies commands, 48 KHz clock and Alesis ADAT proprietary synchronization control information to the ADAT machines.

FRONT PANEL



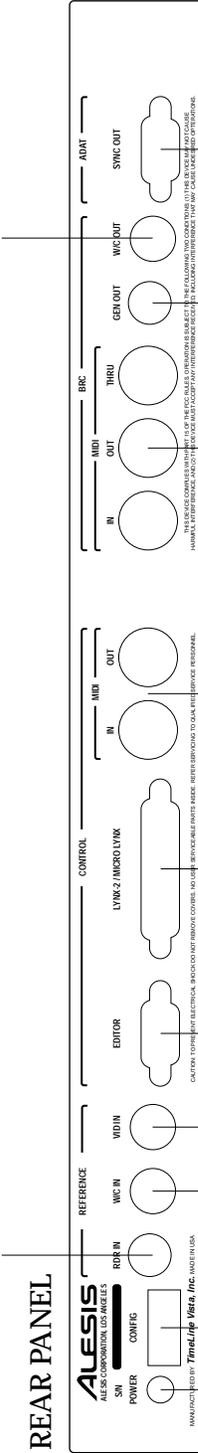
LCD Display

AI-2 Control and Setup Keys

Control and Communication Status LEDs

Power Switch

REAR PANEL



9-12V AC Power Connector

Word Clock Input BNC Connector

Editor 9 Pin D Connector

Lynx-2/Micro Lynx Synchronizer 25 Pin D Connector

MIDI In/Out 5 Pin Din Connector

BRC MIDI 5 Pin Din Connector

Sync Out 9 Pin D Connector

Video Input BNC Connector

Generator Out 1/4 inch TRS Jack

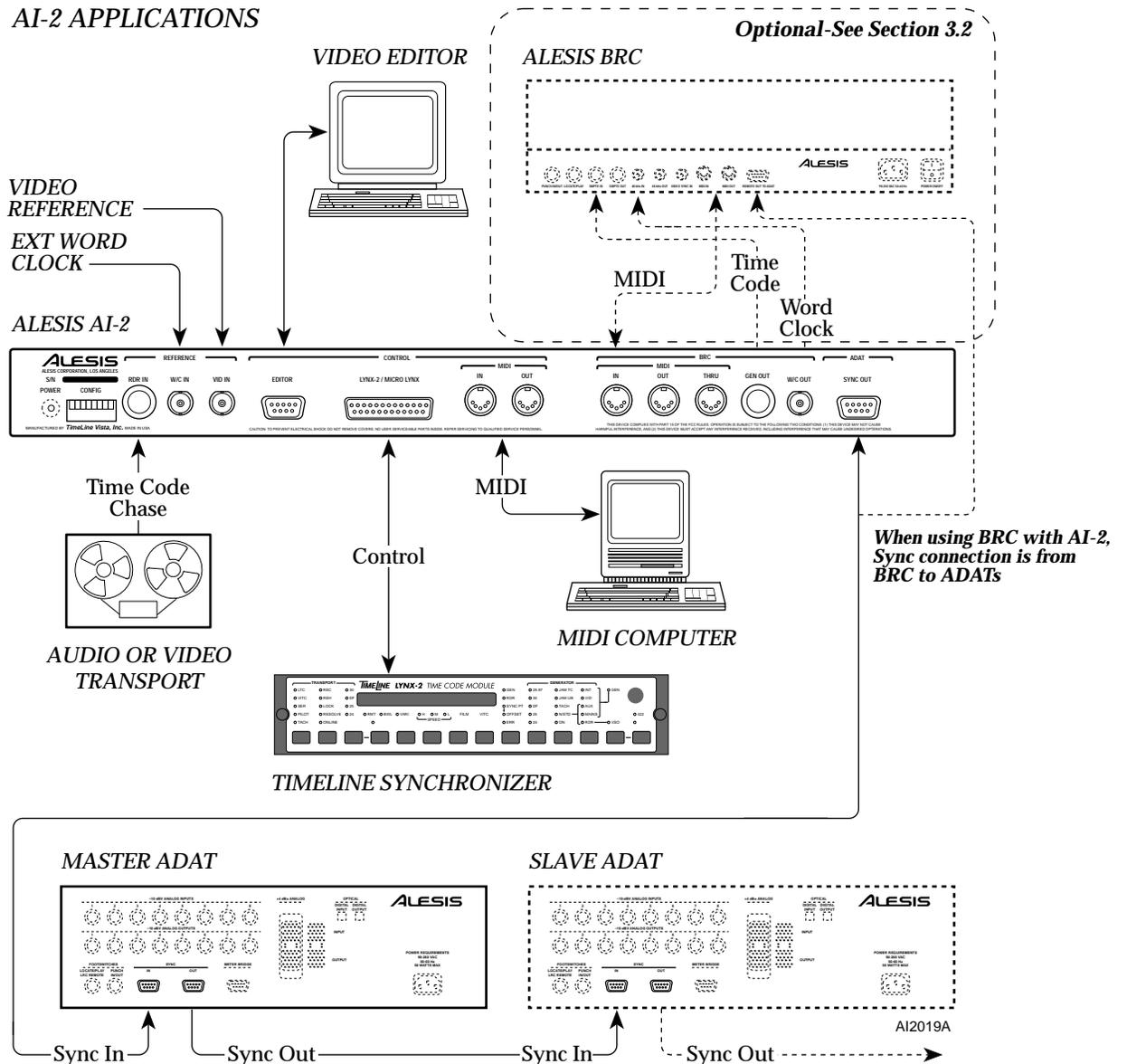
Word Clock Out BNC Connector

CHAPTER 3: APPLICATIONS

3.0 AI-2 INTERFACING

The AI-2 is designed to quickly and effectively integrate the Alesis ADAT digital audio tape recorders into studio and post production facilities. The AI-2 can be used for a wide range of applications, from basic phase synchronization to full control of 16 ADAT transports from a video editor. The first diagram shows a generic configuration, indicating a number of possible applications.

AI-2 APPLICATIONS



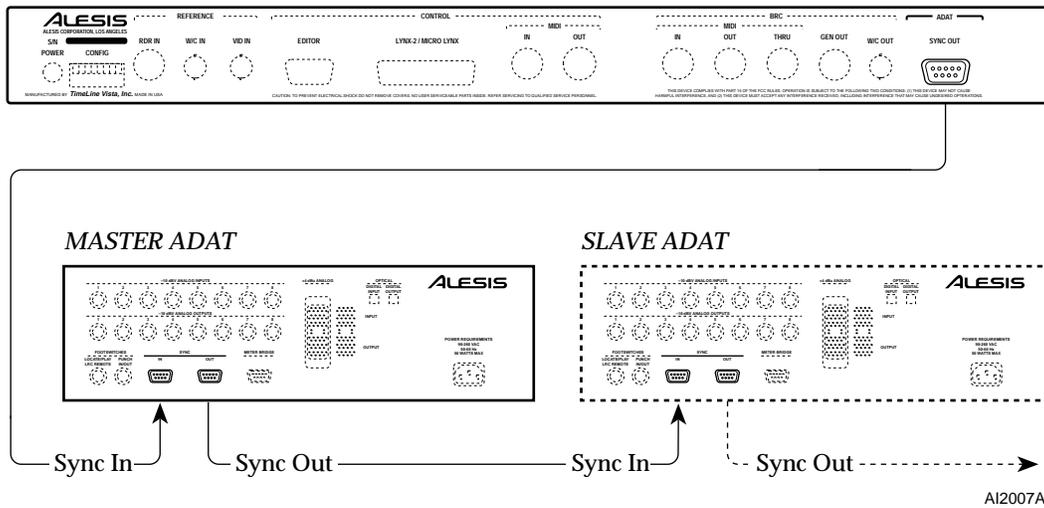
3.1 INTERFACING TO ONE OR MORE ADAT'S

The AI-2 is used to connect one or more ADATs to a control system. The basic ADAT connection is shown here. When the AI-2 is powered on it takes control of the ADAT chain and automatically assigns machine IDs to the connected ADATs. Although by itself the AI-2 cannot control the ADAT chain, if a reference source is connected to the AI-2, when the ADAT transports are put into play locally, the speed of the transports will be resolved to the selected reference by the AI-2.

Connect a standard Alesis ADAT interconnect cable between the AI-2 9-pin SYNC OUT connector and the SYNC IN connector of the "master", or first, ADAT. Connect additional ADATs, SYNC OUT to SYNC IN as described in the ADAT reference manual.

CONTROLLING ONE OR MORE ADAT'S (BASIC INTERFACE)

ALESIS AI-2



When all the connections have been made, and the units powered on, the BRC/ADAT LED on the front panel of the AI-2 should be illuminated, to indicate that valid communication is occurring between the AI-2 and the ADAT units. If the LED does not light (no communications) or is flashing (communication taking place, but with errors) then recheck the cable connections.

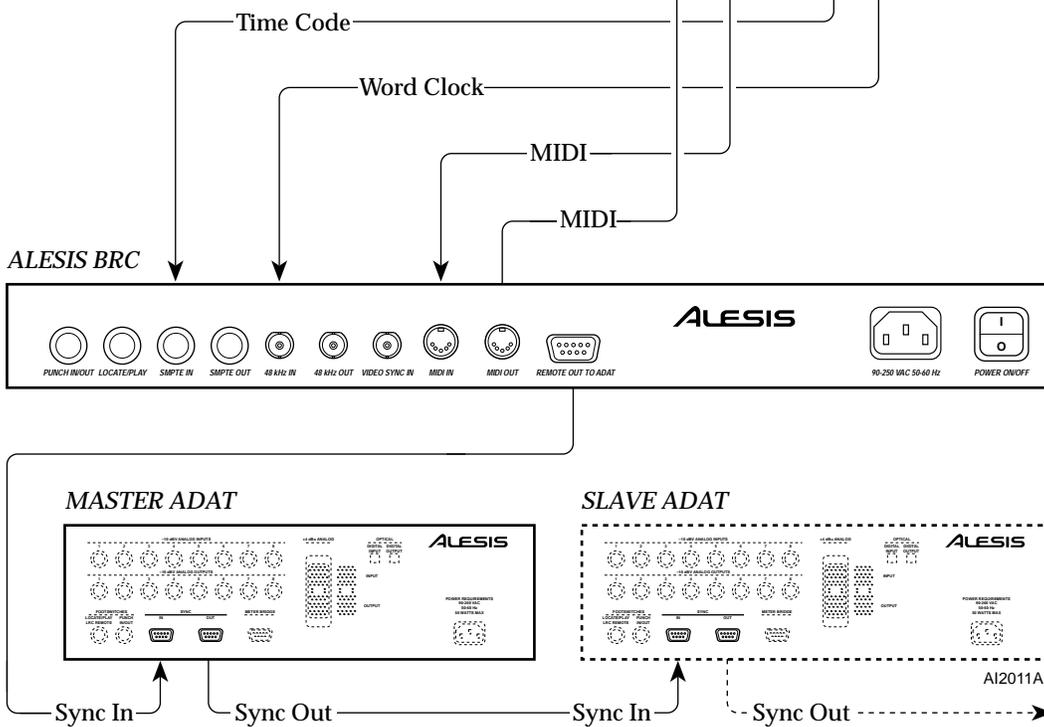
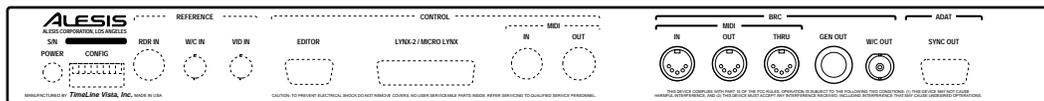
3.2 INTERFACING TO THE BRC REMOTE CONTROL

The AI-2 can be used to control one or more ADATs through the BRC, this allows an "ADAT system" to be connected to a machine control system or video editing system. The AI-2 communicates with the control system and the BRC which can be used to provide such features as track enable buttons and MIDI song tempo mapping. The basic connections are shown below.

Connect the cables between the AI-2 BRC connector section and the BRC. Two standard MIDI cables from AI-2 MIDI IN to BRC MIDI OUT, and from AI-2 MIDI OUT to BRC MIDI IN. A standard BNC to BNC coaxial cable from AI-2 W/C OUT to BRC 48 KHz IN and a mono or stereo jack plug to jack plug cable from AI-2 GEN OUT to the BRC SMPTE input. Connect the BRC REMOTE OUT TO ADAT connector to the SYNC IN on the first ADAT transport.

CONTROLLING THE BRC

ALESIS AI-2



Note, that the ADAT SYNC OUT connector on the AI-2 rear panel is unconnected for this mode of operation.

When all connections have been made, and the units powered on, the BRC/ADAT LED on the front panel of the AI-2 should be illuminated, to indicate that valid communication is occurring between the units. If the LED does not light (no communications) or is flashing (communication taking place, but with errors), then recheck the cable connections.

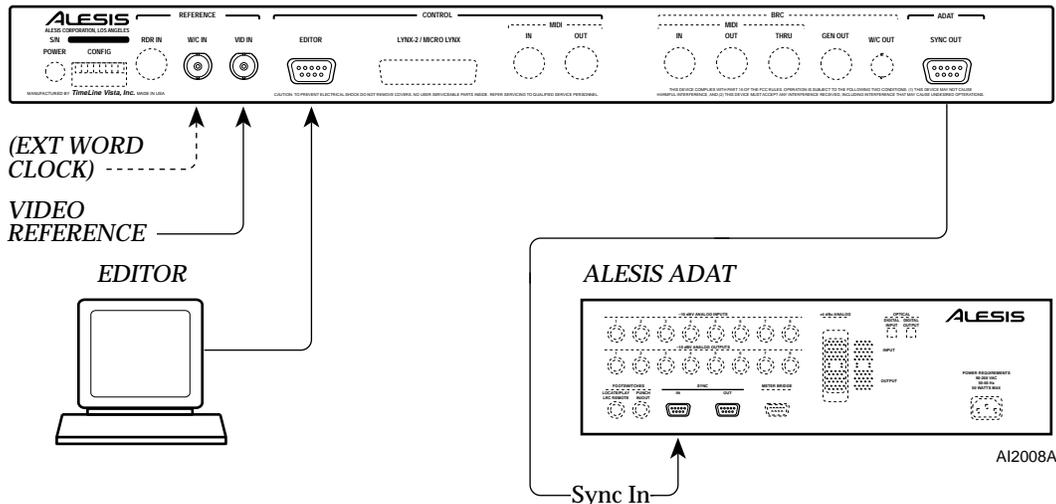
3.3 INTERFACING TO A VIDEO EDITOR

The AI-2 can be used to connect ADATs to a video editing system or other editing devices. The AI-2 provides a 9-pin SONY protocol VTR emulation for the ADAT transport. The AI-2 offers a number of editor specific functions such as selectable E-E and record field options and a comprehensive track mapping menu that maps editor track enables to selected ADAT tracks or machines.

