

CS306 PROFESSIONAL AUDIO MIXER



OPERATOR'S MANUAL

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

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CS306
Cooper Sound Systems, Inc.

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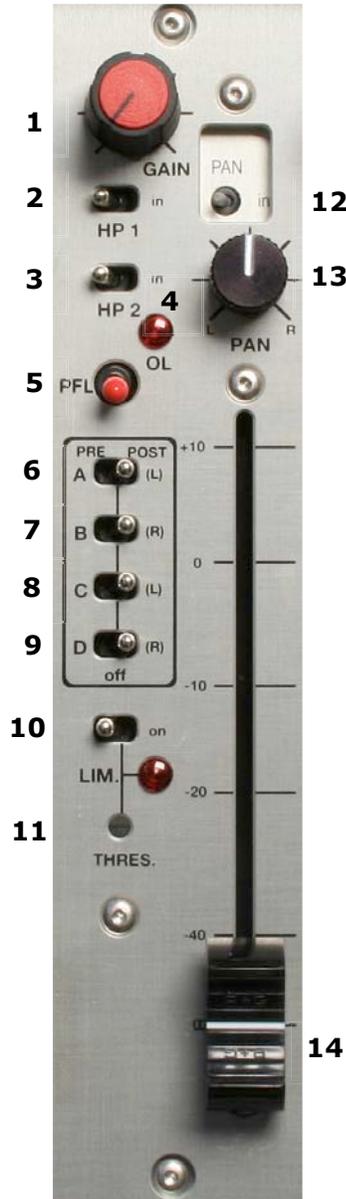


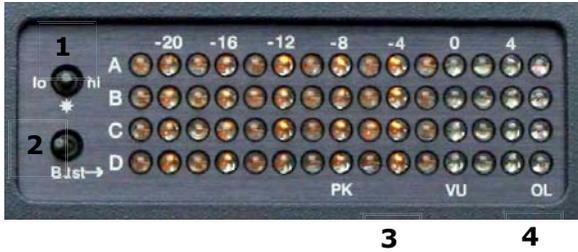
METER BRIDGE (audio)

- 1. **DYN/PH:** Dynamic or phantom power (48 v)
Dynamic is no power.
- 2. **Mic/Line:** Microphone or line level in. Switching to line automatically turns off mic power.
- 3. **∅:** Audio phase; N = normal phase, R = reverse phase
- 4. **Pad:** Attenuator to reduce either mic or line input levels

INPUT CHANNEL

- 1. **Gain:** Mic/line preamp gain
- 2. **HP 1:** High pass filter (see specs)
- 3. **HP 2:** High pass filter (see specs)
- 4. **O/L:** Near overload indicator
- 5. **PFL:** Pre fade listen
- 6-9. **A,B,C,D:** Channel to mix bus assigns: L (left), R (right) indicate monitor & pan pot assignment (center position is off)
- 10. **LIM+LED:** The limiter is a symmetrical peak detecting type & is completely out of circuit when switched off. The LED indicates limiter action.
- 11. **Thres:** Limiter threshold: Clockwise = lower threshold
- 12. **Pan (switch):** Switching the pan switch to the left disengages the panpot. Crosstalk is therefore minimized and the output levels will remain equal.
- 13. **Pan (pot):** (L) = A & or C
(R) = B & or D
- 14. **Channel fader**





Meters:

1. Controls LED brightness. Use lowest setting possible to conserve current consumption.
2. **B. TST:** Battery test (see specs)
3. **PK/VU:** The mixer is configured for either VU or Peak response meters.
PK: The reference tone is at -8 dB
VU: The reference tone is at 0 dB.
4. **OL:** 'Overload' - Indicates near clip level. This LED has a slower release time than the others.



