

Studer DI9m

Digital System Components



STUDER
professional audio equipment

D19m

D19m - digital Components in a modular System

- **up-to-date technology in a low-budget format**
- **universally useable, modular concept**
- **the completion of digital systems**

For building a complete system, additional components are often needed that handle system functions which the individual units cannot fulfill.

In the analog field corresponding STUDER components have been available for a number of years. For digital systems STUDER has now begun to close the corresponding gap by introducing the D19m series (m stands for modular).

The whole series is based upon the latest technology in A/D and D/A. Needless to say that only high-quality components are used.

The individual units of the D19 series are designed for the 19" format occupying 1 or 2 units of vertical space, the D19m series consists of boards with a width of 100 mm (Euro card width) that can be inserted into a chassis occupying 1 or 3 units of vertical space. Each configuration can be individually tailored. Of course, the card chassis has a built-in power supply and can optionally be fitted with a redundant power supply.

System

The input cards are designed to feed a TDM-Bus, and the output cards are fed by this TDM-Bus. The purpose of this TDM bus is to multiplex all inputs in a form that can be directly converted to a MADI link. Vice versa a MADI link can be accepted by the respective MADI Interface and transferred to the TDM-Bus, where the single output cards can derive their information.

In addition, many cards can be used also in stand-alone form.

Components

The components are explained on single data sheets.

All have the same form (100 x 320 mm).

- **D19m MP4RC**
Quad Remote Controlled Mic/Line Input
- **D19m RCC**
Remote Controller Card for MP4RC Mic/Line Input
- **D19m C4AD/24**
Quad 24 bit A/D Converter
- **D19m C4AD NS/24**
Quad 24 bit A/D Converter with Noise Shaping
- **D19m C4DA/24**
Quad 24 bit D/A Converter
- **D19m ADATI**
Dual 8-channel ADAT Input
- **D19m ADATO**
Dual 8-channel ADAT Output
- **D19m AESO**
Dual AES/EBU Output
- **D19m AESI**
Dual AES/EBU Input
- **D19m AESI SFC**
Dual AES/EBU Input with asynchronous SFC
- **D19m MADI**
MADI Input for glass fibre/coaxial cable
- **D19m MADO**
MADI Output for glass fibre/coaxial cable

19" Frames

There are two card racks available:

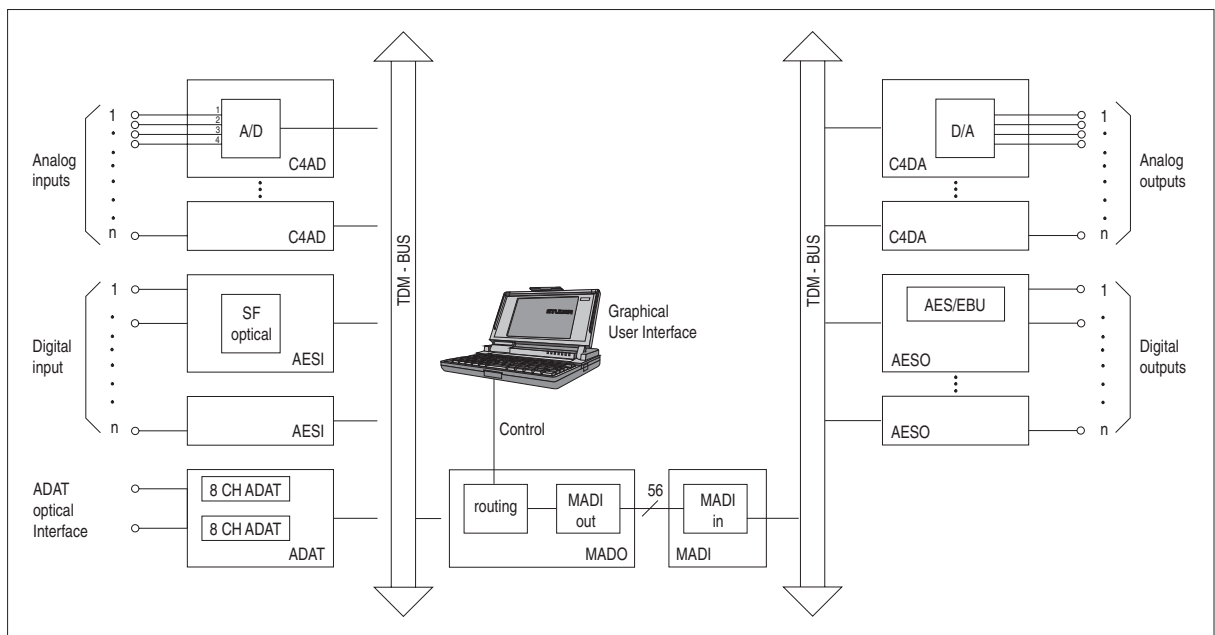
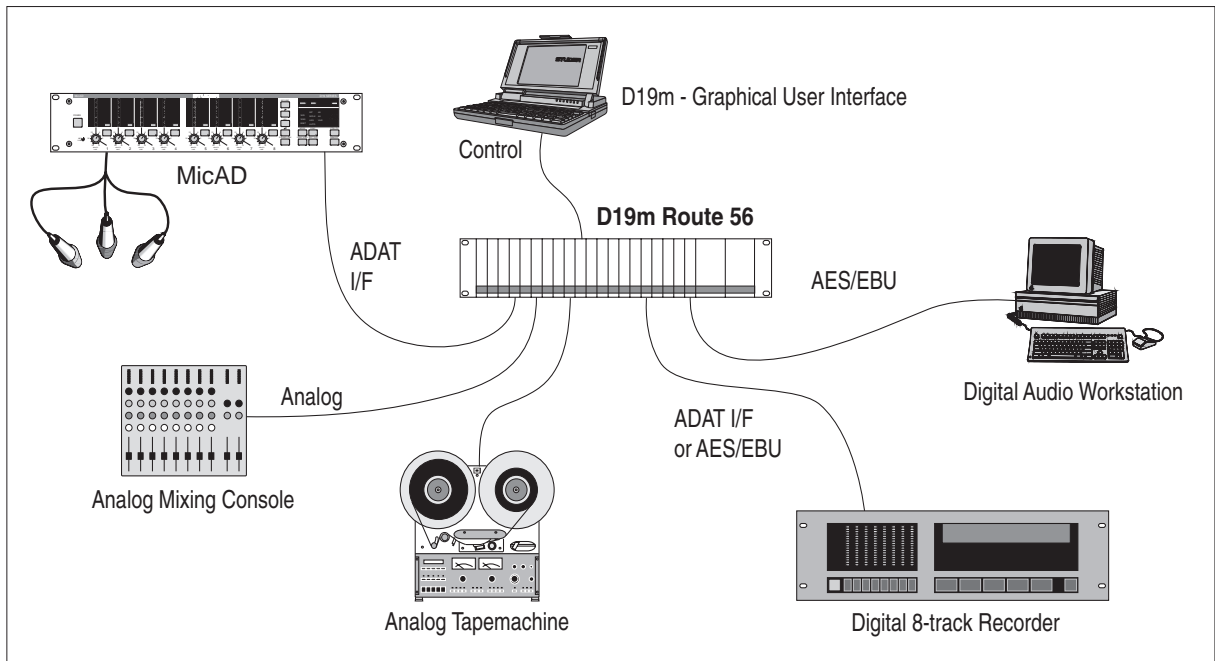
- **D19m** **frame/1U**
Rack chassis 19", 1U, incl. power supply, accommodates up to 4 boards.
- **D19m** **frame/3U**
Rack chassis 19", 3U, incl. power supply, accommodates up to 15 boards.