Connect a standard RS422 cable from the 9-pin EDITOR connector in the control section of the AI-2 rear panel to a control output port on the editor. Connect a video reference signal to the VID IN connector in the reference section of the AI-2 rear panel. This video reference can be either black burst, color bars or composite sync, at either video or sync levels. The AI-2 normally emulates the SONY PCM-7030 DAT recorder, if the editor does not recognize this ID then the AI-2 emulation can be set to BVU950. Consult the Appendix for further details about emulation constants.

EDITOR INTERFACE

ALESIS AI-2



If required, an external digital audio sample rate clock may also be connected to the W/C IN connector in the reference section of the AI-2 rear panel. For the system to operate satisfactorily, the external sample rate clock must be correctly synchronized to the video reference signal connected to the video input.

When the Editor is connected and communicating correctly, the CONTROL LED on the front panel of the AI-2 should be illuminated, to indicate that valid communication is occurring between the units. If the LED does not light (no communications) or is flashing (communication taking place, but with errors), then recheck the cable connections.

The REF LED on the AI-2 front panel should also be illuminated, indicating the presence of a valid video reference. If the REF LED is flashing then check that a valid source of video sync is connected.

3.4 INTERFACING TO THE LYNX-2 OR MICRO LYNX

The AI-2 has a special control connector for interfacing to the TimeLine Lynx-2 and Micro Lynx synchronizers. To simplify the machine control interface this connector supplies machine control commands, time code and a system timing signal all in a single cable. The latest versions of TimeLine software include special optimized drivers for the ADAT machine and new features such as expanded track support up to 128 tracks. The TimeLine interface permits ADAT machines to be used in literally any situation where ADATs need to be synchronized with other transports, film, video or audio.

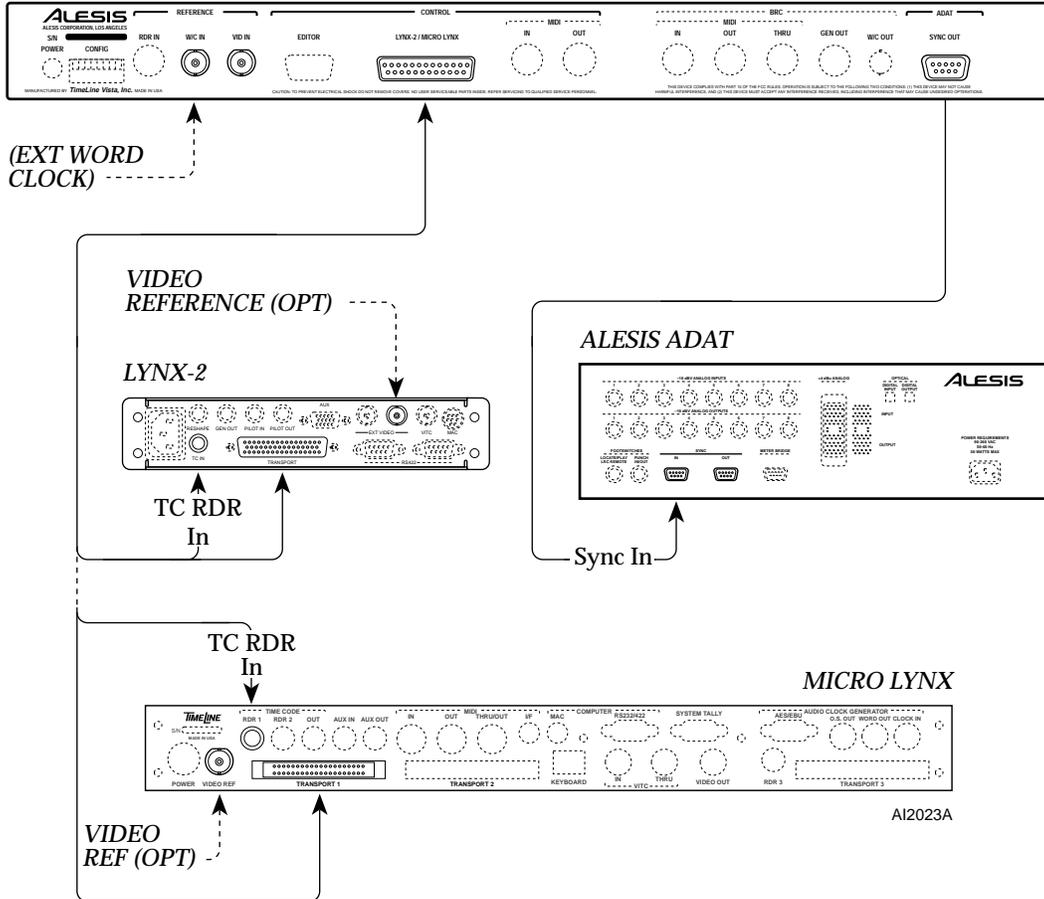
Connect a TimeLine ADAT interface cable from the LYNX-2/ MICRO LYNX connector in the control section of the AI-2 rear panel to the appropriate transport connector on the synchronizer. The synchronizer end of this cable has a small pigtail cable with a 1/4" plug attached. This is the AI-2 time code line and should be plugged into the appropriate time code reader input.

Connect a video reference signal to the VID IN connector in the reference section of the AI-2 rear panel. For a Lynx-2 or Micro Lynx system, it is not necessary to connect a video reference to the AI-2 video input, however it should be connected as a matter of good practice, even if the synchronizer is using video sync as a reference. The original Lynx synchronizer, as well as other synchronizer systems require video sync to be connected to operate correctly. Refer to the appendix for more information on interfacing with the Lynx.

An external digital audio word clock can be connected to the reference W/C IN connector. The same precautions apply as for the video editor interface, the word clock and synchronizer system must both be locked to the same reference signal. For example, if the synchronizer system is referenced to video sync, then the word clock must also be referenced to video sync.

LYNX-2 OR MICRO LYNX INTERFACE

ALESIS AI-2



When the Lynx-2 or Micro Lynx is connected correctly the CONTROL LED on the front panel of the AI-2 should be illuminated, to indicate that valid communication is occurring between the units. If the LED does not light (no communications) or is flashing (communication taking place, but with errors), then recheck the cable connections.

3.5 TIME CODE CHASE INTERFACE

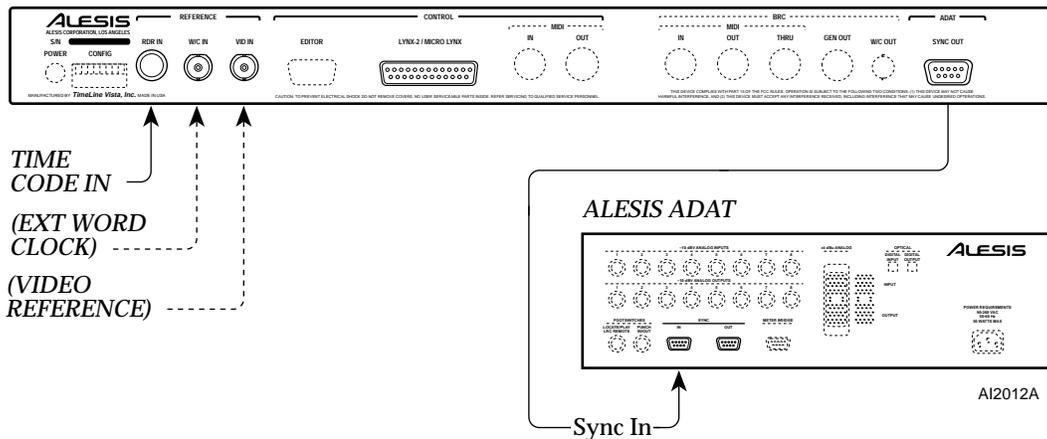
The AI-2 has a high resolution bi-directional time code reader that has been specifically designed for time code chase applications. The reader can read all time code types, at any rate, including discontinuous high speed code. The AI-2 thereby ensures that ADAT tape recorders can be integrated into a system when only a time code feed is available. The AI-2 reader has a wide input range and an adjustable flywheel option to cater for bad time code. The reader input can also be selected as the system reference when it is necessary for the ADAT to lock to unreferenced or off speed code.

Connect the RDR IN connector in the reference section of the AI-2 rear panel to the reference or master time code with a standard mono or stereo jack plug cable.

In time code chase mode an optional video sync or word clock reference may be connected. If an external reference is supplied, the AI-2 will resolve the ADATs to the reference, while using the time code input as a numerical reference only.

TIME CODE CHASE INTERFACE

ALESIS AI-2



Similar precautions apply, when using an external word clock, as for the previous methods of operation. The word clock must be locked to either the video reference, if used, or to the time code which is being fed to the reader input.

On the AI-2 front panel, the LTC LED will illuminate when valid time code is being received at the rear panel reader input. If the LED does not light or is flickering then check the time code cable or the output level of the time code source.

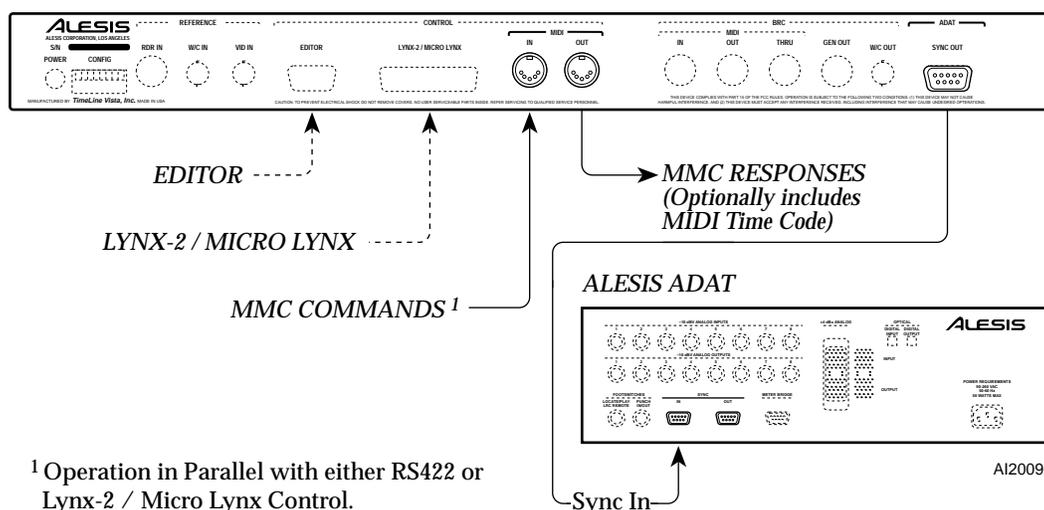
3.6 EXTERNAL MIDI INTERFACING MIDI MACHINE CONTROL

The AI-2 can be controlled from a MIDI controller or software program that generates MIDI Machine Control (MMC) commands. MIDI Machine Control commands and responses will operate simultaneously with either the Editor or Lynx-2/Micro Lynx synchronizer controllers. The AI-2 permits the seamless integration of ADAT transports into the electronic music studio as MIDI programs designed to control the BRC or ADAT machines can be operated without configuring the system.

MIDI Machine Control commands are fed to the AI-2 using a standard MIDI cable to the MIDI IN connector in the control section of the AI-2 rear panel. MIDI Machine Control responses will appear at the MIDI OUT connector. The MIDI out connector also optionally includes MIDI time code.

EXTERNAL MIDI INTERFACING MIDI MACHINE CONTROL

ALESIS AI-2



¹ Operation in Parallel with either RS422 or Lynx-2 / Micro Lynx Control.

During operation the MMC LED on the AI-2 front panel illuminates to indicate valid MIDI data is being received. If the LED does not light (no communications) or is flashing (communication taking place, but with errors), then recheck the MIDI cable connections and make sure that the MIDI controller or software is actually generating MMC messages.

Details of supported MIDI Machine Control commands and responses may be obtained by contacting TimeLine.

3.7 DIGITAL TRANSFER WITH THE AI-1

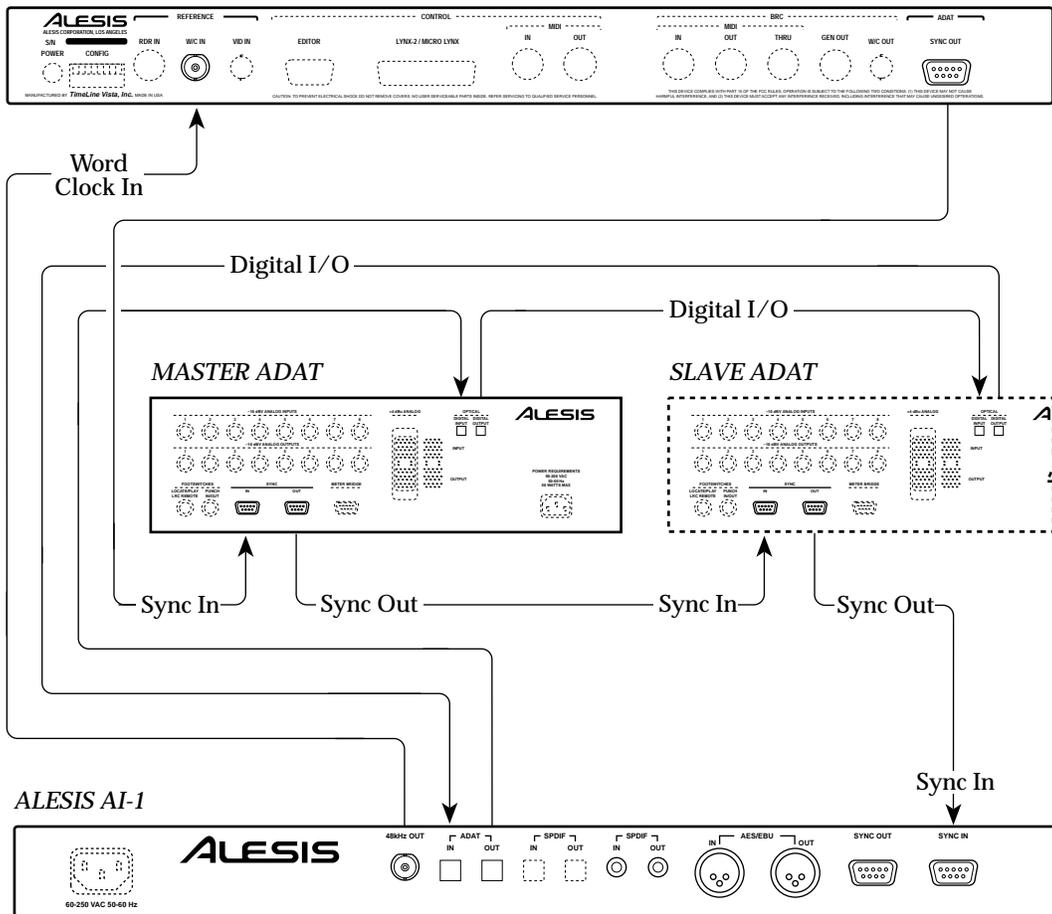
The AI-2 can be used with the Alesis AI-1 digital audio interface. This permits synchronized digital audio transfer to and from other multitrack digital audio tape recorders, DAT machines, digital audio workstations and synthesizers. The AI-1 transfers digital audio in the AES/EBU or S/PDIF formats. Both these formats use a self clocking signal and care should be taken to ensure that the digital audio equipment being synchronized is all locked to a common reference.