MONITOR 2

1. **Level:** Monitor 2 gain adjustment
- 2-5. **A,B,C,D** Assigns busses to Monitor 2 output
ABCD - Normally left at maximum for optimum headroom & signal to noise ratio.
- 6-9. **Master Faders:** Gain adjustment
10. **Level (monitor 1):** Gain adjustment
11. **PL:** Private line assign to Monitor 1
12. **COMM:** Communications return (talkback) to Monitor 1 only (See application note for 2 returns)
The multiturn trimmer above this Switch adjusts the level.
13. **MIC:** Internal slate mic & gain adjustment
14. **TAPE/DIR :** (monitor 1) Tape or Direct to Monitor 1
15. **M/ST/MS :** (monitor 1) M = mono, ST = stereo, MS = mid-side
Any combination selected by switches (16-19) can be monitored in mono, stereo or mid-side.
- 16-19. **SOLO/OFF/ON** A,B,C,D: Any combination of busses can be monitored. 'SOLO' disconnects the other busses to the Monitor 1 output - Solo mono's the signal to the headphone out.
'ON' - In stereo mode the busses are assigned to either (L) left or (R) right.
20. **Power:** Internal or external power (center off)
(LED: Turns off at minimum input voltage.)
- 21,23. **Returns:** Trim pots (multiturn) to adjust return (tape) level to Monitor 1 and the meters
22. **TAPE/DIR :** (meters) Tape/Direct: Meters indicate the return signals.

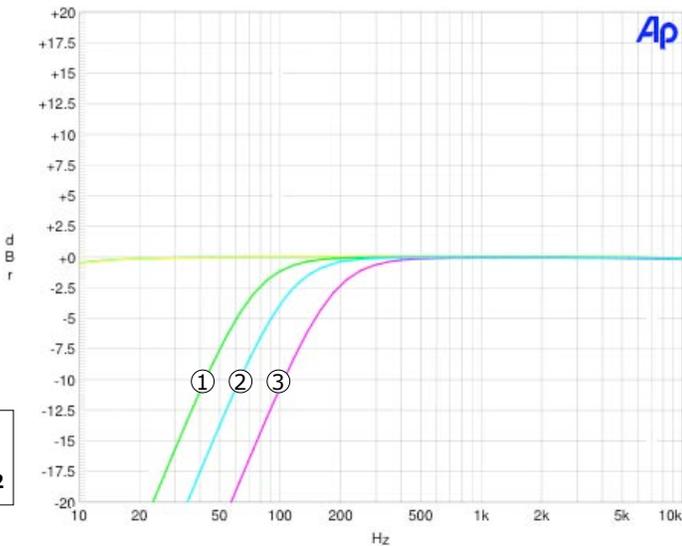
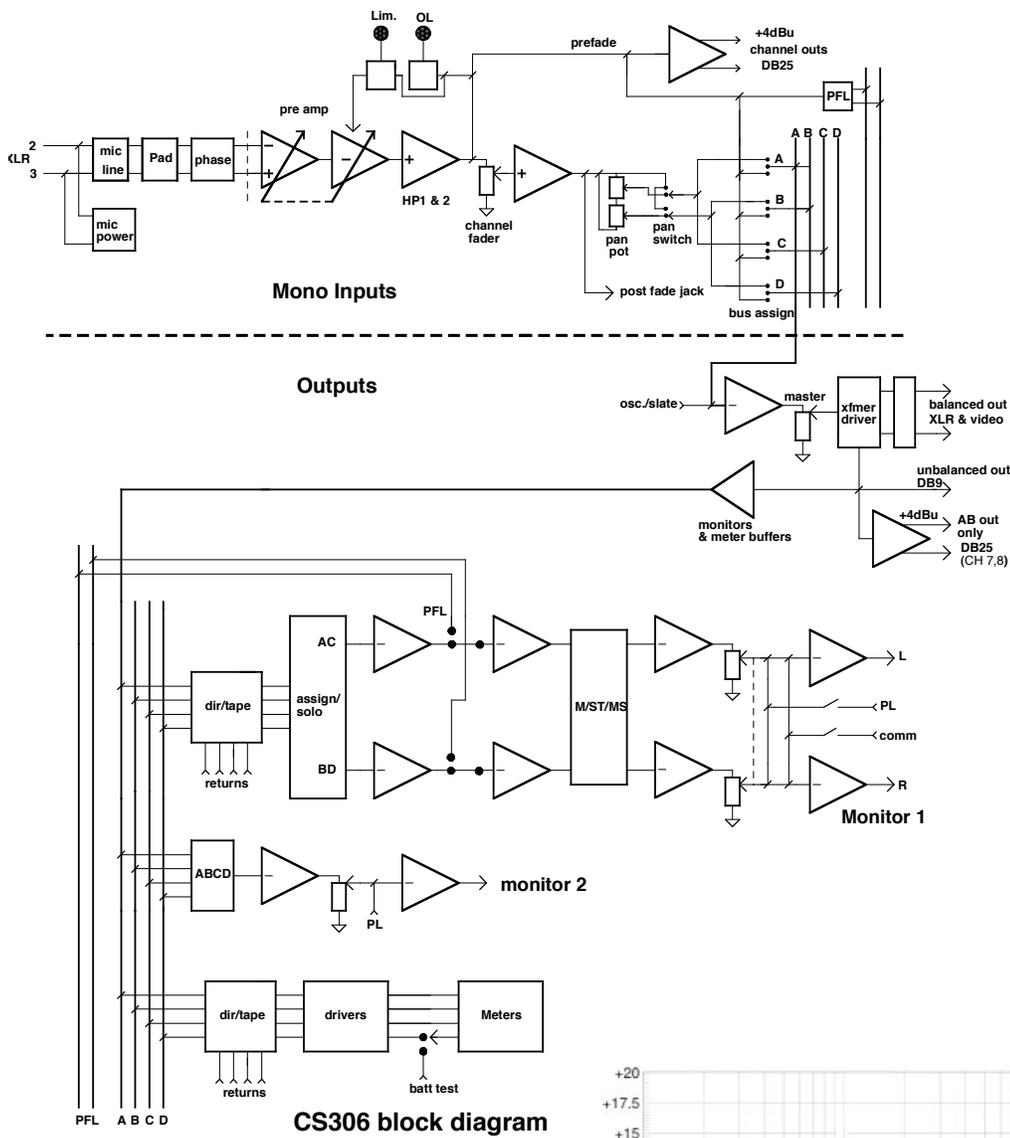
OSCILLATOR SECTION

