

# DIGITEC

## *The Reference for routing and distribution The DS-D Range*

- ✓ Fully integrated global solution
  - Analog and digital technology
  - Ease of operation
  - Open solutions

### Performance and reliability

- ✓ Full compliance with AES/EBU standards
  - Interfaces AES3
  - Complete management of channel status
  - Respect of synchronisation policy (AES5, AES11)
- ✓ Easy construction of complete configurations by assembly of these components

4 TE Eurocard modules integable in a 3U frame  
(up to 16 modules/ frame)

- ✓ Analog Interface Modules
  - 4 ch.A/D & D/A converters DS-D C4AD & DS-D C4DA
  - Dual 1 to 8 digital distribution DS-D DA
- ✓ Synchronisation
  - Digital Audio Reference Signal Generator DS-D ARG

Video synchronised sampling clock generator  
DS-D VS

- ✓ Digital Interface Modules
  - 2 digital AES inputs (4 channels) DS-D AESI
  - 2 digital AES outputs (4 channels) DS-D AESO
  - 1 MADI input interface (56 channels) DS-D MADI
  - 1 MADI output interface (56channels) DS-D MADO

**DS-D VS**

**DS-D ARG**

**DS-D DA**

**DS-D C4AD**

**DS-D C4DA**

**DS-D AESI**

**DS-D AESO**

**DS-D MADI**

**DS-D MADO**

**DS-D FRAME**

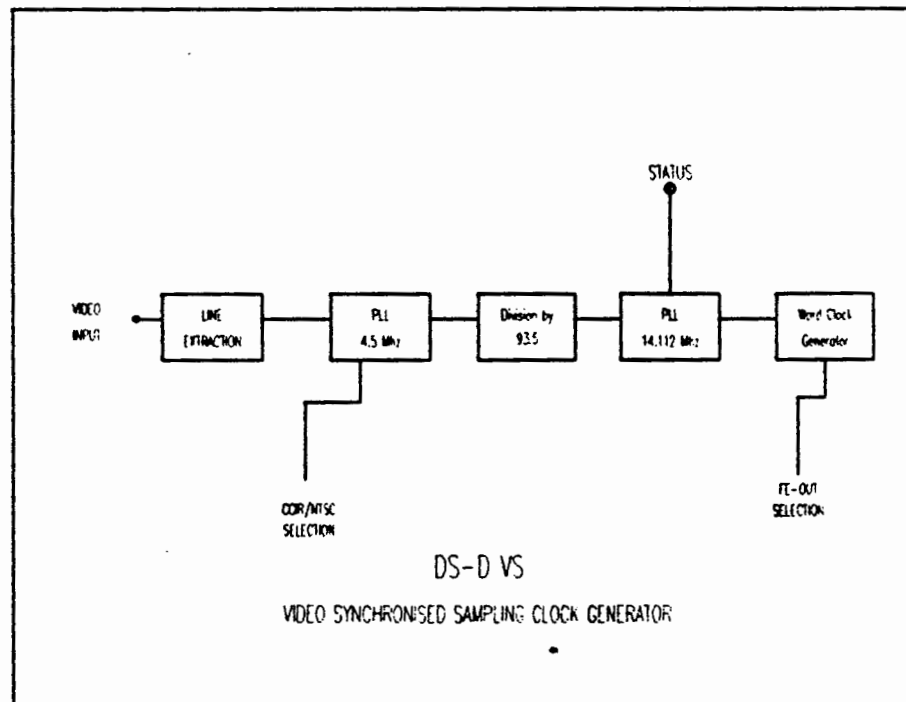
**3U Eurocard module of the DS-D range.  
 Video Synchronised Sampling Clock Generator.  
 Synchronisation of the digital audio sub-system from the video reference.  
 Low jitter sampling frequency clock output.  
 Composite video or video sync. input.  
 CCIR or NTSC input (selectable).  
 32, 44.1, 48 kHz output (selectable).**

### Video Synchronised Sampling Clock Generator

The STUDER DIGITEC DS-D VS belongs to the DS-D modular system range. It features a 3U Eurocard format board designed to be inserted in the self powered DS-D frame.

It is a 4TE Europe module with a video input and a sampling clock output. This module preserves the digital audio quality, and it is possible to synchronise on composite video signal or video sync input in CCIR or NTSC format.. The DS-D VS generate a word clock from a video reference signal. This signal is available for a sampling clock at 32, 44.1, and 48 kHz.

This module is usable in various digital environments related to Radio , TV Production and Broadcasting.

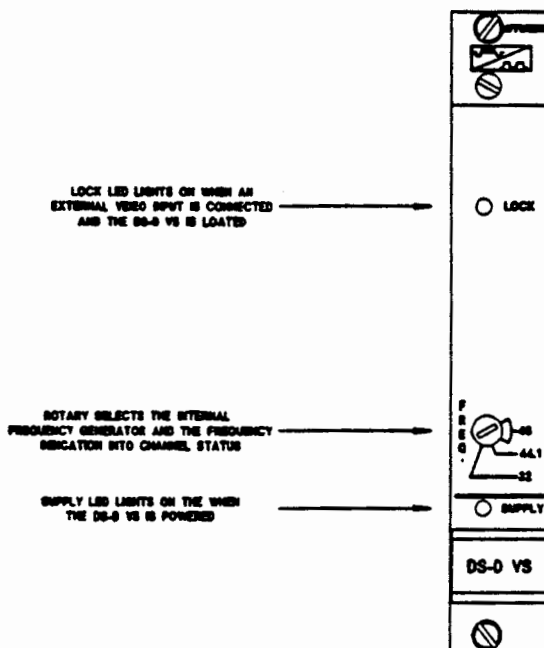


## Operation

The DS-D VS is designed to work with other equivalent modules in the DS-D FRAME to give sync reference signal. As soon as it is plugged into the DIN backplane connector of the chassis, the DS-D VS is functional.

The professional audio digital equipment must work in a synchronous manner to the same sampling frequency. The module DS-D VS generates a word clock signal, synchronisable by video input for CCIR (PAL/SECAM) at 15 625Hz or NTSC at 15 734.26.. Hz.

## DS-D VS Front panel display



## Inputs Electrical Characteristic

CCIR/NTSC video input is typical video input positive 1Volt Peak to Peak without impedance adaptation (the 75 ohms adaptation must be realised with an adaptor on the cable).

## Outputs Electrical Characteristic

The word clock output is TTL output on 75 ohms

## Power supply

5V/0,7A  $\pm 10\%$

Maximum power consumption 3,5W

## Ambient temperature

Operating temperature range 0 to 40° C

## Dimensions

(WxHxL) in mm	20.32 x 133 x 309
PCB in mm	100 x 280

Weight 250 g

## Ordering information

DS-D VS 42 32 1402 01

# Configuration/Adjustments

The DSD VS is adjusted and configured at the factory.

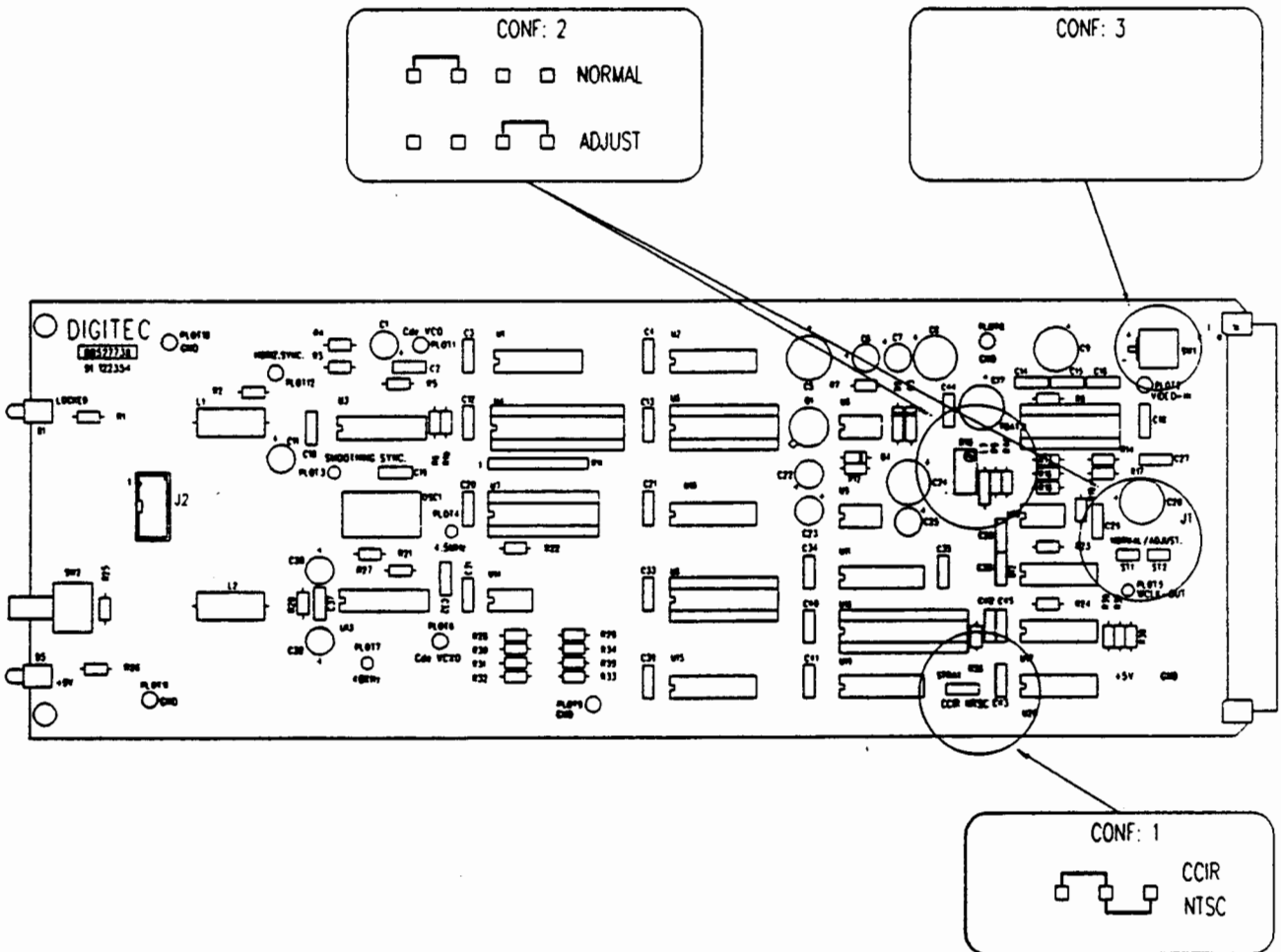
**CONF1 :** CCIR or NTSC. A jumper select the video signal for CCIR (PAL SECAM) or a NTSC video format.

**CONF2 :** this configuration is the default factory setting.

The position must be in normal.

For an adjustment you must connect a video signal (CCIR position) on the input, and change the strap from « normal » to « adjust » position, you must verify that you have square signal on TP 12 with a frequency of 15680 Hz, the adjustment can be realised with R15. Do not forget to pass in normal mode and automatically the signal on plot 12 will be 15625 Hz.

**CONF3 :** is an electrical protection on the power supply and must be selected in ON position.



## Board connector

64-pin DIN 41612 female plug

pin	row A	row B	row C
1	MGND		MGND
2	+5V		+5V
3			
4	GND		GND
5			
6			
7			
8			
9			
10	WCLK out		video IN
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			
26			
27			
28			
29	AGND		AGND
30	-15V		-15V
31	+15V		+15V
32	MGND		MGND

AGND Analog Ground  
MGND Mecanical Ground  
video IN Input for the video reference signal  
WCLK out TTL 75 ohms word clock output

## OPTIONS DESCRIPTION

### DS-D VS Rear connection Board

Ordering information 42 32 1106 01

Rear connection board distributing the input and output of the DS-D VS board on three BNC 75 ohms. One for the video-in (input) one for the video through (or 75 ohms adaptator) and one for the wordclock out. This board can be plugged on the other side of the board connector where the DS-D VS has been inserted.

### Wiring kit

Ordering information 42 32 1103 01

Wiring kit including a in DIN 41612 female plug, its cap and locking screws used to link the DS-D VS out of the DS-D FRAME when the rear connection board is not used.

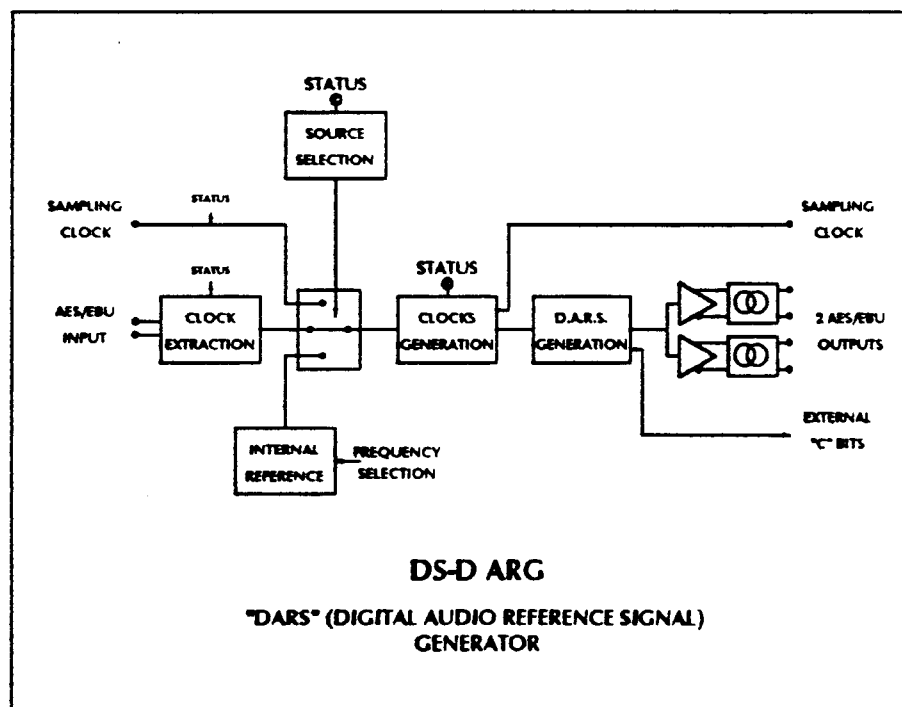
**3U Eurocard module of the DS-D range.**  
**Central clock reference for digital audio sub-system.**  
**Generation of a DARS compliant with AES/EBU standards.**  
**High precision internal clock reference,**  
**with selectable sampling frequency 32/44,1/48 kHz.**  
**Synchronisable from a word clock or an AES/EBU input.**  
**DARS channel status labels automatically set depending on the selected source.**  
**Auxiliary Word clock output, for synchronisation of equipment not synchronisable to a DARS (CD, RDAT ...).**

### Digital Audio Reference Signal Generator

The STUDER DIGITEC DS-D ARG belongs to the DS-D modular system range. It features a 3U Eurocard format board designed to be inserted in the self powered DS-D frame.

It is a 4TE Europe module with a word clock input, an AES/EBU input, a word clock output and an AES/EBU "DARS" (Digital Audio Reference Signal) output. It is also possible to include the DS-D ARG module in a DS-D 1U frame, with the other modules of the range (DS-DVS, DS-DDA), to build a Master clock frame.

This module is usable in various digital environments related to Radio, TV Production and Broadcasting.



### Operation

The DS-D ARG is designed to work with other equivalent modules in the DS-D FRAME to provide sync reference signal. As soon as it is plugged into the DIN backplane connector of the chassis, the DS-D ARG is functional, and the priority to select the sync source inputs is:

1. Word clock input (high level)
2. AES/EBU input (medium level)
3. Internal reference (low level).

# DS-D ARG Front panel display

WORD CLOCK LED lights on when an external word clock input signal is connected

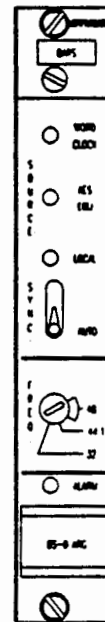
AES/EBU LED lights on when an external AES/EBU input signal is connected

LOCAL LED lights on when no external input signal is detected and the local reference is on

Switch activates an auto synchronisation from input signals with priority

Rotary selects the internal frequency generator and the frequency indication into channel status

ALARM LED lights on when no signal is present on the OUTPUT



## Function

AES/EBU Digital Audio Reference signal Generator	
Synchronisation input	1) Word Clock
priority (auto made)	2) AES/EBU signal
	3) internal generator
Sampling frequency	1) 32 kHz
	2) 44,1 kHz
	3) 48 kHz

## Clock Performance

Word Clock Input characteristic	32/44,1/48 kHz ±12,5%
AES/EBU Input characteristic	32/44,1/48 kHz ±12,5%
Internal Clock	32/44,1/48 kHz precision ±1ppm

## AES/EBU outputs and Synchro input

Transformer balanced	
Input/output impedance	110 ohms typ.
Sensitivity	200 mV pp

## Channel Status bits contents :

- Indication of sampling frequency depends of the front panel selection
- on an external source.
- Digital Audio reference is marked in grade 1 for ± 1ppm (AES 11)
- Label content according to synchro source

## Inputs Electrical Characteristic

AES/EBU AES SYNC	AES3 1992
Word Clock	TTL,75 ohms impedance
C channel status input	TTL
U user bit input	TTL

_AES	reference signal come from the AES/EBU input
WCLK	reference signal come from the WORD CLOCK input
_LOC	Internal DSD ARG clock
_??	DSD ARG not locked ALARM is ON

AES/EBU Input allows adjustable equalization to improve the reception of signal. Input accepts a signal amplitude of 200 mV minimum (peak to peak), and therefore the connection of a "consumer" source (CEI 958/SPDIF).

