

Studer D19m

Digital System Components – Product Information

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1 THE D19m SYSTEM

1.1 Introduction

The D19m series consists of single cards with a width of 100 mm (Eurocard width), which can be plugged into a 19" frame (1 or 3 height units). The output of the input cards feeds a TDM bus. The purpose of this bus is to multiplex all the input signals, so that they can directly feed a MADI connection (multiplexer unit/MUX) via a MADI interface. Just the other way round, the signal coming from a MADI connection can be fed into the TDM bus, too, from where again all output cards can derive their information (demultiplexer unit/DEMUX). Beyond that, most card types can be used in stand-alone applications, too.

TDM bus The TDM bus is a 16-bit wide bus with 128 time slots. The format is similar to the AES/EBU format, however distributed in parallel on two words. This means that 64 audio channels with 24 bits plus additional information (U-bits, C-bits etc..) can be transferred. The time slot allocation is given by the card addresses hardwired on the backplane. Thus an A/D converter card plugged into the first slot automatically gets the address 0 and writes to the bus only during its own assigned time slots. Since ADAT input cards occupy 16 channels on the bus, their address must be set with on-card DIP switches. All remaining cards are 4-channel and can be easily exchanged, e.g. an analog card may be replaced by a digital card. The clock signals (CK128, frame and sync) are sent by the MADI card (unless it is switched to slave mode) or the MADO card and are distributed on the backplane. The signal AES/TDM selects between stand-alone and TDM bus operation for the individual cards. This signal is controlled by the MADI or MADO card, too. It decides e.g. whether the D/A converter card takes its input signal from the TDM bus or from the AES/EBU input, or whether the A/D converter card may write to the TDM bus or not. If individual cards in the rack should operate in stand-alone mode, an additional jumper is available on the backplane in order to interrupt this select signal for every card individually.

Synchronization Except for the AESI and AESO cards, all cards have a separate sync input. Depending on the jumper setting, this input receives the sync signal from the bus (AES/EBU signal with TTL level) or from a separate input (standard balanced AES/EBU signal according to AES11). Thanks to the AES/EBU inputs and outputs, the converter cards also can operate in stand-alone mode. It is possible to extract a sync signal from the MADI (when using MADI optical). However, this feature should be used only for large distances and stagebox systems. Otherwise it is recommended to use the AES/EBU sync line. This results in a smaller error probability (having two PLLs less in the path), reduced jitter, and allows the use of variable speed.

MADI and MADO cards in the same frame

If MADI and MADO cards are mounted in the same rack, using the MADI card's sync out should be avoided whenever possible. Since the MADO card is always considered as a master by the software, a hardware modification is necessary in such a case. Therefore, it is recommended to use separate racks for MUX and DEMUX.

Routing The MADI card transfers the MADI input signal to the TDM bus, and the MADO card converts the TDM bus signal to the MADI format. Without external control, the channels will transmit the signals in the MADI data stream and on the TDM bus in the same sequence. When using the RS485 interface it is possible, however, to arbitrarily change the allocation on the MADO card (application e.g. in Route56).

Rear panels All rear connector panels available are listed in the following table. Considering the rack size, please note that the connector panels may require more space than the plug-in cards, depending on type and number of required connectors.

	Plug-in card	Rear panel	Number	Width TE	Mono channels	Comment
Multiplexer						
D19m RACK BUS 5/15			1.940.592.81-V or .595.00-V	4		not in combination with Mic/Line Input
D19m RACK MKII			1.940.591.00-V or .594.00-V	4		in combination with Mic/Line Input
D19m MADO optical			1.940.531.20	4	56	
			1.940.532.20	4	56	With second redundant output
D19m MADO coax			1.940.520.21	4	56	
D19m RCC			1.940.576.20	4		for remote control of the Mic/line Input
		Control CONN	1.940.630.00	4		connectors for in (opto-coupled) and out (relays)
	D19m MP4RC		1.940.575.20	4	4	
		XLR CONN analog IN	1.940.627.81	8	4	
		Bantam CONN insert	1.940.631.00	4	4	
		Control CONN	1.940.630.00	4		connector for mute input
	D19m C4AD/24		1.940.562.20	4	4	
	D19m C4AD NS/24		1.940.563.20	4	4	
		XLR CONN analog IN	1.940.627.81	8	4	
		S39M CONN input	1.940.610.00	8	12	
	D19m AESI		1.940.580.20	4	4	
	D19m AESI SFC		1.940.540.22	4	4	
		XLR CONN AES in	1.940.617.81	8	8	
		BNC CONN input	1.940.611.00	4	8	
		D15F CONN input	1.940.615.00	4	8	
	D19m ADATI		1.940.490.20	4	16	
	D19m ADATI" with AES out		1.940.491.20	4	16	for stand-alone applications
Demultiplexer						
D19M RACK BUS 5/15			1.940.592.81-V or .595.00-V			not in combination with Mic/Line Input
D19M RACK MKII			1.940.591.00-V or .594.00-V			in combination with Mic/Line Input
D19m MADI optical			1.940.511.20	4	56	
			1.940.512.20	4	56	with second redundant output
D19m MADI coax			1.940.500.21	4	56	
D19m XMADI optical			1.940.515.20	4	56	fixed routing 28x28
	D19m C4DA/24		1.940.570.21	4	4	
		XLR CONN output	1.940.628.81	8	4	
		D15M CONN output	1.940.616.00	4	4	
		S39F CONN output	1.940.609.00	8	12	
	D19m AESO		1.940.585.21	4	4	
		XLR CONN output	1.940.618.81	8	8	
		BNC CONN output	1.940.612.00	4	8	
	D19m ADATO		1.940.495.20	4	16	
	D19m ADATO" with AES in		1.940.496.20	4	16	for stand-alone applications
	SYNC receiver		1.940.557.00	4		Sync in case there is no MADI or MADO card
	Extender card		1.940.555.00			for service purpose
	Blank panel 4TE		1.940.590.02	4		
	Blank panel 8TE		1.940.590.03	8		

1.2 D19m 3U frames with +5/±15 V power supply

(Standard versions: order no. 1.940.592.81-V / 1.940.591.00-V; deep versions with recessed front panel: order no. 1.940.595.00-V / 1.940.594.00-V)
The same frames can be used for MUX and DEMUX units. The 19" frames have a height of 3U and are equipped with backplane, two power supplies (+5 V, ±15V) and rear panels. A special rear panel is available when using redundant power supplies.

The D19m series cards are plugged to the backplane, on the rear side of which the connectors for the power supply, the audio and control signals can be found. Apart from the supply also the clocks, synchronization and control signals are distributed. A jumper determines whether a card is linked to the TDM bus or whether it operates in stand-alone mode.

1.940.592.81-V / 1.940.595.00-V The frames come with two different backplanes:
with Backplane 1.940.550.00

The card address is given by the backplane hardwiring, i.e. by the card's position within the frame. This frame cannot be used together with the control card and Mic/Line input cards. 16 identical card locations are available. The sync input is connected to the last, i.e. the 16th card location.

1.940.591.00-V / 1.940.594.00-V with Backplane 1.940.551.00

This frame is intended for the application of the controller card and Mic/Line input cards. The backplane has additional connectors for the second output ("split out") and the mute input of the preamps. With this backplane the addresses are jumper-selected allowing a more flexible allocation of the card locations, in particular with the Mic/Line inputs. The last, i.e. the 16th card location is provided for the controller card. The sync input is connected with the 15th card location.

1.3 D19m sync receiver

(order no. 1.940.557.00)

The sync receiver distributes an AES/EBU sync signal on the backplane and is required if several cards are used in stand-alone mode, without a MADI or a MADO card. The sync receiver prevents that a separate sync signal must be wired for each card.

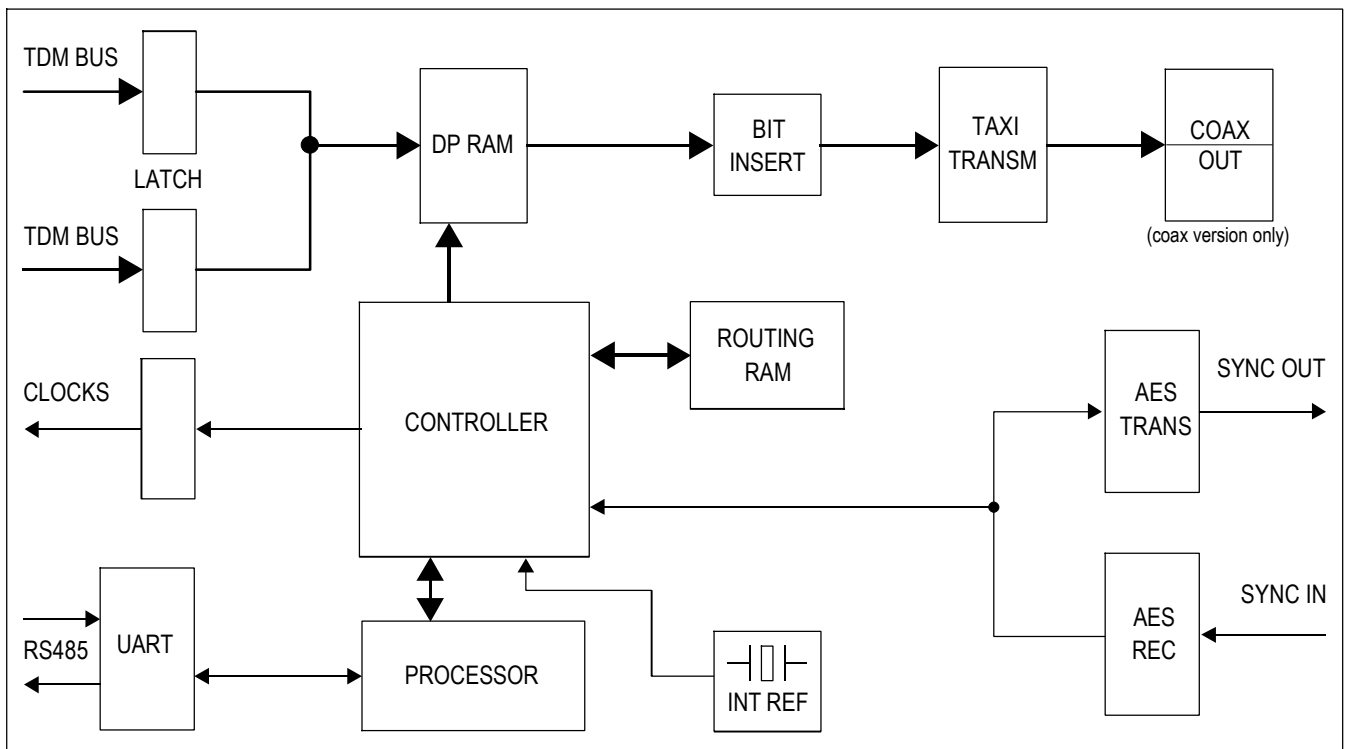
1.4 D19m MAD0 – MADI output for coaxial cable

(order no. 1.940.520.21 coax)

The “MADO” MADI output card serves as multiplexer in a D19m rack. The TDM bus data, written by analog or digital input cards to the bus, are read and output as a MADI signal. The channel allocation can be selected by the control software.

The card is synchronized by the sync input and distributes the clock signals required for the TDM bus. Four additional AES/EBU sync outputs are available. If the external sync signal is invalid, the internal generator is automatically activated and generates a sync signal. Since the frequency accuracy is ± 1 ppm and an AES/EBU signal is output as sync signal, this can be used for the synchronization of a studio.

The MADO cards can be controlled by RS485 from an external device. The frame address is set by a DIP switch on the backplane.



LEDs: SYNC: Indicates “sync” status;
 SUPPLY: Indicates “power on” status.

Jumper: Pins P4/P5: For factory testing purposes only.

Technical data:

AES/EBU sync input	Input impedance	110 Ω
	Input sensitivity	min. 200 mV
AES/EBU sync output	Output impedance	110 Ω
	Output level (into 110 Ω)	5 V
Internal reference 44.1/48 kHz	Clock accuracy	± 1 ppm
MADI output coaxial	Connector type BNC, impedance	75 Ω
	max. length of transmission	50 m
Current consumption 5 V		max. 0.8 A
Operating temperature range		0...40° C

Pin assignment 96-pin DIN 41612 female

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

MGND	Chassis
GND	Ground
SYNC	Syncoutput TTL
AES/DSD BUS	Switchover stand-alone / TDM
AESSYNC	Sync Input
AESOUT	Sync Output
CA0 .. CA7	Frame address
/D0.../D15	Inverted data TDM bus
/FRAME, /CK128	Clocks TDM bus (input in slave mode)
TA, TB	RS485 output
RA, RB	RS485 input

1.5 D19m MADO – MADI output for optical fibre cable

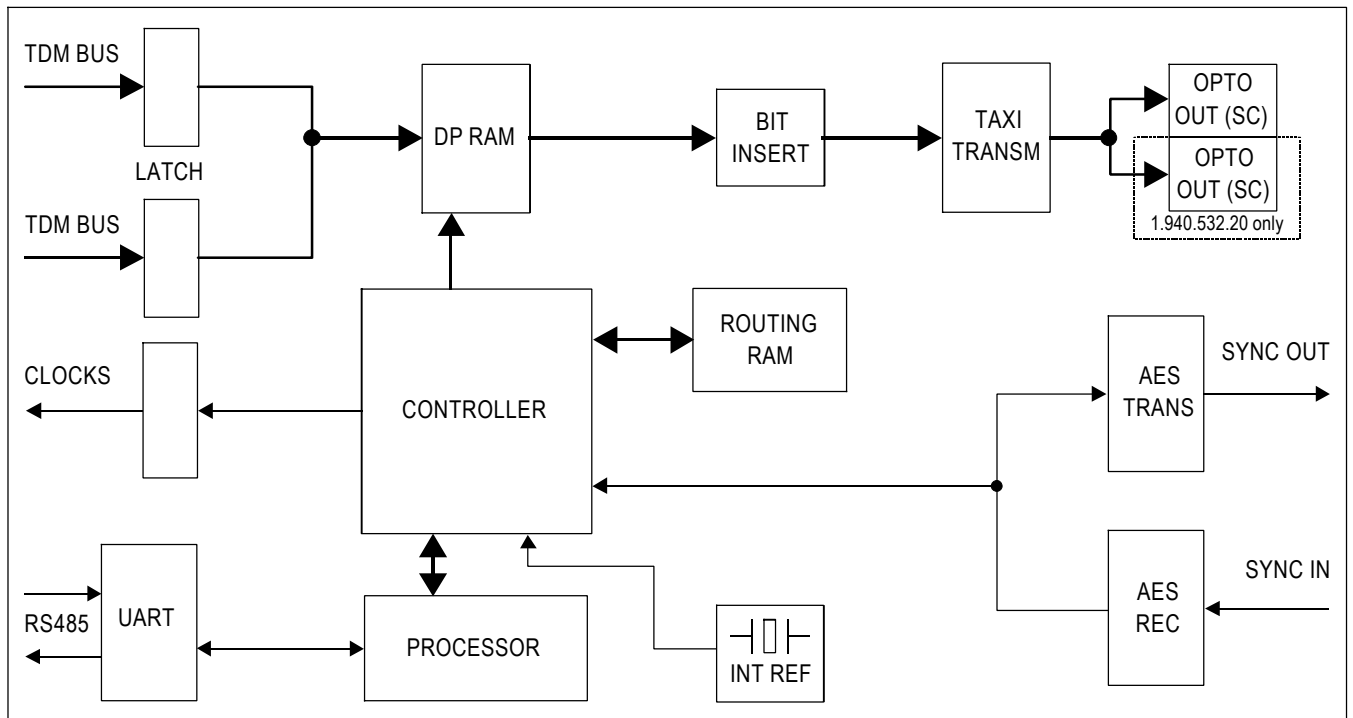
(order no. 1.940.531.20 fibre)

The “MADO” MADI output card serves as multiplexer in a D19m rack. The TDM bus data, written by analog or digital input cards to the bus, are read and output as a MADI signal. The channel allocation can be selected by the control software.

A second, optional optical transmitter can be installed in order to establish a redundant output (D19m MADO RED – order no. 1.940.532.20).

The card is synchronized by the sync input and distributes the clock signals required for the TDM bus. Four additional AES/EBU sync outputs are available. If the external sync signal is invalid, the internal generator is automatically activated and generates a sync signal. Since the frequency accuracy is ± 1 ppm and an AES/EBU signal is output as sync signal, this can be used for the synchronization of a studio.

The MADO cards can be controlled by RS485 from an external device. The frame address is set by a DIP switch on the backplane.



LEDs: SYNC: Indicates “sync” status;
 SUPPLY: Indicates “power on” status.

