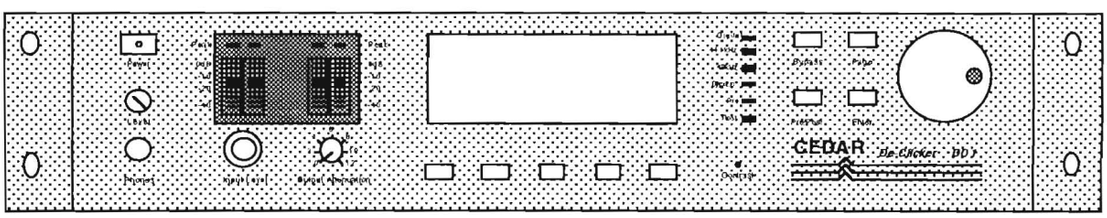
CEDAR

Professional Hardware Systems

DC-1 De-Clicker

Digital Audio Restoration System



OWNER'S MANUAL

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INTRODUCTION

Thank you for purchasing the CEDAR DC-1 De-clicker. This is the world's first dedicated digital de-clicking device, and offers processing power and performance that could only previously be obtained using digital signal processors (DSPs) installed in desk-top (or larger) computer systems such as the CEDAR Production Systems. The system is designed for professional use, although it will work perfectly well in a domestic environment, and its features include the following:

- Digital Audio interfaces conforming to the AES/EBU and SP-DIF standards.
- 24-bit input and output resolution when using AES/EBU interfaces
- Three digital sampling rates supported: 32kHz, 44.1kHz and 48kHz
- 2 analogue sampling rates supported: 44.1kHz and 48kHz
- Balanced (nominal) +4dBm analogue inputs and outputs for connection to professional analogue equipment.
- Unbalanced (nominal) -10dBm analogue inputs and outputs for connection to domestic analogue equipment.
- A/D and D/A converters using the latest 64x over-sampling Δ-Σ (Delta-Sigma) technology.
- Mountable in a 19" EIA rack.
- Remote control via MIDI and RS-232 interfaces.
- Input and output LED bar-graph VU meters.
- Twin 40-bit floating point DSP processors delivering 50MFlops to handle the most complex audio processing requirements.
- High levels of artificial intelligence designed into the DC-1 program algorithms make it extremely simple to use.

THE BACKGROUND TO SCRATCH REMOVAL

The term 'scratch' is often used to describe many different audio phenomena - ticks, pops, clicks, crackle and thumps - as well as genuine scratch-like artefacts. However, when analysed carefully, each of these degradations displays different sonic characteristics. Therefore, a single process attempting to remove all of these impulses would be an unacceptable compromise, incapable of total repair of any single category.

These degradations can be separated into three categories: thumps (which includes loud pops), scratches (including ticks and clicks), and crackle. The DC-1 has been designed to perform real-time scratch removal.

The operation of the DC-1 is totally digital, and any signal presented to the analogue inputs is internally converted to a suitable digital format by the analogue-to-digital converter (ADC). Following click removal the processed signal is then converted back from digital format to analogue by the internal digital-to-analogue converter (DAC).

SAFETY INSTRUCTIONS

CAUTION:

1. **Read all of these instructions**
   All safety and operating instructions should be read before the DC-1 is operated.

2. **Save these instructions for future reference.**

3. **Follow all warnings and instructions.**

4. **Water and Moisture**
   The DC-1 should not be used near water, and must not be exposed to rain or moisture. If the DC-1 is brought directly from a cold environment into a warm one, moisture may condense inside the unit. This, in itself, will not damage the DC-1, but may cause hazardous electrical shorting to occur. This could severely damage the DC-1, and even cause danger to life. ALWAYS allow time for the DC-1 to naturally reach ambient temperatures before connecting the mains power.

5. **Mounting**
   The DC-1 should be carefully mounted in a 19" EIA rack, or placed on a flat, stable surface. If used on a cart or free stand, care should be taken when moved: uneven surfaces or excessive force may cause cart and DC-1 to overturn. Do not position the DC-1 in a place subject to strong sunlight, excessive dust, mechanical vibration or periodic shocks.

