



Studer OnAir 2000M2
Digital Mixing Console
SW Version 4.0/4.02




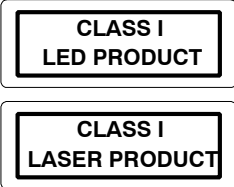
Operating Instructions

Prepared and edited by
Studer Professional Audio GmbH
Technical Documentation
Althardstrasse 30
CH-8105 Regensdorf – Switzerland
<http://www.studer.ch>

Copyright by Studer Professional Audio GmbH
Printed in Switzerland
Order no. 10.27.4265 (Ed. 0403)

Subject to change

A Safety Information

	<p>To reduce the risk of electric shock, do not remove covers (or back). No user-serviceable parts inside. Refer servicing to qualified service personnel.</p>
	<p>This symbol is intended to alert the user to presence of un-insulated <i>dangerous voltage</i> within the equipment that may be of sufficient magnitude to constitute a risk of electric shock to a person.</p>
	<p>This symbol is intended to alert the user to the presence of <i>important instructions</i> for operating and maintenance in the enclosed documentation.</p>
	<p>Assemblies or sub-assemblies of this product can contain opto-electronic devices. As long as these devices comply with Class I of laser or LED products according to EN 60825-1:1994, they will not be expressly marked on the product. If a special design should be covered by a higher class of this standard, the device concerned will be marked directly on the assembly or sub-assembly in accordance with the above standard.</p>

A1 First Aid

In Case of Electric Shock:

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



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!*

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.

B General Installation Hints

Please consider besides these general hints also any product-specific hints in the "Installation" chapter of this manual.

B1 Unpacking

Check the equipment for any transport damage. A unit that is mechanically damaged or that 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.

B2 Installation Site

Install the unit in a place where the following conditions are met:

- The temperature and the relative humidity of the environment must be within the specified limits during operation of the unit. Relevant air values are the ones at the air inlets of the unit.
- Condensation must be avoided. If the unit is installed in a location with large variation of ambient temperature (e.g. in an OB-van), feasible measures must be taken before and after operation (for details on this subject, refer to Appendix 1).
- Unobstructed air flow is essential for proper operation. Air vents of the unit are a functional part of the design and must not be blocked in any way during operation (e.g. by objects placed upon them or placement of the unit on a soft support).
- The unit must not be heated up by external sources of heat radiation (sunlight, spot lights).

B3 Earthing and Power Supply

Earthing of units with mains supply (class I equipment) is performed via the protective earth (PE) conductor integrated in the mains cable. Units with battery operation (< 60 V, class III equipment) must be earthed separately.

Earthing the unit is one of the measures for protection against electrical shock hazard (dangerous body currents). Hazardous voltage may not only be caused by a defective power supply insulation, but may also be introduced by the connected audio or control cables.

If the unit is installed with one or several external connections, its earthing must be provided during operation as well as while the unit is inoperative. If the earthing could be interrupted via the power supply (e.g. by pulling the mains plug), an additional, permanent earthing must be installed using the provided earth terminal.

Avoid ground loops (hum loops) by keeping the loop surface as small as possible (by consequently guiding the earth conductors in a narrow, parallel way), and reduce the noise current flowing through the loop by inserting an additional impedance (common-mode choke).

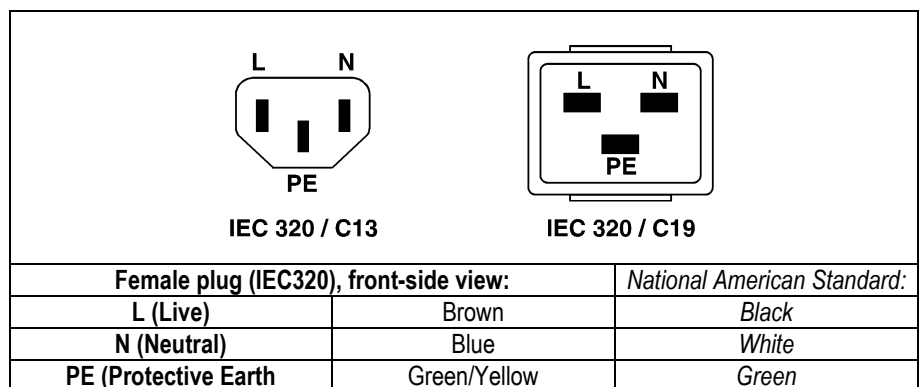
Class I Equipment (Mains Operation)

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.

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 (protection conforming to class I equipment) *must* be connected to a 3-pole AC power outlet so that the equipment cabinet is connected to the protective earth.

For information on mains cable strain relief please refer to Appendix 2.



Class III Equipment (Battery Operation up to 60 V_{DC})

Equipment of this protection class must be earthed using the provided earth terminal, if one or more external signals are connected to the unit (see explanation at the beginning of this paragraph).

B4 Electromagnetic Compatibility (EMC)

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

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

The unit has been tested and conforms to the EMC standards of the specified electromagnetic environment, as listed in the following declaration. The limits of these standards ensure protection of the environment and corresponding noise immunity of the equipment with appropriate probability. However, a professional installation and integration within the system are imperative prerequisites for operation without EMC problems.

For this purpose, the following measures must 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 EMC standards for the given environment.
- Use a system grounding concept that satisfies the safety requirements (class I equipment must be connected with a protective ground conduc-

tor) and 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 within the corresponding frequency range.
- 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 choke).
- Reduce electrostatic discharge (ESD) of persons by installing an appropriate floor covering (e.g. a carpet with permanent electrostatic filaments) and by keeping the relative humidity above 30%. Further measures (e.g. conducting floor) are usually unnecessary and only suitable if used together with corresponding personal equipment.
- When using equipment with touch-sensitive operator controls, please take care that the surrounding building structure allows for sufficient capacitive coupling of the operator. This coupling can be improved by an additional, conducting surface in the operator's area, connected to the equipment housing (e.g. metal foil underneath the floor covering, carpet with conductive backing).

C Maintenance

All air vents and openings for operating elements (faders, rotary knobs) must be checked on a regular basis, and cleaned in case of dust accumulation. For cleaning, a soft paint-brush or a vacuum cleaner is recommended. Cleaning the surfaces of the unit is performed with a soft, dry cloth or a soft brush.

Persistent contamination can be treated with a cloth that is slightly humidified with a mild cleaning solution (soap-suds).

For cleaning display windows, commercially available computer/TV screen cleaners are suited. Use only a slightly damp (never wet) cloth.

Never use any solvents for cleaning the exterior of the unit! Liquids must never be sprayed or poured on directly!

For equipment-specific maintenance information please refer to the corresponding chapter in the Operating and Service Instructions manuals.

D Electrostatic Discharge during Maintenance and Repair

Caution:



Observe the precautions for handling devices sensitive to electrostatic discharge!

Many semiconductor components are sensitive to electrostatic discharge (ESD). The life-span of assemblies containing such components 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.
- *When performing a repair by replacing complete assemblies, the removed assembly must be sent back to the supplier in the same packing*

material in which the replacement assembly was shipped. If this should not be the case, any claim for a possible refund will be null and void.

- 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 as well as all tools and electrically semi-conducting 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.

E Repair

Removal of housing parts, shields, etc. exposes energized parts. For this reason the following precautions must be observed:

- Maintenance may only be performed by trained personnel in accordance with the applicable regulations.
- The equipment must 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 outlet, parts with hazardous charges (e.g. capacitors, picture tubes) must not be touched until they have been properly discharged. Do not touch hot components (power semiconductors, heat sinks, etc.) before they have cooled off.
- If maintenance is performed on a unit that is opened and switched on, no un-insulated circuit components and metallic semiconductor housings must be touched, neither with your bare hands nor with un-insulated tools.

Certain components pose additional hazards:

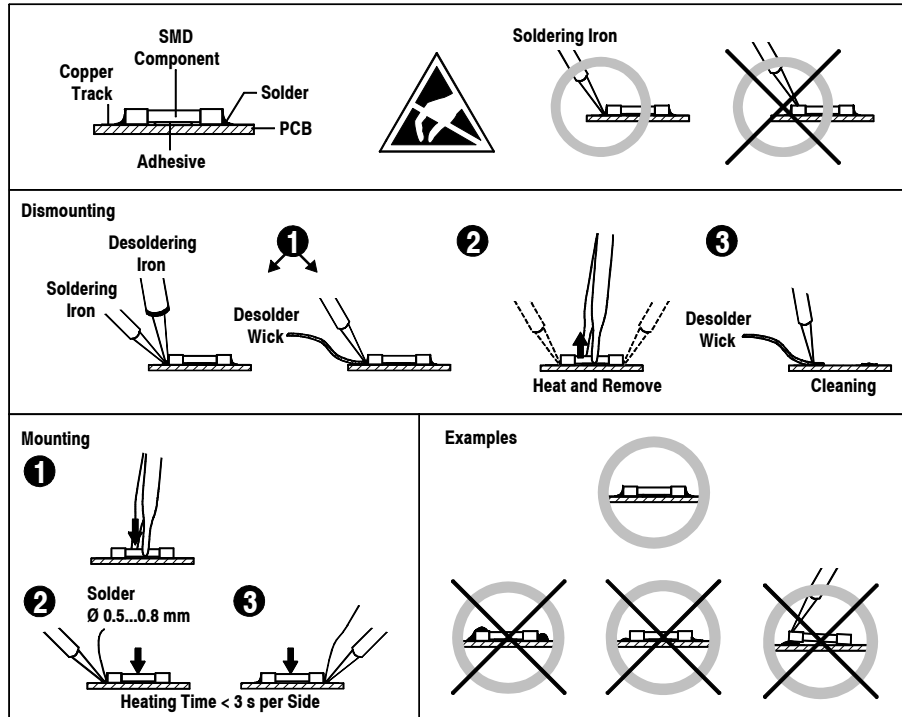
- *Explosion hazard* from lithium batteries, electrolytic capacitors and power semiconductors (watch the component's polarity. Do not short battery terminals. Replace batteries only by the same type).
- *Implosion hazard* from evacuated display units.
- *Radiation hazard* from laser units (non-ionizing), picture tubes (ionizing).
- *Caustic effect* of display units (LCD) and components containing liquid electrolyte.

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

E1 SMD Components

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

SMD components should only be replaced by skilled specialists using appropriate tools. No warranty claims will be accepted for circuit boards that have been damaged. Proper and improper SMD soldering joints are illustrated below.



F Disposal

Disposal of Packing Materials

The packing materials have been selected with environmental and disposal issues in mind. All packing material can be recycled. Recycling packing saves raw materials and reduces the volume of waste. If you need to dispose of the transport packing materials, please try to use recyclable means.

Disposal of Used Equipment

Used equipment contains valuable raw materials as well as materials that must be disposed of professionally. Please return your used equipment via an authorized specialist dealer or via the public waste disposal system, ensuring any material that can be recycled is. Please take care that your used equipment cannot be abused. To avoid abuse, delete sensitive data from any data storage media. After having disconnected your used equipment from the mains supply, make sure that the mains connector and the mains cable are made useless.

G Declarations of Conformity

G1 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.

G2 CE Declaration of Conformity

We,
**Studer Professional Audio GmbH,
CH-8105 Regensdorf,**
declare under our sole responsibility that the product
**Studer On-Air 2000, Digital Mixing System
(starting with serial no. 1001)**
to which this declaration relates, according to following regulations of EU directives and amendments

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

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

- Safety:
EN 60950:2000 (Class I equipment)
- Safety of laser products:
EN 60825-1:1994 + A11 + A2, EN60825-2:2000
- EMC:
EN 55103-1/-2:1996, electromagnetic environments E2 and E4.

Regensdorf, February 27, 2002



B. Hochstrasser, President



P. Fiala, Manager QA

Appendix 1: 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 paragraphs.

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:

- The admissible ambient temperature range for operation of the semiconductor components is 0 °C to +70 °C (commercial temperature range for operation).
- The air flow through the installation must provide that the outgoing air is always cooler than 70 °C.
- Average heat increase of the cooling air shall be 20 K, allowing for an additional maximum 10 K increase at the hot components.
- 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 $P = 800\text{ W}$ requires an air flow of $0.8 * 2.65\text{ m}^3/\text{min}$ which corresponds to $2.12\text{ m}^3/\text{min}$.

- 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, trouble-free operation cannot be guaranteed, independent of temperature.

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 one of the outgoing air.

If it is absolutely necessary to operate the cold 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 relative 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 relative humidity of 40%. On all parts being cooler than +5 °C, dew or ice will be forming.

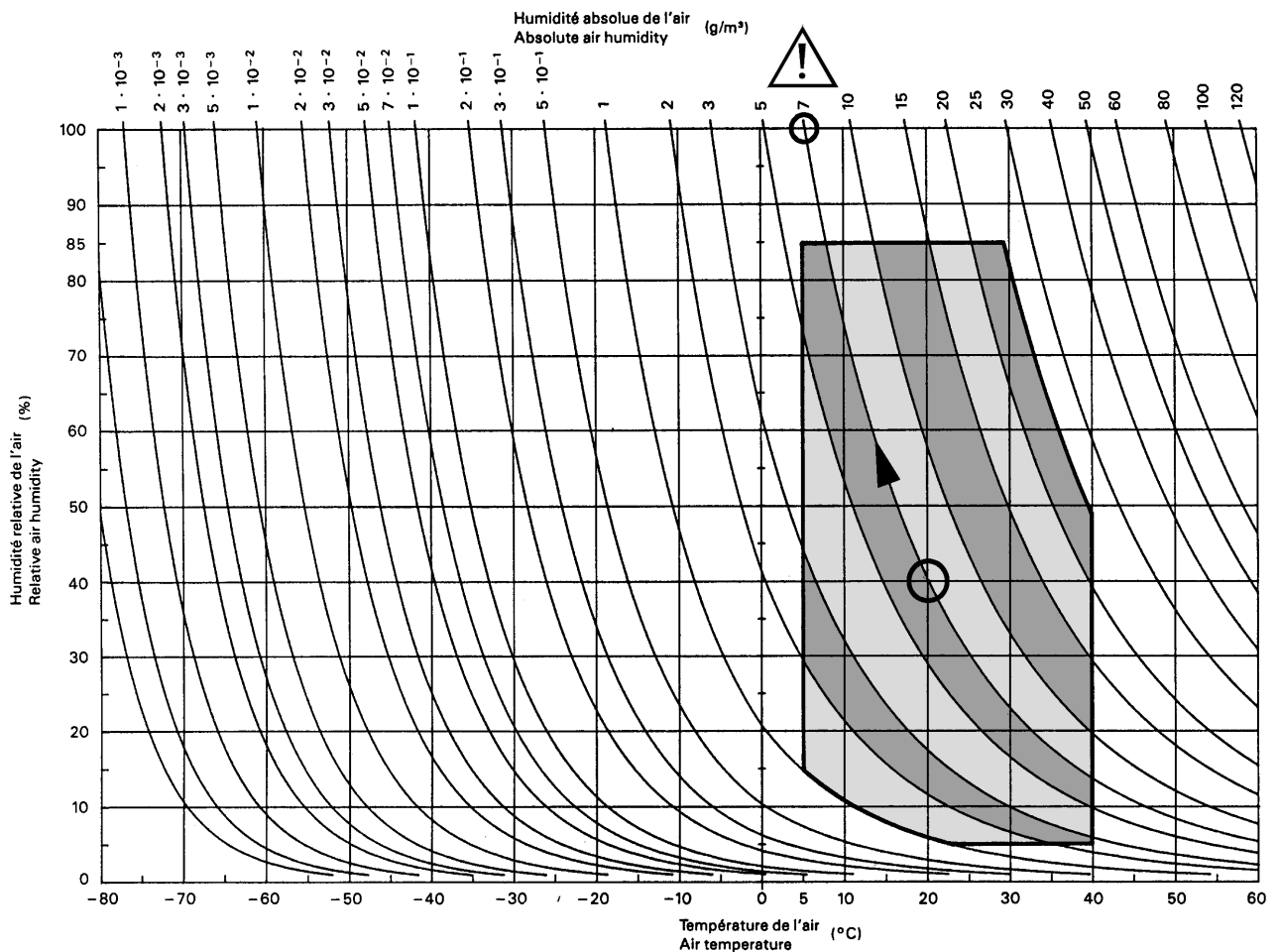
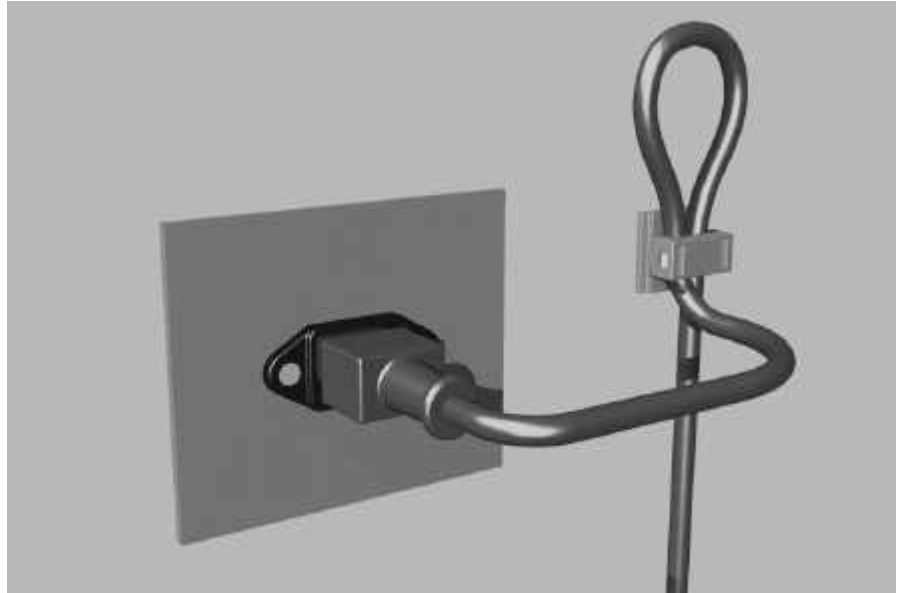


Figure B.3 – Climatogramme pour catégorie 3K3
Climatogram for class 3K3

721-3-3 © CEI:1994

Appendix 2: Mains Connector Strain Relief

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



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

- The surface to be adhered to must be clean, dry, and free from grease, oil, or other contaminants. Recommended application temperature range is 20...40 °C.
- 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.
- For improved stability, the clamp should be fixed with a screw. For this purpose, a self-tapping screw and an M4 bolt and nut are included.
- 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.

Appendix 3: Software License

Use of the software is subject to the Studer Professional Audio Software License Agreement set forth below. Using the software indicates your acceptance of this license agreement. If you do not accept these license terms, you are not authorized to use this software.

Under the condition and within the scope of the following Terms and Conditions, Studer Professional Audio GmbH (hereinafter “Studer”) grants the right to use programs developed by Studer as well as those of third parties which have been installed by Studer on or within its products. References to the license programs shall be references to the newest release of a license program installed at the Customer’s site.

Programs Covered by the Agreement

License Programs of Studer The following Terms and Conditions grant the right to use all programs of Studer that are part of the System and/or its options at the time of its delivery to the Customer, as well as the installation software on the original data disk and the accompanying documentation (“License Material”). In this Agreement the word “Programs” shall have the meaning of programs and data written in machine code.

Using the software indicates your acceptance of this license agreement. If you do not accept these license terms, you are not authorized to use this software.

Programs of Third Parties Programs of third parties are all programs which constitute part of the System and/or its options at the time of delivery to the Customer but have not been developed by Studer. The following conditions are applicable to programs of third parties:

- The right to use third parties’ programs is governed by the License Agreement attached hereto (if applicable), which is an integral part of this Agreement. The Customer shall sign any and all License Agreements for all further programs of third parties installed on the system. The Customer shall be deemed to have received all License Agreements upon delivery of the system and/or its options.
- Studer shall accept no responsibility or liability for, and gives no warranties (express or implied) as to the programs of third parties. The Customer waives any and all claims versus Studer for any consequential damages, which might occur due to defects of these programs.

Right of Use

Principle Studer grants the Customer the non-exclusive right to use the License Material in one copy on the system and/or its options as laid down by the Sales Agreement concluded between the parties and all Terms and Conditions which shall be deemed to form and be read and construed as part of the Sales Agreement. This right is assignable according to the “Assignability” paragraph hereinafter.

Customized Configurations The Customer is not entitled to alter or develop further the License Material except within the expressly permitted configuration possibilities given by the software installed on the system or elsewhere. All altered programs, including but not limited to the products altered within the permitted configuration possibilities, are covered by this License Agreement.

Reverse Engineering Reverse engineering is only permitted with the express consent of Studer. The consent of Studer can be obtained but is not limited to the case in which the interface-software can not be provided by Studer. In any case Studer has to be informed immediately upon complete or partial reverse engineering.

Copying the License Material The Customer is entitled to make one copy of all or parts of the License Material as is necessary for the use according to this Agreement, namely for backup purposes. The Customer shall apply the copyright of Studer found on the License Material onto all copies made by him. Records shall be kept by the Customer regarding the amount of copies made and their place of keeping. The responsibility for the original program and all copies made lies with the Customer. Studer is entitled to check these records on first request. Copies not needed anymore have to be destroyed immediately.

Disclosure of License Material The License Material is a business secret of Studer. The Customer shall not hand out or in any way give access to parts or the complete License Material to third parties nor to publish any part of the License Material without prior written consent of Studer. The Customer shall protect the License Material and any copies made according to the paragraph above by appropriate defense measures against unauthorized access. This obligation of non-disclosure is a perpetual obligation.
Third parties are entitled to have access to the License Material if they use the License Material at the Customer's site in compliance with this Agreement.
Under no circumstance are third parties entitled to have access to the installation software on the original data media. The Customer shall safeguard the original data media accordingly.

Assignability The rights granted to the Customer according to this License Agreement shall only be assignable to a third party together with the transfer of the system and/or its options and after the prior written consent of Studer.

Rights to License Material

With the exception of the right of use granted by this License Agreement all proprietary rights to the License Material, especially the ownership and the intellectual property rights (such as but not limited to patents and copyright) remain with Studer even if alterations, customized changes or amendments have been made to the License Material.

Studer's proprietary rights are acknowledged by the Customer. The Customer shall undertake no infringements and make no claims of any patent, registered design, copyright, trade mark or trade name, or other intellectual property right.

Warranty, Disclaimer, and Liability

For all issues not covered herewithin, please refer to the "General Terms and Conditions of Sale and Delivery" that are part of the sales contract.

NEW FEATURES WITH SW V4.02

1 Momentary/Latching Key Functions

1.1 PFL and Talkback Keys

Latching: If a PFL key or one of the talkback keys (N-1 A, N-1 B, AUX 1, AUX 2, or STUDIO) is pressed for less than 0.2 s, the function is now latching, and the key is illuminated. To release the function, an other short press of the key is required.

The same functionality applies for the F1...F5 keys if configured as additional talkback keys.

Momentary: When pressing a PFL or TB key longer than 0.2 s, it acts as a momentary key, i.e., the function is automatically canceled upon releasing the key.

Basic information on this subject to be found in chapters: 3.1.4 / 7.1 / 7.3 / 12.2.11 (Operating Instructions)

1.2 Monitoring Keys

Mutually Releasing / Latching: If one of the Monitoring Selector keys is pressed for less than 0.2 s, the former monitoring source selection is canceled, and the new monitoring source selection becomes active. The selection is latching and the key is illuminated until any other Monitoring Selector key is pressed.

Mutually Releasing / Momentary: If one of the Monitoring Selector keys is pressed for longer than 0.2 s, it acts as a momentary key. The former monitoring source selection is canceled, and the new monitoring source selection becomes active. Upon releasing the key, the former monitoring source selection is reactivated.

Uhm... This may sound a bit confusing, but in everyday use it is a very convenient feature – just give it a try!

2 Talkback and PFL Signaling

2.1 Talkback Signaling from CR to Studio, and Vice Versa

CR to Studio: When talkback from the control room (CR) to the studio is activated, pin 23 of the STUDIO MON CTRL connector is activated (i.e. pulled to ground). This pin was formerly labeled as “Spare OUT 1”. Now it can be used for illuminating the CR lamp on an external talkback box.

Please refer to the pin assignment diagram and table on the next page.

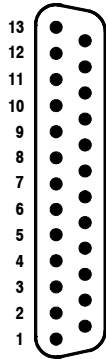
Studio to CR: When talkback from the studio to the CR is activated (e.g. when using the external talkback box), the TALK BACK STUDIO key in the console’s central section is illuminated.

Basic information on this subject to be found in chapters: 3.1.4 / 7.3 / 15.13 (Operating Instructions)

2.2 PFL Signaling

When a PFL key is activated, pin 11 of the STUDIO MON CTRL connector is activated (i.e. pulled to ground). This pin was formerly labeled as “Spare OUT 2”.

STUDIO MON CTRL (D-type, 25 pin, male):

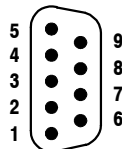


Pin	Signal	Pin	Signal	Pin	Signal
1	+5 V SUPPLY	10	Lamp EXTERN	19	Switch TB TO TEL2
2	COMMON	11	Lamp PFLSIGN.	20	Lamp PGM
3	Switch AUX1	12	n.c.	21	Lamp AUX2
4	Switch OFF AIR	13	GND	22	Lamp PFL
5	Switch EXTERN	14	+5 V SUPPLY	23	Lamp TBTOSTUDIO
6	Switch TB TO TEL1	15	Switch PGM	24	Lamp STUDIO MIC ON
7	n.c.	16	Switch AUX2	25	GND
8	Lamp AUX1	17	Switch PFL		
9	Lamp OFF AIR	18	Switch TB TO CR		

3 Additional REC Signaling Output

An additional REC signaling output has been provided on pin 9 of the SIGN. connector (formerly labeled as “Spare OUT”) to extend the on-air signaling features.

SIGN. (D-type, 9 pin, male):



Pin	Signal	Pin	Signal
1	+5 V SUPPLY	6	COMMON
2	ON AIR IN –	7	Spare IN – or Ext. CR DIM IN – *
3	CR MIC OUT	8	STUDIO MIC OUT
4	PGM OUT	9	REC OUT
5	GND		<i>* depending on Customer Code setting</i>

For the ON AIR INDICATION setting on the COMMON SETTINGS page, a fourth selection item (ΣPROGRAM/ΣREC) was created. Depending on this setting, the two signaling outputs are active according to the following table:

ON AIR INDICATION setting	PROGRAM output on-air	REC output on-air	SIGN output:	
			Pin 4 (PGM OUT)	Pin 9 (REC OUT) (new output)
1) SPROGRAM AND SREC	0	0	0	0
	1	0	1	1
	0	1	1	1
	1	1	1	1
2) SPROGRAM	0	x	0	0
	1	x	1	0
3) SREC	x	0	0	0
	x	1	0	1
4) SPROGRAM / SREC (new setting)	0	0	0	0
	1	0	1	0
	0	1	0	1
	1	1	1	1

In other words:

- For the 1st setting, both signaling outputs are active whenever any audio signal is routed either to the program or the record output (or both).
- For the 2nd setting, only the PGM OUT signaling output is active while an audio signal is routed to the program output. An audio signal routed to the record output has no effect.
- For the 3rd setting, only the REC OUT signaling output is active while an audio signal is routed to the record output. An audio signal routed to the program output has no effect.
- For the 4th (new) setting, only the PGM OUT signaling output is active while an audio signal is routed to the program output, and only the REC OUT signaling output is active while an audio signal is routed to the record output. If audio signals are routed to both the program and the record outputs, both the PGM OUT and REC OUT signaling outputs are active.

Basic information on this subject to be found in chapter 12.2.2 (Operating Instructions)

4 Additional Customer Codes

Code 0x0000800: Used to disable dimming of the CR monitor speakers during talkback from the studio to the control room.

Code 0x00001000: Used to disable dimming of the studio monitor speakers during talkback from the control room to the studio.

Code 0x00002000: Used to swap the functions of the PFL and the OFF keys next to the faders, regardless whether they are used for the standard PFL and OFF functions, or whether other functions are configured for any of these keys.
Basic information on this subject to be found in chapter 9 (Operating Instructions)

Code 0x00004000: If this code is active, whenever a channel is activated by moving its fader up from its lower stop while it is switched ON (or the other way round, by switching the channel ON while its fader is positioned above the lower stop), this channel's Channel Control page pops up automatically and allows for immediate changes of the channel settings. This Channel Control page remains displayed until another channel is activated, or until another page is selected using one of the five buttons next to the clock dial.

Code 0x00008000: If this code is active, the status of the channel ON/OFF switch of channels currently not routed to the console surface will be saved in the flash memory when powering the console off. At power on, the ON or OFF status of these channels will automatically be re-established.
If this code is inactive, the channels not routed to the console surface will always be set to OFF at power on.

Basic information on Customer Code to be found in chapter 12.2.12 (Operating Instructions)

CONTENTS

1 Introduction.....1-1

1.1 Block Diagram V4.0 1-2

1.2 Definition of Terms..... 1-4

2 General2-1

2.1 Utilization for the Purpose Intended 2-1

2.2 First Steps 2-1

2.2.1 Unpacking and Inspection..... 2-1

2.2.2 Installation 2-1

2.2.3 Adjustments, Repair..... 2-2

2.2.4 PC-Card 2-2

2.3 Technical Specifications 2-3

3 Operating Concept3-1

3.1 Operating Elements..... 3-2

3.1.1 Power Switch 3-2

3.1.2 Central Section , Display Unit 3-3

3.1.3 Central Section, Meter Unit 3-3

3.1.4 Central Section, Monitoring and Talkback 3-4

3.1.5 Fader Units..... 3-6

4 Channel Functions4-1

4.1 Keys 4-1

4.2 Faders 4-1

4.3 Overload Indicator 4-1

4.4 Channel Screen 4-2

4.4.1 Channel Screen Fields..... 4-2

4.4.2 Multi-Source Selector Page 4-4

4.4.3 Channel Control Page, Microphone Input 4-5

4.4.4 Channel Control Page, Line Input..... 4-6

4.4.5 EQ/Filter Page, Microphone Input..... 4-8

4.4.6 EQ/Filter Page, Analog Line/Digital Input 4-9

5	Master Functions.....	5-1
5.1	Login/Logout.....	5-1
5.2	AUX and Insert Control.....	5-2
5.3	N-1/Audition Bus and Telephone Hybrid Control.....	5-3
5.3.1	Additional N-1 Outputs.....	5-4
5.4	Studio Monitoring.....	5-5
5.5	Mixer Setup.....	5-6
5.6	Snapshots.....	5-7
5.6.1	Recall a Snapshot from Memory.....	5-7
5.6.2	Save a Snapshot to Memory.....	5-8
5.6.3	Delete a Snapshot from Memory.....	5-8
5.7	Mic Settings.....	5-9
5.7.1	Recall a Mic Setting from Memory.....	5-9
5.7.2	Save a Mic Setting to Memory.....	5-10
5.7.3	Delete a Mic Setting from Memory.....	5-10
5.8	Routing.....	5-11
5.8.1	Channel Routing.....	5-12
5.8.2	Recall a Channel Routing from Memory.....	5-15
5.8.3	Save a Channel Routing to Memory.....	5-15
5.8.4	Delete a Channel Routing from Memory (Administrator Only).....	5-16
5.8.5	Channel Routing Administration.....	5-16
5.9	Using PC-Cards.....	5-17
5.9.1	Load a Snapshot/Mic Setting/Channel Routing from PC-Card.....	5-17
5.9.2	Save a Snapshot/Mic Setting/Channel Routing to PC-Card.....	5-18
5.9.3	Delete a Snapshot/Mic Setting/Channel Routing from PC-Card.....	5-18
5.10	Administrator.....	5-19
5.10.1	Features.....	5-19
5.10.2	Admin Selection of Snapshots/Mic Settings/Channel Routings.....	5-20
5.10.3	Users with and without a Password.....	5-21
5.11	User Administration.....	5-22
5.12	System Configuration.....	5-22
5.13	Watch and Stopwatch.....	5-23
5.13.1	Watch.....	5-23
5.13.2	Fader Stopwatch.....	5-24
5.13.3	User Stopwatch.....	5-24
5.14	Master Fader for PGM and REC Outputs.....	5-25
5.14.1	Default Master Level.....	5-26
6	Level Meters.....	6-1
6.1	Standard Level Meters.....	6-1

7	Monitoring	7-1
7.1	Control Room Monitoring	7-1
7.2	Studio Monitoring	7-4
7.3	Talkback	7-5
7.3.1	Additional Talkback Functions	7-5
7.3.2	Talkback Settings	7-6
7.4	External PFL	7-8
8	Signaling	8-1
9	Machine Control	9-1
9.1	Keys and LEDs	9-1
9.2	Control Outputs	9-3
9.2.1	CTRL OUT1	9-3
9.2.2	CTRL OUT2	9-3
9.3	Control Inputs	9-4
9.3.1	CTRL IN	9-4
9.3.2	EXTERN PFL Input	9-4
9.4	CTRL OUT1/2 & CTRL IN Application Examples	9-5
10	Automation	10-1
10.1	Introduction	10-1
10.2	Features of the OnAir 2000M2 CAB Support	10-1
10.3	Application Handling	10-2
10.3.1	Configuration for Automation Control	10-2
10.3.2	Communication Time-out	10-2
10.3.3	Output Selection	10-3
10.3.4	Start a New Title from Schedule	10-3
10.3.5	Indication of the Currently Playing Input Line	10-4
10.3.6	Pre-Listening	10-4
10.3.7	Time Synchronization	10-4
11	User Modes	11-1
11.1	Purpose of User Modes	11-1
11.2	Access Configurable Functions of the Console	11-2
11.3	User Administration	11-4
11.4	Administration Functions	11-5
11.5	Log-in Procedure and Defaults	11-7

12	Configuration	12-1
12.1	Configuration Handling.....	12-1
12.2	Configuration Procedure	12-2
12.2.1	Input	12-4
12.2.2	Common Settings	12-7
12.2.3	Output.....	12-8
12.2.4	Level Meter	12-8
12.2.5	Time & Date.....	12-9
12.2.6	System Test	12-10
12.2.7	Software Update	12-11
12.2.8	Console Dump.....	12-11
12.2.9	System Synchronization	12-12
12.2.10	Automation.....	12-13
12.2.11	Monitor Extension (Optional)	12-14
12.2.12	Customer Code.....	12-17
13	SW Update.....	13-1
13.1	Software Structure.....	13-1
13.1.1	The CPU Software Package	13-1
13.1.2	DSP Software Package.....	13-1
13.1.3	Important Information for Software Update to V4.0.....	13-1
13.2	SW Update Procedure.....	13-3
13.2.1	Error Handling.....	13-5
14	System Diagnostics and Error Handling.....	14-1
14.1	Error, Warning, and Information Messages	14-1
14.1.1	System Diagnostics.....	14-2
14.2	Indication on Failure of Restricted Functions.....	14-6
14.3	System Test	14-7
14.3.1	Buttons/Faders Test.....	14-7
14.3.2	Fader Calibration.....	14-8
14.3.3	Display Test.....	14-9
14.3.4	PC-Card Test.....	14-9
14.3.5	SW Versions Display	14-10

15	Hardware Modules	15-1
15.1	Mic Input Module.....	15-1
15.2	Analog Line Input Module.....	15-3
15.3	Digital Input Module.....	15-3
15.4	Analog Hex Input Module.....	15-4
15.5	Digital Hex Input Module.....	15-5
15.6	TB Mic Input Module.....	15-6
15.7	Telephone Hybrid Module.....	15-7
15.8	Analog Output Module.....	15-8
15.9	Dual Analog Output Module.....	15-8
15.10	Digital Output Module.....	15-9
15.11	Analog Insert Module.....	15-10
15.12	Digital Insert Module.....	15-11
15.13	Monitoring Module.....	15-12
15.14	Monitoring Module w. Extension.....	15-18
15.15	Serial Interface Module.....	15-21
15.16	Clock Sync Module.....	15-21
15.17	Time Sync Module.....	15-22
16	DIP Switches and Jumpers	16-1
16.1	Input Modules (Mic, Line, Digital).....	16-1
16.2	TB Mic Input Module.....	16-2
16.3	Telephone Hybrid Interface.....	16-5
16.4	Analog Output Module.....	16-5
16.5	Dual Analog Output Module.....	16-5
16.6	Digital Output Module.....	16-6
16.7	Analog/Digital Insert Module.....	16-6
16.8	Monitoring Module.....	16-7
16.9	Clock Sync Module.....	16-7
16.10	Time Sync Module.....	16-7
16.11	Console Size Selection.....	16-8
16.12	Control Front Board I.....	16-8
17	Index	17-1

1 INTRODUCTION



OnAir 2000M2 is a smart yet powerful digital mixing console for “on-air” and small recording and editing studio applications. It has a modularity of 6 fader strips; the maximum console size is limited to 24 fader strips (stereo or mono).

OnAir 2000M2 is based on a touch-screen user surface. Only the most important functions have hardware control elements. Unlike other digital mixing consoles, OnAir 2000M2 does not need external racks and power supply (however, versions for external power supply with redundancy as well as Input Module Extension Box are optionally available – refer to [chapter 5.8](#)). Everything is integrated in a single, lightweight console.

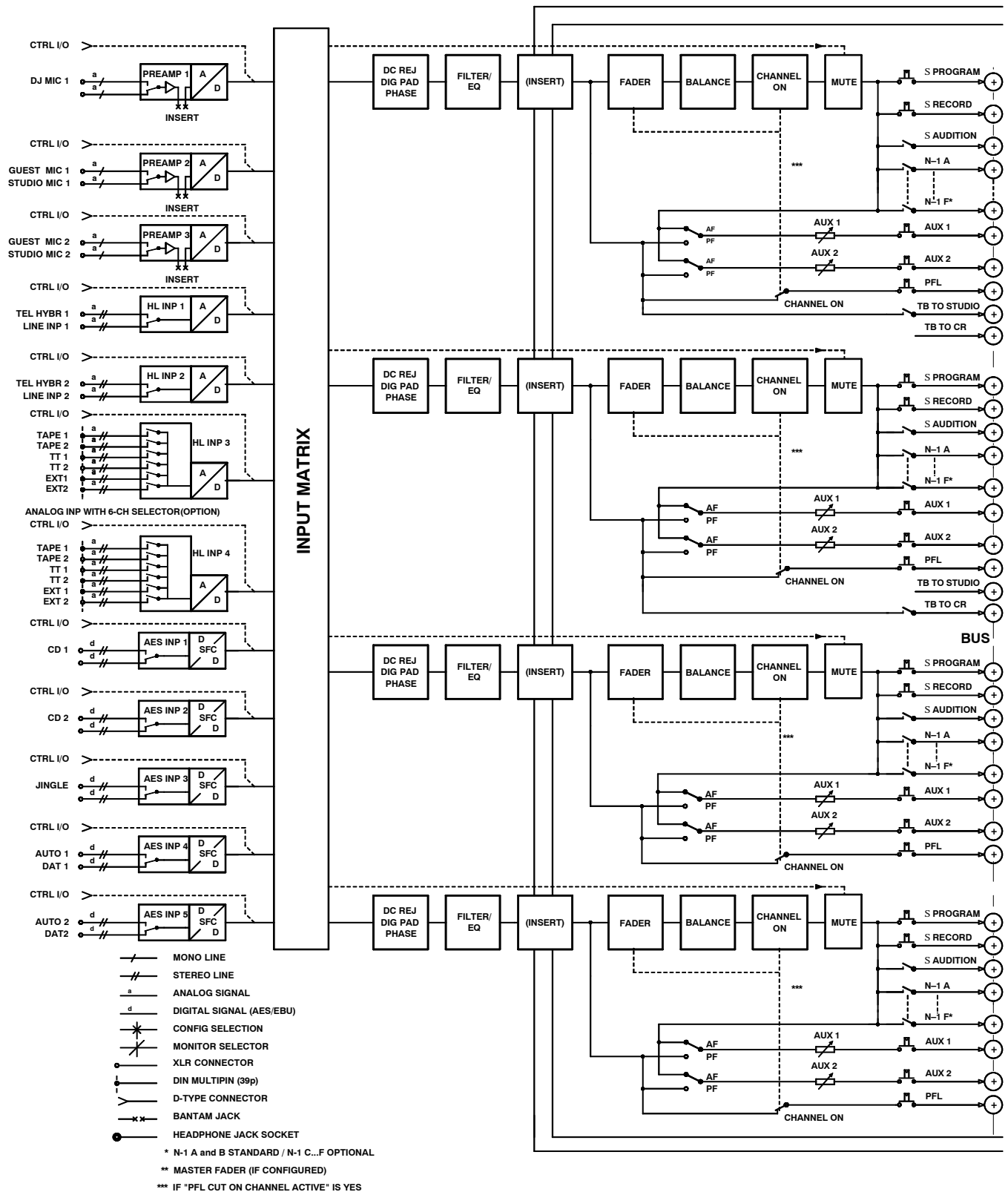
Since it is fully digital, it can be adapted to the current user using snapshot automation. Extensive configuration possibilities allow OnAir 2000M2 to be integrated into almost any broadcast studio environment.

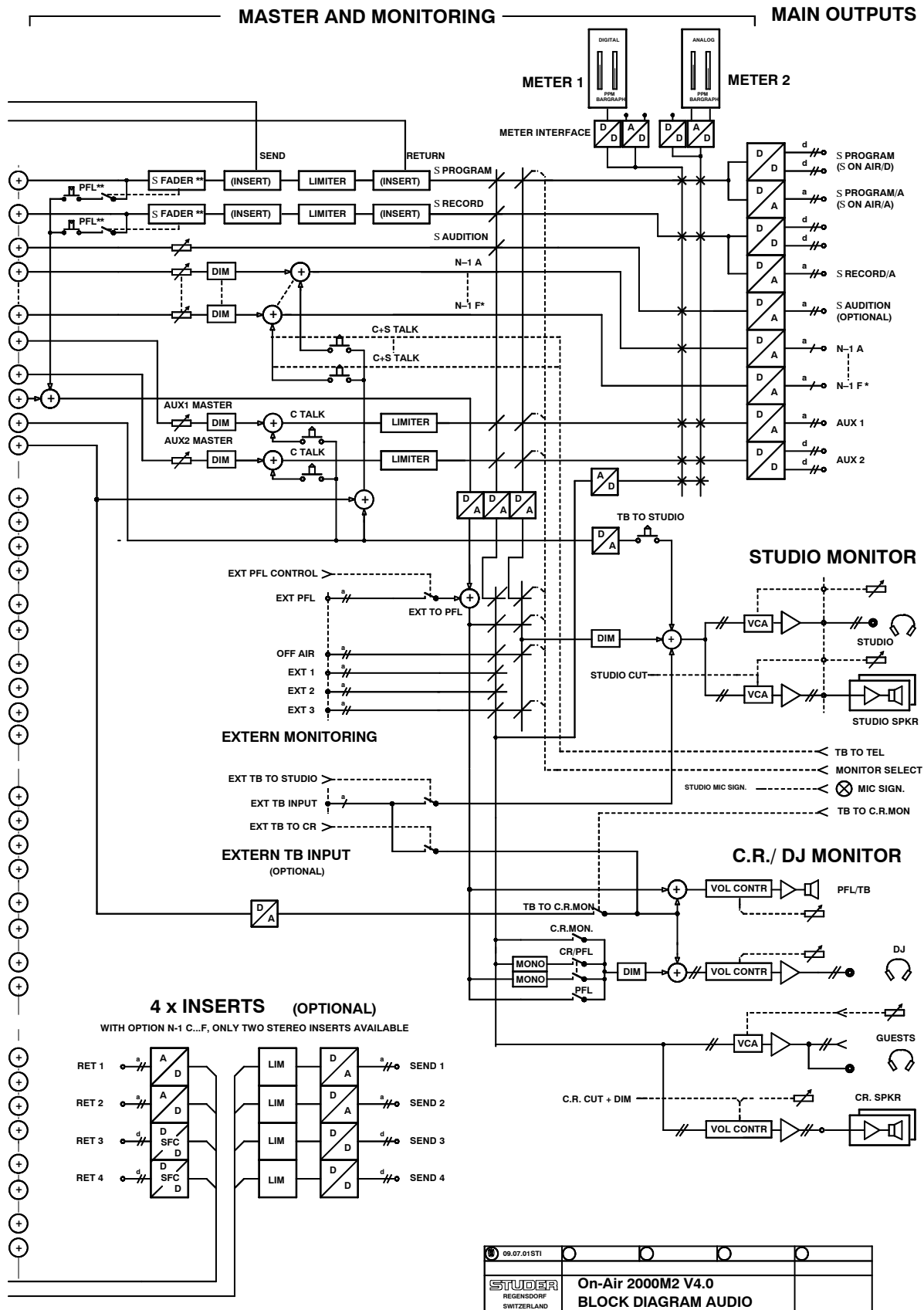
For an overview, please refer to the OnAir 2000M2 block diagram located on the following two pages.

1.1 Block Diagram V4.0

INPUTS INPUT MODULES

INPUT / FADER CHANNELS





1.2 Definition of Terms

Terms used in this manual:

Input: The physical input connector of the input module; standard input modules have two selectable (mono or stereo) inputs, while the hex line input modules have six selectable stereo inputs. These inputs are equipped either with 3-pin XLR connectors or, for the hex input modules, with 39-pin Siemens connectors. On Digital Input Modules, there is a selection of two AES/EBU inputs on XLR connectors and two S/PDIF inputs on Cinch connectors and on optical (TOSlink) connectors available.

Input Module: Hardware module, containing two (or six) mono or stereo inputs. Microphone Input Modules have two transformer-balanced mono inputs on XLRs with selectable 48 V phantom supply. Analog Line Input Modules have two stereo inputs on XLRs, they are available with electronically or transformer-balanced input configuration. On Digital Line Input Modules, there is a selection of two AES/EBU inputs on XLR connectors and two S/PDIF inputs with Cinch and optical (TOSlink) connectors available. Analog Hex Line Input Modules have six stereo inputs on 39-pin Siemens connectors, while the Digital Hex Input Modules have six AES/EBU inputs on 39-pin Siemens connectors as well. Each input of an input module is equipped with control inputs and outputs (GPIO) used for fader start, mute, signaling, etc.; these control inputs and outputs are available on D-type connectors.

Channel: A channel is the combination of all signal processing functions that can be assigned to a fader strip, as A/B (or one-out-of-six) input selection, gain, filter, EQ, pan/balance etc.; each channel can be routed to any fader strip thanks to the channel routing performed in the DSP section of the console.

Fader Strip: A fader strip contains the operating elements of a channel, as linear fader, ON, OFF, and PFL key, as well as a section of the channel touch screen next to the hardware operating elements. As the number of operating elements is reduced to a minimum, the adjustment of some less often used channel functions, as e.g. EQ setting, is performed on the center touch screen and the rotary encoders located next to this screen.

2 GENERAL

2.1 Utilization for the Purpose Intended



The OnAir 2000M2 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.

2.2 First Steps

2.2.1 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.

2.2.2 Installation

Primary Voltage: The power supply unit is auto-ranging; it can be used for mains voltages in a range of 100 to 240 V_{AC}, 50 to 60 Hz.

General Precautions: Do not use the unit in conditions of excessive heat or cold, near any source of moisture, in excessively humid environments, or in positions where it is likely to be subjected to vibration or dust. The ambient temperature range for normal operation of the unit is +5...+40° C.



Unobstructed air flow is essential for proper operation. The air vents at the rear and the bottom of the unit are a functional part of the design and must not be blocked in any way. Never remove the rubber feet of the unit when placing it on a flat surface!

Cleaning: Do not use any liquids to clean the exterior of the unit. A soft, dry cloth or brush will usually do.



For cleaning the touch-screen display windows, most of the commercially available window or computer/TV screen cleaners are suited. *Use only a slightly damp (never wet) cloth. Never use any solvent!*

Power Connection: The attached female IEC 320/C13 mains cable socket has to be connected to an appropriate mains cable by a trained technician, respecting your local regulations. Refer to the “Installation, Operation, and Waste Disposal” section at the beginning of this manual.



Earthing: *This equipment must be earthed, due to the mains input filter network being connected to the mains earth.*



Some consideration should be given to the earthing arrangement of the system; the console *must* be in its center, i.e. in the system's star point.

The console chassis is earthed to the mains earth via the power supply. Ground loops may occur where signal processing equipment, patched to the console, has its signal earth commoned to the equipment chassis.

2.2.3 Adjustments, Repair

Danger:



All internal adjustments as well as repair work on this product must be performed by trained technicians!

Replacing the Supply Unit:



The primary fuse is located inside the power supply module and cannot be changed. In case of failure, the complete supply unit must be replaced. Please ask your nearest Studer representative.

2.2.4 PC-Card

The OnAir 2000M2 mixing console is equipped with a PC-Card socket. Using the industry-standard SRAM PC-Cards, the user can save important console information on a card. This information can then be used to restore the console to the same state at a later moment. Since the information stored on the card is DOS compatible, it is easily transferred to an IBM-compatible PC for data storage and backup.

Note: Although it is possible to format an SRAM card in a PC, the card must be re-formatted in the OnAir 2000; therefore, the write protect tab must be set to OFF when the card is used in the mixing console for the first time.

It is also possible for new software releases to be downloaded from an SRAM PC-Card. This feature is only available for users in possession of the correct files. For more information on this subject, refer to [chapter 13](#).

The mixing console PC-Card support is restricted to 5 V, Type 1, SRAM memory cards with a capacity of 64 kbytes to 32 Mbytes. Hot-swapping is supported, too.

2.3 Technical Specifications (subject to change without notice)

General	Level specs, digital, in dB_{FS} :	dB , referenced to full modulation (dB_{FS} , dB Full Scale)
	Level specs, analog, in dBu :	$0 \text{ dBu} \cong 0.775 \text{ V}_{\text{rms}}$
	Level specs, analog, in dBu_{FS} :	Level in dBu for full modulation ($\cong 0 \text{ dB}_{\text{FS}}$)
	Sampling rate:	$48 \text{ kHz} \pm 100 \text{ ppm}$ (internally synchronized)
	Headroom adjustable:	0 to 20 dB
	Default setting:	9 dB
	Output level:	15 dBu @ 0 dB_{FS}

All input faders set to their 0 dB position. External analog sources: Source impedance $< 200 \Omega$. Frequency range: 20 Hz to 20 kHz , if not stated otherwise.

Microphone Inputs

Microphone input modules have A/B-switchover and are equipped with a balancing transformer and XLR connectors. The signal is routed to an electronically balanced, analog insert point before the A/D-converter.

Input sensitivity	-60 to $+20 \text{ dBu}_{\text{FS}}$ (with 9 dB headroom: -69 to $+11 \text{ dBu}$)
Gain setting	in steps of 1 dB
Phantom power, switchable	48 V
Frequency response	$\pm 0.5 \text{ dB}$
High-pass filter (12 dB/Octave)	-3 dB @ 75 $\text{Hz} \pm 5 \text{ Hz}$, switchable
Input impedance	$> 1 \text{ k}\Omega$
Insert level	$+15 \text{ dBu}_{\text{FS}}$ (with 9 dB headroom: $+6 \text{ dBu}$)
A/D converter	24 bit (Delta-Sigma, $64 \times$ oversampling)
Dynamics	typ. 102 dB (unweighted)
THD+N	$< -85 \text{ dB}_{\text{FS}}$, 20 Hz to 20 kHz , @ $-1 \text{ dB}_{\text{FS}}$
THD+N	$< -100 \text{ dB}_{\text{FS}}$, 20 Hz to 20 kHz , @ $-30 \text{ dB}_{\text{FS}}$
Noise figure	typ. $< 4 \text{ dB}$ @ max. gain, bandwidth 20 kHz , $R_s = 200 \Omega$
Common mode rejection	$> 50 \text{ dB}$ @ 15 kHz , $> 75 \text{ dB}$ @ 50 Hz

Line Level Inputs

Analog line level input modules are available in three versions:

- Stereo input with A/B switching, balancing transformer, XLR connectors
- Stereo input with A/B switching, electronically balanced inputs, XLR connectors
- Stereo input with 6-input selector, balancing transformer. On this module the sources are connected via a 39-pin DIN connector.

