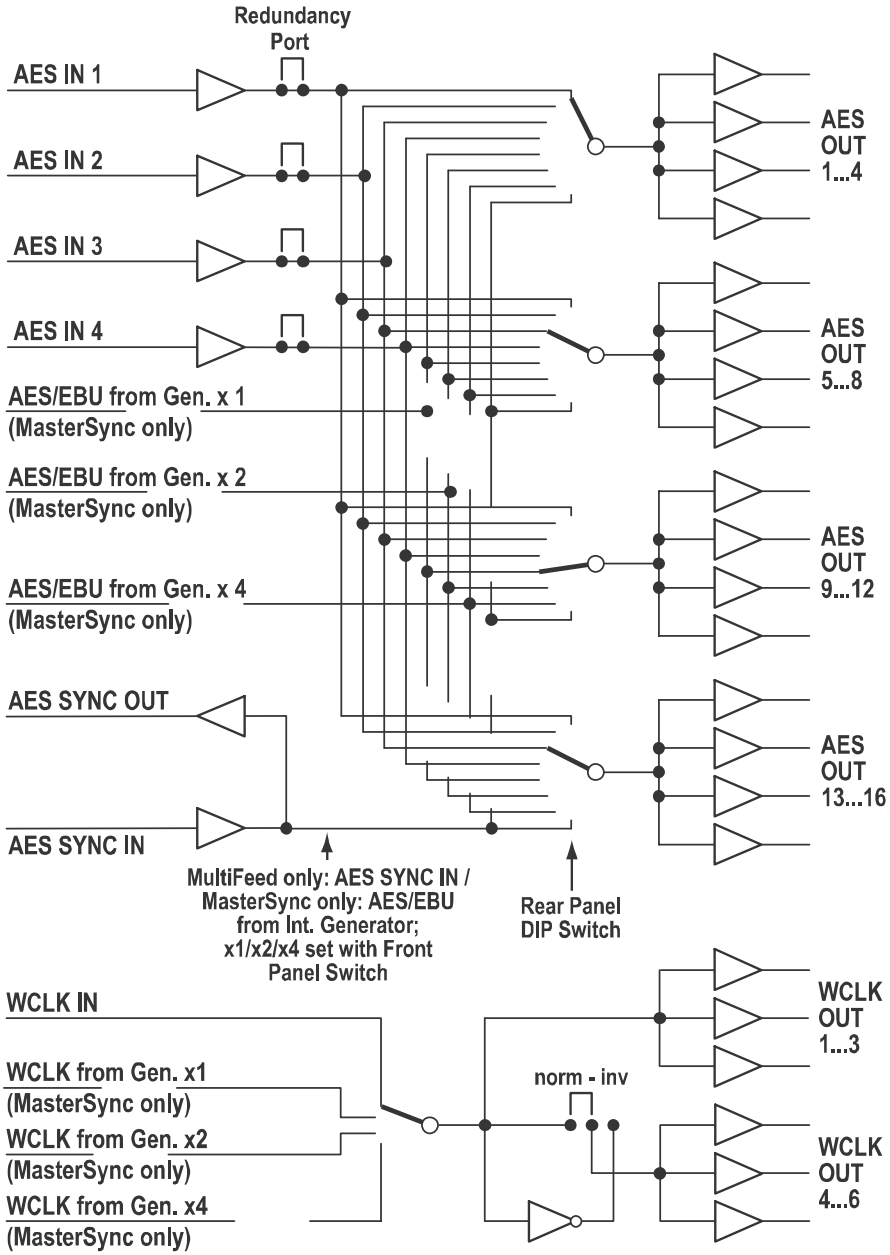
D21 MultiFeed
D21 MasterSync

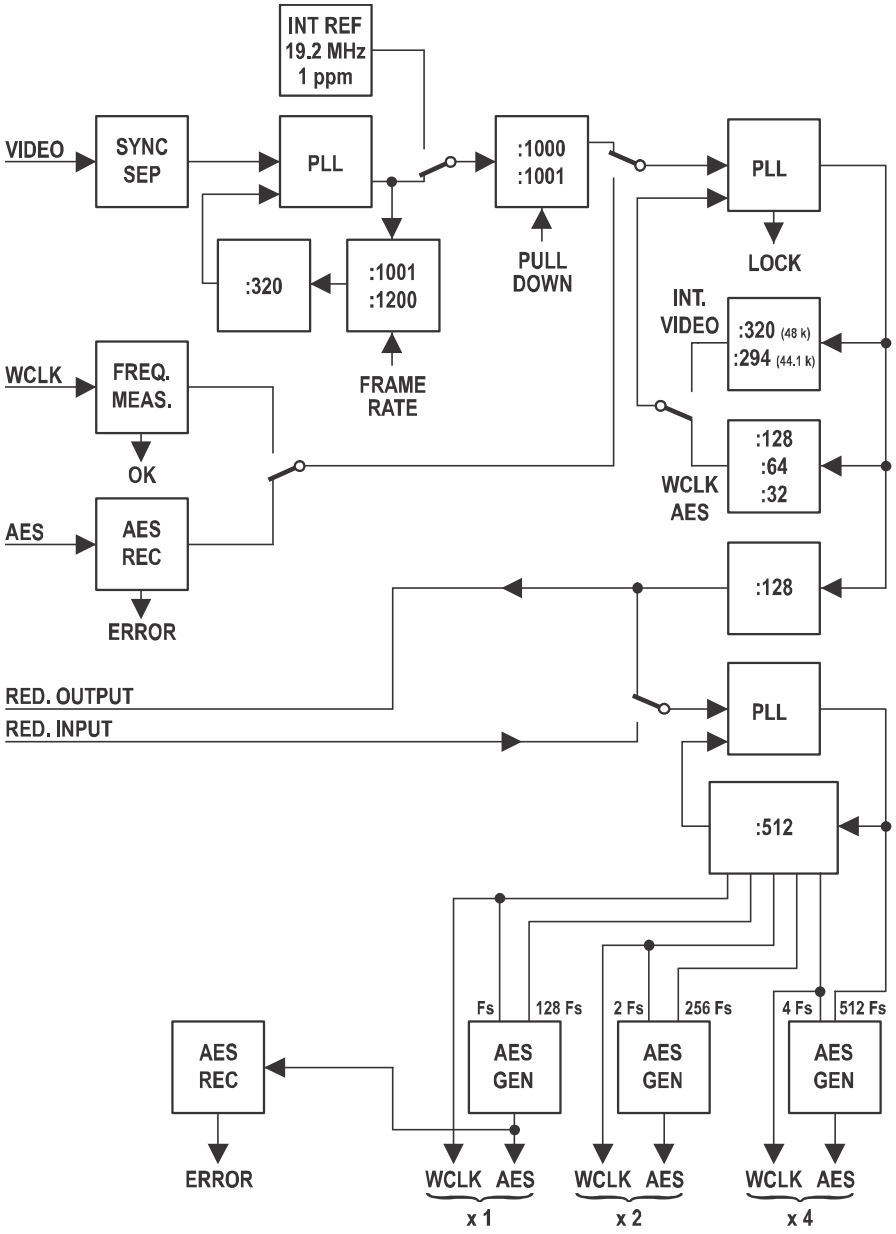
Operating and Service Instructions

1.3 Block Diagrams

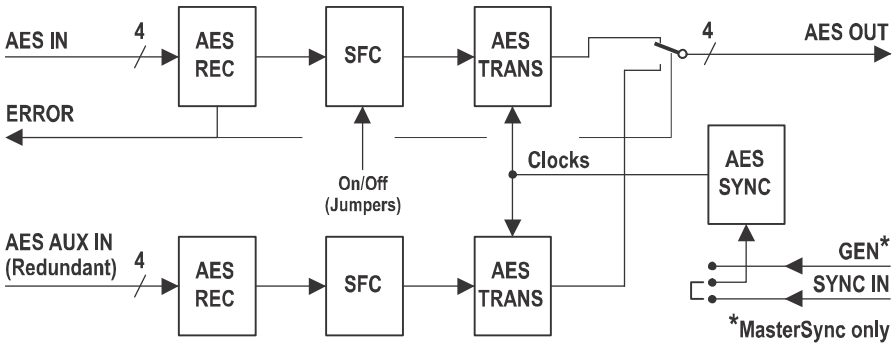
1.3.1 Distributor



1.3.2 Sync Generator *(MasterSync only)*



1.3.3 Redundancy Input Option



1.4 Safety and Connections

1.4.1 Utilization for the Purpose Intended

The MasterSync and MultiFeed units are designed for professional use. It is presumed that the units are operated only by trained personnel; servicing must be performed by qualified experts.

The electrical connections may be connected only to the appropriate voltages and signals specified in this manual. Please consult the Safety and EMC sections at the very beginning of this manual.

1.4.2 Mains Connection

There is no need to select a specific mains voltage setting because the unit has an auto-ranging supply unit; it can be operated on mains voltages from 100 through 240 V_{AC}, 50 to 60 Hz.