6. **Wall or Ceiling Mounting**
   The DC-1 has not been designed for mounting directly to walls or ceilings.

7. **Ventilation**
   Good air circulation is essential to prevent internal heat built-up within the DC-1. The DC-1 should be situated so that its position does not interfere with its proper ventilation. The DC-1 should not be placed in any situation which impedes the flow of air through the fan at the rear. Do not place the DC-1 on a soft surface.

8. **External Heat Sources**
   The DC-1 should be installed away from significant heat sources such as radiators, and (if possible) away from other audio devices such as amplifiers that produce large amounts of heat. Installation in racks with devices such as signal processors or tape machines should not be a problem.

9. **Power Sources**

   The voltage selector switch must be set to the correct voltage before the DC-1 is connected to any power supply.

   Suitable supplies are 110v and 220/240v, 50Hz or 60Hz AC only.

10. **Grounding or Polarisation**
The DC-1 should always be grounded (or 'earthed').

11. **Power Cord Protection**
Power connectors should be routed so that they will not be walked on or pinched.

12. **Extended Periods of Non-Use**
The DC-1 is not disconnected from the mains power as long as it is connected to the wall outlet, even if the unit itself has been switched off. Therefore, if the DC-1 is not to be used for an extended period of time, unplug the unit from the wall. Pull the connector out by the plug, never by the cord itself.

13. **Cleaning**
Clean only with a dry cloth. NEVER use liquid cleaners such as alcohol or benzene on the DC-1. NEVER use abrasive pads on the DC-1.

14. **Damage Requiring Service**
The DC-1 should be returned to qualified service personnel when:
- objects have fallen into the unit
- liquid has been spilled into the unit
- the unit has been exposed to rain
- the unit fails to function or appears to operate abnormally
- the unit has been dropped, or the case damaged.

15. **Servicing**
The user should not attempt to service the DC-1 beyond the instructions contained in the User's Manual. All other servicing should be referred to qualified service personnel.

SET UP

1. UNPACKING AND INSPECTION

Be careful not to damage the DC-1 during unpacking. Save the carton and all packing materials since you may need them to transport the DC-1 in the future.

In addition to the packaging, the carton should contain the following:

- mains connection lead
- this manual

2. INSTALLATION SITE

The DC-1 may be used in most areas, but to maintain reliability and prolong operating life observe the following environmental considerations:

- Nominal temperature should be maintained between 5° and 35° Centigrade (41° and 95° Fahrenheit).
- Relative humidity should be in the range 30% to 60% non-condensing.
- Strong magnetic fields should not exist nearby.

3. RACK MOUNTING

The DC-1 can be mounted in a standard 19" EIA rack.

CONNECTIONS

The DC-1 may be connected to most domestic and professional audio equipment currently available. Four types of input and output are provided (two analogue and two digital) and these will satisfy most users' interconnection requirements. Full descriptions of these connectors will be found later in the manual.

1. BEFORE CONNECTION

- **Before making any connection ensure that the voltage selector on the back of the DC-1 is set to the voltage of the local mains supply. Failure to do so may result in severe damage to the DC-1 and other equipment connected to it.**

  Acceptable mains frequencies are 50Hz and 60Hz.

- To prevent problems and possible equipment damage, turn off all power to all equipment before making connections.

- Be sure to insert plugs firmly into sockets. Loose connections may cause hum and noise.

- When unplugging any lead, do so by grasping the plug, not the lead.

2. POWER CONNECTIONS

Before making any connection ensure that the voltage selector on the back of the DC-1 is set to the voltage of the local mains supply. Failure to do so may result in severe damage to the DC-1 and other equipment connected to it.

Acceptable mains frequencies are 50Hz and 60Hz.

Ensure that the DC-1 is switched OFF on the front panel before inserting the mains lead.

NOTE: Users with 2-pin mains supplies:
When the DC-1 is connected to other audio components, the AC hum of the unit may be increased or decreased by reversing the direction of the power connector in the socket. Check that the cord is in the favourable position ('in-phase') with respect to other audio devices in the chain. This will ensure that the best sound quality is obtained from your DC-1.

For further information on grounding and polarity consult a person familiar with studio grounding techniques.