The AI-1 should be installed at the end of the ADAT chain after the last ADAT transport. Connect a standard Alesis sync cable from the AI-2 SYNC OUT to the SYNC IN connector of the first ADAT transport, connect further ADAT transports sync in to sync out, in the normal manner. Connect the SYNC OUT connector of the last ADAT to the AI-1 SYNC IN connector. Connect the ADAT proprietary multichannel optical digital interface so that there is a complete loop from the AI-1 digital output through all the ADAT transports, digital out to digital in, back to the AI-1 digital input. Connect a coaxial BNC to BNC cable from the AI-1 48 KHz output to the AI-2 W/C input.

The AI-2 requires the 48 KHz word clock signal from the AI-1 to ensure the timing and positional information, being sent to the ADATs, remains synchronous. If required an external video sync signal can be connected to the reference VID IN connector or synchronizer reference to the Lynx-2/Micro Lynx connector and the AI-2 will use these signals to derive a frame edge for external synchronization.

DIGITAL TRANSFER WITH THE AI-1

ALESIS AI-2



AI2018A

As for all the previous methods of operation, when using external references similar precautions apply. The reference signals must be locked together. The word clock signal from the AI-1 is derived from the incoming digital audio data, this must therefore be locked to the video or synchronizer reference for the system to operate correctly.

CHAPTER 4: GETTING STARTED

4.0 POWER ON PROCEDURE

Each time the AI-2 is powered up it runs through a series of initialization tests and displays the current configuration. The power on routine tests all front panel for two seconds and then runs through the following display sequence where the AI-2 configuration is displayed in approximately one second steps. If it necessary to reset the AI-2 to default parameters, then press and hold the STORE key when the power is turned on.

CLEARING MEM	Only displayed when the STORE key is held on power up to reset the AI-2.
ALESIS AI - 2 adat Interface	Model and Manufacturer
By TimeLine	
Software Version AI2-001	
Video = NTSC	Video sync source detected if connected Displays "Not Used" if the selected reference is not external video, or "Not available" if the AI-2 does not detect video sync.
Int Video Sync Gen = On	Indicates that a TimeLine internal video sync generator card (VSG) is fitted, and its current status.
adat Reference Ext Vid	Displays the selected speed reference source.
Sample Rate 48.000K	Displays the selected sample rate.
Control	Displays the selected control method.

SONY

Time Code Type
29.97 Hz / DF

Displays the selected frame rate and time code type.

READ FROM TAPE
STORE TO CONFIRM

Prompts to read data from the tape header. Press the STORE key to confirm and read the data or press the DISPLAY key to cancel and continue.

48.000K 29.97 / DF
L HH:MM:SS:FF.

Default display, which shows Sample rate, Frame rate and Code type, the current transport status and tape position.

4.1 ADAT ID NUMBERS

After connecting the sync cables from the AI-2 to the ADATs, turn on the ADATs, and the AI-2, the AI-2 will automatically assign ID numbers for each slave ADAT in the system. Each ADAT will momentarily display its ID number. The IDs are assigned in ascending order, in the order that the ADAT transports are connected. The first unit in the chain is assigned ID 1, the second ID 2 and so on. At any time the ADAT transport configuration is altered by added or subtracted machines from the chain the AI-2 checks the bus and reassigns ID numbers as necessary.

In a multiple ADAT system power must be applied to all ADATs. If an ADAT in the middle of the chain is turned off, then the AI-2 can not communicate with the transports connected after it. If a transport is not required in the system then simply eject the tape to take the machine offline.

4.2 AI-2 CONFIGURATION

The AI-2 has a battery backed up memory system. Each time the AI-2 is turned on it will power up in exactly the same condition as when it was powered down. The first time the AI-2 is turned on the factory default settings are recalled. If any changes are made to the factory setup, they will be saved for subsequent use.

After running through the power on configuration displays, the AI-2 will prompt you to read from tape. If STORE is pressed the AI-2 will rewind the first ADAT transport to the tape header and read the information from tape. If there is no information on tape then press

the DISPLAY key to cancel the read from tape operation. To disable the automatic power up read from tape prompt, set read tape to off in the commands menu.

On initialization the default AI-2 control mode is set to auto. The AI-2 will check the control ports for communication and switch accordingly, if no communication is detected then the AI-2 will switch to reader chase mode.

The AI-2 system reference, and code type and rate are then set depending on the controller type detected. The AI-2 always defaults to a sample rate of 48.000 KHz. In normal operation the sample rate, frame rate and code type are shown in the top line of the display. If required, use the AI-2 reference menu to change the default selections.

4.2A Time Code and Sample Rates

It is extremely important to understand that the ADAT transport is unlike an analog transport where time code recorded on an audio track has a fixed relationship with the program material. The ADAT is unique in that any time code type and any time code number can be selected for a piece of audio on tape. This provides great operational flexibility, but if not clearly understood can potentially lead to synchronization problems.

To determine the ADAT time code position, the AI-2 reads the current digital audio sample number, or number of samples from ADAT tape zero (digital audio sample zero) from tape and calculates a time code number based on the number of samples per frame and the AI-2 time code offset.

The number of samples per frame is a ratio of sample rate to frame rate. For example, at a sample rate of 48.000 KHz and a frame rate of 30 fps, the sample rate ratio is 1600, so for every 1600 digital audio samples the tape moves forward from zero, the ADAT time code position will advance by a frame. At 25 fps the sample rate ratio is 1920, so for every 1920 samples the ADAT time code position will advance a frame.

The AI-2 determines a sample rate ratio from the frame rate and sample rate options selected in the reference menu. The actual time code position is then calculated by subtracting the AI-2 offset from the ADAT tape position determined using this sample rate ratio.

From this it can be seen that when either the sample rate or frame rate is changed, the sample rate ratio and therefore the tape time code position will change. As an example, if the AI-2 sample rate is altered to 44.100 KHz at 30 fps then the sample rate ratio becomes 1470, and the ADAT time code position would now advance one frame for every 1470 samples instead of one frame for every 1600 samples as above.

The AI-2 provides a number of different sample rate frequency options, including 0.1% pull up and pull down rates to allow the user to correct, transfer or synchronization problems. An inadvertent sample rate change from 48 K to 44.1 K is drastic and extremely noticeable and could not be made by mistake, however the 0.1% sample rate options are not nearly as noticeable and should be used with caution.

When operating in a 30 or 29.97 frame based system the AI-2 time code type can be either DF or NDF as required to suit a particular application. Consideration need only be given to normal tape synchronization issues, such as operating with mixed code types.

4.3 SETTING THE SYSTEM REFERENCE

Before using the system, decide what system speed reference the ADATs will be locked to. The AI-2 should be referenced to the same source that the other transports in the system are referenced to. The AI-2 default reference is automatically determined by the control mode. Under normal circumstances it should not be necessary to change this. If a different reference source is required, press SETUP and then the MENU key until the reference menu is displayed. Use the DOWN and UP keys to select the required reference.

4.4 TIME CODE CHASE OPERATION

Time code chase operation can be used as a quick test check that the AI-2 is operating correctly. When there is no controller connected the AI-2 will automatically switch to time code chase mode.

Connect a time code source to the reader input, the time code supplied should be between zero and forty five minutes. Put a formatted tape in the first ADAT transport and press the AI-2 ONLINE Key. Now start the time code source, the ADAT will cue to the reader time code position, go into play and lock.

Press the DISPLAY key until the position error is displayed, an L and 0.00 will be displayed indicating that the ADAT transport is in perfect synchronization with the reader time code. Rewind the time code source, the ADAT will follow the time code, provided that the AI-2 has received time code in wind.

4.5 SETTING AN OFFSET

An offset is used when the ADAT tape time is not coincident with the time code that it must lock to. As it is unlikely that program material on an ADAT tape will have the same time as the master code, the AI-2 offset register can be used to compensate for the difference between the two time codes.

There are three ways of setting an offset. The offset can be manually entered, captured or read from the ADAT tape header if it has been previously saved to tape.

If the time code offset is known then use Set/Hold mode to manually enter it. Press the SET/HOLD key, the frames digits will start to flash, press the SET/HOLD key again to select the required pair of time code digits, then use the DOWN and UP keys to enter the offset.

To capture an offset, play the ADAT transport to a known cue point and press the STORE and SET/HOLD keys together. The AI-2 automatically calculates the difference between the reader input and the ADAT tape time and enters it in the offset register. If required Set/Hold mode can be used to enter or adjust a reader time code position to a known value before using capture.

To set an offset from cue times stored on tape, set use times to on in the AI-2 Cue menu and then select a cue number, the offset will be calculated by subtracting the ADAT Tape time from the Cue start time. See Using Cue Times, for more information on using cue times.

4.6 TRIM AN OFFSET

To trim an offset press the DISPLAY key until the offset register is shown in the display. Press the SET/HOLD key, the frames digits will start to flash, press the SET/HOLD key again to select the desired pair of time code digits, then use the DOWN and UP keys to adjust the offset. When adjusting time code frames or subframes the adjustment can be made dynamically with the ADAT transports in play, so that it is possible to listen to audio as it comes into sync. Once the correct offset is entered, press the STORE key to save the offset and exit Set/Hold mode.

4.7 USING CUE TIMES

The AI-2 stores start time and offset information for 20 cues, this information can be saved to and read from the ADAT tape header. Each cue has a name, a start time and a tape time. AI-2 cues are the same as BRC songs and the AI-2 start time is referred to as the SMPTE start offset in BRC documentation.

To use the AI-2 cues, the cue menu option Use Times must be set to on. When use times is selected the times for the current cue are added to the main display rotation and can be edited using Set/Hold mode in the normal manner.

If use times is set on the AI-2 offset and capture feature operates as follows. When a cue is selected in the cue menu the offset is automatically calculated from the cue times by subtracting the start time from the tape time. Selecting a different cue causes the offset to immediately recalculate.

Pressing capture transfers the current reader time to the start time register and current ADAT time to the tape time register and then calculates the offset as above. This process updates the selected cue times, ready for saving to tape. It should be noted that the AI-2 cue start time is a high resolution time code number which contains subframe information.

If an offset is entered or captured when use times is set to off, the AI-2 calculates the current cue start time from the offset and zeros out the tape start time. The AI-2 automatically updates the current cue time, even if use times is set to off, so that offset information is always ready to be stored to the ADAT tape header.

4.8 SAVING TO TAPE

The AI-2 can be used to save status information to the ADAT tape header at the end of a session. The AI-2 transfers project information, such as code type, and most significantly the Cue start and Tape start times, this allows offsets to be automatically recalled at a future date. The information is saved in BRC format, so it can be read by either another AI-2 or the BRC. At the end of a session press the AI-2 front panel SAVE key, followed by STORE to confirm the save command. The AI-2 will rewind all the ADAT tapes to the header and transfer the data to each tape.

4.9 CUSTOMIZING THE SETUP

The AI-2 setup can be customized at any time, entering Setup mode does not affect normal operation of the AI-2. However, care should be taken when altering the system reference, sample rate or code rate and type as this causes the AI-2 to relock or internally recalculate the sample rate ratio, which will put the ADATs into stop and disengage the tapes.

In situations where it is necessary to prevent alteration of AI-2 setup parameters, setup mode can be made read only by setting a rear panel configuration dip switch.

4.10 RESET THE AI-2

The AI-2 can be reset to factory default parameters by holding the STORE key when the unit is powered up. The display will show the message Clearing Mem and then run through the normal power on procedure. Any ADAT tape header information stored in the AI-2 will also be cleared.

CHAPTER 5: OPERATIONAL FEATURES

5.0 MODES OF OPERATION

The AI-2 has four modes of operation, Normal, Set/Hold, Command and Setup. These modes are described in detail in this section. The AI-2 will usually be used in Normal mode. Set/Hold mode is used to modify and transfer times between registers. Command mode is used for data read and save operations and Setup mode is used to configure or modify the AI-2 operating parameters. In Setup mode the front panel keys have different functions as indicated by the gray italic legends. In all four modes the eight system LEDs always show AI-2 status.

5.1 NORMAL MODE

Normal mode is the basic operational mode for the AI-2. The LCD display will show one of six time code registers. These registers can be selected by pressing the DISPLAY key. Each press of the display key steps to the next time code register, when the last register in the list is reached the display rotates back to the top. The Cue Start Time and Tape Start Time registers are omitted from the display rotation when the Cue menu option Use Times is set to Off. The displays are as follows:

48 , 000K 29 . 97 / DF
L 00 : 00 : 00 : 00

Default AI-2 display, shows, selected sample rate, frame rate and code type on the upper line and the machine status and AI-2 time code position on the lower line. The AI-2 time code position is a calculated time that is the ADAT tape position compensated by the AI-2 offset.

```
CUE Start Time
L 00:00:00:00.00
```

Only displayed when Cue menu option, Use Times is set to on. The time code displayed is for the current cue, selected in the Cue menu. If the cue start time is modified by the Set/Hold or capture process, then the start time in the Cue menu will be updated. The cue start time is normally read from the ADAT tape header and is referred to in other Alesis documentation as song SMPTE Start Offset. The cue start time is used with the tape start time to calculate the AI-2 ADAT offset time. The cue start time is a high resolution time code number, which includes subframes.

```
Tape Start Time
L 00:00:00:00.00
```

Only displayed when Cue menu option, Use Times is set to on. The time displayed is for the current cue, selected in the Cue menu. If the tape start time is modified by the Set/Hold or capture process, then the current tape time in the Cue menu will be updated. The tape start time is normally read from the ADAT tape header. The tape start time is used with the cue start time to calculate the AI-2 ADAT offset time. The tape start time is a high resolution time code number, which can include subframes and 0-15 subframe sample steps. The AI-2 does not display the sample steps but uses them in the offset calculation.

```
Offset
L 00:00:00:00.00
```

The AI-2 ADAT offset. This is the difference between ADAT tape time and the time code number that the AI-2 will generate or return to the controller. If the Cue menu option Use Times option is on, this offset will be automatically calculated from the cue start time (SMPTE start offset) and tape start time (ADAT tape start) times. If the offset is modified by the Set/Hold process, then the cue start time in the Cue menu will be updated. The offset is a high resolution time code number, which can include subframes.

Position Error
L 0 . 0 0

The ADAT transport position error. In play shows subframe error. In time code chase shows, the difference between the time code input and the ADAT or distance between master and slave. In control modes shows, difference between requested location and actual ADAT position.

Reader Input
L 0 0 : 0 0 : 0 0 : 0 0

The time code value being received at the AI-2 reader input.

The AI-2 has a comprehensive error message and warning display system which is used to inform the user of changes that affect AI-2 operation. The AI-2 will prompt or warn of setup changes, such as selection of a new sample rate or change code type change and, physical changes such as loss of reference source. The AI-2 display also indicates tape status information such as tapes write protected and, if they occur software or hardware errors. Depending on the nature of the message, one of three display methods is used.