Technical data

AES/EBU sync input	Input impedance	110 Ω
	Input sensitivity	min. 200 mV
AES/EBU sync output (4x)	Output impedance	110 Ω
	Output level (into 110 Ω)	5V
Internal reference 44.1/48 kHz	Clock accuracy	± 1 ppm
MADI output optical	Connector type	SC
	Wave length	1300nm
	Fiber cable type multimode	62.5/120 μm
	max. length for transmission	500 m
Current consumption 5V		max. 1 A
Operating temperature range		0... 40°C

Pin assignment 96-pin DIN 41612 female

Pin	A	B	CoC
1	MGND	MGND	MGND
2	+5V	+5V	+5V
3	SYNC		
4	GND	GND	GND
5	AESSYNC+	GND	AESSYNC-
6	AESOUT1+	GND	AESOUT1-
7	AESOUT2+	GND	AESOUT2-
8	AESOUT3+	GND	AESOUT3-
9	AESOUT4+	GND	AESOUT4-
10	/D0		/D8
11	/D1		/D9
12	/D2		/D10
13	/D3		/D11
14	/D4	GND	/D12
15	/D5	/AES/DSD BUS	/D13
16	/D6	GND	/D14
17	/D7	GND	/D15
18	/FRAME	/CK128	
19			
20		CA0	
21		CA1	
22	TA	CA2	TB
23		CA3	
24	RA	CA4	RB
25		CA5	
26		CA6	
27		CA7	
28			
29			
30			
31			
32	MGND	MGND	MGND

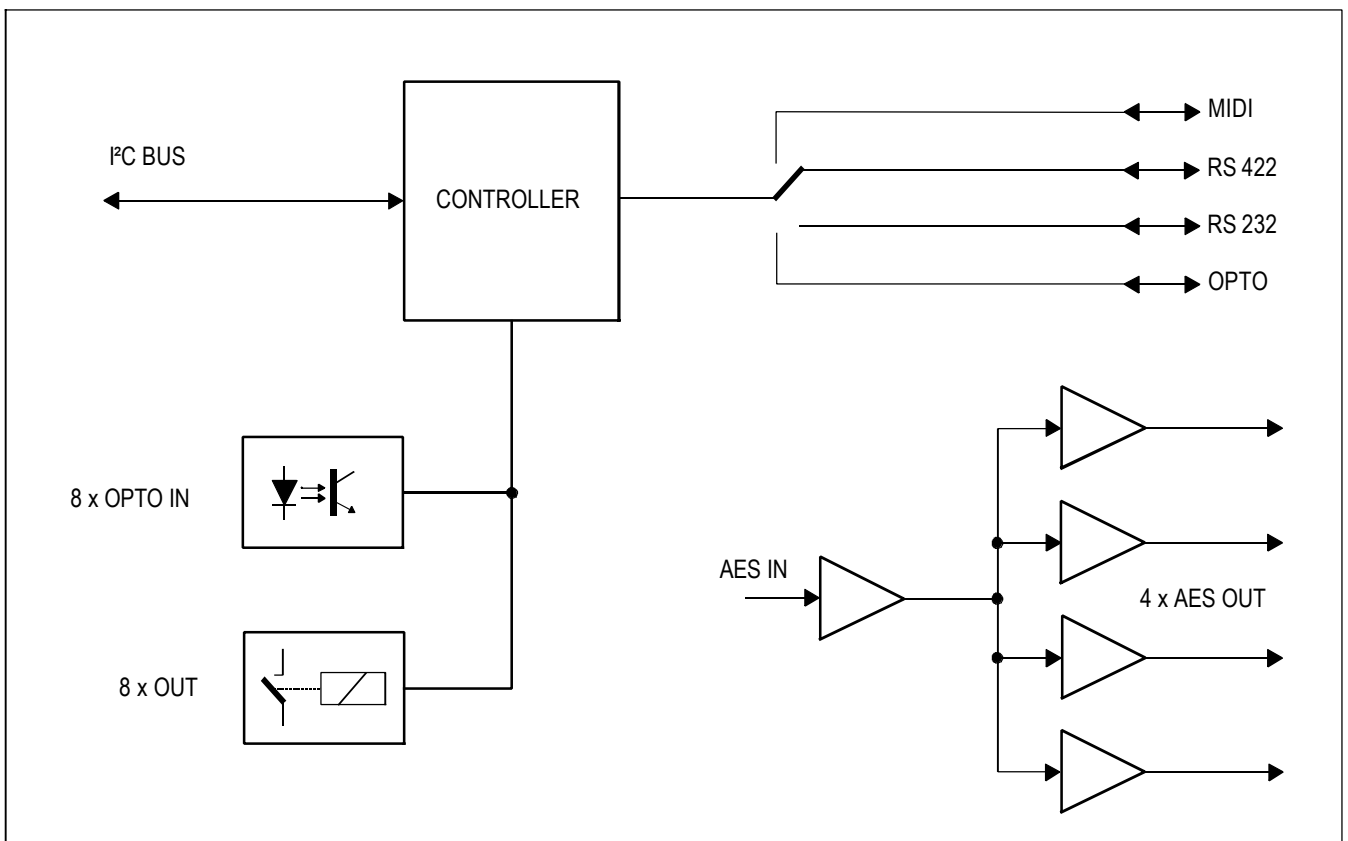
MGND	Chassis
GND	Ground
SYNC	Sync Output TTL
AES/DSD BUS	Switchover stand-alone / TDM
AESSYNC	Sync Input
AESOUT	Sync Output
CA0 .. CA7	Frame address
/D0.../D15	Inverted TDM bus data
/FRAME, /CK128	Clocks TDM bus (input in slave mode)
TA, TB	RS485 Output
RA, RB	RS485 Input

1.6 D19m RCC – remote controller card for MP4RC Mic/Line input

(order no. 1.940.576.20)

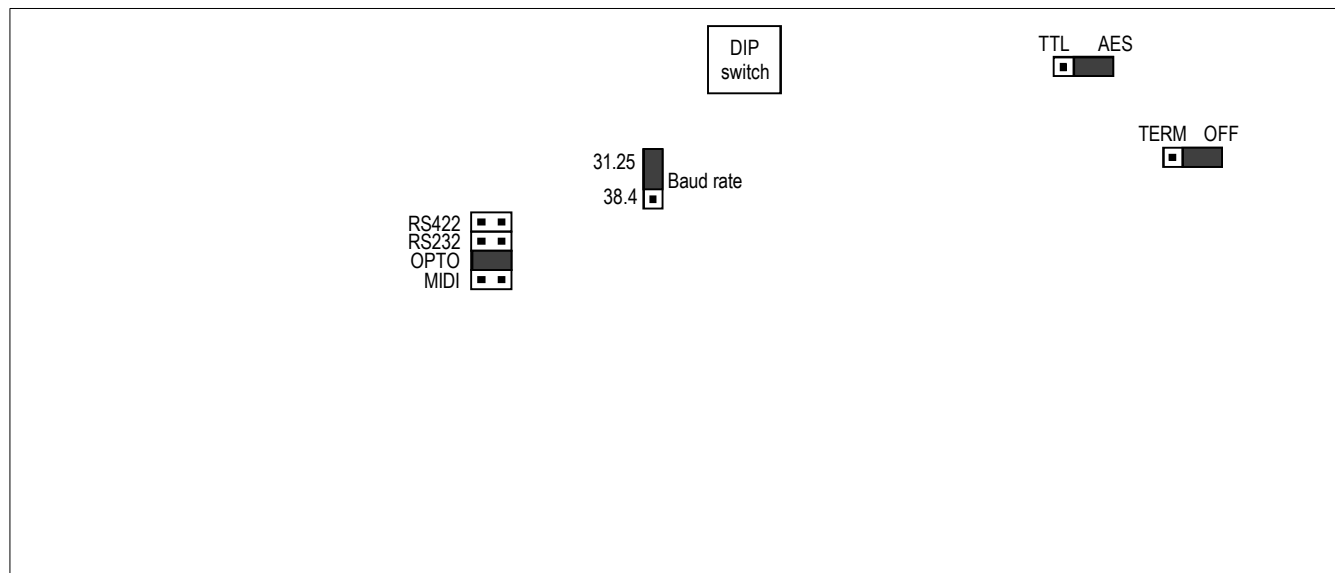
The purpose of the controller card is the control of the Mic/Line input cards (preamps). Gain, high-pass filter, phantom powering and limiter (clip protection) can be set. In contrast to the audio cards, this card *must* be inserted into the 16th, i.e. the last slot on the backplane. Control of the Mic/Line inputs is performed by an I²C bus on the backplane. For various signaling purposes, 8 opto-coupled inputs and 8 relay outputs can be used. An AES/EBU signal can be distributed to 4 outputs, primarily used for sync signal distribution. The standard 110 Ω input impedance of this AES/EBU input can be switched to hi-Z by means of a jumper, which allows to use the same signal also for syncing e.g. a MADO card.

Usually the D19m rack is controlled by a D950 mixing console (stagebox system). In this application, an RS422 signal is used for the control, and the control signal can be transmitted in balanced mode or via an optical interface. For other purposes, RS232 or MIDI control is possible as well. The baud rate of the control link can be jumper-selected to 31.25 or 38 kBaud. If more than one stagebox is used, they must be linked to the mixing console in a star configuration.



LEDs: **SIGNAL:** Indicates “control interface active”;
 SUPPLY: Indicates “power on” status.

Jumpers:	RS422	Control interface via RS422
	RS232	Control interface via RS232
	OPTO	Control interface via fiber optics
	MIDI	Control interface via MIDI
	Baud rate	Switchable 38/31.25 kBaud (MIDI)
	TTL/AES	Sync input from bus or from AES/EBU input
	TERM/OFF	Termination for AES/EBU input (110 Ω – “TERM”, or hi-Z – “OFF”)



DIP switch: #1...4: For factory testing only; *standard setting for normal operation: all OFF*

Technical data

AES/EBU input	Input impedance	110 Ω or hi-Z (selected w. jumper)
	Input sensitivity	min. 200 mV
AES/EBU output	Output impedance	110 Ω
	Output level (into 110 Ω)	5 V
Input level signalling		2.5...48 V
Load relay output		1 A, 100 V, 30 W
Current consumption 5 V (with optical interface)		max. 0.9 A
Operating temperature range		0...40° C

Pin assignment 96-pin DIN 41612 female

Pin	A	B	CoC
1	MGND	MGND	MGND
2	+5V	+5V	+5V
3	SYNC	SCL	SDA
4	GND	GND	GND
5	AESIN+	GND	AESIN-
6	AES1OUT+		AES1OUT-
7	AES2OUT+		AES2OUT-
8	AES3OUT+	GND	AES3OUT-
9	AES4OUT+	GND	AES4OUT-
10	IN1+		IN1-
11	IN2+		IN2-
12	IN3+		IN3-
13	IN4+		IN4-
14	IN5+	GND	IN5-
15	IN6+	RS232RX	IN6-
16	IN7+	GND	IN7-
17	IN8+	GND	IN8-
18	TA		TB
19	RA	MGND	RB
20	R1A	R1R	R1G
21	R2A	R2R	R2G
22	R3A	R3R	R3G
23	R4A	R4R	R4G
24	R5A	RS232TX	R5G
25	R6A	MIDI IN+	R6G
26	R7A	MIDI IN-	R7G
27	R8A	MIDI T+	R8G
28	MIDI T-	MIDI O+	MIDI O-
29			
30			
31			
32	MGND	MGND	MGND

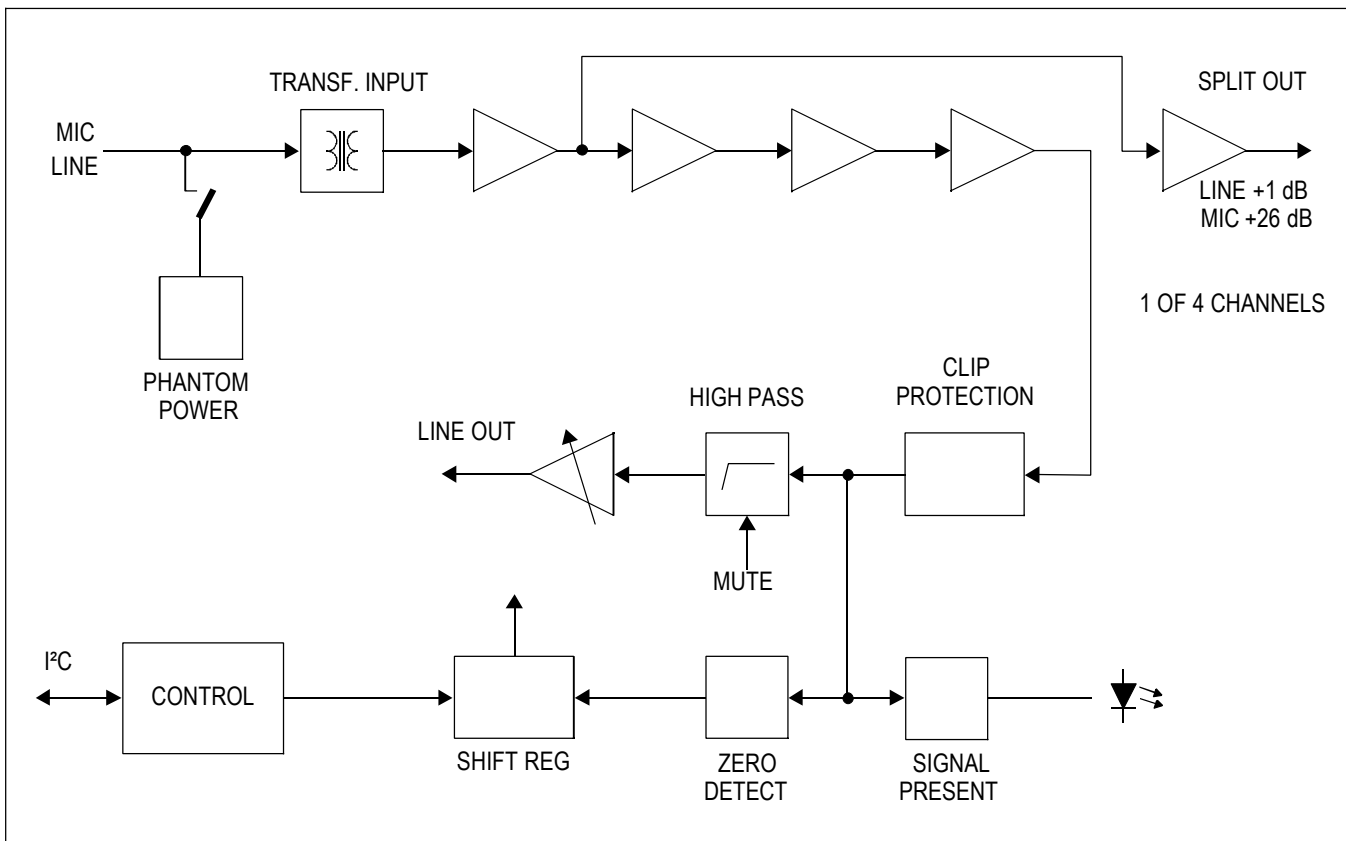
- MGND Chassis
- GND Ground
- SYNC Sync input TTL
- SCL, SDA I2C Bus
- TA, TB RS422 control output
- RA, RB RS422 control input
- RS232 RX, TX RS232 control interface
- MIDI xxx MIDI control interface
- IN..+, IN..- OPTO inputs
- R..A Relay output: Normally open contact
- R..R Relay output: Normally closed contact (relay 1 to 4 only)
- R..G Relay output: Common

1.7 D19m MP4RC – quad remote controlled Mic/Line input

(order no. 1.940.575.20)

The Mic/Line inputs (preamps) are equipped with 4 high-quality preamplifiers. The gain can be controlled in 1 dB steps over a wide range. The inputs are transformer-balanced and switchable between microphone and line level sensitivity. Phantom power, high-pass filter and gain are remote controlled for each channel individually. A simple limiter (clip protection) can be activated for all 4 channels in common. Control of the Mic/Line inputs is performed by an I²C bus coming from the D19m RCC remote controller card 1.940.576.20 via the backplane.

A mute input signal per Mic/Line input permits to mute the signal independent of the remote control signal. The line output is electronically balanced. The Split Out supplies, regardless of the current gain setting, a signal which is 26 dB above the mic input signal or 1 dB above the line input signal).



LEDs:	PHANTOM 1...4:	Indicates active phantom powering for each channel;
	MUTE 1...4:	Indicates external mute, if active, for each channel;
	SIGNAL 1...4:	Indicates present signal for each channel;
	SUPPLY:	Indicates "power on" status.

Alignment

- Set the mic input gain to minimum.
- Feed a balanced 0 dBu test signal into one of the mic inputs.
- Then adjust the level at the corresponding line output to 15 dBu, using the correct trimmer potentiometer according to the illustration below.



Technical data

Input		Transformer-balanced	
Input sensitivity (for 15 dBu output level)	Mic	-60...0 dBu (adjustable in 1 dB steps)	
	Line	-10...+24 dBu (adjustable in 1 dB steps)	
Input impedance	Mic	> 1 kΩ	
	Line	> 2 kΩ	
Phantom power		48 V	
Output		Electronically balanced	
Output level	Line Out	15 ±3 dBu (adjustable with trimmer pot)	
	Split Out	26 dB above mic input level 1 dB above line input level	
Output impedance	Line Out	50 Ω	
	Split Out	50 Ω	
Min. load	Line Out	600 Ω	
	Split Out	600 Ω	
Highpass filter		-3 dB @ 75 Hz, 12 dB/oct.	
Frequency response	Line	30 Hz...20 kHz	±0.1 dB
	Mic	30 Hz...20 kHz	±0.4 dB
THD + N	Line (0 dB gain, +10 dBu input level)	95 dB	
	Mic (30 dB gain, -20 dBu input level)	95 dB	
Equivalent input noise (200 Ω source impedance)		Mic (max gain) -124 dBu	
Crosstalk	Mic (35 dB gain)	@ 1 kHz	< 110 dB
		@ 15 kHz	< 90 dB
	Line (0 dB gain)	@ 1 kHz	< 110 dB
		@ 15 kHz	< 90 dB
Power consumption	5 V	0.25 A	
	+15 V	0.30 A	
	-15 V	0.25 A	
Operating temperature range		0...40° C	

Pin assignment 96-pin DIN 41612 female

Pin	A	B	CoC
1	MGND	MGND	MGND
2	+5V	+5V	+5V
3	SYNC	SCL	SDA
4	GND	GND	GND
5	/MUTE1	GND	/MUTE2
6	DIR OUT1+	/MUTE3	DIR OUT 1-
7	DIR OUT2+	/MUTE4	DIR OUT 2-
8	DIR OUT 3+	GND	DIR OUT 3-
9	DIR OUT 4+	GND	DIR OUT 4-
10		/BA0	
11		/BA1	
12		/BA2	
13		/BA3	
14		GND	
15			
16		GND	
17		GND	
18			
19	MGND	MGND	OUT2-
20	OUT1+	OUT1-	OUT2+
21	MGND	MGND	MGND
22	ANA1IN+		ANA1IN-
23	MGND	MGND	MGND
24	ANA2IN+	MGND	ANA2IN-
25	MGND	MGND	MGND
26	ANA3IN+	MGND	ANA3IN-
27	MGND	MGND	MGND
28	ANA4IN+	OUT4-	ANA4IN-
29	AGND	AGND	AGND
30	-15V	-15V	-15V
31	+15V	+15V	+15V
32	OUT3+	OUT4+	OUT3-

MGND	Chassis
GND	Ground
SCL, SDA	I2C Bus
/MUTE ..	Mute input (low active)
BA0 .. BA3	Card address
ANA..IN	balanced Mic/Line input
OUT...	balanced output
DIR OUT	Split Out