3. SIGNAL LEAD CONNECTIONS

Refer to the Rear Panel diagram:

The DC-1 offers four audio connection standards: two analogue and two digital. These are:

- unbalanced analogue audio I/O
- balanced analogue audio I/O
- digital SP-DIF format audio data
- digital AES/EBU format audio data

Note that the DC-1 passes its output to all four signal outputs irrespective of the input used.

(i) Unbalanced analogue audio I/O (See 1, 2 & 8)

This standard is used on domestic and semi-professional audio equipment such as turntables, CD players, and cassette decks. Connect the output from your source to the unbalanced analogue input using standard RCA (phono) plugs. You will require two connectors: one for each channel.

The unbalanced audio output may be used to connect the DC-1 to audio equipment such as amplifiers, cassette recorders, and reel-to-reel recorders. It is also possible to connect powered, or 'active' speakers to this output. Use caution if you attempt this. The DC-1 has no volume control in the conventional sense, and speaker (or ear) damage may occur if a high amplitude signal is passed through the DC-1 to the speaker inputs. If in doubt, contact your dealer for advice.

(ii) Balanced analogue audio I/O (See 1, 2 & 8)

This standard is used in professional audio equipment. Connect the output from your source to the balanced analogue inputs of the DC-1 using standard XLR plugs. Note that you will require two such connections: one for each channel.

The balanced audio output may be used to connect the DC-1 directly to audio equipment such as mixing desks and professional recorders featuring balanced XLR inputs.

(iii) Digital SP-DIF format audio data (See 3 & 4)

The digital SP-DIF format is used by domestic and semi-professional digital audio devices including DAT machines, some ADCs, and some CD players. Both channels of audio are carried along a single cable, so you may connect the SP-DIF output from your source to the SP-DIF input of the DC-1 using a single cable terminated with RCA (or 'phono') plugs.

The SP-DIF output of the DC-1 may be connected to the SP-DIF input of your recording device or external DAC.

(iv) Digital AES/EBU format audio data (See 4 & 5)

The digital AES/EBU format is used by professional digital audio devices including mastering systems, DASH recorders, and high quality ADCs & DACs. Both channels of audio are carried along a single cable, so you may connect the AES/EBU output from your source to the AES/EBU input of the DC-1 using a single cable terminated with XLR plugs.

The AES/EBU output of the DC-1 may be connected to the AES/EBU input of your digital mixer, recording device or external DAC.

24-bit Digital data resolution:

The DC-1 features 24-bit input and output resolution whenever the AES/EBU digital inputs and outputs are utilised.

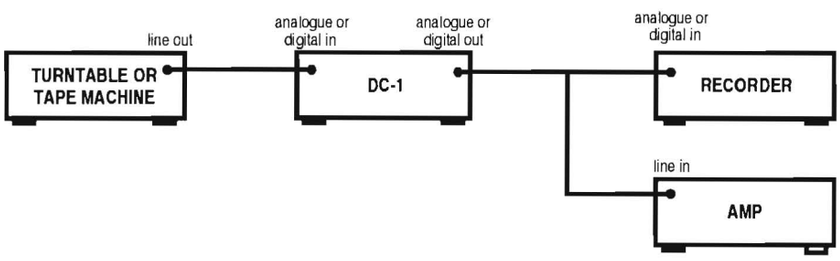
4. OTHER CONNECTIONS

(i) SMPTE (See 6)
An optional SMPTE interface is planned for the DC-1. The standard DC-1 does not feature a SMPTE interface, and these connectors have no function.

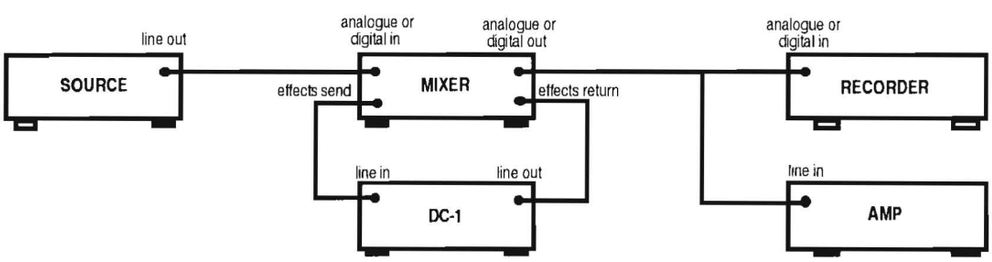
(ii) MIDI IN/OUT/THRU (See 9)
The operation of the DC-1 may be controlled using the Musical Instrument Digital Interface (MIDI). Refer to the chapter on MIDI for further instructions.