Caution

Repair work may only be performed by a trained service technician. The primary fuse inside the unit must be replaced by a spare fuse of exactly the same type.

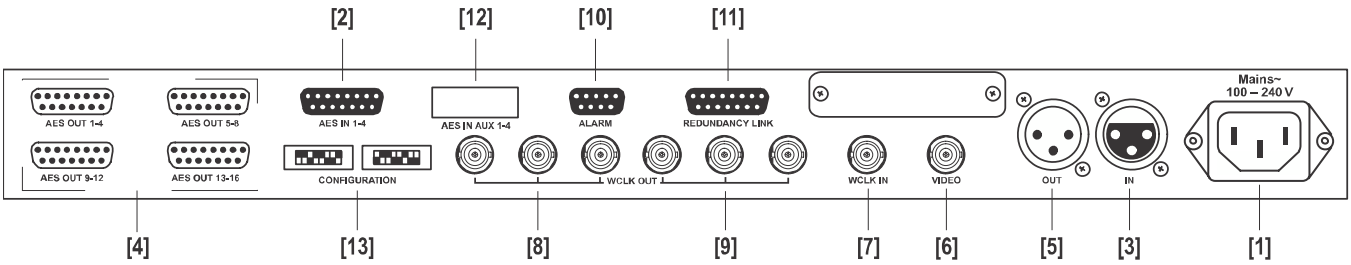
The unit must not be opened by the user – risk of a severe electric shock hazard!

Mains Cable

The supplied mains socket has to be fitted with a mating power cable incl. plug by an electrician, if your local Studer agency or your dealer should not have added a fitting power cable.

Please consult the "Safety" section at the very beginning of this manual.

1.4.3 Connector Field



[1] Mains ~ 100 – 240 V

Connector for socket IEC 320/C13.
Supply voltage range 100...240 V_{AC} (autoranging), 50...60 Hz.
Before connecting the unit to the mains, please consult the "Safety" section at the very beginning of this manual.