D19m

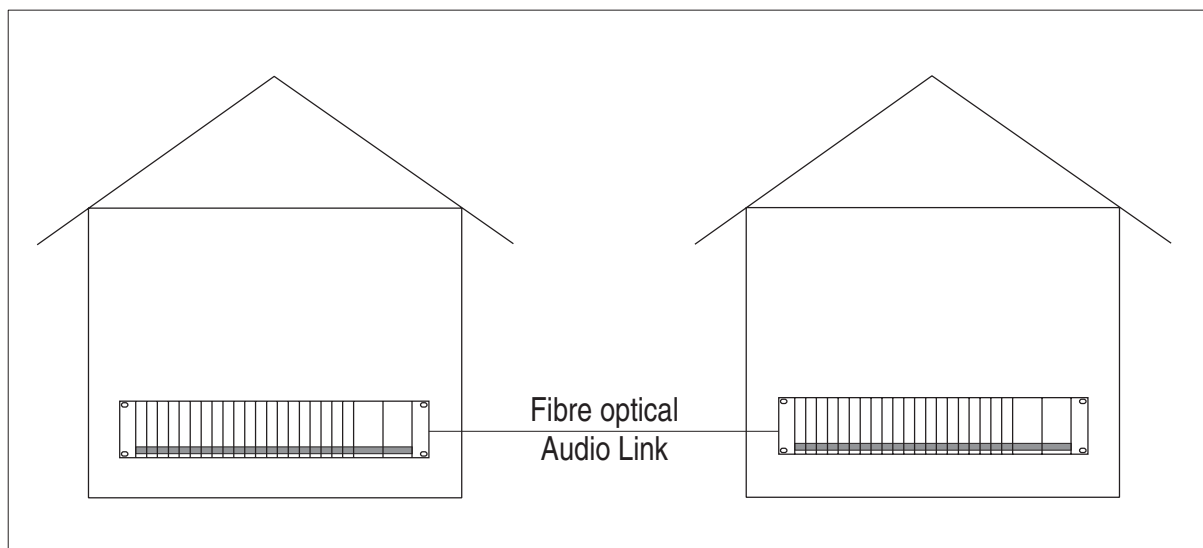
Applications:

With the D19m components a variety of applications can be solved, such as:

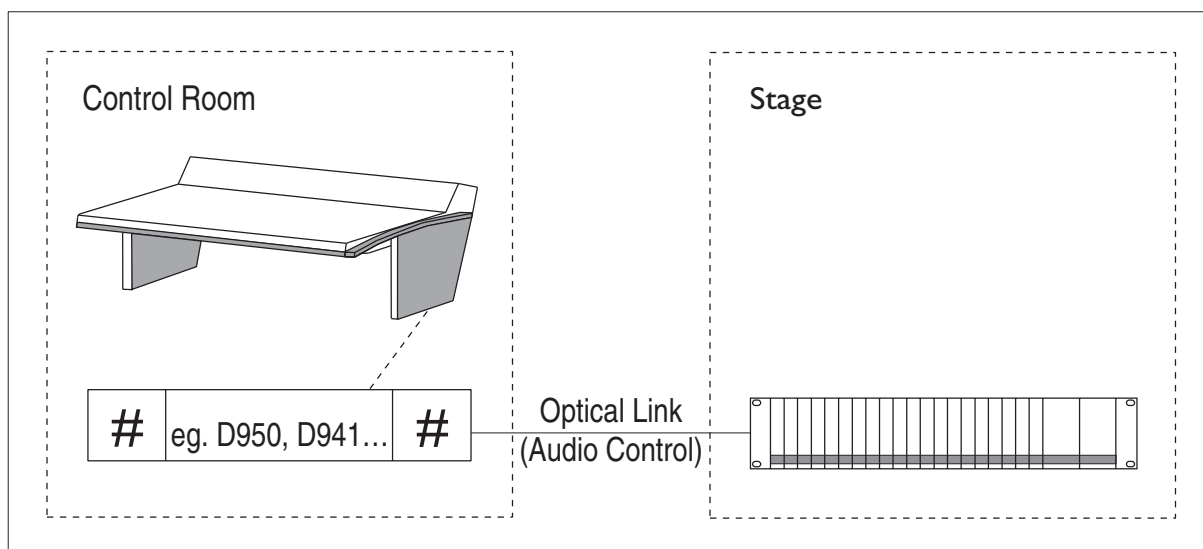
- Custom wired card racks for:
 - Small TDM routers with variable interface configuration (digital and analog). For example a 28 x 28 or a 56 x 56 router can be installed in one or two 3U racks respectively.



- Multiplexing and demultiplexing arrangements
- Fibre optical audio link



- Stage boxes with optical link to the audio production.



- Universal unit with A/D converter, D/A converter, sampling frequency converter and digital signal distribution.
- Analog input rack and analog output rack with more stringent specifications for MADI oriented digital recorders (for example, from STUDER or SONY).
- Individual boards can also be integrated into other systems.

The D19m series will be continually expanded in the future.

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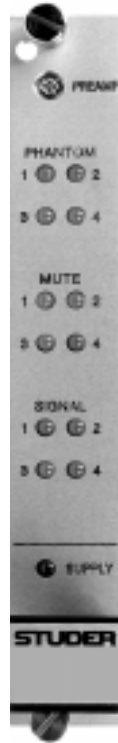
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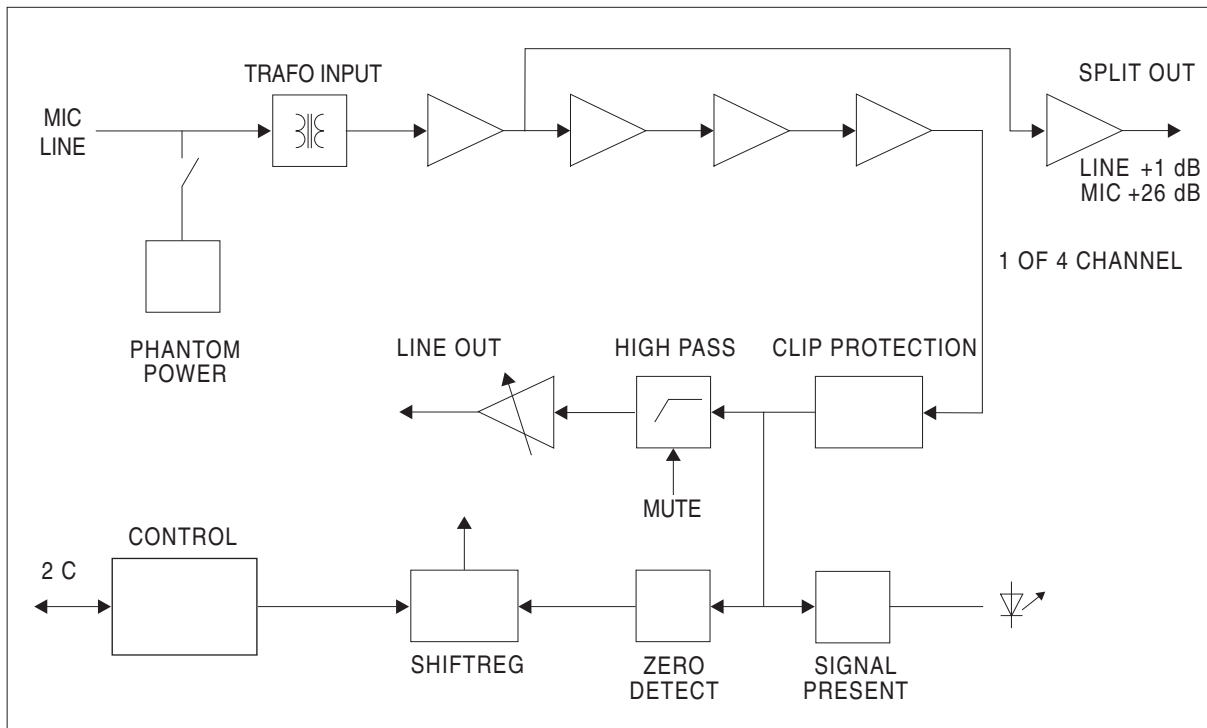
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D19m MP4RC

Quad Remote Controlled Mic/Line Input



- 4 transformer-balanced Mic/Line inputs with gain control in 1 dB steps. Switchable between Mic and Line level.
- 48 V phantom power and high pass filter for Mic/Line input.
- Additional Split output, per Mic/Line input.
- 1 external mute (GPI) input per Mic/Line input.
- Electronically balanced outputs.
- Remote controlled from the D19m Remote Controller card.
- Clip Protection for all 4 Mic/Line inputs in common.