(iii) RS-232 (See 10)
The DC-1 may be controlled using the standard RS-232 computer communications serial protocol. Refer to the chapter on RS-232 for further instructions.

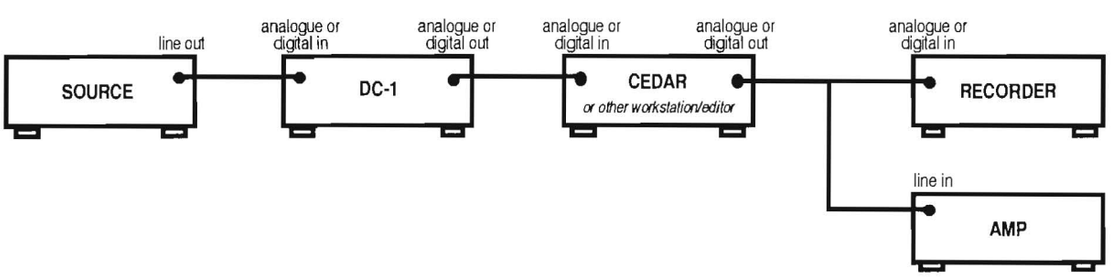
SAMPLE INSTALLATION IDEAS



1. *DC-1 used in-line for transcription or broadcast purposes.*



2. *DC-1 used on the effects loop within a studio environment.*



3. *DC-1 used in-line prior to an editor or audio workstation.*

LOCATION AND FUNCTION OF FRONT PANEL INDICATORS AND CONTROLS

Refer to the Front Panel diagram:

1. **Power Switch**

2. **Input Signal Meters (Left and Right)**
   Calibrated signal meters display the RMS value of incoming analogue signals. These meters do not respond to digital signals.

   The peak meters will light if the incoming signal approaches a level likely to cause clipping in the digital processing stages.

3. **Output Signal Meters (Left and Right)**
   Calibrated signal meters display the RMS value of all output signals.

   The peak meters will light if the amplitude of the digital signal approaches the clipping level.

4. **LCD Screen**
   Provides you with a variety of information and messages, keeping you aware of what is currently happening in the DC-1.

   All the control screens of the DC-1 are displayed on the LCD screen. Please refer to the following chapters for full instructions.

5. **Status Indicators**
   Indicate the status of the analogue and digital inputs, and whether the DC-1 is in idle or processing modes.

6. **Defined Function Keys.**
   Certain functions are fundamental to operating the DC-1, and these are controlled by the defined function keys: Bypass, Page, Pre/Post, and Enter.

7. **α-dial**
   The α-dial enables you to increase and decrease control values. Please refer to the following chapters for full instructions.

8. **Headphone Socket**
   For use with stereo headphones only, takes a standard 1/4" stereo jack plug. DO NOT use 2-conductor mono headphones with the DC-1.

9. **Headphone Level Control**
   Use this to adjust for a satisfactory listening level. This level control will not alter the signal level at any of the rear panel outputs.

10. **Input Level Control**
    This control acts upon the analogue inputs only. Use it to adjust the volume of incoming signals to the desired level. We recommend a peak level of approximately 0 to -3dB as shown on the Input Signal Meters.

11. Output Attenuation Control

On occasion, the DC-1 will restore a signal that would, had it not been damaged by clicks and scratches, have exceeded the digital I/O maximum amplitude. This restoration of the full amplitude can lead to digital clipping.

Avoid clipping using the Output Attenuation Control. This will 'fit' the signal within digital limits. This Control is not a compressor or limiter. It acts purely as a digital gain control.

12. Function Keys

Use along with the LCD screen. Please refer to the following chapters for full instructions.

