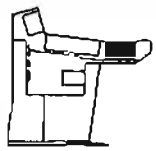
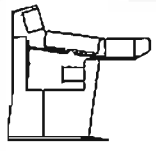
STUDER
professional audio equipment

# Studer 980
*Mixing Console*

| | | |
|---|---|---|
| | 1. | General<br>List of all plug-in modules<br>Layout and designations, dimensions<br>Block diagram |
| | 2. | Operation<br>Alignment |
|  | 3. | Plug-in units of the fader section (1.911..., 1.980...)<br>Fader-Units, Group Units,<br>Master Units<br>Central Control |
|  | 4. | Plug-in units of the master section (1.912..., 1.980...)<br>Inputs, Groups,<br>AUX Master-Units<br>Talkback/Monitoring |
|  | 5. | Plug-in units of the meter panel (1.913...)<br>Signalling<br>Metering |
|  | 6. | EU standard PCBs (1.914..., 1.915..., 1.916...) |
| | 7. | Connectors |
| | 8. | Wiring lists |
|  | 9. | Bus Boards<br>Wiring diagrams |
| | 10. | 19" Rack-mount power supply |

**Operating and Service Instructions**

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Technical Documentation
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http://www.studer.ch

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**CAUTION**
**RISK OF ELECTRIC SHOCK**
**DO NOT OPEN**

**ATTENTION**
**RISQUE DE CHOC ELECTRIQUE**
**NE PAS OUVRIR**

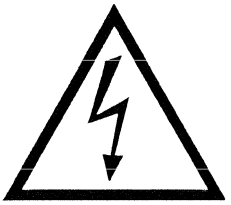
**ACHTUNG**
**GEFAHR: ELEKTRISCHER SCHLAG**
**NICHT ÖFFNEN**

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 dessen 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).

---

## 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.

## 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 ⚠ .

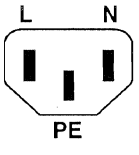
Check the equipment for any transport damage.

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.

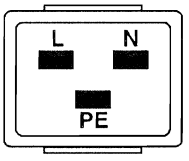
Should the equipment be delivered without a matching mains cable, the latter has to be prepared by a trained person using the attached female plug (IEC320/C13 or IEC320/C19) with respect to the applicable regulations in your country - see diagram below.

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

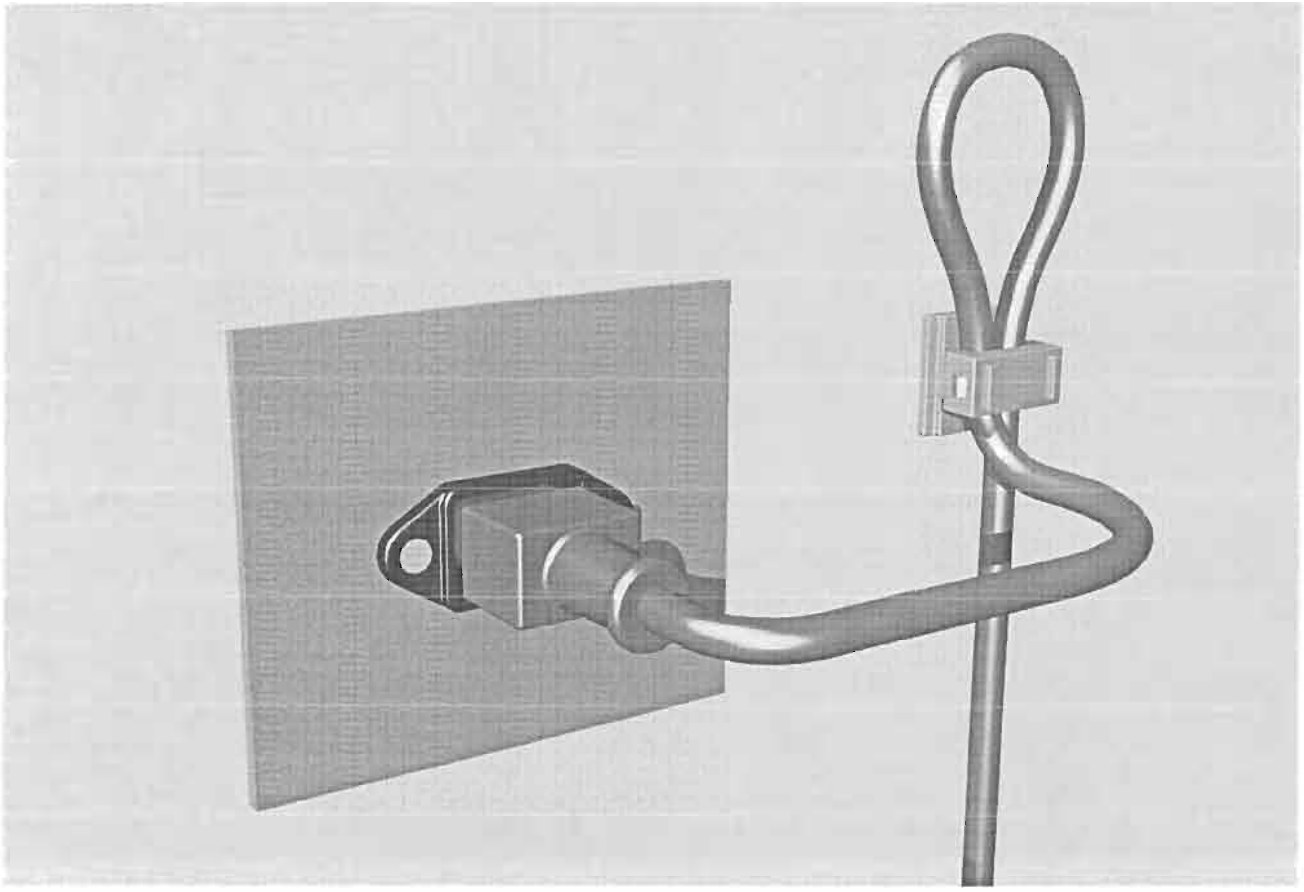
| | | |
|---|---|---|
| Female plug (IEC320), view from contact side:<br>L live; brown<br>N neutral; blue<br>PE protective earth; green and yellow | National American Standard: | Black<br>White<br>green |
| Connecteur femelle (IEC320), vue de la face aux contacts:<br>L phase; brun<br>N neutre; bleu<br>PE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

## 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.

## 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.

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.

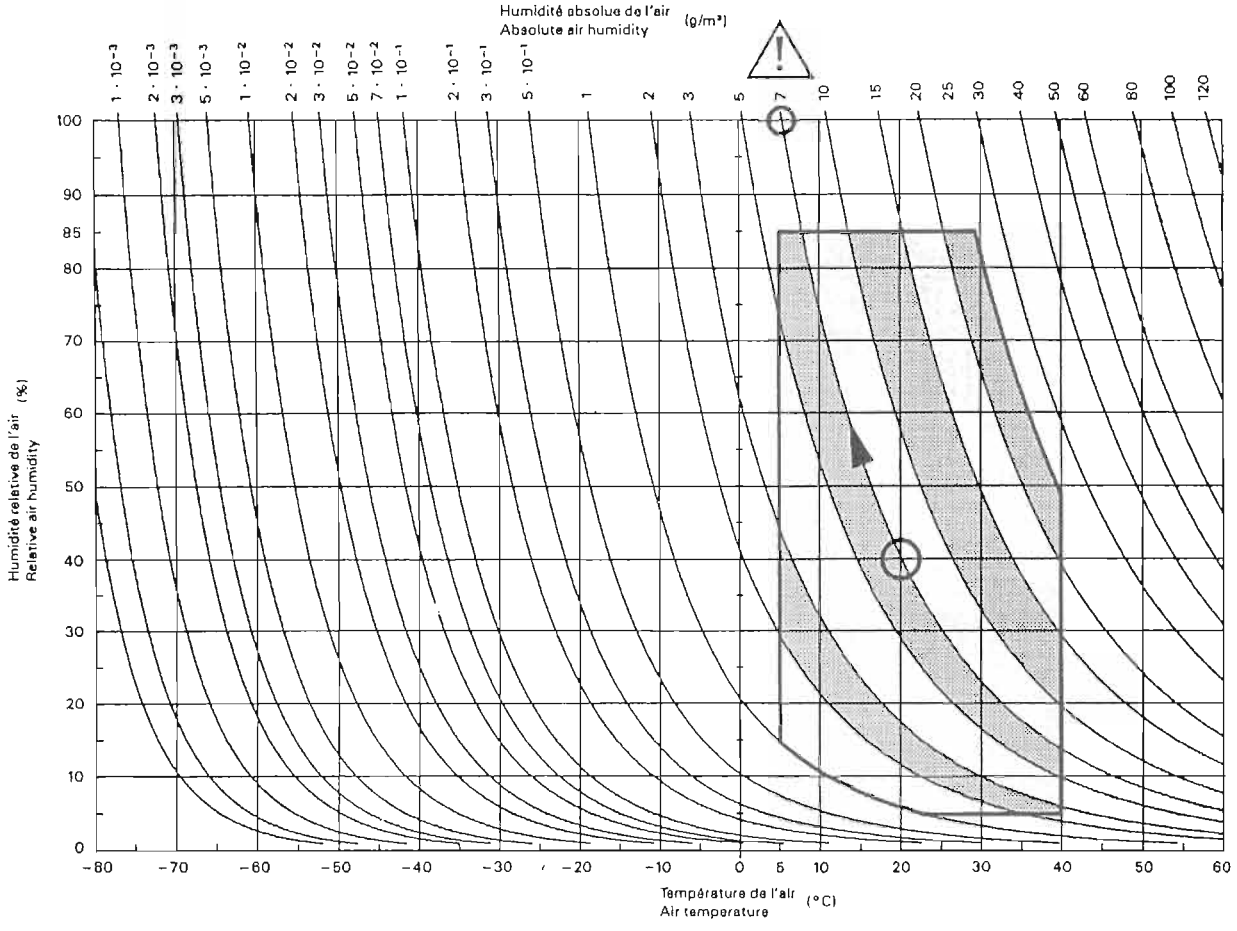



**Figure B.3 – Climatogramme pour catégorie 3K3**

**Climatogram for class 3K3**

721-3-3 © CEI:1994

## 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

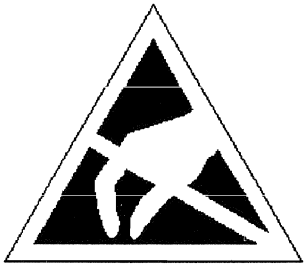
The removal of housing parts, shields, etc. exposes energized parts. For this reason the following precautions should be observed:
Maintenance should only be performed by trained personnel in accordance with the applicable regulations.
The equipment should be switched off and disconnected from the AC 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).*

## 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 Serievviderstand 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.

## SMD-Bauelemente

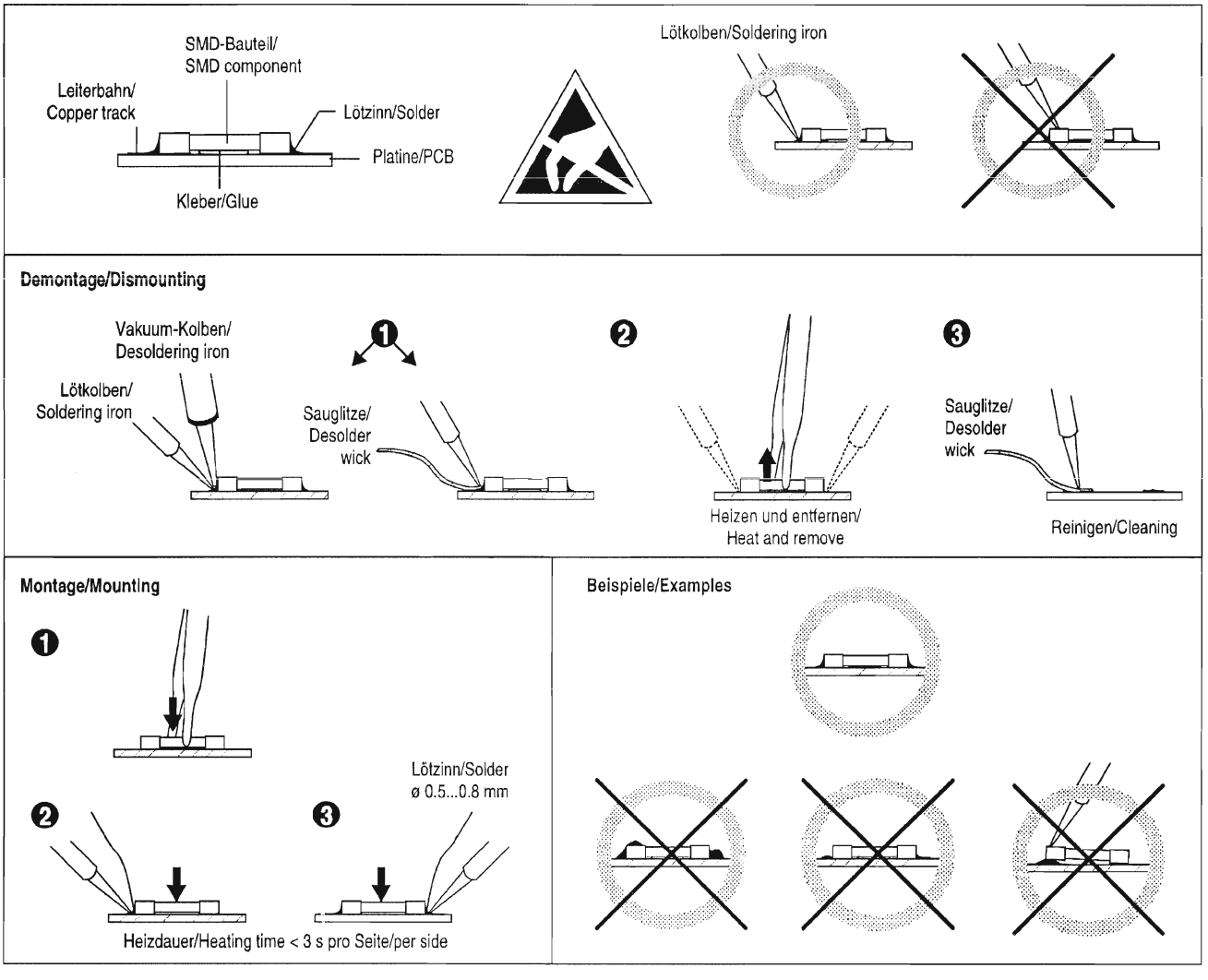
Der Austausch von SMD-Bauelementen ist ausschliesslich geübten Fachleuten vorbehalten. Für verwüstete Platinen können keine Ersatzansprüche geltend gemacht werden. Beispiele für korrekte und falsche SMD-Lötverbindungen in der Abbildung weiter unten.

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.



## 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).

## 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 das Produkt

**Studer 980, Mischpult,**
**(ab Serie-Nr. 8016),**

auf das 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 übereinstimmt:

- Sicherheit:
  Schutzklasse 1, EN 60065:1993, IEC 65:1985
- EMV:
  EN 50081-1:1992, EN50082-1:1992

Regensdorf, 12. April 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 product

**Studer 980, Mixing Console,**
**(on from serial No. 8016),**

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

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

- Safety:
  Class 1, EN 60065:1993, IEC 65:1985
- EMC:
  EN 50081-1:1992, EN50082-1:1992

Regensdorf, April 12, 1996

B. Hochstrasser, Managing director

P. Fiala, Manager QA

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# 1 GENERAL

## 1.1 Utilization for the purpose intended



The Studer 980 mixing console is intended for professional use.
It is presumed that the unit is operated only by trained personnel. Servicing is reserved to skilled technicians.
The electrical connections may be connected only to the voltages and signals designated in this manual.

## 1.2 First steps

### 1.2.1 Unpacking and inspection

Your new mixing console is shipped in a special packing which protects the units against mechanical shock during transit. Care should be exercised when unpacking so that the surfaces do not get marred.
Verify that the content of the packing agrees with the items listed on the enclosed shipping list.
Check the condition of the equipment for signs of shipping damage. If there should be any complaints you should immediately notify the forwarding agent and your nearest Studer distributor.
Please retain the original packing material because it offers the best protection in case your equipment ever needs to be transported.

### 1.2.2 Installation

**Before any connection:**



Check the line voltage setting of the power supply unit(s) before connecting to the mains. Two line voltage selectors are located on the front panel of the power supplies.
For changing the line voltage setting the unit must be completely separated from the mains.

**Power connection:**



The attached female IEC 320/C13 and IEC 320/C19 mains cable sockets have to be connected to appropriate mains cables by a trained technician, respecting your local regulations. Refer to the "Installation, Operation, and Waste Disposal" section at the beginning of this manual.
Maintenance work inside the unit must be performed by a trained technician.



**Humidity:**

Do not use the unit near any source of moisture or in excessively humid environments.



**Ventilation:**

When installing the units in a rack or any other location, be sure that there is adequate ventilation. They should be situated so that their location or position does not interfere with its proper ventilation.

## 1.2.3 Adjustments, repair



**Danger:** All internal adjustments as well as repair work on this product are to be performed by skilled technicians!



**Primary fuse:** For replacement of the primary fuse refer to section 2.10, Power Supply. Only skilled technicians are authorized to replace the fuse.

## 1.2.4 Accessories, options

**Accessories shipped with the 980 console:** **(Set: order No. 1.980.086.00)**

| | | |
|---|---|---|
| 5 | Circlips, 2.3 mm | Order No. 24.16.3023 |
| 5 | Caps, bright grey, for button Ø 10 mm | Order No. 42.01.0250 |
| 5 | Caps, dark grey, for button Ø 10 mm | Order No. 42.01.0251 |
| 2 | Caps, red, for button Ø 10 mm | Order No. 42.01.0253 |
| 2 | Caps, blue, for button Ø 10 mm | Order No. 42.01.0254 |
| 2 | Caps, yellow, for button Ø 10 mm | Order No. 42.01.0255 |
| 2 | Caps, green, for button Ø 10 mm | Order No. 42.01.0256 |
| 2 | Caps, bright grey, for button Ø 15 mm | Order No. 42.01.0257 |
| 6 | Fuses, T 2.0 A L 250 V (slow), 5 × 20 mm | Order No. 51.01.0120 |
| 2 | Fuses, T 3.15 A L 250 V (slow), 5 × 20 mm | Order No. 51.01.0122 |
| 6 | Fuses, T 5.0 A L 250 V (slow), 5 × 20 mm | Order No. 51.01.0124 |
| 2 | Fuses, T 8.0 A L 250 V (slow), 5 × 20 mm | Order No. 51.01.0126 |
| 4 | Fuses, T 10 A L 250 V (slow), 5 × 20 mm | Order No. 51.01.0127 |
| 4 | Incandescent bulbs, 6 V/30 mA, T 1½ | Order No. 51.02.0144 |
| 1 | Hexagonal screwdriver, size 2 | Order No. 98.00.2022 |
| 1 | Hexagonal key, size 2 | Order No. 98.00.2405 |
| 1 | Hexagonal key, size 2.5 | Order No. 98.00.2406 |
| 1 | Hexagonal key, size 3 | Order No. 98.00.2407 |
| 1 | Socket key for M2 nuts | Order No. 1.010.003.26 |
| 5 | Oval-head screws, M3×8 | Order No. 1.010.022.21 |
| 2 | Bus adapters, 2 × 32 pins, EU | Order No. 1.228.327.82 |
| 1 | Bus adapter, 3 × 16 pins | Order No. 1.228.328.00 |
| 1 | Bus adapter, 2 × 16 pins | Order No. 1.228.331.00 |
| 2 | Fader coupling bridge, 25 mm | Order No. 1.911.000.06 |
| 2 | Fader coupling bridge, 52 mm | Order No. 1.911.000.08 |
| 2 | Fader knobs (P+G), red | Order No. 1.911.000.42 |
| 2 | Fader knobs (P+G), yellow | Order No. 1.911.000.44 |
| 2 | Fader knobs (P+G), green | Order No. 1.911.000.45 |
| 2 | Fader knobs (P+G), blue | Order No. 1.911.000.46 |
| 2 | Fader knobs (P+G), grey | Order No. 1.911.000.48 |
| 2 | Fader knobs (P+G), white | Order No. 1.911.000.49 |
| 2 | Module extractors | Order No. 1.912.000.06 |

## 1.3 Technical specifications, console

**Conditions:**

- Voltages in dBu are referred to 0.775 $V_{RMS}$, without being tied to any load resistance.

  0 dBu ≙ 0.775 $V_{RMS}$

- Channel and master faders are set to 0 dB.
- Outputs are terminated with 600 Ω.
- External sources have an output impedance of ≤ 200 Ω.
- Specifications are valid from 31.5 Hz to 16 kHz.
- Levels are measured with a continuous sine wave (0 VU ≙ 6 dB below nominal level).

### 1.3.1 Levels

| | | | |
|---|---|---|---|
| **Inputs** | **MIC:** | Sensitivity: | **–70 dBu...+20 dBu**, adjustable in 10 dB steps |
| | | Fine adjust range: | **10 dB** |
| | | Max. level: | **+24 dBu**, balanced |
| | **LINE:** | Sensitivity: | **+6 dBu**, adjustable ±10 dB |
| | | Max. level: | **+24 dBu**, balanced |
| | **IN2:** | Sensitivity: | **+6 dBu**, adjustable ±10 dB |
| | | Max. level: | **+24 dBu**, balanced |
| **Insert points** | | Insert level: | **+6 dBu**, balanced |
| | | Max. level: | **+24 dBu**, balanced |
| **Outputs** | | | **+6 dBu** (load 600 Ω) |
| | | Max. output level: | **+24 dBu**, balanced, for all outputs except: |
| | | - Monitor: | **+22 dBu** (30 Hz: +18 dBu) |
| | | - Studio Monitor: | **+22 dBu** (30 Hz: +18 dBu) |
| | | - Headphones: | **+20 dBu** (without load, unbalanced) |
| **Overload margin:** | | Channel fader (PF): | **20 dB** (THD ≤ 1%) |
| | | Master fader (PF): | **20 dB** (THD ≤ 1%) |

### 1.3.2 Impedances, terminations

| | | |
|---|---|---|
| **Input impedances:** | MIC: | **>1.5 kΩ** (Source: ≤ 200 Ω, balanced, floating) |
| | LINE: | **>10 kΩ** (Source: ≤ 200 Ω, balanced, floating) |
| | IN2, Insert: | **>10 kΩ** (Source: ≤ 200 Ω, balanced) |
| **Output impedances:** | Master: | **≤50 Ω**, balanced, floating (load: ≥200 Ω) |
| | Studio, Monitor: | **≤50 Ω**, balanced, floating (load: ≥600 Ω) |
| | AUX (with option 1.980.320): | **≤50 Ω**, balanced, floating (load: ≥200 Ω) |
| | AUX, GRP, Dir, Insert: | **≤60 Ω**, balanced (load: ≥600 Ω) |
| | Headphones: | **≈135 Ω**, unbal. (recommended load: ≥200 Ω) |

## 1.3.3 Frequency response

| | | |
|---|---|---|
| | Filters/EQ off: | **+0/–1 dB** (31.5 Hz...16 kHz) |
| | MIC: | **≈6 Hz...50 kHz** (–3 dB) |
| | LINE: | **≈3 Hz...50 kHz** (–3 dB) |
| | IN2: | **≈3 Hz...50 kHz** (–3 dB) |
| **Filter:** | Bass cut, –3 dB point | **15...300 Hz**, adjustable; Bessel characteristics, 12 dB/oct. |

**Equalizer:**

Treble control (HF), shelving:
**±15 dB**; attack frequ. adjustable 700 Hz...15 kHz

Treble control (HF), bell (Q ≈ 1.5 at max. boost):
**±15 dB**; center frequ. adjustable 700 Hz...15 kHz

Presence/absence filter (HMF), bell, constant-Q:
**±15 dB**; center frequ. adjustable 400 Hz...7 kHz
Q ≈ 2 ("narrow")
Q ≈ 0.7 ("wide")

Presence/absence filter (HLF), bell, constant-Q:
**±15 dB**; center frequ. adjustable 120 Hz...2 kHz
Q ≈ 2 ("narrow")
Q ≈ 0.7 ("wide")

Bass control (LF), shelving:
**±15 dB**; attack frequ. adjustable 30 Hz...600 Hz

Bass control (LF), bell (Q ≈ 1.5 at max. boost):
**±15 dB**; center frequ. adjustable 30 Hz...600 Hz

## 1.3.4 Noise

Noise voltages are measured with a true-RMS voltmeter and an equivalent noise bandwidth of 30 Hz...23 kHz.

| | | |
|---|---|---|
| **Microphone input:** | Noise figure, typ. | **F = 3 dB** (source impedance = 200 Ω) |
| **Signal-to-noise ratio:** | Master fader closed: | **≥101 dB** |
| | Master fader open: | **≥97 dB** |

1 channel, line, input and master faders 0 dB, unity gain:

| | |
|---|---|
| Filters off: | **≥92 dB** |
| Filters on (linear): | **≥88 dB** |

4 channels, line, input and master faders 0 dB, unity gain:

| | |
|---|---|
| Filters off: | **≥87 dB** |
| Filters on (linear): | **≥83 dB** |

16 channels, line, input and master faders 0 dB, unity gain:

| | |
|---|---|
| Filters off: | **≥81 dB** |
| Filters on (linear): | **≥77 dB** |

## 1.3.5 Distortion/crosstalk

| | |
|---|---|
| **Distortion:** | **≤0.1%** (Line level, inside frequency range) |
| **Crosstalk:** | **>80 dB** (Master-Master) |

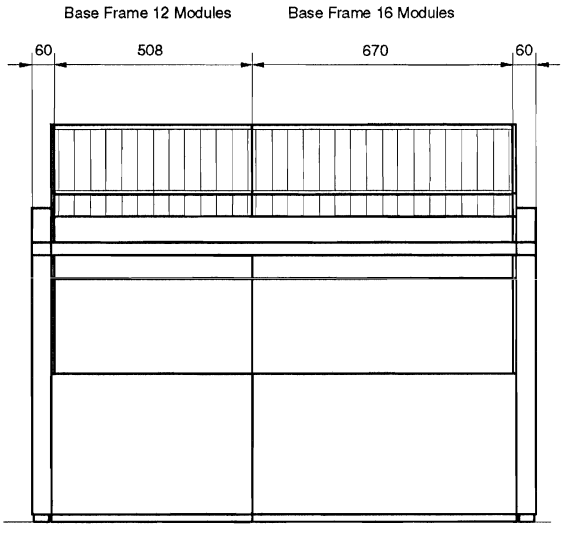
## 1.3.6 Operating conditions

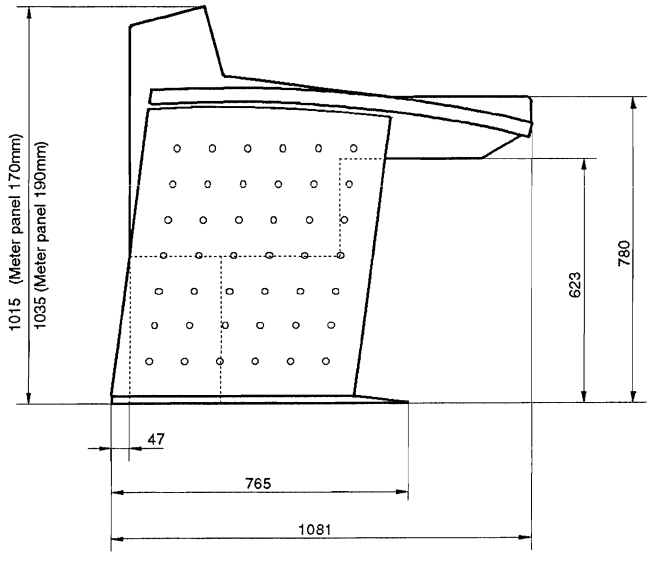
| | |
|---|---|
| **Ambient temperature:** | **+15...+40 °C** |
| **Rel. humidity:** | **Class F (DIN 40040)** |

## 1.3.7 Safety

| | |
|---|---|
| **Safety standard:** | Protection class 1, EN 60065; 1993, IEC 65; 1985 |
| **EMC standard:** | EN 50081-1; 1992, EN 50082-1; 1992 |

## 1.3.8 Dimensions



## 1.4 Specifications, power supply system 1.918.42X

### 1.4.1 Primary

| | | | |
|---|---|---|---|
| **Standby supply** | Voltage range | | **100...240 $V_{AC}$ ±10 %** |
| | Line frequency | | **50/60 Hz** |
| | Power consumption | Standby | **<3 W** |
| | | Operation ON | **<5 W** |
| | Safety transformer | | **short-circuit-proof** |
| | Insulation primary/secondary | | **4 kV** |
| | Secondary fuse | | **0.3 A** (PTC) |
| | Voltage tolerance | | **+10 %/–5 %** |
| **Main supply** | Voltage range | | **100...240 $V_{AC}$ +10/–5 %** |
| | Line frequency | | **50/60 Hz** |
| | Voltage selector | | **100, 120, 140, 200, 220, 240 $V_{AC}$** |
| | Power consumption | Single | **<500 VA** |
| | | Dual | **<1000 VA** |
| | Primary fuse: according to label on front panel | | |
| | | 100...140 $V_{AC}$ | **T 5 A L 250 V (slow), 5 × 20 mm** |
| | | 200...240 $V_{AC}$ | **T 3.15 A L 250 V (slow), 5 × 20 mm** |
| | Inrush current limiter | | **2.2 Ω** (NTC) |
| | | $I_{max (ON)}$ | **<100 A** |
| | Transformer insulation | | **4 kV** |
| | Transformer cut-off temperature | | **approx. 120 °C** |
| | Indirect power-on with relay | | |

### 1.4.2 Safety features

The power supply unit conforms to the requirements for equipment class I according to EN 60065 (IEC 65).

The primary side is designed with double insulation and withstands an AC test voltage of 4 $kV_{RMS}$.

The outputs of the power supply are not connected to the power supply housing. This means that it is not hazardous to separate the connection between the housing and the studio ground for measurement purposes while the mixing console is connected to the AC power source.

**Detailed inspections on the power supply:**

High voltage test (2.5 $kV_{RMS}$; 50 Hz)
Discharge current test
Insulation test (500 V)
Protective ground resistance test

## 1.4.3 Secondary

**General**

Some of the generated reference voltages are used for several applications. The reference systems of the stabilizer circuit and monitoring circuit are completely separated.

### Standby supply

Without standby voltage, operation of the equipment is not possible. The supply is implemented with discrete elements.

| | | |
|---|---|---|
| Output voltage | $U_{sb}$ | **5 V ±5 %** |
| Maximum current | $I_{max}$ | **80 mA** |
| Short-circuit current | $I_k$ | **approx. 110 mA** |
| Overvoltage protection | $U_{max}$ | **5.6 V** |
| Min. LED indication voltage | $U_{min}$ | **>4 V** |
| Shunt 1 Ω | $U_{meas}$ | **1 mV ≙ 1 mA** |

**Auxiliary voltage on diagnostic connector pin 2:**

| | | |
|---|---|---|
| | $U_{out}$ | **5 V ±5 %** |
| | $R_i$ ($R_{PTC}$) | **50 Ω** |
| | $I_{max}$ | **10 mA** |

| | | |
|---|---|---|
| **Standby batteries:** | AM3 (alkaline) | **2 × 1.5 V** |
| **Standby rechargeable batteries:** | according to option: | **3 × UM1 size NiCd,** |
| | or | **3 × UM3 size NiCd** |

Autonomy with disconnected power supply and fully charged batteries:

UM3 size: **2...3 days**

UM1 size: **2 weeks**

After the rechargeable batteries are discharged, the alkaline batteries in the power supply extend the autonomy for another 2 days.

## Phantom supply

Basic specification: **IEC 268-15A**
The factory setting for the phantom supply is 48 V.
As a special version, 12 V or 24 V are available. Such a conversion involves:

| | | |
|---|---|---|
| Transformer | → | Resolder jumpers |
| Electronics | → | Replug jumper |
| Mixing console (refer to section 2.16.1) | → | Replace phantom resistors |

Fuse (F1) **T 2 A L 250 V (slow), 5 × 20 mm**

The phantom supply is adjustable with a trimmer potentiometer from the front panel.

Shunt 1 Ω $U_{meas}$ **1 mV ≙ 1 mA**

**+48 V phantom supply**

| | | |
|---|---|---|
| Output voltage | $U_{out}$ | **+48 V** |
| Cont. output current | $I_{nom}$ | **<0.5 A** |
| Short-circuit current | $I_k$ | **approx. 0.9 A** |
| Fold back current | $I_{fb}$ | **approx. 0.45 A** |
| Overvoltage/cut-off point | $U_{max}$ | **approx. +56 V** |
| Overtemp./cut-off point | T | **approx. 120 °C** |
| Undervoltage indication | $U_{min}$ | **< approx. 44 V** |
| Ripple, BW 20 kHz | $U_r$ | **<1 mV at $I_{nom}$** |

The +48 V is integrated in the alarm system.

**+24 V phantom supply**

| | | |
|---|---|---|
| Output voltage | $U_{out}$ | **+24 V** |
| Cont. output current | $I_{nom}$ | **<0.5 A** |
| Short-circuit current | $I_k$ | **approx. 1.0 A** |
| Fold back current | $I_{fb}$ | **approx. 0.8 A** |
| Overvoltage/cut-off point | $U_{max}$ | **approx. +27 V** |
| Overtemp./cut-off point | T | **approx. 120 °C** |
| Undervoltage indication | $U_{min}$ | **< approx. 20 V** |
| Ripple, BW 20 kHz | Ur | **<1 mV at $I_{nom}$** |

The +24 V is integrated in the alarm system.

**+12 V phantom supply**

| | | |
|---|---|---|
| Output voltage | $U_{out}$ | **+12 V** |
| Cont. output current | $I_{nom}$ | **<0.5 A** |
| Short-circuit current | $I_k$ | **approx. 1.1 A** |
| Fold back current | $I_{fb}$ | **approx. 1 A** |
| Overvoltage/cut-off point | $U_{max}$ | **approx. +13.5 V** |
| Overtemp./cut-off point | T | **approx. 120 °C** |
| Undervoltage indication | $U_{min}$ | **< approx. 9 V** |
| Ripple, BW 20 kHz | $U_r$ | **<1 mV at $I_{nom}$** |

The +12 V is integrated in the alarm system.

## ±15 V supply 1 and 2, regulated

These supplies exist once in a single power supply (master or slave version), or twice in a dual power supply.
The two outputs supply 1 and supply 2 have a common input feeder.

**Fuses:** –20 V (F3) **T 10 A L 250 V (slow), 5 × 20 mm**
+20 V (F4) **T 10 A L 250 V (slow), 5 × 20 mm**
The availability of ±20 V is signaled with 2 LEDs.

The ±20 V input voltages are split into 2 × ±15 V regulator systems with common ground.

### Alarm/voltage deviation or short circuit

A short circuit or an overvoltage on the output disconnects the corresponding transformer unit. This is signaled by the local ALARM LED (flashing). This status information is transmitted also to the central ON/ALARM LED. The local ALARM LED flashes also in case of undervoltage, but no ALARM is triggered.

**Alarm/temperature** If the heat sink temperature rises above 120 °C, the corresponding transformer unit is switched off. This status is signaled by a local flashing LED. The status information is also transmitted to the central ON/ALARM LED.

**Reset** For resetting the alarm systems the power supply must be switched OFF and ON again.

**Supply 1, 2** The 4 voltages behave in the same way and are described only once.

Controlled linear ramping up of the 4 output voltages:
$t_{ON}$ **approx. 4 s**
Maximum total output power **180 W.**
The 4 voltages are adjusted in common with a trimmer potentiometer accessible from the front panel.

**±15 V supply**

| | | |
|---|---|---|
| Output voltage | $U_{out}$ | **15 V** |
| Cont. output current | $I_{nom}$ | **<6 A** (Supply 2: $I_{out}$ = 0 A) |
| Short circuit current | $I_k$ | **approx. 9 A** |
| Fold back current | $I_{fb}$ | **approx. 5 A** |
| Overvoltage/cut-off point | $U_{max}$ | **approx. 17 V** |
| Overtemp./cut-off point | T | **approx. 120 °C** |
| Undervoltage | | **SUPPLY LED is off if +U – (–U) <24 V** |
| Ripple, BW 20 kHz | $U_r$ | **<0.25 mV at $I_{nom}$** |
| Shunt 10 mΩ | $U_{meas}$ | **1 mV ≙ 0.1 A** |

**Note:** Normally the output currents of supply 1 and 2 are selected for a ratio of approx. 1:1 (i.e., 3 A:3 A).

## +25 V supply, unregulated

Voltage for supplying the switching regulators in the mixing console.

| | | |
|---|---|---|
| Smoothing capacitor | | 20'000 µF |
| Output voltage | $U_{out}$ | **approx. 25 V** |
| Max. output current | $I_{max}$ | **<5 A** |
| Undervoltage: LED goes off | $U_{min}$ | **<20 V** |
| Shunt 10 mΩ | $U_{meas}$ | **1 mV ≙ 0.1 A** |
| Fuse | (F5) | **T 8 A L 250 V (slow), 5 × 20 mm** |

## -6 V/-24 V supply, regulated

| | | |
|---|---|---|
| Output voltages | $U_{out}$ | **-6 V, -24 V** |
| Voltage on smoothing cap. | $U_{max}$ | **35 V** |
| Nominal current (depending on power dissipation) | $I_{nom}$ | **1...2.5 A** |
| Short-circuit current | $I_k$ | **approx. 3 A** |
| FB/switch-off | $I_{off}$ | **0 A** |
| Overvoltage/cut-off point/crow bar: | | **jumper-selectable** |
| Undervoltages turn LED off: | $U_{min}$ | **jumper-selectable** |
| Ripple, BW 20 kHz | $U_r$ | **<30 mV at $I_{nom}$ = 1 A** |
| Shunt 10 mΩ | $U_{meas}$ | **1 mV ≙ 0.1 A** |

**General**

After the protective circuit has responded the power supply must be switched OFF and ON.

Fuses (F7, F8) **T 2 A L 250 V (slow), 5 × 20 mm**
These fuse ratings limit the output current to approx. 1.5 A. If the rating is for higher current the front panel is correspondingly engraved.

## 1.4.4 Auxiliary circuits

**Fan**

| | |
|---|---|
| Operating voltage | **25 V...35 $V_{AC}$** |
| Changeover "off/low" to "high": | **temperature depending** |

**Operating modes**

| Fan speed at different settings of jumper J6: | | | |
|---|---|---|---|
| | A | B | OFF |
| Temp < Tvent | low | high | off |
| Temp > Tvent | high | high | high |

Threshold adjustment with FAN trimmer potentiometer on the front panel.
If any point in the power supply exceeds 120 °C, "high" speed is always activated.

**Power-on delay**

Adjustable with DELAY trimmer potentiometer on the front panel.
Range t **50...150 ms**

**Control electronics**

| | |
|---|---|
| Technology | **C-MOS** |
| Supply voltage | **+5 V** |
| ON/OFF state of master switch | **stored** |
| ON/OFF | **remote controllable** |

## 1.4.5 General

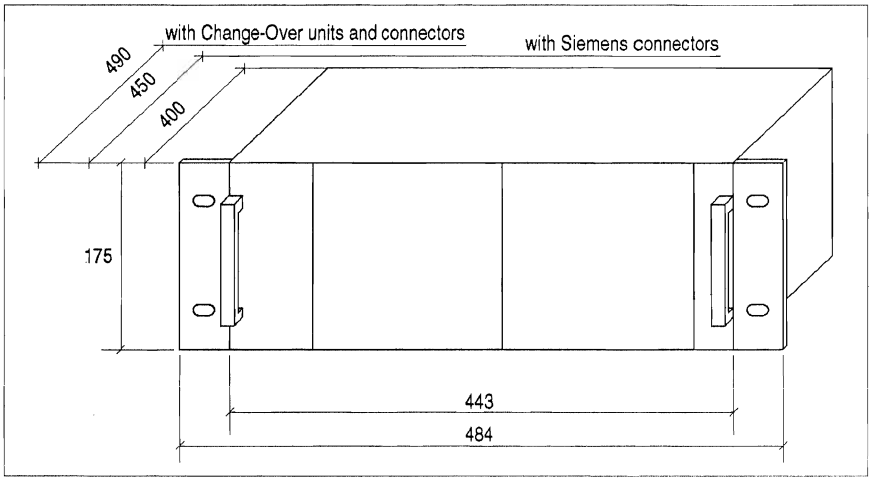
| | |
|---|---|
| Storage temperature | **–20 °C...+70 °C** |
| Ambient temperature: guaranteed | **+10 °C...+40 °C** |
| function | **–10 °C...+45 °C** |

Electrostatic discharge without adverse effect on the function according to IEC 801-2: **8 kV (air discharge)**

Radio interference voltage on mains according to:
**CISPR 11, class B**, and
**DIN VDE 0871, class B**, and
**FCC part 15 B, class B.**

## 1.4.6 Mechanical

**Dimensions**



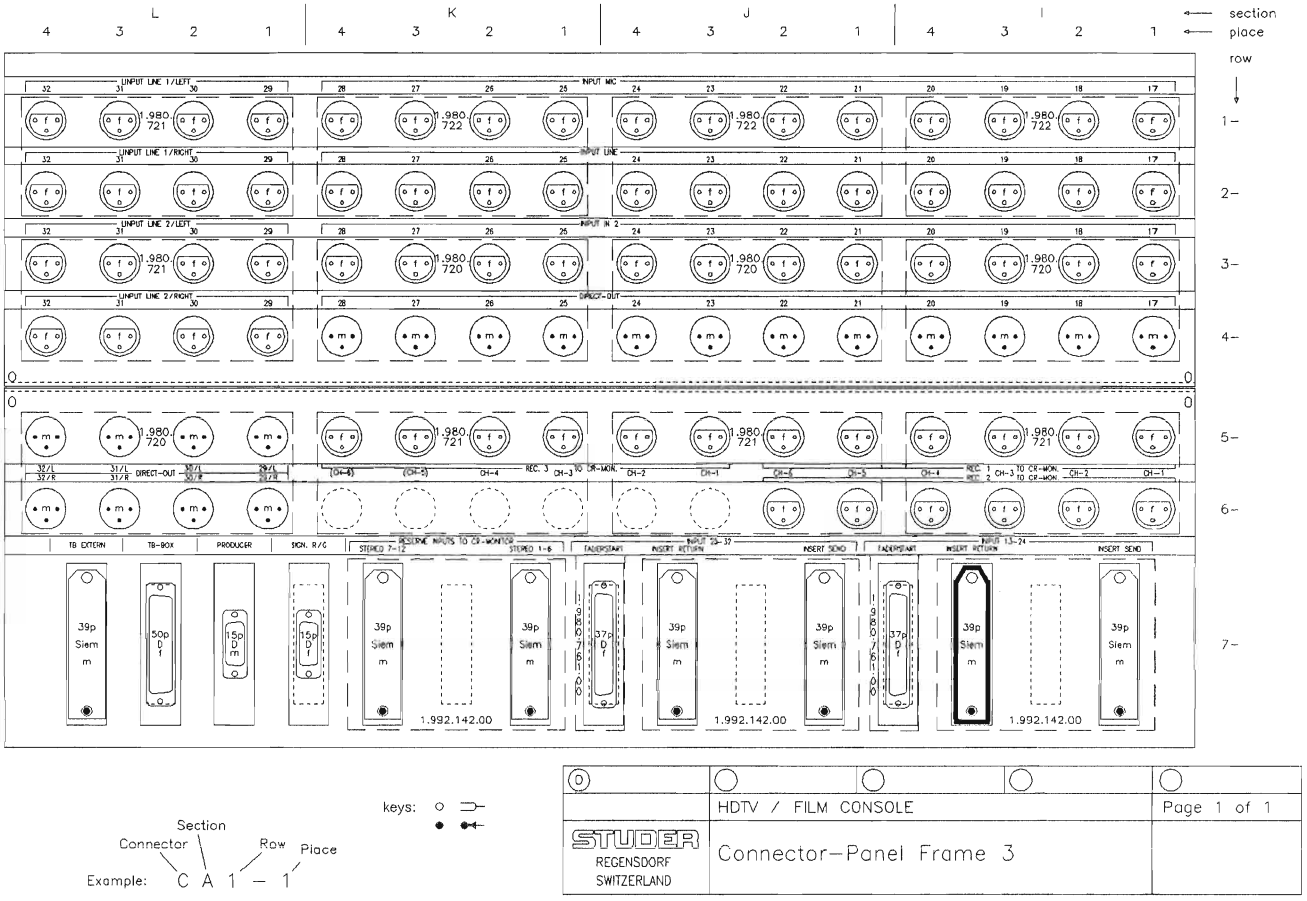

To ensure adequate ventilation the power supply must remain open on all sides.
Operation on a closed surface will not give optimum results. Two accessories are available for this purpose:
Feet, 4 pcs. (stand-off from floor approx. 12 mm) **Part No. 31.02.0209**
Air baffle (can be placed on the floor) **Part No. 1.918.207.00**

**Weight**

| | | |
|---|---|---|
| 1.918.420 | Dual power supply/Master | **27.0 kg** |
| 1.918.421 | Single power supply/Master | **18.8 kg** |
| 1.918.422 | Dual power supply/Slave | **26.2 kg** |
| 1.918.423 | Single power supply/Slave | **18.0 kg** |

## 1.5 Connections, wiring

### 1.5.1 Backpanel




Example for a backpanel drawing of one frame; usually, for the inputs also Siemens connectors are used instead of XLRs.

**Back panel connector** The connections on the rear of the console are clearly arranged and numbered. They are labelled with a number starting with a "C" (for "back panel connector") on principle.

**Sections** Each of the particular frames of the console contains three or four groups of four modules, the *Sections*, being numbered from right to left if viewn from the rear of the console.

**Places** Each Section contains four *Places* for the plug-in modules which are numbered (1...4) from right to left as well.

**Rows** The connectors establish horizontal *Rows* which are numbered from top to bottom.

**Example:** The Siemens connector highlighted in the drawing above has the designation CI7-3, according to the following table:

| C | I | 7– | 3 |
|---|---|---|---|
| | | | Place |
| | | Row | |
| | Section | | |
| Connector on back panel | | | |

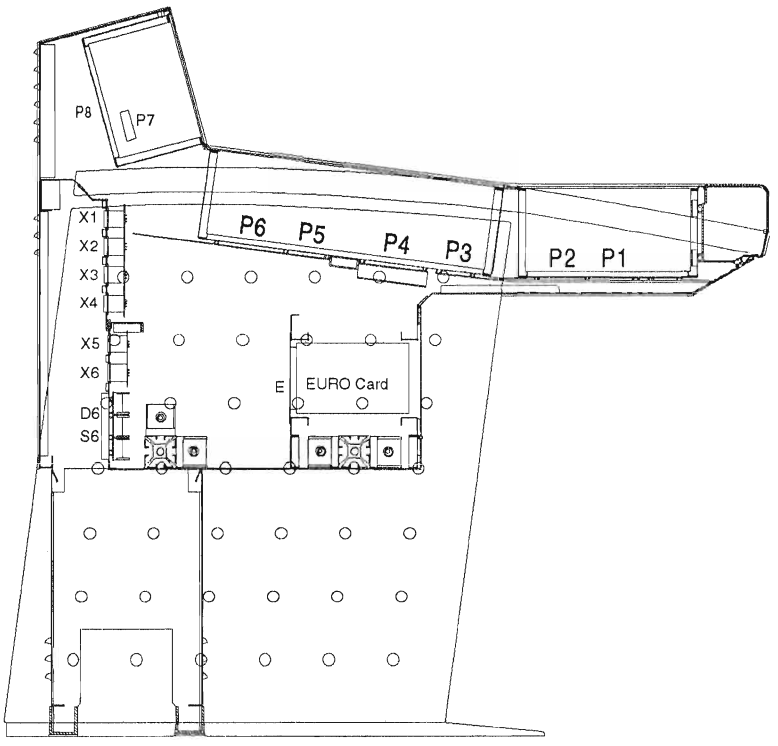
In the wiring list (see below) this connection can be found again:

| CABLE KABEL | FROM/VON CONNECTOR STECKER | TO/NACH CONNECTOR STECKER | SIGNAL NAME SIGNAL NAME | FROM/VON | TO/NACH |
|---|---|---|---|---|---|
| *165* | *CI7-3- 2 : 16* | *INPM5- 26 : 16* | *INSERT RET. INP. 17-20* | *S-CONNECTOR* | *BUS BOARD P6* |
| 166 | CI7-3- 3 : 16 | INPM6- 26 : 16 | INSERT RET. INP. 21-24 | S-CONNECTOR | BUS BOARD P6 |
| 167 | CJ7-3- 1 : 16 | INPM7- 26 : 16 | INSERT RET. INP. 25-28 | S-CONNECTOR | BUS BOARD P6 |
| 220 | - 0 : | - 0 : | | | |
| 221 | FILM1- 2 : 1H2 | CA4/J- 3 : 16 | DIRECT OUT INP. 1-4 | BUS BOARD P3 | XLR-CONN. |
| 222 | FILM2- 2 : 1H2 | CB4/J- 3 : 16 | DIRECT OUT INP. 5-8 | BUS BOARD P3 | XLR-CONN. |
| 223 | FILM3- 2 : 1H2 | CC4/J- 3 : 16 | DIRECT OUT INP. 9-12 | BUS BOARD P3 | XLR-CONN. |
| 224 | FILM4- 2 : 1H2 | CD4/J- 3 : 16 | DIRECT OUT INP. 13-16 | BUS BOARD P3 | XLR-CONN. |

Under "Cable No. 165" is indicated: *CI7-3- 2 : 16*. The "2" identifies the number of the flat cable, the"16" signifies the number of wires contained in this flat cable.

## 1.5.2 Internal wiring

The wiring inside the console is done as far as possible by (printed circuit) basis boards which the modules are plugged to. These multipin connectors are numbered P1...P6 from the front to the rear.

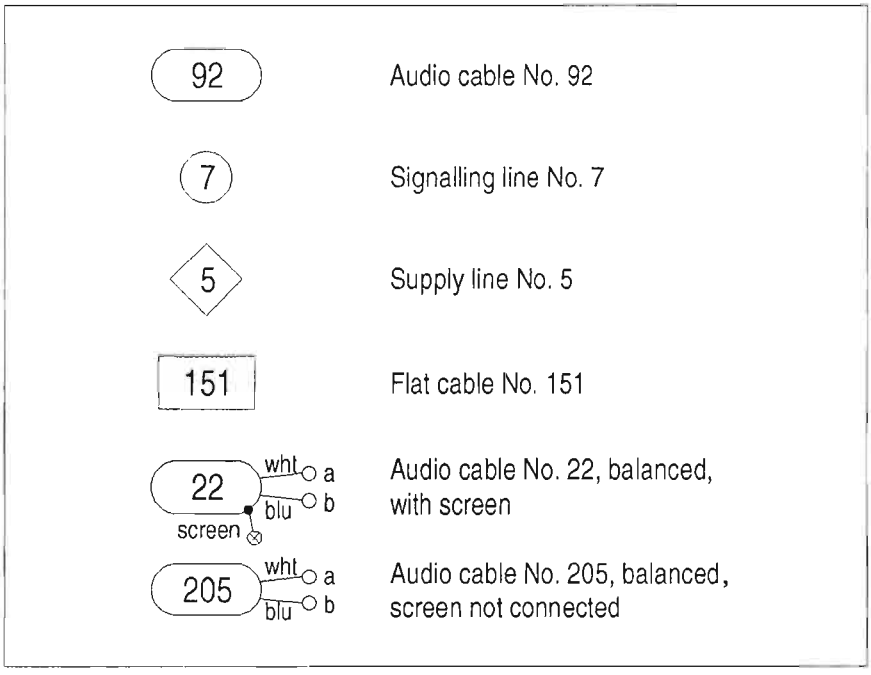


The basis PCBs are connected to the rear panel through flat cables or, where appropriate, through (shielded) stranded wires.
The basis PCBs are identified in the wiring lists by the following abbreviations:

| Abbr. | Designation | Assembly No. |
|---|---|---|
| INPM, INPS | Input Mono/Stereo,<br>IN/OUT connections digital bus boards) | 1.980.712 |
| INPG | Input Group | 1.980.712 |
| INPA | Aux Master Unit | 1.980.712 |
| AUB | Audio Basis Board | 1.992.180/181/183 |
| FILM, FILS | Fader Input Link Mono/Stereo,<br>Input Fader IN/OUT Connection Bus Board | 1.980.710/711 |
| FILG | Fader Input Link Group | 1.980.710/711 |
| AUBV | Interconnection Audio Basis Board | 1.992.182 |
| IF | Interface Board for Uptown automation | 1.980.730 |
| FMON | Film Monitoring Basis Board | 1.980.470 |
| DISTR | Distribution Board | 1.910.111.11 |
| UPTN | Uptown Automation Board | |
| PFREL | Power Fail and Accu Board | |
| CENTU | Central Control Unit | 1.980.820.20 |
| PSP | Power Supply Converter Board | 1.992.198 |
| DYN | Dynamics Unit | 1.992.165/166 |
| EU | EU card rack | |

## 1.5.3 Symbols

In the drawings of the basis PCBs and of the connectors the following symbols are used:



## 1.6 Survey of assemblies (by assembly numbers, in numerical order)

| | Assembly No. | Designation | Section |
|---|---|---|---|
| • | 1.910.302.00 | Stop Watch Auto Start Interface | 5 |
| | 1.910.503.00 | Mains Transformer 2 | 10 |
| | 1.912.326.00 | Talk Back/Studio Monitor Unit | 4 |
| | 1.912.420.00 | Control Room Monitor Unit | 4 |
| | 1.912.460.00 | AUX Monitor Selector Unit | 4 |
| | 1.912.460.81 | AUX Monitor Selector Unit | 4 |
| • | 1.913.100.00 | Correlator 4 CH, 30 LED (1U), master 1+2 and monitor output (switchable) | 5 |
| • | 1.913.101.00 | Peak Program Meter 1 CH, 30 LED | 5 |
| • | 1.913.102.00 | VU Meter 1 CH, 30 LED | 5 |
| • | 1.913.103.00 | Peak Program Meter 1 CH, 30 LED, with Gain Reduction Meter | 5 |
| • | 1.913.104.00 | VU Meter 1 CH, 30 LED, with Gain Reduction Meter | 5 |
| • | 1.913.105.00 | Peak Program Meter 2 CH, 30 LED | 5 |
| • | 1.913.106.00 | VU Meter 2 CH, 30 LED | 5 |
| • | 1.913.107.00 | Peak Program Meter 2 CH, 30 LED, with Gain Reduction Meter | 5 |
| • | 1.913.108.00 | VU Meter 2 CH, 30 LED, with Gain Reduction Meter | 5 |
| • | 1.913.109.00 | Correlator 2 CH, 30 LED | 5 |
| • | 1.913.111.81 | Dual Bargraph PPM with Gain Reduction Meter | 5 |
| • | 1.913.112.81 | Dual Bargraph VU Meter with Gain Reduction Meter | 5 |
| • | 1.913.120.00 | Talk Back Microphone | 5 |
| | 1.913.142.00 | Signalling/Indication Unit | 5 |
| | 1.913.150.81 | Audio Generator Unit | 5 |
| • | 1.913.153.00 | 4-band param. EQ with high-pass and low pass filter | 5 |
| • | 1.913.155.00 | Compressor/Limiter/Noise Gate | 5 |
| • | 1.913.157.00 | High-pass and low pass filter | 5 |
| • | 1.913.198.00 | Input Selector 1 x 8 Stereo | 5 |
| | 1.913.200.00 | *PFL Loudspeaker (Schema fehlt noch im Manual!)* | 5 |
| • | 1.913.210.00 | Correlator 2 CH w. moving-coil instrument | 5 |
| • | 1.913.211.00 | Correlator 4 CH, switchable between 2 stereo inputs | 5 |
| • | 1.913.220.00 | Peak Program Meter | 5 |
| • | 1.913.221.00 | Peak Program Meter with Gain Reduction Meter | 5 |
| • | 1.913.230.00 | VU-Meter | 5 |
| • | 1.913.231.00 | VU Meter Unit w. limiter instrument | 5 |
| • | 1.913.233.00 | VU Meter Unit w. 2 small VU Meters | 5 |
| • | 1.913.310.81 | Stop Watch | 5 |
| • | 1.913.321.00 | Peak Program Meter 4 CH, 30 LED | 5 |
| • | 1.913.322.00 | VU Meter 4 CH, 30 LED | 5 |
| • | 1.913.323.00 | Peak Program Meter 4 CH, 30 LED, with Gain Reduction Meter | 5 |
| • | 1.913.324.00 | VU Meter 4 CH, 30 LED, with Gain Reduction Meter | 5 |
| • | 1.913.411.81 | Bargraph 8 CH, PPM, with Gain Reduction Meter | 5 |
| • | 1.913.412.81 | Bargraph 8 CH, PPM, w. limiter instrument | 5 |
| • | 1.913.421.00 | Bargraph 4 CH, Stereo (990) | 5 |

| | Assembly No. | Designation | Section |
|---|---|---|---|
| • | 1.914.500.00 | MSC Motherboard small | 6 |
| • | 1.914.501.00 | Line Output amplifier | 6 |
| • | 1.914.502.81 | HL Input Amplifier floating w. transformer input (external mute facility) | 6 |
| • | 1.914.503.00 | Zero-Ohm Input Amplifier | 6 |
| • | 1.914.504.81 | HL Input Amplifier balanced, transformerless input (external mute facility) | 6 |
| • | 1.914.505.00 | Amplifier 3 W | 6 |
| • | 1.914.506.81 | Mic Preamp with transformer input (external mute facility) | 6 |
| • | 1.914.507.81 | Mic Preamp for Electret (external mute facility) | 6 |
| • | 1.914.514.00 | HL Input with transformer input and VCA control, unbalanced output | 6 |
| • | 1.914.515.00 | VCA with balanced inputs and outputs | 6 |
| • | 1.914.518.81 | VCA | 6 |
| • | 1.914.519.81 | Limiter Voltage Processor | 6 |
| • | 1.914.520.00 | Call Generator 1.9 kHz | 6 |
| • | 1.914.521.81 | Call Decoder 20...60 Hz | 6 |
| • | 1.914.522.00 | Call Decoder 1.9 kHz | 6 |
| • | 1.914.523.00 | Relay 2 x U (DPDT), 6 V | 6 |
| • | 1.914.524.00 | Relay 2 x U (DPDT), 24 V | 6 |
| • | 1.914.525.00 | Relay 2 x U (DPDT), 6 V, Low Noise | 6 |
| • | 1.914.526.00 | Relay 2 x U (DPDT), 24 V, Low Noise | 6 |
| • | 1.914.528.00 | VCA, 3 control inputs | 6 |
| • | 1.914.529.00 | Universal PCB (Breadboard) | 6 |
| • | 1.914.530.00 | Zero-Ohm Input Amplifier | 6 |
| • | 1.914.531.00 | HL Input with transformer (PFL Opt.) | 6 |
| • | 1.914.532.00 | Flip-Flop | 6 |
| • | 1.914.533.00 | 90° Filter Board for Mono Summing | 6 |
| • | 1.914.534.00 | Dual Vox Detector | 6 |
| • | 1.914.536.00 | Telephone Transformer Unit | 6 |
| • | 1.914.539.00 | Mic Amplifier with Limiter | 6 |
| • | 1.914.540.00 | Fader VCA Control Voltage Interface | 6 |
| | 1.915.106.00 | Stabilizer 5/24 V | 6 |
| • | 1.915.107.00 | Phantom and 24 V Stabilizer | 6 |
| | 1.915.108.00 | Stabilizer 5/24 V, 5 A | 6 |
| • | 1.915.109.00 | Diodes/Power Alarm Board for redundant Power Supply | 6 |
| | 1.915.111.81 | Power Supply LED 3...6 V | 6 |
| | 1.915.112.00 | Power Alarm/Fail 4 Board | 6 |
| | 1.915.304.00 | Monitor Amplifier A | 6 |
| • | 1.915.307.81 | Distribution Amplifier (1 In, 6 Out) | 6 |
| • | 1.915.308.81 | Distribution Amplifier (1 In, 4 Out) | 6 |
| • | 1.915.410.00 | Power Amplifier 5 W | 6 |
| • | 1.915.411.00 | Power Amplifier 5 W, transformer input | 6 |
| • | 1.915.412.00 | Power Amplifier 5 W, w. Mute | 6 |
| • | 1.915.413.00 | Power Amplifier 5 W, transformer input, w. Mute | 6 |

| | Assembly No. | Designation | Section |
|---|---|---|---|
| • | 1.915.414.00 | Power Amplifier 5 W, w. VCA | 6 |
| • | 1.915.415.00 | Power Amplifier 5 W, transformer input, w. VCA | 6 |
| • | 1.915.440.00 | Power Amplifier 40 W/4 Ohm, transformerless input | 6 |
| • | 1.915.441.00 | Power Amplifier 40 W/4 Ohm, transformer input | 6 |
| | 1.915.601.81 | 5/1 Switch A | 6 |
| | 1.915.602.81 | 4/2 Switch A | 6 |
| • | 1.915.603.81 | Relay Board Signalling 9A | 6 |
| • | 1.915.605.00 | Relay Board 8/1A Mono | 6 |
| • | 1.915.607.81 | Bistable Relay Board 5/1A Mono | 6 |
| • | 1.915.608.00 | Bistable Relay Board 5/1A Stereo | 6 |
| • | 1.915.700.00 | Dual Limiter | 6 |
| • | 1.915.760.81 | Telephone Hybrid | 6 |
| • | 1.915.762.81 | Dual Relay Board for Telephone Hybrid | 6 |
| • | 1.915.764.00 | Telephone Hybrid w. Noise Gate | 6 |
| • | 1.915.765.00 | Current adjust for Hybrid Unit | 6 |
| | 1.915.770.00 | MSC Motherboard | 6 |
| • | 1.915.904.81 | Stereo Balancing Unit 2 CH | 6 |
| • | 1.915.913.82 | Power Alarm Unit | 6 |
| • | 1.915.914.00 | 4 CH Balancing Unit, 6 dB, transformerless | 6 |
| • | 1.915.915.00 | 4 CH Balancing Unit, 16 dB, transformerless | 6 |
| • | 1.915.922.00 | Dual Line Amplifier, low output impedance | 6 |
| • | 1.915.924.00 | Dual Balancing Unit w. Insert Switch | 6 |
| • | 1.916.001.00 | Studio Relays | 6 |
| • | 1.916.002.00 | Relay Unit 4 x 2 U (4 x DPDT) | 6 |
| • | 1.916.010.00 | Relay Unit 4 x 2 CO | 6 |
| • | 1.917.110.00 | 32 CH Bus Selector | 6 |
| • | 1.917.300.00 | Monitor Mix Amplifier | 6 |
| • | 1.917.305.00 | Monitor Amplifier for multichannel monitoring | 6 |
| • | 1.917.601.00 | Monitor Relays 8 x 2/2 | 6 |
| • | 1.917.611.00 | Signal I/O Interface | 6 |
| | 1.918.075.00 | Change-Over Board | 10 |
| | 1.918.078.00 | Ventilator | 10 |
| | 1.918.079.00 | NTC Sensor | 10 |
| | 1.918.082.00 | LED Board | 10 |
| | 1.918.083.00 | Rectifier/Capacitor Board | 10 |
| | 1.918.084.00 | ±15 V Stabilizer Board | 10 |
| | 1.918.085.00 | Mains Selector Board | 10 |
| | 1.918.086.00 | Power Amp Rectifier Board | 10 |
| | 1.918.087.81 | Dual Stabilizer/Rectifier Board | 10 |
| | 1.918.088.00 | Phantom/±12 V Stabilizer Board | 10 |
| | 1.918.089.00 | Feed-Through Board | 10 |
| | 1.918.420.00 | Dual Power Supply/Master | 10 |
| • | 1.918.421.00 | Single Power Supply/Master | 10 |
| • | 1.918.422.00 | Dual Power Supply/Slave | 10 |
| • | 1.918.423.00 | Single Power Supply/Slave | 10 |
| | 1.980.110.00 | Fader Unit (Mono) | 3 |

| | Assembly No. | Designation | Section |
|---|---|---|---|
| | 1.980.111.00 | Fader Unit (Film/HDTV, Mono) | 3 |
| | 1.980.120.00 | Fader Unit (Stereo) | 3 |
| | 1.980.130.00 | Fader Unit (Mono, VCA) | 3 |
| | 1.980.131.00 | Fader Unit (Film/HDTV, Mono, VCA) | 3 |
| | 1.980.140.00 | Fader Unit (Stereo, VCA) | 3 |
| | 1.980.150.00 | Fader Unit (Mono, with motor fader) | 3 |
| | 1.980.151.00 | Fader Unit (Film/HDTV, Mono, with motor fader) | 3 |
| | 1.980.160.00 | Fader Unit (Stereo, with motor fader) | 3 |
| | 1.980.180.00 | Dual Master Unit | 3 |
| | 1.980.181.00 | Dual Master Unit with 1 Limiter Switch | 3 |
| | 1.980.182.00 | Dual Master Unit with 2 Limiter Switches | 3 |
| | 1.980.183.00 | Mono Master Unit | 3 |
| | 1.980.184.00 | Mono Master Unit with 1 Limiter Switch | 3 |
| | 1.980.185.00 | Mono Master Unit with Lim./Link Swith | 3 |
| | 1.980.220.20 | Mono Input Unit, with EQ, 8/4 Ch. | 4 |
| | 1.980.221.20 | Mono Input Unit, with EQ, 6/6 Ch. | 4 |
| | 1.980.230.20 | Mono Group Unit, without EQ, 4 Ch. | 4 |
| | 1.980.231.20 | Mono Group Unit, without EQ, 6 Ch. | 4 |
| | 1.980.240.20 | Stereo Input Unit, HL, with EQ, 8/4 Ch. | 4 |
| | 1.980.241.20 | Stereo Input Unit, HL, with EQ, 6/6 Ch. | 4 |
| | 1.980.242.20 | Stereo Input Unit, HL, without EQ, 8/4 Ch. | 4 |
| | 1.980.243.20 | Stereo Input Unit, HL, without EQ, 6/6 Ch. | 4 |
| | 1.980.250.20 | Stereo Input Unit, Universal, with EQ, 8/4 Ch. | 4 |
| | 1.980.251.20 | Stereo Input Unit, Universal, with EQ, 6/6 Ch. | 4 |
| | 1.980.310.20 | AUX Master Unit, transformerless | 4 |
| | 1.980.320.20 | AUX Master Unit, with transformers | 4 |
| | 1.980.710.00 | Input/Fader Connection Board 4A | 9 |
| | 1.980.711.00 | Input/Fader Connection Board 4A, VCA | 9 |
| | 1.980.712.00 | Input/Output Connection / Digital Bus Board | 9 |
| | 1.980.720.00 | XLR to Flat Cable Male Board | 9 |
| | 1.980.721.81 | XLR to Flat Cable Female Board | 9 |
| | 1.980.761.00 | 3 x 16pin to 37pin D-Type Board | 9 |
| | 1.980.763.00 | AUX P5 Connection Board | 9 |
| | 1.980.764.00 | Address Select Board, 40 mm | 9 |
| | 1.980.765.00 | Address Select Board, 60 mm | 9 |
| | 1.980.771.00 | 10pin Connection Board, 60 mm | 9 |
| | 1.980.772.00 | 10pin Connection Board, 40 mm | 9 |
| | 1.980.773.00 | AUX Jumper Connection Board, 2 x 16pin | 9 |
| | 1.980.820.21 | Central Control Unit | 3 |
| | 1.980.822.21 | Central Control µP Board | 3 |
| | 1.980.829.00 | Central Control Switch Board | 3 |
| • | 1.990.510.00 | Dynamics Unit | 5 |
| • | 1.990.620.00 | 4 CH Bargraph Mono + Bus (990) | 5 |
| • | 1.990.621.00 | 4 CH Bargraph Stereo + Bus (990) | 5 |

• = Assemblies with the dot can be installed according to the individual console configuration. The corresponding diagrams are contained in the manual only if the assemblies are present in the console.