-channel destination DATA

DARS is indicated in channel destination Data (Digital Audio Reference Synchro).

## Outputs Electrical Characteristic

AES/EBU SYNC	TTL following the AES3 1992
AES/EBU outputs	AES3 1992
Word clock	TTL,75 Ω impedance
C channel status output	TTL
U user bit output	TTL
clock reference	TTL
bloc reference	TTL
status outputs	Open collector TTL (pull up to +5V through 15 kΩ)

## Power supply

5V/0,7A ±10%

Maximum power consumption 3,5W

## Temperature

Operating temperature range

0 to 40° C

## Dimensions

(WxHxD) in mm	20,32 x 133 x 309
PCB in mm	100 x 280

## Weight

250 g

## Ordering information

DSD ARG 42 32 1401 01

## Configuration/Adjustments

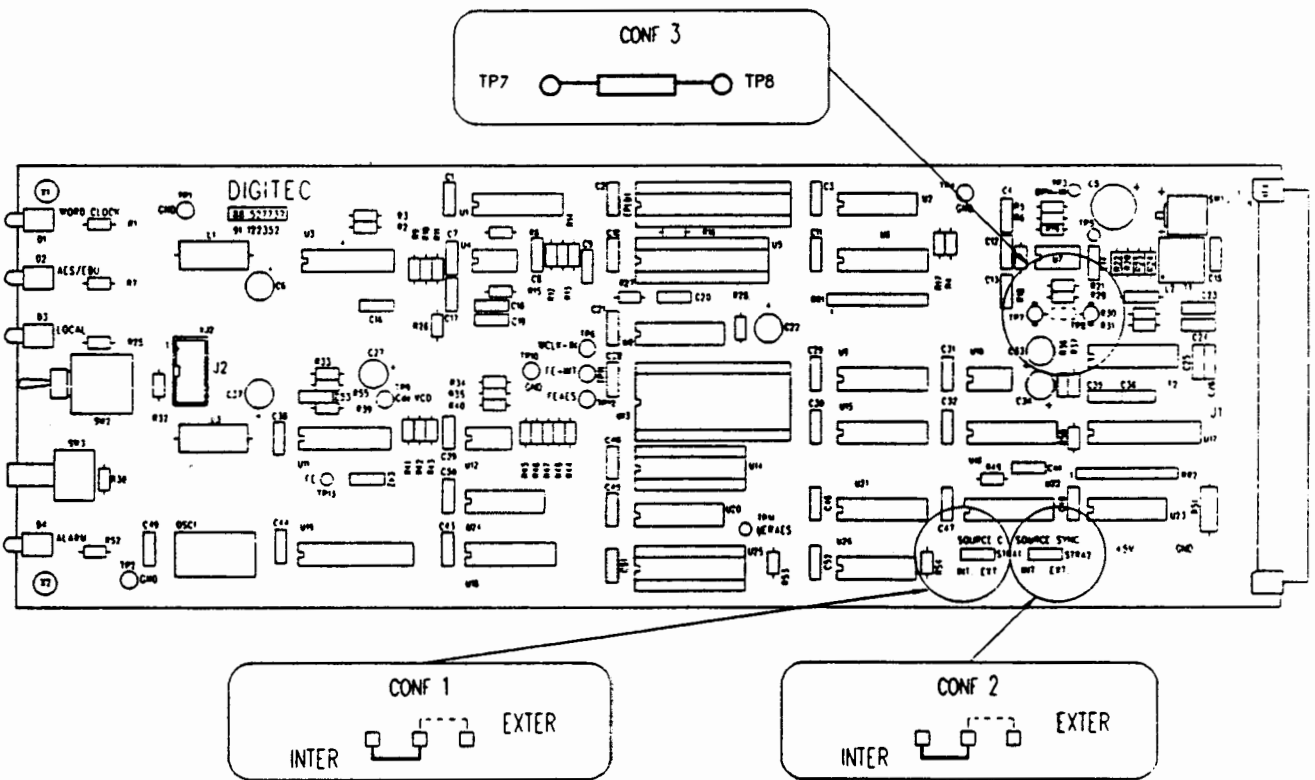
The DSD ARG is adjusted and configured in factory as defined hereafter.

**CONF1** : C bit channel status selection. A jumper selects C bit from the DS-DARG board (INTER position) or from the Mother board connector (EXTER position).

**CONF2** : Synchro Source selection : a jumper allows selection of an external AES sync source (extern) or TTL reference (INTER position).

**CONF3** : Adaptation for the AES/EBU input. A optionnel resistor can be connected for adapted equalisation. Typical values with an AES cable (110 Ω) :

Length in metres	Resistor in Ohms
100	none
200	none
300	470
400	0





## Board connector

64-pin DIN 41612 female plug

pin	row A	row B	row C
1	MGND		MGND
2	+5V		+5V
3	O SYNC		
4	GND		GND
5	I AESSYNC+		I AESSYNC-
6	O S0+		O S0-
7	O S1+		O S1-
8			
9			
10	O WCLK out		I WCLK in
11			
12	O VFEO		
13	O VFE1		
14	O SYNEXTOK		O HBIT
15	O /ALARM		
16	O /BLOC		I /AUDIOin
17	O C out		I C in
18	O HTRAME		I U in
19			
20			
21			
22			
23			
24			
25			
26			
27			
28			
29			
30			
31			
32	MGND		MGND

I=Input	O=Output
AESSYNC	AES/UER input
S0, S1	AES/URE outputs
WCLK out	generated Word clock output 75Ω
WCLK in	Word clock input 75Ω
VFEO, VFE1	FE coding value
SYNEXTOK	status bit
HBIT, HTRAME	TTL output bit clock and frame
ALARM	status bit
BLOC	TTL output AES bloc info
AUDIOin	TTL input for audio A, B channel
C out	TTL output C bit
C in	TTL input Cbit
U in	TTL input user bit

## OPTIONS DESCRIPTION

### DS-DARG Rear connection Board

Ordering information 42 32 1107 01

The rear connection board distributes the inputs and outputs of the DS-D ARG board on one 15-pin D-sub male connector, and two BNC 75 ohms. This board can be plugged on the other side of the board connector where the DS-D ARG has been inserted.

### connector description for the Rear Board

15-pin D-SUB male plug (AES/EBU)

pin	Signal	pin	Signal
1	MGND	9	MGND
2	I AESSYNC+	10	I AESSYNC-
3		11	MGND
4	O S0+	12	O S0-
5		13	MGND
6	O S1+	14	O S1-
7	GND	15	O SYNEXTOK
8	O /ALARM		

I=Input O=Output

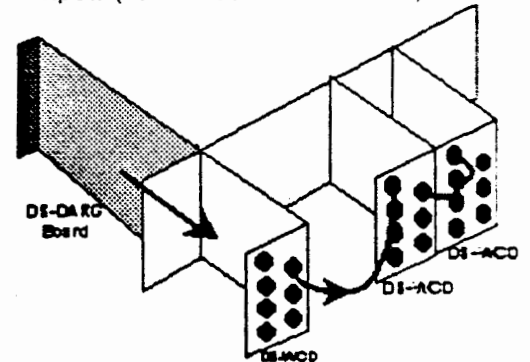
### DS-D ARG Word Clock DISTRIBUTOR

Ordering information

It is a 8TE Europe module with one Word clock input and six Word Clock outputs. This board DS-D WCD can be plugged on the other side of the board connector where the DS-D ARG has been inserted. Rear connection board distributes on BNC 75 ohms plugs.

The board can directly use the DS-DARG word clock out, or an external Word Clock signal (through the input BNC), the choice is available by a strap.

It is possible to transmit the direct Word Clock IN signal or the inverse Word Clock IN signal, the selection being available by a strap on the rear board. It is also possible to chain many WC distributor in the same DS-D frame to increase the number of Word clock outputs (see the schematic below)



### Wiring kit

Ordering information Wiring kit 42 32 1103 01

Wiring kit including a in DIN 41612 female plug, its cap and locking screws used to link the DS-D ARG out of the DS-D FRAME when the rear connection board is not used.

**3U Eurocard module of the DS-D range.  
Dual 1x8 Digital Distribution Amplifier.  
Input signal regeneration.**

**Clock recovery and jitter reduction, separately selectable for each input.**

**Tests points for input monitoring.**

**AES/EBU inputs and outputs.**

**Distribution of any signal with sampling frequency between 28 and 54 kHz.**

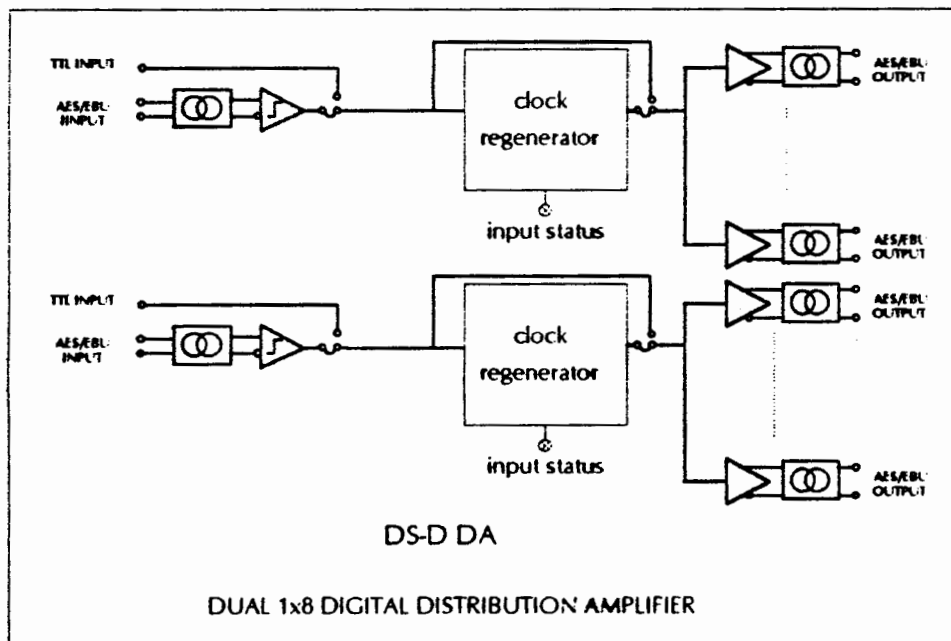
**Input equalisation for long cable correction.**

### AES/EBU distribution module

The STUDER DIGITEC DS-D DA belongs to the DS-D modular system range. It features a 3U Eurocard format board designed to be inserted in the self powered DS-D frame.

It is a double 1 to 8 AES/EBU distributor. It is possible to configure the board in 1 to 16 AES/EBU outputs.

This module is very useful in various digital environments related to Radio, TV Production and Broadcasting. It is used generally to make a distribution of AES SYNC reference. The board can be integrated in DS-D 3U frame or in DS-D 1U frame.



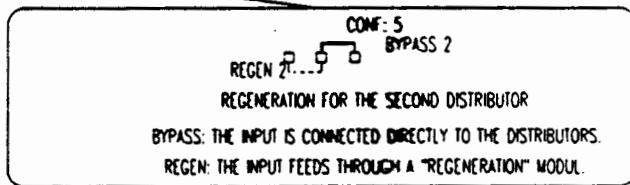
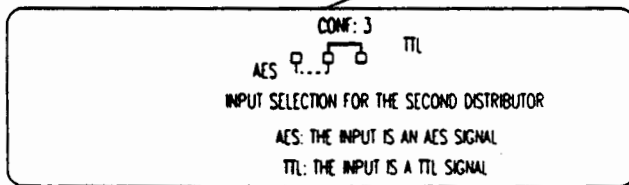
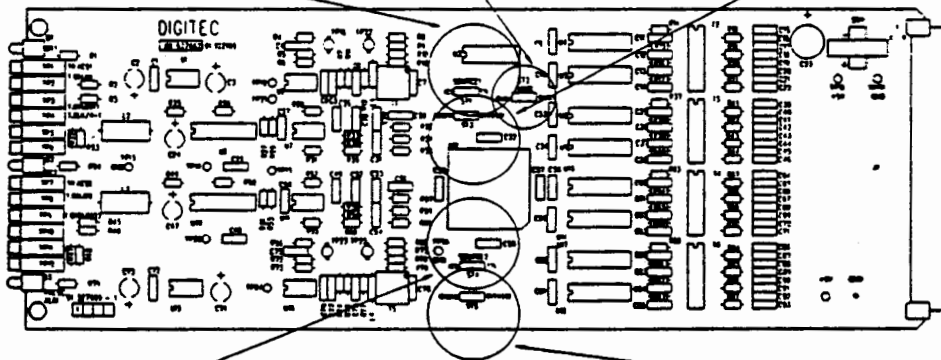
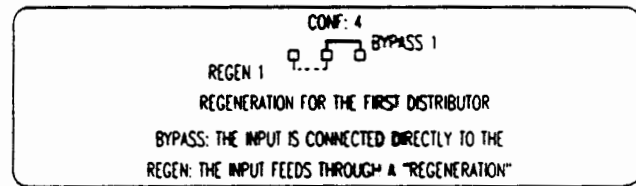
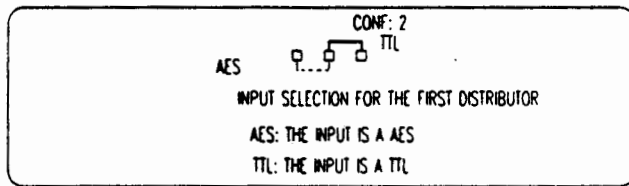
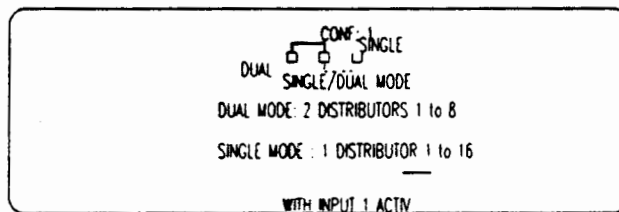
### Operation

The DS-D DA is designed to work with other equivalent modules in the DS-D FRAME. As soon as it is plugged into the DIN backplane connector of the chassis, the DS-D DA is functional. It can be removed and re-inserted at any time even when the chassis power is on, without disturbing the operation of the other modules and without impairing the life of the equipment.

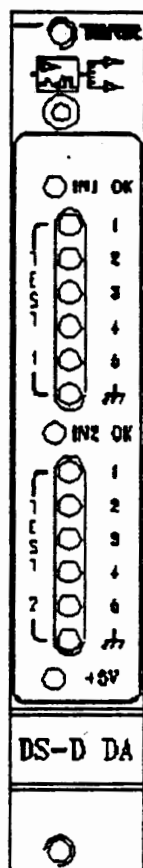
## Configuration/Adjustments

The DS-D DA is adjusted and configured in factory depending on the customer needs. But most settings are available to the end-user by proper selection of the related jumper accessible on the component side of the printed circuit board.

- CONF1 : Single/Dual : selects the possibility to have one distributor 1 to 16, or to have two distributors 1 to 8.
- CONF2 : AES/TTL : selects the format of the electrical interface for the input for the first input
- CONF3 : the same than CONF2 but for the second generator
- CONF4 : Regen/bypass selects the capability to feed through a regeneration module for the first input
- CONF5 : the same than CONF4 but for the second generator



# DS-D DA Front panel display



- ← SIGNAL PRESENT AES/UEP No1
- ← INPUT AES/UEP No1
- ← INPUT AES/UEP No1 TTL FORMAT
- ← OUTPUT AES/UEP No1 REGENERATED BEFORE DISTRIBUTION
- ← CLOCK BIT
- ← CLOCK FRAME
- ← GND
- ← SIGNAL PRESENT AES/UEP No2
- ← INPUT AES/UEP No2
- ← INPUT AES/UEP No2 TTL FORMAT
- ← OUTPUT AES/UEP No2 REGENERATED BEFORE DISTRIBUTION
- ← CLOCK BIT
- ← CLOCK FRAME
- ← GND
- ← POWER ON

- Test Point 1 the signal must have 50mV minimum amplitude
- Test Point 2 AES/EBU input signal in TTL format
- Test Point 3 AES/EBU signal distributed
- Test Point 4 clock bit
- Test Point 5 clock frame (equal sampling frequency)

## AES/EBU outputs and Synchro input

Transformer balanced	
Input/output impedance	110 ohms typ.
Sensitivity	200 mV pp

## Electrical Characteristic Inputs

AES/EBU input	AES3 1992
or logic format input	TTL

AES/EBU Inputs have an adjustable equalization to improve the reception of a depreciated signal. Each entry can accept a signal amplitude of 200 mV minimum (peak to peak), and therefore the connection of a "consumer" source (CEI 958/SPDIF).