Blockdiagram

DI9m MP4RC

Technical data

Analog Inputs

	balanced		by transformer
	switchable between Line and Mic position		
Sensitivity	Mic	-60... 0 dBu for +15 dBu nominal output level	
	Line	-10...+24 dBu for +15 dBu nominal output level	
Input impedance	Mic		>1 k Ω
	Line		>2 k Ω
Aequivalent input noise (200 Ω Ri)	Mic at max. gain		-124 dBu
Crosstalk	Mic 30 dB gain	1 kHz	>110 dB
		15 kHz	> 90 dB
	Line 0 dB gain	1 kHz	> 110 dB
		15 kHz	> 90 dB
Gain setting			in 1 dB steps

Analog Outputs

	Phantom power, switchable		48 V
	balanced		electronically
Level	Line Out		15 dBu \pm 3 dB
	Split Out	Mic	+26 dB
		Line	+1 dB
Output impedance	Line Out		50 Ω
	Split Out		50 Ω

Reference

	HP filter, switchable		-3 dB @ 75 Hz, 12 dB/oct
	Clip protection, switchable for all inputs only		
Frequency response	Line	30 Hz – 20 kHz	\pm 0.1 dB
	Mic	30 Hz – 20 kHz	\pm 0.4 dB
THD & Noise	Line	0 dB gain and +15 dBu input level	95 dB
	Mic	30 dB gain and -20 dBu input level	95 dB
	Mic	60 dB gain and -54 dBu input level	70 dB
Common mode rejection	Mic 35 dB gain	1 kHz	>85 dB
		15 kHz	>75 dB
	Line 0 dB gain	1 kHz	>85 dB
		15 kHz	>70 dB

General

Current consumption	5 V	0.25 A
Current consumption	+15 V	0.30 A
Current consumption	-15 V	0.25 A
Operating range		0 – 40 $^{\circ}$ C

Order No

1.940.575.20

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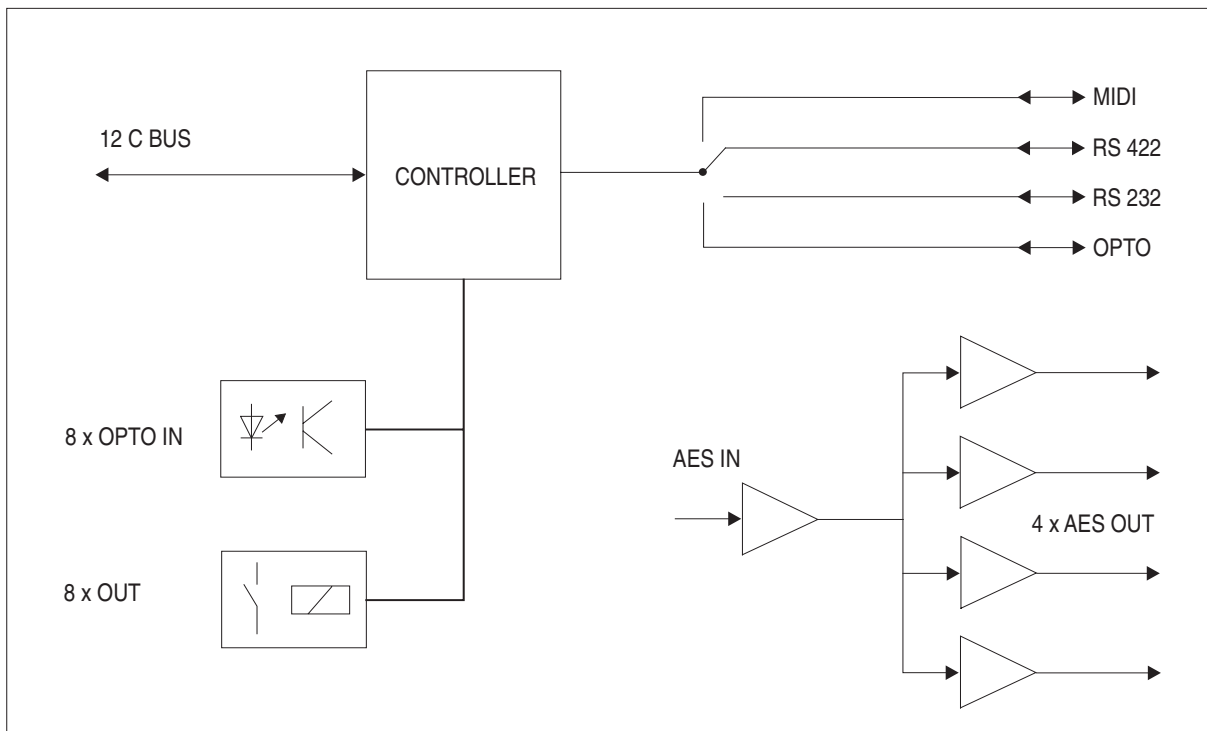
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D19m RCC

Remote Controller Card for MP4RC Mic/Line Input



- Remote controller card for the D19m MP4RC Quad Remote controlled Mic/Line input.
- The card itself is controlled via a serial interface (RS 422 with 38.4 kHz, standard 9 - Pin on backplane or optical IF on front).
- 8 signaling IN and 8 signaling OUT via GPI, remote controlled via serial IF.
- AES/EBU Synch distribution (4 Outputs) optionally mounted.



Blockdiagram

DI9m RCC

Technical data

Serial Interfaces

Types	RS 232 / RS 422 / MIDI / Optical
Baudrates	31.25/38.4 kBaud
Connectors	RS 232 / RS 422 / MIDI Optical
SW Protocol	D-Types on backplane SC Type on front MIDI

AES/EBU Input

Input impedance	110 Ω
Input sensitivity	min. 200 mV
Sampling rate	28 - 55 kHz

AES/EBU Output

Output impedance	110 Ω
Output level with 110 Ω load	5 V

GPI

Signal Input Level	2.5 ... 48 V
Relais Output	1 A, 100 V, 30 W

General

Current consumption 5 V	max. 0.9 A
Operating range	0 – 40° C

Order No

1.940.576.20

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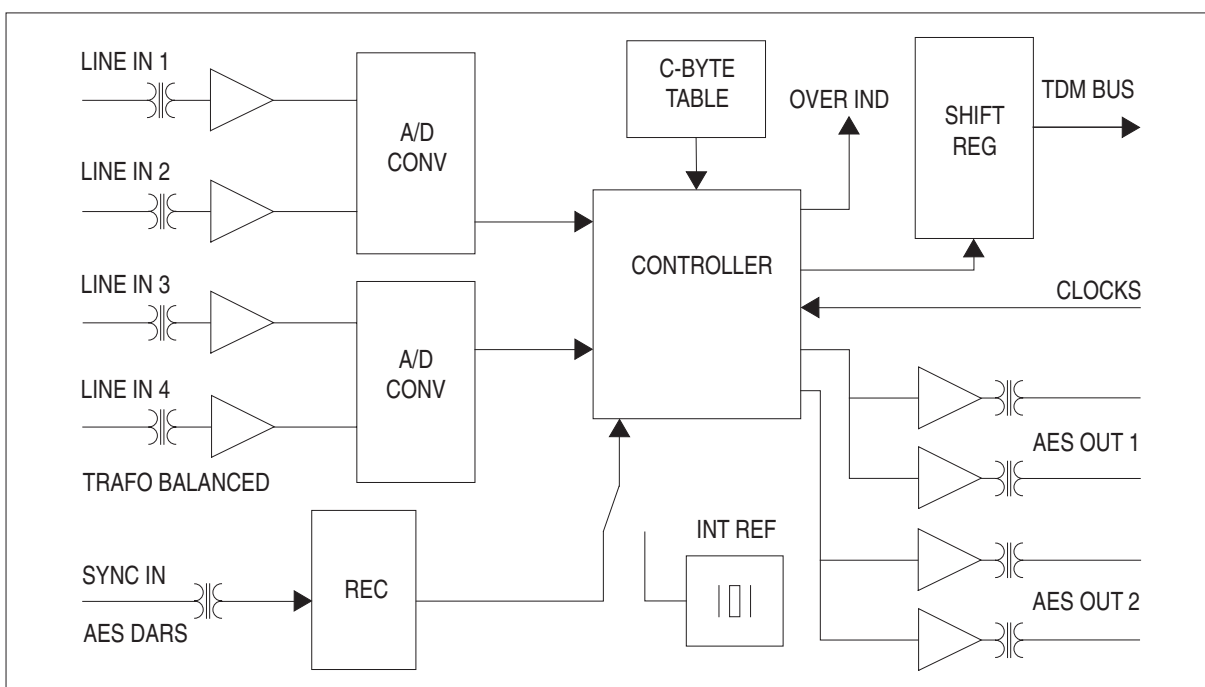
DI9m C4AD/24

