INTERNATIONAL LASER DISPLAY ASSOCIATION

Technical Committee

ADAT DC Coupling Modifications for Laser Graphic Recording

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Introduction

The ADAT is an SVHS cartridge-based 8-track digital audio recorder. The ADAT is a very economical, portable unit that quickly become the defacto-standard for laser graphic recording and playback after its introduction in 1992. The ADAT must be modified to allow it, an AC coupled audio recorder, to record DC coupled laser graphic signals properly.

The following data applies to the modification of Alesis and Fostex brand ADATs. This information is not intended to be a step-by-step guide. Modifications should be performed by those with reasonable technical knowledge and experience.

The modifications are however, quite simple, they consist of jumpering the signal input AC coupling capacitors. The capacitors are typically small electrolytic or tantalum types. Not all channels of the ADAT need be modified. Modify only those channels used for storing laser graphic data. This will typically be ADAT channels 1-6. However, the modified channels can be used for recording audio signals without problems.

> The capacitors are listed in order of the channels to which they pertain. i.e. C36 = channel 1, C48 = channel 2, ..., C58 = channel 8. Since ADAT channels 7 and 8 are typically not used for DC coupled laser graphic signals these channels are typically not modified. If this is the case do not jumper capacitors C7, and C8 on the Alesis **Input Board,** capacitors C13, and C16 on the Fostex **Input Board**, and capacitors C57, C58, C136, C135, C67, and C74 on the **A/D D/A Board**. ADAT channel 6 may be used for 2 channels of XYI, X prime, Z for stereoscopic 3D, or various show control schemes which may require DC coupling. It is strongly recommended to modify channel 6 even if it not intended to be used for laser graphics in the foreseeable future. The modification will not effect its use in recording audio or other AC coupled signals.

All modifications takes place on just two PCBs. The first of the two PCBs is the **Input Board.** The **Input Board** is mounted directly to the rear panel of the ADAT unit. The 1/4" input phono jacks are mounted to the **Input Board**. The input jacks are RCA type on the Fostex **Input Board**. The other PCB to receive modifications is the **A/D, D/A Board** (analog to digital converter, digital to analog converter). This board is mounted directly in front of the input and output boards, and behind the tape

transport. These boards are easily accessible by removing the top, bottom, and rear panels of the unit.

Use caution when modifying the PCBs. Observe static handling procedures for all work. Jumpers are applied carefully on the bottom of the boards. Make all changes neatly. Modifying the ADAT will technically void its warranty. However, the service departments of Alesis and Fostex have both indicated that if all modifications are performed neatly and professionally and have not obviously caused the problem, they will typically honor the warranty.

Deck disassembly, modification and reassembly can usually be completed in about 45 minutes by an experienced technician. Read "Additional ADAT Information" section of this document for important tips on modification and use of ADATs.

ADAT PCB Modifications

Remove the "**Input Board"** and the "**A/D - D/A Board"** from the rear panel and chassis prior to attempting to modify the boards.

Alesis Input board

This board contains the 8, 1/4 inch phono jacks that are labeled "-10dBV Analog Inputs". Short out the following 10uf (typical) electrolytic capacitors by soldering a small jumper wire across both terminals of each capacitor. Capacitors can be removed completely and jumpers installed in their place. However, simply jumpering the leads of the capacitors allow for easy restoration of the deck back to its unmodified state, should this become desirable.

C1, **C2**, **C3**, **C4**, **C5**, **C6**, **C7**, and **C8**.

Fostex Input Board

This board contains the 8, 1/4 inch phono jacks that are labeled "-10dBV Analog Inputs". Short out the following 10uf (typical) electrolytic capacitors by soldering a small jumper wire across both terminals of each capacitor. This PCB is marked "RD8 Input PCB Rev A".

C1, **C3**, **C5**, **C8**, **C9**, **C12**, **C13**, and **C16**.

A/D - D/A Board:

The A/D - D/A board is identical in both the Alesis and Fostex units. Short out the following capacitors by soldering a small jumper wire across both terminals of each capacitor on the bottom side of the board.

1 uF electrolytic caps:

C36, **C48**, **C50**, **C52**, **C54**, **C56**, **C57**, **C58**

47 uF orange dip tantalum:

C126, **C125**, **C127**, **C128**, **C131**, **C132**, **C136**, **C135**

> **Note:** Different styles and values of capacitors have been noted on later models of ADATs. However, changes in the component designator numbers have not been observed. Use caution to avoid accidentally jumpering the power supply bypass capacitors which can look identical to the signal capacitors.

1 uF electrolytic caps:

C47, **C49**, **C51**, **C53**, **C55**, **C73**, **C67**, **C74**.