[2] AES IN 1-4

Inputs for four digital input signals according to AES/EBU, with a female 15-pin D-type connector.

[3] AES IN

Input for sync signal with female XLR socket.
For MasterSync only: This input signal may be routed to the outputs 1...16, depending on the **CONFIGURATION** DIP switch [13] setting (see chapter 3.1).

[4] AES OUT 1-4...13-16

Outputs for 16 digital output signals according to AES/EBU, with four male 15-pin D-type connectors.

[5] AES OUT

Sync output with male XLR socket, hard-wired to the AES IN sync signal input (XLR).

[6] VIDEO

Video input *for MasterSync only*; BNC socket, 75 Ω termination jumper-selectable. *(On MultiFeed units this socket is installed but not connected internally).*

[7] WCLK IN

Word clock input; BNC socket, 75 Ω termination jumper-selectable.

[8] WCLK OUT (1...3)

Word clock outputs 1...3; BNC sockets, distributing the **WCLK IN** signal.
For MasterSync only: In generator mode, these outputs supply a word-clock signal with the sampling rate selected with the **x1/x2/x4** front panel switch.

[9] WCLK OUT (4...6)

Word clock outputs 4...6; BNC sockets, distributing the **WCLK IN** signal. The polarity of these three outputs may be inverted with an internal jumper.
For MasterSync only: In generator mode, these outputs supply a wordclock signal with the sampling rate selected by the **CONFIGURATION** DIP switches [13].

[10] ALARM

Alarm outputs, watching the AES/EBU inputs 1...4 and the power supply; female 9-pin D-type connector (for details refer to chapters 2.3.5 and 3.2).

[11] REDUNDANCY LINK

Socket for redundancy connection to a second unit, with female 15-pin D-type connector. Matching cable: order no. 1.680.026.00

[12] AES IN AUX 1-4

(Option) Inputs for four redundant, digital input signals according to AES/EBU; female 15-pin D-type connector.

[13] CONFIGURATION

DIP switch bank with 16 switches for basic settings such as routing selection (refer to chapter 3.1).

1.5 Technical Specifications (preliminary, subject to change without notice)

1.5.1 General

Inputs	**AES/EBU**	Impedance 110 Ω typ. Sensitivity min. 0.2 V_{pp} Sampling rate 30...200 kHz according to AES3 1992
	Word Clock	Impedance: hi-Z or 75 Ω, selectable with internal jumper; TTL level
Outputs	**AES/EBU**	Impedance 110 Ω typ. Output level with 110 Ω load: 5 V_{pp} Sampling rate 30...200 kHz according to AES3 1992
	Word Clock	Impedance: 75 Ω, TTL level Polarity: The polarity of three of the **WCLK OUT** outputs (the ones below the **REDUNDANCY LINK** connector) can be inverted with an internal jumper.
Generator	**Internal Clock**	44.1, 44.056, 48; 47.952 kHz; each × 1, × 2, × 4 Accuracy: ±1 ppm
	External Clock	If synchronized by an external video signal: 44.1, 44.056, 48, 47.952 kHz; each × 1, × 2, × 4 If synchronized by WCLK or AES/EBU, for input signals of 42...50 kHz, *or* 84...100 kHz, *or* 168...200 kHz: 42...50 kHz; × 1, × 2, × 4

1.5.2 Power Supply

Mains Voltage	100...240 V_{AC}, 50...60 Hz
Current Consumption	1...0.5 A
Power Inlet	IEC 320/C14

1.5.3 Primary Fuse

Danger *The primary fuse is located inside the unit. Repair work may only be performed by a trained service technician.*

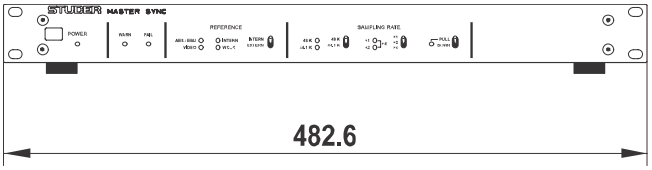
The primary fuse must be replaced by a spare fuse of exactly the same type and value. The unit must not be opened by the user – risk of a severe electric shock hazard.

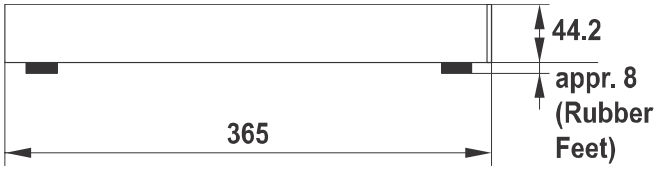
Spare Fuse **T 2.0 A H 250 V (5 × 20 mm)** Order No. 51.01.1022

1.5.4 Mechanical Data

Weight approx. 5 kg

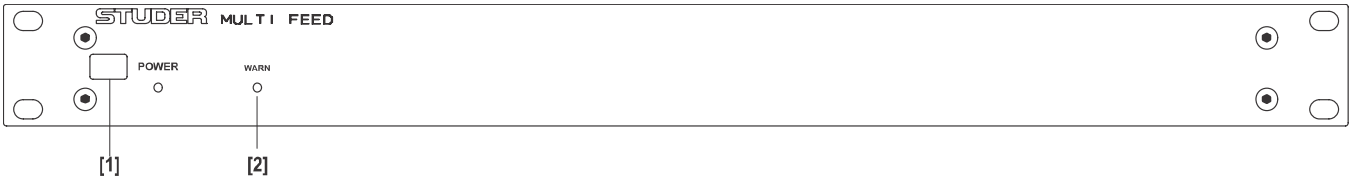
Dimensions [mm]

