stage accompany

Stage Accompany

AI 110

Audio Interface

User and Service Manual
Version 1.0

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stage accompany

Published by:

Stage Accompany B.V.
Training & Documentation
Anodeweg 4
1627 LJ Hoorn, The Netherlands

First Printing, March 1990

Printed in The Netherlands

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stage accompany Release date: 09-03-90

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1 Operation of the AI 110

The Stage Accompany AI 110 is an audio signal interface specially developed to be used in combination with system analysers like the MLSSA measurement system. It is housed in a 19 inch, 1 HE enclosure and it comprises the following components:

Input for microphone, line, and amplifier signals.
Phantom power supply for condenser microphones.
Line signal output (max. +20 dBm).
Loudspeaker output (max. 10 Watts).
Pink and inverse pink weighting filters.

The next paragraphs describe these components and their operation in detail. The connections to the system analyser are at the rear panel of the AI 110, while the operating controls and the connections to your test setup are at the front panel.

1.1 Mains Voltage

Always ensure that you use a correctly grounded power supply. Before connecting the AI 110 to the power supply, also ensure that the value stated at the rear corresponds with the actual voltage of the power supply.

WARNING: Always disconnect the AI 110 from the power supply before operating the fuse holder! Replace a blown fuse only with a new one of the same value!

1.2 Connections to the system analyser

The connections to the system analyser are unbalanced and equipped with cinch connectors. Connect the AI 110 input (at the rear panel) to the signal generator output of your analyser (bottom cinch connector on MLSSA card). Connect the AI 110 output (at the rear panel) to the system analyser signal input (centre cinch connector on MLSSA card, the upper one should not be used). Figure 1-1 on the next page shows a typical system configuration.

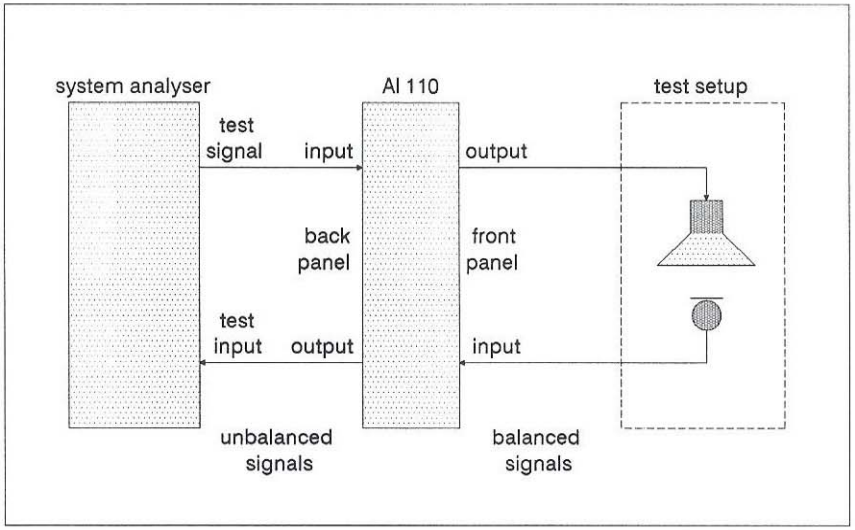


Figure 1-1. Typical system configuration with the AI 110.

1.3 The Balanced Input

The balanced input of the AI 110 consists of a 3-pins female XLR connector and can be used to connect a microphone signal, a line signal, as well as an amplifier output signal. Normally the gain is 0 dB. However, a gain of 30 dB can be switched in (<GAIN>) as well as a pad of 30 dB (<PAD>). The input is wired as follows:

Pin 1 = ground (shield)
Pin 2 = normal phase (+ or "hot")
Pin 3 = inverted phase (- or "cold")

The input signal always has to be connected between pin 2 and pin 3 regardless whether it is a balanced signal or an unbalanced one. In unbalanced situations it is allowed (but not required) to connect pin 1 to pin 3.

The connection of a microphone

To enable acoustical measurements a microphone can be directly connected. A phantom power supply is provided to enable the use of condenser microphones. This power supply can be switched on by means of the <PHANTOM> button. The corresponding LED indicates when the power supply is switched on.

The maximum input level with no additional gain is +20 dBm (7.75 Veff). With insensitive microphones or low signal levels the input signal can be amplified by 30 dB. The corresponding LED indicates when the gain is switched on. The maximum input level with gain is -10 dBm (0.32 Veff).

The connection of a line signal

To enable measurements of equalisers, crossovers, effect equipment, etc. a line signal can be directly connected to the input. In most cases the 30 dB gain will not be necessary.

The connection of an amplifier

To enable measurements of power amplifiers the amplifier output signal can be directly connected to the AI 110 input. In this case the 30 dB pad will probably be necessary. The corresponding LED indicates when the pad is switched on. The maximum input level with pad is +40 dBm (77.5 Veff, 750 Watts into 8 Ohms).

If the <OVERLOAD> LED is lit you have to switch off the 30 dB gain when selected or switch on the 30 dB pad. The input is protected against too high voltages. The connection of an amplifier at full power without using the 30 dB pad normally will not destroy the input electronics.

1.4 The Line Output

To enable the connection of balanced equipment to the measurement system, the AI 110 is provided with an output which can deliver balanced as well as unbalanced signals. The maximum output level is +20 dBm (7.75 Veff). Since the gain is 1.0 this is also the maximum input level of the unbalanced input at the back panel.

The output consists of a 3-pins male XLR connector which is wired as follows (see next page):

Pin 1 = ground (shield)
Pin 2 = normal phase (+ or "hot")
Pin 3 = inverted phase (- or "cold")

The output signal always has to be taken from pin 2 and pin 3 regardless whether a balanced signal or an unbalanced one is needed.

The connection to an unbalanced input

An unbalanced signal can be taken from pin 2 while pin 3 must be connected to the cable shield. Pin 1 is not used. However, it is allowed (but not required) to connect pin 1 to pin 3.

The connection to a balanced input

A balanced signal can be taken from pin 2 and pin 3 while the cable shield may be connected to pin 1.

Pin 1 can be disconnected from the system ground using the <GROUND LIFT> button to avoid ground loops during the measurement of equipment. Note that the input ground must always be connected. The corresponding LED indicates when the output is lifted.