Input sensitivity for 0 dB_{FS}	0 to $+24 \text{ dBu}_{\text{FS}}$ (with 9 dB headroom: -9 to $+15 \text{ dBu}$)
Gain setting	in steps of 1 dB
Frequency response	$\pm 0.1 \text{ dB}$
Input impedance	$> 10 \text{ k}\Omega$
A/D converter	24 bit (Delta-Sigma, $64 \times$ oversampling)
Dynamics	typ. 102 dB @ $+15 \text{ dBu}_{\text{FS}}$ (unweighted)
THD+N	$< -94 \text{ dB}_{\text{FS}}$, 20 Hz to 20 kHz @ $-1 \text{ dB}_{\text{FS}}$
THD+N	$< -100 \text{ dB}_{\text{FS}}$, 20 Hz to 20 kHz @ $-30 \text{ dB}_{\text{FS}}$
Common mode rejection	$> 50 \text{ dB}$ @ 50 Hz to 15 kHz , with transformer; $> 47 \text{ dB}$ @ 50 Hz to 15 kHz , electronically balanced

Digital Inputs

Digital input modules are available either with A/B switching or with a 6-input selector.

The module with A/B switching supports the AES/EBU (AES3-1992) and S/PDIF (IEC 958) formats. It is equipped with XLR, Cinch, and TOSLINK connectors.

The 6-input selector supports the AES/EBU (AES3-1992) format and is equipped with a 39-pin DIN connector for source connection.

All digital inputs are equipped with a sampling frequency converter (SFC).

SFC resolution	20 Bit
Input sampling rate	30 to 54 kHz
THD+N	$< -105 \text{ dB}_{\text{FS}}$ @ 1 kHz , 0 dB_{FS}
Frequency response	$\pm 0.1 \text{ dB}$
Input impedance	110 Ω (XLR and DIN inputs); 75 Ω (Cinch input)

Analog Outputs

Analog output modules are available with balancing transformers or with electronically balanced outputs, XLR connectors.

Output level	(transformer-balanced) +4 to +24 dBu @ $R_L = 100\ \Omega$; +4 to +23 dBu @ $R_L = 300\ \Omega$
Output level	(electronically balanced) +4 to +23 dBu @ $R_L = 100\ \Omega$; +4 to +22 dBu @ $R_L = 300\ \Omega$
D/A converter	24 bit (Delta-Sigma, 128 × oversampling)
Dynamics	typ. 101 dB (unweighted)
THD+N	< -90 dB _{FS} @ 1 kHz, -1 dB _{FS}
Frequency response	±0.2 dB
Output impedance	< 40 Ω

Digital Outputs

Digital output modules are equipped with two independent outputs according to the AES/EBU standard (AES3-1992). On each of these outputs, the same signal is fed to two XLR sockets with individual buffers.

Output level	2 to 5 V
Output impedance	110 Ω

Equalizer

Treble control (High)	5 kHz/10 kHz: ±15 dB (depending on Customer Code setting; refer to 12.2.12)
Equalizer (Mid)	200 Hz to 10 kHz: ±15 dB
Bass control (Low)	200 Hz/400 Hz: ±15 dB

Crosstalk Attenuation

Between channels	> 90 dB
Input fader attenuation	> 100 dB

Power Supply

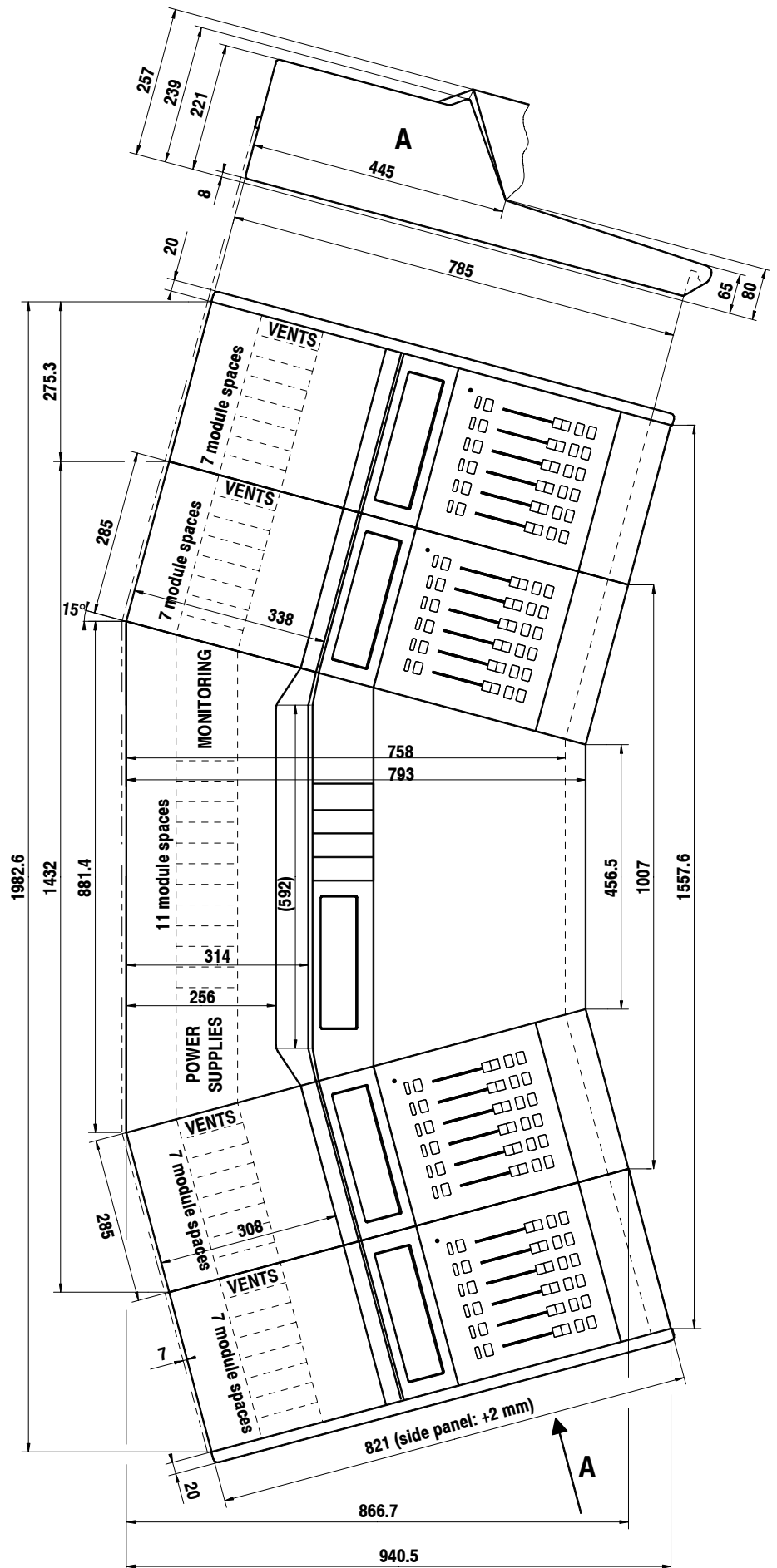
Mains voltage	100 to 240 V, 50/60 Hz (auto-ranging)
Power consumption	150 VA typ. (OnAir 2000/24/4) Redundant power supply available on request.

Weight

OnAir 2000M2 6/4	34 kg
OnAir 2000M2 12/4	44 kg
OnAir 2000M2 18/4	55 kg
OnAir 2000M2 24/4	63 kg

Note: Depending on the application, the on-air mixing consoles can have different configurations. For this reason the abovementioned values are applicable only to a typical configuration; in an individual case, the values may differ. We reserve the right to make changes as technological progress may warrant.

Dimensions:



3 OPERATING CONCEPT

The normal operation of the console is as simple as possible. This has been achieved by reducing the number of operating elements to the minimum. Nevertheless, high flexibility has been achieved thanks to the use of touch-screen technology which just shows those operating elements which are needed at a certain time.

A linear fader and three buttons (ON, OFF, PFL) are the only hardware operating elements in a fader strip. All other functions are available through the touch-screens. To maintain a good console overview these touch-screens (channel screens) are located right above the fader strips. Symbols on the screens show the current settings on every channel. Touching one of the symbols assigns the center touch-screen (control screen) to this function. Parameters can now be entered via the four rotary encoders (e.g. equalizer parameters), or directly through the assigned touch-screen (e.g. equalizer on/off). On the screen above the fader strips, the new settings are immediately updated. The OnAir 2000M2 concept has all current settings for every channel visible at any time. This innovative user surface is called the “Touch’n’Action” concept and is patented by Studer.

In broadcast applications many DJs and operators without a special technical education work on the same mixing console. Every DJ has his preferred console settings, mainly EQ parameters for his microphone. In the OnAir 2000, individual settings can be stored; by simply pressing a few keys, every operator can recall his particular, tailor-made setting and concentrate afterwards upon his essential task – presenting a radio program meeting the needs of the listeners.

Radio stations often use the same mixing console type for on-air and production. The “Snapshot” feature easily turns the production console into an on-air console within seconds, if required.

Thanks to the integrated input router the user/administrator can place any input module's signal to any fader strip on the console surface at his convenience. Through a straightforward representation of the available signals and faders on the screen, the input channel routing is easily done.

3.1 Operating Elements

3.1.1 Power Switch

Standard Versions: The power switch is located on the rear side of the console next to the power inlet.

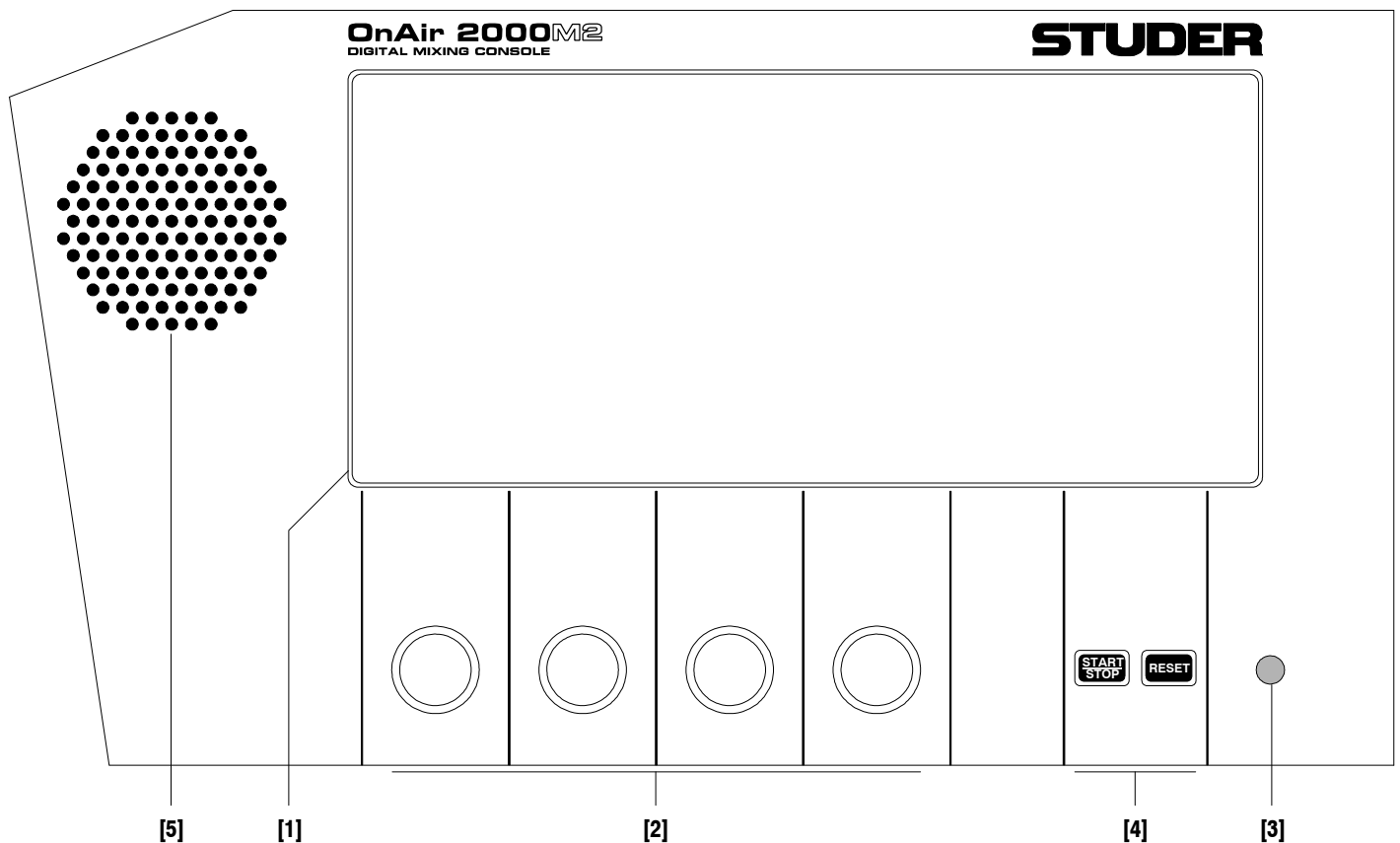
Ext. Supply Versions: If an OnAir 2000M2 is equipped with the optional, dual external power supply for redundancy, no power switch is at the rear of the console. Instead, each of the two power supply units has its own power switch.



Please note that the two external power supply units should be connected to different phases of the mains for improved redundancy.

For operation and service details of the external power supply units, an additional, separate manual is shipped with the power supply units.

3.1.2 Central Section , Display Unit



[1] Central Touch-Screen

The central touch-screen display is used for parameter entries (refer to [chapters 4, 5, 10, 12, and 13](#) for details) and displays the current time and date in digital and analog formats (except when the keyboard or routing pages are active). Besides, the fader stopwatch and the user stopwatch are displayed.

[2] Rotary Encoders

Depending on the current status, the rotary encoders are used for parameter settings.

[3] Contrast Knob

For setting the LC display contrast, depending on the desired viewing angle and the ambient light conditions.

[4] User Stopwatch Control

Keys to control the user stopwatch (lower). Refer to [chapter 5.13](#).

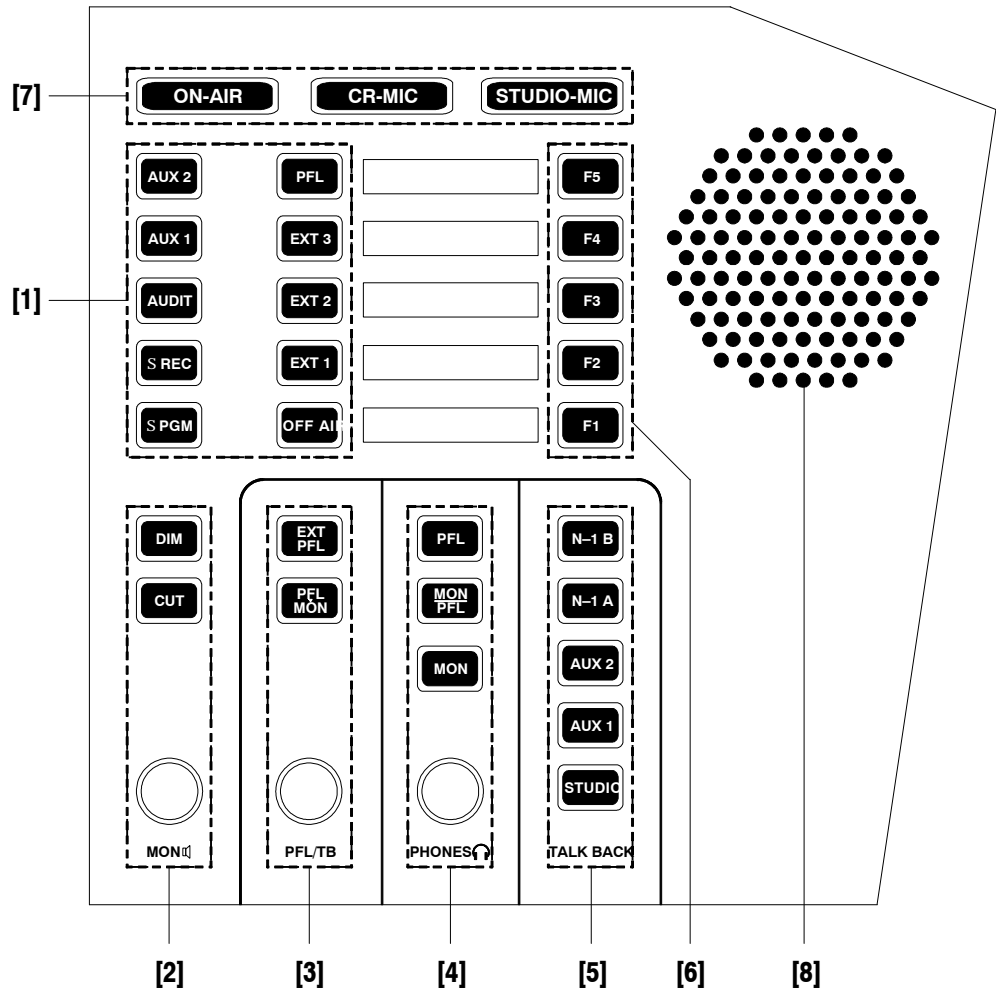
[5] Loudspeaker

for PFL and talkback signals.

3.1.3 Central Section, Meter Unit

The central meter section allows the installation of up to four 190 × 40 mm meter modules. The level meters and/or groups of keys can be installed according to the customer's specification. Therefore, no universally valid statement can be given here.

3.1.4 Central Section, Monitoring and Talkback



[1] Control Room Monitoring Selector

Ten mutually releasing keys for selecting the control room monitoring signal from the following sources:


- AUX 2/AUX 1:** Auxiliary, general purpose outputs;
- AUDIT:** Auxiliary, general purpose output with configurable inputs;
- ΣREC:** Recorder output;
- ΣPGM:** Program output (on-air);
- PFL:** PFL (pre-fader listening);
- EXT 3:** External analog input signal;
- EXT 2:** External analog input signal;
- EXT 1:** External analog input signal;
- OFF AIR:** External analog input signal (e.g. tuner for off-air listening).

[2] CR Monitor Speaker Control

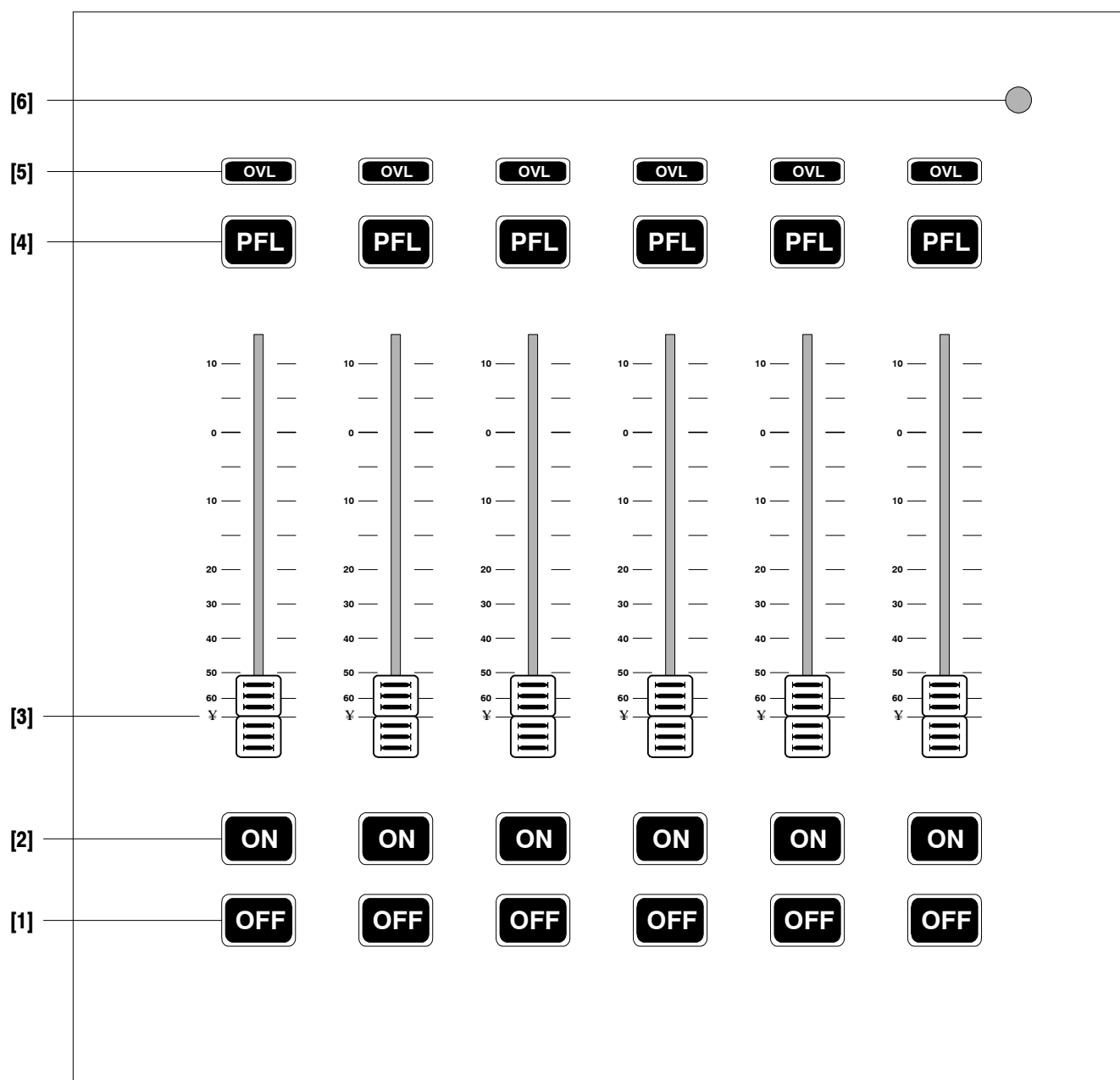
MON : Monitoring volume control.

DIM: If pressed, the monitor speaker level is reduced by 20 dB.

The DIM function is activated automatically if one of the TALK BACK keys is pressed. If “CR DIM WHEN AUDITION SEL” is active (details: refer to [chapter 12.2.2](#)), the monitoring source is AUDIT, and the DJ microphone is on, the AUDIT level is not muted but reduced by 20 dB. If DIM is active, the key is illuminated.

- CUT:** If pressed, the monitor speakers are muted, and the CUT key is illuminated. As long as one of the CR or DJ microphones is on, the monitor speakers are automatically muted, and the CUT key is illuminated.
- [3] PFL/TB**
- PFL/TB:** Volume control for the built-in PFL/TB speakers.
- EXT PFL:** The EXT PFL input can be used as an external PFL input to the monitoring unit. If pressed, the key is illuminated, the external signal is routed to the PFL bus, and the external PFL control output is active.
- PFL>MON:** If PFL is active on any channel, the PFL signal is routed to the main monitor speakers. If no PFL is selected, the monitoring signal is the stereo CR signal as selected. The PFL>MON key is illuminated if active.
- [4] Headphones PHONES **
- Headphones volume control. The headphones socket (6.3 mm TRS jack) is located below the hand rest of the central console part.
- Three keys allow different monitoring modes:
- PFL:** PFL and TB signals are routed to the headphones.
- MON/PFL:** The left-channel headphones signal is the mono PFL signal, while the right-channel headphones signal is the mono CR signal as selected by the monitoring source selector [1]. If no PFL is selected, the headphones signal is the stereo CR signal as selected.
- MON:** The headphones signal is the same stereo signal as selected by the monitoring source selector [1]. It is, however, not affected by the DIM and CUT functions.
- [5] Talkback**
- Selector for five talkback targets:
- N-1 B/N-1 A:** Connection between the DJ microphone* in the control room and the corresponding cleanfeed (N-1) output; this allows talking e.g. to the connected telephone hybrid(s) or communication lines.
- AUX 2/AUX 1:** Connection between the DJ microphone* in the control room and the AUX 2 or AUX 1 outputs.
- STUDIO:** Connection between the DJ microphone* in the control room and the studio speakers and headphones.
The built-in PFL/TB loudspeakers and/or the headphones are used for talkback listening in the control room.
- * If a console is equipped with an additional talkback microphone, this microphone is used instead of the DJ microphone.
- [6] F1...F5**
- Programmable function keys, e.g. for additional CR monitor selector keys (with optional Monitor Expander unit, refer to [12.2.11](#)).
- [7] Signaling Lamps**
- ON-AIR** Is turned on by a control signal on the “SIGN.” control connector on the monitoring module.
- CR-MIC** Is on if at least one microphone in the control room is routed to the program or to the record output (i.e. the corresponding output is selected, the channel is ON, and the fader is opened).
- STUDIO-MIC** Is on if at least one microphone in the studio is routed to the program or to the record output (i.e. the corresponding output is selected, the channel is ON, and the fader is opened).
- [8] Loudspeaker**
- For PFL and talkback signals.

3.1.5 Fader Units



[1] **OFF** (“key no. 3”)

Keys for deactivating or activating a channel. Can be reconfigured.

[2] **ON** (“key no. 2”)

For details please refer to [chapters 9 and 15.1](#).

[3] **Linear Fader**

The audio path is fully digital, therefore the signal does not pass through the fader; the stroke length is 104 mm. For details concerning fader start control please refer to [chapters 9, 14.3, and 15.1](#).

[4] **PFL** (“key no. 1”)

Key for activating/deactivating the PFL (pre-fader listening) function.

[5] **OVL**

Channel overload indicator.

[6] **Contrast Knob**

For setting the contrast of the LC display located above the fader panel, depending on the desired viewing angle and the ambient light conditions.

4 CHANNEL FUNCTIONS

The OnAir 2000M2 hardware is modular in groups of 6 channels; the maximum number of channels is 24. Each channel group consists of a touch-screen, 6 faders, 18 keys (3 per channel) and 6 overload indication LEDs.

Input Router: Through the input router, the output signal of every individual input module can be assigned to any fader strip on the console surface (see [chapter 5.8](#)). The channel parameters relate to the input module and not to the fader strip. They will be re-routed when the input module is assigned to another fader.

4.1 Keys

The channel key functions are configurable; this configuration is valid for the whole console (and not per channel). The different configuration possibilities are:

Configuration	Key 1	Key 2	Key 3
1	PFL	ON	OFF
2	PFL	ON/OFF	LOCATE
3	PFL	ON	LOCATE
4	PFL	ON/OFF	NEXT

For details on the configuration see [chapter 9](#).

4.2 Faders

Since the audio path is fully digital, the signal does not pass through the faders. Therefore linear-track mono faders are used. The stroke length is 104 mm. When opening the fader, fader start or signaling commands can be released, depending on the configuration (see [chapter 9](#)).

Master Faders: Any of the faders can be configured as master fader(s) for the program and/or the record output (see [chapter 5.14](#)).

4.3 Overload Indicator

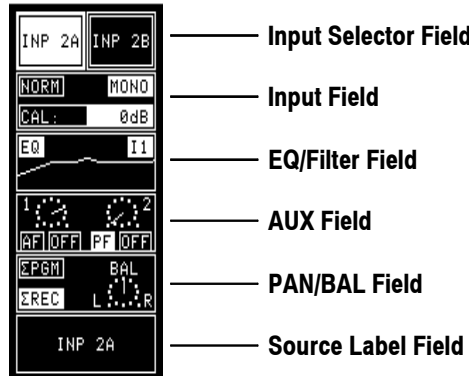
A red OVL indicator per channel signalizes an overload condition anywhere within the channel's signal processing path.

Signals in the OnAir 2000M2 are processed with sufficient digital headroom through the entire signal processing chain. Besides, most outputs (PGM, REC, AUX1, AUX2, SEND1...4) are equipped with limiters in order to prevent overloads. All limiters are set to 0 dB_{FS} with fixed attack and release times.

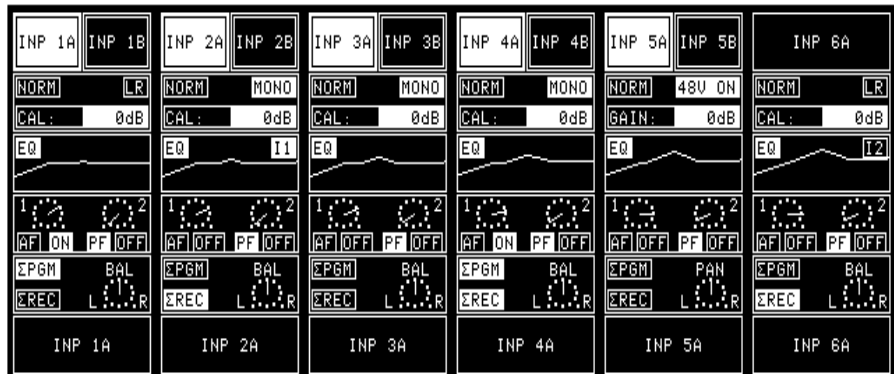
Overload in a channel is indicated if the signal level reaches 0 dB_{FS}. Due to the output limiters, normally distortion can be avoided even in case of an overload.

4.4 Channel Screen

A channel screen is located above each group of six fader strips. The channel screen has a touch matrix with 2 × 6 switch fields per fader strip as shown below.



The channel screen always maintains system overview by displaying the relevant settings of the six fader strips. When touching one of the switching fields, the central control screen automatically displays the attached operating field and allows parameter entry. In the channel screen, the status display is immediately updated.



In the following chapters we assume that the user has access permission to all functions, unless otherwise noted. Access permission may be limited, causing that certain screen parts are blank. For a description of how to set up access permission, refer to [chapter 11](#).

4.4.1 Channel Screen Fields

Input Selector Field:

For microphone and analog/digital line input modules, the Input selector field directly selects one of two physical input signals routed to this fader strip. The field of the selected input is highlighted, and the source name appears in the source label field. While the channel is active (i.e. channel ON, fader opened and output selected), the input selection is disabled.

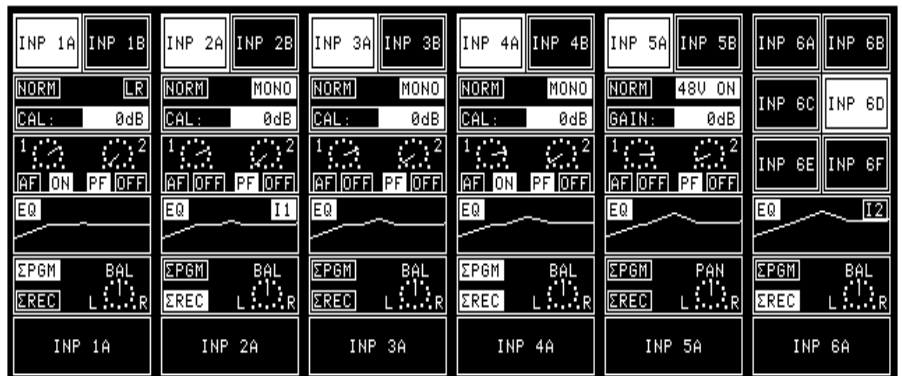
If a hex-input module is routed to this fader strip, the source selection can be made in two different ways depending on the Customer Code setting (for more information on Customer Codes, refer to [chapter 12.2.12](#)):

Code 0x00000001 inactive:

When touching the input selector field, a Source Selector page appears on the central control screen that allows selecting one of the six connected sources. The input selector field displays the currently selected input of the

channel (in the channel screen on the previous page: “INP 6A” at the far right).

Code 0x00000001 active: The six input selection fields are always displayed on the channel screen; the Input and AUX fields are omitted (in the channel screen below: “INP 6A...INP 6F” at the far right).



If the channel is connected to an automation system, the input selector field shows “ON AIR” while the channel is on-air, or it shows “NEXT” if this is the next channel to be switched on-air. For more details on this topic, please refer to [chapter 10](#).

Input Field:

The input field gives an overview of the channel’s relevant front-end parameters. The underlined settings are the default values. If a parameter setting is different from its default value, it is highlighted on the channel screen field.

For a line or digital input module, these parameters are:

- Phase:** NORM/INV (normal, or left channel inverted).
- Stereo Mode:** LR/RL/LL/RR/MONO (normal stereo, channels swapped, left input to both outputs, right input to both outputs, or mono signal to both outputs).
- Calibration:** ±15 dB (deviation of nominal level).

The microphone input modules have the following parameters:

- Phase:** NORM/INV (normal or inverted).
- Phantom Power:** 48 V OFF/48 V ON.
- Gain:** -5...+75 dB (microphone input amplifier gain).

A touch on the Input field does not change a parameter, but opens the Channel Control page on the central control screen. Parameters can now be entered with the four rotary encoders and the control screen touch switches.

EQ/Filter Field:

The *EQ/filter field* is a graphical display of the equalizer setting. “EQ” is highlighted if a filter or the equalizer is on. Touching this field opens the EQ/Filter page on the control screen. If an insert is assigned to this channel, a small “Ix” window is indicated within the EQ/Filter field that is highlighted if the insert is ON.

AUX Field:

The potentiometer symbols in the *AUX field* show the auxiliary settings. Both auxiliaries can be independently set as “AF” (post-fader), “PF” (pre-fader), “ON”, or “OFF”. “PF” and “ON” are highlighted if selected. When touching the “AUX” field, the Channel Control page opens on the central control screen where the auxiliary settings can be changed.

PAN/BAL Field:

The *PAN/BAL field* gives an overview of the current panorama or balance setting and shows the bus assignment. The output sum symbol (Σ) is highlighted if the channel is assigned to the program output (Σ PGM) or to the recording output (Σ REC). The Channel Control page on the central control screen is opened by touching the PAN/BAL field.

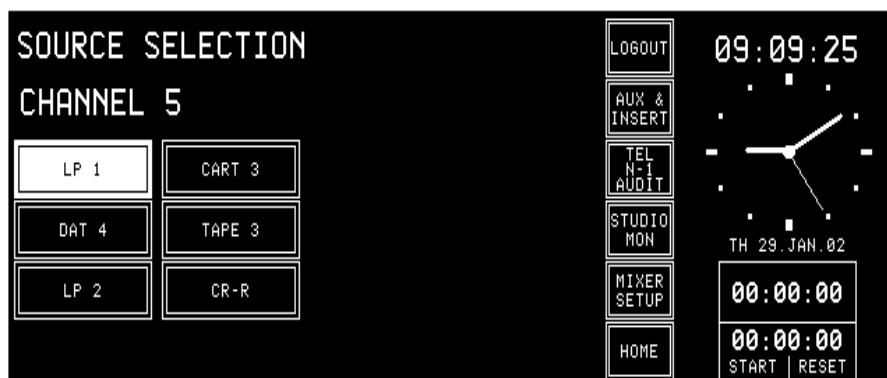
Source Label Field:**“Next” Function:**

The *Source label field* shows the name of the selected input channel.

This function allows highlighting the source label of the channel that is the next to go on-air. For this purpose, just touch the desired channel's source label. Only one source label can be highlighted at a time. The tag is automatically removed when the fader of this channel is opened while the channel is ON. This function has no influence neither on control output signals nor on the internal functionality of the console.

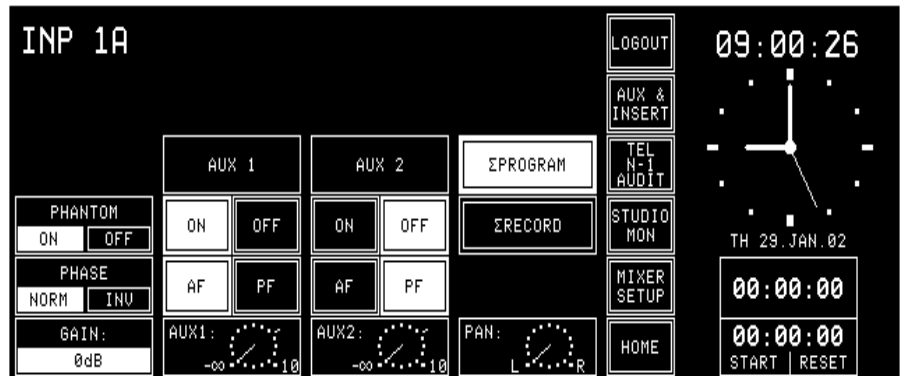
4.4.2 Multi-Source Selector Page

The SOURCE SELECTION page on the central control screen is opened by touching the Input Selector field of a channel, provided the channel is equipped with a hex-input module. On this page, one of the six inputs can be selected and then becomes highlighted. The input name is shown on the channel label field on the channel screen. The source selection page appears only if the hex input modules are configured for central selection (i.e. Customer Code 0x00000001 is inactive).



4.4.3 Channel Control Page, Microphone Input

The Channel Control page for a microphone input is opened if either the AUX, the PAN, or the Input field on the channel screen is touched, provided that the selected input module is a mic input.



PHANTOM Touching the “ON” part of the PHANTOM field turns the 48 V phantom power on; a touch on the “OFF” part of the field turns it off again. The status is indicated by highlighting the corresponding field.

PHASE The phase of the microphone signal is inverted by touching the “INV” part of the PHASE touch-screen field; “INV” is highlighted. Touching “NORM” de-activates the phase inversion.

GAIN The microphone preamp's gain is set with the first rotary encoder (in a $-5\dots+75$ dB range); the adjusted value is indicated in the GAIN field.

AUX 1 / AUX 2 The AUX 1/2 ON and OFF touch-screen fields route the channel signal to the corresponding auxiliary bus, if “ON” is selected (and highlighted). The AF/PF touch-screen fields allow selection whether the signal is taken after- (AF) or pre-fader (PF). The current selections are highlighted. The AUX levels ($-\infty\dots+10$ dB; 0 dB position is marked with a dash) are adjusted with the second and the third rotary encoder. The settings are shown in the fields right above the rotary encoders as well as on the corresponding symbols on the channel screen. The output routing of this particular channel is performed with the “ΣPROGRAM” and “ΣRECORD” touch-screen fields.

PAN The fourth rotary encoder positions the source within the stereo image, the PAN (-ning) indicator shows the adjusted position.

4.4.4 Channel Control Page, Line Input

The Channel Control page for a line input is opened if either the AUX, the PAN, or the Input touch-screen field on the channel screen is touched, provided that the selected input module is an analog line input or a digital input.



MODE Line level inputs have a MODE field which defines whether the input is processed in “ST”(-ereo) or in “MONO” mode. In mono mode the stereo input signal from the input module is added to a mono signal and attenuated by 3 dB.

Stereo signals are processed in the following modes:

- LR: Normal stereo mode;
- RL: Left/right channel swapped;
- LL: Left signal on both channels;
- RR: Right signal on both channels.

PHASE The phase (*of the left input path only*) is inverted by touching the “INV” part of the PHASE touch-screen field; “INV” is highlighted. Touching “NORM” de-activates the phase inversion. Only in the “RR” case, the phase inversion takes place in the R input path.

CAL In the CAL field, the gain deviation referred to nominal level setting is displayed; max. deviation: ± 15 dB, adjustment with the first rotary encoder.

AUX 1 / AUX 2 The AUX 1/2 “ON” and “OFF” touch-screen fields route the channel signal to the corresponding auxiliary bus, if “ON” is selected (and highlighted).

The “AF” / “PF” touch-screen fields allow selection whether the signal is tapped after- (AF) or pre-fader (PF). The current selections are highlighted.

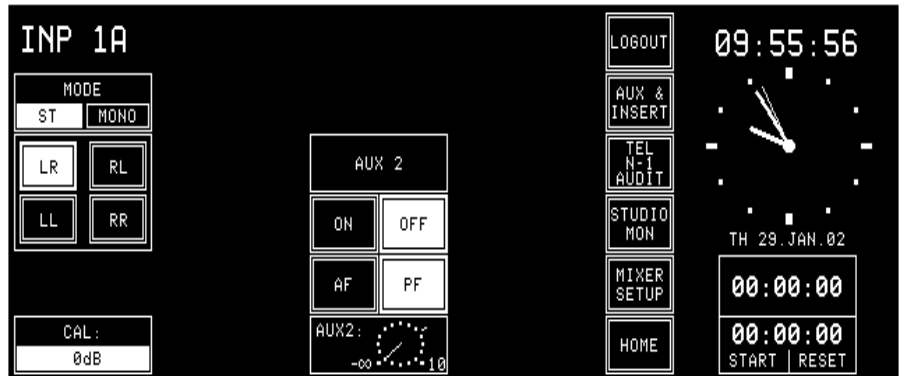
The AUX levels ($-\infty \dots +10$ dB; 0 dB position is marked with a dash) are adjusted with the second and third rotary encoder. The settings are shown in the fields right above the rotary encoders as well as on the corresponding symbols on the channel screen.

The bus assignment is performed with the “ΣPROGRAM” and “ΣRECORD” touch-screen fields.

BAL The fourth rotary encoder adjusts the position of the stereo image, the BAL indicator shows the adjusted position.

Access Permission: Depending on the access permission (see [chapter 11](#)) of the user currently logged in, the functions not available to this user will not be displayed on the Channel Control page; an example is given below. This user cannot access the following parameters:

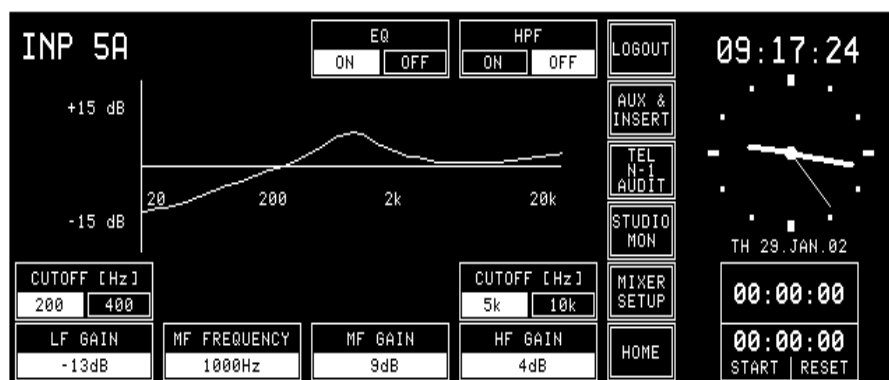
- PHASE
- AUX 1
- Output summing busses (Σ PROGRAM, Σ RECORD)
- PAN/BAL.



If the user has no access permission at all, the Channel Control page will not be displayed.

4.4.5 EQ/Filter Page, Microphone Input

The EQ/Filter page for microphone input modules is opened if the EQ/Filter touch-screen field of the channel screen is touched, provided that the selected input module is a microphone input. If the user has no access permission to the EQ parameters, the EQ/Filter page will not be displayed.



HPF The HPF “ON” / “OFF” touch-screen field is a high-pass filter switch. The filter is part of the analog front end and is available on microphone inputs only. “ON” is highlighted if the filter is active.

EQ The EQ “ON” / “OFF” touch-screen fields activate or bypass the equalizer. If the EQ is bypassed (i.e. set to “OFF”), the preset frequency curve is displayed on the central control screen nevertheless. In the EQ/Filter field of the channel screen, however, the current, linear frequency response is displayed.

The four rotary encoders are the control elements for the equalizer. The low-frequency section is a shelving-type filter with two selectable turnover frequencies and variable boost/cut. The frequency is selected by the left-hand “CUTOFF” touch-screen fields, the gain is set with the leftmost rotary encoder. The next rotary encoder sets the frequency of the mid-frequency section which is a peaking-type filter. The third rotary encoder controls the mid-frequency gain. The rightmost rotary encoder controls the gain of the high-frequency section which again is a shelving-type filter with two turnover frequencies. The right-hand “CUTOFF” touch-screen fields allow frequency selection of the high-frequency shelving filter. The current EQ frequency response curve is displayed on the page.

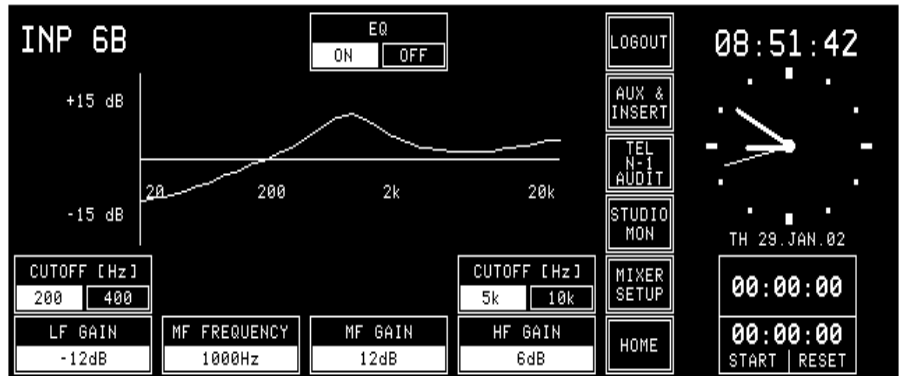
Note: The HF cutoff frequencies can be reduced by approx. one octave (resulting in an increased filter effect) when activating Customer Code 0x00000002; refer to [chapter 12.2.12](#).

EQ Specs:

Filter	Mode	Frequency	Gain range	Comment
High-pass filter	HPF	-3 dB @ 80 Hz	ON/OFF	Analog, 12 dB/oct., mic inputs only
EQ low-frequency	Shelving	200 Hz/400 Hz	-15 dB...+15 dB, 1 dB steps	-
EQ mid-frequency	Peaking	200 Hz...10 kHz, 1/6 octave steps	-15 dB...+15 dB, 1 dB steps	Q = 0.7
EQ high-frequency	Shelving	5 kHz/10 kHz	-15 dB...+15 dB, 1 dB steps	see Customer Code (12.2.12)

4.4.6 EQ/Filter Page, Analog Line/Digital Input

The EQ/Filter page for analog line and digital input modules is opened if the EQ/Filter touch-screen field on the channel screen is touched, provided that the selected input module is an analog line or digital input. If the user has no access permission to the EQ parameters, the EQ/Filter page will not be displayed at all.



The only difference between the analog line/digital and the microphone EQ/Filter pages is the missing HPF high-pass filter switch on analog line/digital inputs.

5 MASTER FUNCTIONS

Master functions are not channel-related but global functions. These are audio functions (AUX master level, studio monitoring), non-audio functions (telephone hybrid control, clock, stopwatch), snapshot management, and system configuration.

Touching one of the LOGIN, AUX & INSERT, TEL, STUDIO MON, MIXER SETUP, or HOME-CHN ON/OFF fields will always lead to the corresponding page.

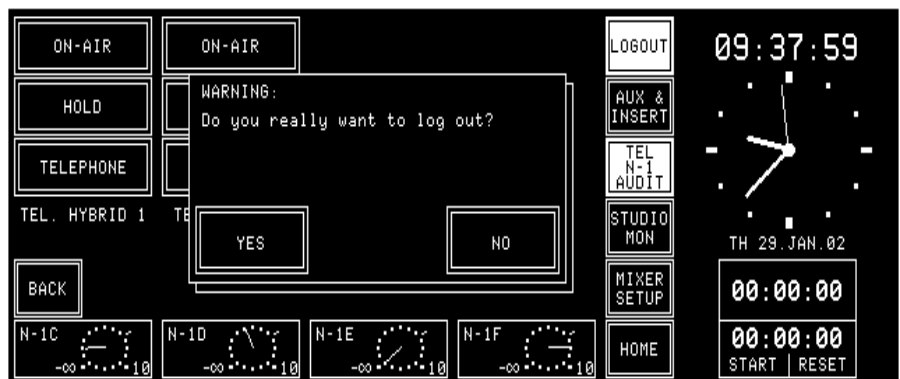
5.1 Login/Logout

The console always starts up in default user mode. If the user is a registered user who wants to work in his own environment, he must log-in. He has to touch the LOGIN field on the central screen. The LOGIN page will appear where the user can touch the field with his own name.



More information on the login procedure can be found in [chapter 11.5](#).

After having logged in, the LOGIN field changes to LOGOUT; when the user leaves the console, this field must be used. After having touched LOGOUT, a dialog box appears, asking for confirmation. This is used as a protection against logging out inadvertently.



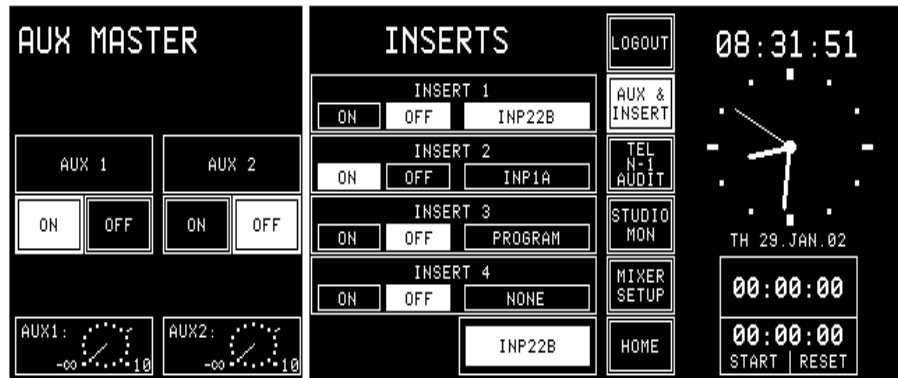
If a console is operated by one person only, the system administrator simply can enable all access rights for the default user. This is the way the user can control all console functions (except the administration functions) without having to log-in. A default user is always defined in the User ad-

ministration table, his name is DEFAULT USER. The access permissions of this user can be edited. His record cannot, however, be deleted, and no password can be defined for him.

5.2 AUX and Insert Control

The AUX MASTER/INSERTS page is entered by touching the AUX & INSERT field on the central control screen.

If the user has no access permission for the AUX and/or insert parameters, there will appear a text next to AUX MASTER and/or INSERTS, telling the user that he cannot modify the parameters.



AUX MASTER: The two rotary encoders below the AUX 1 and AUX 2 gain indication symbols are used to adjust the desired level of the corresponding AUX master. The gain can be adjusted in a range of $-\infty$ to +10 dB; the 0 dB position is marked with a dash.

ON/OFF selection of the AUX master buses is done by touching the corresponding fields on the screen. A highlighted background indicates the current status.

The AUX 1 and AUX 2 gain indication symbols are always displayed, even if no output module is installed for AUX 1 and/or AUX 2.

INSERTS: On the same page, the four insert points can be assigned. Assignment is possible to any of the following signals:

- Input CH1 to input CH24,
- PROGRAM bus,
- RECORD bus,
- Talkback to Studio and/or Control Room output (if an optional TB Mic Input Module is installed within the console configuration),
- NONE.

An insert can only be assigned while it is set to OFF, by touching the channel/bus label field of the insert box. The label field is highlighted and can be changed with the rightmost rotary encoder. If the insert is set to ON, the channel/bus label field cannot be highlighted, and the insert assignment cannot be changed.

When an insert is assigned to a channel, a small “Ix” symbol appears in the EQ/Filter field of this fader strip's channel screen section; it is highlighted if the insert is set to ON (see left).