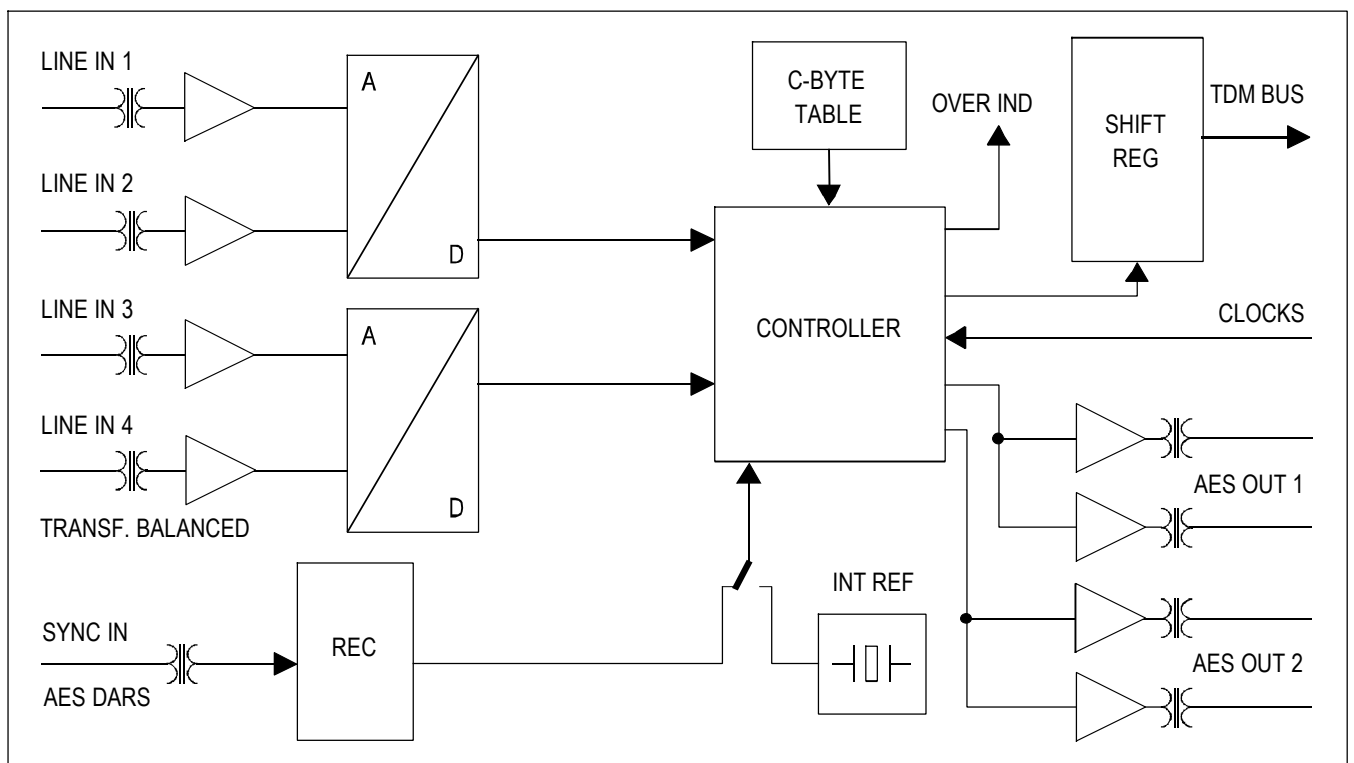
1.8 D19m C4AD/24 – quad 24 bit A/D converter

(order no. 1.940.562.20)

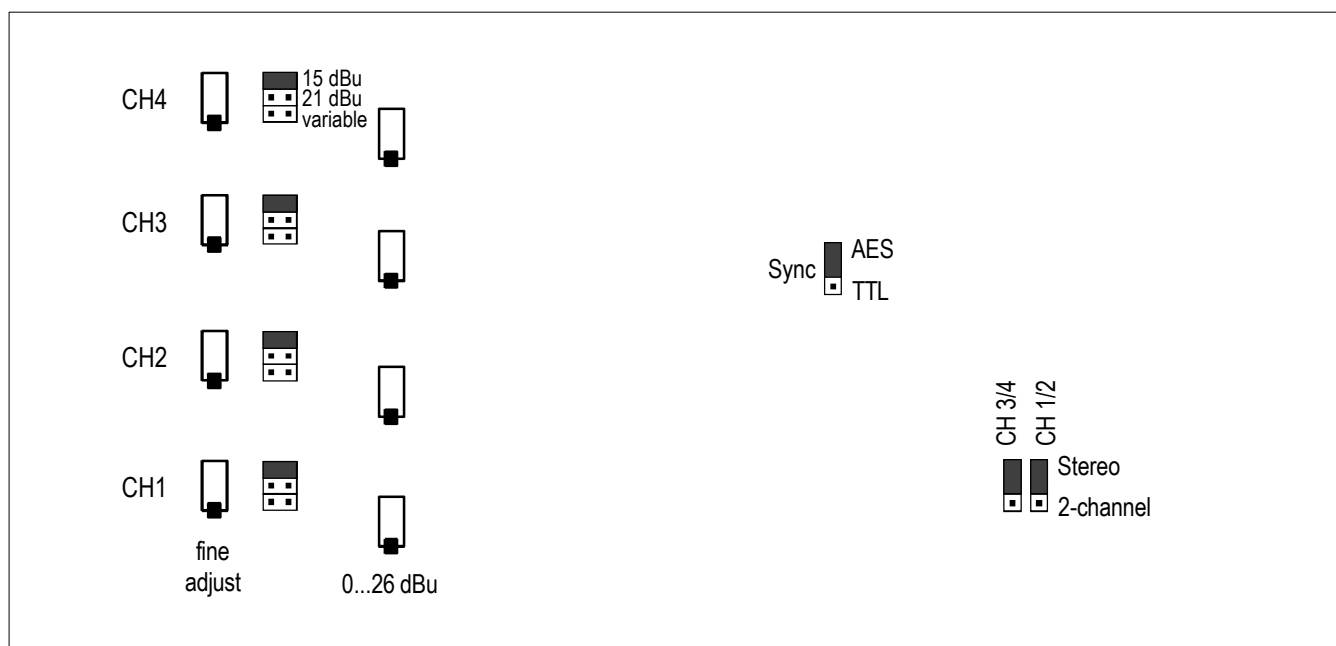
The A/D card uses high-end 24 bit Delta-Sigma converters and can be used for stand-alone applications as well as for the D19m rack. On one card, four analog inputs (mono) are converted to two AES/EBU outputs; if a MADO card is used in the system, these signals can be converted to a MADI link.

If the external sync signal fails or if used in stand-alone applications, the sampling rate will be generated on-board. For such cases the sampling rate can be selected at the front panel (44.1 or 48 kHz).

The channel status information contains the sampling rate as well as source channel information depending on the card address.



- LEDs:**
- SYNC: Indicates if the digital outputs are synced;
 - OVERLOAD 1...4: For each of the 4 channels an LED is available indicating when 0 dB_{FS} level has been reached;
 - SUPPLY: Indicates “power on” status.
- Jumpers:**
- Input level: 3 positions: 15 dBu (fixed), 21 dBu (fixed), or variable (0...26 dBu);
 - AES-TTL: AES: The sync input from the AES/EBU sync input is used (in case of stand-alone use of the A/D card),
TTL: The sync input from the D19M rack is used. The internal TTL sync signal is generated by the MADO card in a D19M MUX frame respectively by the MADI card in a DEMUX frame;
 - Stereo/2-channel: Defines the channel mode in the channel status bit.



Alignment Set jumper to 15 dBu or 21 dBu. Feed an analog signal with a level of +6 dBu or +12 dBu, respectively, to one of the analog inputs. Measure the digital level either locally on the AES/EBU outputs or via the TDM bus on the MADI output. Adjust the level with the corresponding FINE ADJUST trimmer potentiometer to $-9 \text{ dB}_{\text{FS}}$. If no digital measuring equipment is available, feed an analog signal with a level of +15 dBu or +21 dBu to the analog input and adjust the level with the corresponding FINE ADJUST trimmer potentiometer so that the overload LED just comes on. If an other input sensitivity has to be adjusted, set the jumper to position VARIABLE and use the 0...26 dBu trimmer potentiometer to adjust the desired level.

Technical data

AES/EBU sync input	Impedance	110 Ω
	Sensitivity	min. 200 mV
AES/EBU outputs	Impedance	110 Ω
	Output level (into 110 Ω)	5 V
Analog Input	Transformer-balanced	
Level (for 0 dB _{FS}) jumper-selectable	+15 dBu, +21 dBu, 0...26 dBu	Adjustable with trimmer potentiometer
Impedance	> 10 k Ω	
Frequency response	20 Hz...20 kHz	-0.2 dB
THD + N	20 Hz...20 kHz, $-1 \text{ dB}_{\text{FS}}$	< -97 dB
	1 kHz, $-30 \text{ dB}_{\text{FS}}$	< -108 dB
Crosstalk	@ 1 kHz	< -110 dB
Power consumption	5 V	max. 0.4 A
	+15 V	max. 0.25 A
	-15 V	max. 0.06 A
Sampling rate	external sync	28 kHz...55 kHz
	internal sync (stand-alone)	44.1/48 kHz
Operating temperature range	0...+40° C	

Pin assignment 96-pin DIN 41612 female

Pin	A	B	C
1	MGND	MGND	MGND
2	+5V	+5V	+5V
3	SYNC		
4	GND	GND	GND
5	AESSYNC+	GND	AESSYNC-
6	AES1AOUT+	GND	AES1AOUT-
7	AES1BOUT+	GND	AES1BOUT-
8	AES2AOUT+	GND	AES2AOUT-
9	AES2BOUT+	GND	AES2BOUT-
10	/D0	/BA0	/D8
11	/D1	/BA1	/D9
12	/D2	/BA2	/D10
13	/D3	/BA3	/D11
14	/D4	GND	/D12
15	/D5	/AES/DSD BUS	/D13
16	/D6	GND	/D14
17	/D7	GND	/D15
18	/FRAME	/CK128	
19	MGND	MGND	MGND
20			
21	MGND	MGND	MGND
22	ANA1IN+		ANA1IN-
23	MGND	MGND	MGND
24	ANA2IN+		ANA2IN-
25	MGND	MGND	MGND
26	ANA3IN+		ANA3IN-
27	MGND	MGND	MGND
28	ANA4IN+		ANA4IN-
29	AGND	AGND	AGND
30	-15V	-15V	-15V
31	+15V	+15V	+15V
32	MGND	MGND	MGND

MGND Chassis
 GND Ground
 SYNC Sync input TTL
 AES/DSD BUS Switchover stand-alone / TDM
 BA0 .. BA3 Card address
 /D0.../D15 Inverted data on the TDM bus
 /FRAME, /CK128 Clocks TDM Bus

1.9 D19m C4AD NS/24 – quad 24 bit A/D converter w. noise shaping

(order no. 1.940.563.20)

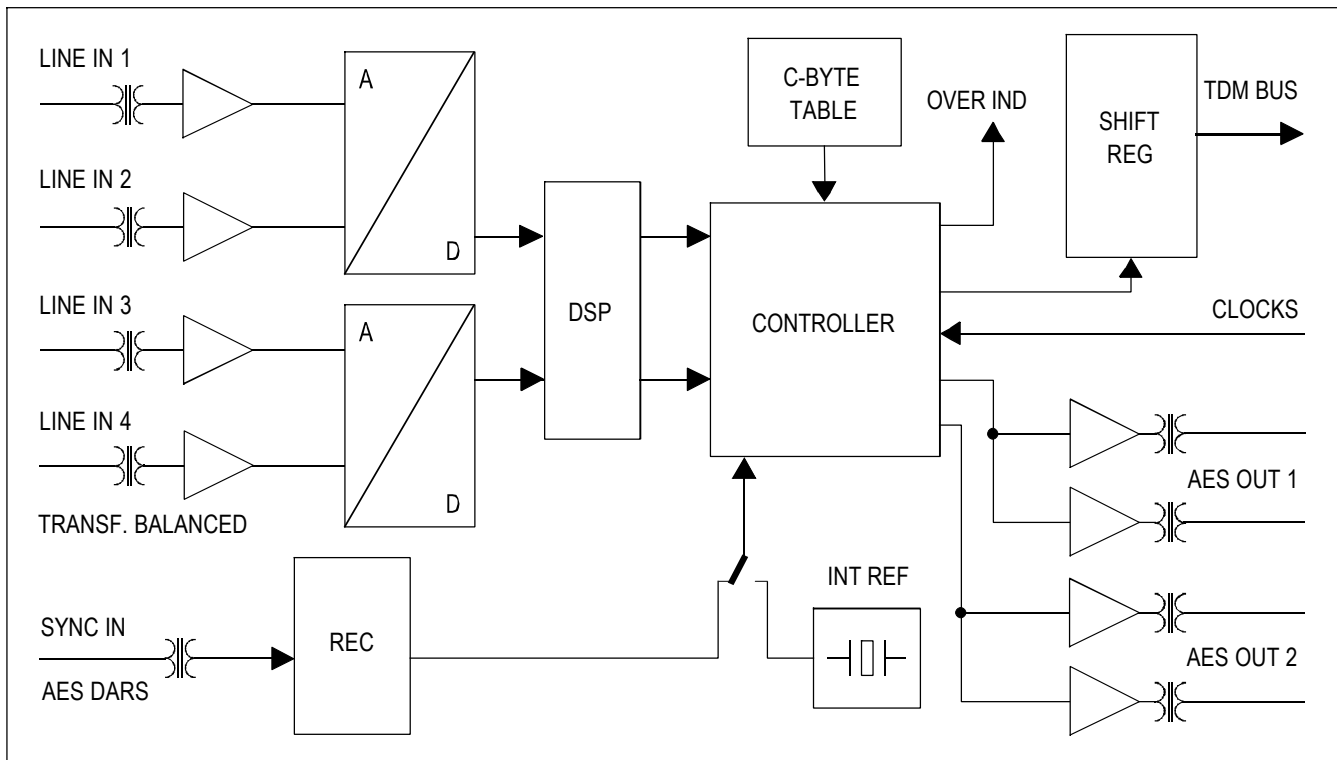
The A/D card uses high-end 24 bit Delta-Sigma converters and can be used for stand-alone applications as well as for the D19m rack. On one card, four analog inputs (mono) are converted to two AES/EBU outputs; if a MADO card is used in the system, these signals can be converted to a MADI link. The converted signal is also available as 16 bit word by using dithering or dithering and noise shaping algorithms.

If the external sync signal fails or if used in stand-alone applications, the sampling rate will be generated on-board. For such cases the sampling rate can be selected at the front panel (44.1 or 48 kHz).

The channel status information contains the sampling rate as well as source channel information depending on the card address.

Noise shaping/dithering

The card is equipped with 24-bit converters. If there is a need for 16 bit resolution only, dithering *and* noise shaping or dithering only can be activated. Dithering helps to improve the low level signals whereas noise shaping allows to have almost the dynamic range of a 24 bit converter in the mid frequency range.



- LEDs:**
- OVERLOAD 1...4: Indication if a level of 0 dB_{FS} has been reached in one of the 4 channels;
 - 16 NS+D: Indication for 16-bit output with dithering, or noise shaping and dithering;
 - EXT: External control for dithering, or noise shaping and dithering, is active;
 - SYNC: Indication if the digital outputs are synced;
 - SUPPLY: Indicates “power on” status.

- Jumpers:**
- Input level: 3 positions: 15 dBu (fixed), 21 dBu (fixed), or variable (0...26 dBu);
 - AES-TTL: AES: The sync input from the AES/EBU sync input is used (in case of stand-alone use of the A/D card),

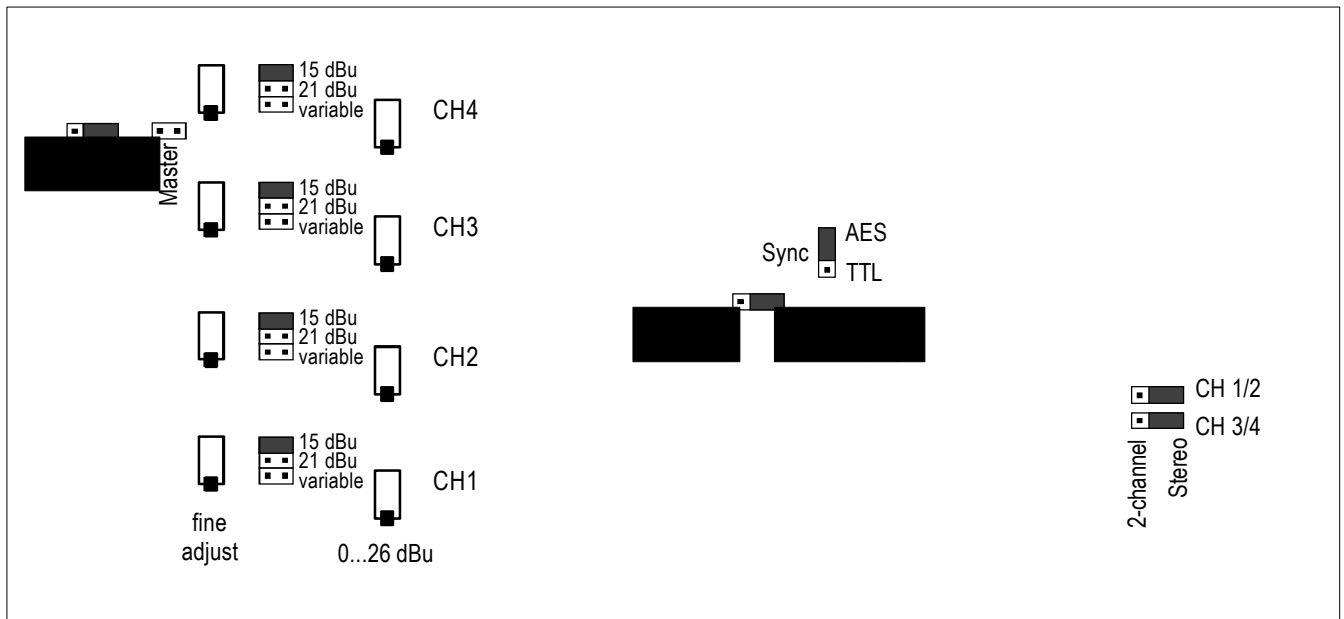
TTL: The sync input from the D19M rack is used. The internal TTL sync signal is generated by the MADO card in a D19M MUX frame respectively by the MADI card in a DEMUX frame;

Stereo/2-channel: Defines the channel mode in the channel status bit.

Dithering only/ + noise shaping: Dithering and noise shaping, or dithering only

Master: Card is master for activating noise shaping and dithering in a D19m frame

ext./int. control: external noise shaping and dithering control (front panel switch has no effect), or noise shaping and dithering activated by front panel switch.



Alignment Set jumper to 15 or 21 dBu position. Feed an analog signal with a level of +6 dBu or +12 dBu, respectively, to one of the analog inputs. Measure the digital level either locally on the AES/EBU outputs or via the TDM bus on the MADI output. Adjust the level with the corresponding FINE ADJUST trimmer potentiometer to -9 dB_{FS} . If no digital measuring equipment is available, feed an analog signal with a level of +15 dBu or +21 dBu to the analog input and adjust the level with the corresponding FINE ADJUST trimmer potentiometer so that the overload LED just comes on. If an other input sensitivity has to be adjusted, set the jumper to position VARIABLE and use the 0...26 dBu trimmer potentiometer to adjust to the desired level.

