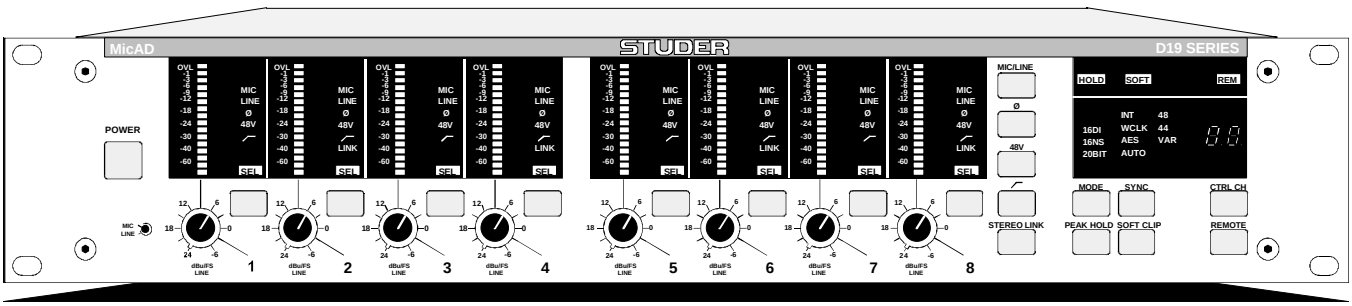
STUDER

D19 series

D19 MicAD

8-Channel Mic/Line Preamplifier with Digital Outputs

Betriebsanleitung
Operating Instructions



Prepared and edited by:
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Printed in Switzerland
Order no. 10.27.3781 (Ed. 0996)

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CAUTION
RISK OF ELECTRIC SHOCK
DO NOT OPEN

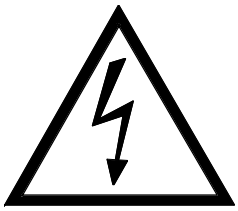
ATTENTION
RISQUE DE CHOC ELECTRIQUE
NE PAS OUVRIR

ACHTUNG
GEFAHR: ELEKTRISCHER SCHLAG
NICHT ÖFFNEN

To reduce the risk of electric shock, do not remove covers (or back). No user-serviceable parts inside. Refer servicing to qualified service personnel.

Afin de prévenir un choc électrique, ne pas enlever les couvercles (où l'arrière) de l'appareil. Il ne se trouve à l'intérieur aucune pièce pouvant être réparée par l'usager.

Um die Gefahr eines elektrischen Schlages zu vermeiden, entfernen Sie keine Geräteabdeckungen (oder die Rückwand). Überlassen Sie Wartung und Reparatur qualifiziertem Fachpersonal.



This symbol is intended to alert the user to presence of uninsulated "**dangerous voltage**" within the apparatus that may be of sufficient magnitude to constitute a risk of electric shock to a person.

Ce symbole indique à l'utilisateur qu'il existent à l'intérieur de l'appareil des "**tensions dangereuses**". Ces tensions élevées entrainent un risque de choc électrique en cas de contact.

Dieses Symbol deutet dem Anwender an, dass im Geräteinnern die Gefahr der Berührung von "**gefährlicher Spannung**" besteht. Die Grösse der Spannung kann zu einem elektrischen Schlag führen.



This symbol is intended to alert the user to the presence of **important instructions** for operating and maintenance in the enclosed documentation.

Ce symbole indique à l'utilisateur que la documentation jointe contient **d'importantes instructions** concernant le fonctionnement et la maintenance.

Dieses Symbol deutet dem Anwender an, dass die beigelegte Dokumentation **wichtige Hinweise** für Betrieb und Wartung enthält.

CAUTION: Lithium battery. Danger of explosion by incorrect handling. Replace by battery of the same make and type only.

ATTENTION: Pile au lithium. Danger d'explosion en cas de manipulation incorrecte. Ne remplacer que par un modèle de même type.

ACHTUNG: Explosionsgefahr bei unsachgemässem Auswechseln der Lithiumbatterie. Nur durch den selben Typ ersetzen.

ADVARSEL: Lithiumbatterei. Eksplosinsfare. Udskinftning ma kun foretages af en sagkyndig of som beskrevet i servicemanualen (DK).

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FIRST AID

(in case of electric shock)

1. Separate the person as quickly as possible from the electric power source:
- by switching off the equipment
- or by unplugging or disconnecting the mains cable
- pushing the person away from the power source by using dry insulating material (such as wood or plastic).
- *After having sustained an electric shock, always consult a doctor.*

PREMIERS SECOURS

(en cas d'électrocution)

1. Si la personne est dans l'impossibilité de se libérer:

- Couper l'interrupteur principal
- Couper le courant

- Repousser la personne de l'appareil à l'aide d'un objet en matière non conductrice (matière plastique ou bois)
- *Après une électrocution, toujours consulter un médecin.*

ERSTE HILFE

(bei Stromunfällen)

1. Bei einem Stromunfall die betroffene Person so rasch wie möglich vom Strom trennen:
- Ausschalten des Gerätes
- Ziehen oder Unterbrechen der Netzzuleitung
- Betroffene Person mit isoliertem Material (Holz, Kunststoff) von der Gefahrenquelle wegstossen

- *Nach einem Stromunfall sollte immer ein Arzt aufgesucht werden.*

WARNING!

DO NOT TOUCH THE PERSON OR HIS CLOTHING BEFORE THE POWER IS TURNED OFF, OTHERWISE YOU STAND THE RISK OF SUSTAINING AN ELECTRIC SHOCK AS WELL!

2. If the person is unconscious:

- check the pulse,
- reanimate the person if respiration is poor,
- lay the body down, turn it to one side, call for a doctor immediately.

ATTENTION!

NE JAMAIS TOUCHER UNE PERSONNE QUI EST SOUS TENSION, SOUS PEINE DE SUBIR EGALEMENT UNE ELECTROCUTION.

2. En cas de perte de connaissance de la personne électrocutée:
- Controller le pouls
- Si nécessaire, pratiquer la respiration artificielle
- Placer l'accidenté sur le flanc et consulter un médecin.

ACHTUNG!

EINE UNTER SPANNUNG STEHENDE PERSON DARF NICHT BERÜHRT WERDEN. SIE KÖNNEN DABEI SELBST ELEKTRISIERT WERDEN!

2. Bei Bewusstlosigkeit des Verunfallten:
- Puls kontrollieren,
- bei ausgesetzter Atmung künstlich beatmen,
- Seitenlagerung des Verunfallten vornehmen und Arzt verständigen.

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Installation

Vor der Installation des Gerätes müssen die hier aufgeführten und auch die weiter in dieser Anleitung mit ⚠ bezeichneten Hinweise gelesen und während der Installation und des Betriebes beachtet werden.
Untersuchen Sie das Gerät und sein Zubehör auf allfällige Transportschäden.
Ein Gerät, das mechanische Beschädigung aufweist oder in welches Flüssigkeit oder Gegenstände eingedrungen sind, darf nicht ans Netz angeschlossen oder muss sofort durch Ziehen des Netzsteckers vom Netz getrennt werden. Das Öffnen und Instandsetzen des Gerätes darf nur von Fachpersonal unter Einhaltung der geltenden Vorschriften durchgeführt werden.

Falls dem Gerät kein konfektioniertes Netzkabel beiliegt, muss dieses durch eine Fachperson unter Verwendung der mitgelieferten Kabel-Gerätedose IEC320/C13 oder IEC320/C19 und unter Berücksichtigung der einschlägigen, im geweiligen Lande geltenden Bestimmungen angefertigt werden; siehe unten.
Vor Anschluss des Netzkabels an die Netzsteckdose muss überprüft werden, ob die Stromversorgungs- und Anschlusswerte des Gerätes (Netzspannung, Netzfrequenz) innerhalb der erlaubten Toleranzen liegen. Die im Gerät eingesetzten Sicherungen müssen den am Gerät angebrachten Angaben entsprechen.
Ein Gerät mit einem dreipoligen Gerätestecker (Gerät der Schutzklasse I) muss an eine dreipolige Netzsteckdose angeschlossen und somit das Gerätegehäuse mit dem Schutzleiter der Netzinstallation verbunden werden (Für Dänemark gelten Starkstrombestimmungen, Abschnitt 107).

Installation

Before you install the equipment, please read and adhere to the following recommendations and all sections of these instructions marked with ⚠.

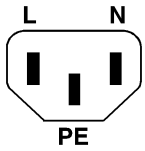
Check the equipment for any transport damage.

A unit that is mechanically damaged or which has been penetrated by liquids or foreign objects must not be connected to the AC power outlet or must be immediately disconnected by unplugging the power cable. Repairs must only be performed by trained personnel in accordance with the applicable regulations.

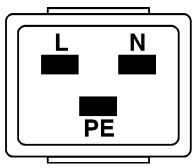
Should the equipment be delivered without a matching mains cable, the latter has to be prepared by a trained person using the attached female plug (IEC320/C13 or IEC320/C19) with respect to the applicable regulations in your country - see diagram below.

Before connecting the equipment to the AC power outlet, check that the local line voltage matches the equipment rating (voltage, frequency) within the admissible tolerance. The equipment fuses must be rated in accordance with the specifications on the equipment.

Equipment supplied with a 3-pole appliance inlet (equipment conforming to protection class I) must be connected to a 3-pole AC power outlet so that the equipment cabinet is connected to the protective earth conductor of the AC supply (for Denmark the Heavy Current Regulations, Section 107, are applicable).



IEC 320 / C13



IEC 320 / C19

Female plug (IEC320), view from contact side: L live; brown N neutral; blue PE protective earth; green and yellow	National American Standard:	Black White green
Connecteur femelle (IEC320), vue de la face aux contacts: L phase; brun N neutre; bleu PE terre protective; vert et jaune	Standard national américain:	Noir Blanc Vert
Ansicht auf Steckkontakte der Kabel-Gerätesteckdose (IEC320): L Phase; braun N Nulleiter; blau PE Schutzleiter; gelb/grün	USA-Standard:	Schwarz Weiss grün

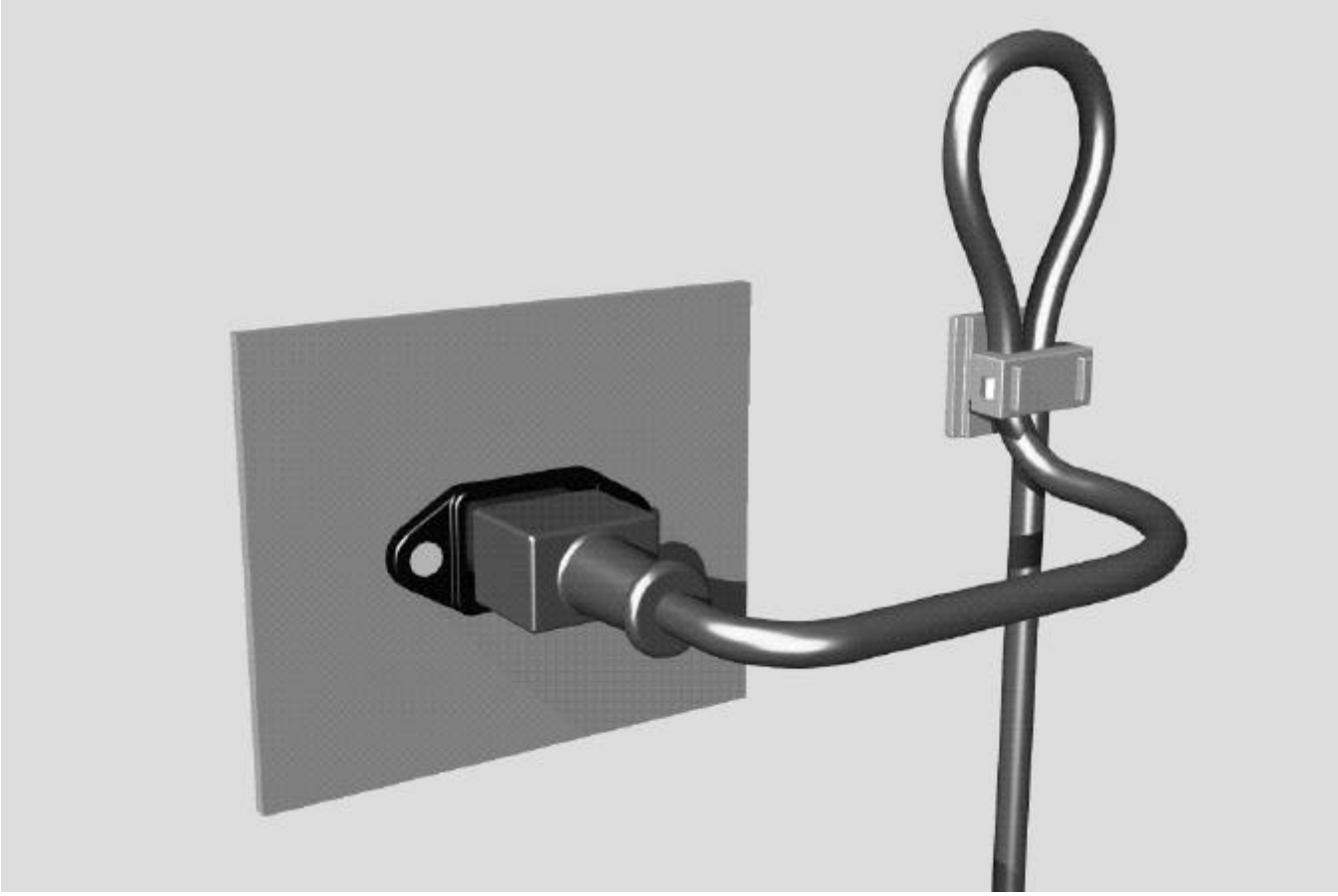
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Zugentlastung für den Netzanschluss

Zum Verankern von Steckverbindungen ohne mechanische Verriegelung (z.B. IEC-Kaltgerätedosen) empfehlen wir die folgende Anordnung:

Mains connector strain relief

For anchoring connectors without a mechanical lock (e.g. IEC mains connectors), we recommend the following arrangement:



Vorgehen: Der mitgelieferte Kabelhalter ist selbstklebend. Bitte beachten Sie bei der Montage die folgenden Regeln:

1. Der Untergrund muss sauber, trocken und frei von Fett, Öl und anderen Verunreinigungen sein. Temperaturbereich für optimale Verklebung: 20...40° C.
2. Entfernen Sie die Schutzfolie auf der Rückseite des Kabelhalters und bringen sie ihn mit kräftigem Druck an der gewünschten Stelle an. Lassen sie ihn unbelastet so lange wie möglich ruhen – die maximale Klebekraft ist erst nach rund 24 Stunden erreicht.
3. Die Stabilität des Kabelhalters wird erhöht, wenn Sie ihn zusätzlich verschrauben. Zu diesem Zweck liegen ihm eine selbstschneidende Schraube sowie eine M4-Schraube mit Mutter bei.
4. Legen Sie das Kabel gemäss Figur in den Halter ein und pressen Sie die Klemme kräftig auf, bis das Kabel fixiert ist.

Procedure: The cable clamp shipped with your unit is auto-adhesive. If mounting, please follow the rules below:

1. The surface to be adhered to must be clean, dry, and free from grease, oil or other contaminants. Best application temperature range is 20...40° C.
2. Remove the plastic protective backing from the rear side of the clamp and apply it firmly to the surface at the desired position. Allow as much time as possible for curing. The bond continues to develop for as long as 24 hours.
3. For improved stability, the clamp can be fixed with a screw. For this purpose, a self-tapping screw and an M4 bolt and nut are included.
4. Place the cable into the clamp as shown in the illustration above and firmly press down the internal top cover until the cable is fixed.

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Lufttemperatur und Feuchtigkeit

Allgemein

Die Betriebstauglichkeit des Gerätes oder Systems ist unter folgenden Umgebungsbedingungen gewährleistet:
EN 60721-3-3, Set IE32, Wert 3K3.
Diese Norm umfasst einen umfassenden Katalog von Parametern; die wichtigsten davon sind: Umgebungstemperatur +5...+40 °C; rel. Luftfeuchtigkeit 5...85% – d.h. weder Kondensation noch Eisbildung; abs. Luftfeuchtigkeit 1...25 g/m³; Temperatur-Änderungsrate < 0,5 °C/min. In den folgenden Abschnitten wird darauf näher eingegangen.
Unter den genannten Bedingungen startet und arbeitet das Gerät oder System problemlos. Ausserhalb dieser Spezifikationen möglicherweise auftretende Probleme sind in den folgenden Abschnitten beschrieben.

Umgebungstemperatur

Geräte und Systeme von Studer sind allgemein für einen Umgebungstemperaturbereich (d.h. Temperatur der eintretenden Kühlluft) von +5...+40 °C ausgelegt. Bei Installation in einem Schrank muss der vorgesehene Luftdurchsatz und dadurch die Konvektionskühlung gewährleistet sein. Folgende Tatsachen sind dabei zu berücksichtigen:
1. Die zulässige Umgebungstemperatur für den Betrieb der Halbleiter-Bauelemente beträgt 0 °C bis +70 °C (commercial temperature range for operation).
2. Der Luftdurchsatz der Anlage muss gewährleisten, dass die austretende Kühlluft ständig kühler ist als 70 °C.
3. Die mittlere Erwärmung der Kühlluft soll 20 K betragen, die maximale Erwärmung an den heissen Komponenten darf somit um weitere 10 K höher liegen.
4. Zum Abführen einer Verlustleistung von 1 kW bei dieser zulässigen mittleren Erwärmung ist eine Luftmenge von 2,65 m³/min notwendig.
Beispiel: Für ein Rack mit einer Leistungsaufnahme *P = 800 W* ist eine Kühlluftmenge von *0,8 * 2,65 m³/min* nötig, entsprechend *2,12 m³/min.*
5. Soll die Kühlfunktion der Anlage (z.B. auch bei Lüfter-Ausfall oder Bestrahlung durch Spotlampen) überwacht werden, so ist die Temperatur der Abluft unmittelbar oberhalb der Einschübe an mehreren Stellen im Rack zu messen; die Ansprechtemperatur der Sensoren soll 65 bis 70 °C betragen.