13. Contrast Control

The LCD screen may be adjusted for optimum visibility. Use a fine screwdriver to make such adjustments.

QUICK TOUR

If you are impatient to hear some immediate results using your DC-1 the following instructions should have you up and running within a few minutes:

1. Connect the DC-1 to the mains supply, and check that the voltage selected on the unit corresponds to that of the mains supply.

2. Connect your input and output devices to the DC-1 using the appropriate input and output sockets. (If in doubt, please refer to the section 'CONNECTING THE DC-1 and the manuals of your other equipment).

3. Switch on the DC-1.

4. If you are using analogue inputs press PAGE once. Press B to select 'analogue'. Then press PAGE twice more.

   [If you are using digital inputs ignore this instruction and proceed directly to 5.]

5. If you are using digital inputs press PAGE once. If outputting to a consumer format machine such as a low-cost DAT recorder press A to select CONSUMER format.

   [The DC-1 defaults to PROFESSIONAL format, so do not press A if connected to a system such as the Sony PCM1630.]

6. Play your material.

7. Press PRE/POST to hear an immediate difference between the processed and unprocessed signals (assuming, of course, that your original material suffers from clicks and scratches).

This section should have whetted your appetite, so you should now proceed to the rest of the manual to ensure that you can obtain the best results from your CEDAR DC-1.

WARMSTART AND COLDSTART

The DC-1 features Warmstart and Coldstart options. Warmstart has been added so that the unit can be configured once, and these parameters are then automatically recalled on every power-up. This is ideal for applications where time-consuming set-ups at the start of each session are not practical.

Coldstart

If the DC-1 has not been used for some time the system will automatically Coldstart. This processes initialises all parameters to their factory default values, and automatically enters at Page 1.

On start-up the message 'Coldstart' will be displayed at the top right of the start-up screen on the LCD display. The screen will then enter PAGE 1, which will show the default Scratch Parameters:

The default values are:	Threshold	=	10
	Mode	=	Small
Other default values are:	Input	=	Digital
	Output	=	Post processing
	MIDI	=	OFF (Channel 1)
	Bypass	=	OFF
	Output format	=	Professional
	A to D frequency	=	44.1kHz

Warmstart

The DC-1 remembers the latest parameters used, and the page that was active at the time that the system was last switched off.

On start-up the DC-1 will display the message 'Warmstart' on the screen, and then re-enter at the appropriate page, with all user parameters set to their previous values.

User Coldstart

If you wish to force the DC-1 to Coldstart, hold down Function Key F1 while switching on the system. Release F1 when the message Coldstart is seen on the LCD display.

OPERATING THE CEDAR DC-1

The DC-1 has three 'pages' which control all aspects of its operation. Each page is displayed on the LCD screen, and may be controlled using the Function Keys and the α-dial.

Switch the DC-1 on. (Refer first to the safety instructions.)

The screen will immediately enter PAGE 1, which will initially show the default Scratch Parameters.

All the controls for the DC-1 are contained in three 'PAGES', each of which is selected by pressing the dedicated **PAGE** function key. The Pages are cycled, and will appear in the following order:

- Threshold Control Page
- I/O Control Page
- Remote Control Page

These, and a description of the Dedicated Controls, are now covered in turn:

DEDICATED CONTROLS

The DC-1 features a number of dedicated controls to speed operation. These are:

Dedicated Function Keys:

- Bypass
- Page
- Pre/Post
- Enter

I/O Level Controls

- Input Level
- Output Attenuation

These are now explained in turn:

Bypass

It may be desired to completely bypass the operation of the DC-1. Press BYPASS to do this. The current status will be indicated on the Status LED.

Note1: The Bypass is implemented in software. There is a 1.3mS (analogue to analogue) or 0.15mS (digital to digital) delay in any signal passed through the DC-1 in Bypass mode.

All delays are 'group delays' (i.e. are constant at all frequencies) and are measured at a sample rate of 44.1kHz.

Note2: The Bypass does not 'hard-wire' the input to the output. Analogue signals still pass through the AtoD and DtoA stages.

Page

Use this Function Key to move between Control Pages.