The output is protected against short circuit.

1.5 The Loudspeaker Output

To enable loudspeaker and listening room measurements the AI 110 provides a loudspeaker output. The gain of the power amplifier is 1.0 (0 dB).

The Speakon loudspeaker connector is wired as follows:

Pin 1- = ground (- or "cold")
Pin 2- = ground (- or "cold")
Pin 1+ = signal (+ or "hot")
Pin 2+ = signal (+ or "hot")

The maximum output power is 10 Watts into 8 Ohms and 8 Watts into 4 Ohms. The output contains a relay that connects the loudspeaker to the amplifier after a short delay to avoid severe audible switching clicks when the AI 110 is switched on.

bandwidth (Hz)	sample rate (Hz)	gain	gain (dB)
1 k	4.0 k	1.90	5.6
2 k	8.0 k	1.42	3.0
5 k	15.0 k	1.19	1.5
10 k	30.1 k	0.80	-1.9
15 k	46.0 k	0.66	-3.6
20 k	60.1 k	0.58	-4.7
25 k	75.5 k	0.53	-5.5
30 k	90.9 k	0.48	-6.4
35 k	105.3 k	0.45	-6.9
40 k	117.6 k	0.43	-7.3

Table 1-1. Test signal gains for default MLSSA acquisition bandwidth selections.

For other clock frequencies (sample rates) the gain can be estimated by the following relation:

$$\text{gain} = \frac{3.64}{\sqrt{\text{sample rate}}} + 0.11$$

The pink weighting filters can be switched in by means of the <PINK> button. The corresponding LED indicates when the filters have been switched in.

Warning:

With MLSSA the pink filter should only be used in the continuous MLS mode. With the stimulus switched off, MLSSA has a DC voltage on its output equal to the selected stimulus amplitude. When the stimulus is turned on, the voltage charged on the decoupling capacitors in the AI110 combined with the gain of the pink weighting filter at low frequencies can cause clipping and thus invalidate the measurement!

The <CLIP> LED indicates when the output level has reached its highest value only if an 8 Ohms loudspeaker is used. With a 4 Ohms loudspeaker the output signal has to be monitored by the user to be sure that it is not clipping. The output is protected against short circuit.

1.6 The Pink Weighting Filters

Measurement systems like MLSSA use a test signal with a white spectrum. This may cause problems with the loudspeaker during high power measurements. Furthermore low frequency geometric effects are masked during room acoustical measurements. To avoid these problems the AI 110 is provided with a selectable pink weighting filter in both the line output and in the loudspeaker output. At the same time an inverse pink weighting filter is switched in the input.

The weighting range is from 40 Hz to 30 kHz (-1 dB). The output filter is of the low pass type with a 3 dB/octave filter slope while the inverse input filter is of the high pass type with a 3 dB/octave filter slope. The weighting factor at 1 kHz is 1.

The resulting output gain will depend on the frequency contents of the test signal. In the MLSSA system this frequency contents depends on the clock frequency (sample rate). As the inverse pink filter has exactly the inverse frequency response at the input, the resulting overall gain is 1 for all test signals. The power load to the device under test however, varies with the frequency contents of the test signal. The table on the next page gives the gain on the test signal for default MLSSA acquisition bandwidth selections.

Maximum Output Power:	8 Watts into 4 Ohms (input: 17.27 dBm (5.66 Veff)) 10 Watts into 8 Ohms (input: 21.24 dBm (8.94 Veff))
Gain:	0 dB (1.0 +/- 3 %)
Total Harmonic Distortion (THD):	< 0.5 %, 1 Watt into 8 Ohms, 20 Hz - 20 kHz

Pink Weighting Filters

Weighting Range:	40 Hz - 30 kHz (-1 dB)
Output Filter Slope:	3 dB/octave low pass
Inverse Input Filter Slope:	3 dB/octave high pass
Weight Factor:	0 dB @ 1 kHz (1.0 +/- 1 %)

Misselaneous

Mains Supply Voltage:	100 / 120 / 220 / 240 V, 50 / 60 Hz (stated at rear panel)
Power Consumption:	20 VA (50 VA maximum)
Weight:	5.2 kg
Housing:	19 inch rack mount, 1 unit high, 11 inch deep (28 cm) (without connectors)
Dimensions (h x w x d, mm):	44 x 482 x 280 (without connectors)

2 Technical Specifications

Balanced Input

Gain:	0 dB (1.0 +/- 3 %)
Extra Gain: Extra Attenuation:	(GAIN) +30 dB (316 +/- 3 %) (PAD) -30 dB (0.0316 +/- 3 %)
Maximum Input Voltage:	-10 dBm (0.32 Veff) (with GAIN) +20 dBm (7.75 Veff) (without GAIN and PAD) +40 dBm (77.5 Veff) (with PAD)
Input Impedance:	5 kOhms each leg
Common Mode Rejection Ratio:	70 dB, typically 80 dB @ 1 kHz
Total Harmonic Distortion (THD):	< 0.02 %, 10 dBm @ 1 kHz

Balanced Line Output

Maximum Output Voltage:	+20 dBm (7.75 Veff)
Gain:	0 dB (1.0 +/- 3 %)
Output Impedance:	25 Ohms
Total Harmonic Distortion (THD):	< 0.02 %, 10 dBm @ 1 kHz

Loudspeaker Output

Maximum Output Voltage:	+22 dBm (9.76 Veff)

attenuation. Unbalanced attenuation configurations have been used because the input must be able to handle balanced as well as unbalanced signals. Combinations of both attenuations result in three sensitivities:

-60 dB - first and second attenuation switched on
-30 dB - only second attenuation switched on
0 dB - both attenuations switched off

The SSM preamplifier IC2 in combination with the opamp IC1-B has a gain of 30 dB, so the net gain result is: -30 dB, 0 dB, and +30 dB. Trimmers P3 and P5 have been added to adjust for a maximal common mode rejection ratio (CMRR). See the last paragraph for an adjustment procedure.

The circuit consisting of R3, R6, F1, F2, Z1, Z2, Z3, and Z4 protects IC2 against too high input voltages. Resistors R3 and R6 limit the input current while multifuses F1 and F2 protect the zenerdiodes Z1 - Z4 against too much dissipation. Resistors R35 and R38 prevend the inputs from floating.