Reif und Tau

Das unversiegelte System (Steckerpartien, Halbleiteranschlüsse) verträgt zwar leichte Eisbildung (Reif). Mit blossem Auge sichtbare Betauung führt jedoch bereits zu Funktionsstörungen.
In der Praxis kann mit einem zuverlässigen Betrieb der Geräte bereits im Temperaturbereich ab –15 °C gerechnet werden, wenn für die Inbetriebnahme des kalten Systems die folgende allgemeine Regel beachtet wird:
Wird die Luft im System abgekühlt, so steigt ihre relative Feuchtigkeit an. Erreicht diese 100%, kommt es zu Niederschlag, meist in der Grenzschicht zwischen der Luft und einer kühleren Oberfläche, und somit zur Bildung von Eis oder Tau an empfindlichen Systemstellen (Kontakte, IC-Anschlüsse etc.). Ein störungsfreier Betrieb mit interner Betauung, unabhängig von der Temperatur, ist nicht gewährleistet.

Air temperature and humidity

General

Normal operation of the unit or system is warranted under the following ambient conditions defined by:
EN 60721-3-3, set IE32, value 3K3.
This standard consists of an extensive catalogue of parameters, the most important of which are: ambient temperature +5... +40° C, relative humidity 5...85% – i.e. no formation of condensation or ice; absolute humidity 1...25 g/m³; rate of temperature change < 0,5 °C/min. These parameters are dealt with in the following paragraphs.
Under these conditions the unit or system starts and works without any problem. Beyond these specifications, possible problems are described in the following sections.

Ambient temperature

Units and systems by Studer are generally designed for an ambient temperature range (i.e. temperature of the incoming air) of +5...+40 °C. When rack mounting the units, the intended air flow and herewith adequate cooling must be provided. The following facts must be considered:

1. The admissible ambient temperature range for operation of the semiconductor components is 0 °C to +70 °C (commercial temperature range for operation).
2. The air flow through the installation must provide that the outgoing air is always cooler than 70 °C.
3. Average heat increase of the cooling air shall be 20 K, allowing for an additional maximum 10 K increase at the hot components.
4. In order to dissipate 1 kW with this admissible average heat increase, an air flow of 2,65 m³/min is required.

Example: A rack dissipating *P = 800 W* requires an air flow of *0,8 * 2,65 m³/min* which corresponds to *2,12 m³/min.*

5. If the cooling function of the installation must be monitored (e.g. for fan failure or illumination with spot lamps), the outgoing air temperature must be measured directly above the modules at several places within the rack. The trigger temperature of the sensors should be 65 to 70 °C.

Frost and dew

The unsealed system parts (connector areas and semiconductor pins) allow for a minute formation of ice or frost. However, formation of dew visible with the naked eye will already lead to malfunctions. In practice, reliable operation can be expected in a temperature range above –15 °C, if the following general rule is considered for putting the cold system into operation:

If the air within the system is cooled down, the relative humidity rises. If it reaches 100%, condensation will arise, usually in the boundary layer between the air and a cooler surface, together with formation of ice or dew at sensitive areas of the system (contacts, IC pins, etc.). Once internal condensation occurs, troublefree operation cannot be guaranteed, independent of temperature.

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Vor der Inbetriebnahme muss das System auf allfällige interne Betauung oder Eisbildung überprüft werden. Nur bei sehr leichter Eisbildung kann mit direkter Verdunstung (Sublimation) gerechnet werden; andernfalls muss das System im abgeschalteten Zustand gewärmt und getrocknet werden.
Das System ohne feststellbare interne Eisbildung oder Betauung soll möglichst homogen (und somit langsam) mit eigener Wärmeleistung aufgewärmt werden; die Lufttemperatur der Umgebung soll ständig etwas tiefer als diejenige der Systemabluft sein.
Ist es unumgänglich, das abgekühlte System sofort in warmer Umgebungsluft zu betreiben, so muss diese entfeuchtet sein. Die absolute Luftfeuchtigkeit muss dabei so tief sein, dass die relative Feuchtigkeit, bezogen auf die kälteste Oberfläche im System, immer unterhalb 100% bleibt.
Es ist dafür zu sorgen, dass beim Abschalten des Systems die eingeschlossene Luft möglichst trocken ist (d.h. vor dem Abschalten im Winter den Raum mit kalter, trockener Luft belüften und feuchte Gegenstände, z.B. Kleider, entfernen).
Die Zusammenhänge sind im folgenden Klimatogramm ersichtlich. Zum kontrollierten Verfahren gehören Thermometer und Hygrometer sowie ein Thermometer innerhalb des Systems.
Beispiel 1: Ein Ü-Wagen mit einer Innentemperatur von 20 °C und 40% relativer Luftfeuchtigkeit wird am Abend abgeschaltet. Sinkt die Temperatur unter +5 °C, bildet sich Tau oder Eis.
Beispiel 2: Ein Ü-Wagen wird morgens mit 20 °C warmer Luft von 40% relativer Luftfeuchtigkeit aufgewärmt. Auf Teilen, die kälter als +5 °C sind, bildet sich Tau oder Eis.

Before putting into operation, the system must be checked for internal formation of condensation or ice. Only with a minute formation of ice, direct evaporation (sublimation) may be expected; otherwise the system must be heated and dried while switched off.
A system without visible internal formation of ice or condensation should be heated up with its own heat dissipation, as homogeneously (and subsequently as slow) as possible; the ambient temperature should then always be lower than the outgoing air.
If it is absolutely necessary to operate the system immediately within warm ambient air, this air must be dehydrated. In such a case, the absolute humidity must be so low that the relative humidity, related to the coldest system surface, always remains below 100%.
Ensure that the enclosed air is as dry as possible when powering off (i.e. before switching off in winter, aerate the room with cold, dry air, and remove humid objects as clothes from the room).
These relationships are visible from the following climatogram. For a controlled procedure, thermometer and hygrometer as well as a thermometer within the system will be required.

Example 1: An OB-van having an internal temperature of 20 °C and rel. humidity of 40% is switched off in the evening. If temperature falls below +5 °C, dew or ice will be forming.
Example 2: An OB-van is heated up in the morning with air of 20 °C and a rel. humidity of 40%. On all parts being cooler than +5 °C, dew or ice will be forming.

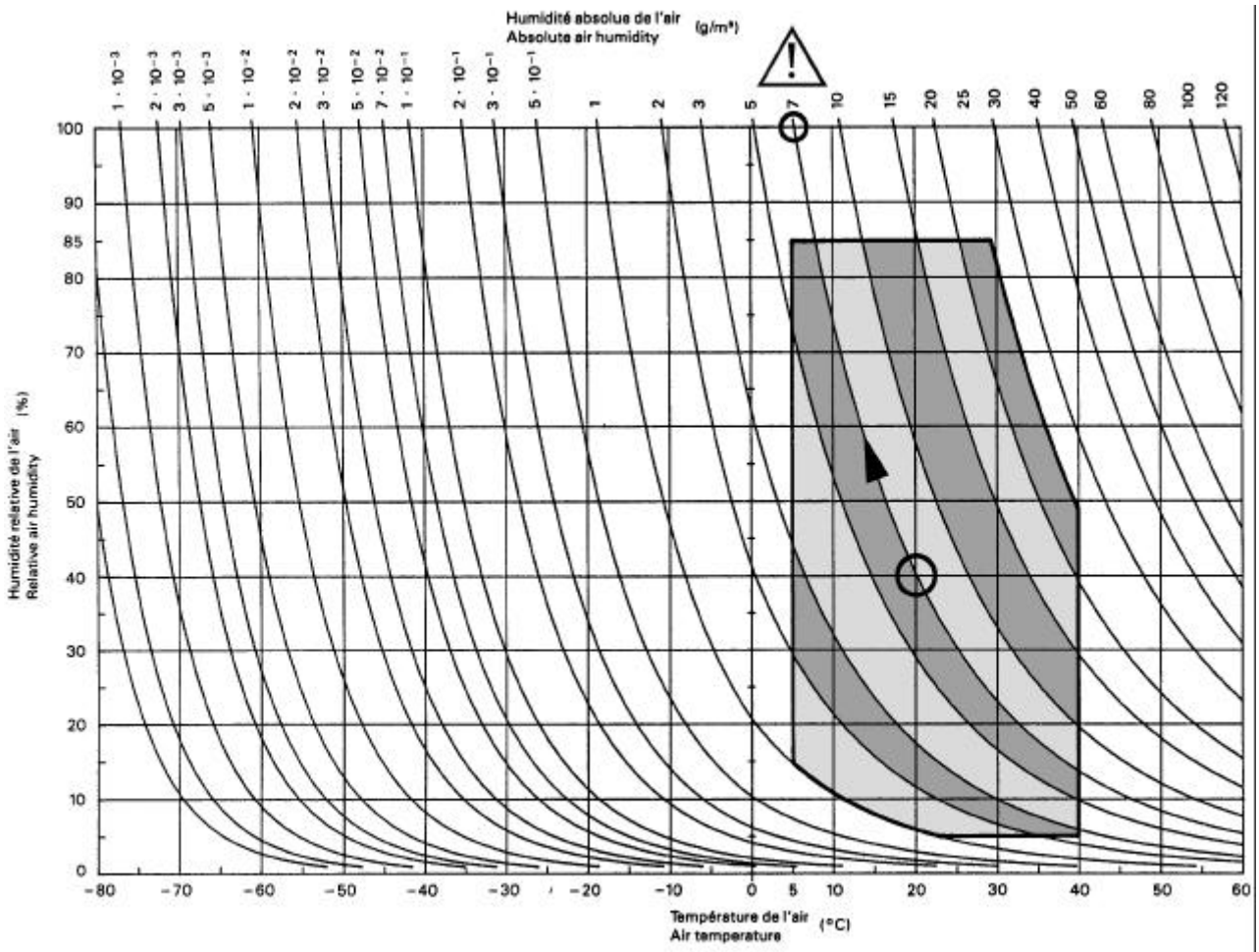


Figure B.3 – Climatogramme pour catégorie 3K3
Climatogram for class 3K3

721-3-3 © CEI:1994

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Wartung und Reparatur

Durch Entfernen von Gehäuseteilen, Abschirmungen etc. werden stromführende Teile freigelegt. Deshalb müssen u.a. die folgenden Grundsätze beachtet werden:
Eingriffe in das Gerät dürfen nur von Fachpersonal unter Einhaltung der geltenden Vorschriften vorgenommen werden.
Vor Entfernen von Gehäuseteilen muss das Gerät ausgeschaltet und vom Netz getrennt werden.
Bei geöffnetem, vom Netz getrenntem Gerät dürfen Teile mit gefährlichen Ladungen (z. B. Kondensatoren, Bildröhren) erst nach kontrollierter Entladung, heiße Bauteile (Leistungshalbleiter, Kühlkörper etc.) erst nach deren Abkühlen berührt werden.

Bei Wartungsarbeiten am geöffneten, unter Netzspannung stehenden Gerät dürfen blanke Schaltungsteile und metallene Halbleitergehäuse weder direkt noch mit nichtisoliertem Werkzeug berührt werden.
Zusätzliche Gefahren bestehen bei unsachgemässer Handhabung besonderer Komponenten:

- *Explosionsgefahr* bei Lithiumzellen, Elektrolyt-Kondensatoren und Leistungshalbleitern
- *Implosionsgefahr* bei evakuierten Anzeigeeinheiten
- *Strahlungsgefahr* bei Lasereinheiten (nichtionisierend), Bildröhren (ionisierend)
- *Verätzungsgefahr* bei Anzeigeeinheiten (LCD) und Komponenten mit flüssigem Elektrolyt.

Solche Komponenten dürfen nur von ausgebildetem Fachpersonal mit den vorgeschriebenen Schutzmitteln (u.a. Schutzbrille, Handschuhe) gehandhabt werden.

Maintenance and Repair

The removal of housing parts, shields, etc. exposes energized parts. For this reason the following precautions should be observed:
Maintenance should only be performed by trained personnel in accordance with the applicable regulations.
The equipment should be switched off and disconnected from the AC power outlet before any housing parts are removed.
Even if the equipment is disconnected from the power, parts with hazardous charges (e.g. capacitors, picture tubes) must not be touched until they have been properly discharged. Touch hot components (power semiconductors, heat sinks, etc.) only when cooled off.

If maintenance is performed on a unit that is opened and switched on, no uninsulated circuit components and metallic semiconductor housings must be touched neither with your bare hands nor with uninsulated tools.
Certain components pose additional hazards:

- *Explosion hazard* from lithium batteries, electrolytic capacitors and power semiconductors
- *Implosion hazard* from evacuated display units
- *Radiation hazard* from laser units (non-ionizing), picture tubes (ionizing)
- *Caustic effect* of display units (LCD) and such components containig liquid electrolyte.

Such components should only be handled by trained personnel who are properly protected (e.g. safety goggles, gloves).

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Elektrostatische Entladung (ESD) bei Wartung und Reparatur



ATTENTION: Observe precautions for handling devices sensitive to electrostatic discharge!

ATTENTION: Respecter les précautions d'usage concernant la manipulation de composants sensibles à l'électricité statique!

ACHTUNG: Vorsichtsmassnahmen bei Handhabung elektrostatisch entladungsgefährdeter Bauelemente beachten!

Viele ICs und andere Halbleiter sind empfindlich gegen elektrostatische Entladung (ESD). Unfachgerechte Behandlung von Baugruppen mit solchen Komponenten bei Wartung und Reparatur kann deren Lebensdauer drastisch vermindern.
Bei der Handhabung der ESD-empfindlichen Komponenten sind u.a. folgende Regeln zu beachten:

- ESD-empfindliche Komponenten dürfen ausschliesslich in dafür bestimmten und bezeichneten Verpackungen gelagert und transportiert werden.
- Unverpackte, ESD-empfindliche Komponenten dürfen nur in dafür eingerichteten Schutzzonen (EPA, z.B. Gebiet für Feldservice, Reparatur- oder Serviceplatz) gehandhabt und nur von Personen berührt werden, die durch ein Handgelenkband mit Seriewiderstand mit dem Massepotential des Reparatur- oder Serviceplatzes verbunden sind. Das gewartete Gerät wie auch Werkzeug, Hilfsmittel, EPA-taugliche (elektrisch halbleitende) Arbeits-, Ablage- und Bodenmatten müssen ebenfalls mit diesem Potential verbunden sein.
- Die Anschlüsse der ESD-empfindlichen Komponenten dürfen unkontrolliert weder mit elektrostatisch aufladbaren (Gefahr von Spannungsdurchschlag), noch mit metallischen Oberflächen (Schockentladungsgefahr) in Berührung kommen.
- Um undefinierte transiente Beanspruchung der Komponenten und deren eventuelle Beschädigung durch unerlaubte Spannung oder Ausgleichsströme zu vermeiden, dürfen elektrische Verbindungen nur am abgeschalteten Gerät und nach dem Abbau allfälliger Kondensatorladungen hergestellt oder getrennt werden.

Electrostatic Discharge (ESD) during Maintenance and Repair

Many ICs and semiconductors are sensitive to electrostatic discharge (ESD). The life of components containing such elements can be drastically reduced by improper handling during maintenance and repair work.

Please observe the following rules when handling ESD sensitive components:

- ESD sensitive components should only be stored and transported in the packing material specifically provided for this purpose.
- Unpacked ESD sensitive components should only be handled in ESD protected areas (EPA, e.g. area for field service, repair or service bench) and only be touched by persons who wear a wristlet that is connected to the ground potential of the repair or service bench by a series resistor. The equipment to be repaired or serviced and all tools, aids, as well as electrically semiconducting work, storage and floor mats should also be connected to this ground potential.

- The terminals of ESD sensitive components must not come in uncontrolled contact with electrostatically chargeable (voltage puncture) or metallic surfaces (discharge shock hazard).

- To prevent undefined transient stress of the components and possible damage due to inadmissible voltages or compensation currents, electrical connections should only be established or separated when the equipment is switched off and after any capacitor charges have decayed.