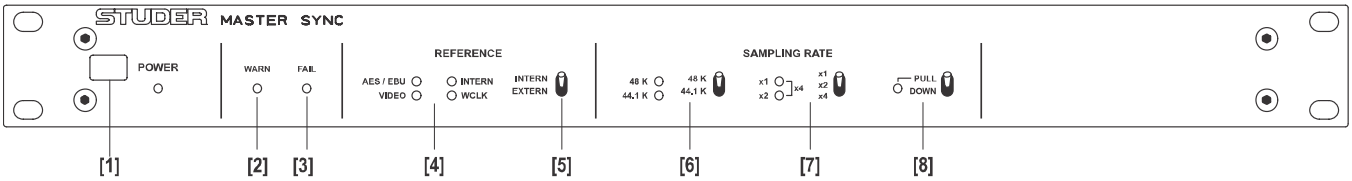




2 OPERATION

2.1 Operating Elements





[1] POWER

Recessed pushbutton for switching the unit on or off; the associated LED is illuminated when the unit is switched on.

[2] WARN

This LED is on if, while in redundancy mode, the unit accesses the power supply of the second unit.
The **WARN** signal is also available at the **ALARM** socket (see chapters 2.3.5 and 3.2).

MasterSync Only: The LED is on if the unit does not receive a valid signal at its input, but receives a valid signal via the redundancy link. (The input signal is considered as invalid either if **EXTERN** is selected but no valid signal – Video, AES/EBU, or Wordclock – is received, or if **INTERN** is selected but the internal PLL cannot generate a valid signal).

[3] FAIL *(MasterSync Only)*

This LED is on if the generator cannot generate a valid output signal, or if the **INTERN/EXTERN** switch **[5]** is set to **EXTERN**, but no valid input signal is received; i.e., the internal generator has been selected automatically.
The **FAIL** signal is also available at the **ALARM** socket (see chapters 2.3.5 and 3.2).

[4] REFERENCE *(MasterSync Only)*

AES/EBU Is on if the unit has successfully synchronized to an AES/EBU signal.
VIDEO Is on if the unit has successfully synchronized to a video signal.
INTERN Is on if the unit uses its own, internal signal.
WCLK Is on if the unit has successfully synchronized to a wordclock signal.

[5] INTERN/EXTERN *(MasterSync Only)*

Manual selection from either the internal or one of the external clock references.
In the **EXTERN** setting, the video input signal has top priority; should the video signal be missing, AES/EBU is selected. Should this be missing as well, the wordclock is selected. If none of these signals should be available, the internal generator signal is selected and the **WARN** LED is on, and the corresponding output signal on the **ALARM** socket is active.
If a valid signal is available via the redundancy link, the signal from the redundancy link is selected (same priority sequence as mentioned above) and the **WARN** LED is on, and the corresponding output signal on the **ALARM** socket is active.

[6] 48 K/44.1 K *(MasterSync Only)* If the video input signal or the internal generator is selected as source, this switch selects the operating frequency of the MasterSync (48/44.1 kHz, or 47.852/44.054 kHz in **PULL DOWN** mode (see [8]).
The associated LEDs indicate the current setting.

[7] ×1 / ×2 / ×4 *(MasterSync Only)* If the unit is operating in generator mode, this switch selects whether the outputs deliver either the basic frequency (44.1/48 kHz), twice (88.2/96 kHz), or four times (176.4/192 kHz) the basic frequency.
The associated LEDs indicate the current setting.

[8] PULL DOWN *(MasterSync Only)*
If the video input signal or the internal generator is selected as source, this switch selects standard or **PULL DOWN** mode, as indicated in the table below.

Switches	[6] 48 K	[6] 44.1 K
[8] PULL DOWN, upper position (LED on)	47.952 kHz	44.056 kHz
[8] PULL DOWN, lower position (LED off)	48 kHz	44.1 kHz

The **PULL DOWN** LED is on if the **PULL DOWN** switch is activated (upper position) *and* the video input or the internal generator is active.

2.2 Sampling Rates Overview

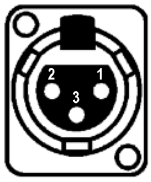
Distributor Input Sampling Rate	AES/EBU or WordClock	30…200 kHz

Generator, Int. Clock or Ext. Clock, *Video Sync*	Multiplier	Standard	Pull-Down	Standard	Pull-Down
	x 1	44.1 kHz	44.056 kHz	48 kHz	47.952 kHz
	x 2	88.2 kHz	88.112 kHz	96 kHz	95.904 kHz
	x 4	176.4 kHz	176.224 kHz	192 kHz	191.808 kHz

Generator, Ext. Clock *Word Clock or AES/EBU Sync*	Multiplier	Output
Input 42 kHz…50 kHz, *or* 84 kHz...100 kHz, *or* 168 kHz...200 kHz	x 1	42 kHz…50 kHz
	x 2	84 kHz...100 kHz
	x 4	168 kHz...200 kHz

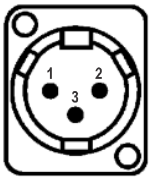
2.3 Connector Pin Assignments

2.3.1 AES IN (XLR-3f)



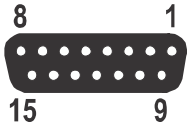
Pin	Signal
1	Screen
2	Input +
3	Input –
-	Chassis

2.3.2 AES OUT (XLR-3m)



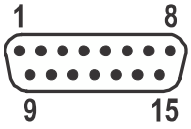
Pin	Signal
1	Screen
2	Input +
3	Input –
-	Chassis

2.3.3 AES IN 1-4 (15-pin D-type, f)



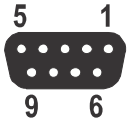
Pin	Signal
1	AES 1 +
9	AES 1 –
2	Screen
10	Screen
11	AES 2 +
3	AES 2 –
15	AES 3 +
7	AES 3 –
14	Screen
6	Screen
5	AES 4 +
13	AES 4 –
4	n.c.
12	n.c.
8	n.c.