## Electrical Characteristic Outputs

AES/EBU 1S0 to 1S7	AES3 1992
AES/EBU 2S0 to 2S7	AES3 1992

AES/EBU Outputs have 10V peak to peak without load, and the level is 5V peak to peak on 110 ohms ( $\pm 1V$ )

## Power supply

5V/1,8A  $\pm 10\%$   
Maximum power consumption 3,5W

## Ambient temperature

Operating temperature range 0 to 40° C

## Dimensions

(WxHxL) in mm	20.32 x 133 x 309
PCB in mm	100 x 280

## Weight

350 g

## Ordering information

DS-D DA 42.32.1201.01

## Board connector

64-pin DIN 41612 female plug

pin	row A	row B	row C
1	MGND		MGND
2	+5V		+5V
3	/ SYNC		
4	GND		GND
5			
6			
7			
8	MGND		MGND
9	/ 1E0+		/ 1E0-
10	O 1S0+		O 1S0-
11	O 1S1+		O 1S1-
12	O 1S2+		O 1S2-
13	O 1S3+		O 1S3-
14	O 1S4+		O 1S4-
15	O 1S5+		O 1S5-
16	O 1S6+		O 1S6-
17	O 1S7+		O 1S7-
18	MGND		MGND
19	/ 2E0+		/ 2E0-
20	O 2S0+		O 2S0-
21	O 2S1+		O 2S1-
22	O 2S2+		O 2S2-
23	O 2S3+		O 2S3-
24	O 2S4+		O 2S4-
25	O 2S5+		O 2S5-
26	O 2S6+		O 2S6-
27	O 2S7+		O 2S7-
28			
29	AGND		AGND
30	-15V		-15V
31	-15V		-15V
32	MGND		MGND

I=Input

O=Output

- AGND Analog Ground
- MGND Mechanical Ground
- GND Ground
- 1E0 first AES/EBU Input for the first distributor
- .E0 second AES/EBU Input for the second distributor
- 1S0..1S7 8 AES/EBU OUTPUTS from the first distributor
- 2S0..2S7 8 AES/EBU OUTPUTS from the second distributor
- SYNC TTL input

## OPTIONS DESCRIPTION

### DS-D DA Rear connection Board

Ordering information 42 32 1101 01

Rear connection board distributing the 2 inputs and 16 outputs of the DS-D DA board on one 37 pin D-sub male connector. This board can be plugged on the other side of the board connector where the DS-D DA has been inserted.

### connector description for the Rear Board

37-pin D-SUB male plug (AES/EBU)

Pin	Signal	Pin	Signal
1	MGND	20	/ 1E0+
2	/ 1E0-	21	O 1S0+
3	O 1S0-	22	O 1S1+
4	O 1S1-	23	O 1S2+
5	O 1S2-	24	O 1S3+
6	O 1S3-	25	O 1S4+
7	O 1S4-	26	O 1S5+
8	O 1S5-	27	O 1S6+
9	O 1S6-	28	O 1S7+
10	O 1S7-	29	/ 2E0+
11	/ 2E0-	30	O 2S0+
12	O 2S0-	31	O 2S1+
13	O 2S1-	32	O 2S2+
14	O 2S2-	33	O 2S3+
15	O 2S3-	34	O 2S4+
16	O 2S4-	35	O 2S5+
17	O 2S5-	36	O 2S6+
18	O 2S6-	37	O 2S7+
19	O 2S7-		

I=Input

O=Output

### Wiring kit

Ordering information 42 32 1103 01

Wiring kit including a in DIN 41612 female plug, its cap and locking screws used to link the DS-D DA out of the DS-D FRAME when the rear connection board is not used.



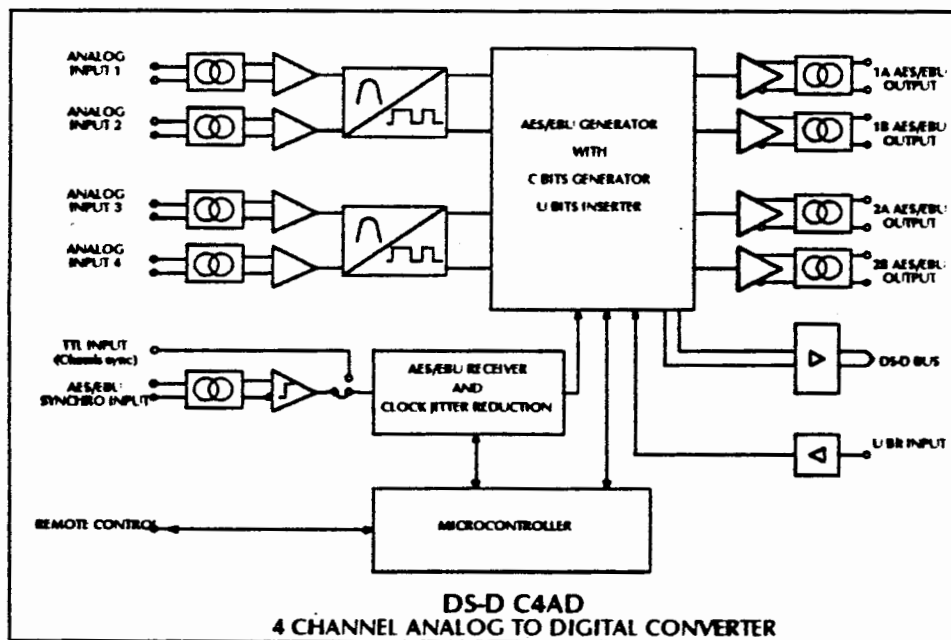
**3U Eurocard module of the DS-D range**  
**18 bits converter providing 95dB dynamic range**  
**Compact : 4 channel conversion on one board**  
**Line level analog inputs, transformer balanced**  
**AES/EBU outputs, 2 stereo or 4 mono**  
**48 or 44.1 kHz sampling frequency (32 kHz optional)**  
**AES-EBU outputs with U and C bits management**  
**On board microcontroller for easy configuration**  
**Usable as analog input module in a DS-D MUX MADI multiplexer**

### 4 channel ANALOG TO DIGITAL converter

The STUDER DIGITEC DS-D C4AD belongs to the DS-D modular system range. It features a 3U Eurocard format board designed to be inserted in the self powered DS-D frame. Up to 16 DS-D C4AD boards may be inserted in a DS-D frame to implement a 64 channel converter system.

It is a 4 channel analog to digital converter which can work with its own selectable local sampling frequency generator or with an AES-EBU synchro input. It provides an excellent audio quality with 18 bits 64 times oversampling  $\Delta$ - $\Sigma$  type converters. The outputs include automatically generated channel status data, fully compliant with AES-EBU standard, and user-bit insertion is possible. In addition to the AES-EBU outputs an access to a parallel bus allows integration in a DS-D MUX MADI Multiplexer.

This module is very useful in various digital environments related to Radio, TV Production and Broadcasting, and also to Telecommunications and other Digital Systems.



### Operation

The DS-D C4AD is designed to work with other equivalent modules in the DS-D FRAME. Up to 16 modules can operate simultaneously in a frame in any combination. As soon as it is plugged into the DIN backplane connector of the chassis, the DS-D C4AD is functional. It can be removed and re-inserted at any time even when the chassis power is on, without disturbing the operation of the other modules and without impairing the life of the equipment.

## Configuration/Adjustments

The DS-D C4AD is adjusted and configured at the factory depending on the customer needs. But most settings are available to the end-user by proper selection of the related jumper accessible on the component side of the printed circuit board.

**CONF1** : Mono/2CH/STEREO : selects the audio mode

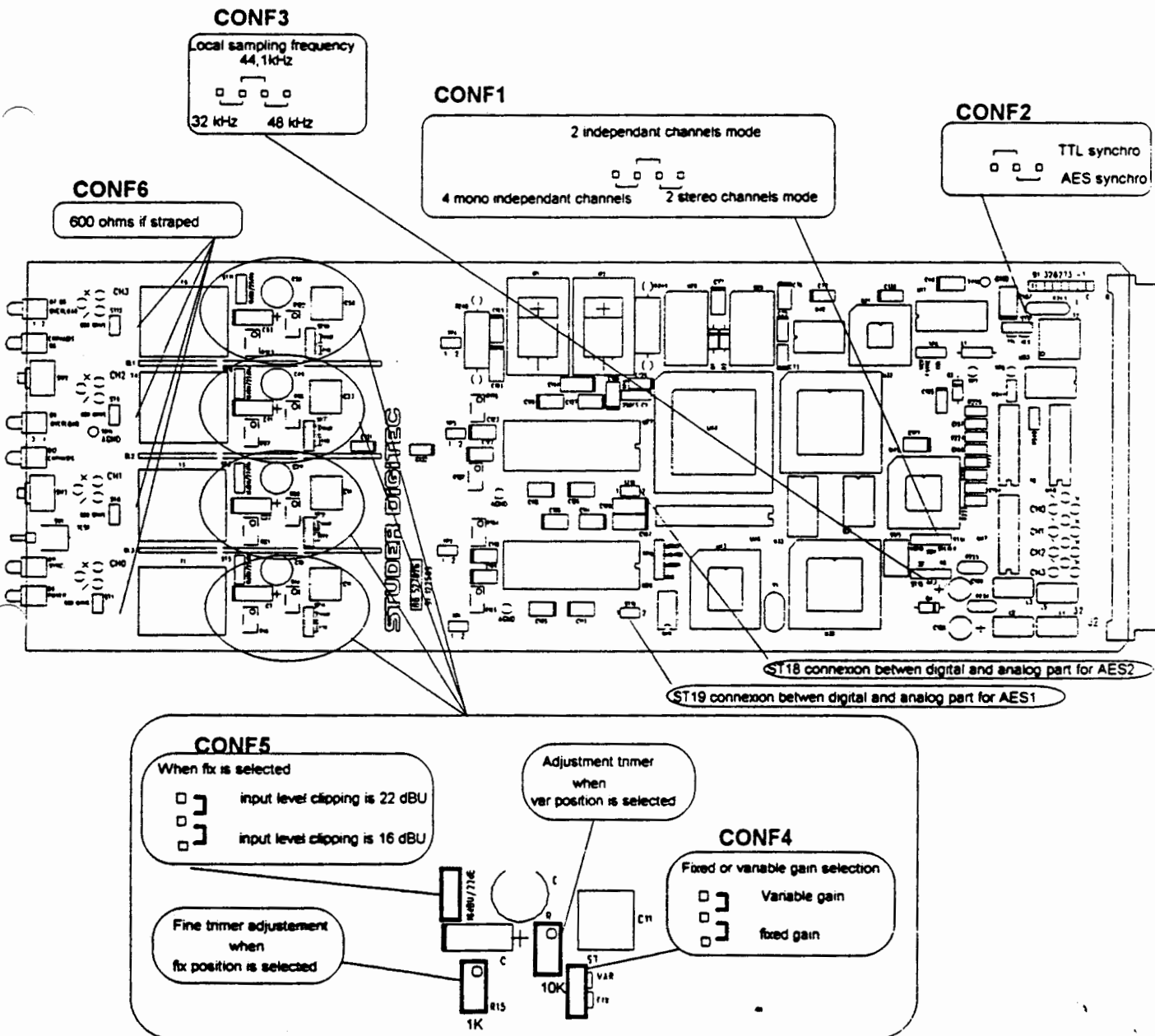
**CONF2** : AES/TTL : selects the AES-EBU Synchro electrical input

**CONF3** : format 32/44.1/48 : selects the default local sampling frequency.(32 kHz is an optional frequency which takes the place of 44.1 kHz)

**CONF4** : FIX/VAR : jumper per channel selects a fixed gain or a variable gain with trimmer adjustment

**CONF5** : 16dBu/22dBu jumper per channel selects the input clipping level for the fixed gain position :

**CONF6** : jumper per channel selects the 600 Ohms analog input impedance



**STUDER DIGITEC**

# DS-D C4AD Front panel display

"OVERLOAD" red LEDs turn on when any input clipping is detected  
 "EMPHASIS" yellow LEDs turn on when emphasis is on  
 "Button" can activate emphasis filter on channels, 1 and 2

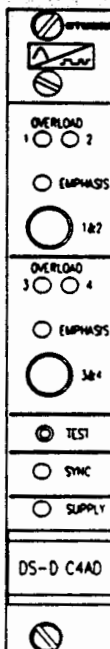
"OVERLOAD" red LEDs turn on when any input clipping is detected  
 "EMPHASIS" yellow LEDs turn on when emphasis is on

"Button" can activate emphasis filter on channels, 3 and 4

AES-EBU Synchro input to AES-EBU outputs loop test is performed by depressing a test button

"SYNC" green LED turns on when an AES synchro input is available

"Supply" green LED turns on when all power supplies are available



## Analog inputs

Analog inputs	Balanced
Input impedance	600 Ohms or >15kOhms
Impedance load	600
Input levels - fixed :	+16dBu or +22dBu
Input levels adjustable :	+0dBu to +26dBu
Maximum input level	+26dBu

## AES-EBU output

Transformer balanced	
Impedance	110 Ohms typ.(±20%)

## AES-EBU Synchro input

Transformer balanced	
Input impedance	110 Ohms typ.
Sensitivity	200 mV pp

## Equalization

Adjustable on all inputs to compensate for long distance losses

## Regeneration

Restores signal waveshape and reduces jitter

## Remote control

An I<sup>2</sup>C access gives the possibility to select pre-emphasis, mono/stereo/2CH mode, alphanumeric channel labels and to read channel status and overload, to reactivate local mode.

## Converters

18 bits 64 x Fs oversampled  $\Delta$ - $\Sigma$  type

## Preemphasis type

32 kHz option :	J17
48 kHz (or 44.1 kHz) :	50 $\mu$ s + 15 $\mu$ s

## Performance

Amplitude response	±0.1 dB
THD+Noise @1 kHz & -30dBFS	<-95dBFS or 0,0018%
THD @-1dBFS :	<-85 dBFS or
Gain difference between channels	<±0,1dB
Phase difference between channels	<±0.5°

All measurements 20-20000 Hz except when stated

## Power supply

5V/1A, ±15V/0.3A

Maximum power consumption 14W

## Ambient temperature

Operating temperature range 0 to 40° C

## Dimensions

(WxHxL) in mm	20.32 x 133 x 309
PCB in mm	100 x 280

## Weight

600 g

## Sampling frequency range

28 to 54 kHz

## Reduced jitter sampling frequencies

48 kHz ± 50ppm  
 44.1 kHz ± 50ppm  
 (Option) 32 kHz ± 50ppm

## Ordering information

DS-D C4AD 42 32 1741 11



## Board connector

96-pin DIN 41612 female plug

pin	row A	row B	row C
1	MGND	MGND	MGND
	+5V	+5V	+5V
3	I SYNC	I HI2C	I DI2C
4	GND	GND	GND
5	I AESSYNC+	GND	I AESSYNC-
6	O AES1a+	GND	O AES1a-
7	O AES1b+	GND	O AES1b-
8	O AES2a+	GND	O AES2a-
9	O AES2b+	GND	O AES2b-
10	O /D0	I BA0	O /D8
11	O /D1	I BA1	O /D9
12	O /D2	I BA2	O /D10
13	O /D3	I BA3	O /D11
14	O /D4	GND	O /D12
15	O /D5	I AES/DS-DBUS	O /D13
16	O /D6	GND	O /D14
17	O /D7	GND	O /D15
18	I FRAME	I CK128	/U
19	MGND	MGND	MGND
0			
21	MGND	MGND	MGND
22	I 1ANA+		I 1ANA-
23	MGND	MGND	MGND
24	I 2ANA+		I 2ANA-
25	MGND	MGND	MGND
26	I 3ANA+		I 3ANA-
27	MGND	MGND	MGND
28	I 4ANA+		I 4ANA-
29	AGND	AGND	AGND
30	-15V	-15V	-15V
31	+15V	+15V	+15V
32	MGND	MGND	MGND

I=Input O=Output

MGND mechanical ground

GND logic ground

AGND analogic ground

AESSYNC AES/USER sync input

I TTL input inverted User bit

AES1a,1b, 2a,2b first and second AES/USER output signal

SYNC TTL AES/USER sync input

FRAME, CK128 TTL inputs clocks

D0,15 TTL data

BA0,3 TTL bus address

AES/DS-D BUS OE data bus (activ low)

HI2C, DI2C clock, nd data for the I2C control

### Options

32 kHz local frequency replaces the standard 44.1

kHz local sampling frequency on specific request

Rear connection board 42 32 1108 01

## OPTIONS DESCRIPTION

### DS-D C4AD Rear connection board

Ordering information 42 32 1108 01

The rear connection board distributes the inputs and outputs of the DS-D C4AD board on two 15-pin D-sub female and male connector. This board can be plugged on the other side of the board connector where the DS-D C4AD has been inserted.

### Connector description for the Rear Board

15-pin D-SUB male plug (AES/EBU)

PIN	Signal	PIN	Signal
1	MGND	9	I AESSYNC+
2	I AESSYNC-	10	MGND
3	O AES1a+	11	I AES1a-
4	MGND	12	O AES1b+
5	O AES1b-	13	MGND
6	O AES2a+	14	O AES2a-
7	MGND	15	O AES2b+
8	O AES2b-		

I=Input O=Output

15-pin D-SUB female plug (Analog)

PIN	Signal	PIN	Signal
1		9	
2		10	MGND
3	I 1ANA+	11	I 1ANA-
4	MGND	12	I 2ANA+
5	I 2ANA-	13	MGND
6	I 3ANA+	14	I 3ANA-
7	MGND	15	I 4ANA+
8	I 4ANA-		

I=Input O=Output

### Wiring kit

Ordering information 42 32 1103 01

Wiring kit includes a in DIN 41612 female plug its cap and locking screws used to link the DS-D C4AD out of the DS-D FRAME when the rear connection board is not used.