Technical data

AES/EBU sync input	Impedance	110 Ω
	Sensitivity	min. 200 mV
AES/EBU outputs	Impedance	110 Ω
	Output level (into 110 Ω)	5V
Analog Input	Transformer-balanced	
Level (for 0 dB_{FS}) jumper-selectable	+15 dBu, +21 dBu, 0...26 dBu	adjustable with trimmer potentiometer
Impedance		> 10 k Ω
Frequency response	20 Hz...20 kHz	-0.2 dB
THD + N (noise shaping OFF)	20 Hz...20 kHz, -1 dB_{FS}	< -97 dB
	1 kHz, -30 dB_{FS}	< -108 dB
Crosstalk	at 1 kHz	< -110 dB
Power consumption	5V	max. 0.6 A
	+15V	max. 0.25 A
	-15V	max. 0.06 A
Sampling rate	with external sync	28 kHz...55 kHz
	internal Sync (stand-alone)	44.1/48 kHz
Temperature range		0°...+40 C

Pin assignment 96-pin DIN 41612 female

Pin	A	B	CoC
1	MGND	MGND	MGND
2	+5V	+5V	+5V
3	SYNC		
4	GND	GND	GND
5	AESSYNC+	GND	AESSYNC-
6	AES1AOUT+	GND	AES1AOUT-
7	AES1BOUT+	GND	AES1BOUT-
8	AES2AOUT+	GND	AES2AOUT-
9	AES2BOUT+	GND	AES2BOUT-
10	/D0	/BA0	/D8
11	/D1	/BA1	/D9
12	/D2	/BA2	/D10
13	/D3	/BA3	/D11
14	/D4	GND	/D12
15	/D5	/AES/DSD BUS	/D13
16	/D6	GND	/D14
17	/D7	GND	/D15
18	/FRAME	/CK128	/U
19	MGND	MGND	MGND
20			
21	MGND	MGND	MGND
22	ANA1IN+		ANA1IN-
23	MGND	MGND	MGND
24	ANA2IN+		ANA2IN-
25	MGND	MGND	MGND
26	ANA3IN+		ANA3IN-
27	MGND	MGND	MGND
28	ANA4IN+		ANA4IN-
29	AGND	AGND	AGND
30	-15V	-15V	-15V
31	+15V	+15V	+15V
32	MGND	MGND	MGND

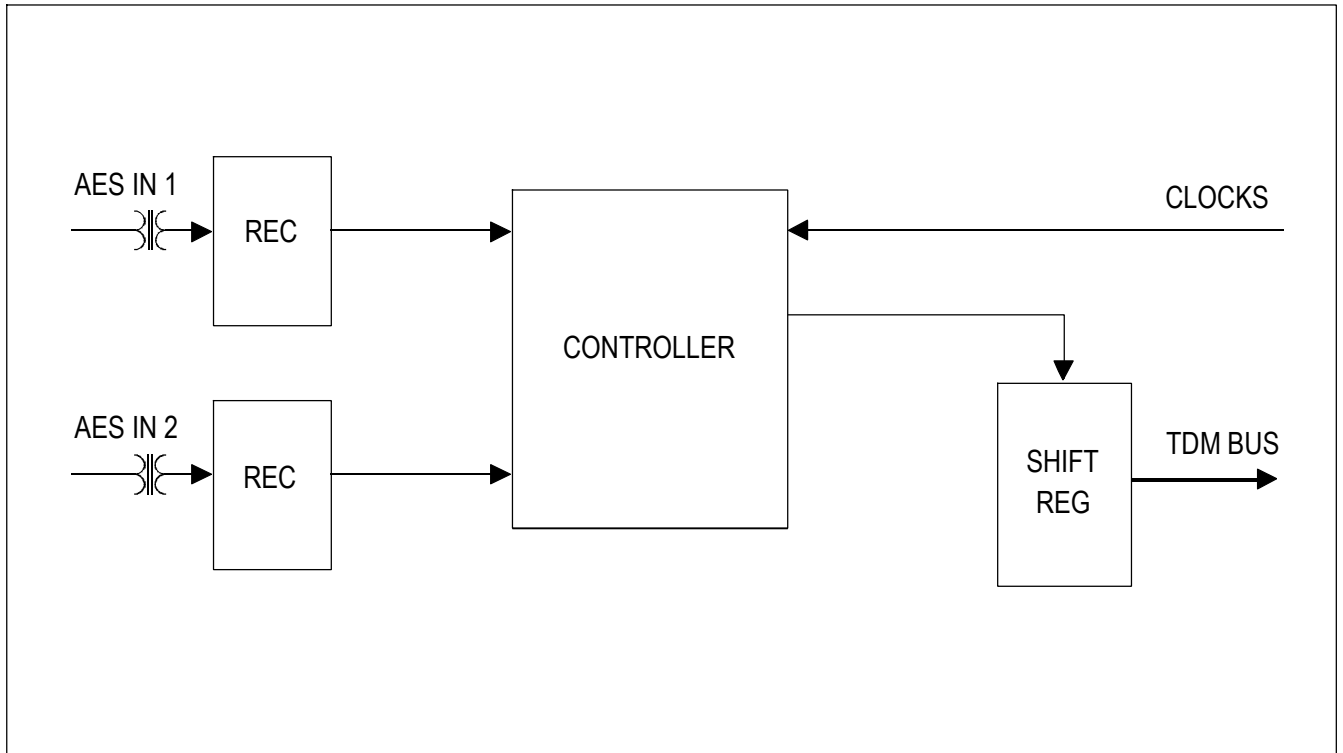
MGND	Chassis
GND	Ground
SYNC	Sync input TTL
AES/DSD BUS	Switchover stand-alone / TDM
BA0 .. BA3	Card address
/D0.../D15	Inverted TDM bus data
/FRAME, /CK128	Clocks TDM Bus
/U	Noise shaping/dithering on/off

1.10 D19m AESI – dual AES/EBU input

(order no. 1.940.580.20)

The AESI card routes two AES/EBU input signals to the TDM bus, where they are read from a MADDO card and can then be output through a MADI link. The sampling frequency can be between 28 kHz and 55 kHz.

The channel status information is transmitted to the TDM bus without changes.



- LEDs:**
- SIGN 1/2: The LEDs are ON when a valid AES/EBU signal is available at the inputs IN1 or IN2;
 - ASYNC 1/2: The LEDs are ON when the input signal is not synchronised to the system clock;
 - SUPPLY: Indicates “power on” status.

Jumpers: No jumpers available on this card.

Technical data

AES/EBU inputs	Impedance	110 Ω
	Sensitivity	min. 200 mV
Power consumption	5 V	Max. 0.3 A
Input sampling rate		28 kHz...55 kHz
Operating temperature range		0...+40° C

Pin assignment 96-pin DIN 41612 female

Pin	A	B	C
1	MGND	MGND	MGND
2	+5V	+5V	+5V
3			
4	GND	GND	GND
5		GND	
6	AES1IN+	GND	AES1IN-
7		GND	
8	AES2IN+	GND	AES2IN-
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/DSD BUS	/D13
16	/D6	GND	/D14
17	/D7	GND	/D15
18	/FRAME	/CK128	
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			
30			
31			
32	MGND	MGND	MGND

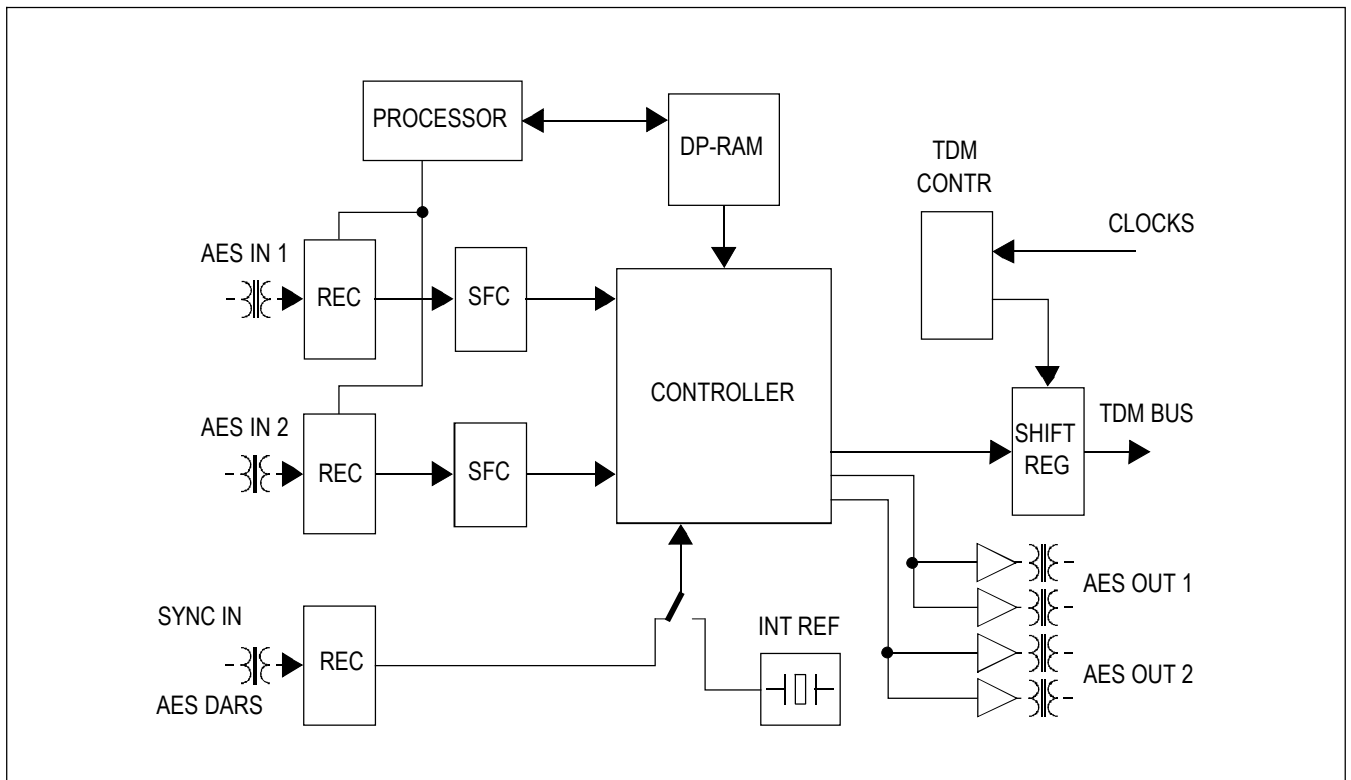
MGND	Chassis
GND	Ground
AES/DSD BUS	TDM bus active
BA0...BA3	Card address (ID)
/D0.../D15	Inverted data on the TDM bus
/FRAME, /CK128	Clocks TDM bus

1.11 D19m AESI SFC – dual AES/EBU input with asynchronous SFC

(order no. 1.940.540.22)

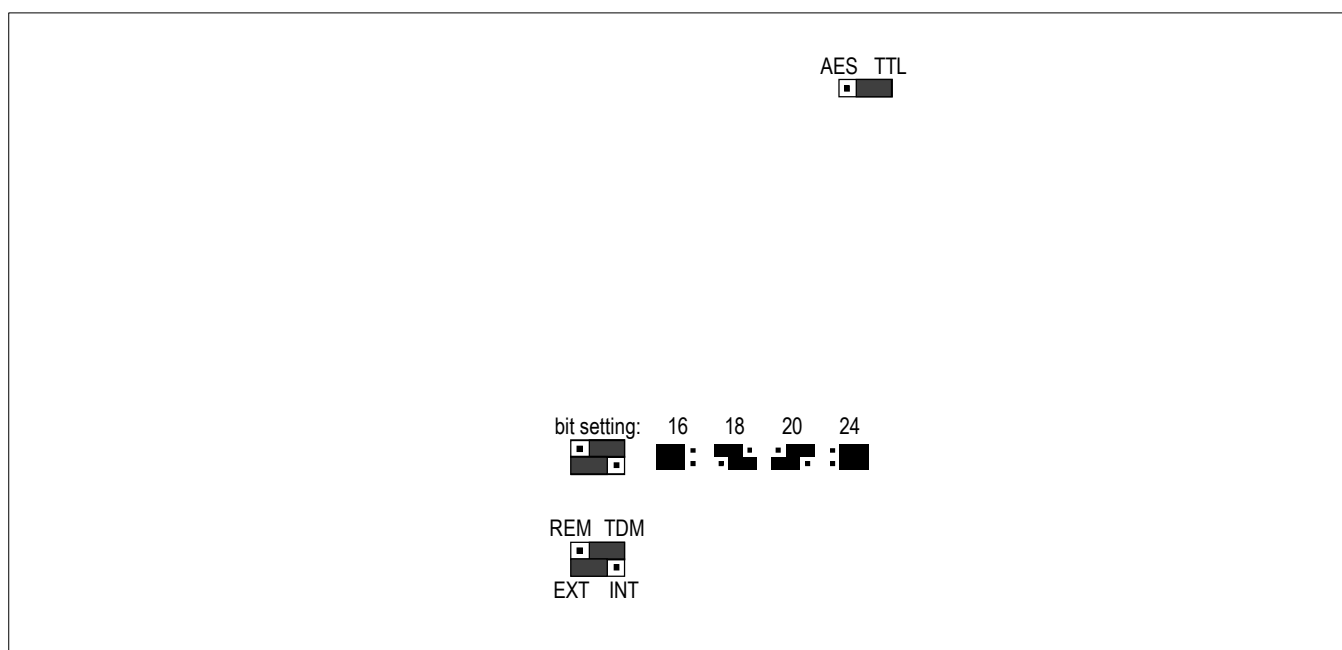
The AESI SFC card can be used for stand-alone applications as well as for the D19M rack. It routes two asynchronous AES/EBU input signals to the TDM bus, where they are read from a MAD0 card and can then be output through a MAD1 link. At the same time, each of the two AES/EBU inputs is fed to two AES/EBU outputs.

The AESI SFC card can be used next to the other D19m cards in a D19m rack. Incoming AES/EBU signals are converted via a sampling rate converter either to an internal sampling rate (32 kHz, 44.1 kHz, or 48 kHz, selectable with a front panel switch), or to the sampling rate of an external sync signal. When the external sync signal fails, the internal sync reference will be used automatically. The input and output sampling rates can be between 25 kHz and 55 kHz, and their ratio must be between 0.5 and 2. The channel status information will be transmitted from the inputs to the outputs, and the sampling rate information will be corrected correspondingly.



- LEDs:**
- SIGN 1/2: The LEDs are on when a valid AES/EBU signal is available at the input IN1 or IN2;
 - SYNC INT/EXT: Depending on how the card is synced, the corresponding LED is on.
 SYNC INT = the internal sync generator is used (in case no external sync signal is available);
 SYNC EXT = TTL sync or AES sync input is used;
 - 48/44.1/32 k: The current sampling rate of the digital output will be indicated;
 - SUPPLY: Indicates “power on” status.

Jumpers:	bit setting:	16, 18, 20, 24 bit;
	EXT/INT:	INT (internal): the internal reference is used, independent of the sync input; EXT (external): the card is synced to the AES sync input (jumper AES-TTL set to AES) or to the TTL sync (jumper AES-TTL set to TTL);
	REM/TDM:	TDM (default): no U-bit handling; REM (remote): will be used for additional external U-bit handling (not implemented yet);
	AES/TTL:	AES: The sync input from the AES/EBU input is used (in case of stand-alone use of the SFC card); TTL: The sync input from the D19m rack is used. The internal TTL sync signal is generated by the MADO card in a D19m MUX frame.



Technical data

AES/EBU inputs	Impedance	110 Ω
	Sensitivity	min. 200 mV
AES/EBU outputs	Impedance	110 Ω
	Output level (into 110 Ω)	4 V
Dynamic range	20 Hz...20 kHz, -60 dB _{FS}	> 120 dB
THD + N	20 Hz...20 kHz, 0 dB _{FS}	< 94 dB
	1 kHz, 0 dB _{FS} , FS IN/Out 0.7...1.4	< 106 dB
Audio delay		3 ms
Power consumption	5 V	max. 0.55 A
Input sampling rate		25 kHz...55 kHz
Operating temperature range		0...+40 C

Pin assignment 96-pin, DIN 41612, female

Pin	A	B	CoC
1	MGND	MGND	MGND
2	+5V	+5V	+5V
3	SYNC	/HI2CoC	/DI2CoC
4	GND	GND	GND
5	AESSYNC+	GND	AESSYNC-
6	AES1IN+	GND	AES1IN-
7		GND	
8	AES2IN+	GND	AES2IN-
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/DSD BUS	/D13
16	/D6	GND	/D14
17	/D7	GND	/D15
18	/FRAME	/CK128	/U
19	MGND	MGND	MGND
20			
21	MGND	MGND	MGND
22	AES1AOUT+		AES1AOUT-
23	MGND	MGND	MGND
24	AES1BOUT+		AES1BOUT-
25	MGND	MGND	MGND
26	AES2AOUT+		AES2AOUT-
27	MGND	MGND	MGND
28	AES2BOUT+		AES2BOUT-
29			
30			
31			
32	MGND	MGND	MGND

- MGND Chassis
- GND Ground
- SYNC Sync input TTL
- AES/DSD BUS Switchover between stand-alone and TDM application
- BA0...BA3 Card address (ID)
- /D0.../D15 Inverted data on the TDM bus
- /U Inverted U-bit
- /FRAME, /CK128 Clocks TDM bus

1.12 D19m ADATI – dual 8-channel ADAT input

(order no. 1.940.490.20/1.940.491.20)

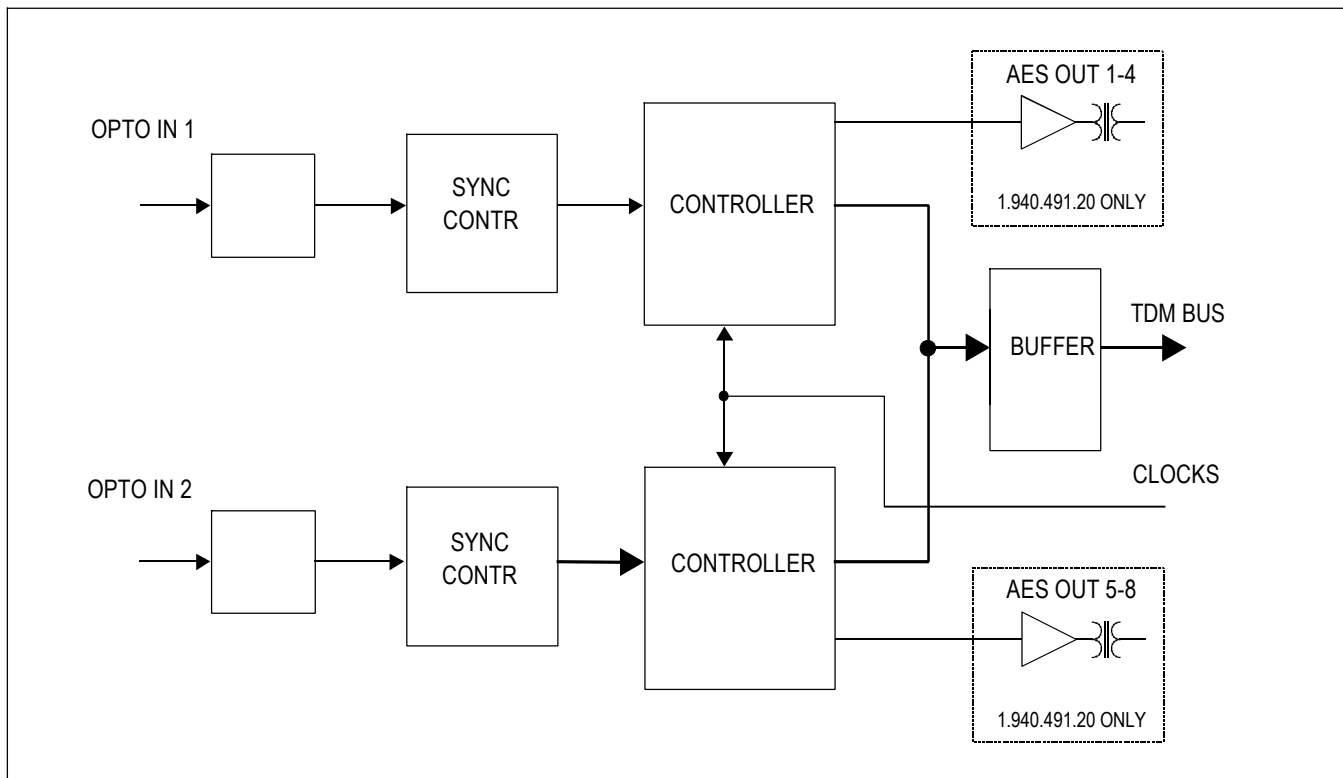
Two optical ADAT inputs are routed to the TDM bus, where they are read from a MADO card and can then be output through a MADI link.