Output board:

There are no modifications on either the Alesis or Fostex output board containing the 8 phono or RCA jacks.

The proposed ILDA Standard Track Assignments for ADAT recording

ADAT Track	Signal Assignment
1	X axis
2	Y axis
3	Red
4	Green
5	Blue
6	X prime, SMPTE time code, ILDA show control
7	Left Audio
8	Right Audio

Additional ADAT Information

- Recording Audio

  Modified channels can be used to record and playback audio without any degradation in audio quality.

- VU Meter LEDs

  It is normal to see the first couple VU meter LEDS illuminated on each modified channel when no input signal is present and channels are record enabled. This may vary from channel to channel. This is typically not visible on the Fostex units.

- Signal Levels/Voltages

  The maximum signal level for the 1/4" phono -10dBV input connectors is plus and minus 2.5 volts. These connectors are two conductor for single ended signals. The maximum signal level for the 56 pin ELCO +4 dBU connector is plus and minus 5 volts. This connector is 3 conductor for each channel for balanced line signals. Both plus and minus signals must be present (10 volt differential signal) when using the ELCO connector for input. The signal levels described above will provide for full scale recorded signal. The same parameters apply to the output signal levels for each connector.

  The proposed standards for signal level recording is full scale using the parameters and voltages described above. These levels can be approximated from the front panel LED meters when an oscilloscope is not available. Adjust signal levels for XYIRGB by displaying the ILDA test pattern at full scale with all colors and intensity at maximum. On Alesis units, adjust levels up until red LEDs illuminate. Slowly decrease signal until the red LED is no longer illuminated. Both Yellow LEDs should now be illuminated.

  The ADAT signals are not actually clipping when red 0 dB LED illuminates. There is about 8-10% signal headroom when the red LED illuminates.

- Signal Polarity

  A positive voltage recorded shall represent deflection to the top and right-hand side of the screen while in a front projection configuration.

- Input/DAC Mode

The ADAT is equipped with two recording modes. The first is Input mode, this is the mode in which the deck will always power up. In this mode the signals seen at the output of the deck is the exact signal which is present at the input connectors. This can be a problem since when in input mode the deck will pass a signal upwards of plus and minus 12 volts even though the maximum recordable voltage (using the 1/4" phono -10dBV connectors) is about plus and minus 2.5 volts. When in input mode the digital clipping would not be seen during recording and would only be visible upon playback.

To prevent this problem it is recommended to set-up and record while in "DAC" mode. In this mode, signals present at the output of the deck are a true representation of the signals being recorded to tape. Any clipping or slight offset is now visible. The Alesis deck can be changed from its start-up mode of "Input" to "DAC" mode by holding down the "Set Locate" button and depressing the "All Input Monitor" button. The display will now read "DAC" momentarily. Modes can be toggled by repeating the procedure.

- Tape Length

  The ADATs is equipped to handle several different length tape cartridges. The first tape length is a T-120. This tape will run approximately 40 minutes. This is the mode in which the deck will power up. All decks can also handle T-160 tapes. Decks with firmware revision 4.00 and higher can also handle T-180 tapes. T-180 tapes will run approximately 60 minutes. If the deck is operating with a tape which is different from that for which the deck is set, certain locate feature may not operate properly and tapes can also be snapped. To set an Alesis deck for proper tape length, depress and hold "Set Locate", now press "Format". T-120, T-160, or T-180 will be momentarily displayed. Modes can be cycled by repeating the procedure.

- Normaled Channels

  There is a feature of ADATs which sometimes leads to confusion and a mistaken concern for modification errors. Input signals are "normal through" to various channels. Channels 1, 3, 5 and 7, are "normaled" together. Also, channels 2, 4, 6, and 8 are normaled together. The "normaling" pertains only to signals input via the 1/4" phono connectors. This means, if a signal is input (via the 1/4" connectors)

to any channel, the same signal will appear on every other channel from that channel up to channel 7 or 8. However, the signal will only appear on additional channels when in, "Auto Input" mode, "All Input" mode or when the channels are record enabled and there are no plugs in the additional unused channel inputs. This is a recording feature. If this feature becomes a nuisance, monitor desired channels by engaging the record enable buttons only, or simply insert dummy plugs into the unused 1/4" input connectors.

For additional information on recording laser data to ADAT see the "ILDA Standard Projector" specification.

Footnotes

- The A/D D/A board used to generate this document has the following markings:

  P/N 09-40-1042
  REV E
  ALESIS Corp.
  1991.

- ADAT, Alesis and Fostex are registered trademarks of their respective companies.