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SMD-Bauelemente

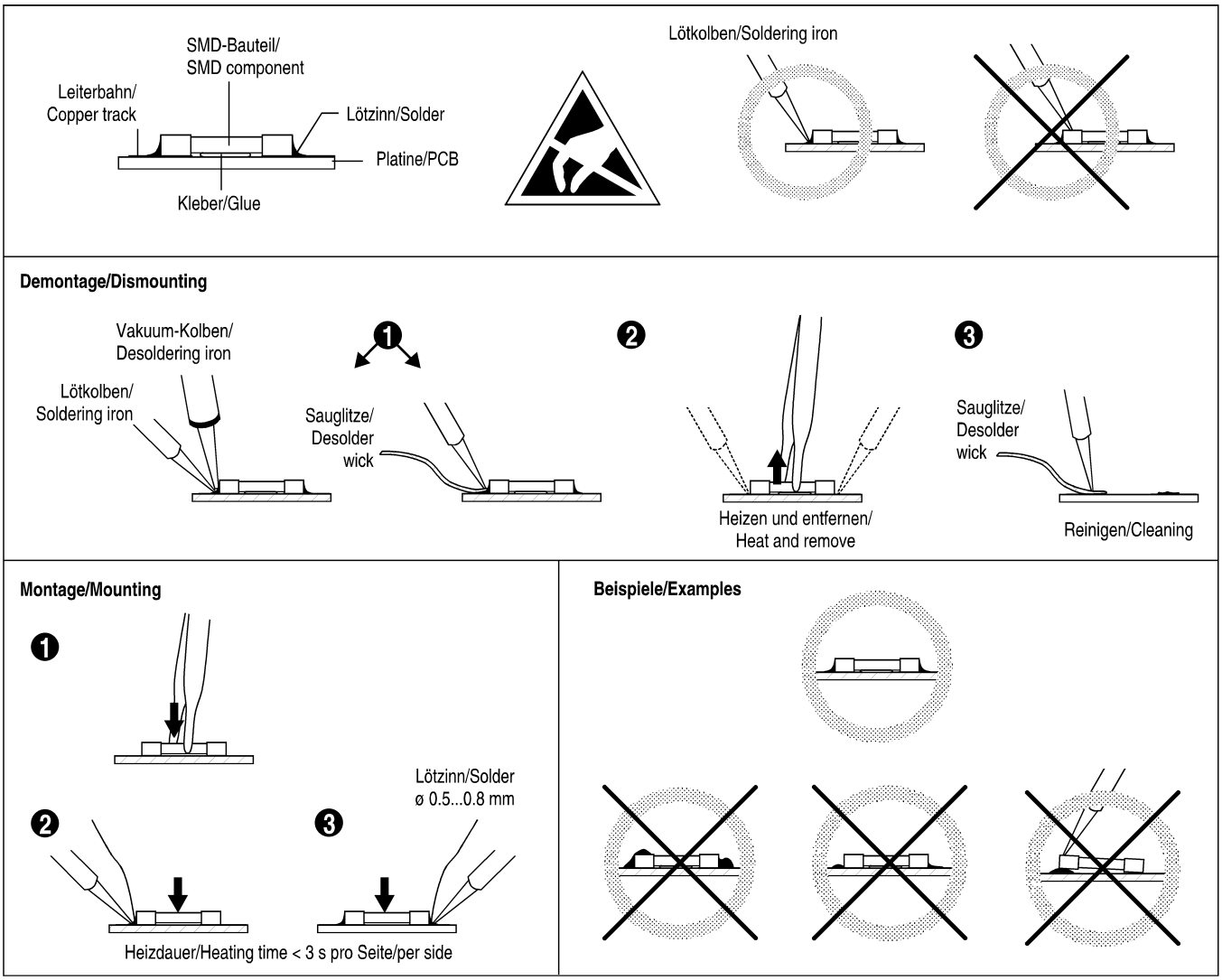
Der Austausch von SMD-Bauelementen ist ausschliesslich geübten Fachleuten vorbehalten. Für verwüstete Platinen können keine Ersatzansprüche geltend gemacht werden. Beispiele für korrekte und falsche SMD-Lötverbindungen in der Abbildung weiter unten.

Bei Studer werden keine handelsüblichen SMD-Teile bewirtschaftet. Für Reparaturen sind die notwendigen Bauteile lokal zu beschaffen. Die Spezifikationen von Spezialbauteilen finden Sie in der Serviceanleitung.

SMD Components

SMDs should only be replaced by skilled specialists. No warranty claims will be accepted for circuit boards that have been ruined. Proper and improper SMD soldering joints are depicted below.

Studer does not keep any commercially available SMDs in stock. For repair the corresponding devices should be purchased locally. The specifications of special components can be found in the service manual.



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Störstrahlung und Störfestigkeit

Das Gerät entspricht den Schutzanforderungen auf dem Gebiet elektromagnetischer Phänomene, wie u.a. in den Richtlinien 89/336/EWG und FCC, Part 15, aufgeführt:

1. Vom Gerät erzeugte elektromagnetische Strahlung ist soweit begrenzt, dass bestimmungsgemässer Betrieb anderer Geräte und Systeme möglich ist.
2. Das Gerät weist eine angemessene Festigkeit gegen elektromagnetische Störungen auf, so dass sein bestimmungsgemässer Betrieb möglich ist.

Das Gerät wurde getestet und erfüllt die Bedingungen der im Kapitel „Technische Daten“ aufgeführten EMV-Standards. Die Limiten dieser Standards gewährleisten mit angemessener Wahrscheinlichkeit sowohl den Schutz der Umgebung wie auch entsprechende Störfestigkeit des Gerätes. Absolute Garantie, dass keine unerlaubte elektromagnetische Beeinträchtigung während des Betriebes entsteht, ist jedoch nicht gegeben.

Um die Wahrscheinlichkeit solcher Beeinträchtigung weitgehend auszuschliessen, sind u.a. folgende Massnahmen zu beachten:

- Installieren Sie das Gerät gemäss den Angaben in der Betriebsanleitung, und verwenden Sie das mitgelieferte Zubehör.
- Verwenden Sie im System und in der Umgebung, in denen das Gerät eingesetzt ist, nur Komponenten (Anlagen, Geräte), die ihrerseits die Anforderungen der obenerwähnten Standards erfüllen.
- Sehen Sie ein Erdungskonzept des Systems vor, das sowohl die Sicherheitsanforderungen (die Erdung der Geräte gemäss Schutzklasse I mit einem Schutzleiter muss gewährleistet sein), wie auch die EMV-Belange berücksichtigt. Bei der Entscheidung zwischen stern- oder flächenförmiger bzw. kombinierter Erdung sind Vor- und Nachteile gegeneinander abzuwägen.
- Benutzen Sie abgeschirmte Kabel, wo vorgesehen. Achten Sie auf einwandfreie, grossflächige, korrosionsbeständige Verbindung der Abschirmung zum entsprechenden Steckeranschluss und dessen Gehäuse. Beachten Sie, dass eine nur an einem Ende angeschlossene Kabelabschirmung als Sende- bzw. Empfangsantenne wirken kann (z.B. bei wirksamer Kabellänge von 5 m oberhalb von 10 MHz), und dass die Flanken digitaler Kommunikationssignale hochfrequente Aussendungen verursachen (z.B. LS- oder HC-Logik bis 30 MHz).
- Vermeiden Sie Bildung von Masseschleifen oder vermindern Sie deren unerwünschte Auswirkung, indem Sie deren Fläche möglichst klein halten und den darin fliessenden Strom durch Einfügen einer Impedanz (z.B. Gleichtaktdrossel) reduzieren.

Electromagnetic Compatibility

The equipment conforms to the protection requirements relevant to electromagnetic phenomena that are listed in the guidelines 89/336/EC and FCC, part 15.

1. The electromagnetic interference generated by the equipment is limited in such a way that other equipment and systems can be operated normally.
2. The equipment is adequately protected against electromagnetic interference so that it can operate correctly.

The unit has been tested and conforms to the EMC standards applicable to residential, commercial and light industry, as listed in the section „Technical Data“. The limits of these standards reasonably ensure protection of the environment and corresponding noise immunity of the equipment. However, it is not absolutely warranted that the equipment will not be adversely affected by electromagnetic interference during operation.

To minimize the probability of electromagnetic interference as far as possible, the following recommendations should be followed:

- Install the equipment in accordance with the operating instructions. Use the supplied accessories.
- In the system and in the vicinity where the equipment is installed, use only components (systems, equipment) that also fulfill the above EMC standards.
- Use a system grounding concept that satisfies the safety requirements (protection class I equipment must be connected with a protective ground conductor) that also takes into consideration the EMC requirements. When deciding between radial, surface or combined grounding, the advantages and disadvantages should be carefully evaluated in each case.
- Use shielded cables where shielding is specified. The connection of the shield to the corresponding connector terminal or housing should have a large surface and be corrosion-proof. Please note that a cable shield connected only single-ended can act as a transmitting or receiving antenna (e.g. with an effective cable length of 5 m, the frequency is above 10 MHz) and that the edges of the digital communication signals cause high-frequency radiation (e.g. LS or HC logic up to 30 MHz).
- Avoid ground loops or reduce their adverse effects by keeping the loop surface as small as possible, and reduce the noise current flowing through the loop by inserting an additional impedance (e.g. common-mode rejection choke).

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Class A Equipment - FCC Notice

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide a reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Caution:
Any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment. Also refer to relevant information in this manual.

CE-Konformitätserklärung

Der Hersteller,

Studer Professional Audio AG,
CH-8105 Regensdorf,

erklärt in eigener Verantwortung, dass die Produkte

Studer D19 MicAD, 8-Channel Mic/Line Preamplifier with Digital Outputs (ab Serie-Nr. 101),
Studer D19 MicAD Stage, Remote Controlled 8-Channel Mic/Line Preamplifier with Digital Outputs (ab Serie-Nr. 1001),
Studer D19 MicAD Master, Remote Control (ab Serie-Nr. 1001),

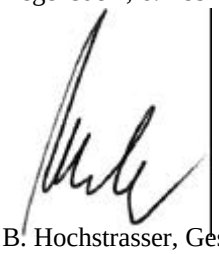
auf die sich diese Erklärung bezieht, entsprechend den Bestimmungen der EU-Richtlinien und Ergänzungen

- Elektromagnetische Verträglichkeit (EMV):
  89/336/EWG + 92/31/EWG + 93/68/EWG
- Niederspannung:
  73/23/EWG + 93/68/EWG

mit den folgenden Normen und normativen Dokumenten übereinstimmen:

- Sicherheit:
  Schutzklasse 1, EN 60950:1992 + A1/A2:1993
- EMV:
  EN 50081-1:1992, EN 50082:1992.

Regensdorf, 6. Februar 1996



B. Hochstrasser, Geschäftsleiter



P. Fiala, Leiter QS

CE Declaration of Conformity

The manufacturer,

Studer Professional Audio AG,
CH-8105 Regensdorf,

declares under his sole responsibility that the products

Studer D19 MicAD, 8-Channel Mic/Line Preamplifier with Digital Outputs (from serial no. 101),
Studer D19 MicAD Stage, Remote Controlled 8-Channel Mic/Line Preamplifier with Digital Outputs (from serial no. 1001),
Studer D19 MicAD Master, Remote Control (from serial no. 1001),

to which this declaration relates, according to following regulations of EU directives and amendments

- Electromagnetic Compatibility (EMC):
  89/336/EEC + 92/31/EEC + 93/68/EEC
- Low Voltage (LVD):
  73/23/EEC + 93/68/EEC

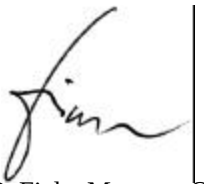
are in conformity with the following standards or other normative documents:

- Safety:
  Class 1, EN 60950:1992 + A1/A2:1993
- EMC:
  EN 50081-1:1992, EN 50082:1992.

Regensdorf, February 6, 1996



B. Hochstrasser, Managing director



P. Fiala, Manager QA

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Studer D19 MicAD

Corrigendum

Section “Technical specifications”

Please note the following correction in the technical specifications:

Crosstalk:
Line-Line/Mic-Mic
< –96 dB @ 1 kHz; **< –92 dB** @ 20 Hz...20 kHz

Kapitel “Technische Daten”

Bitte beachten Sie die folgende Korrektur der technischen Daten:

Übersprechen:
Line-Line/Mic-Mic
< –96 dB bei 1 kHz; **< –92 dB**, 20 Hz...20 kHz

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NEUE FUNKTION FÜR MICAD MASTER

Zum Begrenzen der Anzahl der Fernsteuerkanäle (d.h. der Anzahl der durch den MicAD MASTER gesteuerten Geräte) wurde eine neue Funktion implementiert. Bisher mussten zur Wahl des gewünschten Gerätes immer alle 16 Adressen «durchgeblättert» werden, auch wenn nur zwei oder drei Geräte am MicAD MASTER angeschlossen waren.

Zum Begrenzen der Anzahl der Fernsteuerkanäle gehen Sie wie folgt vor:

- CTRL CH-Taste so oft wie nötig drücken, damit im Display die gewünschte Anzahl ferngesteuerter Einheiten angezeigt wird.
- MODE-Taste drücken und festhalten, anschliessend SYNC-Taste drükken und festhalten, dann CTRL CH-Taste drücken.
  Danach wird beim Blättern mit der Taste CTRL CH nur bis zur gewählten Fernsteuerkanal-Nummer gezählt und anschliessend wieder bei 1 begonnen.

Ausschalten der Funktion:

- MODE-Taste drücken und festhalten, anschliessend SYNC-Taste drükken und festhalten, dann REMOTE-Taste drücken.
  Nun können wieder alle Fernsteuerkanäle mit der CTRL CH-Taste gewählt werden.

NEW FUNCTION FOR MICAD MASTER

For limiting the number of remote control channels (i.e. the number of units controlled by the MicAD MASTER), a new function has been created. Up to now, all 16 addresses had to be toggled through when selecting a particular unit for control, even if only two or three units were connected to the MicAD MASTER.

To limit the number of remote control channels, proceed as follows:

- Press the CTRL CH key as many times as required until the display indicates the desired number of units.
- Press and hold the MODE key, then press and hold the SYNC key, then press the CTRL CH key.
  After that, the display will count up only to the number entered before when toggling with the CTRL CH key, and then restarts with 1.

To cancel this function:

- Press and hold the MODE key, then press and hold the SYNC key, then press the REMOTE key.
  After that, all remote control channels can be accessed again when toggling with the CTRL CH key.

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CONTENTS

1 Come in! E1/1

1.1 Basic information E1/1

1.2 General E1/2

1.2.1 Scope of delivery E1/2

1.2.2 D19 MicAD versions E1/2

1.2.3 Options E1/2

1.2.4 Accessories E1/3

1.3 Safety and connections E1/4

1.3.1 Utilization for the purpose intended E1/4

1.3.2 Power connection E1/4

1.3.3 Connector panel E1/5

1.4 Technical specifications E1/6

1.4.1 Audio specifications E1/6

1.4.2 Peripheral connections E1/7

1.4.3 Power supply E1/7

1.4.4 Primary fuse E1/7

1.4.5 Operating conditions E1/7

1.4.6 Safety and EMC standards E1/7

1.4.7 Mechanical data MicAD/MicAD STAGE E1/8

1.4.8 Mechanical data MicAD MASTER E1/8

2 Operation E2/1

2.1 Operating elements E2/1

2.2 Audio and sync connections, pin assignments E2/5

2.2.1 Mic and line inputs E2/5

2.2.2 Digital outputs E2/5

2.2.3 External AES/EBU synchronization E2/5

2.2.4 Word clock in/out E2/5

2.2.5 Using the TDIF-1 8-channel interface E2/6

2.2.6 Using the optical ADAT 8-channel interface E2/7

2.3 Application ideas and examples E2/8

2.3.1 Wiring for external synchronization E2/10

2.4 Remote control E2/11

2.4.1 General, hardware E2/11

2.4.2 RS422 ..... E2/11

2.4.3 MIDI E2/13

2.4.4 Programming E2/15

2.4.4.1 Recognized MIDI messages E2/15

2.4.4.2 Control change E2/15

2.4.4.3 System exclusive E2/16

2.4.4.4 Transmitted MIDI messages E2/17

2.4.4.5 MicAD internal system status field E2/17

Heruntergeladen von manualslib.de Handbücher-Suchmaschiene

3 Additional information E3/1
3.1 What the heck is Noise Shaping? E3/1
3.2 Block diagrams E3/3
3.2.1 Global audio block diagram E3/3
3.2.2 Synchronization block diagram E3/3
4 Appendix: MIDI protocol ..... yellow pages

"ADAT" is a trade mark of Alesis Corporation.
"TDIF-1" is a trade mark of Tascam Corporation.

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1 COME IN!

We are happy to welcome you in the steadily growing circle of the Studer D19 MicAD's users, and we felicitate you on your selection. Thanks to Studer's experience collected during more than 40 years of business in the professional audio products field, you may expect that the performance of your new unit will fulfill your highest demands.

The MicAD is a simple, reliable, selfcontained eight-channel microphone preamplifier with digital outputs.

1.1 Basic information

MicAD combines the renowned low-distortion Studer transformer-balanced microphone inputs with high-performance 20 bit A/D converters.

For optimum sound quality even in 16 bit mode, DSP dithering and noise shaping are used instead of simple truncating.

MicAD features AES/EBU outputs plus a choice of TDIF-1 or optical ADAT format outputs.

Remote control is possible via the dedicated MicAD Master or via external equipment using MIDI-RS 422 or MIDI.

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1.2 General

1.2.1 Scope of delivery

The D19 MicAD is supplied with a power cord (or an IEC 320/C13 socket), a 2.5 mm hex-socket screwdriver, and this operating manual.

1.2.2 D19 MicAD versions

Order No.

D19 MicAD



Self-contained 8-channel Mic/Line preamplifier with digital outputs — **66.650.00000**

- 8 high-quality Mic/Line preamps with separate XLR inputs.
- 4 AES/EBU outputs on XLR.
- 20-bit high-performance A/D converters.
- Switchable DSP Dithering and Noise Shaping.
- Local or remote control of individual GAIN, MIC/LINE, Phase, 48 V Phantom Power and High-pass filter settings.
- Local or remote control of global Soft-clip, Mode, Sync, and Sampling Frequency settings.
- Built-in 100...240 V power supply.