2.3.4 AES OUT 1-16 (4 × 15-pin D-type, m)



Pin	Signal Out 1...4	Signal Out 5...8	Signal Out 9...12	Signal Out 13...16
1	AES 1 +	AES 5 +	AES 9 +	AES 13 +
9	AES 1 –	AES 5 –	AES 9 –	AES 13 –
2	Screen	Screen	Screen	Screen
10	Screen	Screen	Screen	Screen
11	AES 2 +	AES 6 +	AES 10 +	AES 14 +
3	AES 2 –	AES 6 –	AES 10 –	AES 14 –
15	AES 3 +	AES 7 +	AES 11 +	AES 15 +
7	AES 3 –	AES 7 –	AES 11 –	AES 15 –
14	Screen	Screen	Screen	Screen
6	Screen	Screen	Screen	Screen
5	AES 4 +	AES 8 +	AES 12 +	AES 16 +
13	AES 4 –	AES 8 –	AES 12 –	AES 16 –
4	n.c.	n.c.	n.c.	n.c.
12	n.c.	n.c.	n.c.	n.c.
8	n.c.	n.c.	n.c.	n.c.

2.3.5 ALARM (9-pin D-type, f)

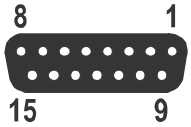


Pin	Signal
1	GND
2	GND
3	WARN relay contact output. Active if an internal supply has a malfunction, provided that either two units are linked or a second redundancy power supply is installed. If active, depending on the internal jumper setting, the relay either connects pins 3 and 6 (J3 position NO), or it interrupts this connection (position NC; default setting). See chapter 3.2 for details.
4	Error signal AES In 2 *
5	Error signal AES In 4 *
6	WARN / FAIL common relay contact
7	FAIL relay contact output. Active if the generator cannot generate a valid AES/EBU signal in spite of redundancy. If active, depending on the internal jumper setting, the relay either connects pins 7 and 6 (J4 position NO), or it interrupts this connection (position NC; default setting). See chapter 3.2 for details.
8	Error signal AES In 1 *
9	Error signal AES In 3 *

* These signals are used only if the redundancy option is installed. They are open-collector outputs pulling to GND in case of an error. Small loads, such as LEDs, opto-couplers or relays may be directly driven. *The external supply voltage must not exceed +24 V_{DC}, the current must not exceed 50 mA per output.*
The pins may also be pulled to GND by external signals or contacts for a forced switch-over to the redundancy inputs.

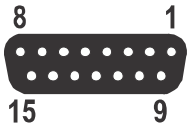
2.3.6 AES IN AUX 1-4 (15-pin D-type, f) *(optional)*

This connector is available only if the redundancy input option is installed. The pin assignment is identical with the one of the standard **AES IN 1-4** connector.



Pin	Signal
1	AES 1 +
9	AES 1 –
2	Screen
10	Screen
11	AES 2 +
3	AES 2 –
15	AES 3 +
7	AES 3 –
14	Screen
6	Screen
5	AES 4 +
13	AES 4 –
4	n.c.
12	n.c.
8	n.c.

2.3.7 REDUNDANCY LINK (15-pin D-type, f)



Pin	Signal
1	GND
2	n.c.
3	n.c.
4	n.c.
5	n.c.
6	RED OUT
7	COM IN
8	GND
9	n.c.
10	n.c.
11	+24 V
12	n.c.
13	COM OUT
14	RED IN
15	n.c.

Matching Cable Order no. 1.680.026.00, suited for two units placed on top of each other.

3 DIP SWITCHES AND JUMPERS

3.1 DIP Switch Setting

The DIP switches are located at the rear of the unit and are numbered 1...16 from left to right.

Signal Selection for AES OUT 1…4

Selected Signal:	AES IN 1	AES IN 2	AES IN 3	AES IN 4	*MasterSync Only:*				*MultiFeed Only:*
					Int. Gen. ×1	Int. Gen. ×2	Int. Gen. ×4	Int. Gen. ×1 / ×2 / ×4	AES IN
DIP Sw. 1	up	up	up	up	down	down	down	down	down
DIP Sw. 2	up	up	down	down	up	up	down	down	down
DIP Sw. 3	up	down	up	down	up	down	up	down	down
Front Panel: ×1 / ×2 / ×4	don't care	don't care	don't care	don't care	don't care	don't care	don't care	×1 / ×2 / ×4	don't care

Signal Selection for AES OUT 5…8

Selected Signal:	AES IN 1	AES IN 2	AES IN 3	AES IN 4	*MasterSync Only:*				*MultiFeed Only:*
					Int. Gen. ×1	Int. Gen. ×2	Int. Gen. ×4	Int. Gen. ×1 / ×2 / ×4	AES IN
DIP Sw. 4	up	up	up	up	down	down	down	down	down
DIP Sw. 5	up	up	down	down	up	up	down	down	down
DIP Sw. 6	up	down	up	down	up	down	up	down	down
Front Panel: ×1 / ×2 / ×4	don't care	don't care	don't care	don't care	don't care	don't care	don't care	×1 / ×2 / ×4	don't care