1. Messages are displayed immediately and are held in the display for a short period, usually two seconds.
2. Messages are displayed immediately and are held in the display until any key except SETUP is pressed to clear the display back to normal operation. The red NON-STD LED flashes to indicate a message is being displayed.
3. Messages are not displayed but are added to a system message stack. The red NON-STD LED flashes to indicate that a change or error has occurred and a message has been placed in the stack. To view the messages, press the STORE key repetitively to step through the stack. When all of the messages have been displayed the display switches back to normal operation. The following example shows a typical error message display.

SYSTEM MESSAGE
S / R O U T O F R A N G E

For a complete list of all the AI-2 messages see Appendix 3.

5.2 SET/HOLD MODE

The SET/HOLD key can be used to "capture" any time code number except the ADAT position error display register. Pressing the SET/HOLD key and holding it down continuously "holds" or freezes the display for observation for two seconds and then releases it to continue incrementing normally. This allows the user to grab and view a time code number on the fly.

A momentary press of the SET/HOLD key captures the display to allow it to be altered or to enter a new time code value. When the display is in Set/Hold mode one pair of time code digits will flash, this pair can be modified with the DOWN/UP keys.

The frames pair of digits (00:00:00:**00**.00) is selected first, subsequent presses of the SET/HOLD key steps up through pairs of digits, and then rotates back around to the subframe digits allowing modification of the complete time code register. Once the correct number is displayed press the STORE key to save the value and exit Set/Hold mode.

In Set/Hold mode, simultaneously pressing the DOWN/UP keys for 1/2 sec will clear the time code value to all zeros, so that it is easy to enter a completely new number. When a pair of digits that is being adjusted with the DOWN or UP keys passes through 00 then the next most significant pair of digits is incremented or decremented by one, accordingly.

Set/Hold mode can be used to transfer a time code value from one register to another register. Select the time code number to be transferred and press the SET/HOLD key, then press the DISPLAY key to step to the register that you wish to transfer to and press the STORE key to save the new or modified value and exit Set/Hold mode.

To exit Set/Hold mode with out saving your changes, press and hold the SET/HOLD key for one second, the display will stop flashing and the original register value will be restored.

The Offset register is treated as a special case, and changes to the register value are made immediately. This permits the tape machine position to be modified dynamically. When the ADAT transport has the correct offset, press STORE or press and hold the SET/HOLD key to exit Set/Hold mode.

The SET/HOLD key is also used in combination with the STORE key to capture a value to the offset register. The AI-2 automatically calculates the difference between the ADAT position and the time

code reader input and enters it in the Offset register. To use the capture feature press and hold the STORE key and then press SET/HOLD.

5.3 COMMAND MODE

5.3A Method for Actioning Destructive Functions

Press the SETUP key to enter Setup mode. Repetitively press the MENU key to select the Commands menu, press the LAST/NEXT keys to select the Data option. Use the DOWN/UP keys to select a data read or save operation. Press SETUP to exit Setup mode, the display prompts for confirmation, press the STORE key to execute or press the DISPLAY key to cancel the command. For example:

SAVE SYSEX
STORE TO CONFIRM

The save data to tape process is not accessed through the Setup Command menu, but directly from a front panel key. To save data to tape, press the SAVE key and the STORE key to confirm.

Only one command can be set at a time, because these commands are considered potentially "destructive" operations. If a command is canceled by pressing the DISPLAY key the Setup Command menu, Data option will be reset to off.

All commands that are used to read or write data, require confirmation with the STORE key as a loss of valuable information could occur.

5.3B Save To Tape

Writes AI-2 data to the ADAT tape header. This command must be confirmed by pressing the STORE key as a loss of information could occur. If performed after a clear header, writes only SMPTE start times, and Tape start times, All Safe, X-fade time, Auto input, All input, Digital input, Track delay, and Pitch Control status and the Pitch value. If performed after a read tape operation will write all original unchanged data back to tape with any new changes that you have made.

Data is written to all connected ADAT transports and all previously recorded data will be overwritten. To PREVENT loss of any information a Read Tape operation must previously have been performed.

5.3C Read Tape

Reads data from the first ADAT tape header. This command must be confirmed by pressing the STORE key as a loss of information could occur. The AI-2 reads and stores every piece of data in the ADAT tape header, even information that the AI-2 does not require. This permits a future Save Data operation to rewrite to tape all the original information. The AI-2 will load and use SMPTE start times, Tape start times, All Safe status, X-fade time, and Pitch Control value and status.

5.3D Clear Header

Resets the AI-2 internal header information to the AI-2 system defaults. This command must be confirmed by pressing the STORE key as a loss of information could occur. All information read from tape will be lost. This feature is used to ensure that data from a previous tape is not written to a new tape. It is recommended that a Clear Header operation be performed at the start of a new session, when there is no data on tape to read.

5.3E Abort Data Read or Save

This command is used to stop a tape or MIDI data save or read operation, once it is in progress. The command must be confirmed by pressing the STORE key. When aborting a save operation, no data will be lost, as the AI-2 retains the original data in memory. Aborting a read operation could result in invalid data in the AI-2.

5.3F Read SysEx

Reads MIDI sysex data from an external MIDI device, through the MIDI IN connector. This command must be confirmed by pressing the STORE key as a loss of information could occur.

5.3G Save SysEx

Dumps AI-2 cue data selected in the MIDI setup menu to an external MIDI device, through the MIDI OUT connector. This command must be confirmed by pressing the STORE key as a loss of information could occur.

5.4 SETUP MODE

Setup mode is used to set or modify the AI-2 operating parameters. Setup is organized in a tree type structure that has menus and submenus with selectable options. The Setup menus and options are described in detail in the Features and Controls section of this

manual. In Setup mode, the function of the front panel keys changes, as indicated by the gray italic legends to MENU, LAST, NEXT, DOWN and UP.

The SETUP key toggles in and out of Setup mode, which can be entered at any time. Press the SETUP key to enter Setup mode and press the key again to exit Setup mode and return to the normal display.

The top level menu structure is arranged alphabetically and in most cases the submenus are also arranged alphabetically, this however was not strictly adhered to if a more obvious or logical order was deemed necessary to simplify operation.

The display in all menus except for the Cue menu is structured so that the upper line indicates, Setup: followed by "Menu name", and the lower line indicates the "submenu " and "selected value or option." For example, sample rate selection in the Reference menu is indicated as follows:

```
Setup: Reference  
S / Rate: 48.000K
```

Because the Cue menu contains time codes, the submenu name is on the top line and cue number and time code are on the lower line.

```
Setup: Cue Start  
1 00:00:00:00
```

The MENU key is used to step through the top level menu list, and the LAST and NEXT keys are used to step through submenus. The DOWN and UP keys are used to adjust the submenu options or values. In some cases to simplify operation, holding the DOWN or UP keys causes the value to automatically scroll.

5.5 SAVING TO TAPE

The AI-2 is equipped to save information to the ADAT tape data header. The AI-2 will transmit cue start times, tape start times, pitch information and ADAT operational status such as cross fade time, all safe status and auto input status over the ADAT sync port to the ADAT machines. Press the front panel SAVE key then the STORE key to confirm the save command. This facility permits vital session data, required for synchronization, to be recalled when a tape is used at a later date.

5.6 READING FROM TAPE

The AI-2 is designed to read information from the ADAT tape data header. When a tape is put into the master machine the AI-2 automatically prompts you to read the data from tape. The AI-2 reads all the ADAT header information, even though it only requires a small amount of the information. All the data is read, so that subsequent tape save operations can restore everything to tape without loss. The AI-2 specifically uses the cue start time and tape start time information. This information is used to calculate the ADAT offset which is required for synchronization.

5.7 AI-2 DEFAULTS

The AI-2 has a comprehensive and intelligent default configuration system that is designed to automatically switch reference and code type based on the type of controller detected. This system simplifies standard configurations for normal operation while still permitting the user to set up the AI-2 for special or unusual applications.

The default control type is auto, this causes the AI-2 to scan the control inputs for a connected control device. The AI-2 speed reference is then set depending on the type of controller detected.

If a SONY editor is detected the reference is set to external video and the code rate and type is then determined by the video sync signal, 29.97 Hz/30 for NTSC and 25 Hz/25 for PAL.

If a TimeLine Lynx-2 or Micro Lynx is detected the speed reference is set to Lynx and the code rate and type determined from system information transmitted by the synchronizer to the AI-2.

If no controller is detected then the AI-2 switches to time code chase mode and the reference is set to reader in. The default code rate and type is determined by configuration dip switch one, if off, to

29.97 Hz/30 and if on, to 25 Hz/25. This however automatically switches if a different code type is detected at the reader input.

The digital audio sample rate at the AI-2's word clock outputs is always set to the ADAT's standard operating frequency of 48.000 KHz

5.8 LONGITUDINAL TIME CODE (LTC)

The AI-2 has a longitudinal time code generator which is used to supply the BRC and other external devices with LTC. The AI-2 takes the ADAT time code on tape and converts it to either SMPTE or EBU time code. The AI-2 time code generator is not intended to be a generator in the traditional sense but a simulation of a normal analog tape, time code output. The time code generated is not ADAT absolute time, as shown on the ADAT front panel, but a virtual or relative time code, that is ADAT tape time minus the AI-2 offset.

For example, if the ADAT time is 30 minutes and the offset is minus 1 hour then the AI-2 time code output would be 1 hour, 30 minutes, calculated as follows:

$$(00:30:00:00) - (-1:00:00:00) = (01:30:00:00)$$

From this calculation, it should be noted that the negative one hour offset gives a positive time code output. If the offset is positive then the calculation would be as follows:

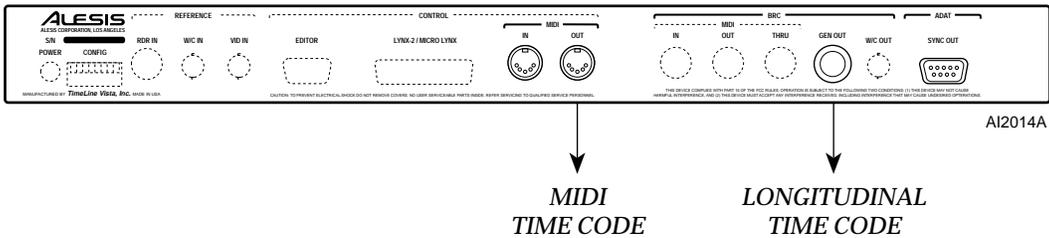
$$(00:30:00:00) - (1:00:00:00) = (23:30:00:00)$$

In this example the time code calculation wraps around the 24 hour boundary and the time code output will be 23 hours and 30 minutes.

The AI-2 time code output can be selected to generate when the ADAT is in play only or when it is in play and wind modes. The code in fast forward and rewind is generated in play speed bursts, with frame numbers dropped out so that it keeps up with the tape position. The AI-2 also generates continuous VITC style time code when the transport is in stop. The generator mode and still options are selectable in the reference setup menu.

TIME CODE

ALESIS AI-2



5.9 MIDI TIME CODE (MTC)

The AI-2 generates MIDI Time Code which is available at the MIDI OUT connector in the control section of the AI-2 rear panel. Operation of the MIDI time code generator follows the LTC generator mode, if the LTC generator is set to generate code in still, play and wind then the MTC generator will do the same.

The MTC output always matches the time code at the GEN OUT connector, which as described above, generates a virtual or relative position for the ADAT at any given time. The MTC generator can be turned on or off in the MIDI setup menu. It should be noted, that the LTC must be on for the AI-2 to generate MTC.

When the MIDI connectors in the control section are being used for MIDI machine control, or for controlling the BRC, the precise timing of the MIDI Time Code output cannot be guaranteed, however every effort has been made to maintain the integrity of the MTC transmission.

5.10 TIME CODE AND SAMPLE CLOCKS

Any device which combines both time code and digital audio sample clocks, must maintain a very accurate interrelationship between the time code rate and the sample clock rate for the system to synchronize. The AI-2 generates both time code and digital audio sample clocks with an extremely precise and consistent relationship.

As an example, if time code is running at 30 frames-per-second and the sample clock rate is 48,000 samples-per-second, then there must be exactly 1600 samples for each frame of time code.

The AI-2 is capable of generating and maintaining all possible frame rate, sample rate combinations locked to either internal or external speed references.

The AI-2 simultaneously generates serial time code for a video editor or synchronizer, LTC, MTC and sample clock, which is sent to the ADAT transport via the SYNC OUT connector or the BRC via the W/C OUT connector.

When the AI-2 synchronizes the ADAT, the time code rate, word clock rate, and the speed of the ADAT tape itself are controlled so that they are all running at one and the same rate.

5.11 SYSTEM REFERENCES

The frame rate of the AI-2's internally generated time code, and the relationship between that rate and the digital audio sample rate, are determined by the selected reference source. Available reference sources are word clock, video sync, Lynx synchronizer frame reference, time code and internal, which can be either fixed or variable. The AI-2 software automatically limits the references available for selection to those that are valid for the selected control type.

Control	References Available	Description
Lynx	W/C, Lynx W/C, Vid W/C, Int Lynx Ext Vid Int Vari Int Fix	Default
SONY	W/C Vid W/C, Int Ext Vid Int Vari Int Fix	Default
Reader Chase	W/C, Vid Reader in Ext Vid Int Fix Int Vari W/C, Int	Default

5.11A External Word Clock Reference

The AI-2 sample rate and time code are derived from an external word clock present at the W/C in connector and one of the three "secondary" frame reference signals described below, Lynx synchronizer, video or internal.

Word clock by itself does not contain frame information so the AI-2 will derive its frame rate reference by bringing its time code frames into alignment with one of the secondary references. For this reason three word clock reference selections are provided.

When operating with an external word clock reference, IT IS ESSENTIAL THAT THE EXTERNAL WORD CLOCK AND FRAME REFERENCE ARE SYNCHRONIZED TO EACH OTHER. If this is not the case, then program material recorded on the ADAT will drift relative to time code. For this reason, THE W/C IN CONNECTOR SHOULD BE USED WITH CAUTION.

5.11B Lynx Reference

The AI-2 sample rate and time code are referenced to a special frame reference signal, provided for the AI-2 by the synchronizer, at the LYNX-2/MICRO LYNX connector.

This signal ensures that the AI-2 will always be correctly synchronized with the frame reference of the synchronizer system. If the synchronizer system reference is changed, the AI-2 will automatically lock to and run at the new reference rate.

5.11C Video Reference

The AI-2 sample rate and time code are referenced to a video sync signal present at the VID IN connector. When selected, the internal time code frame rate and the digital audio sample rate will be derived from this video signal. The AI-2 automatically detects and switches between NTSC (29.97 frames-per-sec) and PAL (25 frames-per-sec).

5.11D Internal Fixed

The AI-2 sample rate is referenced to the AI-2 internal crystal. The frame rate to sample rate relationship is determined internally and then mathematically maintained by the AI-2 so the time code and ADAT transport are always perfectly synchronized.