24. **OSC:** Internal oscillator: Up = on, Down = momentary on.
Trimmer (multiturn) above adjusts level
25. **Slate:** Slate mic on
26. **PL:** Private line to Monitors 1 & 2. The level is adjusted by the multiturn trimmer above. (See #11)
27. **Roll:** Remote control for many types of recorders (see separate application note).
Up = Roll; Down = Stop/Pause



LEFT TO RIGHT

- | | |
|----------------------------------|---|
| 1. MONI 2: | Monitor 2 output - For mono headphones (or mono wireless communications) |
| 2. FUSE: | 2.5 A (5 x 20 mm) |
| 3. PWR: | External power Pin 1 = Negative DC, Pin 3 = Battery charge (positive), Pin 4 = Positive DC (see specifications) |
| 4. Balanced outs (XLR): | A,B,C,D |
| 5. In/Out: | Balanced outputs and balanced (tape) returns (AB: in/out, CD: in/out) |
| 6. COMM In: | Communications input to Monitor 1 (balanced, line level) |
| 7. ROLL: | Remote control for various recorders |
| 8. ACC: | Not used. Machined for a DB9 connector. |
| 9. Unbalanced outs (DB9): | A,B,C,D |
| 10. MIX Bus IN: | A,B,C,D (current input, see specifications) |
| 11. XLR Inputs: | Balanced (mic or line level) |
| 12. Jacks: | Channel direct outs, post fader (unbalanced) |
| 13. Channel outs: | Pre fade channel outputs (+4dBu balanced) for multitrack recording CH. 7 & 8 are the A & B mix bus balanced outputs |



1 = HP 1
 2 = HP 2
 3 = HP 1 + HP 2

STEREO INPUT CHANNEL



Any pair of mono channels can be converted to stereo pairs.* The cosmetic difference is that the Pan out switches are replaced with Link & MS Decode switches with LEDs above.

- 1. Link:** Both channels (odd & even) are linked together with one stereo fader on the odd channel - the even channel fader is disconnected from the circuit. 'Link on' also links the two limiters.
- 2. MS DEC:** MS Decode - The even channel output is inverted to bus B only. Both pan pots should be centered. With equal gain, the M/S mic configuration is decoded to 50%.
 Odd channel = mid, Even channel = side.
 The result will be:
 $A \text{ bus} = M + S = L$, $B \text{ bus} = M - S = R$
 The stereo image width can be changed by altering the gain of one channel.