Quad 24 bit A/D Converter



- Stand-alone Converter converting four analog inputs to two AES/EBU outputs.
- TDM Bus Driver, converting four analog inputs to four time slots in the TDM Bus.
- 24 bit Delta-Sigma Conversion.
- Sync external or internal; with missing external sync signal automatic switch over to internal source.

LEDs on the front panel indicate the „Power on“ and the „Sync“ status. Four LED's indicate an overload, in the respective input.



Blockdiagram

DI9m C4AD/24

Technical data

Analog Inputs

balanced	by transformer
Level (for full scale)	15 or 21 dBu fix (jumper), or 0 - 26 dBu adjustable
Input impedance	min. 10 kOhm
Frequency response 20 Hz - 20 kHz	-0.2 dB
THD & N (30 Hz - 20 kHz, -1 dB _{fs}), input level fix	max. -97 dB _{fs}
THD & N (1 kHz, -30 dB _{fs}), input level fix	max. -108 dB _{fs}
Crosstalk 1 kHz	max. -110 dB

Digital Inputs (Sync) AES/EBU DARS

Input impedance	110 Ohm
Input sensitivity	min. 0.2 V
Sync source	either Sync Input or Bus (Jumper)

Digital Outputs

Sampling rate	28 - 55 kHz with ext. Sync 44.1 or 48 with internal Sync
Output impedance	110 Ohm
Output level with 110 Ohm load	5 V
Channel status	Stereo/2 Channel (Jumper)

General

Current consumption 5 V	0.4 A
Current consumption +15 V	0.25 A
Current consumption -15 V	0.06 A
Operating range	0 - 40° C

Order No

1.940.562.20

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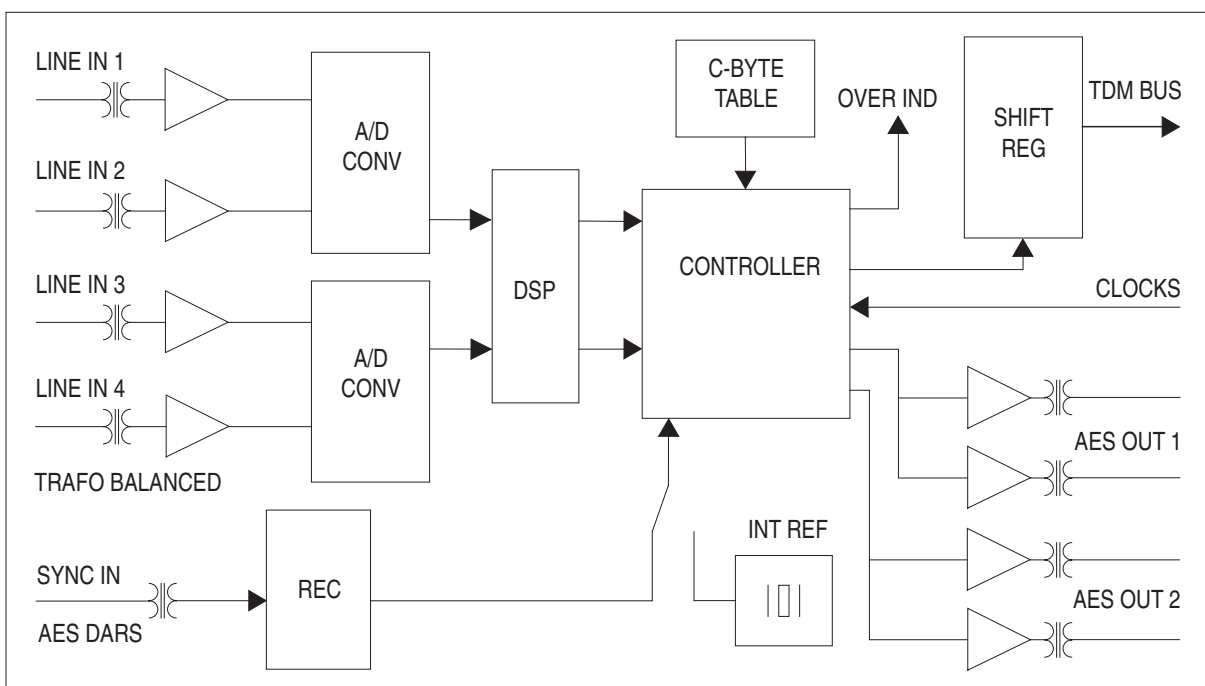
DI9m C4AD NS/24

Quad 24 bit A/D Converter with Noise Shaping



- Stand-alone Converter converting four analog inputs to two AES/EBU outputs.
- TDM Bus Driver, converting four analog inputs to four time slots in the TDM Bus.
- 24 bit Delta-Sigma Conversion.
- 16 bit output with dither or with dither and noise shaper for psycho-acoustical noise reduction.
- Sync external or internal; with missing external sync signal automatic switch over to internal source.

LEDs on the front panel indicate the „Power on“ and the „Sync“ status, the „Noise shaping / Dithering on“ and the „Noise shaping / Dithering external control“ status. Four LED's indicate an overload, in the respective input.



Blockdiagram

DI9m C4AD NS/24

Technical data

Analog Inputs

balanced	by transformer
Level (for full scale)	15 or 21 dBu fix (jumper), or 0 - 26 dBu adjustable
Input impedance	min. 10 kOhm
Frequency response 30 Hz - 20 kHz	-0.2 dB
THD & N (20 Hz - 20 kHz, -1 dB _{fs}), input level fix	max. -97 dB _{fs}
THD & N (1 kHz, -30 dB _{fs}), input level fix	max. -108 dB _{fs}
Crosstalk 1 kHz	max. -110 dB

Digital Inputs (Sync) AES/EBU DARS

Input impedance	110 Ohm
Input sensitivity	min. 0.2 V
Sync source	either Sync Input or Bus (Jumper)

Digital Outputs

Sampling rate	28 - 55 kHz with ext. Sync 44.1 or 48 with internal Sync
Output impedance	110 Ohm
Output level with 110 Ohm load	5 V
Channel status	Stereo/2 Channel (Jumper)

General

Current consumption 5 V	0.6 A
Current consumption +15 V	0.25 A
Current consumption -15 V	0.06 A
Operating range	0 - 40° C