5.11E Internal Variable

The AI-2 sample rate and time code are derived from a variable internal reference which is adjustable in one cent steps. The AI-2 displays the pitch variation in cents and an equivalent speed percentage read out. The range available at 48 KHz is from +100 to -300 cents. The range at other sample rate frequencies will be different, but consistent with the speed variation limits of the ADAT transport. Internal variable can be used when the ADAT chain is the master transport in a system and it is necessary, for production reasons, to run off speed.

5.11F Reader Input

The AI-2 sample rate and time code are referenced to the LTC signal present at the reader input. The AI-2 will filter out minor speed inconsistencies in the time code, but will track speed variation over time.

5.12 SAMPLE CLOCK RATES

The AI-2 generates the digital audio sample rate clock for the ADAT transports. The AI-2 defaults to a sample rate of 48.000 KHz, five other sample rate options are available. The music CD rate of 44.100 KHz and 0.1% pull up and pull down rates for both 48 K and 44.1 K.

When any rate except 48.000 KHz is selected the red Non Std LED will come on solid as a warning. In normal operation the current sample rate is displayed on the top line of the display. The sample rate is set in the AI-2 reference menu.

The four 0.1% pull up and pull down options are provided to allow audio program material that was transferred at an incorrect sample rate to be corrected.

CHAPTER 6: FEATURES AND CONTROLS

6.0 FRONT PANEL

The AI-2 front panel has a power switch, eight status LEDs, six function keys and a two row, sixteen character Liquid Crystal display (LCD) with an orange backlight. The status LEDs are used to give continual user feedback of the AI-2 operating state. When the LEDs are on, the AI-2 is operating correctly, if problems are encountered, they are indicated by flashing LEDs. The keys are used to control AI-2 functions and the display, to give detailed information and provide access to the AI-2 setup mode options.

6.1 POWER SWITCH

The power switch is used to isolate the external 10 volt AC supply. The AC supply is a standard Alesis P3 wall mounting transformer with a 3.5 mm barrel jack. Power on indication is provided by the LED backlight, which is always on when power is present.

6.2 FRONT PANEL LEDs

The AI-2 has eight status LEDs that provide the user with continuous information about the time code, reference source and communications status for the controlling devices and connected ADATs. The LEDs flash to indicate error conditions.

- **ONLINE LED.** Lights when the ONLINE switch is pressed. When the AI-2 is online, external control commands and changes in time code position, if in time code chase, will be communicated to the connected ADAT transports. When the AI-2 is offline, the AI-2 does not control the transports and will report offline status to the controller.
- **LOCK LED.** Lights when all the connected ADATs are playing and correctly synchronized. The LOCK LED is a true lock tally and only comes on when all the ADAT transports are locked. In time code chase operation, the LOCK LED will flash if a lock error greater than 25 subframes occurs after initial lock, such as a code drop out or edited time code.
- **NON STD LED.** Lights when the AI-2 digital audio sample rate is not set to 48.000 KHz. A sample rate of 48 KHz is both the ADAT and Broadcast standard. The NON STD LED is also used to indicate that system errors or changes have occurred.

When a new message is added to the AI-2 error stack, the NON STD LED will flash. The messages can be viewed by pressing the STORE key and each time the STORE key is pressed the next message in the stack is displayed. When all the messages have been read, the stack is cleared and the LED stops flashing.

- **BRC/ADAT LED.** Lights when valid communications are taking place between the AI-2 and the ADAT transports, or the AI-2 and the BRC. This LED will flash when communication errors occur. A communications error could be either bad data or an unrecognized message.
- **MMC LED.** Lights when valid communications are taking place on the MIDI IN control port on the rear panel. This LED will flash when communications errors occur. A communications error could be either bad data or an unrecognized MIDI message.
- **CONTROL LED.** Lights when valid communications are taking place on the selected control port, either the RS422 editor port or the LYNX-2/MICRO LYNX synchronizer connector. Errors in the control communications will cause the LED to flash. A communications error could be either bad data or an unrecognized serial message.
- **REF LED.** Lights when the selected external reference source is present and providing a valid reference signal. The REF LED remains off, if an internal reference is selected. The possible external references are video, word clock and time code. If the selected reference (internal or external) is not present, has lost lock or is determined to be of an unsuitable frequency, the REF LED flashes.
- **The LTC LED.** Lights when there is valid time code being received at the time code reader input.

6.3 DISPLAY

The AI-2 display is used to indicate status information such as sample rate and time code information, and in SETUP mode to enter AI-2 operational parameters. The display is also used to show context sensitive warning messages and system error messages.

The upper line normally indicates the selected AI-2 time code register, and the lower line the current time code value. In setup, the display indicates the mode and menu on the upper line and the submenu and selected option on the lower line.

6.3A Tape Motion Status

Except when in setup mode, the transport status is always indicated by the first character in the lower line of the display. The following designations are used.

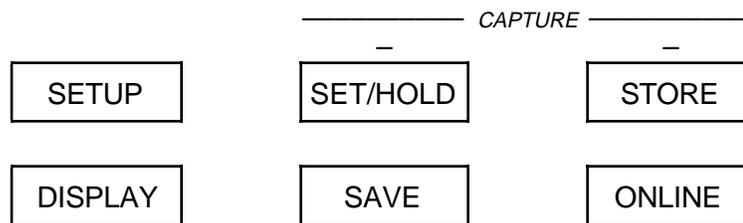
□	0 0 : 0 0 : 0 0 : 0 0	ADAT transports in Stop.
▣	0 0 : 0 0 : 0 0 : 0 0	ADAT transports are Disengaged.
>	0 0 : 0 0 : 0 0 : 0 0	ADAT transports in Play.
L	0 0 : 0 0 : 0 0 : 0 0	ADAT transports in Lock.
»	0 0 : 0 0 : 0 0 : 0 0	ADAT transports in Fast Forward.
«	0 0 : 0 0 : 0 0 : 0 0	ADAT transports in Rewind.
R	0 0 : 0 0 : 0 0 : 0 0	ADAT transports in Record.
r	0 0 : 0 0 : 0 0 : 0 0	ADAT transports in Rehearse.
G	0 0 : 0 0 : 0 0 : 0 0	ADAT transports in Search.
E	0 0 : 0 0 : 0 0 : 0 0	ADAT tapes are Ejected.

6.4 FRONT PANEL KEYS

AI-2 function control is provided by a switch matrix with six keys. These keys are used to configure the AI-2 operational parameters, and to permit the user to control basic functions and select one of a number of available time code registers to display.

6.4A Normal Operation

In normal operation the keys have the following functions.



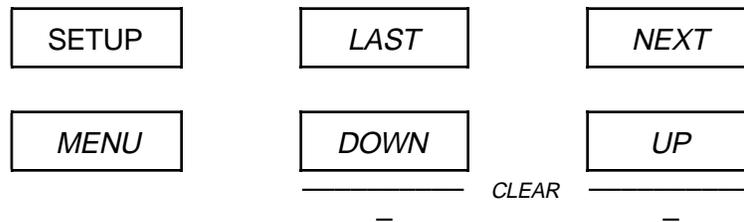
- **SETUP.** Used to enter and exit setup mode, for configuring AI-2 options. The SETUP key operates as a toggle switch, press once to enter setup and press again to leave.
- **SET/HOLD.** Used to enter Set/Hold mode and also to freeze the display for two seconds, permitting the user to view a time code position. Pressing and releasing the key "captures" the display, allowing the time code number to be modified using the DOWN and UP keys. The SET/HOLD key is also used with the STORE key to capture and load an offset in the AI-2. See Set/Hold operation in the operational features section, for a detailed description.
- **STORE.** Used to confirm command settings, store time code values that have been modified by the Set/Hold process and view messages in the system error message stack. Also used with the SET/HOLD key to capture and load an offset in the AI-2. If held down on power up will cause the AI-2 to perform a RAM clear operation and reset to default parameters.
- **DISPLAY.** Used to scroll through the display time code register options. Press the DISPLAY key to rotate around the AI-2 time code, cue start time, tape start time, offset, position error and reader input registers. Also used to cancel read or save data commands that require STORE to confirm.
- **SAVE.** Used to save AI-2 data to tape. At the end of a session press the SAVE key to initiate a save to tape operation. The AI-2 will write all data that has been previously read from tape

and any current session information such as offsets back to the ADAT tape header. The save command requires confirmation with the STORE key.

- **ONLINE.** Used to allow the AI-2 to be controlled externally. The ONLINE key is a toggle that permits the selected control source, editor, synchronizer system, time code chase or MMC to take control of the ADAT transports and receive status from the AI-2.
- **CAPTURE = STORE + SET/HOLD.** Used to capture and automatically load an offset. Press and hold STORE key and then press SET/HOLD key. Used in chase mode to calculate the difference between the current reader input (RDR IN) position and the ADAT position and automatically enter it in the AI-2 offset register. Can also be used to calculate the offset between LTC recorded on an ADAT audio track and the ADAT tape position.

6.4B Setup Operation

In setup, the keys have the following functions.



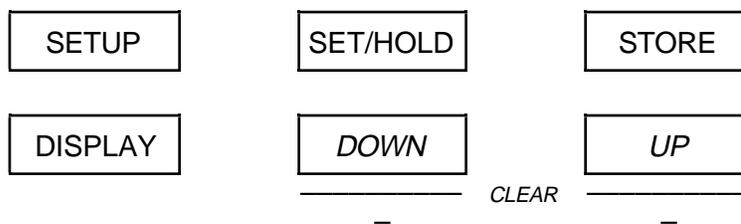
In setup mode, the front panel keys are used to select and adjust AI-2 menu options and parameters that are arranged in a tree style menu structure. The MENU key is used to access the top level categories, the LAST and NEXT keys are used to step through submenus and the DOWN and UP keys used to select options or alter values.

- **SETUP.** Toggles in and out of setup mode as described in normal operation above.
- **LAST.** Moves to the previous submenu entry.
- **NEXT.** Moves to the next submenu entry.
- **MENU.** Steps to the next high level menu. The MENU key rotates round the setup menus.

- **DOWN.** Moves down one submenu option or value.
- **UP.** Moves up one submenu option or value.
- **CLEAR = DOWN + UP.** Press the DOWN and UP keys simultaneously for 1/2 second. Used to reset or clear some AI-2 submenu options to the default setting or zero, prior to entering a new value.

6.4C Set/Hold Operation

In set/hold operation, the keys have the following functions.



In set/hold mode, the front panel keys are used to select, copy and adjust AI-2 time code register values. The SETUP, SET/HOLD, STORE and DISPLAY keys perform the same functions as normal operation.

- **DOWN.** Used to decrease by one the selected pair of time code digits. Pressing and holding the DOWN key causes the display to update continuously.
- **UP.** Used to increase by one the selected pair of time code digits. Pressing and holding the UP key causes the display to update continuously.
- **CLEAR = DOWN + UP.** Press the DOWN and UP keys simultaneously for 1/2 second. Used to reset the display register value to zero (00:00:00:00.00) prior to entering a new time code value.

6.5 SETUP MENUS AND FUNCTIONS

The AI-2 has a setup or configuration structure comprised of separate menus. The items in each menu are grouped by function. The following tables and descriptions explain the operation of each of the functions. The front panel MENU key is used to select a menu, the LAST and NEXT keys step through submenus and the DOWN and UP keys used to select options or modify values. The AI-2 has nine menus, ADAT, Commands, Control, Cue, MIDI, Reference, Status, System and Tracks.

6.5A ADAT Menu

The ADAT menu is used to configure ADAT transport specific functions.

Menu	Submenu	Option	Description
ADAT	All Input:	On Off	Default.
	Auto Input:	#2 #1 Off	Input in record only. Input in nonplay (default).
	C/Fade:	42.67ms 32.00ms 21.33ms 10.67ms	ADAT record cross fade time. Default.
	Digital in	adat Off	All ADATs switch to digital input. Default.
	Track Delay:	On Off	Use ADAT track delays. Default.

- **All Input.** Used to override the transports, auto input switching and switch all tracks to input, regardless of record enable status.
- **Auto Input.** Used to select the transports auto input monitor switching mode. Select mode one to switch tracks to input except in play. Select mode two to switch tracks to input in record only.
- **Cross Fade.** Used to set the transport record punch in and punch out cross fade time.

- **Digital In.** Used to switch the audio input of all connected ADAT transports to the fiber optic digital input.
- **Track Delay.** Used to turn track delays on or off, if delays have been read from the ADAT tape header. Track delays can not be entered from the AI-2 front panel.

6.5B Commands Menu

The commands menu is used to set default command operation and to issue system commands. The read and write data commands are selected in this menu. To perform a data read or save operation, select a command, press the SETUP key to exit setup mode and then press the STORE key to confirm the command.

Menu	Submenu	Option	Description
COMMANDS	Data	Save SysEx	ADAT data read and save selection.
		Read SysEx	See special operating mode #1.
		Save Tape	
		Read Tape	
		Clr Header	
	Abort	Default.	
	Read Tape:	Auto	Always prompt to read ADAT tape header when new tape detected (default).
		Off	
	Read SysEx:	Auto	Allow MIDI SysEx to automatically overwrite AI-2 header information.
		Off	Default.

- **Data.** Used to select a data read or save operation. The menu defaults to Abort, this is used to terminate a data transfer operation in progress. The special case, clear header, erases the tape header information in the AI-2 so that information read from a previous tape will not be inadvertently stored to a new tape.
- **Read Tape.** If set to AUTO will always prompt the user to read data from the tape when the ADAT transports are loaded.
- **Read SysEx.** If set to AUTO MIDI SysEx information received at the MIDI IN port will automatically overwrite the data header.

6.5C Control Menu

The Control menu is used to select the type of controller and set editor, and time code chase synchronizer options.

Menu	Submenu	Option	Description
CONTROL	Mode:	RDR CHASE	Time code chase.
		SONY	Editor input.
		LYNX	Lynx-2/Micro Lynx synchronizer.
		AUTO	Detects serial communications and automatically selects controlling device.
	Emul:	PCM-7030	"VTR" emulation (default).
		BVU-950	
	Flywheel:	0-254 Fr	Time code chase system flywheel time when RDR input not present.
	Cont	Time in frames 10 frame (default). Continuous.	
Phase Mode:	On	Time code chase sync mode. Default.	
	Off	Frame mode, AI-2 will resync frame errors.	
Auto EE:	On	E-E in stop/still.	
	Off	Default.	
Rec Field:	1	Preset field 1 record.	
	2	Preset field 2 record.	
	Auto	Record field set by editor (default).	

- **Mode.** Used to select the AI-2 control source. The AI-2 defaults to AUTO, which automatically scans the control ports and switches to the active port when it detects valid communications. Use this menu to select a specific control source when the AI-2 is wired so that it can be used with more than one controller. MMC control is always active and therefore does not appear as a control input source. The AI-2 control mode should always be selected prior to setting the system reference, as the choice of controller may limit the available options.
- **Emulation.** Used to select AI-2 emulation type. The PCM-7030 should be used whenever possible. Only select BVU-950 when the editor does not recognize the PCM-7030 ID.