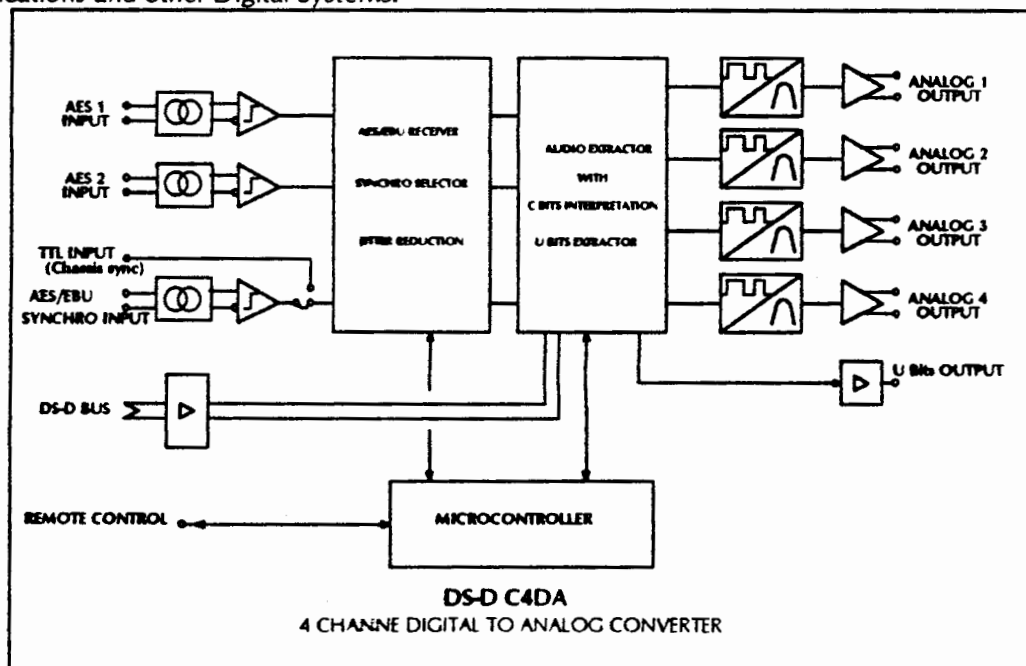
- 3U Eurocard module of the DS-D range.**
- 20 bits converter providing 100dB dynamic range.**
- Compact : 4 channel conversion on one board.**
- High level balanced analog outputs.**
- 48 or 44.1 kHz sampling frequency (32 kHz optional).**
- AES-EBU inputs with U and C bits management.**
- On board microcontroller for easy configuration.**
- Usable as analog output module in a DS-D DMUX MADI demultiplexer.**

### 4 channels DIGITAL TO ANALOG converter

The STUDER DIGITEC DS-D C4DA belongs to the DS-D modular system range. It features a 3U Eurocard format board designed to be inserted in the self powered DS-D frame. Up to 16 DS-D C4DA boards may be inserted in a DS-D frame to implement a 64 channel converter system.

It is a 4-channel digital to analog converter which can work with AES-EBU audio inputs or with an additional AES-EBU Synchro input. It provides excellent audio quality via 20 bits 16 times oversampling converters. It automatically extracts, memorizes and interprets each channel data status, fully compliant with AES-EBU standard, and user-bit extraction. In addition to the AES-EBU inputs an access to parallel bus allows integration in a DS-D DMUX MADI demultiplexer.

This module is usable in various digital environments related to Radio, TV Production and Broadcasting, and also to Telecommunications and other Digital Systems.



### Operation

The DS-D C4DA is designed to work with other equivalent modules in the DS-D FRAME. Up to 16 modules can operate simultaneously in a frame in any combination. As soon as it is plugged into the DIN backplane connector of the chassis, the DS-D C4DA is functional.

It can be removed and re-inserted at any time even when the chassis power is on, without disturbing the operation of the other modules and without impairing the life of the equipment.



# DS-D C4DA Front panel display

"DEEMPHASIS" yellow LEDs turn on when the corresponding channel status is encoded and the emphasis filter is on.

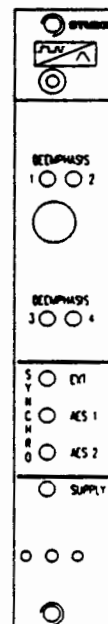
"Button" can activate de emphasis filter on all channels, only if Emphasis is "not indicated" in channel status.

"EXT" green LED lights on when an AES Synchro input is available

"AES1" green LED turns on when an AES1 input is available and EXT synchro is missing

"AES2" green LED turns on when an AES2 input is available and EXT and AES1 Input are missing

"Supply" green LED turns on when all power supplies are available



## Analog outputs

Analog outputs	Balanced
Output impedance	< 40 ohms 20-20 kHz
Load Impedance	600 ohms
Output fixed levels - :	+16dBu or +22dBu
Output adjustable levels :	+0dBu to +26dBu
Maximum output level	+26dBu balanced +22dBu unbalanced

## AES-EBU inputs and AES-EBU Synchro input

Transformer balanced	
Input impedance	110 typ.
Sensitivity	200 mV pp

## Equalization

Adjustable on all inputs to compensate for long distance losses

## Regeneration

Restores signal waveshape and reduces jitter

## Remote control

An I<sup>2</sup>C access gives the possibility to select de-emphasis, to read channel status and to reactivate local mode.

## Converters

20 bits 16 x F<sub>s</sub> oversampled

## Performance

All measurements 20-20000 Hz except when stated

Amplitude response	±0.1dB
THD+Noise @ 1 kHz & -30dBFS	<-100dBFS
THD @ -1dBFS :	<-85 dBFS or 0.0056 %
Gain difference between channels	<±0,1dB
Phase difference between channels	<±0.5°

## Deemphasis type

32 kHz option :	J17
48 kHz (or 44.1 kHz) :	50 μs + 15 μs

## Power supply

5V/1A, ±15V/0.2A

Maximum power consumption 11W

## Ambient temperature

Operating temperature range 0 to 40° C

## Dimensions

(WxHxL) in mm	20.32 x 133 x 309
PCB in mm	100 x 280

## Weight

600 g

## Sampling frequency range 28 to 54 kHz

## Reduced jitter sampling frequencies

48 kHz ± 50ppm

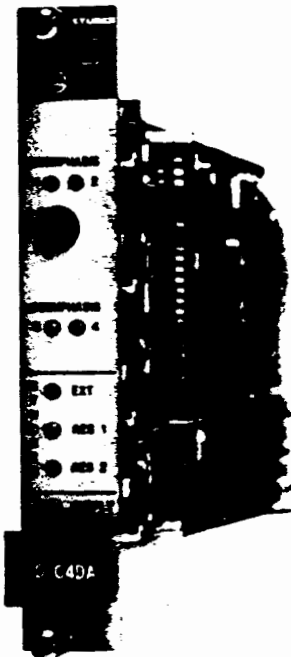
44.1 kHz ± 50ppm

(Option) 32 kHz ± 50ppm

## Ordering information

DS-D C4DA 42 32 1742 11

## DS-D C4DA



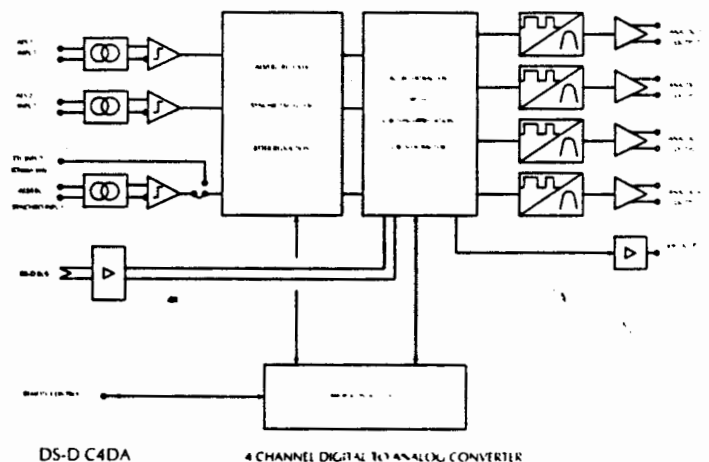
- 3U Eurocard module of the DS-D range
- 20 bits converter providing 100dB dynamic range
- Compact : 4 channel conversion on one board
- High level balanced analog outputs
- 48 or 44.1 kHz sampling frequency (32 kHz optional)
- AES-EBU inputs with U and C bits management
- On board microcontroller for easy configuration
- Usable as analog output module in a DS-D DMUX MADI demultiplexer

### 4 - Channel Digital - To - Analog Converter


The **STUDER DIGITEC DS-D C4DA** belongs to the DS-D modular system range. It features a 3U Eurocard format board designed to be inserted in the self-powered DS-D frame. Up to 16 DS-D C4DA boards may be inserted in a DS-D frame to implement a 64 channel converter system.

It is a 4-channel digital-to-analog converter which can work with AES-EBU audio inputs or with an additional AES-EBU Synchro input. It provides excellent audio quality via 20 bits 16 times oversampling converters. It automatically extracts, memorizes and interprets each channel data status, fully compliant with AES-EBU standard, and user-bit extraction. In addition to the AES-EBU inputs an access to parallel bus allows integration in a DS-D DMUX MADI demultiplexer.

This module will be very useful in various digital environments related to Radio and TV Production to Broadcasting, and also to Telecommunications and other Digital Systems.



## Technical Data

<b>Configuration/Adjustments</b>	The DS-D C4DA is adjusted and configured at the factory depending on the customer needs. But most settings are available to the end-user by proper selection of the related jumper accessible on the component side of the printed circuit board. <b>AES/TTL</b> : selects the AES-EBU Synchro input electrical format <b>32/44.1 48</b> : selects 32 kHz optional frequency which takes the place of 44,1 kHz. <b>16dBu/22dBu/0...26dBu</b> : 1 jumper per channel selects a fixed gain or a variable gain with trimmer adjustment	
<b>Analog outputs</b>	Balanced Output impedance Impedance load Output levels - fixed : - adjustable : Maximum output level	< 40 $\Omega$ , 20-20000 Hz $\geq 600 \Omega$ +16dBu or +22dBu +0dBu to +26dBu +26dBu balanced +22dBu unbalanced
<b>AES-EBU inputs and AES-EBU Synchro input</b>	Transformer balanced Input impedance Sensitivity	110 $\Omega$ typ. 200 mV pp
<b>Equalization</b>	Adjustable on all inputs to compensate for long distance losses	
<b>Regeneration</b>	Restores signal waveshape and reduces jitter	
<b>Remote control</b>	An IR access gives the possibility to select de-emphasis, to read channel status and to reactivate local mode.	
<b>Converters</b>	20 bits 16 x Fs oversampled	
<b>Performance</b>	All measurements except when stated	20-20000 Hz
	Amplitude response THD+Noise @ 1 kHz & -30dBFS THD @ -1dBFS : Gain difference between channels Phase difference between channels	$\pm 0.1$ dB <-100dBFS <-85 dBFS or 0.0056 % < $\pm 0.1$ dB < $\pm 0.5^\circ$
<b>De-emphasis type</b>	32 kHz option : 48 kHz (or 44.1 kHz) :	117 50 $\mu$ s + 15 $\mu$ s
<b>Power supply</b>	Maximum power consumption	5V/1A, $\pm 15$ V/0.2A 11W
<b>Operating temperature</b>	Operating temperature range 0 to 45° C	
<b>Dimensions</b>	(WxHxD) in mm PCB in mm	20.32 x 133 x 309 100 x 280
<b>Weight</b>	600 g	
<b>Sampling frequency range</b>	28 to 54 kHz	
<b>Reduced jitter sampling frequencies</b>	48 kHz $\pm 50$ ppm 44.1 kHz $\pm 50$ ppm (Option) 32 kHz $\pm 50$ ppm	
<b>Operation</b>	The DS-D C4DA is designed to work with other equivalent modules in the DS-D FRAME. Up to 16 modules can operate simultaneously in a frame in any combination. As soon as it is plugged into the DIN backplane connector of the chassis, the DS-D C4DA is functional. It can be removed and re-inserted at any time even when the chassis power is on, without disturbing the operation of the other modules and without impairing the life of the equipment.	
<b>Manual control</b>	The manual de-emphasis is performed for the 4 channels by depressing the push-buttons only if AES-EBU inputs corresponding channel status give the possibility.	
<b>Board connector</b>	96-pin DIN 41612 female plug	
<b>Options</b>	32 kHz jitter reduced sampling frequency replaces the standard 44.1 kHz Rear connection board distributing the inputs and outputs of the DS-D C4DA board on two 15-pin sub-D female and male connector. This board can be plugged on the other side of the board connector where the DS-D C4DA has been inserted. Wiring kit including a in DIN 41612 female plug, its cap and locking screws used to link the DS-D C4DA out of the DS-D FRAME when the rear connection board is not used.	
<b>Front panel display</b>	A "Supply" green LED turns on when all power supplies are available. A "EXT" green LED turns on when an AES Synchro input is available. A "AES1" green LED turns on when AES1 input is the Synchro input. A "AES2" green LED turns on when AES2 input is the Synchro input.	
<b>Front panel</b>		
<b>Ordering information</b>	<b>DS-D C4DA</b>	42 32 1742 11
<b>Options</b>	<b>Rear connection board</b>	42 32 1109 01
	<b>Wiring kit</b>	42 32 1103 01

STUDER is a registered trade mark of STUDER REVOX AG, Regensdorf  
Printed in France - Copyright by STUDER DIGITEC Chatou France

**STUDER**  
PROFESSIONAL AUDIO EQUIPMENT

STUDER DIGITEC, 25, avenue de l'Europe - F - 78402 Chatou Cedex France  
Telephone : + 33 (1) 34.80.87.00 - Telefax : + 33 (1) 34.80.87.79 - Telex : ENERSON 697430 F  
STUDER, a Division of STUDER REVOX AG, Althardstrasse 30, CH-8105 Regensdorf Switzerland  
Telephone : + 41 1 870 75 11 - Telefax : + 41 1 840 47 37

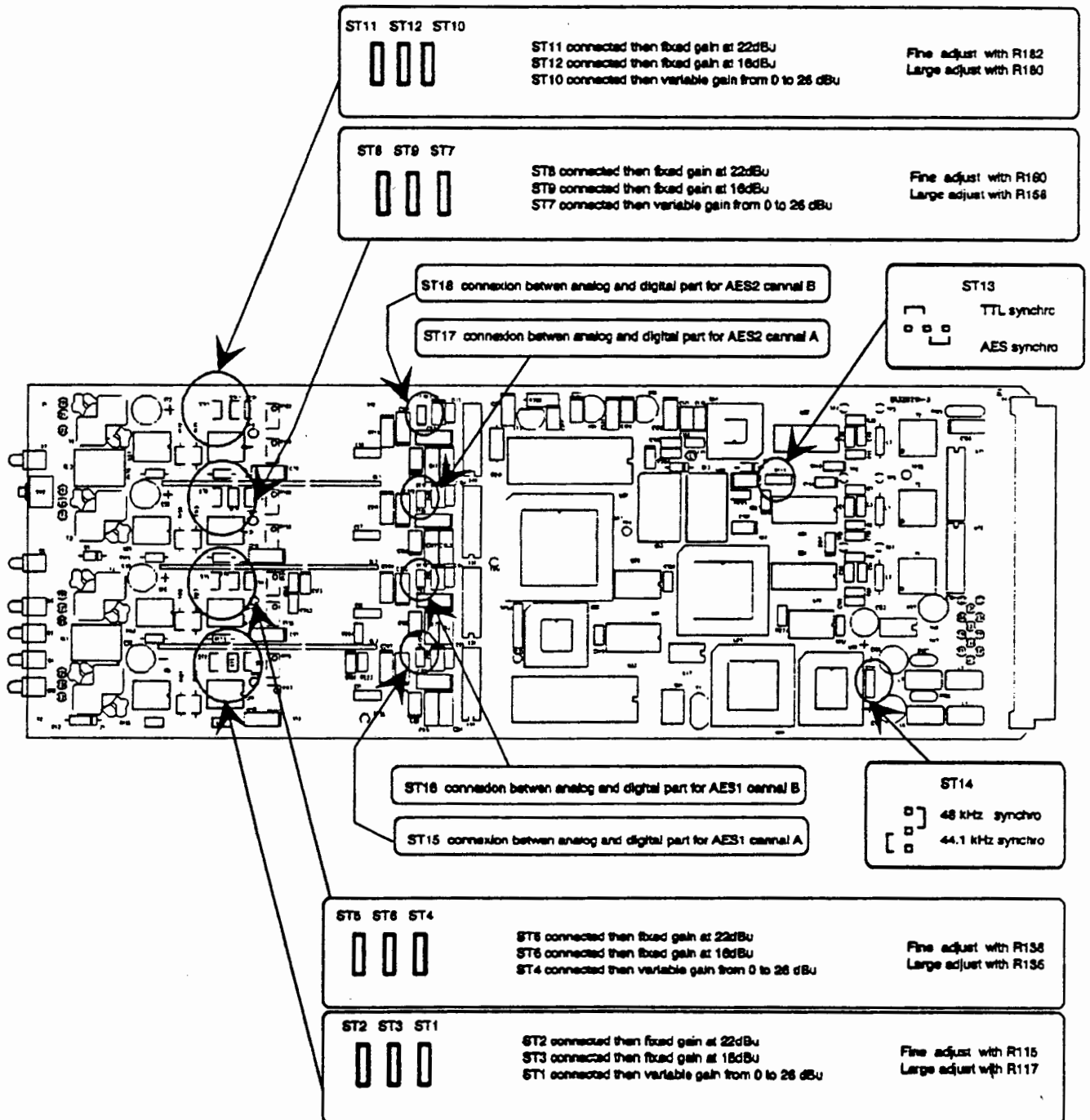
Ordering code  
for this data sheet  
42 93 75 00 73

## Configuration/Adjustments

The DS-D C4DA is adjusted and configured at the factory depending on the customer needs. But most settings are available to the end-user by proper selection of the related jumper accessible on the component side of the printed circuit board.