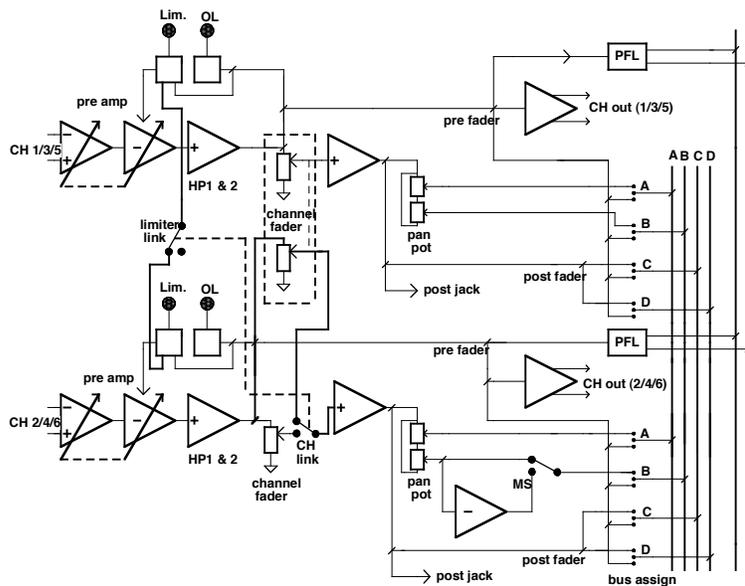
Note: A & B assign switches should be on for both channels.

C & D busses are now pre pan pot (& inverter), allowing a non decoded MS mic configuration to be recorded, pre or post fader to C & D busses.

MS mic configuration can also be recorded via the pre fader channel outs.

Note: For decoding MS to the monitor only - see output section.

***A retrofit kit is available.**



stereo block diagram

XLR 3M & XLR 3F

Pin 1 = Ground
 Pin 2 = High
 Pin 3 = Low

Monitor 1

1/4" stereo jack (max. load = 25Ω per channel)
 Tip = Left
 Ring = Right
 Sleeve = Ground

Direct Out

(post fader)
 1/4" mono jack Tip = Signal
 Sleeve = Ground

Mix Bus In

DB9
 1 = Ground
 2 = D
 3 = C
 4 = A
 5 = B
 (current input, see specifications)

Outputs

DB9
 1 = Ground
 2 = A
 3 = B
 4 = C
 5 = D

Roll

TQG 5M
 (See application note)
 Pin 1 = -10 v (Nagra)
 Pin 2 = Stop (Nagra)
 Pin 3 = Pause/Stop (DATs)
 Pin 4 = Common (DATs)
 Pin 5 = Record (DATs)

Power

XLR-4M
 Pin 1 = Ground (-)
 Pin 2 = N/C
 Pin 3* = Battery charge (+)
 Pin 4 = External power in (+)
 *Do not connect if rechargeable
 batteries are not installed.

Monitor 2

1/4" mono jack (max. load = 25Ω)
 Tip = Signal
 Sleeve = Ground

Comm. In

TQG3M
 Pin 1 = Ground
 Pin 2 = High
 Pin 3 = Low

Video 10 pin:

1 +	A,C out
2 -	A,C out
3 +	B,D out
4 -	B,D out
5 +	B,D in
6 -	B,D in
7 +	A,C in
8 -	A,C in
9	Ground
10	Ground

Channel Outputs DB25

Ch.	Hot	<u>Pin</u>	Ch.	Hot	<u>Pin</u>
Ch. 1	Hot	24	Ch. 5	Hot	18
	Cold	12		Cold	6
	Ground	25		Ground	19
Ch. 2	Hot	10	Ch. 6	Hot	4
	Cold	23		Cold	17
	Ground	11		Ground	5
Ch. 3	Hot	21	A Out	Hot	15
	Cold	9	(Ch. 7)	Cold	3
	Ground	22		Ground	16
CH. 4	Hot	7	B Out	Hot	1
	Cold	20	(Ch. 8)	Cold	14
	Ground	8		Ground	2

General: (0 dBu = .775v RMS)

Dimensions: 11.5" x 10.8" x 4.0" (292 x 274 x 102 mm)
 Weight with no batteries: 9.5 lbs. (4.3 kg)
 Overall distortion (THD + N): < 0.01% (0.003% typ.)
 Equivalent input noise: (150Ω 20-20 kHz) -129 dBu
 (150Ω 'A' WT'D) -131 dBu

Standard Configuration:

All XLR-3 audio connectors are Pin 2 hot.
 Levels are set as specifications.
 Meter types should be specified at time of purchase.