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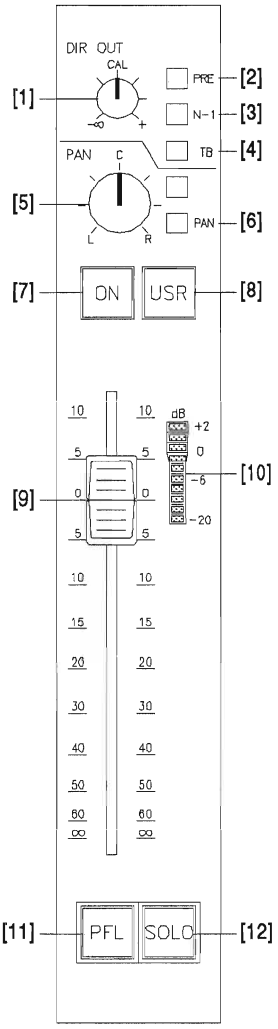
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## 2.1 Fader units

### 2.1.1 Mono fader, broadcast version 1.980.110




[1] **DIR OUT**
Level setting for the (electronically balanced) direct output. Setting range: –∞ to +10 dBu.

[2] **PRE**
Key for tapping the DIR OUT (direct output) signal before (PRE is illuminated) or after the fader.

[3] **N-1**
Multiplex operation for the DIR OUT (direct output). In this operating mode all selected sources except the channel's own modulation are audible.
Typical application: Direct transmissions or telephone recordings, if the concerned channel is used as a feedback channel to an outside commentator.

[4] **TB**
"Talk back", momentary pushbutton for talking via the command microphone to the DIR OUT (direct output).

[5] **PAN** (pot)
Panorama potentiometer, with detent in center position, for setting the mono source on the axis between the stereo speakers.

[6] **PAN** (key)
Key for activating the PAN potentiometer.

[7] **ON**
Key for activating the channel. If only the lower part of the key is illuminated, the channel is active, but the fader is still closed. As soon as the fader is opened the whole key is illuminated
Inverse function is possible on request (MUTE, the channel is muted when the key is illuminated).

[8] **USR**
Key for activating an internal or external customer-specific function with acknowledgement. In standard configurations this key activates the CHANNEL ASSIGN function (refer to "Central control unit (CCU)", section 2.3).

[9] **Fader**
Linear fader with log characteristics (Penny + Giles).

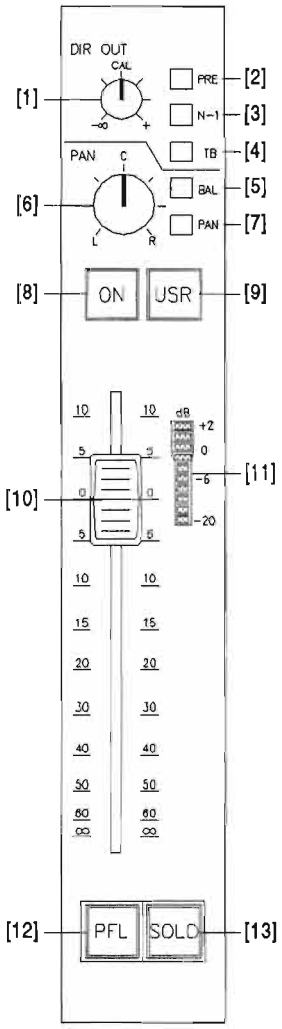
[10] **LED bargraph**
Level meter for monitoring the direct output. With the METER ON INPUT key on the input unit of the channel strip the level meter can be switched over to the selected input.
VU or PPM characteristics can be selected with a jumper (refer to diagram Fader Main Board, 1.980.102; section 3).

[11] **PFL**
Key for the pre-fader listening function. With the PFL MODE key on the central Function Control Unit (FCU), mutually releasing or latching function of the individual PFL keys can be selected.

**[12] SOLO**

Key for monitoring after the PAN potentiometer.
With the SOLO DESTR. key on the central Function Control Unit (FCU) switchover to "Solo destructive" (or "Solo in Place") is possible. This function is mostly used in recording or multi-format consoles; therefore it cannot be found in every console.
With the SOLO SAVE key on the central Function Control Unit (FCU) the SAVE function can be preselected. If SAVE is selected on one channel the lower part of the key is illuminated; this channel cannot switched to the SOLO bus.
With the PFL MODE key on the central Function Control Unit (FCU), mutually releasing or latching function of the individual SOLO keys can be selected.

## 2.1.2 Stereo fader, broadcast version 1.980.120




[1] DIR OUT
Level setting for the (electronically balanced) direct output. Setting range: –∞ to +10 dBu.

[2] PRE
Key for tapping the DIR OUT (direct output) signal before (PRE is illuminated) or after the fader.

[3] N-1
Multiplex operation for the DIR OUT (direct output). In this operating mode all selected sources except the channel's own modulation are audible.
Typical application: Direct transmissions or telephone recordings, if the concerned channel is used as a feedback channel to an outside commentator.

[4] TB
"Talk back", momentary pushbutton for talking via the command microphone to the DIR OUT (direct output).

[5] BAL
Key to switch the PAN pot over to balance characteristics for correcting level differences between the right and the left channel.

[6] PAN (pot)
Panorama potentiometer, with detent in center position, for shifting the stereo image between the speakers. At the potentiometer's left-hand or right-hand stop the complete information of both input channels is retained, however in mono.

[7] PAN (key)
Key for activating the PAN potentiometer.

[8] ON
Key for activating the channel. If only the lower part of the key is illuminated, the channel is active, but the fader is still closed. As soon as the fader is opened the whole key is illuminated.
Inverse function is possible on request (MUTE, the channel is muted when the key is illuminated).

[9] USR
Key for activating an internal or external customer-specific function with acknowledgement. In standard configurations this key activates the CHANNEL ASSIGN function (refer to "Central control unit (CCU)", section 2.3).

[10] Fader
Linear fader with log characteristics (Penny + Giles).

[11] LED bargraph
Level meter for monitoring the direct output. With the METER ON INPUT key on the input unit of the channel strip the level meter can be switched over to the selected input.
VU or PPM characteristics can be selected with a jumper (refer to diagram Fader Main Board, 1.980.102; section 3).

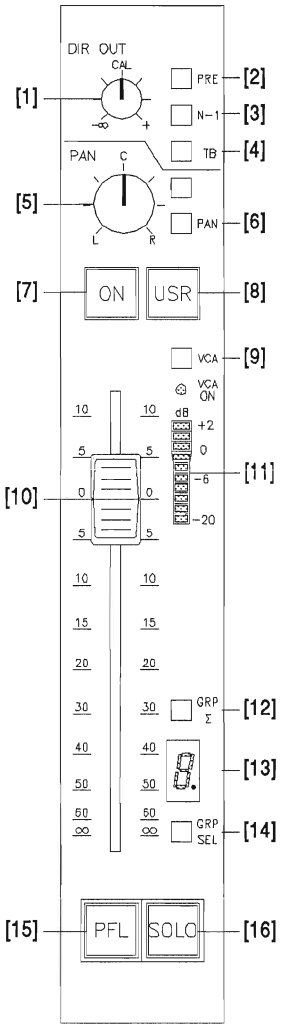
**[12] PFL**

Key for the pre-fader listening function. With the PFL MODE key on the central Function Control Unit (FCU), mutually releasing or latching function of the individual PFL keys can be selected.

**[13] SOLO**

Key for monitoring after the PAN potentiometer.
With the SOLO DESTR. key on the central Function Control Unit (FCU) switchover to "Solo destructive" (or "Solo in Place") is possible. This function is mostly used in recording or multi-format consoles; therefore it cannot be found in every console.
With the SOLO SAVE key on the central Function Control Unit (FCU) the SAVE function can be preselected. If SAVE is selected on one channel the lower part of the key is illuminated; this channel cannot switched to the SOLO bus.
With the PFL MODE key on the central Function Control Unit (FCU), mutually releasing or latching function of the individual SOLO keys can be selected.

## 2.1.3 Mono fader with VCA, broadcast version 1.980.130




[1] **DIR OUT**
Level setting for the (electronically balanced) direct output. Setting range: –∞ to +10 dBu.

[2] **PRE**
Key for tapping the DIR OUT (direct output) signal before (PRE is illuminated) or after the fader.

[3] **N-1**
Multiplex operation for the DIR OUT (direct output). In this operating mode all selected sources except the channel's own modulation are audible.
Typical application: Direct transmissions or telephone recordings, if the concerned channel is used as a feedback channel to an outside commentator.

[4] **TB**
"Talk back", momentary pushbutton for talking via the command microphone to the DIR OUT (direct output).

[5] **PAN** (pot)
Panorama potentiometer, with detent in center position, for setting the mono source on the axis between the stereo speakers.

[6] **PAN** (key)
Key for activating the PAN potentiometer.

[7] **ON**
Key for activating the channel. If only the lower part of the key is illuminated, the channel is active, but the fader is still closed. As soon as the fader is opened the whole key is illuminated.
Inverse function is possible on request (MUTE, the channel is muted when the key is illuminated).

[8] USR
Key for activating an internal or external customer-specific function with acknowledgement. In standard configurations this key activates the CHANNEL ASSIGN function (refer to "Central control unit (CCU)", section 2.3).

[9] VCA
Key for activating the VCA (Voltage Controlled Amplifier). The audio signal is routed through the VCA, the fader is used for setting the VCA control voltage. The VCA ON LED is illuminated as soon as the fader is opened.

[10] Fader
Linear fader with log characteristics (Penny + Giles).

[11] LED bargraph
Level meter for monitoring the direct output. With the METER ON INPUT key on the input unit of the channel strip the level meter can be switched over to the selected input.
VU or PPM characteristics can be selected with a jumper (refer to diagram Fader Main Board, 1.980.102; section 3).

**[12] GRP Σ**

Key for defining the master of the corresponding VCA group (according to display [13]). If this key is illuminated the fader controls the VCAs of all channel strips of the VCA group.

**[13] 7-segment display**

For VCA group indication. As soon as the input is linked to one or several others the right-hand decimal point is on in addition. This link requires that one of the inputs of the VCA group is designed as master (GRP Σ [12] is illuminated on the corresponding channel).

**[14] GRP SEL**

Key for selecting from 8 independent VCA groups (0...7). If the display [13] is dark, then no group is selected; the key is dark as well.
VCA group No. 0 has a special function: It is used for links with one or several channels to the left of the current channel strip only; however, several VCA groups No. 0 can be defined on the same mixing console. So e.g. up to 12 independent dual-VCA groups can be configured on a 24-channel console.

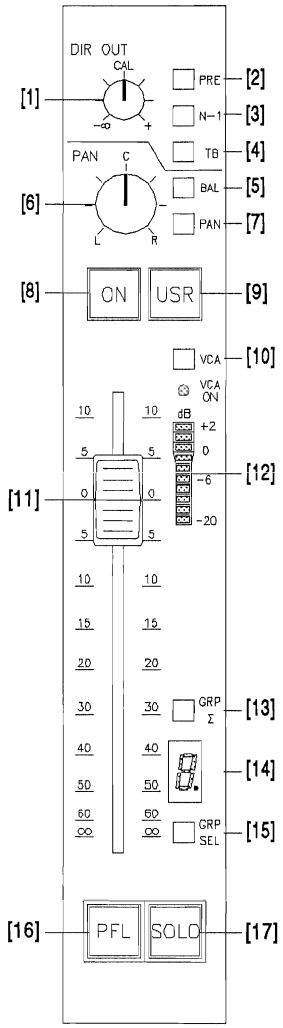
**[15] PFL**

Key for the pre-fader listening function. With the PFL MODE key on the central Function Control Unit (FCU), mutually releasing or latching function of the individual PFL keys can be selected.

**[16] SOLO**

Key for monitoring after the PAN potentiometer.
With the SOLO DESTR. key on the central Function Control Unit (FCU) switchover to "Solo destructive" (or "Solo in Place") is possible. This function is mostly used in recording or multi-format consoles; therefore it cannot be found in every console.
With the SOLO SAVE key on the central Function Control Unit (FCU) the SAVE function can be preselected. If SAVE is selected on one channel the lower part of the key is illuminated; this channel cannot switched to the SOLO bus.
With the PFL MODE key on the central Function Control Unit (FCU), mutually releasing or latching function of the individual SOLO keys can be selected.

## 2.1.4 Stereo fader with VCA, broadcast version 1.980.140




[1] **DIR OUT**
Level setting for the (electronically balanced) direct output. Setting range: –∞ to +10 dBu.

[2] **PRE**
Key for tapping the DIR OUT (direct output) signal before (PRE is illuminated) or after the fader.

[3] **N-1**
Multiplex operation for the DIR OUT (direct output). In this operating mode all selected sources except the channel's own modulation are audible.
Typical application: Direct transmissions or telephone recordings, if the concerned channel is used as a feedback channel to an outside commentator.

[4] **TB**
"Talk back", momentary pushbutton for talking via the command microphone to the DIR OUT (direct output).

[5] **BAL**
Key to switch the PAN pot over to balance characteristics for correcting level differences between the right and the left channel.

[6] **PAN** (pot)
Panorama potentiometer, with detent in center position, for shifting the stereo image between the speakers. At the potentiometer's left-hand or right-hand stop the complete information of both input channels is retained, however in mono.

[7] **PAN** (key)
Key for activating the PAN potentiometer.

[8] **ON**
Key for activating the channel. If only the lower part of the key is illuminated, the channel is active, but the fader is still closed. As soon as the fader is opened the whole key is illuminated.
Inverse function is possible on request (MUTE, the channel is muted when the key is illuminated).

[9] **USR**
Key for activating an internal or external customer-specific function with acknowledgement. In standard configurations this key activates the CHANNEL ASSIGN function (refer to "Central control unit (CCU)", section 2.3).

[10] **VCA**
Key for activating the VCA (Voltage Controlled Amplifier). The audio signal is routed through the VCA, the fader is used for setting the VCA control voltage. The VCA ON LED is illuminated as soon as the fader is opened.

[11] **Fader**
Linear fader with log characteristics (Penny + Giles).

**[12] LED bargraph**

Level meter for monitoring the direct output. With the METER ON INPUT key on the input unit of the channel strip the level meter can be switched over to the selected input.
VU or PPM characteristics can be selected with a jumper (refer to diagram Fader Main Board, 1.980.102; section 3).

**[13] GRP Σ**

Key for defining the master of the corresponding VCA group (according to display [13]). If this key is illuminated the fader controls the VCAs of all channel strips of the VCA group.

**[14] 7-segment display**

For VCA group indication. As soon as the input is linked to one or several others the right-hand decimal point is on in addition. This link requires that one of the inputs of the VCA group is designed as master (GRP Σ [12] is illuminated on the corresponding channel).

**[15] GRP SEL**

Key for selecting from 8 independent VCA groups (0...7). If the display [13] is dark, then no group is selected; the key is dark as well.
VCA group No. 0 has a special function: It is used for links with one or several channels to the left of the current channel strip only; however, several VCA groups No. 0 can be defined on the same mixing console. So e.g. up to 12 independent dual-VCA groups can be configured on a 24-channel console.

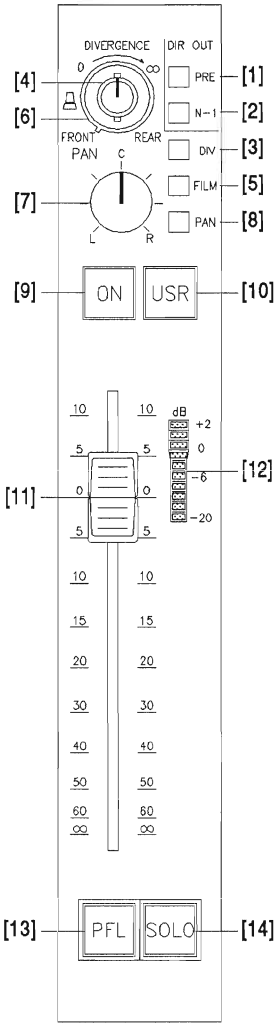
**[16] PFL**

Key for the pre-fader listening function. With the PFL MODE key on the central Function Control Unit (FCU), mutually releasing or latching function of the individual PFL keys can be selected.

**[17] SOLO**

Key for monitoring after the PAN potentiometer.
With the SOLO DESTR. key on the central Function Control Unit (FCU) switchover to "Solo destructive" (or "Solo in Place") is possible. This function is mostly used in recording or multi-format consoles; therefore it cannot be found in every console.
With the SOLO SAVE key on the central Function Control Unit (FCU) the SAVE function can be preselected. If SAVE is selected on one channel the lower part of the key is illuminated; this channel cannot switched to the SOLO bus.
With the PFL MODE key on the central Function Control Unit (FCU), mutually releasing or latching function of the individual SOLO keys can be selected.

## 2.1.5 Mono fader, HDTV/film version 1.980.111




[1] **PRE**
Key for tapping the DIR OUT (direct output) signal before (PRE is illuminated) or after the fader.

[2] **N-1**
Multiplex operation for the DIR OUT (direct output). In this operating mode all selected sources except the channel's own modulation are audible.
Typical application: Direct transmissions or telephone recordings, if the concerned channel is used as a feedback channel to an outside commentator.

[3] **DIV**
Key for activating the rotary knob DIVERGENCE [4].

[4] **DIVERGENCE**
Potentiometer (small knob) for intentionally reducing the strict separation between the front channels (also refer to section 2.1.7).

[5] **FILM**
Key for activating the rotary knob FRONT/REAR [6].

[6] **FRONT/REAR**
Potentiometer (large knob) for distributing the audio signal to the front and rear channels (also refer to section 2.1.7).

[7] **PAN** (pot)
Panorama potentiometer, with detent in center position, for setting the mono source on the axis between the stereo speakers; can be activated with the PAN key [8]. For the front channels the PAN pot's characteristics is depending on whether FILM [5] has been activated (also refer to section 2.1.7).

[8] **PAN** (key)
Key for activating the PAN potentiometer.

[9] **ON**
Key for activating the channel. If only the lower part of the key is illuminated, the channel is active, but the fader is still closed. As soon as the fader is opened the whole key is illuminated.
Inverse function is possible on request (MUTE, the channel is muted when the key is illuminated).

[10] **USR**
Key for activating an internal or external customer-specific function with acknowledgement. In standard configurations on the HDTV/film fader units, this key activates the DIR OUT direct output.

[11] **Fader**
Linear fader with log characteristics (Penny + Giles).

[12] **LED bargraph**
Level meter for monitoring the direct output. With the METER ON INPUT key on the input unit of the channel strip the level meter can be switched over to the selected input.
VU or PPM characteristics can be selected with a jumper (refer to diagram Fader Main Board, 1.980.102; section 3).

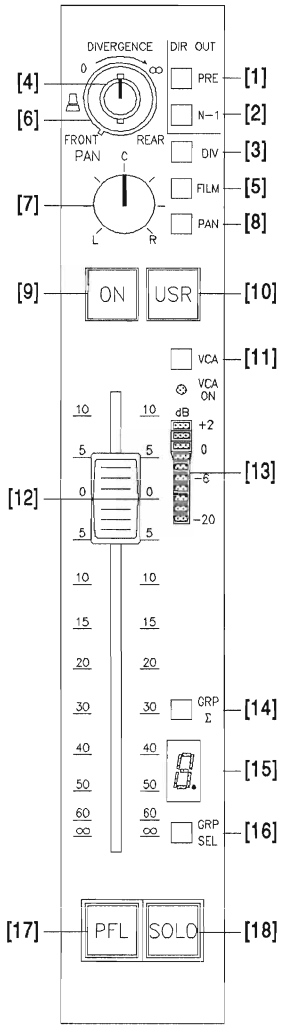
**[13] PFL**

Key for the pre-fader listening function. With the PFL MODE key on the central Function Control Unit (FCU), mutually releasing or latching function of the individual PFL keys can be selected.

**[14] SOLO**

Key for monitoring after the PAN potentiometer.
With the SOLO DESTR. key on the central Function Control Unit (FCU) switchover to "Solo destructive" (or "Solo in Place") is possible. This function is mostly used in recording or multi-format consoles; therefore it cannot be found in every console.
With the SOLO SAVE key on the central Function Control Unit (FCU) the SAVE function can be preselected. If SAVE is selected on one channel the lower part of the key is illuminated; this channel cannot switched to the SOLO bus.
With the PFL MODE key on the central Function Control Unit (FCU), mutually releasing or latching function of the individual SOLO keys can be selected.

## 2.1.6 Mono fader with VCA, HDTV/film version 1.980.131




**[1] PRE**
Key for tapping the DIR OUT (direct output) signal before (PRE is illuminated) or after the fader.

**[2] N-1**
Multiplex operation for the DIR OUT (direct output). In this operating mode all selected sources except the channel's own modulation are audible.
Typical application: Direct transmissions or telephone recordings, if the concerned channel is used as a feedback channel to an outside commentator.

**[3] DIV**
Key for activating the rotary knob DIVERGENCE [4].

**[4] DIVERGENCE**
Potentiometer (small knob) for intentionally reducing the strict separation between the front channels (also refer to section 2.1.7).

**[5] FILM**
Key for activating the rotary knob FRONT/REAR [6].

**[6] FRONT/REAR**
Potentiometer (large knob) for distributing the audio signal to the front and rear channels (also refer to section 2.1.7).

**[7] PAN** (pot)
Panorama potentiometer, with detent in center position, for setting the mono source on the axis between the stereo speakers; can be activated with the PAN key [8]. For the front channels the PAN pot's characteristics is depending on whether FILM [5] has been activated (also refer to section 2.1.7).

**[8] PAN** (key)
Key for activating the PAN potentiometer.

**[9] ON**
Key for activating the channel. If only the lower part of the key is illuminated, the channel is active, but the fader is still closed. As soon as the fader is opened the whole key is illuminated.
Inverse function is possible on request (MUTE, the channel is muted when the key is illuminated).

**[10] USR**
Key for activating an internal or external customer-specific function with acknowledgement. In standard configurations on the HDTV/film fader units, this key activates the DIR OUT direct output.

**[11] VCA**
Key for activating the VCA (Voltage Controlled Amplifier). The audio signal is routed through the VCA, the fader is used for setting the VCA control voltage. The VCA ON LED is illuminated as soon as the fader is opened.

**[12] Fader**
Linear fader with log characteristics (Penny + Giles).

**[13] LED bargraph**

Level meter for monitoring the direct output. With the METER ON INPUT key on the input unit of the channel strip the level meter can be switched over to the selected input.
VU or PPM characteristics can be selected with a jumper (refer to diagram Fader Main Board, 1.980.102; section 3).

**[14] GRP Σ**

Key for defining the master of the corresponding VCA group (according to display [13]). If this key is illuminated the fader controls the VCAs of all channel strips of the VCA group.

**[15] 7-segment display**

For VCA group indication. As soon as the input is linked to one or several others the right-hand decimal point is on in addition. This link requires that one of the inputs of the VCA group is designed as master (GRP Σ [12] is illuminated on the corresponding channel).

**[16] GRP SEL**

Key for selecting from 8 independent VCA groups (0...7). If the display [13] is dark, then no group is selected; the key is dark as well.
VCA group No. 0 has a special function: It is used for links with one or several channels to the left of the current channel strip only; however, several VCA groups No. 0 can be defined on the same mixing console. So e.g. up to 12 independent dual-VCA groups can be configured on a 24-channel console.

**[17] PFL**

Key for the pre-fader listening function. With the PFL MODE key on the central Function Control Unit (FCU), mutually releasing or latching function of the individual PFL keys can be selected.

**[18] SOLO**

Key for monitoring after the PAN potentiometer.
With the SOLO DESTR. key on the central Function Control Unit (FCU) switchover to "Solo destructive" (or "Solo in Place") is possible. This function is mostly used in recording or multi-format consoles; therefore it cannot be found in every console.
With the SOLO SAVE key on the central Function Control Unit (FCU) the SAVE function can be preselected. If SAVE is selected on one channel the lower part of the key is illuminated; this channel cannot switched to the SOLO bus.
With the PFL MODE key on the central Function Control Unit (FCU), mutually releasing or latching function of the individual SOLO keys can be selected.

## 2.1.7 Signal distribution on HDTV/film fader units

Mixing consoles for film, video, and HDTV productions deviate in three significant places from a traditional broadcast console:

- Bus selection
- Output distribution of the mono audio signal to the busses, and
- Monitoring unit which must allow mono, stereo, four-, five-, and six-channel monitoring.

The following text is dealing with the second of the three points above.

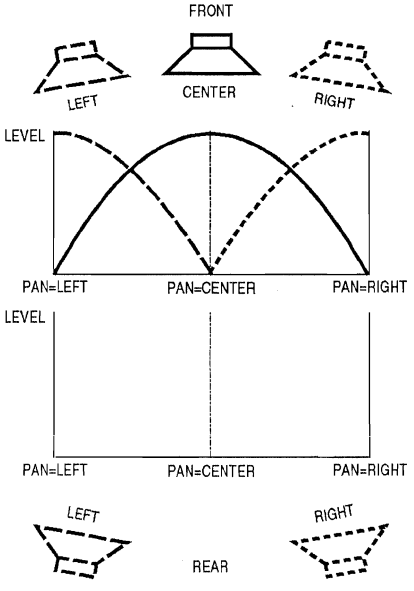
The potentiometers DIVERGENCE and FRONT/REAR allow to distribute the mono signal at will to the up to six masters or groups.

**Mono** For mono outputs direct selection with the bus selector keys is possible.

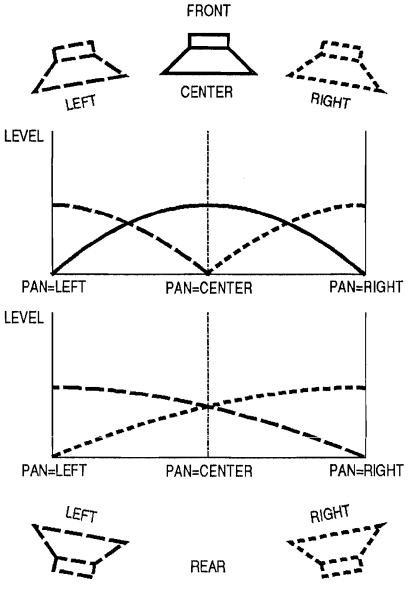
**Stereo** For stereo distribution, the PAN key activates a panorama potentiometer (pan pot) with which the mono information can be placed to any desired spot between the two loudspeakers.

**4 to 6 channels** For the four- to six-channel formats an additional potentiometer is required which is responsible for the distribution to the front and rear loudspeakers. With this procedure, mono sources should be placed not only in a line in front of the listener, but to any desired spot in the listening room. This potentiometer (FRONT/REAR) is activated by the FILM key.
In the Dolby Surround method the rear sound is limited to mono information which is radiated by one or several loudspeakers. In the TV 3-2 standard, however, also the rear information is transmitted separately for the left and right speaker. The panorama potentiometer must remain effective in this case.
All multichannel techniques for film and video contain an additional center channel which radiates the sound in a way that also for a non-ideally placed (i.e. out-of-center) listener the screen-related dialog is located near the picture.
When switching to FILM, the characteristics of the panorama potentiometer is changed in a way that the three front channels can be controlled with different levels depending on the potentiometer's position.
The DIVERGENCE potentiometer which is activated by the DIV key reduces the strict separation of the three front channels. Then, e.g. for center position of the PAN pot, a signal component is added not only to the center speaker but also (with somewhat reduced level) to the side speakers thus broadening the image of the point-type mono source for the non-ideally placed listener.

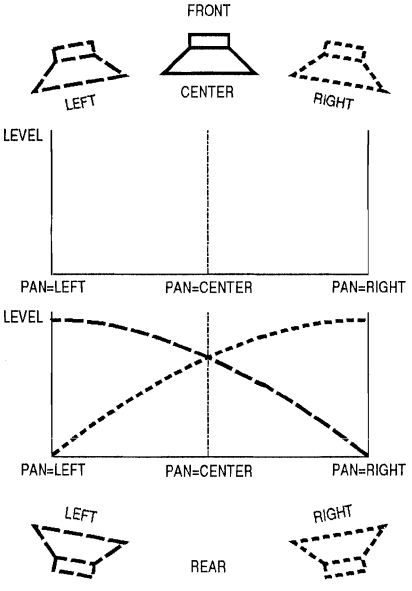
Please refer to the examples on the next page.



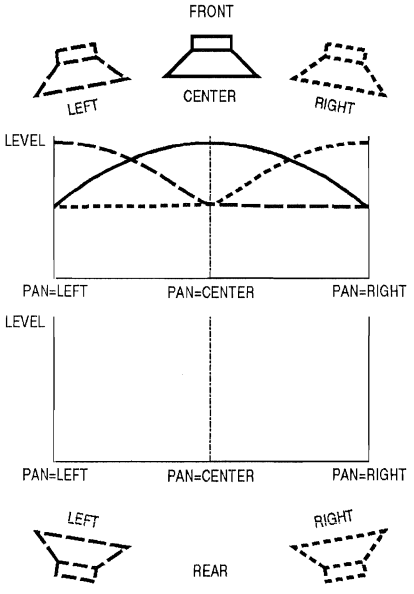

FRONT / REAR = FRONT
DIVERGENCE = 0



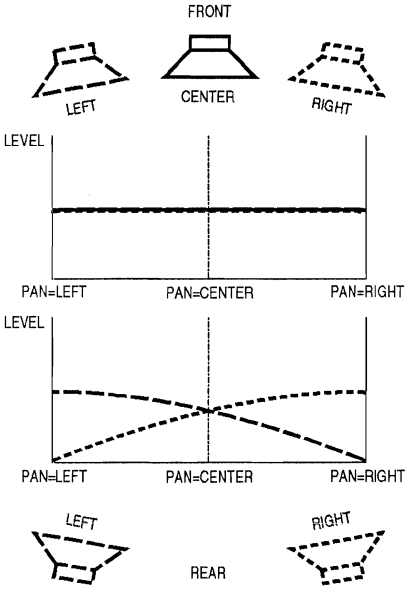

FRONT / REAR = CENTER
DIVERGENCE = 0




FRONT / REAR = REAR
DIVERGENCE = 0

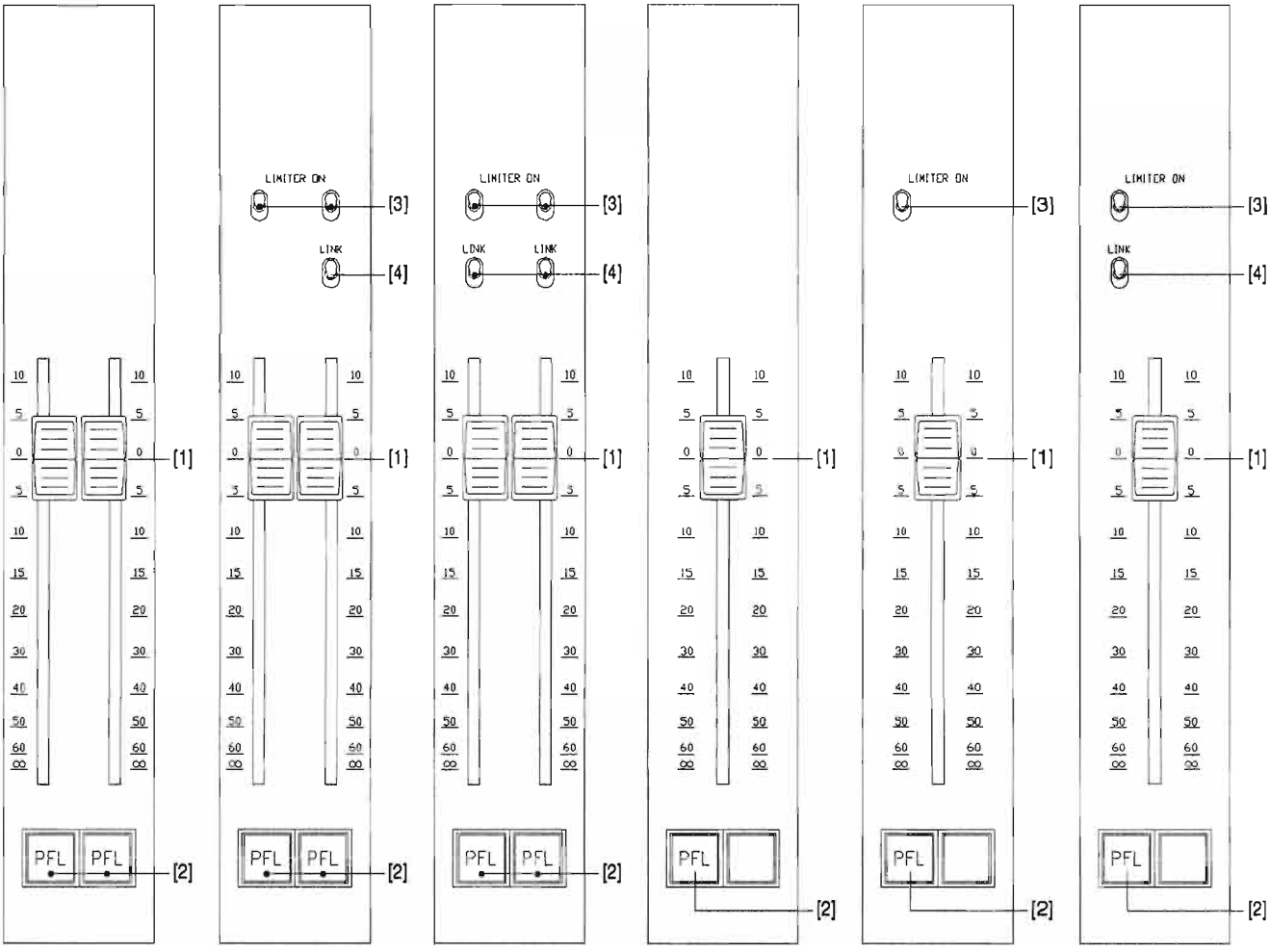



FRONT / REAR = FRONT
DIVERGENCE = CENTER




FRONT / REAR = CENTER
DIVERGENCE = ∞

## 2.2 Master units 1.980.180.00...185.00




Dual Master Unit 1.980.180.00 | Dual Master Unit with limiter 1.980.181.00 | Dual Master Unit with limiter and dual LINK switch 1.980.182.00 | Mono Master Unit 1.980.183.00 | Mono Master Unit with limiter 1.980.184.00 | Mono Master Unit with limiter and LINK switch 1.980.185.00

[1] **Fader** — Linear fader with log characteristics (Penny + Giles).

[2] **PFL** — Key for pre-fader listening function.
**Option 3:** PFL is always active, when the PFL key is pressed (default setting).
**Option 4:** PFL is active, if the PFL key is pressed and the fader is in its OFF position.

[3] **LIMITER ON** — Rocker switch for channel-wise activation of the limiter being installed in the EU card rack.

[4] **LINK**

**Dual Master** — **1.980.181:** Rocker switch for coupling the two limiters in order to avoid floating of the sound source during stereo reproduction.
**1.980.182:** The right-hand rocker switch is used for coupling the two limiters in order to avoid floating of the sound source during stereo reproduction. The left-hand rocker switch is used for coupling the limiter(s) with the one(s) of other Master units, provided their left-hand rocker switch is activated, too.

**Mono Master** — **1.980.185:** Rocker switch for coupling the limiter with the one(s) of other Master units, provided their (left-hand) rocker switch is activated, too.

## 2.3 Central Control Unit (CCU)

### 2.3.1 General

The Central Control Unit allows to control all global console functions. The following functional blocks are included:

- Storing and recalling snapshots in/from the CCU memory.
- Creation and playback of snapshot sequences.
- Assigning input channels to group and master busses and (if the console is prepared for this purpose) to the multichannel bus.
- Storing and recalling snapshots and sequences to standard PCMCIA memory cards.

### 2.3.2 Operating concept

Operation of the CCU is menu oriented. A menu has to be selected by means of one the menu control keys (function keys) to perform the desired function.

The lowest line of the LC display always indicates the menues to be selected in the next step. Routing there is performed by pressing one of the four function keys F1...F4 arranged below the display. This way it is possible to walk down the menu hierarchy step by step.

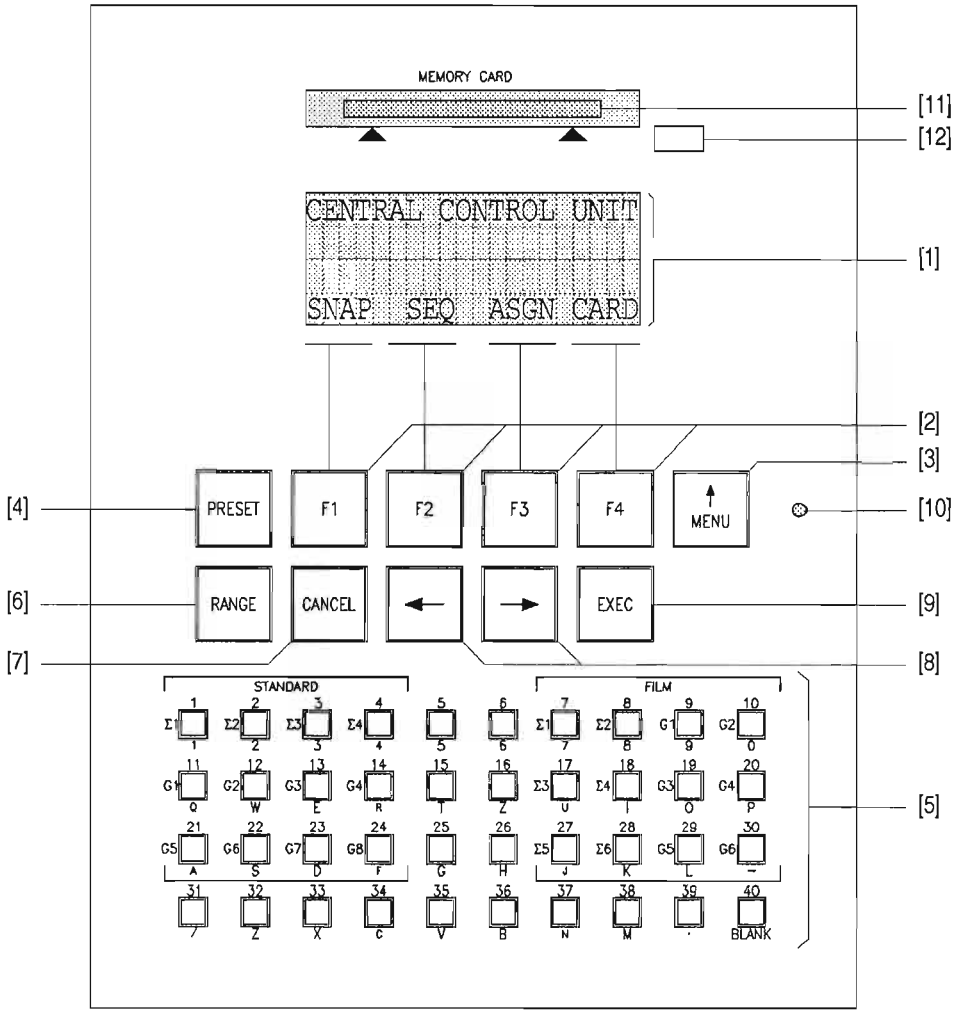
The ↑ MENU key is used to move upwards again through the hierarchy by one or two steps at once, depending on the current menu.

The PRESET menu is separated from this hierarchy. It is immediately accessed by pressing PRESET from any position. Pressing the ↑ MENU key leads back to the respective starting position.

In most cases for releasing a function first a selection with the alphanumerical keyboard (selection keys) is required which has to be acknowledged by pressing EXEC.

Several seconds after power-on the CCU start menu appears in the display. Pressing then one of the four function keys selects one of the menues available.

## 2.3.3 Synopsis, operating elements




[1] LC display

**1st line:** Current menu
**2nd line:** User information
**3rd line:** Warnings and error messages
**4th line:** Branching options

[2] F1...F4

By selecting one of the four function keys selects one of the available menues.

[3] ↑ MENU

Jump back to the superior menu level.

[4] PRESET

Jump to the PRESET menu from any menu position; jump back to the last menu position by pressing ↑ MENU.

[5] Selection keys

(Alpha-numerical keyboard)
Used for indication and selection of snapshots, sequences, sets, input channels, or busses as well as for entering alpha-numerical names, depending on the current menu.
If the key remains illuminated after being pressed, this indicates a valid selection.

**[6] RANGE**

Range selection.
On large consoles this key is used in the ASSIGN menu to access (select) the input channels above No. 41.
When entering names, this key is used to toggle between upper and lower case characters.

**[7] CANCEL**

Cancelling key.
In most menues a selection is cancelled with this key.
When entering names this key is used to clear the name buffer and reset the cursor.

**[8] ←, →**

Cursor keys.
When entering names these keys are used to move the cursor one position to the left/right.
In the SEQUENCE PLAY and SEQUENCE EDIT menues these keys move to the last/next step.
In the ASSIGN menu the input at the left/right next to the current input is selected.

**[9] EXEC**

Execute key.
If a selection has been made the desired function is performed with EXEC.

**[10] Contrast setting**

The LCD contrast can be adjusted for the preferred viewing angle by using a small screwdriver (No. 00).

**[11] MEMORY CARD**

Slot for the PCMCIA memory card.

**[12] Eject pushbutton**

A PCMCIA memory card inserted in the slot must be released by using the eject pushbutton; otherwise the mechanical stability or the card and its fixture cannot be warranted.

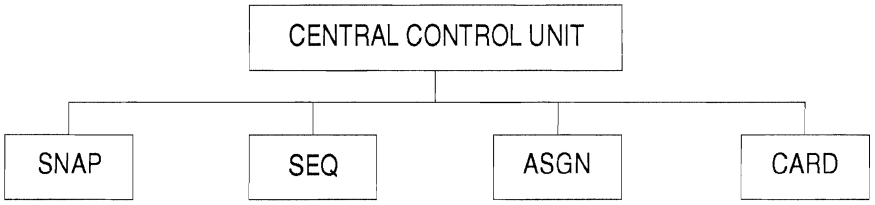
## 2.3.4 Menu structure

### Start menu

After powering the console on, for a few seconds the following is displayed:

**CENTRAL CONTROL UNIT**
**Mixing Console 980**
**Vers 1.xx**
**© STUDER P.A. AG**

after which the start menu appears:



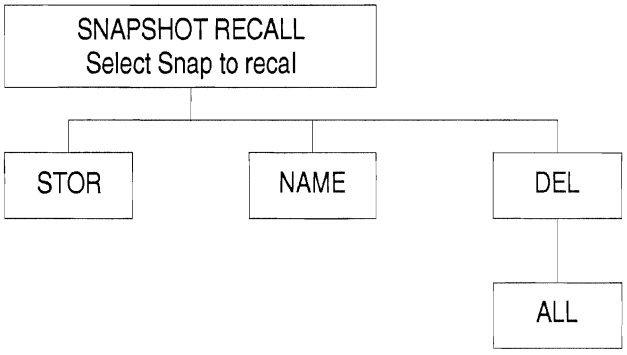

### PRESET menu

The PRESET menu is completely separated from the remaining menu control; it can be called up at any moment and in any console status by pressing the dedicated PRESET key; by pressing ↑ MENU, the menu position having been active before is recalled immediately.

In the PRESET menu only presets can be recalled. Illuminated selection keys indicate the presets available. By pressing one of these keys followed by EXEC selects the console status according to the preset snapshot.

PRESET No. 1 contains *no* snapshot data but rather sends a general reset to all modules. Subsequently all modules are reset, re-initialized, and switched to the LINE or LINE 1 input, respectively.

## SNAPSHOT RECALL menu




**General:** Illuminated selection keys indicate presets available.
Pressing one of the illuminated selection keys followed by EXEC recalls the corresponding snapshot.

**STORe** For storing a snapshot in the internal CCU memory: Pressing the function key labelled STOR, followed by one of the selection keys and EXEC. If one of the illuminated selection keys is used for this purpose, the snapshot already present will be overwritten; a warning message appears.

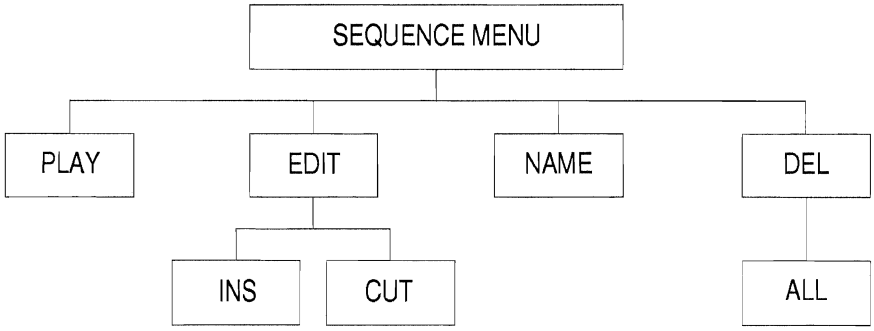
**NAME** A snapshot already stored can be given a name. For this purpose it has to be recalled by pressing one of the illuminated selection keys. After having pressed the function key labelled NAME the LCD indication changes to the current name which can simply be overwritten; CANCEL will clear the name buffer and place the cursor to its leftmost position. The selection keys are used now for entering alpha-numerical characters.
By using ← and → the cursor is moved in name entering mode, RANGE is used to toggle between lower and upper case characters.
The new name is accepted by pressing EXEC after which the SNAPSHOT NAME menu is reactivated.
If pressing ↑ MENU before EXEC has been pressed the name entering mode will be cancelled without performing any name change, and the SNAPSHOT NAME menu is reactivated.

**DELete** For deleting a snapshot already stored. For this purpose the snapshot has to be selected with one of the illuminated selection keys and subsequently deleted with EXEC.

**Note:** It will be *not* verified if the snapshot concerned is part of a sequence!

DELete **ALL** For deleting all snapshots stored in the internal CCU memory. After having pressed the function keys labelled DEL and ALL press EXEC.

## SEQUENCE menu




**General:** Sequences are representing just a series of snapshot numbers; i.e. only the snapshot number is stored instead of the actual snapshot within a sequence. Only when playing back the sequence the snapshot memory range is accessed.
Available snapshots are indicated by illuminated selection keys.
Up to 20 sequences are possible.
One sequence must contain at least one snapshot.

PLAY

For playback select first a sequence, then press EXEC. The first snapshot of the current sequence will be transferred to the console; the LCD indicates the following snapshot or the end of the sequence (SequEnd). The next time EXEC is pressed, the displayed snapshot is transferred to the console, and again the following snapshot is indicated in the LCD. Each time EXEC is pressed the next step within the sequence is activated.
The cursor keys ← and → move to the last/next step within the sequence. For performing the selected step press EXEC.

EDIT

After having pressed the function key labelled EDIT, a sequence already available or a new sequence must be selected with the selection keys. Afterwards the menu points INSert and CUT (in case of a new sequence, only INSert) will be released.

EDIT **INSert**

The display indicates "Step#1 → SequEnd"; the console is ready for entering the first step. Illuminated selection keys indicate which snapshots can be selected. If one of them is pressed, this snapshot will be entered as step No. 1 in the new sequence. Afterwards "Step#2 → SequEnd" is displayed, the next snapshot can be selected.
If an additional step has to be entered into a sequence, use the ← and → cursor keys to move through the sequence. The new snapshot will be inserted at the position indicated; all following steps will be moved backwards by one position.
The editing buffer is a circular buffer; i.e. when the end of the sequence (SequEnd) is indicated, the next pressure on the cursor key → leads back to the first sequence step.

EDIT **CUT**

All selection keys remain dark, they have no function in the CUT menu. The snapshot to be cut out of the sequence is selected with the cursor keys ← and →.
By pressing EXEC the snapshot indicated is cut out; all following snapshots move up, and the gap having emerged is filled.

NAME

A sequence already stored can be given a name. After having pressed the function key labelled NAME the LCD indication changes to the current name which can simply be overwritten; CANCEL will clear the name buffer and place the cursor to its leftmost position. The selection keys are used now for entering alpha-numerical characters.
By using ← and → the cursor is moved in name entering mode, RANGE is used to toggle between upper and lower case characters.
The new name is accepted by pressing EXEC after which the SEQUENCE PLAY menu is reactivated.
If pressing ↑ MENU before EXEC has been pressed the name entering mode will be cancelled without performing any name change, and the SEQUENCE NAME menu is reactivated.

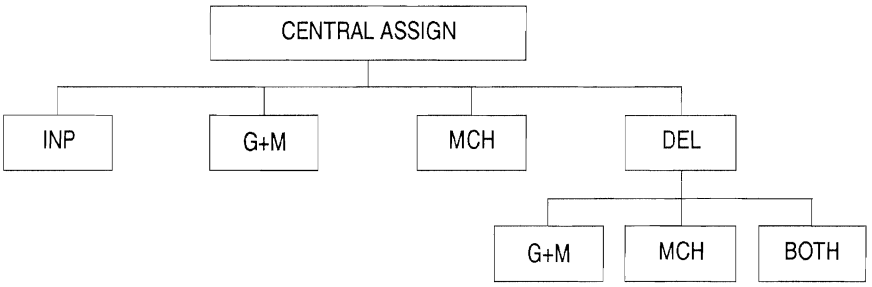
DELete

To delete a sequence already available. After having pressed the function key labelled DEL, the sequence is recalled by one of the selection keys and subsequently deleted with EXEC.

DELete **ALL**

To delete all sequences available in the internal CCU memory. After having pressed the function keys labelled DEL and ALL press EXEC.

## CENTRAL ASSIGN menu




**General:**

The MCH (multichannel) menu point can be selected only if the console has been equipped with the corresponding multichannel option.
In the INP menu point input channels are selected which are to be assigned to a bus. In the G+M (groups + masters) or MCH menu points the bus selection is performed, the final assignment is done by pressing EXEC.
The bus selection can be performed first, i.e. before the input channel selection in the INP menu point is made, as well. The final assignment is done by pressing EXEC.
Bus assignments for groups and masters can alternatively performed directly on the concerned input module, too.

INPut

In this menu point the selection keys are used to select one or several input channels.
If one of the selection keys should not be illuminated after having been pressed, the corresponding channel has been recognized as not available by the CCU. If a corresponding module is installed in the console nevertheless, it should be checked.
The first of the selected channels is always indicated in the LC display; all others are marked by an asterisk ("*").
A selection is cancelled by pressing CANCEL.

If more than 40 input channels should be installed, the channel No. 41 and up can be reached by using the RANGE key.

**G+M**

Depending on the input module type the bus selection is performed by means of the left-hand or the right-hand groups of the yellow/green selection keys.
For multi-format consoles the right-hand group (6 masters, 6 groups), for broadcast consoles the left-hand group (4 masters, 8 groups) is used.
The final assignment is done by pressing EXEC.
If already some input channels are selected, the current bus assignment of the first of the selected channels is indicated when pressing the function key labelled G+M.