The circuit around IC2 is taken from the SSM application guide. The gain of the circuit is 4.41. Trimmer P4 is used to trim the output offset voltage to zero.

3.2 The Balanced Line Output

The balanced line output is a normal cross-coupled active line driver circuit. Its gain is 1. Capacitors C35 and C36 form a DC decoupling. P8 is used to adjust the symmetry of the output signal. Resistors R72 and R73 limit the short circuit current. IC7 compensates for any output DC offset voltages. The output ground can be lifted by means of switch S5.

3.3 The Loudspeaker Output

The power amplifier (see sheet 2) consists of an opamp and two emitter followers to increase the output current. Both transistors are connected to the unregulated power supply to avoid overburdening of the regulators. Capacitors C57 and C58 form a DC offset decoupling. The gain of the amplifier is 0 dB (1.0).

Multifuse F6 protects the amplifier against short circuit while the network C63 and R79 increases the amplifier's stability. Relay RL1 avoids severe switching clicks right after power on. Resistor R81 decreases the 18 Volts supply voltage to 6 Volts for the relay.

3 Schematic Diagrams

This chapter contains two schematic diagrams and a PCB layout of the AI 110. Figure 3-1 shows a block diagram of the AI-110.

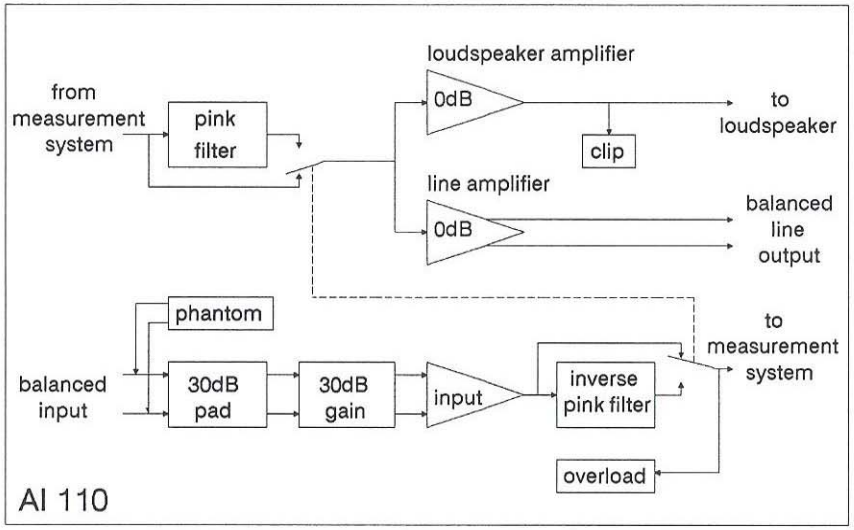


Figure 3-1. AI 110 block diagram.

The next paragraphs describe the different blocks in detail. The last paragraph contains the adjustment procedures for the AI 110.

3.1 The Balanced Input

The top left part of sheet 1 (schematic diagrams) shows the balanced input stage. The circuit consisting of R7, R14, R15, and C8 takes care of the phantom power supply for condenser microphones. Capacitors C1, C2, C3, C4, C6, and C7 form a phantom DC decoupling. Resistors R17, R20, R23, R28, R29, R30, and trimmer P3 form a 30 dB attenuation. Resistors R32, R33, R36, R37, and trimmer P5 form a second 30 dB

P2 adjustment

Supply an input signal of 1 Veff and exactly (!) 1 kHz between pin 2 and pin 3 of the balanced XLR input connector on the front panel and switch off the PAD and GAIN functions. Switch on the PINK function. Connect an AC voltmeter to R1 and adjust the voltage to be exactly equal to the input voltage.

P3 adjustment

Supply an input signal of 1 Veff to both pin 2 and pin 3 of the balanced XLR input connector on the front panel and switch on the PAD and GAIN functions. Connect an AC voltmeter to R1 and adjust the voltage to be minimal.

P4 adjustment

Remove any input signal and switch off the PAD, GAIN, and PINK functions. Connect a DC voltmeter to R1 and adjust the voltage to zero.

P5 adjustment

Supply an input signal of 1 Veff to both pin 2 and pin 3 of the balanced XLR input connector on the front panel and switch off the PAD and GAIN functions. Connect an AC voltmeter to R1 and adjust the voltage to be minimal.

P6 adjustment

Supply an input signal of 1 Veff and exactly (!) 1 kHz to the unbalanced cinch input connector on the rear panel and switch off the PAD, GAIN, and PINK functions. Connect an AC voltmeter between pin 2 and pin 3 of the balanced XLR output connector on the front panel and adjust the voltage to be exactly equal to the input voltage.

P7 adjustment

Supply an input signal of 1 Veff and exactly (!) 1 kHz to the unbalanced cinch input connector on the rear panel and switch off the PAD and GAIN functions. Switch on the PINK function. Connect an AC voltmeter between pin 2 and pin 3 of the balanced XLR output connector on the front panel and adjust the voltage to be exactly equal to the input voltage.

3.4 The Pink Weighting Filters

The 3 dB/octave lowpass pink weighting filter (see sheet 1) consists of opamp IC4-A and the accompanying resistors and capacitors. Capacitor C23 ensures that the DC gain is 0 dB (1.0) to avoid large transient voltages (switching clicks) when the pink filters are switched on or off. Capacitor C25 reduces the high frequency gain of the circuit and trimmer P7 is used to adjust the gain of the filter to be exactly 1.0 at 1 kHz. Opamp IC4-B and trimmer P6 have been added to adjust the gain of the output circuit if the filter is not switched on by means of switch S4-B.

The 3 dB/octave highpass inverse pink weighting filter consists of opamp IC1-A and the accompanying resistors and capacitors. Capacitor C13 reduces the high frequency gain of the circuit and trimmer P2 is used to adjust the gain of the filter to be exactly 7.17 at 1 kHz. Opamp IC1-B and trimmer P1 have been added to adjust the gain of the input circuit if the filter is not switched on by means of switch S4-A. The total gain of the input circuit equals 4.41 times 7.17 which corresponds to 30 dB (31.6). Resistor R1 limits an eventual short circuit current.