Signal Selection for AES OUT 9…12

Selected Signal:	AES IN 1	AES IN 2	AES IN 3	AES IN 4	*MasterSync Only:*				*MultiFeed Only:*
					Int. Gen. ×1	Int. Gen. ×2	Int. Gen. ×4	Int. Gen. ×1 / ×2 / ×4	AES IN
DIP Sw. 7	up	up	up	up	down	down	down	down	down
DIP Sw. 8	up	up	down	down	up	up	down	down	down
DIP Sw. 9	up	down	up	down	up	down	up	down	down
Front Panel: ×1 / ×2 / ×4	don't care	don't care	don't care	don't care	don't care	don't care	don't care	×1 / ×2 / ×4	don't care

Signal Selection for AES OUT 13…16

Selected Signal:	AES IN 1	AES IN 2	AES IN 3	AES IN 4	*MasterSync Only:*				*MultiFeed Only:*
					Int. Gen. ×1	Int. Gen. ×2	Int. Gen. ×4	Int. Gen. ×1 / ×2 / ×4	AES IN
DIP Sw. 10	up	up	up	up	down	down	down	down	down
DIP Sw. 11	up	up	down	down	up	up	down	down	down
DIP Sw. 12	up	down	up	down	up	down	up	down	down
Front Panel: ×1 / ×2 / ×4	don't care	don't care	don't care	don't care	don't care	don't care	don't care	×1 / ×2 / ×4	don't care

Signal Selection for AES OUT

Selected Signal:	*MasterSync Only:*				*MultiFeed Only:*
	Int. Gen. ×1	Int. Gen. ×2	Int. Gen. ×4	Int. Gen. ×1 / ×2 / ×4	AES IN
DIP Switch 13	up	up	down	down	down
DIP Switch 14	up	down	up	down	down
Front Panel Switch: ×1 / ×2 / ×4	don't care	don't care	don't care	×1 / ×2 / ×4	don't care

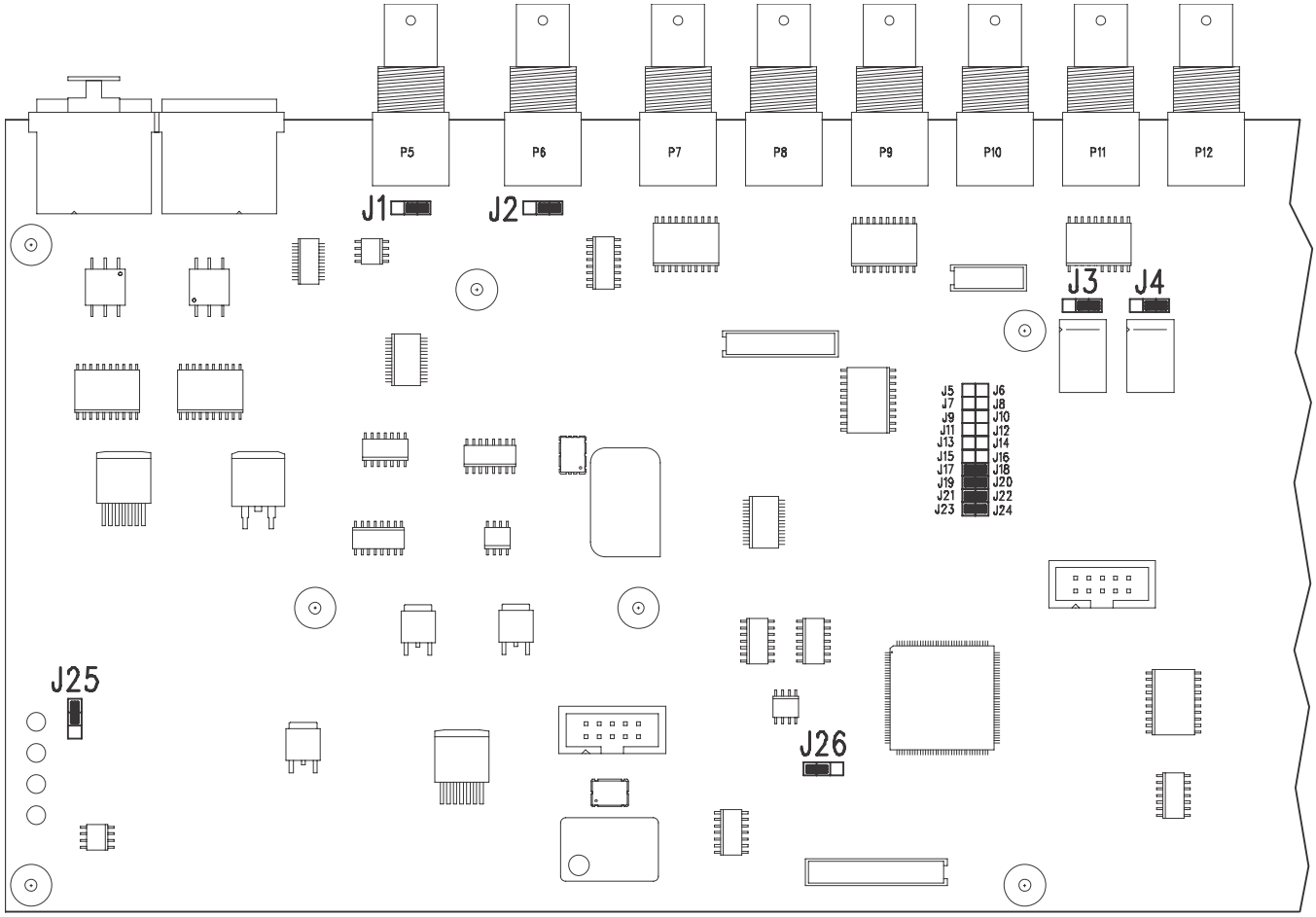
Signal Selection for WCLK Out 4...6 *(Selection for WCLK Out 1...3 is performed by the front panel switches)*