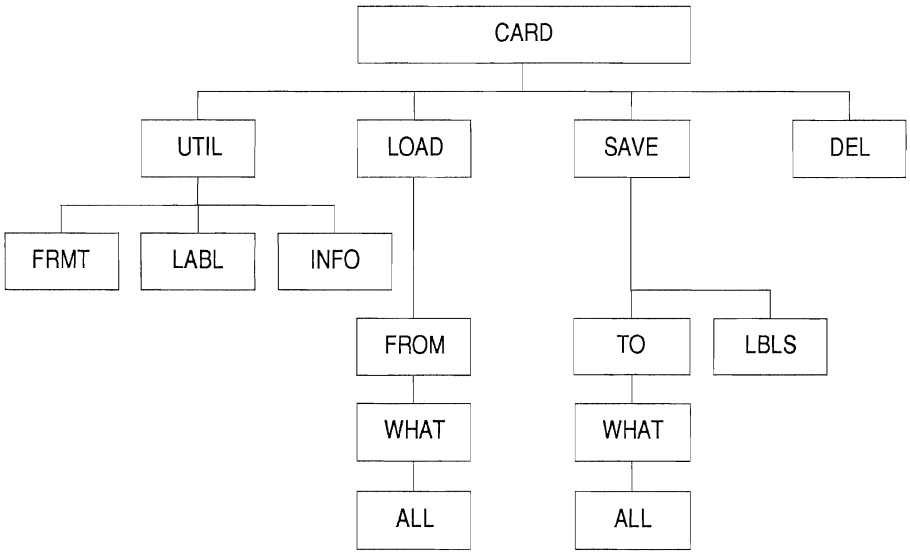
**MCH**

Prerequisite for the multichannel bus selection: The console must be equipped with the multichannel option.
Multichannel bus selection is possible only with the CCU.
The multichannel bus selection is performed with the selection keys 1...32.
The final assignment is done by pressing EXEC.
If already some input channels are selected, the current bus assignment of the first of the selected channels is indicated when pressing the function key labelled MCH.

**DELete**

Deleting the bus assignment for the selected input channels.
DEL G+M only deletes the groups and masters bus assignments.
DEL MCH only deletes the multichannel bus assignments.
DEL BOTH deletes the groups and masters as well as the multichannel bus assignments.

## CARD menu




**General:** For archiving purposes, snapshots and sequences can be stored and recalled on/from standard S-RAM PC memory cards (PCMCIA cards) with a storage capacity of up to 4 Mbyte. The data on a memory card are organized as follows:

- Up to 40 "sets" can be established.
- One set can contain up to 40 snapshots and 20 sequences.
- Sequences can be stored or recalled only together with their accompanying snapshots using the menu points SAVE ALL or LOAD ALL, respectively.

On high-capacity memory cards searching operations for sets and snapshots as well as storing and recalling can last several seconds.
The CCU only accepts memory cards formatted by its own system.
The system supports the MS-DOS file system.

UTILities **FRMT**

After having pressed the function keys labelled UTIL and FRMT and consecutively the EXEC key, the memory card inserted will be formatted, i.e. organized and provided with information in a way that the card can be written to and read from by the CCU.

**Note:** When formatting the memory card all data will completely be deleted.

UTILities **LABL**

For improved identification a label (a name) can be assigned to a memory card. Entering of a name is performed as described above under the NAME menu points. When formatting, this name will be definitively deleted, too.

UTILities **INFO**

When calling up this menu point, the following information on the memory card inserted is displayed after a short delay:

- Name
- Total storage capacity in kByte
- Occupied storage capacity in % (5% resolution).

CARD **LOAD**

In this menu point first the set has to be selected on the memory card from which the data are to be loaded.
Available sets on the memory card are indicated by illuminated selection keys.

If an available set has been selected, the next menu is selected with the function key labelled WHAT.

CARD LOAD **WHAT**

This menu point is accessed only from CARD LOAD.
Illuminated selection keys indicate the snapshots available in the selected set.
By pressing one of the illuminated selection keys followed by EXEC a snapshot is loaded from the memory card.
By pressing the function key labelled ALL followed by EXEC the complete set including sequences and snapshots is loaded from the memory card.

CARD LOAD **ALL**

This menu point is accessed only from CARD LOAD.
Illuminated selection keys indicate the snapshots available in the selected set.
By pressing EXEC the complete set including sequences and snapshots is loaded from the memory card.
After execution, a jump back to the start menu is performed.

CARD **SAVE**

In this menu point the set on the memory card is selected into which the data have to be stored.
It is possible to select a new set or a set already available on the memory card.
Sets already available on the memory card are indicated by illuminated selection keys.
From this menu point it is possible to branch to the LBLS menu point, where a name is assigned to the selected set.
If a set has been selected which is already available, it is possible to branch to the next menu by pressing the function key labelled WHAT.

CARD SAVE **WHAT**

This menu is accessed only from CARD SAVE.
Snapshots available in the internal CCU memory are indicated by illuminated selection keys.
By pressing one of the illuminated selection keys followed by EXEC a snapshot is saved to the memory card.
By pressing the function key labelled ALL followed by EXEC, all snapshots available in the internal CCU memory are saved to the previously selected set (CARD SAVE menu point) on the memory card.
Snapshots already present in a set on the memory card *cannot* be overwritten.

CARD SAVE **ALL**

This menu is accessed only from CARD SAVE WHAT.
Snapshots available in the internal CCU memory are indicated by illuminated selection keys.
By pressing EXEC, all snapshots available in the internal CCU memory are saved to the previously selected set (CARD SAVE WHAT menu point) on the memory card.
Should the selected set already be present on the memory card, it will be first deleted and then added again with the current data.
After execution, a jump back to the CARD SAVE menu is performed.

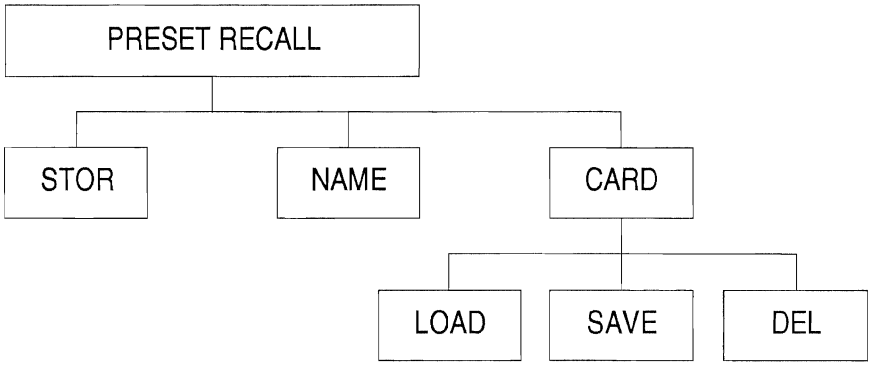
CARD SAVE **LBLS**

A label (i.e. a name) can be assigned to an already available set; in order to do this, press first the function keys CARD, SAVE, and LBLS. Then select the set with one of the (illuminated) selection keys. The display now indicates the current label of the set. The selection keys can be used to enter alpha-numerical characters.
By pressing EXEC the new label is accepted after which a jump back to the CARD SAVE menu is performed.
The behaviour of the LBLS menu is identical to the one of the SNAPSHOT NAME menu (refer to section SNAPSHOT RECALL menu).

**DELete**

All sets present on the memory card are indicated by illuminated selection keys.
By pressing one of the illuminated selection keys followed by EXEC the desired set is deleted from the memory card.

## For Chief Engineer Only




**General:** The extended PRESET RECALL menu only appears if, from the start menu, "UNLOCK" is entered via the selection keys, followed by EXEC. The display indicates "Presets unlocked". When pressing the PRESET key for the next time, the PRESET RECALL menu appears in its extended form.
For locking, "LOCK" has to be entered from the start menu via the selection keys, followed by EXEC. Then the display indicates "Presets locked". After powering the console off, the PRESET RECALL menu is automatically locked without having to enter the LOCK command.

**STORe** Operation is identical to the SNAPSHOT menu (refer to section SNAPSHOT RECALL menu).

**NAME** Operation is identical to the SNAPSHOT menu (refer to section SNAPSHOT RECALL menu).

**CARD** Presets are stored in an individual, particular set.
When formatting the memory card, the stored presets are deleted as well.

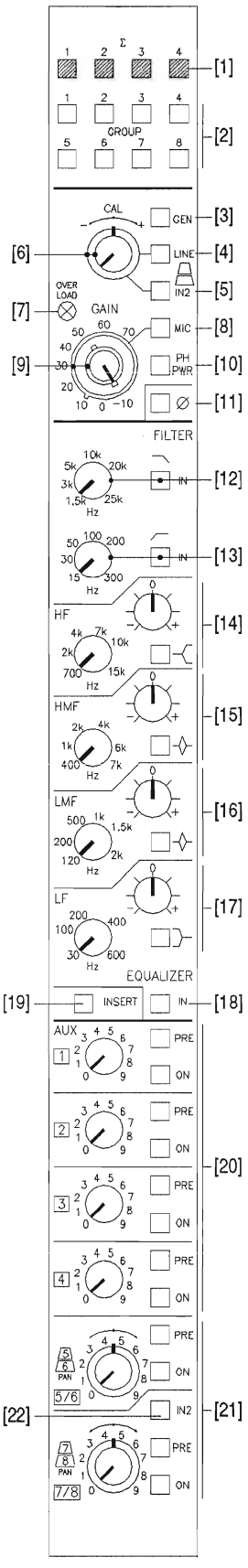
CARD **LOAD** When pressing the function keys labelled CARD and LOAD followed by EXEC, all presets from the memory card are stored to the internal CCU memory.

CARD **SAVE** When pressing the function keys labelled CARD and SAVE followed by EXEC, all presets from the internal CCU memory are stored to the memory card.

CARD **DELete** When pressing the function keys labelled CARD and DEL followed by EXEC, all presets from the memory card are deleted.

## 2.4 Input units

### 2.4.1 Mono input unit 1.980.220




**[1] Σ 1...4**
Key for assigning the audio signal to the MASTER busses.

**[2] GROUP 1...8**
Key for assigning the audio signal to the GROUP busses.

**[3] GEN**
Key for selecting the electronically balanced generator input with fixed input sensitivity. (Generator standard output level: +6 dBu).

**[4] LINE**
Key for selecting the transformer-balanced line input (electronically balanced line input optional).
Gain setting with potentiometer [6].

**[5] IN2**
Key for selecting the electronically balanced line input (transformer-balanced line input optional).
Gain setting with potentiometer [6].

**[6] – CAL +**
Gain setting for the LINE (knob) and IN2 (ring) inputs. Detent in CAL center position; the gain can be varied for ±10 dB with respect to the CAL position.

**[7] OVERLOAD**
From all critical points within the channel the signal is routed to the overload indicator in order to indicate any undesired clipping of the signal.

**[8] MIC**
Key for selecting the transformer-balanced microphone input.
Coarse gain setting with the GAIN ring, fine adjustment with the GAIN knob.

**[9] GAIN**
Gain adjustment of the MIC input. The gain can be set in steps of 10 dB with the GAIN ring from –10 to +70 dBu; additional fine adjustment with the GAIN knob from 0 to +10 dB.

**[10] PH PWR**
Key for switching the phantom power to the microphone input lines. Factory setting: 48 V, switchable to 24 V or 12 V by means of solder bridges in the power supply (refer to "Aligning the power supply", section 2.16).

**[11] Ø**
Phase reverse switch, effective for all inputs of the input unit in common.

**[12] FILTER ⌒ IN** Individually selectable low-pass filter, Bessel characteristics. Slope 12 dB/octave. Cut-off frequency can be set with rotary knob between 1.5 kHz and 25 kHz.

**[13] FILTER ⌒ IN** Individually selectable high-pass filter, Bessel characteristics. Slope 12 dB/octave. Cut-off frequency adjustable with rotary knob between 15 Hz and 300 Hz.

**[14] HF** Parametric constant-Q equalizer (Q = 0.7), can be switched over to treble control (key is illuminated). Boost/cut up to ±15 dB, center/turnover frequency adjustable between 700 Hz and 15 kHz.

**[15] HMF** Parametric constant-Q equalizer, Qs of 0.7 (wide) and of 2 (narrow, key is illuminated) are selectable. Boost/cut up to ±15 dB, center frequency adjustable between 400 Hz and 7 kHz.

**[16] HLF** Parametric equalizer as HMF [15], but center frequency adjustable between 120 Hz and 2 kHz.

**[17] LF** Parametric equalizer/bass control as HF [14], but center/turnover frequency adjustable between 30 Hz and 600 Hz.

**[18] EQUALIZER IN** Key for inserting (key illuminated) or bypassing the equalizer [14]...[17].

**[19] INSERT** Electronically balanced insert point, either before or after the equalizer (selectable with a jumper, refer to circuit diagram Input Main and Side Board 1.980.201; section 4).

**[20] AUX 1...4** Mono outputs to the auxiliary busses 1...4. If ON is pressed (key is illuminated), the input signal can be mixed to the desired AUX bus with the potentiometer.
If PRE is pressed in addition (key is illuminated), the pre-fader signal is mixed to the AUX bus.

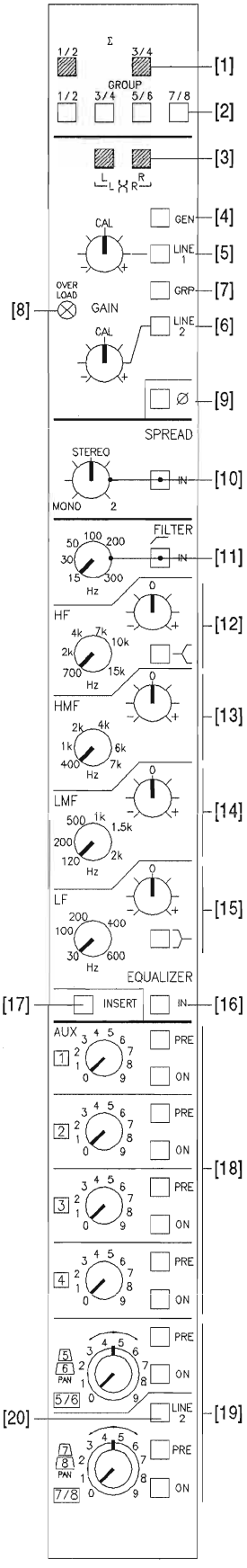
**[21] AUX 5/6, 7/8** Outputs to the auxiliary busses 5/6 and 7/8, either as two mono channels or one stereo channel (this selection is performed centrally with the 2CH key on the AUX MASTER UNIT).

**Mono:** If ON is pressed (key is illuminated), the input signal can be mixed to the AUX busses 5 and 7 with the knobs, and to the AUX busses 6 and 8 with the rings of the concentric potentiometers.
If PRE is pressed in addition (key is illuminated), the pre-fader signal is mixed to the AUX bus.

**Stereo:** If ON is pressed (key is illuminated), the input signal can be mixed to the AUX busses 5/6 and 7/8 with the knobs of the concentric potentiometers; the rings of the potentiometers are used as pan pots.
If PRE is pressed in addition (key is illuminated), the pre-fader signal is mixed to the AUX bus.

**[22] IN2** The input unit's IN2 line input is mixed to the AUX bus 7/8; this way an independent mix of the IN2 signals (e.g. monitor mix) can be realized.

## 2.4.2 Stereo high level input unit (HL) with EQ 1.980.240




**[1] Σ 1/2, 3/4**
Key for assigning the input signals to the stereo MASTER busses.

**[2] GROUP 1/2...7/8**
Key for assigning the input signals to the stereo GROUP busses.

**[3] L, R, L ✕ R**
Channel selector.
**L, R dark:** Normal operation, left and right channel in stereo mode.
**L illuminated:** Left input channel is switched to both output channels with level matching.
**R illuminated:** Right input channel is switched to both output channels with level matching.
**L and R illuminated:** Stereo operation, however both input channels are swapped and connected to the output channels.

**[4] GEN**
Key for selecting the electronically balanced generator input with fixed input sensitivity. (Generator standard output level: +6 dBu).

**[5] LINE 1**
Key for selecting the transformer-balanced line input (electronically balanced line input optional).
Gain setting with potentiometer next to the key; detent in 0 dB center position. Gain setting range: ±10 dB.

**[6] LINE 2**
Key for selecting the electronically balanced line input (transformer-balanced line input optional).
Gain setting with potentiometer next to the key; detent in 0 dB center position. Gain setting range: ±10 dB.

**[7] GRP**
This key is operative only if the input unit is used as a stereo group; in normal operation the key has no function.

**[8] OVERLOAD**
From all critical points within the channel the signal is routed to the overload indicator in order to indicate any undesired clipping of the signal.

**[9] Ø**
Phase inversion key; the phase of the right channels of all inputs is shifted by 180° (key is illuminated).

**[10] SPREAD**
Stereo width setting. The width of a stereo signal can be continuously adjusted between mono and twice the normal width if the key is illuminated. If the potentiometer is in its STEREO center position (detent), the width corresponds to a normal stereo signal.

**[11] FILTER ⌒ IN** Individually selectable high-pass filter, Bessel characteristics. Slope 12 dB/octave. Cut-off frequency adjustable with rotary knob between 15 Hz and 300 Hz.

**[12] HF** Parametric constant-Q equalizer (Q = 0.7), can be switched over to treble control (key is illuminated). Boost/cut up to ±15 dB, center/turnover frequency adjustable between 700 Hz and 15 kHz.

**[13] HMF** Parametric constant-Q equalizer (Q = 0.7). Boost/cut up to ±15 dB, center frequency adjustable between 400 Hz and 7 kHz.

**[14] HLF** Parametric equalizer as HMF [13], but center frequency adjustable between 120 Hz and 2 kHz.

**[15] LF** Parametric equalizer/bass control as HF [12], but center/turnover frequency adjustable between 30 Hz and 600 Hz.

**[16] EQUALIZER IN** Key for inserting (key illuminated) or bypassing the equalizer [12]...[15].

**[17] INSERT** Electronically balanced insert point, either before or after the equalizer (selectable with a jumper, refer to circuit diagram Input Main and Side Board 1.980.201, section 4).

**[18] AUX 1...4** Mono outputs to the auxiliary busses 1...4. If ON is pressed (key is illuminated), the input signal can be mixed to the desired AUX bus with the potentiometer.
If PRE is pressed in addition (key is illuminated), the pre-fader signal is mixed to the AUX bus.

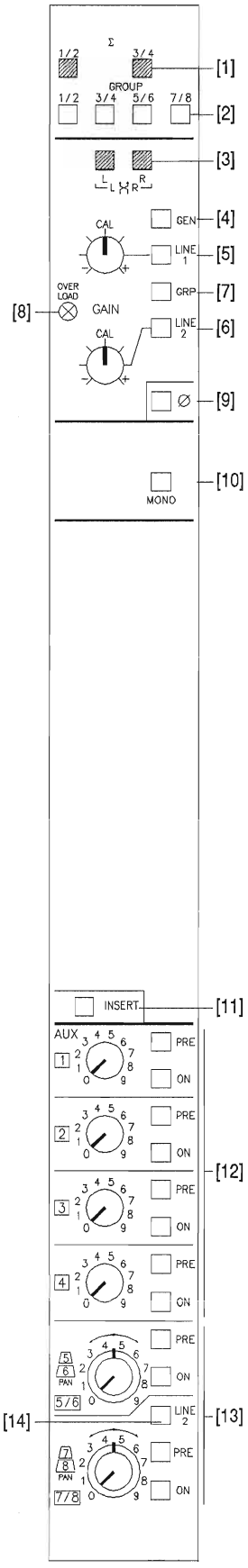
**[19] AUX 5/6, 7/8** Outputs to the auxiliary busses 5/6 and 7/8, either as two mono channels or one stereo channel (this selection is performed centrally with the 2CH key on the AUX MASTER UNIT).

**Mono:** If ON is pressed (key is illuminated), the input signal can be mixed to the AUX busses 5 and 7 with the knobs, and to the AUX busses 6 and 8 with the rings of the concentric potentiometers.
If PRE is pressed in addition (key is illuminated), the pre-fader signal is mixed to the AUX bus.

**Stereo:** If ON is pressed (key is illuminated), the input signal can be mixed to the AUX busses 5/6 and 7/8 with the knobs of the concentric potentiometers; the rings of the potentiometers are used as pan pots.
If PRE is pressed in addition (key is illuminated), the pre-fader signal is mixed to the AUX bus.

**[20] LINE 2** The LINE 2 line input is mixed to the AUX bus 7/8; this way an independent mix of the LINE 2 signals (e.g. monitor mix) can be realized.

## 2.4.3 Stereo high level input unit (HL) without EQ 1.980.242




[1] **Σ 1/2, 3/4**
Key for assigning the input signals to the stereo MASTER busses.

[2] **GROUP 1/2...7/8**
Key for assigning the input signals to the stereo GROUP busses.

[3] **L, R, L ⤫ R**
Channel selector.
**L, R dark:** Normal operation, left and right channel in stereo mode.
**L illuminated:** Left input channel is switched to both output channels with level matching.
**R illuminated:** Right input channel is switched to both output channels with level matching.
**L and R illuminated:** Stereo operation, however both input channels are swapped and connected to the output channels.

[4] **GEN**
Key for selecting the electronically balanced generator input with fixed input sensitivity. (Generator standard output level: +6 dBu).

[5] **LINE 1**
Key for selecting the transformer-balanced line input (electronically balanced line input optional).
Gain setting with potentiometer next to the key; detent in 0 dB center position. Gain setting range: ±10 dB.

[6] **LINE 2**
Key for selecting the electronically balanced line input (transformer-balanced line input optional).
Gain setting with potentiometer next to the key; detent in 0 dB center position. Gain setting range: ±10 dB.

[7] **GRP**
This key is operative only if the input unit is used as a stereo group; in normal operation the key has no function.

[8] **OVERLOAD**
From all critical points within the channel the signal is routed to the overload indicator in order to indicate any undesired clipping of the signal.

[9] **Ø**
Phase inversion key; the phase of the right channels of all inputs is shifted by 180° (key is illuminated).

[10] **MONO**
If the key is illuminated, the left and right channel will be added to a mono signal and routed to both outputs.

**[11] INSERT**

Electronically balanced insert point, either before or after the equalizer (selectable with a jumper, refer to circuit diagram Input Main and Side Board 1.980.201, section 4).

**[12] AUX 1...4**

Mono outputs to the auxiliary busses 1...4. If ON is pressed (key is illuminated), the input signal can be mixed to the desired AUX bus with the potentiometer.
If PRE is pressed in addition (key is illuminated), the pre-fader signal is mixed to the AUX bus.

**[13] AUX 5/6, 7/8**

Outputs to the auxiliary busses 5/6 and 7/8, either as two mono channels or one stereo channel (this selection is performed centrally with the 2CH key on the AUX MASTER UNIT).

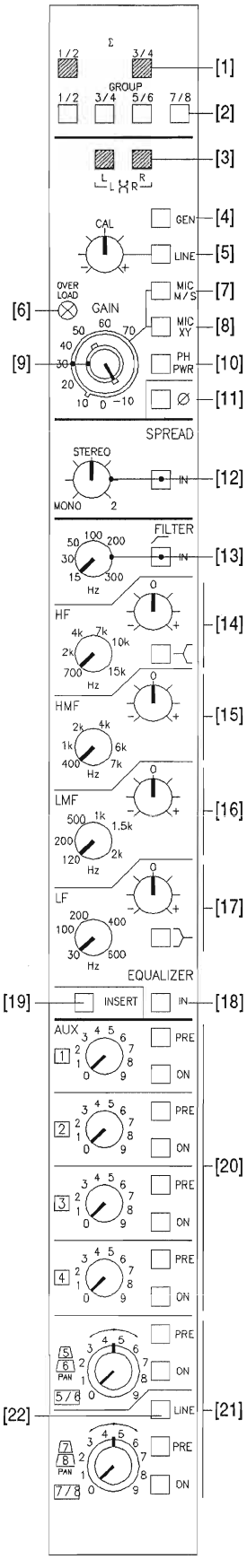
**Mono:** If ON is pressed (key is illuminated), the input signal can be mixed to the AUX busses 5 and 7 with the knobs, and to the AUX busses 6 and 8 with the rings of the concentric potentiometers.
If PRE is pressed in addition (key is illuminated), the pre-fader signal is mixed to the AUX bus.

**Stereo:** If ON is pressed (key is illuminated), the input signal can be mixed to the AUX busses 5/6 and 7/8 with the knobs of the concentric potentiometers; the rings of the potentiometers are used as pan pots.
If PRE is pressed in addition (key is illuminated), the pre-fader signal is mixed to the AUX bus.

**[14] LINE 2**

The LINE 2 line input is mixed to the AUX bus 7/8; this way an independent mix of the LINE 2 signals (e.g. monitor mix) can be realized.

## 2.4.4 Stereo universal input unit with EQ 1.980.250




**[1] Σ 1/2, 3/4**
Key for assigning the input signals to the stereo MASTER busses.

**[2] GROUP 1/2...7/8**
Key for assigning the input signals to the stereo GROUP busses.

**[3] L, R, L ⤫ R**
Channel selector.
**L, R dark:** Normal operation, left and right channel in stereo mode.
**L illuminated:** Left input channel is switched to both output channels with level matching.
**R illuminated:** Right input channel is switched to both output channels with level matching.
**L and R illuminated:** Stereo operation, however both input channels are swapped and connected to the output channels.

**[4] GEN**
Key for selecting the electronically balanced generator input with fixed input sensitivity. (Generator standard output level: +6 dBu).

**[5] LINE**
Key for selecting the transformer-balanced line input (electronically balanced line input optional).
Gain setting with potentiometer next to the key; detent in 0 dB center position. Gain setting range: ±10 dB.

**[6] OVERLOAD**
From all critical points within the channel the signal is routed to the overload indicator in order to indicate any undesired clipping of the signal.

**[7] MIC M/S**
Key for selecting the transformer-balanced microphone input for M/S microphone arrangements; the M/S decoding matrix is active.
Coarse gain setting with the GAIN ring, fine adjustment with the GAIN knob.

**[8] MIC XY**
Key for selecting the transformer-balanced microphone input for standard microphone arrangements.
Coarse gain setting with the GAIN ring, fine adjustment with the GAIN knob.

**[9] GAIN**
Gain adjustment of the MIC input. The gain can be set in steps of 10 dB with the GAIN ring from –10 to +70 dBu; additional fine adjustment with the GAIN knob from 0 to +10 dB.

**[10] PH PWR** Key for switching the phantom power to the microphone input lines. Factory setting: 48 V, switchable to 24 V or 12 V by means of solder bridges in the power supply (see "Aligning the power supply", 2.16).

**[11] Ø** Phase reverse switch, effective for all inputs of the input unit in common.

**[12] SPREAD** Stereo width setting. The width of a stereo signal can be continuously adjusted between mono and twice the normal width if the key is illuminated. If the potentiometer is in its STEREO center position (detent), the width corresponds to a normal stereo signal.

**[13] FILTER ⌒ IN** Individually selectable high-pass filter, Bessel characteristics. Slope 12 dB/octave. Cut-off frequency adjustable with rotary knob between 15 Hz and 300 Hz.

**[14] HF** Parametric constant-Q equalizer (Q = 0.7), can be switched over to treble control (key is illuminated). Boost/cut up to ±15 dB, center/turnover frequency adjustable between 700 Hz and 15 kHz.

**[15] HMF** Parametric constant-Q equalizer (Q = 0.7). Boost/cut up to ±15 dB, center frequency adjustable between 400 Hz and 7 kHz.

**[16] HLF** Parametric equalizer as HMF [15], but center frequency adjustable between 120 Hz and 2 kHz.

**[17] LF** Parametric equalizer/bass control as HF [14], but center/turnover frequency adjustable between 30 Hz and 600 Hz.

**[18] EQUALIZER IN** Key for inserting (key illuminated) or bypassing the equalizer [14]...[17].

**[19] INSERT** Electronically balanced insert point, either before or after the equalizer (selectable with a jumper, refer to circuit diagram Input Main and Side Board 1.980.201, section 4).

**[20] AUX 1...4** Mono outputs to the auxiliary busses 1...4. If ON is pressed (key is illuminated), the input signal can be mixed to the desired AUX bus with the potentiometer.
If PRE is pressed in addition (key is illuminated), the pre-fader signal is mixed to the AUX bus.

**[21] AUX 5/6, 7/8** Outputs to the auxiliary busses 5/6 and 7/8, either as two mono channels or one stereo channel (this selection is performed centrally with the 2CH key on the AUX MASTER UNIT).

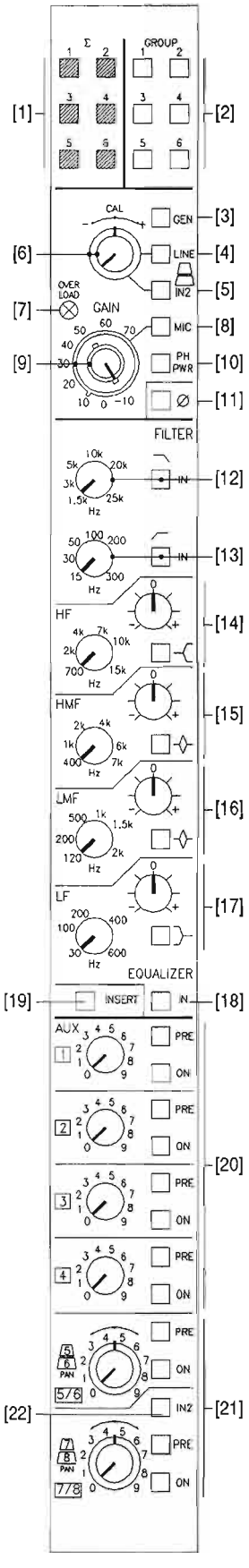
**Mono:** If ON is pressed (key is illuminated), the input signal can be mixed to the AUX busses 5 and 7 with the knobs, and to the AUX busses 6 and 8 with the rings of the concentric potentiometers.
If PRE is pressed in addition (key is illuminated), the pre-fader signal is mixed to the AUX bus.

**Stereo:** If ON is pressed (key is illuminated), the input signal can be mixed to the AUX busses 5/6 and 7/8 with the knobs of the concentric potentiometers; the rings of the potentiometers are used as pan pots.
If PRE is pressed in addition (key is illuminated), the pre-fader signal is mixed to the AUX bus.

**[22] LINE**

The LINE input is mixed to the AUX bus 7/8; this way an independent mix of the LINE signals (e.g. monitor mix) can be realized.

## 2.4.5 Mono film/HDTV input unit 1.980.221




**[1] Σ 1...6**
Key for assigning the audio signal to the MASTER busses.

**[2] GROUP 1...6**
Key for assigning the audio signal to the GROUP busses.

**[3] GEN**
Key for selecting the electronically balanced generator input with fixed input sensitivity. (Generator standard output level: +6 dBu).

**[4] LINE**
Key for selecting the transformer-balanced line input (electronically balanced line input optional).
Gain setting with potentiometer [6].

**[5] IN2**
Key for selecting the electronically balanced line input (transformer-balanced line input optional).
Gain setting with potentiometer [6].

**[6] – CAL +**
Gain setting for the LINE (knob) and IN2 (ring) inputs. Detent in CAL center position; the gain can be varied for ±10 dB with respect to the CAL position.

**[7] OVERLOAD**
From all critical points within the channel the signal is routed to the overload indicator in order to indicate any undesired clipping of the signal.

**[8] MIC**
Key for selecting the transformer-balanced microphone input.
Coarse gain setting with the GAIN ring, fine adjustment with the GAIN knob.

**[9] GAIN**
Gain adjustment of the MIC input. The gain can be set in steps of 10 dB with the GAIN ring from –10 to +70 dBu; additional fine adjustment with the GAIN knob from 0 to +10 dB.

**[10] PH PWR**
Key for switching the phantom power to the microphone input lines. Factory setting: 48 V, switchable to 24 V or 12 V by means of solder bridges in the power supply (refer to "Aligning the power supply", section 2.16).

**[11] Ø**
Phase reverse switch, effective for all inputs of the input unit in common.

**[12] FILTER ⌒\ IN**

Individually selectable low-pass filter, Bessel characteristics. Slope 12 dB/octave. Cut-off frequency can be set with rotary knob between 1.5 kHz and 25 kHz.

**[13] FILTER /⌒ IN**

Individually selectable high-pass filter, Bessel characteristics. Slope 12 dB/octave. Cut-off frequency adjustable with rotary knob between 15 Hz and 300 Hz.

**[14] HF**

Parametric constant-Q equalizer (Q = 0.7), can be switched over to treble control (key is illuminated). Boost/cut up to ±15 dB, center/turnover frequency adjustable between 700 Hz and 15 kHz.

**[15] HMF**

Parametric constant-Q equalizer, Qs of 0.7 (wide) and of 2 (narrow, key is illuminated) are selectable. Boost/cut up to ±15 dB, center frequency adjustable between 400 Hz and 7 kHz.

**[16] HLF**

Parametric equalizer as HMF [15], but center frequency adjustable between 120 Hz and 2 kHz.

**[17] LF**

Parametric equalizer/bass control as HF [14], but center/turnover frequency adjustable between 30 Hz and 600 Hz.

**[18] EQUALIZER IN**

Key for inserting (key illuminated) or bypassing the equalizer [14]...[17].

**[19] INSERT**

Electronically balanced insert point, either before or after the equalizer (selectable with a jumper, refer to circuit diagram Input Main and Side Board 1.980.201, section 4).

**[20] AUX 1...4**

Mono outputs to the auxiliary busses 1...4. If ON is pressed (key is illuminated), the input signal can be mixed to the desired AUX bus with the potentiometer.
If PRE is pressed in addition (key is illuminated), the pre-fader signal is mixed to the AUX bus.

**[21] AUX 5/6, 7/8**

Outputs to the auxiliary busses 5/6 and 7/8, either as two mono channels or one stereo channel (this selection is performed centrally with the 2CH key on the AUX MASTER UNIT).

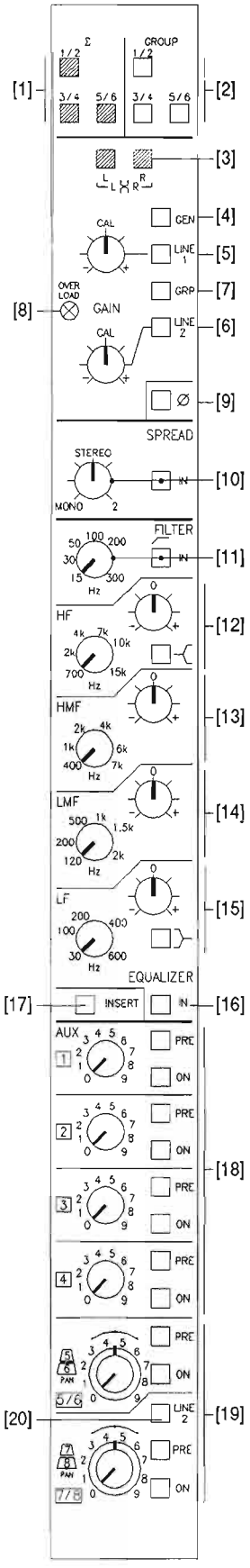
**Mono:** If ON is pressed (key is illuminated), the input signal can be mixed to the AUX busses 5 and 7 with the knobs, and to the AUX busses 6 and 8 with the rings of the concentric potentiometers.
If PRE is pressed in addition (key is illuminated), the pre-fader signal is mixed to the AUX bus.

**Stereo:** If ON is pressed (key is illuminated), the input signal can be mixed to the AUX busses 5/6 and 7/8 with the knobs of the concentric potentiometers; the rings of the potentiometers are used as pan pots.
If PRE is pressed in addition (key is illuminated), the pre-fader signal is mixed to the AUX bus.

**[22] IN2**

The input unit's IN2 line input is mixed to the AUX bus 7/8; this way an independent mix of the IN2 signals (e.g. monitor mix) can be realized.

## 2.4.6 Stereo high level film/HDTV input unit (HL) with EQ 1.980.241




[1] **Σ 1/2...5/6**
Key for assigning the input signals to the stereo MASTER busses.

[2] **GROUP 1/2...5/6**
Key for assigning the input signals to the stereo GROUP busses.

[3] **L, R, L ✕ R**
Channel selector.
**L, R dark:** Normal operation, left and right channel in stereo mode.
**L illuminated:** Left input channel is switched to both output channels with level matching.
**R illuminated:** Right input channel is switched to both output channels with level matching.
**L and R illuminated:** Stereo operation, however both input channels are swapped and connected to the output channels.

[4] **GEN**
Key for selecting the electronically balanced generator input with fixed input sensitivity. (Generator standard output level: +6 dBu).

[5] **LINE 1**
Key for selecting the transformer-balanced line input (electronically balanced line input optional).
Gain setting with potentiometer next to the key; detent in 0 dB center position. Gain setting range: ±10 dB.

[6] **LINE 2**
Key for selecting the electronically balanced line input (transformer-balanced line input optional).
Gain setting with potentiometer next to the key; detent in 0 dB center position. Gain setting range: ±10 dB.

[7] **GRP**
This key is operative only if the input unit is used as a stereo group; in normal operation the key has no function.

[8] **OVERLOAD**
From all critical points within the channel the signal is routed to the overload indicator in order to indicate any undesired clipping of the signal.

[9] **Ø**
Phase inversion key; the phase of the right channels of all inputs is shifted by 180° (key is illuminated).

[10] **SPREAD**
Stereo width setting. The width of a stereo signal can be continuously adjusted between mono and twice the normal width if the key is illuminated. If the potentiometer is in its STEREO center position (detent), the width corresponds to a normal stereo signal.

**[11] FILTER ⌒ IN** Individually selectable high-pass filter, Bessel characteristics. Slope 12 dB/octave. Cut-off frequency adjustable with rotary knob between 15 Hz and 300 Hz.

**[12] HF** Parametric constant-Q equalizer (Q = 0.7), can be switched over to treble control (key is illuminated). Boost/cut up to ±15 dB, center/turnover frequency adjustable between 700 Hz and 15 kHz.

**[13] HMF** Parametric constant-Q equalizer (Q = 0.7). Boost/cut up to ±15 dB, center frequency adjustable between 400 Hz and 7 kHz.

**[14] HLF** Parametric equalizer as HMF [13], but center frequency adjustable between 120 Hz and 2 kHz.

**[15] LF** Parametric equalizer/bass control as HF [12], but center/turnover frequency adjustable between 30 Hz and 600 Hz.

**[16] EQUALIZER IN** Key for inserting (key illuminated) or bypassing the equalizer [12]...[15].

**[17] INSERT** Electronically balanced insert point, either before or after the equalizer (selectable with a jumper, refer to circuit diagram Input Main and Side Board 1.980.201, section 4).

**[18] AUX 1...4** Mono outputs to the auxiliary busses 1...4. If ON is pressed (key is illuminated), the input signal can be mixed to the desired AUX bus with the potentiometer.
If PRE is pressed in addition (key is illuminated), the pre-fader signal is mixed to the AUX bus.

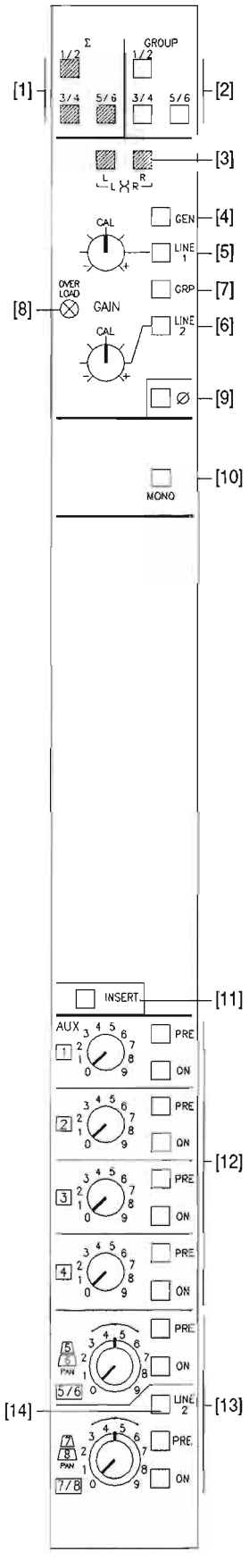
**[19] AUX 5/6, 7/8** Outputs to the auxiliary busses 5/6 and 7/8, either as two mono channels or one stereo channel (this selection is performed centrally with the 2CH key on the AUX MASTER UNIT).

**Mono:** If ON is pressed (key is illuminated), the input signal can be mixed to the AUX busses 5 and 7 with the knobs, and to the AUX busses 6 and 8 with the rings of the concentric potentiometers.
If PRE is pressed in addition (key is illuminated), the pre-fader signal is mixed to the AUX bus.

**Stereo:** If ON is pressed (key is illuminated), the input signal can be mixed to the AUX busses 5/6 and 7/8 with the knobs of the concentric potentiometers; the rings of the potentiometers are used as pan pots.
If PRE is pressed in addition (key is illuminated), the pre-fader signal is mixed to the AUX bus.

**[20] LINE 2** The LINE 2 line input is mixed to the AUX bus 7/8; this way an independent mix of the LINE 2 signals (e.g. monitor mix) can be realized.

## 2.4.7 Stereo high level film/HDTV input unit (HL) without EQ 1.980.243




[1] Σ 1/2...5/6
Key for assigning the input signals to the stereo MASTER busses.

[2] GROUP 1/2...5/6
Key for assigning the input signals to the stereo GROUP busses.

[3] L, R, L ✕ R
Channel selector.
**L, R dark:** Normal operation, left and right channel in stereo mode.
**L illuminated:** Left input channel is switched to both output channels with level matching.
**R illuminated:** Right input channel is switched to both output channels with level matching.
**L and R illuminated:** Stereo operation, however both input channels are swapped and connected to the output channels.

[4] GEN
Key for selecting the electronically balanced generator input with fixed input sensitivity. (Generator standard output level: +6 dBu).

[5] LINE 1
Key for selecting the transformer-balanced line input (electronically balanced line input optional).
Gain setting with potentiometer next to the key; detent in 0 dB center position. Gain setting range: ±10 dB.

[6] LINE 2
Key for selecting the electronically balanced line input (transformer-balanced line input optional).
Gain setting with potentiometer next to the key; detent in 0 dB center position. Gain setting range: ±10 dB.

[7] GRP
This key is operative only if the input unit is used as a stereo group; in normal operation the key has no function.

[8] OVERLOAD
From all critical points within the channel the signal is routed to the overload indicator in order to indicate any undesired clipping of the signal.

[9] Ø
Phase inversion key; the phase of the right channels of all inputs is shifted by 180° (key is illuminated).

[10] MONO
If the key is illuminated, the left and right channel will be added to a mono signal and routed to both outputs.

**[11] INSERT**

Electronically balanced insert point, either before or after the equalizer (selectable with a jumper, refer to circuit diagram Input Main and Side Board 1.980.201, section 4).

**[12] AUX 1...4**

Mono outputs to the auxiliary busses 1...4. If ON is pressed (key is illuminated), the input signal can be mixed to the desired AUX bus with the potentiometer.
If PRE is pressed in addition (key is illuminated), the pre-fader signal is mixed to the AUX bus.

**[13] AUX 5/6, 7/8**

Outputs to the auxiliary busses 5/6 and 7/8, either as two mono channels or one stereo channel (this selection is performed centrally with the 2CH key on the AUX MASTER UNIT).

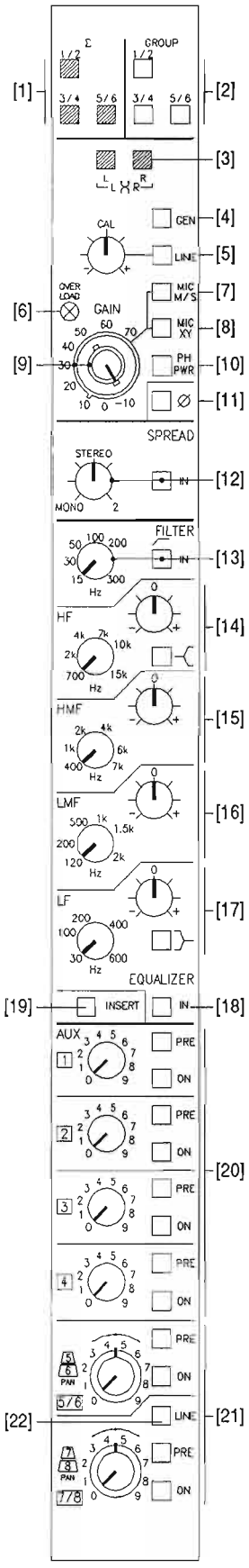
**Mono:** If ON is pressed (key is illuminated), the input signal can be mixed to the AUX busses 5 and 7 with the knobs, and to the AUX busses 6 and 8 with the rings of the concentric potentiometers.
If PRE is pressed in addition (key is illuminated), the pre-fader signal is mixed to the AUX bus.

**Stereo:** If ON is pressed (key is illuminated), the input signal can be mixed to the AUX busses 5/6 and 7/8 with the knobs of the concentric potentiometers; the rings of the potentiometers are used as pan pots.
If PRE is pressed in addition (key is illuminated), the pre-fader signal is mixed to the AUX bus.

**[14] LINE 2**

The LINE 2 line input is mixed to the AUX bus 7/8; this way an independent mix of the LINE 2 signals (e.g. monitor mix) can be realized.

## 2.4.8 Stereo universal film/HDTV input unit with EQ 1.980.251




[1] Σ 1/2...5/6
Key for assigning the input signals to the stereo MASTER busses.

[2] GROUP 1/2...5/6
Key for assigning the input signals to the stereo GROUP busses.

[3] L, R, L ✕ R
Channel selector.
**L, R dark:** Normal operation, left and right channel in stereo mode.
**L illuminated:** Left input channel is switched to both output channels with level matching.
**R illuminated:** Right input channel is switched to both output channels with level matching.
**L and R illuminated:** Stereo operation, however both input channels are swapped and connected to the output channels.

[4] GEN
Key for selecting the electronically balanced generator input with fixed input sensitivity. (Generator standard output level: +6 dBu).

[5] LINE
Key for selecting the transformer-balanced line input (electronically balanced line input optional).
Gain setting with potentiometer next to the key; detent in 0 dB center position. Gain setting range: ±10 dB.

[6] OVERLOAD
From all critical points within the channel the signal is routed to the overload indicator in order to indicate any undesired clipping of the signal.

[7] MIC M/S
Key for selecting the transformer-balanced microphone input for M/S microphone arrangements; the M/S decoding matrix is active.
Coarse gain setting with the GAIN ring, fine adjustment with the GAIN knob.

[8] MIC XY
Key for selecting the transformer-balanced microphone input for standard microphone arrangements.
Coarse gain setting with the GAIN ring, fine adjustment with the GAIN knob.

[9] GAIN
Gain adjustment of the MIC input. The gain can be set in steps of 10 dB with the GAIN ring from –10 to +70 dBu; additional fine adjustment with the GAIN knob from 0 to +10 dB.

**[10] PH PWR**

Key for switching the phantom power to the microphone input lines. Factory setting: 48 V, switchable to 24 V or 12 V by means of solder bridges in the power supply (see "Aligning the power supply", 2.16).

**[11] Ø**

Phase reverse switch, effective for all inputs of the input unit in common.

**[12] SPREAD**

Stereo width setting. The width of a stereo signal can be continuously adjusted between mono and twice the normal width if the key is illuminated. If the potentiometer is in its STEREO center position (detent), the width corresponds to a normal stereo signal.

**[13] FILTER ⌒ IN**

Individually selectable high-pass filter, Bessel characteristics. Slope 12 dB/octave. Cut-off frequency adjustable with rotary knob between 15 Hz and 300 Hz.

**[14] HF**

Parametric constant-Q equalizer (Q = 0.7), can be switched over to treble control (key is illuminated). Boost/cut up to ±15 dB, center/turnover frequency adjustable between 700 Hz and 15 kHz.

**[15] HMF**

Parametric constant-Q equalizer (Q = 0.7). Boost/cut up to ±15 dB, center frequency adjustable between 400 Hz and 7 kHz.

**[16] HLF**

Parametric equalizer as HMF [15], but center frequency adjustable between 120 Hz and 2 kHz.

**[17] LF**

Parametric equalizer/bass control as HF [14], but center/turnover frequency adjustable between 30 Hz and 600 Hz.

**[18] EQUALIZER IN**

Key for inserting (key illuminated) or bypassing the equalizer [14]...[17].

**[19] INSERT**

Electronically balanced insert point, either before or after the equalizer (selectable with a jumper, refer to circuit diagram Input Main and Side Board 1.980.201, section 4).

**[20] AUX 1...4**

Mono outputs to the auxiliary busses 1...4. If ON is pressed (key is illuminated), the input signal can be mixed to the desired AUX bus with the potentiometer.
If PRE is pressed in addition (key is illuminated), the pre-fader signal is mixed to the AUX bus.

**[21] AUX 5/6, 7/8**

Outputs to the auxiliary busses 5/6 and 7/8, either as two mono channels or one stereo channel (this selection is performed centrally with the 2CH key on the AUX MASTER UNIT).

**Mono:** If ON is pressed (key is illuminated), the input signal can be mixed to the AUX busses 5 and 7 with the knobs, and to the AUX busses 6 and 8 with the rings of the concentric potentiometers.
If PRE is pressed in addition (key is illuminated), the pre-fader signal is mixed to the AUX bus.

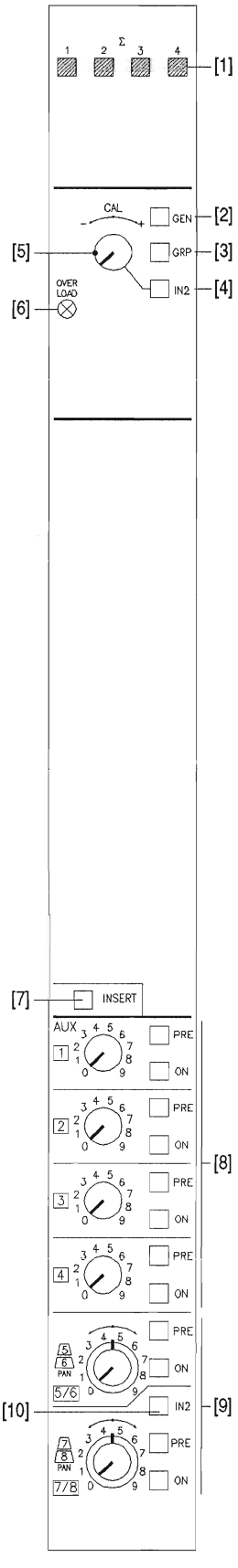
**Stereo:** If ON is pressed (key is illuminated), the input signal can be mixed to the AUX busses 5/6 and 7/8 with the knobs of the concentric potentiometers; the rings of the potentiometers are used as pan pots.
If PRE is pressed in addition (key is illuminated), the pre-fader signal is mixed to the AUX bus.

**[22] LINE**

The LINE input is mixed to the AUX bus 7/8; this way an independent mix of the LINE signals (e.g. monitor mix) can be realized.

## 2.5 Group units

### 2.5.1 Mono group unit, broadcast version 1.980.230




[1] **Σ 1...4**
Key for assigning the audio signal to the MASTER busses.

[2] **GEN**
Key for selecting the electronically balanced generator input with fixed input sensitivity. (Generator standard output level: +6 dBu).

[3] **GRP**
Key for group take-over, if the input is used as a group.

[4] **IN2**
Key for selecting the electronically balanced line input (transformer-balanced line input optional).
Gain setting with potentiometer [5].

[5] **– CAL +**
Gain setting for the IN2 input. Detent in CAL center position; the gain can be varied for ±10 dB with respect to the CAL position.

[6] **OVERLOAD**
From all critical points within the channel the signal is routed to the overload indicator in order to avoid undesired clipping of the signal.

[7] **INSERT**
Electronically balanced insert point, either before or after the equalizer (selectable with a jumper, refer to circuit diagram Input Main and Side Board 1.980.201, section 4).

[8] **AUX 1...4**
Mono outputs to the auxiliary busses 1...4. If ON is pressed (key is illuminated), the input signal can be mixed to the desired AUX bus with the potentiometer.
If PRE is pressed in addition (key is illuminated), the pre-fader signal is mixed to the AUX bus.

[9] **AUX 5/6, 7/8**
Outputs to the auxiliary busses 5/6 and 7/8, either as two mono channels or one stereo channel (this selection is performed centrally with the 2CH key on the AUX MASTER UNIT).

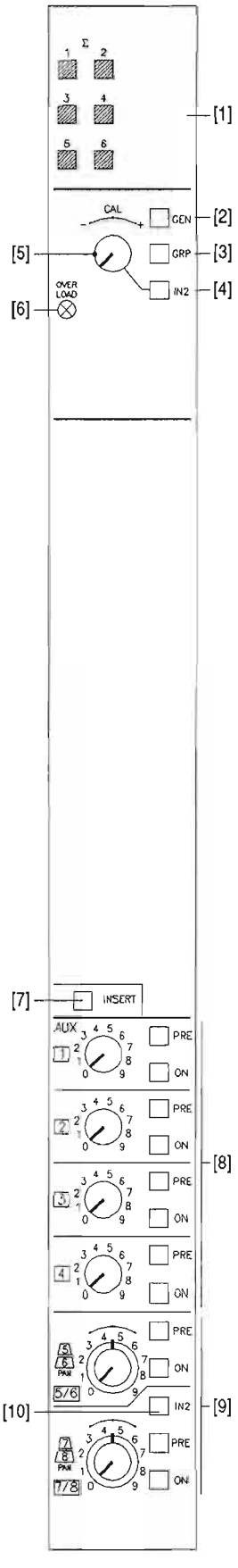
**Mono:** If ON is pressed (key is illuminated), the input signal can be mixed to the AUX busses 5 and 7 with the knobs, and to the AUX busses 6 and 8 with the rings of the concentric potentiometers.
If PRE is pressed in addition (key is illuminated), the pre-fader signal is mixed to the AUX bus.

**Stereo:** If ON is pressed (key is illuminated), the input signal can be mixed to the AUX busses 5/6 and 7/8 with the knobs of the concentric potentiometers; the rings of the potentiometers are used as pan pots.
If PRE is pressed in addition (key is illuminated), the pre-fader signal is mixed to the AUX bus.

**[10] IN2**

The IN2 line input of this group is mixed to the AUX bus 7/8; this way an independent mix of the IN2 signals (e.g. monitor mix) can be realized.

## 2.5.2 Mono group unit, HDTV/film version 1.980.231




[1] **Σ 1...6**
Key for assigning the audio signal to the MASTER busses.

[2] **GEN**
Key for selecting the electronically balanced generator input with fixed input sensitivity. (Generator standard output level: +6 dBu).

[3] **GRP**
Key for group take-over, if the input is used as a group.

[4] **IN2**
Key for selecting the electronically balanced line input (transformer-balanced line input optional).
Gain setting with potentiometer [5].

[5] **– CAL +**
Gain setting for the IN2 input. Detent in CAL center position; the gain can be varied for ±10 dB with respect to the CAL position.

[6] **OVERLOAD**
From all critical points within the channel the signal is routed to the overload indicator in order to avoid undesired clipping of the signal.

[7] **INSERT**
Electronically balanced insert point, either before or after the equalizer (selectable with a jumper, refer to circuit diagram Input Main and Side Board 1.980.201, section 4).

[8] **AUX 1...4**
Mono outputs to the auxiliary busses 1...4. If ON is pressed (key is illuminated), the input signal can be mixed to the desired AUX bus with the potentiometer.
If PRE is pressed in addition (key is illuminated), the pre-fader signal is mixed to the AUX bus.

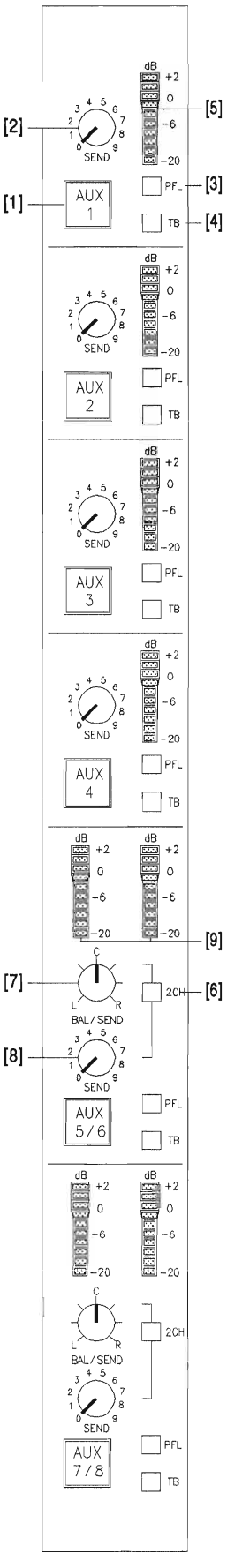
[9] **AUX 5/6, 7/8**
Outputs to the auxiliary busses 5/6 and 7/8, either as two mono channels or one stereo channel (this selection is performed centrally with the 2CH key on the AUX MASTER UNIT).

**Mono:** If ON is pressed (key is illuminated), the input signal can be mixed to the AUX busses 5 and 7 with the knobs, and to the AUX busses 6 and 8 with the rings of the concentric potentiometers.
If PRE is pressed in addition (key is illuminated), the pre-fader signal is mixed to the AUX bus.

**Stereo:** If ON is pressed (key is illuminated), the input signal can be mixed to the AUX busses 5/6 and 7/8 with the knobs of the concentric potentiometers; the rings of the potentiometers are used as pan pots.
If PRE is pressed in addition (key is illuminated), the pre-fader signal is mixed to the AUX bus.

[10] **IN2**
The IN2 line input is mixed to the AUX bus 7/8; this way an independent mix of the IN2 signals (e.g. monitor mix) can be realized.

## 2.6 AUX MASTER unit I.980.310/320




**[1] AUX 1...4, 5/6, 7/8**
Keys for activating the AUX channels.

**[2] SEND**
Potentiometer for setting the AUX output level. Max. additional gain: Line level +15 dB.

**[3] PFL**
Key for activating the Pre-Fader Listening monitoring function – listening before the SEND level control. If the jumper JP4 (P31/32) is inserted on AUX MASTER units with serial No. 8017 and up, the PFL keys are mutually releasing, in common with the PFL keys on the input and group units (refer to diagram AUX Master Main Board, section 4).

**[4] TB**
Momentary key for talk-back to the corresponding AUX channel via the command microphone.
If the jumper JP3 is inserted on AUX MASTER units with serial No. 8017 and up, then "TB TO ALL" on the central Function Control Unit (FCU) is also active for the AUX MASTER unit(s) (refer to diagram AUX Master Main Board, section 4).

**[5] LED bargraph**
Level meters for monitoring the AUX level of the channels 1...4. VU or PPM characteristics depending on the console version; selectable for all bargraphs of the AUX MASTER unit with jumper JP1 (i.e. connect P37/38 for PPM; refer to diagram AUX Master Main Board, section 4).

**[6] 2CH**
Key to select two-channel mode (i.e. two separate channels, key is illuminated) or stereo mode for the AUX outputs 5/6 and 7/8.

