



CS 106+1
CS 108+1

OPERATOR'S MANUAL

COOPER ■ SOUND
□ S O N U S □ C L A R U S □
TM

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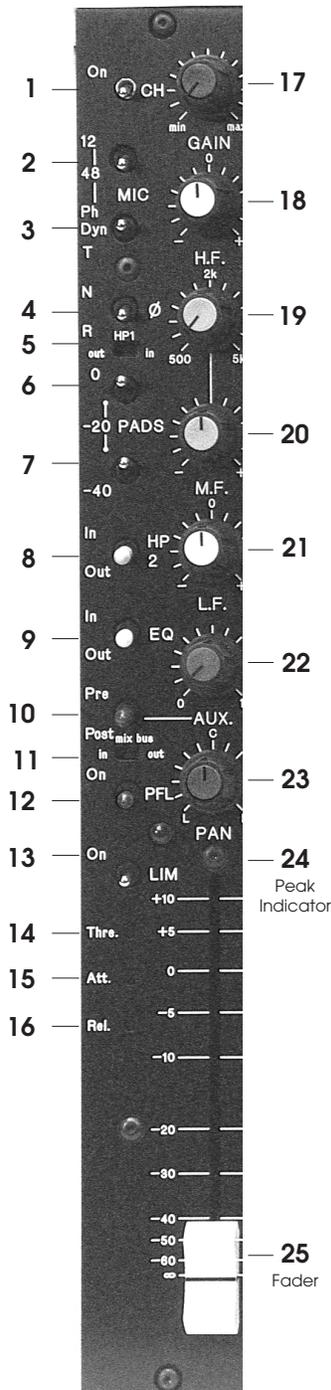
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INPUT PANEL

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1. **CHANNEL POWER:** Do not switch during recording.
2. **12V / 48V PHANTOM POWER.**
3. **MIC POWER SELECT:** Phantom (select voltage above)
Dynamic (no power)
"T" power (A B)
4. **PHASE:** Audio phase only
5. **HIGH PASS FILTER 1:** Pre-transformer.
- 6./7. **PAD:**

	'-20' SWITCH	'-40' SWITCH
	up	up = '0'
	down	up = 20
	down	down = 40
	up	down = '0'
8. **HIGH PASS FILTER 2:** Post mic preamp:
9. **EQUALIZER SECTION BYPASS:** Includes HF, MF & LF filters, but not high pass filters
10. **PRE / POST:** Auxiliary send select
11. **MIX BUS:** Disables channel to mix bus to enable channel to be used discretely from the mixer outputs.
12. **PFL:** Sends selected channel to "phones" only, cuts out all other inputs to "phones" when operated.

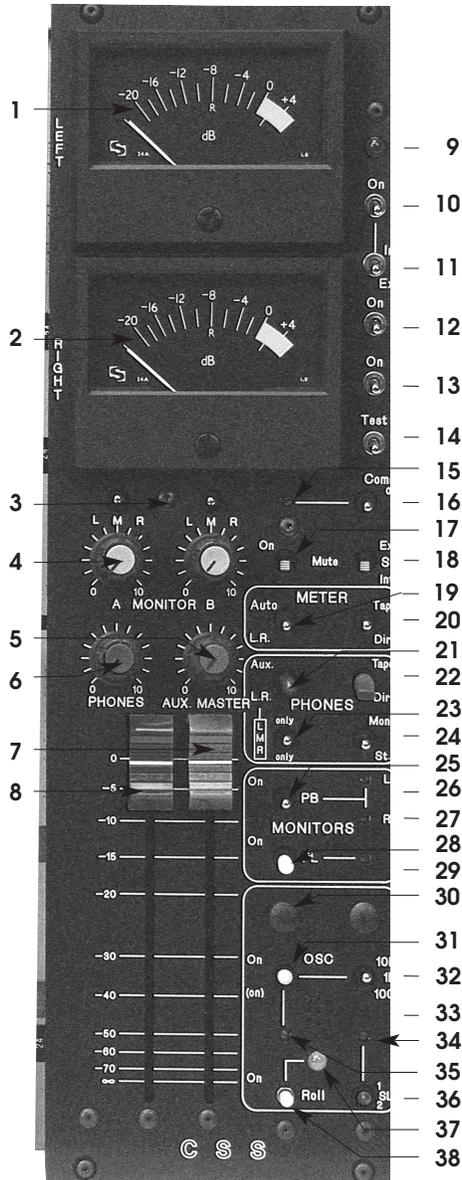
- 13. **LIMITER ON / OFF:** Limiter is completely out of circuit in off position. Limiter is a symmetrical peak detecting type. Intended as a peak limiter only.
- 14. **THRESHOLD:** Clockwise=lower threshold
- 15. **ATTACK:** Clockwise=shorter attack time
- 16. **RELEASE:** Clockwise=shorter release time
- 17. **GAIN:** Mic preamp stage gain
- 18. **HIGH FREQUENCY
AMPLITUDE CONTROL.**
- 19. **MID FREQUENCY SELECT.**
- 20. **MID FREQUENCY
AMPLITUDE CONTROL.**
- 21. **LOW FREQUENCY
AMPLITUDE CONTROL.**
- 22. **AUXILIARY SEND:** 3 o'clock position is nominal output level for O 'Vu' with auxiliary master set at max.
- 23. **PAN CONTROL.**
- 24. **PEAK LEVEL INDICATOR:** Symmetrical peak detector
- 25. **CHANNEL FADER.**

ADDITIONAL NOTES: With Vu meters—Nominal level is '0'
With PPM meters—Nominal level is -8 dB

See page 11 for specifications.

OUTPUT MODULE

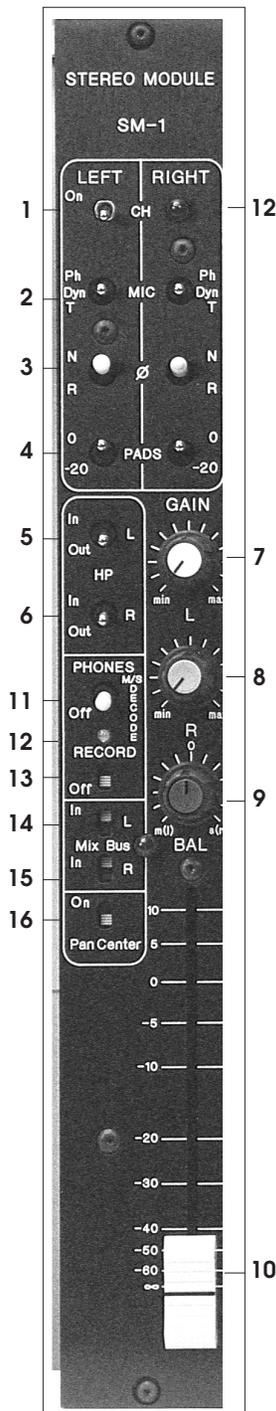
MODELS: CS 106+1
CS 108+1



1. **LEFT METER:** Vu or PPM. Indicates left, Aux., PFL
 2. **RIGHT METER:** Indicates right, aux., PFL and battery level.
 3. **MONITORS A & B SELECT:** Left only, right only, left and right.
 4. **MONITORS A & B LEVEL:** Mono output
Application: monitor A can be assigned to boom operators and monitor B to director / script.
 5. **AUX. MASTER:** Max=nominal level
 6. **"PHONES" LEVEL:** Stereo output
 7. **RIGHT OUTPUT FADER:** Max=nominal level
 8. **LEFT OUTPUT FADER:** Max=nominal level
 9. **POWER ON LED.**
 10. **POWER ON / OFF.**
 11. **POWER INTERNAL / EXTERNAL SELECT.**
 12. **PHANTOM POWER ON:** To conserve current consumption when 48v phantom mics are not used (Does not affect 12v phantom)
 13. **LIGHT ON:** Switches +12vDC to BNC connector. May be used to power a Littlite.
Note: Not recommended to use Q5 type bulb due to large current consumption. Ground of BNC is isolated from chassis. (Do not ground lamp to chassis)
 14. **BATTERY TEST:** Lower (right) meter measures level of batteries or external power.
- | | |
|------------------------|-------------------------|
| With Vu Meters: | With PPM Meters: |
| 0Vu=12v | -6=12v |
| +3Vu=18v | +2=18v |