Pre/Post

It will often be useful to compare the original signal with the post-processing output of the DC-1. This Function Key toggles between output modes. The current status will be indicated on the Status LEDs.

Enter

The ENTER Key functions as a 'set' command, disabling the α-dial to stop accidental adjustment of scratch parameters. Press the ENTER Key once to lock out the α-dial.

To re-enable the system, select whichever parameters you wish to adjust using the appropriate Function Keys under the LCD screen.

Input Level

This control acts upon the analogue inputs only. Use it to adjust the volume of incoming signals to the desired level. We recommend a peak level of approximately 0 to -3dB as shown on the Input Signal Meters.

Output Attenuation

On occasion, the DC-1 will restore a signal that would, had it not been damaged by clicks and scratches, have exceeded the digital I/O maximum amplitude. This restoration of the full amplitude can lead to digital clipping.

Avoid clipping using the Output Attenuation Control. These will 'fit' the signal within digital limits. This Control is not a compressor or limiter. It acts purely as a digital gain control. The Gain is variable from 0dB to -10dB in 1dB steps.

PAGE 1: THRESHOLD CONTROL PAGE

Access this page by pressing the Defined Function Key 'PAGE'.

Threshold Level

This determines the size of scratch removed by the DC-1. A high threshold tells the system to remove only the largest clicks and scratches, while a lower threshold also removes fine ticks and clicks.

WARNING: *If the threshold for a given piece of music is too low, distortion of the genuine signal may result.*

Typical thresholds to use are as follows:

Large scratch removal:	20+
Large click removal:	15
Smaller click removal:	8
Very small tick removal:	5

Increase or decrease the threshold by turning the α-dial clockwise or anticlockwise (respectively).

To adjust the Channels individually:

At the bottom of the screen you will find three items of information. These are:

- the Left Threshold (numeric value)
- the Mode
- the Right Threshold (numeric value)

You will note that both thresholds are surrounded by boxes. This shows that they are SELECTED, and that the action of the α-dial applies to both channels.

To de-select a channel (and to re-select it as desired) press the Function Key immediately below the read-out. The box will disappear, showing that the channel is now DE-SELECTED.

If both channels are de-selected the α-dial will have no effect.

Mode

The CEDAR DC-1 can optimise its scratch removal depending on whether the material being processed suffers predominantly from large scratches, or from smaller ticks and clicks. The Scratch Mode parameter enables you to select the most appropriate setting for each restoration:

Small: Use this setting when the damage is predominantly small clicks and ticks.

Medium: This is a compromise setting lying between the 'small' and 'large' settings.

Large: Use this setting when the material suffers from larger 'thump'-like scratches.

Press the Function Key under the word MODE to toggle between the Scratch Mode settings.

WARNING: Signal degradation may occur if an inappropriate Scratch Mode setting is used.

PAGE 2: INPUT/OUTPUT CONTROL PAGE (I/O CONTROL)

Access this page by pressing the Defined Function Key 'PAGE'.

This page allows you to determine the input used, the sampling frequency of the Analogue to Digital Converters, and the digital output format.

(Remember that all outputs are permanently active, and that they do not require selecting.)

There are three options in the I/O Control Page:

A. Digital Output format:

This option defaults to PROFESSIONAL.
To toggle between the two input modes, PROFESSIONAL and CONSUMER, press the Function Key marked 'A' on the LCD screen.

- PROFESSIONAL FORMAT:

When PROFESSIONAL is selected, both the phono and XLR connectors will carry AES/EBU specification audio data. You should patch the output from the XLR connectors to your recording device.

The DC-1 features 24-bit input and output resolution when the AES/EBU digital inputs and outputs are utilised.

- CONSUMER FORMAT:

When CONSUMER is selected, both the phono and XLR connectors will carry SP-DIF specification audio data. You should patch the output from the phono connectors to your recording device.

B. Input Source:

There are two input sources: DIGITAL and ANALOGUE.