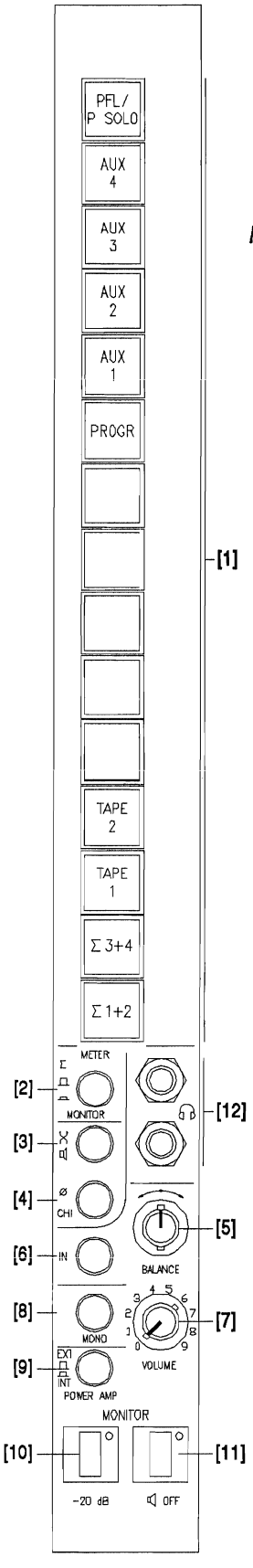
**[7] BAL/SEND**
Potentiometer for balance setting in stereo mode (compensation of level differences); in two-channel mode (key 2CH [6] is illuminated) for level setting of the channels 5 or 7, respectively.

**[8] SEND**
Potentiometer, for setting the level of the channels 5/6 or 7/8 in stereo mode; in two-channel mode (key 2CH [6] is illuminated) for level setting of the channels 6 or 8, respectively.

**[9] LED bargraphs**
Dual level meter for monitoring the AUX level of the channels 5/6 and 7/8. VU or PPM characteristics depending on the console version; selectable for all bargraphs of the AUX MASTER unit with jumper JP1 (i.e. connect P37/38 for PPM; refer to diagram AUX Master Main Board, section 4).

## 2.7 Control room monitoring

### 2.7.1 CR Monitor unit 1.912.420




**[1] Source selector**
Mutually releasing pushbuttons for selecting from 1 5 different sources.

**[2] METER**
Switchover for the level meters.
**Σ:** Key released; level meters 1 and 2 are connected to the Master outputs Σ 1 and Σ 2.
**MONITOR:** Key pressed; level meters 1 and 2 are connected to the CR Monitor outputs.

**[3]**
Key for swapping the left- and right-hand CR Monitor outputs.

**[4] CH1**
Key for changing the phase of the left CR Monitor channel (i.e. inversion of channel 1).

**[5] BALANCE**
Potentiometer for compensating level differences caused by the control room acoustics or by the monitor speakers; activated with key IN [6].

**[6] IN**
Key for activating the potentiometer BALANCE [5].

**[7] VOLUME**
Potentiometer for setting the monitoring level. For optimum stereo tracking the pot controls two VCAs.

**[8] MONO**
Key for adding the two monitor channels to a mono signal for compatibility checks; the combined signal is fed to both monitor outputs.

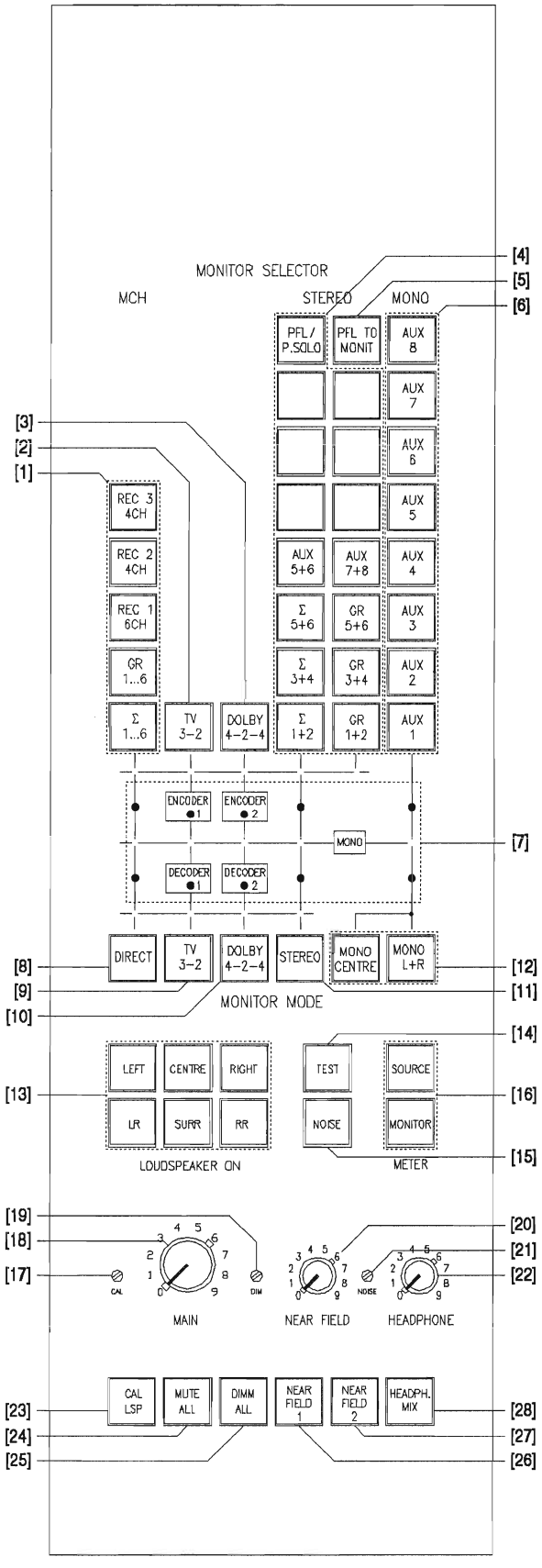
**[9] POWER AMP**
Key for selecting the monitoring amplifier.
**EXT:** Key released; external power amp or active monitor speakers.
**INT:** Key pressed; internal power amp for passive monitor speakers.

**[10] MONITOR –20 dB**
Key for attenuating the monitoring level by 20 dB.

**[11] MONITOR OFF**
Key for muting the monitor output.

**[12]**
Two headphones outputs, 6.3 mm jack sockets. Output impedance 200 Ω.

## 2.7.2 HDTV/Film monitor




**[1] MCH**
Mutually releasing keys to activate the multi-channel inputs REC 1...3 (external) or Σ 1...6 and GR 1...6 (internal). The external sources REC 1...3 may be four- or six-channel (jumper-selectable, refer to diagram HDTV/Film Monitor, section 4), and the corresponding monitor speaker outputs will be switched on.

**[2] TV 3-2**
Key for activating the external 5-channel TV 3-2 input.

**[3] DOLBY 4-2-4**
Key for activating the external 4-channel Dolby 4-2-4 input.

**[4] STEREO**
Mutally releasing keys for selecting the internal or external STEREO sources.

**[5] PFL TO MONIT**
Latching key for activating the PFL TO MONITOR function. When this key is pressed and one or more of the PFL/P. SOLO keys on the console is pressed, the selected monitoring source is disabled and the PFL/P. SOLO is routed to the monitor system instead.

**[6] MONO**
Mutually releasing keys for selecting the MONO sources AUX 1...8.

**[7] Signal path display**
Graphical display of the selected signal path. The display informs on the use and position of the encoder/decoder and its insertion point.

**[8] MONITOR MODE DIRECT**
Direct monitoring without any encoder or decoder inserted in the signal path. The channels required for the particular application must be selected with the LOUDSPEAKER ON keys [13].

**[9] MONITOR MODE TV 3-2**
Five-channel monitoring via the left, right, and center front speakers and the left and right rear speakers (CH 1, 2, 3, 5, 6).

[10] MONITOR MODE **DOLBY 4-2-4**

Four-channel monitoring via the left, right, and center front speakers and the surround speaker(s) (CH 1...4).

[11] MONITOR MODE **STEREO** Two-channel monitoring via the left and right front speakers (CH 1 and 2).

[12] MONITOR MODE **MONO** For checking the mono compatibility, the monitor mode can be switched to MONO CENTRE or MONO L+R. When using MONO CENTRE mode, the mono mix of the selected stereo channel is reproduced by the front centre loudspeaker only (i.e. CH 3). When using MONO L+R mode, the mono signal is reproduced by both the left and right front speakers (CH 1 and 2).

[13] **LOUDSPEAKER ON** Loudspeaker selector keys for switching the desired channels to the monitor outputs.
According to the current standards, the source-to-monitor channel assignment is as follows:

| TV 3-2 | Source | Speaker | Dolby 4-2-4 | Source | Speaker |
|---|---|---|---|---|---|
| | CH 1 | front left | | CH 1 | front left |
| | CH 2 | front right | | CH 2 | front right |
| | CH 3 | front centre | | CH 3 | front centre |
| | CH 4 | ----- | | CH 4 | surround |
| | CH 5 | rear left | | CH 5 | ----- |
| | CH 6 | rear right | | CH 6 | ----- |

[14] **TEST** Key for routing the test generator to the selected monitor outputs.

[15] **NOISE** For simulating ambient noise, white noise from the test generator can be added to the monitor signal using this key. The noise level can be adjusted with the NOISE trimmer potentiometer [21].

[16] METER **SOURCE/MONITOR** The level meters can monitor the signal at the monitor input (SOURCE key), or at the monitor output, before the volume control VCA (MONITOR key).

[17] **CAL preset trimmer pot** Trimmer potentiometer for setting the calibrated level (active if CAL LSP [23] is pressed). The calibrated level is identical for the MAIN and the NEAR FIELD outputs.

[18] **MAIN** Rotary knob for level control of all main monitor outputs. If none of the NEAR FIELD keys [26], [27] is pressed, the main monitor outputs are active.

[19] **DIM preset trimmer** Trimmer potentiometer for setting the dimmed level. The attenuation is identical for the MAIN and the NEAR FIELD outputs.

[20] **NEAR FIELD** Rotary knob for level control of all near-field outputs (refer to NEAR FIELD 1 [26] and NEAR FIELD 2 [27].

**[21] NOISE**

Preset trimmer potentiometer for setting the white noise level (simulation of additional ambient noise; refer to NOISE key [15]).

**[22] HEADPHONE**

Rotary knob for headphones level control.
Two headphones outputs are available which can also be used together with a set of surround headphones. They are located in the last frame (far right) underneath the hand rest.
Channels 1 and 2 are connected to the left and right channels of the HEADPHONE 1 output. If HEADPH. MIX [28] is selected, the centre channel (CH 3) is mixed to both channels of the HEADPHONE 1 output.
Channels 5 and 6 are connected to the left and right channels of the HEADPHONE 2 output. If HEADPH. MIX [28] is selected, the surround channel (CH 4) is mixed to both channels of the HEADPHONE 2 output.

**[23] CAL LSP**

Key for activating the calibrated level. If active, the level having been preset with the CAL trimmer potentiometer [17] is routed to the selected monitor outputs.

**[24] MUTE ALL**

Key for muting the selected monitor outputs.

**[25] DIMM ALL**

Key for attenuating the selected monitor outputs by an amount preset with the DIM trimmer potentiometer [19].
The DIMM ALL function is also active (key is illuminated) if a talkback function is activated (e.g. talkback to a direct output, from talkback box, or to studio, etc.).

**[26] NEAR FIELD 1**

Key for routing the monitor output signals to a second group of loudspeakers. The channel 5 and 6 outputs (left and right rear) may alternatively be connected to a third pair of loudspeakers, provided the internal jumpers have been set accordingly. They will then reproduce the channels 1 and 2 (left and right front) if selected with NEAR FIELD 2 [27].
If none of the NEAR FIELD 1 or NEAR FIELD 2 [27] keys is pressed, the monitor output signals are automatically routed to the main monitor loudspeakers.

**[27] NEAR FIELD 2**

Key for routing the channels 1 and 2 (left and right front) to a third pair of loudspeakers connected to the NEAR FIELD 1 right and left rear outputs, provided the internal jumpers have been set accordingly. Refer to NEAR FIELD 1 [26].
If none of the NEAR FIELD 1 [26] or NEAR FIELD 2 keys is pressed, the monitor output signals are automatically routed to the main monitor loudspeakers.

**[28] HEADPH. MIX**

The channels 1 and 2 (right and left front) are connected to the left and right channels of the HEADPHONE 1 output socket. If HEADPH. MIX is selected, the centre front channel (CH 3) is mixed to both channels of the HEADPHONE 1 output socket.
The channels 5 and 6 (right and left rear) are connected to the left and right channels of the HEADPHONE 2 output socket. If HEADPH. MIX

is selected, the surround channel (CH 4) is mixed to both channels of the HEADPHONE 2 output socket.
In this way, a surround headphone set can be connected to both HEADPHONE 1 and 2 outputs.

## Monitoring examples

**Stereo source:**

The desired stereo source can be selected via the monitor selection keyboard. The monitor mode then automatically switches to STEREO, and the left and right front loudspeakers are activated.

For checking the mono compatibility, the monitor mode can be switched to MONO CENTRE or MONO L+R. When using the MONO CENTRE mode, the mono mixed signal of the selected stereo channel is routed to the front centre loudspeaker. When using the MONO L+R mode, the signal is routed to the left and right front loudspeakers.

When using a coded Dolby 4-2-4 signal, the DOLBY 4-2-4 monitor mode allows for a 4-channel decoded reproduction.

**Multi-channel source:**

If one of the multi-channel sources is selected and the DIRECT monitor mode key is pressed, all four or six channels (jumper-selectable, refer to diagram HDTV/Film Monitor, section 4) are switched to the loudspeakers in the sequence according to the table below:

| TV 3-2 | Source | Speaker | Dolby 4-2-4 | Source | Speaker |
|---|---|---|---|---|---|
| | CH 1 | front left | | CH 1 | front left |
| | CH 2 | front right | | CH 2 | front right |
| | CH 3 | front centre | | CH 3 | front centre |
| | CH 4 | ----- | | CH 4 | surround |
| | CH 5 | rear left | | CH 5 | ----- |
| | CH 6 | rear right | | CH 6 | ----- |

Unused channels can be switched off by pressing the appropriate LOUDSPEAKER ON key.

When selecting the TV 3-2 monitor mode, the source channels 1, 2, 3, 5, and 6 are routed to the monitor loudspeaker outputs without any changes. In addition, channel 4 is mixed to the channels 5 and 6.

When selecting the DOLBY 4-2-4 monitor mode, the source channels 1, 2, 3, and 4 are routed to the monitor loudspeaker outputs without any changes. In addition, the channels 5 and 6 are mixed to channel 4.

In STEREO monitor mode, the channels 1 and 2 are routed to the loudspeakers 1 and 2; the channels 3 and 4 are summed and mixed to both outputs 1 and 2; channel 5 is mixed to channel 1, and channel 6 is mixed to channel 2.

In MONO monitor mode, the abovementioned stereo signal is mixed to a mono signal and routed to the left and right front loudspeakers or to the center front loudspeaker, depending on the selection of MONO L+R or MONO CENTRE modes.

**Dolby 4-2-4:**

If the DOLBY 4-2-4 monitor mode is enabled and the DIRECT monitor mode key is pressed, the unprocessed input signal of the Dolby encoder can be monitored. The monitor speaker outputs 1, 2, 3, and 4 are active, i.e. left, centre, and right front, as well as surround.

When selecting the STEREO monitor mode, the coded Dolby signal can be monitored via the monitor speakers 1 and 2 (left and right front). Thus, the signal compatibility to reproduction equipment without surround decoder can be checked.

In the MONO CENTRE and MONO L+R monitor modes, the coded signal is mixed to a mono signal and routed to the loudspeakers 3 (centre front), or 1 and 2 (left and right front), respectively.

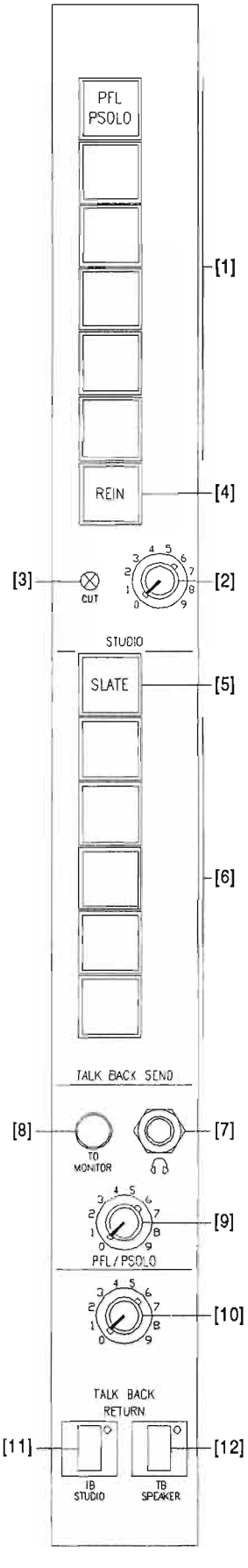
When selecting the DOLBY 4-2-4 monitor mode, the signal runs through the complete encoder/decoder path. At the loudspeakers 1, 2, 3, and 4 (left, centre, right front, and surround) the final result of a Dolby Surround production can be monitored.

When selecting TV 3-2 monitor mode, the decoded Dolby Surround signal is routed to the front loudspeakers 1, 2 and 3; the surround channel 4 is routed to both TV rear channels (5 and 6).

**TV 3-2:**

The use and the sort of the TV 3-2 encoder and decoder are not finally defined yet, therefor the final attachment can not yet be done. Nevertheless, all inputs and outputs are provided to connect this equipment. All the necessary switching and configuration commands can be added later with a software update.

## 2.8 Studio Monitor/Talkback unit 1.912.326




### Studio Monitor

[1] **Source selector**
Mutually releasing pushbuttons for the selection from 6 different sources to be fed to the studio.

[2] **STUDIO**
Studio volume control; the volume can also be controlled with an external control signal thanks to the use of a VCA.

[3] **CUT**
If microphone faders are opened, the studio monitors are muted, and CUT is illuminated. The separate headphones output remains active. If playback via the studio monitors should be desired, the muting function can be cancelled with the latching pushbutton REIN [4].

[4] **REIN**
Latching pushbutton to cancel the muting of the sutdio monitors (if a microphone fader is opened).

### Talkback SEND

[5] **SLATE**
Momentary pushbutton to connect the talk back signal to the master busses.

[6] **Communication keys**
Five additional momentary pushbuttons for communication to talk back stations. The answering signal is reproduced by the TB/PFL speaker.

### PFL/P.SOLO

[7] 🎧
Headphones output, 6.3 mm Jack socket, output impedance 200 Ω. For pre-fader listening (PFL) or monitoring after the PAN potentiometer (P.SOLO). If a headphone is plugged in, the built-in PFL speaker is disabled.

[8] **TO MONITOR**
As soon as one or more PFL or P.SOLO buttons are pressed, the monitor signal is automatically disabled, and the selected PFL or P.SOLO signal is connected to the monitor speakers. In this way it is possible to monitor any group of input channels with the true stereo balance as adjusted with the PAN potentiometer. A recording or broadcast in progress will not be affected.

[9] **PFL/P.SOLO**
Volume control for the PFL speaker or the PFL/P.SOLO headphones.

### Talkback RETURN

**[10] TALK BACK RETURN** Volume control for the talk back signal from the external talk back station.

**[11] TB STUDIO** Momentary pushbutton for talk back via the talk back microphone and the studio monitor speakers.

**[12] TB SPEAKER** Momentary pushbutton for talk back via the talk back microphone and an external talk back station (e.g. in the announcer's or in the conductor's desk).

## 2.9 Signalling

The 980 mixing console is equipped with two signalling circuits:

- An optical studio signalling circuit, and
- a fader start system for remote control of reproduction equipment.

**Studio signalling**

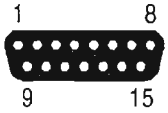
The studio signalling system consists of a signalling field with:

- Indication for "STUDIO ON" (red light),
- Indication for "READY" (green light),
- Return command for "ON AIR",
- CALL key for optical connection between speaker and control room.

**Control logic:** The READY and STUDIO ON signals can be enabled individually by separate non-locking switches. The STUDIO ON signal is only connected through if the following criteria are satisfied on at least one of the input units:

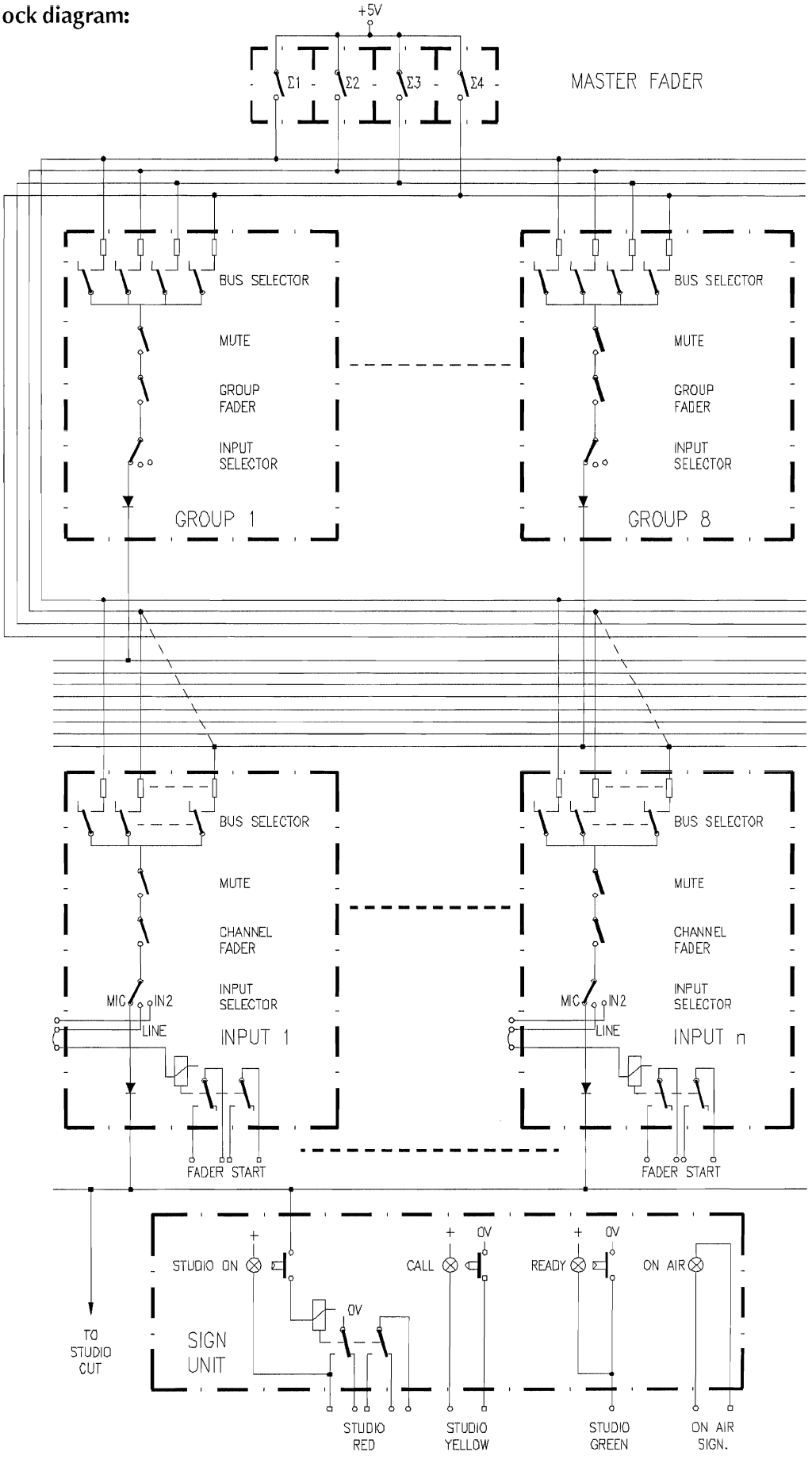
- Input selector must be switched to MIC,
- MIC CUT must be disabled,
- MUTE must be disabled,
- Input fader must be open,
- At least one of the MASTERs must be selected (bus selection), and
- At least one of the MASTER faders must be open.

The relay contacts for the signalling circuit are wired to the 15-pin Sub-D connector "SIGNALLING STUDIO" (female) in the connector panel. The signalling block diagram shows the individual design of the studio signalling system; the position of the "SIGNALLING STUDIO" connector is given there, too.
The studio signalling system is operated with –24 $V_{DC}$. The built-in supply can deliver up to 500 mA.




| Pin | Signal | Function |
|---|---|---|
| 1 | B-ON AIR | Lamp ON AIR |
| 2 | B-ON AIR | Lamp ON AIR |
| 3 | S+B READY | Switch + lamp READY |
| 4 | S-STUDIO ON n.o. | Switch STUDIO ON, norm. open contact |
| 5 | S-STUDIO ON n.c. | Switch STUDIO ON, norm. closed contact |
| 6 | S-CALL | Switch CALL |
| 7 | B-CALL | Lamp CALL |
| 8 | 0V SIGN. | Signalling ground |
| 9 | S-STUDIO ON 0 | Switch STUDIO ON, center |
| 10 | S-STUDIO ON n.c. | Switch STUDIO ON, norm. closed contact |
| 11 | S-STUDIO ON n.o. | Switch STUDIO ON, norm. open contact |
| 12 | not used | |
| 13 | not used | |
| 14 | not used | |
| 15 | –24V SIGN. | Supply –24 VDC, 0.5 A max. |

**Signalling block diagram:**



**Fader start signalling:** Two separate relay contacts are available per channel for audio playback units. Depending on the position of the input selector, the playback unit for the LINE or the IN2 input is controlled individually.

**Control logic:** A remote signal is switched-through only if the following conditions are met:

- INPUT SEL to "LINE", if the line input is connected to the relay, or INPUT SEL to "IN2", if the IN2 input is connected to the relay,
- MUTE must be disabled,
- The input fader must be open,
- At least one of the MASTERs must be selected (bus selection), and
- At least one of the MASTER faders must be open.

## 2.10 Power supply, system start

### 2.10.1 Supply concept

**Primary power circuits**

- Power transformer block:
  The power transformer block is switched on and off with its power switch. It is equipped with an RF filter and an overcurrent trip. The line voltage selector and the primary fuse (F6) are located on the front.

- Standby supply block:
  A separate block supplies the standby voltage. It feeds the numerous memory modules of the console control when the power supply block is switched off. The standby supply block can be connected to any primary voltage of 100...240 $V_{AC}$ without adjustment. It is unswitched and should be connected permanently to the AC power source. Switching off the main power to the entire audio control room should not affect the AC power source of the standby supply.
  *The standby voltage must be available for switching on the power transformer block!*

**Mains connections**

- 3-pronged appliance inlet IEC 320/C20 (250 V/16 A) for the power transformer block.
- 3-pronged appliance inlet IEC 320/C14 (250 V/10 A) for the standby supply block.

**Secondary power circuits**

- The power transformer block unit produces the following voltages:
  ±15 $V_{DC}$ regulated,
  48 $V_{DC}$ regulated (phantom supply; the phantom supply voltage can also be factory set to 12 or 24 $V_{DC}$),
  +25 $V_{DC}$ for supplying the voltage converters in the console,
  –6 $V_{DC}$,
  –24 $V_{DC}$.

- The standby voltage is +5 $V_{DC}$ regulated. It is used for preserving the memory data of the mixing console control, and for supplying the alarm and control circuits of the power supply unit.
  If the standby voltage fails, the memories are supplied by rechargeable batteries, and, for a short period, by two batteries in the power supply unit, if the former should be discharged.

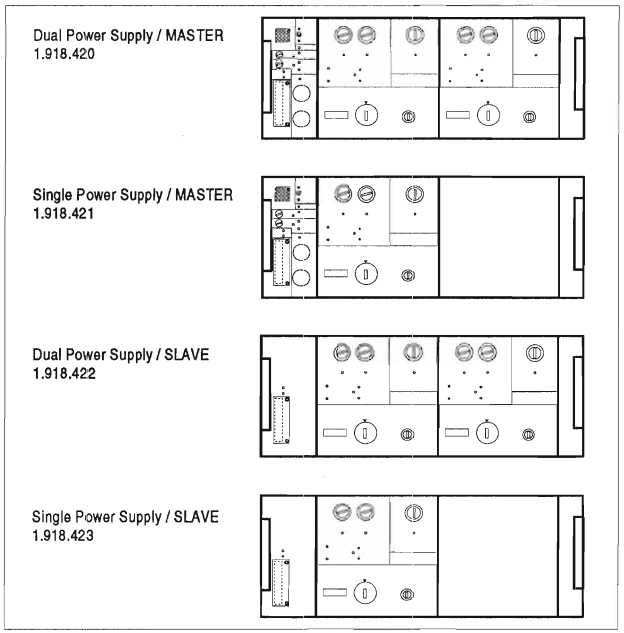
- The voltage converters in the console (EU standard PCB 1.915.111) generate the following voltages from the +25 $V_{DC}$:
  +5 $V_{DC}$ regulated, for the logic circuits and the control system,
  approx. +4 $V_{DC}$ for the LED supply, and
  –24 $V_{DC}$ for signalling.





**Modular system**

Several power supply versions are available with which the different power requirements of the various mixing consoles can be satisfied. Each power supply can be equipped with one or two transformers for the AC power supply. On the left-hand side there is room for the standby power supply and the monitoring logic. On the far right there is a small space for up to two additional regulated voltages.
For each console at least one MASTER unit is used. If the mixing console draws more power, additional SLAVE units are configured which are coupled to the master unit via a control line.
The number of EU-standard converter boards in the mixing console can be matched to the required power.

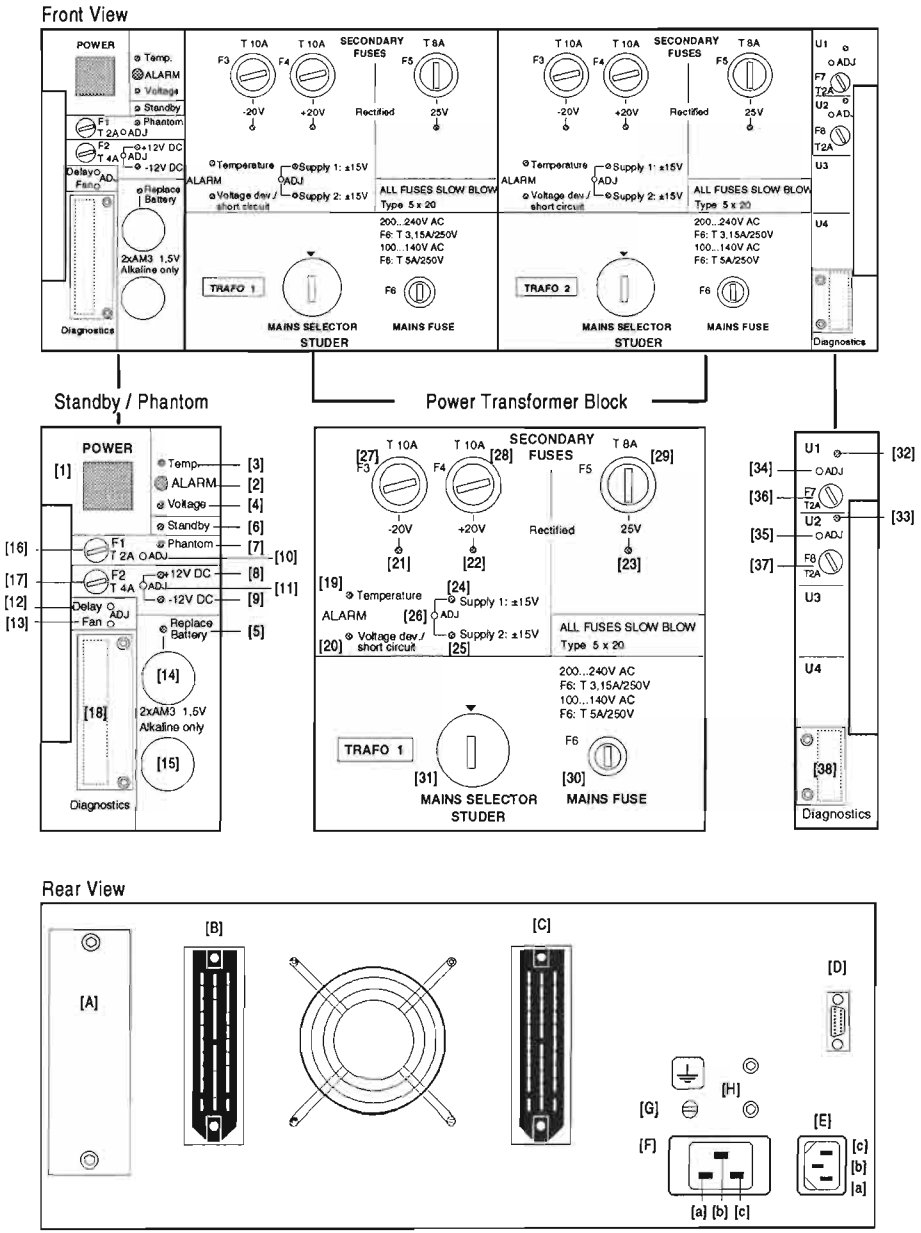



The four basic versions of the modular power supply concept.

**Backup supply unit**

If maximum reliability is required, a second power supply unit can be connected and operated in parallel. If a fault occurs in the active unit, the backup unit is automatically activated without significant voltage drop. The reliability of the converters can be enhanced in the same manner.
The alarm system monitors the power supply as well as the backup units.

## 2.10.2 Operator controls




[1] **POWER** Switches the power on and off. The POWER button indicates the operating state (On/Off) of the power supply unit: on or flashing: ON / dark: OFF. When the button is flashing the mixing console can be switched on with the STUDIO MASTER switch (see 2.10.3). In the event of an alarm the POWER key flashes alternatingly with the large ALARM LED [2]. In battery standby mode this key remains dark.

[2] **ALARM** If any fault exists in the power supply itself, this LED flashes slowly (2 Hz). During normal operation this LED remains dark (see 2.10.4).

[3] **Temp.** This LED flashes if the temperature of the ±12 V, +5 V standby, or phantom supply heat sinks exceeds 120 °C.

[4] **Voltage** This LED flashes if an overvoltage occurs on the phantom or the ±12 V supply.

[5] **Replace Battery** If the battery voltage drops too low, this LED starts to flash signalling that the batteries should be replaced.

[6] **Standby** Function indicator of the standby power supply. This LED is on when the +5 V are available.

[7] **Phantom** Function indicator of the phantom power supply. Depending on the factory setting, the phantom voltage is +12, +24, or +48 V (default: +48 V).

[8] **+12 $V_{DC}$** Not used.

[9] **–12 $V_{DC}$** Not used.

[10] **ADJ** (Phantom) Trimmer potentiometer for fine-adjusting the phantom voltage (12/24/48 V); changeover in the power supply unit by jumper settings and solder straps on the transformer, and by replacing resistors on the connection PCB, refer to 2.16.1.

[11] **ADJ** (±12 $V_{DC}$) Not used.

[12] **Delay** Trimmer potentiometer for adjusting the power-on delay, refer to 2.16.1.

[13] **Fan** Trimmer potentiometer for adjusting the temperature at which the ventilator switches to maximum power, refer to 2.16.1.

[14,15] **Batteries** Two 1.5 V/AM3 alkaline batteries preserve the memory content of the mixing console control in the event of a standby power failure. The battery condition is monitored and the low condition is signalled by LED [5]. Use alkaline batteries only! In case of standby power failure the data are protected for 2 days.

[16] **F1** Fuse for the phantom supply (T 2 A L 250 V (slow)).

[17] **F2** Fuse for the +12 V supply (T 4 A L 250 V (slow)).

[18] **Diagnostics** Behind this cover plate there is a 40-pin connector for plugging in the diagnose board 1.918.080 (see 2.10.6).

**[19] Temperature**
This LED flashes if the temperature of the heat sink or the transformer exceeds 120 °C.

**[20] Voltage dev./short circuit**
This LED flashes if there is an overvoltage or short circuit in one of the ±15 V supplies.

**[21] –20 V**
This LED is on as long as the –20 V supply (unregulated) is available (the –15 V are generated from this voltage).

**[22] +20 V**
This LED is on as long as the +20 V supply (unregulated) is available (the +15 V are generated from this voltage).

**[23] 25 V**
This LED is on as long as the 25 V supply for the converters is available (without load this voltage can rise up to 30 V).

**[24] Supply 1: ±15 V**
This LED is on as long as the first ±15 V supply is available.

**[25] Supply 2: ±15 V**
This LED is on as long as the second ±15 V supply is available.

**[26] ADJ.**
Trimmer potentiometer for adjusting the first and second ±15 V supply voltages simultaneously.

**[27] F3**
Secondary fuse for the first and second –15 V supplies (T 10 A L 250 V (slow)).

**[28] F4**
Secondary fuse for the first and second +15 V supplies (T 10 A L 250 V (slow)).

**[29] F5**
Secondary fuse for the 25 V supply (T 8 A L 250 V (slow)).

**[30] MAINS FUSE, F6**

Primary fuse for a transformer block. The fuse rating must be matched to the line voltage as indicated above the fuse holder.

**[31] MAINS SELECTOR**

Line voltage selector.
Before changing the selector setting, the unit must be completely separated from the mains!

**[32] U1**
This LED is on as long as the –24 V FET supply is available.

**[33] U2**
This LED is on as long as the –6 V supply is available.

**[34] U1 ADJ**
Trimmer potentiometer for adjusting the –24 V FET supply voltage.

**[35] U2 ADJ**
Trimmer potentiometer for adjusting the –6 V supply voltage.

**[36] F7**
Fuse for the –24 V FET supply voltage (T 2 A L 250 V (slow)).

**[37] F8**
Fuse for the –6 V supply voltage (T 2 A L 250 V (slow)).

**[38] Diagnostics**
Behind this cover there is a 16-pin connector for plugging in the diagnose board 1.918.080 . The voltages and currents related to U1 and U2 can then be measured on the diagnose board (see 2.10.6).

**Connector panel (rear):**

[A] Spare opening.

[B] 30-pin connector (IEC 130.6) with secondary voltages.

[C] 30-pin connector (IEC 130.6) with secondary voltages.

[D] 15-pin Sub-D-type connector for control lines.

[E] 3-pronged appliance inlet IEC 320/C14 (250 V/10 A) for the standby supply block (see 2.10.3).

- [a] Live
- [b] Protective ground
- [c] Neutral

[F] 3-pronged appliance inlet IEC 320/C20 (250 V/16 A) for the power transformer block (see 2.10.3).

- [a] Live
- [b] Protective ground
- [c] Neutral

[G] Ground terminal with clamping screw.

[H]  Internal protective ground to the power supply. These screws must never be unfastened! Use terminal [G] for the studio ground.

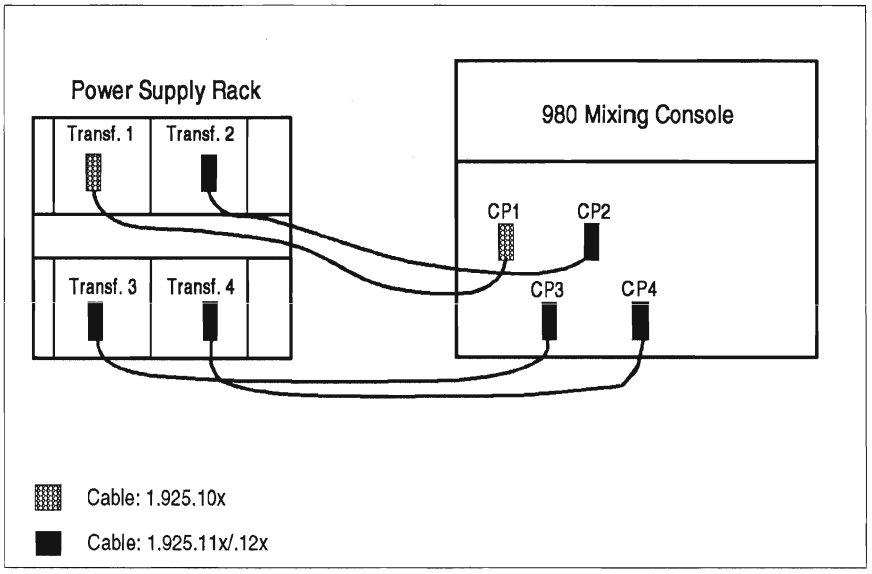
## 2.10.3 Supply connections

**Configurations:**

The cabling arrangement depends on which of the possible configurations is selected:

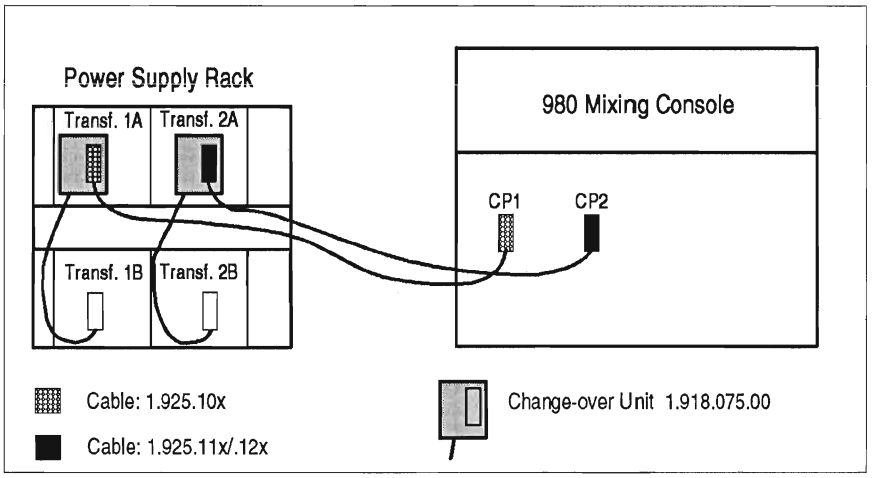
1. Each transformer block is directly connected to the console.
2. Double supply with Change-Over Units.

**Direct connection:**




Each transformer block is directly connected to a large console

**Double supply:**




Redundant supply with automatic change-over

**Ground connection:**

The wiring of the studio ground depends on the specific customer requirements.

**AC power connections:**



Before connecting the power transformer block's appliance inlet [F] (IEC 320/C20) to the mains, make sure that the line voltage selector setting and the fuse rating are correct. The line voltage selector [31] and the fuse F6 [30] are accessible from the front. The primary fuse F6 should be rated as follows:

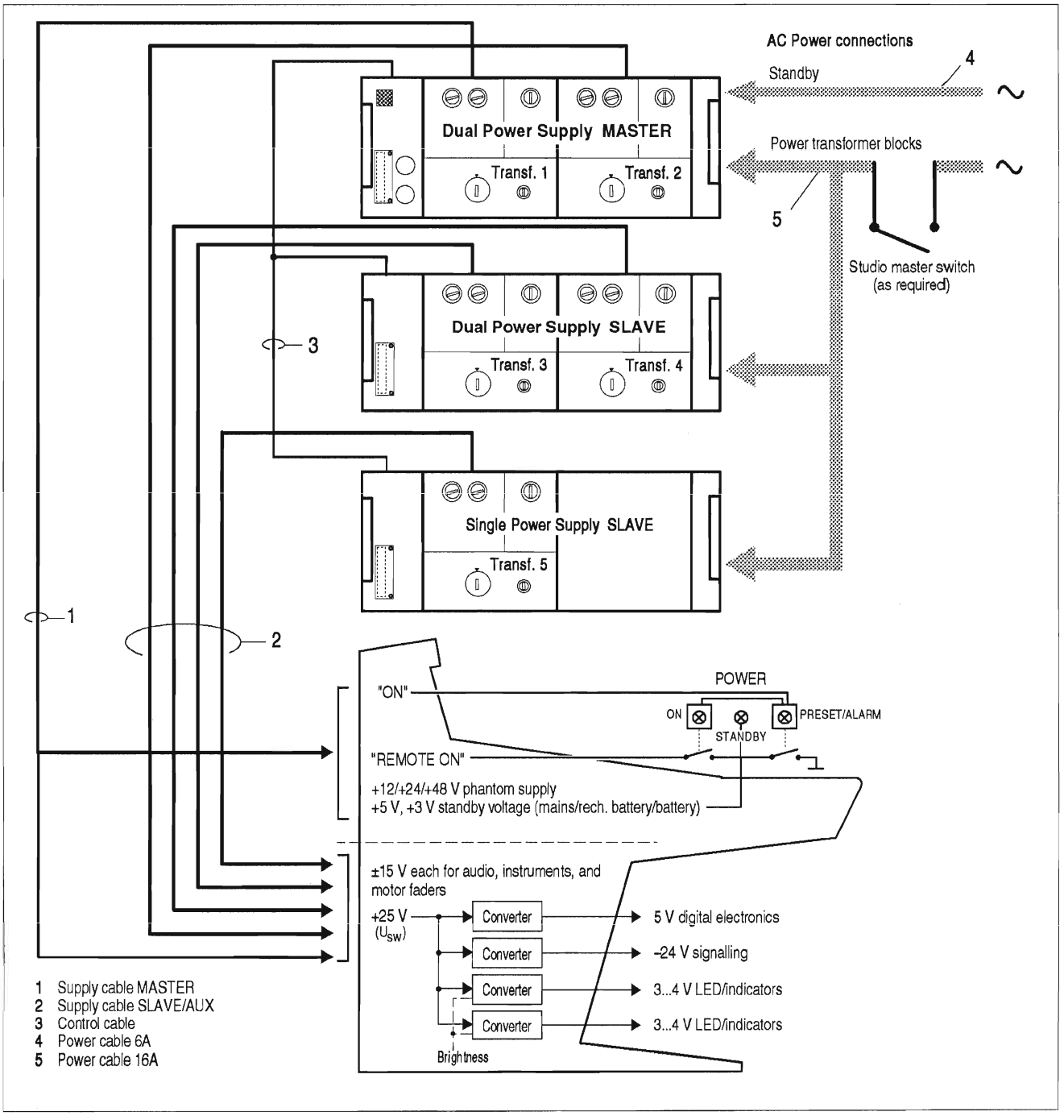
100...140 $V_{AC}$: T 5.0 A L 250 V (slow blow)

200...240 $V_{AC}$: T 3.15 A L 250 V (slow blow)

The standby supply block's appliance inlet [E] (IEC 320/C14) should be connected permanently to the AC power source. It can be connected to any 100...240 $V_{AC}$ outlet without adjustment. Protection is provided on the secondary side by a PTC resistor (0.3A).

**Cabling:**

The secondary voltages are taken individually from each transformer through a multi-conductor cable to the console. The individual power supply units are interconnected by a control cable. The following diagram illustrates the cabling for a large system. Please note the different primary connection of the standby and the main power blocks.



## Cables

**Mains cables:**

**16 A:** 3 × 2.5 mm²; SEV type 12 connector; 3m **Order No. 10.223.001.13**
3 × 2.5 mm²; without connector; 3m **Order No. 10.223.001.03**

**6 A:** 3 × 0.75 mm²; SEV type 12 connector; 2.5m **Order No. 10.223.001.11**
3 × 0.75 mm²; without connector; 2.5m **Order No. 10.223.001.01**

**Connection cables:**

For connecting the power supplies to the console, two different connecting cables are used.

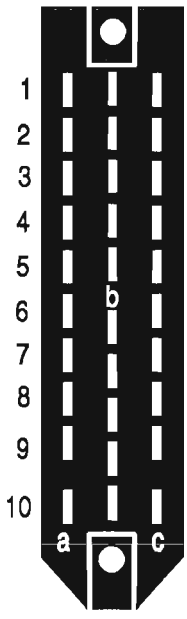
**Master cable:** Connection from the master power supply transformer block 1 to the mixing console. In addition to the ±15 V, this cable carries the phantom and standby voltages as well as control lines.
**Order No. 1.925.10x.00**

**Slave/AUX cable:** This cable is used for connecting each additional transformer block to the console. **Order No. 1.925.12x.00**

The cable length is indicated by one digit in the part number. For the cables described above, the wildcard "**x**" is to be substituted by a digit 0...9 indicating the length according to the table below:

| Value "x" | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|
| Length (in m) | 1 | 1.5 | 2.5 | 5 | 7.5 | 10 | 12.5 | 15 | 17.5 | 20.0 |

**Pin assignments:**



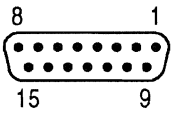

| Master connecting cable 1.925.10x | |
|---|---|
| Pin | Signal |
| 1 a | LED ON |
| 2 a | Remote ON |
| 4 a | n.c. |
| 10 a | –Usw |
| 1 b | +5 V St.By |
| 2 b | Phantom |
| 3 b | n.c. |
| 4 b | n.c. |
| 5 c | 0 V (Audio) |
| 6 c | +15 V II |
| 7 c | –15 V II |
| 8 c | –15 V I |
| 9 c | +15 V I |
| 10 c | +Usw |

| Slave/Aux connecting cable 1.925.12x | |
|---|---|
| Pin | Signal |
| 8 a | –15 V I |
| 9 a | +15 V I |
| 10 a | –Usw |
| 8 b | 0 V (Gnd) |
| 1 c | 0 V (–6 V) |
| 2 c | –6 V |
| 3 c | 0 V (–24 V FET) |
| 4 c | –24 V FET |
| 5 c | 0 V (Audio) |
| 6 c | +15 V II |
| 7 c | –15 V II |
| 8 c | –15 V I |
| 9 c | +15 V I |
| 10 c | +Usw |

**Note:** Cables *of the same type* can be connected in series to form an extension.

**Control cable:** 15-pin Sub-D-type cable for interconnecting the power supply units. This cable is manufactured according to the customer's specs.

**Pin assignment:**




| Pin | Signal |
|---|---|
| 1 | Remote ON |
| 2 | 0 V * |
| 3 | U Stand by |
| 4 | 5 V * |
| 5 | ¬ Rest ON * |
| 6 | n.c. |
| 7 | n.c. |
| 8 | n.c. |
| 9 | ¬ ON |
| 10 | BLINK * |
| 11 | ON |
| 12 | ¬ ALARM * |
| 13 | n.c. |
| 14 | n.c. |
| 15 | n.c. |

* connected to all supply units in parallel

## 2.10.4 Function monitoring and alarm system

**General**

Comprehensive automatic checks have been provided to ensure utmost reliability in the power supply. The LEDs signal the correct operation of the monitored functions. A networked alarm system reports system faults to the master power supply and to the mixing console.

**Networking**

With the networked alarm system it is possible to diagnose a fault in:

- Master unit(s)
- Slave unit(s)
- Standby supply block(s)
- Standby batteries
- Backup power supply unit(s)
  *Alarm: flashing frequency 2 Hz*
- Converters (in the console)
- Backup converters (console)
  *Alarm: flashing frequency 5 Hz*

**Pilot lamps**

When the equipment functions correctly, all yellow LEDs should be on. They turn dark as soon as the measured output voltages are outside the corresponding tolerance range. In this way the function can be monitored also visually.

**Fault indication**

Only red LEDs are used for fault indication. They provide information on the nature of the fault and identify the affected transformer block.

**Function monitoring**

Self-diagnosis of the power supply is achieved by monitoring and displaying its functions. The values of the following parameters are monitored and will trigger an alarm if they leave the tolerance band.

**Temperature**

If the temperature of a transformer or a heat sink exceeds 120 °C, the affected transformer block switches off. The following indicators are activated:

- The POWER button [1] and the ALARM LED [2] flash slowly (2 Hz).
- The corresponding red LED Temp. [3] or Temperature [19] flashes.

**Undervoltage**

If an undervoltage occurs on an output, the corresponding LED switches off.

- The POWER button [1] and the ALARM LED [2] flash slowly (2 Hz).
- The yellow LED of the corresponding voltage is off.

**Overvoltage**

If an overvoltage is present on an output, the monitoring system switches the corresponding transformer block off.

- The POWER button [1] and the ALARM LED [2] flash slowly (2 Hz).
- The corresponding red LED Voltage [4] or Voltage dev./short circuit [20] flashes.

**Short circuit**

(secondary)
If the short circuit on one of the ±15 V outputs exceeds about one second, the corresponding transformer block is switched off.

- The POWER button [1] and the ALARM LED [2] flash slowly (2 Hz).
- The corresponding red LED Voltage dev./short circuit [20] flashes.

**Alarm system**

The alarm system basically fulfills two functions:

1. Signalling of missing or low voltages by flashing LEDs.
2. Powering off the affected transformer block if there is a possibility that the electronics of the power supply unit or the mixing console could suffer damage. This is the case under the following conditions:

- Power transformer temperature exceeds 120 °C
- Heat sink temperature exceeds 120 °C
- Short circuit on a ±15 V output
- Overvoltage on a ±15 V output
- Overvoltage on the output of the phantom supply

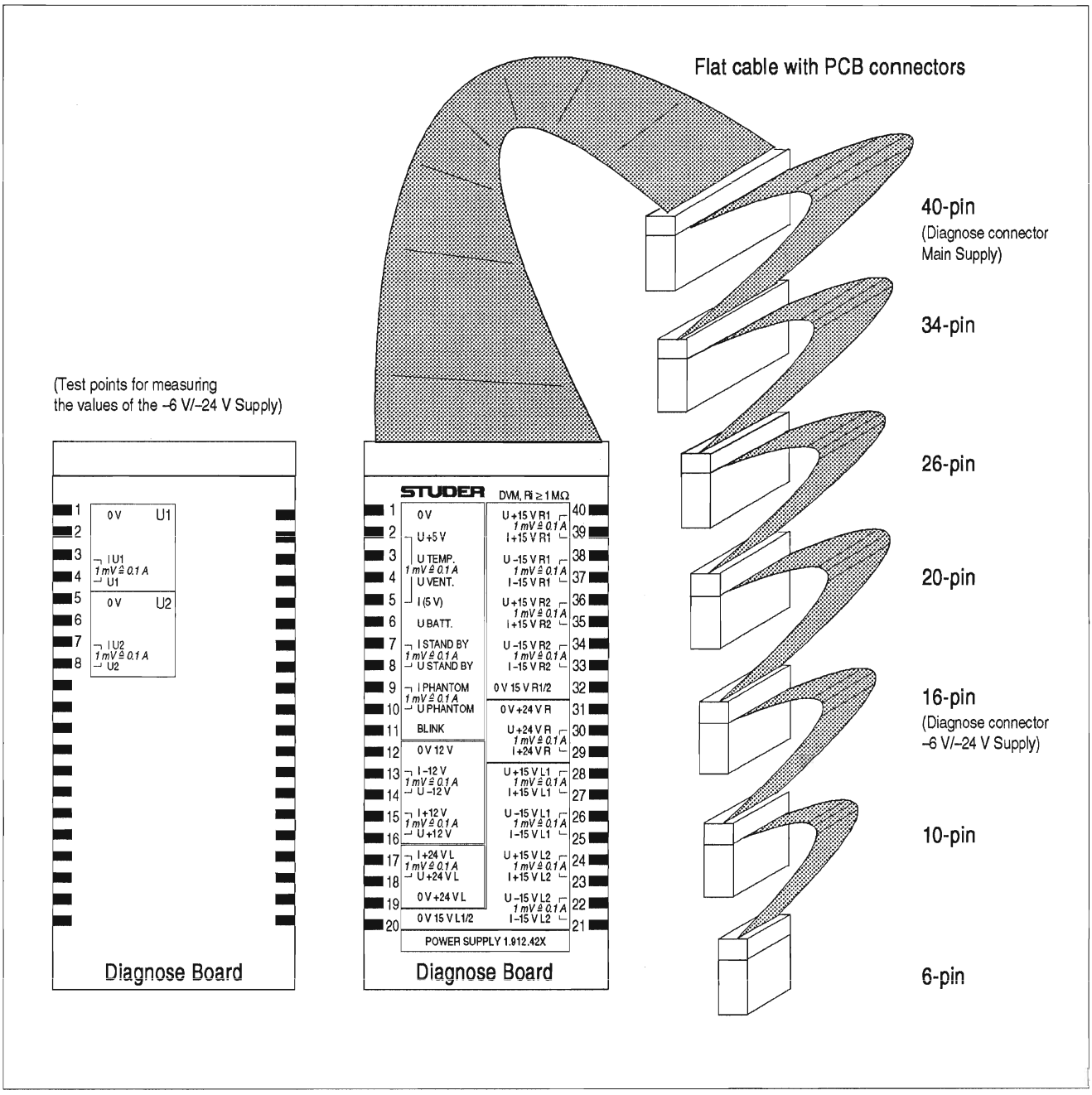
**Notes:** If the left-hand transformer block of the MASTER power supply switches off, all associated slave transformers will also be switched off. The master supply provides e.g. the phantom supply. Continued operation would generally make little sense.
If the function monitoring has switched off a transformer block, *the power supply must be switched off and on again after the fault has been remedied.* It does not automatically power on after the fault has been cleared!

**Power-on:** Flashing of any LEDs for a few seconds after power-on is normal because the voltage is built up slowly, therefore undervoltage is initially signalled initially.

**Additional alarms:** The POWER ALARM/FAIL 4 Board installed in the EU card rack monitors the outputs of the 5 V converters as well as the –6 V and the –24 V FET voltages.
Over- and undervoltage conditions will be indicated by flashing LEDs as well.

## 2.10.6 Diagnose connector

The principal voltages and currents are terminated on a 40-pin diagnose connector. The *Diagnose Board 1.918.080* is available as an accessory on which these variables can be conveniently measured. 6-pin to 40-pin card edge connectors are mounted on the cascade type cable harness so that the latter can be used universally. When this cable is connected to a circuit board, the signals can be easily tapped on the numbered measuring pins.

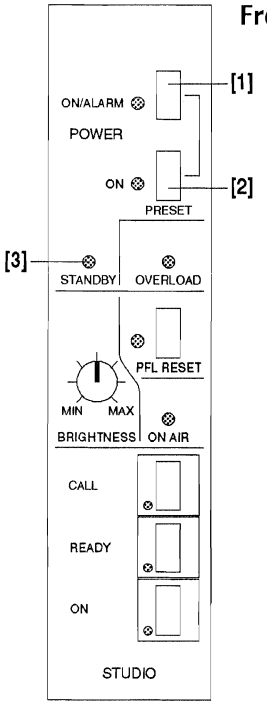



**Notes:** The test points are de-coupled inside the power supply via 1 kΩ resistors (short-circuit protection).
For auxiliary purposes the +5 V can be tapped between pins 1 and 2 (max. current: 10 mA).
Use a voltmeter with Ri ≥1 MΩ

## 2.10.7 System start

**Power-on**

The standby supply block is permanently connected to the mains. It supplies the voltage with which the power transformer block is switched on and off.
The power supply can be switched on either from the master power supply or from the mixing console.




**From console:**

The keys and indicators of the power supply are located on the Sign./ Indication Unit on the display panel. The ON/ALARM and PRESET keys must be pressed simultaneously for switching the system on or off.

[1] **ON/ALARM**
Key to be used together with the PRESET key.
The LED next to this key indicates that the mixing console is energized. As an alarm indicator it signals a fault in one of the power supply units by flashing slowly (2 Hz). Rapid flashing (5 Hz) signals a fault in one of the EU-size converter boards in the mixing console.

[2] **PRESET**
Key to be used together with the ON/ALARM key.
In normal operation, the ON LED next to this key is illuminated.

[3] **STANDBY**
This yellow LED indicates that the standby supply block functions correctly.

**At the power supply:**

The power supply can be switched on or off with the POWER key of the master power supply.

**With studio master switch:**

The power supply can also be switched on and off with a studio master switch. The on/off state remains stored.

Switching states of the POWER key on the power supply unit:

| | Studio master switch | |
|---|---|---|
| Power supply | ON | OFF |
| ON | illuminated | flashing |
| OFF | dark | dark |

**Power-on delay**

In a system with multiple power supply units, a power inrush overload could occur when power is switched on. To prevent this, a power-on delay circuit has been installed (refer to section 2.16).