3.5 Adjustment Procedures

The AI 110 contains eight resistor trimmers that have to be adjusted. Their functions are as follows:

P1 Input circuit gain without filter (IC1-B).
P2 Inverse pink weighting filter gain (IC1-A).
P3 First attenuation stage common mode rejection ratio (CMRR).
P4 Input stage amplifier offset (IC2).
P5 Second attenuation stage common mode rejection ratio (CMRR).
P6 Output circuit gain without filter (IC4-B).
P7 Pink weighting filter gain (IC4-A).
P8 Balanced output amplifier symmetry (IC6 and IC7).

P1 adjustment

Supply an input signal of 1 Veff and exactly (!) 1 kHz between pin 2 and pin 3 of the balanced XLR input connector on the front panel and switch off the PAD, GAIN, and PINK functions. Connect an AC voltmeter to R1 and adjust the voltage to be exactly equal to the input voltage.

4 Parts List

Resistors

All resistors are 0.6 Watts unless stated otherwise.

R1	47R5
R2	4K75
R3	33R / 5 Watts
R4	2K21
R5	1K00
R6	33R / 5 Watts
R7	6K81
R8	475R
R9	221R
R10	100R
R11	9K09
R12	9K09
R13	4K99
R14	6K81
R15	100R
R16	1K10
R17	8K87
R18	1K62
R19	2K00
R20	8K87
R21	10K0
R22	2K00
R23	147R
R24	10K0
R25	10K0
R26	12K4
R27	4K99
R28	150R
R29	8K87

P8 adjustment

Supply an input signal of 1 Veff to the unbalanced cinch input connector on the rear panel. Measure the AC voltage at pin 6 of IC7 and adjust it to be minimal.

R30	8K87
R31	1K10
R32	4K64
R33	147R
R34	10K0
R35	10K0
R36	150R
R37	4K64
R38	10K0
R39	1K10
R40	9K09
R41	10K0
R42	10K0
R43	10K0
R44	10K0
R45	5K23
R46	1K10
R47	1K00
R48	100R
R49	10K0
R50	221R
R51	10K0
R52	475R
R53	10K0
R54	1K00
R55	15K8
R56	2K21
R57	1K10
R58	4K75
R59	9K09
R60	10K0
R61	1K10
R62	10K0
R63	10K0
R64	10K0
R65	9K09

R66	10K0
R67	10K0
R68	1K10
R69	1M00
R70	1K00
R71	1K00
R72	47R5
R73	47R5
R74	221R
R75	82R5
R76	8K06
R77	0R33 / 5 Watts
R78	100K
R79	10R0
R80	10K0
R81	100R / 5 Watts
R82	0R33 / 5 Watts
R83	1K10

Capacitors

C1	100 uF / 50 V radial
C2	100 uF / 50 V radial
C3	100 uF / 50 V radial
C4	100 uF / 50 V radial
C5	100 uF / 35 V radial
C6	470 nF MKH
C7	470 nF MKH
C8	47 uF / 50 V radial
C9	100 nF MKH
C10	47 nF MKH
C11	22 nF MKH
C12	10 nF MKH
C13	220 pF ceramic
C14	4.7 nF MKH
C15	2.2 nF MKH

C16	220 pF ceramic
C17	120 pF ceramic
C18	33 pF ceramic
C19	47 pF ceramic
C20	1 nF MKH
C21	10 uF / 35 V radial
C22	470 pF ceramic
C23	10 uF / 35 V radial
C24	10 uF / 35 V radial
C25	220 pF ceramic
C26	220 pF ceramic
C27	1 nF MKH
C28	2.2 nF MKH
C29	10 uF / 35 V radial
C30	10 uF / 35 V radial
C31	4.7 nF MKH
C32	10 nF MKH
C33	22 nF MKH
C34	47 nF MKH
C35	100 uF / 35 V radial
C36	470 nF MKH
C37	100 nF MKH
C38	470 nF MKH
C39	10 pF ceramic
C40	33 pF ceramic
C41	22 pF ceramic
C42	2200 uF / 40 V radial or axial
C43	2200 uF / 40 V radial or axial
C44	2200 uF / 40 V radial or axial
C45	100 nF bypass
C46	10 uF / 35 V radial
C47	2200 uF / 40 V radial or axial
C48	100 nF bypass
C49	100 nF bypass
C50	10 uF / 35 V radial
C51	100 nF bypass

C52	470 uF / 63 V radial
C53	100 nF bypass (250 V)
C54	47 uF / 50 V radial
C55	100 nF bypass (250 V)
C56	100 nF bypass (250 V)
C57	100 uF / 35 V radial
C58	470 nF MKH
C59	10 uF / 50 V radial
C60	33 pF ceramic
C61	33 pF ceramic
C62	470 uF / 63 V radial
C63	10 nF MKH
C64	100 nF bypass
C65	100 nF bypass
C66	470 uF / 63 V radial
C67	100 nF bypass
C68	100 nF bypass
C69	10 pF ceramic
B1-14	100N bypass

Diodes / Rectifiers

D1	1N4007
D2	B80C3700 rectifier
D3	1N4007
D4	1N4007
D5	B380C1500 rectifier
D6	1N4007
D7	1N4007
D8	1N4007
D9	1N4007

Zenerdiodes

Z1	BZT03-12 (Philips)

Z2	BZT03-12
Z3	BZT03-12
Z4	BZT03-12

Transistors

T1	2SC4382-Y (Sanken)
T2	2SA1668-Y

Integrated Circuits

IC1	NE5532AN
IC2	SSM2016 (PMI)
IC3	LM311
IC4	LF353
IC5	LM311
IC6	NE5532AN
IC7	TL071
IC8	uA7918
IC9	uA7818
IC10	LM317
IC11	NE5534AN

Multifuses

F1	MFR020 (Bourns)
F2	MFR020
F3	MFR250
F4	MFR250
F5	MFR020
F6	MFR250

Jumpers

J1	do not use!

J2	do not use!