- **Flywheel.** The number of frames the AI-2 will flywheel when in time code chase. In normal operation this number should be 10 frames, which permits significant interruption to the time code input, while retaining positive transport response. The continuous option can be used when it is desired to run the ADAT transports for longer than the available input time code. When using continuous, care should be taken to ensure that the time code source and the AI-2 are both connected to a common reference, such as video sync.
- **Phase Mode.** This allows control of the AI-2 lock mode in chase. Phase Mode On is normal resolve after lock operation. Phase Mode Off provides for automatic resynchronization, in the event that a frame number difference or frame offset error develops, for example, due to a tape splice.

Phase Mode On (default mode). After initial synchronization, the AI-2 reverts to a phase-lock mode and maintains resolved speed, while ignoring the actual value of the incoming reader frame numbers. This allows the ADAT to "free-wheel" over any discontinuities or jumps in time code. The Lock LED on the AI-2 will flash if a jump or discontinuity is greater than 25 subframes.

Phase Mode OFF. After initial synchronization, the AI-2 continues to read the frame numbers, and corrects for frame number errors if they occur. If a frame number jump occurs, the AI-2 will relocate and resynchronize the ADATs.

- **Auto E-E.** Used by an editor to switch the ADAT transports to all input when in stop or still.
- **Rec Field.** Used to preset the video field that the ADAT will enter record. This is normally controlled by the video editor.

6.5D Cue Menu

The Cue menu is used to select the active cue. Cue information is read from and can be stored to the ADAT tape header. All ADAT machines store information for 20 cues on tape. The AI-2 reads this information from the master ADAT tape (first machine) and transfers it to memory. This menu displays the Cue Name, SMPTE Start Time and associated ADAT Tape Start Time for the selected cue. In Alesis BRC documentation cues are referred to as "Songs".

The current cue number is displayed in the lower left of the display. Cues can be selected in any of the three submenus, Name, Start or Tape by using the DOWN and UP keys.

Cue times can not be edited in this menu, but if the Use Times option is set to on, they can be selected in the main display rotation and edited by the set/hold process. The cue start time is also automatically updated when the AI-2 offset is altered. If no data has been read from tape, the AI-2 will default to Cue #1.

Menu	Submenu	Option	Description
CUE	Use Times:	On	Use ADAT song start time and SMPTE start offset in AI-2 offset calculation.
		Off	Default.
	Name:	ABCDEFGH	Cue name. (status only).
	Start:	00:00:00:00.0 0	Cue start time (status only). ADAT SMPTE start offset, used in AI-2 offset calc if Use Times set on. Read from or will be saved to ADAT tape header.
Tape:	00:00:00.00	ADAT tape start time (status only). ADAT "Song" start time, used in AI-2 offset calc if Use Times set on. Read from or will be saved to ADAT tape header.	

- **Use Times.** Used to automatically calculate the AI-2 offset from the Start and Tape times read from the ADAT tape header. If set to on will add these two time code registers to the main display rotation.
- **Name.** The name of the current cue. Cue names are limited to ten characters and are the same as BRC "song" names. There is no method of writing or editing cue names from the AI-2, a cue name will therefore only be displayed if it has been read from tape.
- **Start.** The cue start time. The external time code value at which the selected cue starts. This is the same as SMPTE start offset in the Alesis BRC documentation. This can be thought of as a reference sync point. The AI-2 offset is calculated by subtracting the cue start time from the tape start time.
- **Tape.** The ADAT tape start time. The time on the ADAT tape that the selected cue starts. This can be thought of as a tape sync point. The AI-2 offset is calculated by subtracting the cue start time from the tape start time. In many situations the tape start time will be zero and the AI-2 offset will be the same number, but negative, as the cue start time.

6.5E MIDI Menu

The MIDI menu is used to control the MTC generator and select AI-2 data for MIDI SysEx dump. Midi information can be transferred bi-directionally from one AI-2 to another AI-2, the BRC or an external MIDI storage device.

Menu	Submenu	Option	Description
MIDI	MTC:	On	Default.
		Off	
	Data:	Global	Select data for MIDI SysEx dump. Save ADAT header global data.
		Cue 1-20	Save/read selected cue data only, cue range 1-20.
		AI-2 Setup	Save AI-2 specific setup data only.
All Cues		Save/read all cue data (default).	

- **MTC.** Used to turn the MTC generator on and off. The MTC generator output follows the LTC tape time out generator and mode. If the LTC generator is set to off then there will be no MTC output. See the reference menu for LTC output settings.
- **Data.** Used to select specific data for MIDI Sysex dump. The selections permit, all cue data, selective cue data or setup data to be transferred.

6.5F Reference Menu

The reference menu is used to select the system reference, code type and rate and the tape time output, generator modes. The AI-2 internal speed and rate computations are all determined by the options selected in this menu.

Menu	Submenu	Option	Description
REFERENCE	Input	W/C, Lynx	Word clock in and Lynx frame edge.
		W/C, Vid	Word clock in and video frame edge.
		W/C, Int	Word clock in and internal frame edge.
		Reader	Time code reader input.
		Lynx	Micro Lynx/Lynx-2 frame edge.
		Ext Vid	External video sync.
		Int Var	AI-2 internal variable speed ref, Varispeed set by VAR menu.
		Int Fix	AI-2 internal crystal.
REFERENCE	Code:		Code type automatically set to ADAT tape header code type. In chase, set to reader type.
		30 Hz/30	
		30 Hz/DF	
		29.97 Hz/30	NTSC default.
		29.97 Hz/DF	
		25 Hz/25	PAL default.
		24 Hz/24	
REFERENCE	S/Rate:	48.048 K	Nonstandard, 48K + 0.1%.
		48.000 K	Default.
		47.952 K	Nonstandard, 48K -0.1%.
		44.144 K	Nonstandard, 44.1K +0.1%.
		44.100 K	Nonstandard.
		44.056 K	Nonstandard, 44.1K -0.1%.
REFERENCE	Var:		Sets speed when Int Var reference selected.
		±000/100.00 %	ADAT pitch number and equivalent speed variation %, range -300 to +100.
REFERENCE	Gen:	Play/Wind	Generator output operation mode.
		Play Off	Default.
REFERENCE	Gen Still:	On	Generator stationary operation mode.
		Off	Default.
REFERENCE	VSG	On	TimeLine internal video sync generator card (VSG) control.
		Off	Select VSG. Default.

- **Input.** Used to select the ADAT system speed reference source. The default reference selection is determined by the method of control selected in the control menu. If SONY editor is selected the reference will default to external video. If Lynx is selected the reference will default to Lynx and if time code chase is selected the reference will default to reader in. Internal variable can be selected when it is desired to run the ADAT transports at a different pitch.

There are three reference settings provided, where external word clock can be used as the system reference. The word clock in each case is used to resolve the speed of the system but the frame edge is derived from the video input, the Lynx input or an internal frame reference. Care must be taken to ensure that the word clock and the signal that the frame edge is being taken from are synchronous, or synchronization problems will occur.

- **Code.** Used to select the system code rate and type. When a video reference is selected the rate and type defaults to 29.97 Hz/30 in NTSC or 25 Hz/25 in PAL. The other combinations available are 30 Hz/30, 30 Hz/DF, 29.97 Hz/DF and 24 Hz/24 film code.
- **Sample Rate.** Used to select the ADAT transport sample rate. The sample rate option defaults to the standard, 48.000K. Sample rates of 48.048K, 47.952K, 44.144K, 44.100K, 44.056K are also selectable to allow audio program material to be originated at 44.100K or to pull up or down existing audio.
- **Variable.** Used to set the ADAT speed when Internal Variable is selected as the system reference. The display is adjustable in cents with a speed variation range of -300 to +100 cents. The equivalent speed variation %, is calculated and simultaneously shown in the display. To reset the pitch value to zero, ($\pm 000/100.0\%$) press the DOWN and UP keys together.
- **Generator.** Used to select the normal tape time code generator output mode. The generator can be set to generate in play and wind, in play only or not at all. The MTC generator will follow the LTC generator mode selection.
- **Generator Still.** Used to select the stationary code mode of the tape time code generator output. If set to on, a stationary time code number will be generated for two seconds when the ADAT goes into stop.
- **VSG.** Used to enable the TimeLine Video Sync Generator (VSG) option card, if fitted. The VSG will generate a composite

sync video signal at video black level locked to the AI-2 system reference. If the option card is on then the AI-2 video input BNC is used as a video output and may be connected to the sync input of a VTR or other transport that needs to be reference to the ADAT system.

6.5G Status Menu

The Status menu has three items the number of connected ADATs, the external word clock rate and the reader code type.

Menu	Submenu	Option	Description
STATUS	Connected	1-16	Status Only Connected ADAT slave count.
	Ext W/C	XX.XXXK	Status Only Measured external sample rate ± 5 Hz.
	Rdr In Code:	30/DF/25/24	Status Only Reader input code type.

- **Connected.** Displays the number of ADAT transports connected to the AI-2.
- **External Word Clock.** Displays the sample rate of the external word clock connected to the W/C in connector.
- **Reader Input Code.** Displays the code type being read at the reader input.

6.5H System Menu

The System menu has two menu items, display contrast and software version

Menu	Submenu	Option	Description
SYSTEM	Contrast:	10-100%	Display contrast default 70%. Adjusts in 10% steps.
	Ver:	"AI2 001"	AI-2 software version. Status only.

- **Contrast.** Used to adjust the AI-2 LCD display contrast.
- **Version.** Displays the current AI-2 software version.

6.5I Tracks Menu

The tracks menu is used to select the track control method and to allocate or map tracks to editor track enables.

The highest track available for track mapping is determined by the number of ADATs connected. If a track previously mapped is no longer available because the number of ADATs connected has been reduced then the selected tracks will flash to indicate that they are invalid.

Track mapping is only available when the AI-2 control source is set for SONY editor control.

Menu	Submenu	Option	Description
TRACKS	All safe:	Off On	Default
	Sel:	Editor Map Lynx/MMC Local	Use track mapping assignments. TimeLine Ext controller or MMC. Track enable at machine front panel.
	Mapping	Single A1-A2 A1-A4 Da1-Da8	Any selected audio track. A1/A2 to odd/even pairs, (default) Any group of 4, 1-4 etc. Any group of 8, 1-8 etc.
	Map to:	Single Odd/Evn Grp of 4 Grp of 8	Mapping table determined by mapping variable above as follows, default to lowest numbered selection.. 1, 2, 3, ..., 128 1-2, 3-4, 5-6, ..., 127-128 1-4, 5-8, 9-12, ..., 125-128 1-8, 9-16, 17-24, ..., 121-128
	Rec Src:	Any AudOnly A1 A2 A3 A4 Vid	Determines editor track source for local track selection. Any track record enabled. Any audio track record enabled.

- **All Safe.** Used to put all ADAT tracks into safe. Any track mapping configuration will be retained. Faster lock times can be achieved if the AI-2 is set to all safe, this of course is only possible if it is not intended to record on the ADAT transports.

- **Selection.** Used to determine the track control method. The selections are editor control, Lynx control (which is also used for MMC track control), and local at the front panel of the ADAT transports.
- **Mapping.** The mapping option determines the operation of the following map to, track assignment selection. Single tracks, pairs of tracks or groups of four or eight can be selected. When using Da1-Da4 track enables from the editor the AI-2 automatically maps these to A1-A4
- **Map To.** Used to select the track or groups of tracks that are mapped to the editor record enables. The track allocation method is determined by the mapping option selection.
- **Record Source.** If the track select mapping control is set to local then the record source selection determines the editor track enable for issuing the record command to the ADATs. This allows a single track enable to put multiple tracks selected on the front panel of the ADAT transports into record.

CHAPTER 7: ADVANCED FEATURES

Chapter seven contains information on a number of features or procedures that are not covered in other sections of the manual. Some of the information in the chapter has been included for completeness and should not be considered an advanced feature.

7.0 ADAT DIGITAL INPUT

The AI-2 ADAT menu digital input option is used to select the transports input audio source. When set to on all the ADAT transports are set to digital input and the ADAT transport will use the fiber optic digital input. Do not select the digital input if it is not connected.

When digital input is selected the ADAT speed reference is derived from the optical digital bus which must be locked to the AI-2 for correct operation. See the AI-2 Applications section for information on digital audio transfer, also refer to the AI-1 Reference manual.

7.1 AI-2 DISPLAY INFORMATION

In some special cases the AI-2 time code display shows a different time code value or is calculated from different time code registers. These special cases are covered below.

7.1A Time Code and Position Error Displays

In chase mode the AI-2 normal time code display shows ADAT absolute time and the position error display shows the difference between the ADAT transport and the reader input.

In controlled modes the AI-2 normal time code display shows virtual or relative time, the ADAT position minus the AI-2 offset, and the position error display shows the difference between the actual ADAT position and the virtual position.

7.1B Time Code Number Differences

In certain situations there will be a slight difference between the AI-2 time code display and the time displayed on the front panel of the ADAT. This time difference is due to the fact that the ADAT transport always displays "real" time and therefore only uses four of the six possible rate/code type displays, 24/24, 25/25, 29.97/DF and 30/30.

The difference comes when one of the two non-real time, rate/code type combinations 29.97/30 or 30/DF is selected in the AI-2. The time code difference will gradually become more noticeable as the ADAT tape plays, eventually amounting to approximately three seconds.

When 29.97/DF or 30/30 is selected, the AI-2 and ADAT time code values will match, when 29.97/30 or 30/DF is selected the time code values will mis-match.

7.2 ALL SAFE

The AI-2 track select defaults to all safe. This prevents ADAT tracks from being selected. To make a record track selection, all safe must be set off in the Tracks menu.

When all safe is set on, the AI-2 optimizes synchronization performance by taking control of the ADAT head track delays which will result in faster lock times.

When the AI-2 is controlling the head delay the AI-2 reduces the maximum track delay available by up to 960 samples which is 20 ms, at a sample rate of 48.000 KHz.

To record, all safe must be off and the AI-2 does not make use of the ADAT track delay feature.

7.3 MIDI INTERFACING

7.3A MIDI Time Code

The AI-2 generates the MIDI time code virtual or relative position of the ADAT at any given time. The MTC is available at the MIDI OUT connector in the control section of the rear panel. The MIDI OUT connector is also used to provide MMC responses, BRC responses and AI-2 responses to an external MIDI control device.

If a clean MTC only feed is required, a MIDI controlling device must operate in open loop mode.

7.3B BRC Control Feed Through

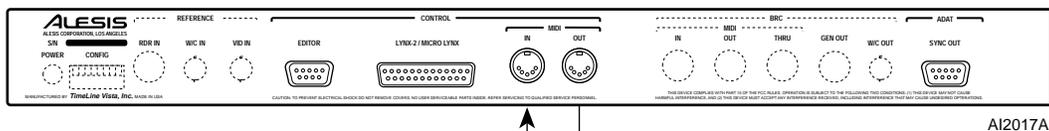
The AI-2 permits MIDI control and response feed through to the BRC from the MIDI input and output connectors. This is provided so that devices which are designed to control the BRC through its MIDI connectors can still do so, even though the AI-2 is now in control of the BRC MIDI connectors.