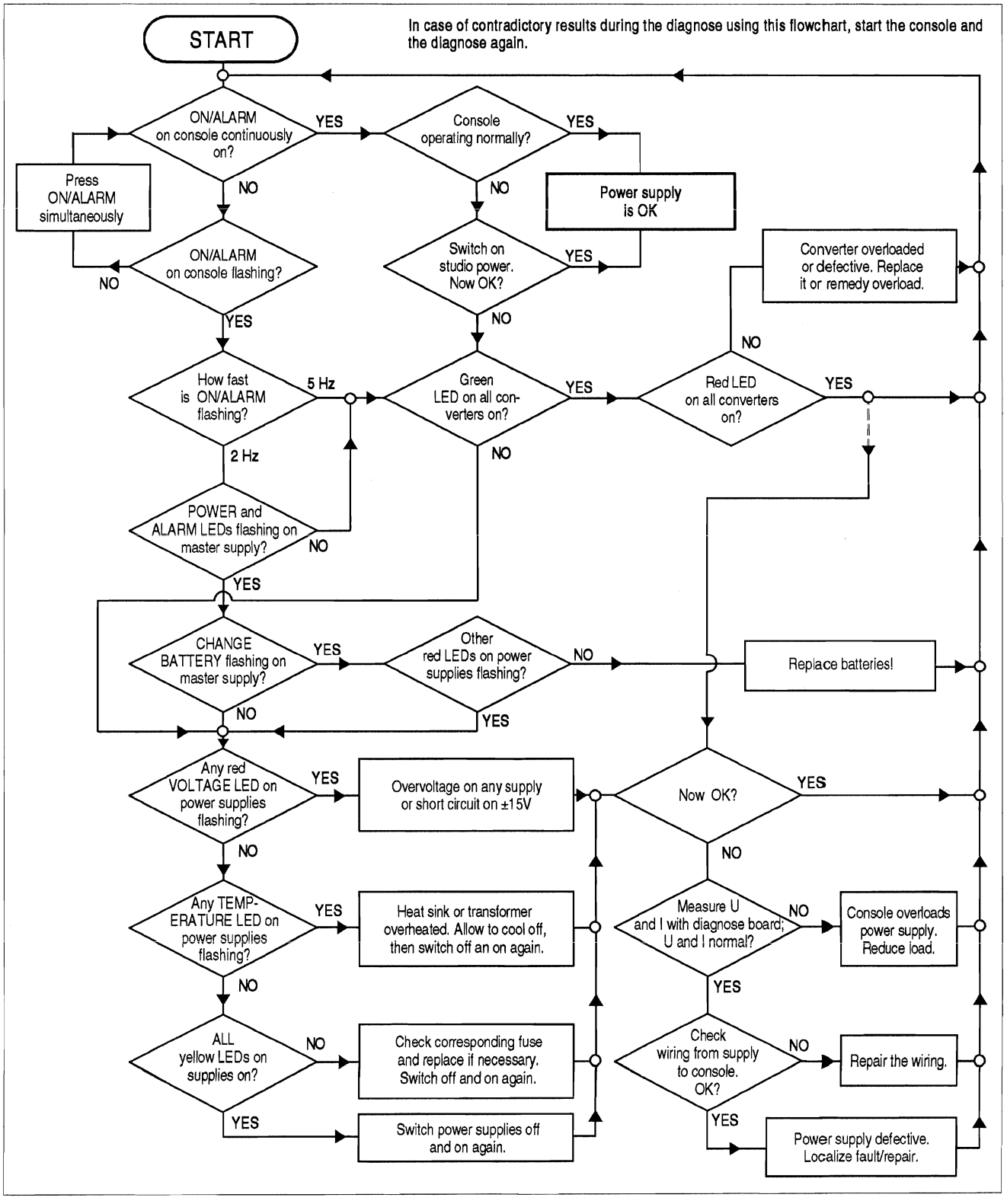
**Power-on after alarm**

The power relays switch the supply voltages of the transformers and are integrated into the alarm system: If a malfunction occurs, the power transformer block is switched off if damage to the equipment could occur. *After the fault has been remedied the mixing console must be switched off and on again.*

### Dual power supply with changeover unit

If a dual power supply is used, the master and the backup master supplies must be in the same state (ON or OFF). If this is not the case one system is always disabled. POWER-ON at the console controls both master supplies simultaneously.

## 2.10.8 Troubleshooting in alarm state

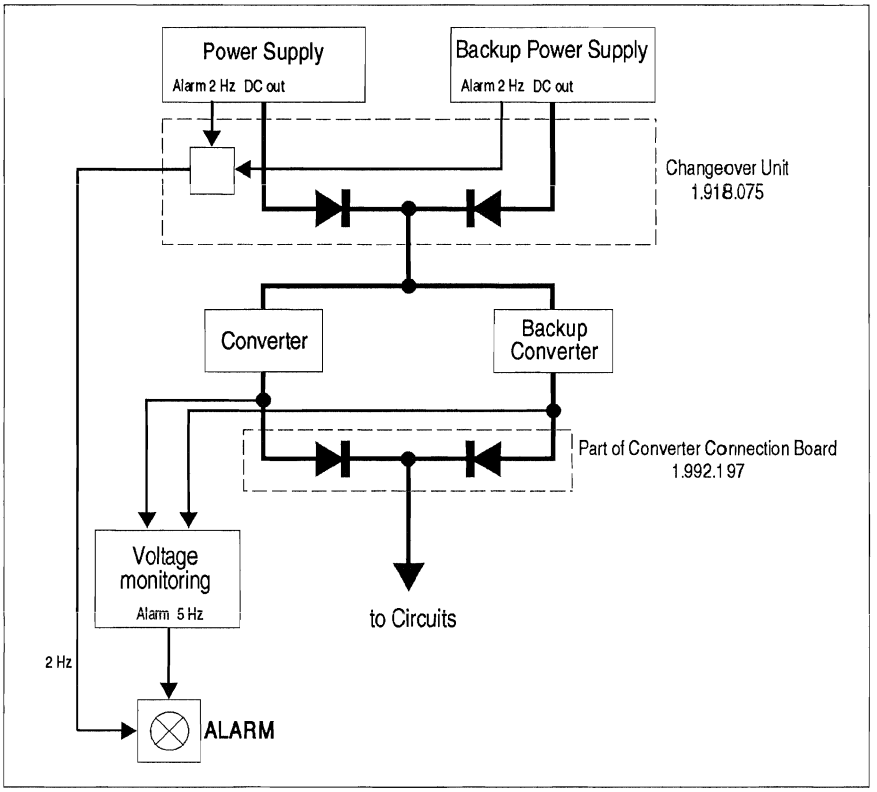


## 2.10.9 Dual supply with change-over mode

**General**

In applications where maximum reliability is required, possible defects in the power supply should also be taken into consideration. By installing redundant components it is possible to compensate the failure of one unit without causing an equipment malfunction. Two different configurations are possible:

- Spare circuit boards are installed for all EU standard converter PCBs.
- The entire power-pack system as well as the converter boards are redundant.




Dual power supply with redundant power-packs and converter boards. The alarm system also monitors the correct function of the backup units.

**Converter change-over**

A redundant board is installed for each converter board. These two boards are interconnected on a bus via diodes in such a way that, if one of the boards fails, its function is taken over by the other board without interruption. The output voltages are monitored on a separate module. If a failure should occur, an alarm is signalled by flashing of the ON/ALARM LED (5 Hz).

Retrofitting with backup converters is very difficult because the wiring of the complete power supply system must be changed.

**Power supply change-over**

The entire power supply including master and slave equipment exists twice. The output voltages of each pair of main and backup supply are wired to the mixing console via change-over units. If a supply voltage fails, this change-over unit switches automatically to the backup transformer without interruption. The change-over unit is plugged into the 30-pin socket of the transformer block (see 2.10.3).
Retrofitting with plug-in change-over units is possible without difficulty.

Required materials:

- For each power supply: A backup unit of the same type
- For each existing supply cable: 1 change-over unit 1.918.075 .

**Alarm system, change-over mode**

The alarm system is designed for simultaneous monitoring of the power supply and the backup system. Even if the backup power supplies are not under load, all variables captured by the alarm system are monitored. The availability of the backup system is always monitored *as long as both power supplies are switched on.*

## 2.11 Alignment, general information

- The mixing console should be aligned only when it has reached its operating temperature.
- For measuring the levels on the line outputs they must not be loaded with less than 10 kΩ.
- Work should be performed in the indicated sequence only, because several of the steps are prerequisites for subsequent steps.



- All fixing screws of the modules must be firmly tightened. Solid ground connections and the specified EMC values are only achievable if all modules are correctly inserted and fastened.

### 2.11.1 Level definitions

**Level specification:** The nominal level specified in *dBu* is based on a fixed voltage as reference level:

**0 dBu ≙ 0,775 $V_{rms}$**

**Nominal level in dBu:**

**Nominal level = level at full amplitude**

The nominal level corresponds to the level at full amplitude. The terms nominal level, studio level, and line level are used as synonyms. The nominal level is used as the 0 dB value for all relative level specifications.

**Output level:**

**0 dB PPM = nominal level**
**0 VU = nominal level minus 6 dB***

* 6 dB corresponds to a commonly used lead of the VU indicator.

**PPM consoles** Peak Program Meters as quasi-peak-indicating instruments indicate the level of a sine wave as RMS value. A signal with nominal level results in an indication of 0 dB.

**VU consoles** For a continuous tone, a VU instrument indicates a value that is too high by the amount of the lead. For a 0 VU reading the level of the test signal must be reduced by the lead value.
VU consoles are frequently set to a nominal value of +10 dBu, i.e., with a 6 dB lead of the VU meter a level of +4 dBu is indicated as 0 VU.

## 2.11.2 Voltage level ↔ Decibel

| U1/U2 | µV ---------- dBu<br>mV ---------- dBu<br>V ----- dBu | | | | U1/U2 | µV ---------- dBu<br>mV ---------- dBu<br>V ----- dBu | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1.00 | 0.775 | 0 | –60 | –120 | 31.6 | 24.5 | +30 | –30 | –90 |
| 1.12 | 0.869 | +1 | –59 | –119 | 35.5 | 27.5 | +31 | –29 | –89 |
| 1.26 | 0.975 | +2 | –58 | –118 | 39.8 | 30.8 | +32 | –28 | –88 |
| 1.41 | 1.09 | +3 | –57 | –117 | 44.7 | 34.6 | +33 | –27 | –87 |
| 1.59 | 1.23 | +4 | –56 | –116 | 50.1 | 38.8 | +34 | –26 | –86 |
| 1.78 | 1.38 | +5 | –55 | –115 | 56.2 | 43.6 | +35 | –25 | –85 |
| 2.00 | 1.55 | +6 | –54 | –114 | 63.1 | 48.9 | +36 | –24 | –84 |
| 2.24 | 1.73 | +7 | –53 | –113 | 70.8 | 54.8 | +37 | –23 | –83 |
| 2.51 | 1.95 | +8 | –52 | –112 | 79.4 | 61.5 | +38 | –22 | –82 |
| 2.82 | 2.18 | +9 | –51 | –111 | 89.1 | 69.0 | +39 | –21 | –81 |
| 3.16 | 2.45 | +10 | –50 | –110 | 100 | 77.5 | +40 | –20 | –80 |
| 3.55 | 2.75 | +11 | –49 | –109 | 112 | 86.9 | +41 | –19 | –79 |
| 3.98 | 3.08 | +12 | –48 | –108 | 126 | 97.5 | +42 | –18 | –78 |
| 4.47 | 3.46 | +13 | –47 | –107 | 141 | 109 | +43 | –17 | –77 |
| 5.01 | 3.88 | +14 | –46 | –106 | 159 | 123 | +44 | –16 | –76 |
| 5.62 | 4.36 | +15 | –45 | –105 | 178 | 138 | +45 | –15 | –75 |
| 6.31 | 4.89 | +16 | –44 | –104 | 200 | 155 | +46 | –14 | –74 |
| 7.08 | 5.48 | +17 | –43 | –103 | 224 | 173 | +47 | –13 | –73 |
| 7.94 | 6.15 | +18 | –42 | –102 | 251 | 195 | +48 | –12 | –72 |
| 8.91 | 6.90 | +19 | –41 | –101 | 282 | 218 | +49 | –11 | –71 |
| 10.0 | 7.75 | +20 | –40 | –100 | 316 | 245 | +50 | –10 | –70 |
| 11.2 | 8.69 | +21 | –39 | –99 | 355 | 275 | +51 | –9 | –69 |
| 12.6 | 9.75 | +22 | –38 | –98 | 398 | 308 | +52 | –8 | –68 |
| 14.1 | 10.9 | +23 | –37 | –97 | 447 | 346 | +53 | –7 | –67 |
| 15.9 | 12.3 | +24 | –36 | –96 | 501 | 388 | +54 | –6 | –66 |
| 17.8 | 13.8 | +25 | –35 | –95 | 562 | 436 | +55 | –5 | –65 |
| 20.0 | 15.5 | +26 | –34 | –94 | 631 | 489 | +56 | –4 | –64 |
| 22.4 | 17.3 | +27 | –33 | –93 | 708 | 548 | +57 | –3 | –63 |
| 25.1 | 19.5 | +28 | –32 | –92 | 794 | 615 | +58 | –2 | –62 |
| 28.2 | 21.8 | +29 | –31 | –91 | 891 | 690 | +59 | –1 | –61 |
| 31.6 | 24.5 | +30 | –30 | –90 | 1000 | 775 | 60 | 0 | –60 |

## 2.11.3 Alignment necessity

Every mixing console leaving the factory comes with an alignment protocol containing the data of the final inspection, as:

- Alignment to customer-specific nominal level
- Frequency response, harmonic distortion, signal-to-noise ratio, noise voltage, and crosstalk attenuation.

Aligning the console is required after changing the operating conditions (nominal level) or after modifications to the console. The only measure to be performed regularly is demagnitizing the input transformers (see 2.11.8).

**Note:** New (spare) modules are factory-aligned to a nominal level of +6 dBu and can be installed in the console without further measures.

## 2.11.4 Electrostatically sensitive components („ESE")



Many materials of today's working environment are possible sources of static electricity. Under certain conditions persons or objects can be charged to very high voltages – and according to Murphy's Law, these conditions are always met. When discharged, pulses of substantial peak power can occur. If this energy even partly finds its way into an electronic component, the latter can be damaged or destroyed.

**Handling „ESE" assemblies**

Correct handling of electronic assemblies is a very important factor in the area of equipment maintenance; some simple guidelines must be followed:

1. Discharge your body by touching ground potential before touching any electronic assembly.
2. Shake hands with your partner before handing him over an electronic assembly.
3. Only touch a PCB at its edges (or its front panel, if any).
4. Switch off power before removing or inserting an assembly.
5. Stocking and transporting of „ESE" assemblies must be performed only in special packaging material designed for this purpose.
6. Work only with tools suited and tested for „ESE" components.
7. Always wear the grounding wrist-strap when working on electronic assemblies.
8. Keep Styrofoam, PVC foils, plastic bags and similar materials far away from „ESE" assemblies.



**Use of a grounded protection mat *(„ESE" mat)* is strongly recommended** (refer to the next paragraph).

## 2.11.5 Required test equipment and tools

- Audio frequency generator with balanced output,
  output impecance ≤ 200 Ω
  or (if no balanced output is available): additional balancing transformer – also refer to 2.11.7)
- Audio frequency voltmeter with balanced input,
  input impedance ≥ 10 kΩ
  or (if no balanced input is available): additional balancing transformer – also refer to 2.11.7)
- DC voltmeter, $R_i \geq 20$ kΩ/V
- Distortion analyzer
- Two-channel oscilloscope
- Alignment screwdriver, size 2
- Bus adapters for connecting detached modules to the bus; minimum requirement:



1 Bus adapter, 2 × 16-pin Order No. 1.228.331.00
1 Bus adapter, 2 × 32-pin Order No. 1.228.327.82
1 Bus adapter, 3 × 16-pin Order No. 1.228.328.00

- 2 Module extractors Order No. 1.912.000.06 (1 pce.)

**Note:** Bus adapters and module extractors are contained in the accessories set, order no. 1.980.086.00; refer to section 1.2.4 .

- „ESE" protection set (mat 60 × 70 cm, grounding wrist strap, grounding cable) Order No. 20.020.001.44
- Solid insulating mat (e.g. rubber or cardboard), size approx. 25 × 40 cm, as a rest for detached modules which are connected to the bus and are placed onto the operating surface of the console.

## 2.11.6 Measurement basics

**Temperature:** Aligning the console should only be performed when it has reached operating temperature (approx. 15 min after powering on).

**Load:** All outputs and insert points are to be measured without load – i.e. the input impedance of the AF voltmeter must be 10 kΩ at least.

**Test signal:** Sine wave, approx. 1 kHz.

**Level reference:** **All indications in the following instructions are referred to a nominal level of +6 dBu.**
Other nominal levels require changed indications according to the table below:

**Level overview:**

| Nominal level | Line outputs | Indication 0 VU @ (6 dB lead) | Indication 0 dB @ (PPM) |
|---|---|---|---|
| +6 dBu | +6 dBu | +0 dBu | +6 dBu |
| +10 dBu | +10 dBu | +4 dBu | +10 dBu |
| +15 dBu | +15 dBu | +9 dBu | +15 dBu |

**Insert levels:** The level of the balanced insert points is equal to the nominal level.

## 2.11.7 Measuring set-up

**Inserting/removing modules:**

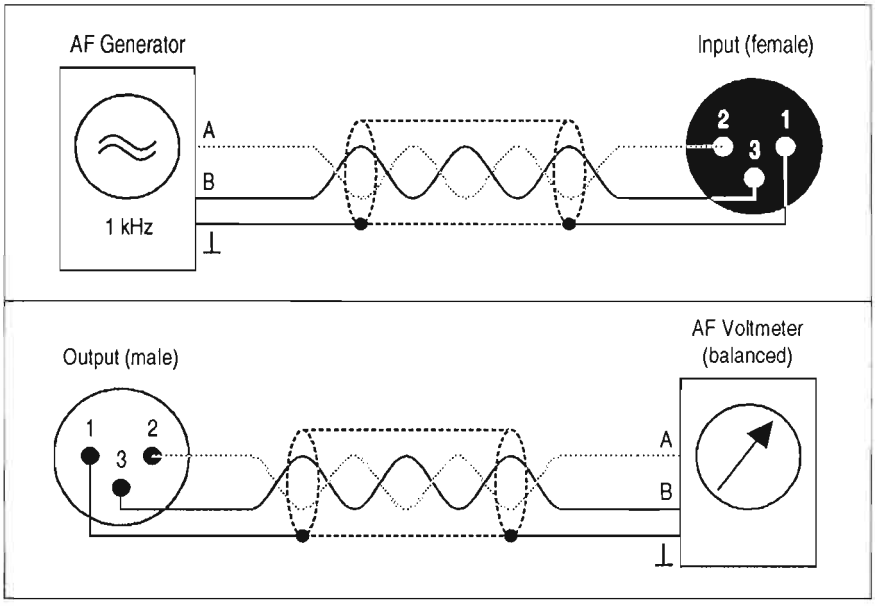
The modules to be aligned must be removed from the console and connected to the bus via bus adapters.

*The 0 Ω bus amplifiers are sensitive to voltage peaks occuring during hot patching.*

For protection of the console and its periphery, the following modules may be inserted or removed only after switching the console off:
VCA Fader, Master Fader, Group Fader, Aux Master Unit, Studio Monitor, CR Monitor.

**Balanced test equipment:**

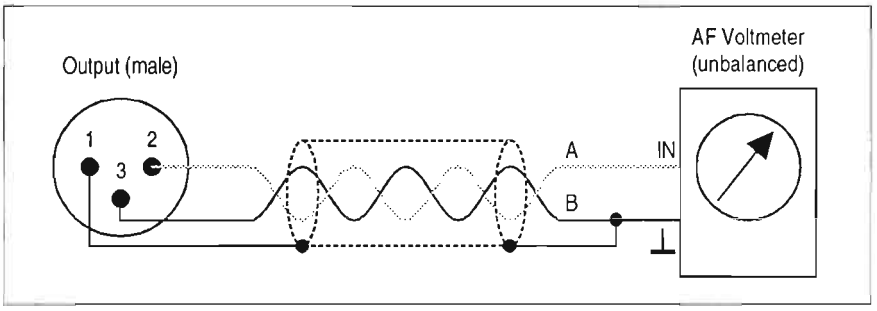
Principally the AF voltmeter must have a balanced input, the AF generator must have a balanced output.




Connection of the AF generator with a balanced line. Measurements with the AF voltmeter are performed without load (Ri ≥ 10 kΩ)

**Unbalanced test equipment:**

If the input of the AF voltmeter is unbalanced, it has to be connected via a balancing transformer. Should this not be feasible, the following method can be used as a makeshift:



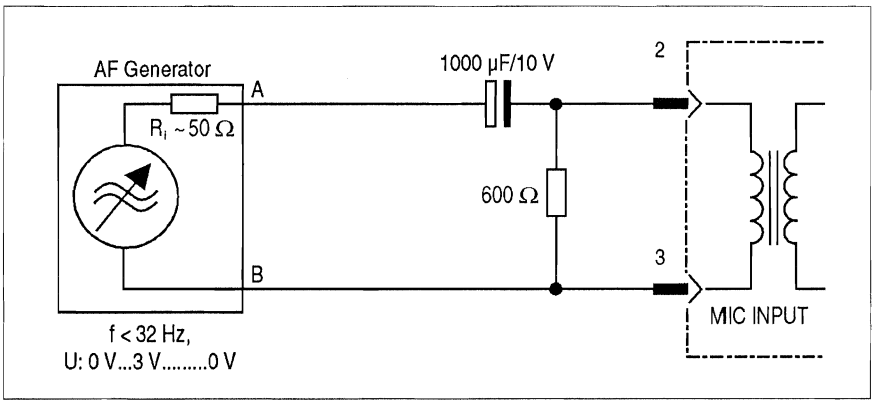

The „cold" b-line (pin 3) is connected to the audio ground (pin 1) and constitutes an unbalanced ground point.
*This set-up cannot be used for high-level measurements (in electronically balanced outputs clipping can occur).*

## 2.11.8 Demagnetizing the input transformers

- Prohibited connection of unbalanced input sources or unintentional shorting of the a/b audio lines of the microphone inputs to chassis when phantom supply is active can drive the input transformers into saturation and cause permanent magnetization (remanence). This manifests itself in the form of significantly higher harmonic distortion and microphonic noise: Light mechanical action on the mixing console, as tapping, causes an audible modulation via the outputs even when the microphone inputs are not active.
- Remanence can also accumulate over extended operating periods.
- All microphone inputs should, therefore, be demagnetized periodically *and prior to calibration.*

**Procedure:**

- *Switch the console off.*
- Feed a frequency of < 32 Hz to one microphone input after the other.
- Increase the generator level from 0 V to about 3 V.
- Continuously reduce the level *very slowly* to 0 V.




Capacitor (1000 µF/10 V) blocks any DC component
Resistor (600 Ω) is used for discharging the capacitor

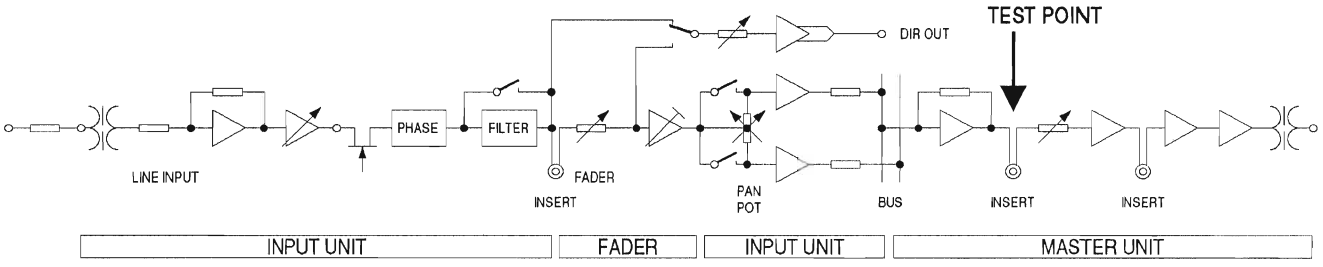
## 2.12 Aligning the Fader units

For alignment, the fader unit concerned must be removed from the console and connected to it via bus adapters.

**Always switch the console off before connecting and disconnecting the modules to avoid damaging the modules.**

During the alignment any filters, equalizers, balance and pan pots must be switched off.
All settings are performed on the faders only.

### 2.12.1 Input Fader Mono/Stereo 1.980.110/111/120




- Feed test signal with nominal level (1 kHz, typ. +6 or +10 dBu) at the LINE input.
- Set the line gain potentiometer on the Input Unit to center position (CAL), switch filters off.
- Remove the Input Fader unit from the console and reconnect it via the bus adapter.

**Fader:**

- Set the fader to its **0 dB position**.
- Select a Master Unit on the Input Unit, connect the AF voltmeter to the PF INSERT SEND of the selected Master (corresponds to the level after the input fader; „Test Point" in the diagram above).

**Fader Unit Mono:** Set the level with trimmer potentiometer **RA5** to **+6 dBu**.
**Fader Unit Stereo:** Set the level with trimmer potentiometers **RA5** (left/channel1) and **RA6** (right/channel 2) to **+6 dBu**.

**Level meter:**

The display characteristics can be selected from VU and PPM and therefore be matched to the characteristics of the main metering. Switchover with jumper **JP1** (not inserted: VU setting).

*For PPM characteristics (jumper JP1 inserted):*

- Press METER ON IN on the Central Switch Panel; button is illuminated.
- With the input fader, set the voltage at the **PF Insert** of the Master Unit to **+6 dBu**.

**Fader Unit Mono:** Set the indication with trimmer potentiometer **RA4** to **0 dB**.
**Fader Unit Stereo:** Set the indication with trimmer potentiometers **RA4** (left/channel 1) and **RA3** (right/channel 2) to **0 dB**.

*For VU characteristics (jumper JP1 not inserted):*

- Press METER ON IN on the Central Switch Panel; button is illuminated.
- Setting for **studio level +10 dBu**. For a 0 VU indication at this studio level, the level amounts to +4 dBu; i.e. the lead is 6 dB.
- With the input fader, set the voltage at the PF Insert of the Master Unit to **+4 dBu**.

**Fader Unit Mono:** Set the indication with trimmer potentiometer **RA4** to **0 dB**.

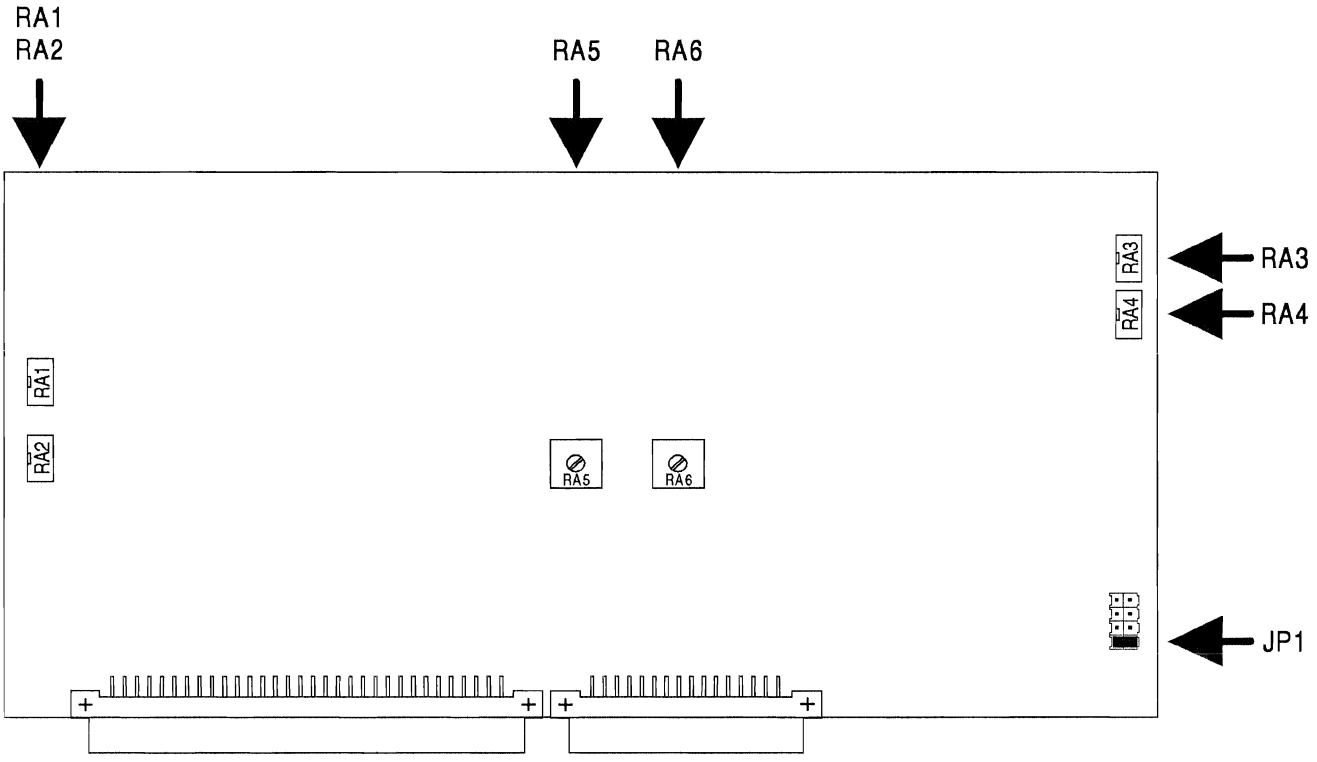
**Fader Unit Stereo:** Set the indication with trimmer potentiometers **RA4** (left/channel1) and **RA3** (right/channel 2) to **0 dB**.

**Direct Output:**

- Set the DIR OUT potentiometer to its center position („CAL") (except for Mono Film/HDTV versions).
- Set the fader to its **0 dB position**.
- Connect the AF voltmeter to the DIRECT OUTPUT.

**Fader Unit Mono:** Set the level with trimmer potentiometer **RA1** to **+6 dBu**.

**Fader Unit Stereo:** Set the level with trimmer potentiometers **RA1** (left/channel1) and **RA2** (right/channel 2) to **+6 dBu**.




Alignment elements on Fader Units Mono/Stereo

## 2.12.2 VCA fader, mono 1.980.130

- Feed test signal with nominal level at the LINE input.
- Set the line gain potentiometer on the Input Unit to center position (CAL), switch filters off.
- Select a Master Unit on the Input Unit, connect the AF voltmeter to the PF INSERT SEND of the selected Master (corresponds to the level after the input fader).

**Coarse adjustment:**

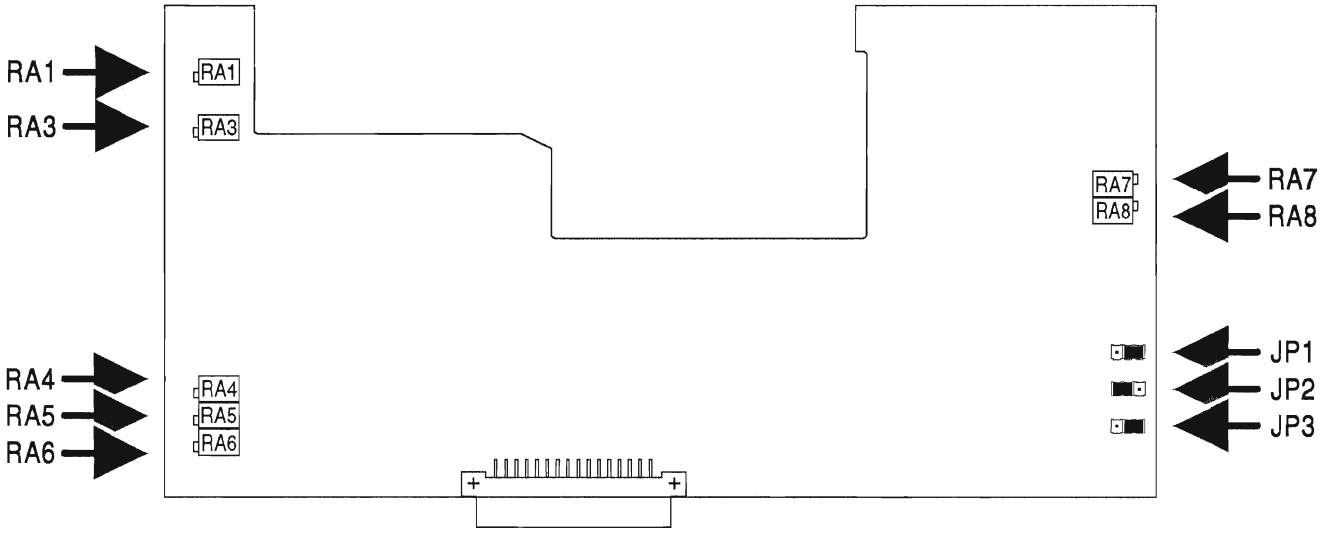
- Switch VCA on (VCA LED is on).
- Set the mark on the fader knob to the center of „–∞" on the fader scale.
- Adjust **RA6** so that the VCA ON LED just goes off at this point.
- Set fader to +10 dB (top position).
- Measure DC voltage with DC voltmeter between **IC1, Pin7** and **Pin1** (ground).
- Set to **0.00 V** with **RA5**.
- Set fader to 0 dB.
- Connect distortion analyzer to PF INSERT SEND.
- Adjust for minimum distortion with **RA3** (typ. **–83 dB**, or 0.007 %, respectively).
- Switch VCA off (VCA LED is dark).
- Set the output level with the normal fader and the AF voltmeter to nominal level –30 dB.
- Switch VCA on (VCA LED is on).
- Adjust the output level with **RA4** to the same AF voltmeter reading as before.
- Switch VCA off (VCA LED is dark).
- Set the output level with the normal fader and the AF voltmeter to nominal level.
- Switch VCA on (VCA LED is on).
- Adjust the output level with **RA1** to nominal level.

**Fine adjustment:**

- Switch VCA off (VCA LED is dark) and set the output level with the normal fader and the AF voltmeter to nominal level –30 dB.
- Switch VCA on (VCA LED is on) and adjust the output level with **RA4** to the same AF voltmeter reading as before.
- Switch VCA off (VCA LED is dark) and set the output level with the normal fader and the AF voltmeter to nominal level.
- Switch VCA on (VCA LED is on) and adjust the output level with **RA1** to nominal level.
- *The four steps above are mutually interdependent. Therefore, they are to be repeated until the following accuracies are met:*
  **0 dB: ±0.1 dB**
  **–30 dB: ±0.3 dB.**

***VCA ON* LED check:**

- LED is on at approx. –50 dB
- LED goes off at approx. –55 dB.




## External VCA control:

**General:**

The internal VCA can be controlled by a control voltage applied to the EXT. VCA CONTROL INPUT. For using the internal VCA with different control systems the input sensitivity of the control input must be adjustable to different control levels.

The EXT. VCA CONTROL INPUT is a 50-pin D-Sub socket. The control inputs are balanced differential inputs, each of the two control lines per input can be connected to audio ground (0 VA, pins 18...33). The pins 1...16 are labeled with „–VDC", the pins 34...49 with „+VDC".

**Range:**

Attenuation >100 dB
Gain 10 dB.
The VCA used allows gain settings of >10 dB; however, correct functioning cannot be warranted; therefor this option is not recommended.

**Standard setting:**

0 V ≙ 0 dB gain, gain control slope 20 dB/V.
0 $V_{DC}$ between –VDC and +VDC means *0 dB gain*;
–5 $V_{DC}$ at +VDC, 0 $V_{DC}$ at –VDC means *100 dB attenuation*.

**Ranges:**

| | |
|---|---|
| Gain/attenuation at 0 dB: | **±15 dB** |
| Gain control slope: | **±7 dB/V ... ±25 dB/V** |

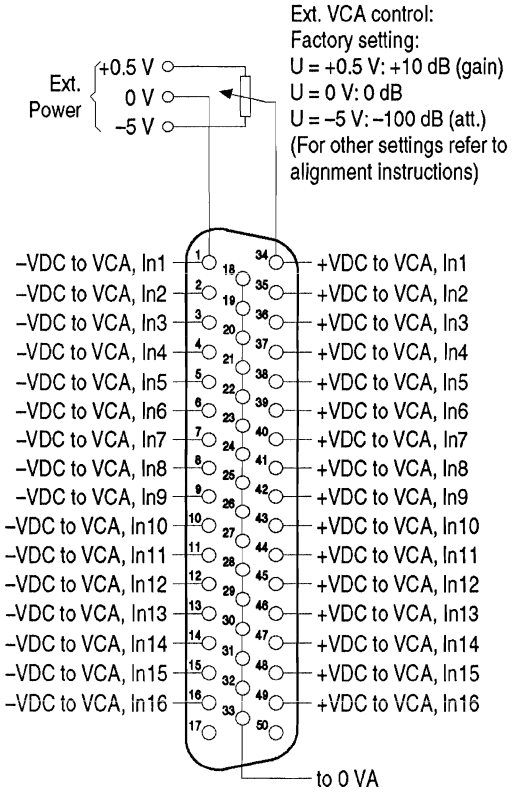
**Jumpers (refer to the diagram above):**

**JP1** Position P11/P12: With the VCA ENABLE button (on the Function Control Unit, FCU) switchover between fader control and external control input.
*) Position P12/P13: VCA is always connected; external control input is connected with the VCA ENABLE button on the FCU.

**JP2** *) Position P14/P15: ENABLE BUS on the FCU switches over between fader control and external control input.
Position P15/P16: USER key is used for the switchover.

**JP3** Position P17/P18: Fader start relay is activated by the fader *and* the external control input.
*) Position P18/P19: Fader start relay is activated by the fader only.
**) Factory settings (default; same settings as indicated in the diagram above).*

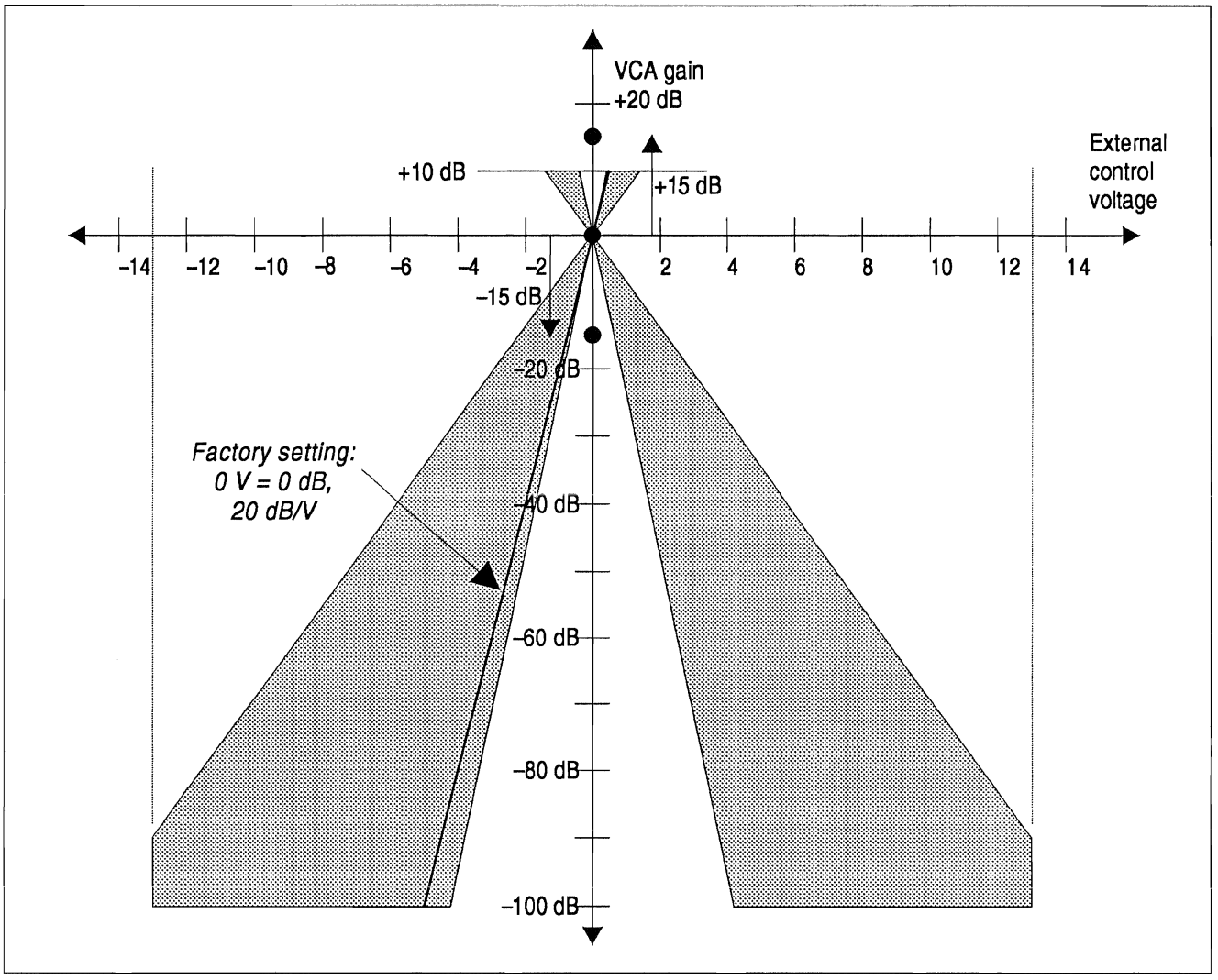
**Standard pin assignment EXT. VCA CONTROL INPUT** (50-pin Sub-D connector, female)**:**




| Pin | Function | Pin | Function |
|---|---|---|---|
| 1 | –VDC to VCA / input 1 | 26 | 0 VA (ground) |
| 2 | –VDC to VCA / input 2 | 27 | 0 VA (ground) |
| 3 | –VDC to VCA / input 3 | 28 | 0 VA (ground) |
| 4 | –VDC to VCA / input 4 | 29 | 0 VA (ground) |
| 5 | –VDC to VCA / input 5 | 30 | 0 VA (ground) |
| 6 | –VDC to VCA / input 6 | 31 | 0 VA (ground) |
| 7 | –VDC to VCA / input 7 | 32 | 0 VA (ground) |
| 8 | –VDC to VCA / input 8 | 33 | 0 VA (ground) |
| 9 | –VDC to VCA / input 9 | 34 | +VDC to VCA / input 1 |
| 10 | –VDC to VCA / input 10 | 35 | +VDC to VCA / input 2 |
| 11 | –VDC to VCA / input 11 | 36 | +VDC to VCA / input 3 |
| 12 | –VDC to VCA / input 12 | 37 | +VDC to VCA / input 4 |
| 13 | –VDC to VCA / input 13 | 38 | +VDC to VCA / input 5 |
| 14 | –VDC to VCA / input 14 | 39 | +VDC to VCA / input 6 |
| 15 | –VDC to VCA / input 15 | 40 | +VDC to VCA / input 7 |
| 16 | –VDC to VCA / input 16 | 41 | +VDC to VCA / input 8 |
| 17 | n.c. | 42 | +VDC to VCA / input 9 |
| 18 | 0 VA (ground) | 43 | +VDC to VCA / input 10 |
| 19 | 0 VA (ground) | 44 | +VDC to VCA / input 11 |
| 20 | 0 VA (ground) | 45 | +VDC to VCA / input 12 |
| 21 | 0 VA (ground) | 46 | +VDC to VCA / input 13 |
| 22 | 0 VA (ground) | 47 | +VDC to VCA / input 14 |
| 23 | 0 VA (ground) | 48 | +VDC to VCA / input 15 |
| 24 | 0 VA (ground) | 49 | +VDC to VCA / input 16 |
| 25 | 0 VA (ground) | 50 | n.c. |

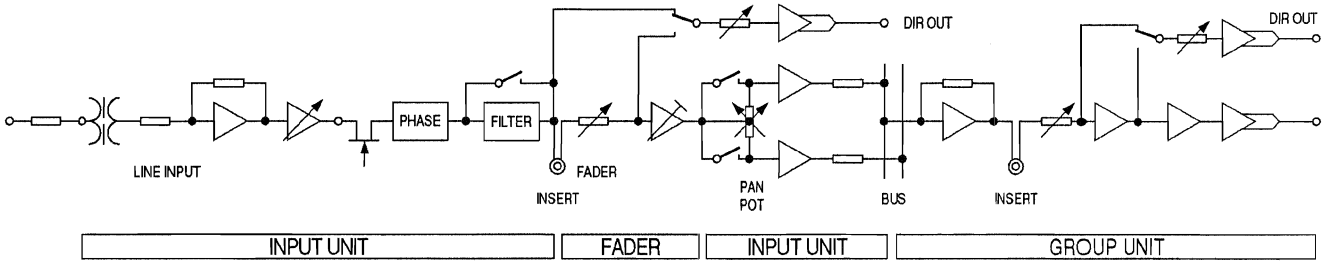
**Settings:**

- Connect 0 V to the corresponding pins of the EXT. VCA CONTROL INPUT (or shorten the pins).
- Feed nominal level/1 kHz at the corresponding LINE input.
- Connect AF voltmeter to PF INSERT SEND of the Master Unit.
- Activate VCA.
- Set fader knob to its 0 dB position.
- Select external control with VCA ENABLE button on the FCU (button is illuminated). The output level must not change; else, adjust with **RA8**.
- Connect a known voltage (e.g. 1.00 V) with the desired polarity to the desired pins of the EXT. VCA CONTROL INPUT.
- Adjust the desired gain control slope (e.g. 20 dB attenuation) with **RA7**.




**Optional fader control:** An external fader is operated with, say, 10 $V_{DC}$. 0 $V_{DC}$ corresponds to 10 dB gain, 10 $V_{DC}$ corresponds to maximum attenuation.
Since 0 dB gain is at approx. 0.91 $V_{DC}$, this level shift has to be compensated with RA8.

## 2.12.3 Group Fader 1.980.110/111/120




- Feed test signal with nominal level (1 kHz, typ. +6 or +10 dBu) into a correctly aligned LINE input.
- Set the line gain potentiometer on the Input Unit to center position (CAL), switch filters off.
- Remove the group fader unit from the console and reconnect it via the bus adapters.

**Fader:**

- Set the input and group faders to their **0 dB positions**.
- Select GRP on the Group Unit.
- Select the desired group on the input unit, connect the AF voltmeter to its output.

**Group Fader Unit Mono:** Set the level with trimmer potentiometer **RA5** to **+6 dBu**.

**Group Fader Unit Stereo:** Set the level with trimmer potentiometers **RA5** (left/channel1) and **RA6** (right/channel 2) to **+6 dBu**.

**Level meter:**

The display characteristics can be selected from VU and PPM and therefore be matched to the characteristics of the main metering. Switchover with jumper **JP1** (not inserted: VU setting).

*For PPM characteristics (jumper JP1 inserted):*

- Press METER ON IN on the Central Switch Panel; button is illuminated.
- With the group fader, set the voltage at the GROUP OUTPUT to **+6 dBu**.

**Group Fader Unit Mono:** Set the indication with trimmer potentiometer **RA4** to **0 dB**.

**Group Fader Unit Stereo:** Set the indication with trimmer potentiometers **RA4** (left/channel 1) and **RA3** (right/channel 2) to **0 dB**.

*For VU characteristics (jumper JP1 not inserted):*

- Press METER ON IN on the Central Switch Panel; button is illuminated.
- Setting for **studio level +10 dBu**. For a 0 VU indication at this studio level, the level amounts to +4 dBu; i.e. the lead is 6 dB.
- With the group fader, set the voltage at the GROUP OUTPUT to **+4 dBu**.

**Group Fader Unit Mono:** Set the indication with trimmer potentiometer **RA4** to **0 dB**.

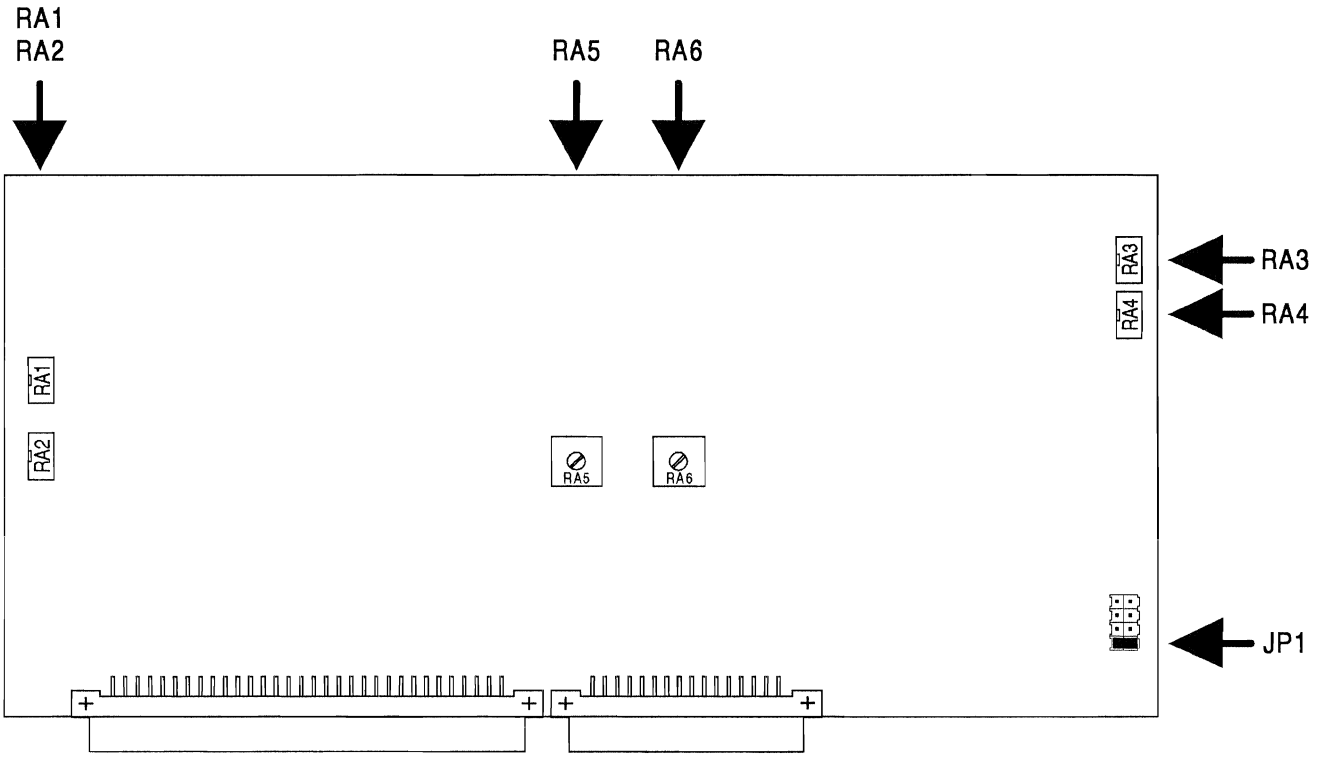
**Group Fader Unit Stereo:** Set the indication with trimmer potentiometers **RA4** (left/channel1) and **RA3** (right/channel 2) to **0 dB**.

**Direct Output:**

- Set the DIR OUT potentiometer to its center position („CAL") (except for Mono Film/HDTV versions).
- Set the fader to its **0 dB position**.
- Connect the AF voltmeter to the DIRECT OUTPUT.

**Group Fader Unit Mono:** Set the level with trimmer potentiometer **RA1** to **+6 dBu**.

**Group Fader Unit Stereo:** Set the level with trimmer potentiometers **RA1** (left/channel1) and **RA2** (right/channel 2) to **+6 dBu**.




Alignment elements on Group Fader Units Mono/Stereo

## 2.12.4 Master Fader (Master Unit) 1.980.180

**Note:** For Mono Master Units, the test points and alignment elements for the left channel/channel 1 are to be used.

CAUTION

*When connecting a Dual Master Unit to the console with bus adapters, make sure not to cross the two flat cables – else the unit will be damaged!*

**AF Insert level:**

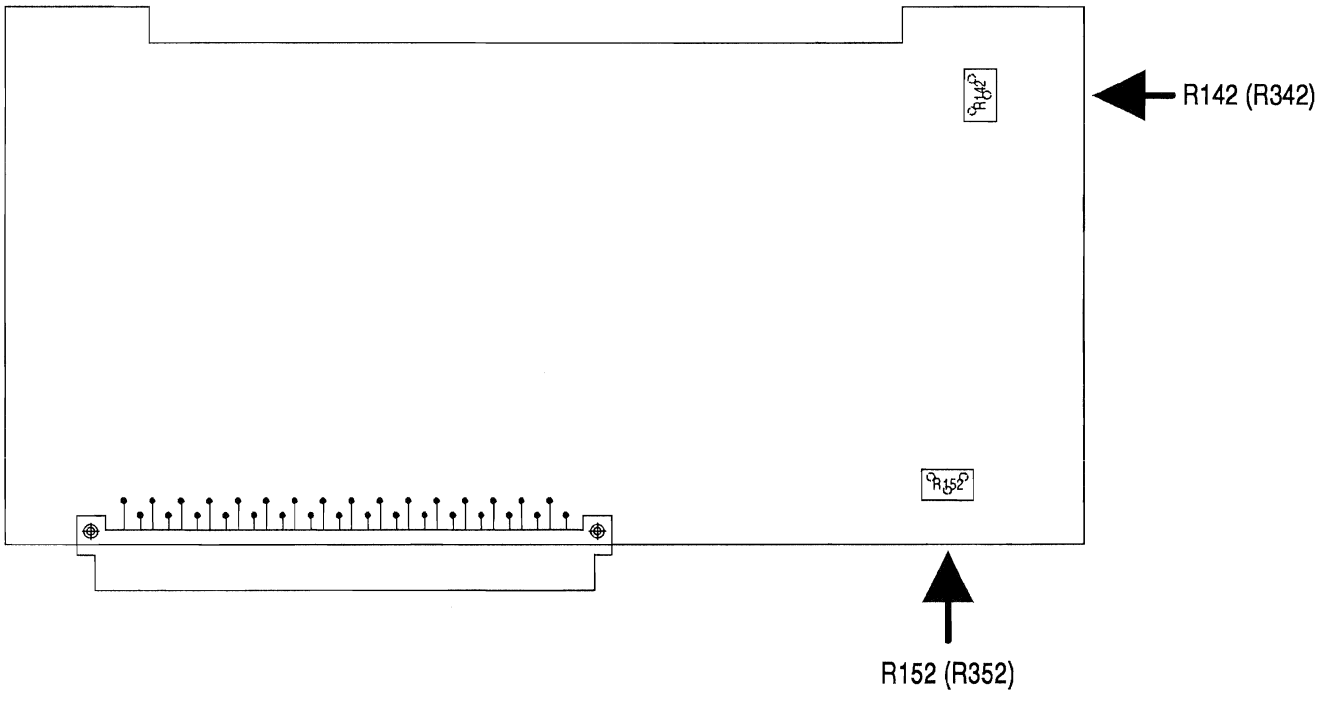
- Feed in test signal with nominal level via a correctly aligned line input; select the desired Master.
- Set the input and master faders to their **0 dB positions.**
- Connect the AF voltmeter to pins 3 and 16 (GND) (left/channel 1) or to pins 30 and 17 (GND) (right/channel 2) of the bus adapters' eurocard connectors.
- Set the level with trimmer potentiometers **R142** (left/channel 1) and **R342** (right/channel 2) to **0 dBu.**

**Master Outputs:**

- Feed in test signal with nominal level via a correctly aligned line input.
- Set the input fader to its **0 dB position.**
- Select the corresponding Master (Bus Selector), set the master fader to its **0 dB position.**
- Connect the AF voltmeter to the Master Output.
- Set the level with trimmer potentiometers **R152** (left/channel 1) and **R352** (right/channel 2) to **+6 dBu.**
- Then select the next Master Channel on the Input Unit, make settings as above. Align all Master Faders in the same way as mentioned above.

**Distortion alignment:**

A distortion alignment is not necessary, for the output stages are distortion compensated.




Alignment elements on Master Unit (right channel/channel 2 in parantheses)

## 2.12.5 AUX Master Units

The N-1 attenuation is aligned in the AUX Master unit as follows:

- Feed test signal with nominal level (1 kHz, typ. +6 or +10 dBu) via a correctly aligned LINE input.
- Set the line gain potentiometer on the Input Unit to center position (CAL), switch filters off.
- Connect the AF voltmeter to the DIRECT OUTPUT of the current input channel.
- Set the DIR OUT potentiometer of this input to center position (on HDTV/Film fader units press the DIR OUT key).
- Remove the AUX Master unit from the console and reconnect it via the bus adapter.
- Set the input fader to its **0 dB position**.
- Press the N-1 key.
- Adjust the output signal **to minimum** with trimmer potentiometer **RA17** on the AUX Master unit (typical attenuation: 50 dB).

**Level meter:**

The display characteristics can be selected from VU and PPM and therefore be matched to the characteristics of the main metering. Switchover with jumper **JP1** (not inserted: VU setting).

**PPM:**

For PPM characteristics (jumper JP1 inserted):

**PPM, AUX 1...4:**

- Press one of the AUX ON 1...4 keys on the input unit.
- Set the corresponding AUX 1...4 potentiometer on the input unit to maximum (i.e. to its clockwise stop).
- Set the level of the corresponding output (AUX SEND 1...4) with the corresponding potentiometer SEND 1...4 on the AUX Master unit to +6 dBu.
- Adjust level meters to **0 dB**: For AUX 1 with trimmer potentiometer **RA9**, for AUX 2 with **RA10**, for AUX 3 with **RA11**, for AUX 4 with **RA12**.

**PPM, AUX 5...8:**

- On the AUX Master unit at AUX 5/6 and AUX 7/8, press the 2CH keys in order to configure the AUX paths as two separated mono paths each.
- Press one of the AUX ON 5/6 and 7/8 keys on the input unit.
- Set one of the concentric potentiometers AUX 5/6 and 7/8 on the input unit to maximum (i.e. to its clockwise stop).
- Set the level of the corresponding output (AUX SEND 5...8) with the corresponding potentiometer SEND 5...8 on the AUX Master unit to +6 dBu.
- Adjust level meters to **0 dB**: For AUX 5 with trimmer potentiometer **RA13**, for AUX 6 with **RA14**, for AUX 7 with **RA15**, for AUX 8 with **RA16**.

**VU:**

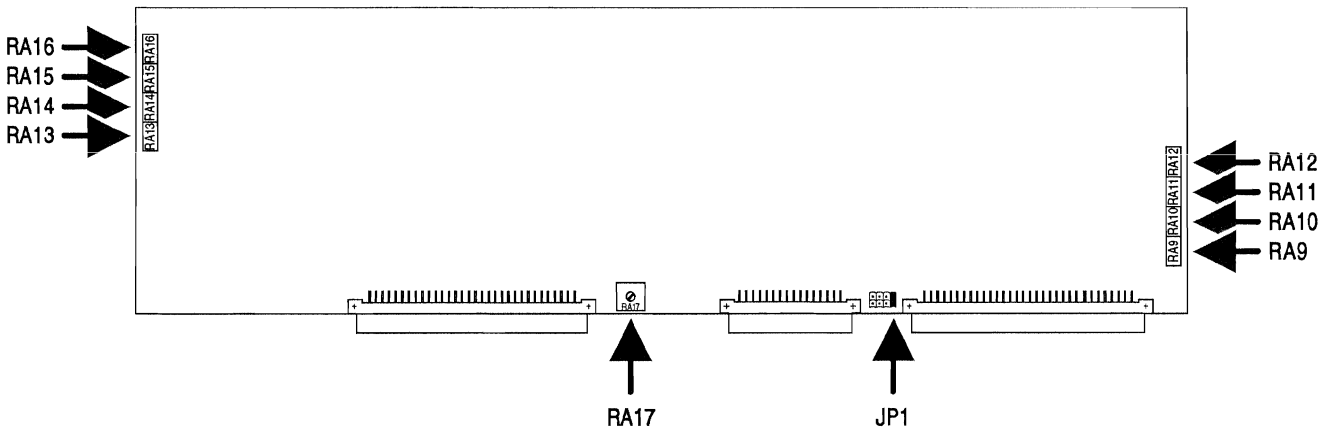
For VU characteristics (jumper JP1 not inserted):
Example for studio level +10 dBu (i.e. for 0 VU indication the level is +4 dBu, the lead is therefore 6 dB)

**VU, AUX 1...4:**

- Press one of the AUX ON 1...4 keys on the input unit.
- Set the corresponding AUX 1...4 potentiometer on the input unit to maximum (i.e. to its clockwise stop).
- Set the level of the corresponding output (AUX SEND 1...4) with the corresponding potentiometer SEND 1...4 on the AUX Master unit to +4 dBu.
- Adjust level meters to **0 dB**: For AUX 1 with trimmer potentiometer **RA9**, for AUX 2 with **RA10**, for AUX 3 with **RA11**, for AUX 4 with **RA12**.