D19 MicAD STAGE

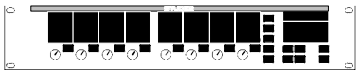


Remote controlled 8-channel Mic/Line preamplifier with digital outputs — **66.651.00000**

as D19 MicAD (above), except:

- Remote control for all functions of the unit.
- Front panel controls: Only Power switch, CTRL CH and REMOTE keys.

D19 MicAD MASTER



Dedicated remote controller for up to 16 MicAD units. — **66.653.00000**

1.2.3 Options

Order No.

Digital Audio Output Options:

ADAT Interface: **8-channel optical digital audio output card** — **1.650.050.20**

for connecting with the ADAT and compatible 8-channel recorders or other equipment featuring the ADAT standard connectors.

TDIF-1 Interface: **8-channel digital audio output card** — **1.650.052.20**

for connecting with the DA-88 and compatible 8-channel recorders or other equipment featuring the TDIF-1 standard connectors.

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Control Port Options:

MIDI Merge Module:	**For connection with MIDI compatible controllers** featuring MIDI In, Out, Thru, Return connectors for simple remote control daisy-chaining of up to 16 MicAD units.	**1.650.060.20**
MIDI RS422 Module:	**For connection with the MicAD MASTER or other RS422 compatible controllers** featuring In/Out and Thru/Return connectors for simple remote control daisy-chaining of up to 16 MicAD units.	**1.650.065.20**

1.2.4 Accessories

		Order No.
Accessories/Spares:	Kit, consisting of: • Mating XLR connectors (10 pcs. male, 4 pcs. female) • Mic/Line Gain knobs (2 pcs. each) • Rack mounting screws with washers (4 pcs. each) • Identification strip (1 pc.) • 9-pin D-Type connectors (2 pcs.)	**20.020.302.48**
Interface cables:	**ADAT/Alesis optical interface cable**, length 1.0 m	**10.325.010.00**
	ADAT/Alesis optical interface cable, length 5.0 m	**10.325.011.00**
	TDIF-1/Tascam interface cable "PW 88D", length 1.0 m	**F-10.025.031.08**
	TDIF-1/Tascam interface cable "PW 88D", length 5.0 m	**F-10.025.031.09**
	RS422 Remote control cable, length 15.0 m For interconnection between D19 MicAD MASTER and D19 MicAD STAGE or D19 MicAD units or other compatible RS422 controllers.	**1.023.745.81**
	RS422 Remote control cable, length 1.0 m For interconnection between several D19 MicAD STAGE or D19 MicAD units (or D19 MicAD MASTER, if required).	**1.023.754.00**

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1.3 Safety and connections

1.3.1 Utilization for the purpose intended

The Studer D19 MicAD 8-channel Mic/Line preamplifier is designed for professional use. It is presumed that the unit is 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" section at the very beginning of this manual.

1.3.2 Power connection

There is no need to select a specific mains voltage setting because the Studer D19 MicAD can be operated on mains voltages from 100 through 240 V_{AC}.

Caution!



Repair work may only be performed by a trained service technician. The primary fuse of the D19 MicAD must be replaced by a spare fuse of exactly the same type. The D19 MicAD must not be opened by the user because of the risk of a severe electric shock hazard!

Power cable

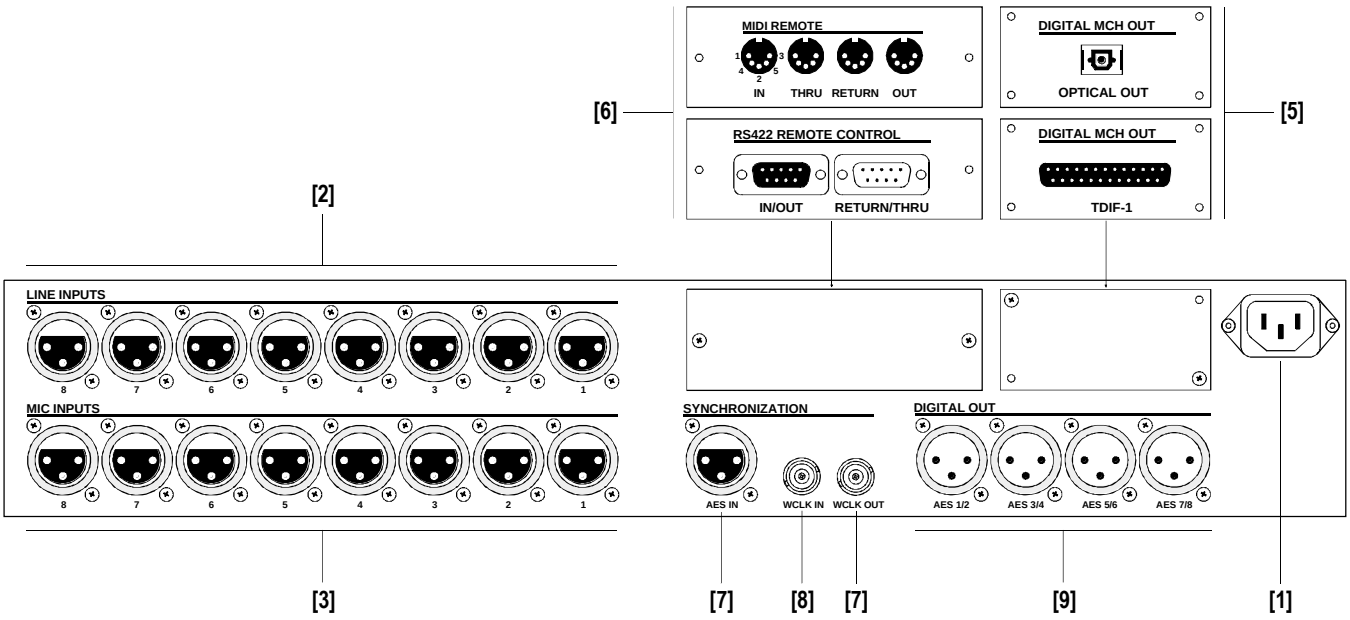


The supplied power socket has to be fitted with a mating power cable incl. plug by an electrician, if your local Studer agency or your dealer should not have added a fitting power cable.

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

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1.3.3 Connector panel



[1] AC POWER



Connector for socket IEC 320/C13.
Supply voltage range 100...240 V_{AC} (without voltage selector); mains frequency 50...60 Hz.
For connecting to the mains, please consult the Safety section at the very beginning of this manual.

[2] LINE INPUTS

Analog Line inputs on female XLR connectors. Sensitivity for full-scale input level of the A/D converter adjustable from –5 dBu to +24 dBu. Input impedance 11 kΩ, transformer-balanced.

[3] MIC INPUTS

Microphone inputs on female XLR connectors. Sensitivity for full-scale input level of the A/D converter adjustable from –49 dBu to +20 dBu. Input impedance 1 kΩ, transformer-balanced.

[4] DIGITAL OUT

AES/EBU Outputs on male XLR connectors, transformer-balanced. Output impedance 110 Ω.

[5] Optional Digital Outputs

TDIF-1 eight-channel format or optical ADAT eight-channel format.

[6] Remote Control Options

For installation of optional remote modules: Either MIDI-RS422 module or MIDI merge module .

[7] AES IN

Input for external synchronization via AES/EBU (female XLR connector).

[8] WCLK IN

Input for external Word Clock synchronization (BNC connector).

[9] WCLK OUT

Output of the Word Clock Sync signal (BNC connector).

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1.4 Technical specifications (subject to change without notice)

1.4.1 Audio specifications (all measurements at f_s = 48 kHz)

Frequency response:	Microphone	**20 Hz...20 kHz, ±0.4 dB**
	Line	**20 Hz...20 kHz, ±0.1 dB**
A/D converter:	Delta-Sigma, 64 × oversampling, resolution 20 bit, linear.	
Mic input noise figure:	typ.	**< 3.5** @ max. gain, 20 Hz...20 kHz, 24°C
Signal/noise ratio:	A/D converter	**> 106 dBFS**, CCIR 468-3
THD + Noise:	Line	**< –85 dBFS** @ 20 Hz...24 kHz, Full Scale
Crosstalk:	Line-Line/Mic-Mic	**< –96 dB** @ 1 kHz; **< –92 dB** @ 20 Hz...20 kHz
Analog inputs:	8 separate Mic and Line inputs on XLRs, transformer-balanced and floating. 8 dual concentric potentiometers for MIC/LINE Gain control. Functions selectable per channel: Phase, Phantom (Mic input only), High-pass filter (–3 dB @ 75 Hz, 12 dB/oct.; Mic input only). Stereo Link Control for adjacent channel pairs. Selectable for all channels simultaneously: Soft Clip.	

Input sensitivity range for Full Scale:

Mic	**–49...+20 dBu**
Line	**–5...+24 dBu**

Maximum input level (analogue):

Mic	**+20 dBu**
Line	**+24 dBu**

Interchannel gain deviation (stereo pairs):

Mic	**< 0.5 dB**
Line	**< 0.05 dB**

Input impedance:	Microphone	**1 kΩ**
	Line	**11 kΩ**
Metering:	PPM, peak program meter with switchable Peak Hold function; 16-segment bargraph displays, range –60 dBFS...Overload.	
Digital audio processing:	DC reject (always on) Output word length 20 bit, 16 bit with Dithering or 16 bit with Noise Shaping.	
Digital outputs:	4 AES/EBU outputs on XLRs, transformer-balanced and floating according to AES3-1992, ANSI S4.40-1992 Amplitude 2...5 V Impedance 110 Ω	
Optional outputs:	• TDIF-1 8-channel, 20 or 16 bit serial audio data with sampling frequency information; C-MOS level. • ADAT optical 8-channel format.	

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1.4.2 Peripheral connections

Synchronization/sampling rate:	Word Clock IN	30...54 kHz, TTL level, impedance 75 Ω
	Word Clock OUT	30...54 kHz, TTL level, impedance 75 Ω
	AES/EBU IN	30...54 kHz, transformer-balanced and floating, impedance 110 Ω, according to AES 11-1991
	Internal clock	44.1 kHz / 48 kHz
Remote control:	Control ports:	MIDI or MIDI-RS422 (optional)
	Device number:	1...16 or OMNI mode, settable on front panel
	Remote:	ON/OFF, selectable on front panel

1.4.3 Power supply

Mains voltage: 100...240 V_{AC}, 50...60 Hz

Current consumption: 0.5...0.25 A

Appliance inlet: IEC 320/C14

Primary fuse: T 2.0 A H 250 V UL, CSA

1.4.4 Primary fuse

Caution: The primary fuse is located inside the D19 MicAD/MicAD STAGE. Repair work may only be performed by a trained service technician. *The primary fuse of 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!

Spare fuse: T 2.0 A H 250 V UL, CSA (5 × 20 mm) Order No. 51.01.1022

1.4.5 Operating conditions

Ambient air temperature: **+10°...+40°C**

Relative humidity: **Category F (DIN 40040)**

1.4.6 Safety and EMC standards

Safety: **Protection class I according to EN 60950; 1992 + A1/A2; 1993 (UL 1950)**

EMC: Product family standard for audio, video, audio-visual, and entertainment lighting control apparatus for professional use.

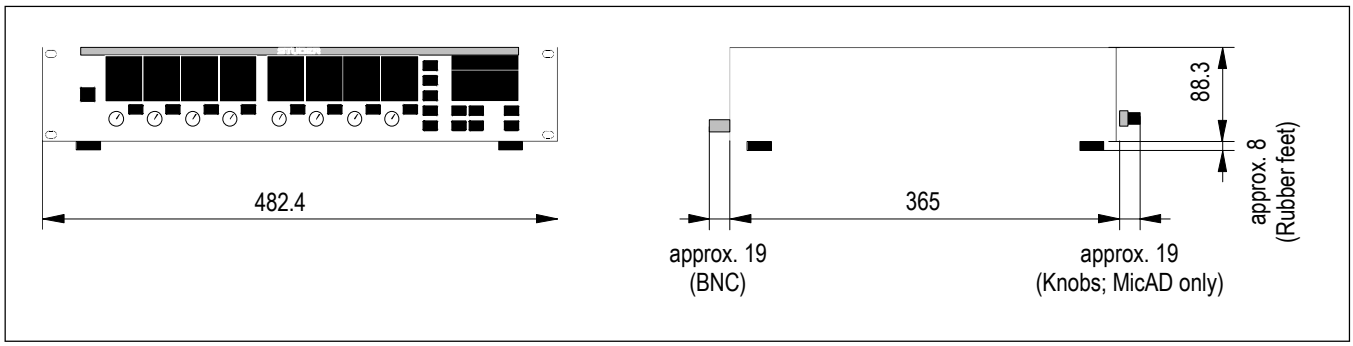
Emission:	**EN 50081-1; 1992**
Immunity:	**EN 50082-1; 1992**

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1.4.7 Mechanical data MicAD/MicAD STAGE

Weight: approx. 6 kg, all options installed.

Dimensions: [mm]

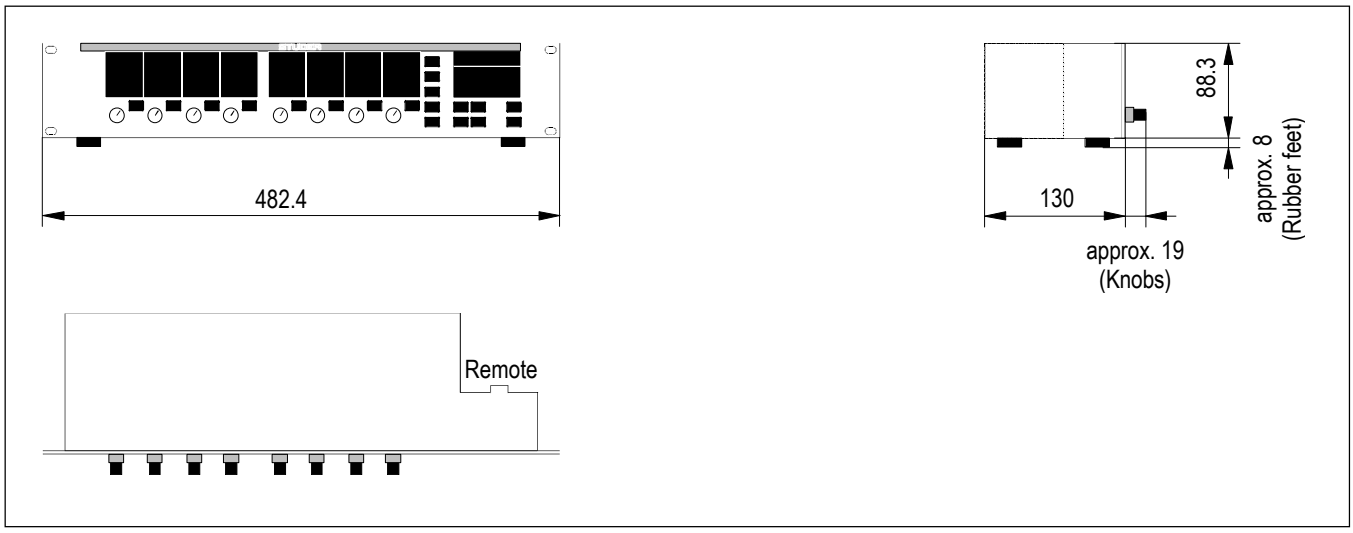


1.4.8 Mechanical data MicAD MASTER

MicAD MASTER can be installed into the meter panel section of Studer mixing consoles.

Weight: approx. 2.5 kg.

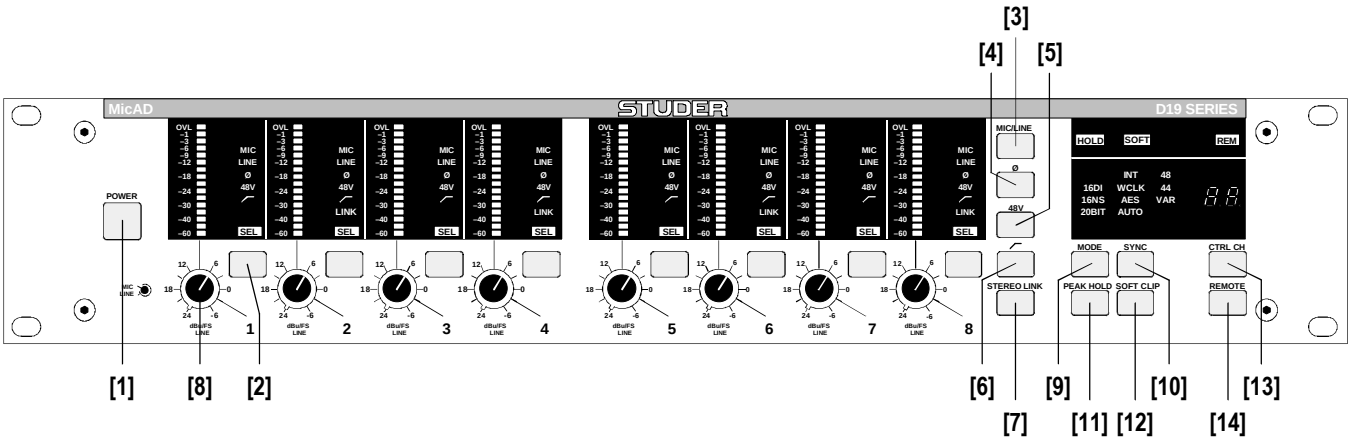
Dimensions: [mm]



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2 OPERATION

2.1 Operating elements



MicAD

[1] POWER Switches the unit on or off. The unit is ready to operate with the factory default settings. The subsequent settings remain stored in a Flash EPROM after switching the unit off (unit contains no battery).