Selected Signal:	WCLK IN	*MasterSync Only:*		
		Int. Gen. ×1	Int. Gen. ×2	Int. Gen. ×4
DIP Switch 15	down	down	up	up
DIP Switch 16	down	up	down	up

3.2 Internal Jumpers

Caution ⚠ *All internal adjustments as well as repair work on this product must be performed by a trained technician – no user-serviceable parts inside!*

Factory Setting In all drawings below, the default jumper settings are marked in black.



J1: 75 Ω Hi-Z

(MasterSync only) Impedance setting for the **VIDEO** input (BNC socket P5). Default setting: hi-Z; when changing the jumper position, the input impedance is 75 Ω.

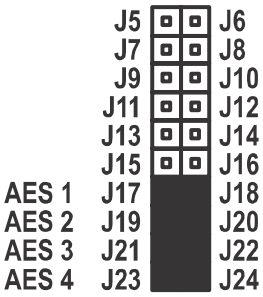
J2: 75 Ω Hi-Z

Impedance setting for the WCLK IN input (BNC socket P6). Default setting: hi-Z; when changing the jumper position, the input impedance is 75 Ω.

J3: (WARN Relay) NO NC

J4: (FAIL Relay) NO NC

Configuration for the FAIL and WARN relay contact outputs.
WARN is active if an internal supply has a malfunction, provided that either two units are linked or a second power supply unit is installed. J3 default setting: NC (normally closed), pins 3 and 6 of the **ALARM** socket are shorted as long as no error is detected (i.e. WARN inactive).
FAIL is active if the generator cannot generate a valid AES/EBU signal in spite of redundancy. J4 default setting: NC (normally closed), pins 6 and 7 of the **ALARM** socket are shorted as long as no error is detected (i.e. FAIL inactive).
For the pin assignment of the **ALARM** socket on the rear panel refer to chapter 2.3.5.

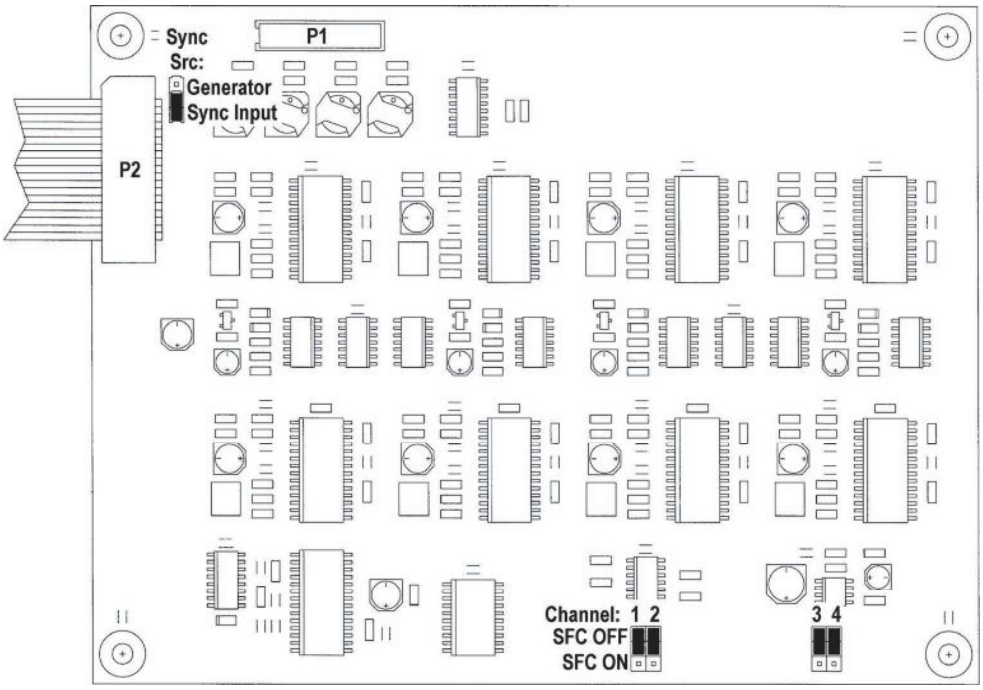


This pin array is used for installing the redundancy input option (refer to chapters 1.2 and 1.3.3).
If no redundancy input option is installed, the following pins *must* be connected with jumpers: J17-J18, J19-J20, J21-J22, and J23-J24 (default setting).

If a second, redundant power supply unit is installed, jumper J25 must be set to the "Redundant" position (refer to chapter 1.2).
If not, the jumper remains in the "Default" position.

Position INV: Polarity inversion of the word clock outputs **WCLK OUT** 4...6 (i.e., BNC sockets P10...P12). Default setting: NORM.

3.3 Jumpers on Redundancy Input Option



The redundancy input option is plugged to the pin array J5...J24 (see above) using the flat cable connected to P2. The flat cable from the rear-panel D-type connector is plugged to P1.