The card 1.940.491.20 is equipped with additional AES/EBU outputs for stand-alone applications. For this purpose, also an AES/EBU receiver for synchronization, output transformers, and drivers are provided.

The input sampling rate can be between 25 kHz and 55 kHz.

The ADAT format does not contain channel status information. Therefore the C-bits are set to default mode (not indicated). A maximum of 24 bits of audio are transmitted.

The TDM output occupies the addresses of 4 slots (16 signals). The addresses are set via DIP switches. It is possible to use 8 TDM signal only by setting a jumper (8/16CH) on the card, for cases where only one optical input is needed.



Synchronization The synchronization comes usually from the TDM bus. In stand-alone applications an AES/EBU sync input or the optical input provides the synchronization.

Configuration: On standard cards described above, the card address is given by the physical slot on the backplane itself; this means that the card in slot 0 occupies the channels 1 to 4, the second slot corresponds to channel 5 to 8, etc. Since the ADAT card provides 16 inputs instead of 4, the card addresses have to be set configured via DIP switches (card addresses 0 to 12).

Please be careful in setting card addresses because of potential conflicts with other cards.

Typically one uses the lower slots for standard 4 channel cards and moves the ADAT interfaces to the upper addresses.

Card address	Channels occupied for single input	channels occupied for dual inputs	DIP Switch			
			1	2	3	4
0	1...8	1...16	on	on	on	on
1	5...12	5...20	off	on	on	on
2	9...16	9...24	on	off	on	on
3	13...20	13...28	off	off	on	on
4	17...24	17...32	on	on	off	on
5	21...28	21...36	off	on	off	on
6	25...32	25...40	on	off	off	on
7	29...36	29...44	off	off	off	on
8	33...40	33...48	on	on	on	off
9	37...44	37...52	off	on	on	off
10	41...48	41...56	on	off	on	off
11	45...52	45...60	off	off	on	off
12	49...56	49...64	on	on	off	off

LEDs: IN 1/2: Lock status for each ADAT input;
 SUPPLY: Indicates “power on” status.

Jumpers: 8/16 CH: Switchover between 8 or 16 channels to TDM bus
 AES/TTL: Synchronization from TDM Bus or from AES/EBU input

Technical data

AES/EBU input (1.940.491.20 only)	Input impedance		110 Ω
	Input sensitivity		min. 200 mV
AES/EBU output (1.940.491.20 only)	Output impedance		110 Ω
	Output level (into 110 Ω)		5 V
Current consumption	5 V	1.940.490.20	max. 0.7 A
		1.940.491.20	max. 1.1 A
Input sampling rate			28...55 kHz
Operating temperature range			0...40° C

Pin assignment 96-pin DIN 41612 female

Pin	A	B	C
1	MGND	MGND	MGND
2	+5V	+5V	+5V
3	SYNC		
4	GND	GND	GND
5	AESSYNC+	GND	AESSYNC-
6	AES1OUT+	GND	AES1OUT-
7	AES2OUT+	GND	AES2OUT-
8	AES3OUT+	GND	AES3OUT-
9	AES4OUT+	GND	AES4OUT-
10	/D0	/BA0	/D8
11	/D1	/BA1	/D9
12	/D2	/BA2	/D10
13	/D3	/BA3	/D11
14	/D4	GND	/D12
15	/D5	/AES/DSD BUS	/D13
16	/D6	GND	/D14
17	/D7	GND	/D15
18	/FRAME	/CK128	
19	MGND	MGND	MGND
20			
21	MGND	MGND	MGND
22	AES5OUT+		AES5OUT-
23	MGND	MGND	MGND
24	AES6OUT+		AES6OUT-
25	MGND	MGND	MGND
26	AES7OUT+		AES7OUT-
27	MGND	MGND	MGND
28	AES8OUT+		AES8OUT-
29			
30			
31			
32	MGND	MGND	MGND

MGND	Chassis
GND	Ground
AES/DSD BUS	TDM Bus active
BA0 .. BA3	Card address
/D0.../D15	Inverted TDM bus data
/FRAME, /CK128	Clocks TDM Bus

1.13 D19m MADI – MADI input for coaxial cable

(order no. 1.940.500.21 coax)

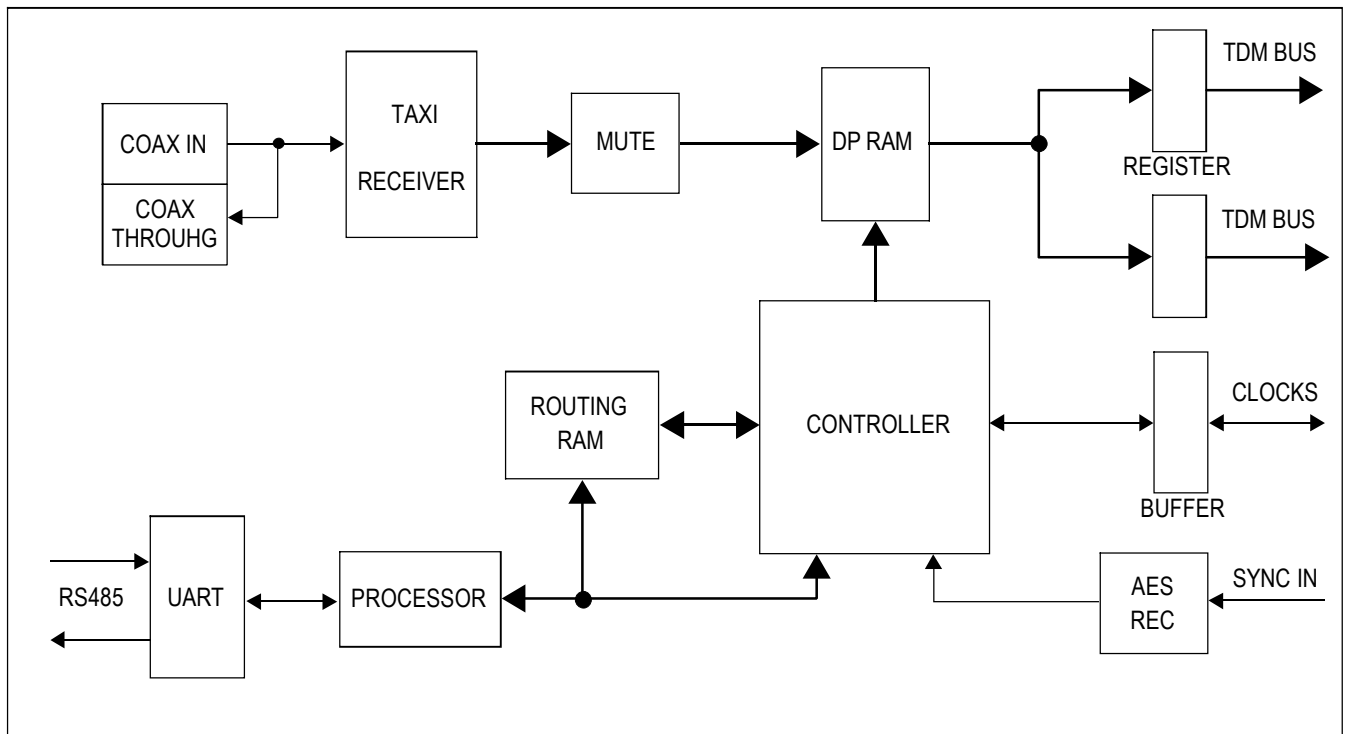
The MADI card is used as demultiplexer for the MADI input signal in a D19m rack. The MADI input signal will be converted to the TDM bus. AESO cards as well as A/D cards (output cards) receive their signals from the TDM bus. Any MADI channel can be routed to any output card.

The MADI card is equipped with a coaxial input (BNC connector) as well as a BNC "through" output.

In standard applications the MADI card is synchronised via the AES sync input of the D19m rack. It generates the required clock signal for the TDM bus as well as the TTL sync signal for the output cards.

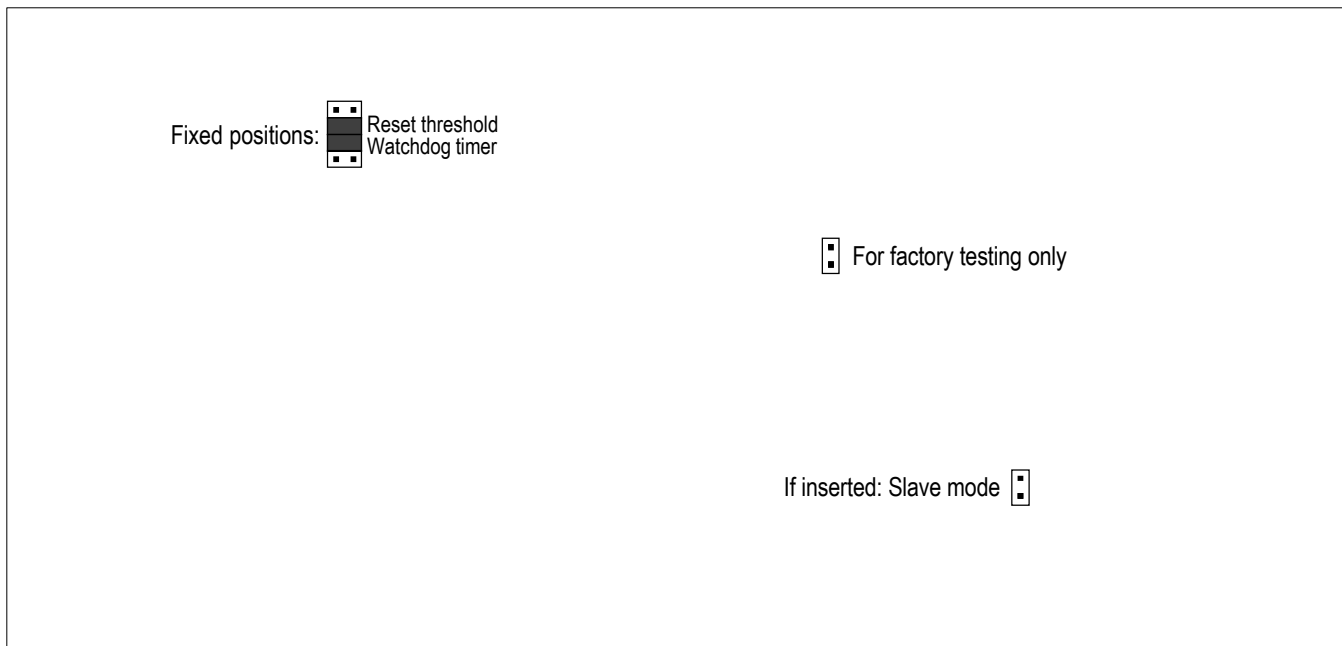
If the MADI card is set to SLAVE mode, it will receive the sync and clock signals from the backplane.

Via the RS485 interface the MADI card can be remote controlled. In that case the frame address will be set via the DIP switches on the backplane.



- LEDs:**
- MADI OK: Indicates that a valid MADI input signal is connected;
 - SYNC: Indicates that the card is synchronised to the sync source;
 - SLAVE: Card is configured as slave on the TDM bus;
 - SUPPLY: Indicates "power on" status.

Jumpers: SLAVE: If this jumper is set, the clock and the sync signals will be read from the bus. Otherwise, the MADI card writes the clock and the sync signals to the bus.



Technical data

AES/EBU sync input	Impedance	110 Ω
	Sensitivity	min. 200 mV
MADI input coaxial	Connector type	BNC
	Impedance	75 Ω
	Maximum cable length	50 m
Power consumption	5 V	Max. 0.8 A
Temperature range		0...+40° C

Pin assignment 96-pin DIN 41612 female

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

- MGND Chassis
- GND Ground
- SYNC Sync Input TTL
- AES/DSD BUS Switchover stand-alone/TDM bus operating
- BA0...BA3 Card address (ID)
- /D0.../D15 Inverted data on the TDM bus
- /FRAME, /CK128 Clocks TDM bus

1.14 D19m MADI – MADI input for optical fibre cable

(order no. 1.940.511.20 fibre / 1.940.512.20)

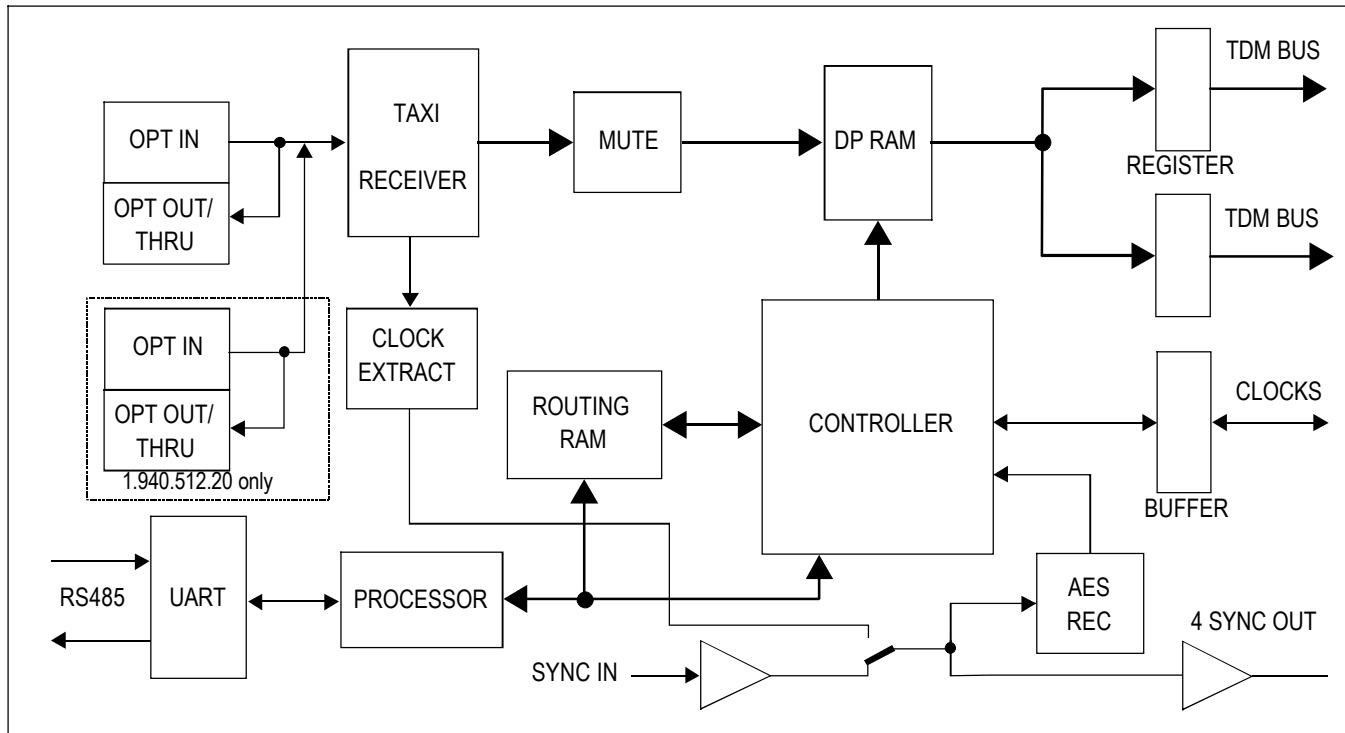
The MADI card is used as demultiplexer for the MADI input signal in a D19m rack. The MADI input signal will be converted to the TDM bus. AESO cards as well as A/D cards (output cards) receive their signals from the TDM bus. Any MADI channel can be routed to any output card.

The MADI card is equipped with a coaxial input (BNC connector) as well as a BNC "through" output.

In standard applications the MADI card is synchronised via the AES sync input of the D19m rack. It generates the required clock signal for the TDM bus as well as the TTL sync signal for the output cards.

If the MADI card is set to SLAVE mode, it will receive the sync and clock signals from the backplane. If necessary, the sync signal can be extracted out of the MADI stream. This method is recommended only for long distances and stagebox applications, because the fault tolerance is lower and the jitter is higher (2 PLLs involved). Besides that, varispeed is not possible. The card 1.940.512.20 has an additional MADI through output for daisy-chaining MADI cards.

Via the RS485 interface the MADI card can be remote controlled. In that case the frame address will be set via the DIP switches on the backplane.