- 15. COMMUNICATIONS TRIMMER:** To adjust level of communications signal.
- 16. COMMUNICATIONS ON/ OFF:** Communication input is fed only to "phones." (Line level input) (eg: Boom operator talkback or cueing)
- 17. MUTE ON:** In "on" position both monitor A & B outputs are muted during slating and oscillator operation. An internal circuit board switch disables muting function to monitor A output.
- 18. SLATE INTERNAL /EXTERNAL:** External slate mic may be connected to the slate XLR. Level is adjusted by (34)
- 19. "METER" AUTO /LEFT RIGHT:** In auto, the meters follow the "phones" selection. ie: Mono / stereo, L/R, Aux., PFL, Tape/Direct, L only, R only. In the L/R position the meter indicates left and right signals, controlled by switch #20. (Tape direct)
- 20. "METER" TAPE /DIRECT.**
- 21. "PHONES" AUX. /LEFT RIGHT:** Auxiliary signal is fed to both left and right "phones" outputs.
- 22. "PHONES" TAPE /DIRECT.**
- 23. "PHONES" LEFT, MIX, RIGHT:** With switch (21) in L.R., either left only or right only or both are fed to "phones" outputs.
- 24. "PHONES" MONO / STEREO.**
- 25. "PLAYBACK:** Assigns tape return to monitor A & B outputs.
- 26. LEFT TAPE RETURN:** Level adjust for tape return.
- 27. RIGHT TAPE RETURN:** Level adjust for tape return.
- 28. PRIVATE LINE:** Either internal or external slate mic output is fed to monitor A output. (Can also be assigned to monitor B, see page 16).
- 29. PRIVATE LINE LEVEL:** Independent of slate level.
- 30. OSCILLATE ASSIGN:** Aux only, L/R only, all outputs
- 31. OSC. ON:** Three-position switch; Up=On Center=Off
Down=Momentarily on
Level is dependent upon master fader positions.
- 32. OSC. FREQUENCY SELECT:** Note: Also controls the frequency of the auto end tones.
- 33. INTERNAL SLATE MIC.**
- 34. SLATE LEVEL:** Controls both internal and external slate levels.
- 35. OSCILLATOR LEVEL.**
- 36. SLATE ON:** Three-position switch; Up =On(no sub-tone) Center=Off
Down=Momentarily on (with subtone)
Also, turns remote roll on (internal switch to defeat, see page 16).
- 37. ROLL ON LED.**
- 38. ROLL ON:** Roll is connected to the tuchel connectors to turn on either a Nagra 4.2 or IVS or both. When the roll switch is turned to off, the recorder will remain on for ≈1 sec. and two end tones are fed to outputs. This function can be defeated by a dip switch inside. (See location diagrams, page 16).

See Specifications on Page 12



1. **CHANNEL POWER.**
 2. **LEFT & RIGHT MIC POWER SELECT:** Phantom (48v)
Dynamic (no power)
"T" power (A B)
12v phantom may be selected on circuit board via straps.
 3. **LEFT & RIGHT PHASE:** Audio phase only.
 4. **LEFT & RIGHT PADS.**
 - 5./6. **LEFT & RIGHT HIGH PASS FILTER.**
 - 7./8. **LEFT & RIGHT PREAMP GAIN CONTROL.**
 9. **BALANCE / STEREO WIDTH CONTROL:** With a left, right mic configuration, the balance of the two channels can be changed. In M/S configuration, this control affects the stereo width: A wider stereo image is obtained with the control set towards S.
 10. **CHANNEL STEREO FADER.**
- M / S DECODE SECTION:**
11. **PHONES DECODE:** Phones circuit only is switched to M/S decode. In left, right operation, this switch should be off.
 12. **LED:** Indicates phones decode on.
 13. **RECORD DECODE:** The output of the stereo module is decoded (M/S in =L/R out).
 - 14./15. **MIX BUS IN / OUT LEFT & RIGHT:** With the mix bus switches out the line outputs of the stereo module may be used to feed a separate recorder without affecting your main mix. (See switch combination examples.)
 16. **PAN CENTER:** Monos module outputs

SWITCH COMBINATIONS

	<u>L MIX BUS</u>	<u>R MIX BUS</u>	<u>PAN CENTER</u>
Ex. 1	In	Out	Off
Ex. 2	Out	In	Off
Ex. 3	In	In	Off
Ex. 4	In	In	On
Ex. 5	Out	Out	Off
Ex. 6	Out	Out	On
Ex. 7	In	Out	On
Ex. 8	Out	In	On

Ex. 1 Left mic in is assigned to the left mix bus (right input is not used). This enables module to be used as a single mono channel. By switching the unused channel out there will be no additional noise contributed to the other mix bus.

Ex. 2 As above, with right mic.

Ex. 3 Both inputs are fed to their respective outputs.

Ex. 4 Both module outputs are centered (ie; they are combined and fed equally to both left and right mix busses and outputs).

Ex. 5 Both outputs are disconnected from the mix busses and fed only to the module line outs.
(To enable a discrete mix to be made on a separate recorder.)

Ex. 6 As above, but both outputs are combined as in Example 4.

Ex. 7 Left output only is assigned to both left and right mix busses and outputs.

Ex. 8 As above, with right output.

NOTE: The switches above enable the module to function as a single channel or as dual mono channels.

SPECIFICATIONS:

PADS:	-20 dB
HIGH PASS FILTER:	FC=70 HZ, 12 dB/octave.
RESPONSE:	20-20 kHz +/- 0.5 dB
EIN:	20-20 kHz better than -128 dBu
THD+N:	20-20 kHz better than .01%

AUX MODULE

MODELS: CS 106+1
CS 108+1

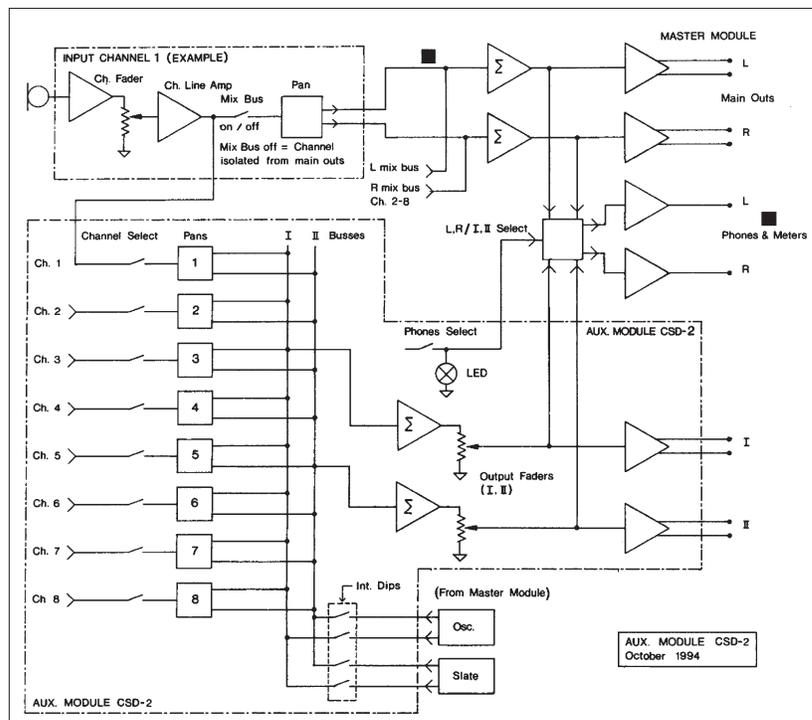
A modular unit that can be installed in the Cooper series 100 location mixers. This module provides two extra independent balanced outputs (Aux I, I I) that can be utilized for four track recording (eg; Nagra D), two stereo mixes or additional aux. sends.

The CSD-2 includes two P&G faders that are aligned with the existing two output faders on the master module for easy group fades. Any input channel can be selected or assigned to the CSD-2 outputs via the aux. module channel select switches and the pan pots. The aux. outputs can be monitored by the 'phones' and 'meters' on the output module by selecting 'I, II' on the module.

Mix bus switch on input channels - when switched 'off' the channel line out will only go to the aux. module outputs allowing separate mixes to be made independent of the main L, R outputs.

The slate and oscillator from the master module is also connected to the aux. outs (internal dip switches can defeat this feature). The outputs are via a 5-pin XLR connector mounted on the rear panel. Adapters to 3-pin XLRs are available. Pin configuration is standard. (See specifications)

As with all other Cooper Sound products, all components are the best available to ensure the highest audio quality and reliability in the field.