- **Sample rate of incoming digital signal:**

When the DC-1 is switched to receive digital audio data, the 'DIGITAL' LED will be lit, and the front panel LEDs will indicate the sample rate of the digital signal presented to the inputs:

44.1	kHz LED lit	44.1	kHz signal presented to inputs
48	kHz LED lit	48	kHz signal presented to inputs
neither 44.1 nor 48	kHz LED lit	32	kHz signal presented to inputs

- **Digital Lock:**

If the digital lock is lost (i.e. no digital signal is recognised at the digital inputs) the 'Digital' LED will flash to indicate the loss of lock.

- **Sample rate of A to D Converters**

When the DC-1 is switched to receive analogue audio data, the 'DIGITAL' LED will not be lit, and the front panel LEDs will now indicate the sample rate of the analogue-to-digital converters.

The A-to-D Converters in the DC-1 do not offer a 32kHz option.

- **Switching between Digital and Analogue inputs:**

To toggle between the input sources press the Function Key marked 'B' on the LCD screen.

You will note the following effects:

- The Status LEDs will indicate the inputs selected and the sample rate received (digital) or selected for conversion (analogue).
- When ANALOGUE is selected a third option appears on the screen:

  C: A to D Frequency: 44.1kHz

C. A to D Frequency (only when Input source = Analogue)

To toggle between the sampling frequencies 44.1kHz and 48kHz press the Function Key marked 'C' on the LCD screen. The change in frequency will be shown on-screen and also by the Status LEDs.

The sampling frequency reverts to 44.1kHz on Coldstart.

PAGE 3: REMOTE CONTROL

Access this page by pressing the Defined Function Key 'PAGE'.

This page allows you to determine the Remote Control in use, MIDI or RS-232, and the MIDI Channel on which the DC-1 receives commands.

Remote

To toggle between states OFF / MIDI / RS-232 press the Function Key marked 'A'.
On Coldstart this option defaults to OFF.

Channel

To change the MIDI Channel turn the α-dial clockwise or anti-clockwise to increase or decrease the MIDI Channel (respectively).

To toggle this function on/off press the Function Key marked 'B'.
On Coldstart this option defaults to 1.

MIDI

Details to follow

CEDAR Audio Ltd do not produce software for remote devices to control the DC-1 over MIDI.

RS-232

Refer to chapter: RS-232 Protocol

CEDAR Audio Ltd do not produce software for remote devices to control the DC-1 over RS-232.

NOTES AND HINTS TO USERS:

CEDAR Scratch removal is an *almost* foolproof process. However, there are rare instances when experience of its occasional quirks is useful. These notes have been written by the in-house Engineers at Cambridge Sound Restoration, and should aid your quick progress to full understanding and competence.

Low thresholds are most effective at removing all classes of scratch, click, and tick. However, a higher threshold is advisable if processing begins to introduce distortion.

If distortion is introduced, it will be most noticeable as a burbling sound (rather than the traditional Jimi Hendrix fuzz), particularly following the transients of harsh sounds such as trumpets or synthesised brass. To avoid this, try raising the threshold a little. In general, no distortion will be introduced with a threshold of 8 or above.

When the Large Mode is selected it will be necessary to use higher thresholds than typical for Small and Medium modes. This is a consequence of the differences between the algorithms used in the modes.

In special cases (noticeably high pitched, high amplitude big-band brass) the de-scratch process will not totally de-click without distortion. CEDAR Audio now produce a dedicated unit, the CEDAR CR-1 De-Crackler, to remove small ticks and crackles from material such as this. In addition, the CR-1 will remove crackles from all other types of material, remove buzzes and reduce some forms of amplitude distortions.

There are also processes on the computer-based CEDAR System which restore material suffering from crackle, buzzes, and distortion. Please contact CEDAR Audio Ltd or your national distributor for details of this, and other advanced CEDAR processes .