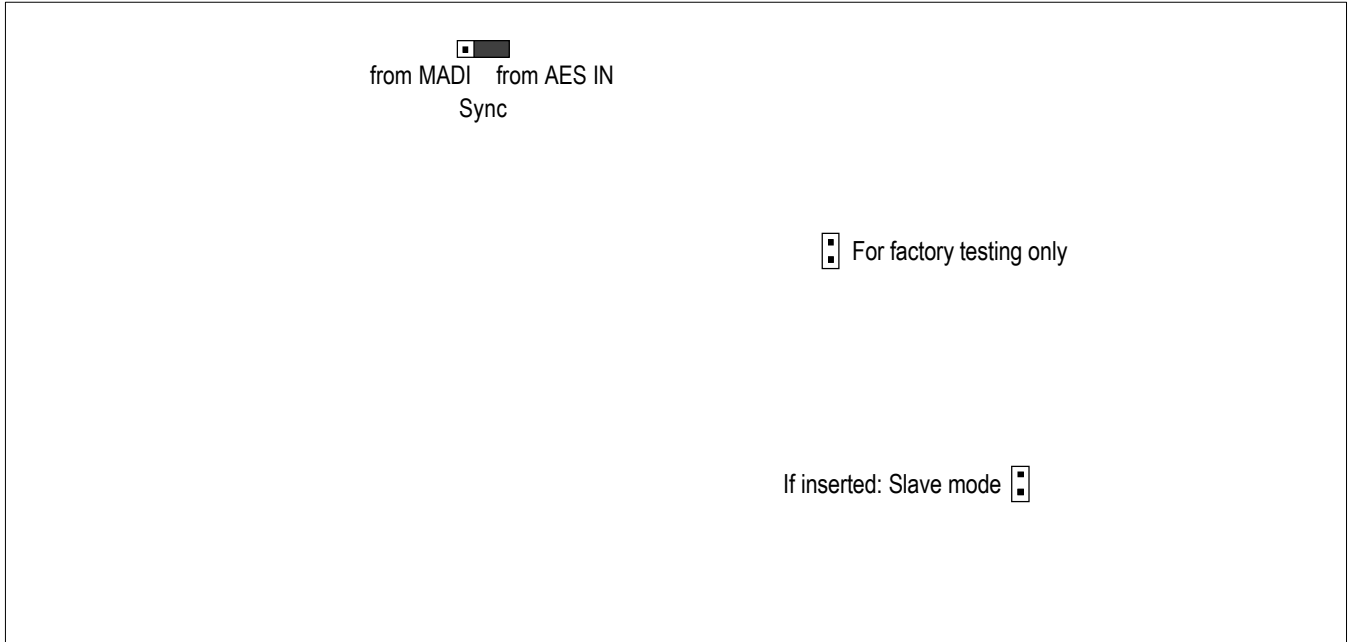
LEDs:

- MADI OK: Indicates that a valid MADI input signal is connected;
- SYNC: Indicates that the card is synchronised to the sync source;
- SLAVE: Card is configured as slave on the TDM bus;
- SUPPLY: Indicates "power on" status.

Jumpers:

SLAVE: If this jumper is set, the clock and the sync signals will be read from the bus, otherwise, the MADI card writes the clock and the sync signals to the bus;

SYNC: Synchronization from MADI or AES/EBU.



Technical data

AES/EBU sync input	Impedance	110 Ω
	Sensitivity	min. 200 mV
AES/EBU sync output	Impedance	110 Ω
	Output level (into 110 Ω)	5 V
MADI input optical	Connector type	SC
	Wave length	1300nm
	Fiber cable type multimode	62.5/120 μm
	Maximum cable length	500 m
Power consumption	5 V	max. 1.2 A
Temperature range		0...+40 C

Pin assignment 96-pin DIN 41612 female

Pin	A	B	CoC
1	MGND	MGND	MGND
2	+5V	+5V	+5V
3	SYNC	HIIC	DIIC
4	GND	GND	GND
5	AESSYNC+	GND	AESSYNC-
6	AESOUT1+	GND	AESOUT1-
7	AESOUT2+	GND	AESOUT2-
8	AESOUT3+	GND	AESOUT3-
9		GND	
10	/D0		/D8
11	/D1		/D9
12	/D2		/D10
13	/D3		/D11
14	/D4	GND	/D12
15	/D5	/AES/DSD BUS	/D13
16	/D6	GND	/D14
17	/D7	GND	/D15
18	/FRAME	/CK128	
19			
20		CA0	
21		CA1	
22	TA	CA2	TB
23		CA3	
24	RA	CA4	RB
25		CA5	
26		CA6	
27		CA7	
28			
29			
30			
31			
32	MGND	MGND	MGND

MGND	Chassis
GND	Ground
SYNC	Sync output TTL (Input in Slave Mode)
AES/DSD BUS	Switchover stand alone / TDM (Input in Slave Mode)
AESSYNC	Sync Input
CA0 .. CA7	Frame address
/D0.../D15	Inverted TDM Bus data
/FRAME, /CK128	Clocks TDM Bus (Input in Slave Mode)
TA, TB	RS485 Output
RA, RB	RS485 Input

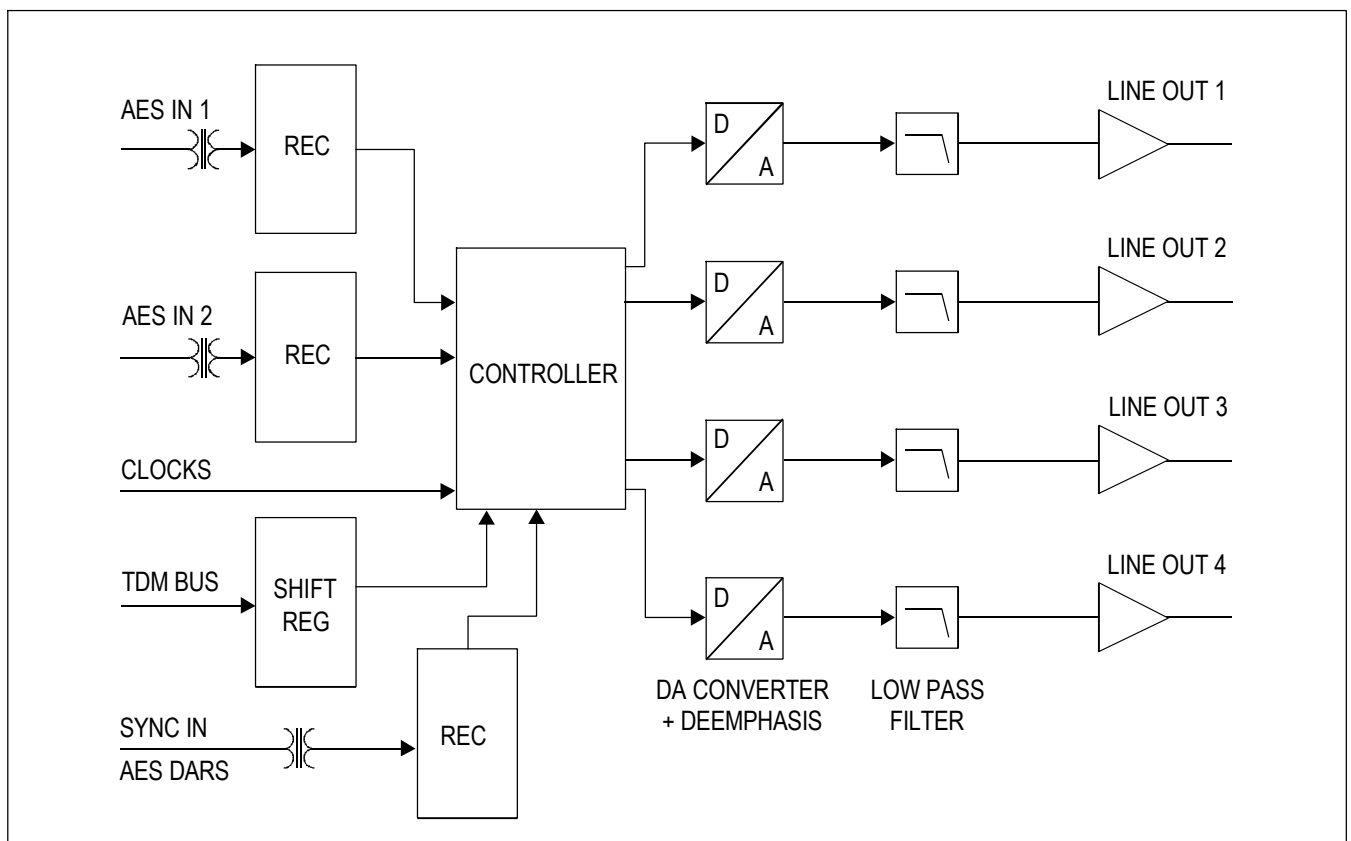
1.15 D19m C4DA/24 – quad 24 bit D/A converter

(order no. 1.940.570.21)

The C4DA/24 card can be used for stand-alone applications as well as for the D19m rack for TDM application. On one card, four digital channels are converted to four analog outputs. High-end 24 bit Delta-Sigma stereo converters are used for each channel, working in subrange mode. The converters receive their input signals either from the AES/EBU inputs (stand-alone application) or from the TDM bus.

The C4DA/24 card can be used next to the other D19m cards in a D19m rack. If in stand-alone applications the synchronization should fail, the clock will be generated from one of the AES/EBU inputs.

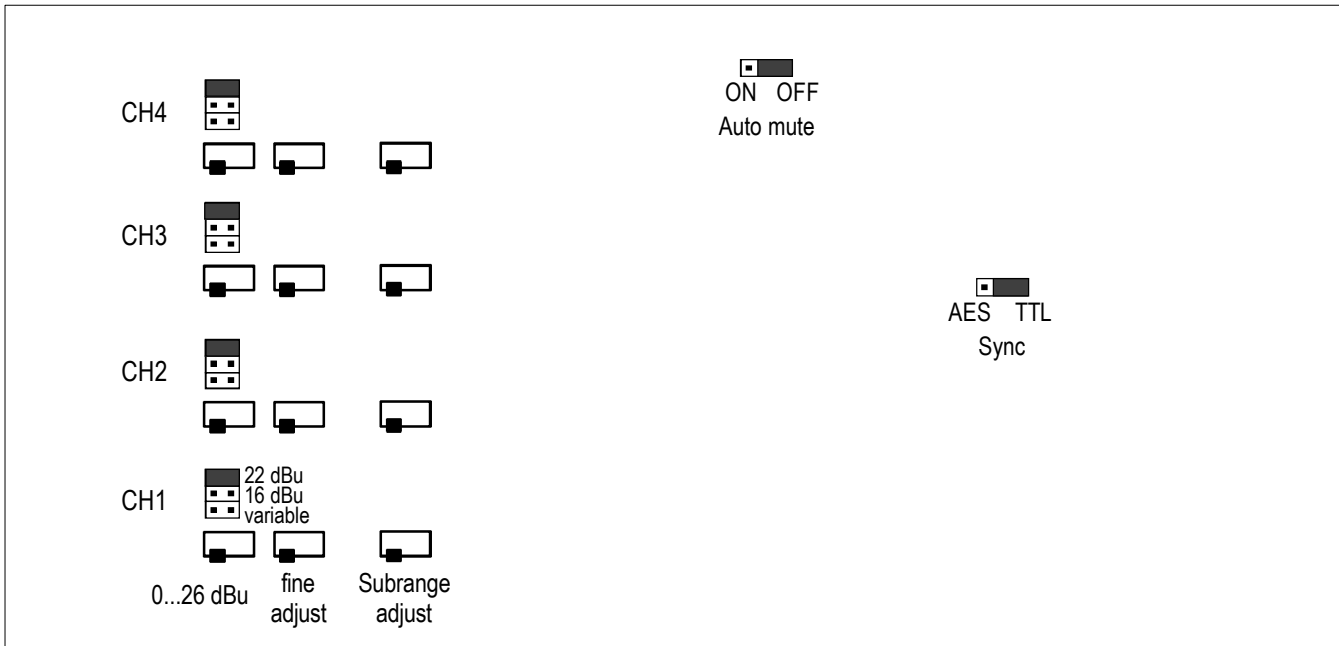
The channel status bits contain the source channel defined by the card address as well as the sampling rate information.



LEDs:	SYNC EXT:	Indication if the card is synced from the AES/EBU input or from the TTL sync clock;
	SYNC AES1:	is ON when the external sync fails, and the sync of the AES1 is taken to synchronise the card;
	SYNC AES2:	is ON when the external sync fails, and the sync of the AES2 is taken to synchronise the card (in case no signal is connected to AES1);
	SUPPLY:	Indicates “power on” status.

Jumpers:

Output level: 16 dBu fixed, 22 dBu fixed, or 0...26 dBu variable.
 AES-TTL: Position AES: The unit will be synced from the AES/EBU input (in case of stand-alone use of the D/A card).
 Position TTL: The sync input from the D19M rack is used. The internal TTL sync signal is generated by the MADO card in a D19M MUX frame or by the MADI card in a DEMUX frame.
 AUTOMUTE: Output will be muted if digital zero is fed to the input.



Alignment:

For best results the card should be aligned only when it has reached operating temperature. Feed a digital audio signal with a level of $-10 \text{ dB}_{\text{FS}}$ either via one of the AES/EBU inputs or via the TDM bus to the C4DA/24 card. Set the jumpers to either 16 or 22 dBu and measure the corresponding analog outputs. Use the corresponding FINE ADJUST trimmer potentiometers to set the output to +6 or +12 dBu, respectively. Reduce the digital audio level to $-13 \text{ dB}_{\text{FS}}$ and adjust the analog output level with the SUBRANGE ADJUST trimmer potentiometers to +3 dBu or +9 dBu, respectively. It is important to make this alignment very carefully; otherwise the switchover from normal to subrange operating could be audible. If a different output level has to be adjusted, set the jumper to position VARIABLE and use the 0...26 dBu FINE ADJUST trimmer potentiometers to adjust the desired level.
 Repeat this alignment for the second AES/EBU input.

Technical data

AES/EBU inputs	Impedance	110 Ω
	Sensitivity	min. 200 mV
Analog output		Electronically balanced
Frequency response	20 Hz...20 kHz	-0.2 dB
THD + N	20 Hz...20 kHz, -1 dB _{FS}	< -85 dB
	1 kHz, -30 dB _{FS}	< -105 dB
Crosstalk	@ 1 kHz	< -110 dB
Output impedance (analog output)		< 40 Ω
Minimum load at maximum level	+24 dBu	300 Ω
Analog output level	for 0 dB _{FS} , jumper-selectable	+16 dBu, +22 dBu; 0...26 dBu (adjustable with on-board trimmer potentiometer)
Power consumption	5 V	max. 0.2 A
	+15 V	max. 0.25 A
	-15 V	max. 0.15 A
Sampling rate		28 kHz...55 kHz
Operating temperature range		0...+40° C

Pin assignment 96-pin, DIN 41612, female

Pin	A	B	CoC
1	MGND	MGND	MGND
2	+5V	+5V	+5V
3	SYNC		
4	GND	GND	GND
5	AESSYNC+	GND	AESSYNC-
6	AES1IN+	GND	AES1IN-
7		GND	
8	AES2IN+	GND	AES2IN-
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/DSD BUS	/D13
16	/D6	GND	/D14
17	/D7	GND	/D15
18	/FRAME	/CK128	-
19	MGND	MGND	MGND
20			
21	MGND	MGND	MGND
22	ANA1OUT+		ANA1OUT-
23	MGND	MGND	MGND
24	ANA2OUT+		ANA2OUT-
25	MGND	MGND	MGND
26	ANA3OUT+		ANA3OUT-
27	MGND	MGND	MGND
28	ANA4OUT+		ANA4OUT-
29	AGND	AGND	AGND
30	-15V	-15V	-15V
31	+15V	+15V	+15V
32	MGND	MGND	MGND

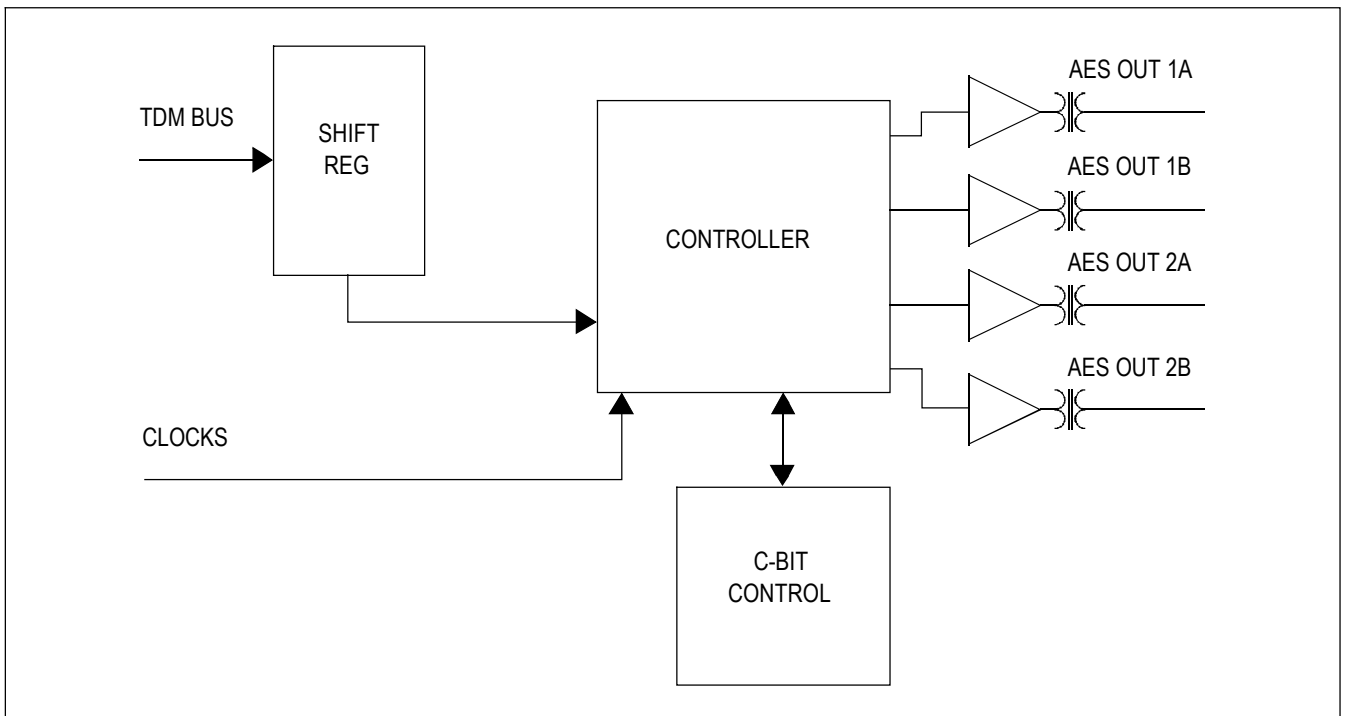
MGND	Chassis
GND	Ground
SYNC	Sync Input TTL
AES/DSD BUS	Switchover stand-alone/TDM bus operating
BA0...BA3	Card address (ID)
/D0.../D15	Inverted data on the TDM bus
/FRAME, /CK128	Clocks TDM bus

1.16 D19m AESO – dual AES/EBU output

(order no. 1.940.585.21)

The AESO card has been developed for the use in the D19m rack. On one card, four channels coming from the TDM bus are converted to either two AES/EBU outputs (stereo or two-channel), or to 4 AES/EBU outputs (mono). The signal on the TDM bus is normally coming from the MADI card (input).

The channel status information is transmitted from the TDM bus to the AES/EBU outputs, according to the jumper settings.



LEDs: **SUPPLY:** Indicates “power on” status.