LEDs

LD1	yellow, 3 mm	(PHANTOM)
LD2	yellow, 3 mm	(PAD
LD3	yellow, 3 mm	(GAIN)
LD4	red, 3 mm	(OVERLOAD)
LD5	yellow, 3 mm	(PINK)
LD6	yellow, 3 mm	(GROUND LIFT)
LD7	red, 3 mm	(CLIP)
LD9	red, 3 mm	(POWER ON)

Resistor Trimmers (Bourns)

P1	2K 10-turn
P2	2K 10-turn
P3	10R 10-turn
P4	100K 10-turn
P5	10R 10-turn
P6	2K 10-turn
P7	2K 10-turn
P8	2K 10-turn

Relay

RL1	RAPA 015-19-001 (6 Volts)

Switches

S1	ALPS (2 switches) + white button
S2	ALPS (4 switches) + white button
S3	ALPS (4 switches) + white button
S4	ALPS (4 switches) + white button
S5	ALPS (2 switches) + white button

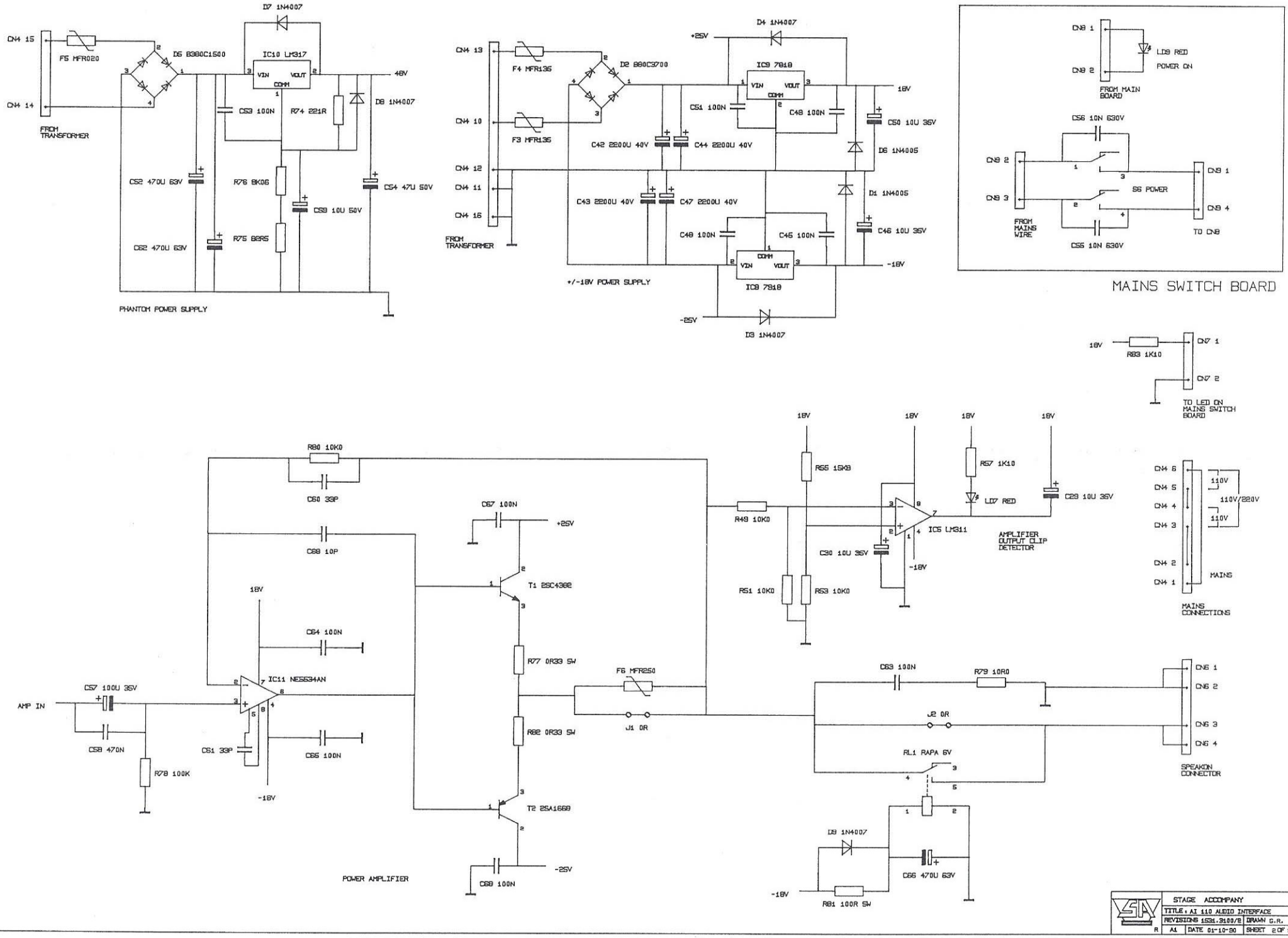
S6	Power on/off

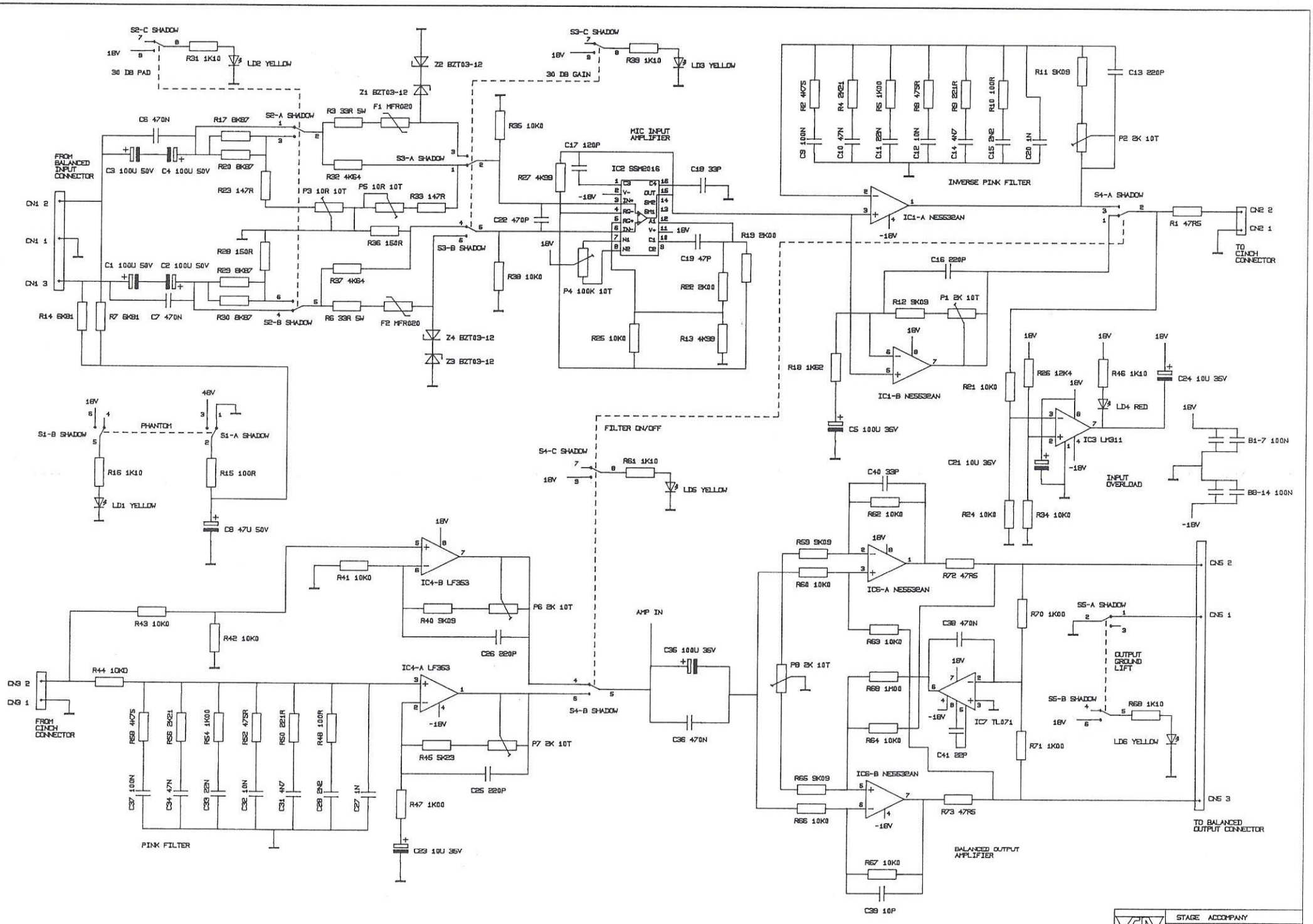
Connectors

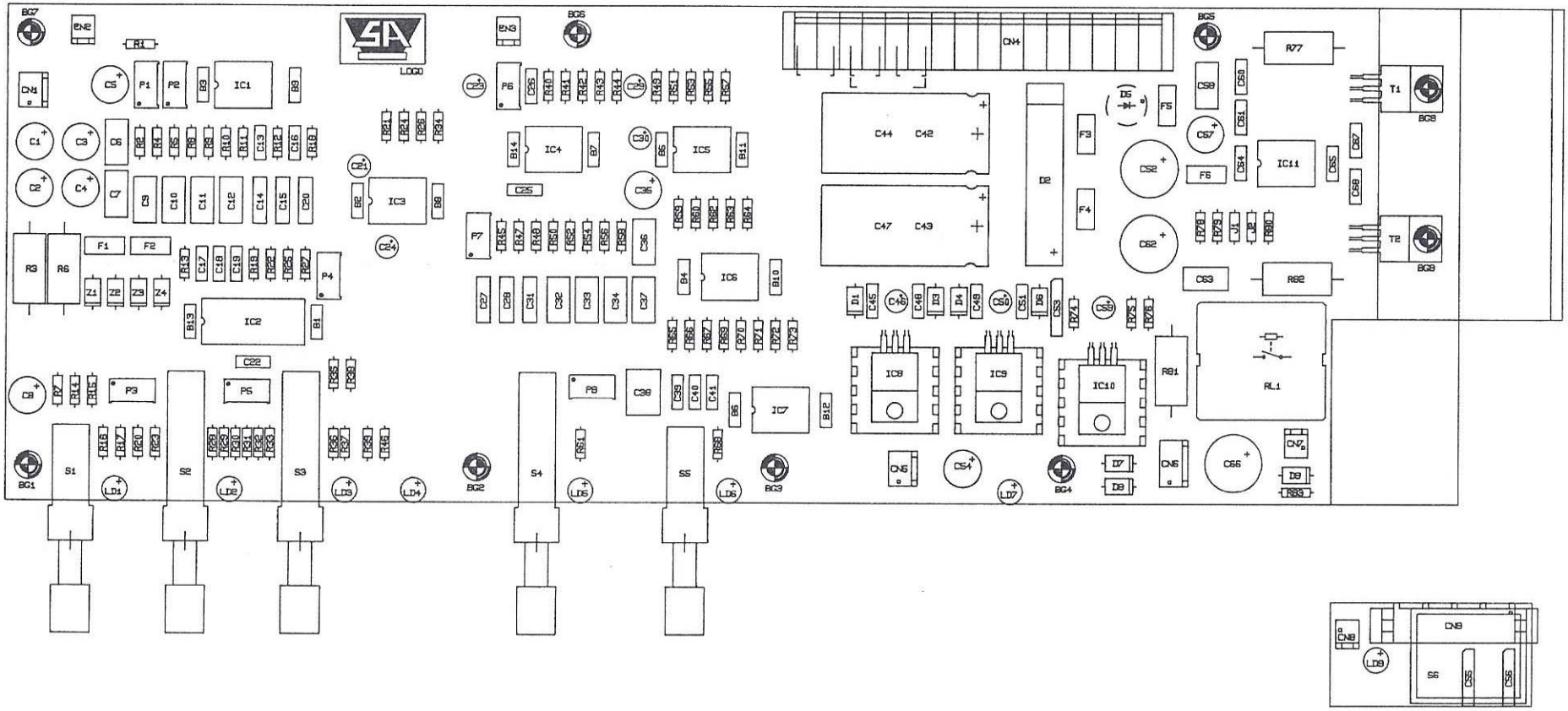
CN1	3-pins 2.54 mm header with lock + cable part
CN2	2-pins 2.54 mm header with lock + cable part
CN3	2-pins 2.54 mm header with lock + cable part
CN4	Weidmuller 16-pins
CN5	3-pins 2.54 mm header with lock + cable part
CN6	4-pins 2.54 mm header with lock + cable part
CN7	2-pins 2.54 mm header with lock + cable part
CN8	2-pins 2.54 mm header with lock + cable part
CN9	Mate & Lock 4-pins header + cable part