CHANNEL FUNCTIONS: The following functions operate on individual channels:

[2] SEL Toggle key to select or deselect one or more of the eight channels to be operated on (Functions [3]...[7]). Multiple channel selection is possible by holding one of the SEL keys down and pressing several SEL keys successively.

[3] MIC/LINE Toggle key to select the MIC INPUT or LINE INPUT of the selected channel(s).

[4] Ø Toggle key to activate the phase reverse switch of the selected channel(s).

[5] 48 V Toggle key to activate the 48 V phantom power supply for the selected microphone channel(s).

[6] ⌐ Activates the high pass filter on the microphone inputs of the selected channel(s). Cut-off frequency (–3 dB point) 75 Hz, slope 12 dB/octave.

[7] STEREO LINK Activates the STEREO LINK of the selected channel(s) in pairs (1/2, 3/4, 5/6, 7/8). The linked channels are then controlled as a stereo pair from the odd channel's controls. If linked, the odd-numbered channel's gain potentiometer sets the gain of both the odd- and even-numbered channels. Mic/Line setting, Gain setting, 48 V phantom power supply and high-pass filter setting of the odd channels are copied into the evennumbered channels. Exception: The phase reversal function can always be controlled individually. After having deselected the link function, the even-numbered channel retains the settings which have been copied from the odd-numbered channel, but all channel functions can be controlled individually again.

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[8] LINE/MIC Potentiometer

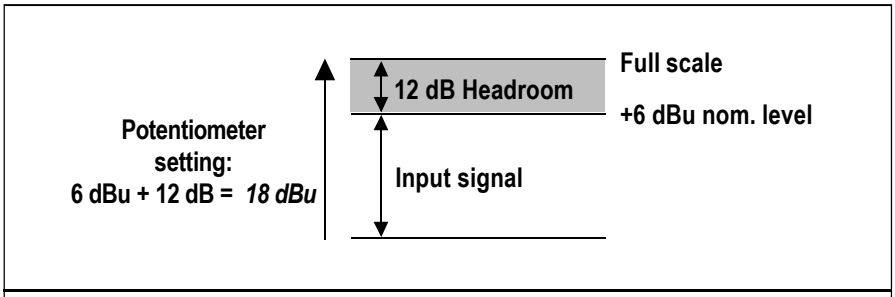
Adjusts the gain of the LINE INPUT (ring) and the MIC INPUT (knob) in 1 dB steps. The printed scale on the front panel corresponds to the LINE INPUT.

LINE INPUT, Headroom

The LINE potentiometer is calibrated in dBu per full-scale. It represents the dBu value of an analog input signal which causes a full-scale output of the A/D converter.

Example:

A studio works with +6 dBu nominal analog level and uses 12 dB headroom. The LINE potentiometer should then be set to 18 dBu.



(Panel) **S**etting [dBu] = **N**ominal level [dBu] + **H**eadroom [dB].

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GLOBAL FUNCTIONS: The following functions are activated for the entire unit:

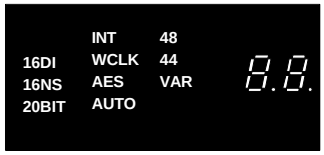
[9] MODE

Toggle key to select the word length of the DIGITAL OUTput. 20 Bit, 16 Bit with Noise Shaping or 16 Bit with dithering can be selected.

[10] SYNC

Selects the synchronization source for the unit. Possible selections are:

INT 48 Internal quartz reference, 48 kHz
INT 44 Internal quartz reference, 44.1 kHz
WCLK Selects external Word Clock Sync
AES Selects external AES/EBU Sync
AUTO Selects sources automatically in the sequence AES-WCLK-INT
VAR Indication only, active if the external source frequency deviates from 48 or 44.1 kHz for more than approx. ±1%.



[11] PEAK HOLD

Toggle key to select the PEAK HOLD function for the PPM level meters – either permanent or with automatic reset after approx. 2 s.

[12] SOFT CLIP

Toggle key to activate the SOFT CLIP function in the analog paths to reduce the danger of overloading the A/D converter with short signal peaks. Threshold at 3 dB below full-scale, allowing for approx. 6 dB reserve before hard clipping occurs.

[13] CTRL CH

Toggle key to select a remote control channel (1...16), or Omni mode (for MIDI control).

[14] REMOTE

Toggle key to activate REMOTE MODE. Local controls and display are disabled.To switch the REMOTE function off, press the key for more than one second.

MicAD STAGE



The MicAD Stage version contains only the CTRL CH and REMOTE keys and the POWER switch.

[13] CTRL CH

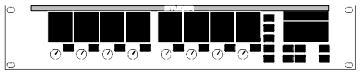
Toggle key to select a remote control channel (1...16), or Omni mode (for MIDI control).

[14] REMOTE

Toggle key to activate REMOTE MODE. To switch the REMOTE function off, press the key for more than one second.

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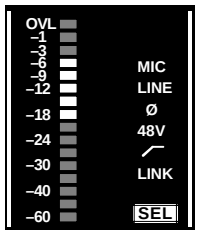
MicAD MASTER



The MicAD MASTER can be used to control all functions of any MicAD version. Usually, it is powered from the controlled MicAD; it has no POWER switch. All functions work in the same way as on the MicAD except for the following additional functions:

[8] LINE/MIC Potentiometer

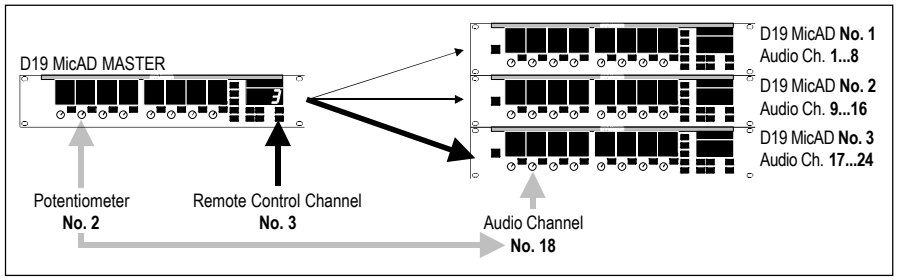
When a remote control channel is selected, the potentiometer settings of the Master will usually be different from the ones of the selected MicAD. Normally, audio levels are displayed. As soon as a potentiometer is slightly turned, the Master's display changes to indicate the difference between the potentiometer setting and the actual gain setting on the MicAD.



With reference to this indication, the corresponding potentiometer has to be turned (down for our example) until only the center LED is on. During this matching process the potentiometer does *not* change the gain. As soon as only the center LED is on, the display changes to indicate the signal level again, and the potentiometer position is matched to the gain setting. From now on, the potentiometer is active and controls the gain of the MicAD's corresponding input channel.

[13] CTRL CH

Key to select the remote control channel to be operated.

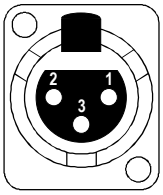


In the example above, 3 MicAD units are remotely controlled by a MicAD Master. The audio channels are numbered in succession: Unit no. 1 holds the audio channels no. 1...8, unit no. 2 holds the audio channels no. 9...16, and so on.
If the gain of audio channel 18 has to be adjusted, select remote control channel no. 3 by pressing CTRL CH as many times as required until a "3" is displayed. Then, the potentiometer no. 2 adjusts the gain of audio channel no. 18.

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2.2 Audio and sync connections, pin assignments

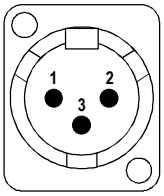
2.2.1 Mic and line inputs



Pin assignment (XLR, 3-pin, female):

Pin	Description
1	Ground
2	Input +
3	Input -
-	Chassis

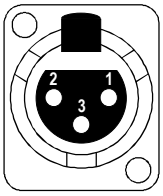
2.2.2 Digital outputs



Pin assignment (XLR, 3-pin, male):

Pin	Description
1	Ground
2	Output +
3	Output -
-	Chassis

2.2.3 External AES/EBU synchronization

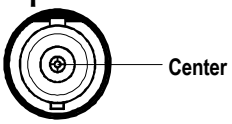


Pin assignment (XLR, 3-pin, female):

Pin	Description
1	Ground
2	Input +
3	Input -
-	Chassis

2.2.4 Word clock in/out

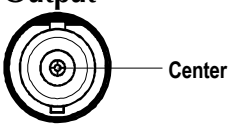
Input



Pin assignment (BNC, 75 Ω):

Pin	Description
center	Word Clock Input (TTL level)
outer	Ground

Output



Pin assignment (BNC, 75 Ω):

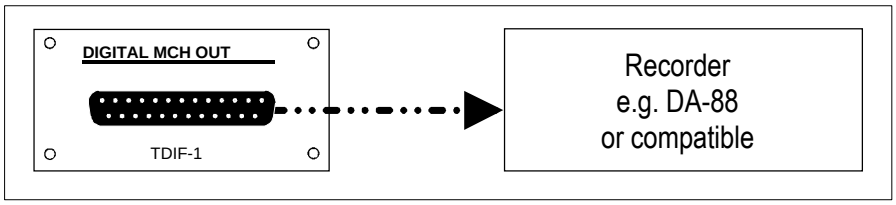
Pin	Description
center	Word Clock Output (TTL level)
outer	Ground

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2.2.5 Using the TDIF-1 8-channel interface

The Tascam TDIF-1 digital I/O format interface is used for sending digital audio data from the D19 MicAD to Tascam DA-88 and compatible units.

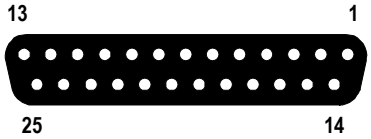
Basic characteristics: 8-channel audio data with sampling frequency information, emphasis information, and sync signal.
Signal transmission level is C-MOS, unbalanced.



Cables: Order No.: F-10.025.031.08 (1.0 m)
F-10.025.031.09 (5.0 m)

Note: The maximum cable length should not exceed 10 m.
Only the specified connecting cables should be used (order numbers above).

Pin assignment:



Pin	Designation
1	DOUT 1/2
2	DOUT 3/4
3	DOUT 5/6
4	DOUT 7/8
5	LRCK OUT
6	FS 0 OUT
7	GND
8	(FS 1 IN) **) ****)
9	(LRCK IN) *)
10	(DIN 7/8)
11	(DIN 5/6)
12	(DIN 3/4)
13	(DIN 1/2)
14	GND
15	GND
16	GND
17	GND
18	EMPHASIS OUT
19	FS 1 OUT
20	(FS 0 IN) **) ****)
21	(EMPHASIS IN) ***)
22	GND
23	GND
24	GND
25	GND

*) DA-88 ignores
**) IF-88 SD ignores
***) DA-88 ignores except “DIGITAL IN” and “FORMAT” modes
****) DA-88 displays only warning except “DIGITAL IN” and “FORMAT” modes

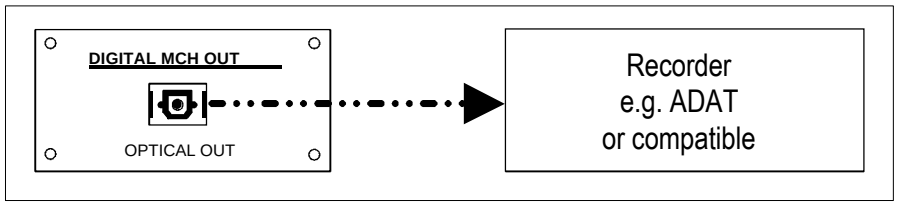
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Cable configuration:

25-pin D-Type, male	Cable colours (twisted pairs)	25-pin D-Type, male
1 14	org/red 1 org/blk 1	13 25
2 15	gry/red 1 gry/blk 1	12 24
3 16	wht/red 1 wht/blk 1	11 23
4 17	yel/red 1 yel/blk 1	10 22
5 9	pnk/red 1 pnk/blk 1	9 5
7 18	org/red 2 org/blk 2	7 21
6 19	gry/red 2 gry/blk 2	8 20
8 20	wht/red 2 wht/blk 2	6 19
21 Shield + housing	yel/red 2 yel/blk 2	18 Shield + housing
10 22	pnk/red 2 pnk/blk 2	4 17
11 23	org/red 3 org/blk 3	3 16
12 24	gry/red 3 gry/blk 3	2 15
13 25	wht/red 3 wht/blk 3	1 14

2.2.6 Using the optical ADAT 8-channel interface

The ADAT format is a serial 8-channel format. It uses a single line cable with fibre optic.



Plug type: TOCP 155 k
Optical fibre: TOFC 100

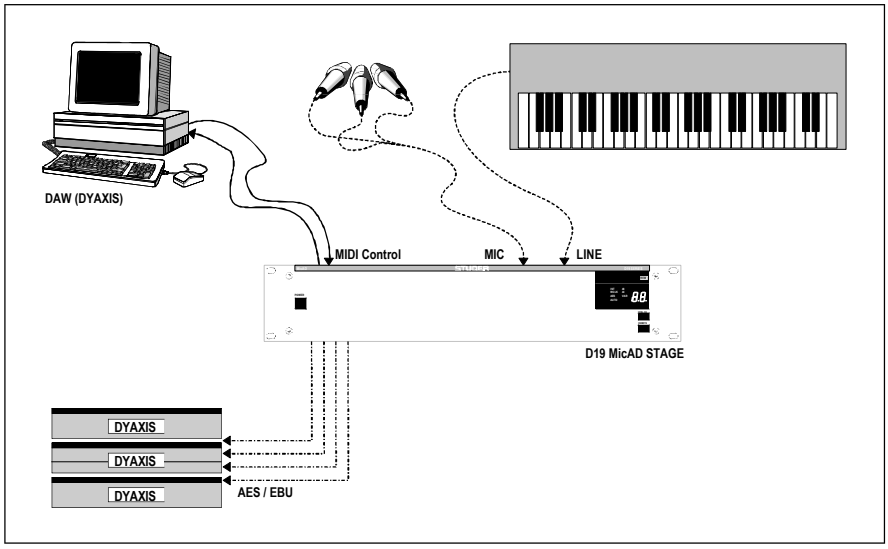
The maximum cable length specified by Alesis is 1 m. However, in most cases, operation with a cable length up to 10...15 m is possible.

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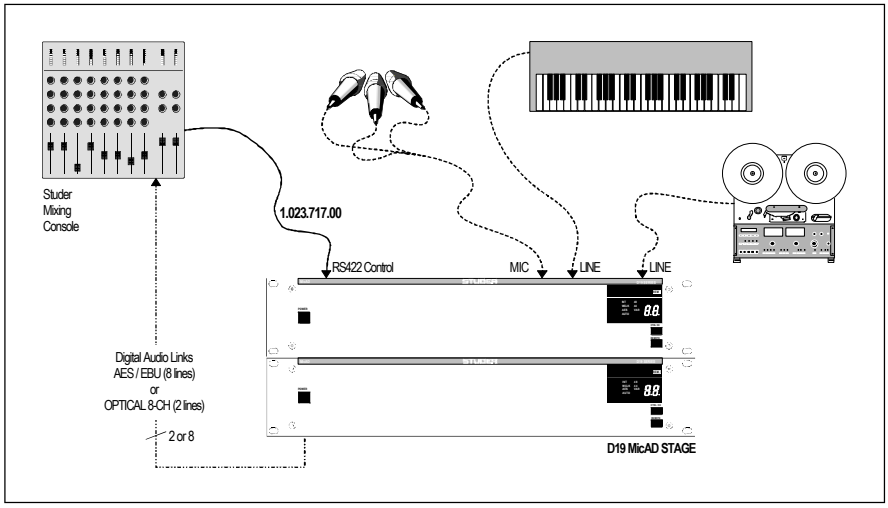
2.3 Application ideas and examples

The D19 MicAD is perfectly suitable for a whole range of applications. Here are some suggestions:

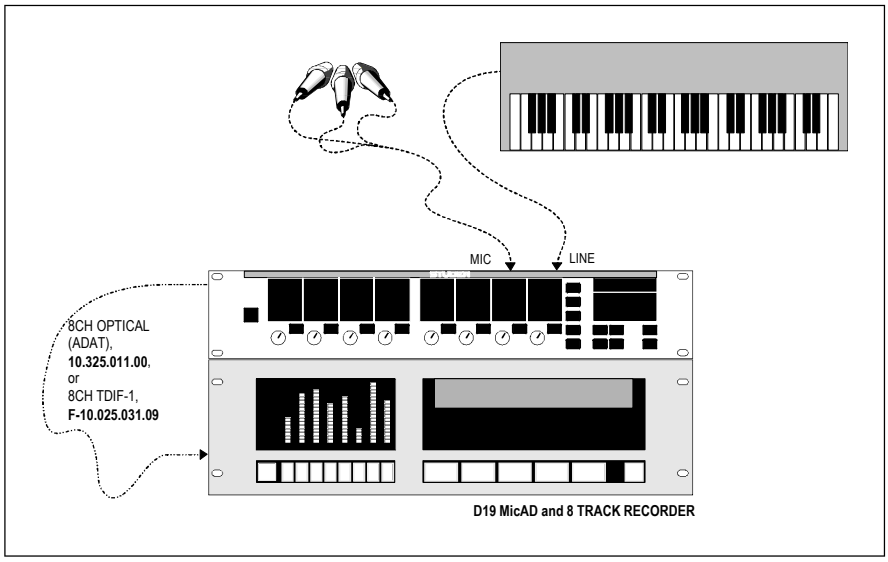
Studio-in-a-box front end for STUDER Dyaxis or other DAWs.