Jumpers:

Channel mode: MONO: Each TDM channel will be set to an AES/EBU channel, e.g.:

 CH1 – AES out 1a
 CH2 – AES out 1b
 CH3 – AES out 2a
 CH4 – AES out 2b

 STEREO: 2 channels from the TDM bus are available as STEREO pair on 2 AES/EBU channels, e.g.:

 CH1/CH2 – AES out 1, LEFT/RIGHT
 CH3/CH4 – AES out 2, LEFT/RIGHT

 2-CHANNEL: 2 TDM channels are available as 2-CHANNEL pair on 2 AES/EBU channels, e.g.:

 CH1/CH2 – AES out 1, CH1/CH2
 CH3/CH4 – AES out 2, CH3/CH4

Channel mode



Stereo:



Mono:



2CH:

**Technical data**

AES/EBU inputs	Impedance	110 Ω
	Sensitivity	min. 200 mV
Power consumption	5 V	max. 0.3 A
Input sampling rate		28...55 kHz
Temperature range		0...+40° C

Pin assignment 96-pin, DIN 41612, female

Pin	A	B	CoC
1	MGND	MGND	MGND
2	+5V	+5V	+5V
3			
4	GND	GND	GND
5		GND	
6	AES1AOUT+	GND	AES1AOUT-
7	AES1BOUT+	GND	AES1BOUT-
8	AES2AOUT+	GND	AES2AOUT-
9	AES2BOUT+	GND	AES2BOUT-
10	/D0	/BA0	/D8
11	/D1	/BA1	/D9
12	/D2	/BA2	/D10
13	/D3	/BA3	/D11
14	/D4	GND	/D12
15	/D5	/AES/DSD BUS	/D13
16	/D6	GND	/D14
17	/D7	GND	/D15
18	/FRAME	/CK128	
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			
30			
31			
32	MGND	MGND	MGND

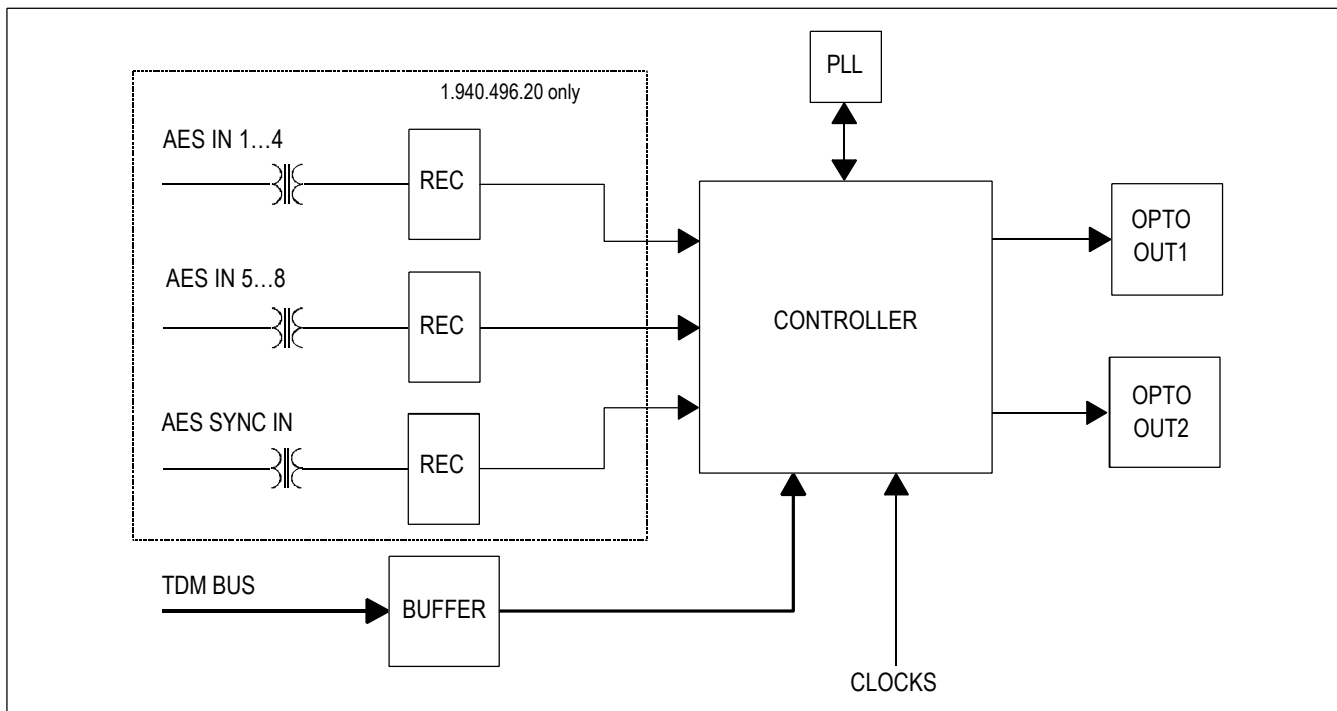
MGND Chassis
 GND Ground
 BA0...BA3 Card address (ID)
 /D0.../D15 Inverted data on the TDM bus
 /FRAME, /CK128 Clocks TDM bus

1.17 D19m ADATO – dual 8-channel ADAT output

(order no. 1.940.495.20 / 1.940.496.20)

The ADATO card converts the TDM bus signals into the optical ADAT format. The card supports two 8-channel outputs for (plastic) optical fibre with a word length of up to 24 bits. The synchronization is taken from the TDM bus (CK128 clock). A PLL increases the clock rate to $256 \times FS$. The channel status bit is not supported by the ADAT format.

The addressing must be done with four DIP switches on the backplane. For this card, it cannot be performed automatically because more than four audio channels are processed.



The card can also be equipped with eight AES/EBU receivers and a separate sync input for stand-alone applications (order no. 1.940.496.20). The ITDM jumper on the backplane decides whether the sync signal is taken from the TDM bus or from the card itself. If it comes from the card itself, the sync is either taken from the separate sync input (as long as a valid signal is available) or from the first AES/EBU input.

LEDs: **SUPPLY:** Indicates “power on” status.

Address setting: 4 DIP switches have to be set for a proper addressing of the card, according to the table below.

DIP switch No.				Address
1	2	3	4	
on	on	on	on	1...16
off	on	on	on	5...20
on	off	on	on	9...24
off	off	on	on	13...28
on	on	off	on	17...32
off	on	off	on	21...36
on	off	off	on	25...40
off	off	off	on	29...44
on	on	on	off	33...48
off	on	on	off	37...52
on	off	on	off	41...56
off	off	on	off	45...60
on	on	off	off	49...64
off	on	off	off	49...64
on	off	off	off	49...64
off	off	off	off	49...64

Jumper: TTL/AES: This jumper is available only on the stand-alone version (1.940.496.20) and defines whether the sync signal is taken from the TDM bus or from the separate sync input.

Technical data

AES/EBU input (1.940.496.20 only)	Sensitivity	200 mV
	Impedance	110 Ω
Optical output	Wave length	660 nm
	max. transmission length	Approx. 3 m (optical fibre)
Power consumption	1.940.495.20: 5 V	0.2 A
	1.940.496.20: 5 V	0.4 A
Input sampling rate		28...55 kHz
Temperature range		0...+40° C

Pin assignment 96-pin DIN 41612 female

Pin	A	B	C
1	MGND	MGND	MGND
2	+5V	+5V	+5V
3	SYNC		
4	GND	GND	GND
5	AESS+	GND	AESS-
6	AES IN 1+	GND	AES IN 1-
7	AES IN 2+	GND	AES IN 2-
8	AES IN 3+	GND	AES IN 3-
9	AES IN 4+	GND	AES IN 4-
10	/D0		/D8
11	/D1		/D9
12	/D2		/D10
13	/D3		/D11
14	/D4	GND	/D12
15	/D5	/AES/DSD BUS	/D13
16	/D6	GND	/D14
17	/D7	GND	/D15
18	/FRAME	/CK128	
19	MGND	MGND	MGND
20			
21	MGND	MGND	MGND
22	AES IN 5+		AES IN 5-
23	MGND	MGND	MGND
24	AES IN 6+	MGND	AES IN 6-
25	MGND	MGND	MGND
26	AES IN 7+	MGND	AES IN 7-
27	MGND	MGND	MGND
28	AES IN 8+	MGND	AES IN 8-
29	AGND	AGND	AGND
30			
31			
32	MGND	MGND	MGND

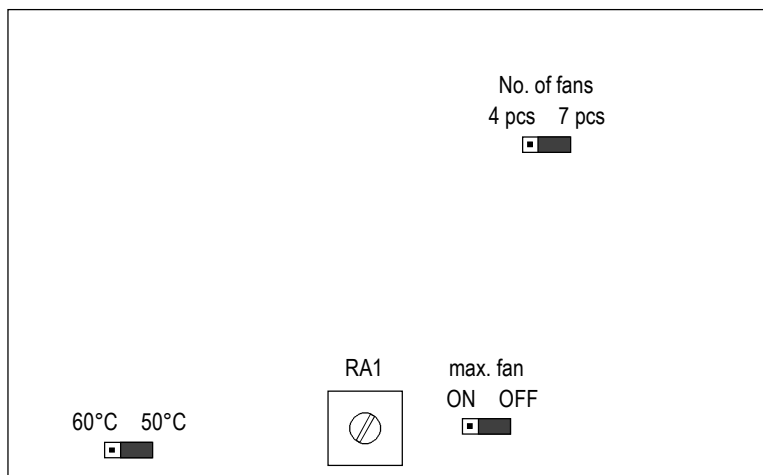
SYNC AES/EBU SYNC TTL
 AESS AES/EBU SYNC sym
 AES IN xx AES/EBU inputs
 AES/DSD BUS Switchover stand alone / TDM (Input in Slave Mode)
 /D0.../D15 TDM DATABUS

1.18 Fan Module

(order no. 1.940.597.00)

The Fan Module can be equipped with four or seven fan units, and it contains the Fan Regulation Board 1.940.596.81. On this board, each fan unit is monitored, their speed can be adjusted, and if one of the fans should fail or be blocked, the alarm output and an optional LED are activated.

If temperature has to be monitored, too, an optional NTC can be connected; if the temperature exceeds a threshold (50 or 60° C, jumper-selectable), the alarm output is activated, too.



Jumpers/settings:

- RA1: To set the normal fan speed.
- No. of fans: This jumper must be set according to the number of used fans (4 or 7).
- Max. fan: ON: If the selected temperature threshold is exceeded, the fans are switched to full speed (prerequisite: the optional NTC is connected).
- 50°C / 60°C: Selection of the threshold temperature.

Pin assignment 15-pin D-type

Pin	Signal	Pin	Signal
1	+15 V	2	n.c.
3	GND	4	n.c.
5	Alarm Relay +	6	n.c.
7	GND	8	n.c.
9	GND	10	n.c.
11	NTC	12	n.c.
13	GND	14	n.c.
15	Alarm LED +		

An optional alarm LED can be connected between pin15 and one of the GND pins; a internal series resistor is provided.

The alarm relay is connected between the alarm relay + output and one of the GND pins. The output supplies 15 V; the output current must be matched to the relay coil with an appropriate series resistor. Max. output current is 100 mA.

For temperature monitoring, an NTC can be connected between pin11 and one of the GND pins.

NTC specs: nominal resistance: 330 kΩ, @ 50° C: 100 kΩ, @ 60° C: 65 kΩ. Order no: 57.99.0801.

The usual supply voltage is 15 V. In a MUX or DEMUX rack usually the negative supply is loaded less, so it can be sensible to connect the Fan Module to the negative supply rail as follows:

Pin1 (+15 V) to supply GND, and
one of the GND pins (3, 7, 9, or 13) to the -15 V supply.

Higher supply voltages: Supply voltages up to 30 V may be used.
However, the "max. fan" jumper must always be set to OFF in such a case; otherwise, the fans would get too high a full-speed operating voltage at over-temperature conditions. The alarm relay and the alarm LED series resistor, too, must then be matched to the corresponding higher operating voltage.

1.19 RS422-to-optical Converter

(order no. 1.940.577.20)

This assembly is a partially equipped version of the D19m RCC board 1.940.576.20. It is used for the conversion of a balanced RS422 signal to an optical signal between the stallion box and the RCC board.

It can be installed in any free slot of a D19m rack, operating voltage is 5 V. The front panel LED displays either the send or the receive signal (Jumper MP6 in pos. "RS422": send signal, pos. "optical": receive signal).

The RS422 signal is wired to the 96-pin DIN 41612 female connector.

Pin assignments:

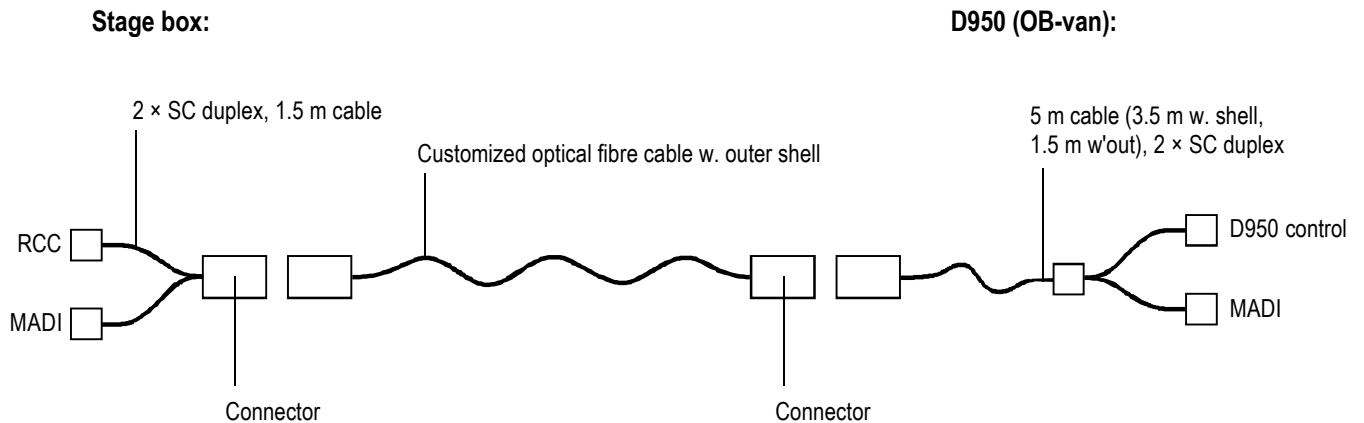
Signal	Pin on 96-pin DIN 41612 connector	Pin on flat cable connector on backplane
RA	7c	5
RB	7a	6
TA	6a	1
TB	6c	2

2 STAGEBOX APPLICATION FOR D950

Some points have to be considered for a stagebox setup with the mixing console D950:

- The D950 is always the star point if multiple stageboxes are used; the Stageboxes *cannot* be connected in series, because the control signals cannot be transferred from one Remote Controller Card (RCC) to another, and the control signals for two cards cannot be merged.
- A frame can hold input and output cards (mixed arrangement); in such a case, the ratio of inputs to outputs is defined in the MADDO software (EPROM).
- The connection to the D950 can be done in two ways. Standard is to use four optical fibre cables for MADI and control signals (MADI in/out, control receive/transmit). The other way is to use four separate copper cables or a combination of both for the four signals. The control signals are standard RS232/RS422 or MIDI connections. This also gives the possibility to connect the system to another mixing console, provided the correct software protocols are implemented.
- Cooling is an important point to be carefully considered in designing a stagebox. A fan is absolutely necessary as soon as the system holds more than 5...6 Mic/Line and A/D pairs.
- It is possible to combine D19m Mic/Line cards with D19 MicADs in a D950 system. However, in such a combination separate control lines are required for the two systems.

2.1 Example: Stage box for OB-Van with optical fibre cables



Customized optical fibre cable units, consisting of:

LEMO series 4K connectors on both ends:

- for 4 type F2 ceramical optical fibre contacts
- with anti-kink bush, black, type FGG.4K.03C.CLZ.800A, and 4 type F2, FFS.F2.BB2.LCE30 contacts.

Cable type:

- M.051.04.A.9, roll on/roll off, camera cable
- 4 x 62.5/125, approx. 6.6 mm dia.
- Cable length can be customized.

In addition, on both the stage box and the D950 ends, a customized cable is required.

D950: Side 1 (rear panel):

- LEMO panel socket with strain-relieve, Type PKG.4K.03C.CLZ.800A

Seite 2 (MADI card, Control card):

- 2 x SC-Duplex, cable type LM.051.04.A.9, cable length 5.0 m, 1.5 m of which without outer shell

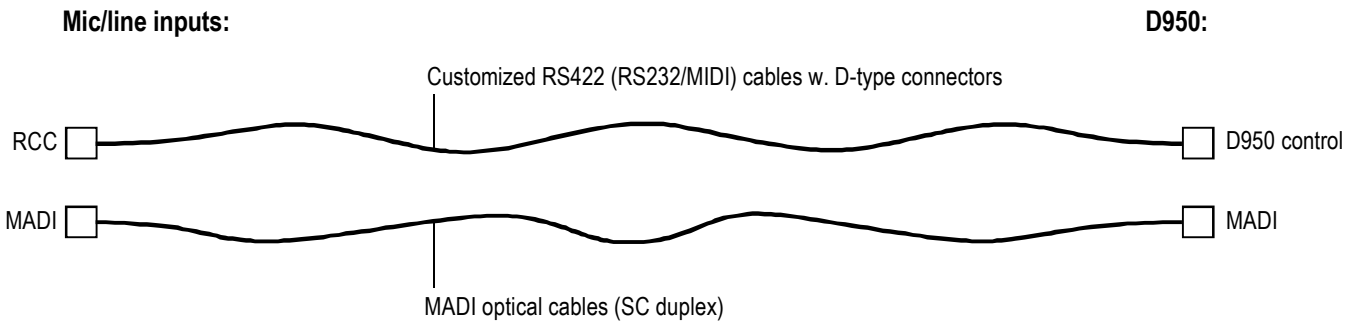
Stagebox: as above, but with following cable type: Single lines from LM.051.04.A.9, length 1.5 m.

The connecting card on the D950 is identical with the RCC (same card), but is inserted in two different ways:

Standard: The connecting card is inserted into a D19m frame, which is in most cases available in the main D950 rack. The D19m frame is used for mechanical hold and power supply. From there, a serial cable goes to the Stallion box, and optical cables to the stagebox.