SPECIFICATIONS

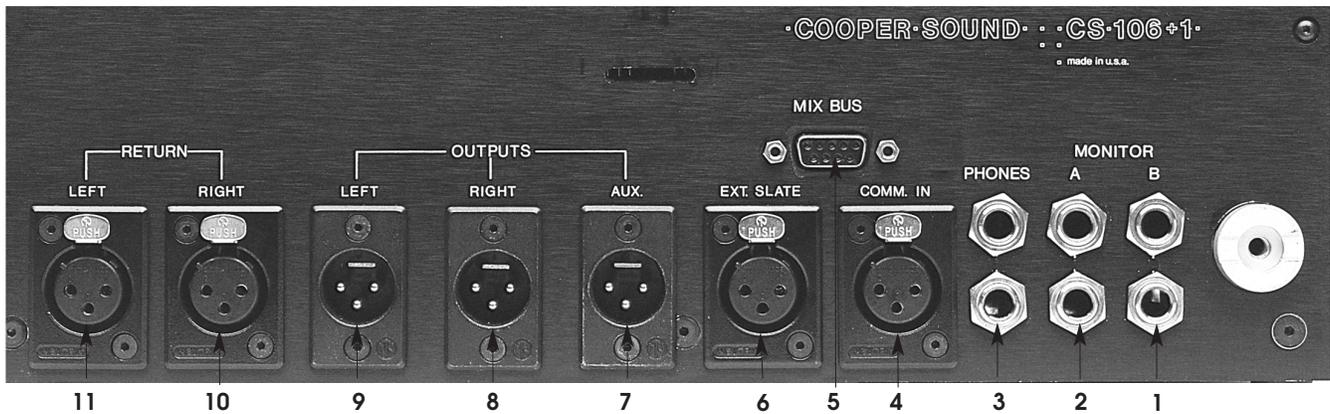
OUTPUTS: +4 dBu balanced

RESPONSE: (20-20 kHz)
= +/- 0.5 dB

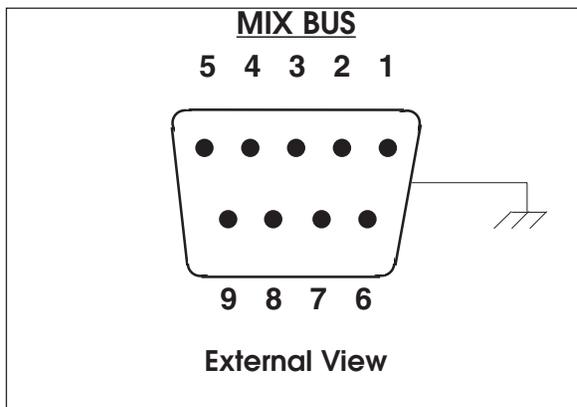
THD + N: (20-20 kHz) = 0.01%
(TYP. 0.005%)

XLR-5 CONFIGURATION:

- Pin 1 = ground
- Pin 2 = I high
- Pin 3 = I low
- Pin 4 = II high
- Pin 5 = II low



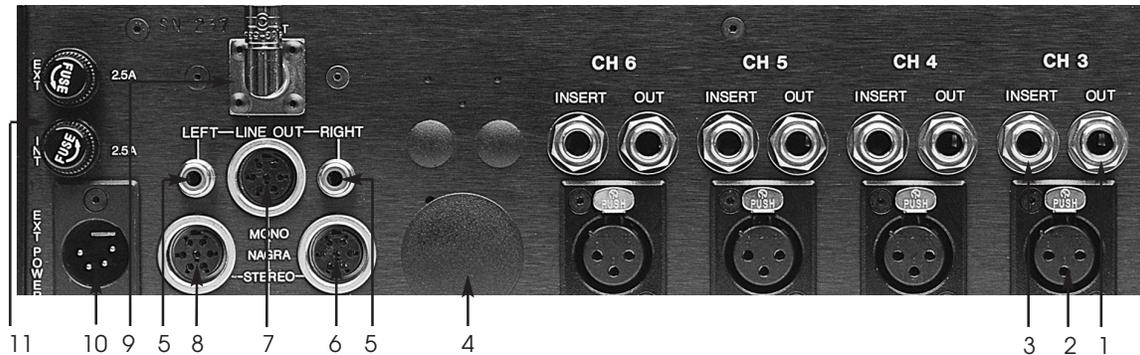
1. **MONITOR B OUTPUT:**
Mono out. Both jacks are paralleled.
2. **MONITOR A OUTPUT:**
Mono out. Both jacks are paralleled.
3. **PHONES OUTPUT:**
Stereo out. Both jacks are paralleled.
(Additional jack on front panel.)
4. **COMM. IN:**
Balanced, line level.
5. **MIX BUS:**
Access to mixer busses. Another mixer may be connected to this input to increase the number of channels.
See below for connections.
6. **EXTERNAL SLATE IN:**
Unbalanced mic level in.
7. **AUX. OUT:**
Balanced. Nominal level +4 dBu.
8. **RIGHT OUT:**
Balanced. Nominal level +4 dBu.
9. **LEFT OUT:**
Balanced. Nominal level +4 dBu.
10. **RIGHT TAPE RETURN:**
Balanced input.
11. **LEFT TAPE RETURN:**
Balanced input.



1. PFL VC
 2. PFL SIGNAL
 3. AUX BUS
 4. LEFT MIX BUS
 5. RIGHT MIX BUS
- CASE = GROUND

REAR PANEL & CONNECTOR DATA

MODELS: CS 106+1
CS 108+1



1. **LINE OUT:** Unbalanced mono jack
2. **XLR IN:** Transformer balanced input
3. **INSERT:** Send, return
Tip = Send
Ring = Return
Sleeve = Ground
4. **EXTRA CHANNEL:** See notes.
5. **LOW LINE OUTS:** For connection to cassette or DAT recorders.
6. **MIXER INPUT-STEREO:** Nagra IVS output. Includes remote roll and tape return.
7. **MONO:** Nagra 4.2 "mixer" input. Includes remote roll and tape return.
8. **MIXER OUTPUT-STEREO:** Nagra IVS line input.
9. **BNC LIGHT:** Switched by "light" switch. Internally fused. +12 v DC (Negative isolated from chassis.)
10. **POWER INPUT:** External power and charger input.
11. **FUSES:** Protects both internal batteries and external power.



EXTERNAL VIEWS

Mixer Input
IVS 'Output'

- | | |
|--------------|-----------|
| 1. Ch. 2 Out | 6. Stop |
| 2. -10v | 7. Ground |
| 3. Ch. 1 Out | |
| 4. N/C | |
| 5. N/C | |

Mono
4.2 'Mixer'

- | | |
|-----------|-----------|
| 1. Input | 6. Stop |
| 2. -10v | 7. Ground |
| 3. N/C | |
| 4. N/C | |
| 5. Output | |

Mixer Output
IVS Line 'Input'

- | | |
|----------|-----------|
| 1. Ch. 2 | 6. N/C |
| 2. N/C | 7. Ground |
| 3. Ch. 1 | |
| 4. N/C | |
| 5. N/C | |

Power XLR

- | |
|---|
| 1. Ground- Power ground (-)
only (not chassis) |
| 2. N/C |
| 3. Charger Input (+) |
| 4. External Power In (+) |

SPECIFICATIONS

MODELS: CS 106+1
CS 108+1

GENERAL

Dimensions of Chassis
(excluding connectors and handle):

CS 106: 14.4 x 12.3 x 3.3
CS 108: 17.4 x 12.3 x 3.3

Dimensions of Chassis
(including all hardware and lid):

CS 106: 15.0 x 12.75 x 4.5
CS 108: 18.0 x 12.75 x 4.5

Weight without Batteries:
Weight with Alkaline Cells:

CS 106, 6 channels: ≈ 17 Lbs.
CS 106, 6 channels: ≈ 20 Lbs.

POWER SUPPLY

External DC:

10-27v DC, minimum 12v DC for
48v Phantom

Internal Batteries (12 D cells):

18v DC

+12v DC out (on BNC):
(switched by light switch)

Max current: 500 mA
Regulated with input voltage
> 14v DC
Ground is isolated from chassis.

48v Phantom:

Supplies over 40 mA of current for
Phantom powered microphones

Current Consumption:
(6 channels on, no mic powering or input signal)
Output Section only

≈ 450 mA with 18v DC in.
≈ 250 mA with 18v DC in.

Battery Life, Continuous Use, Alkaline Cells:

≈ 12 hours-6 channels on

Overall Frequency Response:

20-20 KHz +/-0.5 dB

Overall Distortion THD+N @ 0'Vu' (20-20 KHz):

< 0.01 %

	<u>"A" Weighted</u>	<u>Lin 20-20 KHz</u>
Equivalent Input Noise 150 Ω source	<-130.5 dBu	<-128 dBu

INPUT

Specs below are for 0 'Vu' modulation and channel fader @ '0'.
0'Vu' refers to mixer meter, not 0 dBm
(With PPM meters installed: 0 'Vu'=-8 dB.)