**CONF1 : AES/TTL :** selects the AES-EBU Synchro input electrical format 32/44.1 48 : selects 32 kHz optional frequency which takes the place of 44,1 kHz.

**CONF2 : 16dBu/22dBu/0...26dBu :** 1 jumper per channel selects a fixed gain or a variable gain with trimmer adjustment.



## Board connector

96-pin DIN 41612 female plug

pin	row A	row B	row C
1	MGND	MGND	MGND
2	+5V	+5V	+5V
3	I SYNC	I HI2C	I DI2C
4	GND	GND	GND
5	I AESSYNC+	GND	I AESSYNC-
6	I AES1+	GND	I AES1-
7		GND	
8	I AES2+	GND	I AES2-
9		GND	
10	O /D0	I BA0	O /D8
11	O /D1	I BA1	O /D9
12	O /D2	I BA2	O /D10
13	O /D3	I BA3	O /D11
14	O /D4	GND	O /D12
15	O /D5	I AES/DS-DBUS	O /D13
16	O /D6	GND	O /D14
17	O /D7	GND	O /D15
18	I FRAME	I CK128	/U
19	MGND	MGND	MGND
20			
21	MGND	MGND	MGND
22	O 1ANA+		O 1ANA-
23	MGND	MGND	MGND
24	O 2ANA+		O 2ANA-
25	MGND	MGND	MGND
26	O 3ANA+		O 3ANA-
27	MGND	MGND	MGND
28	O 4ANA+		O 4ANA-
29	AGND	AGND	AGND
30	-15V	-15V	-15V
31	+15V	+15V	+15V
32	MGND	MGND	MGND

I=Input O=Output

MGND mechanical ground

GND logic ground

AGND analogic ground

AESSYNC AES/UER sync input

/U TTL input inverted User bit

AES1, 2 first and second AES/UER input signal

SYNC TTL AES/UER sync input

FRAME, CK128 TTL inputs clocks

D0,15 TTL data

BA0,3 TTL bus address

AES/DS-D BUS OE data bus (activ low)

HI2C, DI2C clock, nd data for the I2C control

### Options

32 kHz jitter reduced sampling frequency replaces the standard 44.1 kHz on specific request

Rear connection board 42 32 1109 01

Wiring kit 42 32 1103 01

## OPTIONS DESCRIPTION

### DS-D C4DA Rear connection Board

Ordering information 42 32 1109 01

Rear connection board distributing the inputs and outputs of the DS-D C4DA board on two 15-pin D-sub female and male connector. This board can be plugged on the other side of the board connector where the DS-D C4DA has been inserted.

### connector description for the Rear Board

15-pin D-SUB female plug (AES/EBU)

PIN	Signal	PIN	Signal
1	MGND	9	I AESSYNC+
2	I AESSYNC-	10	MGND
3	I AES1a+	11	I AES1a-
4		12	
5		13	MGND
6	I AES2a+	14	I AES2a-
7		15	
8			

I=Input O=Output

15-pin D-SUB male plug (Analog)

PIN	Signal	PIN	Signal
1		9	
2		10	MGND
3	O 1ANA+	11	O 1ANA-
4	MGND	12	O 2ANA+
5	O 2ANA-	13	MGND
6	O 3ANA+	14	O 3ANA-
7	MGND	15	O 4ANA+
8	O 4ANA-		

I=Input O=Output

### Wiring kit

Ordering information 42 32 1103 01

Wiring kit including a in DIN 41612 female plug, its cap and locking screws used to link the DS-D C4DA out of the DS-D RAME when the rear connection board is not used.

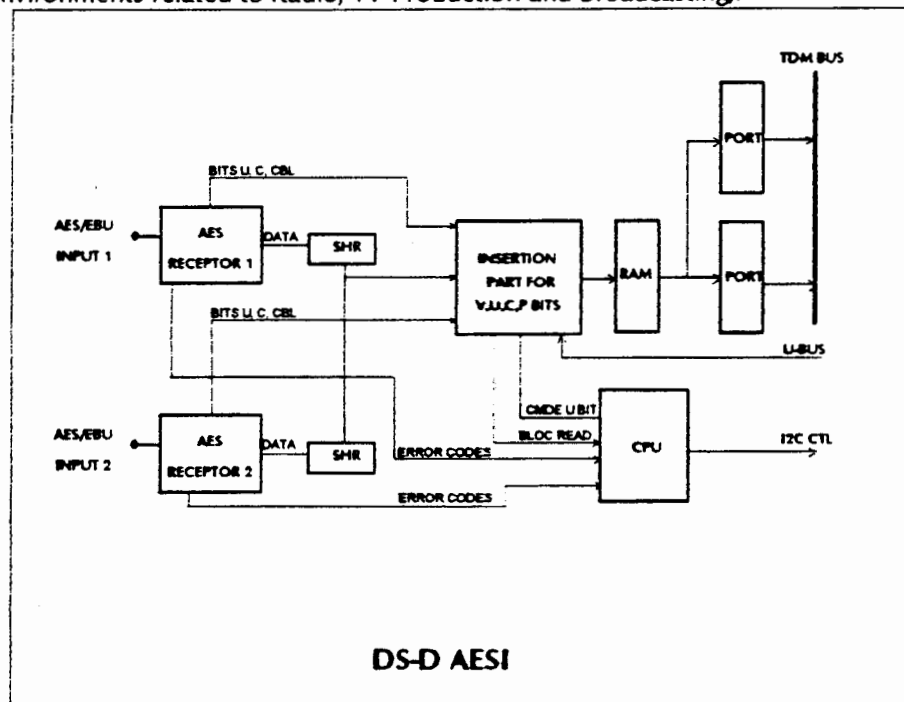
**3U Eurocard module of the DS-D range.  
Module for reception of 2 AES input signals  
Multiplexing of the 4 audio signals in a MADi link  
U & C bits management**

**Management of jump/repeat of samples in case of sampling frequency shifting  
Compatible with DS-DC4AD for replacement of analog inputs by digital inputs**

### Digital Audio Inputs

The STUDER DIGITEC DS-D AESI belongs to the DS-D modular system range. It features a 3U Eurocard format board designed to be inserted in the self powered DS-D frame.

It is a 4TE Europe module, this board is a demultiplexer from 2 AES links inputs to the DS-D BUS bus. Each AES/EBU input can be accepted for a sampling frequency between 28 to 54 kHz in professional or consumer mode. It is also possible to include the DS-D AESI module in a DS-D 1U frame, with the other modules of the range. This module is usable in various digital environments related to Radio, TV Production and Broadcasting.



### Operation

The DS-D AESI is designed to work with other equivalent modules in the DS-D FRAME, to interface an AES/EBU inputs to the DS-D MADO board through the DS-D Tdm BUS. The board is able to make jump or repetition of the last correct sample when an AES/EBU transmission errors occur inside a channel, or in case of frequency difference between clocks. As soon as it is plugged into the DIN backplane connector of the chassis, the DS-D AESI is functional. The DS-D AESI board is a slave of the I2C serial synchronous bus of the DS-D MUX chassis. The user bits of the incoming AES signals may be replaced by bits extracted from the U bus. The choice is made by remote control via I2C.

The DS-D AESI board is compatible with an DS-D C4AD board, and by this way it is possible to change the Digital interface (DS-D AESI) board by the Analog interface (DS-D C4AD).



# DS-D AESI Front panel display

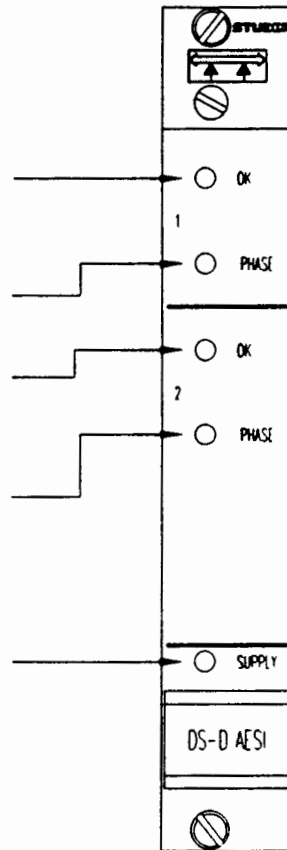
OK green LED turns ON when the AES/EBU 1 input is available and correct (validity bit, parity bit, biphas validation code, locking)

PHASE yellow LED turns ON when the phase relation between AES input and DS-D BUS synchro clocks are ok

OK green LED turns ON when the AES/EBU 2 input is available and correct (validity bit, parity bit, biphas validation code, locking)

PHASE yellow LED turns ON when the phase relation between AES input and DS-D BUS synchro clocks are ok

"SUPPLY" green LED turns ON when all power supplies are available



## Outputs

outputs data	TTL, DS-D BUS FORMAT
C channel status output	TTL
U user bit output	TTL
clock reference	TTL
bloc reference	TTL

## AES-EBU input

AES/EBU Input follows the AES3 recommendations

Transformer balanced	
Input impedance	110 Ohms typ.
Sensitivity	200 mV pp

AES/EBU Input allows adjustable equalization to improve the reception of signal. Input accepts a signal amplitude of 200 mV minimum (peak to peak), and therefore the connection of a "consumer" source (CEI 958/SPDIF).

## Sample frequency

Able from 28 to 54 KHz..

## Synchronisation clocks Inputs

These inputs are electrical TTL format inputs..

## AES/FRAME sync phase relationship

Information from AES/EBU inputs with  $\pm 0.25$  frame phase relationship with FRAME signal, are in phase to the DS6D BUS..

## User bits Option

The User bits of the incoming AES signals may be replaced by bits extracted from the U bus. The choice is made by remote contro

## Power supply

5V/0,3A  $\pm 10\%$

Maximum power consumption 3,5W

## Temperature

Operating temperature range 0 to 40° C

## Dimensions

(WxHxD) in mm	20.32 x 133 x 309
PCB in mm	100 x 280

## Weight

260 g

## Ordering information

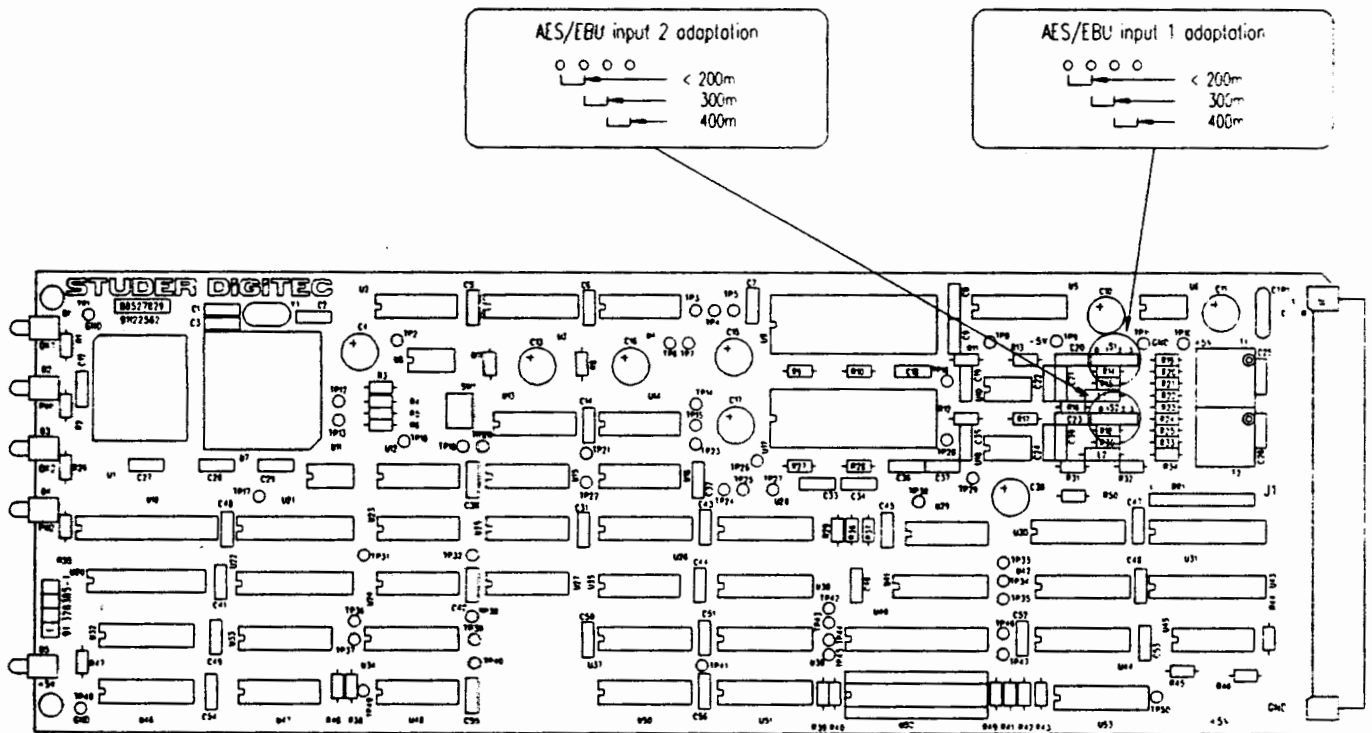
DS-D AESI 42 32 1261 01

# Configuration/Adjustments

The DS-D AESI is adjusted and configured in factory.

**CONF1** : adaptation for the AES/EBU input. A strap permits to adjust the input equalisation.  
 Typical values with an AES cable (110 Ω) :

Length in metres	Position
<200	0_1
300	1_2
400	2_3



CARTE DS-DAES

## Board connector

### 96-pin DIN 41612 female plug

pin	row A	row B	row C
1	MGND	MGND	MGND
2	+5V	+5V	+5V
3		/HI2C	/DI2C
4	GND	GND	GND
5		GND	
6	/AES1a+	GND	/AES1a-
7		GND	
8	/AES2a+	GND	/AES2a-
9		GND	
10	O/D0	/BA0	O/D8
11	O/D1	/BA1	O/D9
12	O/D2	/BA2	O/D10
13	O/D3	/BA3	O/D11
14	O/D4	GND	O/D12
15	O/D5	/AES/DS-DBUS	O/D13
16	O/D6	GND	O/D14
17	O/D7	GND	O/D15
18	/FRAME	/CK128	/U
19			
20			
21			
22			
23			
24			
25			
26			
27			
28			
29	AGND	AGND	AGND
30	-15V	-15V	-15V
31	+15V	+15V	+15V
32	MGND	MGND	MGND

I=Input O=Output

MGND mechanical ground

GND logic ground

AGND analogic ground

/U TTL input inverted User bit

AES1a,2a first and second AES/USER input signal

FRAME, CK128 TTL inputs clocks

D0,15 TTL data

BA0,3 TTL bus address

AES/DS-D BUS OE data bus (activ low)

HI2C, DI2C clock, nd data for the I2C control

## OPTIONS DESCRIPTION

### DS-D AESI Rear connection Board

Ordering information 42 32 1161 01

The rear connection board distributes the inputs of the DS-D AESI board on one 15-pin D-sub female connector. This board can be plugged on the other side of the board connector where the DS-D AESI has been inserted.