Power Requirements:

External: 10v - 18 v operating range
 Internal: 8 'AA' cells
 Consumption ≈ 500 mA at 12v DC, 6 watts

Estimated battery life with: NP1, Nicad > 4.5 hours
 NP1, Nmh > 7.5 hours
 8 AA alkaline cells > 3.5 hours
 (Nicad AA cells are ≈ 1/3 the capacity of alkaline cells)

Battery test: +13.5v DC = +2
 +12v DC = 0
 +11v DC = -2
 +10v DC = -4 (change batteries)
 +9v DC = -6 (minimum)

Power on LED: Turns off when the voltage is 9v or less
 Power cut off voltage: 8 v DC (internal supply switches off)
 48v Phantom: 48v +/- 1v

System Power Connections and Precautions:

RE: (+) chassis equipment

Analog Nagras must have a separate supply, with no common power supply connections to the mixer or other (-) chassis equipment.

Input: Reference: -8 PPM, 0 VU (XLR's are Pin 2 high)

Mic In: Minimum input level -80 dBu (Z in 1.4k Ω)
 Maximum input, line position (no pad) +30 dBu (Z in 10k Ω)
 Pad 15 dB Z in ≈ 600 Ω
 Mic/Line 40 dB Z in ≈ 10k Ω
 Combined 55 dB Z in ≈ 10k Ω

High Pass Filters: HP 1 70 Hz 12 dB/oct.
 HP 2 110 Hz 12 dB/oct.
 HP1 & HP2 180Hz 12 dB/oct.

Direct out (post-fader): -8 dBu, Zout = 47Ω

Channel Outs: +4 dBu, balanced, Zout = 100Ω

O/L indicator: -3 dB MOL

Limiter: Threshold Variable 0 PPM to M.O.L. (+4 PPM typ.)
 Attack 1 ms
 Release 150 ms
 (M.O.L. = maximum output level = 25 dBu on XLR outs, +19 dBu on unbalanced outs)

Pan Pots: Center = -3 dB
 All specifications are measured with the pan pots panned either L or R or switched out.

Output: Reference: -8 PPM, 0 VU (XLR's are Pin 2 high)
 XLR & 10-pin balanced outputs: (A,B,C,D) +4 dBu, Zout ≈ 100Ω
 DB 9 unbalanced outputs: (A,B,C,D) -2 dBu, Zout ≈ 100Ω
 Monitor 1 out: 0 dBu no load
 0 dBu 60Ω load
Maximum load is 25Ω for each output.
 Monitor 2 out: 0 dBu no load
 -8 dBu 60Ω load
Maximum load is 25Ω.
 Tape return (balanced): -14 dBu to +19 dBu Zin = 10k Ω
 Communication in (balanced): -14 dBu to +19 dBu Zin = 10k Ω
 Mix bus in - current input - series resistor: 10k Ω -8 dBu (-10 dBV)
 (needs series resistors) 20k Ω -2 dBu
 40k Ω +4 dBu
 Oscillator frequency: 500 HZ

Signal (M.O.L.) to noise of output section:
 (Dynamic range)
 (Channel faders off, masters at max): -115 dB 20-20 kHz