Order No

1.940.563.20

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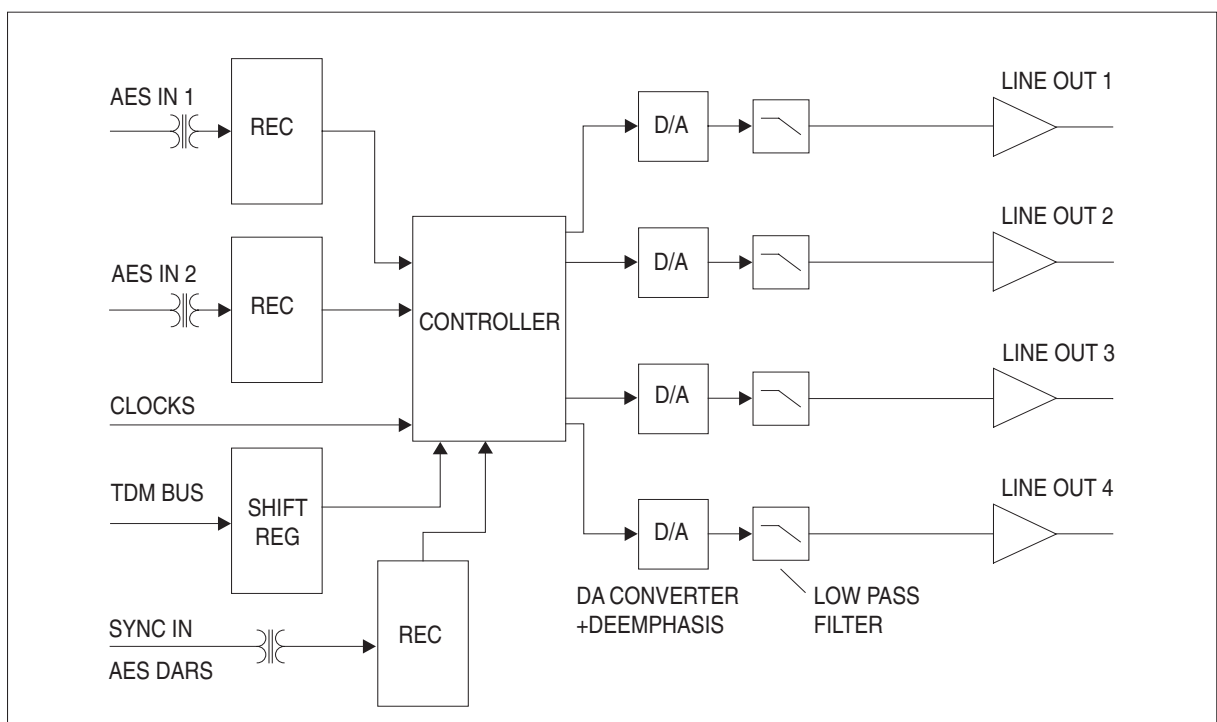
D19m C4DA/24

Quad 24 bit D/A Converter



- **Stand-alone Converter converting two AES/EBU inputs to four analog outputs.**
- **TDM Bus Receiver, converting four time slots in the TDM Bus to four analog outputs.**
- **24 bit Delta-Sigma Conversion.**
- **External Sync input; with missing external sync signal automatic switch over to one of the AES/EBU inputs.**
- **Special electronic balanced output circuit, providing functionality similar to a balanced floating output.**

LEDs on the front panel indicate the „Power on“ and the „Sync“ status. The analog outputs will be muted if „digital zero“ is fed to the AES/EBU inputs.



Blockdiagram

DI9m C4DA/24

Technical data

Analog Outputs

balanced	by transformer
Level (for full scale)	15 or 21 dBu fix (jumper), or 0 - 26 dBu adjustable
Input impedance	min. 10 kOhm
Frequency response 30 Hz - 20 kHz	-0.2 dB
THD & N (20 Hz - 20 kHz, -1 dB _{fs}), input level fix	max. -97 dB _{fs}
THD & N (1 kHz, -30 dB _{fs}), input level fix	max. -108 dB _{fs}
Crosstalk 1 kHz	max. -110 dB

Digital Inputs (Sync) AES/EBU DARS

Input impedance	110 Ohm
Input sensitivity	min. 0.2 V
Sync source	either Sync Input or Bus (Jumper)

Digital Inputs

Sampling rate	28 - 55 kHz with ext. Sync 44.1 or 48 with internal Sync
Output impedance	110 Ohm
Output level with 110 Ohm load	5 V
Channel status	Stereo/2 Channel (Jumper)

General

Current consumption 5 V	0.6 A
Current consumption +15 V	0.25 A
Current consumption -15 V	0.06 A
Operating range	0 - 40° C

Order No

1.940.570.21

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DI9m ADATI

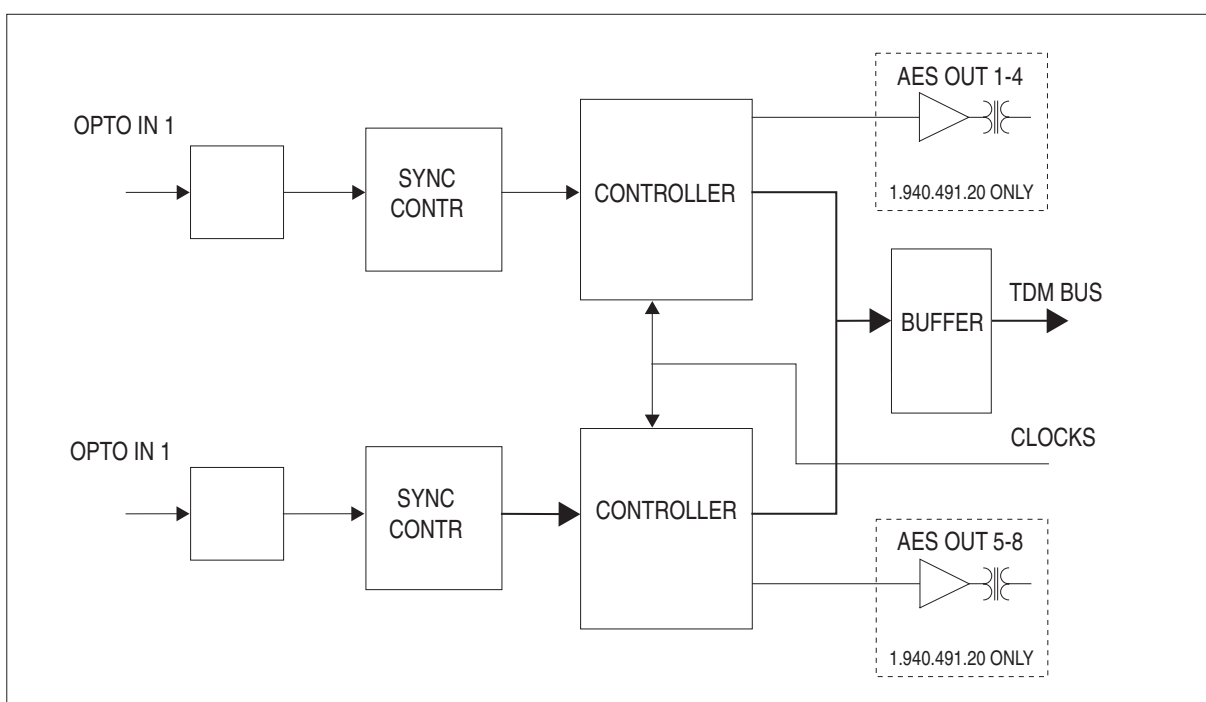
Dual 8-channel ADAT Input



- **Optical Receiver and TDM Bus Driver, converting 2 8-channel ADAT inputs into 16 time slots on the TDM Bus.**
- **Two input channel can be transferred to AES/EBU stereo outputs [1.940.491.20 only].**
- **Sync by the frame signal of the TDM Bus; in stand-alone applications via an AES/EBU sync input or directly from the optical input.**

As the Alesis Format does not contain any channel status informatio, the C bits will be generated by default or set to “not indicated”.

LED's on the front panel indicate the “Power on” status, and the lock status for each Alesis Input.