**VU, AUX 5...8:**

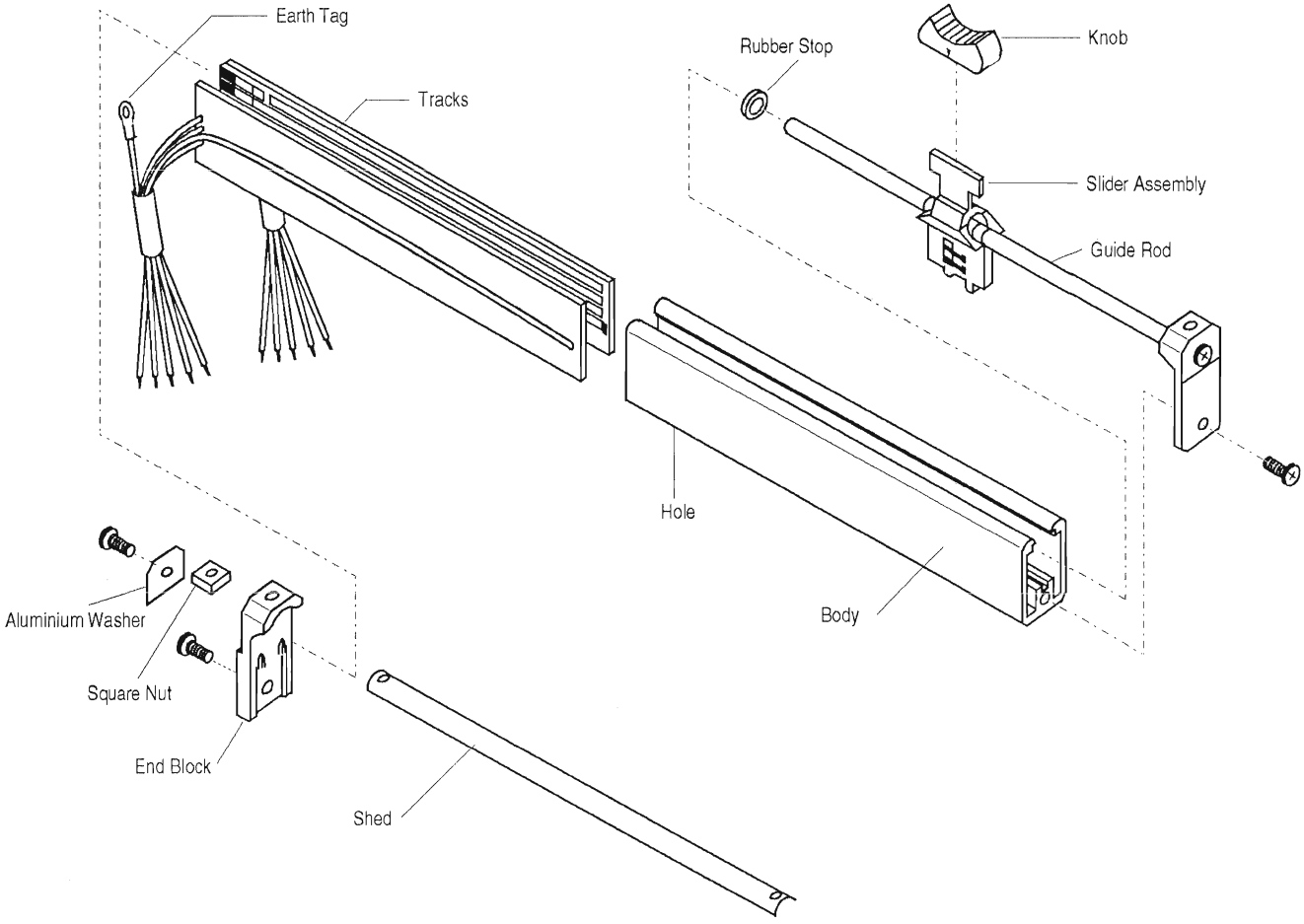
- On the AUX Master unit at AUX 5/6 and AUX 7/8, press the 2CH keys in order to configure the AUX paths as two separated mono paths each.
- Press one of the AUX ON 5/6 and 7/8 keys on the input unit.
- Set the corresponding concentric potentiometers AUX 5/6 and 7/8 on the input unit to maximum (i.e. to its clockwise stop).
- Set the level of the corresponding output (AUX SEND 5...8) with the corresponding potentiometer SEND 5...8 on the AUX Master unit to +6 dBu.
- Adjust level meters to **0 dB**: For AUX 5 with trimmer potentiometer **RA13**, for AUX 6 with **RA14**, for AUX 7 with **RA15**, for AUX 8 with **RA16**.



## 2.13 Care of the faders

**Required auxiliary materials:**

Phillips screwdriver No. 0
Lint-free cloth
Cotton buds
Silicone oil (Baysilon M300)
PTFE dry film aerosol (e.g. Kontakt-Chemie "Kontaflon" or Cramolin "Sprayflon")




### 2.13.1 Disassembly

**Removing an end block:**

- Remove the two screws from the appropriate end block.
- Remove the aluminium washer and the square fixing nut.

**Removing the slider assembly:**

- To remove the slider assembly first remove the end block (as described above) *from the non-wire end* of the fader.
- Slide the shed away from the end block opposite to the one just removed, through the slider assembly, and remove it.
- Remove the rubber stop from the free end of the guide rod.
- Carefully pull the slider assembly along the guide rod and remove. If the slider is to be reinstalled ensure that the wipers are not damaged (see below).

**Removing a track:**

- Remove the slider assembly as described above.
- Remove the remaining end block by removing only the bottom screw from the end block, the earth tag assembly will come free.
- Pull the end block free of the body, note the guide rod should still be attached to the end block.
- Carefully remove the appropriate track(s) from the body by gently pulling them by their wires. If the tracks are tight in the body then carefully push them out from the opposite end.

**Note:** If the track(s) have been touched they will have to be cleaned prior to reinstalling (see below).

## 2.13.2 Deterioriation in operating feel

**Guide rod lubrication:**

- Remove the upper screw from one end of the fader and remove the aluminium washer and the square fixing nut.
- Pull the shed through the semi-circular slot in the end block and remove it.
- Place the slider in mid stroke and place one drop of silicone oil to each side of the slider.
- Move the slider assembly back and forth on the guide rod to distribute the oil evenly; remove any visible excess oil using a cloth or tissue.
- Replace the shed in the semi-circular slot and push through until the shed locates in the opposite end block.
- Replace the square fixing nut and the aluminium washer, replace and tighten the screw.

**Cleaning the guide rod:**

- Remove the upper screw from one end of the fader and remove the aluminium washer and the square fixing nut.
- Pull the shed through the semi-circular slot in the end block and remove it.
- Slide the slider towards the second end block.
- Remove the rubber stop from the free end of the guide rod, pull the end block with attached guide rod from the fader body (the slider assembly remains inserted inside the body).
- Apply a small amount of silicone oil to a cotton bud and clean the rod thoroughly, removing all traces of dirt.
- Re-insert the guide rod into the slider assembly, attach the rubber stop to the free guide rod end and insert the guide rod completely.
- Insert the bottom screw of the second end block.
- Lubricate the guide rod and assemble the fader as described above.

**Cleaning the track:**

- Remove the track as described above, clean off any debris using a lint-free cloth, and rub firmly down the length of the track until all traces are gone. If the deposits on the track are difficult to remove, the track should be washed in warm water; if required, brush gently using a soft brush.
- The track should then be thoroughly dried using a cloth and a hot air dryer. When the track is completely dry it should be rubbed with the lint-free cloth to remove any marks.
- Agitate the PTFE aerosol by shaking the can.
- Hold the can such that the nozzle is 150 to 200 mm away from the track and spray the lubricant over the track surface in one sweep (2 to 3 seconds).

- Allow the solvent to evaporate, the track will appear white when dry.
- Polish lightly with a lint-free cloth until the surface is shiny. Inspect to ensure that all areas have been polished; areas having a dull appearance require further polishing.
- Reinstall the track as described below.

**Cleaning the guide channel:**

- Remove the slider assembly and the track as described above.
- Press a cotton bud firmly into the guide slot at one end of the body and slowly slide it towards the opposite end of the body.
- Remove the cotton bud and repeat again using its opposite end.
- Reinstall the track and and the slider assembly as described below.

## 2.13.3 Reassembly

**Reinstalling a track:**

- Lay the wires across the back of the track such that the wires exit at the appropriate end of the track, i.e. at the same side as the largest number of wire/track terminals.
- Position the non-wire end of the track at the edge of the slot in the body sucht that the holes in the base of the body are nearest to the track. The active portion of the track should be facing inwards, and the law track at the base of the body.
- The non-wire end of the track can now be pushed in.
- Repeat for track 2 where necessary.

**Reinstalling a slider assembly:**

- Press an end block onto the body at the hole end.
- Place the earth tag onto the lower hole of the end block and secure with a screw.
- Place the square fixing nut into the end block and the aluminium washer in position.
- Place a rubber stop on the guide rod at one end and mount this end to the end block with a screw.
- Slide the slider assembly onto the open end of the guide rod such that it locates in the slot, and the free end of the wipers are the last part of the wipers to enter.
- Place a rubber stop on the remaining end of the guide rod.
- Press the end block onto the body such that it locates the guide rod.
- Place a screw into the bottom hole and tighten it.
- Lubricate the guide rod as described above.
- Slide the shed through the end block's semi circular slot, through the slider and into the opposite end block.
- Position the square fixing nut and the aluminium washer, and secure with a screw.

## 2.14 Alignment Control Room Monitor 1.912.420

To start the alignment, no key on the CR Monitor unit must be pressed.

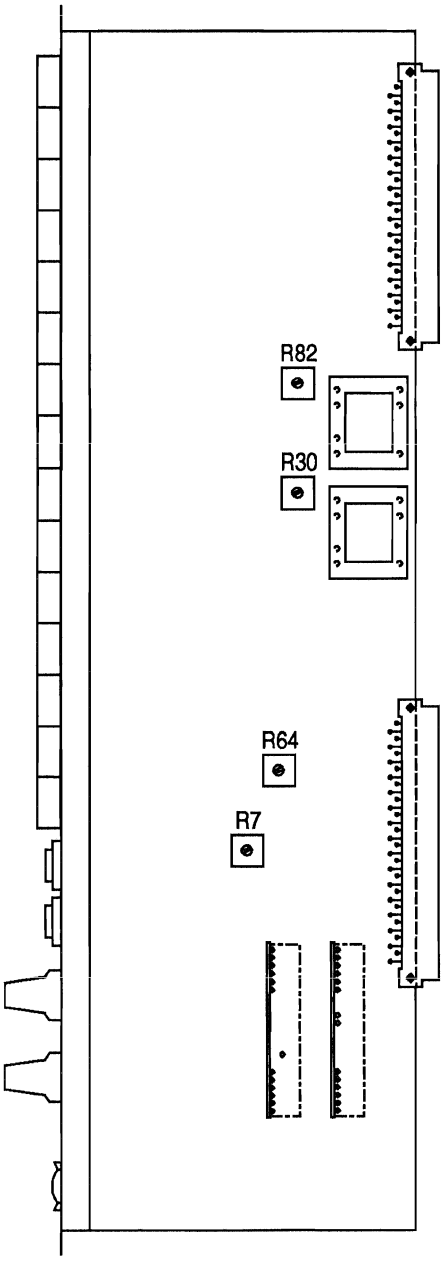
- Feed test signal at nominal level to the EXTERNAL 1 input (left or right).
- Select the input EXT 1 input on the CR Monitor unit.
- Turn the MONITOR VOLUME potentiometer fully clockwise.
- Make sure that BALANCE is switched off (BALANCE IN key released).

**Headphones level:**

- Connect audio voltmeter without load to one of the 6.3 mm TRS headphone sockets (Tip = left, Ring = right, Sleeve = ground).
- Adjust level with **R7** (left) and **R64** (right) to **+20 dBu** (7.75 V).

**CR Monitor:**

- Connect voltmeter with no load to the CR MONITOR output (left or right).
- Adjust the output level with **R30** (left) and **R82** (right) to **+16 dBu**.




Alignment elements of the CR Monitor unit.

## 2.15 Alignment Studio Monitor/Talk Back unit 1.912.326

The Control Room Monitor unit must have been correctly aligned before the alignment of the Studio Monitor unit.

**PFL level:**

- Feed test signal at nominal level to the LINE input (gain: CAL) of the input unit #1.
- Press PFL key on this input unit.
- Turn the MONITOR VOLUME potentiometer of the CR Monitor unit fully clockwise.
- Press the PFL/P.SOLO TO MONITOR key on the Studio Monitor unit. The PFL/P.SOLO potentiometer has no effect on the CR MONITOR output level.

**PFL/P.SOLO monitor:**

- Connect the voltmeter with no load to the CR MONITOR output.
- Adjust with **R67** (left) and **R70** (right) to **+16 dBu**.

**PFL/P.SOLO headphones:**

- Turn the PFL/P.SOLO potentiometer fully clockwise.
- Connect voltmeter with no load to the PFL/P.SOLO headphones socket (Tip = left, Ring = right, Sleeve = ground)
- Adjust with **R79** (left) and **R87** (right) to **+20 dBu**.

**Notes:** The Studio Monitor is muted as soon as a microphone is on. In this case the CUT LED is on. Muting can be released with the RE-IN key.
The TB STUDIO and TB SPEAKER keys attenuate the studio output level by 20 dB and must therefore not be activated.

**Studio Monitor:**

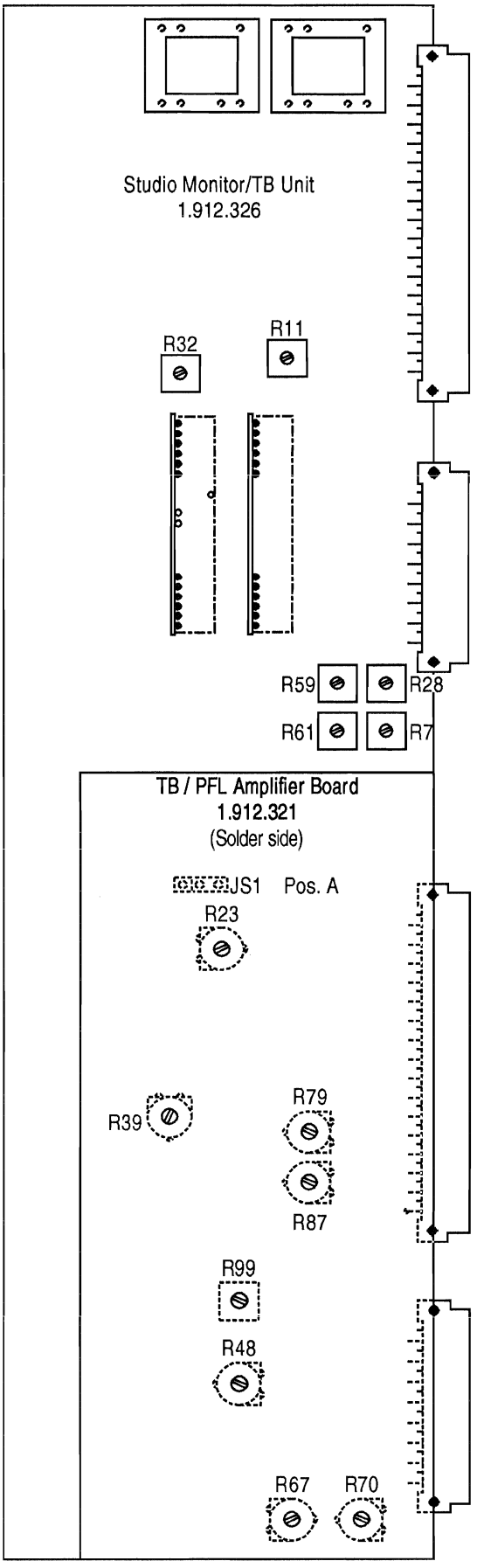
- Feed test signal at nominal level to one of the PROGR. monitor inputs and press the corresponding source selector key.
- Turn the STUDIO potentiometer fully clockwise.
- Connect voltmeter with no load to the STUDIO output (left or right).
- Adjust with **R11** (left) and **R32** (right) to **+16 dBu**.

**Headphones studio:**

This adjustment affects the Studio Monitor signal level to the studio headphones (e.g. connected to TB box).

- Feed test signal at nominal level to one of the PROGR. monitor inputs and press the corresponding source selector key.
- Connect voltmeter with no load to the TB box output (D-type) or to the headphones socket on the TB box, turn the VOLUME potentiometer fully clockwise (Tip = left, Ring = right, Sleeve = ground).
- Adjust with **R7** (left) and **R28** (right) to **+20 dBu**.

*(Refer to drawing on next page)*



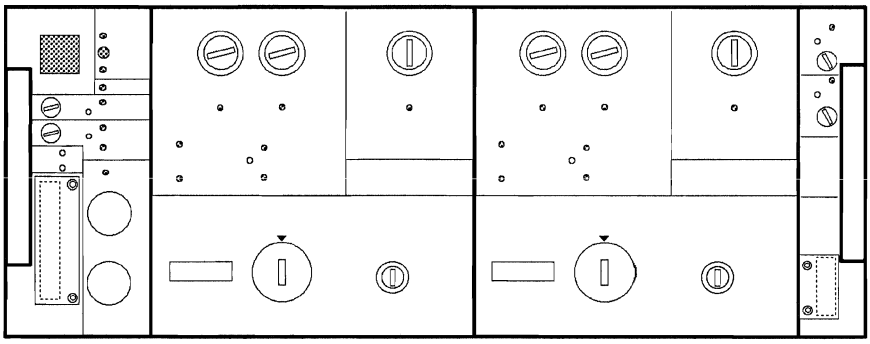

Alignment elements of the Studio Monitor and Talk Back unit 1.912.326

## 2.16 Alignment of the power supply

This alignment instructions apply to all power supply types:

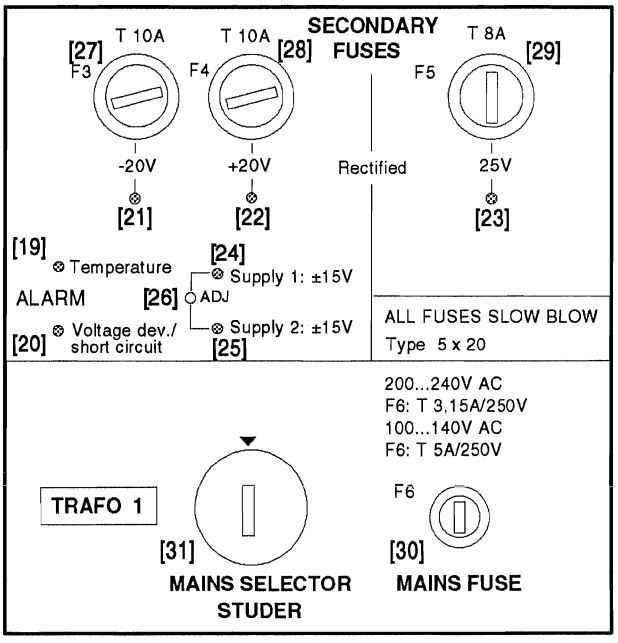
- Dual power supply/Master 1.918.420
- Single power supply/Master 1.918.421
- Dual power supply/Slave 1.918.422
- Single power supply/Slave 1.918.423

### 2.16.1 Dual power supply/Master 1.918.420

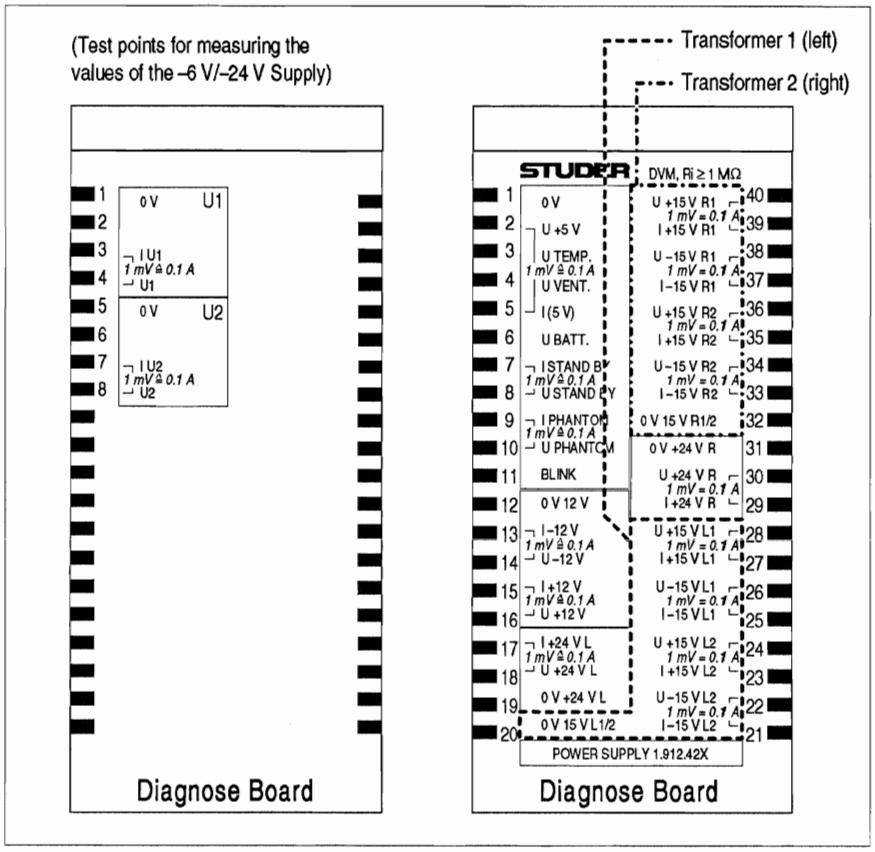


**±15 V I/II transformer block 1 (left)**

- Switch the power supply ON.
- Connect the diagnose board to the large connector labeled Diagnostics.
- Measure the +15 V (L1) on the diagnose board.
  0 V: pin 20 / +15 V: pin 28.
- With trimmer potentiometer ADJ [26] adjust the left-hand transformer block to **+15.6 V**.




The corresponding voltages –15 V of L1 or ±15 V of L2 are automatically set by the tracking, that is, for each transformer block the adjustment of only one voltage is required.




Diagnose board 1.918.080.00

### ±15 V I/II transformer block 2 (right)

Both transformer blocks are identical. All voltages of both units can be measured on the diagnose board.

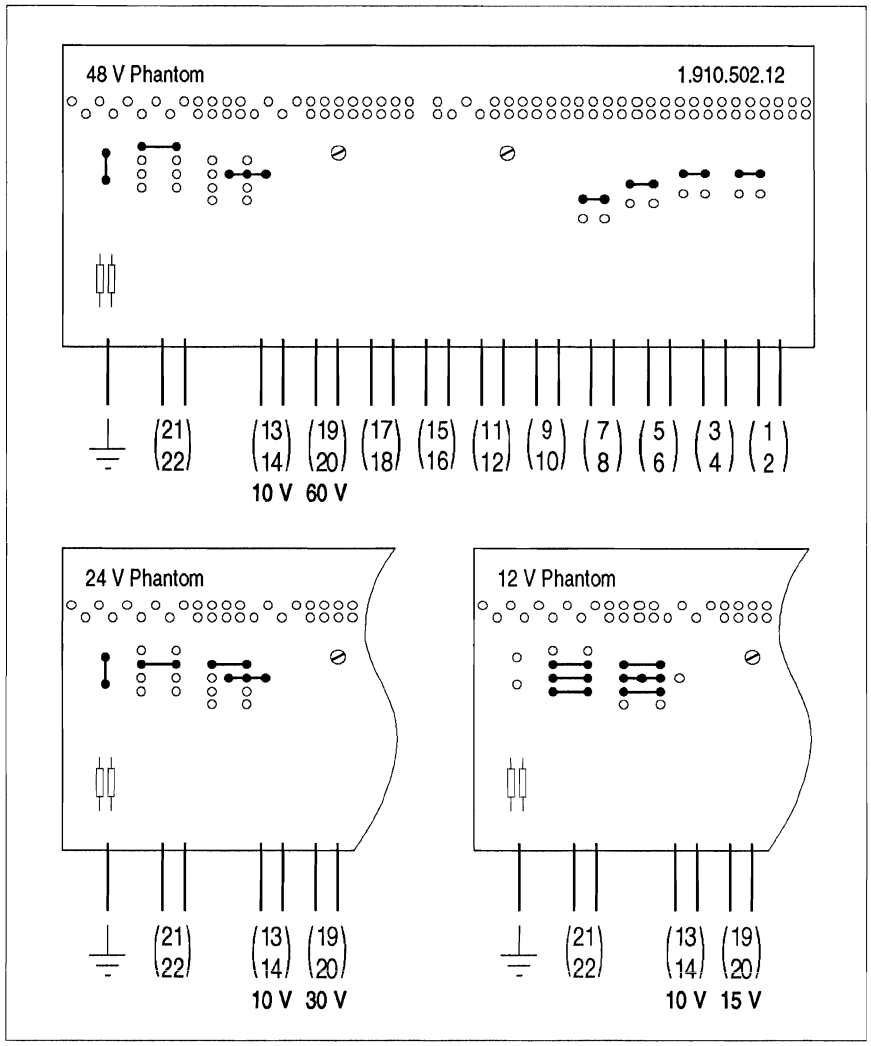
- Measure the +15 V (R1) on the diagnose board.
  0 V: pin 32 / +15 V: pin 40
- With trimmer potentiometer ADJ [26] adjust the right-hand transformer block to **+15.6** V.

### Phantom supply

The phantom supply is specified by the customer and is either +48 V, +24 V, or +12 V. For this purpose the soldering straps on the transformer 1.910.503 can be changed according to the figure on the opposite page. In addition, the setting of jumper J7 on the Phantom/Stand-by/±12 V board 1.918.088 must be matched (see figure in the Fan adjustment section).

When changing the phantom supply voltage, also the phantom resistors on the Connection PCB 1.980.712 must be adapted accordingly. These resistors are partially hidden below the connectors P9 (uppermost connectors for the input units). On Mono units two resistors per channel must be adapted, and on Stereo units four resistors.

| Phantom supply | R1...R8, R11...R18 | Tolerance |
|---|---|---|
| 48 V | 6.8 kΩ | 0.1 % |
| 24 V | 4.3 kΩ | 0.1 % |
| 12 V | 680Ω | 0.1 % |




**Alignment:**

- Measure the phantom supply voltage on the Diagnose Board.
  0 V: pin 1 / UPHANTOM: Pin 10
- Adjust with trimmer potentiometer ADJ [10] to **+12.2 V**, or **+24.2 V**, or **+48.2 V**, as desired.

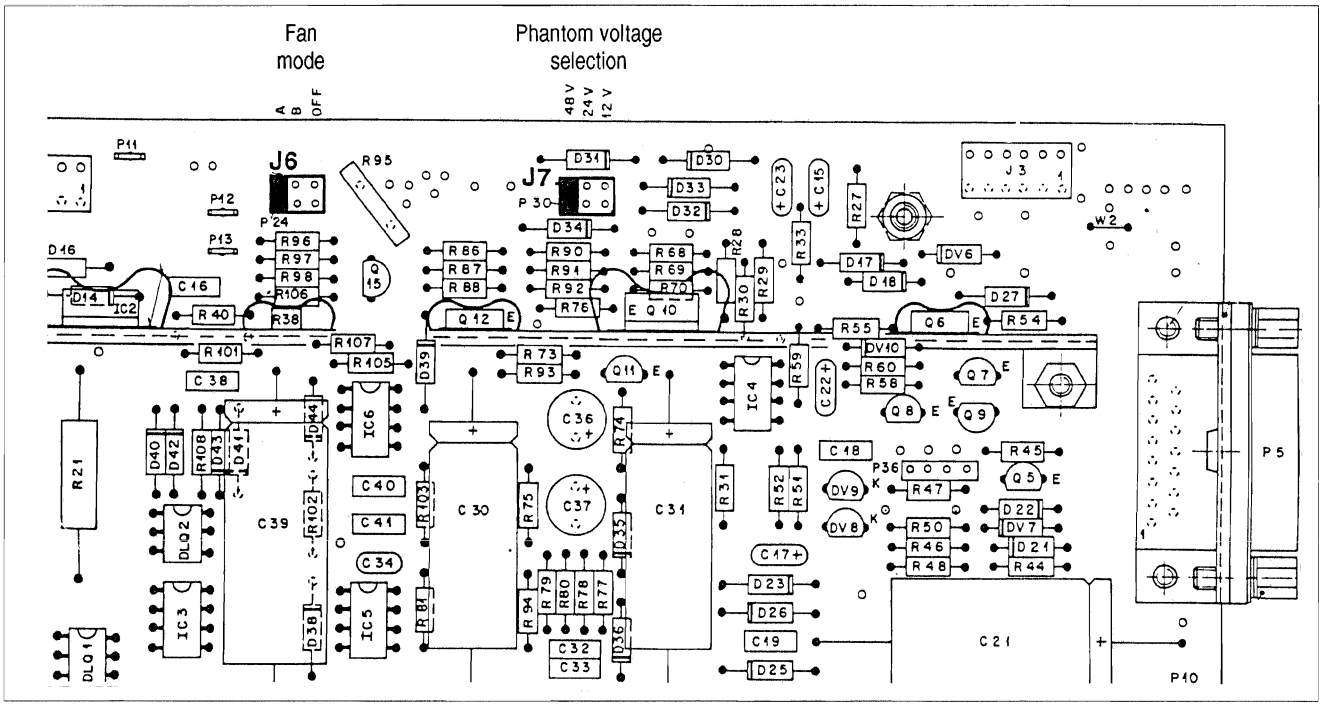
**Fan adjustment**

The fan operates at two speeds. If the temperature threshold is exceeded it switches automatically to the maximum speed. Below this temperature it is possible to define with a jumper whether the fan should turn at maximum speed, reduced speed, or not at all.

**Jumper settings**

On the Phantom/Standby/±12 V Board 1.918.088 and on the Feed Through Board 1.918.089, the jumpers J6 define the fan power below the temperature threshold $T_{vent}$. The jumper J7 is used for phantom voltage selection as described in the preceding paragraph.

| Fan speed at different settings of jumper J6: | | | |
|---|---|---|---|
| | A | B | OFF |
| Temp < Tvent | low | high | off |
| Temp > Tvent | high | high | high |




Phantom/Standby/±12 V Board 1.918.088, Feed Through Board 1.918.089: Jumper settings for fan operating mode and phantom supply voltage setting

**Factory settings:** J6 (fan mode) in position A (i.e. low speed for low temperature, high speed for high temperature)
J7 (phantom power) according to customer's specification.

**Setting the threshold $U_{vent}$:** Connect the diagnose board (1.918.080) to the Diagnostics [18] connector. $U_{temp}$ and $U_{vent}$ correlate with the temperature as follows:

| Utemp, Uvent | Temperature |
|---|---|
| 1.0 V | 40 °C |
| 1.5 V | 55 °C |
| 2.0 V | 65 °C |
| 2.5 V | 80 °C |
| 3.0 V | 95 °C |
| 3.5 V | 120 °C |

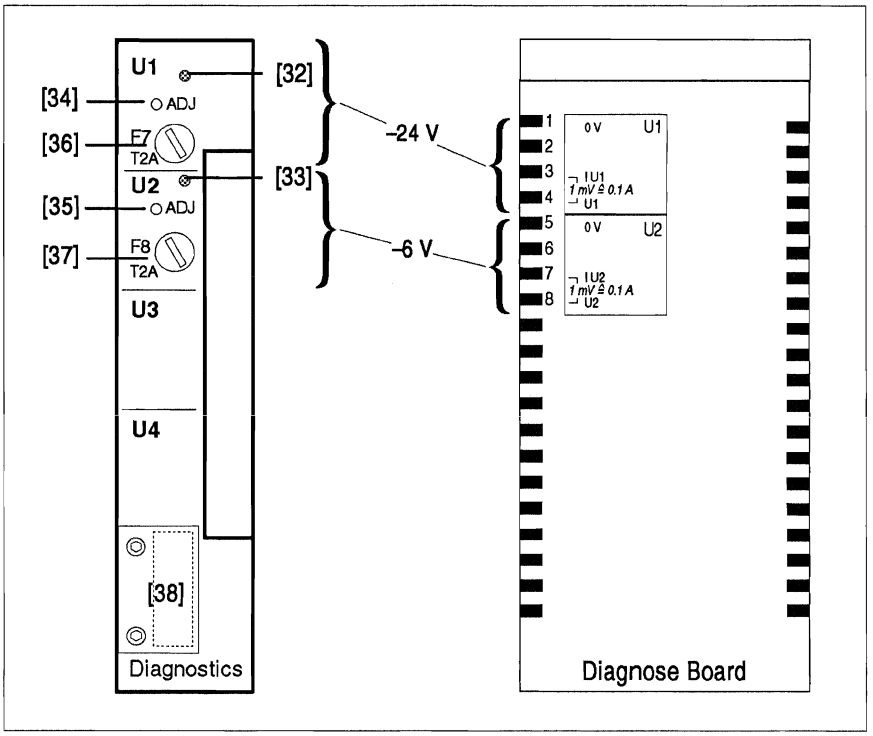
The voltage $U_{temp}$ represents the highest value of the various temperature sensors: transformer 1; transformer 2; heatsink 1; heatsink 2; heatsink standby/phantom.

- Measure $U_{vent}$ and set the switching threshold voltage according to the desired temperature with trimmer potentiometer FAN [13].
  The fan is switched to full speed as soon as $U_{temp}$ exceeds $U_{vent}$.
- Repeat this adjustment for all power supplies including slave and standby units.

**Factory setting:** Uvent = 3.5 V, corresponding to 120 °C.

**Dual stabilizer –6/–24 V**

The Stabilizer Board 1.918.087.81 is used for regulating the –6 V and –24 V voltages. These voltages can be measured at the 16-pin Diagnostics connector [38] by using the Diagnose Board.



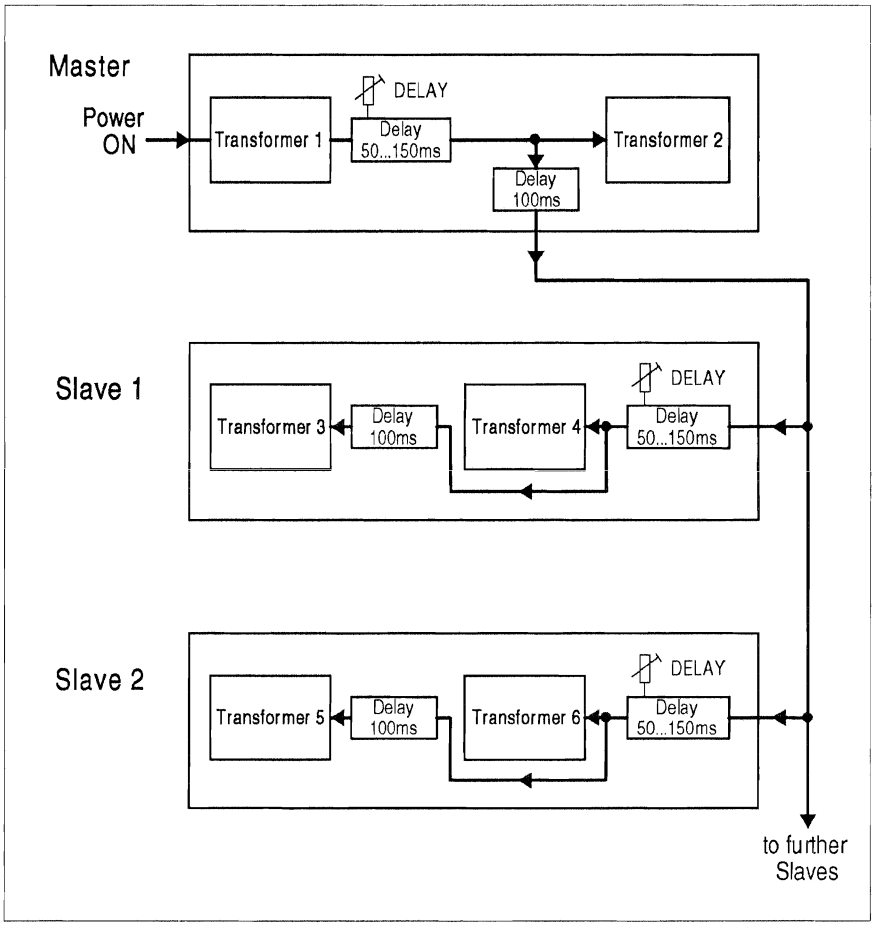

**Alignment:** Measure the voltages on the Diagnose Board.

- 0 V: pin 1 / –24V: pin 4; adjust with trimmer potentiometer ADJ [34] to **–24.0 V**.
- 0 V: pin 5 / –6V: pin 8; adjust with trimmer potentiometer ADJ [35] to **–6.0 V**.

**Power-on delay**

In a system with more than one power supply, the power-on delay prevents an overload when the mixing console is switched on. Between two transformers within the same housing the switch-on is delayed by approx. 100 ms. For transmitting the power-on pulse to the equipment input, a variable delay element (DELAY [12]) is available. The exact conditions are illustrated in the figure below.
An additional protection is provided by limiting the secondary inrush current by NTC elements.

- The delay times can be set "by ear". The power-on clicks of the individual transformers should be heard at regular intervals.
- Perform this adjustment on all power supplies. On slave power supplies the left-hand front panel section is blank, but the FAN and DELAY trimmer potentiometers are arranged at the same positions as on master power supplies.



## 2.16.2 Dual standby power supply/Master 1.918.420

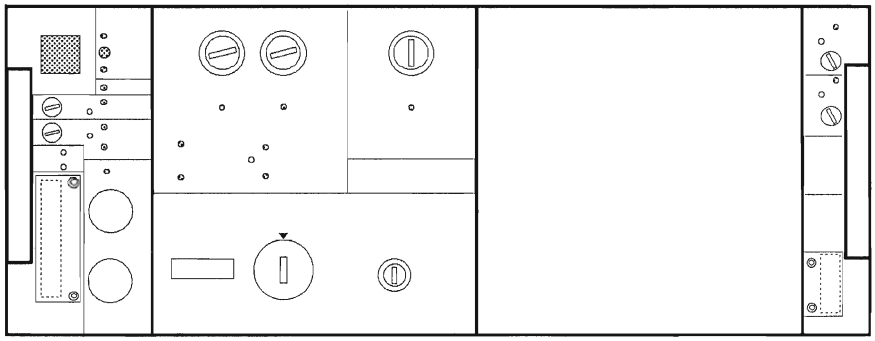
This alignment is only required if a dual supply with a standby power supply unit exists.

Perform the same adjustments as described in section 2.16.1. Of course, the diagnose board must be connected to the standby power supply. The basic difference applicable to standby units is:

| All voltages of the standby power supply must be set lower by 0.2 V. |
|---|

This setting ensures that only one of the units is loaded. The standby power supply operates in no-load mode and can assume the supply function immediately when this should be required.

## 2.16.3 Single power supply/Master 1.918.421



This power supply is used in smaller consoles with lower power requirements.
The adjustments are the same as for the Dual power supply/Master as described in section 2.16.1.

## 2.16.4 Single standby power supply/Master 1.918.421

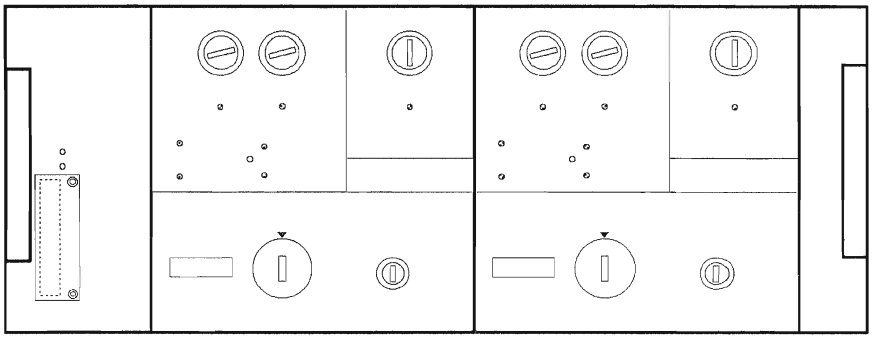
This alignment is only required if a dual supply with a standby power supply unit exists.

Perform the same adjustments as described in section 2.16.1. Of course, the diagnose board must be connected to the standby power supply. The basic difference applicable to standby units is:

| All voltages of the standby power supply must be set lower by 0.2 V. |
|---|

This setting ensures that only one of the units is loaded. The standby power supply operates in no-load mode and can assume the supply function immediately when this should be required.

## 2.16.5 Dual power supply/Slave 1.918.422



Slave power supplies increase the capacity of the power supply. In contrast to the master there is no standby/phantom unit.

**Alignment:** The alignment procedure follows the instructions in section 2.16.1. The fan and the switch-on delay are adjusted as described there. The corresponding holes through which the trimmer potentiometers are accessible are located in the blank front panel.

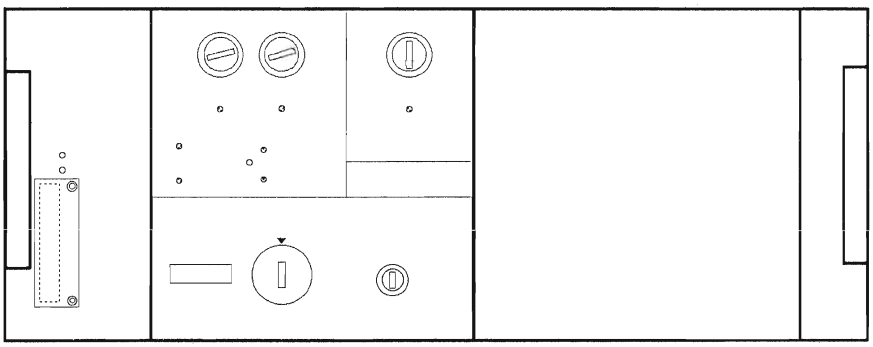
## 2.16.6 Dual standby power supply/Slave 1.918.422

This alignment is only required if a dual supply with a standby power supply unit exists.
Perform the same adjustments as described in section 2.16.1. Of course, the diagnose board must be connected to the standby power supply.
The basic difference applicable to standby units is:

| All voltages of the standby power supply must be set lower by 0.2 V. |
|---|

This setting ensures that only one of the units is loaded. The standby power supply operates in no-load mode and can assume the supply function immediately when this should be required.

## 2.16.7 Single power supply/Slave 1.918.423



Slave power supplies increase the capacity of the power supply. In contrast to the master there is no standby/phantom unit.

**Alignment:** The alignment procedure follows the instructions in section 2.16.1. The fan and the switch-on delay are adjusted as described there. The corresponding holes through which the trimmer potentiometers are accessible are located in the blank front panel.

## 2.16.8 Single standby power supply/Slave 1.918.423

This alignment is only required if a dual supply with a standby power supply unit exists.
Perform the same adjustments as described in section 2.16.1. Of course, the diagnose board must be connected to the standby power supply.
The basic difference applicable to standby units is:

| All voltages of the standby power supply must be set lower by 0.2 V. |
|---|

This setting ensures that only one of the units is loaded. The standby power supply operates in no-load mode and can assume the supply function immediately when this should be required.

## 2.16.9 Dual supply with standby system/change-over

**General**

If maximum reliability is required, possible defects in the power supplies should be taken into consideration. By installing standby units it is possible to bridge a power supply failure without interference with normal operation. Two versions are feasible:

- Redundant cards are installed for all power converters in EU card format.
- The entire power supply system as well as the power converter cards are redundant.

**Power supply changeover**

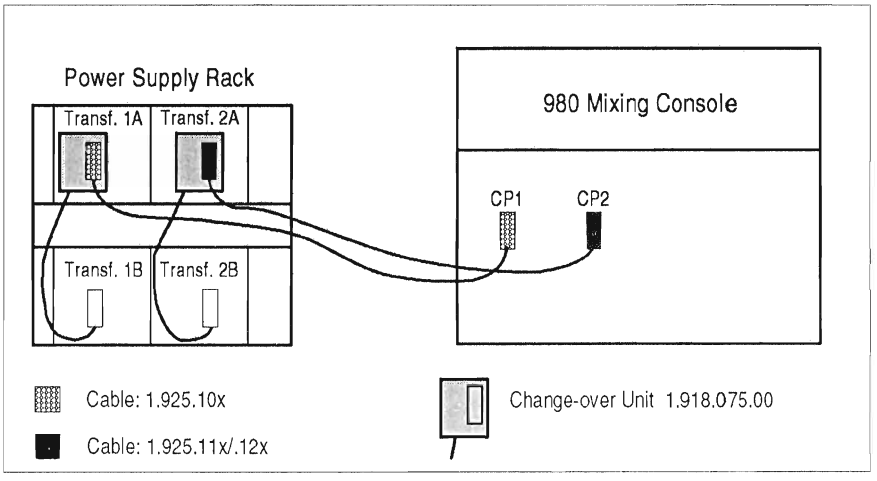
Two complete power supply complexes comprising master and slave units exists. The output voltage of each pair consisting of a main unit and standby unit are connected to the mixing console via change-over units. In the event of a supply voltage failure this change-over unit switches to the standby transformer without any interference. The change-over unit can be conveniently plugged into the 30-pin socket of the transformer block.

Required material:

- For each power supply unit one standby unit of the same type
- For each existing supply cable 1 Change-over unit 1.918.075

**Example**

In this simple example a dual master main power supply and a dual master standby power supply are connected via two change-over units. A control line (not shown in the figure) interconnects the two units into a system with networked alarm and function monitoring. The entire power supply system is redundant. The Change-Over unit 1.918.075.00 connects each transformer to its standby transformer and connects the higher of the two voltages to the mixing console.



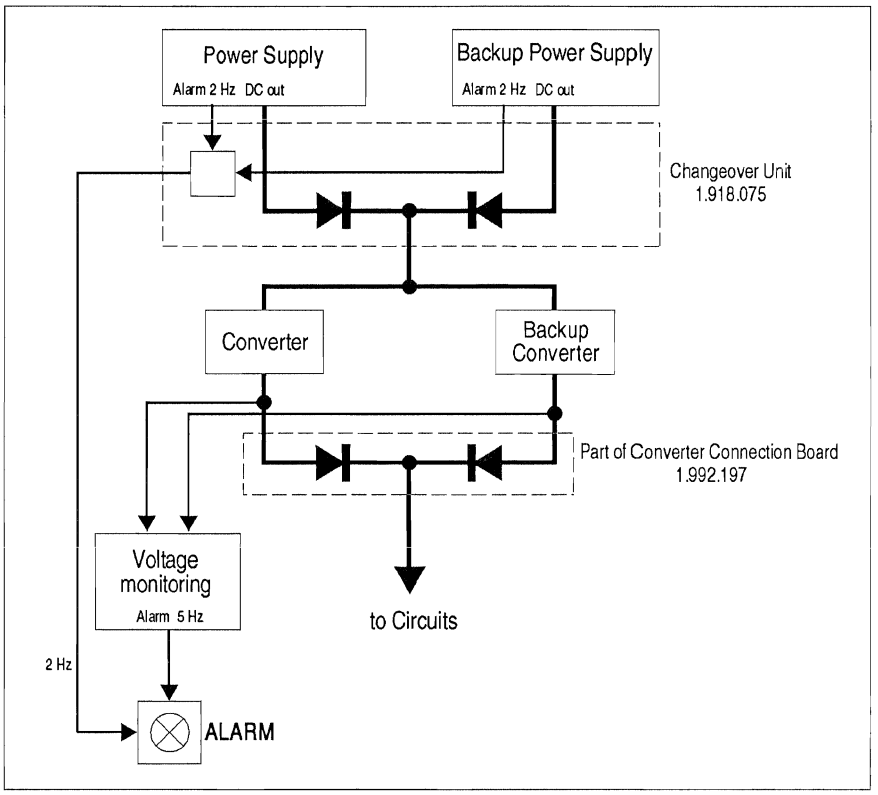
## 2.17 Alignment of the DC/DC converters 1.915.111

The DC/DC converter boards installed in the EU card rack of the console (power supply 3...6 V 1.915.111.81) convert the unregulated 25 V to:

- +5 V (supply of the logical circuits)
- $U_{LED}$ (adjustable LED supply)

As in the case of the power supplies a standby power converter with change-over can be installed for each converter.

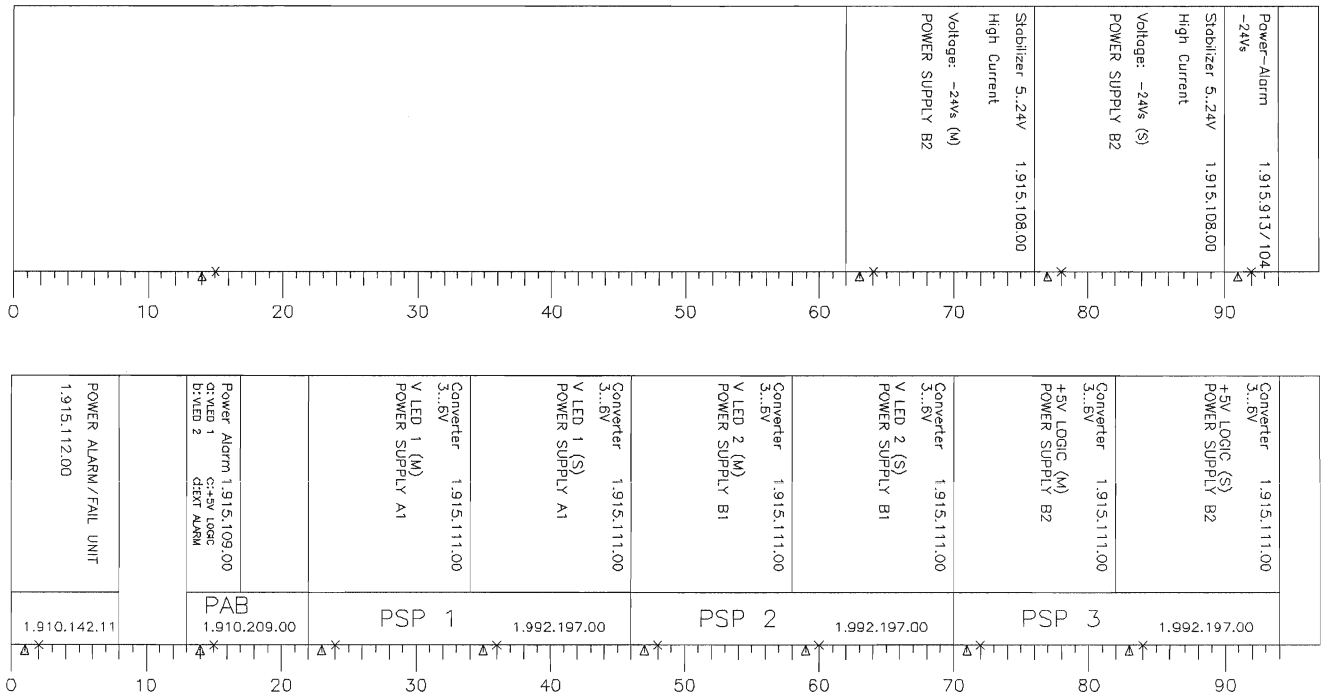
**Special case:** For a redundant power supply with at least one redundant power converter a "Diodes/Power Alarm 2 Board" is also installed.




Dual supply with standby units for power supply and converter boards. The alarm system monitors also the correct functioning of the standby unit.

For implementing the comprehensive alarm indications, the regulated output voltages of up to 8 converters are connected to a "Diodes/Power Alarm 2 Board" 1.915.109.
This board is only configured for consoles with standby converters (EU card rack).
The assignment of the converters to their loads is documented in the manual of the specific console. The main board is labeled as "a" or ".1", the standby board with "b" or ".2".

**Example from a specific console manual with standby converters:**




On consoles without standby supply the alignment is the same as for "main boards" (as described below), and the adjustments to the "standby boards" are not applicable.

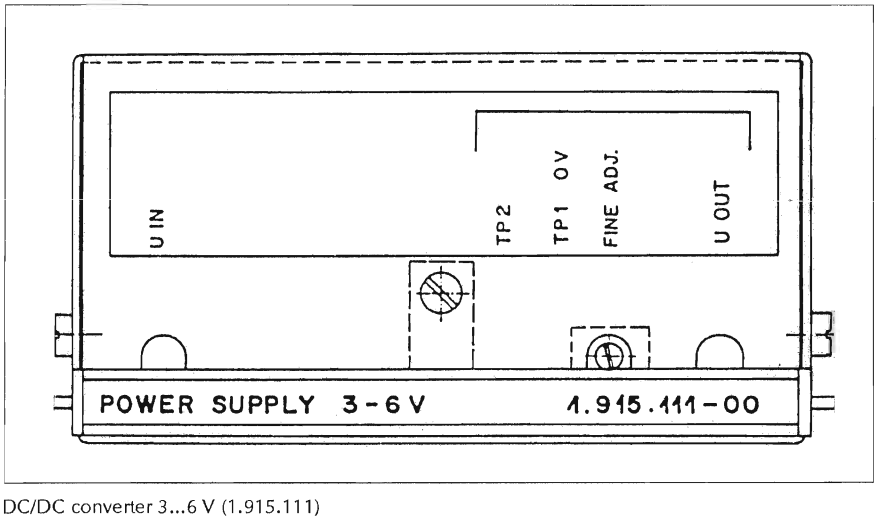
## 2.17.1 Alignment of +5 V Logic

**Main boards**

- Connect a digital multimeter ($R_i \geq 1$ MΩ) to the converter's **TP1** (0 V) and **TP2** (+U).
- Align to **+5.6 V** with **R45** ("FINE ADJ").
- Repeat the procedure for all 5 V converters.

**Standby boards**

- Align the standby converters to a voltage that is lower by **0.2V (i.e. to 5.4V)**.
- Repeat the procedure for all +5V logic standby converters.




DC/DC converter 3...6 V (1.915.111)

## 2.17.2 Alignment of $V_{LED}$ for consoles without standby supply

**Required tools:** Digital multimeter ($R_i \geq 1$ MΩ)
Diagnose board 1.918.080

**Alignment:** (also refer to the drawing in section 2.17.1)

- Turn the BRIGHTNESS potentiometer on the Sign./Indication Unit to the minimum, i.e. the counterclockwise stop.
- Connect the digital multimeter to the 1st converter ($V_{LED}$ 1) between test point TP1 (0 V) and TP2 ($V_{LED}$).
- Adjust $V_{LED}$ with trimmer potentiometer **FINE ADJ** (R45) to **+2.8 V**.
- Repeat this procedure on all existing converters for the LED supply (the number of existing converters depends on the size of the mixing console and can consequently vary).

## 2.17.3 Alignment of $V_{LED}$ for consoles with standby supply

**Required tools:** Digital multimeter ($R_i \geq 1$ MΩ)
Diagnose board 1.918.080

**Alignment:** (also refer to the drawing in section 2.17.1)

- *Switch the console OFF.*
- Connect the Diagnose board to P2 (16-pin connector) of the Diodes/ Power Alarm 2 Board (1.915.109; refer to section 2.17.4).
- Switch the console ON again.
- Turn the BRIGHTNESS potentiometer on the Sign./Indication Unit to the minimum, i.e. the counterclockwise stop.
- Turn the trimmer potentiometer FINE ADJ (R45) on all $V_{LED}$ converters to the maximum, i.e. the clockwise stop.
- Connect the digital multimeter to pin 1 (0V) and pin 5 (A1) of the Diagnose board.
- Adjust $V_{LED}$ 1.1 of the first main converter ("a") with its trimmer potentiometer **FINE ADJ** (R45) to **+2.9 V**.

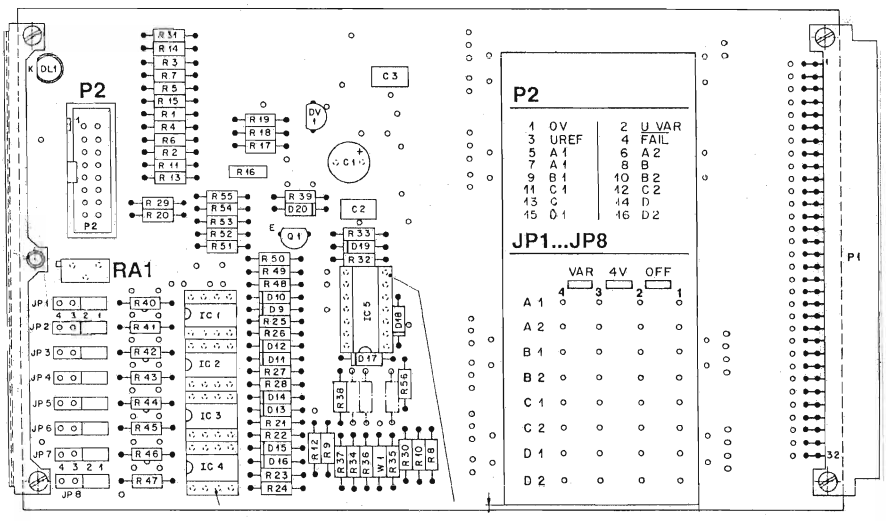
- Connect the digital multimeter to pin 1 (0V) and pin 6 (A2) of the Diagnose board.
- Adjust $V_{LED}$ 1.2 of the first standby converter ("b") with its trimmer potentiometer **FINE ADJ** (R45) to **+2.7 V**.

- Repeat the procedure for all other converter pairs. Main boards (*.1) are to be aligned to +2.9 V, standby boards (*.2) to +2.7 V.

  The pin assignment of P2 on the Diodes/Power Alarm 2 Board is shown in the figure in section 2.17.4.
  The correlation of the different converters to the positions A1...D2 on the alarm board is shown in the drawing of the EU card rack as well as in the wiring list of the power supply (refer to section 2.17.4).