MIC IN (TRANSFORMER BALANCED):

Max. sensitivity for 0 'Vu':	-83 dBu $Z_{in}=1.4\text{ k } \Omega$
Max. input with -40 dB pad:	+28 dBu $Z_{in}=10\text{ k } \Omega$

HIGH PASS FILTER:

Pre-transformer.	-6 dB/octave, 100 Hz
Post transformer & mic preamp:	-18 dB/octave, 70 Hz

EQ:

High frequency:	+/- 12 dB @ 10 kHz
Mid frequency:	+/- 15 dB 500-5 kHz
Low frequency:	+/- 12 dB @ 100 Hz

INSERT:

Send:	-11dBu $Z_{out}=47\Omega$
Return (max input+19 dBu):	-11dBu $Z_{in}=10k\Omega$

LINE OUT:

-7dBu
 $Z_{out}=100\Omega$

PEAK INDICATOR:

Nom. -3dB below clip

LIMITER:

Threshold - variable	Nom. -9dB below clip
Attack - variable	
Release - variable	

SPECIFICATIONS

MODELS: CS 106+1
CS 108+1

OUTPUT

All specs with output faders at '0' (i.e., max)
and
0 'Vu' modulation (0 dBu .775v)

MAIN OUTPUTS:

Left, Right and Auxiliary - transformer balanced: +4 dBu, Zout=600Ω

UNBALANCED OUTPUTS:

Tuchel: Mono: -11dBu=-8dB on Nagra
modulometer

Stereo: Current Output: (-11dBu into 69.8kΩ)

RCA Out: -2.5dBu Zout=47Ω

TAPE RETURN:

Balanced: Variable: -13dBu to +18dBu

MONITORS:

Phones: -1.7dBu

A & B: -2.5dBu, (+3.5dBu mix)

Minimum load is 25Ω for all monitors

COMMUNICATION IN:

Balanced: Line Level Min. Input -8dBu Balanced
-2dBu Unbalanced

SLATE IN:

Unbalanced Mic Level: Variable Gain: 12 to 72dB

MIX BUS INPUT:

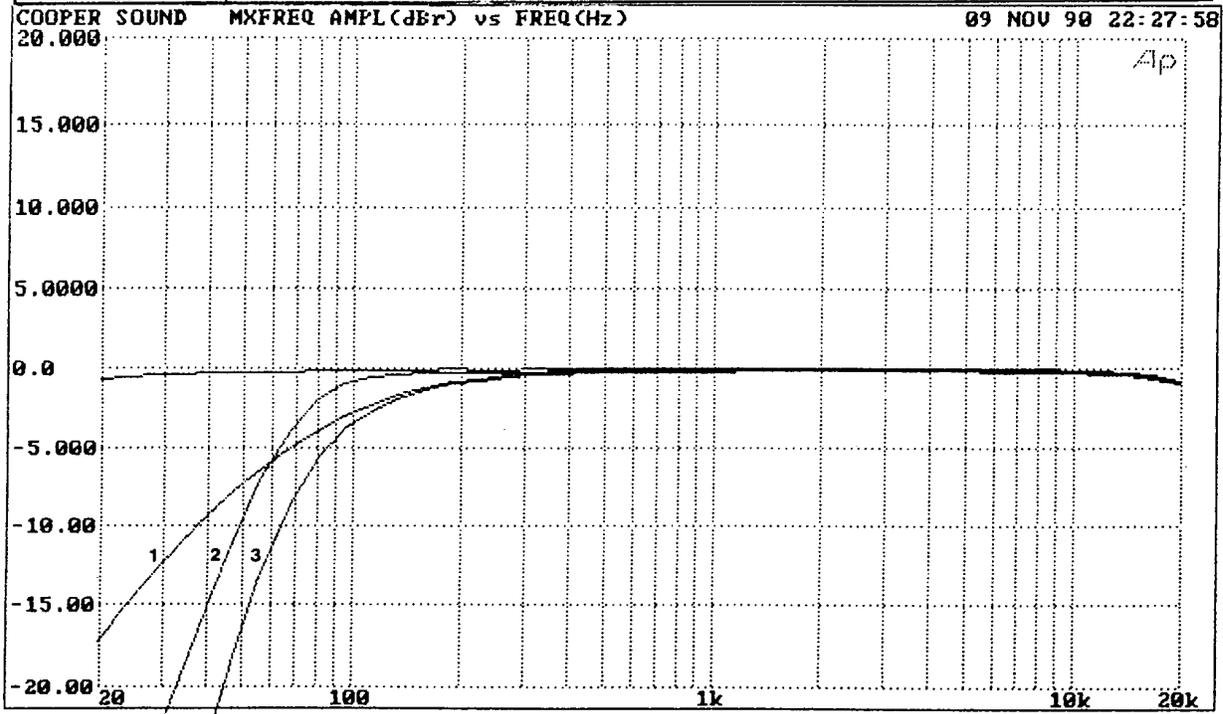
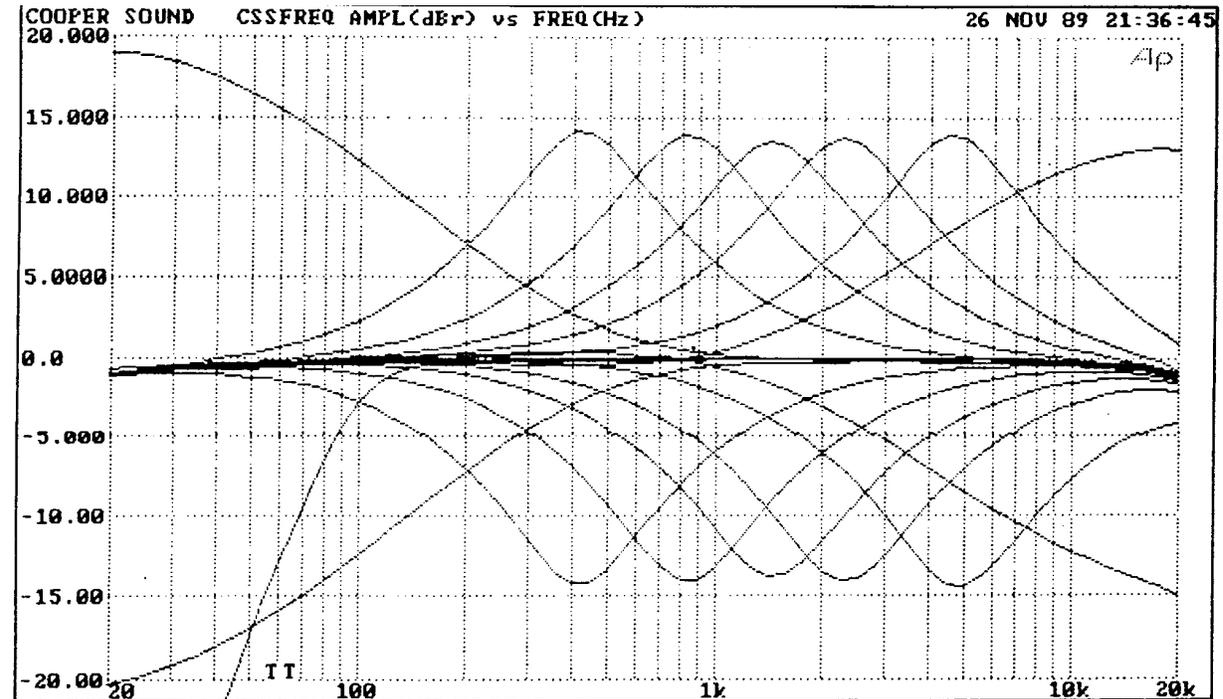
Left, Right and Auxiliary: Current Input:
-6dBu 16k external resistor
14dBu 2.4k external resistor

PFL:

NOTE: Resistor value may be changed to suit different input levels.