Blockdiagram

D19m ADATI

Technical data

Digital Input (Sync) [1.940.491.20 only]

Input impedance	110 Ohm
Input sensitivity	min. 0,2 V
Sampling rate	28 - 55 kHz

Digital Outputs [1.940.491.20 only]

Output impedance	110 Ohm
Output level with 110 Ohm load	5 V

General

Current consumption 5 V [1.940.491.20]	1,1 A
Current consumption 5 V [1.940.490.20]	0,7 A
Operating range	0 - 40° C

Order No	D19m ADATI	Dual 8-channel Input	1.940.490.20
	D19m ADATI	With 8 AES Outputs	1.940.491.20

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DI9m ADATO

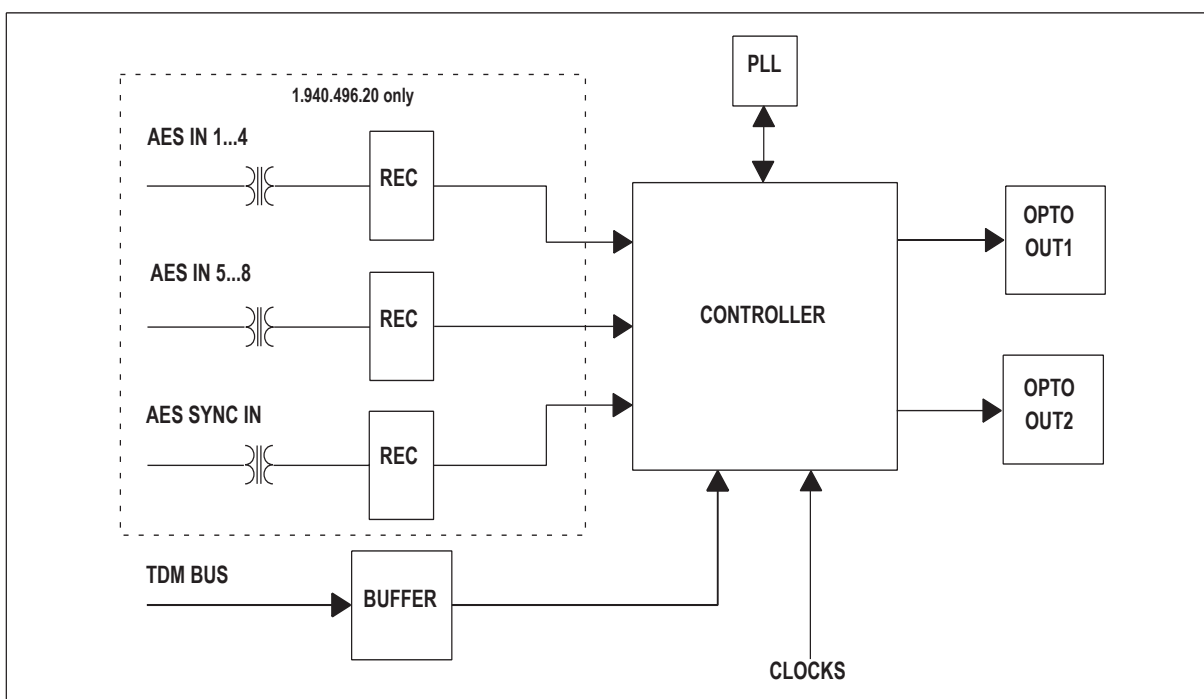
Dual 8-channel ADAT Output



- **Optical Transmitter, converting 16 time slots on the TDM bus to two 8-channel ADAT outputs.**
- **Optionally, the card can be equipped with eight AES/EBU receivers for standalone applications [1.940.496.20].**

As the Alesis Format does not contain any channel status information, the C-bits will be lost in case of having AES/EBU inputs.

LEDs on the front panel indicate the “Power on” status.



Block diagram

D19m ADATO

Technical data

Digital Inputs [1.940.496.20 only]

Input impedance	110 Ω
Input sensitivity	200 mV
Sampling rate	28...55 kHz

Optical Outputs

Wave length	660 nm
Maximum length of transmission (plastic fibre)	3 m

General

Current consumption 5 V [1.940.495.20]	0.2 A
Current consumption 5 V [1.940.496.20]	0.4 A
Operating temperature range	0...40° C

Order No.

D19m ADATO	Dual 8-channel Output	1.940.495.20
D19m ADATO	With 8 AES Inputs	1.940.496.20

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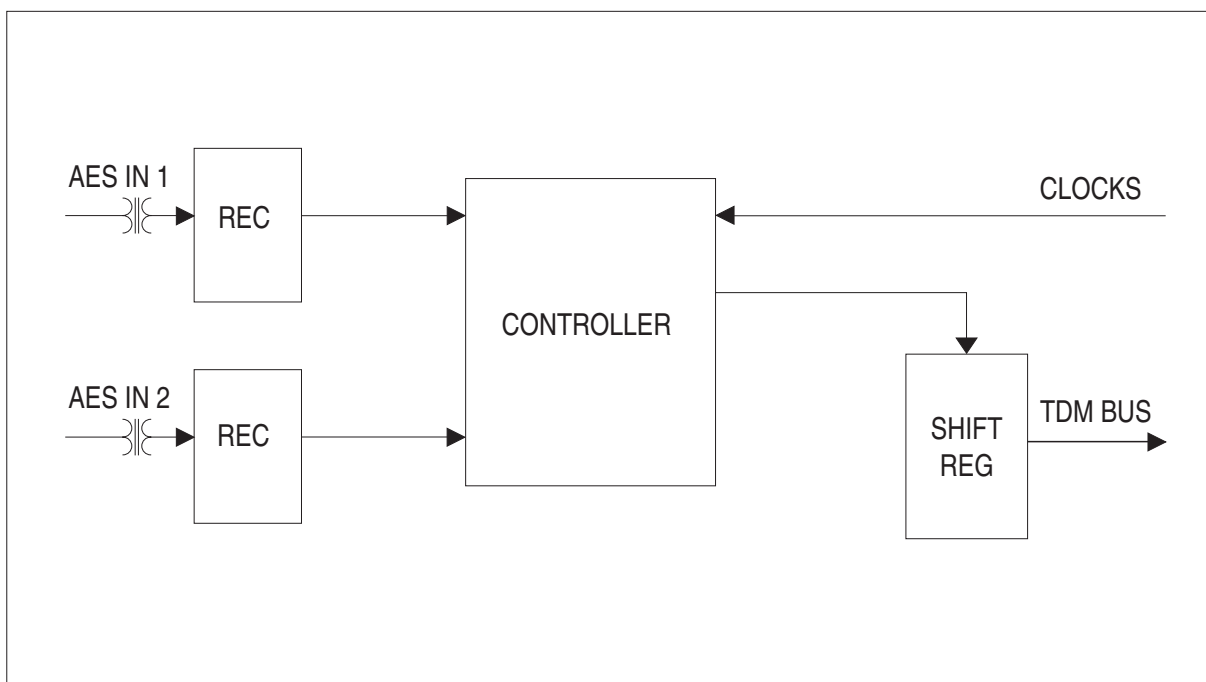
DI9m AESI

Dual AES/EBU Input



- **TDM Bus Driver, converting two AES/EBU inputs to four time slots in the TDM Bus.**
- **Channel status information from the inputs will be transferred on the TDM Bus (transparent interface).**

LEDs on the front panel indicate the „Power on“ status, the status of the inputs AES IN 1 and AES IN 2, and any asynchron relation between the input signals and the reference (ASYNC 1 and ASYNC 2).