RS-232 PROTOCOL

RS-232 is defined in the DC-1 as:

9600 baud
8 bits data
1 stop bit
No parity

A command packet contains 5 bytes. These are:

byte 1: channel number byte: must be 0xaf plus the channel number
byte 2: fixed: must be 0x63
byte 3: command number (see below)
byte 4: fixed: must be 0x06
byte 5: command value

Command numbers:

0 Set Scratch Threshold*
1 Set Attenuation
2 Set Bypass mode
3 Set Pre/Post mode
4 Set Input Source
5 Set A to D frequency
6 Set Scratch Mode

Command Values:

		Min	Max
0	Scratch Threshold	0	40
1	Attenuation	0	10

		-1	0	1	2
2	Bypass	Toggle	NO	YES	n/a
3	Pre/Post	Toggle	PRE	POST	n/a
4	Input	Toggle	Analogue	Digital	n/a
5	Sampling f.	Toggle	44.1kHz	48kHz	n/a
6	Scratch Mode	Toggle	SMALL	MEDIUM	LARGE

*Both channels are set. There is no means to control channels individually over RS-232.

Toggle

When this command is used the value is cycled 0, 1, (2).
This duplicates the action of the Function Keys.

MIDI PROTOCOL

MIDI commands are the same as RS-232 commands.

A MIDI implementation chart will appear here in later versions of this manual.

SELF TEST MODE

The DC-1 features a powerful self-test mode which enables the System to check the operation of each of its major sub-systems, plus all of the user controls.

To enter the self-test mode:
Switch on the DC-1 while holding down the ENTER key.

ROUTINE 1: BUTTON TESTING ROUTINE

The DC-1 will instruct you to press each of the Function Keys in turn. If a key fails the System will display the message "TOO LATE" thus notifying you that it has not detected the key press.

The DC-1 will then instruct you to press each of the Defined Function Keys. If a key fails the System will display the message "TOO LATE" thus notifying you that it has not detected the key press.

If all tests are passed the screen will display the message:

"All Buttons are Functional".

If a Function key is not detected the screen will display the message:

"Failed Key xx".

Note: The message TOO LATE will occur in all subsequent tests if the required operation is not performed when requested.

ROUTINE 2: ATTENUATION KNOB TEST

The DC-1 will instruct you to turn the Attenuation knob to -10dB. It will then instruct you to turn the knob in steps of 1dB from -10dB to 0dB.

If all tests are passed the screen will display the message:

"All knob positions are functional".

If the Attenuation knob is faulty (or if you have missed a step) the screen will display the messages:

"Position xx failed".

ROUTINE 3: LED TEST

The DC-1 will light each LED in turn and ask you to press a key to confirm that the correct LED is lit.

If all tests are passed the screen will display the message:

"All LEDs are functional".

If an LED is faulty (or if you have missed a step) the screen will display the messages:

"failed xxxxx".

ROUTINE 4: SPIN WHEEL TEST

The DC-1 will instruct you to spin the α-dial anti-clockwise and then clockwise.

If all tests are passed the screen will display the message:

"The spin wheel is functional".

If the α-dial is faulty (or if you have missed a step) the screen will display the message:

"Faulty on turning xxxxx".

ROUTINE 5: DSP MEMORY TEST BOARD1

The DC-1 will test its internal memory. Please wait for this test to complete.

If the System is fully functional the screen will display the message:

"Memory OK (press a key to continue)".

If a memory error is detected the screen will display the message:

"Memory failed (press a key to continue)".

If you observe this message please repeat the self-test. If the message recurs please contact your dealer for assistance.

WARNING: The DC-1 contains no user-serviceable parts. Even if you are a computer-literate engineer DO NOT UNDER ANY CIRCUMSTANCES attempt to service your unit.

ROUTINE 6: DSP MEMORY TEST BOARD2

As above.

TEST COMPETED

Your DC-1 will now return you to operating mode (whether all tests have been passed or not).

Some failures will not stop you from using the DC-1 successfully. However, consistent failures should be notified to your dealer or directly to CEDAR Audio Ltd.

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40-bit 3
44.1kHz 3
48kHz 3
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transients 24
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voltage selector 8
VU meters 3
Warmstart 15
workstation 11
XLR 9, 10, 21
Δ-∑ 3

CEDAR DC-1

Designed and Manufactured by

CEDAR Audio Ltd
5 Glisson Road
Cambridge
CB1 2HA

Tel: & Fax: +44 (0)223 464117

Distributed by

HHb Communications Ltd
73-75 Scrubs Lane
London
NW10 6QU

Tel: +44 (0)81 960 2144 Fax: +44 (0)81 960 1160