Mic/Line front end, remotely controlled from a digital mixing console or a router

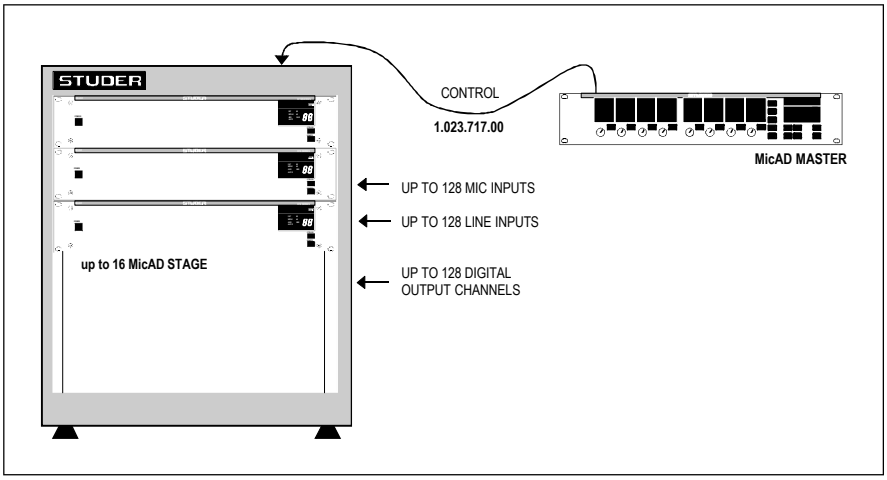


Portable studio with an 8-CH Recorder (ADAT, DA88, or compatibles), for direct cuts from the mics to the digital tracks.

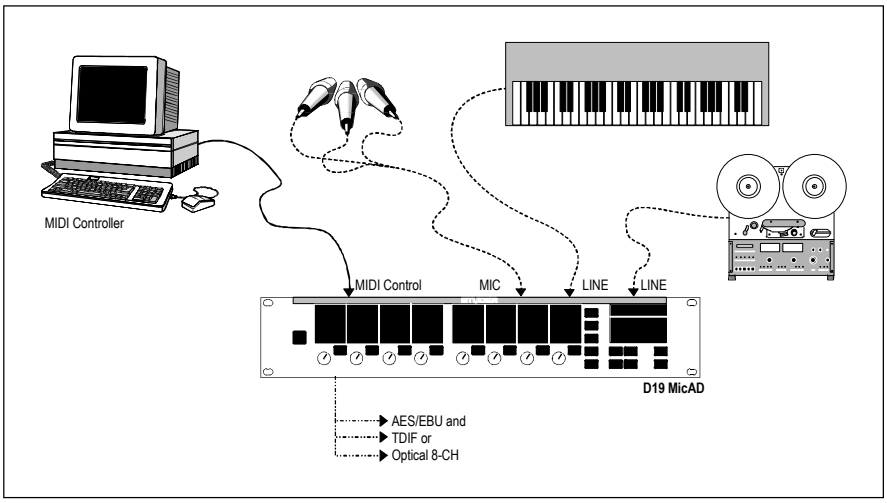


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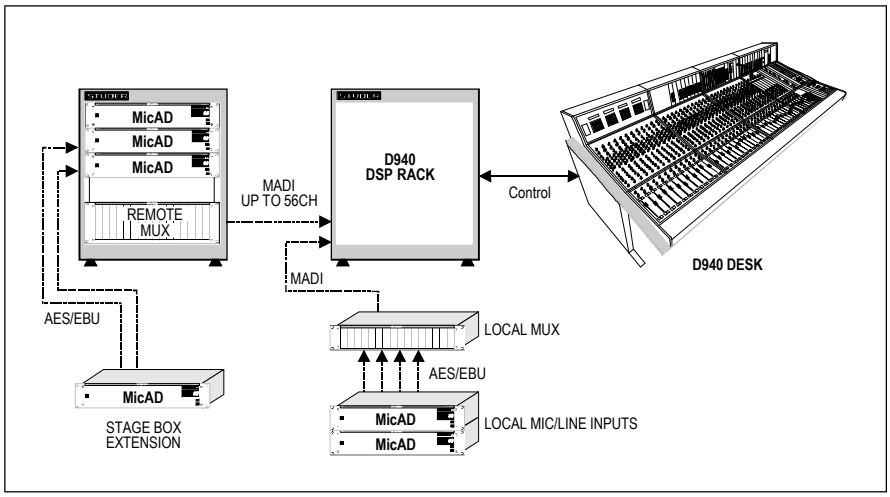
Stacked Mic/Line studio interface system, controlled via the dedicated remote controller MicAD MASTER



Universal studio tool, controlled via a MIDI controller



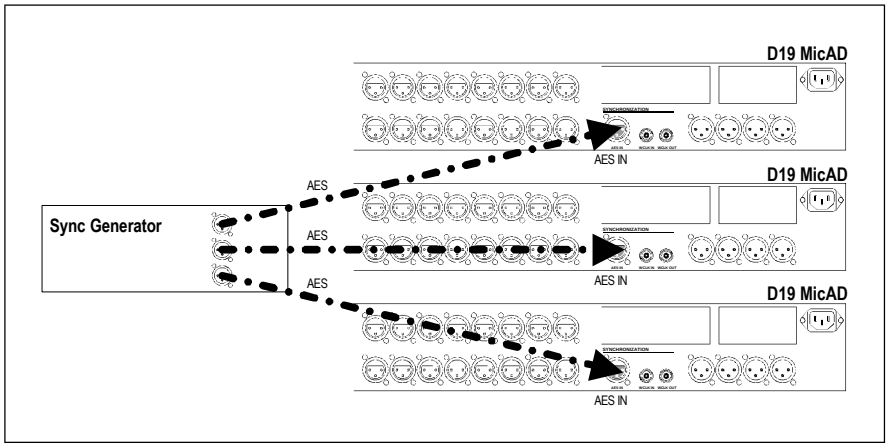
Front end for Studer D940 Digital Mixing Console, also to be used as a stage box.



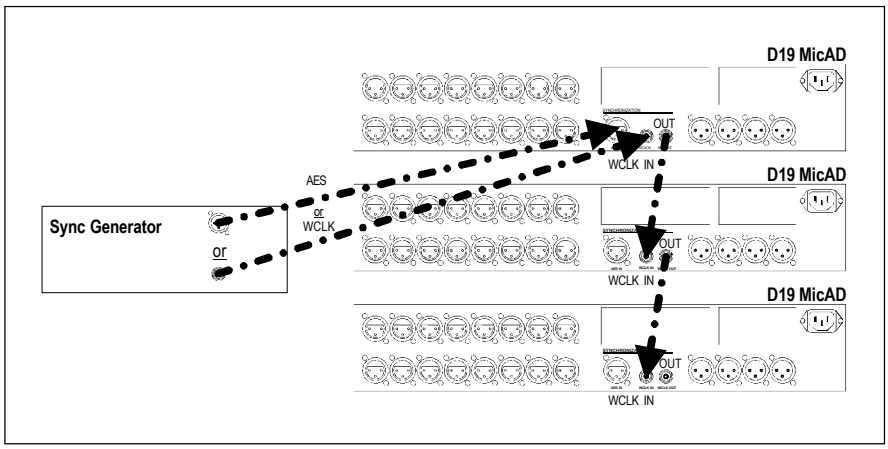
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2.3.1 Wiring for external synchronization

External synchronization – recommended practice



External synchronization, alternative wiring methods – not expressly recommended but possible



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2.4 Remote control

2.4.1 General, hardware

The D19 MicAD can be equipped optionally with a remote control interface. Two types are available, with the following features and electrical standards:
RS422 (31.25 kBaud)
MIDI (31.25 kBaud)

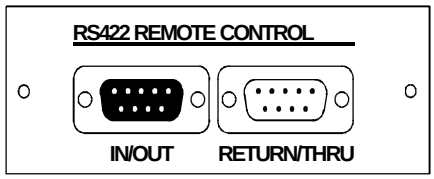
IN: Input
OUT: Output
RETURN: Input, received data is contained in the output data stream
THRU: Buffered, but unchanged input signal

2.4.2 RS422

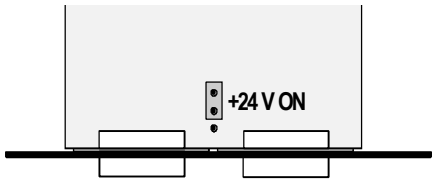
RS422 is an industry standard allowing for interference-free communication even in rough environments. Owing to the balanced-mode implementation the data rate can be up to 10 Mb/s over a distance of up to 1000 m, provided that good quality, twisted-pair cable is used.

For the RS422 interface 9-pin D-Sub connectors are used.
Input and output are located together with the 24 V supply for the MicAD Master on the female 9-pin connector. The supply voltage can be switched on or off with a jumper; the supply current must not exceed 375 mA.
The RETURN input is located together with the THRU output on the male 9-pin connector.

Connector panel:



Jumper:



Pin assignment:

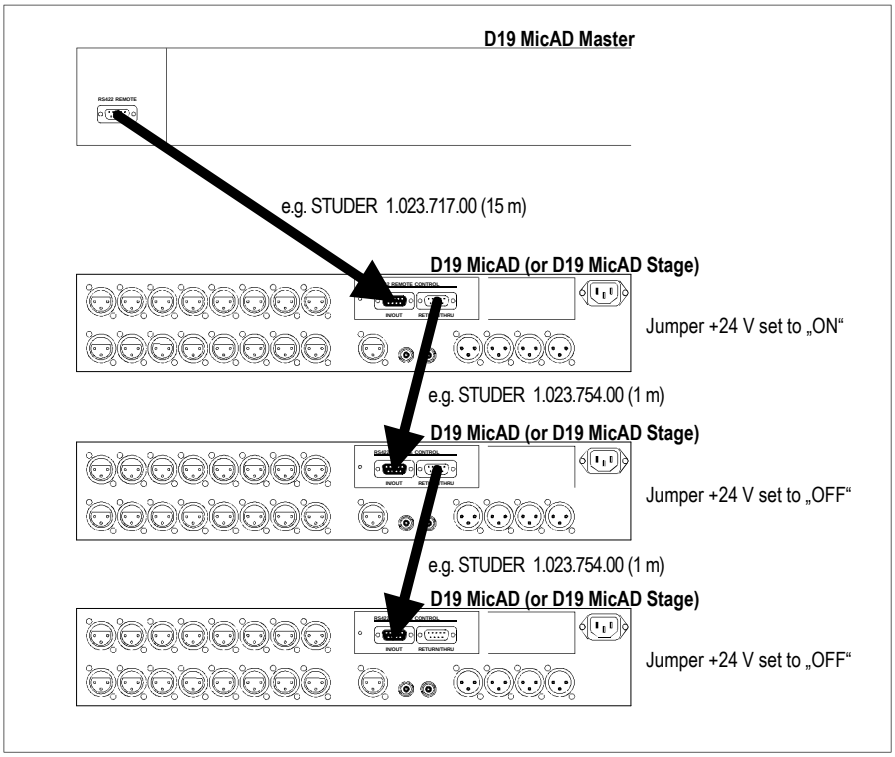
9-pin, female (IN/OUT)		9-pin, male (RETURN/THRU)	
Pin 1	0 V	Pin 1	0 V
Pin 2	OUT+	Pin 2	RETURN+
Pin 3	IN-	Pin 3	THRU-
Pin 4	0 V	Pin 4	0 V
Pin 5	+24 V*	Pin 5	--
Pin 6	0 V	Pin 6	0 V
Pin 7	OUT-	Pin 7	RETURN-
Pin 8	IN+	Pin 8	THRU+
Pin 9	+24 V*	Pin 9	--
*connected in parallel; activated with jumper on RS422 board			

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The MicAD uses the MIDI data rate; the following specifications apply:
31.25 kBaud; ±1%, asynchronous
1 start-, 1 stop bit, 8 data bits

Remote powering: Since the MicAD Master can only be supplied by the MicAD it is directly connected to, usually for shorter distances also the supply voltage is taken through the RS422 cable.
The minimum supply voltage of the MicAD Master may be as low as 21 V_{DC}, i.e. the voltage drop at maximum current (375 mA) must not exceed 3 V_{DC}. The cable resistance must be less than 8 Ω. The maximum distance with a specific type of cable depends on the copper resistance per meter of the cable and can easily be calculated using the cable's specs. Please consider that the DC power is wired to two pins of the 9-pin Sub-D connector for each leg, so that two wires each can be used.
In the MicAD supplying the MicAD Master the supply jumper has to be set to "24 V ON" (refer to the preceding page). In all remaining MicADs the jumper must be set to "24 V OFF".

Wiring for MIDI-RS422 control



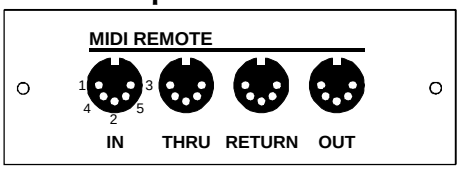
Local powering: If the voltage drop is too high with the cable used, a local supply (24 V_{DC}/375 mA) can be connected to the corresponding pins of the IN/OUT connector.

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2.4.3 MIDI

MIDI controllers can be used via the popular MIDI interface (**M**usical **I**nstrument **D**igital **I**nterface).
This interface is designed as a 5 mA current loop isolated by opto couplers. According to the specifications the cable length should not exceed 15 m. For MIDI links 5-pin DIN connectors are used. On the transmitter side, the ground pin (no. 2) is used for the screen, but the screen is *not connected* to the receiver ground.

Connector panel:

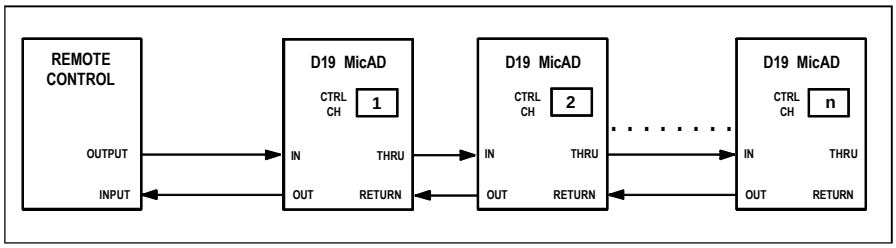


Pin assignment:

Outputs OUT, THRU:		Inputs IN, RETURN:	
Pin 1:	NC	Pin 1:	NC
Pin 2:	GROUND	Pin 2:	NC
Pin 3:	NC	Pin 3:	NC
Pin 4:	OUT+	Pin 4:	IN+
Pin 5:	OUT-	Pin 5:	IN-

The MIDI data rate is specified as follows:
31.25 kBaud; ±1%, asynchronous
1 start-, 1 stop bit, 8 data bits.

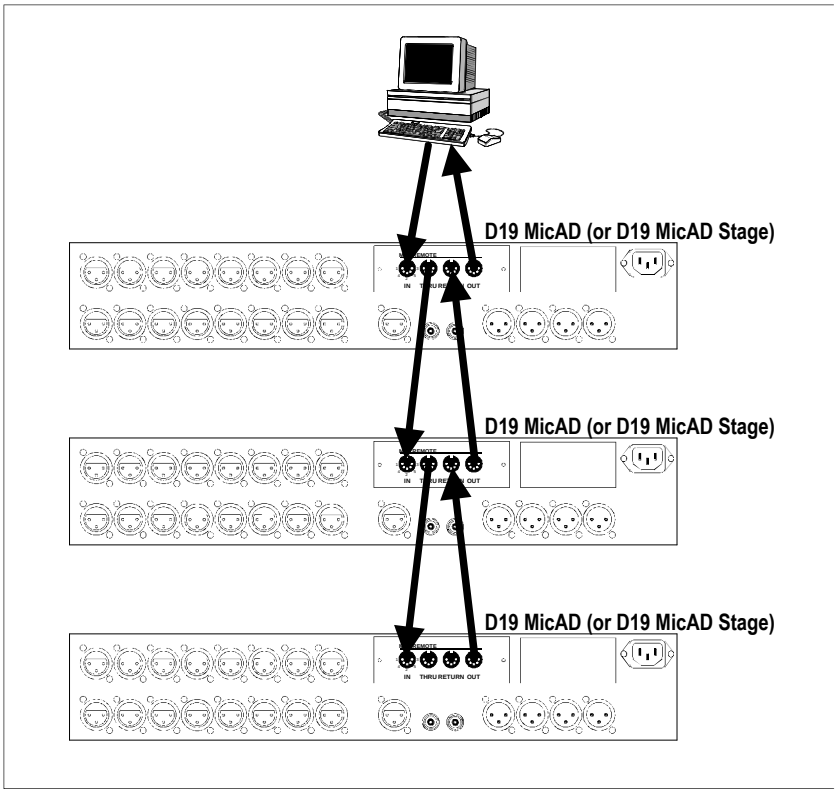
Connection diagram: Multiple MicADs are interconnected according to the following principle (possible with the MIDI or RS422 interface):



In this way up to 16 units can be linked. Note that only the MicAD selected by the remote control unit may send its level status to avoid data loss (see Sysex messages). So it is the remote control unit's task to mute all automatically generated MicAD messages when switching over to another unit.
(Request Sync Status with update = OFF; Request Level Status with update = OFF).