The insert send always follows the setting as displayed on the screen; it remains active while the insert is OFF. If the insert is switched ON, a switchover from the internal connection to the insert return is performed.



Each insert can be assigned to one signal only. If an insert is already assigned to a signal, this signal's name will no longer appear in the channel/bus label field during signal selection for another insert.

Inserts are assigned per input module and not per physical input, which means that an insert assignment is always valid for all inputs of the input module. When the input module-to-fader strip assignment is modified, the inserts are re-routed accordingly.

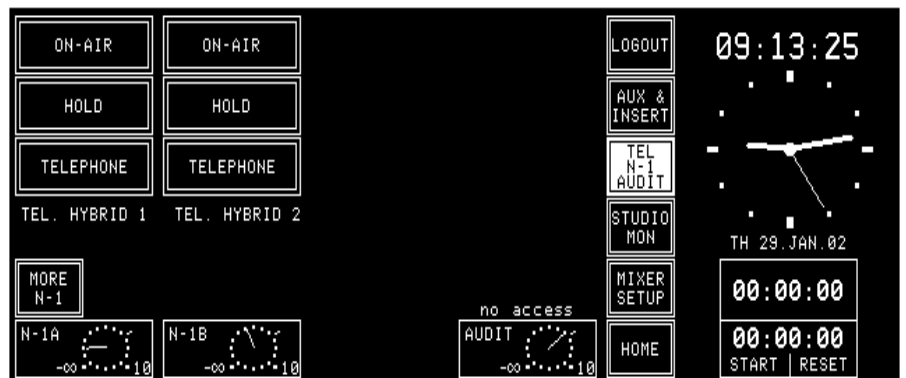
Insert assignment and insert ON/OFF setting are included in snapshots.

If an insert module is removed, the insert assignments are disconnected (OFF, NONE) and will no longer be visible on the AUX MASTER/INSERTS page and in the channel screen.

5.3 N-1/Audition Bus and Telephone Hybrid Control

Two clean-feeds (N-1A, N-1B) are provided (for software V3.0 and up, up to six clean-feeds N-1A... N-1F; refer to [chapter 5.3.1](#)). The clean-feeds can be used as mono outputs to telephone hybrids, or as mono line outputs. The audition bus can either be used as a special stereo monitoring bus (for information on the special CUT and DIM conditions, please refer to [chapter 12.2.2](#), "CR DIM WHEN AUDITION SELECTED"), or as a third, mono or stereo clean-feed.

If the user has no access permission for the clean-feed and/or audition bus parameters, there will appear a text next to the corresponding field, telling the user that he cannot modify the parameters.



The clean-feeds as well as the audition bus have master level controls which can be accessed on the N-1/audition master and telephone hybrid page (opened by touching the TEL/N-1/AUDIT field). The output levels are controlled with the rotary encoders; the output gain range is $-\infty$ to +10 dB, the 0 dB position is marked with a dash.

Two telephone hybrid units to which the clean-feeds are fed can be controlled from the OnAir 2000M2 user surface, if an (optional) telephone hybrid control module is installed. In such a case the ON-AIR, HOLD, and TELEPHONE fields appear on this page. TELEPHONE switches the telephone line to the telephone. By touching HOLD, the telephone line is connected to the telephone hybrid unit; the return signal is routed to the console, but the incoming signal is not. Only when touching ON-AIR, both the return and the incoming signals are routed to the console.

5.3.1 Additional N-1 Outputs

Starting with SW V3.0, four additional N-1 outputs (N-1C...F) are available, *provided that no Insert 3/4 module is installed in the console*. Their respective levels are also part of a snapshot. *When upgrading from a SW version earlier than V3.0, a hardware modification is required on the DSP Board – please ask your Studer distributor for additional information.*

Conditions:

- A Dual Analog Output Module or a Digital Output Module must be installed in order to output the four additional N-1C...F signals;
- On the Dual Analog Output Module, output mode must be set to “Stereo” (jumper setting), refer to [chapter 16.5](#).
- For the Digital Output Module, this selection is not required.
- For bus assignment on the Dual Analog Output Module (jumper setting), also refer to [chapter 16.5](#); plug the jumper for output A to position OUT1, the jumper for output B to position OUT2.

Then, the four N-1 signals are output on the following connectors:

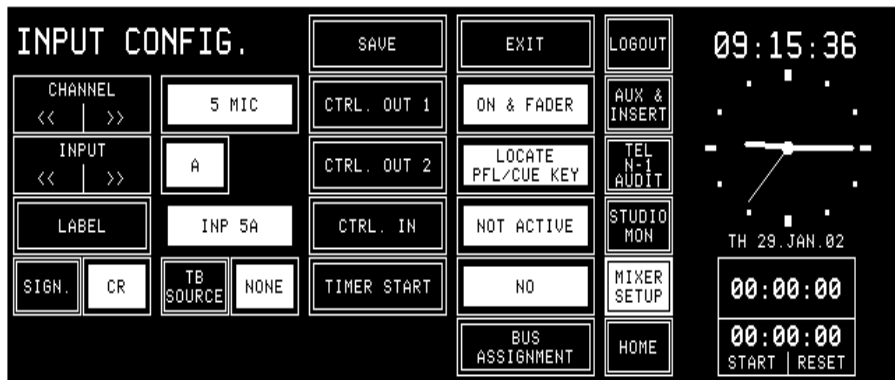
N-1C on output A, left channel; N-1D on output A, right channel
 N-1E on output B, left channel; N-1F on output B, right channel.

- For bus assignment on the Digital Output Module (DIP switch setting), refer to [chapter 16.6](#); set DIP switch A to N-1C/D, and DIP switch B to N-1E/F according to the table in chapter 16.6.

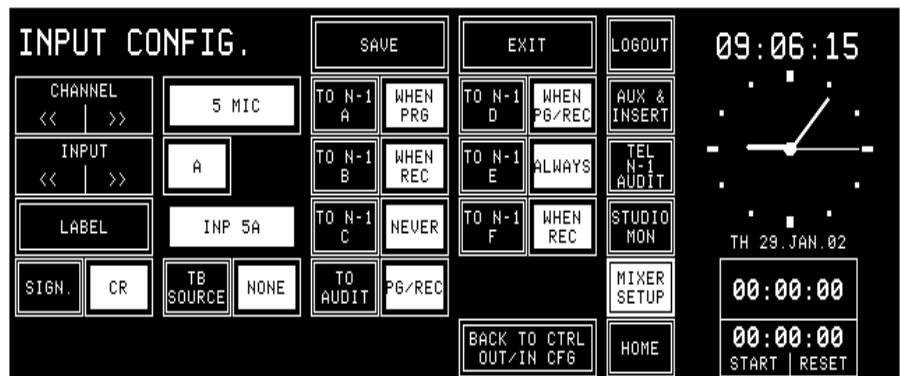
Then, the four N-1 signals are output on the following connectors:

N-1C/D on output A, left/right channel

N-1E/F on output B, left/right channel.



When touching BUS ASSIGNMENT on this page, it changes as follows, allowing to select the six N-1 and the audition bus assignments:



The TEL/N-1/AUDIT page allows to control the N-1 outputs A and B and the audition output using the rotary encoders, as described earlier. After touching “MORE N-1”, the additional N-1 outputs (C to F) can be controlled, as shown below. With “BACK”, the previous page is displayed again.



Note: If the console is configured for N-1C...F outputs without removing an Insert 3/4 Module, the N-1C...F outputs are not available; however, talkback with fixed level to these outputs is possible.

5.4 Studio Monitoring

The STUDIO MONITORING SOURCE page is opened by touching the STUDIO MON field. This page allows selecting one of six signals to be routed to the studio monitoring loudspeakers and headphones. This selection can also be done via a pushbutton remote control from the studio (optional accessory “Studio Talkback Box” available). The field of the currently selected signal source is highlighted.

The signal selected with the EXT3 field is the same as the one selected with EXT3 on the CR monitor selector in the central console section; this signal is fed to the console via the 39-pin EXTERN MONITOR (INPUT) connector on the monitoring module.

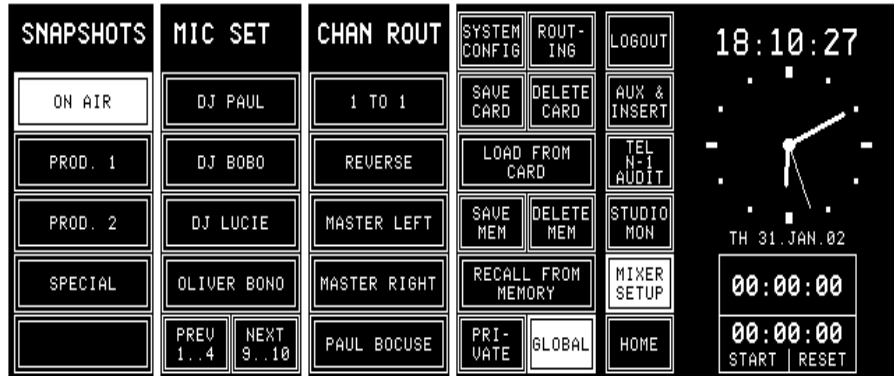


For a more detailed description of the monitoring system, see [chapter 7](#).

5.5 Mixer Setup

The Mixer Setup page gives access to several function groups used for setting the general status of the console. These are:

Global snapshots, private snapshots, global microphone (mic) settings, private microphone (mic) settings, global channel routings.



At the left of the Mixer Setup page there is the SNAPSHOTS area. The five fields allow snapshot selection.

Up to ten mic settings can be selected in the MIC SET area; either all of them are displayed, or – if the CHAN ROUT section is visible on this page as well – they are displayed in groups of four and can be browsed using the NEXT... and/or PREV... fields, as shown above.

Five global channel routings are accessible in the CHAN ROUT area. If no global channel routings should have been defined by the system administrator, the CHAN ROUT area is not displayed, as shown below.



The right part of the Mixer Setup page also provides the following command fields:

- PRIVATE/GLOBAL:** Users can select between private and global snapshots and mic settings.
- SYSTEM CONFIG:** This field leads to the second level of mixer setup functions. These are accessible only for users having the corresponding parameter set in the user configuration. A new page is displayed, allowing to select from several groups of configuration parameters.
- ROUTING:** This field leads to the CHANNEL ROUTING. page. This page is only accessible for users having the corresponding access right set in the user configuration.

The use of snapshots, mic settings, and channel routings is described in the following chapters, followed by some information on user administration and the watch/stopwatch functions.

5.6 Snapshots

A snapshot is a copy of a momentary console setup. It contains all parameters (as input selection, input gain, phase, phantom power, balance or panorama setting, EQ settings, AUX settings, channel ON/OFF, and insert assignment), except fader positions and PFL. A snapshot does *not* contain any parameters being part of the console configuration (input channel routing, channel labels, control signal functions, clean-feed bus assignment, level meter assignment, etc.).

Each user having a personal password can store up to four private snapshots (max. 20 users), and up to five global snapshots (available for every user) can be saved in the console's flash memory. More snapshots can be saved on a PC-Card (refer to [chapter 5.8](#)) and loaded from the card into the console's flash memory if required.

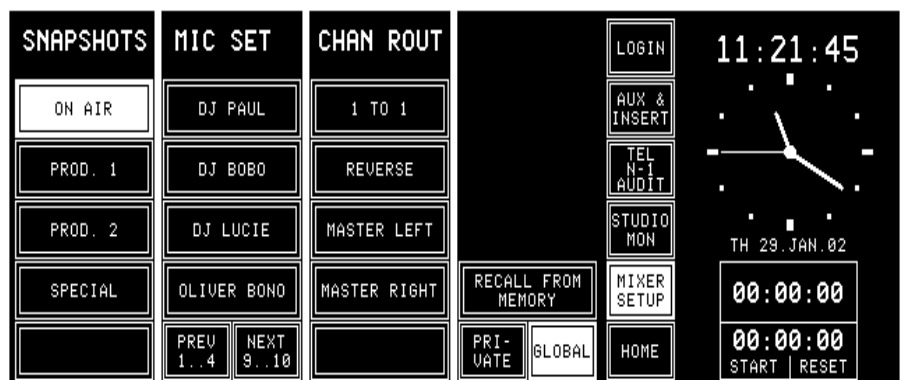
A name can be given to every snapshot which is displayed in the leftmost field column.

Also refer to [chapter 5.10.1](#) for information on snapshot access rights.

5.6.1 Recall a Snapshot from Memory

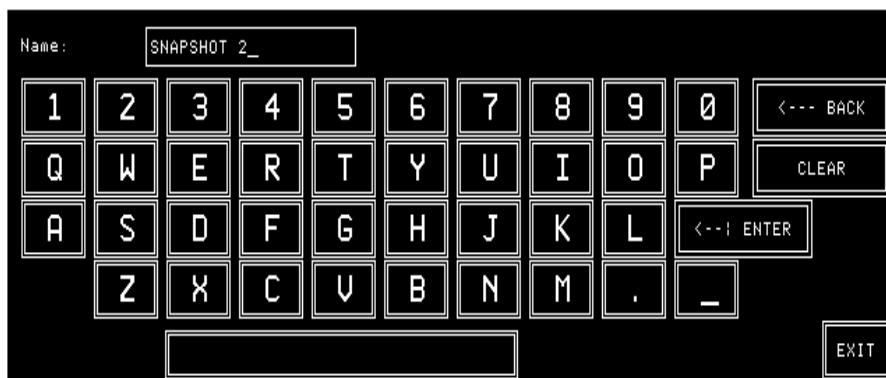
Select a snapshot by touching one of the name fields. The name of the selected snapshot is highlighted. When touching the RECALL FROM MEMORY field, the snapshot will immediately be recalled from the console's internal flash memory, except if the current channel is active (switched to the program or the record bus); then the recall operation is delayed until the channel is closed.

During execution of the snapshot RECALL function, the system compares the configuration parameters of each channel with the configuration parameters saved together with the snapshot. If there is a mismatch, the snapshot will not be executed for this channel.



5.6.2 Save a Snapshot to Memory

Saving a snapshot is done by touching a snapshot field, followed by SAVE MEM. The keyboard page appears where the snapshot name can be entered or edited (max. 20 characters). If the existing name is to be kept, just touch the <---| ENTER field.



CLEAR is used to clear the text field for entering a new name with the keyboard.

<--- BACK is used to delete one character to the left of the cursor.

EXIT is used to leave the keyboard page without saving the new name.

When touching <---| ENTER, the keyboard page is left and the snapshot data are saved.

Note: Global snapshots can be saved by the system administrator only. Logged-in users only can save their private snapshots.

5.6.3 Delete a Snapshot from Memory

When saving a snapshot, the previously saved snapshot data are overwritten. A snapshot can be deleted, too, without overwriting it with new data. For deleting a snapshot from the console's internal flash memory, the desired snapshot has to be selected. The selected field is highlighted. After touching the DELETE MEM field a dialog box appears. If it is confirmed, the snapshot will be permanently removed from the memory, and the name within the selected field is cleared.

5.7 Mic Settings

A mic (microphone) setting is a set of parameters (EQ, gain, phantom power) for a single microphone channel. Thus, every DJ or announcer can store his preferred mic settings and recall them at any time. Up to four private mic settings for each user (max. 20 users), and up to ten global mic settings can be stored in the console's flash memory; additional mic settings can be stored on a PC-Card as well (refer to [chapter 5.8](#)).

If the CHAN ROUT section is also displayed on the Mixer Setup page, the global mic settings are displayed in groups of four. To display the other groups, use the NEXT... and/or PREV... fields below the MIC SET label fields.

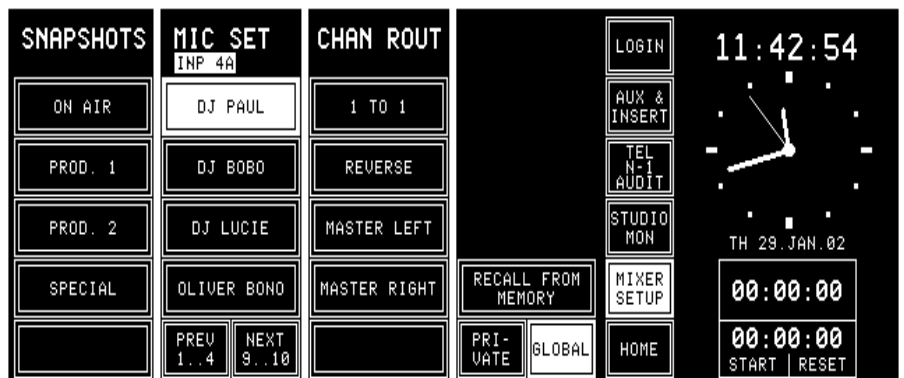
Mic settings can be named, as the snapshots; these names are displayed on the corresponding touch field columns on the Mixer Setup page.

5.7.1 Recall a Mic Setting from Memory

To recall a mic setting from the console's internal flash memory, first open the Mixer Setup page by touching the MIXER SETUP field, then select a microphone input channel by touching its label field in the channel screen, followed by the corresponding field in the MIC SET area. The name of the selected mic setting is highlighted.

Then touch the RECALL FROM MEMORY field. The selected channel's parameters are immediately set to the values of the mic setting.

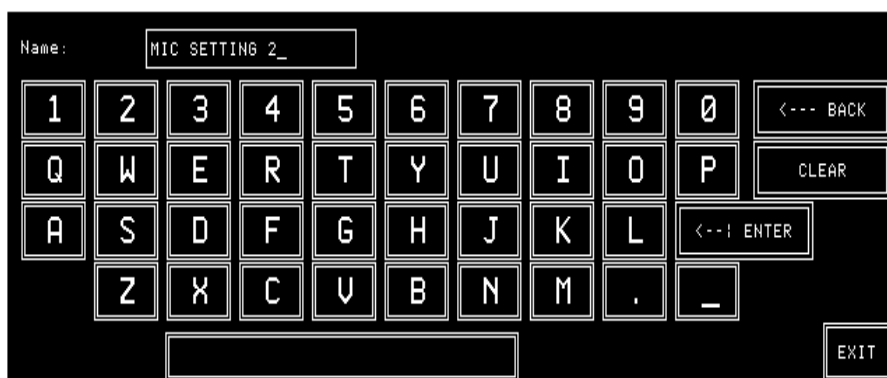
Selection of another type of input (line or digital) is treated as an error and will not be accepted by the system.



If the last modification was made on a microphone channel, this channel is automatically selected and displayed in the top line of the Mixer Setup page. To change the input selection, just touch the label field of the desired channel in the channel screen. The input being currently active (A or B) of this channel is now selected and shown in the top line of the Mixer Setup page.

5.7.2 Save a Mic Setting to Memory

Creating a mic setting means saving a set of equalizer and gain parameters for a single microphone channel under a given name into the console's internal flash memory. This is done by first selecting the microphone channel to be stored, then touching a MIC SET field, followed by SAVE MEM. The keyboard page appears where the mic setting's name can be edited. Any MIC SET field (also one of these that have already been used and have a name assigned) can be selected. It will, however, be overwritten by the new mic setting.



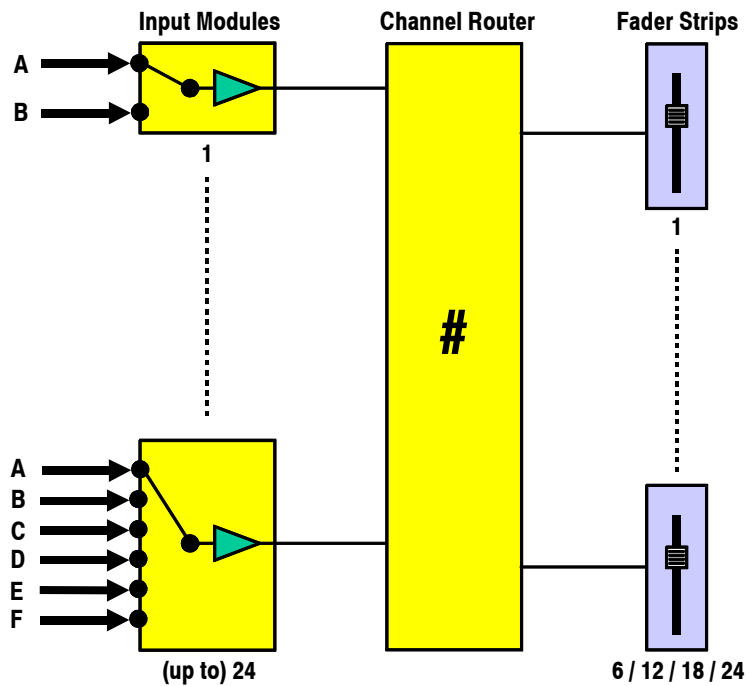
Now a new name can be generated, or the already present name can be overwritten or edited. When touching <--! ENTER, the mic setting data and its new name are saved.

5.7.3 Delete a Mic Setting from Memory

When saving a mic setting the previously stored data are overwritten. A mic setting can be deleted, too, without overwriting it with new data. For deleting a mic setting from the console's internal flash memory, the desired mic setting has to be selected. The selected field is highlighted. After touching the DELETE MEM field, a dialog box will appear. If it is confirmed, the mic setting will be permanently removed from the memory, and the text within the selected field is cleared.

5.8 Routing

The OnAir 2000M2 features a channel router that allows to route the output of any input module (including the complete parameter set, as stereo mode, gain, filter, sends, bus assignment) to any fader strip. Please note that the inputs of the same input module *cannot* be assigned to different fader strips, as the input selector switch is located before the preamplifier. An input module signal *cannot* be routed to more than one fader strip.



The console can be equipped with 6, 12, 18, or 24 fader strips (1...4 fader modules) and with the same number of input modules (with A/B inputs or hex inputs) installed in the console. The Input Module Extension Box (optionally available) allows to increase the number of input modules for smaller console versions.

The following combinations are allowed:

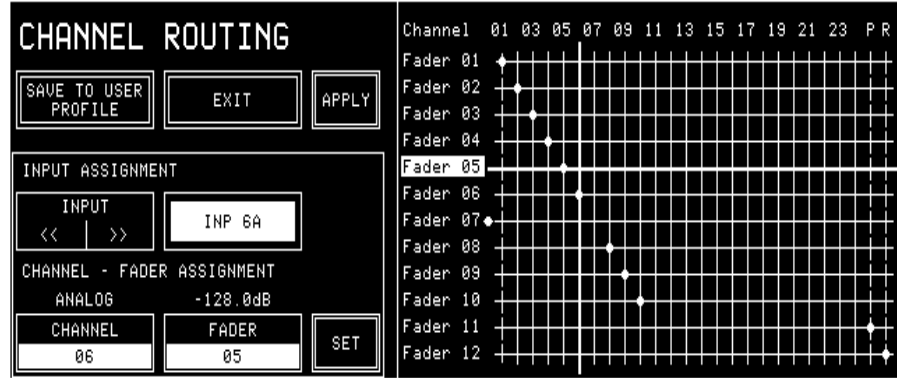
No. of Fader Strips	No. of Input Modules	No. of Extension Boxes
6	6	–
6	12	1
6	18	2
6	24	3
12	12	–
12	18	1
12	24	2
18	18	–
18	24	1
24	24	–



The maximum number of input signals is 64, which means that up to twenty input modules (with A/B switching) plus four hex input modules can be installed, regardless of the number of fader strips.

5.8.1 Channel Routing

The channel routing, i.e. the input module-to-fader strip assignment, is accessed on the CHANNEL ROUTING page. There is only one user-specific channel routing per logged-in user available. Should the user have no access permission to the channel routing, this page is not displayed.



The right part of the CHANNEL ROUTING page displays a matrix with the corresponding number of faders and input channels. In case the number of faders and/or input modules is higher than 12, only every other number is displayed due to limited space. The current input module-to-fader strip assignment is indicated by the crosspoints.

Program and Record masters can also be assigned to a fader; they are positioned at the far right of the grid (“P” and “R”).

Making a Crosspoint

On the left part of the CHANNEL ROUTING page, the input module-to-fader strip assignment is performed with the two left rotary encoders below the center screen. When turning these encoders, the highlighted horizontal and vertical lines are moved within the grid. The input channel and fader numbers are displayed above the two rotary encoders, as well as the type of the selected input module (MIC/ANALOG/DIGITAL) and the position of the currently selected fader.

Above the input module-to-fader strip assignment, the input labels are displayed. For hex input modules, the left box shows left-and-right arrows for selection, and the right box displays the current label out of the six.

The channel routing relates to the physical input. This means that, for example, input B can be selected; when loading this set-up later, input B is automatically selected with all its input parameters (as input gain, EQ settings, etc.). These parameters are input-related and will be automatically re-routed when the input channel is assigned to a different fader.

When the desired crosspoint is found, touch the SET field. A dot appears at this crosspoint in the grid, indicating the established connection.

The fader to which this input channel had been assigned before is free now, and its dot jumps outside the grid to the left (fader 07 in the picture above). The same happens when the CLEAR field is touched after having selected a connection.

When all settings are done, touch the APPLY field. The new channel routing is loaded to the work memory. There are two ways to proceed now:

Temporary Routing

When touching the EXIT field, the page is left without saving, and the user can work with the new channel routing.

However, the new routing is not stored in the user's profile. When the user logs out, the temporary channel routing is lost, and his original channel routing will be loaded when logging in the next time.

Permanent Routing

To store the new channel routing within the user's profile, the SAVE TO USER PROFILE field has to be touched before exiting the page with EXIT.

Clearing a Crosspoint

When the CLEAR field is touched after having selected a connection, then this fader strip is free now, and its dot jumps outside the grid to the left.

Protected Connections

One or several connections can be protected by the administrator from being modified, even by users having access permission to the CHANNEL ROUTING page. In such a case, a *dashed vertical line* is displayed for the corresponding input module (channels 01, P, and R in the picture above).

Input Modules not Connected to a Fader Strip

There are cases where the signals must be routed "to the background", i.e., it is possible for channels to be active, but without operating elements on the console surface. Either the user deliberately decides that some channels must be in the background, or the console just has more input modules than fader strips, which may also be the case when a master output (PGM and/or REC) is assigned to a fader. In the fader screen, the channel section of a channel routed to the background is either blank, or it displays a master fader.

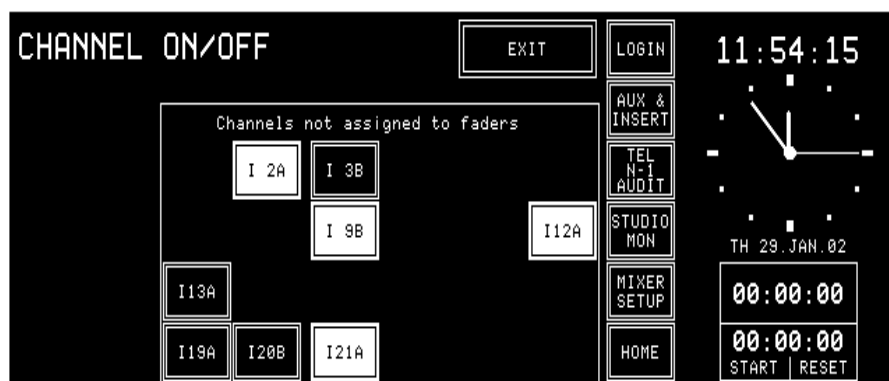
All channels currently routed to the background can be displayed in the CHANNEL ON/OFF page; this page is selected by touching CHN ON/OFF in the HOME page.

When routing an input module signal to the background, the audio path remains open, and the audio passes through the console with the fader level set at the moment of routing the signal to the background. This can be used, for example, for channels being controlled in the background by a broadcast automation system (e.g. DigiMedia) using the serial port. In this way, a channel fader is made free for another signal or for the PGM or REC master.

External MUTE control for the channel is still available. In such a case, this channel may also be used as a talkback mic input channel; please note that the TB SOURCE parameter of this input must then be set to "CR" in the INPUT CONFIG. page.

Notes: This could be dangerous for a new user taking over the console or for un-experienced users. Therefore being in the HOME page, the HOME field toggles to CHN ON/OFF. When touching this field, the CHANNEL ON/OFF page is opened (see below), displaying all channels not assigned to fader strips (i.e., being in the background); the ones that are highlighted are open for audio signals ("ON"). Now, the user can switch any channel ON or OFF on this page directly by touching the corresponding field on the screen.

When the PFL function is active at the moment of routing a channel to the background, it is automatically switched off.



When powering the console off and on again, the channels in the background are always set to OFF, to prevent audio from being played out unintentionally.

Auto Takeover

When a new channel routing is loaded or when a user logs in, the input module-to-fader strip assignment is modified. In this moment, the audio level of an input signal may not correspond to the physical position of the new fader. As the OnAir 2000M2 does not feature motorized faders, the Auto Takeover symbol is displayed in the corresponding channel section of the fader screen. By moving the fader knob up or down in the indicated direction, the audio level is caught, and control is gained over the signal again.

5.8.2 Recall a Channel Routing from Memory

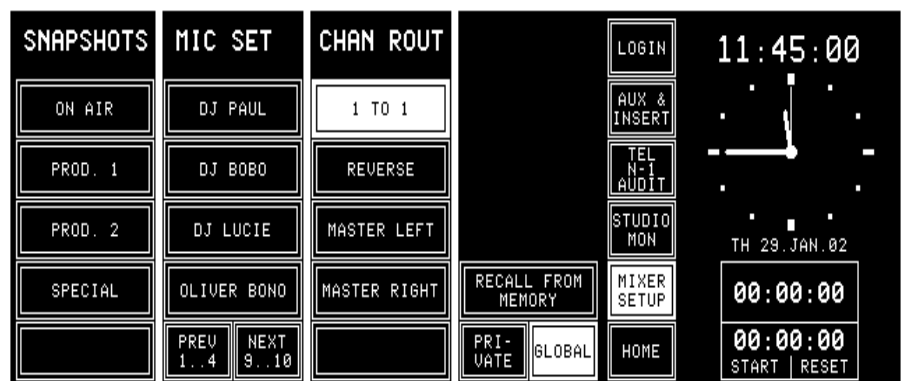
Automatical Recall: Every logged-in user has his own user channel routing that is loaded either automatically when logging-in, or manually. This is defined by customer code 0x00000200 (see chapter 12.2.12).

Usually it is easier to load the user-specific channel routing automatically at log-in; in some cases, however, the channel routing must not be changed (e.g. when the administrator makes some changes in a user domain).

When the console is switched on, the last channel routing (i.e. the one that was active before power off) is automatically loaded.

Manual Recall: A user can recall one of the five global channel routings or, when logged in, his own user channel routing at any time. This is done in the Mixer Setup page, either after selection of GLOBAL (up to five channel routings can be recalled by selecting one of them and touching RECALL FROM MEMORY), or PRIVATE (only one user channel routing can be recalled for logged-in users by selecting RECALL USER ROUTING).

When the console is switched on, the last channel routing (i.e. the one that was active before power off) is automatically loaded.



5.8.3 Save a Channel Routing to Memory

After having configured the channel routing as desired (see chapter 5.8.1), touch the APPLY field. The new channel routing is loaded to the work memory. When touching the EXIT field, the CHANNEL ROUTING page is left, and the user can work with the new channel routing. However, this routing is not yet stored in the user's profile. When the user logs out, the temporary channel routing is lost; if customer code 0x00000200 is set (see chapter 12.2.12), his original channel routing will be loaded when logging in the next time.

To store a modified channel routing within the user's profile, the SAVE TO USER PROFILE field has to be touched before exiting the page with EXIT.

Note: The system administrator can set and save his own user channel routing as described above.

For administrator setting and saving of global channel routings or user channel routings, please refer to chapter 5.8.5 and chapter 5.10.2.

5.8.4 Delete a Channel Routing from Memory (Administrator Only)

When saving a channel routing, the previously stored data are overwritten. A global channel routing can be deleted, too, without overwriting it by new data. To do this, first the desired channel routing has to be selected. The selected field is highlighted. After touching the DELETE MEM field, a dialog box will appear. If it is confirmed, the channel routing will be permanently removed from the memory, and the text within the selected field is cleared.

For more information on deleting global channel routings please refer to [chapter 5.10.2](#).

5.8.5 Channel Routing Administration

In addition to the user's own user channel routing, the administrator can save the current channel routing to one of the five globally-accessible channel routings. These can be recalled in the Mixer Setup page. The default and global channel routings can be saved or edited by the administrator; the default user's user routing can also be saved or edited by any user not logged-in (i.e. the default user), if access permission is given.

Channel Routings:

User Channel Routing

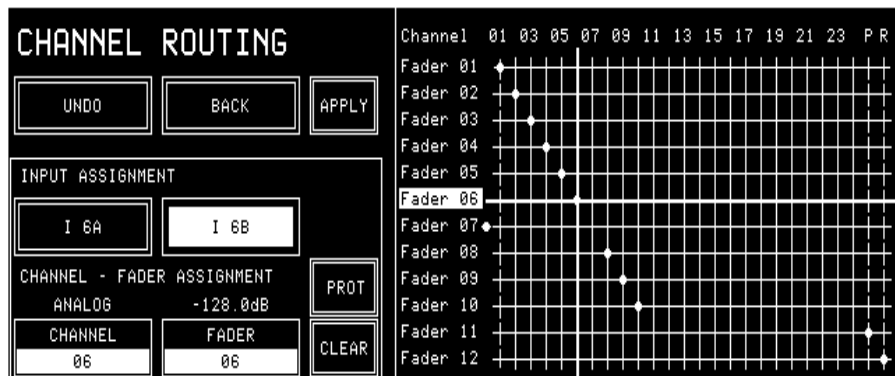
The procedure for the system administrator changing a user's channel routing is described in [chapter 5.10.2](#).

Global Channel Routings

Five globally accessible channel routings can only be created by the administrator, allowing users to set-up the channel routing for specific transmissions, e.g. news broadcasts or sports events. Users do not have access to the global channel routings configuration. However, access permission given, a user could load a global channel routing, edit it, and store it in his own user profile.

Administrator Protection:

The administrator can protect specific connections within the channel routing by selecting the desired cross-point with the horizontal and vertical lines, and then touching the PROT field. A protected connection is indicated by a dashed vertical line in the grid (see below); this connection cannot be changed by the users, even if they are allowed to change their channel routing. Only the administrator can UNPROT this connection again.



However, the user can change the input selection A/B (or A...F in case of a hex input module) of this input module, if he has the INPUT SEL access permission.

5.9 Using PC-Cards

Snapshots, mic settings, and global channel routings can be saved to a PC-Card or loaded from the card into the console's flash memory. Using PC-Cards, parameter settings of a console can also be copied to an other console, provided that both have the same configuration.

A PC-Card with a capacity of 64 kB can hold about 20 snapshots.

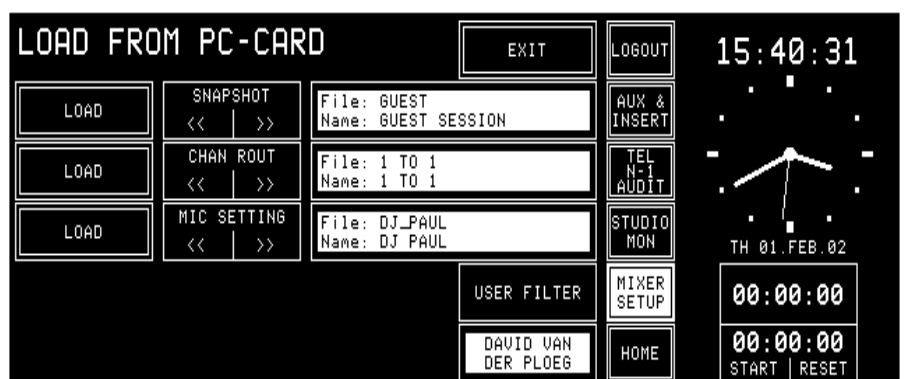
Notes: Using PC-Cards, it is also possible to exchange snapshot, mic setting, and/or channel routing data between OnAir 2000, OnAir 2000M2, and OnAir 1000 consoles. However, some restrictions must be considered if the consoles have different hardware configuration (e.g. number of channels, number of fader strips, different input module types).
Only the administrator is allowed to load, save, and delete global channel routings from/to PC-Card.

File Name Extensions: The three-character DOS file name extensions on the PC-Card will be generated automatically. The relationship between the file name extension and the file content is shown in the following table.

Data type	File name extension
Global snapshot	.gss
Private snapshot	.pss
Global mic setting	.mis
Private mic setting	.mip
Global channel routing	.gfm

5.9.1 Load a Snapshot/Mic Setting/Channel Routing from PC-Card

To load a snapshot, a mic setting, or a global channel routing from a PC-Card, touch MIXER SETUP followed by LOAD FROM CARD. The page below will be displayed (*please note that the CHAN ROUT area is only displayed for the administrator*). The USER FILTER allows to select different user's data with the fourth rotary encoder.



Snapshots, mic settings, or a global channel routing can only be loaded as long as there is sufficient empty space available in the console's flash memory; if not, some of them must be deleted first. They can be selected for loading by scrolling with the corresponding << or >> fields, followed by LOAD. After having loaded a snapshot, a mic setting, or a channel routing, it is not automatically active, but it is available in the Mixer Setup page and must be recalled with RECALL FROM MEMORY, as described in [chapters 5.6.1, and 5.7.1, or 5.8.2](#), respectively.

5.9.2 Save a Snapshot/Mic Setting/Channel Routing to PC-Card

To save a snapshot, a mic setting, or a channel routing to a PC-Card, first select a snapshot, a mic setting, or a channel routing in the Mixer Setup page. Then touch the SAVE CARD field. A keyboard appears for entering a file name (max. 8 characters, no dots, no spaces), as described in [chapters 5.6.2 and 5.7.2](#).

After confirmation with ENTER, the snapshot, the mic setting, or the channel routing is saved on the card.

If an empty file name is entered or if EXIT is touched, the action is cancelled without saving anything to the PC-Card.

Please note that only the administrator is allowed to save channel routings on the PC-Card.

Exceptions: If the file name already exists on the PC-Card, the action must be confirmed before the file is overwritten.

If a user tries to store a file under a file name that is already existing but has been given by an other user, the existing file will (after confirmation) be overwritten; it will no more be visible for the initial user.

If the card is full, a dialog box appears, telling that the file cannot be saved.

5.9.3 Delete a Snapshot/Mic Setting/Channel Routing from PC-Card

To delete a snapshot, a mic setting, or a channel routing from the PC-Card, DELETE CARD must be touched. The page below is displayed; (*please note that the CHAN ROUT area is only displayed for the administrator*).



A snapshot, a mic setting, or a channel routing can be selected for deleting by scrolling with the corresponding << or >> fields. The selected file and the snapshot, mic setting, or channel routing name which is contained in this file are displayed to the right of the << / >> fields. When touching DELETE, the console asks for confirmation. After confirmation, the file is deleted permanently. *Once deleted, the data cannot be recovered.*

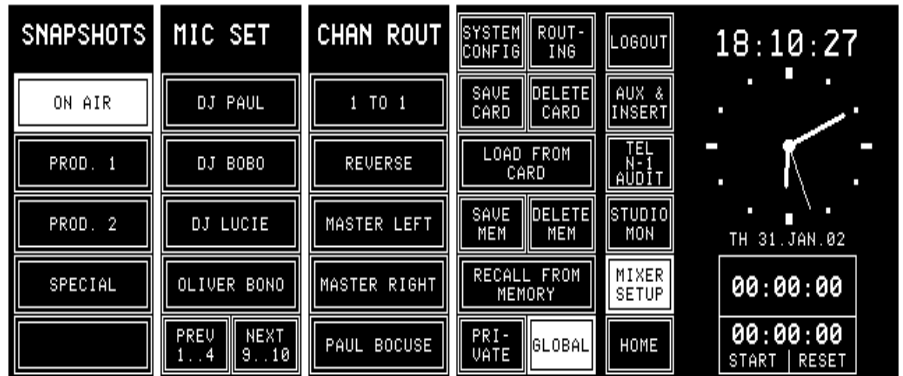
A user can only delete his own, private data from the card. The administrator, however, has access to all (global and private) files on the card. Depending on what selection the administrator has made in the Setup page, either only the global or only the private files are displayed for him.

The DELETE FROM PC-CARD page remains until either EXIT or one of the main menu fields is touched.

5.10 Administrator

5.10.1 Features

- The administrator has access to *all* private and global snapshots, mic settings, and channel routings.
- *The administrator has no private snapshots or mic settings, but one user channel routing.*



The administrator's Mixer Setup page is shown above. In this case all SAVE, DELETE, RECALL, and LOAD actions correspond to *global* snapshots, mic settings, and channel routings.

When the administrator touches the PRIVATE field and selects one of the users, he can modify the private settings of this user (see [chapter 5.10.2](#)).

Summary: The displayed private snapshots, private mic settings, and user channel routing depend on the user logged-in to the console; global snapshots, global mic settings, and global channel routings are the same for all users. When a user is not logged-in, i.e. he has not entered any password, he is automatically treated as the default user. The default user, too, has private settings; these will, however, not be password-protected, so they can be overwritten by any other user that is *not* logged-in to the console. Global parameter settings can be recalled by any user, but modified by the system administrator only.

Access Rights:	Global Snapshots	Private Snapshots	Global Mic Settings	Private Mic Settings	Global Channel Routings	User Channel Routings
Administrator	read/write	read/write*	read/write	read/write*	read/write	read/write
Logged-in user, default user	read	read/write	read	read/write	read	read/write

* The administrator can read and write the private snapshots and mic settings of any user, but he has no own snapshots or mic settings.

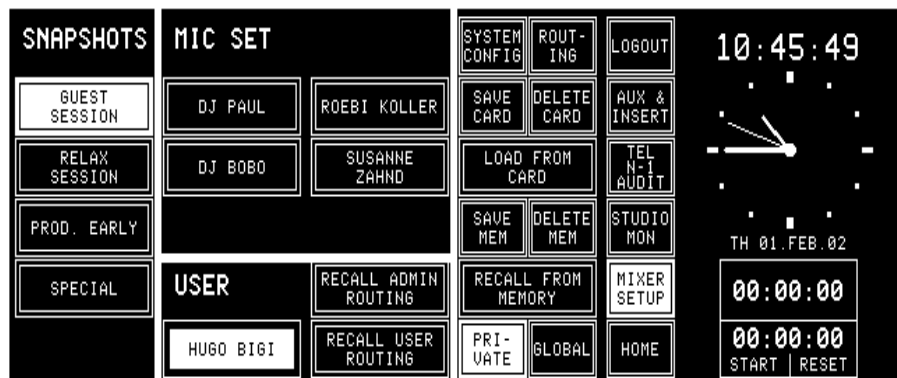
Number of Parameter Sets:			
Data Type	Number	Multiplied by	Total Data Records
Global snapshots	5	1	5
Global mic settings	10	1	10
Global channel routings	5	1	5
Private snapshots	4 per user	20	80
Private mic settings	4 per user	20	80
User channel routings	1 per user	22	22

5.10.2 Admin Selection of Snapshots/Mic Settings/Channel Routings

The system administrator can display and modify the private snapshot, mic setting, and channel routing data of any user.

This feature has been implemented in order to enable the setting of parameters in a private snapshot, mic setting, or channel routing to which the particular user has no access. All actions, such as RECALL FROM MEMORY, SAVE (to) MEM, DELETE (from) MEM, LOAD FROM CARD, SAVE (to) CARD, and DELETE (from) CARD, concern the selected user's data. No other actions on the console can be affected.

Snapshots and Mic Settings: After selecting PRIVATE in the Mixer Setup page, the second rotary encoder from the left (the one below the user's name label) allows to select the user's name. In this mode the system administrator can LOAD, RECALL, SAVE, or DELETE all the data being displayed.



Channel Routing: With RECALL USER ROUTING, the system administrator can activate the user channel routing of the user selected with the rotary encoder. With RECALL ADMIN ROUTING he activates his own user channel routing.

The procedure for changing a user's channel routing is as follows:

- Log-in as administrator,
- touch MIXER SETUP,
- SYSTEM CONFIG,
- USER ADMIN,
- select the desired user,
- touch EDIT,
- SET CHANNEL ROUTING,
- modify the channel routing,
- touch BACK,
- SAVE,
- EXIT.

5.10.3 Users with and without a Password

When a normal user enters the Mixer Setup page before logging-in (which means he is treated as the *default user*), he works with the default user's data. He can LOAD, RECALL, SAVE, or DELETE all of the default user's data in the console's memory or on the PC-Card. These data can, however, be used, saved, overwritten, or deleted by any other user who is not logged in.

The Mixer Setup page offers a PRIVATE field next to the GLOBAL field, allowing the user – after having logged-in – to access his own, protected private snapshots and mic settings.

A user can recall his user channel routing in the Mixer Setup page, after selection of PRIVATE (only one user channel routing can be recalled by selecting RECALL USER ROUTING); for more information on this subject please refer to [chapter 5.8.2](#).

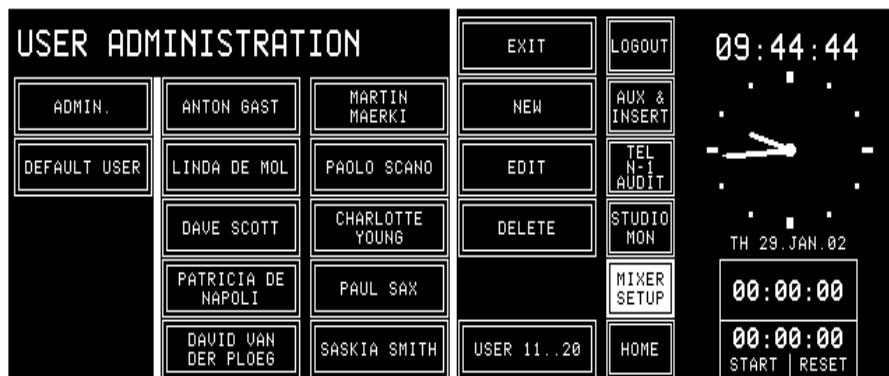
Should the user have access permission to the system configuration and/or channel routing, the corresponding SYSTEM CONF./ROUTING fields would be displayed here as well.



A user can decide to work with the global data although he is already logged-in. If the GLOBAL field is touched, the Mixer Setup page will look as shown below, where he can recall (but not modify) the global snapshots, mic settings, and channel routings; the CHAN ROUT area is suppressed if no global channel routings are available. Should the user have access permission to the system configuration and/or channel routing, the corresponding SYSTEM CONF./ROUTING fields would be displayed here as well.



5.11 User Administration



USER ADMINISTRATION is only accessible by the system administrator. Refer to [chapter 11](#) for details on how to set up function access permission and new user accounts.

5.12 System Configuration

System configuration is a separate function group which can be accessed only by the system administrator or by users having access permission. It is separately described in detail (refer to [chapter 12](#)).

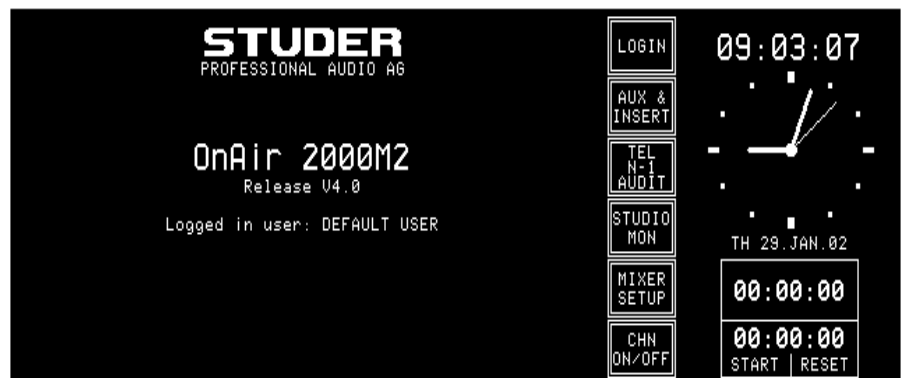
5.13 Watch and Stopwatch

The watch and stopwatch functions are continuously displayed on the right-hand side of the central screen (except when the keyboard or routing pages are active).

The term “watch” refers to the time-of-day in analog and digital format, the day-of-week, and the date in an abbreviated format.

The term “stopwatch” refers to both the fader and the user stopwatches. The fader stopwatch measures the time the most recently used channel fader has been opened. The user stopwatch works like a normal stopwatch with START/STOP and RESET keys located directly below the central screen.

Below, the HOME page with the watch and stopwatch displays and functions is shown.



5.13.1 Watch

The watch gives a time, day-of-week, and date display. The normal time reference is an internal, battery-buffered real-time clock (RTC). The RTC continues to run even when the console is switched off. Therefore it is unnecessary to set the watch at power-up. The RTC can also be synchronized by an optional Time Sync Module connected to the control module bus. If synchronization is established, the top right corner of the central screen shows a small “S” (Sync OK).

Changes to the internal time reference and the time and date formats can be made by the system administrator on the TIME page (MIXER SETUP, SYSTEM CONFIG., TIME). For details, refer to [chapter 12.2.5](#).

Both time and date can be displayed in two formats, as shown below:

Time Format	Digital Time Indication
05:00:00 p.m.	12 hour time format
17:00:00	24 hour time format

Date Format	Example
DD.MMM.YY	MO 20.MAR.02
MMM-DD-YY	MO MAR-20-02

5.13.2 Fader Stopwatch

The upper one of the two stopwatches is called the fader stopwatch. It always restarts at 00:00:00 when a new audio channel is activated (e.g. channel ON, fader open, and output bus selected). In other words, it displays the elapsed time of the audio channel opened last.

This function can be enabled or disabled for any desired audio channel via the MIXER SETUP/SYSTEM CONFIG./INPUT menu, item TIMER START YES/NO.

The counter stops when the audio channel that has started the stopwatch is switched OFF, or its fader is closed.

Note: If more than one audio channel has caused the fader stopwatch to restart, only the last audio channel's time is displayed.

5.13.3 User Stopwatch

The user stopwatch is located just below the fader stopwatch. It is controlled by two keys on the console's surface located below the digits of the display. One key starts and stops the timer, the other resets the timer.

Key	Label	Description
	START	Start timer if stopped
	STOP	Stop timer if running
	RESET	Reset timer regardless whether stopped or running

5.14 Master Fader for PGM and REC Outputs

Any of the installed faders can be configured as master fader(s) for the program and/or the record bus. This selection is performed in the CHANNEL ROUTING page. Instead of a physical input module, either the PGM Master or the REC Master is assigned to a fader (also refer to [chapter 5.8](#)).

The corresponding input channel can still be used, however it is routed “to the background”, i.e. without any means for direct control on the operating surface. Any input channel not being on the surface can be switched on or off in the ON/OFF page (access located alternating with the HOME field). External MUTE and Monitora control for the channel is still available. In such a case, this channel may also be used as a talkback mic input channel; please note that the TB SOURCE parameter of this input must then be set to “CR” in the INPUT CONFIG. page.

Specifications:

- In the audio path, the master fader(s) is/are located before the insert points (also refer to the block diagram in [chapter 1](#)); if an insert is assigned to the master channel, a small “Ix” window is indicated next to the master channel label; it is highlighted if the insert is ON.
- No ON/OFF function is available for the master buses;
- PFL function is available;
- Overload indication is available;
- Master level can be controlled by Monitora extended commands;
- Signaling (ON-AIR, CR-MIC, and STUDIO-MIC), as well as CR/Studio CUT/DIM, and input selection are logically linked to the master faders.