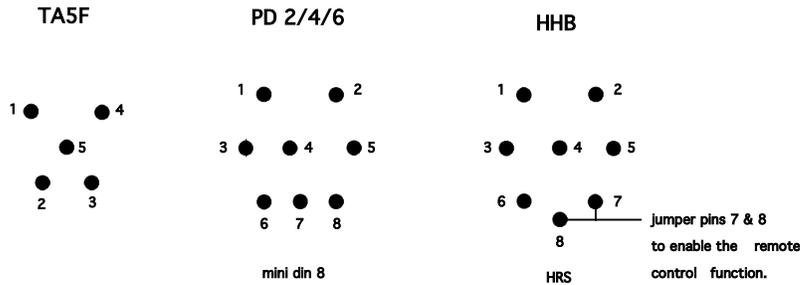
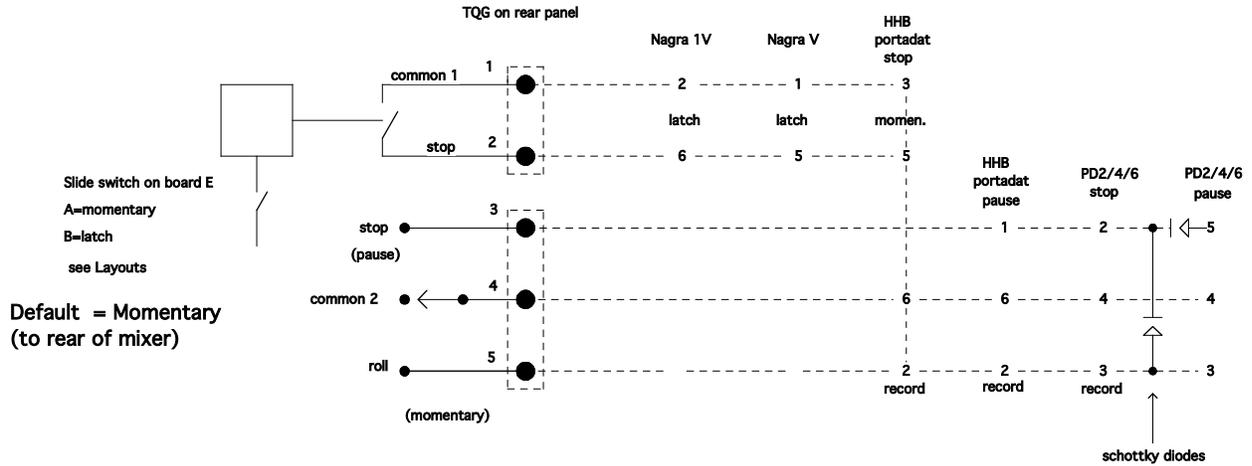
Warning: The monitor outputs of this mixer are capable of driving low-impedance headphones at a very high level. Before headphones are in use, set all monitor levels to minimum. Prolonged listening at high volumes might affect your hearing.

Inputs:

- XLR in:** Balanced input. Nominally Pin 2 high (Pin 3 - low, Pin 1 - ground)
- Mic Power:** Mic power off. For example, dynamic and radio microphones. Phantom power = positive DC voltage on both Pins 2 and 3, set for 48v.
- Phase:** It is important that the phase of the microphones are matched to avoid phase cancellation. Absolute phase throughout the system should also be maintained.
- Pad:** Effective in both mic and line positions. 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.
- HP Filters:** Sharp roll-off to reduce microphone handling noise and other low frequency disturbances. It is recommended to use these for dialogue recording as the bandwidth of interest normally exceeds 100 Hz.
- PFL:** Selects prefade listen. All other inputs to Monitor 1 will be disconnected (except private line and communication in).
- Channel Fader:** 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.
- O/L LED:** Nominally set for 3 dB below M.O.L. (maximum output level) 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.
- Direct Out:** Post fader. (eg; feed to playback systems or a direct feed to multi-track recorders)
- Output Section:**
- Monitor 1 Section:** Main phones out, on the front panel.
- Solo, Off, On**
Any combination of busses can now be monitored.
Selected busses can be monitored in mono, stereo or M/S.
To facilitate checking of busses, it is recommended to assign the main monitor requirements to the 'on' position and spot check by soloing the other inputs. This is quicker than assigning the mains to solo as there is no need to switch off the other busses.
- Note: 'On' function - when more than two busses are selected, the signal level will increase to the headphones. Turn down phones level if necessary - especially when using the line up tone (osc.).
- Monitor Pots 1 & 2:** To adjust level to phones 1 & 2. 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.

Meters Section:

- 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. For digital audio recorders the line up time on the recorder is set for -18 to -20 dB. The mixer should still be set up for 0 VU = +4 dBu out. For peak reading meters, the mixer should still be set up for -8 PPM = +4 dBu out. 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 500 HZ sine wave is set for -8 dB (+4 dBu on XLR outs). This corresponds to approximately '0' VU, although the difference between an average responding meter and a PPM meter will vary according to program material.
- Output Faders:** These faders should be left at the maximum position (ie; '0') for optimum headroom. All line-up tones etc., should be made with the faders in this position.
- Power; Internal/External:** Switch to internal when using batteries. It is recommended to use alkaline AA cells. Rechargeable (Nicad cells) may be used with reduced battery life. Pin 3 of power XLR is the positive charger input. Pin 1 - negative.
- 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 needs to be installed in line with each input. An interface box is available (CSMB) with a 'D' connector and four XLR's with in line resistors.
- 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 12 to 18 volts and a current rating of > 1 Amp. We recommend using a linear type supply or a very clean switching type. Some switching supplies can output high frequency noise that can interfere with the internal DC-DC converter and microphones that have internal converters.
- Side Panels:** 1/4" - 28 holes are provided for a handle or for mounting the mixer to a cart.
Note: Either the front or the rear holes may be used.
Screws can be up to 1" long (25.4 mm)
In addition, a small recorder tray can be fitted to the mixer.