Blockdiagram

DI9m AESI

Technical data

Digital Inputs

Input impedance	110 Ohm
Input sensitivity	min. 0.2 V
Sampling rate	28 - 55 kHz

General

Current consumption 5 V	0.3 A
Operating range	0 - 40° C

Order No

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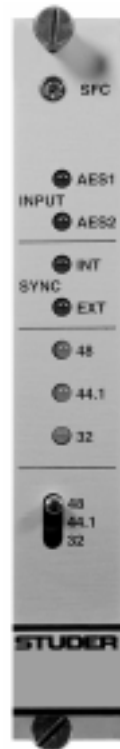
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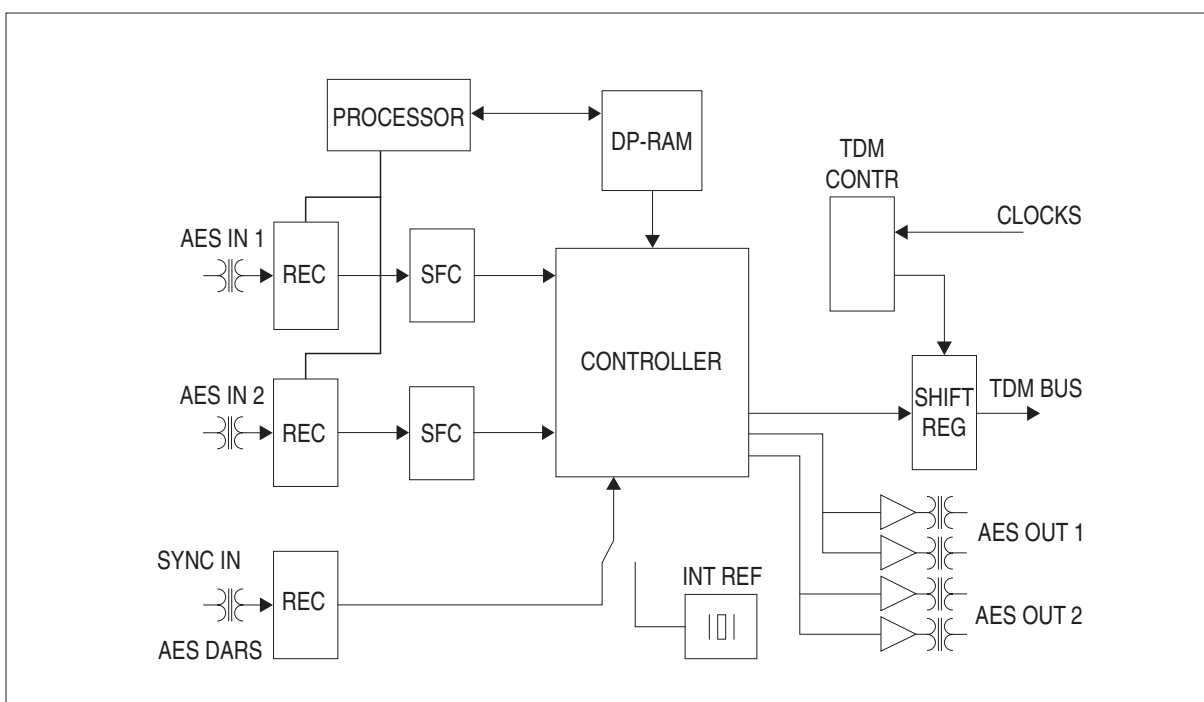
DI9m AESI SFC

Dual AES/EBU Input with asynchronous SFC



- Stand-alone Converter converting two AES/EBU inputs to two AES/EBU outputs using asynchronous Sampling Frequency Converters.
- TDM Bus Driver, converting two AES/EBU inputs to four time slots in the TDM Bus using asynchronous Sampling Frequency Converters.
- Internal Sync (32, 44.1 or 48 kHz) or External Sync input; with missing external sync signal automatic switch over internal reference.

LEDs on the front panel indicate the status of the digital inputs (AES IN 1 and AES IN 2), the sync source (intern or extern) and the output sampling frequency.



Blockdiagram

DI9m AESI SFC

Technical data

Digital Inputs

Input impedance	110 Ohm
Input sensitivity	min. 0.2 V
Sampling rate	28 - 55 kHz

Digital Outputs

Output impedance	110 Ohm
Output level with 110 Ohm load	4 V
Dynamic range (20 Hz - 20 kHz, -60 dB _{fs})	min. 120 dB
THD & N (20 Hz - 20 kHz, 0 dB _{fs})	max. -94 dB _{fs}
THD & N (1 kHz, 0 dB _{fs})	max. -106 dB _{fs}
with SF _{in} /SF _{out} less than 0.7/1.4	
Audio delay	3 ms
Max. range of SF _{in} /SF _{out}	1 : 0.5 to 2

General

Current consumption 5 V	0.55 A
Operating range	0 - 40° C

Order No

1.940.540.20

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DI9m AESO

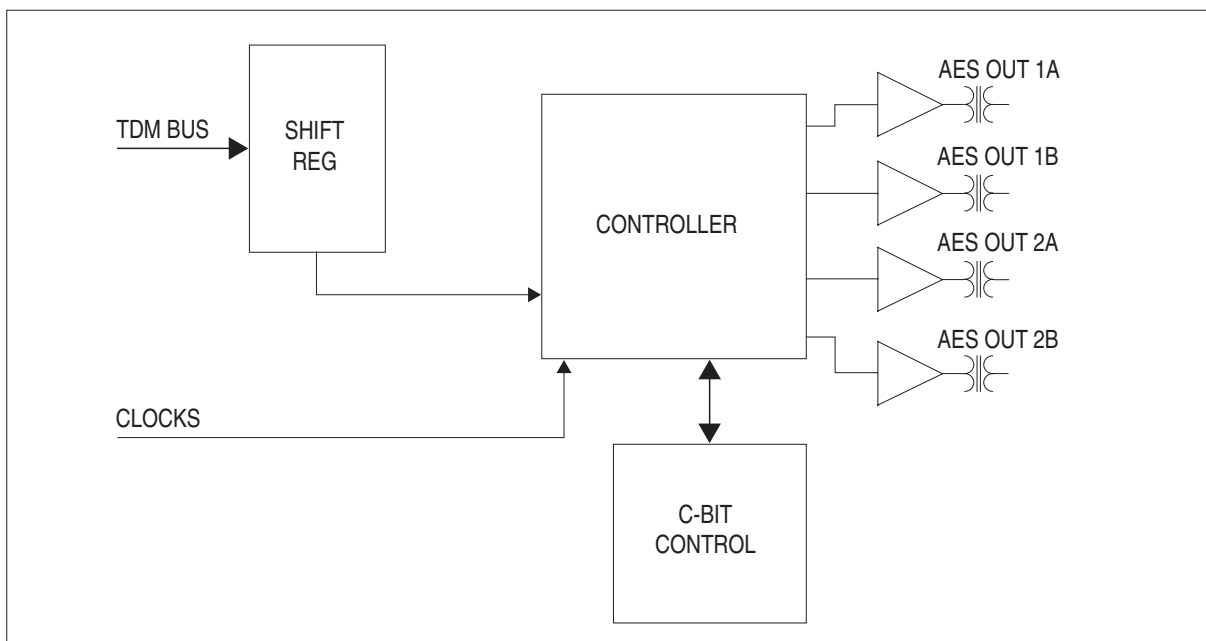
Dual AES/EBU Output



- **TDM Bus Receiver, converting four time slots in the TDM Bus to two AES/EBU outputs or to four AES/EBU mono outputs depending on Channel mode setting.**

LEDs on the front panel indicate the „Power on“ status. The channel status information will be transferred from the TDM Bus signal to the outputs (transparent interface). The Channel mode can be set internally in the following versions:

- **MONO**
Each TDM time slot will be fed separately to one AES/EBU output
- **STEREO**
Two TDM time slots will be fed as a stereo pair to two parallel AES/EBU outputs
- **2 CHANNEL**
Two TDM time slots will be fed as a 2 channel pair to two parallel AES/EBU outputs



Blockdiagram

DI9m AESO

Technical data

Digital Outputs

Output impedance	110 Ohm
Output level with 110 Ohm load	5 V
Sampling rate	28 - 55 kHz