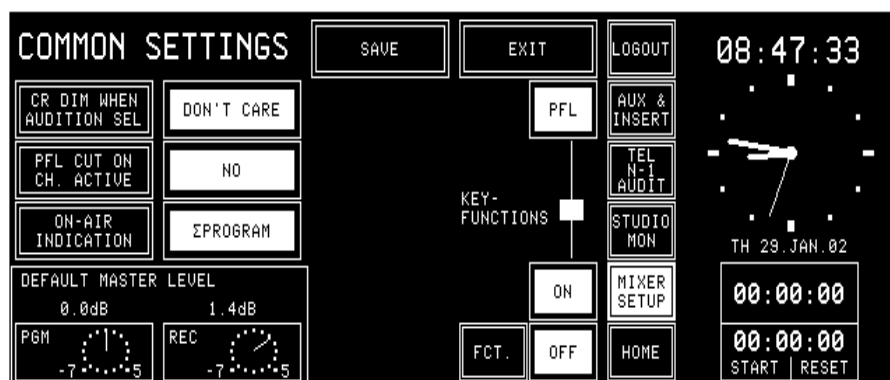
Corresponding Channel Screen:



5.14.1 Default Master Level

If a fixed level offset of the PGM and/or REC main output signal(s) is required, it is possible to enter this offset in the DEFAULT MASTER LEVEL window on the COMMON SETTINGS page in a range of $-7...+5$ dB.

The level offset for a master output becomes active when the corresponding master output is de-assigned from a fader strip.



Important: *This setting may directly affect the level of the main output signals. Please be careful when changing this parameter.*

6 LEVEL METERS

The OnAir 2000M2 mixing consoles can be equipped with one or two stereo level meters, according to customer's specification.

For the two meters, the sources can be selected in the configuration menu and are available in analog and digital (AES/EBU) form for the meters:

Meter 1	Meter 2	Source
X	X	CR MONITOR
X	X	PROGRAM
X	X	RECORD
X	X	AUX 1
X	X	AUX 2
X		AUDIT
X		N-1 A

For configuration details refer to [chapter 12.2.4](#).

6.1 Standard Level Meters

The following level meters can be installed as standard:
















Digital input	Dual bar graph, PPM, with correlator	RTW 11519D STU
	Stereo display, dual PM, with correlator	RTW 1069 STU
Analog input	Dual bar graph, PPM, with correlator	RTW 1119E STU
	Dual bar graph, PPM	Studer 1.913.611
	Dual bar graph, VU	Studer 1.913.612
	Dual 30-LED, PPM	Studer 1.913.605
	Dual 30-LED, VU	Studer 1.913.606
	Dual 30-LED + Dual 10-LED, PPM	Studer 1.913.610
	Correlator, 30-LED, 2-CH	Studer 1.913.609
	Correlator, 30-LED, 4-CH, switchable to meter 1 and 2	Studer 1.913.600

7 MONITORING

7.1 Control Room Monitoring



The CR monitoring source selector has 10 keys to select one out of six internal and 4 analog external sources. The key of the selected source is illuminated.


The F1 to F5 keys can act as additional “to all ...” talkback target selectors (refer to [chapter 7.3](#)) or, if the optional Monitor Extension 1 is installed and configured accordingly, as additional source selectors. F1 to F5 then select two digital and three analog external sources. The functionality of these keys is configured in the Monitor Expander screen.

Key	Source	Description
	Auxiliary 2	General purpose output bus. AUX2 is illuminated if selected.
	Auxiliary 1	General purpose output bus. AUX1 is illuminated if selected.
	Audition	General purpose output bus. The input channels to the audition bus are configurable. AUDIT is illuminated if selected.
	Record output	Output signal of the record master output. ΣREC is illuminated if selected.
	Program output (on-air)	Output signal of the on-air master output. ΣPGM is illuminated if selected.
	PFL	PFL sum. PFL is illuminated if selected.
	External 3	General purpose analog stereo input signal. EXT3 is illuminated if selected.
	External 2	General purpose analog stereo input signal. EXT2 is illuminated if selected.
	External 1	General purpose analog stereo input signal. EXT1 is illuminated if selected.
	Off-air	General purpose analog stereo input signal (e.g. tuner). OFF AIR is illuminated if selected.
	TB.../External 8*	TB target selector, or General purpose digital (AES/EBU) stereo input signal. F5 is illuminated if selected.
	TB.../External 7*	TB target selector, or General purpose digital (AES/EBU) stereo input signal. F4 is illuminated if selected.
	TB.../External 6*	TB target selector, or General purpose analog stereo input signal. F3 is illuminated if selected.
	TB.../External 5*	TB target selector, or General purpose analog stereo input signal. F2 is illuminated if selected.
	TB.../External 4*	TB target selector, or General purpose analog stereo input signal. F1 is illuminated if selected.

* see Talkback, [chapter 7.3](#), and Monitor Expander module configuration, [chapter 12.2.11](#).

Two additional keys are used to control the monitoring loudspeakers in the control room. The functions of these keys are described in the table below.

Key	Function	Description
	-20 dB	The output level to the CR monitor loudspeakers is reduced by 20 dB. DIM is illuminated if selected.
	Mute	The output to the CR monitor loudspeakers is muted. CUT is illuminated if selected.

A volume control knob (MON ) is used to set the level sent to the CR monitor speakers.

As long as one of the microphones in the control room (DJ or guest microphone) is on, the monitor speakers are muted. In this case the CUT key is illuminated.

If the monitoring source is AUDIT (audition bus), the monitor speakers are either dimmed (DIM key illuminated), muted (CUT key illuminated), or not affected at all, according to the configuration (see [chapter 12.2.2](#) for details).




If talkback is active, the level of the monitor speakers is dimmed by 20 dB and the DIM key is illuminated.

External CR DIM:

Starting with SW V2.02, an additional control input has been implemented, allowing to reduce the level of the CR monitor speakers by 20 dB by an external signal; for this purpose, the corresponding Customer Code must be activated, too (see [chapters 12.2.12 and 15.13](#) for details).


The signal on the PFL bus is reproduced by the console's built-in speakers (mono). The same speakers are used for talkback. The volume is adjusted with the PFL/TB potentiometer.


For monitoring purposes, a headphones connector is provided below the hand rest of the central console part. Three keys allow different monitoring modes, as described below:

Key	Function	Description
	PFL	The headphones signal is the stereo PFL signal. PFL is illuminated if selected.
	PFL/CR monitor	The left headphones signal is the mono PFL signal, while the right headphones signal is the mono CR signal as selected by the monitor source selector. If no PFL is selected, the headphones signal is the stereo CR signal as selected. MON/PFL is illuminated if selected.
	CR monitor	The headphones signal is the same stereo signals as selected by the source selector for the monitor speaker. MON is illuminated if selected.

The CUT and DIM keys have no effect on the headphones signal. The headphones output is not muted if one of the control room microphones is on. The incoming talkback signal from the studio is mixed to the headphones output. For improved intelligibility, the monitoring signal is attenuated by 20 dB.

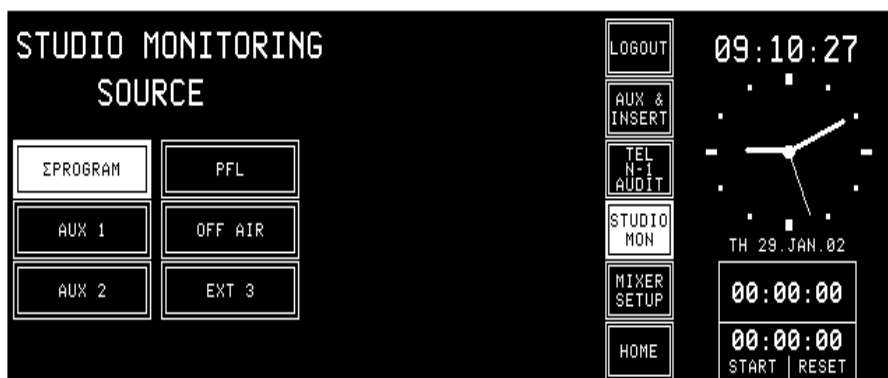
The PFL to MONITOR function feeds the PFL signal to the monitor loudspeakers, if PFL is selected on any channel. The normal monitoring signal is muted for as long as any PFL keys are active.

Key	Function	Description
	PFL to MONITOR	The PFL signal is routed to the monitor speakers if PFL on any channel is active. If no PFL is selected, the monitoring signal is the stereo CR signal as selected. PFL > MON is illuminated if active.

A volume control knob (PHONES ) adjusts the headphones listening level.

7.2 Studio Monitoring

The built-in studio monitoring functions are based on a touch-screen menu on the control screen. The STUDIO MONITORING SOURCE page allows one of six sources to be selected for routing to the studio speakers and headphones.



The table below lists the available sources.

Label	Function	Description
ΣPROGRAM	Program output (on-air)	Output signal to the transmitter. PROGRAM is highlighted if selected.
AUX 1	Auxiliary output 1	General purpose output sum. AUX1 is highlighted if selected.
AUX 2	Auxiliary output 2	General purpose output sum. AUX2 is highlighted if selected.
PFL	Pre-fader listening output	PFL sum. PFL is highlighted if selected.
OFF AIR	External Off-air input	General purpose input signal, usually from receiver. OFF AIR is highlighted if selected.
EXT 3	External input	General purpose input signal. EXT 3 is highlighted if selected.

As soon as one of the fields is touched, the corresponding signal is routed to the studio, and the field is highlighted.






The monitoring source selection can be controlled from the studio via external pushbuttons thanks to the parallel interface. The monitor speaker and headphones levels can independently be controlled by two potentiometers located in the studio.

The studio monitoring speakers are muted if one of the studio microphones is on. The headphones are not muted in this case.

During talkback from the CR to the studio, the volume for the studio speakers is reduced by 20 dB. The talkback signal from the CR to the studio is not reduced and has therefore the normal listening level on both the studio monitor speakers and the studio monitor headphones.

7.3 Talkback

There is a choice among several talkback targets from the DJ microphone. A key is assigned for each target as can be seen in the table below.

Key	Function	Description
	TB to Telephone 2	The connection between DJ mic and Cleanfeed B (N-1B, e.g. telephone 2) is established for as long as this key is pressed.
	TB to Telephone 1	The connection between DJ mic and Cleanfeed A (N-1A, e.g. telephone 1) is established for as long as this key is pressed.
	TB to Auxiliary 2	The connection between DJ mic and Auxiliary 2 is established for as long as this key is pressed.
	TB to Auxiliary 1	The connection between DJ mic and Auxiliary 1 is established for as long as this key is pressed.
	TB to Studio	The connection between DJ mic and the Studio is established for as long as this key is pressed.

On the MONITOR EXPANDER page, any of the function keys F1 to F5 can be configured as additional talkback target keys. This allows, together with the optional Monitor extension, e.g. talkback to the audition bus. This bus could therefore be used as a third Cleanfeed bus (N-1 C).

The DJ microphone usually is the source for talkback from the CR. For mixing consoles with less than 24 channels, a separate talkback microphone is optionally available, including preamplifier, limiter, and A/D converter. Its main application is in production and editing control rooms where no DJ microphone is required; for details, refer to [chapter 15.6](#).

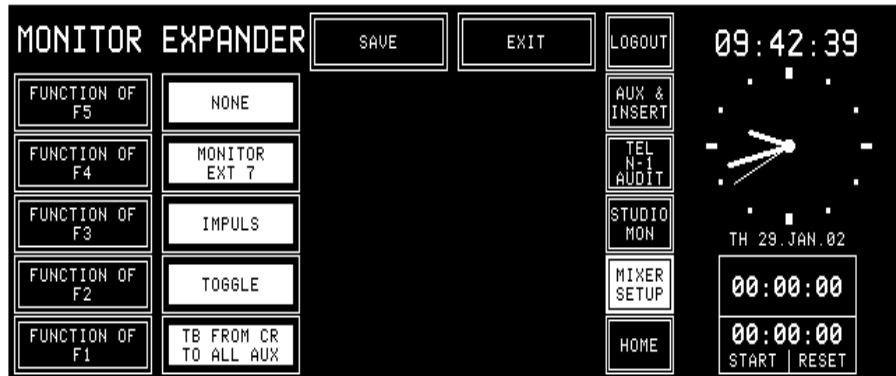
The parallel studio interface on the “STUDIO MON CTRL” connector allows the connection of three external pushbuttons for talkback target selection. The possible targets are: CR, Cleanfeed 1 (N-1 A/TEL1), and Cleanfeed 2 (N-1 B/TEL2). For talkback from the studio, the studio microphones are used (“TB SOURCE” is set to “STUDIO”).

The console’s built-in PFL/TB loudspeakers and the headphones are used for talkback listening in the CR, while in the studio the monitoring speakers and the headphones are used.

7.3.1 Additional Talkback Functions

The *Monitoring Module w. TB return 1.942.180.20* as well as the *Extended Monitoring Module w. TB return 1.942.181.20* both provide an additional electronically balanced TB line input on the “STUDIO MONITOR AUDIO” connector, as well as additional Talkback to CR and to Studio control inputs on the “EXT PFL CTRL” connector. Please refer to the pin assignment tables and the connection diagram in [chapter 15.13](#).

For ease of operation, the F1...F5 keys can also be configured as “TB FROM CR TO ALL N-1”, “TB FROM CR TO ALL AUX”, or “TB FROM CR TO ALL” (N-1 and AUX) keys.

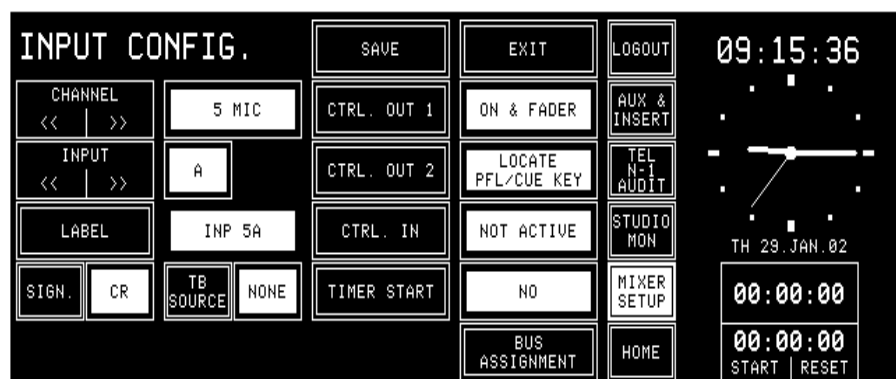


If e.g. the TB FROM CR TO ALL AUX function is configured on the F1 key as shown above, pressing this key activates talkback from the DJ microphone to all AUX outputs, and the two AUX1 and AUX2 keys are illuminated as well; pressing both AUX1 and AUX2 keys simultaneously then also illuminates the F1 key.

7.3.2 Talkback Settings

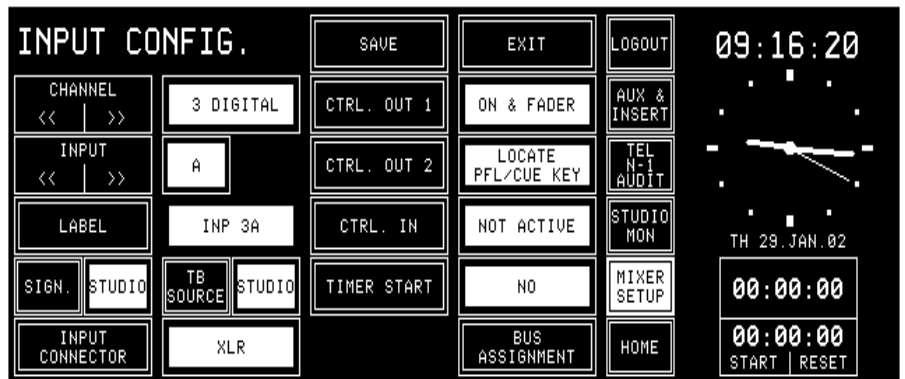
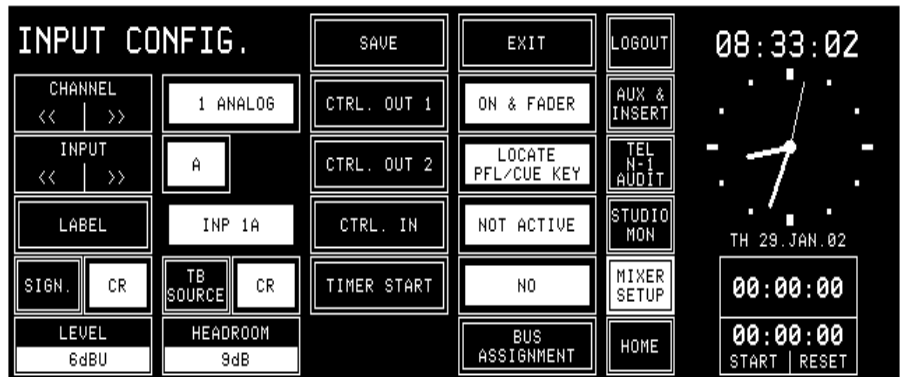
Starting with SW V3.0, talkback and signaling can be configured independently. The “SIGN.” setting (formerly labeled “MIC LOCATION”) in the INPUT CONFIG. page is used only for signaling (red light) and monitoring (cut and dim).

The additional “TB SOURCE” parameter in the INPUT CONFIG. page sets the assignment of the talkback source, i.e. the input to the TB bus (NONE, from CR, or from Studio).



During talkback from the Studio, the studio speakers are dimmed only if at least one input is configured as “SIGN.” = STUDIO and “TB SOURCE” = STUDIO. The same applies for talkback from the control room.

Note: Configuration of talkback and signaling is also possible for analog line or digital inputs as well as for a TB mic input, as shown by the following screenshots.




When installing an optional TB Mic Input module, two different cases must be distinguished:

Console configuration	TB Source	Signaling
TB Mic Input module <i>within</i> channel configuration (e.g. input module no. 13 of an 18-input-module console)	configurable	configurable
TB Mic Input module <i>outside</i> channel configuration (e.g. input module no. 13 of a 12-input-module console)	must be set to CR, else no function	don't care, no signaling available

7.4 External PFL

The OnAir 2000M2 provides an external PFL audio input. If the EXT PFL key is pressed, the key is illuminated, and the signal at the EXT PFL input is routed to the PFL bus. A control output is activated if EXT PFL is active. In addition, the EXT PFL function can be activated by a dedicated control input on the “EXT PFL CTRL” connector (refer to [chapter 15.13](#)). With this feature, the OnAir 2000M2 is well-suited for the integration with a broadcast automation (CAB, computer-assisted broadcasting) system. These systems need a separate PFL input that can be activated by the CAB system itself.

Key	Function	Description
	External PFL	Switches the EXT PFL OUT control output on and off, and routes the EXT PFL audio input signal to the PFL bus. The key is illuminated if active, or if a control signal is applied to the EXT PFL input.

8 SIGNALING

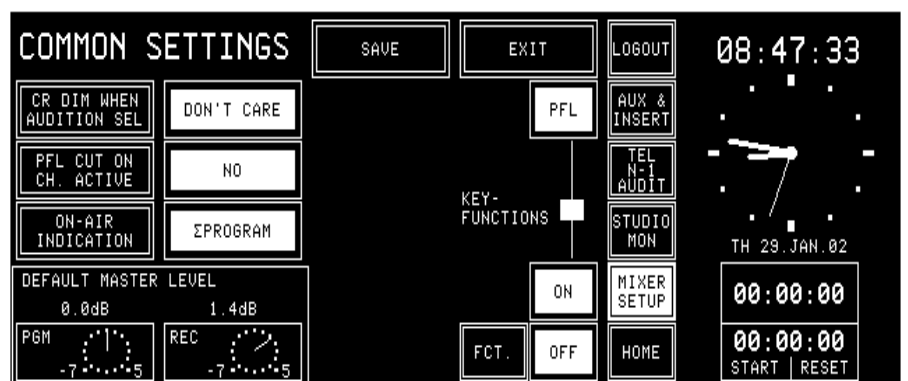
For control room and studio, signaling is provided by means of open-collector outputs (9-pin D-type “SIGN.” connector on the Monitoring module; for connection details, refer to [chapter 15.13](#)).

One output is available for each of the following statuses:

- Control Room microphone is on-air,
- Studio microphone is on-air, and
- Any signal from the console is on-air (i.e., a fader is open, this channel's ON key is active, its signal is routed to the PROGRAM and/or the RECORD bus, and, if configured, the corresponding master fader is open).

The CR-MIC and STUDIO-MIC indicators in the central operating section of the console are illuminated when the corresponding control output is active. Signaling always refers to the input module and not to the fader strip.

SIGN. Output	Active if:
CR MIC OUT	At least one input of a CR or DJ microphone is active (channel ON, fader open, assigned to program or record bus, corresponding master fader open).
STUDIO MIC OUT	At least one input of a studio microphone is active (channel ON, fader open, assigned to program or record bus, corresponding master fader open).
PGM OUT	Depending on ON-AIR INDICATION condition selected in the COMMON SETTINGS page: <ul style="list-style-type: none"> • ΣPROGRAM AND ΣRECORD – at least one channel is active (channel ON, fader open, assigned to program or record bus, corresponding master fader open). • ΣPROGRAM – at least one channel is active (channel ON, fader open, assigned to program bus, PGM master fader open). • ΣRECORD – at least one channel is active (channel ON, fader open, assigned to record bus, REC master fader open).



The ON AIR INDICATION condition for the PGM OUT control signal can be set in the COMMON SETTINGS page (which is reached by pressing MIXER SETUP followed by COMMON), if access permission is available.

An additional ON AIR IN opto-coupler input on the SIGN. connector can be used for illuminating the ON-AIR indicator in the monitoring section of the console.

Note: For information on the DEFAULT MASTER LEVEL window on the COMMON SETTINGS page, please refer to [chapter 5.14.1](#).

9 MACHINE CONTROL

The OnAir 2000M2 provides different control inputs and outputs. These can be used e.g. for switching a channel on and off, or for starting, stopping, and cueing of the connected source unit (as CD/cartridge/MD players, tape recorders, or a CAB system). The control inputs and outputs are input-related and are re-assigned together with the input signal to the respective fader strip if the channel routing is changed.

Each audio input holds two control outputs and one control input on D-type connectors. The signals are:

- CTRL OUT 1 (normally used for fader start, but configurable for other functions; see [chapter 9.2.1](#))
- CTRL OUT 2 (configurable functions see [chapter 9.2.2](#))
- CTRL IN (configurable functions see [chapter 9.3.1](#))

The status of the output signals depends on the control elements of the fader strip (keys 1 to 3, fader, input selection, channel routing, and output bus assignment), as well as on the console configuration.

Each channel consists of either two (A/B input module) or six (hex input module) audio inputs. Each audio input has its own control input and two control outputs allowing to control every external source separately.

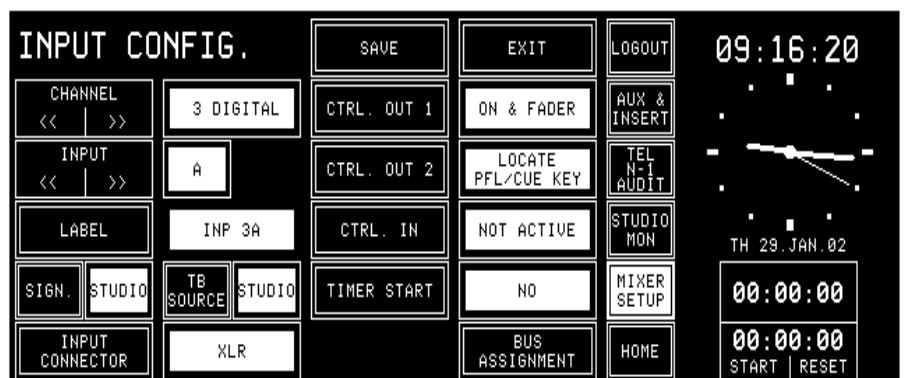
9.1 Keys and LEDs

Key 1/LED 1



The first key (labeled “PFL”) is always used to activate/deactivate the PFL function; if active, LED 1 is illuminated.

The PFL function can affect the CTRL OUT1 and/or CTRL OUT2 control signals, depending on the configuration. This configuration is performed in the center part of the INPUT CONFIG. page and is identical for all types of input modules.



Key 2/LED 2

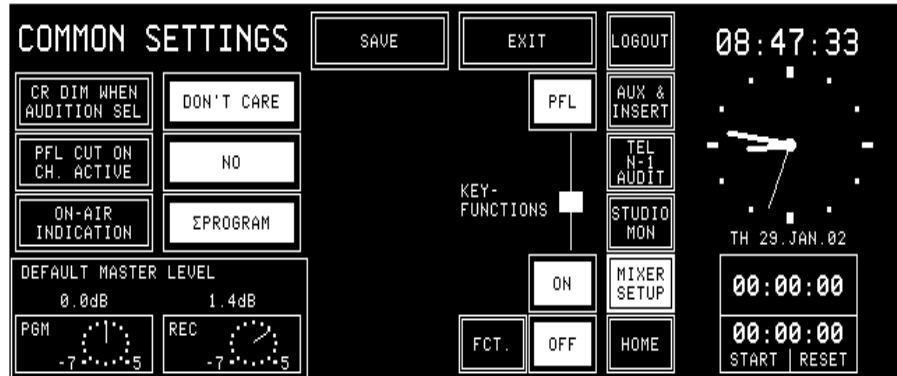


The second key (labeled “ON”) is used either to switch the channel ON or to toggle the channel ON/OFF, depending on the configuration of key 3. This function affects the CTRL OUT1 control signal. LED 2 always indicates the channel's ON/OFF status.

Key 3/LED 3



The functionality of the third key (labeled “OFF”) depends on the console configuration. It can act as channel OFF key or trigger a LOCATE function. The key 3 functionality is set in the COMMON SETTINGS page:



Console configuration (valid for all channels):	
Key 3 (“OFF”) function	Key 2 (“ON”) function
(Channel) OFF	(Channel) ON
LOCATE	(Channel) ON/OFF
LOCATE	(Channel) ON *

Channel ON/OFF affects the CTRL OUT1 control signal of the selected input, and the LOCATE function defines the status of the CTRL OUT2 control signal of the selected input.

* This additional configuration possibility has been introduced with SW V3.0; to protect a channel from being switched off inadvertently, the OFF function can be disabled. This setting is performed in the COMMON SETTINGS page; *it is valid for all channels of the console simultaneously.*

Note: If this setting is selected, no channel can be switched off by pressing a key – therefore, either closing the fader must do, or an external pushbutton per channel has to be added. For this purpose, a CTRL IN control input per channel is provided; please refer to [chapter 9.3.1](#). Select the option “CTRL. IN – EXT. ON/OFF” in the INPUT CONFIG. page.

LED 3 is illuminated if an external device indicates ready status using the CTRL IN input signal of the selected input, or if the CAB system indicates “ready for playback” via the (optional) serial interface (“Monitors” protocol, refer to [chapter 10](#)).

9.2 Control Outputs

9.2.1 CTRL OUT1

This open-collector output is normally used to start external devices, such as CD players or a CAB system, to play the next track. On the INPUT CONFIG. page (see [chapter 9.1](#)), other functions can be assigned individually for each audio input.

Input configuration (for each channel individually):	
CTRL OUT1 mode	CTRL OUT1 signal
NOT ACTIVE	Output always open (inactive).
PFL/ON & FADER	Active if either PFL key is pressed (independent of fader position), or if ON key is pressed and fader is open (fader start function, causing the source to be started as well when PFL key is pressed).
ON & FADER	Active if ON key is pressed and fader is open (standard fader start function).
ON LAMP	Active if channel is ON; used as acknowledgement if the channel is remotely controlled.

9.2.2 CTRL OUT2

This open-collector output can be used to re-park an external device, such as a CD player, after cueing, or for signaling, or as an acknowledgement for ON status. It can be configured individually for each input in the INPUT CONFIG. page (see [chapter 9.1](#)).

Input configuration (for each channel individually):	
CTRL OUT2 mode	CTRL OUT2 signal
NOT ACTIVE	Output always open (inactive).
LOCATE KEY	Active if key 3 ("OFF", configured as LOCATE key) is pressed while the channel is closed (fader closed or channel OFF). Using this function, a source which has been pre-listened before can be reset to the start point.
PREVIEW	Active as long as key 1 ("PFL") is pressed while the channel is closed (fader closed or channel OFF). Using this function, a source can be started for pre-listening.
LOCATE PFL KEY	Active for approx. 0.3 s when key 1 ("PFL") is switched off while the channel is closed (fader closed or channel OFF). Using this function, a source can be given a locate command to return to the start point.
LOCATE PFL / LOC KEY	Combination of the LOCATE KEY and LOCATE PFL KEY functions: <ul style="list-style-type: none"> Output is active for approx. 0.3 s when key 1 ("PFL") is switched off while the channel is closed (fader closed or channel OFF). Using this function, a source can be given a locate command to return to the start point. Output is active if key 3 ("OFF", configured as LOCATE key) is pressed while the channel is closed (fader closed or channel OFF). Using this function, a source which has been pre-listened before can be reset to the start point.
ATTENTION	Active as long as key 3 ("OFF", configured as LOCATE key) is pressed; can be used for "ready" signaling.
ON LAMP	Active if channel is ON; used as acknowledgement if the channel is remotely controlled.
FADER STOP_PULSE	Generates a fader start pulse (approx. 0.2 s) at CTRL OUT 1 and a fader stop pulse (approx. 0.3 s) at CTRL OUT 2, but only if CTRL OUT 1 is configured as ON & FADER or PFL/ON & FADER.

9.3 Control Inputs

9.3.1 CTRL IN

A CTRL IN control input is available for each audio input. This input's function can be selected in the INPUT CONFIG. page (see [chapter 9.1](#)).

Input configuration (for each channel individually):	
CTRL IN mode	CTRL IN signal
NOT ACTIVE	No function (input signal is ignored)
READY	Key 3 ("OFF") is illuminated as long as CTRL IN is active
EXT. MUTE	Channel is muted as long as CTRL IN is active (e.g. cough key)
EXT. ON/OFF	Toggles the channel ON/OFF; used e.g. for ON/OFF button on speaker's desk, or for remote control through CAB system

Note: An optional, external control interface (1.942.803.xx) can be used for the following functions of a single channel:

- Electrical isolation between CTRL OUT and the connected source (relay with make contact);
- Conversion from the continuous fader start signal to electrically isolated start and stop pulses;
- Remote control of a channel using separate ON and OFF keys, logically linked with the ON LAMP signal. The ON and OFF keys in the console remain functional;
- Remote control of a channel through a CAB system which gives a continuous signal as long as a channel must be on, logically linked with the ON LAMP signal. The external command is overridden by the ON and OFF keys in the console.

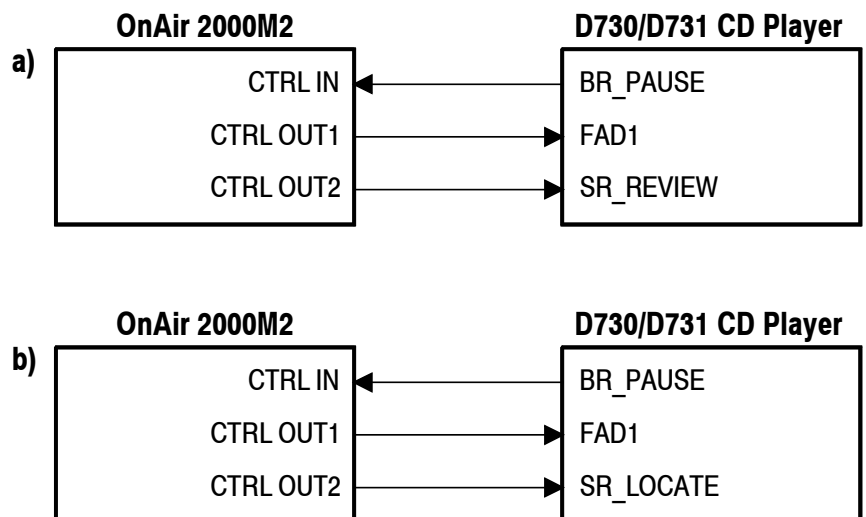
Additional information on this interface can be found in the circuit diagrams chapter of the OnAir 2000M2 Service Manual.

9.3.2 EXTERN PFL Input

An external PFL control input is available on the "EXT PFL CTRL" connector on the monitoring module (refer to [chapter 15.13](#)). It allows e.g. to open the EXTERN PFL pre-listening audio path by a CAB system.

9.4 CTRL OUT1/2 & CTRL IN Application Examples

Application	Configuration CTRL OUT1; see Note 4	Configuration CTRL OUT2; see Note 4	Configuration of key 3 ("OFF"/LOCATE); see Note 4	Connection(s) OnAir 2000M2 → controlled source (e.g. CD player, cart/tape recorder)
Fader start/stop with: Fader open/close, or channel ON/OFF	ON & FADER	—	—	CTRL OUT1 → remote control input "fader start"
Fader start/stop with: Fader open/close, or channel ON/OFF, or PFL ON/OFF	PFL / ON & FADER	—	—	CTRL OUT1 → remote control input "fader start"
Review function of Studer D730/D731: pre-listening with PFL and subsequent locate to the last cue address. Afterwards: PLAY with fader start; see Notes 1 and 2	ON & FADER	PREVIEW	—	CTRL OUT2 → Studer D730/D731, remote control input "SR_REVIEW"; see fig. a)
Pre-listening with PFL and subsequent locate to the start; console sends an 0.2 s locate pulse on CTRL OUT2. Afterwards: PLAY with fader start; see Note 1	PFL / ON & FADER	LOCATE PFL KEY	—	CTRL OUT1 → remote control input "fader start", CTRL OUT2 → remote control input "locate"; see fig. b)
Manual locate to the start, using OFF/LOCATE key 3; see Note 1	—	LOCATE KEY	LOCATE	CTRL OUT2 → remote control input "locate"; see fig. b)
Pre-listening with PFL and subsequent locate to the start. Manual locate also available; see Note 1	PFL / ON & FADER	LOCATE PFL / LOC KEY	LOCATE	CTRL OUT1 → remote control input "fader start"; CTRL OUT2 → remote control input "locate"; see fig. b)
Fader start pulse and fader stop pulse (on different control outputs)	ON & FADER or PFL / ON & FADER	FADER STOP PULSE	—	CTRL OUT1 → fader start pulse, CTRL OUT2 → fader stop pulse; used for any remote control input using pulses instead of a static signal
Control of any external signal with key 3 ("OFF")	—	ATTENTION	LOCATE	CTRL OUT2 → any control input
Reflects the ON lamp status to CTRL OUT1	ON LAMP	—	—	CTRL OUT1 → any control input
Reflects the ON lamp status to CTRL OUT2	—	ON LAMP	—	CTRL OUT2 → any control input
<p>Note 1: Function is available only if the corresponding console channel is not active; "channel active" = fader open and channel ON and channel assigned to PGM or REC bus.</p> <p>Note 2: D730/D731 configuration checksum example, suited for this function: 4050631164470. For more information on this subject, please refer to the D730/D731 operating instructions manual, order no. 10.27.1672</p> <p>Note 3: Combination of different applications is possible if allowed by the CTRL OUT1/2 wiring.</p> <p>Note 4: <i>DO NOT change the settings while any of the control output signals is active!</i></p>				



10 AUTOMATION

10.1 Introduction

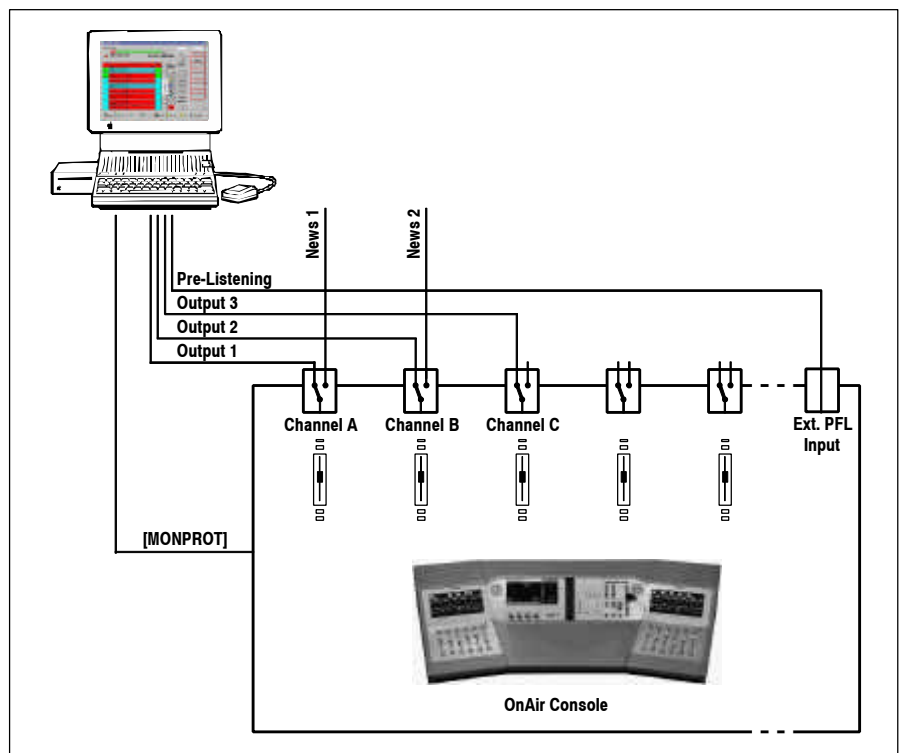
The OnAir 2000M2 supports external CAB (computer-assisted broadcasting) systems. Starting with software version V3.04, also a serial interface (RS232/RS422) can be used for communication with the CAB system.

Studer DigiMedia System: Information on how to connect and operate the OnAir 2000M2 mixing console with a DigiMedia CAB system is given in the current DigiMedia operating instructions.

The serial interface protocol is based on the “Schnittstellen-Spezifikationen Regiepult” of DSA (Digitale Steuerungs- und Automations-technik, Thomas Volgmann) furthermore called [MONPROT], which was defined by VCS and Siemens.

The implementation in the OnAir 2000M2 is a subset of [MONPROT].
For detailed information on the telegrams implemented in the OnAir 2000M2, please refer to the “Communication Protocol for Broadcast Automation” document [BCACOM] (available on request).

10.2 Features of the OnAir 2000M2 CAB Support

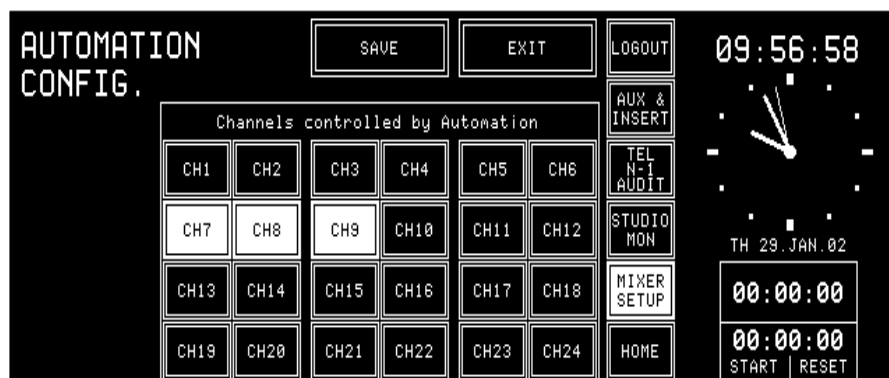


- Serial interface: Serial RS232/RS422 standard communication interface based on [MONPROT].
- 2 x 12 character text display per channel.
- Music and speech output:
The CAB can control the output assignment (program/record bus) of the currently selected input of a channel.

10.3 Application Handling

10.3.1 Configuration for Automation Control

Channels must be assigned to the automation system in the console configuration in order to be controlled by an external CAB system. AUTOMATION CONFIG. is reached from the SYSTEM CONFIG. page:



The AUTOMATION CONFIG. page allows each channel to be assigned to the CAB system.

Please note that these channels' labels *must* be named “DIGI 1” through “DIGI 3”. Normally three channels are used with the CAB system; a fourth “DIGI 4” channel is possible, but unusual.

10.3.2 Communication Time-out

If no valid telegram is received from the CAB within approx. 30 seconds, the OnAir 2000M2 assumes that the communication is interrupted.

In this case it stops sending telegrams and the following actions are performed:

- All channels are deselected;
- The channel screens are re-drawn (name of selected input source will be indicated again) which might have been overwritten;
- A warning: “Communication to Broadcast Automation lost!” is displayed.

After the next or first telegram from the CAB, communication will be re-established.

The information: “Communication to Broadcast Automation established!” is generated.

10.3.3 Output Selection

The CAB is able to control the output assignment (program/record bus) of the currently selected input of any channel. This allows, for instance, to route speech to the program output, and music to the record output.

10.3.4 Start a New Title from Schedule

In automatic mode, the CAB can start a new title automatically (it is also possible to start new titles manually; then, the operator opens the fader while the channel is already switched ON, or switches the desired channel ON while the fader is already open).

Automatic New Title Start:

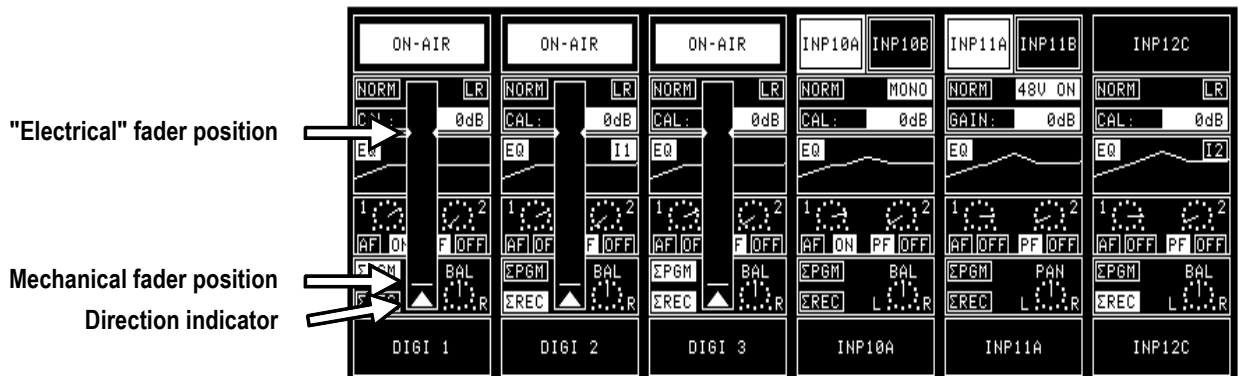
The CAB can control the console automatically. This automatic mode must be activated from within the CAB and can, for example, be used for controlling a program during the night without any assistance.

If the CAB runs in automatic mode, it starts playback of the source and opens the appropriate channel with the pre-defined level and fade-in time. This will send a new audio level to the DSP, and switch the channel ON in any case.

If a take ends, the CAB performs a cross-fade on its audio card, the selected channels on the console remain open.

If the CAB changes the audio level, the mechanical position of the fader knob differs from the “electrical” fader position, i.e. the level set by the CAB. Moving the fader knob will have no effect on the level unless the electrical fader position is “caught” with the fader knob.

This is simplified by the touch screen indication, as shown below.



The large arrow at the bottom (or top) indicates the direction in which the fader has to be moved. The narrow horizontal line indicates the current mechanical fader position. It follows the fader knob when it is moved towards the two small left-and-right arrows indicating the electrical fader position.

10.3.5 Indication of the Currently Playing Input Line

As the OnAir 2000M2 is not equipped with motor faders, a clear indication of the channel currently “playing” is visible on the screen of the CAB system.

Under the following conditions the selector field on the channel screen indicates “ON-AIR” (refer to the figure above), and the selection of another input is inhibited:

- The channel is switched ON;
- The channel is assigned to program and/or record bus (as defined in the Common Settings page);
- The channel is selected by the CAB.

10.3.6 Pre-Listening

When starting the pre-listening function in the CAB system by clicking on the LISTEN button on the CAB screen, followed by selecting a title, the CAB system immediately sends the desired title over the fourth channel of its audio card. At the same time, it opens the external PFL input, so that the desired title is audible in the console's PFL loudspeakers.

10.3.7 Time Synchronization

The CAB is able to set the console's internal clock (time and date) if TIME SYNC. is set to AUTOMATION in the TIME & DATE FORMAT page; refer to [chapter 12.2.5](#).



11 USER MODES

11.1 Purpose of User Modes

The console is used in different studios with different working practice and different personnel structure. A large part of users in broadcast studios is not technically oriented. A mixing console meeting their requirements must be simple to use, reliable and free of “unnecessary” controls and displays. Setting of a wider range of console parameters, saving of console settings (snapshots), and modifications of the console configuration have to be left for technically more competent users (studio technicians, chief engineer). It is also necessary to protect parts of system data and give the permission to change them only to a restricted number of users. In order to satisfy these needs, the OnAir 2000M2 console supports individual user access rights.

Three classes of users are defined for the OnAir 2000M2; these are:

- | | |
|------------------------------|---|
| Default User: | <ul style="list-style-type: none">• No password required;• Private snapshots and mic settings;• User channel routing;• Function access rights according to the configuration. |
| Normal User: | <ul style="list-style-type: none">• Password-protected;• Private snapshots and mic settings;• User channel routing;• Function access rights according to the configuration. |
| System Administrator: | <ul style="list-style-type: none">• Password-protected;• User channel routing;• Unlimited access rights to all functions;• Defines new users;• Defines access rights for all users;• Stores global snapshots, global mic settings, and global channel routings.• Stores private snapshots, private mic settings, and user channel routings for all users. |

The table in [chapter 11.2](#) shows the functions to which access is configurable in the OnAir 2000M2.

11.2 Access Configurable Functions of the Console

Function Description	Default User	Normal User	Administrator
Loglist management			
Accept an entry (delete entry from list)	configurable	configurable	accessible
View the log list	accessible	accessible	accessible
Aux Master			
Inserts on AUX page	configurable	configurable	accessible
Aux 1 and 2 parameters	configurable	configurable	accessible
AUDIT master			
AUDIT level on TEL N-1 AUDIT page	configurable	configurable	accessible
N-1 master			
N-1A/N-1B levels on TEL N-1 AUDIT page	configurable	configurable	accessible
Channel input parameters			
<i>Aux 1 parameters:</i>			
Set channel input as AF for Aux 1 Set channel input as PF for Aux 1 Add channel input to Aux 1 Remove channel input from Aux 1 Aux 1 level	configurable	configurable	accessible
<i>Aux 2 parameters:</i>			
Set channel input as AF for Aux 2 Set channel input as PF for Aux 2 Add channel input to Aux 2 Remove channel input from Aux 2 Aux 2 level	configurable	configurable	accessible
<i>Phase parameters:</i>			
Set phase to invert Set phase to normal	configurable	configurable	accessible
<i>Phantom parameters:</i>			
Set phantom to ON Set phantom to OFF	configurable	configurable	accessible
<i>Stereo mode parameters:</i>			
Set channel to stereo mode Set channel to mono mode Set stereo mode to LR Set stereo mode to LL Set stereo mode to RL Set stereo mode to RR	configurable	configurable	accessible
<i>Gain/cal parameters:</i>	configurable	configurable	accessible
<i>Pan/balance parameters:</i>	configurable	configurable	accessible
<i>Sum selection:</i>			
Add/remove chn to/from ON-AIR bus Add/remove chn to/from RECORD bus	configurable	configurable	accessible

Function Description	Default User	Normal User	Adminis- trator
<i>EQ parameters:</i>			
Switch EQ for this channel input on Switch EQ for this channel input off Set EQ high shelving corner freq. to low Set EQ high shelving corner freq. to high Switch high-pass filter off Switch high-pass filter on Set EQ low shelving corner freq. to low Set EQ low shelving corner freq. to high Switch phantom power off Switch phantom power on Set the low filter gain Set the peak filter corner frequency Set the peak filter gain Set the high filter gain	configurable	configurable	accessible
Channel common parameters			
Input selection	configurable	configurable	accessible
All other parameters	accessible	accessible	accessible
Mixer setup			
Delete selected global snapshot/mic setting/ channel routing	–	–	accessible
Create global snapshot/mic setting/ channel routing	–	–	accessible
Recall global snapshot/mic setting/ channel routing	accessible	accessible	accessible
Delete selected private snapshot/mic setting	accessible*	accessible*	accessible
Create private snapshot/mic setting	accessible*	accessible*	accessible
Recall private snapshot/mic setting	accessible*	accessible*	accessible
Recall user channel routing	accessible*	accessible*	accessible
Channel routings			
Enter channel routing page	configurable	configurable	accessible
User administration			
Enter user administration	–	–	accessible
System configuration			
Display system configuration page	configurable	configurable	accessible
* accessible for a user = his own data only			

11.3 User Administration

The described access permission allows different functionality ranges to important console functions for each user. By assigning an appropriate access permission to each user, it is possible to fit the OnAir 2000M2 console to very different working environments.

This user administration is done with the help of a User Administration table that is part of the console configuration. This table can be edited by the system administrator only.

The users supposed to use the console with basic functionality do not need an account. To adjust the console to differently trained staff, it is possible to change the access permissions of the default user.

A user who wants to store his own, private data (snapshots, mic settings and/or channel routing) must have an account containing his name, his access permission table, and an optional password.

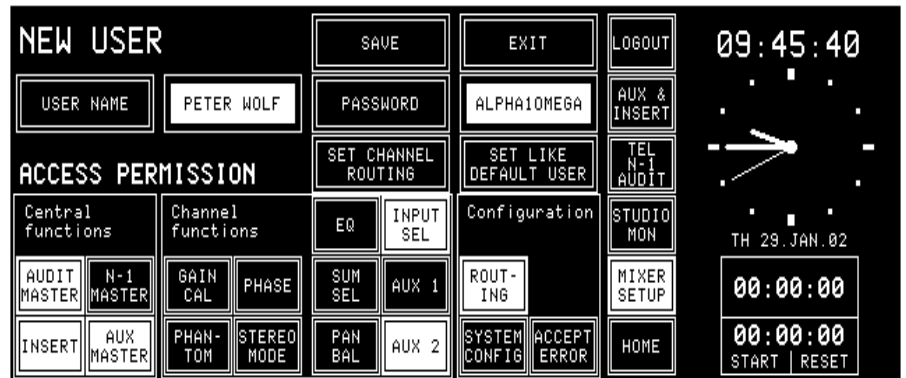


The USER ADMINISTRATION page can only be opened by the system administrator, by touching USER ADMIN in the SYSTEM CONFIG. page. Ten users will be listed. With the USER 11..20 field, the administrator can list the remaining users. When the second block of users is displayed, the USER 11..20 field changes to USER 1..10.

11.4 Administration Functions

By the system administrator, a user record can be created (NEW), changed (EDIT), or deleted (DELETE).

Create User Record: To create a new user record, touch NEW in the USER ADMINISTRATION page. The NEW USER page appears with empty input fields:



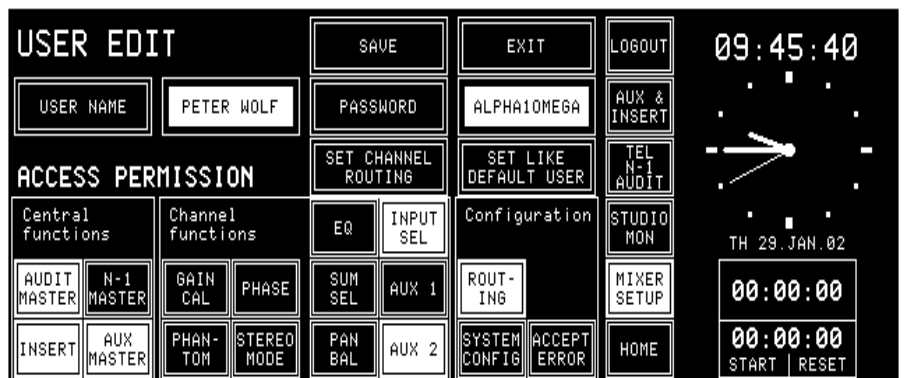
put fields:

The USER NAME and PASSWORD fields are filled in, using the KEYBOARD page. The maximum length of the password is 22 characters. The user name may consist of up to 20 characters. If the new user is not accepted (e.g. because the user name already exists), an error message tells the system administrator that the new user will not be registered. A user name can be entered without a password, too.