Miscellaneous

1	Toroidal Transformer 80 VA (TBS) primary voltage: 2 x 110 V / 0.75 A secundary voltages: 2 x 22 V / 1.5 A 1 x 50 V / 0.25 A
7	IC-socket DIL-8
1	IC-socket DIL-16
3	Heat sink TO-220
1	Printed Circuit Board (PCB) 1531.3100/2
1	19 inch enclosure, 1 unit high, 28 cm deep
1	Mains cord with fixed plug
1	Panel mounted fuseholder + fuse 1 Amp slow
1	Ground lift switch
2	Panel mounted insulated cinch connector
1	Panel mounted 3-pins XLR female connector (with PCB pins)
1	Panel mounted 3-pins XLR male connector (with PCB pins)
1	Panel mounted 4-pins Speakon connector (Neutrik)
1	Stereo cinch-cinch cable (ca. 1 metre)
1	4-Pins speakon connector (Neutrik)


CN4 15
CN4 14
FROM TRANSFORMER
F5 MFR020
D5 B380C1500
D7 1N4007
IC10 LM317
VIN
VOUT
COMM
48V
C53 100N
R74 221R
D8 1N4007
C52 470U 63V
R76 8K06
C59 10U 50V
C54 47U 50V
C62 470U 63V
R75 882R5
PHANTOM POWER SUPPLY
CN4 13
CN4 10
CN4 12
CN4 11
CN4 16
F4 MFR135
F3 MFR135
D2 B80C3700
D4 1N4007
+25V
IC9 7818
18V
C51 100N
C48 100N
C50 10U 35V
C42 2200U 40V
C44 2200U 40V
D6 1N4005
C43 2200U 40V
C47 2200U 40V
D1 1N4005
C49 100N
C45 100N
C46 10U 35V
-18V
IC8 7918
-25V
D3 1N4007
+/-18V POWER SUPPLY
CN8 1
CN8 2
LD8 RED
POWER ON
FROM MAIN BOARD
CS6 10N 630V
CN8 2
CN8 3
S8 POWER
CN8 1
CN8 4
FROM MAINS WIRE
TO CN8
CS5 10N 630V
MAINS SWITCH BOARD
18V
R83 1K10
CN7 1
CN7 2
TO LED ON MAINS SWITCH BOARD
R80 10K0
C60 39P
C67 100N
+25V
C89 10P
T1 2SC4382
18V
C64 100N
IC11 NE5534AN
AMP IN
C57 100U 35V
C58 470N
R78 100K
C61 39P
C65 100N
-18V
R77 0R33 5W
R82 0R33 5W
T2 2SA1668
-25V
C68 100N
POWER AMPLIFIER
F6 MFR250
J1 0R
R55 15K8
R49 10K0
R51 10K0
R53 10K0
C30 10U 35V
IC5 LM311
R57 1K10
LD7 RED
C29 10U 35V
AMPLIFIER OUTPUT CLIP DETECTOR
CN4 6
CN4 5
CN4 4
CN4 3
CN4 2
CN4 1
110V
110V/220V
110V
MAINS
MAINS CONNECTIONS
C63 100N
R79 10R0
J2 0R
RL1 RAPA 6V
D9 1N4007
C66 470U 63V
R81 100R 5W
CN6 1
CN6 2
CN6 3
CN6 4
SPEAKON CONNECTOR
STAGE ACCOMPANY
TITLE : AI 110 AUDIO INTERFACE
REVISIONS 1531.3100/2
DRAWN G.R.
R
A1
DATE 01-10-90
SHEET 2 OF 2


S2-C SHADOW
18V
30 DB PAD
R31 1K10
LD2 YELLOW
Z2 BZT03-12
Z1 BZT03-12
F1 MFR020
S3-C SHADOW
18V
30 DB GAIN
R39 1K10
LD3 YELLOW
C6 470N
R17 8K87
S2-A SHADOW
R3 33R 5W
R35 10K0
MIC INPUT AMPLIFIER
C17 120P
IC2 SSM2016
C18 33P
FROM BALANCED INPUT CONNECTOR
C3 100U 50V
C4 100U 50V
R20 8K87
S3-A SHADOW
R32 4K64
R27 4K99
-18V
CN1 2
CN1 1
CN1 3
R23 147R
P3 10R 10T
P5 10R 10T
R33 147R
C22 470P
R36 150R
S3-B SHADOW
R19 8K00
18V
C19 47P
R29 150R
R29 8K87
R37 4K64
R30 10K0
P4 100K 10T
R22 8K00
C1 100U 50V
C2 100U 50V
R14 8K81
R7 8K81
C7 470N
R30 8K87
S2-B SHADOW
R6 33R 5W
F2 MFR020
R25 10K0
R13 4K99
Z4 BZT03-12
Z3 BZT03-12
INVERSE PINK FILTER
R2 4K75
R4 2K21
R5 1K00
R8 475R
R9 221R
R10 100R
R11 9K09
C13 220P
C9 100N
C10 47N
C11 22N
C12 10N
C14 4N7
C15 2N2
C20 1N
P2 2K 10T
IC1-A NE5532AN
S4-A SHADOW
R1 47R5
CN2 2
CN2 1
TO CINCH CONNECTOR
C16 220P
R12 9K09
P1 2K 10T
18V
-18V
IC1-B NE5532AN
R18 1K62
R21 10K0
C5 100U 35V
18V
18V
18V
R26 12K4
R46 1K10
C24 10U 35V
LD4 RED
IC3 LM311
C21 10U 35V
-18V
INPUT OVERLOAD
B1-7 100N
B8-14 100N
R24 10K0
R34 10K0
-18V
18V
48V
S1-B SHADOW
PHANTOM
S1-A SHADOW
R16 1K10
R15 100R
LD1 YELLOW
C8 47U 50V
FILTER ON/OFF
S4-C SHADOW
18V
R61 1K10
LD5 YELLOW
C40 33P
R62 10K0
18V
R59 9K09
R60 10K0
IC5-A NE5532AN
R72 47R5
CN5 2
CN5 1
CN5 3
18V
R41 10K0
IC4-B LF353
P6 2K 10T
R40 9K09
C26 220P
R43 10K0
R42 10K0
AMP IN
C35 100U 35V
C36 470N
P8 2K 10T
R44 10K0
IC4-A LF353
CN3 2
CN3 1
FROM CINCH CONNECTOR
R58 4K75
R56 2K21
R54 1K00
R52 475R
R50 221R
R48 100R
C37 100N
C34 47N
C33 22N
C32 10N
C31 4N7
C28 2N2
C27 1N
PINK FILTER
-18V
R45 5K23
P7 2K 10T
C25 220P
R47 1K00
C23 10U 35V
S4-B SHADOW
C38 470N
18V
IC7 TL071
-18V
C41 22P
R70 1K00
S5-A SHADOW
OUTPUT GROUND LIFT
S5-B SHADOW
R68 1K10
LD6 YELLOW
R71 1K00
R69 10K0
R64 10K0
R63 1M00
R65 9K09
R66 10K0
IC5-B NE5532AN
R73 47R5
-18V
BALANCED OUTPUT AMPLIFIER
TO BALANCED OUTPUT CONNECTOR
R67 10K0
C39 10P
STAGE ACCOMPANY
TITLE: AI 110 AUDIO INTERFACE
REVISIONS 1531.3100/2
DRAWN G.R.
A1
DATE 01-10-00
SHEET 1 OF 2