### connector description for the Rear Board

15-pin D-SUB female plug (AES/EBU)

pin	Signal	pin	Signal
1		9	
2		10	MGND
3	/AES 1a+	11	/AES 1a-
4		12	
5		13	MGND
6	/AES 2a+	14	/AES 2a-
7		15	
8			

I=Input

O=Output

### Wiring kit

Ordering information Wiring kit 42 32 1103 01

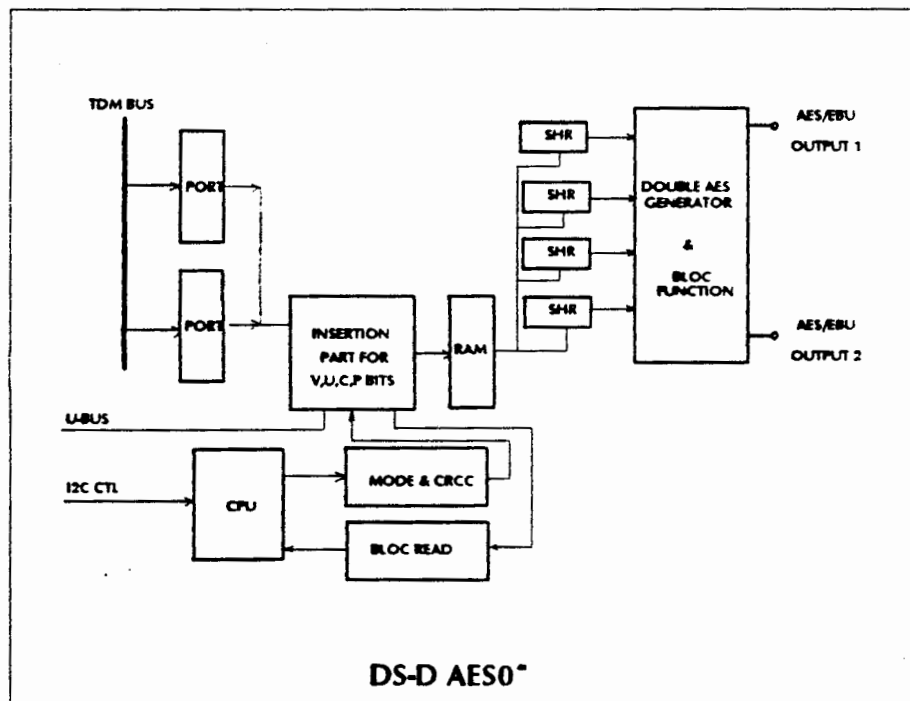
Wiring kit including a in DIN 41612 female plug, its cap and locking screws used to link the DS-D AESI out of the DS-D FRAME when the rear connection board is not used.

**3U Eurocard module of the DS-D range.**  
**Module for output of 4 audio signals in 2 AES output signals**  
**Demultiplexing of the 4 audio signals in a MADI link**  
**U & C bits management**  
**2 stereo AES outputs or 4 mono**  
**Compatible with DS-DC4DA for replacement of analog outputs by digital outputs**

### Digital Audio Outputs

The STUDER DIGITEC DS-D AESO belongs to the DS-D modular system range. It features a 3U Eurocard format board designed to be inserted in the self powered DS-D frame.

It is a 4TE Europe module, this board is a multiplexer from the DS-D BUS to 2 AES links outputs. Each AES/EBU output can be accepted for a sampling frequency between 28 to 54 kHz in professional or consumer mode. It is also possible to include the DS-D AESO module in a DS-D 1U frame, with the other modules of the range. This module is usable in various digital environments related to Radio, TV Production and Broadcasting.



## Operation

The DS-D AESO is designed to work with other equivalent modules in the DS-D FRAME. to interface AES/EBU outputs from the DS-D MAD1 board through the DS-D BUS TDM. As soon as it is plugged into the DIN backplane connector of the chassis, the DS-D AESO is functional.

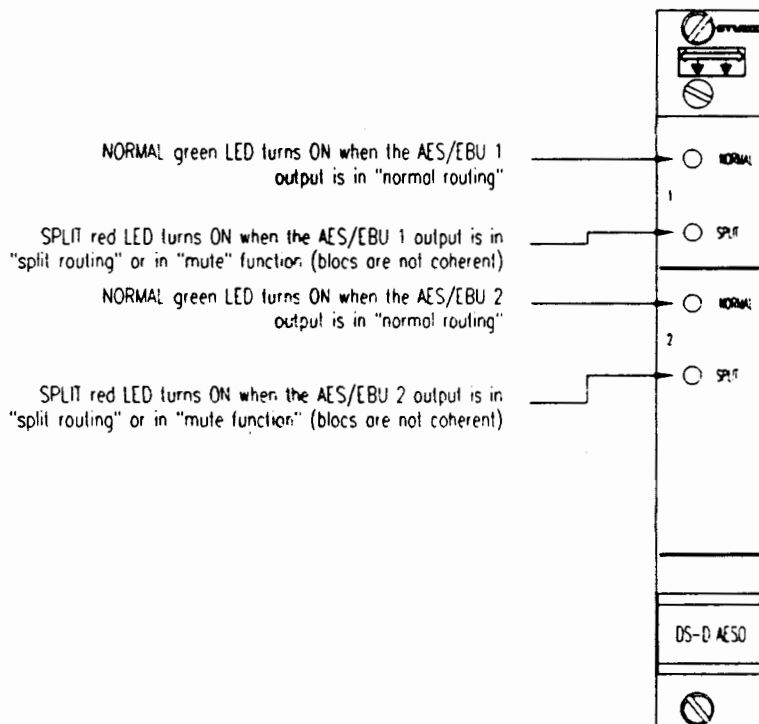
The DS-D AESO board is compatible with an DS-D C4DA board, and by this way it is possible to change the Digital interface (DS-D AESO) board by the Analog interface (DS-D C4DA).

The DS-D AESO board is a slave of the I2C serial synchronous bus of the DS-D MUX chassis. The user bits of the incoming DS-D BUS signals may be replaced by bits extracted from the U bus. The choice is made by remote control via I2C. If modification are made on U C bits the parity and the CRCC are computed through the AESO board, if one error come from before via an other board the AESO board do not make correction.

The 4 DS-D BUS channels are made in 2 AES/UEP, the mode is forced in "NOT INDICATED". When the blocs are not coherent the AESO board modified the blocs like the following description :

- if the blocs are not synchronised then the B bloc is replaced by A bloc
- if one bloc is missing then we have a copy of the other bloc
- if the two blocs are not present then the output is off (no AES signal  $\Rightarrow$  no sound)

## DS-D AESO Front panel display



## Inputs

inputs data	TTL, DS-D BUS FORMAT
C channel status output	TTL
U user bit output	TTL
clock reference	TTL
bloc reference	TTL

## AES-EBU output

AES/EBU Input follows the AES3 recommandations

Transformer balanced	
Input impedance	110 Ohms typ. $\pm 20\%$

## Sample frequency

Able from 28 to 54 KHz..

## Synchronisation clocks Inputs

These inputs are electrical TTL format inputs..

## User bits Option

The User bits of the incoming AES signals may be replaced by bits extracted from the U bus. The choice is made by remote contro

## Power supply

5V/1,4A  $\pm 10\%$

Maximum power consumption 7W

## Temperature

Operating temperature range 0 to 40° C

## Dimensions

(WxHxD) in mm	20.32 x 133 x 309
PCB in mm	100 x 280

## Weight

295 g

## Ordering information

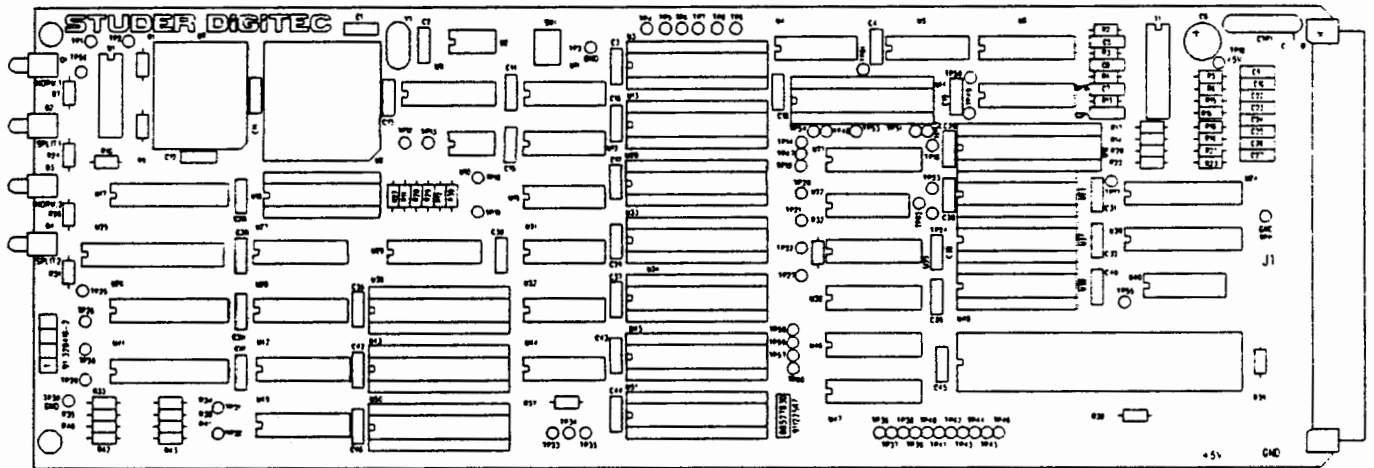
DS-D AESO 42 32 1262 01

## Configuration/Adjustments

The DS-D AESO is adjusted and configured in factory.

No configuration is required.

NO CONFIGURATION IS REQUIRED



CARTE DS-DAESO

## Board connector

96-pin DIN 41612 female plug

pin	row A	row B	row C
1	MGND	MGND	MGND
2	+5V	+5V	+5V
3		/HI2C	/DI2C
4	GND	GND	GND
5		GND	
6	O AES1a+	GND	O AES1a-
7	O AES1b+	GND	O AES1b-
8	O AES2a+	GND	O AES2a-
9	O AES2b+	GND	O AES2b-
10	/D0	/BA0	/D8
11	/D1	/BA1	/D9
12	/D2	/BA2	/D10
13	/D3	/BA3	/D11
14	/D4	GND	/D12
15	/D5	/AES/DS-DBUS	/D13
16	/D6	GND	/D14
17	/D7	GND	/D15
18	/FRAME	/CK128	/U
19			
20			
21			
22			
23			
24			
25			
26			
27			
28			
29	AGND	AGND	AGND
30	-15V	-15V	-15V
31	+15V	+15V	+15V
32	MGND	MGND	MGND

I=Input O=Output

MGND mechanical ground

GND logic ground

AGND analogic ground

/U TTL input inverted User bit

AES1a,2a first and second AES/USER output signal

FRAME, CK128 TTL inputs clocks

D0,15 TTL data

BA0,3 TTL bus address

AES/DS-D BUS OE data bus (activ low)

HI2C, DI2C clock, nd data for the I2C control

## OPTIONS DESCRIPTION

### DS-D AESO Rear connection Board

Ordering information 42 32 1162 01

The rear connection board distributes the outputs of the DS-D AESO board on one 15-pin D-sub male connector. This board can be plugged on the other side of the board connector where the DS-D AESO has been inserted.

### connector description for the Rear Board

15-pin D-SUB male plug (AES/EBU)

pin	Signal	pin	Signal
1		9	
2		10	MGND
3	O AES 1a+	11	O AES 1a-
4	MGND	12	O AES 1b+
5	O AES 1b-	13	MGND
6	O AES 2a+	14	O AES 2a-
7	MGND	15	O AES 2b+
8	O AES 2b-		

I=Input

O=Output

### Wiring kit

Ordering information Wiring kit 42 32 1103 01

Wiring kit including a in DIN 41612 female plug, its cap and locking screws used to link the DS-D AESO out of the DS-D FRAME when the rear connection board is not used.

**3U Eurocard module of the DS-D range.**  
**Module for reception of 1 MADI input signal**  
**Respectful of the AES11-1992 recommendations**  
**Demultiplexing of the 56 audio signals from a MADI link**  
**U & C bits transparency**  
**Optical fiber or coaxial MADI input available**  
**MADI through output for easy cascading of equipment**  
**RS 485 serial access for AES auxiliary data management**

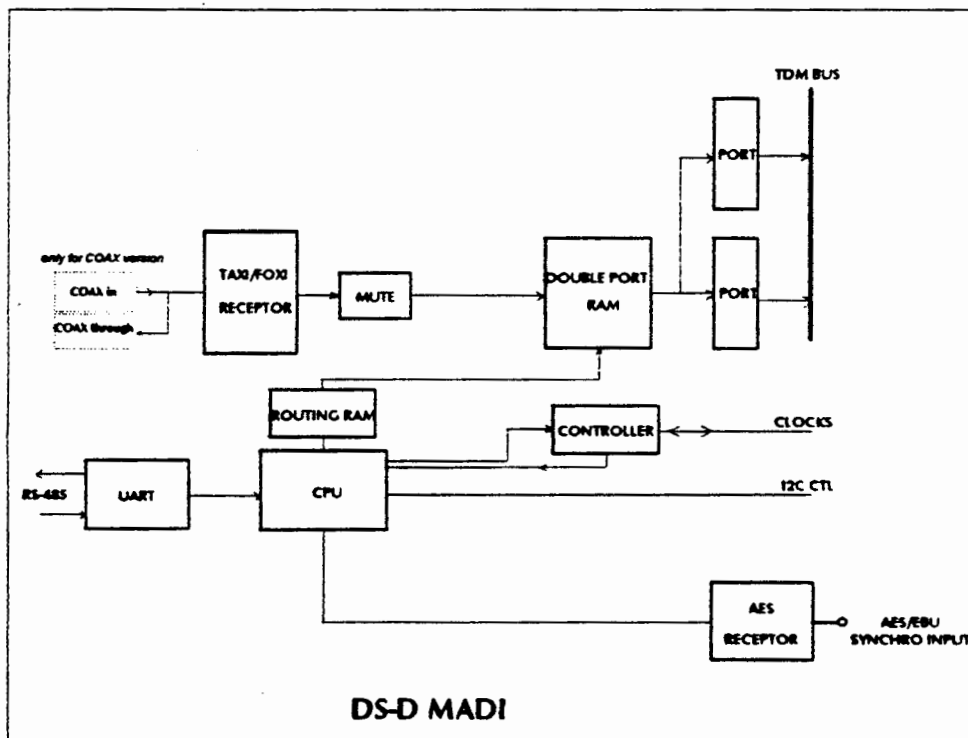
### Digital MADI Input

The STUDER DIGITEC DS-D MADI belongs to the DS-D modular system range. It features a 3U Eurocard format board designed to be inserted in the self powered DS-D frame.

It is a 4TE Europe module, this board is a demultiplexer from 1 MADI link input to the DS-D BUS bus. The DS-D MADI module receives 56 frames of 32 bits (24 bits audio + V + U + C + P +...).

The DS-D MADI module can route MADI channels to DS-D BUS with a special routing stored in a non volatile memory, or with a routing received by remote control (option).

The DS-D MADI module is available in two different versions : a coaxial version and a fiber optic version. In the coaxial version a "MADI through" output copies the MADI input for an other equipment simultaneously used.



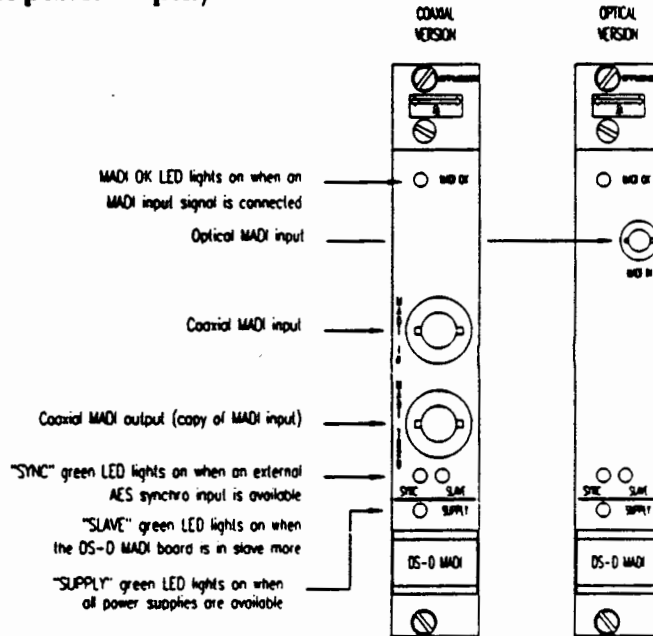
### Operation

The DS-D MADI is designed to work with other equivalent modules in the DS-D FRAME. to interface an MADI input to the DS-D AESO or DS-D C4DA through the DS-D Tdm BUS. The front panel indicates the status of the synchronisation input. The optional remote control can read the status.



An AES/EBU synchronisation input is used as a synchronisation reference for the MADI input. This input accept a sampling frequency between 28 to 54 kHz. The DSD MADI module is able to run in master or slave mode. When the module is in Master mode, the "SYNC" TTL signal is driven from the AES input, and the DS-D BUS clocks are derived from the AES input. When the module is in slave mode, the "SYNC" signal and DS-D BUS clocks are inputs for the module. By this way it is possible to combine more than one MADI link in a single DS-D DMUX frame or to propose in only one 3U frame the MUX and DMUX functions (see the DS-TDM products family).  
 The DS-D MADI module is operational only with a AES/EBU Synchro input. If the synchro input is absent, the module forces high impedance information to the DS-D BUS and declares inactive the DS-D BUS channels (no "clicks"). Moreover, if the synchro input is present but MADI input is absent, the module have the same function than without synchro signal. When MADI transmission errors occur inside a channel or when a channel is detected inactive, all following channels are also declare inactive (MADI receiver fonction). Then, all the equivalent DS-D BUS channels are decalred inactive.

### DS-D MADI Front panel display



### AES-EBU input

AES/EBU Input follows the AES3 recommendations

Transformer balanced	
Input impedance	110 Ohms typ.
Sensitivity	200 mV pp

AES/EBU Input allows adjustable egalization to improve the reception of signal. Input accepts a signal amplitude of 200 mV minimum (peak to peak), and therefore the connection of a "consumer" source (CEI 958/SPDIF).

### MADI input

MADI Input follows the AES10 recommendations

Optical version (able up to 2 Km)	
Type	Multimode.
Wave length	1300nm
Optical Power	25µW
Fiber Diameter	62;5/125µm
Coaxial version (able up to 50 m)	
Cable	75 ohm ± 2 ohm
Connector	BNC

### MADI output

MADI Output is available only on the coaxial version. It is named MADI THRU, and it is an electrical copy of the MADI input.