Access permission is configured by touching the corresponding function fields on the NEW USER page. With SET LIKE DEFAULT USER, the access permission setting and the channel routing of the default user are copied to the user currently being edited and can subsequently be edited again. The new user record is stored with SAVE.

Two users are already predefined: The default user and the administrator. Both can only be edited, *but not created or deleted*.

Change User Record: A user record is selected by touching the appropriate name field in the USER ADMINISTRATION page, followed by EDIT. The USER EDIT page, containing the user's individual data, appears.



The data can be edited in the same way as described above, except that the user name is displayed but cannot be modified. The only way to rename a

user while preserving his snapshots, mic settings, and channel routings is to save them to a PC-card, delete the user, create a new one with the desired name, and then reload the snapshots, mic settings, and channel routing from the card. After touching SAVE, the old record is replaced by the new one. This procedure has to be performed this way in order to avoid name conflicts in the console's memory and on the PC-card.

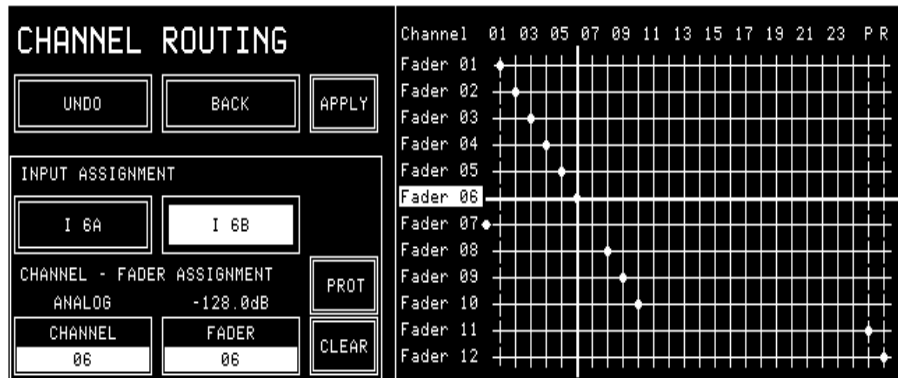
When editing the default user, the USER EDIT page looks similar, except that no password field is displayed.

When editing the administrator, the USER EDIT page neither displays the access permission fields nor the USER NAME field, but the password field is enabled.

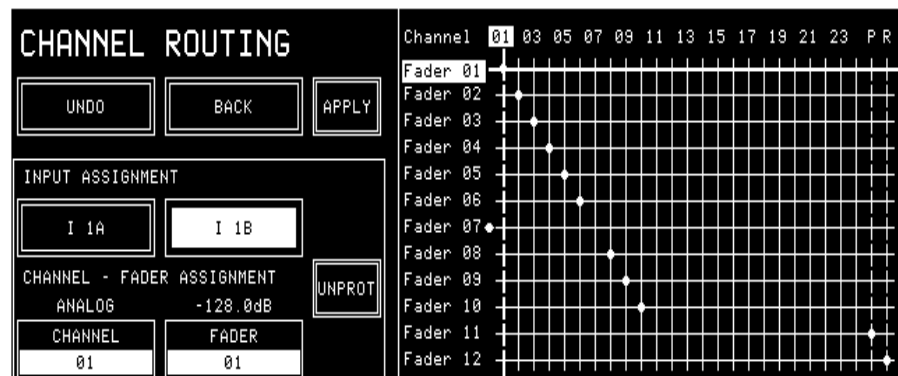
Set User Channel Routing:

The system administrator can define the user channel routing (surface definition) for every user by touching the SET CHANNEL ROUTING field in the USER EDIT page. In addition, the administrator can allow a user to change his own channel routing.

When the SET CHANNEL ROUTING field is touched, the CHANNEL ROUTING page appears and displays this specific user's channel routing. Instead of the SAVE TO USER PROFILE field, a BACK field is displayed, leading back to the USER EDIT page.



The system administrator can protect specific connections within the channel routing by selecting the desired cross-point with the horizontal and vertical lines, and then touching the PROT(ect) field. A protected connection is indicated by a dashed vertical line in the grid (see below); this connection cannot be changed by the user, even if he might be allowed to change his channel routing. Only the administrator can UNPROT(ect) this connection again. However, the user can change the input selection (A/B or A...F) of this input module, if he has the INPUT SEL access right.



Delete User Record: To delete a user record from the user administration table, a record must be selected by touching the desired name field. A dialog box appears; if deleting the user is confirmed there, the selected user is permanently removed from the memory, and the user record disappears from the USER ADMINISTRATION page.

The default user and the administrator can be edited only, but not deleted.

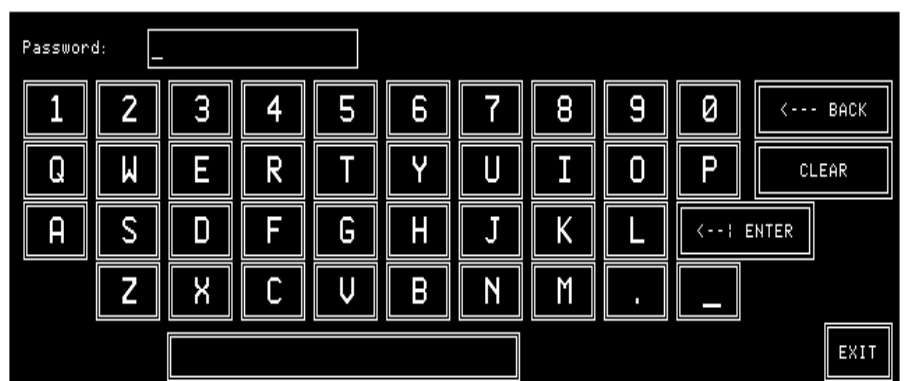
11.5 Log-in Procedure and Defaults

The console always starts up in default user mode. The default user's access permission is activated automatically when a user logs out. If the corresponding customer code is activated (refer to [chapter 12.2.12](#)), the default user's channel routing is also recalled automatically.

If the user is a registered user, and if he wants to work in his own, private environment, he must log-in. After touching the LOGIN field, the LOGIN page will appear where the user can touch the field with his own name.



If a password is defined for this user, he has to enter it on the keyboard page.



If the password is correct, the system automatically returns to the page on which the user touched the LOGIN field. If the password is not valid, a dialog box will appear on the LOGIN page telling the user that the password was not correct. The user can leave the LOGIN page via the EXIT field which brings him back to the previous page.

If no password is defined for a user, the system does not show the keyboard page after a touch on a name field in the LOGIN page. The system directly jumps back to the page where the LOGIN field was touched. As

the system does not check for a password in this case, this user's private data are not protected, and any other user can access them.

If a console is operated by one person only, the system administrator simply has to enable all access rights for the default user. This is the way the user can control all console functions (except the user administration functions) without having to log-in.

A default user is always defined in the user administration table. His name is DEFAULT USER. The access permission of this user can be edited, but the record cannot be deleted, and no login code can be defined for this user.

12 CONFIGURATION

In order to meet the requirements for different studio environments, the OnAir 2000M2 is highly configurable.

Depending on the connected audio equipment, different input and output modules can be installed. Some optional modules (Time Sync, RS232/422, Clock Sync, etc.) can also be installed to allow for extended functionality. All these hardware modules are automatically detected by the OnAir 2000M2 software.

According to the installed hardware modules, the system offers corresponding software configuration options. This software configuration is described in this chapter.

A configuration is “static”, which means that it cannot be changed during normal operation. Although snapshots rely on a certain configuration, the configuration data are not stored together with the snapshots. Therefore, snapshots cannot change the console configuration.

12.1 Configuration Handling

At system startup, each installed module is identified. The list of detected modules is compared with the list of modules which had been installed at the last power-down. If a hardware configuration change is found, a message is displayed in the central screen. This is very important, since e.g. snapshots may not be compatible if the type of an input module has changed.

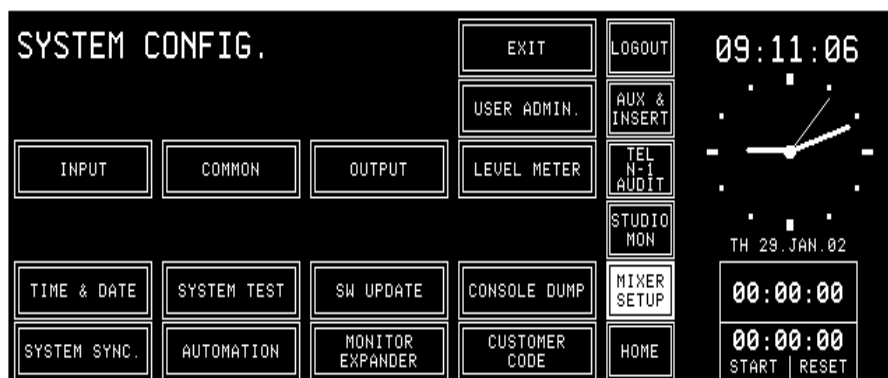
Hardware configuration can only be changed if the console is switched off. *Modules must not be replaced or added while the console is running; “hot-patching” of modules will make the system hang.*

System configuration can be changed by the system administrator, or by any user with access right to the SYSTEM CONFIG. page. System configuration includes data for:

- Channel labels
- Control signal modes
- Nominal input levels
- Level meter assignment, etc.

An OnAir 2000M2 configuration can be stored on a PC-Card, or loaded from the PC-Card into the console.

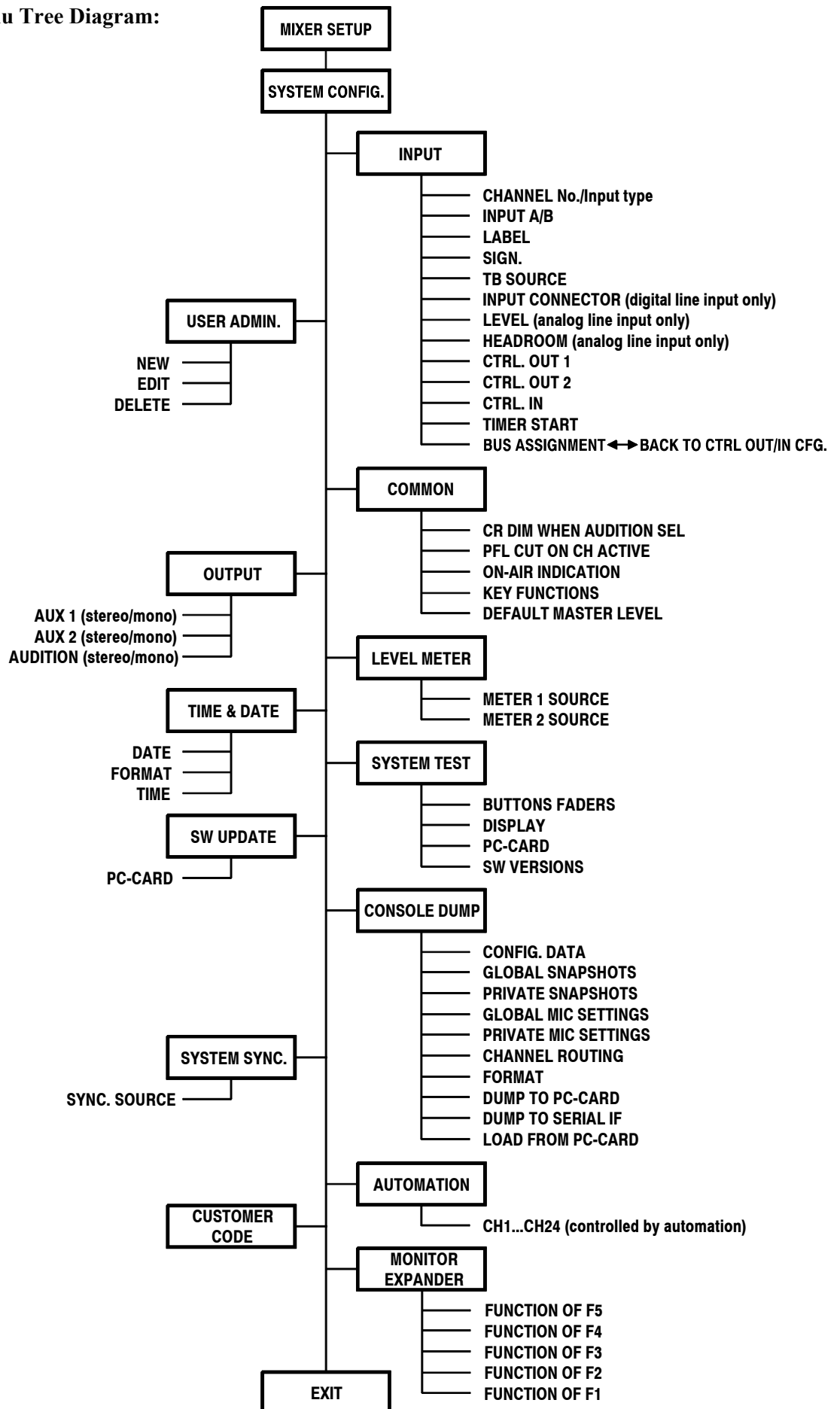
12.2 Configuration Procedure



The console configuration can be changed in the SYSTEM CONFIG. page. This page can only be reached from the Mixer Setup page by an operator with system administrator permission.

The configuration parameters are subdivided in groups. Each group is edited on a separate page accessed from the SYSTEM CONFIG. page.

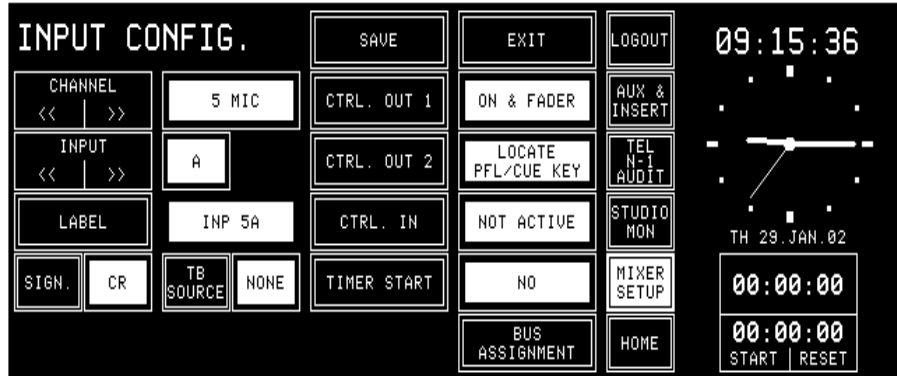
Configuration Menu Tree Diagram:



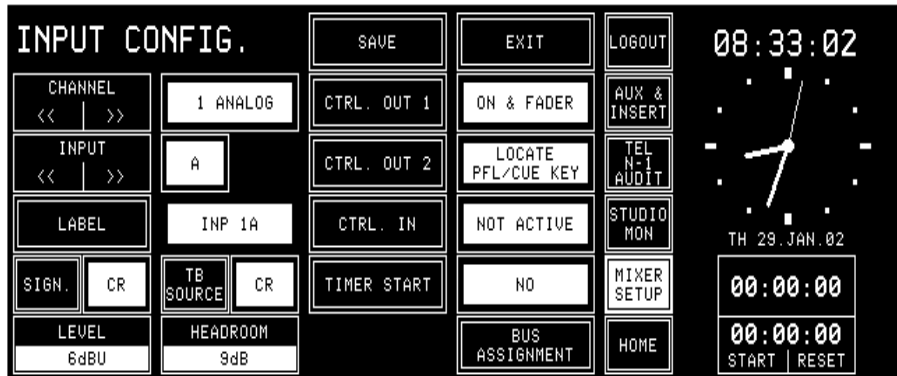
12.2.1 Input

There are three slightly different INPUT CONFIG. pages for editing input configurations, depending on the type of input module identified by the hardware. The pages for microphone, analog line, and digital line inputs are shown below.

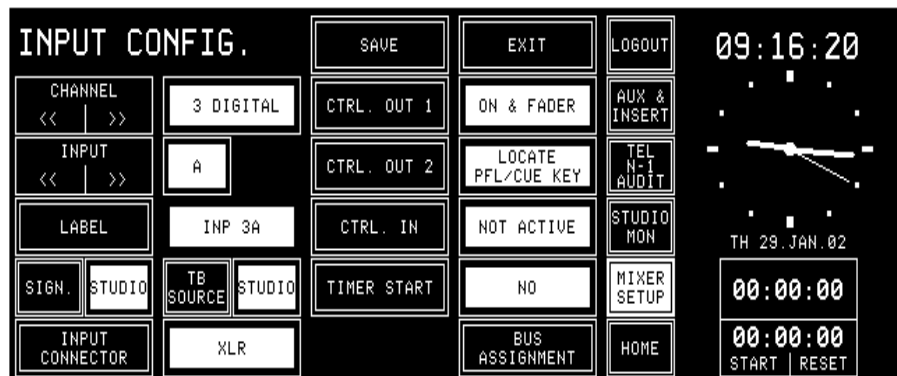
Microphone Input



Analog Line Input



Digital Input

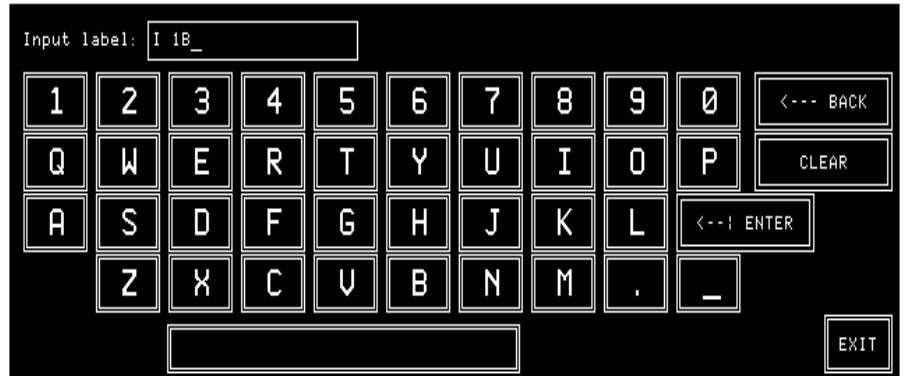


Channel and input are selected with the CHANNEL and INPUT forward (>>) and backward (<<) fields. Channel and input can also be selected by touching the Label field on the channel screen. The display will show the current configuration data for the selected input and channel. To change a parameter, the corresponding field must be touched; it will change to the next possible value. Consecutive touching toggles through all the options.

Exceptions:

Touching the LABEL field will open the KEYBOARD page where an input label can be edited. The values in the LEVEL and HEADROOM fields (analog line inputs only) can be adjusted with the rotary encoders next to these fields. Touching BUS ASSIGNMENT opens the BUS ASSIGNMENT page where the channel routing to all N-1 and to the AUDIT buses is performed.

LABEL The LABEL field is used for giving a name to a channel. Touching this field, the keyboard page opens.



The source label field on the channel screen can display long labels (up to 2 × 12 characters), while the input selector fields can display short labels only (up to 2 × 6 characters).

The following rules apply to the display of the labels in the fields:

The upper line contains the first word plus every following word which completely fits into the field. If the first word is longer than 6 or 12 characters, it is cut after 6 or 12 characters. The lower line is filled up with as many characters (6 or 12) as possible, i.e. the last word is cut if it does not fit completely into the field. The separation character is the space character. If the label consists of one long word only, it is cut after 6 or 12 characters and displayed on one single line. The following table illustrates the different possibilities:

Name	Short label	Long label
ABC 12	ABC 12	ABC 12
ABC 1234	ABC 1234	ABC 1234
ABCDEFGH 1234567	ABCDEFGH 123456	ABCDEFGH 1234567
ABCDEFGH 1234567 ABC	ABCDEFGH 123456	ABCDEFGH 1234567 ABC
ABC EFGHIJK MN 1234	ABC EFGHIJ	ABC EFGHIJK MN 1234
ABC EFGHIJKLMNOP 1234	ABC EFGHIJ	ABC EFGHIJKLMNOP 1

When completed, touch <-- | ENTER followed by SAVE (to keep the changes) or EXIT (to cancel without changes).

SIGN. / TB SOURCE

Signaling and talkback can be configured individually (in software versions earlier than V3.0, these settings were allowed for microphone inputs only; there, this function was called “MIC LOCATION”).

SIGN. is used for signaling (red light) and monitoring (cut and dim), the available options are NONE, CR, and STUDIO.

The TB SOURCE parameter in the INPUT CONFIG. page sets the assignment of the input to the TB bus (NONE, from CR, or from STUDIO).

During talkback from the studio, the studio speakers are dimmed only if at least one input is configured as SIGN. = STUDIO and TB SOURCE = STUDIO. The same applies for talkback from the control room.

INPUT CONNECTOR *(Digital input modules only)*

Each (A and B) input of a digital input module has three different input connectors (XLR, RCA/Cinch, and optical/TOSLINK). This option selects independently for the A and the B inputs which connector is used.

LEVEL *(Analog line input modules only)*

“Level” is the nominal studio level expressed in dBu.

HEADROOM *(Analog line input modules only)*

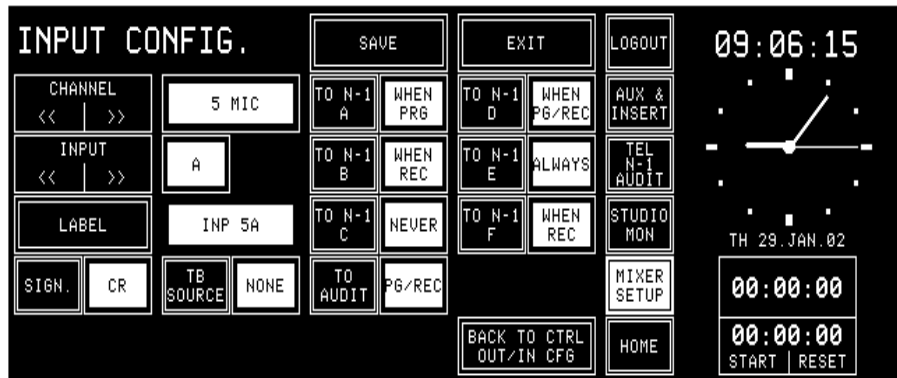
“Headroom” is the difference between the A/D converter's clipping level and the nominal studio level.

Example: An input with a level setting of +6 dBu and a headroom setting of 9 dB will accept a +15 dBu signal before the A/D converter comes into overload.

CTRL. OUT 1/2 Please refer to **chapter 9** for more information on this subject.

CTRL. IN Please refer to **chapter 9** for more information on this subject.

BUS ASSIGNMENT When touching the BUS ASSIGNMENT field, the display changes as follows, allowing to select the N–1 and the audition bus assignments:



The TO... fields allow routing the input signal to the corresponding N–1 (A...B or A...F) or to the Audition bus. The Audition bus is similar to the N–1 buses, but it is a stereo bus that can be selected as a monitoring source in the control room.

N–1 and Audition bus assignment is related to the input signal and is rerouted with the input signal when the input module assignment is changed. Talkback to the Audition bus is possible only on the analog outputs of the optional monitoring extension.

N–1/AUDIT Configuration:

Setting	Meaning
NEVER	The channel is never routed to N–1 or AUDIT
WHEN PG/REC	The channel is routed to N–1 and/or AUDIT if the channel is either assigned to the program or to the record bus
WHEN PGM	The channel is routed to N–1 and/or AUDIT if the channel is assigned to the program bus
WHEN REC	The channel is routed to N–1 and/or AUDIT if the channel is assigned to the record bus
ALWAYS	The channel is always routed to N–1 and/or AUDIT, regardless of the bus assignment

Notes: If the console is equipped with an Insert 3/4 Module, the N–1C to F outputs are not available; however, talkback to the OUT1/2 buses is possible.

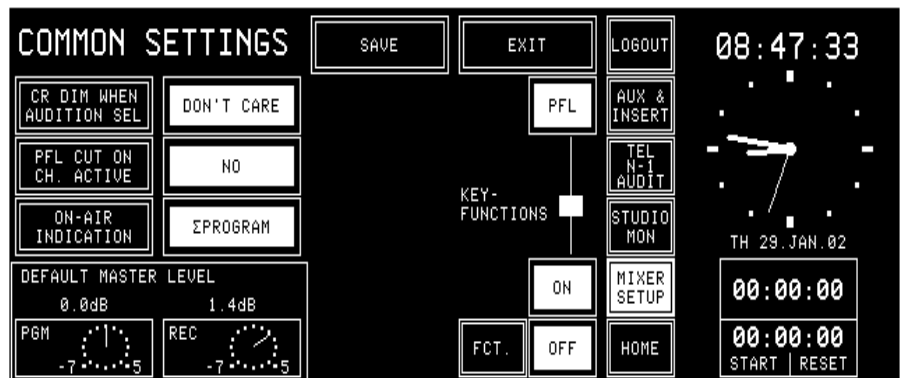
The N-1 bus and the Audition bus output levels are controlled on the TEL/N-1/AUDIT page using the rotary encoders. For details, please refer to [chapter 5.3.1](#).

When touching BACK TO CTRL OUT/IN CFG, the display switches back from the bus assignment option to the standard INPUT CONFIG. page.

TIMER START If TIMER START is set to YES, the fader stop watch will be started/reset by the corresponding fader, if the channel is ON and the fader is opened. TIMER START is related to the input signal and will be re-routed when the input module assignment is changed.

SAVE / EXIT The Input Configuration must be saved for each input channel. If the user switches to a different channel, a dialog box will call his attention to the fact that the changes will be cancelled if he does not save the current Input Configuration. The program remains in the Input Configuration page when saving a channel. Once a change has been saved, it will not be cancelled when leaving the Input configuration page with EXIT.

12.2.2 Common Settings



The COMMON SETTINGS page contains the following configuration possibilities:

CR DIM WHEN AUDITION SEL When the Audition bus is selected as a CR monitoring source, and a CR microphone channel is ON, the CR monitor speaker level will be attenuated (DIM), muted (CUT), or nothing happens at all (DON'T CARE).

PFL CUT ON CH. ACTIVE If YES is selected, the signal of a channel is taken off the PFL bus when the channel is ON, although the PFL function is active (the PFL function remains active).

ON AIR INDICATION Three possibilities are available: ΣPROGRAM, ΣRECORD, or ΣPROGRAM AND ΣRECORD.

The ON-AIR signaling is only active if at least one channel is ON, if this channel's fader is open, and if this channel is assigned to the selected bus (ΣPROGRAM, ΣRECORD, or either of them).

In automation operation, ON-AIR is indicated in the input selection field of the channel selected by the automation system. FADERSTATUS is ON-AIR if the input is assigned to the selected bus (ΣPROGRAM, ΣRECORD, or either of them).

KEY FUNCTIONS Functions of the channel keys labeled ON and OFF. The ON key either switches the channel ON or has an ON/OFF toggle function, depending on the function selected for the OFF key.

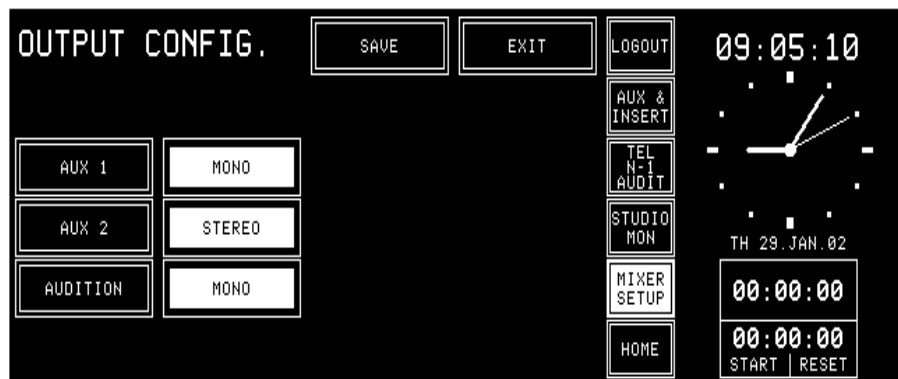
If the OFF function is selected for the OFF key, the channel is switched off by pressing this key; if LOCATE is selected, the ON function automatically changes to a channel ON/OFF toggle function (also refer to [chapters 9.2 and 9.3](#)).

DEFAULT MASTER LEVEL: The level of the ΣPGM and ΣREC outputs can be biased in a range of -7 to +5 dB using the two rotary encoders below the corresponding fields. This setting is only valid if no fader strips are assigned to the ΣPGM and/or ΣREC outputs; please note that this setting must be done with care, as it directly affects the level of the main outputs.

Note: The MASTER FADER ASSIGNMENT function for PGM and REC outputs that was available on this page in earlier software versions is located on the CHANNEL ROUTINGS page now; please refer to [chapter 5.9](#).

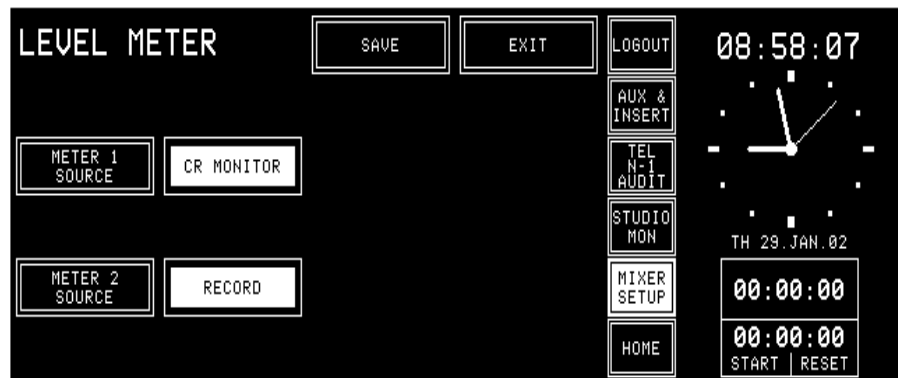
12.2.3 Output

On the OUTPUT CONFIG. page, the types of the output signals on the AUX 1, AUX 2, and AUDITION buses can be set.



12.2.4 Level Meter

The LEVEL METER configuration page defines the signal sources for the level meters no. 1 and no. 2.



Available signal sources:

- METER 1 SOURCE** CR MONITOR, PROGRAM, RECORD, AUX 1, AUX 2, AUDIT, N-1 A.
- METER 2 SOURCE** CR MONITOR, PROGRAM, RECORD, AUX 1, AUX 2.

12.2.5 Time & Date

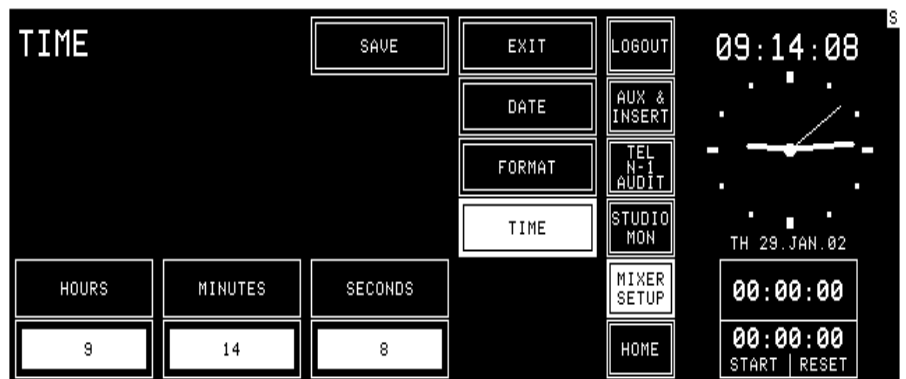
The watch gives a time, day-of-week, and date display. The standard time reference is an internal battery-buffered real-time clock (RTC). The RTC continues to run even when the console is switched off. Therefore it is unnecessary to set the watch at power-up.

The RTC may also be synchronized by a time signal on the Time Sync Module's input or by a broadcast automation system (CAB). If time synchronization is established, the top right corner of the center screen shows an "S".

Changes to the time or date settings are made on the TIME page. Access permission to the SYSTEM CONFIG. page is required.

From the HOME page, this page is found by selecting MIXER SETUP, followed by SYSTEM CONFIG., TIME & DATE, and TIME.

An example of the TIME page is given below:



The hours, minutes, and seconds are adjusted with three of the rotary encoders located next to the corresponding fields. By touching "SAVE", the parameters are updated. If they are invalid, the parameter changes are ignored.

The DATE page is shown below. This page is displayed by touching the "DATE" field on either the TIME or the FORMAT page.



The day, month, and year is adjusted with three of the rotary encoders located next to the corresponding fields. By touching "SAVE", the parameters are updated. If they are invalid, the parameter changes are ignored.

The watch configuration is done in the TIME & DATE FORMAT page. This page is displayed after touching the “FORMAT” field on either the TIME or the DATE page.



Both time and date can be displayed in two formats (select with TIME FORMAT or DATE FORMAT, respectively), as shown below:

Time Format	Digital Time Indication
05:00:00 p.m.	12 hour time format
17:00:00	24 hour time format

Date Format	Example
DD.MMM.YY	MO 20.MAR.02
MMM-DD-YY	MO MAR-20-02

TIME SYNC. defines the means to set and maintain time and date. The following settings are available:

Time Sync	Sync Reference	Date Setting	Time Setting
INTERNAL	Internal quartz	By user	By user
TIME SYNC. MODULE	Internal quartz, periodically updated by the external time reference signal	By user, periodically reset by ext. time reference signal (century never overwritten by ext. ref.)	By user, periodically reset by the external time reference signal
AUTOMATION	Internal quartz, periodically updated by automation time reference	By user, periodically reset by automation time reference	By user, periodically reset by automation time reference

The Time Sync module can process different time reference signal formats, the current format is selected with a DIP switch on the Time Sync module. The setting of this switch is displayed in hexadecimal in the TIME SYNC. PROTOCOL field for easy verification. For details please refer to [chapter 16.10](#).

The time zone offset can always be set, regardless whether it makes sense to set an offset in conjunction with the time sync source or not.

Offset	Watch Function
-12:00 to +12:00 (resolution: 1 h)	Compensates the sync time by the given offset before setting (synchronizing) the internal watch.

12.2.6 System Test

More information on this subject can be found in [chapter 14](#).

12.2.7 Software Update

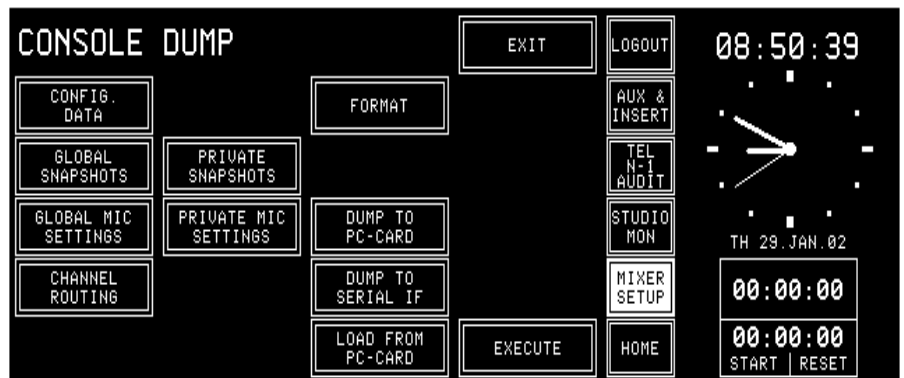
More information on this subject can be found in [chapter 13](#).

12.2.8 Console Dump

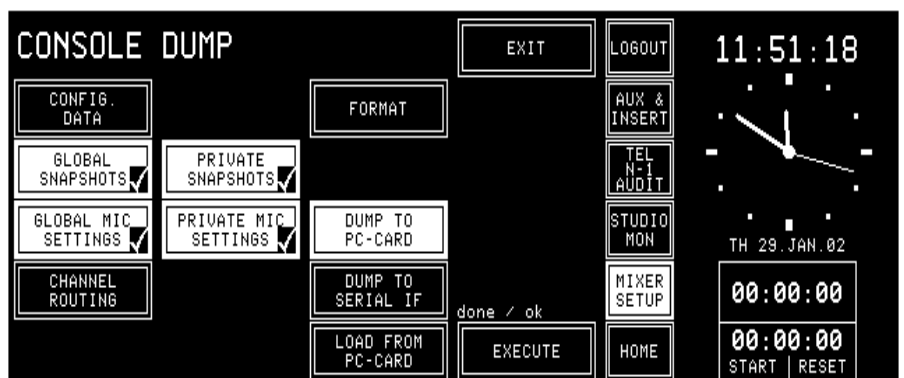
A “console dump” consists of configuration data (CONFIG. DATA), snapshots (global and private), mic settings (global and private), and channel routings.

Formatting the PC-Card

Before dumping any data, the PC-Card has to be formatted. This is done in the console's PC-Card slot (or, if the console is equipped with two slots, in the lower one, slot 0). Touch FORMAT followed by EXECUTE. A dialog box appears where the user can confirm the formatting (i.e. erasing the card completely). While formatting, the EXECUTE field flashes.



The CONSOLE DUMP page allows the user to save mixer setup data on a PC-Card, to send them to the serial port, or to load mixer setup data from a PC-Card. This feature can be used for back-up purposes, for copying data from one console to another, or for diagnostics. A PC-Card can contain one console dump only. It is possible to dump or to load the mixer setup data completely or partially only. The selection is done with the CONFIG. DATA, GLOBAL and PRIVATE SNAPSHTS, GLOBAL and PRIVATE MIC SETS, and CHANNEL ROUTING fields. The function can then be selected with the fields in the center of the page and will be started by touching the EXECUTE field.



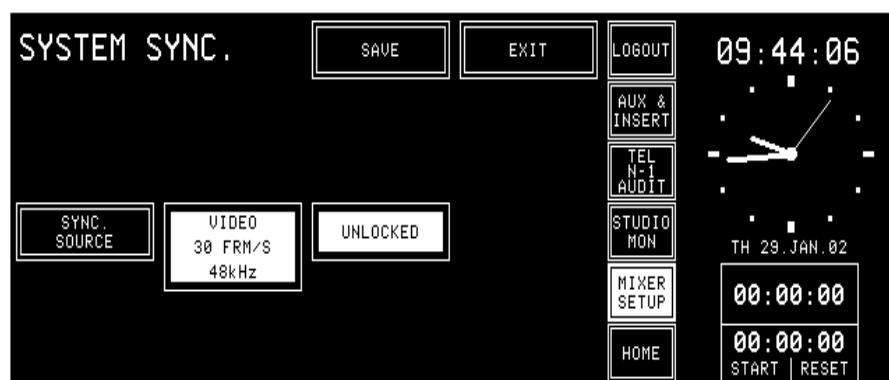
A checkmark appears in the corresponding field when done, and “done / ok” is displayed after the selected operation(s) have been successfully completed, as shown above (or “done / error” if there is a problem).

When loading data from the PC-Card, the console data will be overwritten. Therefore this procedure has to be confirmed in a dialog box. The EXIT field returns to the SYSTEM CONFIG. page.

- A Configuration** is loaded into the console by selecting CONFIG. DATA, LOAD FROM PC-CARD, and EXECUTE. An error message is displayed if the configuration cannot be loaded completely (e.g. Channel Type Mismatch).
- Snapshots** are loaded into the console by selecting GLOBAL (or PRIVATE) SNAPSHOTS, LOAD FROM PC-CARD, and EXECUTE. Snapshots existing in the console will be overwritten.
- Mic Settings** are loaded into the console by selecting GLOBAL (or PRIVATE) MIC SETS, LOAD FROM PC-CARD, and EXECUTE. Mic settings already existing in the console will be overwritten.
- Channel Routings** are loaded into the console by selecting CHANNEL ROUTING, LOAD FROM PC-CARD, and EXECUTE. Channel routings already existing in the console will be overwritten.

12.2.9 System Synchronization

On this page the system synchronization is configured. The synchronization source can be internal or external; for an external source, the sync signal type must be defined.



All possible sync modes are listed below. If the optional clock sync module is not installed, only INTERNAL can be selected.

Sync source	Sampling rate
INTERNAL 48 kHz	48 kHz \pm 100 ppm default, or 48 kHz, precision adjustable on sync module (if installed); adjustment range approx. \pm 1000 ppm
WORDCLOCK 32/44.1/48 kHz	32/44.1/48 kHz
AES/EBU 32/44.1/48 kHz	32/44.1/48 kHz
VIDEO 25 FRM/S 48 kHz	48 kHz
VIDEO 30 FRM/S 48 kHz	48 kHz
VIDEO 29.97 FRM/S 47.952 kHz	47.952... kHz
VIDEO 29.97 FRM/S 48 kHz	48 kHz

Note: The OnAir 2000M2 is designed to run at a sampling rate of 48 kHz. Due to this fact, filter parameters are accurate at 48 kHz only. If the console is synchronized to 44.1 kHz, the actual center and turnover frequencies of the EQ are lower by 8.125 %; if the clock frequency is 32 kHz, the frequencies will be lower by approx. 33.3 %.

If the console is synchronized to an external signal, a message box is displayed if synchronization is lost; a “Missing External Clock” warning is added to the error list.

If the console was synchronized to either WORDCLOCK or AES/EBU and a “no sync” condition is detected, the console automatically selects the INTERNAL mode; however, the external clock selection in the SYSTEM SYNC page is not changed. As soon as a valid external clock signal is available, the console will be re-synchronized.

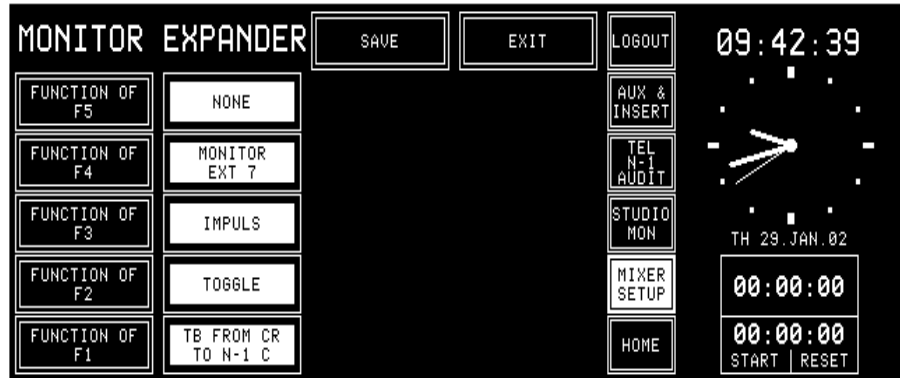
If synchronization to a video source is lost, only a message box is displayed. The sync source remains in VIDEO mode.

If the Clock Sync module is removed, sync source selection changes to INTERNAL mode, and no other sync source can be selected.

12.2.10 Automation

More information on this subject can be found in [chapter 10](#).

12.2.11 Monitor Extension (Optional)



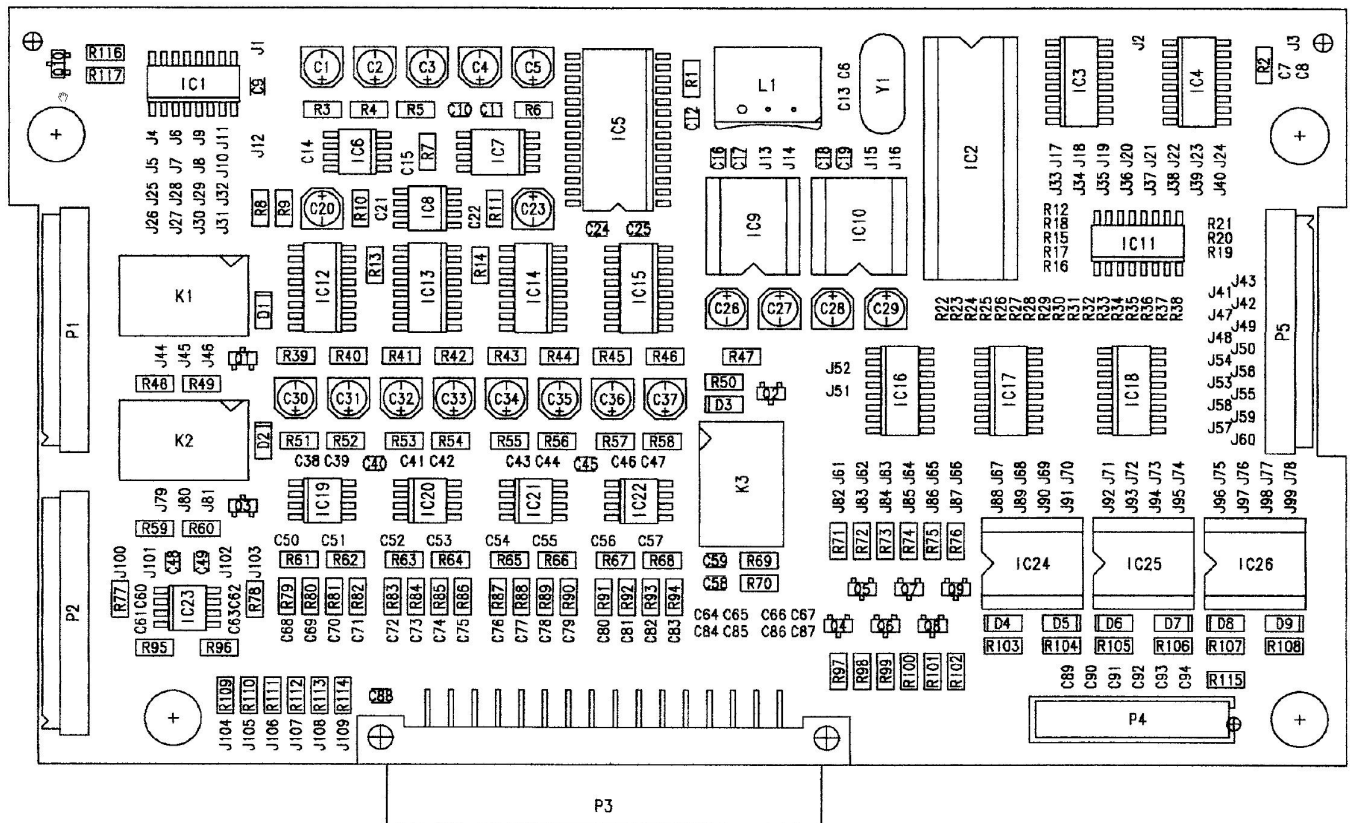
The MONITOR EXPANDER page allows to configure the functionality of the F1 to F5 keys. The different possible functions are described on the next pages and refer to the screenshot above. For additional information on the monitor extension see the block diagram in chapter 15.14.

Modification:

Please note that for the functions IMPULS, TOGGLE, and TB FROM CR TO... described later, a modification is required on the Monitor Expander Board 1 (1.942.136.xx); this allows to send the F1...5 (Fx) output signals to the EXTENSION CTRL1 connector of the Monitoring Module.

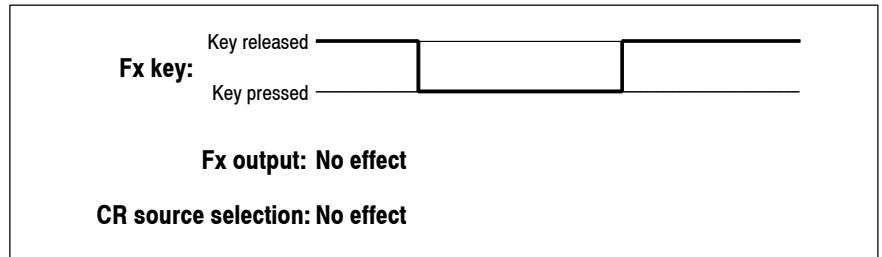
Signal Name	F1 / CTRL OUT1	F2 / CTRL OUT 2	F3 / CTRL OUT 3	F4 / CTRL OUT 4	F5 / CTRL OUT 5
Cut	J62-J83, J32-J31	J63-J84, J11-J10	J64-J85	J65-J86	J66-J87
Connect	J32-J83	J11-J84	J51-J85	J52-J86	IC2 pin16-J87
Output Pin on EXTENSION CTRL1	3	4	5	6	7

In addition, switch no. 8 of the DIP switch on the Monitor Expander Board 2 (1.942.137.xx) must be set to OFF.



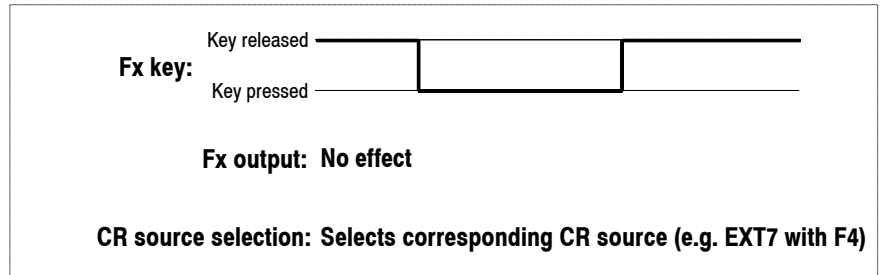
NONE

If one of the F1 to F5 keys is configured to NONE, pressing this key has no effect at all – neither for the F1 to F5 output, nor for the CR source selection. The key LED is not illuminated unless the system is in test mode.



MONITOR EXT 7

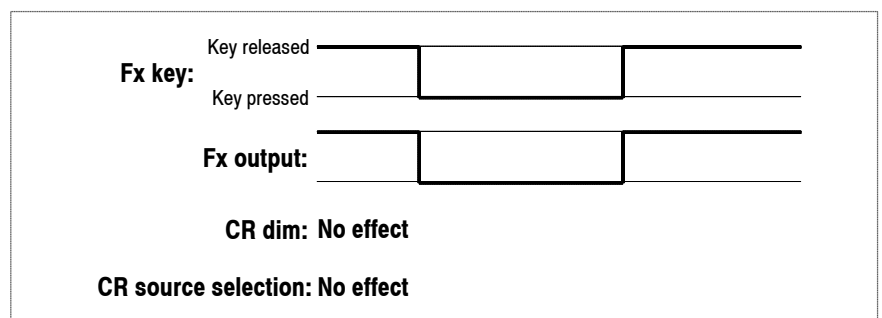
According to the first table in [chapter 7](#), each of the F1 to F5 keys is related to one of the external control room monitoring inputs. In our example, F4 is configured to act as CR monitoring selector with EXT7 being the corresponding input. The key LED is on if the corresponding source is selected.



The relationship between the F1 to F5 keys and the EXT4 to EXT8 inputs is given through hardware wiring. The table in [chapter 7.1](#) gives information on the default wiring.