LOGO
IC1
IC2
IC3
IC4
IC5
IC6
IC7
IC8
IC9
IC10
IC11
S1
S2
S3
S4
S5
RL1
T1
T2
CN1
CN2
CN3
CN4
CN5
CN6
CN7
CN8
CN9

AI 110 test procedure.

- Zet de AI 110 aan en kontroleer of de voedingsspanningen OK zijn (+48V, +18V en -18V).

- Verbindt een sinus van 1 Volt en 1 kHz met de gebalanceerde ingang op de voorkant. Check d.m.v. de scoop de vorm van de sinus aan de ongebalanceerde uitgang op de achterkant.

- Check de werking van de PHANTOM, PAD, GAIN en PINK schakelaars.

- Regel vervolgens in deze volgorde P5, P3, P4, P1 en P2 af.

- Verbindt een sinus van 1 Volt en 1 kHz met de ongebalanceerde ingang op de achterkant. Check d.m.v. de scoop de vorm van de sinus aan de gebalanceerde uitgang op de voorkant.

- Check de werking van de PINK en GROUND LIFT schakelaars.

- Regel vervolgens in deze volgorde P8, P6 en P7 af.

- Check de versterking van de eindtrap. Deze moet 1 bedragen. Check het maximale uitgangsvermogen bij 4 en 8 Ohm. Dit moet resp. meer dan 8 en 10 Watt bedragen. Check de vorm van de sinus.

- Check de OVERLOAD en CLIP funkties m.b.v. de scoop. Verbindt hiervoor de ongebalanceerde in- en uitgangen d.m.v. een cinch kabel.

- Check de frekwentie karakteristieken bij in/uitgeschakelde filters. Check de CMRR van de ingang en de THD van de uitgang en de eindversterker.

NB. Vergeet niet de trimmers na afregeling af te lakken! Zijn beide stickers op de achterkant geplakt (serienummer en netspanning)?

AI 110 afregelprocedures.

De AI 110 bevat 8 trimmers die afgeregeld moeten worden:

P1: Dient om de versterking van het totale ingangscircuit in de niet-filterstand bij 1 kHz op 1 af te regelen. Verbindt een ingangssignaal van 1 Veff en exact (!) 1 kHz tussen pin 2 en pin 3 van de gebalanceerde ingang op de voorkant van de AI 110 en schakel de PAD, de GAIN en de PINK funkties uit. Verbindt een AC voltmeter met R1 en regel de spanning op exact 1 Volt af.

P2: Dient om de versterking van het totale ingangscircuit in de filterstand bij 1 kHz op 1 af te regelen. Verbindt een ingangssignaal van 1 Veff en exact (!) 1 kHz tussen pin 2 en pin 3 van de gebalanceerde ingang op de voorkant van de AI 110 en schakel de PAD en de GAIN funkties uit. Schakel de PINK funktie in. Verbindt een AC voltmeter met R1 en regel de spanning op exact 1 Volt af.

P3: Dient om de common mode onderdrukking van de eerste verzwakkingstrap maximaal af te regelen. Verbindt een ingangssignaal van 1 Veff met pin 2 en pin 3 van de gebalanceerde ingang op de voorkant van de AI 110 en schakel de 30 dB PAD en de 30 dB GAIN in. Verbindt een AC voltmeter met pin 15 van IC1 en regel de spanning op minimaal af.

P4: Dient om de offset van het totale ingangscircuit op 0 af te regelen. Verbindt een DC voltmeter met R1 en regel de spanning af op 0 volt (zonder ingangssignaal!).

P5: Dient om de common mode onderdrukking van de tweede verzwakkingstrap maximaal af te regelen. Voor de afregeling zie de afregeling van P3 maar dan met de 30 dB PAD en 30 dB GAIN uitgeschakeld.

P6: Dient om de versterking van het totale uitgangscircuit in de niet-filterstand bij 1 kHz op 1 af te regelen. Verbindt een ingangssignaal van 1 Veff en exact (!) 1 kHz met de ongebalanceerde cinch ingang op de achterkant van de AI 110 en schakel de PINK funktie uit. Verbindt een AC voltmeter tussen pin 2 en pin 3 van de gebalanceerde XLR uitgang op de voorkant van de AI 110 en regel de spanning op exact 1 Volt af.

P7: Dient om de versterking van het totale uitgangscircuit in de filterstand bij 1 kHz op 1 af te regelen. Verbindt een ingangssignaal van 1 Veff en exact (!) 1 kHz met de ongebalanceerde cinch ingang op de achterkant van de AI 110 en schakel de PINK funktie in. Verbindt een AC voltmeter tussen pin 2 en pin 3 van de gebalanceerde XLR uitgang op de voorkant van de AI 110 en regel de spanning op exact 1 Volt af.

P8: Dient om de symmetrie van de gebalanceerde lijnversterker optimaal af te regelen. Verbindt een ingangssignaal van 1 Veff met de ingang op de achterkant van de AI 110. Verbindt een AC voltmeter met pin 6 van IC7 en regel de spanning op minimaal af.