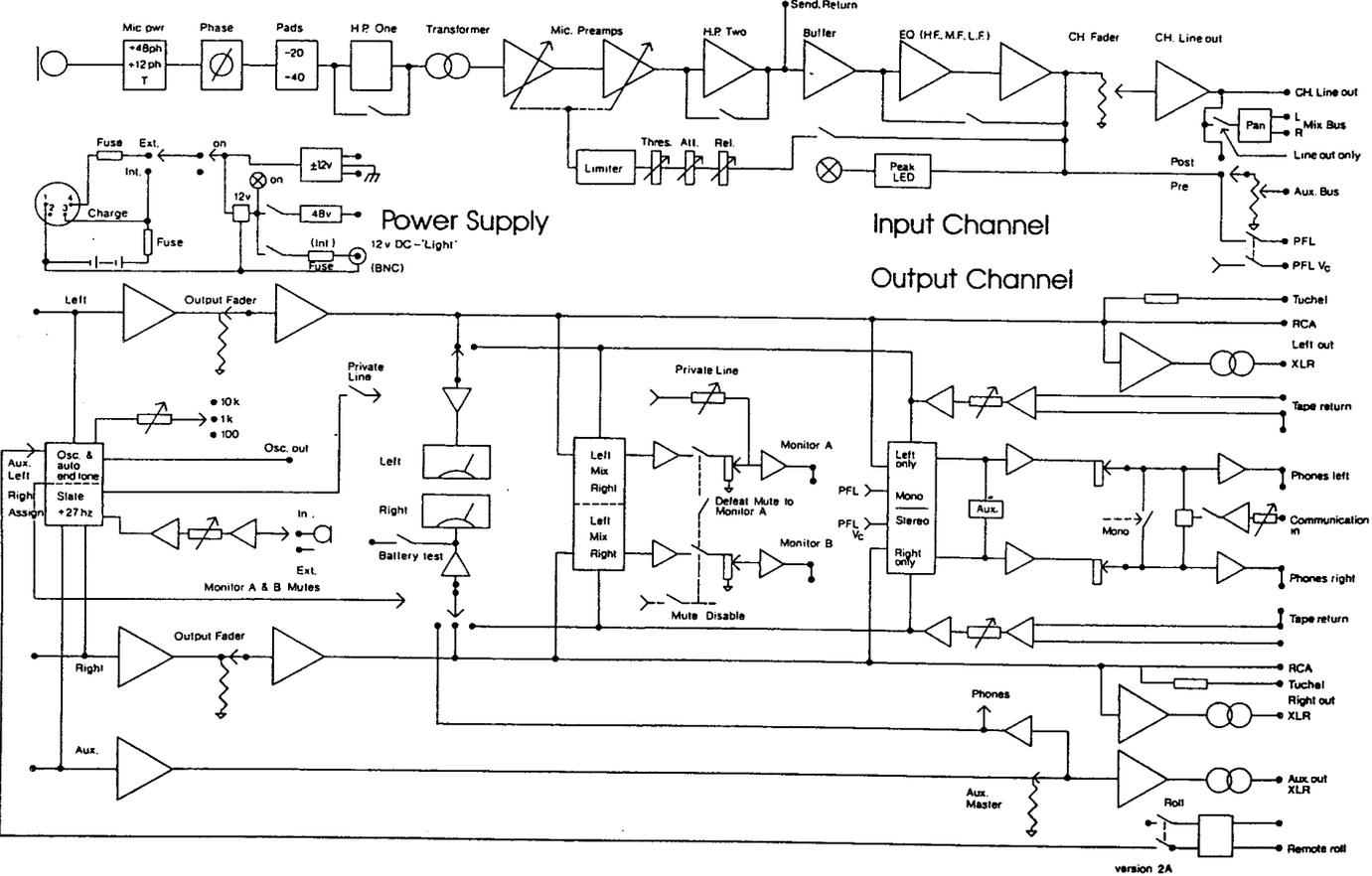
SIGNAL TO NOISE WITH FADERS @ '0', CHANNEL FADERS OFF:

	Lin 20-20k
Low Line Output:	-88 dBu
+4 dBu Output:	-82 dBu



- 1. HIGH PASS 1
- 2. HIGH PASS 2
- 3. COMBINED

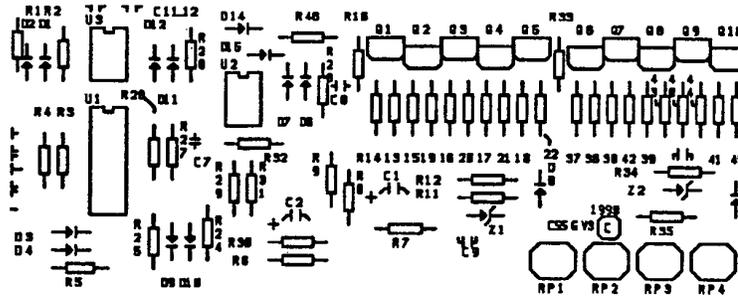
BLOCK DIAGRAM



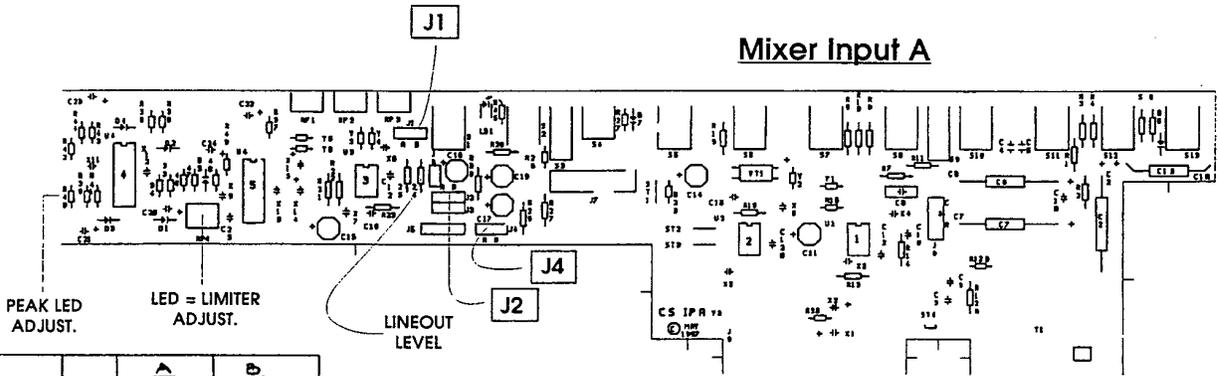
TRIMMER AND SWITCH LOCATION DIAGRAMS

MODELS: CS 106+1
CS 108+1

PPM Meter Drivers



Mixer Input A



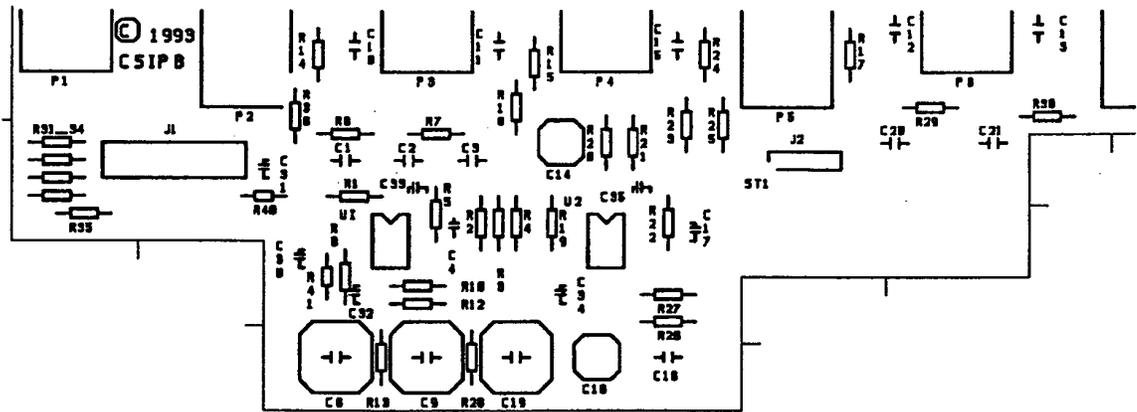
PEAK LED
ADJUST.

LED = LIMITER
ADJUST.