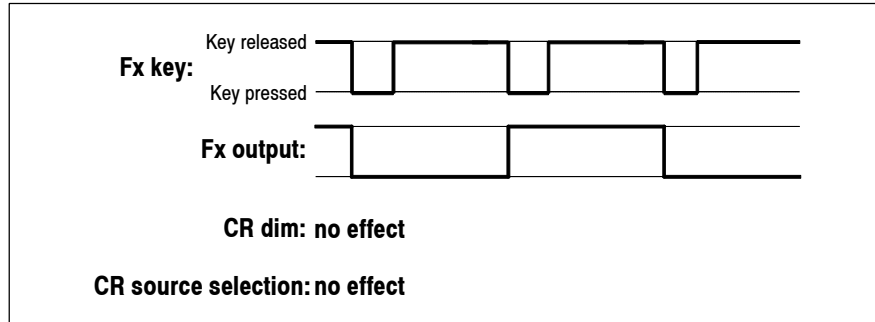
IMPULS

If one of the F1 to F5 keys is configured as “IMPULS”, the output is active for as long as the key is pressed. Neither the CR monitoring level nor the CR source selection are affected. The key LED is on for as long as the key is pressed.



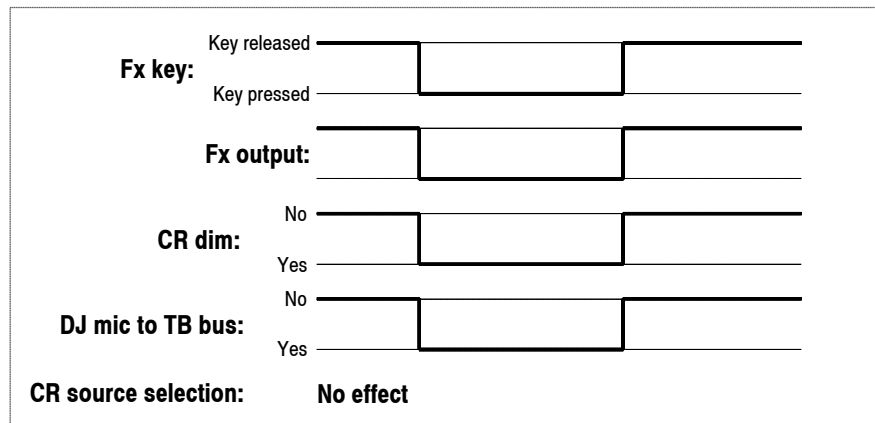
TOGGLE

If one of the F1 to F5 keys is configured as “TOGGLE”, the output changes its status each time the key is pressed. Neither the CR monitoring level nor the CR source selection are affected. The key LED is on for as long as the output is active.



TB FROM CR TO...

If one of the F1 to F5 keys is configured as “TB FROM CR TO...”, the output is active and the key LED is on as long as the key is pressed, the CR monitor speakers are dimmed, and the outputs of all microphone input modules with the configuration “TB SOURCE” = CR and “SIGNALING” = CR are routed to the TB bus. (The TB bus signal can be selected with an appropriate jumper or DIP switch setting on the output modules).



Additional Talkback Targets:

In addition to the standard talkback targets (selected with the STUDIO, AUX 1/2, and N-1 A/B keys), the following talkback targets can be configured as well for the F1 to F5 keys:

TB FROM CR TO	N-1 C (if installed) N-1 D (if installed) N-1 E (if installed) N-1 F (if installed) ALL N-1 ALL AUX ALL
----------------------	---

For further information on this subject, please refer to [chapter 7.3](#).

12.2.12 Customer Code

Starting with software version 2.0.1, there is a possibility to activate optional, customer-specific functions as, for instance, the hex source selector fields on the touch-panel of the fader strip. For this purpose, a feature called Customer Code is used. *Please note that the customer codes are displayed and entered in hexadecimal.*

- Code 0x00000000** **Default Setting**
- Code 0x00000001** **Permanent Hex Input Selection**
For permanent display of the hex input selection field in the channel screen, refer to [chapter 4.4.1](#).
- Code 0x00000002** **High Shelving Filter Modification**
When selected, the turnover frequency of the high-shelving filter is reduced by approx. one octave, resulting in increased filter effect. For more information on EQ and filters, please refer to [chapters 4.4.5 and 4.4.6](#).
- Code 0x00000004** **External CR DIM Function**
The spare control input on the Monitoring Module ("SIGN." connector P4, 9-pin D-type) can be used as CR DIM control input. If activated by an external control signal, the CR monitor speakers are attenuated by 20 dB. Please refer to the pin assignment table and connection diagram in [chapter 15.13](#).
- Code 0x00000008** **MONITORA: SAS_INPUTROUTING**
Allows to ask for the SAS_INPUTROUTING, even if no SOURCE was selected for that fader.
- Code 0x00000010** **MONITORA: SET_FADER_LEVEL**
If the broadcast automation system sets a level (SET_FADER_LEVEL) to 0 dB and the current physical position of the corresponding fader is between +4.5 dB and -4.5 dB, then the channel's level is set according to the physical fader position instead of 0 dB.
This avoids the console to enter the Auto Takeover mode.
Note: Not implemented for the SET_FADER_LEVEL_ONLY command.
- Code 0x00000020** **Shift Studio TB to N-1**
Allows talkback from the studio to the outputs N-1C and N-1D, instead of to N-1A and N-1B.
- Code 0x00000040** **Longer Reverb Time**
Increases the delay for the switching from CR Cut or CR Dim to CHANNEL ON, or from CHANNEL OFF to CR UnCut or CR UnDim from 40...50 ms to 160...170 ms.
This delay is used to avoid acoustical feedback noise from the CR monitor speakers to a microphone channel being opened (CHANNEL ON), when the control room has an unusually long reverb time.
- Code 0x00000080** **Faders 0 dB on Top**
For applications where the 0 dB point of the faders is desired to be at the fader's upper end position, this code can be used. It shifts the DSP gain setting with respect to the mechanical fader position by -10 dB.
- Code 0x00000100** **Fader Start and Stop Pulse**
When CTRL OUT1 mode is set to "ON & FADER" in the INPUT CONFIG. page (refer to [chapter 9.2](#)), 200 ms pulses are generated instead

of a static signal at the CTRL OUT1 output when the status is activated (fader open and channel ON) and when it is de-activated (fader closed and channel OFF).

Note: There is a second possibility to generate start and stop pulses without activating this customer code; using this feature, however, different outputs are used for the two pulses. For this purpose, set CTRL OUT1 mode to "ON & FADER", and CTRL OUT2 mode to "STOP PULSE" in the INPUT CONFIG. page (refer to *chapter 9.2*).

Code 0x0000200 Automatic Channel Routing

When activated, the user's own channel routing is automatically activated during log-in. Otherwise, the channel routing has to be manually loaded after having logged-in.

Code 0x0000400 Higher Attenuation of Sum Signal During Talkback

Allows to attenuate the "N" content of the N-1 signal by a further 10 dB, improving the intelligibility of the TB voice.

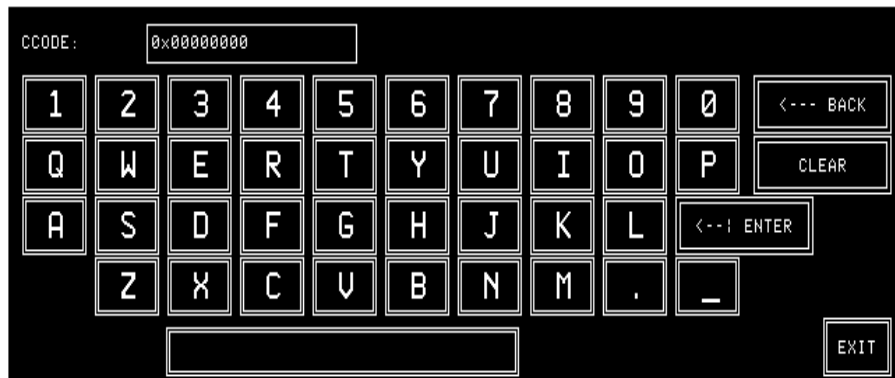
Customer Code Combinations:

If more than one of the Customer Code functions are desired, the corresponding codes can be accumulated by just adding the code numbers. Please note that the customer codes are displayed and entered in hexadecimal.

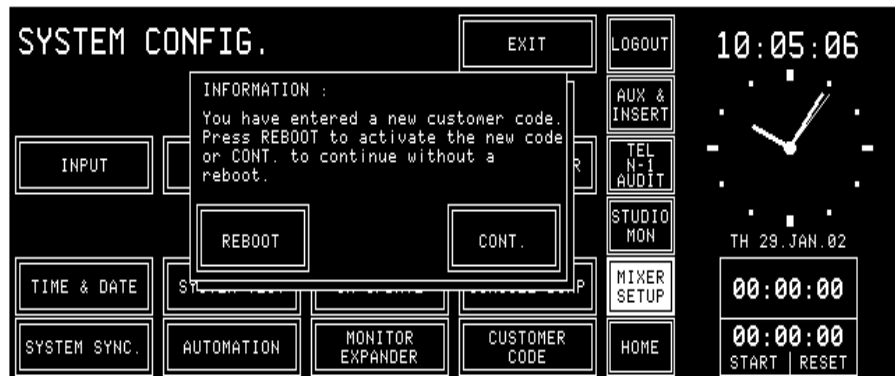
For activating both the 0x0000004 and 0x0000008 codes, enter a customer code sum of 0x000000C.

Customer Code Setting:

After touching CUSTOMER CODE on the SYSTEM CONFIG. page, the KEYBOARD page appears where the new code can be entered.



After confirmation with ENTER, the following dialog box appears. Now, you can either re-boot the system (REBOOT) which is necessary for the new code to become active, or continue (CONT.), then the code modification becomes active at the next power up of the console:



13 SW UPDATE

13.1 Software Structure

The OnAir 2000M2 software consists of the following packages:

- CPU software
- DSP software
- Peripheral modules and surface control software.
- Control Front Board software.

13.1.1 The CPU Software Package

Boot Software The boot software part is installed in an EPROM and consists of:

- Hardware initialization
- Elementary hardware tests
- Start-up (or loading) of the application.

Application Software The application part of the software package covers the remaining console functions. Program and data (current status, snapshots, configuration...) remain stored in memory after power-off, so that neither program nor data have to be loaded during normal operation. This is achieved by using a Flash memory.

The application software is loaded at the first start-up of the console (in the factory), and afterwards due to new releases and upgrades only. Program and data are installed in a Flash memory.

The application software is loaded from PC-Cards. For this purpose, read-only cards can be used.

13.1.2 DSP Software Package

The DSP software package is treated the same way as the CPU software package (application software).

13.1.3 Important Information for Software Update to V4.0



Software V4.0 requires compatible Control Front Board I firmware.

If software V4.0 is loaded without the corresponding firmware, the console will be blocked and cannot be used. In this case, either the former main software has to be re-loaded, the new Control Front Board I firmware must be installed, or the Control Front Board has to be replaced.



Studer will not take any responsibility nor accept warranty claims for not following this procedure.



Please note that the software upgrade to V4.0 is only possible from an existing version V3.0 or later. Should your console be equipped with an earlier software version (i.e. below V3.0), you must upgrade to V3.0 first due to a different memory structure and a hardware modification on the Controller Board. Please contact your distributor.



If your console should still be equipped with software V1.0, the DSP Board must be upgraded as well. Please contact your distributor.



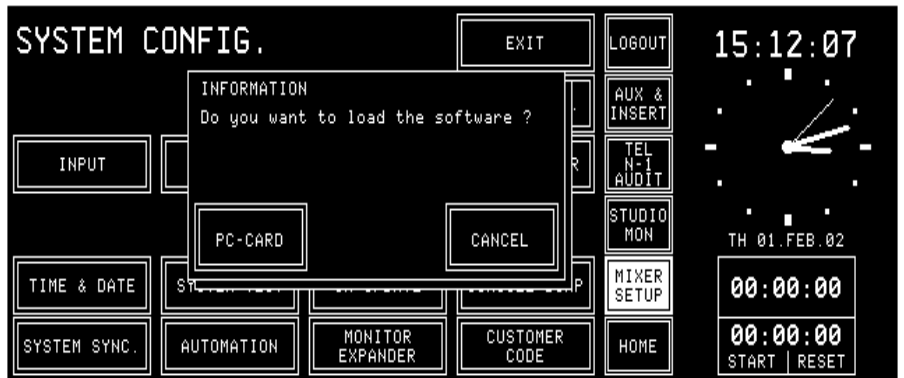
If your console should be equipped with an early Power Supply PCB 1.942.105.00, the smoothing capacitors C11 and C16 (22'000 μ F) must be modified to 33'000 μ F (order no. 59.29.0323). Otherwise, after powering the console off and on again, a warning message “Flash Verification – Console Configuration corrupted!” or “Flash Verification – Current Console State corrupted!” could be displayed. In this case, normally the console can be operated as usual, without restrictions, but configuration changes might get lost from time to time.



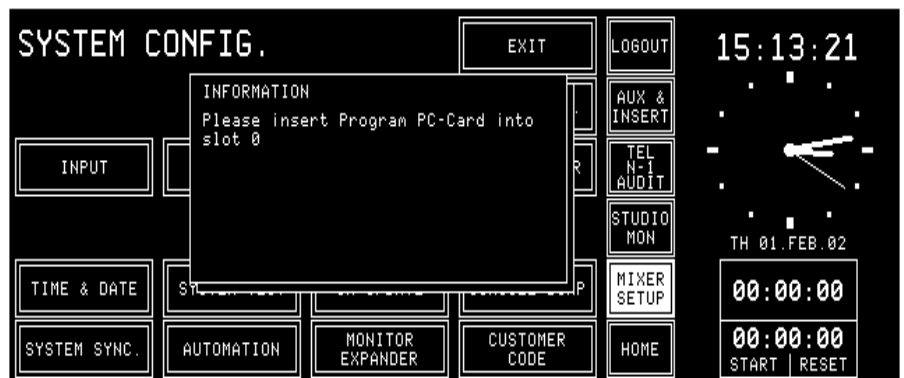
Please make sure that the console data are backed-up prior to any modification as the internal data structure is different. Note the current customer code setting (refer to [chapter 12.2.12](#)).

13.2 SW Update Procedure

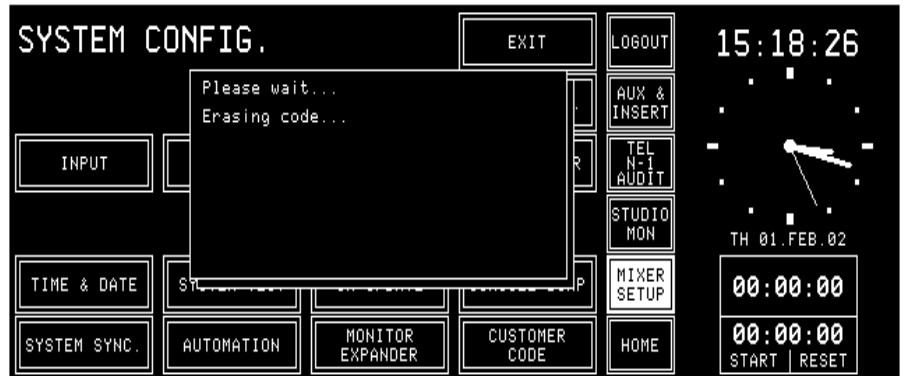
After touching the SW UPDATE field in the SYSTEM CONFIG. page, a dialog box appears, where the user can decide whether he wants to load the software (PC-CARD), or whether he wants to stop the software update procedure (CANCEL).



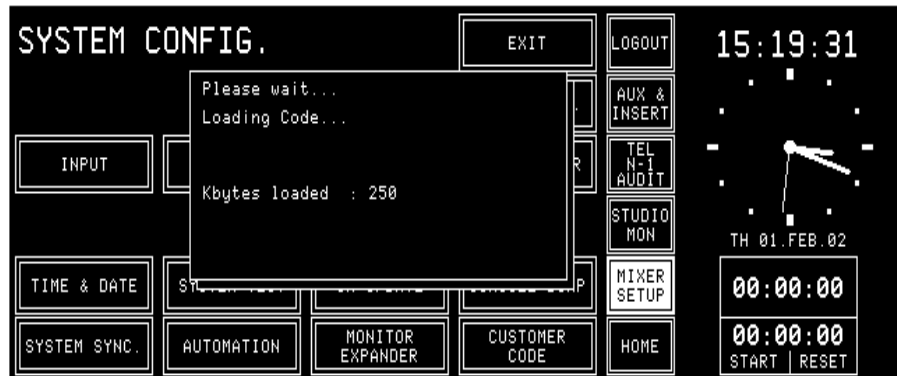
When canceling the software update, the program returns to the SYSTEM CONFIG. page. After touching the PC-CARD button in the dialog box, the next dialog box appears.



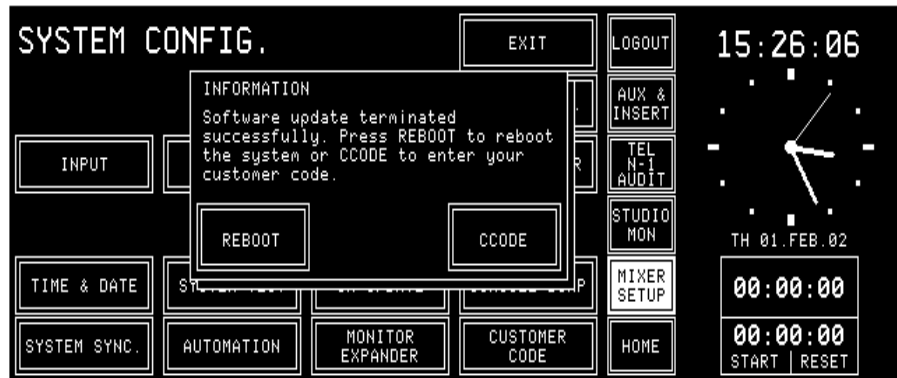
As soon as the software has detected a PC-Card in slot 0, the card is checked. If the PC-Card contains valid code, the software download starts. In a first step, the previous program of the console is erased.



Then the new software is copied from the PC-Card into the console's Flash EPROM. This will take several minutes.

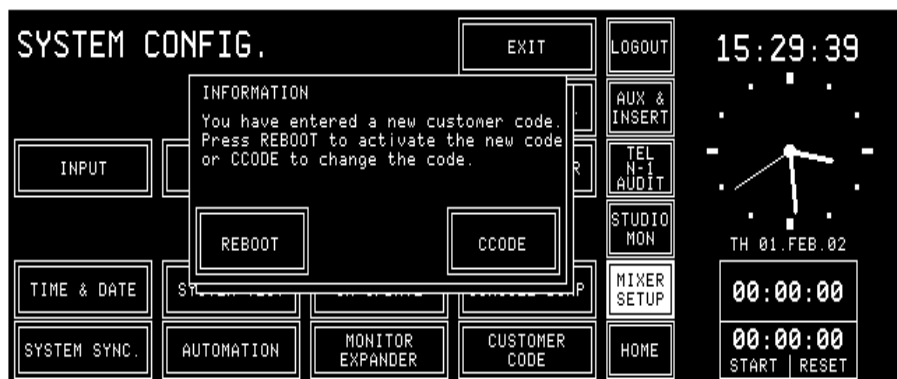


Finally the last dialog box appears. The system can now be re-booted (REBOOT) with the new software, or, if required and available, an optional customer code (CCODE) can be entered.



Any customer code (see [chapter 12.2.12](#)) will be reset to the default value (0x00000000) when updating the system software. This means that if your system had a customer code before, you need to re-enter it in order to have the particular features again.

After confirmation with ENTER, the following dialog box appears. Now, you can either re-boot the system (REBOOT) or touch CCODE to change the customer code:



13.2.1 Error Handling

If the software update is interrupted by any reason, the system has to be re-booted. Afterwards, a message box appears with the message that the system software must be updated.



Should the PC-Card not contain valid code, the following dialog box appears. Insert a PC-Card with a valid software version; the download will then be restarted. If the download cannot be terminated correctly, the console can no more be used.



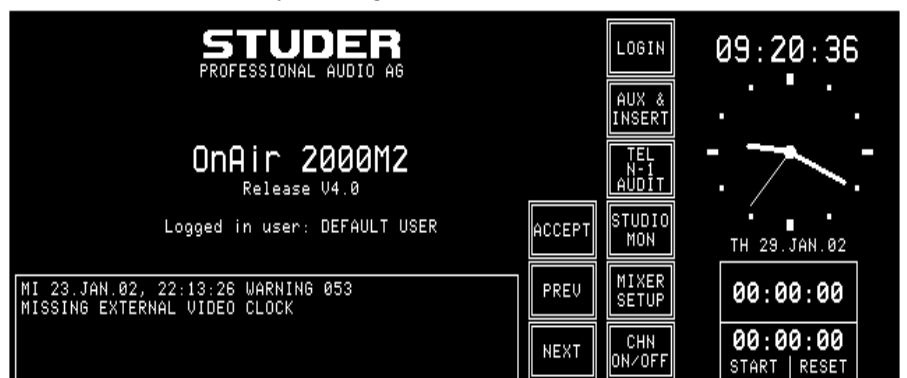
14 SYSTEM DIAGNOSTICS AND ERROR HANDLING

The OnAir 2000M2 error system concept consists of three topics:

- Diagnostics and Error Handling** The system diagnostics software works completely in the background. The user takes notice of the diagnostics only in case of an irregularity. The system diagnostics consists of finding out the console's hardware configuration and detecting discrepancies to the system configuration. It also effects a hardware performance check during power-up. The error handling describes indications and actions on occurrence of errors and irregular behavior of the console detected by the system diagnostics software.
- Failure of Restricted Functions** Most of the OnAir 2000M2's functions do not have any restriction. However, there exist several functions which are restricted in some situations, e.g. loading a snapshot into a console the channel types of which do not match the ones of the snapshot (Mic/Line Inputs). The behavior of the console in case of restrictions is defined at the place where the function is described. The way the user is told about failures is defined globally in the following.
- System Tests** They are executed on the service engineer's demand to run some specific performance controls, e.g. to check the function of touch fields and faders. The console is switched to a special test mode for this purpose.

14.1 Error, Warning, and Information Messages

A message field in the HOME page is used by the system diagnostics software to indicate any messages.



- Errors** There are three types of messages: *Errors*, *Warnings*, and *Information*. Errors are serious problems detected by the diagnostics software. Error messages are generated if a problem prevents the console from normal operation. In case of an error, the error handler cannot solve the problem.
- Warnings** are given to the user if the action required by the occurrence of a problem automatically changes any settings of the console so that operation is no longer the same, e.g. if the input type of a channel has changed since last power-off.
- Information** An information-type message is used by the system diagnostics telling the user that an action required by any conflict automatically changes console settings, but the console can at least be operated as it could before (e.g. if a 6-channel module has been added).

As more than one system message can occur at the same time, the diagnostics software manages a Log List containing one entry for each system message, completed by time and date of occurrence. If the Log List contains more than one entry, the PREV and NEXT fields appear on the central screen. This allows scrolling through different messages.

The Log List will be lost on power-down.

Warning and information messages can be acknowledged by the user, provided he has got access permission. This causes the diagnostics software to remove the message from the Log List.

Some entries in the Log List need to be indicated to the user immediately on their occurrence. A dialog box does this, regardless of the page currently selected on the central screen.



System diagnostics is performed during power-up as well as during operation. For more information see [chapters 14.1.1 and 14.2](#).

14.1.1 System Diagnostics

- | | |
|-----------------------------------|--|
| Hardware Performance Check | On power-up the diagnostics software executes some hardware device checks which may result in conflicts. |
| Communication Check | On power-up the diagnostics software tries to establish communication to other microprocessors. If communication fails, an error message is displayed. |
| Configuration Check | On power-up the diagnostics software finds out the current physical hardware configuration. Any difference to the hardware configuration before the last power-down (missing or additional options) results in a warning or information. |

Diagnostics and Error Handling – System Configuration Detection				
Error ID	Type	Indication	Diag. Box	Error Text (Conflict)
000	Information	no	no	Module for Channels [n] - [m] installed!
001	Information	yes	no	Module for Channels [n] - [m] added!
002	Warning	yes	no	Module for Channels [n] - [m] removed!
003	Information	no	no	Central Module installed!
004	Information	no	no	Central Module added!
005	Error	yes	yes	No communication to Central Module!
006	Information	no	no	Input Module for Channel [n] installed!
007	Information	yes	no	Input Module for Channel [n] added!
008	Warning	yes	no	Input Module for Channel [n] removed!
009	Information	yes	no	Channel [n] Input Type changed to Mic Input!
010	Information	yes	no	Channel [n] Input Type changed to Analog Line Input!
011	Information	yes	no	Channel [n] Input Type changed to Digital Line Input!
012	Information	yes	no	Channel [n] Input Selector changed to A/B!
013	Information	yes	no	Channel [n] Input Selector changed to 1/2/3/4/5/6!
014	Information	no	no	Digital Output Module for [output] installed!
015	Information	yes	no	Digital Output Module for [output] added!
016	Warning	yes	no	Digital Output Module for [output] removed!
017	Information	yes	no	Insert [n/m] Input Type changed to Analog Line Input!
018	Information	yes	no	Insert [n/m] Input Type changed to Digital Line Input!
019	Information	no	no	Monitoring Module installed!
020	Information	yes	no	Monitoring Module added!
021	Error	yes	yes	No communication to Monitoring Module!
022	Information	no	no	Time Sync Module installed!
023	Information	yes	no	Time Sync Module added!
024	Warning	yes	no	Time Sync Module removed!
025	Information	no	no	Insert [n/m] Module installed!
026	Information	yes	no	Insert [n/m] Module added!
027	Warning	yes	no	Insert [n/m] Module removed!
028	Information	no	no	Sync Module installed!
029	Information	yes	no	Sync Module added!
030	Warning	yes	no	Sync Module removed - Now Running on 48 kHz internal Clock Reference!
031	Information	no	no	Telephone Hybrid Control Module installed!
032	Information	yes	no	Telephone Hybrid Control Module added!
033	Warning	yes	no	Telephone Hybrid Control Module removed!
034	Information	no	no	Channel DSP for Channel [m/n] installed!
035	Information	yes	no	Channel DSP for Channel [m/n] added!
036	Warning	yes	yes	No communication to Channel DSP for Channel [m/n]!
038	Information	yes	no	Number of Channels increased to [n]!
039	Warning	yes	no	Number of Channels decreased to [n]!
043	Information	no	no	Sum DSP installed!
044	Warning	yes	yes	No communication to Sum DSP!
045	Information	no	no	Insert DSP installed!
046	Warning	yes	yes	No communication to Insert DSP!
047	Information	no	no	Aux DSP installed!
048	Warning	yes	yes	No communication to Aux DSP!
049	Information	yes	no	Channel Front Board type is OnAir 2000!
050	Information	yes	no	Channel Front Board type is OnAir 1000!
156	Information	yes	no	Number of Faders increased to [n]! (<i>n in hexadecimal</i>)
157	Information	yes	no	Number of Faders decreased to [n]! (<i>n in hexadecimal</i>)
158	Information	yes	no	Channel Routing reset to 1:1 mapping, since the number of Channels has been changed!
159	Information	yes	no	Channel Routing reset to 1:1 mapping, since the number of Faders has been changed!

Diagnostics and Error Handling – Hardware Performance				
Error ID	Type	Indication	Diag. Box	Error Text (Conflict)
051	Warning	yes	yes	Watch RTC Failure! - RTC Device Missing - Device Faulty - Battery Low
052	Warning	yes	no	Missing External Clock - Now Running on 48 kHz internal Clock Reference!
053	Warning	yes	no	Missing External Video Clock

Diagnostics and Error Handling – Flash Checksum Tests				
Error ID	Type	Indication	Diag. Box	Error Text (Conflict)
054	Warning	yes	yes	Flash verification - All Snapshots, Mic Settings and Channel Routings lost due to software version mismatch!
055	Warning	yes	yes	Flash verification - Customer Configuration corrupted!
056	Warning	yes	yes	Flash Verification - Console Configuration corrupted!
057	Warning	yes	yes	Flash Verification - Current Console State corrupted!
058	Warning	yes	yes	Flash Verification - Snapshot Block Checksum Verification Failure! [n] of [m] Global Snapshots loaded.
059	Warning	yes	yes	Flash Verification - Mic Setting Block Checksum Verification Failure! [n] of [m] Global Mic Settings loaded.
072	Warning	yes	yes	Flash verification - Channel Routing Block Checksum Verification failure! [n] of [m] channel routings loaded.

Diagnostics and Error Handling – PC-Card Battery Tests				
Error ID	Type	Indication	Diag. Box	Error Text (Conflict)
060	Information	yes	yes	PC-Card Slot [%] – Card battery low. Replace battery immediately!
061	Warning	yes	yes	PC-Card Slot [%] – Card battery dead. Replace battery immediately!

Diagnostics and Error Handling – Flash Checksum Tests				
Error ID	Type	Indication	Diag. Box	Error Text (Conflict)
062	Warning	yes	yes	Flash verification – Snapshot Block Checksum Verification failure! [n] of [m] Private Snapshots loaded.
063	Warning	yes	yes	Flash verification – Snapshot Block Checksum Verification failure! [n] of [m] Private Mic Settings loaded.

Configurator				
Error ID	Type	Indication	Diag. Box	Error Text (Conflict)
064	Information	yes	yes	Load Configuration Failure due to channel type mismatch! Channel [n] input parameters not reconfigured.
065	Information	yes	yes	Load Configuration Failure due to missing Channel Data in Configuration File! Channel [n] - [m] not reconfigured.
066	Information	yes	yes	Load Configuration Failure due to missing Input Data in Configuration File! Channel [n] Input 3 - 6 not reconfigured.
067	Information	yes	yes	Restore Configuration Failure due to channel type mismatch! Channel [n] not restored during EXIT.
068	Information	yes	yes	Restore Configuration Failure due to number of channels mismatch! Channel [n] - [m] not restored during EXIT.
069	Information	yes	yes	Restore Configuration Failure due to number of inputs mismatch! Channel [n] Input 3 - 6 not restored during EXIT.
073	Information	yes	yes	Input Selection for Channel [n] not activated, since the number of Inputs is 2 instead 6!
074	Information	yes	yes	New Channel Routing not activated, since the number of Channels or the number of Fader strips doesn't match the current configuration!
075	Information	yes	yes	Global Channel Routing not activated, since the number of Channels or the number of Fader strips doesn't match the current configuration!

Snapshot Controller				
Error ID	Type	Indication	Diag. Box	Error Text (Conflict)
080	Information	yes	yes	Snapshot Recall not completed due to missing Input Data in Snapshot! Channel [n] Input 3 - 6 not recalled.
081	Information	yes	yes	Snapshot Recall not possible due to corrupted Snapshot Data!
096	Information	yes	yes	All Global Channel Routings used. - Only [n] of [m] Global Channel Routings loaded!
097	Information	yes	yes	All Global Snapshots used. - Only [n] of [m] Global Snapshots loaded!
098	Information	yes	yes	All Private Snapshots used. - Only [n] of [m] Private Snapshots loaded!
099	Information	yes	yes	Snapshot Recall Failure due to channel type mismatch! Channel [n] not recalled.
100	Information	yes	yes	Snapshot Recall not completed due to missing Channel Data in Snapshot! Channel [n] - [m] not recalled.
101	Information	yes	yes	All Global Mic Settings used. - Only [n] of [m] Global Mic Settings loaded!
102	Information	yes	yes	Mic Setting not created - Input must be of type microphone!
103	Information	yes	yes	Mic Setting not recalled - Input must be of type microphone!

Snapshot Controller (cont.)				
104	Information	yes	yes	Mic Setting not recalled due to corrupted Mic Setting Data!
105	Information	yes	yes	Snapshot not loaded because user [%s] (owner of the Snapshot) is not defined on this mixing console!
106	Information	yes	yes	Mic Setting not loaded because user [%s] (owner of the Mic Setting) is not defined on this mixing console!
107	Information	yes	yes	All Private Mic Settings used.- Only [n] of [m] Private Mic Settings loaded!
108	Information	yes	yes	Recall not possible as selected Snapshot is not defined!
109	Information	yes	yes	Recall not possible as selected Mic Setting is not defined!
110	Information	yes	yes	Snapshot recall failure - channel [n] not available for insert assignment! Insert [m] not recalled.

PC-Card Controller				
Error ID	Type	Indication	Diag. Box	Error Text (Conflict)
113	Information	yes	yes	PC-Card Slot [%] - Empty!
114	Information	yes	yes	PC-Card Slot [%] - Card not supported!
115	Information	yes	yes	PC-Card Slot [%] - Card not formatted!
116	Information	yes	yes	PC-Card Slot [%] - File not found!
117	Information	yes	yes	PC-Card Slot [%] - Card already formatted!
118	Information	yes	yes	PC-Card Slot [%] - Card write protected!
119	Information	yes	yes	PC-Card Slot [%] - Please wait, formatting in progress!
120	Information	yes	yes	PC-Card Slot [%] - Card formatted!
121	Information	yes	yes	PC-Card Slot [%] - Card write error, IFX errorcode = [n]
122	Information	yes	yes	PC-Card Slot [%] - Card read error, IFX errorcode = [n]
123	Information	yes	yes	PC-Card Slot [%] - Volume not mounted, no IFX workspace.
124	Information	yes	yes	PC-Card Slot [%] - Volume not mounted, bad BIOS Parameter Block.
127	Information	yes	yes	PC-Card Slot [%] - File Empty!
128	Information	yes	yes	PC-Card Slot [%] - Snapshot Block Checksum Failure! [n] of [m] Snapshots loaded.
129	Information	yes	yes	PC-Card Slot [%] - Mic Setting Block Checksum Failure! [n] of [m] Mic Settings loaded.
130	Information	yes	yes	PC-Card Slot [%] - Configuration Checksum Failure! Configuration not loaded.
131	Information	yes	yes	PC-Card Slot [%] - Snapshot Block Software Version mismatch!
132	Information	yes	yes	PC-Card Slot [%] - Mic Setting Block Software Version mismatch!
133	Information	yes	yes	PC-Card Slot [%] - Configuration Software Version mismatch!
134	Information	yes	yes	PC-Card Slot [%] - SW Update Prolib Version mismatch! SW not loaded.
136	Information	yes	yes	PC-Card slot [%] - Channel Routing Block Checksum failure! [n] of [m] Channel Routings loaded.
137	Information	yes	yes	PC-Card slot [%] - Channel Routing Block software version mismatch!
138	Information	yes	yes	PC-Card slot [%] - SW update central Module firmware incompatibility! Software not loaded.

Flash Programming				
Error ID	Type	Indication	Diag. Box	Error Text (Conflict)
144	Error	yes	yes	Flash: Sector is protected. AMD error code = [n]
145	Error	yes	yes	Flash: Programming failure. Addr = [adr], prevData = [x], newData = [y]. AMD error code = [n]
146	Error	yes	yes	Flash: Erase failure. AMD error code = [n]
147	Error	yes	yes	Flash: Odd address invalid with word access
148	Error	yes	yes	Flash: Memory access failed at address = [adr]
149	Error	yes	yes	Flash: AMD error code = [n]

User Interface				
Error ID	Type	Indication	Diag. Box	Error Text (Conflict)
176	Information	yes	no	Due to insufficient memory the first 10 messages have been removed from the loglist

Automation Interface				
Error ID	Type	Indication	Diag. Box	Error Text (Conflict)
192	Warning	yes	no	Communication to Broadcast Automation lost!
193	Information	yes	no	Communication to Broadcast Automation established!

14.2 Indication on Failure of Restricted Functions

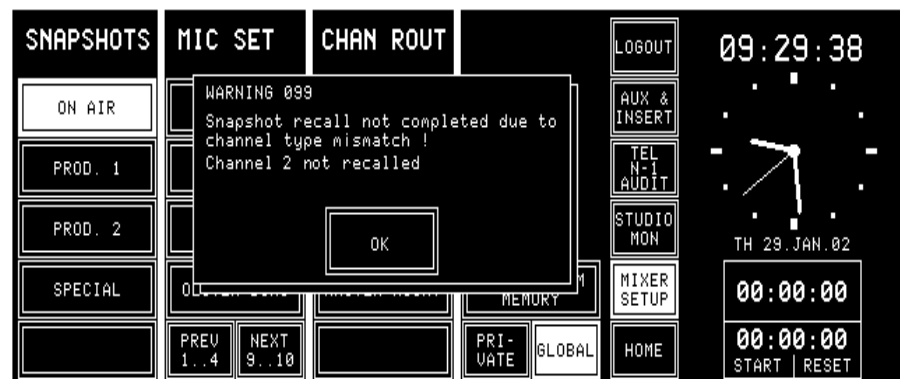
Usually, there is no indication of any error or warning if the execution of functions is prohibited in case of restrictions, because the user immediately notices whether the desired function is performed correctly. Nevertheless, some warnings need to be indicated to the user as a feedback, e.g. if a complete console dump fails because of a write-protected memory card.

The means to indicate to the user a failure during function execution is a dialog box appearing always at the same position on the central screen. It displays a system message and will disappear when the user acknowledges the message by touching the "OK" field in the box.

Each of these system messages is also entered to the Log List. To be removed from the Log List, it has to be acknowledged by the user.

To prevent from annoying the user with lots of warning and error message dialog boxes, they are generated only where it is not possible to notice function execution failure. In these cases an error message is generated if the function execution fails completely. A warning is given to the user if a function might be executed partially only.

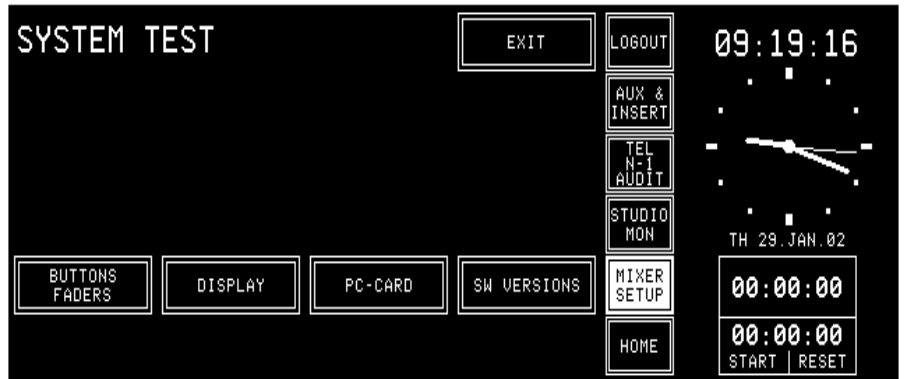
Example: The snapshot recall function could not set all channels due to different input types:



The user has to acknowledge the dialog box before any other action on the Central screen will be accepted. Touching the Channel screens, which would lead to a different page on the Central screen, will also be ignored as long as the dialog box has not been acknowledged.

14.3 System Test

The system test can be activated by touching the SYSTEM TEST field on the SYSTEM CONFIG. page. The SYSTEM TEST selection page appears on the central screen:

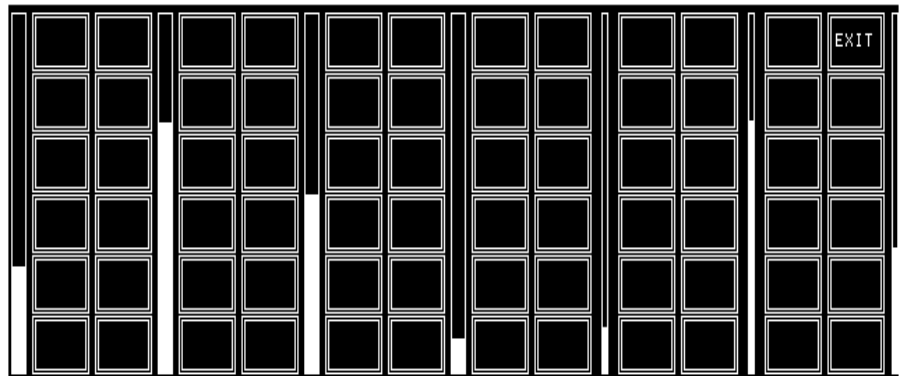


14.3.1 Buttons/Faders Test

Selecting the BUTTONS/FADERS test brings the console into a mode where the controls of the console can be checked. To return to the SYSTEM TEST selection page, the EXIT field has to be touched.

Keys and Lamps Test:

The PFL, ON, and OFF keys can be checked. If one of these keys is pressed, the corresponding LED lights; if PFL is pressed, also the OVL LED is on together with the LED in the PFL key.



Central Screen Test:

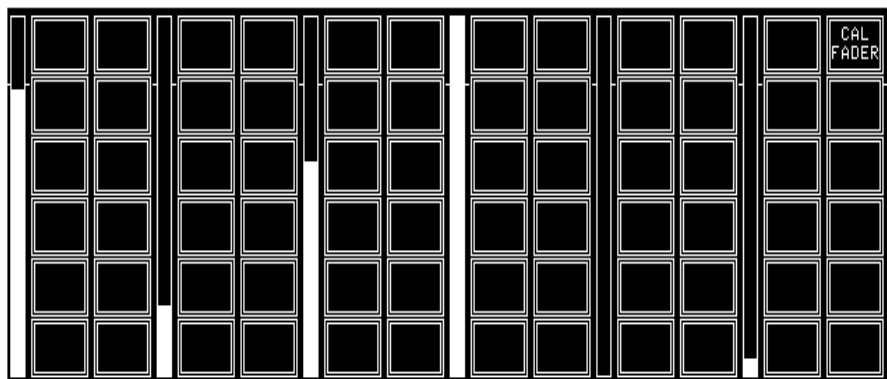
If a field is touched on the central screen, it is highlighted.

Rotary Encoders Test:

If the rotary encoder is turned clockwise, the bar graph next to the rotary encoder increases. The three narrow bar graphs in the right-hand part of the screen are used for the MON, PFL/TB, and PHONES knobs. The full length of the bar graph corresponds to a complete turn of the rotary encoder.

Channel Screen Test:

If a field is touched on one of the channel screens, it is highlighted.



For each fader, a bar graph indicates the current position.

14.3.2 Fader Calibration

SW V1.0 through 2.01:

For calibrating the fader's zero position, set all fader knobs to their "0" mark and press the CAL FADER field (see screenshot above).

SW V2.02 and up:

After having upgraded the channel front board software 1.942.920.21, it might be possible that fader start is always active. In such a case, the fader start trigger point needs to be calibrated. Please proceed as follows:

Fader Calibration: Enter the SYSTEM CONFIG. - SYSTEM TEST – BUTTONS/FADERS menu (if using the service terminal, *enter the commands printed in italics*).

0 dB Point: (always required!)

- Move all faders not to be calibrated to their –20 dB position (this position is ignored during calibration).
- Move the fader(s) to be calibrated to the 0 dB position.

Note: We strongly recommend to perform this adjustment for all the faders at the same time.

- Touch CAL FADER or, on the service terminal (only V2.0.1 and up), enter: *call all <return>*.

Fader Start Trigger Point:

The fader start trigger point must be calibrated only for two reasons:

1. If using the optional kit from Penny&Giles (allows a mechanical detent when the fader is closed), or
2. In case of problems with the fader start control output signal, i.e. if fader start is active even if the fader is completely closed.

- Move all faders not to be calibrated to their –20 dB position (this position is ignored during calibration).
- Move the fader(s) to be calibrated, starting from the lower end, and set them to a position about 1 to 2 mm above the lower end (or just above the mechanical detent, if installed). This will be the point where the fader start output gets active after calibration.

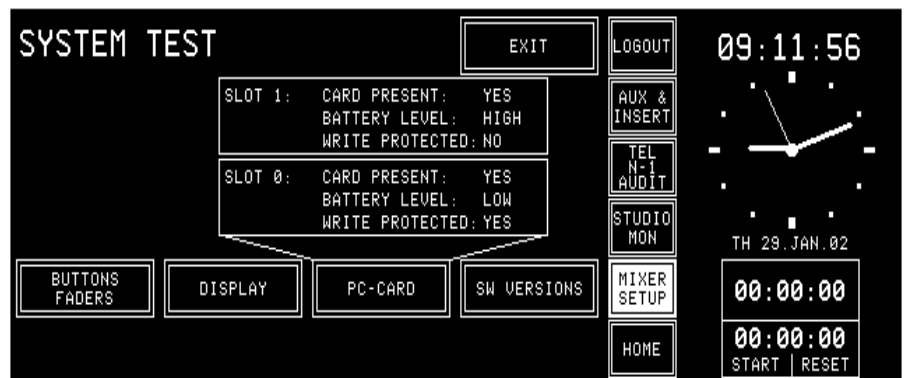
Note: We strongly recommend to perform this adjustment for *all* the faders at the same time.

- Touch CAL FADER or, on the service terminal (only V2.0.1 and up), enter:
call all <return>.
- Close the fader(s) which just has/have been calibrated; the corresponding fader bar(s) on the channel screen should disappear.

14.3.3 Display Test

Selecting DISPLAY generates a test pattern on all available displays, allowing to check for faulty LCD pixels. This mode remains on until the central screen is touched again.

14.3.4 PC-Card Test



Two types of PC-Cards are used with the console:

- Program card, used for software upgrade
- Data card, used for storing and recalling console configuration, snapshot data, and mic settings

When having touched PC-CARD, the inserted PC-Card is checked for battery voltage and write protection.

14.3.5 SW Versions Display

When having touched SW VERSIONS, the current software versions are displayed for every module.

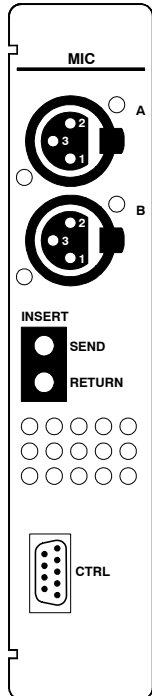


With the PREV and NEXT fields, all available pages can be browsed.

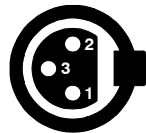
15 HARDWARE MODULES

15.1 Mic Input Module

1.942.220.xx



Pin Assignments:



Module with two inputs and A/B input selector. Inputs A and B are transformer-balanced mono microphone inputs. The maximum input level is such that also mono line level signals can be processed if required.

The analog path has an insert point right after the preamplifier stage. Both the insert send and insert return signals are electronically balanced. The nominal send and return levels are +6 dBu, with 9 dB headroom for 0 dB_{FS}. The module address depends on the input channel number given to the module and is set with a DIP switch; refer to [chapter 16.1](#). *Two modules must not have the same address.*

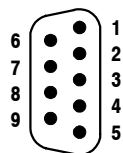
Microphone inputs A/B (XLR, 3pin, female):

Pin	Signal
1	Chassis
2	Input +
3	Input -

INSERT connectors (Bantam jacks):

Pin	Signal
T	Signal +
R	Signal -
S	Chassis

CTRL connector (D-type, 9pin, male):



Pin	Signal	Pin	Signal
1	CTRL OUT 1A	6	COMMON
2	+5 V SUPPLY	7	CTRL OUT 2B
3	CTRL OUT 2A	8	CTRL IN B
4	CTRL IN A	9	GND
5	CTRL OUT 1B		

Two control outputs (CTRL OUT xA/B) are available for each individual input, which can be used to start and/or cue external devices such as CD players, R-DAT units, or a radio automation system, or for redlight signaling. The control signals can be triggered by various functions and depend on the selected fader start mode (INPUT CONFIG. page). For details please refer to [chapter 9](#). The CTRL OUT xA/B configuration is related to the input channel and not to the fader strip.

For CTRL OUT 1A/B, four operating modes are available:

- NOT ACTIVE** Output is always open.
- ON & FADER** Output is closed (i.e. pulled to GND) when the ON key is pressed *and* the fader is open.
- PFL/ON & FADER** Output is closed when *either* PFL is active (independent of the fader position), *or* when the ON key is pressed *and* the fader is open.
- ON LAMP** Output is closed while the ON lamp is illuminated.

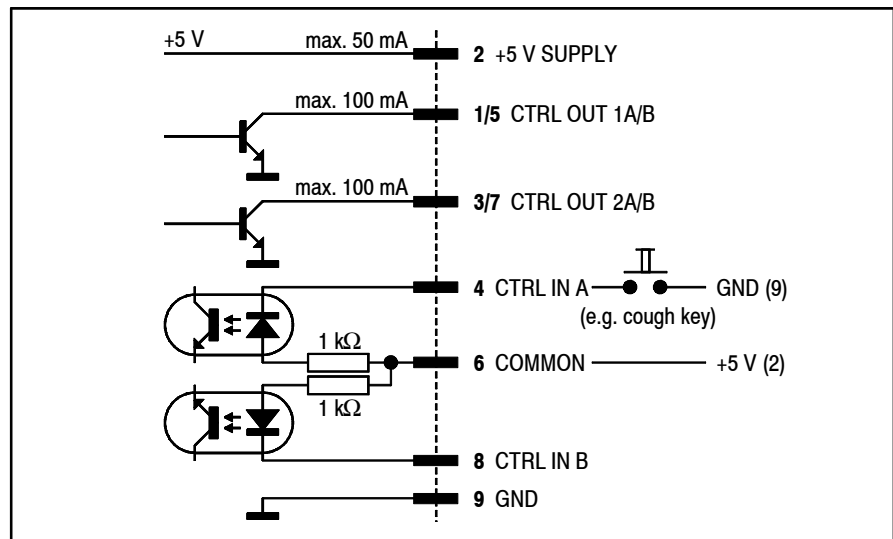
For CTRL OUT 2A/B, eight operating modes are available:

NOT ACTIVE	Output is always open.
LOCATE KEY	Output is closed (i.e. pulled to GND) when the OFF key is pressed and the channel is active.
PREVIEW	Output is closed when the PFL key is active and the PREVIEW function has been activated; the channel must be switched off.
LOCATE PFL KEY	Output produces a pulse when the PFL key is deactivated (LOCATE function is activated).
ATTENTION	Output is closed as long as the OFF key is pressed, independent of whether the channel is open or closed.
ON LAMP	Output is closed while the ON lamp is illuminated.
LOCATE PFL/LOC KEY	Combination of the LOCATE KEY and LOCATE PFL KEY functions.
STOP PULSE	Output produces a pulse when the channel is switched off (OFF key and/or fader closed).

For details please refer to [chapter 9](#).

CTRL IN A/B can be used for muting the channel, for remote control of the ON/OFF key, or for entering ready status. Four operating modes are available:

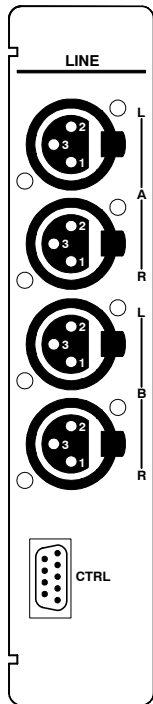
NOT ACTIVE	Input is inactive.
READY	Acknowledgement of a ready signal.
EXT. MUTE	Channel is muted (e.g. cough key).
EXT. ON/OFF	External ON/OFF switchover.



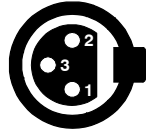
Notes: “COMMON” can be wired either to “+5 V SUPPLY” or to an external power supply (max. +15 V_{DC}). An active low control signal is connected between “CTRL IN A” or “CTRL IN B” and “GND”. The inputs are optocoupler inputs with internal 1 kΩ current limiting resistors. All outputs are open-collector outputs. Small loads such as LEDs, optocouplers, or relays can be driven directly. *Maximum current per open-collector output must not exceed 100 mA.* The “+5 V” output can supply up to 50 mA for optocouplers or relays. *The sum of all “+5 V” outputs for all input modules of a complete console must not exceed 800 mA!*

15.2 Analog Line Input Module

1.942.230.xx (w. transf.); 1.942.232.xx (el. bal.)



Pin Assignments:



The analog line input module has an input selector for two stereo input sources (A and B). Inputs A and B are equivalent.