General

Current consumption 5 V	0.4 A
Operating range	0 – 40° C

Order No 1.940.585.20

STUDER
professional audio equipment

H A Harman International Company

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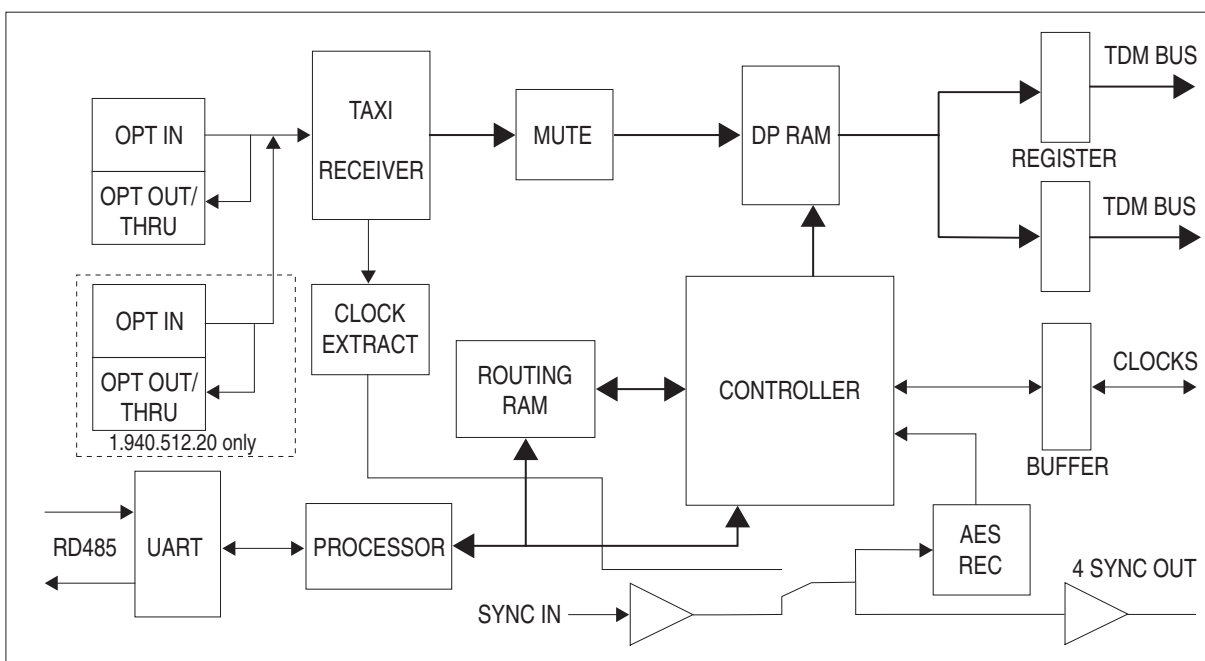
DI9m MADI

MADI Input for glass fibre/coaxial cable



- **MADI Receiver, and TDM Bus driver, converting a MADI frame into 56 TDM Bus time slots.**
- **The TDM Bus is synchronized by the received sync signal. In slave mode, the board is synchronized by a back plane signal.**
- **1.940.511.20, 1.940.512.20 only:
Sync signal extracted from MADI (no additional sync input needed)**
- **Extern control via an RS 485 interface.**
- **1.940.512.20 only:
Redundant MADI input / through with automatic switcher**

LEDs on the front panel indicate the „Power on“, the „Sync“, the „Slave“ and the „MADI receive“ status.



Blockdiagram

D19m MADI

Technical data

MADI Input Optical [1.940.511.20, 1.940.512.20 only]

Plug type	SC
Maximum length of transmission	500m
Multimode fibre (62.5/125 µm)	

MADI Input Coaxial [1.940.500.20 only]

Plug type	BNC
Input impedance	75 Ohm
Maximum length of transmission	50m

AES/EBU Sync Input

Input impedance	110 Ohm
Input sensitivity	min. 200 mV

AES/EBU Sync Output

Output impedance	110 Ohm
Output level	5 V

General

Current consumption 5 V	0.8 A
Operating range	0 – 40° C

Order No	D19m MADI COAX	Input for coaxial cable	1.940.500.20
	D19m MADI	Input for glass fibre cable	1.940.511.20
	D19m MADI RED	Input for glass fibre cable with redundant input	1.940.512.20

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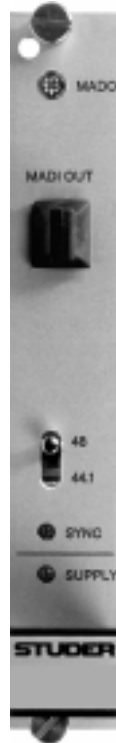
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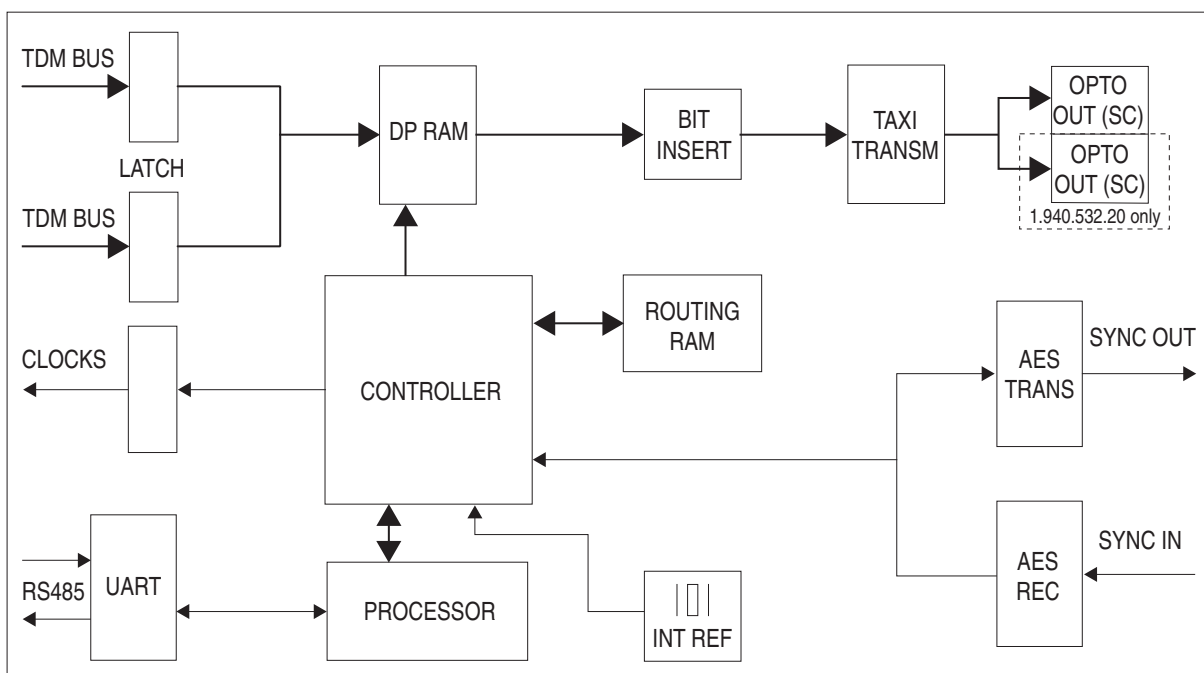
DI9m MADO

MADI Output for glass fibre/coaxial cable



- TDM Bus Receiver, and MADI transmitter, converting up to 56 time slots into a MADI frame.
- The time slot allocation between the TDM signals and the MADI frame can be externally controlled via an RS 485 interface.
- This function allows the configuration of a very simple 56x56 MADI router.
- The TDM Bus is synchronized by the received sync signal. In case of a missing sync signal, the unit generates automatically a high precision sync signal.

LEDs on the front panel indicate the „Power on“ and the „Sync“ status.



Blockdiagram

D19m MADO

Technical data

MADI Output Optical [1.940.531.20, 1.940.532.20 only]

Plug type	SC
Maximum length of transmission	500m
Multimode fibre (62.5/125 µm)	

MADI Output Coaxial [1.940.520.21 only]

Plug type	BNC
Output impedance	75 Ohm
Maximum length of transmission	50m

AES/EBU Sync Input

Input impedance	110 Ohm
Input sensitivity	min. 200 mV

AES/EBU Sync Output

Output impedance	110 Ohm
Output level	5 V

Internal Reference

Frequency	44.1/48 kHz
Clock accuracy	±1 ppm

General

Current consumption 5 V	0.8 A
Operating range	0 – 40° C

Order No

D19m MADO COAX	Output for coaxial cable	1.940.520.21
D19m MADO	Output for fibre glass cable	1.940.531.20
D19m MADO RED	Output for fibre glass cable with redundant output	1.940.532.20

STUDER
professional audio equipment

H A Harman International Company

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