LINEOUT
LEVEL

		A	B
LED	J1	O/L ONLY	LED=LIM
PHONES	J2	AFL	PFL
DIRECT OUT	J4	POST	PRE

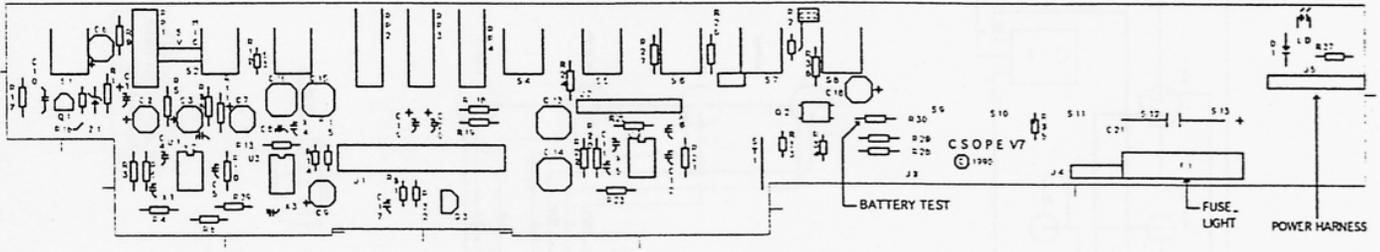
Mixer Input B



TRIMMER AND SWITCH LOCATION DIAGRAMS

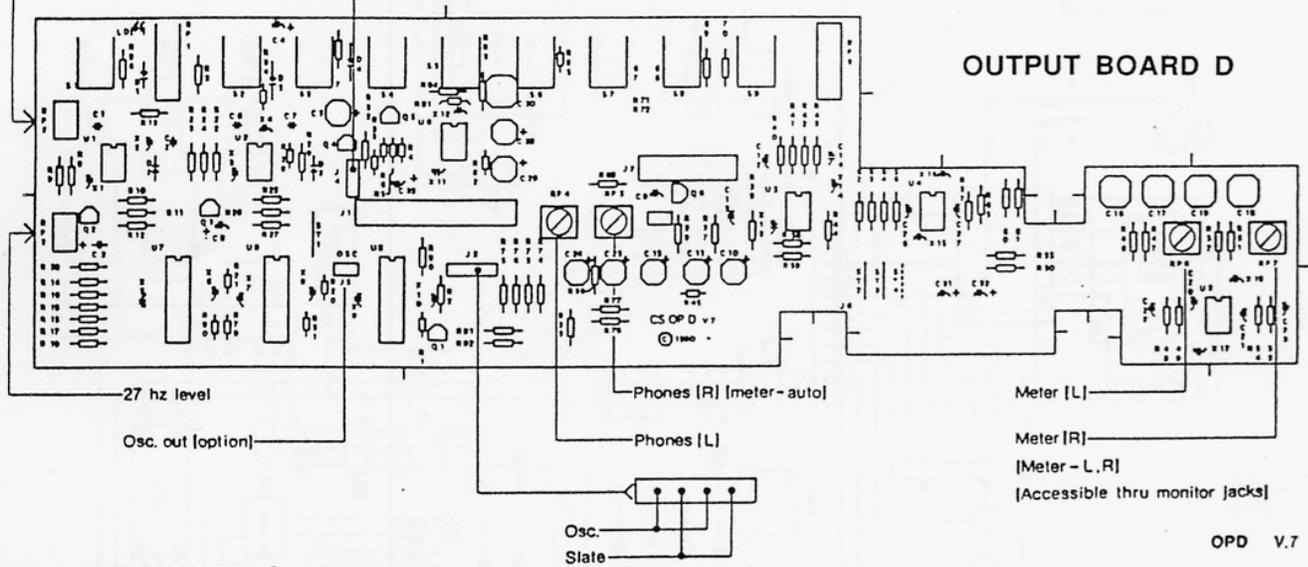
MODELS: CS 106+1
CS 108+1

OUTPUT BOARD E

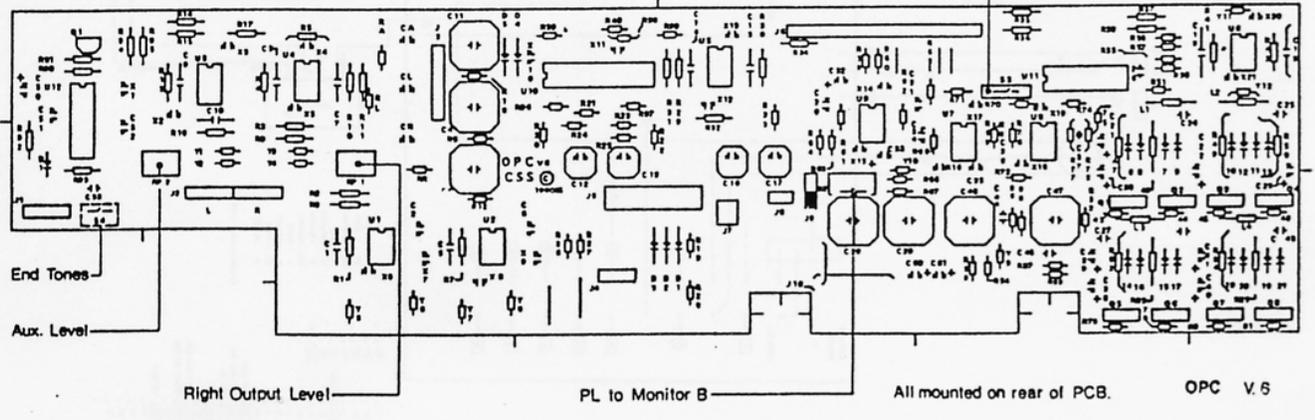


Slate = Roll: Positions 1 & 2
Slate = Roll: Position 2 only
[No jumper; Slate ≠ Roll]

OUTPUT BOARD D

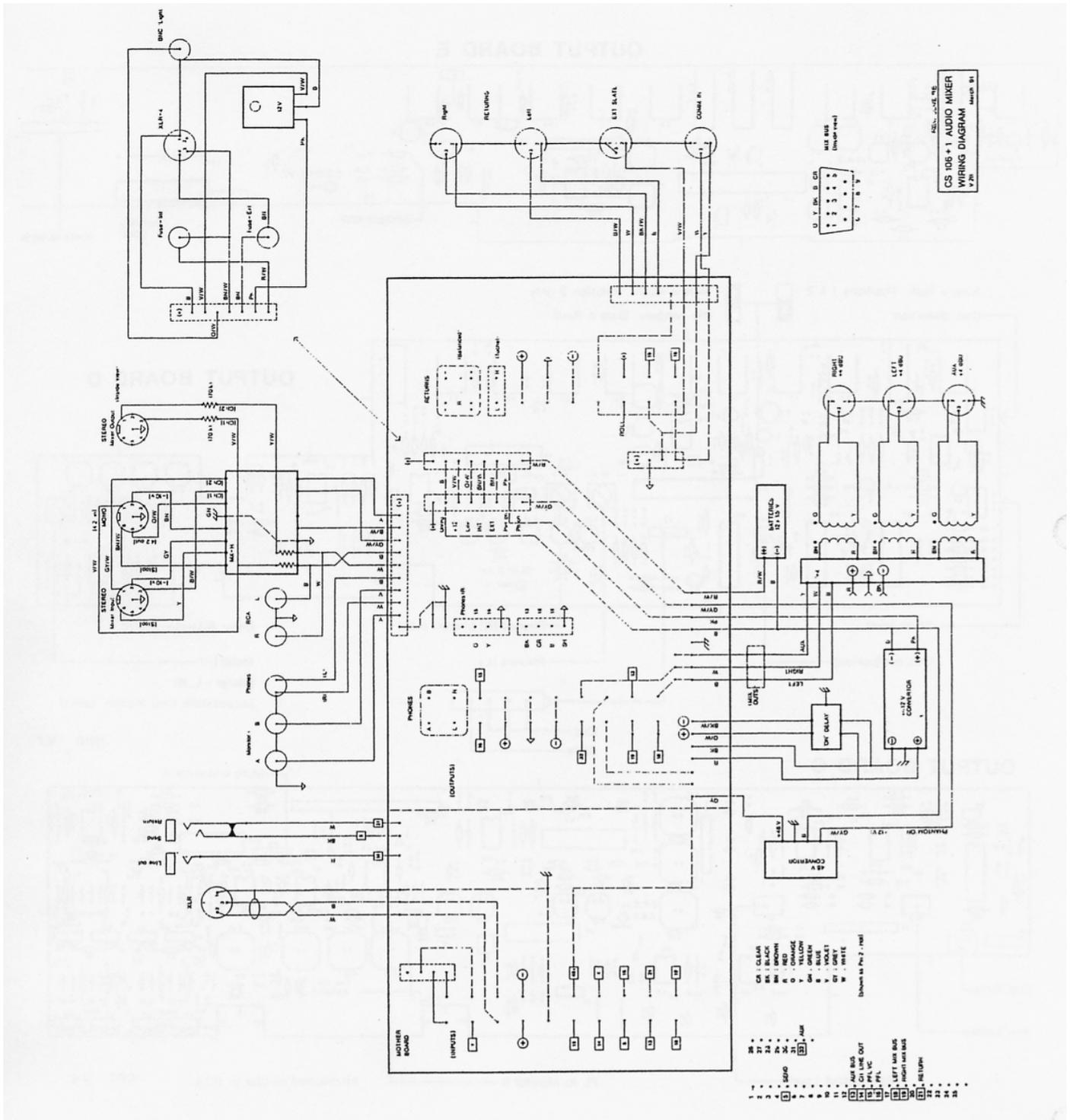


OUTPUT BOARD C



WIRING DIAGRAM

MODELS: CS 106+1
CS 108+1



INPUTS

XLR IN: Transformer balanced input. Nominally Pin 2 high. (Pin 3 - low, Pin 1 - ground).

CHANNEL POWER: To conserve current consumption, switch off unused channels. Do not switch during record.

MIC POWER SELECT: Dynamic=no power applied to microphone. For example, dynamic and radio microphones. T-power/AB power=Unbalanced microphone powering, nominally Pin 2 is positive, for use with unmodified European microphones. XLR must be reversed for 'red dot' microphones. Phantom power=Balanced powering, positive DC voltage on both Pins 2 and 3; 48 volt and 12 volt phantom switchable. Phantom master switch must be on for 48 volt. 12 volt phantom is always available. Do not switch to 48 volt with 12 volt phantom microphones. Some phantom powered microphones (eg: AKG 451 and 460 Series) will function from 12 to 48 volt. (It is recommended to use 12 volt phantom and switch off 48 volt phantom master switch to conserve battery consumption.)

PHASE: This affects audio phase only (ie; does not control the T-power polarity). N (normal)=Pin 2 high. R (reverse). It is important that the phase of the microphones are matched to avoid phase cancellation. Absolute phase throughout the system should also be maintained.

PADS: To attenuate the input signal, either 20 or 40 dB. For typical SPL (sound pressure levels) pads are not necessary due to the high system headroom. The use of pads will degrade the signal to noise ratio if used within the range of the microphone gain trim. 40 dB pad may be used for balanced line level signals. Again, this configuration would only be used where signal to noise is not important. It is preferable to use the insert point for line level inputs.