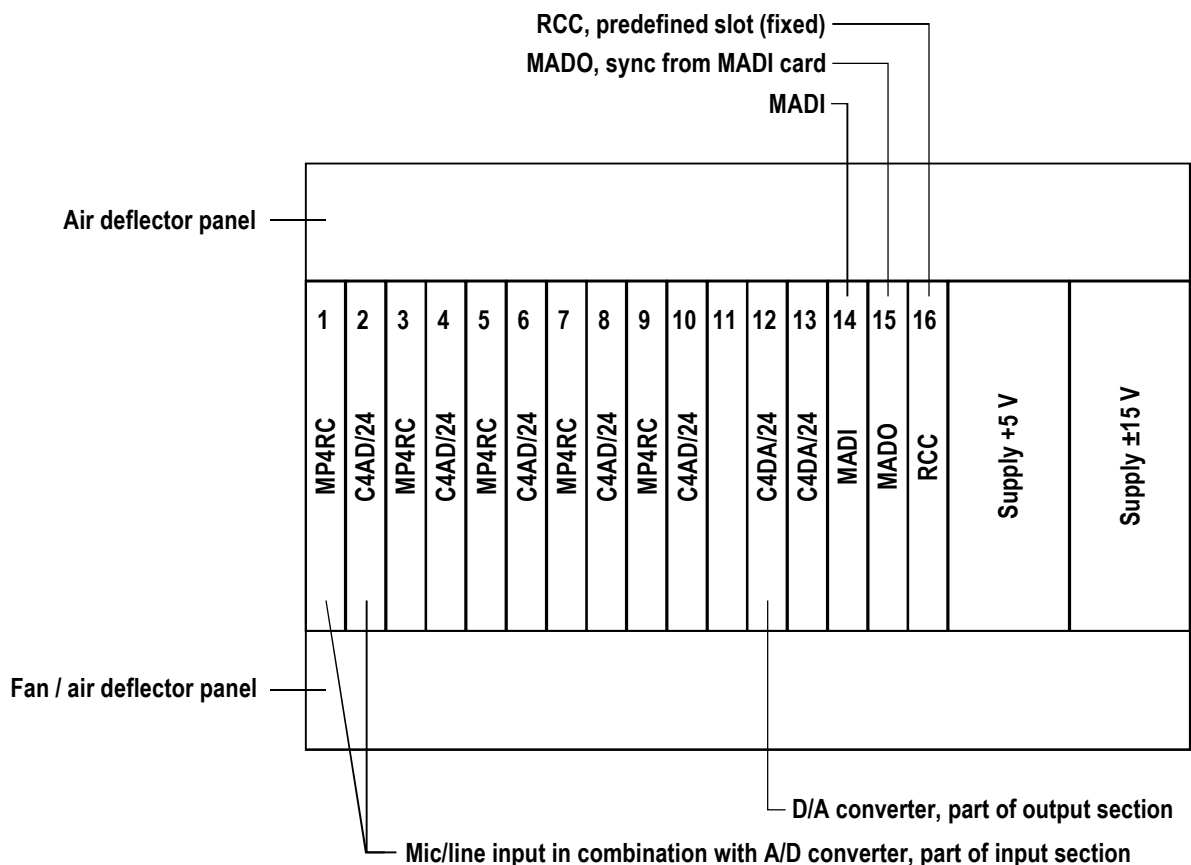
Alternative: The connecting card is installed into a separate box with its own power supply and connectors.

2.2 Example: Mic/Line inputs for stationary application



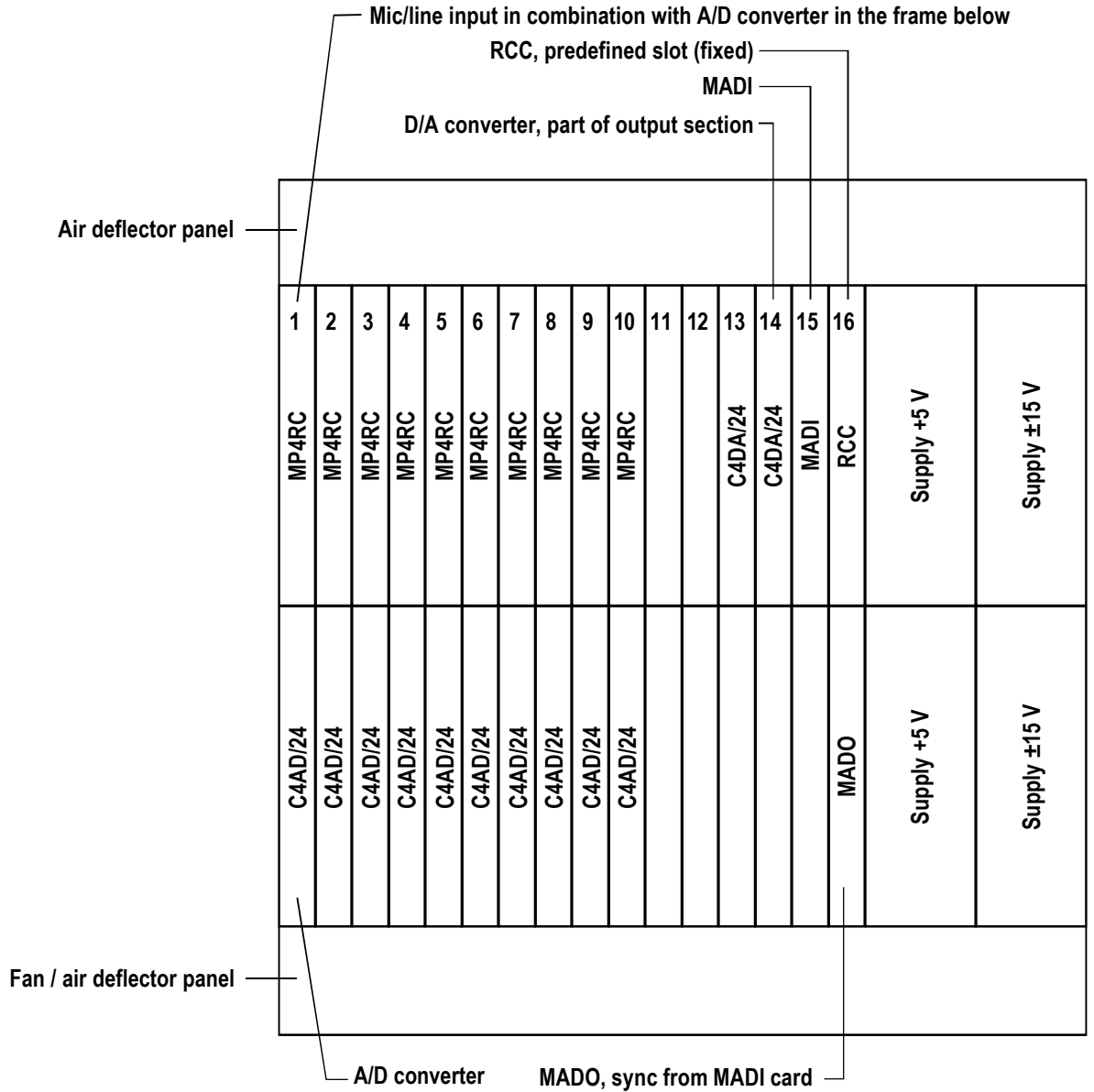
2.3 Typical stagebox configurations

2.3.1 Single rack with Mic/Line inputs and line outputs (min. height 5 units)



Note: The size of the input and output sections is set in the MADO software.
Alternate possibility: If no output cards are installed within the system, it can be used as a standard MUX frame for Mic/Line inputs.

2.3.2 Double rack with Mic/Line inputs and line outputs (min. height 8 units)



Note: The size of the input and output sections is set in the MADO software.
Alternate possibility: If no output cards are installed within the system, it can be used as a standard MUX frame for Mic/Line inputs.

3 RCC/MP4RC – MIDI SOFTWARE PROTOCOLS

STUDER D19m STAGE BOX (MP4RC) MIDI Implementation Date: 14.01.99
 I. MIDI Implementation Chart Version: Preliminary

Function	Transmitted	Recognized	Remarks
Basic Default Channel Changed	1 1 - 16	1 1 - 16	Memorized
Mode Default Messages Altered		Mode 3	
Note Number True Voice	x	x	
Velocity Note ON Note OFF	x x	x x	
After Touch Key's Channel's	x x	x x	
Pitch Bender	x	x	
Control Change		16 - 19 24 - 27 67 68 - 71 72 - 75 76 - 79 80 - 81 85 - 86 91 - 92* 93 - 94* 120	MIC Sensit. Ch.1-4 LINE Sensit.Ch.1-4 SOFT CLIP ON/OFF MIC/LINE Selector Phantom Power HiPass Filter MIC STEREO LINK LINE STEREO LINK Relay 1-8 Pattern Opto Coupl.1-8 Pat. Gain Test Ch. 1-4 * only valid on MIDI Channel 16
Program Change True#	x	x	
System Exclusive	o	o	
System :Song Pos Common :Song Sel :Tune	x x x	x x x	
System :Clock Real Time:Commands	x x	x x	
Aux :Local ON/OFF Mes- :All Notes OFF sages:Active Sense :Reset	x x x x	x x x o	

Mode 1: OMNI ON, POLY Mode 2: OMNI ON, MONO
 Mode 3: OMNI OFF, POLY Mode 4: OMNI OFF, MONO

o: Yes
 x: No

STUDER D19 STAGE BOX (MP4RC) MIDI Implementation

II. Recognized MIDI Messages

1.0 Control Change

Status	1011nnnn	(Bn) n = MIDI channel number-1	Note 1
Controller no.	0ccccccc		
Controller val.	0vvvvvvvv		
c = 16	MIC Sensit.Ch.1	v = 20	+00 dBu dig. fullscale
		v = 21	-01 dBu " "
	 " "
	 " "
		v = 39	-19 dBu " "
		v = 40	-20 dBu " "
		v = 41	-21 dBu " "
	 " "
	 " "
		v = 79	-59 dBu " "
		v = 80 - 127	-60 dBu " "
c = 17	MIC Sensit.Ch.2	v = 20 - 127	+00 dBu .. -60 dBu
c = 18	MIC Sensit.Ch.3	v = 20 - 127	+00 dBu .. -60 dBu
c = 19	MIC Sensit.Ch.4	v = 20 - 127	+00 dBu .. -60 dBu
c = 24	LINE Sensi.Ch.1	v = 0	+24 dBu dig. fullscale
		v = 1	+23 dBu " "
	 " "
	 " "
		v = 23	+ 1 dBu " "
		v = 24	+ 0 dBu " "
		v = 25	- 1 dBu " "
	 " "
	 " "
		v = 34 - 127	-10 dBu " "
c = 25	LINE Sensi.Ch.2	v = 0 - 127	+24 dBu .. -10 dBu
c = 26	LINE Sensi.Ch.3	v = 0 - 127	+24 dBu .. -10 dBu
c = 27	LINE Sensi.Ch.4	v = 0 - 127	+24 dBu .. -10 dBu
c = 67	SOFT CLIPPER	v = 0	Soft Clip OFF Note 2
		v = 1 - 127	Soft Clip ON
c = 68	MIC/LINE Ch.1	v = 0	Input Selector MIC
		v = 1 - 127	Input Selector LINE
c = 69	MIC/LINE Ch.2	v = 0 - 127	Input Selector MIC/LINE
c = 70	MIC/LINE Ch.3	v = 0 - 127	Input Selector MIC/LINE
c = 71	MIC/LINE Ch.4	v = 0 - 127	Input Selector MIC/LINE
c = 72	Phantom P. Ch.1	v = 0	Phantom Power OFF
		v = 1 - 127	Phantom Power ON
c = 73	Phantom P. Ch.2	v = 0 - 127	Phantom Power ON/OFF
c = 74	Phantom P. Ch.3	v = 0 - 127	Phantom Power ON/OFF
c = 75	Phantom P. Ch.4	v = 0 - 127	Phantom Power ON/OFF
c = 76	HiPass Flt.Ch.1	v = 0	HiPass Filter OFF
		v = 1 - 127	HiPass Filter ON
c = 77	HiPass Flt.Ch.2	v = 0 - 127	HiPass Filter ON/OFF
c = 78	HiPass Flt.Ch.3	v = 0 - 127	HiPass Filter ON/OFF
c = 79	HiPass Flt.Ch.4	v = 0 - 127	HiPass Filter ON/OFF

c = 80	STEREO MIC 1/2	v = 0	Independent MIC 1/2
		v = 1 - 127	STEREO MIC 1/2 Note 5
c = 81	STEREO MIC 3/4	v = 0 - 127	STEREO MIC 3/4
c = 85	STEREO LINE 1/2	v = 0	Independent LINE 1/2
		v = 1 - 127	STEREO LINE 1/2 Note 5
c = 86	STEREO LINE 3/4	v = 0 - 127	STEREO LINE 3/4
c = 91	REL.1-4 Pattern	v = 0000xxx0	Relay 1 OFF
		v = 0000xxx1	Relay 1 ON
		v = 0000xx0x	Relay 2 OFF
		v = 0000xx1x	Relay 2 ON
		v = 0000x0xx	Relay 3 OFF
		v = 0000x1xx	Relay 3 ON
		v = 00000xxx	Relay 4 OFF
		v = 00001xxx	Relay 4 ON
c = 92	REL.5-8 Pattern	v = 0000yyyy	Relay 5-8 ON/OFF
c = 93	OPTO 1-4 Req.	v = 0	OPTO 1-4 Request without sending Update on next Change
		v = 1	OPTO 1-4 Request with sending Update on next Change
c = 94	OPTO 5-8 Req.	v = 0 - 1	OPTO 5-8 Request
c = 120	GAIN TEST	v = 0	Gain test OFF Note 3
		v = 1	Gain Test on Ch. 1
		v = 2	Gain Test on Ch. 2
		v = 3	Gain Test on Ch. 3
		v = 4	Gain Test on Ch. 4
c = 121	SYSTEM RESET	v = 0	Set Default val. Note 4

Note 1: Preamp related Parameters on MIDI ch. 1 - 15
Relay res. Opto 1-8 Pattern (c = 91,92 resp. 93,94) only on MIDI ch. 16

Note 2: Soft Clip ON/OFF common for all 4 Preamp channels

Note 3: Gain Test set to OFF on any other Control Change message

Note 4: Individual MP4RC System Reset if recognized on MIDI ch. 1 - 15
Global D19 Stagebox Reset (all MP4RCs) if recognized on MIDI ch.16

Note 5: If STEREO MIC or LINE LINK is active, all channel related parameters on ch.1&2 resp. on ch.3&4 are controlled in parallel from ch.1 resp. ch.3 except for the Sensitivity parameters. If STEREO MIC LINK is ON and STEREO LINE LINK is OFF all channel related parameters including MIC Sensitivity but excluding LINE Sensitivity are linked and vice versa. Leaving the STEREO LINK Mode all channel settings on ch.2 resp. ch.4 must be restored to the state before the STEREO LINK was active.

Example to Note 5:

1. Suppose STEREO MIC & LINE LINK 1/2 is OFF

Channel 1 Channel 2

MIC Sens:	25	35
LINE Sens:	5	10
MIC/LINE Sel:	MIC	LINE
Phantom P:	ON	OFF
HiPass Flt.:	OFF	ON

2. STEREO MIC LINK 1/2 OFF->ON; STEREO LINE LINK remains OFF

	Channel 1	Channel 2
MIC Sens:	25	25
LINE Sens:	5	10
MIC/LINE Sel:	MIC	MIC
Phantom P:	ON	ON
HiPass Flt.:	OFF	OFF

3. MIC Sens Ch.1 25->30, Ch.2 35->40; LINE Sens. Ch.1 5->8, Ch.2 10-15;
MIC/LINE Ch.1 MIC->LINE, Ch.2 LINE->MIC

	Channel 1	Channel 2
MIC Sens:	30	30
LINE Sens:	8	15
MIC/LINE Sel:	LINE	LINE
Phantom P:	ON	ON
HiPass Flt.:	OFF	OFF

4. STEREO MIC LINK 1/2 ON->OFF; STEREO LINE LINK OFF->ON

	Channel 1	Channel 2
MIC Sens:	30	40
LINE Sens:	8	8
MIC/LINE Sel:	LINE	LINE
Phantom P:	ON	ON
HiPass Flt.:	OFF	OFF

5. STEREO MIC LINK 1/2 remains OFF; STEREO LINE LINK ON->OFF

	Channel 1	Channel 2
MIC Sens:	30	40
LINE Sens:	8	15
MIC/LINE Sel:	LINE	MIC
Phantom P:	ON	OFF
HiPass Flt.:	OFF	ON

2.0 System Exclusive

No device-specific System Exclusive messages implemented

Status	11110000	F0	System Exclusive
Manufacturer ID		00 00 11	STUDER ID
Product ID		02	D19 (MP4RC) STAGE BOX ID
Device ID	0000nnnn		n = MIDI channel no-1
Command ID	0ccccccc		see below
Data	0ddddddd		see below
		
		
	0ddddddd		
checksum	0ccccccc		1-complement (data)
Status	11110111	F7	End of Sys. Exclusive

3.0 Universal System Exclusive Non-real-time Inquiry Message

Status		F0 7E 0n(or 7F)	Universal Sysex Non-real time header n = MIDI channel no-1 (7F: response anyway)
General Info	00000110	06	Sub ID # 1
Device Inquiry	00000001	01	Sub ID # 2
Status	11110111	F7	End of Sys. Exclusive

III. Transmitted MIDI Messages

1.0 Control Change

Status	1011nnnn	(Bn) n = MIDI channel number-1	Note 1
Controller no.	0ccccccc		
Controller val.	0vvvvvvvv		
c = 93	OPTO Cpl.1-4 P.	v = 0000xxx0	Opto Coupler 1 inactive
		v = 0000xxx1	Opto Coupler 1 energized
		v = 0000xx0x	Opto Coupler 2 inactive
		v = 0000xx1x	Opto Coupler 2 energized
		v = 0000x0xx	Opto Coupler 3 inactive
		v = 0000x1xx	Opto Coupler 3 energized
		v = 00000xxx	Opto Coupler 4 inactive
		v = 00001xxx	Opto Coupler 4 energized
c = 94	OPTO Cpl.5-8 P.	v = 0000yyyy	Opto Coupler 5-8 inactive/energized

Note 1: Opto Coupler 1-8 Pattern (c = 93,94) only on MIDI ch. 16

2.0 System Exclusive

no device-specific System Exclusive messages implemented

Status	11110000	F0	System Exclusive
Manufacturer ID		00 00 11	STUDER ID
Product ID		02	D19 (MP4RC) STAGE BOX ID
Device ID	0000nnnn		n = MIDI channel no-1
Status ID	0sssssss		see below
Data	0ddddddd		see below
		
		
	0ddddddd		
checksum	0ccccccc		1-complement (data)
Status	11110111	F7	End of Sys. Exclusive

3.0 Universal System Exclusive Non-real-time Device ID Message

Status		F0 7E 0n	Universal Sysex
			Non-real time header
			n = MIDI channel no-1
General Info	00000110	06	Sub ID # 1
Device ID msg	00000010	02	Sub ID # 2
Manufacturer ID		00 00 11	STUDER ID
Dev. Fam code		00 00	D19 Serie
Fam. Member code		00 02	(MP4RC) STAGE BOX
Power ON state		0000000p	Power ON state:
			0: 2.and futher Inq Req.
			after Power ON
			1: first Inq. Req.
			after Power ON
			(only valid on RCC resp.
			MIDI channel 16)
Softw. Version		0aaaaaaaa	Software Version
		(20 byte ASCII String)
		
		0zzzzzzz	
Status	11110111	F7	End of Sys. Exclusive