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Wiring for MIDI control



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2.4.4 Programming

The Software Protocol is written down in the *STUDER D19 MicAD MIDI IMPLEMENTATION CHART* is valid for all kinds of hardware interfaces.

The Studer D19 MicAD uses an internal cycle duration of 20 ms; in this time grid all tasks as updating the display, reading in the gain potentiometers, computing the level etc. are fulfilled. During the periodical level dump every 20 ms a Sysex message is transmitted.

All parameters which can be modified are set immediately and without any logical automatisms. That means in practical operation that, for instance when setting a STEREO LINK, no input or filter switchover in the Slave channel occurs. So the remote application control becomes more flexible for the programmer. Care must be taken, however, that no impossible combinations are selected (e.g. selecting the LINE input when no LINE interface is available).

The so-called "Runnig Status" is supported (refer to the general MIDI specs).

2.4.4.1 Recognized MIDI messages

Recognized MIDI Messages are messages which can be executed by the MicAD. According to the MIDI specifications several message types are known; repeating them all would be beyond the scope of this explanation. Only the commands valid for the MicAD will be mentioned here. Further information can be found in the *MIDI 1.0 detailed specification Ver 4.0* or issues of recent date.

2.4.4.2 Control change

This 2-byte command is part of the Channel Voice Messages. The status byte (Bn) is followed by 2 data bytes. The first data byte is the controller number, the second is the control value. There are two possibilities for the control value. Either it is used for controlling a continuously variable value (as a potentiometer setting), then every value between zero and maximum (7F) means a discrete value to be set; or it is used for an ON/OFF function, then a zero means OFF, any other value greater than zero means ON.

c = 97, 97 (Data Increment, Decrement):

The control value is imperatively 127 (7F), it will be incremented or decremented up to the limit values (0 or 127). For ON/OFF commands always the complementary mode is selected.

c = 98, 99 (Non Registered Parameter):

A pointer is set to an address with NRPN LSB and NRPN MSB (**N**on **R**egistered **P**arameter **N**umber). The actual value is then entered by Data Entry (c = 6).

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Example: All MIC phase switches are to be set to “reversed”.

According to the MIDI Implementation Chart this function is executed with NRPN v = 24.

1. Step: Set NRPN MSB to zero (Bn = Control Change, c = 99, v = 00)

2. Step: Set NRPN LSB to 24 (Bn = Control Change, c = 98, v = 24)
NRPN is now 0024, and so the address is selected.

3. Step: Enter a value. In order to switch all phases to REV, ON must be set – i.e. a value unequal to zero must be selected. For our example we choose 127 (7F) which is the maximum value interpreted as data byte. This value is now set with Data Entry.
(Bn = Control Change, c = 6, v = 127).

After having set NRPN, any modifications can be made for the selected parameter by means of Data Entry without having to repeat the steps 1 and 2 from above.

2.4.4.3 System exclusive

The MIDI Implementation Chart indicates the topology of a Sysex message. The message is arranged exactly according to the general MIDI specifications.
The Manufacturer ID is defined as 00 00 11 (Studer), MicAD has the Product ID 00.
Every message is supplied with a checksum which is the one's complement of all data bytes.

Checksum = **NOT** (**S** (Data Byte 0 ... Data Byte n) **AND** 7F) **AND** 7F;

A Sysex message is processed only when the checksum has been received correctly, when the number of data bytes is correct and an EOX (F7) has been received to terminate the Sysex. In all other cases the MicAD's state remains unchanged.

If “Request System Status” is requested, the MicAD sends its status field in the so-called “nibblized data format”, because the maximum value 127 (7F) interpreted as MIDI data byte could be exceeded (see MIDI implementation, chapter 2.1). It has to be considered that 64+9 Bytes = 73 Bytes are transmitted, and the time required for this transmission will be at least 24 ms. Considering the MicAD's internal cycle time of 20 ms there will be a data loss if multiple requests follow immediately.

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2.4.4.4 Transmitted MIDI messages

The D19 MicAD sends Sysex messages only on request (refer to chapter 4.3 of the Appendix). The calculation of the Checksum is performed according to the method explained above in section 2.4.4.3 .

System Status is transmitted in the “nibblized data format”, the data correspond to the MicAD's internal status field.
On “Level Dump” requests, every 20 ms the valid level data are transmitted.

2.4.4.5 MicAD internal system status field

system_status	+	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
mic	0	CH 8	CH 7	CH 6	CH 5	CH 4	CH 3	CH 2	CH1
line	1	CH 8	CH 7	CH 6	CH 5	CH 4	CH 3	CH 2	CH1
phase_mic	2	CH 8	CH 7	CH 6	CH 5	CH 4	CH 3	CH 2	CH1
phantom	3	CH 8	CH 7	CH 6	CH 5	CH 4	CH 3	CH 2	CH1
filter	4	CH 8	CH 7	CH 6	CH 5	CH 4	CH 3	CH 2	CH1
st_link_mic	5	CH 8+7		CH 6+5		CH 4+3		CH 2+1	
channel_select	6	CH 8	CH 7	CH 6	CH 5	CH 4	CH 3	CH 2	CH1
resolution_mode	7						20BIT	16NS	16DI
sync_setting	8		VAR	44,1	48	AUTO	AES	WCLK	INT
sync_status	9		VAR	44,1	48		A_LOCK	W_LOCK	
operation_mode	A	CAL	MUTE				REM	SOFT	HOLD
midi_channel	B				OMNI	b3	b2	b1	b0
TX_mode	C						?	?	?
gain_mic1	D	b7	b6	b5	b4	b3	b2	b1	b0
gain_line1	E	b7	b6	b5	b4	b3	b2	b1	b0
gain_mic2	F	b7	b6	b5	b4	b3	b2	b1	b0
gain_line2	10	b7	b6	b5	b4	b3	b2	b1	b0
gain_mic3	11	b7	b6	b5	b4	b3	b2	b1	b0
gain_line3	12	b7	b6	b5	b4	b3	b2	b1	b0
gain_mic4	13	b7	b6	b5	b4	b3	b2	b1	b0
gain_line4	14	b7	b6	b5	b4	b3	b2	b1	b0
gain_mic5	15	b7	b6	b5	b4	b3	b2	b1	b0
gain_line5	16	b7	b6	b5	b4	b3	b2	b1	b0
gain_mic6	17	b7	b6	b5	b4	b3	b2	b1	b0
gain_line6	18	b7	b6	b5	b4	b3	b2	b1	b0
gain_mic7	19	b7	b6	b5	b4	b3	b2	b1	b0
gain_line7	1A	b7	b6	b5	b4	b3	b2	b1	b0
gain_mic8	1B	b7	b6	b5	b4	b3	b2	b1	b0
gain_line8	1C	b7	b6	b5	b4	b3	b2	b1	b0
sys_config	1D						LINE_ID	REM_ID	REM_ID0
phase_line	1E	CH 8	CH 7	CH 6	CH 5	CH 4	CH 3	CH 2	CH1
st_link_line	1F	CH 8+7		CH 6+5		CH 4+3		CH 2+1	

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At the Sysex commands “Request Level Status with update” or “Request Sync Status with update” the addressed MicAD sends the requested data. For a level dump, e.g., 17 bytes are required. The time consumed (approx. 6 ms) is only a third of the MicAD's cycle time of 20 ms. It is easy to see that an overflow will occur if more than 3 MicADs will send a level dump. To avoid this, only the active MicAD must be allowed to send its data if several MicADs are interlinked.

Before switching the Remote Control over to an other MIDI channel, transmitting a “Level Request OFF” is imperative in order to avoid the MIDI link to be occupied.

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3 ADDITIONAL INFORMATION

3.1 What the heck is Noise Shaping?

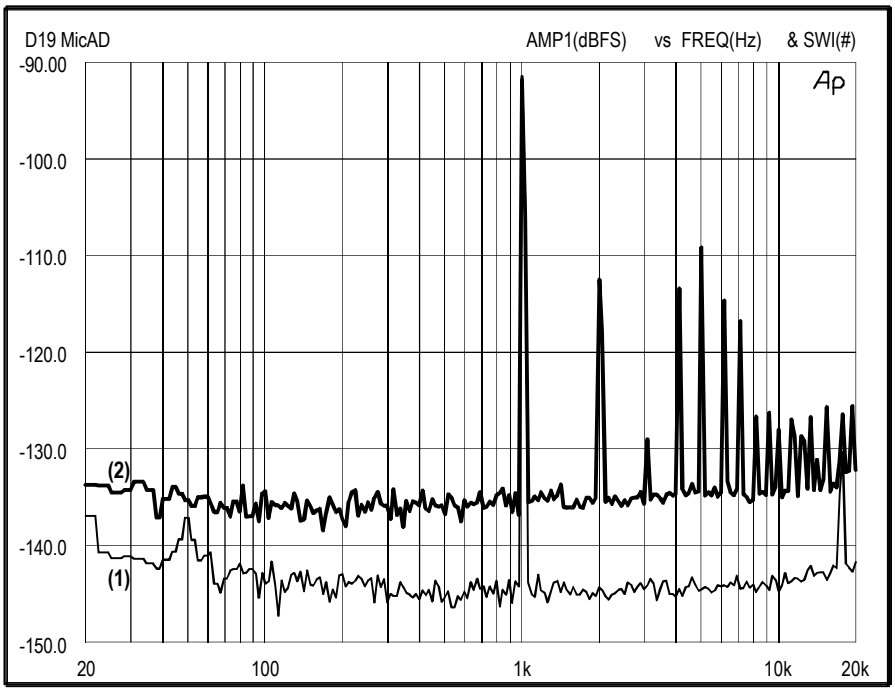
It is often necessary to record on digital media accepting only 16 bit signals. In such cases, the word length of the MicAD's 20 bit converters is best reduced to 16 bit by selecting either then 16NS (Noise shaping) or 16DI (Dither) modes. Special DSP algorithms are then activated to reduce the unwanted signal deterioriation which is the result of shortening the word length.

Dither mode: Eliminates unwanted truncation artifacts (distortion, noise modulation). *Dither can always be used, independent of any subsequent signal processing.*

Noise shaping mode: Further improves the perceptive audio quality, thus best preserving the original 20-bit signal as it was before being reduced to 16 bit. *However, for further processing of the signal always crossfades, fade-ins, or fade-outs must be used in order to avoid possible clicks.*

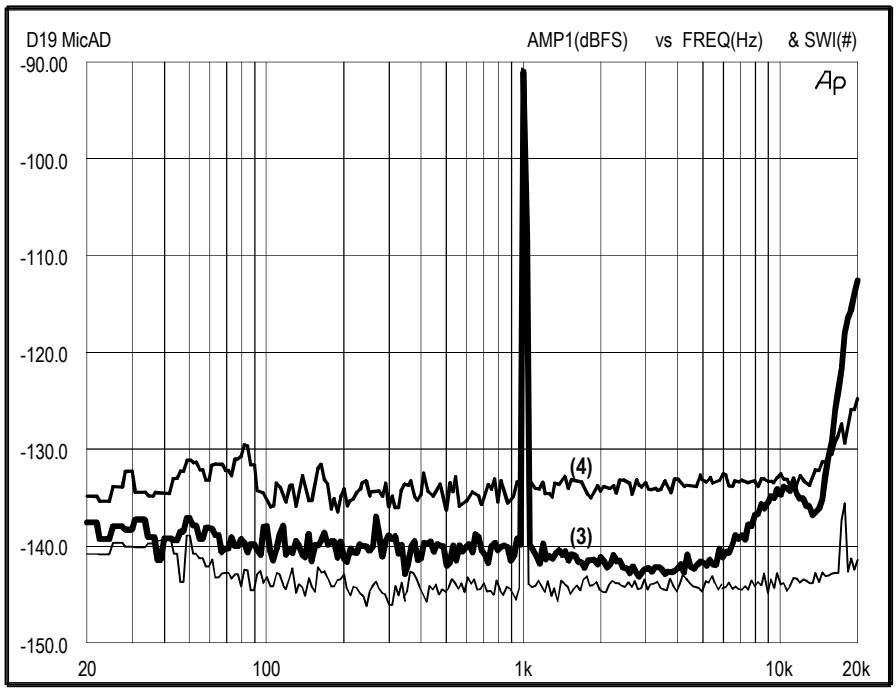
Both processes bring distinctive quality improvement as opposed to just truncating a 20-bit signal.

The diagram below shows the original 20 bit signal (1) and the effect of truncating to 16 bits (2). Note the distinctive artifacts which contribute to the degradation of signal quality.



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The curve (3) in the diagram below shows the 16 bit signal after Noise shaping had been applied. The curve (4) is the same with only Dither applied.



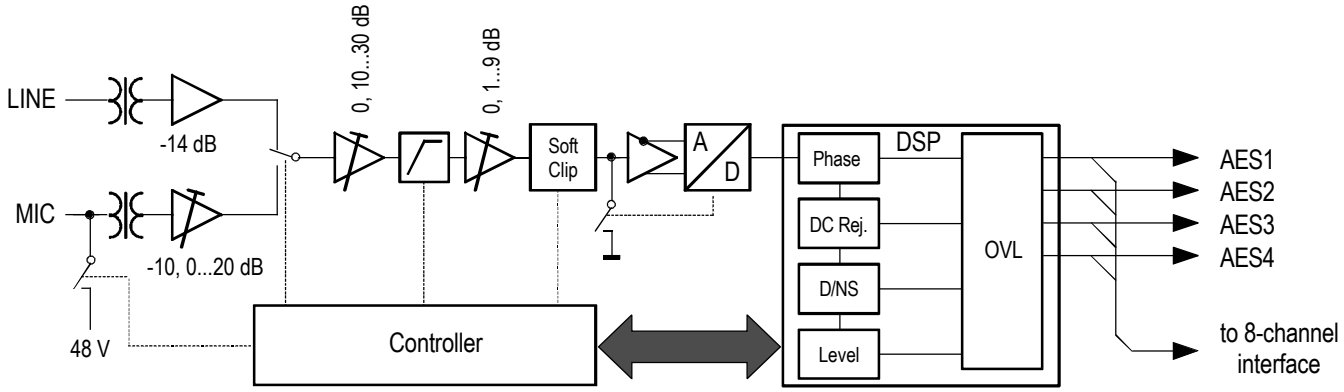
More information on Noise shaping and Dithering technology is available at your nearest Studer representative.

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3.2 D19 MicAD block diagrams

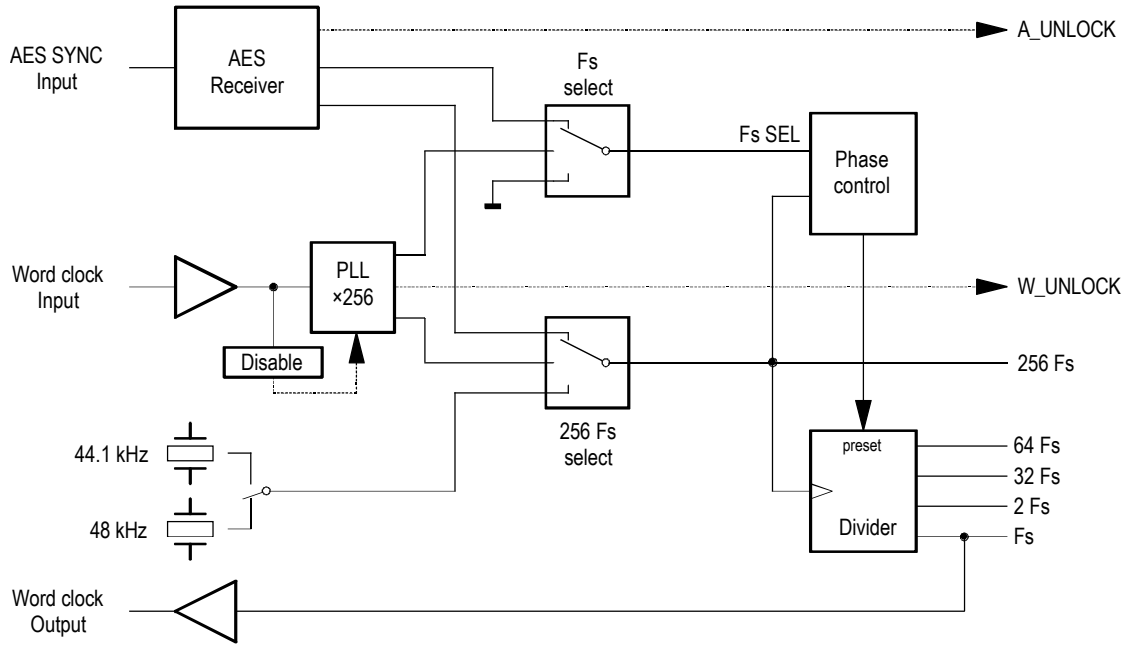
3.2.1 Global audio block diagram

Only one channel shown; 48 V Phantom power, Mic/Line input, Level, and High-pass filter are individually settable per channel, while Soft Clip is a global function.



3.2.2 Synchronization block diagram

The Word clock PLL which transforms up to 256 × F_s is automatically stopped if no Word clock is applied. The quartz oscillators can be stopped by the controller individually.