HIGH PASS FILTERS: HP 1=Pre-input transformer, for use where very high level, low frequency signals may saturate the transformer and pre-amplifier. In general, because of the very high saturation point of the Jensen Transformers (-6 dBu at 20 Hz), this filter is rarely necessary. HP 2=Sharp roll-off below 75 Hz to reduce microphone handling noise and other low frequency disturbances. It is recommended to use this for dialogue recording as the bandwidth of interest normally exceeds 100 Hz.

EQ: Hard bypass switch does not affect H.P. filters. EQ-H.F.=(High frequency) Used to increase/decrease 'brightness' of signal. (eg: to reduce sibilance.) Shelving response (+/-12 dB at 10 kHz) EQ-M.F.=(Mid frequency) Center frequency variable from 500-5 kHz. Amplitude variable from +/-14 dB. (eg: May be used to increase 'presence') EQ- L.F.=(Low frequency) Shelving response may be used for a more gradual tapering of low frequency signals. (+/-12 dB at 100 Hz)

AUX: Pre/Post channel fader with auxiliary send level control. A separate mix may be made using this bus. Levels are matched pre/post with the fader at '0'. Master gain is on the output module. Note: Insure that unused channel auxiliary pots are set at zero. (eg: 1. A separate audio feed for video assist purposes. 2. Playback mix or for any other mono mix purposes.) (See also Master Aux. Level control.)

INPUTS, Continued

PAN POT: Used either for stereo music applications, selecting Left or Right for two track mono recordings, or left for one channel mono recorders. Two track mono-sometimes it is useful to separate the boom microphone from the radio microphones inputs. Therefore a mix may be made in post production to obtain the perspective of the shot. An additional benefit is that if there are radio microphone transmission problems during the take, the boom microphone recording will remain unaffected.

PRE FADE LISTEN (PFL): For monitoring on the phones output. Sends selected channel to 'phones' only. Cuts out all other inputs to 'phones' when operated. (eg: May be used for pre-checking inputs not yet active.)

THRESHOLD ADJUSTMENT

1. With Signal Generator: Feed in a 1kHz signal into the channel. With the channel fader at '0' adjust the signal level and channel gain trim so the channel O/L LED comes on, with the limiter off. Turn on limiter and adjust threshold for a +4 PPM on the meters, with the master faders at maximum. RCA Out=2.5v RMS (+10dBu) (-10dB below clip)

2. With Voice Only: Turn on the internal oscillator. Reduce master faders 8 dB. (-16 PPM). Turn off oscillator. With channel fader at '0', adjust gain trim so that the O/L LED just turns on. Adjust threshold for +4PPM deflection with limiter on. (This corresponds approximately to a +4 steady state signal). Reposition master faders to '0'.

ATTACK: Trimmer is normally set vertical C.C.W. Full counter clockwise=slowest attack time. Too fast an attack time will attenuate the leading edge of the wave form, changing the envelope and therefore the limiter effect becomes more audible.

RELEASE: Trimmer is normally set vertical C.W. Full clockwise=fastest release time. Too slow a release time becomes quite audible with speech as the background noise level between word changes. The attack and release time settings do interact with the threshold adjustment, therefore the threshold may need to be changed after adjustment of these trimmers.

CHANNEL FADER & PEAK LED: For optimum headroom and versatility it is best to operate the channel fader around the zero point. Therefore, the microphone preamp gain trim should be adjusted during rehearsals with the channel fader at '0' so that the average program level will modulate the meter to '0'dB. During the take, the channel fader may be used for controlling the channel gain. Peak LED: Nominally set at -3dB below clipping, with the channel fader at '0'. Occasional flash of the indicator on peaks is not a problem. If the indicator is consistently on, microphone preamp gain should be reduced.

INSERT: Send and return to auxiliary equipment. (eg: Outboard compressor/limiter, equalizers and multi-track recorders).

MIX BUS: When switched to off, the input channel is disconnected from the output module. (eg: discrete feed for playback systems or separate ffered for multi-track recorders) (Also see CSD-2 Aux. Module)

LINE OUT: Normally preset for post channel fader. (eg: feed to playback systems. Direct ffered to multi-track recorders). For pre-fader, see layout IPA v8.

OUTPUT MODULE

METERS

Vu METER: Responds to the average program level. The internal oscillator should be set for '0' VU on the meter. This will correspond to +4 dBu on the XLR outputs. As this is an average responding meter, the peak program level will not be indicated. In general, the Nagra modulometer will indicate approximately '0' dB for peak levels if the line up tone is set at -8 dB modulometer. For feeding external equipment with VU meters, the level should be set for '0' VU on both the mixer and the outboard equipment.

PPM METER: Peak responding meter. The reference level for a 1 kHz sine wave is set for -8 dB. This corresponds to approximately '0' VU, although the difference between an average responding meter and a PPM meter will vary according to program material. The rise and fall times are set to approximate the Nagra modulometer meters.

OUTPUT FADERS: These faders should be left at the maximum position (ie: '0') for optimum signal to noise and headroom. All line-up tones etc., should be made with the faders in this position.

POTS

PHONES: To adjust level to phones only (stereo output). Caution: It is recommended to set the 'phones' pot at minimum before wearing headphones. Then increase the level to suit personal preference. The minimum total load (impedance) per side is 25Ω. As all the phone jacks are in parallel, the combined load should not be less than 25Ω.

MONITORS A & B: Minimum total load impedance is 25Ω. As the A outputs are in parallel, the combined load should not be less than 25Ω.

AUX. MASTER: Nominal level is at '10'. Controls level fed to aux. output connector. With input pots at 3 o'clock and master at maximum, meter and output levels will correspond to the left, right bus levels.

SWITCHES

POWER: INTERNAL/EXTERNAL: Switch to internal when using batteries. It is recommended to use alkaline D cells. Rechargeable (Nicad cells) may also be used with reduced battery life. Pin 3 of power XLR is the positive charger input. Pin 1 - negative.

PHANTOM POWER: Only turns on the 48 v phantom power supply, 12 v phantom is always available. To conserve current consumption, do not turn on if 48 v phantom microphones are not in use.

LIGHT: Supplies 12 v DC to BNC connector on the rear panel. Note: BNC ground is isolated from the chassis. Do not ground to the chassis as this will defeat the floating chassis feature. A Littlite may be mounted to this connector. Be aware that a battery operated light bulb consumes considerable current.

OUTPUT MODULE, Continued

BATTERY TEST: Will read the total voltage of the internal D cells or external power and is fed to the lower meter only. With VU meters: +3 VU=18 volts and '0' Vu=12 volts. For PPM meters: +2=18 volts and -6=12 volts. It is recommended to replace the batteries when they are down to 12 volts. (Although, when phantom 48 v is not used, the mixer will function within specifications down to 10 volts.)

COMMUNICATIONS: Balanced line level input. Nominally Pin 2 - high. Fed to phones monitor only. Input level may be adjusted with the multi-turn trim pot adjacent to the switch. (eg: This communications input could be used for talkback from the boom operator to the mixer, cueing or as a second mono tape return.) For talkback purposes, a microphone to line preamplifier is required at the boom operator's end.

INTERNAL-EXTERNAL SLATE: External slate input is unbalanced. Pin 2. Gain adjustment above slate-on switch.

MUTE SWITCH: This switch mutes oscillator and slating functions to Monitors A & B outputs. There is an internal dip switch to deactivate mute to Monitor A. (See parts location diagrams.)

METER AUTO./LEFT, RIGHT: Switches both meters to either left, right buses or to auto. Internal trim pot adjusts the oscillator reference level for the aux. out to correspond with left and right levels. Tape/direct; To view either the direct signal or the tape return signal via tuchel input or XLR inputs. In the auto mode, the meters follow the phones section.

PHONES: Stereo output. (2) connectors on side panel and one jack on front panel. Aux./L.R.; To send either aux. or main L,R busses to 'phones'. L.M.R.; When selected to L.R., this switch selects either left only, right only or both L & R to phones. (eg: When using only a mono recorder with the mixer, pan pots are assigned to left, the tape return also feeds the left channel. Select LMR to L for a mono signal to feed both headphone capsules. This will also match the phones level with the meter indication Tape/Dir.; As meter section. See above for single tape return. Adjustment of tape return levels is via 'L' (left) and 'R' (right) trim pots adjacent to PB switch. Send tone from mixer to recorder and back to tape return XLR's or via tuchel sockets; adjust trimmers for -8 dB PPM or '0' VU. Mono/stereo; To mono the input signal to the phones section. (eg: Checking phase of various inputs.) Does not mono any other output.

MONITORS PB (Playback): Sends tape return to both Monitor A and B outputs. (eg: Director critique of previous take, etc.) PL (Private Line); To talk to Monitor A& B* (boom operator). This is discrete from all other outputs. Level adjustment trimmer is adjacent to it. Monitor A & B* level is adjusted first then PL trimmer is adjusted independent of slate level. L & R (Left and Right); All tape return level adjustments. (See phones tape/dir.)