External commands intended for the BRC may be connected to the MIDI IN connector, in the control section of the AI-2. These commands will be merged with the AI-2's own commands for the BRC and sent through the MIDI OUT connector, in the BRC section to the BRC.

Responses from the BRC may be picked up at the MIDI THRU connector in the BRC section of the AI-2 or the MIDI OUT connector. The responses will include not only those responses which the external device would normally receive, but also those responses which were generated by the AI-2's data requests to the BRC.

EXTERNAL MIDI INTERFACING

ALESIS AI-2



- MIDI Commands
1. MIDI Machine Control (MMC)
 2. Feed through to BRC
 3. AI-2 Commands

- MIDI Responses
1. MIDI Machine Control (MMC) Responses
 2. BRC Responses
 3. AI-2 Responses
 4. MIDI Time Code (MTC)

Note: Will operate simultaneously with RS422 or Lynx-2 control.

7.3C MIDI SysEx

The AI-2 can be interfaced to external MIDI storage devices, the BRC, or another AI-2, for transferring setup information. This MIDI data can be used to set up the AI-2 menus. The read and save data transfer options are set in the commands menu and when saving selected data is specified in the MIDI menu.

The AI-2 also has an Auto SysEx read mode command that can be used to automatically overwrite the AI-2 header information,

whenever SysEx information is transmitted to the AI-2 MIDI IN connector.

7.4 REAR PANEL CONFIGURATION DIP SWITCHES

- **Switch 1.** Is used to configure the AI-2 so that after a memory clear the default settings will initialize for 25 frame operation. Once the AI-2 is configured the selected options will be retained in battery ram and used each time the unit is powered up.
- **Switch 2.** Is used to remove internal tape length limit checking. The AI-2 assumes that the length of an ADAT tape will be less than one hour. If tapes become available that have extended play times that exceed one hour, use this switch to disable limit checking.
- **Switch 3.** When the AI-2 powers up the display steps through a configuration information sequence. Use this switch to defeat the sign on information and jump straight to the normal time code display.
- **Switch 4.** Use this switch if it is necessary to prevent an operator from making inadvertent changes to the AI-2 setup. The switch makes Setup mode read only, by inhibiting the DOWN and UP editing keys. If this option is used, consideration should be given to the fact that submenu options that are set to auto will change when operating conditions change. To prevent this from occurring menu options set to auto should be set to specific modes of operation.
- **Switches 5 & 6.** Are used to determine the device numbers for the MIDI machine control interface. The default MIDI address is 00, if this is being used by another device in the MIDI system then an alternative MIDI assignment can be selected as follows.

SW 5	SW 6	MIDI Device ID
OFF	OFF	00 hex
ON	OFF	29 hex
OFF	ON	49 hex
ON	ON	69 hex

- **Switches 7 and 8.** Are not currently implemented and have been reserved for future use.

7.5 EXT WORD CLOCK

The AI-2 will measure the frequency of an external word clock reference and display the measurement in the status menu. The AI-2 measurement has an accuracy of ± 5 Hz and is intended for information and troubleshooting purposes only.

7.6 INTERNAL VARI REFERENCE

When the AI-2 is selected as master in a synchronizer system, the AI-2 internal variable reference can be used to run ADAT transports off speed. Select Int Var in the reference menu and then use the Var option to set the speed variation.

The speed variation range is nominally -300 to +100 cents at 48.000 KHz, which is the same as the ADAT pitch range. The AI-2 display shows the pitch variation and the equivalent speed variation percentage. This range will be different when other sample rates are selected.

To indicate when the ADATS are not running at normal play speed, the AI-2 will turn one of the pitch control LEDS on the front panel of the ADAT on.

7.7 GENERAL INFORMATION

7.7A Tape Header Information

The AI-2 can read and save setup and cue information to the ADAT data header. When saving information the AI-2 writes to all ADAT tapes, so it will not matter which machine the tapes are put in at a future session. When reading information the AI-2 reads from the master ADAT transport, machine number one only.

7.7B Offline

The OFFLINE key is used to release all ADAT transports from AI-2 control. The master ADAT will automatically assume control of the slave ADATs.

Individual machines in an ADAT chain can be taken "offline" by ejecting the ADAT tape. The AI-2 will detect when a tape is ejected and if necessary automatically reassign the master transport. Do not power down transports in the ADAT chain to take them offline, this will prevent communication with ADAT transports further down the chain.

7.7C Assemble mode

When controlling ADAT transports from a video editor or synchronizer controller in assemble edit mode the AI-2 will automatically put the ADATs in to format extend as each edit is assembled.

CHAPTER 8: APPENDICES

8.0 APPENDIX 1: SPECIFICATIONS

8.0A Operating Codes

SMPTE (30 fps NDF)
SMPTE (29.97 fps NDF)
SMPTE Drop Frame (30 fps DF)
SMPTE Drop Frame (29.97 fps DF)
EBU (25 fps)
Film Code (24 fps)

Generator Output	Unbalanced
Signal Output Level	1 Vpp fixed
Output Impedance	330 ohms
Signal Rise Time	4 microseconds
Time Code Stability	±2 microseconds max.

8.0B Reference Sources

Internal Crystal Internal Timing	Crystal (±50 ppm)
External Video Sources	30, 29.97 (NTSC), 25 (PAL) Color bars, Black burst or Composite sync (must be terminated into 75 ohms)
Input Sensitivity Input Impedance	0.33 - 8 Vpp 2 Kohms
External Word Clock Input range Input Level	48.000 KHz nominal 40.363-50.854 KHz 5 V TTL, 1 K Pull-up

8.0C Time Code Reader

Input	Differential Input
Input Sensitivity	-20 to +10 dBm
Input Impedance	>10 Kohms
Speed Range	1/10-60 x play speed

8.0D ADAT Synchronizer

Lock Time	2 to 3 seconds, nominal
User Adjustment	None

8.0E Control

Editor Interfaces	Serial RS422, 38.4 Kbaud. Conforms to ANSI specification
Synchronizer Interface	Serial RS422, 38.4 Kbaud. Conforms to ANSI specification
MIDI Interface	Serial, 31.25 Kbaud. Conforms electronically to the standards specified in the MIDI 1.0 Detailed Specification.

8.0F Front Panel

The front panel has the following features:

Display	Alpha Numeric 2 row 16-character LCD
Selection Keys	6 switches
LED Status Indicators	8 LEDs

8.0G Electrical

Mains Input	Wall mounting power supply 9-12 VAC at 50-60 Hz
Power Requirement	Approximately 4W

8.0H Interconnections

The connectors mounted on the rear of the AI-2 are as follows:

POWER	2.5 mm Male socket
RDR IN	1/4" Female stereo jack
EXT VID	BNC Female connector
EXT W/C	BNC Female connector
EDITOR	RS422 9-pin Female 'D' connector
MIDI IN	5-pin Din Female connector
MIDI OUT	5-pin Din Female connector
MIDI IN BRC	5-pin Din Female connector
MIDI OUT BRC	5-pin Din Female connector
MIDI THRU BRC	5-pin Din Female connector
LYNX-2/MICRO LYNX	25-pin Female 'D' connector
GEN OUT	1/4" Female stereo jack
W/C OUT	BNC Female connector
SYNC OUT	9-pin Female 'D' connector

8.0I Option Cards

Video Sync Generator card. Plug-in card that generates composite video sync at video black level, locked to the AI-2 reference.

8.0J Mechanical

Dimensions	19.0"W x 1.75"H x 6.75"D
Weight	3 lbs, 8 oz
Shipping Dimensions	22.25"W x 4.25"H x 9"D
Shipping Weight	5 lbs, 0 oz

Alesis Corporation and TimeLine Vista, Inc. reserve the right to change the design and specification of equipment without notice.

8.1 APPENDIX 2: INTERFACE INFORMATION

8.1A Sony Editor Constants

If your editor does not recognize the SONY PCM-7030 machine ID, the editor machine constants should be set as follows:

VTR	Constant Values (in hexadecimal)														
	Item number														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
PCM-7030 (30 Fr)	70	00	00	96	05	05	03	80	0A	07	FF	00	00	5C	FF

Description of VTR Constant settings

Item Number	Setting	Details of Setting
1	DEVICE TYPE (most significant byte)	Specifies the VTR device type. Normally it is not necessary to change this from hexadecimal FFFF.
2	DEVICE TYPE (least significant byte)	Factory default: FFFF (hexadecimal)
3	PREROLL TIME (minimum preroll time, most significant byte)	Specifies the minimum preroll time required by the VTR.
4	PREROLL TIME (minimum preroll time, least significant byte)	
5	EDIT DELAY	Corrects for the delay (in frames) from a VTR receiving a Record command until it actually starts recording.
6	EE DELAY	Corrects for the delay (in frames) from a VTR receiving a PB/EE command, until it actually enters the preview mode.
7	OVER RUN (overrun time)	Corrects for the time (in frames) for which the tape overruns the specified preroll point in a preroll stop.
8	TRAJECTORY	Specifies the optimum speed curve for preroll.
9	TC READ DELAY (time code read delay)	Corrects for the delay (in frames) from tape movement starting until the VTR is able to read the time code.
10	START DELAY	Corrects for the delay in frames from a VTR receiving a tape transport command until it actually starts moving the tape.

Item Number	Setting	Details of Setting
11	AFTER SYNC DELAY --	After synchronization, when changing to play mode, specifies the optimum command delay for the servo to lock in the correct position from low speed. (In frame units, correction value)
12	AFTER SYNC DELAY +	After synchronization, when changing to play mode, specifies the optimum command delay for the servo to lock in the correct position from high speed. (In frame units)
13	MODE 1	Specifies the maximum framing value which the VTR format permits. Depending on the VTR functions, this specifies whether or not time code CTL (timer) interpolation is possible.
14	MODE 2	Specifies whether the CF status value from the VTR is effective or ineffective.
15	MAX PREROLL SPEED	Specifies the maximum tape speed during preroll, as a multiple of the normal tape speed. If FF (hexadecimal) is specified, this speed is the same as the tape speed during fast forward and rewind.

8.1B Lynx Interface

The original Lynx module uses the LYNX-2/MICRO LYNX connector to control the AI-2. A Lynx-2 ADAT cable is used to connect the AI-2 to the Lynx module, which must be fitted with a serial interface card. A video reference should be connected to the Lynx module and the AI-2.

In the AI-2 control menu, select LYNX control mode and set the reference source to external video. In the Lynx module select BVU950 and make sure that serial time code is enabled.

8.1C External video

The AI-2 will accept composite sync, color bars, video black, or black burst as valid video reference signals. The video signal should be properly terminated with a 75 ohm load. Use a BNC T piece to connect the reference signal and a 75 ohm plug to the VID IN connector.

Do not use the video output of a VTR being used in the system as a reference signal. If an external source of video sync is not available, a plug in video sync generator card (VSG) is available. When a VSG card is installed, the AI-2 VID IN connector is used as a video output, connect this to the sync or ref. input on the VTR.

8.1D External Word Clock

The AI-2 will accept a 48k 5V TTL external word clock signal. The word clock should ideally be supplied by a high quality digital reference generator. A constant stable word clock reference is required for communication between the AI-2 and the ADAT transports. If word clock is selected as the AI-2 reference source and the reference is not connected, stops or is interrupted then the ADATs will drop off line.

For correct operation the word clock must be synchronous with the system frame rate or the ADATs will drift out of sync.

The AI-2 word clock frequency range is restricted to the operational range of the ADAT transport, from 40.363 KHz to 50.854 KHz. It is strongly recommended that the word clock signal has a 50% duty cycle. If the input does not have a 50% duty cycle then the word clock must be high for a period that is greater than 2 usecs and less than 14 usecs.

If the external word clock exceeds the ADAT transport control limits, then the AI-2 will display a "S/R Out of Range" warning message.

8.1E Internal Word Clock

The AI-2 has a word clock generator that is used to control the speed of the ADAT transports except when using an external word clock reference. The internal generator has been specifically designed for use with ADAT transports and the BRC. The AI-2 word clock output was not intended for use as a studio reference generator and in some circumstances may be unsuitable as a word clock source.

8.2 APPENDIX 3: MAINTENANCE/ SERVICE INFORMATION

8.2A Cleaning

First, turn the unit off and disconnect the AI-2 wall mounting power supply. Use a damp cloth, with a mild detergent to clean the front panel of the AI-2. Under no circumstances use an abrasive cleaner or chemical solvent, this will damage the front panel finish.

8.2B Maintenance

The AI-2 is a solid state device that will give a life time of service with no maintenance. To keep the AI-2 looking as good as new, periodically clean the front panel.

8.2C Servicing

If problems occur, check the cables between the AI-2, controller and ADAT transports, also refer to the Troubleshooting Guide and Error Messages listed in Appendix Four.

There are no fuses inside the AI-2, if the unit fails to power up, try replacing the wall mounting power supply with a similar 9-12 volt AC supply.

DO NOT ATTEMPT REPAIRS YOURSELF. THERE ARE NO USER SERVICEABLE PARTS INSIDE THE AI-2. REFER ALL SERVICING TO TIMELINE.

YOU MUST FIRST CONTACT TIMELINE CUSTOMER SERVICE TO OBTAIN AN RMA NUMBER (Return Authorization Number) BEFORE THE UNIT IS RETURNED TO TIMELINE.

UNITS RETURNED TO THE FACTORY WITHOUT RMA NUMBERS WILL BE SUBJECT TO UNNECESSARY DELAYS.

For International service contact your local Alesis distributor. For service in the USA, contact:

TimeLine Vista Inc.
2401 Dogwood Way
Vista, CA 92083
3620

Phone: (619) 727 3300 Fax: (619) 727

8.3 APPENDIX 4: TROUBLESHOOTING

Symptom	Solution
Front panel display does not light.	The AI-2 power supply is not connected or is faulty. Check the 2.5 mm power connection and make sure that the wall transformer is plugged in properly. If this fails to correct the problem, try another power supply.
The AI-2 fails to ID all the connected ADATs.	Check the sync in to sync out cable connections, if necessary try swapping cables to eliminate the problem. Make sure that all ADAT transports are powered on.
Editor does not control AI-2.	Check that SONY is selected in the control menu and that the AI-2 emulation setting is correct. If the control LED is off or flashing check the cable between the AI-2 and the editor port. Make sure that the correct driver is selected at the editor, if necessary reinitialize the editor.
Control communications failures.	Communications failures are normally caused by bad or incorrectly wired cables, or because control software or drivers of an incompatible type are being used. If the AI-2 control or MMC LEDs are flashing then make sure that the cables are correctly wired and connected. Check that the controlling device is properly configured to operate with the AI-2.
ADATs stop and tapes disengage	ADAT transports require a continuous sample clock signal otherwise they will go into stop and the tapes disengage. Check that the sync cable to the ADATs is properly installed. If external word clock has been selected as the AI-2 reference, check that the cables are properly installed and that the word clock signal is not being interrupted.
AI-2 switches to chase operation	When the AI-2 control source is set to Auto it will automatically switch to reader chase operation if editor or synchronizer communication is lost. If communication is sporadic or intermittent then do not use auto control selection as this may cause the AI-2 to time out and switch control type. Choose one of the named settings in the control menu.