### Sample frequency

Able from 28 to 54 KHz..

### DS-D MADI Outputs

outputs data	TTL, DS-D BUS FORMAT
C channel status output	TTL
U user bit output	TTL
clock reference	TTL
bloc reference	TTL

### Power supply

5V/0,8A ±10%

Maximum power consumption 4W

### Temperature

Operating temperature range

0 to 40° C

### Dimensions

(WxHxD) in mm	20.32 x 133 x 309
PCB in mm	100 x 280

### Weight

330 g

### Ordering information

DS-D MADI (optical)	42 32 1252 11
DS-D MADI (coaxial)	42 32 1252 21

## Configuration/Adjustments

The DSD MADI is adjusted and configured in factory.

**CONF1** : Adaptation for the AES/EBU Input (Synchro input). A optionnel resistor can be connected for adapted equalisation.

Typical values with an AES cable (110  $\Omega$ ) :

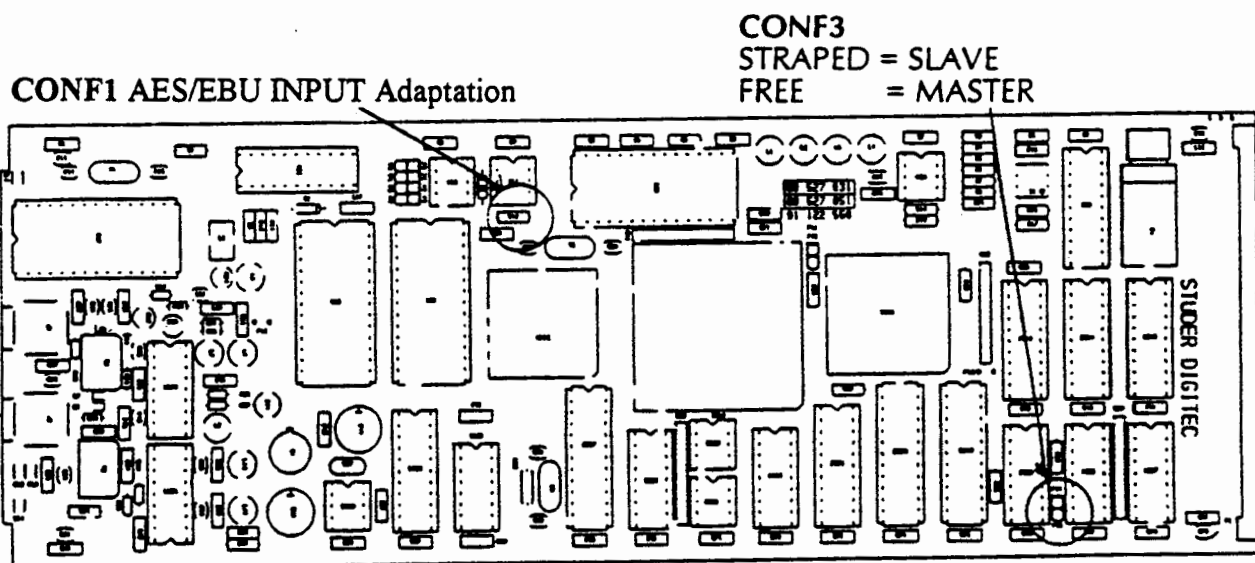
Length in metres	Resistor in Ohms
100	none
200	none
300	470
400	0

**CONF2** : It is possible to give a different Frame address with the DSD MADI board to the DSD DMUX. To do that we have two solutions, the first is to connect strap to GND directly on the DSD MADI board (see table below), and the second is to configure the address with the DSD MADI Rear connection Board (see rear board description next page).

address	pin number in Row B
CA0	20
CA1	21
CA2	22
CA3	23
CA4	24
CA5	25
CA6	26
CA7	27

The default value is 1111 1111 (signals are pull-up).

**CONF3** : It is possible to connect multiple DSD MADI board in the same frame. In these case only one must declare MASTER and the other must be declare SLAVE. To configure in SLAVE mode a stap must be link P14 and P15, the default value is MASTER mode and no strap.



## Board connector

96-pin DIN 41612 female plug

pin	row A	row B	row C
1	MGND	MGND	MGND
2	+5V	+5V	+5V
3	O SYNC	I HI2C	I DI2C
4	GND	GND	GND
5	I AESSYNC+	GND	I AESSYNC-
6		GND	
7		GND	
8		GND	
9		GND	
10	O /D0	I BA0	O /D8
11	O /D1	I BA1	O /D9
12	O /D2	I BA2	O /D10
13	O /D3	I BA3	O /D11
14	O /D4	GND	O /D12
15	O /D5	I AES/DS-DBUS	O /D13
16	O /D6	GND	O /D14
17	O /D7	GND	O /D15
18	O/ FRAME	O/ CK128	
19			
20		I CA0	
21		I CA1	
22	O TA	I CA2	O TB
23		I CA3	
24	I RA	I CA4	I RB
25		I CA5	
26		I CA6	
27		I CA7	
28			
29	AGND	AGND	AGND
30	-15V	-15V	-15V
31	+15V	+15V	+15V
32	MGND	MGND	MGND

I=Input      O=Output  
 MGND mechanical ground  
 GND logic ground  
 AGND analogic ground  
 FRAME, CK128 TTL inputs clocks in slave mode  
 outputs clocks in master mode  
 D0,15 TTL data  
 BA0,3 TTL bus address (not used)  
 AES/DS-D BUS OE data bus (activ low)  
 HI2C, DI2C clock, nd data for the I2C control  
 AESSYNC AES/UER synchronisation input  
 SYNC TTL AES sync output  
 TA, TB RS485 A and B outputs  
 RA, RB RS485 A and B inputs  
 CA0..CA7 frame address

## OPTIONS DESCRIPTION

### DS-D MADi Rear connection Board

Ordering information 42 32 1152 01

The rear connection board distributes the sync input of the DS-D MADi board on a "mini" XLR plug, and the remote control RS485 on a 9-pin D-sub female connector. This board can be plugged on the other side of the board connector where the DS-D MADi has been inserted. An address can be configured with the 8 straps (see serigraphy).

### connector description for the Rear Board

9-pin D-SUB female plug (AES/EBU)

pin	Signal	pin	Signal
1	MGND	6	Trans common
2	O TA	7	O TB
3	I RB	8	I RA
4	Recei common	9	MGND
5			

I=Input      O=Output

\*mini XLR\* female Input synchro

pin	Signal
1	MGND
2	I AESSYNC+
3	I AESSYNC-

### Wiring kit

Ordering information Wiring kit 42 32 1103 01

Wiring kit including a in DIN 41612 female plug, its cap and locking screws used to link the DS-D MADi out of the DS-D FRAME when the rear connection board is not used.

**3U Eurocard module of the DS-D range.**  
**Module for output of 1 MADI signal**  
**Respectful of the AES11-1992 recommendations**  
**Multiplexing of the 56 audio signals to a MADI link**  
**U & C bits transparency**  
**Optical fiber or coaxial MADI output available**  
**RS 485 serial access for AES auxiliary data management**

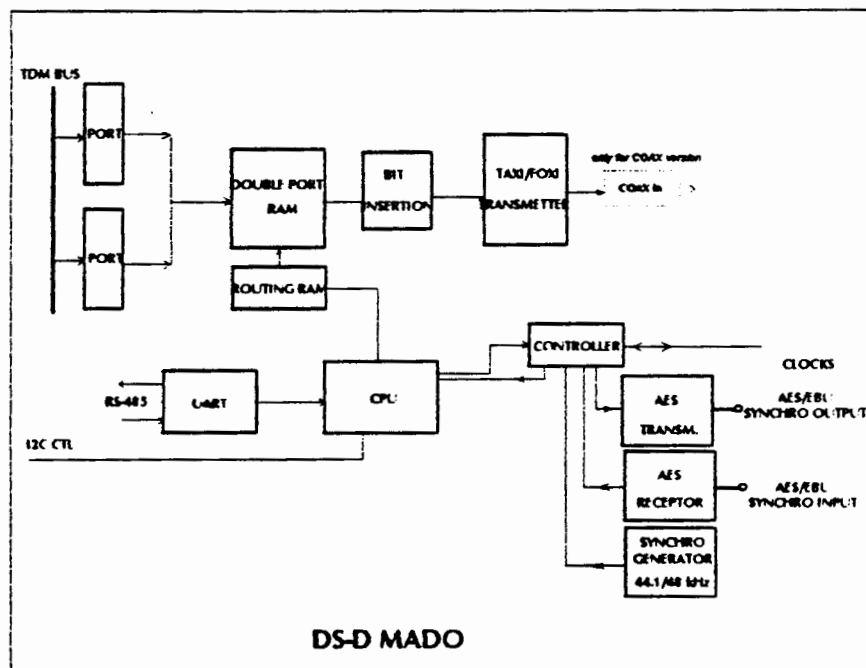
### Digital MADI Output

The STUDER DIGITEC DS-D MADI belongs to the DS-D modular system range. It features a 3U Eurocard format board designed to be inserted in the self powered DS-D frame.

It is a 4TE Europe module, this board is a multiplexer from the DS-D BUS to 1 MADI link output. The DS-D MADO module transmit 56 frames of 32 bits (24 bits audio + V + U + C + P +...).

The DS-D MADO module can route DS-D BUS channels to MADI with a special routing stored in a non volatile memory, or with a routing received by remote controle (option).

The DS-D MADO module is available in two different versions : a coaxial version and a fiber optic version.

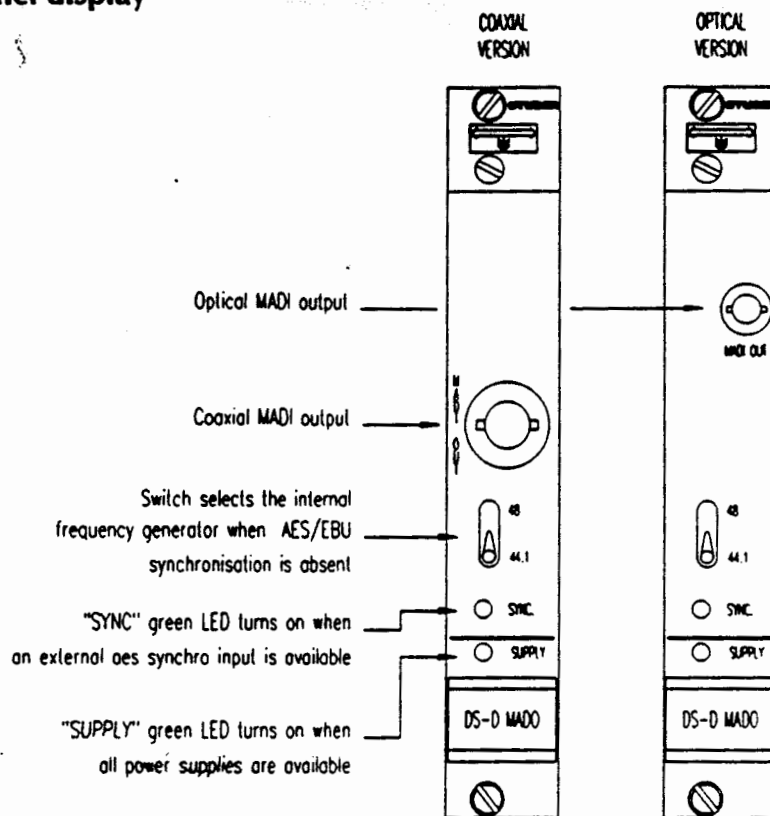


### Operation

The DS-D MADO is designed to work with other equivalent modules in the DS-D FRAME. to interface an MADO output to the DS-D AESI or DS-D C4AD though the DS-D Tdm BUS. The front panel indicates the status of the synchronisation input. The optionnal remote control can read the status.

An AES/EBU synchronisation input is used as a synchronisation reference for the whole DS-D MADO module, its MADI output and the DS-D BUS. When this AES/EBU it receive and recognized according with the standard, DS-D MADO module extracts useful clocks for all the frame. When AES/EBU synchronisation input is absent, the module automatically selects an internal precision clock reference. Then, this clock is the reference for the whole frame. The sampling frequency is 44.1kHz or 48 kHz, front panel selectable. This input accept a sampling frequency between 28 to 54 kHz..

# DS-D MADO Front panel display



## AES-EBU input (synchro input)

AES/EBU Input follows the AES3 recommendations

Transformer balanced	
Input impedance	110 Ohms typ.
Sensitivity	200 mV pp

AES/EBU Input allows adjustable equalization to improve the reception of signal. Input accepts a signal amplitude of 200 mV minimum (peak to peak), and therefore the connection of a "consumer" source (CEI 958/SPDIF).

## MADI output

MADI Output follows the AES10 recommendations

Optical version (able up to 2 Km)	
Type	Multimode.
Wave length	1300nm
Optical Power	25µW
Fiber Diameter	62;5/125µm
Coaxial version (able up to 50 m)	
Cable	75 ohm ± 2 ohm
Connector	BNC

## DS-D MADO Outputs

outputs data	TTL, DS-D BUS FORMAT
U user bit output	TTL
clock reference	TTL
bloc reference	TTL

## MADI output

MADI Output is available only on the coaxial version. It is named MADI THRU, and it is an electrical copy of the MADI input.

## Sample frequency

Able from 28 to 54 KHz..

## Clock Performance

Internal Clock	32/44,1/48 kHz precision ±1ppm
----------------	-----------------------------------

## Power supply

5V/0,8A ±10%

Maximum power consumption 4W

## Temperature

Operating temperature range

0 to 40° C

## Dimensions

(WxHxD) in mm	20.32 x 133 x 309
PCB in mm	100 x 280

## Weight

330 g

## Ordering information

DS-D MADO (optical) 42 32 1251 11

DS-D MADO (coaxial) 42 32 1251 21

## Configuration/Adjustments

The DS-D MADO is adjusted and configured in factory. The board must be inserted in slot 15 in the DS-D frame (the slot 15 is on the left of the power supply).

**CONF1** : Adaptation for the AES/EBU input (Synchro input). A optionnel resistor can be connected for adapted equalisation.

Typical values with an AES cable (110  $\Omega$ ) :

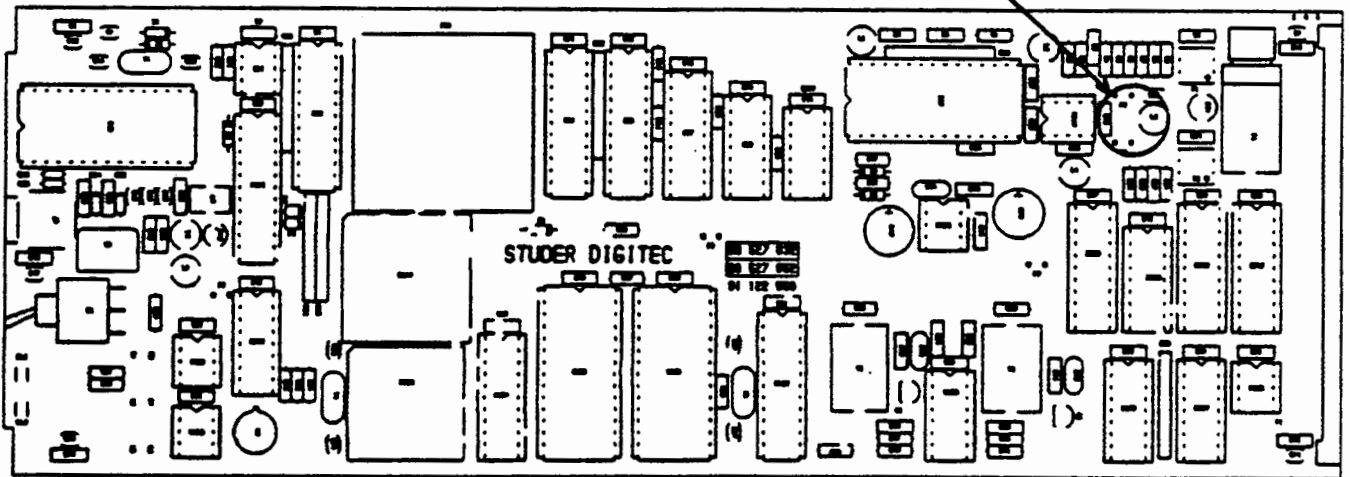
Length in metres	Resistor in Ohms
100	none
200	none
300	470
400	0

**CONF2** : It is possible to give a different Frame address with the DS-D MADO board to the DS-D DMUX. To do that we have two solutions, the first is to connect strap to GND directly on the DS-D MADO board (see table below), and the second is to configure the adress with the DS-D MADO Rear connection Board (see rear board description next page).

address	pin number in Row B
CA0	20
CA1	21
CA2	22
CA3	23
CA4	24
CA5	25
CA6	26
CA7	27

The default value is 1111 1111 (signals are pull-uped).