The module address depends on the input channel number given to the module and is set with a DIP switch; refer to [chapter 16.1](#). *Two modules must not have the same address.*

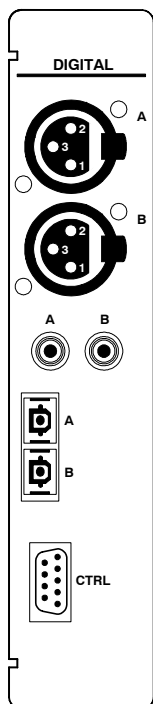
Line inputs A/B (XLR, 3pin, female):

Pin	Signal
1	Chassis
2	Input +
3	Input -

CTRL connector (D-type, 9pin, male): Please refer to [chapter 15.1](#) for details.

15.3 Digital Input Module

1.942.240.xx



Pin Assignments:



The digital input module has an input selector for two digital signals A and B. Each of the inputs has all connectors (XLR, Cinch, TOSLINK) required for supporting the AES/EBU and S/PDIF standards.

The most important C-bits (Professional, Audio, Emphasis, Sampling rate, Stereo) are read on the interface and transferred to the host controller. Audio and Emphasis bits are processed. The digital source needs not being synchronized to the console since the digital input module is equipped with a 20 bit sampling frequency converter (SFC).

The module address depends on the input channel number given to the module and is set with a DIP switch; refer to [chapter 16.1](#). *Two modules must not have the same address.*

AES/EBU inputs A/B (3pin, female):

Pin	Signal
1	Chassis
2	Input +
3	Input -

S/PDIF connectors A/B (RCA/Cinch):

Pin	Signal
Inner	Input
Outer	GND

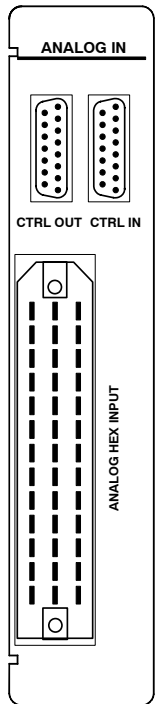


Optical connectors A/B (TOSLINK): For optical-fibre cables.

CTRL connector (D-type, 9pin, male): Please refer to [chapter 15.1](#) for detail.

15.4 Analog Hex Input Module

1.942.245.xx (Option)

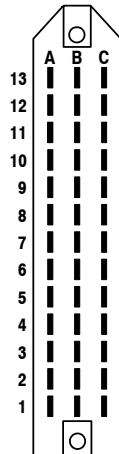


The analog hex line input module has an input selector for six stereo input sources (A...F). All inputs A...F are equivalent.

The module address depends on the input channel number given to the module and is set with a DIP switch; refer to [chapter 16.1](#). *Two modules must not have the same address.*

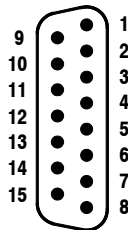
Pin Assignments:

ANALOG HEX INPUT (Siemens, 39pin, male):



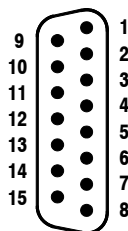
Pin	Signal	Pin	Signal	Pin	Signal
1A	Input A + left	1B	Input A - left	1C	Chassis
2A	Input A + right	2B	Input A - right	2C	Chassis
3A	Input B + left	3B	Input B - left	3C	Chassis
4A	Input B + right	4B	Input B - right	4C	Chassis
5A	Input C + left	5B	Input C - left	5C	Chassis
6A	Input C + right	6B	Input C - right	6C	Chassis
7A	Input D + left	7B	Input D - left	7C	Chassis
8A	Input D + right	8B	Input D - right	8C	Chassis
9A	Input E + left	9B	Input E - left	9C	Chassis
10A	Input E + right	10B	Input E - right	10C	Chassis
11A	Input F + left	11B	Input F - left	11C	Chassis
12A	Input F + right	12B	Input F - right	12C	Chassis
13A	n.c.	13B	n.c.	13C	n.c.

CTRL IN (D-type, 15pin, male):



Pin	Signal	Pin	Signal	Pin	Signal
1	+5 V SUPPLY	6	n.c.	11	CTRL IN E
2	n.c.	7	n.c.	12	CTRL IN D
3	n.c.	8	GND	13	CTRL IN C
4	n.c.	9	COMMON	14	CTRL IN B
5	n.c.	10	CTRL IN F	15	CTRL IN A

CTRL OUT (D-type, 15pin, male):



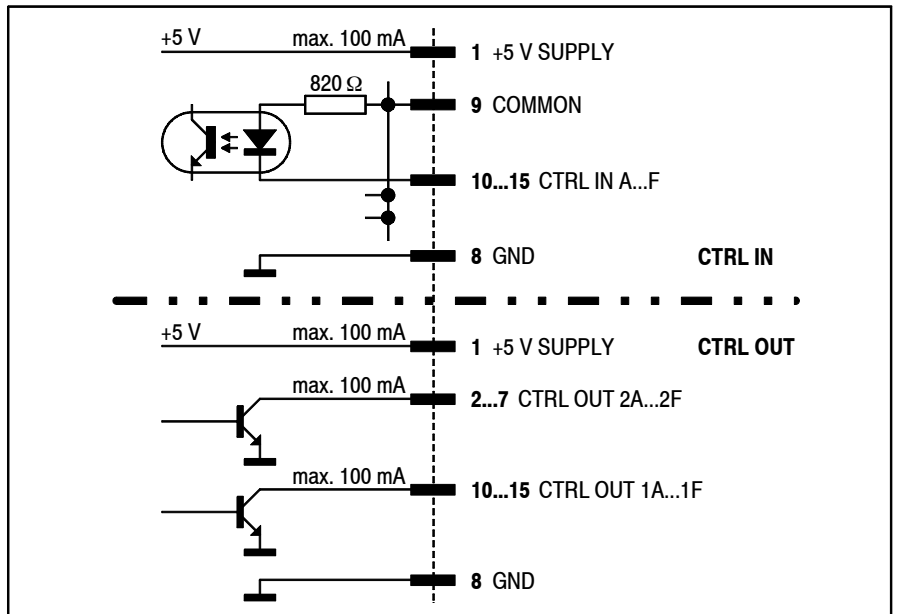
Pin	Signal	Pin	Signal	Pin	Signal
1	+5 V SUPPLY	6	CTRL OUT 2B	11	CTRL OUT 1E
2	CTRL OUT 2F	7	CTRL OUT 2A	12	CTRL OUT 1D
3	CTRL OUT 2E	8	GND	13	CTRL OUT 1C
4	CTRL OUT 2D	9	n.c.	14	CTRL OUT 1B
5	CTRL OUT 2C	10	CTRL OUT 1F	15	CTRL OUT 1A

The inputs are opto-coupler inputs with internal 820 Ω current limiting resistors.

All outputs are open-collector outputs. Small loads, such as LEDs, opto-couplers, or relays can be driven directly. *Maximum current per open-collector output must not exceed 100 mA.*

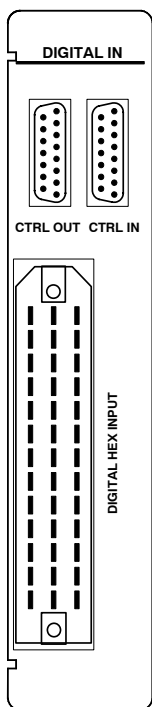
The “+5 V” output can supply up to 100 mA for opto-couplers or relays.

The sum of all “+5 V” outputs for all input modules of a complete console must not exceed 800 mA!

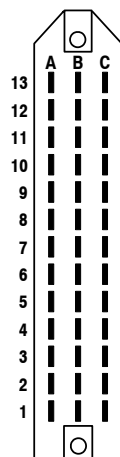


15.5 Digital Hex Input Module

1.942.250.xx (Option)



Pin Assignments:



The digital hex input module has an input selector for six AES/EBU input sources (A...F). All inputs A...F are equivalent.

The module address depends on the input channel number given to the module and is set with a DIP switch; refer to [chapter 16.1](#). *Two modules must not have the same address.*

DIGITAL HEX INPUT (Siemens, 39pin, male):

Pin	Signal	Pin	Signal	Pin	Signal
1A	Input A +	1B	Input A -	1C	Chassis
2A	Input B +	2B	Input B -	2C	Chassis
3A	Input C +	3B	Input C -	3C	Chassis
4A	Input D +	4B	Input D -	4C	Chassis
5A	Input E +	5B	Input E -	5C	Chassis
6A	Input F +	6B	Input F -	6C	Chassis
7A	n.c.	7B	n.c.	7C	Chassis
8A	n.c.	8B	n.c.	8C	Chassis
9A	n.c.	9B	n.c.	9C	Chassis
10A	n.c.	10B	n.c.	10C	Chassis
11A	n.c.	11B	n.c.	11C	Chassis
12A	n.c.	12B	n.c.	12C	Chassis
13A	n.c.	13B	n.c.	13C	n.c.

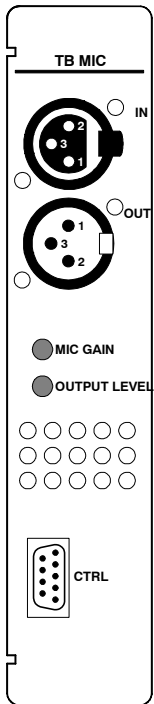
The input impedance is 110 Ω. The input also accepts S/PDIF signals. A 240 Ω resistor in parallel to the input pins may be required to adjust the input impedance to 75 Ω as defined by the S/PDIF standard.

CTRL IN (D-type, 15pin, male), CTRL OUT (D-type, 15pin, male):

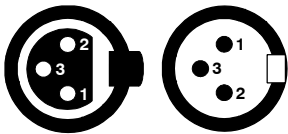
Please refer to [chapter 15.4](#).

15.6 TB Mic Input Module

1.942.219.xx (Option)



Pin Assignments:



The TB Mic Input Module is used for connecting an internal or external talkback microphone (jumper-selectable). It offers a supply voltage for the internal unbalanced goose-neck electret microphone (order no. 1.942.218.xx), and a transformer-balanced XLR input for an external mic with jumper-selectable 48 V phantom power. The balanced input is available on a 3-pin AMP connector on the PCB as well. The input gain is set with a jumper (LO/HI) and is adjustable with a rear-panel trimmer potentiometer. An on-board limiter protects the output from an accidental overload.

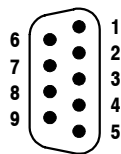
The analog TB output is transformer-balanced and fed to an XLR (at the rear panel) and an AMP connector (on the PCB); an unbalanced AMP output is available on the PCB. The level of the balanced output is adjusted with a rear-panel trimmer potentiometer. The analog TB output must be activated by an external control signal or by a wire bridge in a dummy plug on the CTRL connector (connect pins 2-6 and 4-9)

For information on installation of an optional TB Mic Input Module and on configuration of the console as well as for jumper settings and pin assignment of the on-board connectors please refer to [chapter 16.2](#).

TB MIC IN/OUT (XLR, 3pin, female/male)

Pin	Signal
1	Chassis
2	Input +/Output +
3	Input -/Output -

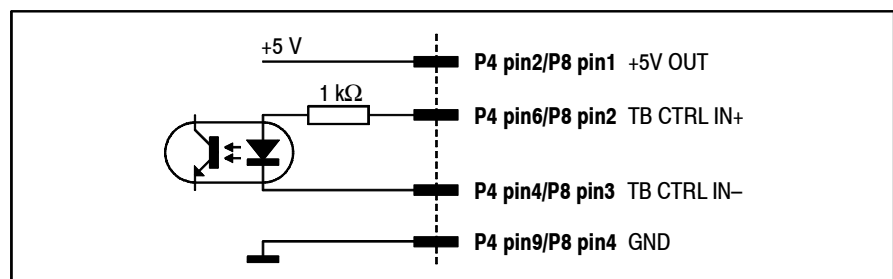
CTRL connector P4 (D-type, 9pin, male), P8 (on PCB AMP, 4pin, male)



P4, pin	P8, pin	Signal	P4, pin	P8, pin	Signal
1	-	n.c.	6	2	TB CTRL IN +
2	1	+5 V OUT	7	-	n.c.
3	-	n.c.	8	-	n.c.
4	3	TB CTRL IN -	9	4	GND
5	-	n.c.			

Control Input:

If a control signal is applied to “TB CTRL IN+” and “TB CTRL IN-”, the EXT TB MIC OUTPUT is activated.



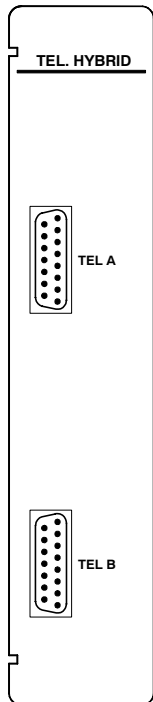
Notes:

“TB CTRL IN +” can be wired either to “+5 V OUT” or to an external supply (max. +15 V_{DC}). An active low control signal is connected between “TB CTRL IN -” and “GND”. The input is an opto-coupler input with an internal 1 kΩ current limiting resistor.

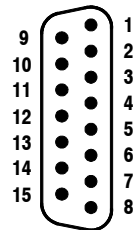
The “+5 V OUT” output can supply up to 50 mA.

15.7 Telephone Hybrid Module

1.942.140.xx (Option)

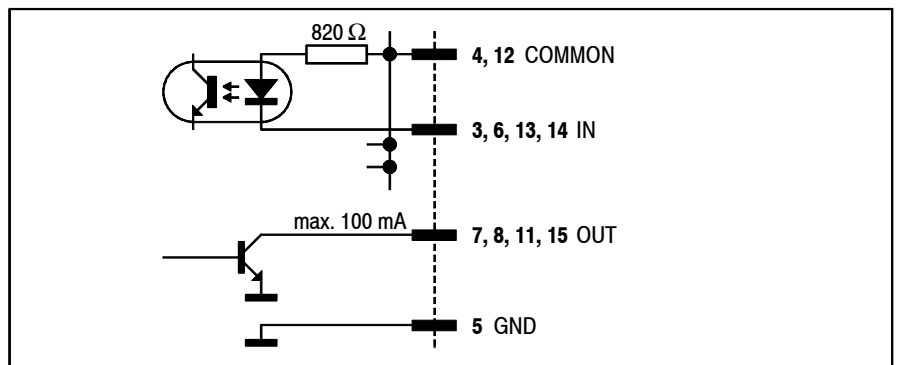


Pin Assignment:



TEL A/B (D-type, 15pin, male):

Pin	Signal	Pin	Signal	Pin	Signal
1	n.c.	6	Hold IN	11	Spare OUT
2	n.c.	7	Studio OUT	12	COMMON
3	Spare IN	8	Tel OUT	13	Tel IN
4	COMMON	9	n.c.	14	Studio IN
5	GND	10	n.c.	15	Hold OUT

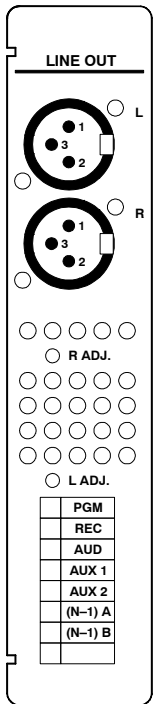


The inputs are opto-coupler inputs with internal 820 Ω current limiting resistors.

All outputs are open-collector outputs. Small loads, such as LEDs, opto-couplers, or relays can be driven directly. *Maximum current per open-collector output must not exceed 100 mA.*

15.8 Analog Output Module

1.942.120.xx (with balancing transformers)

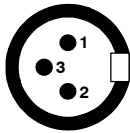


The analog output module provides a transformer-balanced, stereo or mono output signal (jumper-selectable).

The output signal selection is performed on the PCB by means of labeled jumpers.

Note: In mono mode, the output signals of the stereo DAC are added in the analog domain to increase the converters' dynamic range. Therefore, if the DAC input signal is a stereo signal, the resulting mono output level is increased by 3 dB referred to the stereo output, and if the DAC input signal is a mono signal, the resulting mono output level is increased by 6 dB. These level differences have to be compensated by adjusting the output level with the two trimmer potentiometers "R ADJ." and "L ADJ." accessible from the rear of the module.

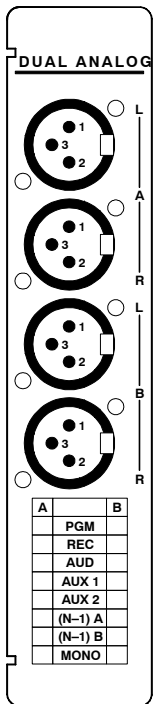
Pin Assignment: Line output (XLR, 3pin, male):



Pin	Signal
1	Chassis
2	Output +
3	Output -

15.9 Dual Analog Output Module

1.942.121.xx (with balancing transformers)

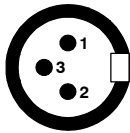


The dual analog output module provides a transformer-balanced, dual stereo or mono output signal (jumper-selectable).

The output signal selection is performed on the PCB by means of jumpers; refer to [chapter 16.5](#).

Note: In mono mode, the output signals of the stereo DAC are added in the analog domain to increase the converters' dynamic range. Therefore, if the DAC input signal is a stereo signal, the resulting mono output level is increased by 3 dB referred to the stereo output, and if the DAC input signal is a mono signal, the resulting mono output level is increased by 6 dB. These level differences have to be compensated by adjusting the output level with trimmer potentiometers located on the PCB; refer to [chapter 16.5](#) for component locations.

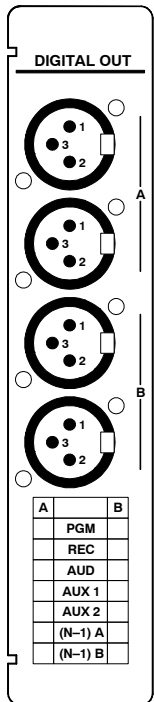
Pin Assignment: Line outputs A/B (XLR, 3pin, male):



Pin	Signal
1	Chassis
2	Output +
3	Output -

15.10 Digital Output Module

1.942.124.xx

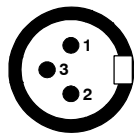


Each digital output module delivers two independent AES/EBU output signals. The most important C-bits (Professional, Audio, Emphasis, Sampling rate, Stereo) are set by the host controller. The output sampling rate is that of the console.

A pair of XLR connectors with separate signal drivers are provided for each of the two AES/EBU output signals.

The output signal selection is performed on the PCB by means of jumpers; refer to [chapter 16.6](#).

Pin Assignment: AES/EBU outputs A/B (XLR, 3pin, male):



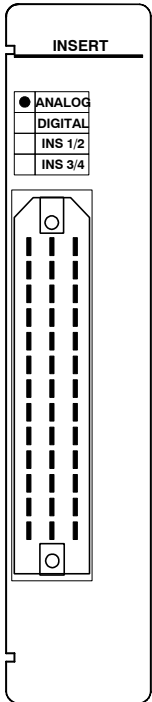
Pin	Signal
1	Chassis
2	Output +
3	Output -

C-Bits: The abovementioned C-bits are set as follows:

- Professional: PRO
- Audio: AUDIO
- Emphasis: NO EMPHASIS
- Stereo: depending on output configuration
- Sampling rate: According to the internal sampling rate measurement.

15.11 Analog Insert Module

1.942.160.xx (Option)



The analog insert module has two electronically balanced, stereo insert sends and insert returns that can be assigned to any of the input channels, or to the program or the record bus.

Selection of the channel to be assigned to the insert is performed on the AUX MASTER/INSERTS page by means of the fourth rotary encoder. Selection is possible only if the corresponding insert is set to OFF (i.e., the return signal is not routed to the output).

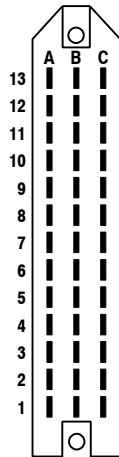
The insert assignment is related to an input and not to a fader. If the input signal is re-routed, the insert is re-assigned accordingly.

The insert send is always active; the return, however, is only active if the ON field of the corresponding insert (on the AUX MASTER/INSERT page) is activated.

The sends are equipped with an internal limiter located before the D/A converter to avoid overloads. Nominal insert level is +6 dBu with 9 dB headroom (i.e. maximum level is +15 dBu for 0 dB_{FS}).

Up to two insert modules (analog, digital, or mixed) can be installed in a console. The insert 1/2 (1st module) or insert 3/4 (2nd module) selection is performed with a DIP switch for each module; refer to [chapter 16.7](#).

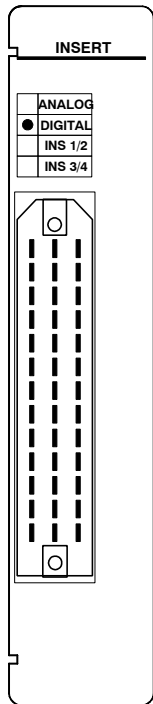
Pin Assignment: INSERT (Siemens, 39pin, male):



Pin	Signal	Pin	Signal	Pin	Signal
1A	Send 1/3 + left	1B	Send 1/3 – left	1C	Chassis
2A	Return 1/3 + left	2B	Return 1/3 – left	2C	Chassis
3A	Send 1/3 + right	3B	Send 1/3 – right	3C	Chassis
4A	Return 1/3 + right	4B	Return 1/3 – right	4C	Chassis
5A	Send 2/4 + left	5B	Send 2/4 – left	5C	Chassis
6A	Return 2/4 + left	6B	Return 2/4 – left	6C	Chassis
7A	Send 2/4 + right	7B	Send 2/4 – right	7C	Chassis
8A	Return 2/4 + right	8B	Return 2/4 – right	8C	Chassis
9A	n.c.	9B	n.c.	9C	Chassis
10A	n.c.	10B	n.c.	10C	Chassis
11A	n.c.	11B	n.c.	11C	Chassis
12A	n.c.	12B	n.c.	12C	Chassis
13A	n.c.	13B	n.c.	13C	n.c.

15.12 Digital Insert Module

1.942.165.xx (Option)



The digital insert module has two transformer-coupled AES/EBU insert sends and insert returns, which can be assigned to any of the input channels, or to the program or the record bus.

Selection of the channel to be assigned to the insert is performed on the AUX MASTER/INSERTS page by means of the fourth rotary encoder. Selection is possible only if the corresponding insert is set to OFF (i.e., the return signal is not routed to the output).

The insert assignment is related to an input and not to a fader. If the input signal is re-routed, the insert is re-assigned accordingly.

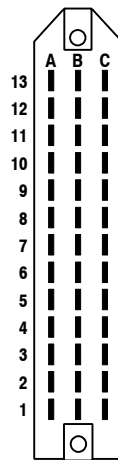
The insert send is always active; the return, however, is only active if the ON field of the corresponding insert (on the AUX MASTER/INSERT page) is activated.

The sends are equipped with an internal limiter which is located before the AES/EBU driver stage in order to avoid overloads. Nominal insert level is 9 dB below full modulation (0 dB_{FS}).

The sends are synced to the console's clock, while the returns are equipped with sampling frequency converters.

Up to two insert modules (analog, digital, or mixed) can be installed in a console. The insert 1/2 (1st module) or insert 3/4 (2nd module) selection is performed with a DIP switch for each module; refer to [chapter 16.7](#).

Pin Assignment: INSERT (Siemens, 39pin, male):



Pin	Signal	Pin	Signal	Pin	Signal
1A	Send 1/3 +	1B	Send 1/3 –	1C	Chassis
2A	Return 1/3 +	2B	Return 1/3 –	2C	Chassis
3A	Send 2/4 +	3B	Send 2/4 –	3C	Chassis
4A	Return 2/4 +	4B	Return 2/4 –	4C	Chassis
5A	n.c.	5B	n.c.	5C	Chassis
6A	n.c.	6B	n.c.	6C	Chassis
7A	n.c.	7B	n.c.	7C	Chassis
8A	n.c.	8B	n.c.	8C	Chassis
9A	n.c.	9B	n.c.	9C	Chassis
10A	n.c.	10B	n.c.	10C	Chassis
11A	n.c.	11B	n.c.	11C	Chassis
12A	n.c.	12B	n.c.	12C	Chassis
13A	n.c.	13B	n.c.	13C	n.c.

15.13 Monitoring Module

1.942.134.xx /1.942.180.xx

The monitoring module is a (mainly analog) monitoring unit. It has five external analog inputs in addition to the console’s internal buses. It provides analog output signals for headphones and loudspeakers in the control room and the studio.

The *Monitoring Module w. TB return 1.942.180.xx* provides an additional TB line input, as well as additional CR and studio control inputs.

For details refer to the block diagram in [chapter 1](#), which is an overview over the complete signal processing functionality.

The parallel “STUDIO MON CTRL” interface (25-pin D-Type, male) allows the construction of a studio monitoring unit. The signals on this interface are:

- 6 × monitor source selector in (opto-coupler inputs)
- 3 × talkback target in (opto-coupler inputs)
- 6 × source selector feedback out (open collector outputs)

The monitor sources and talkback targets are described in [chapter 7](#), “Monitoring”.

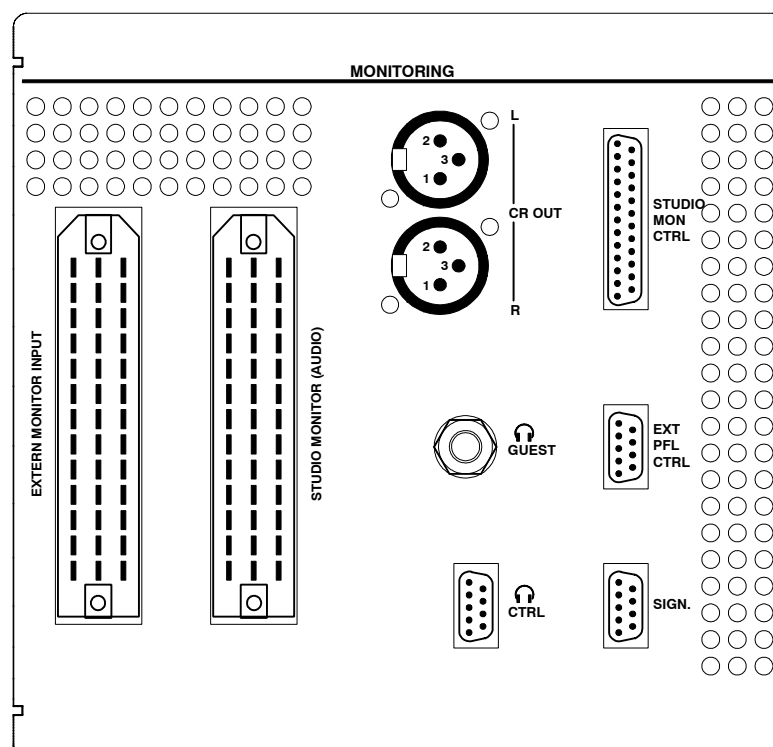
One of the external analog inputs on the module is used as a PFL input provided for a CAB (radio automation) system.

The following control signals are available for this purpose:

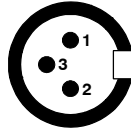
- 1 × External PFL IN (opto-coupler input)
- 1 × External PFL OUT (open-collector output)

The “EXT PFL CTRL” D-Type connector (9-pin, male) is used for the control signals from and to the CAB system. If “External PFL IN” is activated, the “EXT PFL” audio signal on the “EXTERN MONITOR INPUT” connector is routed to the PFL bus.

When pressing the “EXT PFL” key in the monitoring section, the “External PFL OUT” control signal on the “EXT PFL CTRL” connector is active, and the “EXT PFL” audio signal on the “EXTERN MONITOR INPUT” connector is routed to the PFL bus as well.

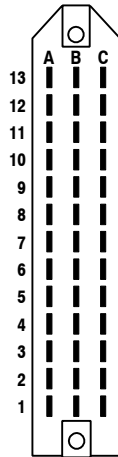


Pin Assignments: CR OUT L/R (XLR, 3pin, male):



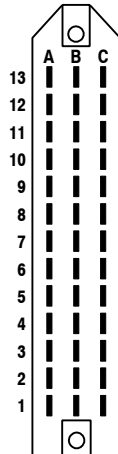
Pin	Signal
1	Chassis
2	Output +
3	Output -

EXTERN MONITOR INPUT (39-pin Siemens, male):



Pin	Signal	Pin	Signal	Pin	Signal
1A	EXT1 + left	1B	EXT1 - left	1C	Chassis
2A	EXT1 + right	2B	EXT1 - right	2C	Chassis
3A	EXT2 + left	3B	EXT2 - left	3C	Chassis
4A	EXT2 + right	4B	EXT2 - right	4C	Chassis
5A	OFF AIR + left	5B	OFF AIR - left	5C	Chassis
6A	OFF AIR + right	6B	OFF AIR - right	6C	Chassis
7A	EXT3 + left	7B	EXT3 - left	7C	Chassis
8A	EXT3 + right	8B	EXT3 - right	8C	Chassis
9A	EXT PFL + left	9B	EXT PFL - left	9C	Chassis
10A	EXT PFL + right	10B	EXT PFL - right	10C	Chassis
11A	n.c.	11B	n.c.	11C	Chassis
12A	n.c.	12B	n.c.	12C	Chassis
13A	n.c.	13B	n.c.	13C	n.c.

STUDIO MONITOR (AUDIO) output (39-pin Siemens, male):



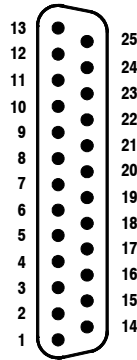
Pin	Signal	Pin	Signal	Pin	Signal
1A	Phones left	1B	GND	1C	Chassis
2A	Phones right	2B	GND	2C	Chassis
3A	Loudspeaker + left	3B	Loudspeaker - left	3C	Chassis
4A	Loudspeaker + right	4B	Loudspeaker - right	4C	Chassis
5A	n.c.	5B	n.c.	5C	Chassis
6A	n.c.	6B	n.c.	6C	Chassis
7A	n.c. / Ext. TB in + (note 3)	7B	n.c. / Ext. TB in - (note 3)	7C	Chassis
8A	n.c.	8B	n.c.	8C	Chassis
9A	Phones volume pot, wiper (note 1)	9B	n.c.	9C	Chassis
10A	+5 V (note 2)	10B	GND	10C	Chassis
11A	Speakers volume pot, wiper (note 1)	11B	n.c.	11C	Chassis
12A	+5 V (note 2)	12B	GND	12C	Chassis
13A	n.c.	13B	n.c.	13C	n.c.

Note 1: 10 kW lin. volume control potentiometers connected between +5 V and GND. Volume is maximum if wiper voltage is +5 V.

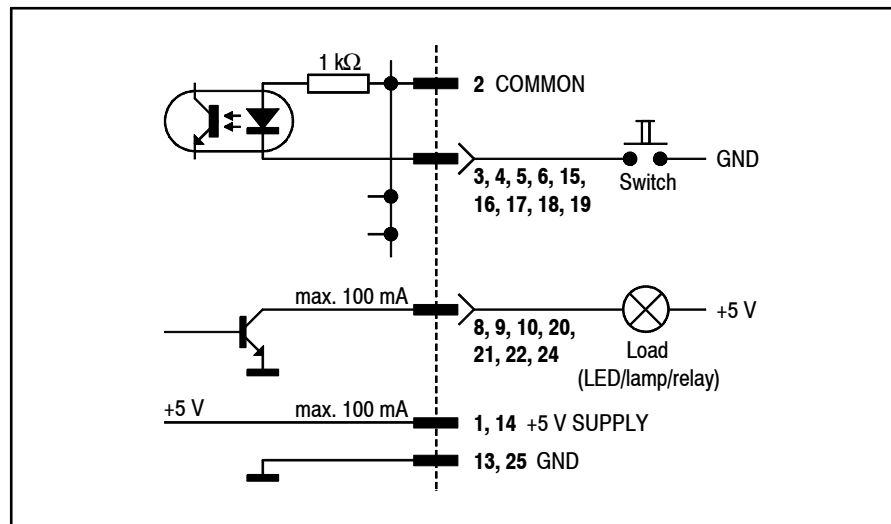
Note 2: 100 W series resistors provided internally for short-circuit protection.

Note 3: Electronically balanced audio input available on 1.942.180.xx and 1.942.181.xx only.

STUDIO MON CTRL (D-type, 25 pin, male):



Pin	Signal	Pin	Signal	Pin	Signal
1	+5 V SUPPLY	10	Lamp EXTERN	19	Switch TB TO TEL2
2	COMMON	11	Spare OUT2	20	Lamp PGM
3	Switch AUX1	12	n.c.	21	Lamp AUX2
4	Switch OFF AIR	13	GND	22	Lamp PFL
5	Switch EXTERN	14	+5 V SUPPLY	23	Spare OUT1
6	Switch TB TO TEL1	15	Switch PGM	24	Lamp STUDIO MIC ON
7	n.c.	16	Switch AUX2	25	GND
8	Lamp AUX1	17	Switch PFL		
9	Lamp OFF AIR	18	Switch TB TO CR		

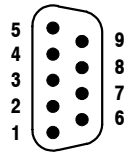


Notes: “COMMON” can be connected either to “+5 V SUPPLY” or to an external power supply (max. +15 V_{DC}). An active-low control signal is, for example, connected between “Switch AUX1” and “GND”. The Switch inputs are opto-coupler inputs with an internal 1 kΩ current limiting resistor each.

The outputs are open-collector outputs; small loads, such as LEDs, opto-couplers, or relays, can be driven directly. *The current must not exceed 100 mA per output.*

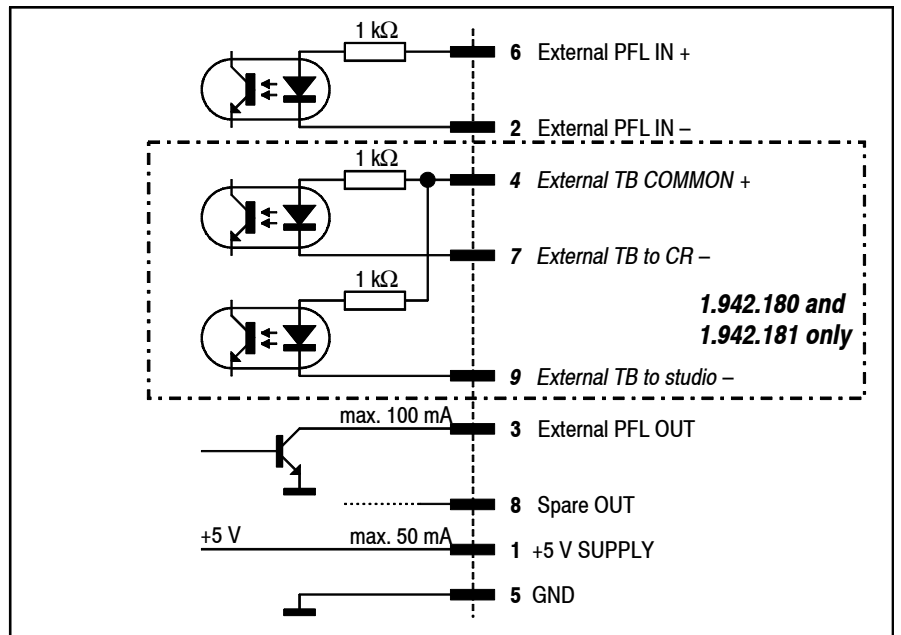
The “+5 V” supply current for LEDs or relays must not exceed 100 mA in total.

EXT PFL CTRL (D-type, 9 pin, male):



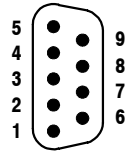
Pin	Signal	Pin	Signal
1	+5 V SUPPLY	6	External PFL IN +
2	External PFL IN -	7	n.c. / External TB to CR - (note 1)
3	External PFL OUT	8	Spare OUT
4	External TB COMMON + (note 1)	9	n.c. / Ext. TB to Studio - (note 1)
5	GND		

Note 1: Available on 1.942.180.xx and 1.942.181.xx only.

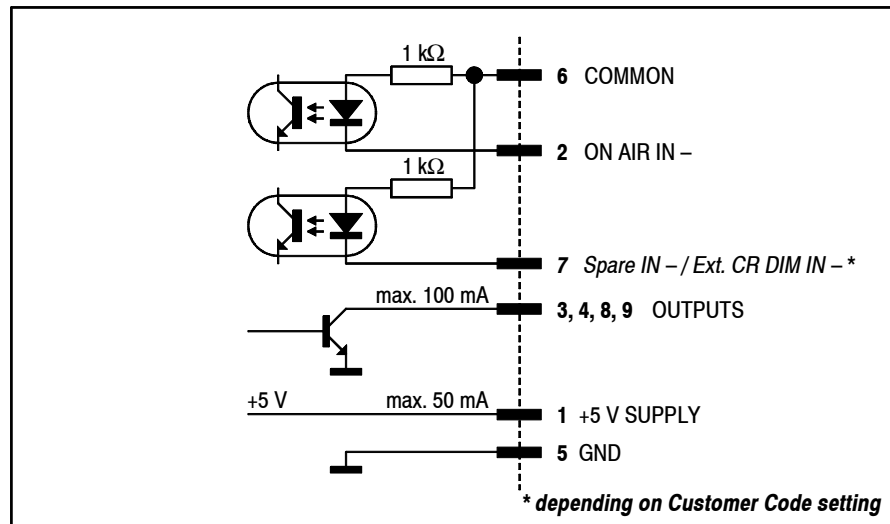


Notes: “External PFL IN +” and/or “External TB COMMON” can be connected either to “+5 V SUPPLY” or to an external power supply (max. +15 V_{DC}). A pushbutton or an active-low control signal from a radio automation system is connected between the „ - ” control inputs and “GND”. The inputs are opto-coupler inputs with internal 1 kΩ current limiting resistors. The “External PFL OUT” output is an open-collector output; small loads, such as an LED, an opto-couplers, or a relay can be driven directly. *The current must not exceed 100 mA.* *The “+5 V” supply current for an opto-coupler or a relay must not exceed 50 mA.*

SIGN. (D-type, 9 pin, male):



Pin	Signal	Pin	Signal
1	+5 V SUPPLY	6	COMMON
2	ON AIR IN –	7	Spare IN – or Ext. CR DIM IN – *
3	CR MIC OUT	8	STUDIO MIC OUT
4	PGM OUT	9	Spare OUT
5	GND	* <i>depending on Customer Code setting</i>	



The “ON AIR IN –” signal turns on the “ON AIR” lamp on the console's monitoring section.

The “CR MIC OUT” output is active if any microphone in the control room is on (i.e. fader open, ON pushbutton active, signal routed to the PROGRAM or RECORD bus).

The “STUDIO MIC OUT” output is active if any microphone in the studio is on (i.e. fader open, ON pushbutton active, signal routed to the PROGRAM or RECORD bus).


The “PGM OUT” output is active if any input channel is on (i.e. fader open, ON pushbutton active, signal routed to the PROGRAM or RECORD bus).

If set with the Customer Code (refer to [chapter 12.2.12](#)), an external control signal at the “Ext. CR DIM IN –” input reduces (dims) the level of the CR monitor speakers by 20 dB.

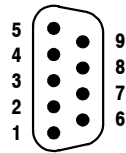
Notes: “COMMON” can be connected either to “+5 V SUPPLY” or to an external power supply (max. +15 V_{DC}). Active-low control signals are connected between the control inputs and “GND”. The inputs are opto-coupler inputs with internal 1 kΩ current limiting resistors.

The outputs are open-collectors; small loads, such as LEDs, opto-couplers, or relays can be driven directly. *The current must not exceed 100 mA per output.*

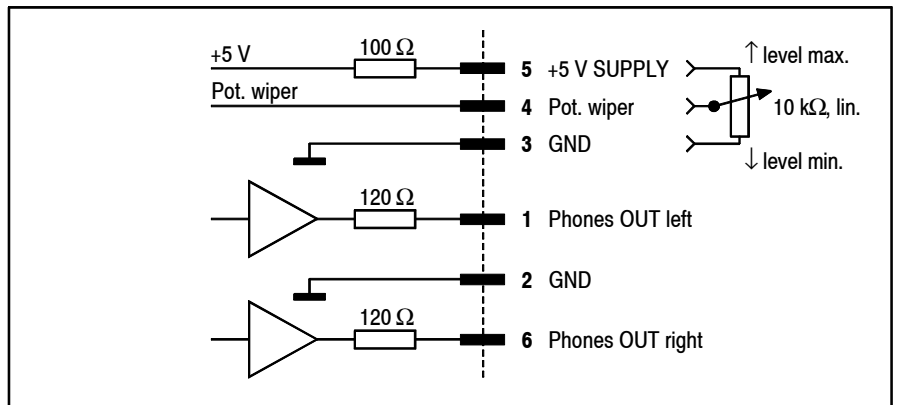
The “+5 V” supply current must not exceed 50 mA.

 **CTRL** (D-type, 9 pin, male):

This connector provides all the signals required for a guest headphone. The “Phones OUT” signal is the same as the one on the GUEST jack socket on the same module.



Pin	Signal	Pin	Signal
1	Phones OUT left	6	Phones OUT right
2	GND	7	n.c.
3	GND	8	n.c.
4	Potentiometer wiper	9	n.c.
5	+5 V SUPPLY		



Notes: A linear 10 kΩ volume control potentiometer can be connected between “+5 V SUPPLY” and “GND”. The volume is maximum if the wiper voltage is at +5 V. The signal on pins 1 and 6 is the same as the one on the GUEST headphones jack socket.

15.14 Monitoring Module w. Extension

1.942.138.xx/1.942.181.xx (Option)

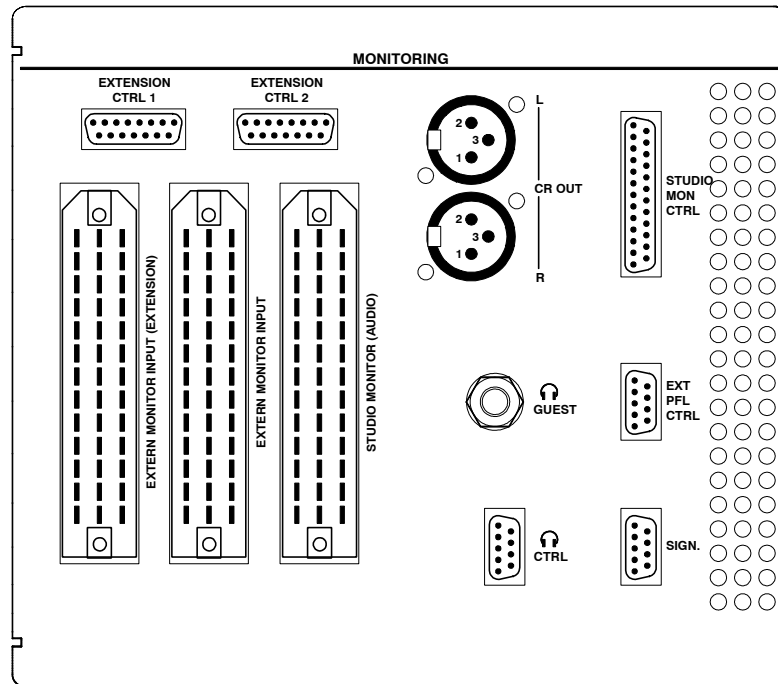
The monitoring module can be extended in two stages; in both cases, the basic functions of the monitoring module as described in [chapter 15.13](#) will be maintained. The basic unit can be extended by one or two PCBs; in addition, a modified connector panel is required as well.

Monitor Extension 1:

The extension 1.942.136.xx allows five more sources to be monitored, two of them being digital. Selection is made with the mutually releasing spare keys F1...F5 in the monitoring section or by external control signals via opto-couplers. Depending on the configuration, these keys can control other functions, too, such as relays or signaling functions etc. Two summing amplifiers and two relays used with the monitor extension 1+2 complete the functionality.

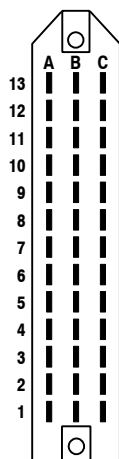
Monitor Extension 1+2:

All functions mentioned above are included; in addition, two VCA modules, two electronically balanced line outputs, a D/A converter and two relays are installed on one more PCB (1.942.137.xx). These components allow the implementation of customer-specific circuits.



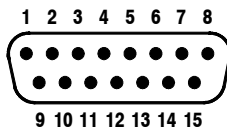
Pin Assignments:

EXTERN MONITOR INPUT (EXT.) (39-pin Siemens, male):

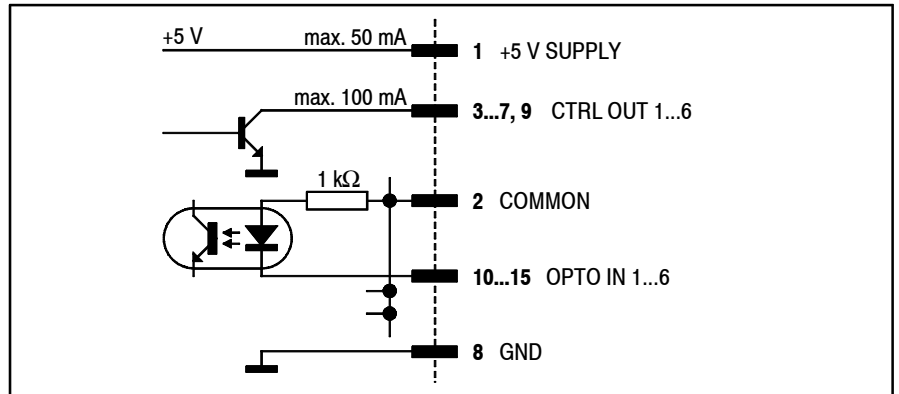


Pin	Signal	Pin	Signal	Pin	Signal
1A	EXT1 IN + left	1B	EXT1 IN - left	1C	Chassis
2A	EXT1 IN + right	2B	EXT1 IN - right	2C	Chassis
3A	EXT4 IN + left	3B	EXT4 IN - left	3C	Chassis
4A	EXT4 IN + right	4B	EXT4 IN - right	4C	Chassis
5A	EXT5 IN + left	5B	EXT5 IN - left	5C	Chassis
6A	EXT5 IN + right	6B	EXT5 IN - right	6C	Chassis
7A	EXT6 IN + left	7B	EXT6 IN - left	7C	Chassis
8A	EXT6 IN + right	8B	EXT6 IN - right	8C	Chassis
9A	EXT7 IN + (digital)	9B	EXT7 IN - (digital)	9C	Chassis
10A	EXT8 IN + (digital)	10B	EXT8 IN - (digital)	10C	Chassis
11A	EXT OUT + left	11B	EXT OUT - left	11C	Chassis
12A	EXT OUT + right	12B	EXT OUT - right	12C	Chassis
13A	n.c.	13B	n.c.	13C	n.c.

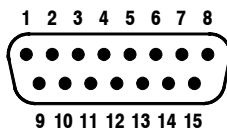
EXTENSION CTRL 1 (D-type, 15pin, male):



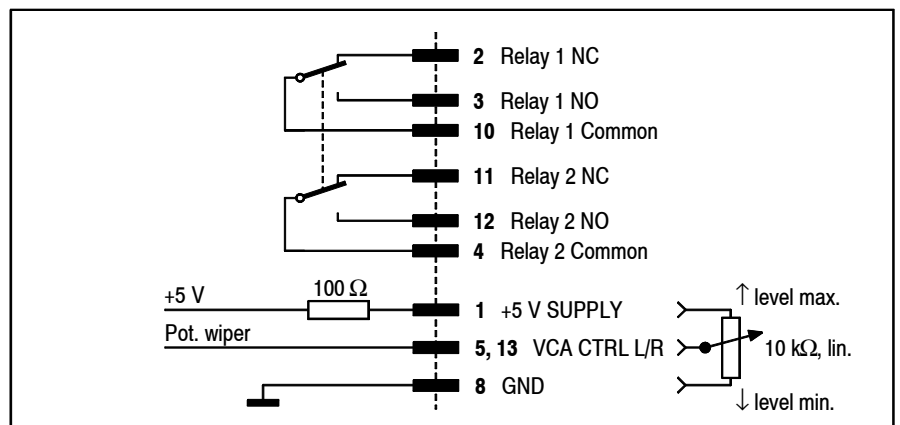
Pin	Signal	Pin	Signal	Pin	Signal
1	+5V SUPPLY	6	CTRL OUT 4	11	OPTO IN 2
2	COMMON	7	CTRL OUT 5	12	OPTO IN 3
3	CTRL OUT 1	8	GND	13	OPTO IN 4
4	CTRL OUT 2	9	CTRL OUT 6	14	OPTO IN 6
5	CTRL OUT 3	10	OPTO IN 1	15	OPTO IN 5



EXTENSION CTRL 2 (D-type, 15pin, male):

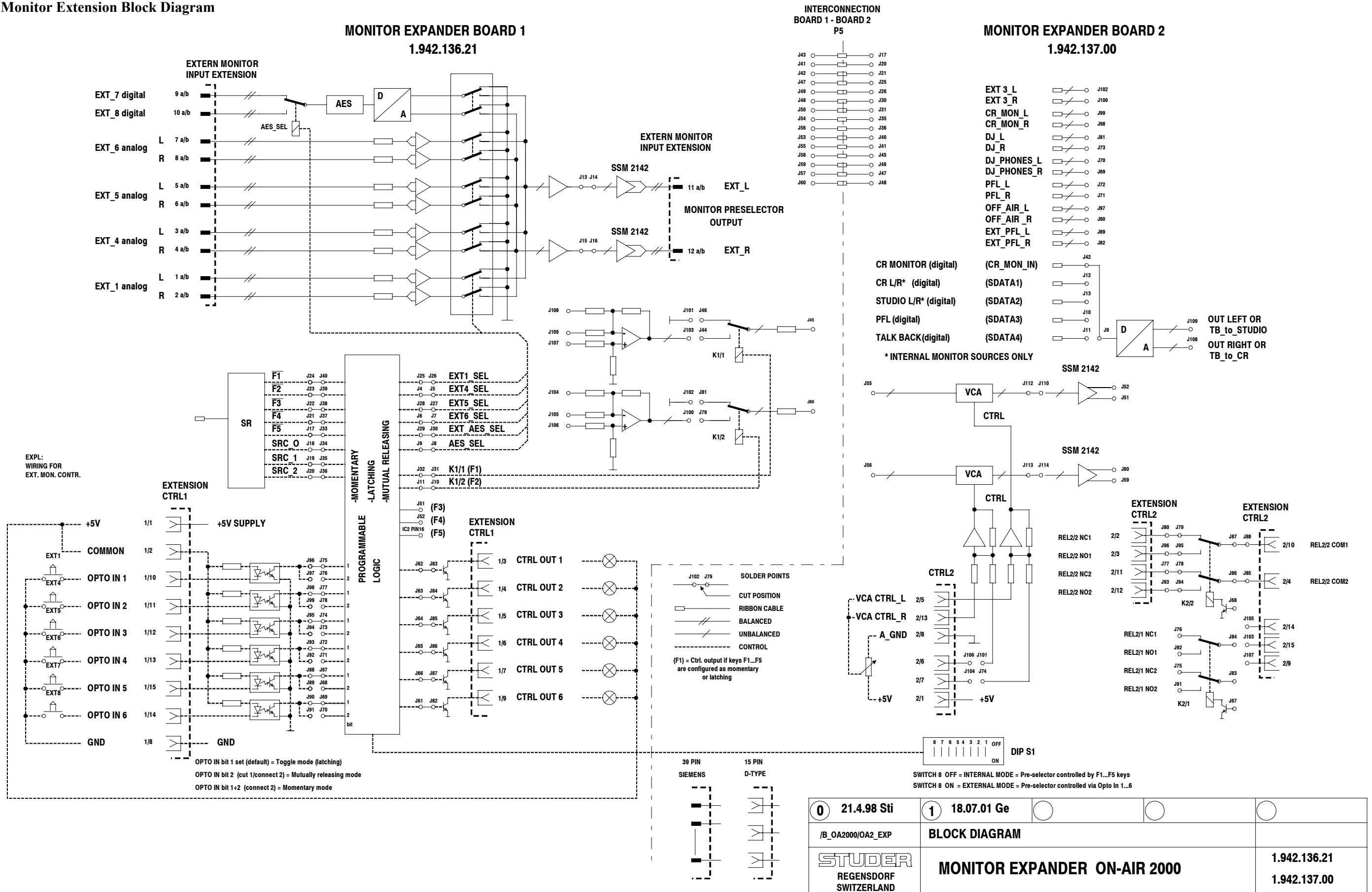


Pin	Signal	Pin	Signal	Pin	Signal
1	+5V SUPPLY	6	n.c.	11	Relay 2 NC
2	Relay 1 NC	7	n.c.	12	Relay 2 NO
3	Relay 1 NO	8	GND	13	VCA CTRL R (pot. wiper)
4	Relay 2 COMMON	9	n.c.	14	n.c.
5	VCA CTRL L (pot. wiper)	10	Relay 1 COMMON	15	n.c.