Symptom	Solution
Reference LED flashes.	The selected system reference is not present or the AI-2 can not lock to it. Make sure that the correct reference source is selected in the reference menu. Check that the reference signal is connected.
Non Std LED flashes.	System messages have been placed in the AI-2 message stack. Press the STORE key to view the first message, if the LED continues to flash, there is more than one message, press the STORE key until all the messages have been read. Check the appendix for a list of system messages and the probable cause, take corrective action if necessary.
Time code numbers do not agree.	Make sure you have selected the correct time code rate and format on the AI-2. The ADAT transport front panel tape counter is designed to run in "real" time at a sample rate of 48 KHz. If a code rate/type combination is selected that does not show real time, for example 29.97/30 or a different sample rate is selected then there will be differences between the displays.
ADAT program material drifts.	All the transports in the system are not locked to a common reference. Make sure that the reference source selected for the AI-2 is also controlling the speed of the other transports. The wrong AI-2 sample rate has been selected. Check the sample rate setting in the reference menu is correct.
No MTC output.	Check that MTC is set on in the MIDI menu. The LTC Gen must also be set on for the AI-2 to generate MTC. Set the generator mode to play or play, wind in the reference menu. If MTC is required when the ADATs are in stop, set the generator still mode on.
ADAT Tracks do not go into record.	Check the tracks menu and set All Safe off. If using an editor, make sure that the track mapping is correctly assigned.
Lynx Module Serial error.	Early versions of TimeLine software, had a short serial communications time out value. Contact your TimeLine dealer for a current software version.
ADAT version error message , when AI-2 put Online.	The AI-2 has detected an early version of ADAT software. The AI-2 will perform optimally with ADAT software version V3.05 and above. Contact Alesis to obtain a current software version.

8.3A Tape Status Messages

- **All Wr Protected.** A record command cannot be executed, because all ADAT tapes are write protected.
- **Ejected.** A read data command cannot be executed because the tape in the first ADAT machine is ejected or a save data command cannot be executed because all ADAT tapes are ejected.
- **Reading Tape.** ADAT tape header data being read from first ADAT transport.
- **Read/Sav In Prog.** A command has been received when a read or save data operation is already in progress.
- **Saving To Tape.** ADAT header data is being saved to all ADAT tapes.
- **Tape Read Abort.** An unsuccessful ADAT tape read operation has been aborted.
- **Tape Read Err.** A tape read operation timed out or an error was encountered during the data transfer. The data in the AI-2 may be incorrect.
- **Tape Read Done.** A successful ADAT tape read operation has been completed.
- **Tape Read Wait.** A read tape operation has been requested and the master ADAT transport is rewinding to the data header.
- **Tape Save Abort.** An unsuccessful save tape operation has been aborted.
- **Tape Save Done.** A successful ADAT tape save operation has been completed.
- **Tape Save Err.** A tape save operation timed out or an error has been encountered during the data transfer. The data saved on the ADAT tapes may be incorrect.
- **Tape Save Wait.** A save tape operation has been requested and the ADAT transports are rewinding to the data header.
- **Unformatted.** The tape in the first ADAT machine is unformatted.

- **Wr Protected.** A command cannot be executed because the write protect tab has been removed from the tape.

8.3B System Status Messages

- **ADAT Unavailable.** A tape operation has been requested and the ADAT transport is not available.
- **ADAT Version Err.** The AI-2 has detected a version of ADAT software that is earlier than V3.05. This does not prevent operation, but synchronization performance may not be as good as it could be.
- **All Safe.** The AI-2 has received a record command and track All Safe is set to on.
- **Clearing Mem.** The AI-2 memory is being cleared by a power up ram clear command.
- **Code Changed.** The AI-2 time code type has changed.
- **Format Extend.** An ADAT format extend is occurring as part of an assemble edit operation.
- **Fps Changed.** The AI-2 system frame rate has changed.
- **Generator Err.** The AI-2 time code output has lost lock.
- **Ignoring Data.** A data read or save operation has been aborted, the AI-2 will ignore any data that is still being transferred.
- **Loc Out of Range.** The AI2 has received a locate command that would cause the ADAT tape to wind beyond the physical tape limits.
- **MIDI Read.** The AI-2 is reading MIDI data from an external MIDI device.
- **MIDI Read Abort.** An unsuccessful read MIDI data operation has been aborted.
- **MIDI Read Err.** An error has been encountered during a MIDI data read operation or the read operation timed out. The data in the AI-2 may be incorrect.
- **MIDI Read Done.** A successful read MIDI data operation has been completed.

- **MIDI Read Wait.** A read MIDI data operation has been requested and the AI-2 is waiting for data.
- **MIDI Save.** MIDI data is being saved to an external MIDI device.
- **MIDI Save Abort.** An unsuccessful save MIDI data operation has been aborted.
- **MIDI Save Done.** A successful save MIDI data operation has been completed.
- **No Data.** A read operation has found no data to transfer.
- **Reader Lost Lock.** Time code is selected as the system reference, but due to interruption, drop outs or instability, the AI-2 has lost lock.
- **Reader Ref Error.** The time code being read at the reader input is not locked to the AI-2 system reference.
- **Setup Read Only.** Changing parameters in setup mode has been inhibited by a rear panel dip switch selection.
- **Rec Not Locked.** A record command was issued to the ADAT machine chain before all ADAT transports were locked.
- **Reference Err.** A generic message indicating that a reference related problem has occurred. This message is displayed each time any one of the specific reference lock messages is added to the error message stack.
- **Ref Lost Lock.** The internal reference or external synchronizer reference has lost lock.
- **Ref Not Present.** Selected AI-2 reference is not present.
- **Ref Src Changed.** The AI-2 reference source has changed.
- **Reh Not Locked.** A rehearse command was issued to the ADAT machine chain before all ADAT transports were locked.
- **S/R Out of Range.** The word clock signal connected to the AI-2 has exceeded the ADAT range.
- **S/R Changed.** The AI-2 sample rate has changed.
- **Store to Confirm.** Prompt for confirming commands that have a potential data loss.

- **System Message.** System message, followed by error message, warning, condition or number.
- **PLL Lost Lock.** The AI-2 internal hardware phase lock loop has lost lock.
- **Video = NTSC.** Video sync source detected is NTSC.
- **Video = PAL.** Video sync source detected is PAL.
- **Video Lost Lock.** Video sync input has lost lock.
- **VSG Not Locked.** The video sync generator card (VSG) is not locked to the system reference.
- **VSG Not Present.** The video sync generator card (VSG) has been selected but is not fitted.
- **VSG On.** The video sync generator card (VSG) is on.
- **VSG Off.** The video sync generator card (VSG) is off.
- **W/C Frame Err.** Internal or external word clock reference for the ADAT machine has lost lock or is misframed.

8.3C Warnings

- **Abort Save/Read.** An abort command to stop a data read or save operation has been selected, press STORE to confirm or DISPLAY to cancel.
- **Clear Header.** A clear header command has been selected press STORE to confirm or DISPLAY to cancel.
- **Read From Tape.** A read tape data command has been selected, press STORE to confirm or DISPLAY to cancel.
- **Read SysEx.** A read SysEx data command has been selected, press STORE to confirm or DISPLAY to cancel.
- **Save SysEx.** A save data to an external MIDI device command has been selected, press STORE to confirm or DISPLAY to cancel.
- **Save to Tape.** A save data to tape command has been selected, press STORE to confirm or DISPLAY to cancel.

8.4 GLOSSARY

24. '24' refers to both the film-standard speed and code type.

25. '25' refers to both the EBU/PAL speed and code type.

29.97. '29.97' refers to a SMPTE frame rate only, in frames-per-second. (See Drop Frame)

30. '30' refers to SMPTE frame rate, in frames-per-second. (See Drop Frame and Non drop Frame)

Address. SMPTE/EBU time code address. Also referred to as time code value. A specific and unique address in the time code data stream. A set of SMPTE or EBU time code numbers indicating a specific position on tape. A complete SMPTE address includes hours, minutes, seconds, and frames.

Analog Audio. The "traditional" means of recording and reproducing sound, using fluctuating electronic voltages to replicate audio waveforms.

Autolocator. A device that can hold multiple tape locations in memory and chase to those locations on command, using SMPTE addresses, tach pulses, or control track pulses to find a desired point on tape.

Biphase Encoding. The way in which SMPTE time code gets encoded onto analog tape. It expresses binary '1' and binary '0'. Biphase encoding reverses the signal polarity halfway through a bit to represent a '1' and leaves the bit polarity unchanged to represent a '0'.

Blanking Interval. The blanking interval occurs at the end of a frame. Video information is absent during the blanking interval. The interval occurs when the CRT electron gun scanner goes from the bottom right corner of the screen to the beginning of the next field in the top left corner.

Byte. A byte is made up of two or more bits, which can be either a 0 or 1. A group of related binary data or a word that can be read, interpreted, and acted on by a microprocessor.

Cent. A unit or measurement of musical pitch that is 1/100 of a semitone. There are twelve semitones to an octave.

Code Type. See Time Code Type.

Control Track. A synchronizing signal on the edge of a tape, which provides a reference for tracking control and tape speed.

Digital Audio. A means of storing and transmitting sound using binary digits to replicate the audio waveforms.

Display. Numeric display. Time Code/Message Display.

Drop Frame. Drop frame is one of the two SMPTE code types, and is the NTSC color television standard. When using this code type, 108 specific frame numbers are "dropped" for each hour of time code.

EBU. EBU time code is 25 frame running at 25 fps.

ERR. Error or offset error. Indicates that the display shows the difference between the actual position of the machine in relation to where it should be.

Frame. A single image on a motion picture film or a television picture formed from two interlaced fields. One complete video scanning cycle, one complete SMPTE time code word.

Frame Lock. Frame lock synchronizes the Master and Slave(s) using *all* of the information available in the reference time code address.

Frame Rate. The number of frames that go by in one second of audio, film or video tape. Film and different types of video all have different frame rates.

30	30 fr/s	Monochrome TV, & audio
NTSC	29.97 fr/s	Color videotape, TV operations
PAL	25 fr/s	European TV, European Broadcast, & audio
Film	24 fr/s	Film cameras & projectors

HH:MM:SS:FF. Hours:Minutes:Seconds:Frames. A SMPTE time code address or value.

Lock. The transport has synchronized with the system reference.

LTC. Longitudinal Time Code. Time code information encoded in binary coded decimal (BCD) form which is recorded as an audio signal on a designated track of a VTR or an ATR.

Machine. Machine refers to the generic concept of tape or hard disk-based record/playback hardware.

MIDI. Musical Instrument Digital Interface. This serial data language is used by microprocessors in synthesizers, sequencers, drum machines, signal processors, and computers. It provides

musical pitch and rhythm information, synthesizer performance parameters, song position markers, stop/start/continue commands for sequencers and computers, and synchronizing data called MIDI Clock, which is based on 24 pulses per quarter-note. MIDI is frequently used with SMPTE for sync-to-tape functions.

MIDI is transmitted between microprocessors at 32.125 KBits per second. It can also be used by lighting systems and mixing consoles.

MTC. MIDI Time Code.

Non Drop Frame. NDF or ND is one of the two SMPTE code types and is the black & white television standard. When using this code type, every frame of time code is counted in real time.

NTSC. A system of coding color information for television transmission used primarily in the USA and Japan. Named after the National Television System Committee.

Offset. Offset is the difference between two time codes at the point at which they are to be synchronized. Offsets are subframe-accurate and are displayed using the HH:MM:SS:FF format.

PAL. Phase Alternate Line. PAL is another name for the 25 time code format, which is the standard for European color and B&W television.

Phase Lock. A mode of synchronizer operation that uses phase information derived from SMPTE time code and after initial synchronization, ignores specific frame addresses. It is also called Sync Lock.

Post-production. Activities that take place after the raw footage has been shot for a video program or motion picture. Includes video editing and a number of audio processes, such as ADR, Foley, and mixing.

Production. The initial stages in the making of a film or television program, which includes the shooting of raw footage and recording of production audio.

RAM. Random Access Memory. The module's configuration parameters are stored in battery-backed RAM. And recalled each time the unit is turned on.

Rate. See Frame Rate or Speed.

Resolving. A technique for regulating the play speed of a tape machine by matching the rate of pulses recorded on tape with a pulse rate from another stable source or a master tape machine.

Sequencer. A device that can record performance data for synthesizers and other electronic instruments and then, on playback, pass that data on to the instruments so that they'll play what has been recorded. Modern sequencers use MIDI as their communications protocol.

Setup Mode. The process of defining the user-selected operational parameters, such as defining a specific mode or option.

Shuttle. Fast-wind, Fast-forward or Rewind.

SMPTE. Society of Motion Picture and Television Engineers. An industry standards committee. The group responsible for developing SMPTE time code.

Speed. Speed, Frame Rate and Rate are synonymous. Time code speed is counted in frames-per-second (fps). SMPTE time code has two speeds: 30 fps and 29.97 fps. EBU time code is 25 fps. Film time code is 24 fps.

Synchronizer. A device that reads time codes recorded on two or more tape machines, compares the codes, and adjusts the machine's tape positions and speeds based on the results of that comparison.

Time Code Format. Time code format defines both the frame rate and code type being used. Example: To describe a time code format as 30 NDF is to say that the frame rate is 30 fps and the code type is non-drop frame. Simply saying either 30 or drop frame defines only part of the SMPTE time code.

Time Code Generator. A special signal generator designed to generate and transmit SMPTE time code at one of the international formats and rates.

Time Code Reader. A counter designed to read and display SMPTE time code.

Time Code Type. The word "type" is the key to understanding this phrase. *Type* defines the counting method that is employed by the reader. There are two SMPTE types: 30 (also called non-drop "ND" or non-drop frame "NDF") and DF (drop frame). EBU and film types are the same as their respective speeds, 25 and 24.

Toggle. To toggle is to consecutively press a key to enable or disable a feature.

Type. See Time Code Type.

Video Sync. A reference video signal generated by an extremely stable source. This signal is used to control the speed of video machines, digital audio machines and is used as a timing reference to ensure accurate synchronization.

Virtual Tracks. Used to describe any circumstance whereby the method for reproducing audio tracks is not directly analogous to the linear tape track format. Hard disk systems (DAW's) and MIDI sequencers are typical examples.

MIDI performance commands can be stored in a sequencer. Because the sequencer can "play" these parts in real time, synchronized to tape, they can be regarded as extra or "virtual" tracks, not on the tape, but present nonetheless.

VITC. Vertical Interval Time Code. An alternative to the LTC format of SMPTE time code. It is recorded in the blanking interval of the video signal, which is not used for the picture.

VTR. Video Tape Recorder.

8.5 FCC NOTICE

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide a reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

In order to maintain compliance with FCC regulations, shielded cables must be used with this equipment. Operation with non-approved equipment or unshielded cables is likely to result in interference to radio and TV reception.

Any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.