Sync Src Selects the sync source for the AES/EBU output. *The* **Generator** *position is allowed for MasterSync units only.* Default setting: **Sync Input**.

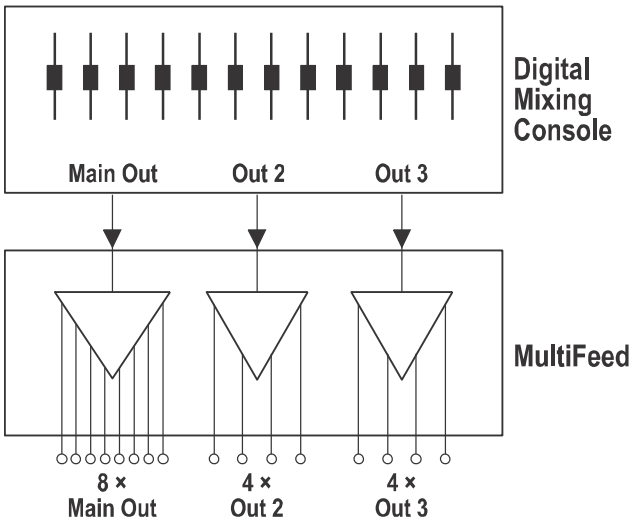
SFC ON / OFF Individually enables the sampling frequency converters (SFC) for each of the monitored **AES IN 1-4** inputs. Default setting: **SFC OFF**.
The SFCs in the four redundant signal paths **AES AUX IN 1-4** *are always enabled.*

4 APPLICATIONS

4.1 Digital Mixing Console

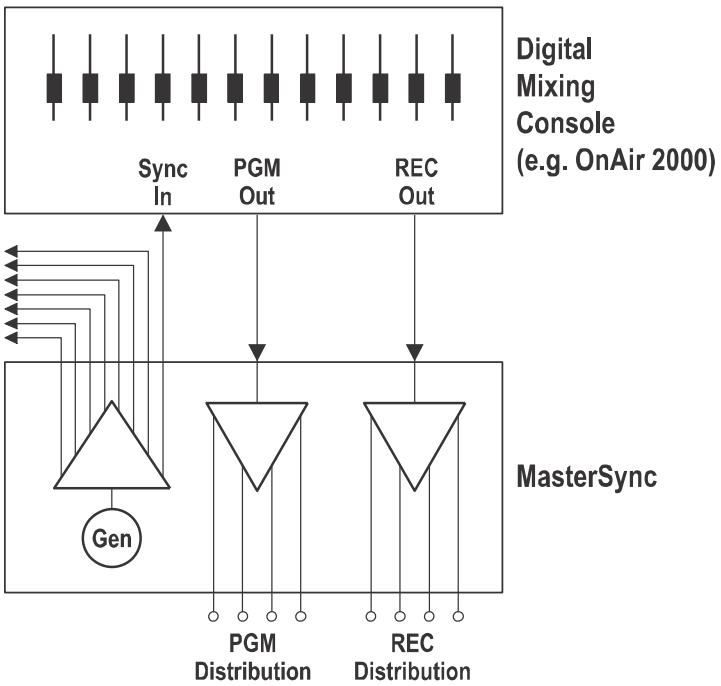
MultiFeed

In most applications, the different output signals of a digital console have to be distributed to different targets. For example, the main output has to be distributed to the master control room, to a digital harddisk workstation, and to several other recording devices.
As the outputs of a MultiFeed can be configured in such a way that they distribute different signals, it is possible to use eight of them for the distribution of the main output, and four of them each for two other signals, such as AUX outputs or a second master output.



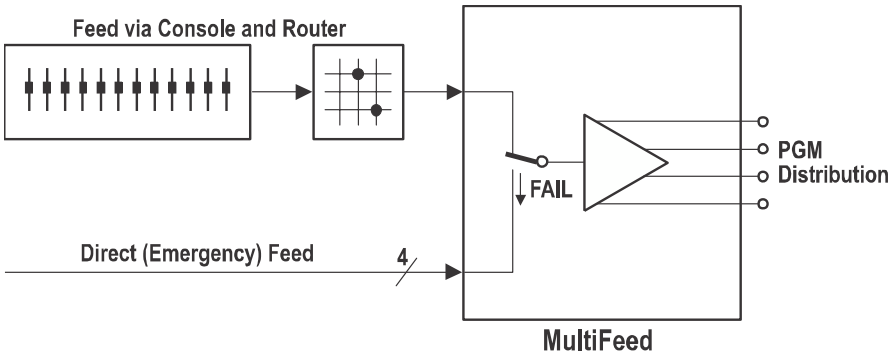
MasterSync

In some installations with digital mixing consoles, a sync signal must be generated and distributed to some peripheral devices, such as recording or playback units. Eight of the MasterSync's outputs may be configured in such a way that they are used for distributing the sync signal generated internally.



4.2 Emergency Feeds

Each of the MultiFeed's inputs can be equipped with an additional input when using the redundancy input option. It automatically switches over to the corresponding redundancy input if one or more of the main inputs do not receive a valid AES/EBU signal. Thus, important outputs (such as program feeds) can be made very reliable.
In the given example, the MultiFeed will switch over to the emergency feeds in the same moment when the program feed via console and router is interrupted. This ensures that the important system outputs will never be without a signal.



5 DIAGRAMS

D21 MultiFeed / MasterSync Assemblies	Order No.
Sync Generator PCB	1.680.060
Distributor PCB	1.680.065
Redundancy Input PCB (Option)	1.680.040