## 2.17.4 Diodes/Power Alarm 2 Board 1.915.109.00

This board exists only in consoles with dual supply and standby converters. It monitors the regulated voltages of up to eight DC/DC converters. If one of them should fail, this alarm board causes flashing (approx. 5 Hz) of the ON/ALARM LED on the Sign./Indication Unit.
The jumpers JP1...JP8 set the voltage to which the converters are adjusted:
Position 4/3: VAR, for $V_{LED}$
Position 3/2: 4 V, for all other voltages
Position 2/1: OFF, for an unused input
The pin assignment of connector P2 to the voltages A1...D2 is specified in the figure below.




| CABLE KABEL | WIRE DRAHT | FROM/VON CONNECTOR PIN STECKER KONT | TO/NACH CONNECTOR PIN STECKER KONT | Q mm2 | VOLTAGE | SIGNAL NAME SIGNAL NAME | FROM VON | TO NACH |
|---|---|---|---|---|---|---|---|---|
| <11> | GRN | PSP 1 1: VLED | PAB 1 0: UA1 | 0.1 | VLED | VLED1.1 TO PWR ALARM | EUROBOARD | EUROBOARD |
| <12> | GRN | PSP 1 2: VLED | PAB 1 0: UA2 | 0.1 | VLED | VLED1.2 TO PWR ALARM | EUROBOARD | EUROBOARD |
| <13> | GRN | PSP 2 1: VLED | PAB 1 0: UB1 | 0.1 | VLED | VLED2.1 TO PWR ALARM | EUROBOARD | EUROBOARD |
| <14> | GRN | PSP 2 2: VLED | PAB 1 0: UB2 | 0.1 | VLED | VLED2.2 TO PWR ALARM | EUROBOARD | EUROBOARD |
| <15> | GRN | PSP 3 1: VLED | PAB 2 0: UA1 | 0.1 | VLED | VLED3.1 TO PWR ALARM | EUROBOARD | EUROBOARD |

| FROM column | | TO column | |
|---|---|---|---|
| PSP1.1 | Conn. board of converter 1.1 | PAB1 | Conn. board of alarm board 1 |
| PSP1.2 | Conn. board of converter 1.2 | PAB2 | Conn. board of alarm board 2 |
| | etc. | U A1 | Voltage A1 of an alarm board |
| | | U A2 | Voltage A2 of an alarm board |
| | | | etc. |

Extract from the wiring list of a console with 2 alarm boards.

**Example:** $V_{LED}$ 3.1 → UA1: On position A1 of the alarm board the (variable) $V_{LED}$ voltage is monitored. Jumper JP1 must consequently be set to VAR.
$V_{LED}$ 3.2 → UA2: On position A2 of the alarm board the (variable) $V_{LED}$ voltage is monitored. Jumper JP2 must consequently be set to VAR.

**Note:** Jumpers JP1...JP8 on the alarm board are factory set according to these specifications.

**Setting the alarm threshold**

After all converters have been aligned the alarm threshold for the $V_{LED}$ voltage must be set:

- *Switch the console OFF.*
- Connect the Diagnose board to P2 (16-pin connector) of the Diodes/ Power Alarm 2 Board (1.915.109).
- Switch the console ON again.
- Turn the BRIGHTNESS potentiometer on the Sign./Indication Unit to the minimum, i.e. the counterclockwise stop.
- Connect the digital multimeter to pin 1 (0 V) and pin 2 (U VAR) of the Diagnose board.
- Turn the multiturn potentiometer RA1 until the LED DL1 is continuously on.
- The digital multimeter reading is e.g. +2.0 V.
- With RA1 adjust to 100 mV below the measured voltage. (Example: +2.0 V – 0.1 V = +1.9 V)

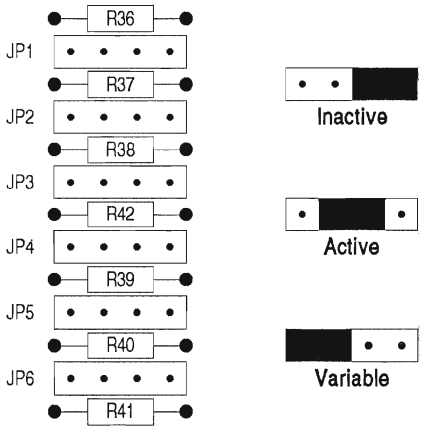
**Checking the alarm threshold**

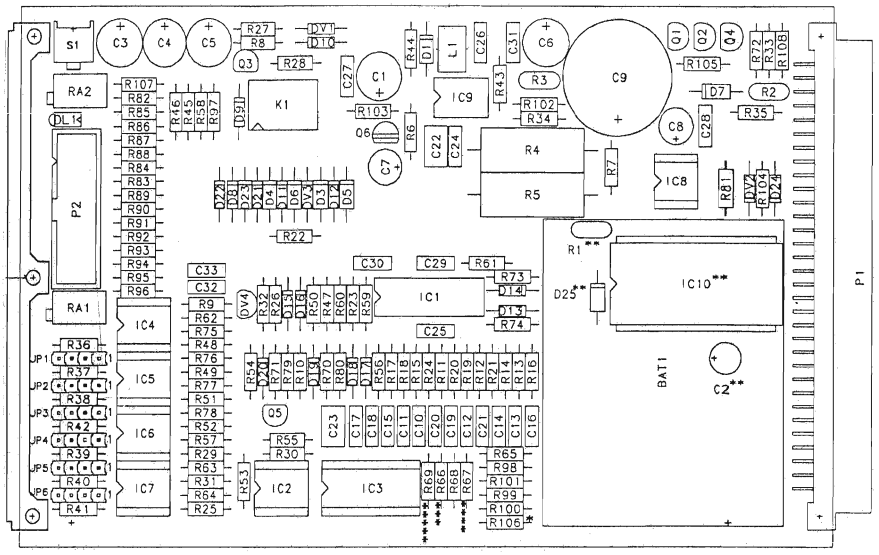
- Turn the BRIGHTNESS potentiometer on the Sign./Indication Unit to the maximum, i.e. the clockwise stop.
- LED **DL1** on the alarm board **should not flash**.
- Pull out each converter individually:
  - LED **DL1** on the alarm board **should flash** (approx. 5 Hz)
  - The **ON/ALARM** LED on the Sign./Indication Unit **should flash**
  - *Switch the console OFF*
  - Reinsert the converter
  - Switch the console ON again: **No alarm should be indicated.**
- Repeat the test with the other converters until all of them are checked.

## 2.17.5 Power Alarm/Fail 4 Board 1.915.112.00

This board has been introduced in consoles with serial No. 8017 and later. It is used for monitoring the output voltages of all the converters installed in the console (+5 V logic, +24 V, VLED) as well as the additional, regulated –6 V and –24 V FET voltages delivered from the Stabilizer Board 1.918.087.00 in the power supply unit(s).
A failure of one of these voltages will be indicated by fast flashing (approx. 5 Hz) of the ON/ALARM LED on the Sign./Indication Unit.

**Jumpers:** The various voltages to be monitored can be set to active, inactive, or (for $V_{LED}$) with variable threshold by means of the jumpers JP1...JP6.




**Alignment $V_{LED}$:** For adjusting the $V_{LED}$ threshold, all converters must have been aligned correctly according to sections 2.17.1...2.17.3.

- *Switch the console OFF.*
- Connect the Diagnose board to P2 (16-pin connector) of the Power Alarm/Fail 4 Board (1.915.112).
- Switch the console ON again.
- Turn the BRIGHTNESS potentiometer on the Sign./Indication Unit to the minimum, i.e. the counterclockwise stop.
- Connect the digital multimeter to pin 7 (0 V) and pin 1 (U VAR) of the Diagnose board.
- Turn the multiturn potentiometer **RA1** until the LED DL1 is **continuously on.**
- The digital multimeter reading is e.g. +2.8 V.
- With **RA1** adjust to **200...300 mV below the measured voltage.** (Example: +2.8 V – 0.2...0.3 V = +2.5...2.6 V)

**Alignment DC/DC converter:** For consoles equipped with built-in rechargeable battery or operating from a car battery, the standby DC/DC converter has to be aligned in addition.

- Separate the console completely from the mains.
- Remove the Power Alarm/Fail 4 Board and reconnect it via the bus adapter 1.228.327.82 (contained in the accessories set, refer to 1.2.4).
- Connect the digital multimeter to pin 4a ($+U_{SB}$) and pin 28a (0 V) of P1 on the Power Alarm/Fail 4 Board.
- Align the DC/DC converter output voltage with the multiturn potentiometer **RA2** to **+5 VDC**.

# Schemata / Circuit Diagrams

Wegweiser durch den Schema-Dschungel
How to find your way through the diagrams jungle

## Fader Units

### Structure lists and block diagrams:


Fader Unit (Mono) ..... 1.980.110.00
Block Diagram Mono Fader Unit ..... 1.980.110.00

Fader Unit (Film/HDTV, Mono) ..... 1.980.111.00
Block Diagram HDTV Fader Unit ..... 1.980.111.00

Fader Unit (Stereo) ..... 1.980.120.00
Block Diagram Stereo Fader ..... 1.980.120.00

Fader Unit (Mono, VCA) ..... 1.980.130.00
Block Diagram VCA Fader Unit ..... 1.980.130.00

Fader Unit (Mono, Film/HDTV, VCA) ..... 1.980.131.00
Block Diagram HDTV VCA Fader Unit ..... 1.980.131.00

Fader Unit (Stereo, VCA) ..... 1.980.140.00
Block Diagram Stereo Fader with VCA ..... 1.980.140.00

Fader Unit (Mono, w. motor fader) ..... 1.980.150.00
Block Diagram Motor Fader Unit Mono ..... 1.980.150.00

Fader Unit (Mono, Film/HDTV, w. motor fader) ..... 1.980.151.00
Block Diagram HDTV Motor Fader Unit ..... 1.980.151.00

Fader Unit (Stereo, w. motor fader) ..... 1.980.160.00
Block Diagram Motor Fader Unit Stereo ..... 1.980.160.00


### Circuit diagrams and component layouts:


Fader Main Board ..... 1.980.102.81

Fader Switch Board ..... 1.980.109.00

Fader Film Pan Pot Board ..... 1.980.117.00

Fader VCA Side Board (Mono) (IC2 and IC4 not used) ..... 1.980.133.00

Fader VCA Side Board (Stereo) ..... 1.980.143.00

3 Pot 12.5 mm Board ..... 1.990.298.00

## Parts lists:

Fader Switch Board ..... 1.980.109.70

Fader Pan Pot Board (Film) ..... 1.980.117.00

Fader Side Board (Mono, VCA) ..... 1.980.133.00

Fader Side Board (Stereo, VCA) ..... 1.980.143.00

Fader Main Board (Mono) ..... 1.980.190.00

Fader Main Board (Mono, VCA) ..... 1.980.191.00

Fader Main Board (Stereo) ..... 1.980.192.00

Fader Main Board (Stereo, VCA) ..... 1.980.193.00

Fader Main Board (Mono, Film) ..... 1.980.194.00

Fader Main Board (Mono, Film, VCA) ..... 1.980.195.00

Fader Switch Board (VCA) ..... 1.980.198.00

Fader Switch Board (Univ.) ..... 1.980.199.00

## Pin Assignments:

P1A VCA FADER UNIT to INPUT/FADER CONNECTION BOARD
Valid for:
- Fader Side Board Mono ..... 1.980.133.00
- Fader Side Board Stereo ..... 1.980.143.00

P1B VCA FADER UNIT to INPUT/FADER CONNECTION BOARD
Valid for:
- VCA Fader, Mono ..... 1.980.130.00
- VCA Fader, Mono, Film/HDTV ..... 1.980.131.00
- VCA Fader, Stereo ..... 1.980.140.00

P2B FADER UNIT to INPUT/FADER CONNECTION BOARD
Valid for: All Fader Units

P2C1 20-pin flat cable connection FADER SWITCH BOARD (P1) to FADER MAIN BOARD (P11)
Valid for: All Fader Units

P2C2 16-pin direct connection FADER SWITCH BOARD (P2) to FADER MAIN BOARD (P12)
Valid for: All Fader Units

P2C3 16-pin flat cable connection FADER SWITCH BOARD (P3) to FADER VCA SIDE BOARD (P3)
Valid for: VCA Fader Units only

## Master Units

### Structure lists and block diagrams:

Dual Master Unit ..... 1.980.180.00
Block Diagram Dual Master Unit ..... 1.980.180.00

Dual Master Unit with 1 Limiter Switch ..... 1.980.181.00
Block Diagram Dual Master Unit with 1 Limiter Switch ..... 1.980.181.00

Dual Master Unit with 2 Limiter Switches ..... 1.980.182.00
Block Diagram Dual Master Unit with 2 Limiter Switches ..... 1.980.182.00

Mono Master Unit ..... 1.980.183.00
Block Diagram Mono Master Unit ..... 1.980.183.00

Mono Master Unit with 1 Limiter Switch ..... 1.980.184.00
Block Diagram Mono Master Unit with 1 Limiter Switch ..... 1.980.184.00

Mono Master Unit with Limiter + Link Switches ..... 1.980.185.00
Block Diagram Mono Master Unit with Limiter + Link Switches .. 1.980.185.00

### Circuits diagrams and component layouts:

Dual Master Unit ..... 1.980.180.00

Master Board ..... 1.980.187.00

Master Board CH2 ..... 1.980.188.00

Master Switch Board ..... 1.980.189.00

### Parts lists:

Dual Master Unit ..... 1.980.180.00

Dual Master Unit with 1 Limiter Switch ..... 1.980.181.00

Dual Master Unit with 2 Limiter Switches ..... 1.980.182.00

Mono Master Unit ..... 1.980.183.00

Mono Master Unit with 1 Limiter Switch ..... 1.980.184.00

Mono Master Unit with Limiter + Link Switches ..... 1.980.185.00

Master Board CH1 ..... 1.980.187.00

Master Board CH2 ..... 1.980.188.00

Master Switch Board ..... 1.980.189.00

## Central Control

**Circuit diagrams, component layouts, and parts lists:**

**Central Control Unit ..... 1.980.820.21**
**consisting of:**

**Central Control µP Board ..... 1.980.822.22**

**Central Control Switch Board ..... 1.980.829.00**

# Wegweiser durch den Schema-Dschungel

Wenn Sie als Kind mit LEGO®-Bausteinen gespielt haben, dann wird es Ihnen nicht schwerfallen, das modulare System, nach dem die Einschübe des 980er-Mischpultes zusammengestellt werden, zu verstehen.
Wäre dieser Schemateil in der üblichen Weise (Schema, Bestückungsplan, Stückliste für jeden einzelnen Einschub) aufgebaut worden, dann wäre diese Anleitung mindestens doppelt so dick und viel komplexer geworden.
Für jeden Einschub wurde deshalb eine Strukturliste kreiert, auf die unmittelbar das Blockschema des betreffenden Einschubes folgt. Am Anfang jedes der Schema-Kapitel, die nach dem neuen System aufgebaut sind, sind die entsprechenden Strukturlisten angeordnet. Diese Strukturlisten dienen als Wegweiser, die Sie durch die Sammlung der Schema-, Bestückungsplan- und Stücklisten-«Bausteine» führen.

**Schauen wir zwei Beispiele mit der Mono Fader Unit (Bestell-Nr. 1.980.110.00) an.**

**Assemblies structure:**

Die «Assemblies structure»-Liste gibt an, aus welchen Unterbaugruppen jeder Einschub besteht. In unserem Fall sind dies das *Mono Main Board 1.980.190.00*, das *Universal Switch Board 1.980.199.00*, und zwei kleine Baugruppen mit Potentiometern.

1. Das *Mono Main Board 1.980.190.00* ist auf dem *Fader Main PCB* bestückt (d.h. der «nackten» gedruckten Schaltung, identifiziert durch die letzten zwei Stellen der Bauteil-Nr. mit *.11*, *.12*, etc.; in unserem Fall also Bauteil-Nr. *1.980.102.11*).
2. Das *Switch Board* ist auf dem *Switch PCB* bestückt (d.h. der «nackten» gedruckten Schaltung, identifiziert durch die letzten zwei Stellen der Bauteil-Nr. mit *.11*, *.12*, etc.; in unserem Fall also Bauteil-Nr. *1.980.109.11*).
   Auf dieser gedruckten Schaltung ist eine Anzahl von Standard-Bauelementen bestückt, die für jede der Versionen der Switch Board-Baugruppe verwendet werden; dies ergibt die Baugruppe mit der Nummer *1.980.109.70*.
   Diese Baugruppe ist in dieser Form nicht funktionsfähig und wird, abhängig von der gewünschten Einschub-Version, durch zusätzliche Komponenten ergänzt; in unserem Fall ergibt sich daraus das *Universal Switch Board*, Bestell-Nr. *1.980.199.00*.

**Circuit diagrams:**

1. Das Schaltschema des *Main Board 1.980.102.00* besteht aus vier Seiten. Von der vierten Seite existieren drei verschiedene Versionen (4a, b, c), die je nach der Version des Fader-Einschubes verwendet werden. Für unser Beispiel mit dem *Mono Main Board 1.980.190.00* sind gemäss dem Abschnitt «Circuit diagrams» die Schemaseiten *1, 2, 3* und *4a* anzuwenden.
2. Das allgemeine Schaltschema des *Fader Switch Board* finden Sie, gemäss dem Abschnitt «Circuit diagrams», unter der Nummer *1.980.109.00*. Beachten Sie bitte, dass nicht alle Bauteile des Schemas für jede Einschubversion gebraucht werden (z.B. entweder DL3, oder DL4 und DL5). Die für eine bestimmte Version notwendigen Komponenten entnehmen Sie bitte der entsprechenden Stückliste.

**Layout drawings:**

1. Den allgemeinen Bestückungsplan des *Mono Main Board* finden Sie unmittelbar nach dessen Schema unter der Nummer *1.980.102.00*, wie unter «Component layout drawings» angegeben. Beachten Sie bitte, dass nicht alle Bauteile des Schemas für jede Einschubversion gebraucht werden. Die für eine bestimmte Version notwendigen Komponenten entnehmen Sie bitte der entsprechenden Stückliste.
2. Den allgemeinen Bestückungsplan des *Fader Switch Board* finden Sie unmittelbar nach dessen Schema unter der Nummer *1.980.109.00*, wie unter «Component layout drawings» angegeben. Beachten Sie bitte, dass nicht alle Bauteile des Schemas für jede Einschubversion gebraucht werden (z.B. entweder DL3, oder DL4 und DL5). Die für eine bestimmte Version notwendigen Komponenten entnehmen Sie bitte der entsprechenden Stückliste.

**Parts lists:**

1. Für die Baugruppe *Fader Main Board (Mono) 1.980.190.00* gilt die Stückliste *Fader Main Board (Mono) 1.980.190.00*, wie unter «Parts lists» angegeben.
2. Für die Baugruppe *Fader Switch Board (Univ.)* sind zwei verschiedene Stücklisten notwendig (*Fader Switch Board 1.980.109.70* und *Fader Switch Board (Univ.) 1.980.199.00*), wie unter «Parts lists» angegeben. Wie weiter oben bereits erwähnt, enthält die Stückliste *...70* allgemeine Bauteile für verschiedene Baugruppen; die Stückliste *1.980.199.00* enthält alle zusätzlichen Teile, die die Baugruppe *....70* zum gewünschten Einschub *Fader Switch Board (Univ.) 1.980.199.00* machen.

# How to find your way through the diagrams jungle

If you ever played with LEGO® building blocks as a child, it will be very easy for you to understand the modular system according to which the 980 mixing console's modules are assembled.
If the diagrams sections would have been edited in the conventional way (i.e. an schematic diagram, a component layout drawing, as well as a parts list for every individual module), this manual would have been at least twice as thick as it is now – and much more complex.
For every module there has been created a so-called structure list, immediately *followed by a block diagram of the module concerned. The structure lists can be found at the beginning of every section dealing with modules composed according to the* new system. These structure lists can be used as signposts indicating your way through the collection of schematic diagrams, component layout drawings, and parts lists "building blocks".

**Let's have two examples with the Mono Fader Unit, part No. 1.980.110.00**

**Assemblies structure:**

The "Assemblies structure" list indicates which sub-modules a module consists of. In our case, there is a *Mono Main Board 1.980.190.00*, a *Universal Switch Board 1.980.199.00*, and two small boards carrying different potentiometers.

1. The *Mono Main Board 1.980.190.00* is assembled using the *Fader Main PCB* (i.e. the "empty" printed circuit board, identified by the two last digits of the part No. being *.11*, *.12*, etc.; in our case, its part No. *1.980.102.11*).
2. The *Switch Board* is assembled using the *Switch PCB* (i.e. the "empty" printed circuit board, identified by the two last digits of the part No. being *.11*, *.12*, etc.; in our case, its part No. is *1.980.109.11*).
   On this PCB there is a number of standard components being used for all versions of the Switch Board module, establishing a module identified by the part No. *1.980.109.70.* This module, together with additional components which are varying from one module to the next, establishes the *Universal Switch Board*, part No. *1.980.199.00.*

**Circuit diagrams:**

1. The circuit diagram of the *Main Board 1.980.102.00* consists of 4 pages; of the 4th page, however, there exist 3 different versions (4a, b, c) which are used depending on the desired fader module version. The version to be applied to a particular unit is indicated in the "Circuit diagrams" section. For our *Mono Main Board 1.980.190.00* example, the following diagram pages apply: *1, 2, 3, and 4a*, as indicated in the "Circuit diagrams" section.
2. The general circuit diagram of the *Fader Switch Board* can be found under the number *1.980.109.00*, as indicated in the "Circuit diagrams" section. Please note that not all the components indicated in the diagram are used for the same module (e.g. either DL3, or DL4 and DL5). The components used for a particular module version are indicated in the corresponding parts list.

**Layout drawings:**

1. The general component layout drawing of the *Mono Main Board* unit can be found immediately after its circuit diagram pages under the number *1.980.102.00*, as indicated in the "Component layout drawings" section. Please note that not all the components indicated in the drawing are used for the same module. The components used for a particular version of the module are indicated in the corresponding parts list.
2. The general component layout drawing of the *Fader Switch Board* unit can be found immediately after its circuit diagram under the same number *1.980.109.00*, as indicated in the "Component layout drawings" section. Please note that not all the components indicated in the drawing are used for the same module (e.g. DL3, or DL4 and DL5). The components used for a particular version of the module are indicated in the corresponding parts list.

**Parts list(s):**

1. For the *Fader Main Board (Mono) 1.980.190.00* the parts list *Fader Main Board (Mono) 1.980.190.00* applies, according to the "Parts lists" section.
2. For the *Fader Switch Board (Univ.)* module, you need two different parts lists (*Fader Switch Board 1.980.109.70*, and *Fader Switch Board (Univ.) 1.980.199.00*), as indicated in the "Parts lists" section. As mentioned above, the *...70* list contains the general parts for several different modules; the *1.980.199.00* parts list contains the additional parts used to convert the *....70* module to our particular *Fader Switch Board (Univ.) 1.980.199.00.*

# Fader Unit (Mono) 1.980.110.00

## Assemblies structure

| | |
|---|---|
| **Fader Main Board (Mono)** | 1.980.190.00 |
| **Fader Main PCB** | 1.980.102.11 |
| **Fader Switch Board (Univ.)** | 1.980.199.00 |
| **Fader Switch Board** | 1.980.109.70 |
| **Fader Switch PCB** | 1.980.109.11 |
| **Fader Dir Pot Board** | 1.980.105.00 |
| **3 Pot 12.5 mm PCB** | 1.990.298.11 |
| **Fader Pan Pot Board** | 1.980.106.00 |
| **3 Pot 12.5 mm PCB** | 1.990.298.11 |

## Block diagram

| | |
|---|---|
| **Mono Fader Unit** | 1.980.110.00 |

## Circuit diagrams

| | |
|---|---|
| **Fader Main Board** | 1.980.102.81, *pages 1; 2; 3; 4a* |
| **Fader Switch Board** | 1.980.109.00 |
| **Fader Dir Pot Board** | on 1.980.102.81, *page 3* (assembly 1.980.105.00) |
| **Fader Pan Pot Board** | on 1.980.102.81, *page 4a* (assembly 1.980.106.00) |
| **3 Pot 12.5 mm Board** | 1.990.298.00 |

## Component layout drawings

| | |
|---|---|
| **Fader Main Board** | 1.980.102.81 |
| **Fader Switch Board** | 1.980.109.00 |
| **3 Pot 12.5 mm PCB** | 1.990.298.00 |

## Parts lists

| | |
|---|---|
| **Fader Switch Board** | 1.980.109.70 (general parts only) |
| **Fader Main Board (Mono)** | 1.980.190.00 |
| **Fader Switch Board (Univ.)** | 1.980.199.00 |

## Connector pin assignments

P2B, P2C1, P2C2

## Comments

| | |
|---|---|
| **Meter:** | VU or PPM characteristics selectable with jumper, or centrally via VAR bus. |
| **Meter:** | OPTION MCH. Input Right re-wired to IN2 |
| **Talkback:** | OPTION USER = TB |
| **DIR OUT:** | OPTION USER = DIR OUT ON/OFF |
| **DIR OUT:** | OPTION MCH instead of MPX |
| **USER:** | Normally used for CH SEL/CCU. This function is omitted if the USER key is used for another purpose. |

## Options with PFL fader mute

### Input Units

**Normal operation:**

PFL and APL are independent of fader and mute.

**Option 1, PFL audio mute:**

PFL is depending on fader and mute. No effect on APL. The PFL LED remains on. PFL audio is muted. The PFL signalization is switched off (PFL to monitor). No other parameters as master signalization or input selection have an effect. The possibility of mutually unlatching remains.

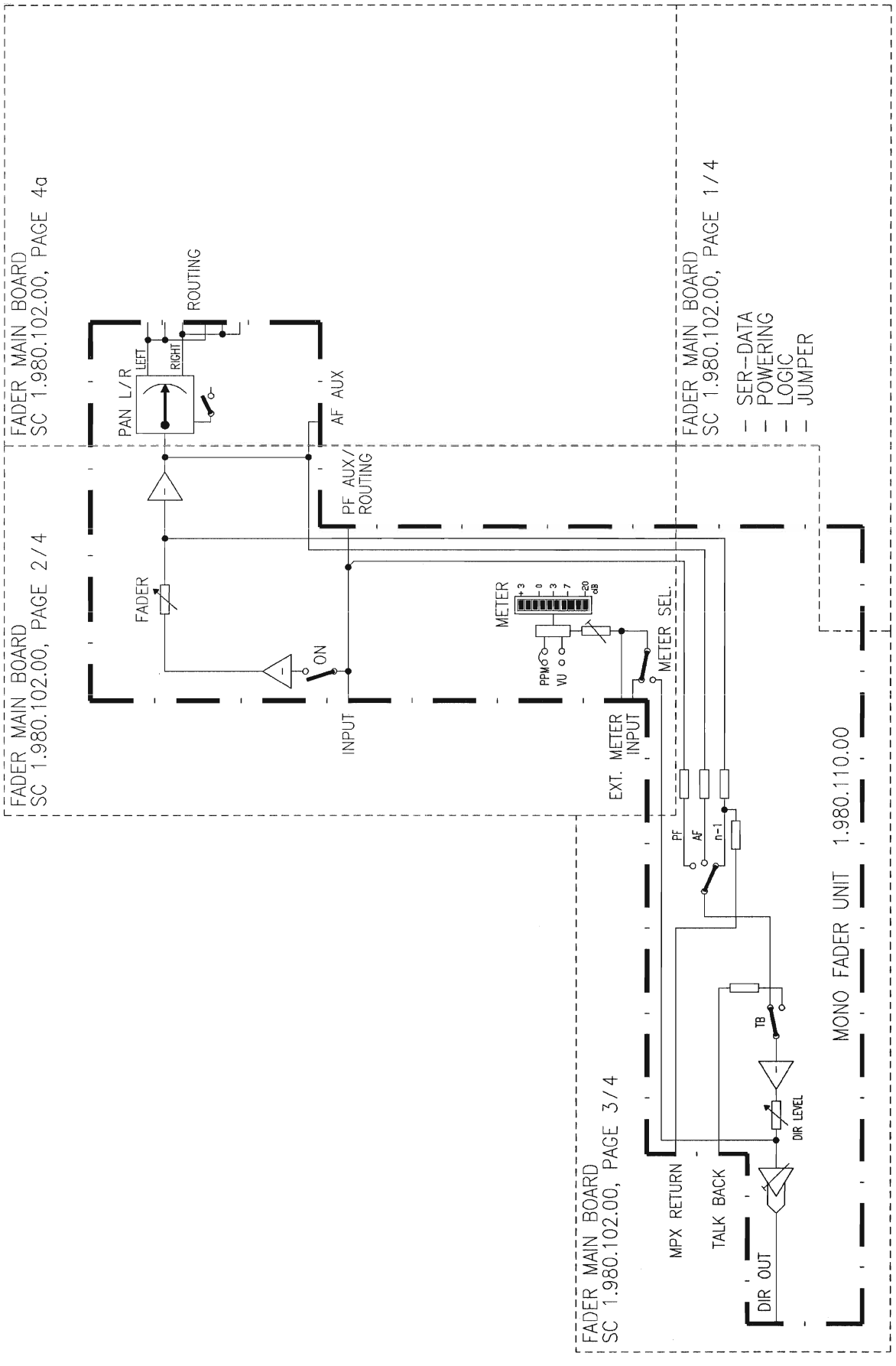
Fixed wiring. TP8 of the input unit is connected to 0 V with a stranded wire.

**Option 2, PFL with fader start reset:**

PFL is depending on the fader and mute. No effect on APL. When opening the fader or the mute switch, the PFL switch is reset.
No other parameters as master signalization or input selection have an effect. The possibility of mutually unlatching remains.

Not frequently used; fixed wiring. TP7 is connected to ground by a printed conductor; for installing option 2, this conductor must be interrupted, and TP7 must be connected to +5 Vcc by a stranded wire.

## BLOCK DIAGRAM
## MONO FADER UNIT 1.980.110.00



# Fader Unit (Film/HDTV, Mono) 1.980.111.00

## Assemblies structure

| | |
|---|---|
| **Fader Main Board (Mono, Film/HDTV)** | 1.980.194.00 |
| **Fader Main PCB** | 1.980.102.11 |
| **Fader Switch Board (Univ.)** | 1.980.199.00 |
| **Fader Switch Board** | 1.980.109.70 |
| **Fader Switch PCB** | 1.980.109.11 |
| **Fader Film Div Pot Board** | 1.980.115.00 |
| **3 Pot 12.5 mm PCB** | 1.990.298.11 |
| **Fader Film Pan Pot Board** | 1.980.117.00 |
| **Fader Film Pan PCB** | 1.980.107.11 |

## Block diagram

| | |
|---|---|
| **HDTV Fader Unit** | 1.980.111.00 |

## Circuit diagrams

| | |
|---|---|
| **Fader Main Board** | 1.980.102.81, *pages 1; 2; 3; 4c* |
| **Fader Switch Board** | 1.980.109.00 |
| **Fader Film Div Pot Board** | on 1.980.102.81, *page 4c* (assembly 1.980.115.00) |
| **Fader Film Pan Pot Board** | 1.980 117.00 as well as on 1.980.102.81, *page 4c* |
| **3 Pot 12.5 mm Board** | 1.990.298.00 |

## Component layout drawings

| | |
|---|---|
| **Fader Main Board** | 1.980.102.81 |
| **Fader Switch Board** | 1.980.109.00 |
| **Fader Film Pan Pot Board** | 1.980.117.00 |

## Parts lists

| | |
|---|---|
| **Fader Switch Board** | 1.980.109.70 (general parts only) |
| **Fader Main Board (Mono, Film)** | 1.980.194.00 |
| **Fader Switch Board (Univ.)** | 1.980.199.00 |
| **Fader Film Pan Pot Board** | 1.980.117.00 |

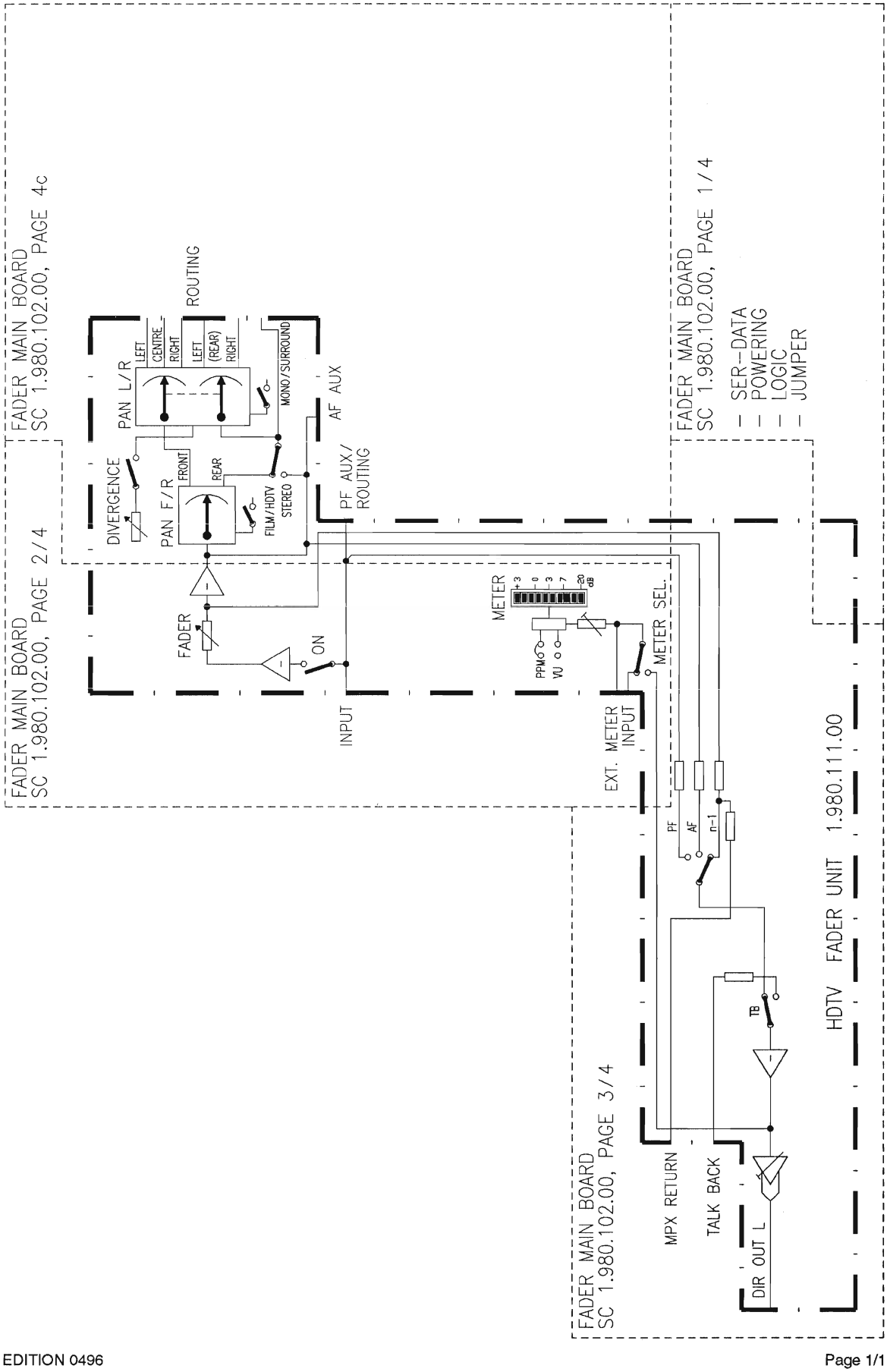
## Connector pin assignments

P2B, P2C1, P2C2

## Comments

| | |
|---|---|
| **Meter:** | VU or PPM characteristics selectable with jumper, or centrally via VAR bus. |
| **Meter:** | OPTION MCH. Input Right re-wired to IN2 |
| **Talkback:** | OPTION USER = TB |
| **DIR OUT:** | Level potentiometer not used. |
| **DIR OUT:** | OPTION USER = DIR OUT ON/OFF |
| **DIR OUT:** | OPTION MCH instead of MPX |
| **FILM:** | any particular options |
| **USER:** | Normally used for CH SEL/CCU. This function is omitted if the USER key is used for another purpose. |

## BLOCK DIAGRAM
## HDTV FADER UNIT 1.980.111.00



# Fader Unit (Stereo) 1.980.120.00

### Assemblies structure

| | |
|---|---|
| **Fader Main Board (Stereo)** | 1.980.192.00 |
| **Fader Main PCB** | 1.980.102.11 |
| **Fader Switch Board (Univ.)** | 1.980.199.00 |
| **Fader Switch Board** | 1.980.109.70 |
| **Fader Switch PCB** | 1.980.109.11 |
| **Fader Dir Stereo Pot Board** | 1.980.125.00 |
| **3 Pot 12.5 mm PCB** | 1.990.298.11 |
| **Fader Bal Pot Board** | 1.980.126.00 |
| **3 Pot 12.5 mm PCB** | 1.990.298.11 |

### Block diagrams

| | |
|---|---|
| **Stereo Fader Unit** | 1.980.120.00 |

### Circuit diagrams

| | |
|---|---|
| **Fader Main Board** | 1.980.102.81, *pages 1; 2; 3; 4b* |
| **Fader Switch Board** | 1.980.109.00 |
| **Fader Dir Stereo Pot Board** | on 1.980.102.81, *page 3* (assembly 1.980.125.00) |
| **Fader Bal Pot Board** | on 1.980.102.81, *page 4b* (assembly 1.980.126.00) |
| **3 Pot 12.5 mm Board** | 1.990.298.00 |

### Component layout drawings

| | |
|---|---|
| **Fader Main Board** | 1.980.102.81 |
| **Fader Switch Board** | 1.980.109.00 |
| **3 Pot 12.5 mm Board** | 1.990.298.00 |

### Parts lists

| | |
|---|---|
| **Fader Switch Board** | 1.980.109.70 (general parts only) |
| **Fader Main Board (Stereo)** | 1.980.192.00 |
| **Fader Switch Board (Univ.)** | 1.980.199.00 |

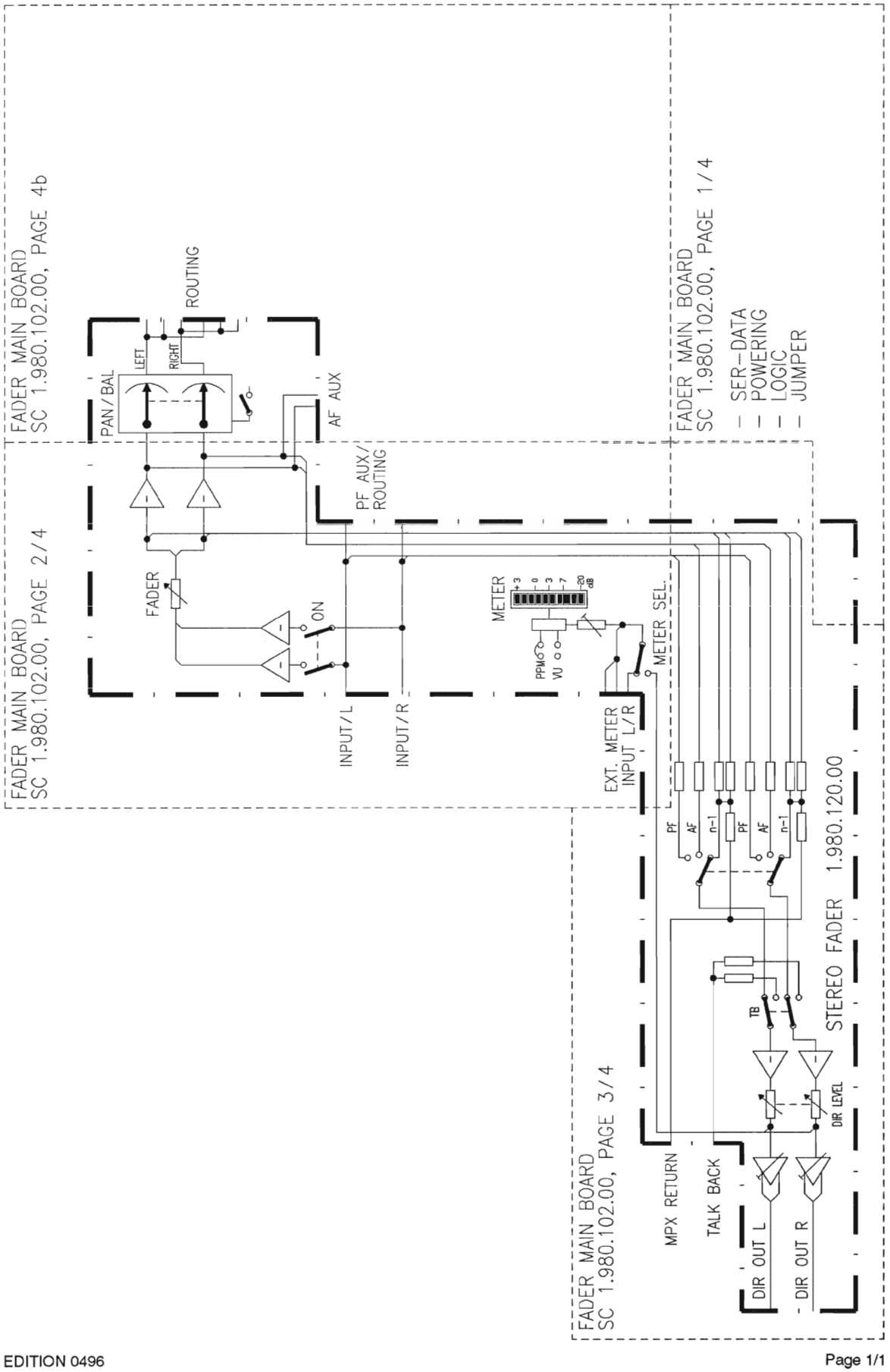
### Connector pin assignments

P2B, P2C, P2C2

### Comments

| | |
|---|---|
| **Meter:** | VU or PPM characteristics selectable with jumper, or centrally via VAR bus. |
| **Talkback:** | OPTION USER = TB |
| **DIR OUT:** | OPTION USER = DIR OUT ON/OFF |
| **USER:** | Normally used for CH SEL/CCU. This function is omitted if the USER key is used for another purpose. |

## BLOCK DIAGRAM
## STEREO FADER 1.980.120.00



# Fader Unit (Mono, VCA) 1.980.130.00

## Assemblies structure

| | |
|---|---|
| **Fader Main Board (Mono, VCA)** | 1.980.191.00 |
| **Fader Main PCB** | 1.980.102.11 |
| **Fader Switch Board (VCA)** | 1.980.198.00 |
| **Fader Switch Board** | 1.980.109.70 |
| **Fader Switch PCB** | 1.980.109.11 |
| **Fader Dir Pot Board** | 1.980.105.00 |
| **3 Pot 12.5 mm PCB** | 1.990.298.11 |
| **Fader Pan Pot Board** | 1.980.106.00 |
| **3 Pot 12.5 mm PCB** | 1.990.298.11 |
| **Fader Side Board (Mono, VCA)** | 1.980.133.00 |
| **Fader Side PCB (VCA)** | 1.980.103.11 |

## Block diagram

| | |
|---|---|
| **VCA Fader Unit** | 1.980.130.00 |

## Circuit diagrams

| | | |
|---|---|---|
| **Fader Main Board** | 1.980.102.81, *pages 1; 2; 3; 4a* | |
| **Fader Switch Board** | 1.980.109.00 | |
| **Fader Dir Pot Board** | on 1.980.102.81, *page 3* (assembly 1.980.105.00) | |
| **Fader Pan Pot Board** | on 1.980.102.81, *page 4a* (assembly 1.980.106.00) | |
| **3 Pot 12.5 mm Board** | 1.990.298.00 | |
| **Fader Side Board (Stereo, VCA)** | 1.980.133.00 | ***Note:*** Same diagram as stereo version; IC2, 4 not used. |

## Component layout drawings

| | | |
|---|---|---|
| **Fader Main Board** | 1.980.102.81 | |
| **Fader Switch Board** | 1.980.109.00 | |
| **3 Pot 12.5 mm Board** | 1.990.298.00 | |
| **Fader Side Board (Stereo, VCA)** | 1.980.133.00 | ***Note:*** Same diagram as stereo version; IC2, 4 not used. |

## Parts lists

| | |
|---|---|
| **Fader Switch Board** | 1.980.109.70 (general parts only) |
| **Fader Main Board (Mono, VCA)** | 1.980.191.00 |
| **Fader Switch Board (VCA)** | 1.980.198.00 |
| **Fader Side Board (Mono, VCA)** | 1.980.133.00 |

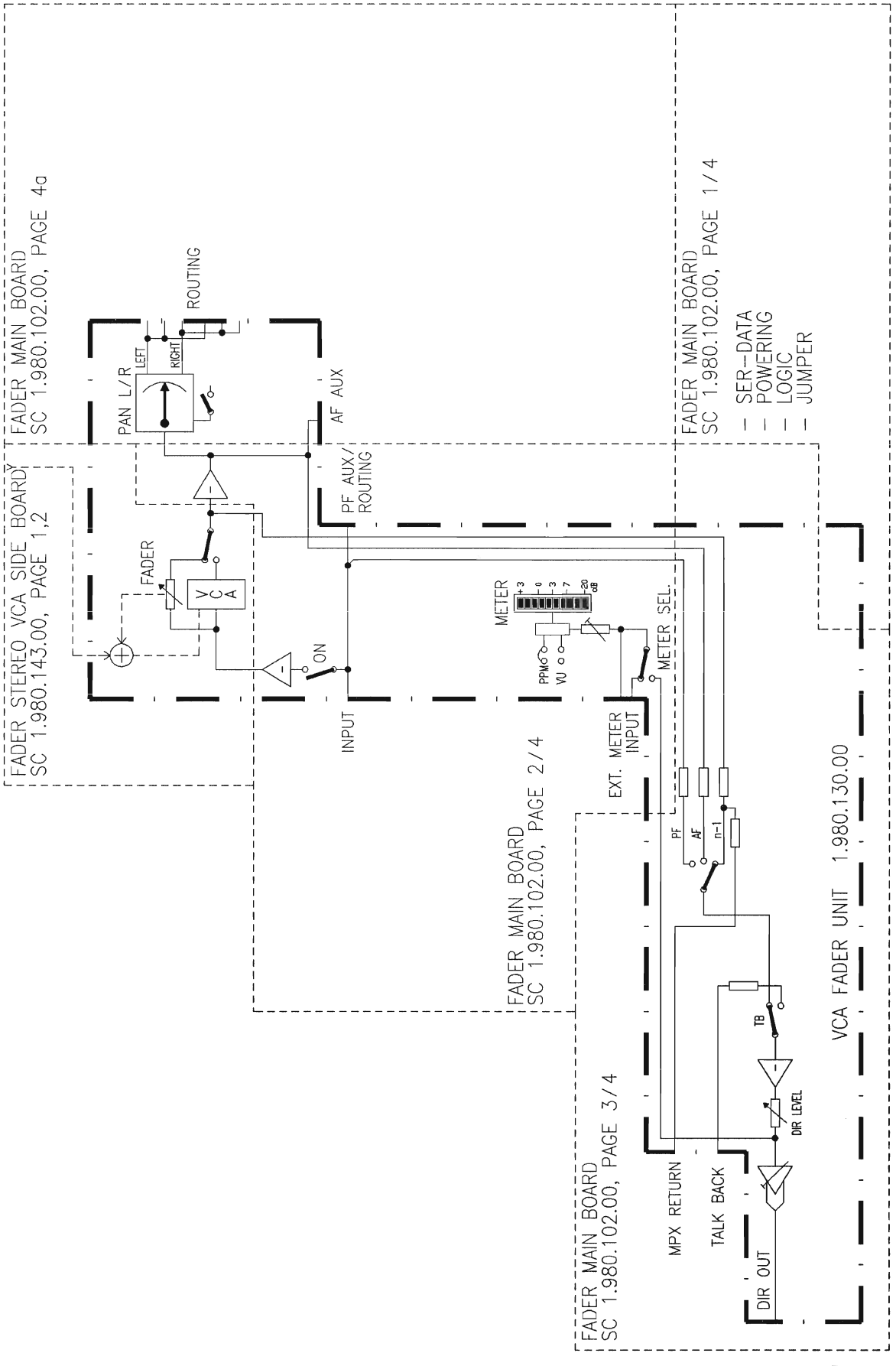
## Connector pin assignments

| | |
|---|---|
| **FADER UNIT** | P1B, P2B, P2C1, P2C2 |
| **VCA UNIT** | P1A |

## Comments

| | |
|---|---|
| **Meter:** | VU or PPM characteristics selectable with jumper, or centrally via VAR bus. |
| **Meter:** | OPTION MCH. Input Right re-wired to IN2 |
| **Talkback:** | OPTION USER = TB |
| **DIR OUT:** | OPTION USER = DIR OUT ON/OFF |
| **DIR OUT:** | OPTION MCH instead of MPX |
| **USER:** | Normally used for CH SEL/CCU. This function is omitted if the USER key is used for another purpose. |

## BLOCK DIAGRAM
## VCA FADER UNIT 1.980.130.00



# Fader Unit (Mono, Film/HDTV, VCA) 1.980.131.00

## Assemblies structure

| | |
|---|---|
| **Fader Main Board (Mono, Film/HDTV, VCA)** | 1.980.195.00 |
| **Fader Main PCB** | 1.980.102.11 |
| **Fader Switch VCA Board** | 1.980.198.00 |
| **Fader Switch Board** | 1.980.109.70 |
| **Fader Switch PCB** | 1.980.109.11 |
| **Fader Film Div Pot Board** | 1.980.115.00 |
| **3 Pot 12.5 mm PCB** | 1.990.298.11 |
| **Fader Film Pan Pot Board** | 1.980.117.00 |
| **Fader Film Pan PCB** | 1.980.107.11 |
| **Fader Side Board (Mono, VCA)** | 1.980.133.00 |
| **Fader VCA Side PCB** | 1.980.103.11 |

## Block diagram

| | |
|---|---|
| **HDTV VCA Fader Unit** | 1.980.131.00 |

## Circuit diagrams

| | | |
|---|---|---|
| **Fader Main Board** | 1.980.102.81, *pages 1; 2; 3; 4c* | |
| **Fader Switch Board** | 1.980.109.00 | |
| **Fader Film Div Pot Board** | on 1.980.102.81, *page 4c* (assembly 1.980.115.00) | |
| **Fader Film Pan Pot Board** | 1.980 117.00 as well as on 1.980.102.81, *page 4c* | |
| **3 Pot 12.5 mm Board** | 1.990.298.00 | |
| **Fader Side Board (Stereo, VCA)** | 1.980 143.00 | ***Note:*** Same diagram as stereo version; IC2, 4 not used. |

## Component layout drawings

| | | |
|---|---|---|
| **Fader Main Board** | 1.980.102.81 | |
| **Fader Switch Board** | 1.980.109.00 | |
| **Fader Film Pan Pot Board** | 1.980.117.00 | |
| **3 Pot 12.5 mm Board** | 1.990.298.00 | |
| **Fader Side Board (Stereo, VCA)** | 1.980.143.00 | ***Note:*** Same diagram as stereo version; IC2, 4 not used. |

## Parts lists

| | |
|---|---|
| **Fader Switch Board** | 1.980.109.70 (general parts only) |
| **Fader Film Pan Pot Board** | 1.980.117.00 |
| **Fader Main Board (Mono, Film/HDTV, VCA)** | 1.980.195.00 |
| **Fader Switch Board (VCA)** | 1.980.198.00 |
| **Fader Side Board (Mono, VCA)** | 1.980.133.00 |

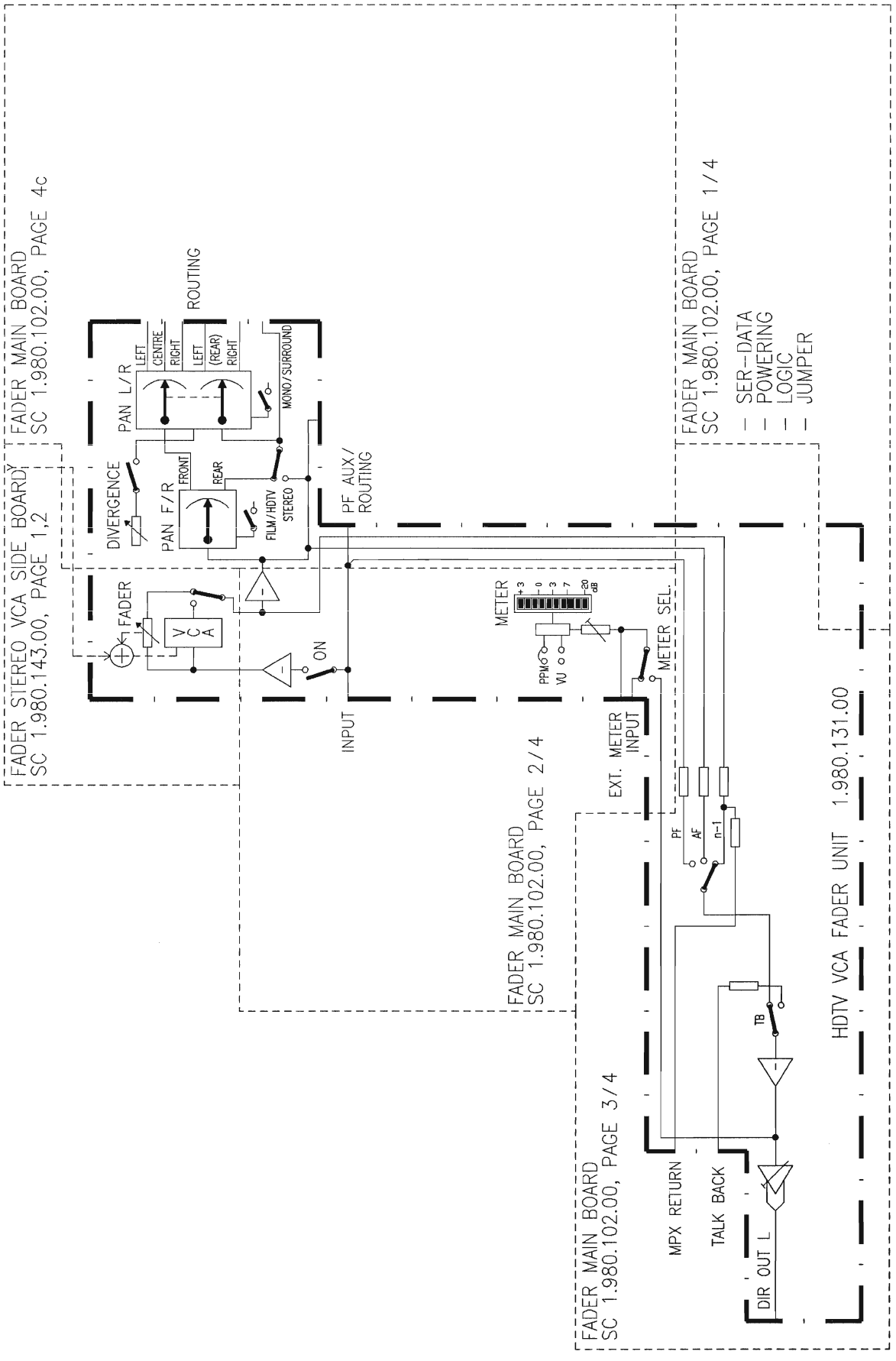
## Connector pin assignments

| | |
|---|---|
| **FADER UNIT** | P1B, P2B, P2C1, P2C2 |
| **VCA UNIT** | P1A |

**Comments**

| | |
|---|---|
| **Meter:** | VU or PPM characteristics selectable with jumper, or centrally via VAR bus. |
| **Meter:** | OPTION MCH. Input Right re-wired to IN2 |
| **Talkback:** | OPTION USER = TB |
| **DIR OUT:** | Level potentiometer not used. |
| **DIR OUT:** | OPTION USER = DIR OUT ON/OFF |
| **DIR OUT:** | OPTION MCH instead of MPX |
| **FILM:** | any particular options |
| **USER:** | Normally used for CH SEL/CCU. This function is omitted if the USER key is used for another purpose. |

## BLOCK DIAGRAM
## HDTV VCA FADER UNIT 1.980.131.00



# Fader Unit (Stereo, VCA) 1.980.140.00

## Assemblies structure

| | |
|---|---|
| **Fader Main Board (Stereo, VCA)** | 1.980.193.00 |
| **Fader Main PCB** | 1.980.102.11 |
| **Fader Switch Board (VCA)** | 1.980.198.00 |
| **Fader Switch Board** | 1.980.109.70 |
| **Fader Switch PCB** | 1.980.109.11 |
| **Fader Dir Pot Board (Stereo)** | 1.980.125.00 |
| **3 Pot 12.5 mm PCB** | 1.990.298.11 |
| **Fader Bal Pot Board** | 1.980.126.00 |
| **3 Pot 12.5 mm PCB** | 1.990.298.11 |
| **Fader Side Board (Stereo, VCA)** | 1.980.143.00 |
| **Fader Side PCB (VCA)** | 1.980.103.11 |

## Block diagram

| | |
|---|---|
| **Stereo Fader with VCA** | 1.980.140.00 |

## Circuit diagrams

| | |
|---|---|
| **Fader Main Board** | 1.980.102.81, *pages 1; 2; 3; 4b* |
| **Fader Switch Board** | 1.980.109.00 |
| **Fader Dir Stereo Pot Board** | on 1.980.102.81, *page 3* (assembly 1.980.125.00) |
| **Fader Bal Pot Board** | on 1.980.102.81, *page 4b* (assembly 1.980.126.00) |
| **3 Pot 12.5 mm Board** | 1.990.298.00 |
| **Fader VCA Side Board** | 1.980 143.00 |

## Component layout drawings

| | |
|---|---|
| **Fader Main Board** | 1.980.102.81 |
| **Fader Switch Board** | 1.980.109.00 |
| **3 Pot 12.5 mm PCB** | 1.990.298.00 |
| **Fader Side Board (Stereo, VCA)** | 1.980.143.00 |

## Parts lists

| | |
|---|---|
| **Fader Switch Board** | 1.980.109.70 (general parts only) |
| **Fader Main Board (Stereo, VCA)** | 1.980.193.00 |
| **Fader Switch Board (VCA)** | 1.980.198.00 |
| **Fader Side Board (Stereo, VCA)** | 1.980.143.00 |