CONF1 AES/EBU Adaptation input



## Board connector

96-pin DIN 41612 female plug

pin	row A	row B	row C
1	MGND	MGND	MGND
2	+5V	+5V	+5V
3	O SYNC	I HI2C	I DI2C
4	GND	GND	GND
5	I AESSYNC+	GND	I AESSYNC-
6	O AESOUT+	GND	O AESOUT-
7		GND	
8		GND	
9		GND	
10	O /D0	I BA0	O /D8
11	O /D1	I BA1	O /D9
12	O /D2	I BA2	O /D10
13	O /D3	I BA3	O /D11
14	O /D4	GND	O /D12
15	O /D5	I AES/DS-DBUS	O /D13
16	O /D6	GND	O /D14
17	O /D7	GND	O /D15
18	O FRAME	O CK128	
19			
20		I CA0	
21		I CA1	
22	O TA	I CA2	O TB
23		I CA3	
24	I RA	I CA4	I RB
25		I CA5	
26		I CA6	
27		I CA7	
28			
29	AGND	AGND	AGND
30	-15V	-15V	-15V
31	+15V	+15V	+15V
32	MGND	MGND	MGND

I=Input O=Output

MGND mechanical ground

GND logic ground

AGND analogic ground

FRAME, CK128 TTL outputs clocks

D0,15 TTL data

BA0,3 TTL bus address (not used)

AES/DS-D BUS OE data bus (activ low)

HI2C, DI2C clock, nd data for the I2C control

AESSYNC AES/UER synchronisation input

SYNC TTL AES sync output

TA, TB RS485 A and B outputs

RA, RB RS485 A and B inputs

CA0..CA7 frame address

## OPTIONS DESCRIPTION

### DS-D MAD0 Rear connection Board

Ordering information 42 32 1151 01

The rear connection board distributes the sync input of the DS-D MAD0 board on a "mini" XLR plug, and the remote control RS485 on a 9-pin D-sub female connector. This board can be plugged on the other side of the board connector where the DS-D MAD0 has been inserted. An address can be configured with the 8 straps (see serigraphy).

### connector description for the Rear Board

9-pin D-SUB female plug (AES/EBU)

pin	Signal	pin	Signal
1	MGND	6	Trans common
2	O TA	7	O TB
3	I RB	8	I RA
4	Recei common	9	MGND
5			

I=Input O=Output

\*mini XLR\* female Input synchro

pin	Signal
1	MGND
2	I AESSYNC+
3	I AESSYNC-

\*mini XLR\* male Output synchro

pin	Signal
1	MGND
2	O AESOUT+
3	O AESOUT-

### Wiring kit

Ordering information Wiring kit 42 32 1103 01

Wiring kit including a in DIN 41612 female plug, its cap and locking screws used to link the DS-D MAD0 out of the DS-D FRAME when the rear connection board is not used.

### System integrability

**3U and 1U frame for integration of DS-D modules with power supply**

**Redundant Power Supply Option**

**Up to 16 modules in 3U frame**

**Up to 4 modules in 1U frame**

**Optional rear board module for easy interconnection**

**Easy construction of complete configurations :**

**Integrate a family of 3U Eurocard module for various digital audio functions**

- DARG
- Switch
- Conversion
- MADI MUX/DMUX system & MADI-ROUTER

### DS-D 3U Frames and Accessories

DS-D frame is a 19" frame 3U height. The frame is 365 mm deep. It includes power supplies and 16 slots for 4 TE modules.

The left hand side of the frame houses up to 16 4 TE modules. The right hand side includes the power supply modules, which are Europe power supplies, easily removable and changeable.

For each slot available in the frame, a DIN 41612 male connector, mounted on the mother board, mates with the module connector.

When plugging a module, the contacts dedicated to power supply establish before the others. This enables hot insertion and removal of modules. A DIN 41612 male connector is also available on the rear side of the motherboard, for each slot. This connector allows the external wiring corresponding to the module.

The motherboard distributes to the modules the following :

- DC power supplies : + 5 V and (depending on the frame)  $\pm 15V$ .
- "SYNC" line (AES synchronisation line in TTL format) ; this line must be driven by a module to be active.
- Control bus lines ; modules can communicate through these lines.

The power supplies operate from AC mains. The frame and supplies can be configured for 110 or 220 V operation (selectable or automatic depending on frame version).

This module is very useful in various digital environments related to Radio, TV Production and Broadcasting, and also to Telecommunications and other Digital Systems.

#### Accessories

- Spare power supplies for replacement or for on-site modification from normal to redundant supply (possible for the "DS-D 5" frame).
- Front filling plate (4 TE width) for each unused slot.
- Rear filling plate (4 TE width) for each unused slot (optional).
- Wiring kit : DIN 41612 female connector with cover and locking screens, for the external wiring of a module.
- For each module, an alternate possibility is to use a rear connection module (specific for each module type), plugged from the rear side of the frame and equipped with BNC and/or Sub D connectors.

### DS-D 1U Frame

DS-D frame is a 19" frame 1U height. The frame is 380 mm deep (without plugs). It includes power supplies and 4 slots for 4 TE modules.

This module is very useful in various digital environments related to Radio, TV Production and Broadcasting, and also to Telecommunications and other Digital Systems.





## DS-D FRAME Versions

Within one DS-D frame, various combinations of the existing modules can be installed, depending on the system needs. The following describes the rules to observe when defining a configuration, as well as the features that can be useful.

Tree ways can be followed to use the DS-D Frame modules :

1. The size :
  - 19" 1U
  - 19" 3U
2. The power supply
  - +5 Volts (all DS-D modules except Analog converters)
  - +5/+15/-15 Volts (+- 15 Volts are necessary for analog converters)
  - Redundancy Options
3. Functions
  - General applications
  - TDM BUS application (MUX and DMUX)

### Size considerations

The DS-D 1U frame can receive up to 4 DS-D modules., while the DS-D 3U frame can receive up to 16 DS-D modules.

For the DS-D1U frame it is possible to have two versions :

- DS-D FRAME 1U ref. 42.32.0110.01: this frame is 1U packaging version with +5V power and +15V power.
- DS-D FRAME 1U/EXT ref. 42.32.0111.01: this frame is 1U packaging version with +5V and +/-15V power. This frame is reserved for the multiple DS-D DA boards (larger current consumption), where 2 powers supply are integrated (with a better fans).

The two versions are able to receive the analogue converters (+/-15 volts able).

### Power supply considerations (for 3U frame)

The first step is to select the right frame version for the desired configuration of modules.

Obviously, the "5/15" version will be selected only when modules using  $\pm 15$  V DC supply (like e.g. DS-D C4AD, DS-D C4DA) have to be included in the frame or could be added in further extensions.

Besides, the "5R" version will be chosen when power supply redundancy is required (only in 3U package available).

Afterwards, it must be checked if the DC supply requirements of the desired configurations are compatible with the power available from the frame. The following tables sum up :

- a) Available DC supply for each frame.
- b) DC supply consumption of each module (worst case).

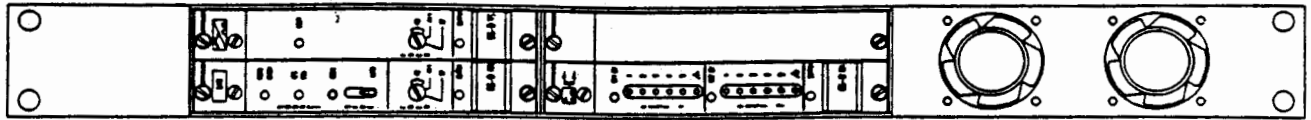
FRAME VERSION	AVAILABLE CURRENT		
	+5 V	+ 15 V	- 15 V
DS-D FRAME 5	30 A		
DS-D FRAME 5R	20 A		
DS-D FRAME 5/15/BUS	20 A	5 A	5 A

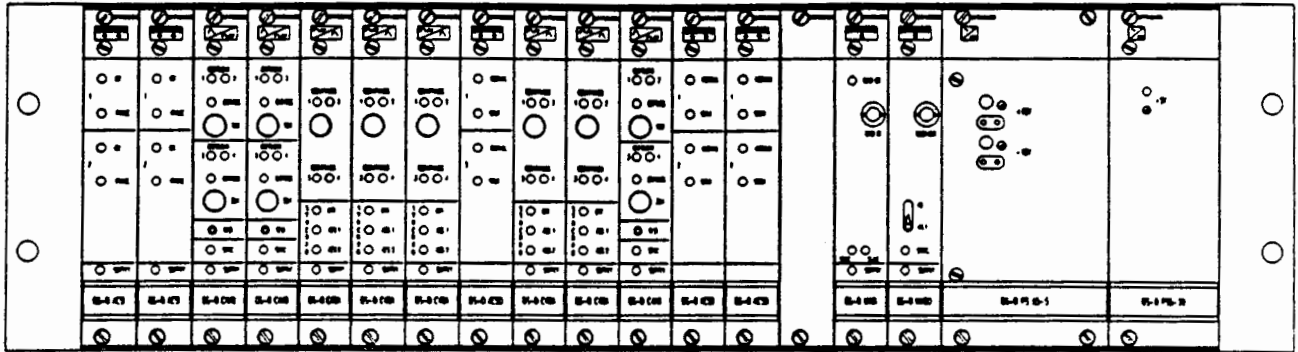
MODULE	+5 V	+ 15 V	- 15 V
DS-D DA	1,8 A		
DS-D M8>1	0,6 A		
DS-D ARG	0,7 A		
DS-D VS	0,6 A		
DS-D AESI	0,3		
DS-D AESO	1,4 A		
DS-D MADI	0,8 A		
DS-D MADO	0,8 A		
DS-D C4AD	1 A	0,3 A	0,3 A
DS-D C4DA	1 A	0,3 A	0,3 A

As an example, it is possible to put 16 DS-D DA modules in a "5" frame, but only 12 can be fitted in the redundant supply version.

## DS-D 1U Front Panel display



## DS-D 3U Front Panel display



### Functions considerations

#### General versions

- DS-D FRAME 5 ref. 42.32.0101.01: this frame only supplies + 5 V to the modules. It includes a + 5 V/30 A power supply (DS-D PS 5 - 30).
- DS-D FRAME 5R ref. 42.32.0102.01: this frame only supplies + 5 V, but includes two redundant power supplies, each + 5 V/20 A (DS-D PS 5 - 20). This version can be obtained from the previous one by very simple retrofit (replacement of single power supply for the two others).
- DS-D FRAME 5/15 ref. 42.32.0103.01: this frame supplies + 5 V and  $\pm 15$  V.

#### Special signals description

Some lines are distributed to all modules in the frame.

The "SYNC" line can be a synchronisation signal for all synchronisation modules. The modules that can be configured to drive this line are : DS-D ARG, DS-D MAD1, DS-D MADO

All the synchronisable modules can be configured to be synchronised by this line : DS-D C4AD, DS-D C4DA, DS-D AESI, DS-D AESO

The DS-D DA can be configured to take this line as input. This makes it easy to replicate the synchro reference in a large number of AES outputs by setting one or several DS-D DA distributors in this mode.

The internal control bus enables communication between the modules. The address of a module on the control bus is directly related to its physical position in the frame : address = slot number, from 0 at the extreme left to 15 in the last slot on the right. A master module must be fitted in the frame. This master itself has a remote control interface which allows total control of a frame from an external device or system.

### Board connectors

96-pin DIN 41612 male plug

pin	row A	row B	row C
1	MGND		MGND
2	+5V		+5V
3	SYNC		
4	GND		GND
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			
26			
27			
28			
29	AGND		AGND
30	-15V		-15V
31	+15V		+15V
32	MGND		MGND

MGND mechanical ground

GND logic ground

AGND analogic ground

### TDM BUS versions

This frame is the same as the previous one, but includes an internal TDM bus (DS-D BUS). This version is reserved for MADI multiplexors and demultiplexors and can only house the modules designed for these applications (DS-D MADI, DS-D MADO, DS-D AESI, DS-D AESO, DS-D C4AD, DS-D C4DA).

- DS-D FRAME 5 BUS ref. 42.32.0104.01: this frame only supplies + 5 V to the modules. It includes a + 5 V/30 A power supply (DS-D PS 5 - 30).

- DS-D FRAME 5R BUS ref. 42.32.0105.01: this frame only supplies + 5 V, but includes two redundant power supplies, each + 5 V/20 A (DS-D PS 5 - 20). This version can be obtained from the previous one by very simple retrofit (replacement of single power supply for the two others).

- DS-D FRAME 5/15/BUS ref. 42.32.0106.01:

### Board connectors

96-pin DIN 41612 male plug

pin	row A	row B	row C
1	MGND	MGND	MGND
2	+5V	+5V	+5V
3		HI2C	DI2C
4	GND	GND	GND
5		GND	
6		GND	
7		GND	
8		GND	
9		GND	
10	/D0	BA0	/D8
11	/D1	BA1	/D9
12	/D2	BA2	/D10
13	/D3	BA3	/D11
14	/D4	GND	/D12
15	/D5	AES/DS-DBUS	/D13
16	/D6	GND	/D14
17	/D7	GND	/D15
18	FRAME	CK128	/U
19	MGND	MGND	MGND
20			
21	MGND	MGND	MGND
22			
23	MGND	MGND	MGND
24			
25	MGND	MGND	MGND
26			
27	MGND	MGND	MGND
28			
29	AGND	AGND	AGND
30	-15V	-15V	-15V
31	+15V	+15V	+15V
32	MGND	MGND	MGND

MGND mechanical ground

GND logic ground

AGND analogic ground

## TYPICAL APPLICATION DESCRIPTION

### DS-MC SYSTEM/ SUB-SYSTEM

DS-MC is a generic name for an association of modules devised for the central digital audio synchronisation. Such an association may use a frame or part of a frame. The following diagram describes the typical structure of such a system.

The heart of the system is the DS-D ARG reference generator, generating a "DARS" signal (AES 11 - 1991). This module operates from a  $\pm 1$  ppm precision internal reference ("grade one"), and also generates a "Word Clock" TTL output clock. It can be itself synchronised to either an external AES reference, or a "Word Clock" TTL input clock.

When the generated DARS must be used for the synchronisation of several devices, DS-D DA modules are added for the distribution of the DARS (Digital Audio Reference Signal).

In video/audio systems, the digital audio equipment must be synchronised to the video line rate. This is possible by using the DS-D VS. This module receives a video reference (PAL/SECAM or NTSC, selectable) and extracts a "Word Clock" output. This output must be connected to the "Word Clock" input of the DS-D ARG module to produce a "DARS" synchronised to the video reference.

The DS-D CC translates a standard Word Clock frequency (among 32/44.1/48 kHz) to another standard frequency. This module thus generates a secondary sampling rate which can synchronise devices that cannot operate at the normal system rate.

A typical application is the synchronisation of CD players within a system operating at 48 kHz. If the digital outputs of the CD players are fed to sampling rate transcoders to obtain 48 kHz sampling rate signals, the exact 44.1/48 ratio guaranteed by the use of the DS-D CC will mean a better quality of the rate transcoding process.

### A/D/A CONVERSION SYSTEMS

A/D and D/A converters can be gathered in a frame. Usually, it is required that all these modules are synchronised to the global system reference.

Two solutions exist for this purpose :

- 1) Each converter features an AES synchronisation input, so it is possible to connect one reference to each module. The drawback of this solution is, of course, the large number of synchronisation signals necessary to make this.
- 2) The converters can be configured for synchronisation from the internal "SYNC" signal, and a master board can be fitted in the frame (e.g. DS-D ARG). This master module can itself be synchronised to an external AES reference. Only one AES reference is enough to synchronise a whole frame.

### MADI MUX/DEMUX SYSTEMS

These systems are different from the general DS-D configuration described above. They are used for the generation of multichannel links (MADI) from separate analog and/or digital signals, or the extraction of such signals from a MADI link.

Both systems are based on the "DS-D FRAME 5/15/BUS" frame, which includes a TDM bus carrying all the signals handled inside the unit.

#### DS-D MUX : MADI multiplexer

This unit includes a MADI out board (DS-D MADO) and 1 to 14 input modules. Each of the input modules receive 4 elementary audio channels. The input modules are either analog input modules (DS-D C4AD, 4 analog inputs, which may be 2 stereo inputs) or digital input module (DS-D AESI, 2 AES inputs for 4 digital channels).

In the default routing mode, each input is inserted in the MADI output at a position directly related to the physical position of the input module (slot number). For example, the 4 channels of the module in the first left most module are transmitted as channels 0 to 3, etc.

Slots 0 to 13 are for input modules. Slot 14 is reserved for future use, and slot 15 is reserved for the MADI output module.

The MADI output module is synchronisable to an AES reference. It is also capable to operate from an internal high precision reference.

This module has an AES output, which is a "copy" of the synchronisation input or an AES signal generated from the internal reference. This output may be transmitted together with the MADI output, in order to synchronise the receiving device.

#### DS-D DEMUX : MADI demultiplexer

This unit includes a MADI in board (DS-D MADII) and 1 to 14 output modules. Each of these output 4 elementary audio channels, either analog (DS-D C4DA) or digital (DS-D AESO, 2 or 4 AES outputs for 4 channels).

In the default routing mode, each MADI channel is output by the output module corresponding to its number. For example, MADI channels 0 to 3 are routed to the outputs of the module which is in slot 0 of the frame, channels 52 to 55 (if any) are available at the outputs of the module in slot 13.

Slots 0 to 13 are for output modules. Slot 14 is reserved for future use, and slot 15 is reserved for the MADI in module.

The MADI in module features an AES input for synchronisation. It also includes a "MADI thru" output replicating the MADI input for use by other devices.