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4 APPENDIX

4.1 MIDI Protocol

MIDI Implementation Chart Version: 1.02

Function		Transmitted	Recognized	Remarks
Basic Channel	Default Changed	1 1-16	1 1-16	 Memorized
Mode	Default Messages Altered		Mode3	
Note Number	 True Voice	x	x	
Velocity	Note ON Note OFF	x x	x x	
After Touch	Keys Channels	x x	x x	
Pitch Bender		x	x	
Control Change		x	6 14 15 16-23 24-31 67 80-83 85-88 90 96 97 98 99	Data Entry CLOCK SYNC Select DIGITAL MODE Select MIC Sensitivity Ch. 1-8 LINE Sensitivity Ch. 1-8 SOFT CLIP ON/OFF MIC STEREO LINK LINE STEREO LINK PEAK HOLD Mode Data Increment/ON Data Decrement/OFF Non-Reg. Param. LSB Non-Reg. Param. MSB
Program Change	 True#	x	x	
System Exclusive		o	o	
System Common	:Song Pos :Song Sel :Tune	x x x	x x x	
System Real Time	:Clock :Commands	x x	x x	
Aux Messages	:Local ON/OFF :All Notes OFF :Active Sense :Reset	x x x x	o x x o	Remote OFF/ON

Mode 1: OMNI ON, POLY Mode 2: OMNI ON, MONO **o: Yes**
Mode 3: OMNI OFF, POLY Mode 4: OMNI OFF, MONO **x: No**

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4.2 Recognized MIDI Messages

A	Control Change			
Status	1011nnnn; (Bn) n = MIDI ch. no. -1			
Controller no.	0ccccccc			
Controller val.	0vvvvvvv			
	c = 6	**Data Entry**	v = 0...127	Note 1
	c = 14	**CLOCK SYNC Sel.**	v = 0	Internal 48 kHz
			v = 1	Internal 44.1 kHz
			v = 2	Ext. Word Clock (BNC)
			v = 3	Ext. AES Clock (XLR)
			v = 4...127	Automatic Clock Select
	c = 15	**DIGITAL MODE**	v = 0	16 Bit Dithered
			v = 1	16 Bit Noise Shaping
			v = 2...127	20 Bit
	c = 16	**MIC Sens. Ch.1**	v = 0	+20 dBu dig. full scale
			v = 1	+19 dBu dig. full scale
			.....	.....
			v = 19	+1 dBu dig. full scale
			v = 20	+0 dBu dig. full scale
			v = 21	-1 dBu dig. full scale
			.....	.....
			v = 68	-48 dBu dig. full scale
			v = 69...127	-49 dBu dig. full scale
	c = 17	**MIC Sens. Ch.2**	v = 0...127	+20 dBu...-49 dBu
	c = 18	**MIC Sens. Ch.3**	v = 0...127	+20 dBu...-49 dBu
	c = 19	**MIC Sens. Ch.4**	v = 0...127	+20 dBu...-49 dBu
	c = 20	**MIC Sens. Ch.5**	v = 0...127	+20 dBu...-49 dBu
	c = 21	**MIC Sens. Ch.6**	v = 0...127	+20 dBu...-49 dBu
	c = 22	**MIC Sens. Ch.7**	v = 0...127	+20 dBu...-49 dBu
	c = 23	**MIC Sens. Ch.8**	v = 0...127	+20 dBu...-49 dBu
	c = 24	**LINE Sens. Ch.1**	v = 0	+24 dBu dig. full scale
			v = 1	+23 dBu dig. full scale
			.....	.....
			v = 23	+1 dBu dig. full scale
			v = 24	+0 dBu dig. full scale
			v = 25	-1 dBu dig. full scale
			.....	.....
			v = 29...127	-5 dBu dig. full scale
	c = 25	**LINE Sens. Ch.2**	v = 0...127	+24 dBu...-5 dBu
	c = 26	**LINE Sens. Ch.3**	v = 0...127	+24 dBu...-5 dBu
	c = 27	**LINE Sens. Ch.4**	v = 0...127	+24 dBu...-5 dBu
	c = 28	**LINE Sens. Ch.5**	v = 0...127	+24 dBu...-5 dBu
	c = 29	**LINE Sens. Ch.6**	v = 0...127	+24 dBu...-5 dBu
	c = 30	**LINE Sens. Ch.7**	v = 0...127	+24 dBu...-5 dBu
	c = 31	**LINE Sens. Ch.8**	v = 0...127	+24 dBu...-5 dBu
	c = 67	**SOFT CLIPPER**	v = 0	Soft Clip OFF
			v = 1...127	Soft Clip ON

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(cont.)	**c = 80**	**STEREO MIC 1/2**	v = 0	Independent MIC 1/2
			v = 1...127	STEREO MIC Ch. 1/2
	c = 81	**STEREO MIC 3/4**	v = 0...127	STEREO MIC Ch. 3/4
	c = 82	**STEREO MIC 5/6**	v = 0...127	STEREO MIC Ch. 5/6
	c = 83	**STEREO MIC 7/8**	v = 0...127	STEREO MIC Ch. 7/8
	c = 85	**STEREO LINE 1/2**	v = 0	Independent LINE 1/2
			v = 1...127	STEREO LINE Ch. 1/2
	c = 86	**STEREO LINE 3/4**	v = 0...127	STEREO LINE Ch. 3/4
	c = 87	**STEREO LINE 5/6**	v = 0...127	STEREO LINE Ch. 5/6
	c = 88	**STEREO LINE 7/8**	v = 0...127	STEREO LINE Ch. 7/8
	c = 90	**PEAK HOLD Mode**	v = 0	Riding Peak
			v = 1...127	Permanent Peak Hold
	c = 96	**Data Increment**	v = 127	Note 1
	c = 97	**Data Decrement**	v = 127	Note 1
	c = 98	**Non-Reg. Param.**	v = 0...88	NRPN LSB
			v = 0	MIC/LINE Input Ch. 1
			.....	.....
			v = 7	MIC/LINE Input Ch. 8
			v = 8	MIC/LINE Input Ch.1-8
			v = 16	MIC Phase Rev. Ch. 1
			.....	.....
			v = 23	MIC Phase Rev. Ch. 8
			v = 24	MIC Phase Rev. Ch.1-8
			v = 32	LINE Phase Rev. Ch. 1
			.....	.....
			v = 39	LINE Phase Rev. Ch. 8
			v = 40	LINE Phase Rev. Ch.1-8
			v = 48	Phantom Power Ch. 1
			.....	.....
			v = 55	Phantom Power Ch. 8
			v = 56	Phantom Power Ch.1-8
			v = 64	High Pass Filter Ch. 1
			.....	.....
			v = 71	High Pass Filter Ch. 8
			v = 72	High Pass Filter Ch.1-8
			v = 80	MIC Sensitivity Ch. 1
			.....	.....
			v = 87	MIC Sensitivity Ch. 8
			v = 88	MIC Sensitivity Ch.1-8
			v = 96	LINE Sensitivity Ch. 1
			.....	.....
			v = 103	LINE Sensitivity Ch. 8
			v = 104	LINE Sensitivity Ch.1-8
	c = 99	**Non-Reg. Param.**	v = 0	NRPN MSB (always 0)

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B	System Exclusive			
Status	11110000		F0	System Exclusive
Manufact. ID			00 00 11	STUDER ID
Product ID			0	D19 MICAD ID
Device ID	0000nnnn			n = MIDI channel no-1
Command ID	0ccccccc			see below
Data	0ddddddd 0ddddddd			see below
Checksum	0ccccccc			1-complement (data)
Status	11110111		F7	End of Sys. Exclusive
B.1	**c = 0**	**System Status**	0000hhhh	nibblized data format
			0000llll	System Status byte 0
			.....	64 bytes packed (32 bytes unpacked)
			0000hhhh	ddddddddd = hhhhllll
			0000llll	Sys. Status byte 31
B.2	**c = 1**	**Global Param.**	d0 00000001 00000010 00000100	Dig. Resolution mode 16 Bit Dithered 16 Bit Noise Shaping 20 Bit
			d1 00010001 00100001 00000010 00000100 00001000	Sync. Selection Internal 48 kHz Internal 44.1 kHz External Word Clock External AES Clock Auto Clock Select
			d2 000xxxx0 000xxxx1 000xxx0x 000xxx1x 000xx0xx 000xx1xx 000x0xxx 000x1xxx 0000xxxx 0001xxxx	Operation Mode Local Riding Peak Local Permanent Peak Soft Clip OFF Soft Clip ON Remote OFF, Local ON Remote ON, Local OFF DSP Mute OFF DSP Mute ON A/D Calibrate OFF A/D Calibrate ON
			d3 000yyyyy	Midi Channel selection y = 0 poly Ch. 1 ..... y = 15 poly Ch. 16 y = 16 omni mode
B.3	**c = 2**	**Input Parameter**	d0	Input parameter Ch. 1
			d1	Input parameter Ch. 2
			d2	Input parameter Ch. 3
			d3	Input parameter Ch. 4
			d4	Input parameter Ch. 5
			d5	Input parameter Ch. 6
			d6	Input parameter Ch. 7
			d7	Input parameter Ch. 8

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B.3 (cont.)	**c = 2**	**Input Parameter**	dn	Input parameter Ch. n
			0xxxxxx0	Mic Input Select
			0xxxxxx1	Line Input Select
			0xxxxx0x	MIC Phase Rev OFF
			0xxxxx1x	MIC Phase Rev ON
			0xxxx0xx	Phantom Power OFF
			0xxxx1xx	Phantom Power ON
			0xxx0xxx	Highpass Filter OFF
			0xxx1xxx	Highpass Filter ON
			0xx0xxxx	MIC Stereo Link OFF
			0xx1xxxx	MIC Stereo Link ON only valid on d1, d3, d5 & d7
			0x0xxxxx	LINE Stereo Link OFF
			0x1xxxxx	LINE Stereo Link ON only valid on d1, d3, d5 & d7
			00xxxxxx	LINE Phase Rev OFF
			01xxxxxx	LINE Phase Rev ON
B.4	**c = 3**	**Mic Sensitivity**	d0	Mic Sensitivity Ch. 1
			d1	Mic Sensitivity Ch. 2
			d2	Mic Sensitivity Ch. 3
			d3	Mic Sensitivity Ch. 4
			d4	Mic Sensitivity Ch. 5
			d5	Mic Sensitivity Ch. 6
			d6	Mic Sensitivity Ch. 7
			d7	Mic Sensitivity Ch. 8
			dn = 0 1 ... 19 20 21 ... 69...127	+20 dBu dig. full scale +19 dBu dig. full scale ..... +1 dBu dig. full scale +0 dBu dig. full scale -1 dBu dig. full scale ..... -49 dBu dig. full scale
B.5	**c = 4**	**Line Sens.**	d0	Line Sensitivity Ch. 1
			d1	Line Sensitivity Ch. 2
			d2	Line Sensitivity Ch. 3
			d3	Line Sensitivity Ch. 4
			d4	Line Sensitivity Ch. 5
			d5	Line Sensitivity Ch. 6
			d6	Line Sensitivity Ch. 7
			d7	Line Sensitivity Ch. 8
			dn = 0 1 ... 23 24 25 ... 29...127	+24 dBu dig. full scale +23 dBu dig. full scale ..... +1 dBu dig. full scale +0 dBu dig. full scale -1 dBu dig. full scale ..... -5 dBu dig. full scale

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B.6	**c=11**	**Program Load**	d0...dn	MicAD Program Data
B.7	**c=12**	**FLASH Memory Erase**		No Data Bytes (Checksum = 7F)
B.8	**c=127**	**Request**	d = 0	System Status
			d = 1	Global Parameters
			d = 2	Input Parameters
			d = 3	MIC channel gain
			d = 4	LINE channel gain
			d = 5	System Configuration
			d = 6	Software Version
			d = 7	Sync status w. update
			d = 8	Level status w. update
			d = 9	Sync status req. OFF
			d = 10	Level status req. OFF
			d = 11	Program Dump

C	**Aux Messages**			
C.1	**Local Control ON/OFF**			
Status	1011nnnn; (Bn) n = MIDI ch. no. -1			
Controller no.	0ccccccc			
Controller val.	0vvvvvvv			
	c=122	**LOCAL CONTROL**	v = 0...63	Remote ON, Local OFF
			v = 64...127	Remote OFF, Local ON
C.2	**System Reset**			
Status	11111111		FF	Reset to Default

4.3 Transmitted MIDI Messages

A	**System Exclusive**			
Status	11110000		F0	System Exclusive
Manufactor ID			00 00 11	STUDER ID
Product ID			0	D19 MICAD ID
Device ID	0000nnnn; n = MIDI channel no-1			
Status ID	0sssssss			see below
Data	0ddddddd 0ddddddd			see below
Checksum	0ccccccc			1-complement (data)
Status	11110111		F7	End of Sys. Exclusive
A.1	**s = 0**	**System Status**	0000hhhh	nibblized data format
			0000llll	System Status byte 0
			.....	64 bytes packed (32 bytes unpacked)
			0000hhhh	ddddddddd = hhhhllll
			0000llll	Sys. Status byte 31
A.2	**s = 1**	**Global Status**	d0 00000001 00000010 00000100	Dig. Resolution mode 16 Bit Dithered 16 Bit Noise Shaping 20 Bit

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A.2 (cont.)	**s = 1**	**Global Status**	d1 00010001 00100001 00000010 00000100 00001000	Sync. Selection Internal 48 kHz Internal 44.1 kHz External Word Clock External AES Clock Auto Clock Select
			d2 000xxxx0 000xxxx1 000xxx0x 000xxx1x 000xx0xx 000xx1xx 000x0xxx 000x1xxx 0000xxxx 0001xxxx	Operation Mode Riding Peak Permanent Peak Soft Clip OFF Soft Clip ON Remote OFF, Local ON Remote ON, Local OFF DSP Mute OFF DSP Mute ON A/D Calibrate OFF A/D Calibrate ON
			d3 000yyyyy	Midi Channel selection y = 0 poly Ch. 1 ..... y = 15 poly Ch. 16 y = 16 omni mode
A.3	**s = 2**	**Input Status**	d0	Input parameter Ch. 1
			d1	Input parameter Ch. 2
			d2	Input parameter Ch. 3
			d3	Input parameter Ch. 4
			d4	Input parameter Ch. 5
			d5	Input parameter Ch. 6
			d6	Input parameter Ch. 7
			d7	Input parameter Ch. 8
			dn 0xxxxxx0 0xxxxxx1 0xxxxx0x 0xxxxx1x 0xxxx0xx 0xxxx1xx 0xxx0xxx 0xxx1xxx 0xx0xxxx 0xx1xxxx 0x0xxxxx 0x1xxxxx 00xxxxxx 01xxxxxx	Input parameter Ch. n Mic Input Select Line Input Select MIC Phase Rev OFF MIC Phase Rev ON Phantom Power OFF Phantom Power ON Highpass Filter OFF Highpass Filter ON MIC Stereo Link OFF MIC Stereo Link ON only valid on d1, d3, d5 & d7 LINE Stereo Link OFF LINE Stereo Link ON only valid on d1, d3, d5 & d7 LINE Phase Rev OFF LINE Phase Rev ON

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A.4	**s = 3**	**Mic Sens.Status**	d0	Mic Sensitivity Ch. 1
			d1	Mic Sensitivity Ch. 2
			d2	Mic Sensitivity Ch. 3
			d3	Mic Sensitivity Ch. 4
			d4	Mic Sensitivity Ch. 5
			d5	Mic Sensitivity Ch. 6
			d6	Mic Sensitivity Ch. 7
			d7	Mic Sensitivity Ch. 8
			dn = 0 1 ... 19 20 21 ... 69...127	+20 dBu dig. full scale +19 dBu dig. full scale ..... +1 dBu dig. full scale +0 dBu dig. full scale -1 dBu dig. full scale ..... -49 dBu dig. full scale
A.5	**s = 4**	**Line Sens.Stat.**	d0	Line Sensitivity Ch. 1
			d1	Line Sensitivity Ch. 2
			d2	Line Sensitivity Ch. 3
			d3	Line Sensitivity Ch. 4
			d4	Line Sensitivity Ch. 5
			d5	Line Sensitivity Ch. 6
			d6	Line Sensitivity Ch. 7
			d7	Line Sensitivity Ch. 8
			dn = 0 1 ... 23 24 25 ... 29...127	+24 dBu dig. full scale +23 dBu dig. full scale ..... +1 dBu dig. full scale +0 dBu dig. full scale -1 dBu dig. full scale ..... -5 dBu dig. full scale
A.6	**s = 5**	**System Config.**	00000lrr	Configuration field
			00000x00	MIDI interface
			00000x01	RS 422 interface
			00000x10	RS 232 C interface
			00000x11	no remote interface
			000000xx	Line Input not pres.
			000001xx	Line Input present
A.7	**s = 6**	**Softw. Version**	0aaaaaaa 0zzzzzzz	Software Version 20 byte ASCII String
A.8	**s = 7**	**Sync. Status**	0v440aw0	Sync. Status byte
			0xxx0x00	Word Clk not locked
			0xxx0x10	Word Clk locked
			0xxx00x0	AES Clk not locked
			0xxx01x0	AES Clk locked
			00010xx0	48 kHz Clock
			00100xx0	44.1 kHz Clock
			01000xx0	Variable Clock

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A.9	**s = 8**	**Level Status**	d0	Level Ch. 1
			d1	Level Ch. 2
			d2	Level Ch. 3
			d3	Level Ch. 4
			d4	Level Ch. 5
			d5	Level Ch. 6
			d6	Level Ch. 7
			d7	Level Ch. 8
			dn = 0...127	Level Ch. n 0 = Clipping 1 = 0.0 dB FS 2 = -0.5 dB FS . . .. 127 = -63.0 dB FS
A.10	**s = 11**	**Program Dump**	d0...dn	MicAD Program Dump

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