All solder view.

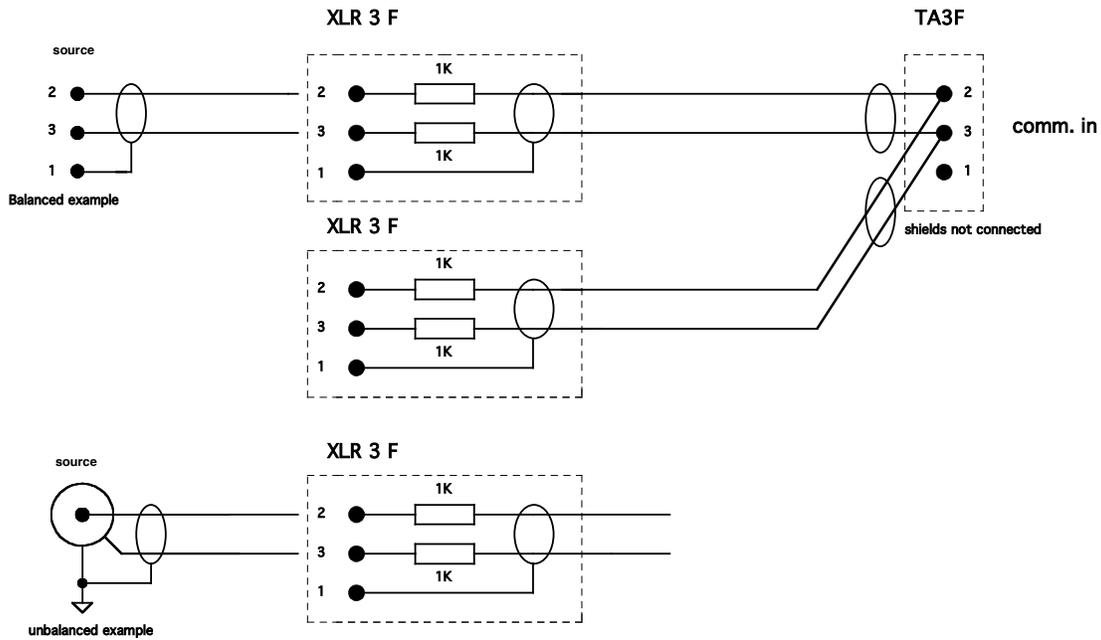
Notes:

- The two commons are isolated from each other & the chassis (which allows, for example, a HHB recorder to be wired for Stop/Roll)
- The polarity of Pins 1&2 do not matter (however we recommend wiring pin 1 as negative to remain consistent with earlier versions)

The communications input can be used with multiple inputs (eg; two boom operators) by using a special adapter cable (see below). The communication in connector is balanced.

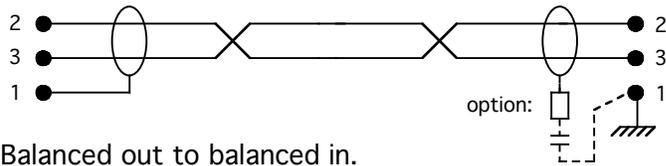
Pin 2 = high, Pin 3 = low, Pin 1 = ground

The resistors (1% or less) in the diagram are necessary to provide some isolation between two or more sources.