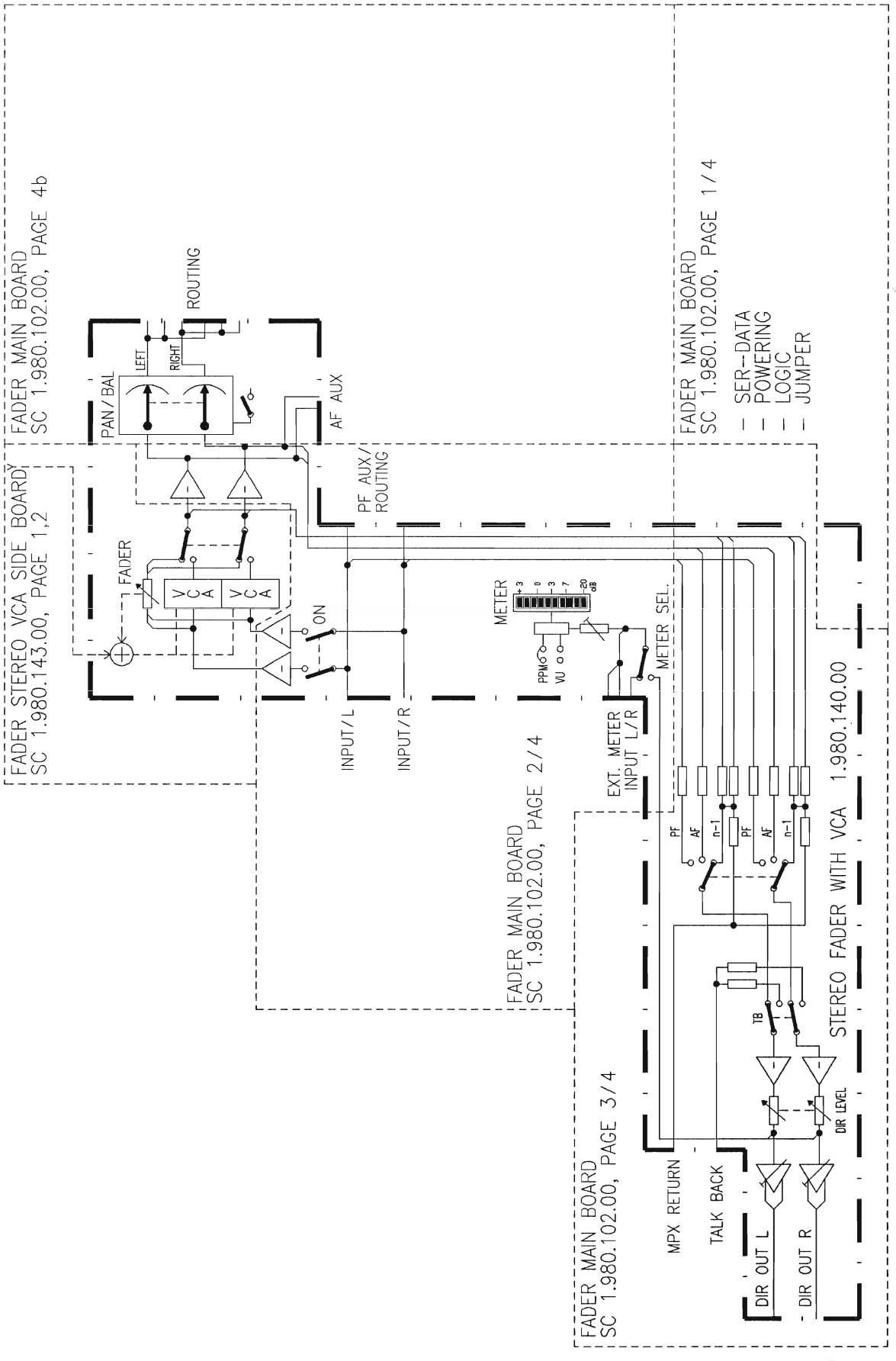
## Connector pin assignments

| | |
|---|---|
| **FADER UNIT** | P1B, P2B, P2C1, P2C2 |
| **VCA UNIT** | P1A |

## Comments

| | |
|---|---|
| **Meter:** | VU or PPM characteristics selectable with jumper, or centrally via VAR bus. |
| **Talkback:** | OPTION USER = TB |
| **DIR OUT:** | OPTION USER = DIR OUT ON/OFF |
| **USER:** | Normally used for CH SEL/CCU. This function is omitted if the USER key is used for another purpose. |

## BLOCK DIAGRAM
## STEREO FADER WITH VCA 1.980.140.00



# Fader Unit (Mono, w. motor fader) 1.980.150.00

## Assemblies structure

| | |
|---|---|
| **Fader Main Board (Mono)** | 1.980.190.00 |
| **Fader Main PCB** | 1.980.102.11 |
| **Fader Switch Board (Univ.)** | 1.980.199.00 |
| **Fader Switch Board** | 1.980.109.70 |
| **Fader Switch PCB** | 1.980.109.11 |
| **Fader Dir Pot Board** | 1.980.105.00 |
| **3 Pot 12.5 mm PCB** | 1.990.298.11 |
| **Fader Pan Pot Board** | 1.980.106.00 |
| **3 Pot 12.5 mm PCB** | 1.990.298.11 |

## Block diagram

| | |
|---|---|
| **Motor fader Unit mono** | 1.980.150.00 |

## Circuit diagrams

| | |
|---|---|
| **Fader Main Board** | 1.980.102.81, *pages 1; 2; 3; 4a* |
| **Fader Switch Board** | 1.980.109.00 |
| **Fader Dir Pot Board** | on 1.980.102.81, *page 3* (assembly 1.980.105.00) |
| **Fader Pan Pot Board** | on 1.980.102.81, *page 4a* (assembly 1.980.106.00) |
| **3 Pot 12.5 mm** | 1.990.298.00 |

## Component layout drawings

| | |
|---|---|
| **Fader Main Board** | 1.980.102.81 |
| **Fader Switch Board** | 1.980.109.00 |
| **3 Pot 12.5 mm** | 1.990.298.00 |

## Parts lists

| | |
|---|---|
| **Fader Switch Board** | 1.980.109.70 (general parts only) |
| **Fader Main Board (Mono)** | 1.980.190.00 |
| **Fader Switch Board (Univ.)** | 1.980.199.00 |

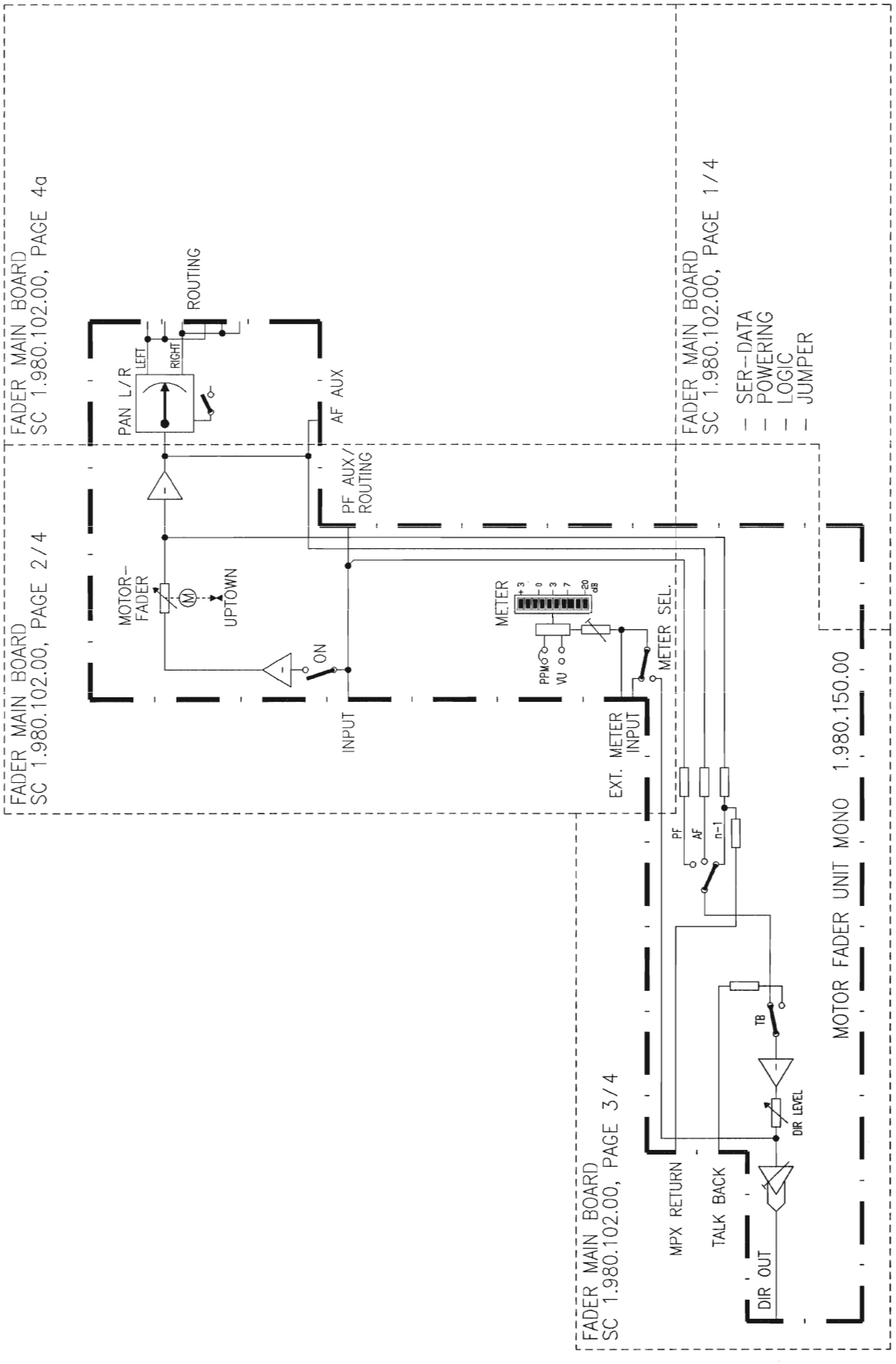
## Connector pin assignments

P2B, P2C1, P2C2

## Comments

| | |
|---|---|
| **Meter:** | VU or PPM characteristics selectable with jumper, or centrally via VAR bus. |
| **Meter:** | OPTION MCH. Input Right re-wired to IN2 |
| **Talkback:** | OPTION USER = TB |
| **DIR OUT:** | OPTION USER = DIR OUT ON/OFF |
| **DIR OUT:** | OPTION MCH instead of MPX |
| **USER:** | Normally used for CH SEL/CCU. This function is omitted if the USER key is used for another purpose. |

## BLOCK DIAGRAM
## MOTOR FADER UNIT MONO 1.980.150.00



# Fader Unit (Mono, Film/HDTV, w. motor fader) 1.980.151.00

## Assemblies structure

| | |
|---|---|
| **Fader Main Board (Mono, Film/HDTV)** | 1.980.194.00 |
| **Fader Main PCB** | 1.980.102.11 |
| **Fader Switch Board (Univ.)** | 1.980.199.00 |
| **Fader Switch Board** | 1.980.109.70 |
| **Fader Switch PCB** | 1.980.109.11 |
| **Fader Film Div Pot Board** | 1.980.115.00 |
| **3 Pot 12.5 mm PCB** | 1.990.298.11 |
| **Fader Film Pan Pot Board** | 1.980.117.00 |
| **Fader Film Pan PCB** | 1.980.107.11 |
| **Fader Side Board (Mono, VCA)** | 1.980.133.00 |
| **Fader VCA Side PCB** | 1.980.103.11 |

## Block diagram

| | |
|---|---|
| **HDTV Motor Fader Unit** | 1.980.151.00 |

## Circuit diagrams

| | |
|---|---|
| **Fader Main Board** | 1.980.102.81, *pages 1; 2; 3; 4c* |
| **Fader Switch Board** | 1.980.109.00 |
| **Fader Film Div Pot Board** | on 1.980.102.81, *page 4c* (assembly 1.980.115.00) |
| **Fader Film Pan Pot Board** | 1.980 117.00 as well as on 1.980.102.81, *page 4c* |
| **3 Pot 12.5 mm** | 1.990.298.00 |

## Component layout drawings

| | |
|---|---|
| **Fader Main Board** | 1.980.102.81 |
| **Fader Switch Board** | 1.980.109.00 |
| **Fader Film Pan Pot Board** | 1.980.117.00 |

## Parts lists

| | |
|---|---|
| **Fader Switch Board** | 1.980.109.70 (general parts only) |
| **Fader Main Board (Mono, Film/HDTV)** | 1.980.194.00 |
| **Fader Switch Board (Univ.)** | 1.980.199.00 |
| **Fader Film Pan Pot Board** | 1.980.117.00 |

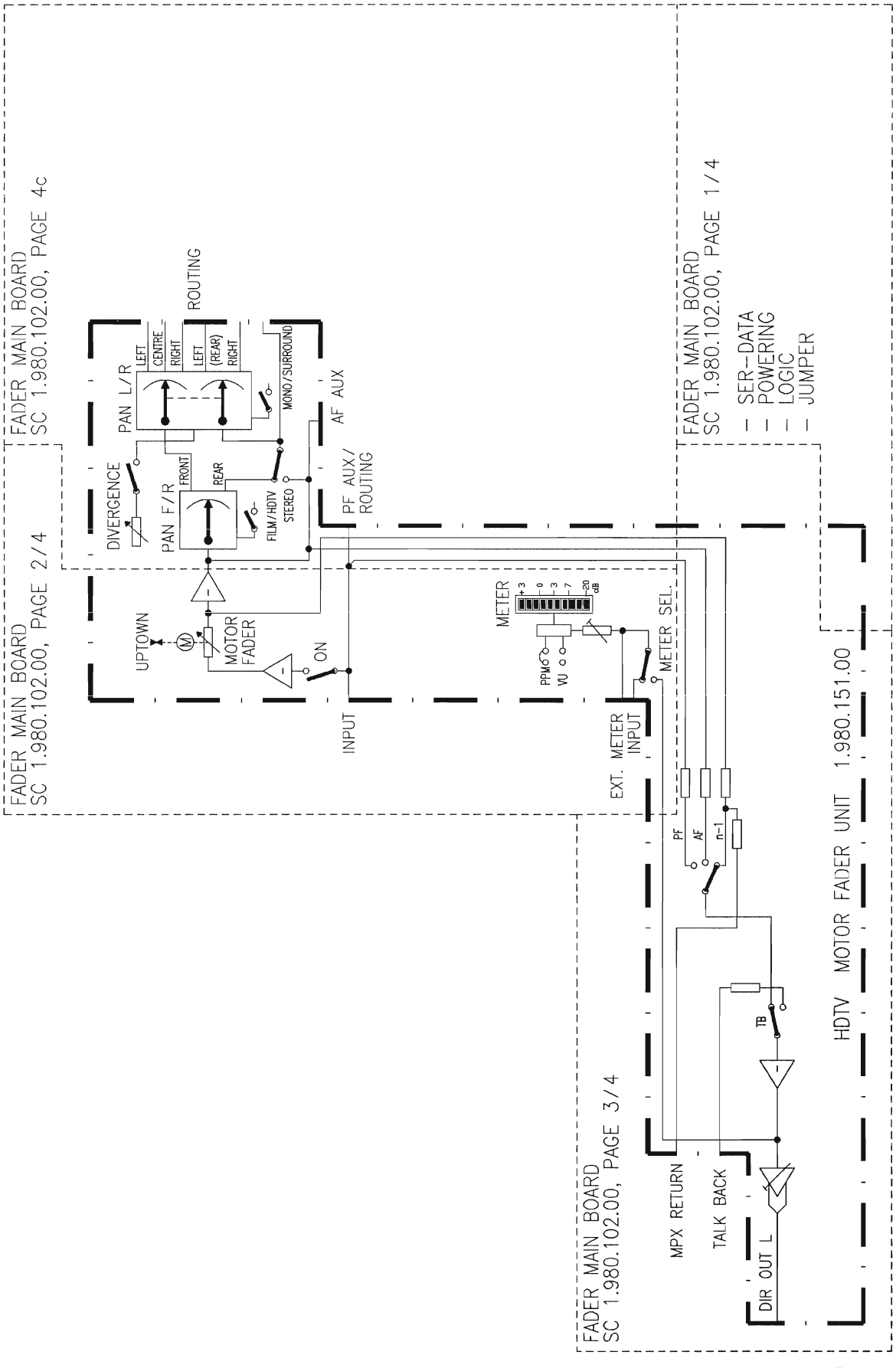
## Connector pin assignments

P2B, P2C1, P2C2

## Comments

| | |
|---|---|
| **Meter:** | VU or PPM characteristics selectable with jumper, or centrally via VAR bus. |
| **Meter:** | OPTION MCH. Input Right re-wired to IN2 |
| **Talkback:** | OPTION USER = TB |
| **DIR OUT:** | Level potentiometer not used. |
| **DIR OUT:** | OPTION USER = DIR OUT ON/OFF |
| **DIR OUT:** | OPTION MCH instead of MPX |
| **FILM:** | any particular options |
| **USER:** | Normally used for CH SEL/CCU. This function is omitted if the USER key is used for another purpose. |

## BLOCK DIAGRAM
## HDTV MOTOR FADER UNIT 1.980.151.00



# Fader Unit (Stereo, w. motor fader) 1.980.160.00

## Assemblies structure

| | |
|---|---|
| **Fader Main Board (Stereo)** | 1.980.192.00 |
| **Fader Main PCB** | 1.980.102.11 |
| **Fader Switch Board (Univ.)** | 1.980.199.00 |
| **Fader Switch Board** | 1.980.109.70 |
| **Fader Switch PCB** | 1.980.109.11 |
| **Fader Dir Pot Board (Stereo)** | 1.980.125.00 |
| **3 Pot 12.5 mm PCB** | 1.990.298.11 |
| **Fader Bal Pot Board** | 1.980.126.00 |
| **3 Pot 12.5 mm PCB** | 1.990.298.11 |

## Block diagram

| | |
|---|---|
| **Motor Fader Unit Stereo** | 1.980.160.00 |

## Circuit diagrams

| | |
|---|---|
| **Fader Main Board** | 1.980.102.81, *pages 1; 2; 3; 4b* |
| **Fader Switch Board** | 1.980.109.00 |
| **3 Pot 12.5 mm Board** | 1.990.298.00 |

## Component layout drawings

| | |
|---|---|
| **Fader Main Board** | 1.980.102.81 |
| **Fader Switch Board** | 1.980.109.00 |
| **Fader Dir Stereo Pot Board** | on 1.980.102.81, *page 3* (assembly 1.980.125.00) |
| **Fader Bal Pot Board** | on 1.980.102.81, *page 4b* (assembly 1.980.126.00) |
| **3 Pot 12.5 mm Board** | 1.990.298.00 |

## Parts lists

| | |
|---|---|
| **Fader Switch Board** | 1.980.109.70 (general parts only) |
| **Fader Main Board (Stereo)** | 1.980.192.00 |
| **Fader Switch Board (Univ.)** | 1.980.199.00 |

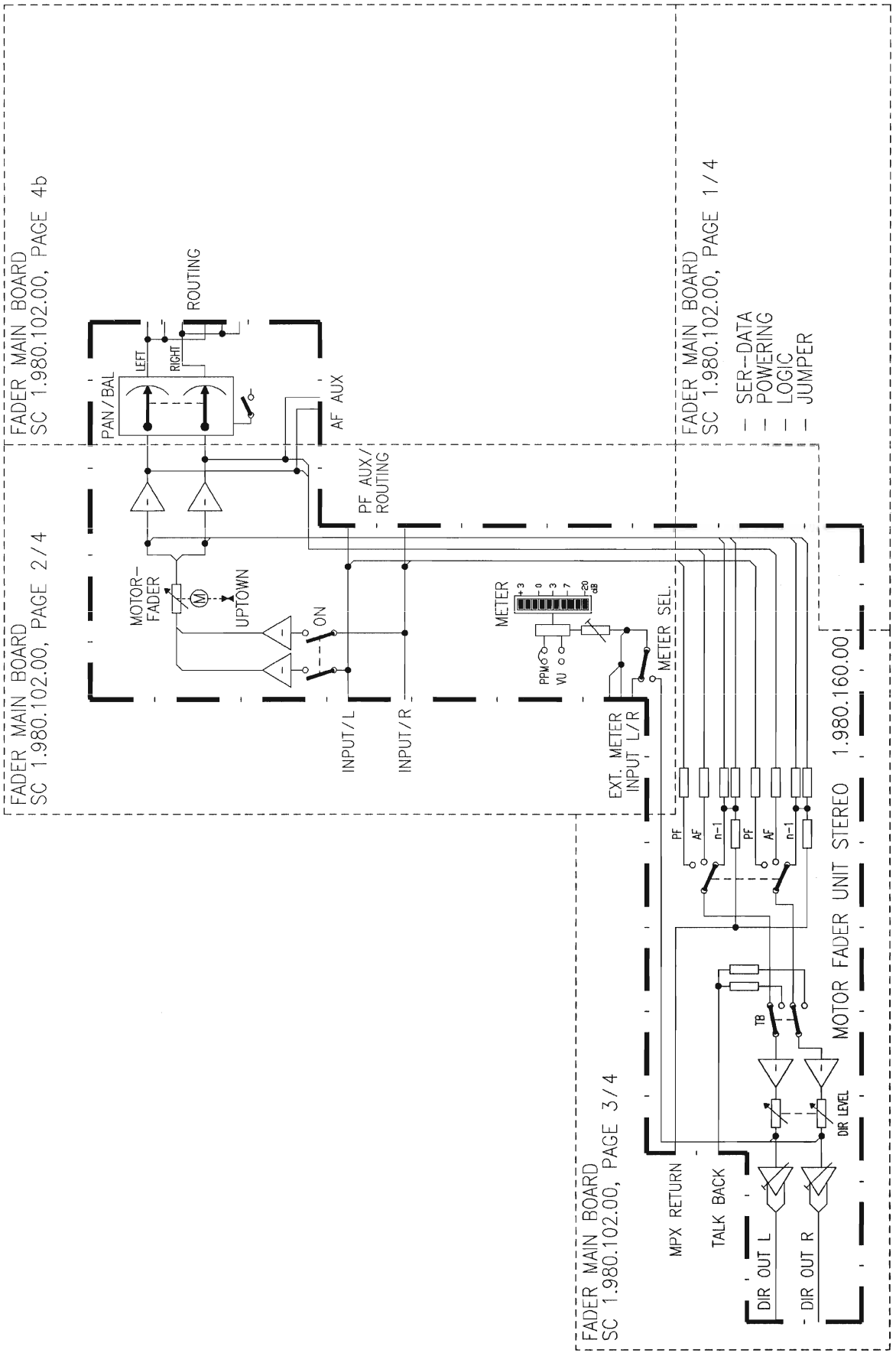
## Connector pin assignments

P2B, P2C, P2C2

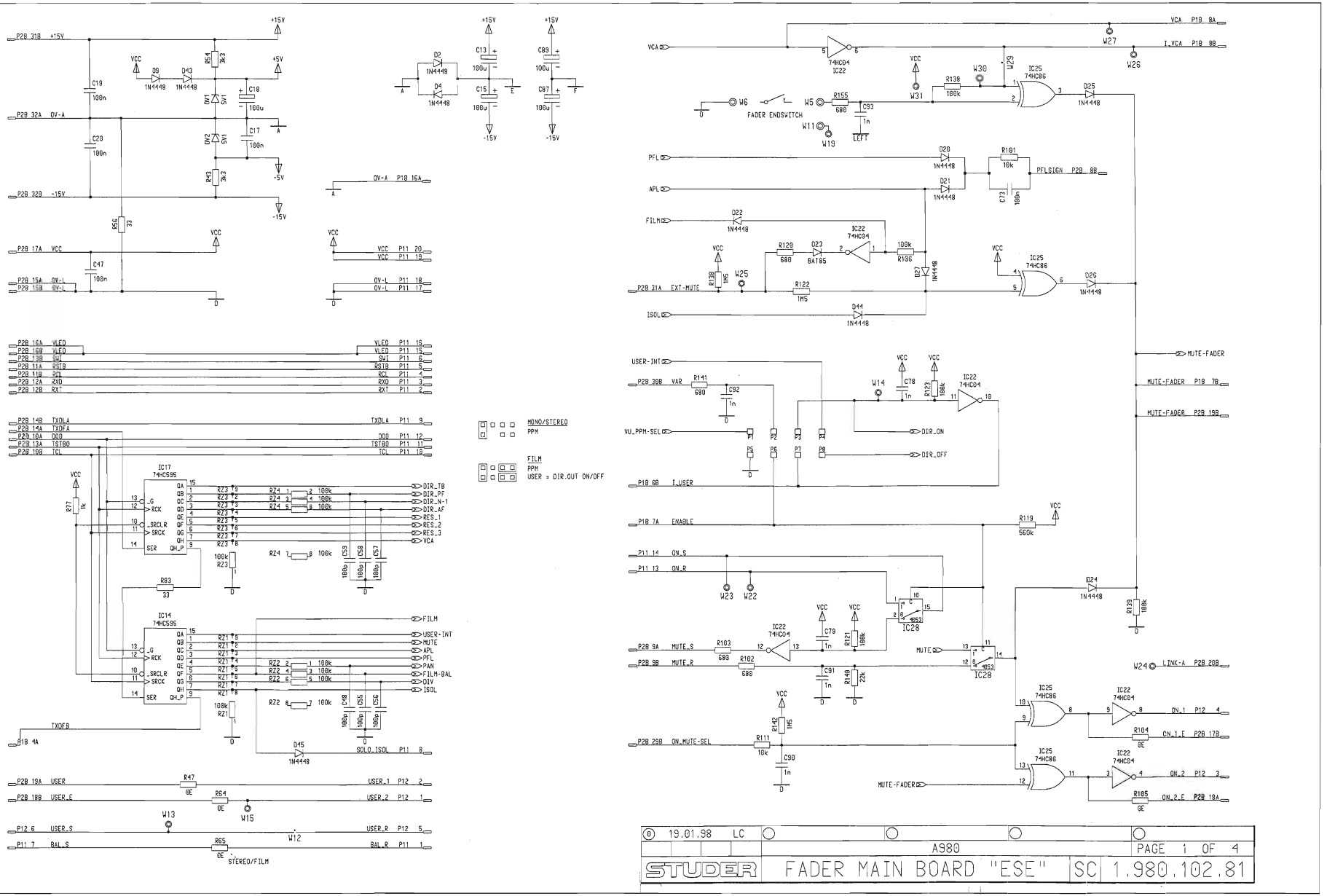
## Comments

| | |
|---|---|
| **Meter:** | VU or PPM characteristics selectable with jumper, or centrally via VAR bus. |
| **Talkback:** | OPTION USER = TB |
| **DIR OUT:** | OPTION USER = DIR OUT ON/OFF |
| **USER:** | Normally used for CH SEL/CCU. This function is omitted if the USER key is used for another purpose. |

## BLOCK DIAGRAM
## MOTOR FADER UNIT STEREO 1.980.160.00

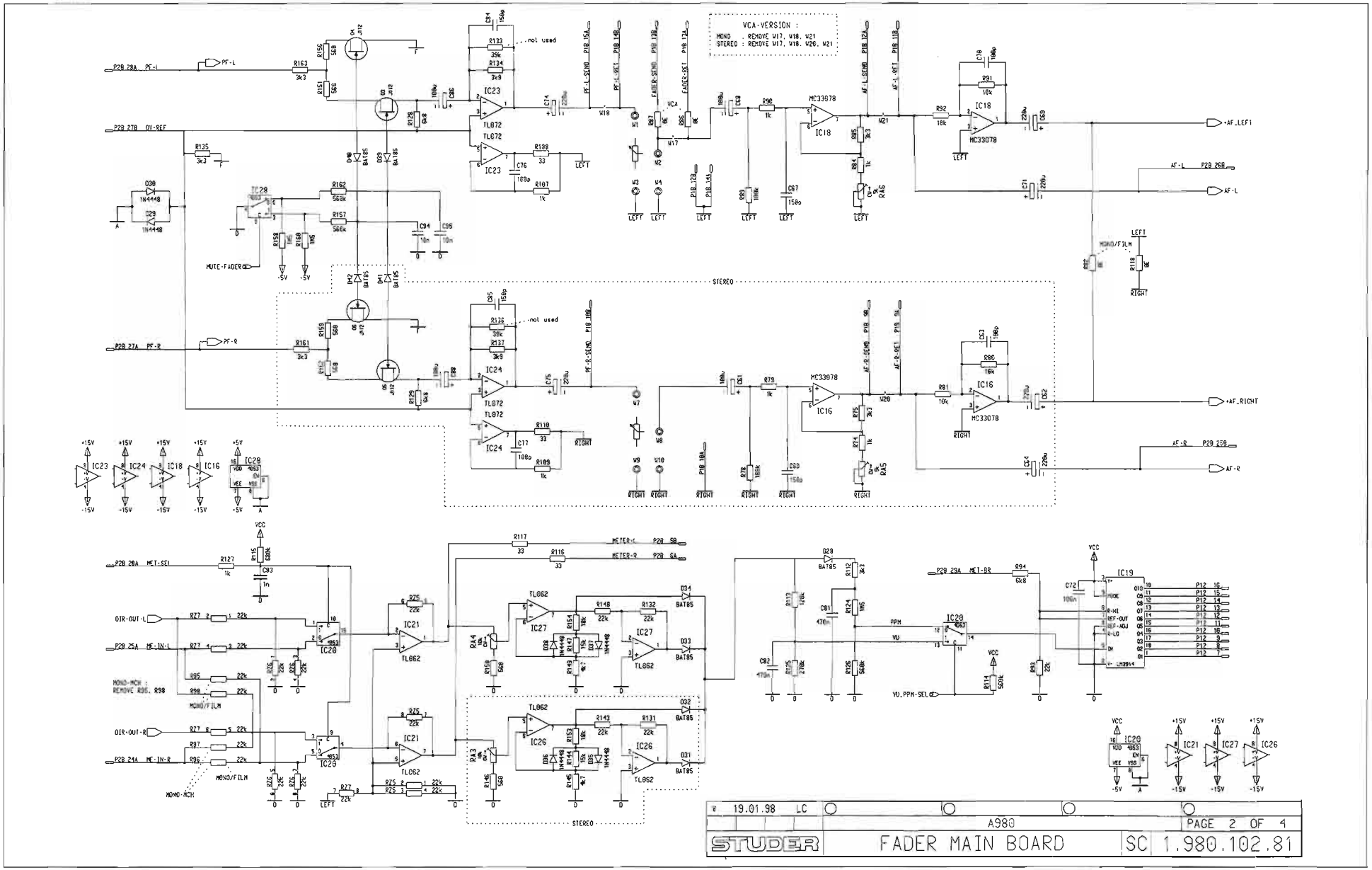


## FADER MAIN BOARD 1.980.102.81

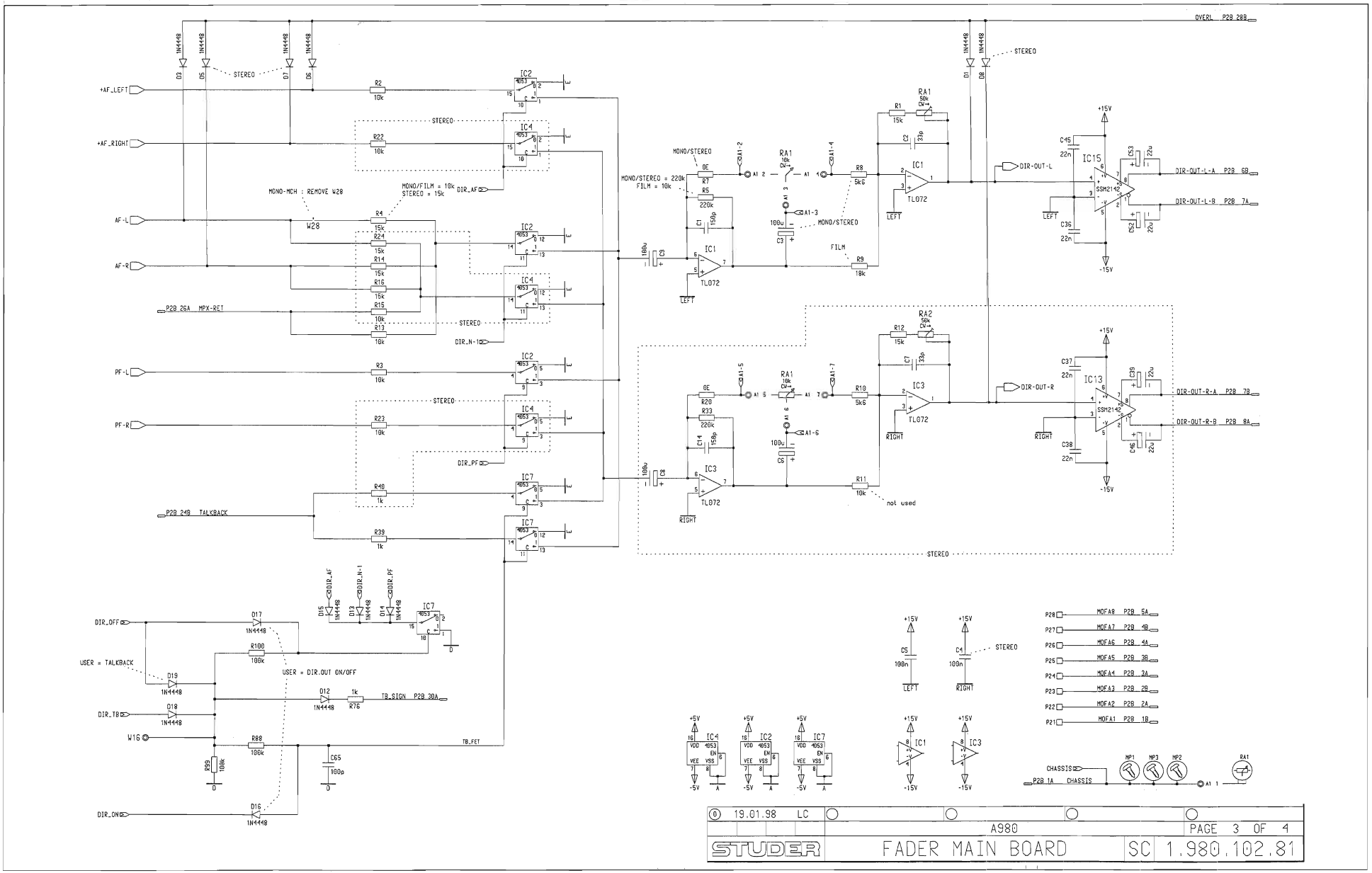



| | | | | |
|---|---|---|---|---|
| B 19.01.98 LC | | | | |
| | | A980 | | PAGE 1 OF 4 |
| STUDER | FADER MAIN BOARD "ESE" | | SC | 1.980.102.81 |

FADER MAIN BOARD 1.980.102.81

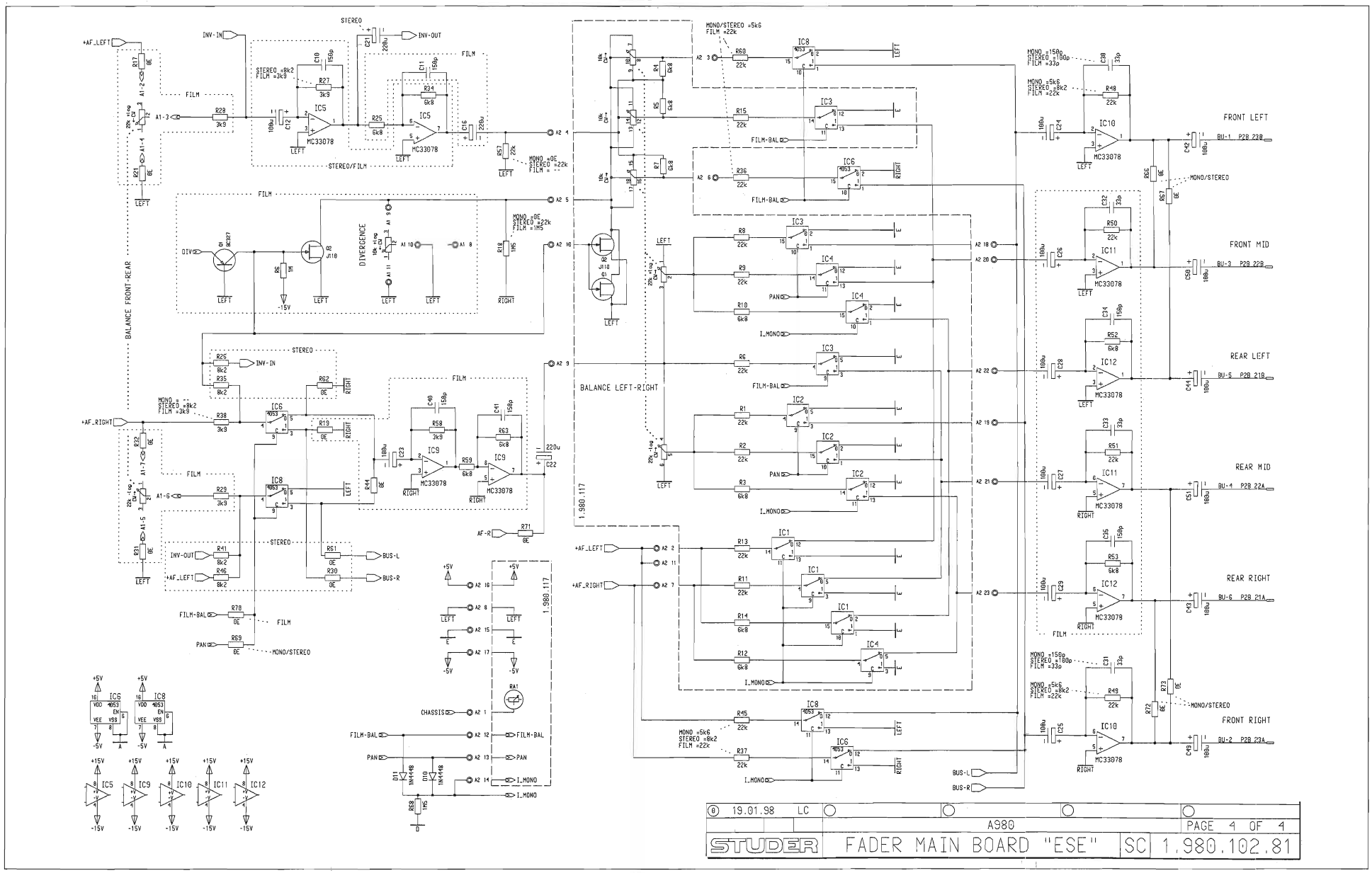


## FADER MAIN BOARD 1.980.102.81



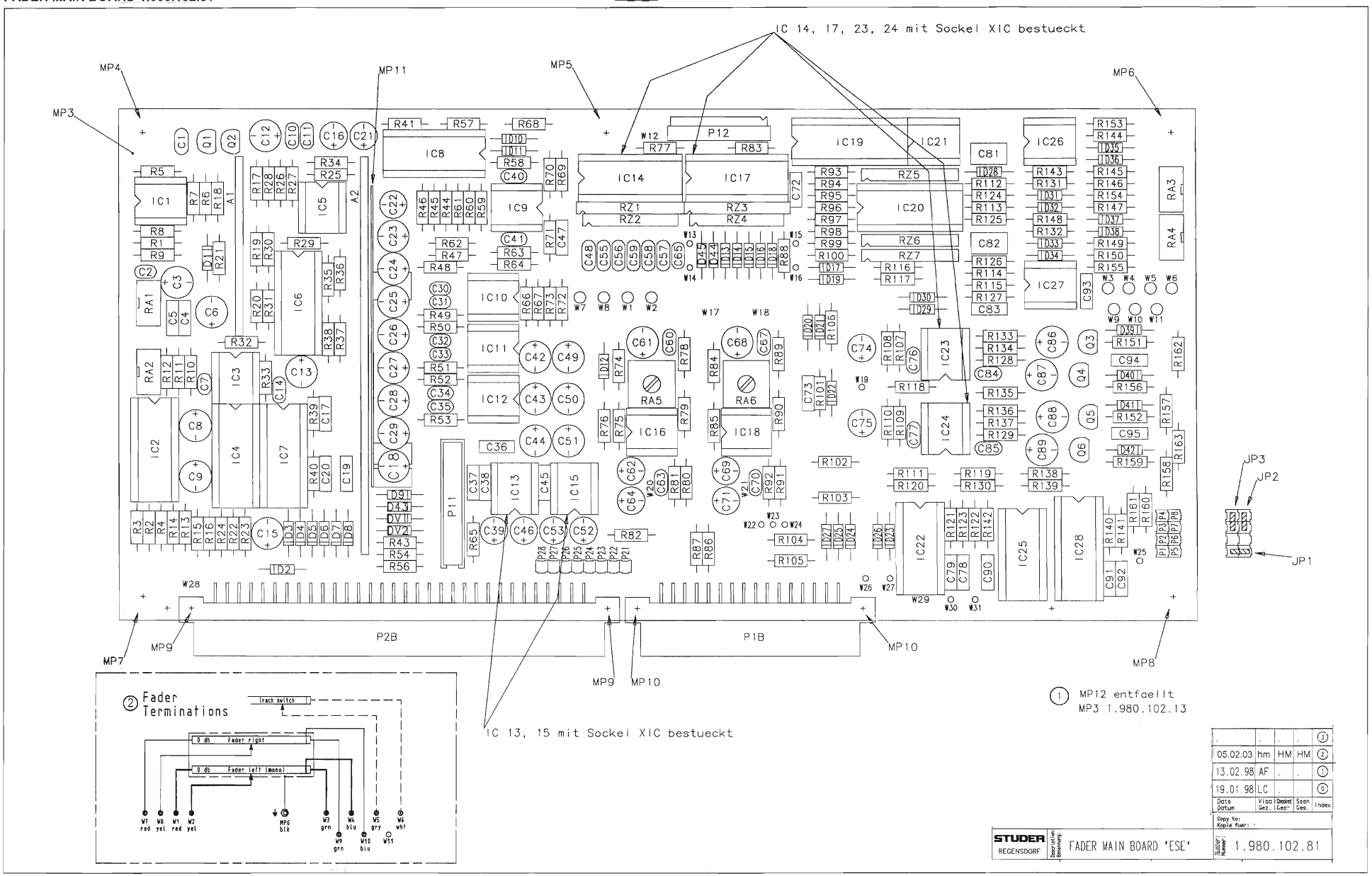

| | | | | |
|---|---|---|---|---|
| 0 | 19.01.98 | LC | | |
| | | | A980 | PAGE 3 OF 4 |
| STUDER | | | FADER MAIN BOARD | SC 1.980.102.81 |

## FADER MAIN BOARD 1.980.102.81

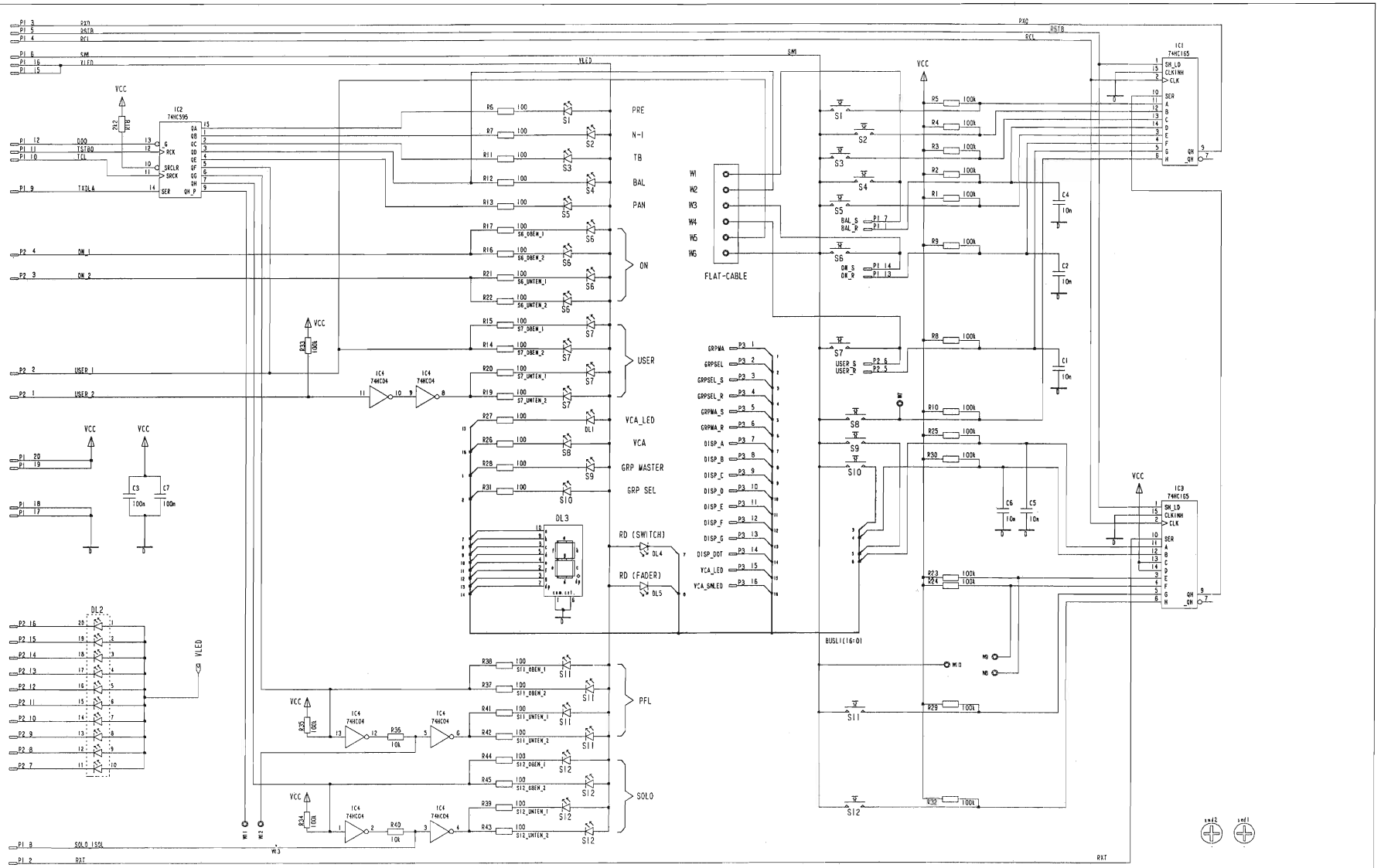



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|---|---|---|---|---|
| 0 19.01.98 LC | | | | |
| | A980 | | | PAGE 4 OF 4 |
| STUDER | FADER MAIN BOARD "ESE" | SC | 1.980.102.81 | |

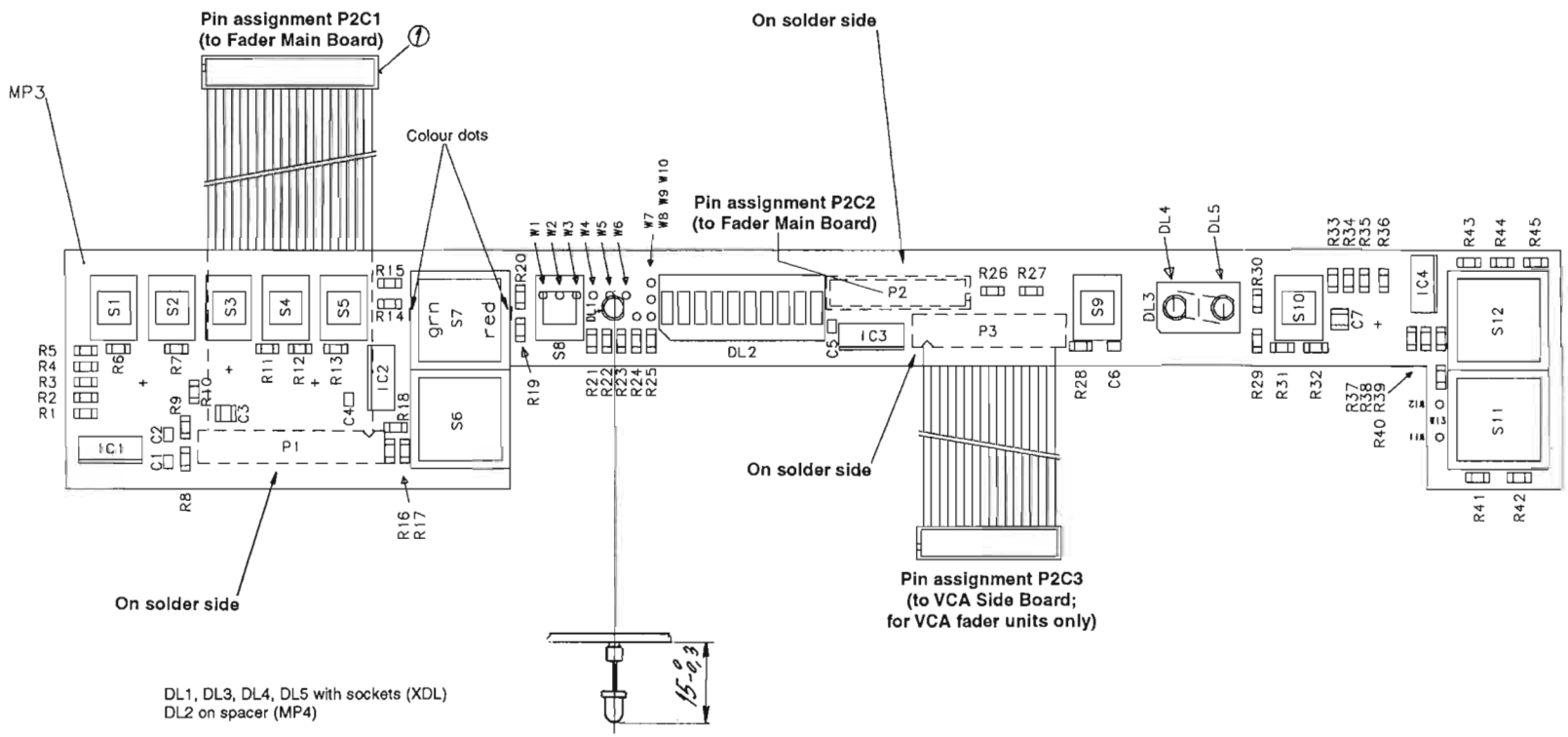
FADER MAIN BOARD 1.980.102.81

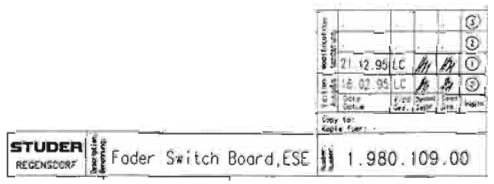


## FADER SWITCH BOARD 1.980.109.00

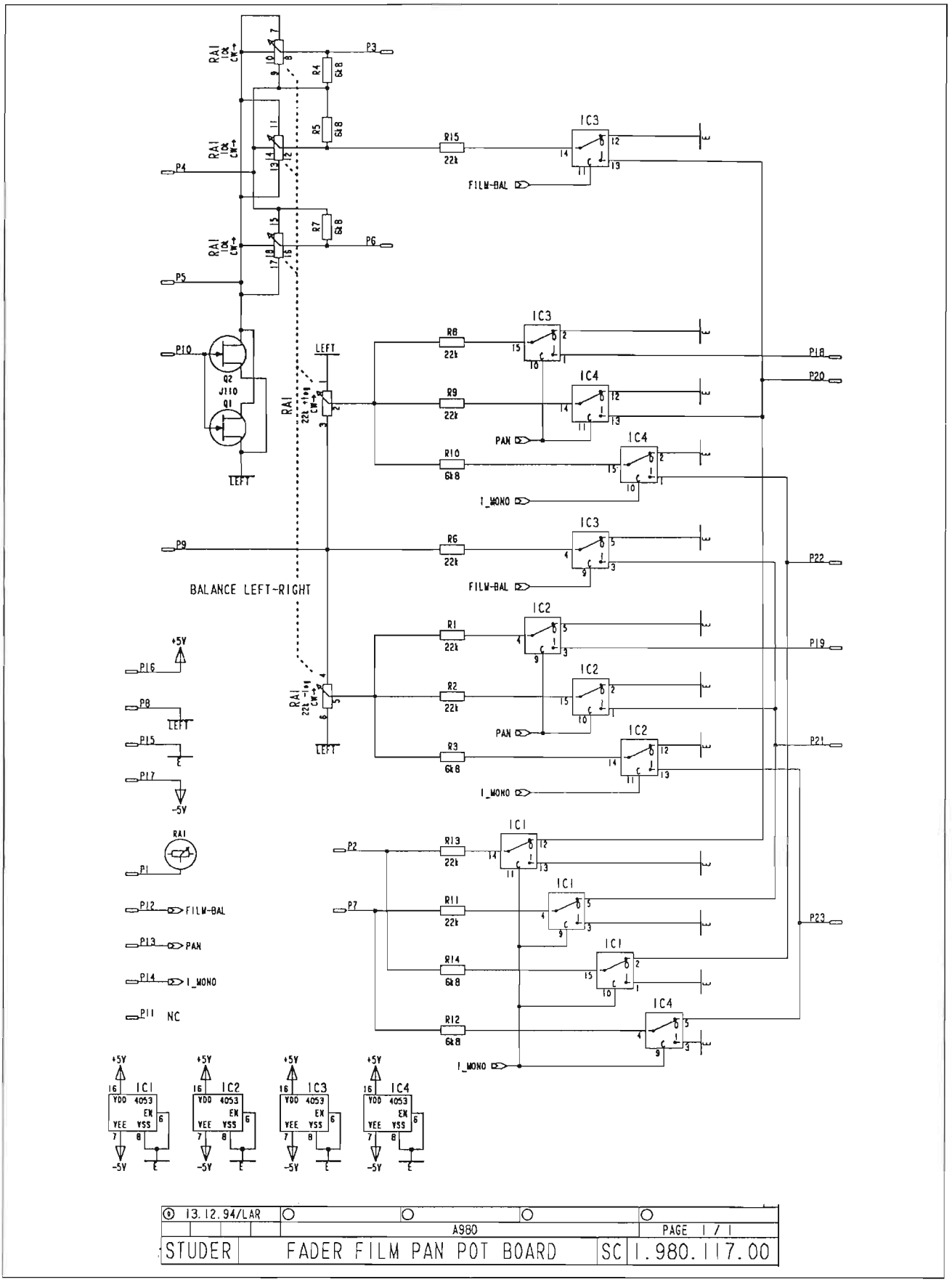


FADER SWITCH BOARD 1.980.109.00



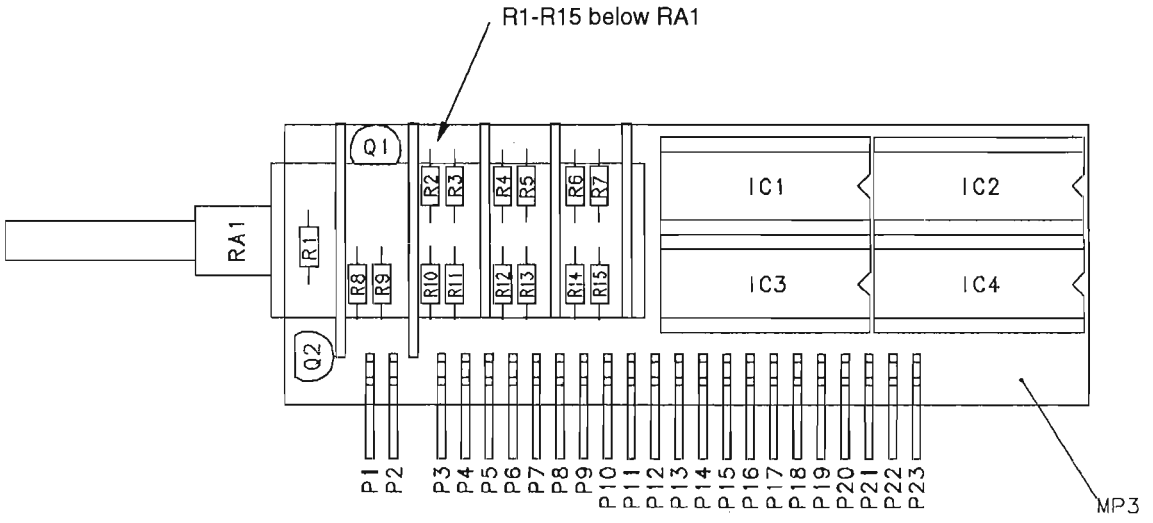



## FADER FILM PAN POT BOARD 1.980.117.00




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| 13.12.94/LAR | | | |
| | A980 | | PAGE 1/1 |
| STUDER | FADER FILM PAN POT BOARD | SC | 1.980.117.00 |

## FADER FILM PAN POT BOARD 1.980.117.00




| Modification Aenderung | | | | | |
|---|---|---|---|---|---|
| | . | . | . | . | 3 |
| | . | . | . | . | 2 |
| | . | . | . | . | 1 |
| Edition Ausgabe | 20.02.95 | LC | . | . | C |
| | Date Datum | Visa Gez. | Checked Gepr. | Seen Ges. | Index |

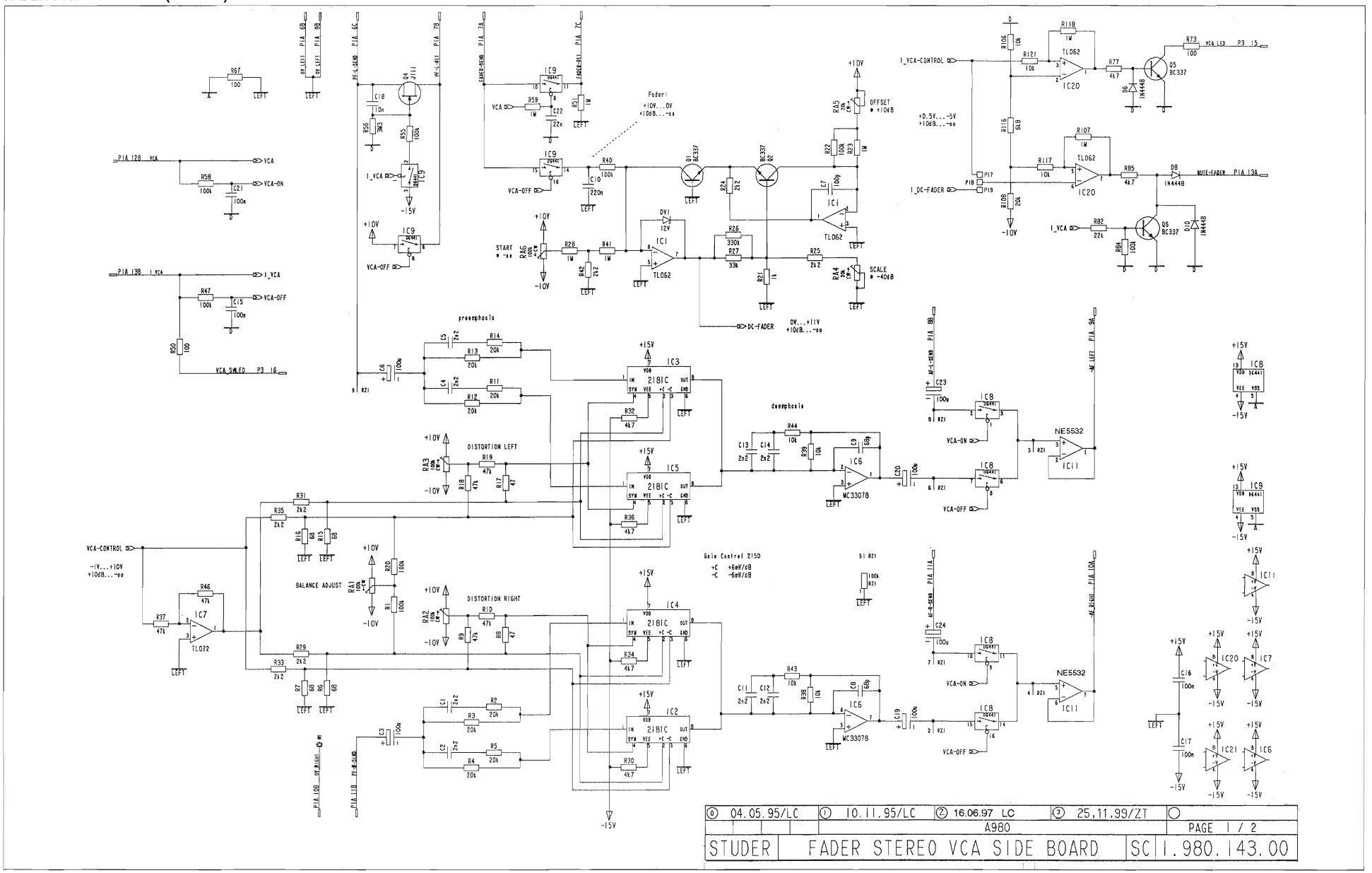
Copy to:
Kopie fuer:

STUDER REGENSDORF

Description: Benennung: FADER FILM PAN POT BOARD, ESE

Number: Nummer: 1.980.117-00

**FADER VCA SIDE BOARD (MONO) 1.980.133.00** (IC2 and IC4 not used)
**FADER VCA SIDE BOARD (STEREO) 1.980.143.00**



**FADER VCA SIDE BOARD (MONO) 1.980.133.00** (IC2 and IC4 not used)
**FADER VCA SIDE BOARD (STEREO) 1.980.143.00**