*Selected by dip switch on board C. See layout 5.

OSC./SI. (Oscillator/Slate) AUX., ALL, LEFT/RIGHT: Assigns both oscillator and slate to aux. out only, left, right outs only or all outputs.

OUTPUT MODULE, Continued

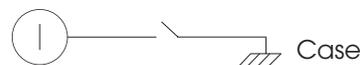
OSC. (Oscillator) **OSC. ON:** Momentarily or permanently on. Level trimmer is below this switch. Adjust oscillator level for -8 dB on PPM meter or '0' dB on VU meters. All outputs at this level will be at their nominal level. (i.e.: tuchels=-8 dB Nagra modulometer, XLRs=+4 dBu, RCAs=-2.5dBu) **10 k, 1 k, 100:** Frequency of oscillator. Note: 100 Hz may be changed to a different frequency for special applications. (eg: 400 Hz for less objectionable end take markers.) (See parts location diagram for OPE.)

ROLL (with LED): This switch will remote roll either a Nagra 4.2 or IVS or both. Auto end tones can be laid down upon turning off this switch. There is an internal dip switch (board OPC) to defeat the end tones. Note: Frequency of end tones are dependent upon oscillator frequency.

SL (Slate): Turns on either internal or external slate. Will also remote roll Nagras connected to the tuchel connectors, if the internal dip switch is on. (See parts location diagram, board OPD). Note: There are no end tones when turned to off. **SI** (on) - With LF (low frequency) tone (27 Hz). For slating takes where a LF tone is desired. The tone is set at -16 dB on the meter. When the takes are played back at high speed, the LF tone becomes audible to indicate the front end of recorded takes. Internal trimmer (board OPD) adjusts this LF tone level. **SI** on (up)-no LF tone.

SIDE PANEL

MIX. BUS : These are inputs only. Another mixer output may be inserted at this point to increase the number of input channels. Note: A resistor (eg: 10 k) needs to be installed in line with each input. (except PFLvc) The case (shell) of connector is ground. **PFLvc** This is a DC control voltage disconnect the mix bus from the phones monitor, it also monos left and right phones output. **PFL on** - Connect Pin 1 to ground, as shown below:



An interface box is available (CSMB) with a 'D' connector and four 1/4" jacks with in line resistors. This will enable you to connect Left, Right, Aux. and PFL signals to the mix bus inputs. It also incorporates a toggle switch to turn on the PFL input.

PFL SIGNAL: This input may be used for an additional tape return signal (mono). The box above may be used as an interface. The PFL on switch will cut out all other signals to the 'phones', except Aux., PL & Comm. in.

COMM. IN (Communications in): Balanced line level input (Pin 2 high) (eg: Can be used for cueing or talkback from boom operator to mixer.)

REAR PANEL

TUCHELS: With the Nagra IVS, use both 'mixer output' to line input and Nagra output to 'mixer input'. Nagra output cable includes tape return and remote roll. With Nagra 4.2, use 'mono' connector to Nagra mix input. Also includes tape return and remote roll. Cables marked CS 106 are interchangeable for both IVS and 4.2.

BNC=Light 12 v DC.: Negative is input negative not chassis ground. Do not connect to chassis as this will defeat ground isolation of chassis. See also 'light switch' output module.

POWER SUPPLY SUGGESTIONS: An external AC to DC power supply may be connected to Pin 1 (-), Pin 4 (+) of the XLR-4. The requirements are that output voltage is regulated and filtered, with a DC voltage level of 15 to 24 volts and a current rating of >1 Amp. A 24 volt, 30 watt supply is very suitable. See below regarding separating power sources.

EXTERNAL BATTERY POWER: Connect to the same pins as above. For a reasonable time between charges a 18 to 24 volt power pack should be used, rated at least for 8 AH. It should be noted that Nagra recorders have a positive chassis potential. Because the chassis of the mixer is floating from the power input, it will not cause a problem when the two units are connected together via the signal lead grounds, when they share a common power supply. Although this is the case, if other equipment with a non-isolated chassis is also powered from the battery pack (eg: radio mic receivers) and the signals are fed to the mixer there will be a short across the battery. Therefore, it is recommended to power each unit separately. (eg: (1) power source for the mixer, (1) power source for the Nagra and (1) for accessory equipment; or (1) power source for mixer and accessories and (1) power source for the Nagra.)

METERING OPTIONS

VU: Slow rise and fall times. (\approx 300mS, 300mS)

PEAK: Fast rise and slow fall times. (\approx 10mS, 500mS)

VU meters were designed to indicate the average program level. They are useful for indicating the relative 'loudness' of program material. However, as they do not respond to 'peaks', there is the possibility of overloading the recorder circuitry (peaks can be 8-15dB higher than the average level). This is not so much a problem with professional analog audio recorders but with today's digital audio recorders and video cameras, peak levels need to be accurately monitored.

The peak reading meters, on the CS 104, CS 106+1, CS 108+1, will fully display peaks of longer than 10mS. Their ballistics are similar to the Nagra modulometer and the BBC spec for PPM meters (however with a shorter fall time). The reference tone on the mixer is set at -8dB below 0, therefore, peaks of 8dB above the average level will be displayed at 0dB.

When using a recorder with a VU meter, the tone should be sent at -8dB and the recorder input adjusted for 0VU. The two meters will then react approximately the same to the program material.

NAGRA IVS

CONNECTION TO NAGRA IVS

Connect cable (marked CS 106) between "mixer output" socket and Nagra IVS line input socket (not NRS).

With the mixer oscillator set at -8dB ppm (or 0VU) (master faders at maximum, 1kHz) and the Nagra line pots set at maximum, the nagra modulometer should indicate -8dB (+/- .5dB).

To have adjustment over this level, the Nagra mono/stereo, HS switch may be set to the 'HS' position. This will increase the sensitivity of the input by 6dB.

TAPE RETURN

Connect tuchel cable (CS 106) from Nagra output to 'mixer input' tuchel. Send the -8ppm (0VU) tone to the Nagra (Nagra in test).

Set meter switch on the mixer to tape. Adjust trimmers 'L', 'R' for -8ppm (0VU) located below phones mono/stereo switch.

Option: Adjust trimmers with Nagra in record, tape running, tape selected. This will allow for direct vs. record level differences.

NAGRA 4.2

CONNECTION TO THE NAGRA 4.2

Connect tuchel cable (marked CS 106) between the mixer 'mono' connector and the Nagra mixer input connector.

Set mixer oscillator to -8ppm (0VU) (1kHz, left master fader at maximum).

With the 4.2 in test, the modulometer should indicate -8dB (+/- .5dB). Note: The mixer input of the 4.2 is a fixed level - line pot and mic pots should be at minimum (off).

Only one cable is necessary for the 4.2 direct, tape return and remote roll is included in this cable.

TAPE RETURN

Switch mixer meter switch to Tape. With the Nagra in record and tape running, adjust the 'L' trimmer for -8ppm (0VU) (located below the phones mono/stereo L, M, R switch to 'L'). This will mono the signal to the phones.

Two types of meters are available;

PPM Meter: (peak program meter)
(black dial / white markings)
Adjust oscillator for -8dB with master faders at maximum.

VU Meter:
Adjust for 0VU.

The XLR outputs will then be +4dBu and the RCA outputs will be -2.5dBu.

Adjust recorder input as follows:

Nagra IVS, 4.2.....-8dB on modulometer
DAT / Digital Betacams...-18dB (-20dB)
Analog Betacams.....0VU (or less for improved headroom)

With the above set up, full advantage is taken of the mixers headroom and signal to noise ratio.

NOTE:

1. Most CS 106 and CS 108 are equipped with PPM meters.
2. See "Metering Options", (page 24) for further details.
3. RCA outs-as the references is -18dB below full scale (-14dBu)
the RCA out put levels are usually sufficient to feed DAT
recorders

STANDARD CONFIGURATION

All audio XLR connectors are pin #2 hot. Mic 'T' powering is: Pin #2+12v DC.

Alternate phase to be specified at time of purchase.

Levels are set as specifications.

CS 106

Six input channels plus one blank panel. (An additional channel will plug directly into the seventh slot. The spare channel could be used for a stereo input module with MS decoder (CSST) or aux module (CSD-2). The rear panel is drilled for one XLR and two 1/4" jack sockets.

Meter types should be specified at time of purchase.

WARNING

The monitor outputs of this mixer are capable of driving low-impedance headphones at a very high level. Before headphones are in use, set all monitor levels at 'O' (i.e.: 'off'). Prolonged listening at high volumes might affect your hearing.

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2. Cooper Sound Systems, Inc. warrants the materials and workmanship of this product for a period of one year from the original date of purchase. If any defects are found in the materials or workmanship, or if the product fails to function properly (as per the specifications out-lined in the Operator's Manual) within the specified warranty period, Cooper Sound Systems, Inc.. will repair or replace the product, at its option. Please note the following:
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