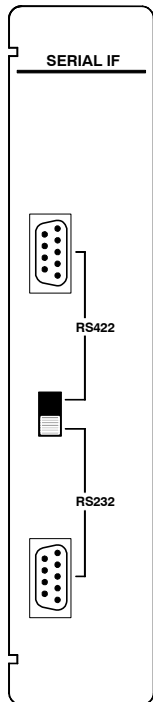
Note: The EXTENSION CTRL 2 connector is active for the monitor extension 1+2 only.

Monitor Extension Block Diagram



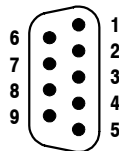
15.15 Serial Interface Module

1.942.145.xx (Option)



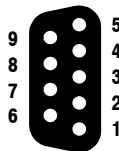
Pin Assignments:

RS422 (D-type, 9 pin, male):



Pin	Signal	Pin	Signal
1	GND	6	n.c.
2	RX + (PC to console)	7	RX - (PC to console)
3	TX - (console to PC)	8	TX + (console to PC)
4	n.c.	9	n.c.
5	n.c.	TX: transmit; RX: receive	

RS232 (D-type, 9 pin, female):



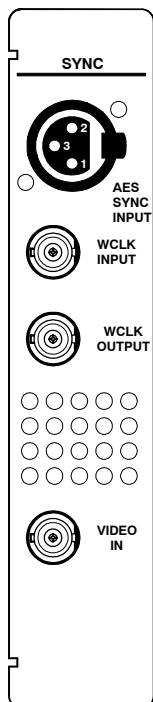
Pin	Signal	Pin	Signal
1	DCD (Note 1)	6	DSR (Note 1)
2	TX (console to PC)	7	RTS (Note 2)
3	RX (PC to console)	8	CTS (Note 2)
4	DTR (Note 1)	9	n.c.
5	GND	TX: transmit; RX: receive	

Note 1: DCD, DTR, and DSR are connected internally

Note 2: RTS and CTS are connected internally

15.16 Clock Sync Module

1.942.135.xx (Option)



Pin Assignments:

AES SYNC INPUT (3pin, female):



Pin	Signal
1	Chassis
2	Input +
3	Input -

WCLK INPUT, WCLK OUTPUT, VIDEO IN (BNC, 75 Ω):



Pin	Signal
Inner	Input
Outer	GND

The OnAir 2000M2 console can be equipped with a clock sync module which allows the console to be synchronized to external clock sources. Synchronizing to the following external signals is provided:

AES/EBU 32 kHz, 44.1 kHz, 48 kHz;

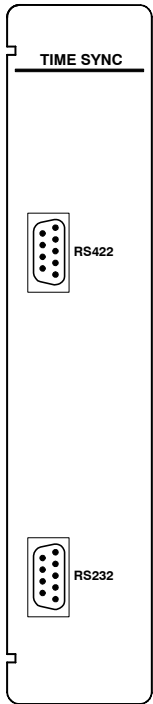
Word clock 32 kHz, 44.1 kHz, 48 kHz;

Video sync 25 frames/s, 29.97 frames/s, 30 frames/s. The termination is jumper-selectable, refer to [chapter 16.9](#). If synchronized to video sync, the sampling rate is either 48 kHz or, for 29.97 frames/s, 47.952 kHz.

If no clock sync module is installed or if no valid external clock signal is available, the console runs from its own internal 48 kHz clock reference.

15.17 Time Sync Module

1.942.150.xx (Option)

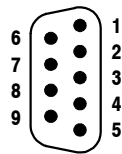


With a time sync module, the console's internal clock can be synchronized to an external time reference unit, such as a DCF77 or GPS receiver, or a Mobatime clock providing a serial output signal. The current software of the module supports AFNOR and Seiko protocols as well as SMPTE bi-phase timecode (Leitch).

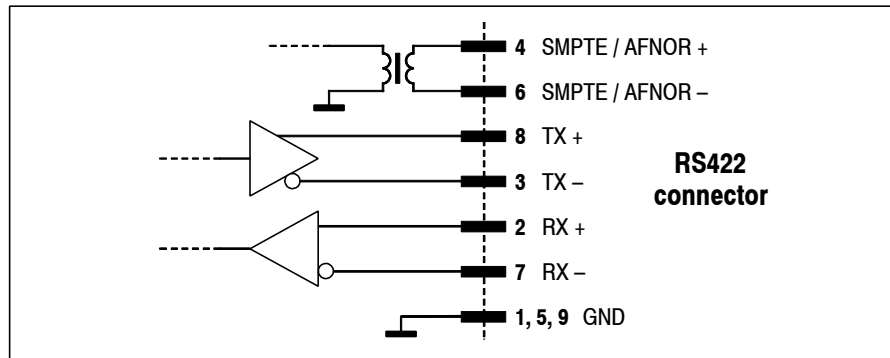
For either of these time reference units (except AFNOR and SMPTE) the connector labeled RS232 is used. For ANOR and SMPTE signals, a transformer-balanced input is available on the RS422 connector. Please note the configuration ([chapter 12.2.5](#)) and the DIP switch and jumper setting ([chapter 16.10](#)), depending on the type of reference unit being used.

Note: The Time Sync Module software version is completely independent of the console software; this means that a Time Sync Module with the most recent software version supports all time sources available, even if installed in a console with the earliest software version.

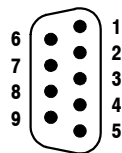
Pin Assignments: RS422 (D-type, 9 pin, male):



Pin	Signal	Pin	Signal
1	GND	6	SMPTE/AFNOR -
2	RX + (unit to console)	7	RX - (PC to console)
3	TX - (console to unit)	8	TX + (console to PC)
4	SMPTE/AFNOR +	9	GND
5	GND	TX: transmit; RX: receive	



RS232 (D-type, 9 pin, male):



Pin	Signal	Pin	Signal
1	+12 V (Note 1)	6	+12 V (Note 1)
2	RX (unit to console)	7	-12 V (Note 1)
3	TX (console to unit)	8	-12 V (Note 1)
4	+12 V (Note 1)	9	n.c.
5	GND	TX: transmit; RX: receive	

Note 1: These voltages are available if jumpers 12-13 and 10-11 are inserted. These outputs are very high-Z and must not be used, except for the specified DCF77 and MOBA receivers only!

16 DIP SWITCHES AND JUMPERS

Note: The DIP switch and jumper positions are printed on the PCBs, except for the TB Mic Input Module and the Analog Output Module; for these two assemblies, drawings have been included in the following chapters for component location.

16.1 Input Modules (Mic, Line, Digital)

Input Module Address:

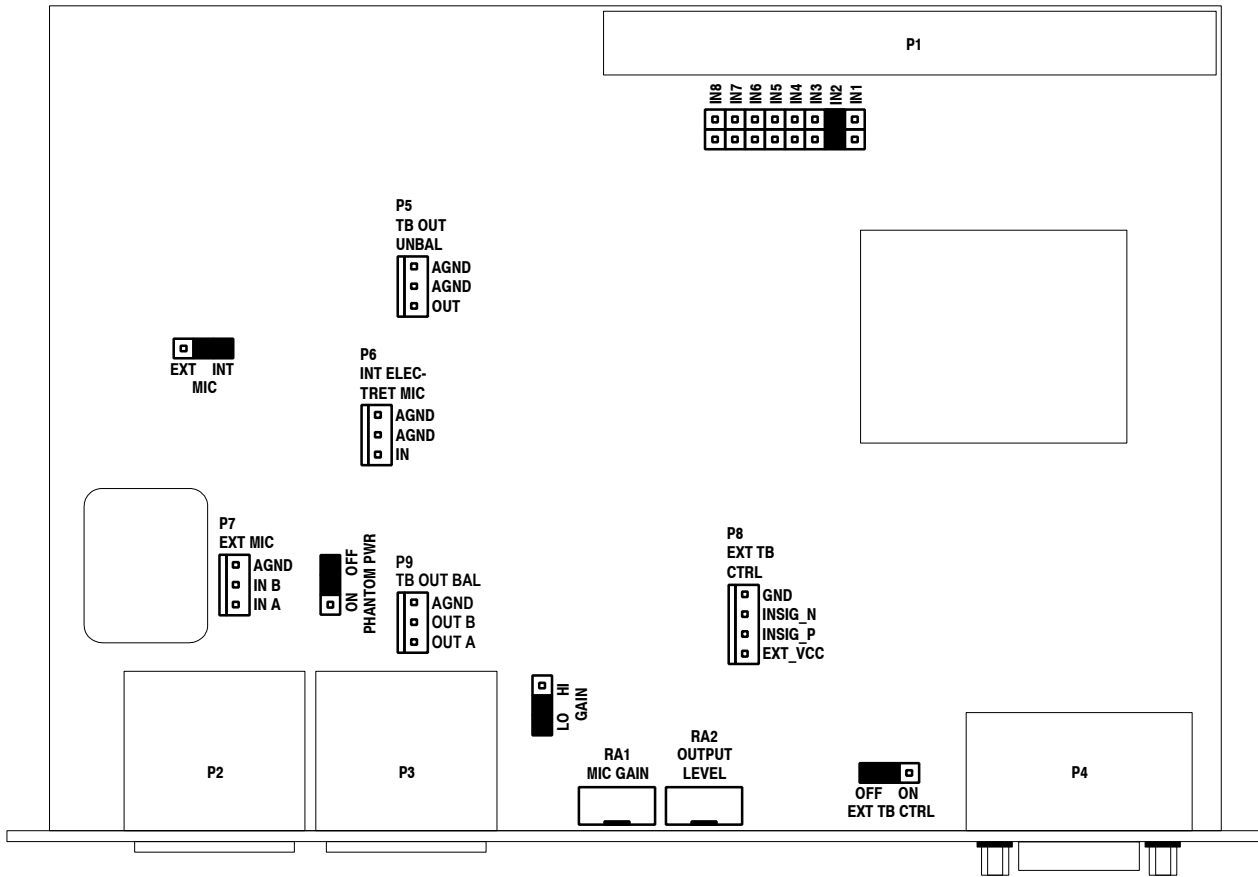
The physical input module's input channel number is defined with DIP switches or jumpers. The assignment of the input module relative to the fader strip, however, is done dynamically in the CHANNEL ROUTING page.

On the Mic, Line, and Digital Input Modules, the input channel number is set with DIP switches, according to the following table:

Input Channel No.:	DIP Switch No.:							
	1	2	3	4	5	6	7	8
1, 7, 13, 19	OFF	ON	ON	ON	ON	ON	ON	OFF
2, 8, 14, 20	ON	OFF	ON	ON	ON	ON	ON	OFF
3, 9, 15, 21	OFF	OFF	ON	ON	ON	ON	ON	OFF
4, 10, 16, 22	ON	ON	OFF	ON	ON	ON	ON	OFF
5, 11, 17, 23	OFF	ON	OFF	ON	ON	ON	ON	OFF
6, 12, 18, 24	ON	OFF	OFF	ON	ON	ON	ON	OFF

On the Talkback Mic Input Module, however, the address is set with a jumper (see [chapter 16.2](#)).

16.2 TB Mic Input Module



Jumper for Module Position:

6-Channel Console

When installing the TB Mic Input Module in an OnAir 2000M2 console, the console configuration must be updated.

- Configure as 12-channel console (on DSP Board: only CFG1 inserted).
- Connect the module to IMB2 of the DSP Board; any desired board address can be selected; *factory jumper setting is IN2 (see Note 1)*.
- Select MIXER SETUP / SYSTEM CONFIG. / INPUT, select CHANNEL 8, and set TB SOURCE to CR.

12-Channel Console

- Configure as 18-channel console (on DSP Board: only CFG0 inserted).
- Connect the module to IMB3 of the DSP Board; any desired board address can be selected; *factory jumper setting is IN2 (see Note 1)*.
- Select MIXER SETUP / SYSTEM CONFIG. / INPUT, select CHANNEL 14, and set TB SOURCE to CR.

18-Channel Console

- Configure as 24-channel console (on DSP Board: neither CFG0 nor CFG1 inserted).
- Connect the module to IMB4 of the DSP Board; any desired board address can be selected; *factory jumper setting is IN2 (see Note 1)*.
- Select MIXER SETUP / SYSTEM CONFIG. / INPUT, select CHANNEL 20, and set TB SOURCE to CR.

Note 1: The INx jumper position is related to one of the 6-channel sections of the console, as shown in the table:

Jumper position on TB Mic Input Module	IN1	IN2	IN3	IN4	IN5	IN6
On 6-ch console, select channel no.	7	8	9	10	11	12
On 12-ch console, select channel no.	13	14	15	16	17	18
On 18-ch console, select channel no.	19	20	21	22	23	24
factory setting						

24-Channel Console

- One of the input modules being already installed must be sacrificed when installing a TB Mic Input Module.
- Make sure that the correct address is set on the TB Mic Input Module; e.g., if the removed input module was no. 12 (or 18, or 24), setting the jumper to position “IN6” is correct (see table above).
- Connect the TB Mic Input Module to the same daisy-chain connector as the removed input module was connected to.
- Select MIXER SETUP / SYSTEM CONFIG. / INPUT, select CHANNEL “x”, and set TB SOURCE to CR (“x” is the number of the input module that was removed).

Remaining Jumpers:

MIC INT/EXT	Input selection – either internal unbalanced microphone (i.e. the standard electret TB mic with fixed supply voltage), connected to P6, or external balanced microphone with switchable phantom power, connected to P2 or P7.
PHANTOM PWR ON/OFF	Selection of 48 V phantom power for the balanced mic input (P2 or P7).
GAIN HI/LO	For the internal standard electret TB mic, the LO position (nominal input level: –60 dBu) is used. In HI position, the mic input gain is increased by 20 dB, i.e. nominal input level –80 dBu.
EXT. TB CTRL ON/OFF	Activates or deactivates the external TB control input on P4 or P8.
IN1...8	Address selection – refer to the “ Jumper for Module Position ” paragraph above; factory setting: IN1.

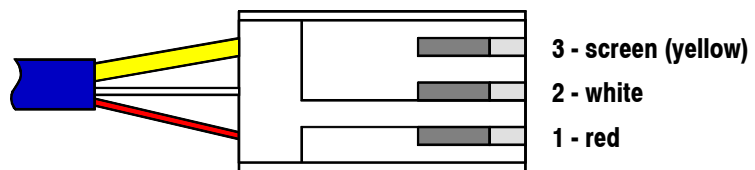
Connections:

TB Mic Input Module

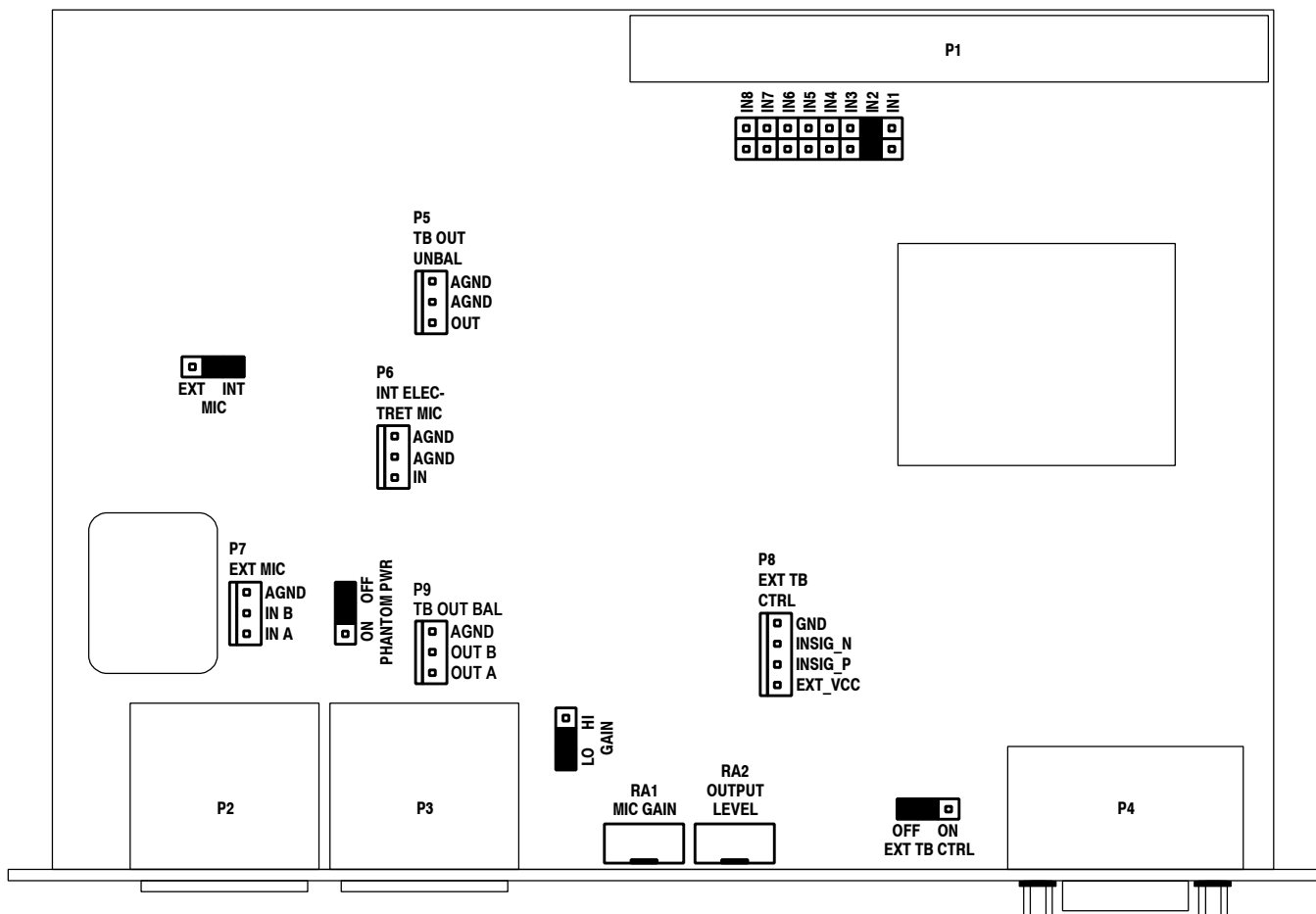
Connect the flat cable to the IMB connector on the DSP Board which corresponds to the selected console configuration. In a 24-channel console the TB Mic Input Module is connected to the same daisy-chain connector as the removed input module was connected to.

TB Mic

Insert the contacts of the microphone cable into the AMP connector housing contained in the set, and make sure that the contact retaining springs engage:



Then plug the AMP connector to P6 of the TB Mic Input Unit.



PCB Connectors:

- P6** Internal electret TB mic input (unbalanced)
- P7** External, transformer-balanced mic input (parallel to P2)
- P5** Unbalanced TB output
- P9** Transformer-balanced TB output (parallel to P3)
- P8** External TB control input (parallel to P4)

Adjustments:

- RA1** MIC GAIN; the factory setting is performed for the electret TB mic. The integrated limiter just starts limiting at input levels above -60 dBu (GAIN jumper in LO position).
- RA2** OUTPUT LEVEL; the factory setting corresponds to the customer-specified line level (adjustment range $-10...+14$ dBu).

16.3 Telephone Hybrid Interface

The DIP Switch on the Telephone Hybrid Control Module must *always* be set as follows:

DIP switch no.:							
1	2	3	4	5	6	7	8
OFF	OFF	ON	ON	ON	ON	ON	OFF

16.4 Analog Output Module

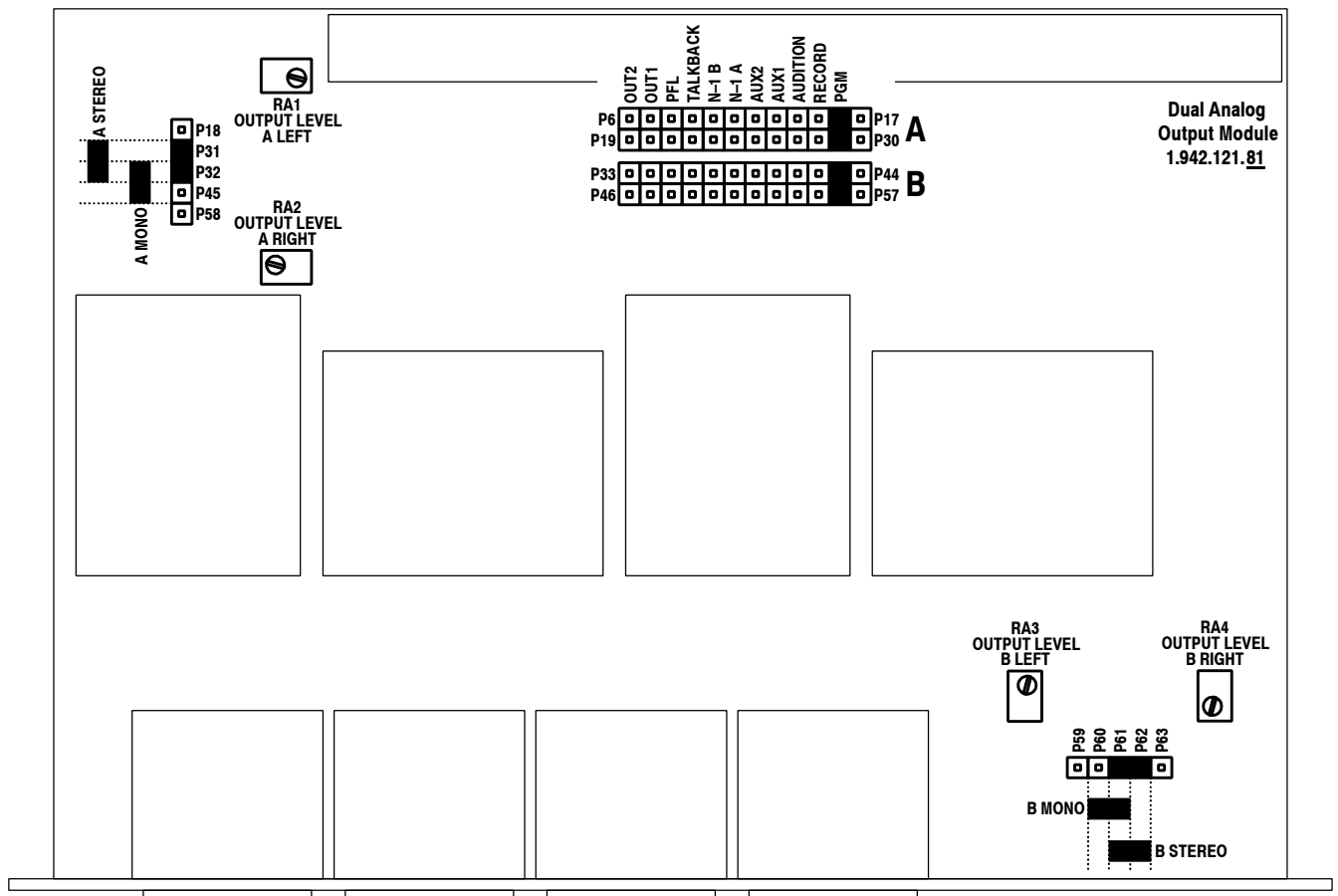
The Analog Output Module has labeled jumpers located on the PCB for mono/stereo selection and output signal selection.

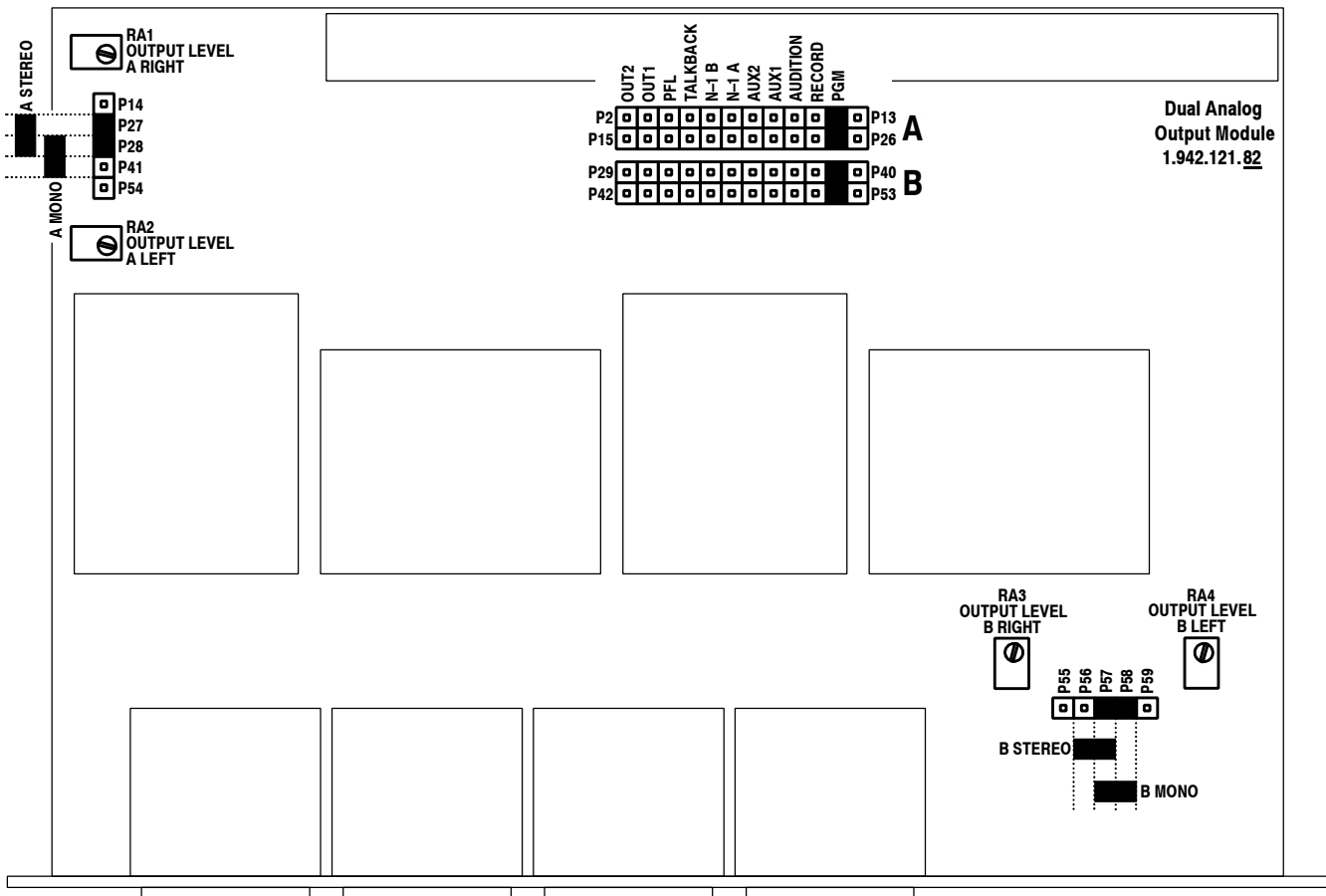
16.5 Dual Analog Output Module

Dual Analog Output Modules have jumpers for mono/stereo selection and output signal selection, individually for each output A and B.

Notes: *Jumper and trimmer potentiometer locations are different for the two PCB versions ...81 and ...82, as indicated in the two drawings below.*

Jumper positions OUT1 and OUT2 can be used for assignment of four additional N-1 outputs C...F; refer to [chapter 5.3.1](#).





16.6 Digital Output Module

Digital Output Modules have two DIP switches (A and B) for output signal selection for each of the two independent outputs A and B. Selection is done according to the following table:

Output signal	DIP switch no.:							
	1	2	3	4	5	6	7	8
PROGRAM (PGM, ON-AIR)	ON	OFF	OFF	ON	ON	ON	ON	OFF
RECORD (REC)	OFF	OFF	OFF	ON	ON	ON	ON	OFF
AUDITION (AUD)	ON	ON	ON	OFF	ON	ON	ON	OFF
N-1 A	OFF	ON	ON	OFF	ON	ON	ON	OFF
N-1 B	ON	OFF	ON	OFF	ON	ON	ON	OFF
AUX 1	OFF	OFF	ON	OFF	ON	ON	ON	OFF
AUX 2	ON	ON	OFF	OFF	ON	ON	ON	OFF
OUT1 (N-1 C/D)	ON	OFF	ON	ON	OFF	ON	ON	OFF
OUT2 (N-1 E/F)	OFF	OFF	ON	ON	OFF	ON	ON	OFF

16.7 Analog/Digital Insert Module

The insert 1/2 or 3/4 address selection is performed with a DIP switch:

Module address	DIP switch no.:							
	1	2	3	4	5	6	7	8
Insert 1/2	ON	ON	OFF	ON	ON	ON	ON	OFF
Insert 3/4	OFF	ON	OFF	ON	ON	ON	ON	OFF

16.8 Monitoring Module

On the Monitoring Controller PCB, *all* DIP switches must be set to their OFF position.

16.9 Clock Sync Module

If P7 and P8 are connected with a jumper, the 75 Ω termination of the VIDEO IN input is active. If this jumper is removed, the input is terminated with 110 Ω.

16.10 Time Sync Module

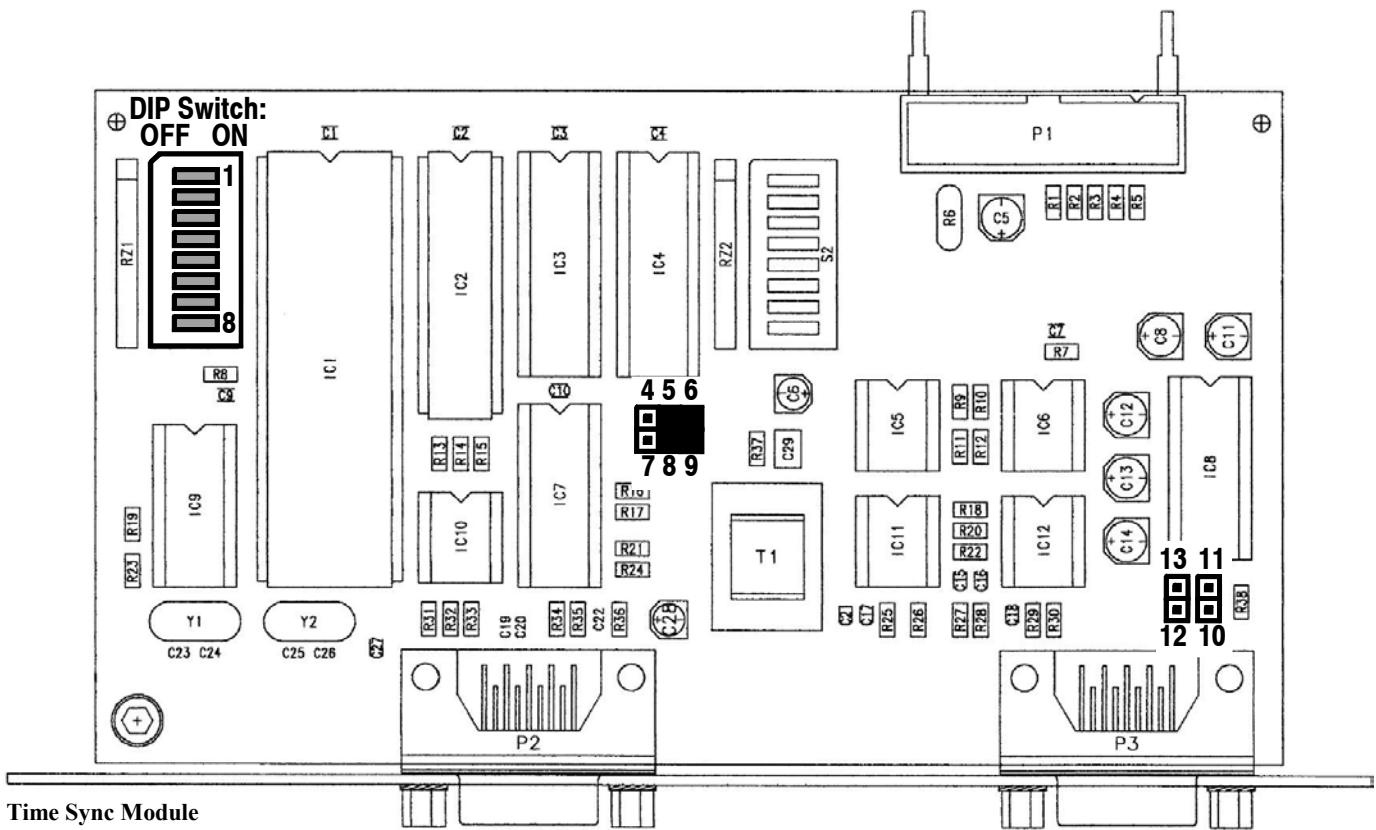
DIP Switch The external time reference signal for the Time Sync Module is selected with a DIP switch. The DIP switch setting is displayed in hexadecimal on the TIME & DATE FORMAT page (TIME SYNC. PROTOCOL field) for easy verification.

Time source	Hex Display	DIP switch no.:							
		1	2	3	4	5	6	7	8
NONE	NONE	ON	ON	ON	ON	ON	ON	ON	ON*
AFNOR NFS87-500	1	OFF	ON	ON	ON	ON	ON	ON	ON*
DCF77 (expert mouse clock)	2	ON	OFF	ON	ON	ON	ON	ON	ON*
MOBATIME (IF482; 9600 baud)	3	OFF	OFF	ON	ON	ON	ON	ON	ON*
GPS (NMEA 0183 V1.5, V2.0; 4800 baud)	4	ON	ON	OFF	ON	ON	ON	ON	ON*
SEIKO serial clock (RS485; 2400 baud)	5	OFF	ON	OFF	ON	ON	ON	ON	ON*
RCC 8000A (9600 baud)	6	ON	OFF	OFF	ON	ON	ON	ON	ON*
HOPF 6021 telegram (9600 baud)	7	OFF	OFF	OFF	ON	ON	ON	ON	ON*
VORTEX 482D (9600 baud), opt. "0"	8	ON	ON	ON	OFF	ON	ON	ON	ON*
LEITCH CSD-5300 (300 baud) (SMPTE bi-phase TC)	9	OFF	ON	ON	OFF	ON	ON	ON	ON*
SMPTE bi-phase input (LEITCH format)	A	ON	OFF	ON	OFF	ON	ON	ON	ON*
SEIKO QC-7CF2	B	OFF	OFF	ON	OFF	ON	ON	ON	ON*
SIPRONIKA SAT520 protocol (9600, 7E2)	C	ON	ON	OFF	OFF	ON	ON	ON	ON*
GORGY ASCII format (2400 baud)	D	OFF	ON	OFF	OFF	ON	ON	ON	ON*
Reserved for future use		all remaining combinations							
		* Standard setting: ON This switch can be set to OFF in order to mask out the validity bits in some data formats (e.g. it is possible to use Mobatime data from a Mobatime clock that has no DCF reception and thus sends "M" instead of "A")							

Jumper Setting

IF type	Jumper setting	Used for:
RS232C	8-9, 5-6	DCF77, Hopf, MOBA, RCC8000A, Seiko
RS422/RS485	7-8, 4-5	GPS, Leitch (SMPTE TC), AFNOR
Supply (high-Z)	10-11, 12-13	DCF77 or MOBA only!

Note: For DIP switch and jumper locations refer to the drawing on the next page.



16.11 Console Size Selection

Jumper Setting The console size must be set with the two jumpers CFG0 (P20-P23) and CFG1 (P21-P24) on the DSP board (1.942.102.xx):

Console size	CFG0 inserted	CFG1 inserted
6 channels	yes	yes
12 channels (or 6 ch with TB Mic Input Unit option)	no	yes
18 channels (or 12 ch with TB Mic Input Unit option)	yes	no
24 channels (or 18 ch with TB Mic Input Unit option)	no	no

16.12 Control Front Board I

DIP Switches On the Control Front Board I (1.942.110.xx), *all* DIP switches must be set to their OFF position.

17 INDEX

A

Access Permission 4-6
 Access Rights 5-19
 Additional N-1 Outputs 5-4
 Additional Talkback Functions 7-5
 Adjustments 2-2
 administrator 5-19
 AES SYNC INPUT 15-21
 AES/EBU 12-12, 15-3, 15-9, 15-11, 15-21
 AES/EBU inputs 15-3
 AES/EBU outputs 15-9
 AF/PF touch-screen fields 4-5
 AFNOR 15-22, 16-7
 ANALOG HEX INPUT 15-4
 Analog Hex Input Module 15-4
 Analog Insert Module 15-10
 Analog Line Input Module 15-3
 Analog Output Module 15-8, 16-5
 Application Software 13-1
 AUDIT 3-4, 7-1
 audition bus 5-3
 Auto Takeover 5-14
 Automatic Routing Setup 12-18
 Automation Config. page 10-2
 AUX 1 3-4, 3-5, 4-5, 4-6, 5-2, 7-1, 7-4
 AUX 2 3-4, 3-5, 4-5, 4-6, 5-2, 7-1, 7-4
 AUX and Insert Control 5-2
 AUX Field 4-3
 AUX levels 4-5
 AUX MASTER 5-1, 5-2
 AUX MASTER/INSERTS page 5-2, 15-10, 15-11

B

BAL 4-6
 Block Diagram 1-2
 BNC 15-21
 boost/cut 4-8
 Boot Software 13-1
 BUS ASSIGNMENT 5-4, 12-6
 BUS ASSIGNMENT page 12-4
 Buttons/Faders Test 14-7

C

CAB 10-1, 15-21
 CAB system 10-1
 CAL 4-6
 Calibration 4-3
 C-bits 15-3, 15-9
 CD/cartridge/MD players 9-1
 Central Screen Test 14-7

Central Touch-Screen 3-3
 Change User Record 11-5
 CHANNEL 12-4
 Channel Control page 4-5, 4-6
 Channel Functions 4-1
 channel key functions 4-1
 channel OFF 9-2
 channel ON 9-1
 channel ON/OFF 9-1
 Channel overload 3-6
 channel router 5-11
 channel routing 5-12
 CHANNEL ROUTING page 5-12
 Channel Routings 12-12
 Channel Screen 4-2
 Channel Screen Test 14-8
 channels in the background 5-13
 channel-to-fader assignment 5-14
 Cinch 15-3
 clean-feeds 5-3
 Cleaning 2-1
 Clock Sync Module 15-21, 16-7
 Common Settings 12-7
 COMMON SETTINGS page 12-7
 Communication Check 14-2
 Communication Time-out 10-2
 computer-assisted broadcasting 10-1
 Configuration 12-1, 12-12
 Configuration Check 14-2
 configuration parameters 12-2
 Configuration Tree Diagram 12-3
 Console Dump 12-11
 Console Dump page 12-11
 Console Size Selection 16-8
 Contrast Knob 3-3, 3-6
 Control Front Board I 16-8
 control input 9-1, 9-4, 15-6
 control inputs and outputs 9-1
 control outputs 9-1, 9-3
 Control Room Monitoring 3-4, 7-1
 CR DIM WHEN AUDITION SEL 12-7
 CR monitor selector keys 3-5
 CR Monitor Speaker 3-4
 CR monitoring source selector 7-1
 CR OUT L/R 15-13
 Create User Record 11-5
 CR-MIC 3-5, 8-1
 CTRL 15-17
 CTRL connector 15-1, 15-3, 15-6
 CTRL IN 9-1, 9-2, 9-4, 12-6, 15-4, 15-5
 CTRL IN A/B 15-2

CTRL OUT	15-4, 15-5
CTRL OUT 1	9-1, 9-3
CTRL OUT 1A/B.....	15-1
CTRL OUT 2	9-1, 9-3
CTRL OUT 2A/B.....	15-2
CTRL OUT1/2 & CTRL IN Appl. Examples	9-5
CTRL. OUT 1/2	12-6
Customer Code.....	4-8, 5-15, 12-17
Customer Code Combinations	12-18
Customer Code setting	4-2, 12-18
CUT	3-5, 5-3, 7-2
CUTOFF	4-8

D

date.....	5-23, 12-9
DATE	12-9
Date format.....	5-23
DATE FORMAT	12-10
DATE page.....	12-9
Date setting.....	12-10
day	12-9
day-of-week.....	5-23, 12-9
DCF77	15-22, 16-7
Default Master Level	5-26, 12-8
default user.....	11-1, 11-8
Defaults	11-7
Delete a Mic Setting.....	5-10
Delete a Snapshot.....	5-8
Delete a Snapshot/Mic Setting.....	5-18
DELETE CARD.....	5-18
DELETE MEM.....	5-8, 5-10, 5-16
Delete User Record	11-7
Diagnostics.....	14-1
DigiMedia	10-1
DIGITAL HEX INPUT.....	15-5
Digital Hex Input Module	15-5
Digital Input Module.....	15-3
Digital Insert Module.....	15-11
Digital Output Module.....	15-9, 16-6
DIM	3-4, 5-3, 7-2
DIP Switches	16-1
Display Test	14-9
Display Unit	3-3
Dual Analog Output Module.....	15-8, 16-5

E

Earthing.....	2-2
Emphasis	15-3, 15-9
EQ	4-8
EQ high-frequency	4-8
EQ low-frequency	4-8
EQ mid-frequency	4-8
EQ/Filter Field	4-3

EQ/Filter page	4-8, 4-9
Error	14-1
Error Handling	13-5, 14-1
Error messages	14-1
EXT 1	3-4, 7-1
EXT 2	3-4, 7-1
EXT 3	3-4, 7-1, 7-4
EXT PFL	3-5
EXT PFL CTRL.....	7-5, 7-8, 15-15
EXT PFL input.....	7-8
Ext. TB ctrl on/off.....	16-3
EXTENSION CTRL 1	15-19
EXTENSION CTRL 2	15-19
EXTERN MONITOR input	15-13
EXTERN MONITOR INPUT (EXT.)	15-18
EXTERN PFL Input.....	9-4
External analog input	3-4
External CR DIM	7-2, 12-17
External PFL	7-8
external PFL audio input.....	7-8
external time reference signal	16-7

F

F1 to F5	3-5, 7-5
F1 to F5 keys	7-1, 12-14
Fader.....	3-6, 4-1
Fader Calibration.....	14-8
Fader Start and Stop Pulse	12-17
fader start control	3-6
Fader Start Trigger Point.....	14-8
fader stopwatch	5-24
Fader Units	3-6
Faders 0 dB on Top	12-17
Failure of Restricted Functions	14-6
File Name Extensions	5-17
fixed level offset.....	5-26
Formatting the PC-Card	12-11
function keys	3-5, 7-5

G

Gain.....	4-3
GAIN.....	4-5
Gain hi/lo.....	16-3
general purpose outputs.....	3-4
global channel routings	5-6, 5-16
Global mic settings.....	5-6
Global snapshots	5-6
goose-neck.....	15-6
GPS.....	15-22, 16-7

H

Hardware Modules.....	15-1
Hardware Performance Check.....	14-2
Headphones.....	3-5
headroom.....	4-1, 12-4, 12-6, 15-1, 15-10
Hex Input Selection.....	12-17
High Shelving Filter.....	12-17
Higher Attenuation of Sum.....	12-18
high-pass filter.....	4-8
HOLD.....	5-3
HOME-CHN ON/OFF.....	5-1
Hopf.....	16-7
HPF.....	4-8

I

IMPULS.....	12-15
IN1...8.....	16-3
Information.....	14-1
Information message.....	14-1
INPUT.....	12-4
INPUT CONFIG. page.....	7-6, 12-4
INPUT CONNECTOR.....	12-6
Input Field.....	4-3
Input Module Address.....	16-1
Input Module Extension Box.....	5-11
Input Modules.....	16-1
input router.....	3-1, 4-1
input selection.....	4-2
input selector.....	15-1, 15-3, 15-4, 15-5
Input Selector Field.....	4-2
INSERT.....	5-2, 15-10, 15-11
INSERT connectors.....	15-1
Insert Module.....	16-6
insert point.....	15-1
insert return.....	15-1, 15-10, 15-11
insert send.....	15-1, 15-10, 15-11
INTERNAL.....	12-12, 12-13
internal limiter.....	15-10, 15-11

J

Jumpers.....	16-1
--------------	------

K

Key 1.....	9-1
Key 2.....	9-1
Key 3.....	9-2
KEY FUNCTIONS.....	12-7
keyboard page.....	5-8, 12-4
Keys and Lamps Test.....	14-7

L

LABEL.....	12-4, 12-5
LC display.....	3-6
Leitch.....	15-22, 16-7
LEVEL.....	12-4, 12-6
Level Meter.....	3-3, 6-1, 12-8
LEVEL METER configuration page.....	12-8
Line inputs.....	15-3
Line output.....	15-8
Load a Snapshot/Mic Setting.....	5-17
LOAD FROM CARD.....	5-17
LOCATE.....	12-7
LOCATE function.....	9-2
LOGIN.....	5-1
LOGIN page.....	5-1, 11-7
Log-in Procedure.....	11-7
Login/Logout.....	5-1
Longer Reverb Time.....	12-17
Loudspeaker.....	3-3, 3-5

M

Machine Control.....	9-1
mains cable.....	2-1
mains earth.....	2-2
mains voltages.....	2-1
master fader.....	4-1, 5-25
MASTER FADER ASSIGNMENT.....	12-8
Master Functions.....	5-1
Meinberg.....	16-7
Mic Input Module.....	15-1
MIC Int/Ext.....	16-3
mic settings.....	5-6, 5-9, 12-12
Microphone inputs.....	15-1
Missing External Clock.....	12-13
Mixer Setup.....	5-1, 5-6
mixer setup data.....	12-11
Mixer Setup page.....	5-6
Mobatime.....	15-22, 16-7
MODE.....	4-6
module address.....	15-1, 15-3, 15-4, 15-5, 15-7
MON.....	3-4, 3-5, 7-2
MON/PFL.....	3-5, 7-2
Monitor Expander module.....	7-1
Monitor Expander page.....	12-14
Monitor Expander unit.....	3-5
MONITOR EXT 7.....	12-15
Monitor Extension.....	7-1, 12-14
Monitor Extension 1.....	15-18
Monitor Extension 1+2.....	15-18
Monitor Extension Block Diagram.....	15-20
Monitoring.....	3-4, 7-1
Monitoring Module.....	15-12, 16-7
Monitoring Module w. Extension.....	15-18

mono/stereo selection.....	16-5
month.....	12-9
Multi-Source Selector Page.....	4-4

N

N-1.....	3-5
N-1 A.....	3-5, 5-3
N-1 B.....	3-5, 5-3
N-1/AUDIT.....	12-6
N-1/Audition Bus.....	5-3
New Title Start.....	10-3
NEW USER page.....	11-5
Next Function.....	4-4
no sync.....	12-13
Nominal insert level.....	15-10, 15-11
nominal send and return levels.....	15-1
NONE.....	12-15
normal operation.....	3-1
Normal User.....	11-1

O

OFF.....	3-6, 9-2
OFF AIR.....	3-4, 7-1, 7-4
OFF function.....	12-7
OFF key.....	12-7
ON.....	3-6, 9-1
ON AIR IN opto-coupler input.....	8-1
ON AIR INDICATION.....	8-1, 12-7
ON function.....	12-7
ON key.....	12-7
ON/OFF toggle function.....	12-7
ON-AIR.....	3-5, 5-3, 10-4, 12-7
Operating Elements.....	3-2
Optical connectors.....	15-3
optical-fibre.....	15-3
Output.....	12-8
Output Config. page.....	12-8
Output Selection.....	10-3
output signal selection.....	15-8, 15-9, 16-5, 16-6
Overload Indicator.....	4-1
OVL.....	3-6, 4-1

P

packing.....	2-1
PAN.....	4-5
PAN/BAL Field.....	4-4
parallel studio interface.....	7-5
password.....	5-21, 11-1, 11-5
PC-Card.....	2-2, 12-11
PC-Card Test.....	14-9
peaking.....	4-8
PFL.....	3-3, 3-4, 3-5, 3-6, 7-1, 7-2, 7-4, 9-1

PFL > MON.....	3-5, 7-3
PFL CUT ON CH. ACTIVE.....	12-7
PFL function.....	9-1
PFL to MONITOR.....	7-3
PFL/TB.....	3-5
PFL/TB loudspeakers.....	3-5, 7-5
PFL/TB speakers.....	3-5
PHANTOM.....	4-5
phantom power.....	4-3, 4-5
Phantom pwr on/off.....	16-3
Phase.....	4-3, 4-5, 4-6
PHONES.....	3-5
Power Connection.....	2-1
power inlet.....	3-2
power supply.....	1-1, 2-1
Power Switch.....	3-2
pre-fader listening.....	3-4
Pre-Listening.....	10-4
primary fuse.....	2-2
Private mic settings.....	5-6
Private snapshots.....	5-6
PRIVATE/GLOBAL.....	5-6
Professional.....	15-3, 15-9
PROGRAM.....	7-4
Program output.....	3-4

R

RCC.....	16-7
real-time clock.....	5-23, 12-9
Recall a Mic Setting.....	5-9
Recall a Snapshot.....	5-7
RECALL FROM MEMORY.....	5-7, 5-9, 5-17
Recorder output.....	3-4
redundancy.....	1-1
registered user.....	5-1
Repair.....	2-2
RESET.....	5-23, 5-24
Restricted Functions.....	14-1
Rotary Encoders.....	3-3
Rotary Encoders Test.....	14-7
routing.....	3-1, 5-6, 5-11
RS232.....	10-1, 15-21, 15-22, 16-7
RS422.....	10-1, 15-21, 15-22, 16-7
RS485.....	16-7
RTC.....	5-23, 12-9

S

S (Sync OK).....	5-23
S/PDIF.....	15-3, 15-5
S/PDIF connectors.....	15-3
sampling frequency converter.....	15-3, 15-11
Sampling rate.....	15-3, 15-9
SAVE / EXIT.....	12-7

V

VIDEO	12-12
VIDEO IN	15-21
Video sync.....	15-21
viewing angle	3-6
volume control	7-2, 7-3
Vortex.....	16-7

W

Warning.....	14-1
watch	5-23
WCLK INPUT	15-21

WCLK OUTPUT	15-21
Word clock.....	12-12, 15-21

Y

year	12-9
------------	------

Z...

ΣPGM.....	3-4, 7-1
ΣPROGRAM.....	4-5, 4-6
ΣREC.....	3-4, 7-1
ΣRECORD	4-5, 4-6