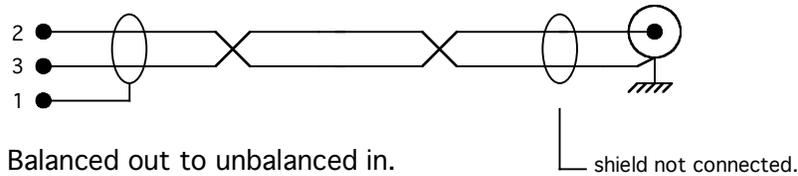


XLR female

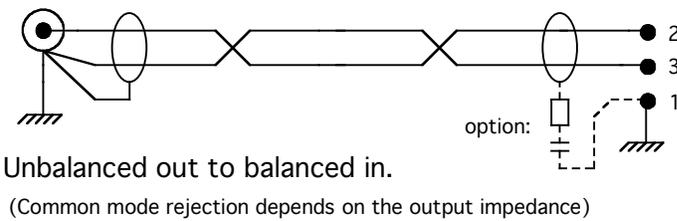
XLR male



Balanced out to balanced in.

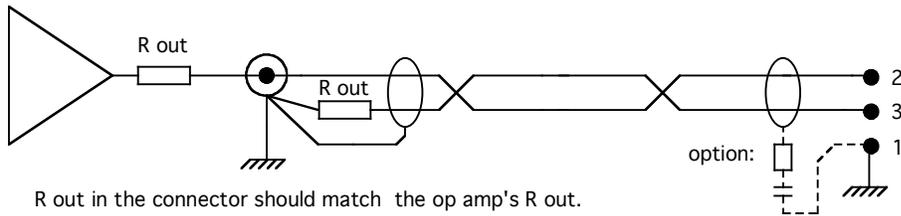


Balanced out to unbalanced in.



Unbalanced out to balanced in.

(Common mode rejection depends on the output impedance)



R out in the connector should match the op amp's R out.

Unbalanced out to balanced in.

Impedance matched for better common mode rejection

Notes: The Shield is connected at the source only to avoid ground loops.

A RC network (.01μ+51ohms) may be installed from the shield to pin 1 to terminate RF.

Twisted pair cables should be used.

CS104
unbalanced outs
Ro=100Ω
(not tape out)

CS106
direct, insert & RCA outs
Ro=47Ω

CS208 v1 & v2
direct & insert outs
Ro=47Ω
unbalanced outs
Ro=94Ω

CS306
direct out (jacks)
Ro=47Ω
unbalanced outs
& channel outs
Ro=100Ω

cables
rev 5/22/06

1. Warranty registration must be completed and mailed to Cooper Sound Systems, Inc. within 30 days of the date of purchase.
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:

- A. Modifications made by the customer or a non-authorized service center will invalidate the warranty.
- B. Damage caused to the unit by incorrect or improper usage (eg; utilization of incorrect power supply or other improper connections) is not covered under this warranty.
- C. To obtain factory service, call: Cooper Sound Systems, Inc. (805) 772-1007 or FAX (805) 772-1098
- D. All returns and service requests must have prior authorization.
- E. Cooper Sound Systems, Inc. reserves the right to inspect any product which may be the subject of any warranty claim, before repair or replacement is carried out. Cooper Sound Systems, Inc. may, at its option, require proof of the original date of purchase (dated copy of original retail dealer's invoice). Final determination of warranty coverage lies solely with Cooper Sound Systems, Inc. Products which do not meet the terms of this warranty will be repaired and returned C.O.D. with billing for labor, materials ,return freight and insurance. Products repaired under warranty will be returned via U.P.S. ground, freight prepaid, by Cooper Sound Systems, Inc. to any location within the boundaries of the U.S.A. Outside the U.S.A., the products will be returned freight collect.
- F. This warranty is extended to the original purchaser, and to anyone who may subsequently purchase this product within the specified warranty period.
- G. Cooper Sound Systems, Inc. does not authorize any third party, including any dealer or sales representative to assume any liability on behalf of Cooper Sound Systems, Inc., or to make any warranty for Cooper Sound Systems, Inc.
- H. The above warranty is the only warranty given by Cooper Sound Systems, Inc. and is in lieu of all other warranties. All implied warranties, including warranties of merchantability or fitness for any particular purpose shall be strictly limited in duration to one year from the date of original purchase. Upon the expiration of the warranty period (one year), Cooper Sound Systems, Inc. shall have no further warranty obligation of any kind, expressed or implied. Cooper Sound Systems, Inc. shall in no event be obligated for any incidental or consequential damages that may result from any defect, or warranty claim of any kind, expressed or implied.
- I. Cooper Sound Systems, Inc. reserves the right to modify the design of the equipment and to amend specifications without prior notice.

NOTES: