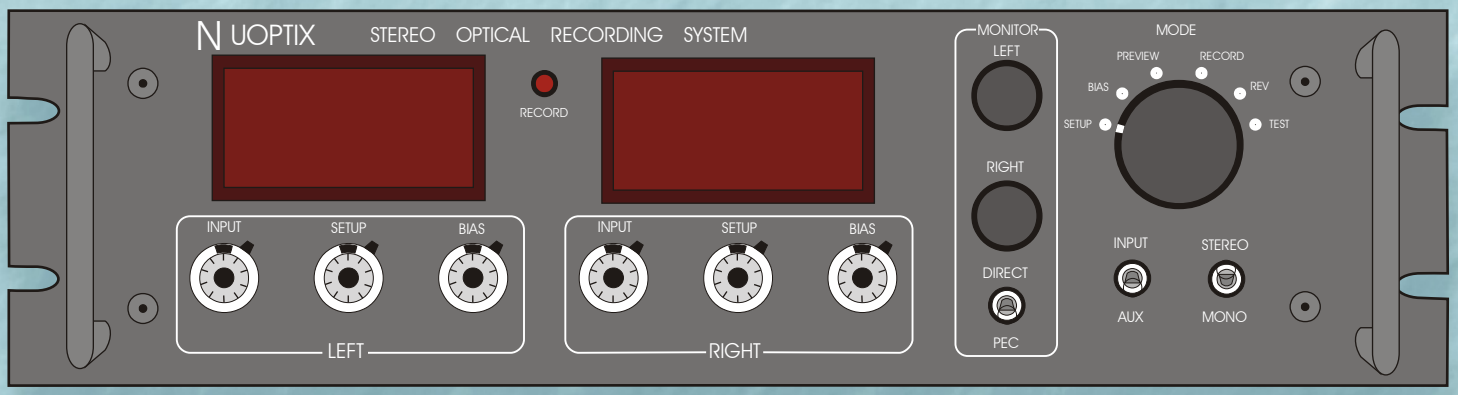
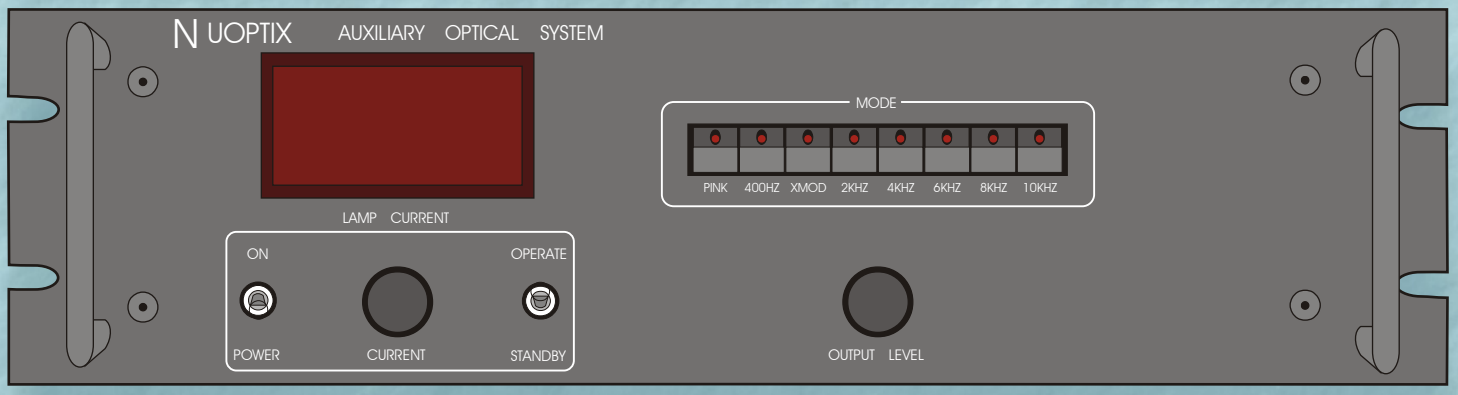
Nuoptix inc.

Stereo Optical Recording System





J R Sky, LLC

www.jrsky.com

TABLE OF CONTENTS

DIAGRAMS:

Revised December 1, 2007

1.0 SPECIFICATIONS

STEREO OPTICAL RECORDING SYSTEM (SORS)

Input Impedance:	20 kΩ – Balanced differential amplifier
Input Level:	-10 dBm to +16 dBm (for 50% track)
Preamp Input:	SORS provides ±15 VDC to and accepts monitor signals from photocell preamplifier
Output:	Drives Nuoptix modified 5 contact Westrex type light valves
Frequency Response:	20 Hz to 14 kHz
S/N Ratio:	>80 dB
THD:	<0.05% (400 Hz at 100%)
Power Requirements:	Powered by Auxiliary Optical System
Dimensions:	19.0" wide x 5.2" tall x 14.5" deep (48.2 x 13.3 x 36.5cm)
Weight:	12 lbs. 10 oz. (5.72 kg.)

AUXILIARY OPTICAL SYSTEM (AOS)

Lamp Output:	4.25 to 8.50 amps
Digital Meter:	Displays lamp current in amps
Signal Output:	Minus infinity to +13 dBm Auto-controlled from SORS
Frequency Tolerance:	±0.005%
THD:	Less than 0.15% (400 Hz at +10 dBm)
Output Frequencies:	400 Hz, 8 kHz X-MOD, 1 kHz, 2 kHz, 6 kHz, 8kHz, 10kHz & and Pink Noise
Power Output:	±15 VDC and +5 VDC at 3 amps
Power Requirements:	115 VAC or 230 VAC at 60 Hz or 50 Hz
Power Consumption:	Approximately 225 watts
Dimensions:	19.0" wide x 5.2" tall x 14.5" deep (48.2 x 13.3 x 36.5cm)
Weight:	26 lbs. 8 oz. (12 kg.)

2.0 GENERAL DESCRIPTION

The Stereo Optical Recording System (SORS) and Auxiliary Optical System (AOS) together comprise a complete photographic sound track recording package for making both monaural and Stereo Optical sound track negatives on a Westrex type recorder. The system uses a specially modified five contact light valve and electro-optical monitoring system. The SORS provides direct independent electronic control of each of the four "ribbons" in the five contact light valve. This allows electronic track placement and spacing so that a single valve can be used for both mono and stereo recording. The SORS monitors the light passing through the light valve to the film and uses this information to display on digital meters a direct readout of optical track size which means extremely accurate dimensions can be maintained. The SORS uses a 16 bit digital delay to delay the audio signal while the noise reduction signal is being configured. This results in the lowest possible noise and eliminates the transient distortion and muted sound quality of older generation optical sound tracks. The direct electronic control of the light valve modulator provides for frequency response from 20 Hz to 14 kHz. The system provides for selected print loss equalization and exact level setup by use of digital peak signal monitoring. The SORS will accept input signal bus levels from –10 dBm to +16 dBm. It has a separate monaural input which is automatically selected when the system is switched to the MONO mode. The system provides line level monitor outputs capable of driving 600 Ω loads.

The AOS auxiliary system provides a unique set of digitally generated test signals which can be instantly selected and injected into a recorded track. The digitally generated test signals frequencies and levels are extremely accurately defined. This assures that cross-modulation test tracks made on the machine are extremely accurate. Pink noise signal is also selectable.

3.0 INSTALLATION INSTRUCTIONS

The SORS may be rack mounted in a standard 19" rack directly above the AOS unit. The AOS must have at least one inch clearance below to allow adequate air flow into the slots in its bottom panel. The case of the AOS is connected to the power cord third wire common. The case of AOS is connected to the case of the SORS through the aux power interconnect cable. Signal ground is isolated from the case in both units. It is recommended that all audio signals be carried on shielded cables and that the recorder and the SORS and the AOS be tied to a common chassis ground. All interconnect cables and connectors are supplied in the factory installation of the system.

Bright light falling directly onto the optical recorder visual observation window should be avoided as it can result in erroneous SETUP readings.

The pin outs of all connections on both units is given on last page of this manual as well as being indicated on the system schematics.

4.0 EXPLANATION OF CONTROL

The INPUT controls adjust the input signal levels.

The SETUP controls adjust the gains of the photocell monitor amplifiers which are DC coupled. The SETUP pot(s) is set so that when the SORS unit is in the SETUP mode (which disconnects the light valve), the front panel digital meters read the "ribbons at rest" or "slack ribbon" width in mils (0.001"), of the two sound tracks exposed on the film negative. These "ribbons at rest" track widths must be verified by developing a strip of the exposed negative with the SORS in the SETUP position and measuring, with a toolmakers microscope, the track dimensions. A light negative density will provide a more accurate measurement.

The BIAS control adjusts the gain of the output drive amplifier of the SORS whose output is the composite of the audio and noise reduction signals. In the BIAS mode the input audio signal is disconnected, and the ten turn BIAS controls are adjusted to provide the desired size bias lines read directly in mils (to the nearest tenth of a mil) on the digital meters.

The MONO/STEREO toggle switch does two things. It selects the audio input to the SORS from either the two stereo inputs or the monaural input and sets the light valve ribbons for proper track placement for the two different recording modes. Remember that different BIAS settings will be required for stereo and mono recordings (see next section).

5.0 OPERATION

Before turning the system on or off, the front panel mode switch should be set to the SETUP position. This electrically disconnects the light valve from the electronics and thereby protects it from electrical transients. The system is turned on by the power switch on the front of the AOS. To record an optical track, first set the record lamp current and select MONO or STEREO mode with the SORS front panel toggle switch. (Note that the lamp current may be reduced when not recording by toggling the lamp standby switch to the standby position. The reduced lamp current prolongs lamp life.) With the mode switch in the SETUP position, adjust the SETUP pot(s) controls on the front panel to read the "ribbons at rest" or "slack ribbons" width (in mils) for the light valve in use. Rotate the mode switch to the BIAS position and adjust the two ten turn controls labeled BIAS to provide the desired size bias lines as indicated on the digital meters. A 1.5 mil (0.0015") bias lines for stereo recording and a 2.0 mil (0.002") bias lines for monaural recording are recommended. Note that different BIAS settings will be required for stereo and mono recording. Rotate the mode switch to the PREVIEW position and adjust the input bus level signal to read 50% using the INPUT level controls. In this mode the light valves are not connected and the meter displays the signal level prior to the overload clipper and anti alias filters. The SORS will accept input bus levels from -10 dBm to +16 dBm. Rotate the mode to the RECORD position. In the record mode the light valve is connected and the meter displays the signal level after the overload clipper and anti-alias filters.

At any time during recording, any of the test signals from the AUXILIARY ELECTRONICS may be recorded by switching the input select switch from

INPUT to AUX. The XMOD test signal may be used to verify cross-modulation distortion cancellation on the print or for recording standard cross-modulation distortion tests. The PINK NOISE test signal can be used to monitor printer losses at the film laboratory.

Following the recording, the mode switch may be switched to the REVERSE position for density check or to the TEST position which alternates reverse bias and bias line. Following the recording, the mode switch should be returned to the SETUP position to protect the light valve.

The monitor controls on the front panel of the SORS adjust the output monitor level but have no effect on the recording itself. The P.E.C./DIRECT toggle switch selects the monitor signal from the input or from the photocell monitor. The SORS is designed so that the adjustment of the SETUP controls assures that the P.E.C. and DIRECT monitor levels match.

CAUTION: Operation of the recording system with constant frequency above 8 kHz and 80% may cause permanent damage to the light valve.

6.0 CALIBRATION

6.1 NECESSARY EQUIPMENT;

The SORS is factory calibrated and use of the following procedures is not required in daily operation. An audio signal source and a digital voltmeter are required to calibrate the Stereo Optical Recorder. All measurements made during the calibration of the unit are made between the stated test point and the system common. A convenient ground is provided as a loop of bare wire marked TPGND on the motherboard. The ground test point is located near top center on the motherboard.

6.2 INPUT LEVEL AND CLIPPER CALIBRATION;

Unplug the light valve connector from the SORS unit rear panel. Rotate both BIAS controls on the front panel fully counter-clockwise. Remove the film loss EQ by setting the dip switches labeled PRE-EMP and DE-EMP to the OPEN position. Turn the power on. Apply a 100% signal at 400 Hz (i.e. 6 dB over buss level) to the MONAURAL input connector on the SORS back panel. Toggle the Mono/Stereo switch to the MONO position and set the mode switch to PREVIEW. Set the input controls on the front panel to 5.00. Adjust the trimpot labeled GAIN (R15) for a reading of 100 on the panel meter. Rotate the mode switch to RECORD and adjust trimpot labeled DEL (R89) so panel meters read 100. This calibrates the Digital Delay for unity gain. Adjust the trimpot labeled CLIP (R43) for +4.00VDC at TP1. This sets the clipper at 130% Repeat this procedure for both left and right channels.

6.0 CALIBRATION (continued)

6.3 NOISE REDUCTION CALIBRATION;

Once again the noise reduction should not require adjustment once factory set but the following procedure can be used if alignment is necessary. Rotate the mode switch to the BIAS position. Adjust comparator COMP (R99) so that the voltage at TP3 just switches from -15 to +15 volts. This allows the NR circuit to follow signals that are at extremely low levels. Return the mode switch to RECORD and select a 400 Hz input signal at 100% as shown on the panel meters. Adjust NR (R115) for –50 mV dc at TP4. This adjusts the NR gain or margin. Adjust AUDIO (R54) for a +10 dBm signal at TP5. This sets the required amount of audio signal to be summed to the DC noise reduction signal.

NOTE: The adjustment of R54 should be verified by photographic development tests of tracks as described in the TRACK SIZE ADJUSTMENT section. The final setup requires that the modulated amplitudes on the track be those given on page 12 for a given meter % modulation reading in the RECORD position. R54 should be adjusted finally for that result.

7.0 MAINTENANCE

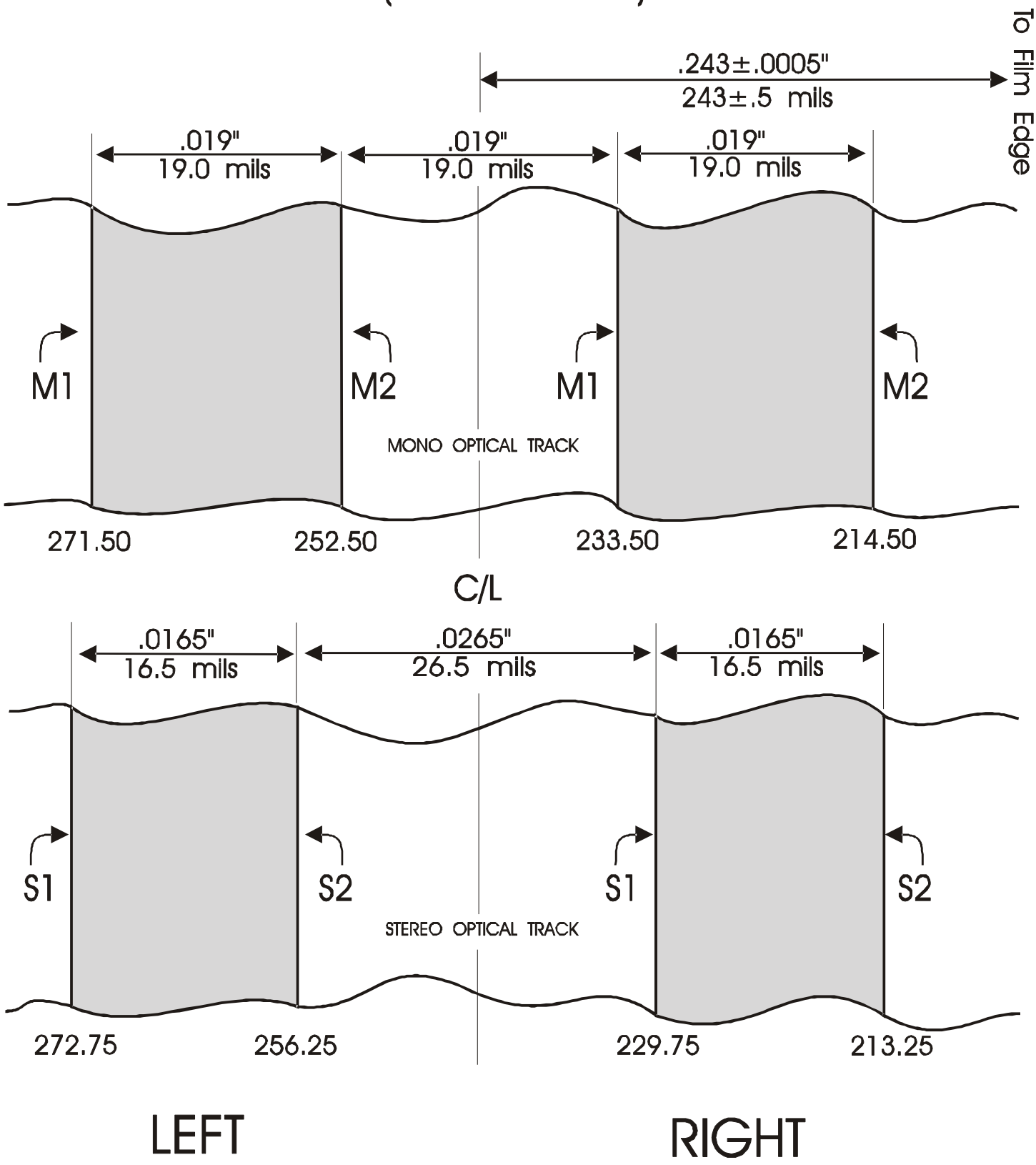
7.1 TRACK PLACEMENT;

Before you make any electronic adjustments, the light valve should be mechanically adjusted for 0.243±.001" (243 mils) from track center line to film edge. Refer to you RA-1731 camera manual for instructions.

This section will require a series of darkroom development tests. On the PC board layout diagram you will notice four trimpots labeled S1, S2, M1 and M2. Trimpots S1 and S2 displace the light valve ribbons while the unit is in the Stereo mode. Trimpots M1 and M2 displace the light valve ribbons while in the Mono mode. Trimpots S1 and M1 move the ribbons that are closest to the picture area of the film while S2 and M2 move the ribbons that are closest to the sprocket holes. Ribbon positions can be quickly and accurately set using the front panel meters to measure how far a ribbon is displaced. With the front panel 10 turn BIAS controls reduced to zero and the rotary mode switch set to BIAS, the meters will accurately read the ribbon spacing if the SETUP pots on the front panel have been properly adjusted to slack spacing reading (See Operating Instructions). Now the meter will accurately reflect any movements of the individual ribbons made by the ribbon placement trimpots. One must first determine how much and in which direction each ribbon needs to be moved using a film development test. The appropriate internal placement trimpots can be adjusted, while observing the front panel meters, to gauge the resultant displacements. This will provide rapid and accurate positioning of the track edges. Track placement should be verified by a final photographic development.

OPTICAL TRACK DIMENSIONS AND PLACEMENT

(WITH ZERO BIAS)



7.0 MAINTENANCE (CONTINUED)

7.2 TRACK SIZE ADJUSTMENT;

Apply an 80% signal at 400 Hz and verify the total recorded modulation as determined using the formula on the page titled "How to Measure % Modulation". R54 should be adjusted (by reading the level at TP5 on the D202 Board) so that the modulation measured on the film corresponds exactly to the meter reading in the RECORD position. To figure out how much to adjust, after measuring the amount of modulation according to the formula on the page "How to Measure % Modulation", divide 80 by the % modulation, then use the following formula:

dB=20*log(80 / %mod)

An Example:

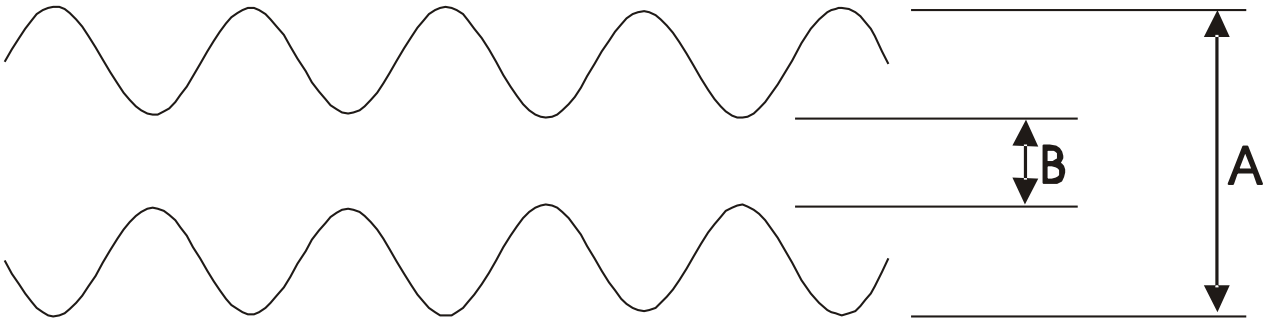
If your results where 77% then

20*log(80% / 77%) = +0.2 dB,

and you would raise the level +0.2 dB again as read at TP5 on the D202 main board.

NOTE: The above procedure is the only correct way to adjust size. If you are comparing your print to the Dolby tone reference material, make sure that you are using the newer CAT 69T material, as the older CAT 69 material will read incorrectly as it was printed on black and white print stock.

HOW TO MEASURE % MODULATION
ON 35mm DUAL BILATERAL OPTICAL TRACKS



$$\%MOD = \frac{A-B}{38} \times 100 \qquad \text{MONO TRACK}$$

$$\%MOD = \frac{A-B}{33} \times 100 \qquad \text{STEREO TRACK}$$

EXAMPLE: % MODULATION OF ONE TRACK OF A STEREO TRACK

A = 31.5 MILS

B = 5.8 MILS

(A-B) = 25.7 MILS

$\frac{(A-B)}{33} \times 100 = 77.8\%$ MODULATION

MUST MEASURE BOTH TRACKS OF DUAL BILATERAL TRACK AND AVERAGE

7.0 MAINTENANCE (CONTINUED)

7.3 LIGHT VALVE EQUALIZATION;

Light Valve equalization is very important and should be checked periodically. The frequency response should be flat to at least 12.5 kHz with no more than ±0.5 dB ripple. Do not use these controls to compensate for print losses as this will damage your light valve. (See PRINT LOSS EQUALIZATION).

Check to see that film loss EQ dip switches labeled PRE-EMP and DE-EMP are set to OPEN (i.e. flat or no equalization). Toggle the recording lamp to OPERATE and set to nominal current. Rotate the mode switch to the SETUP position and adjust the SETUP controls for slack spacing meter reading. Advance the mode switch to the BIAS position and increase the BIAS controls on the front panel for an 8 mil bias line as indicated on the front panel meter. Advance the mode switch to the RECORD position and apply a 50% signal at 400 Hz. With the DIRECT/P.E.C. toggle switch in the P.E.C. position, increase the MONITOR control for a 0 dBm level on the monitor output. Carefully sweep the input frequency, making sure that the input level remains constant, and adjust the light valve equalization internal trimpots to achieve a flat response as monitored on the P.E.C. monitor output. The reduced signal and bias levels are used to assure that the light valve does not clash during the equalization procedure. The 2 kHz, 4 kHz and 6 kHz are boost and cut filters with midrange being flat. The 8 kHz (R58) is a cut only filter. The 8 kHz filter has a frequency trim control F8 (R59) with midrange being around 8.5 kHz. The Q of this filter is similar to that of the light valve. Setting the notch frequency of the 8 kHz filter to just above the light valve resonance frequency, say 9 kHz, results in the most accurate equalization. The 10 kHz (R78) is a boost only filter.

7.0 MAINTENANCE (CONTINUED)

7.4 LAMP BALANCE;

Optical sound track negatives must be properly exposed to assure cross-modulation distortion cancellation. This is accomplished by preparing cross-modulation tests for each laboratory at which sound track negatives are to be made. In addition, the two tracks of a Stereo Optical or dual bilateral optical sound track must be of equal density. Hand development test at the recording studio may be used to assure this balance of density. The photoelectric monitoring system on the SORS is very helpful in achieving lamp balance, which is changed by moving the record lamp horizontally. You will note that with the SORS in the SETUP position the meters read the amount of light exposing the two tracks. As the lamp is moved horizontally the displayed numbers will change. You will note that there is a simple relationship between the meter readings and the densities measured on the exposed negative and that this may be used to balance the lamps by monitoring the meters while moving the lamp. You can set the “SETUP” pots to read exactly what your density readings are, making sure you put the picture side density reading on the “Left” meter. the simply adjust until they read the same. This is explained also in the Camera manual.

7.0 MAINTENANCE (CONTINUED)

7.5 PRINT LOSS EQUALIZATION;

After all the calibration procedures are complete, the print loss EQ dip switches need to be set. There are a total of five 3 position dip switches that need to be set; two are on the left channel D202 main board, another two are on the right channel D202 main board, and one is on the D203 AOS signal generator board.

The switches are marked PRE-EMP and DE-EMP on the SORS D202 main board. PRE-EMP is for recording pre-emphasis and DE-EMP is for monitor de-emphasis.

The dip switch on the AOS D203 signal generator board is marked S1. This de-emphasis circuit is used to maintain a constant recording level when selecting different tone frequencies or the XMOD signal, by canceling print loss pre-emphasis. Note that, for obvious reasons, when pink noise is selected, the AOS de-emphasis circuit is out.

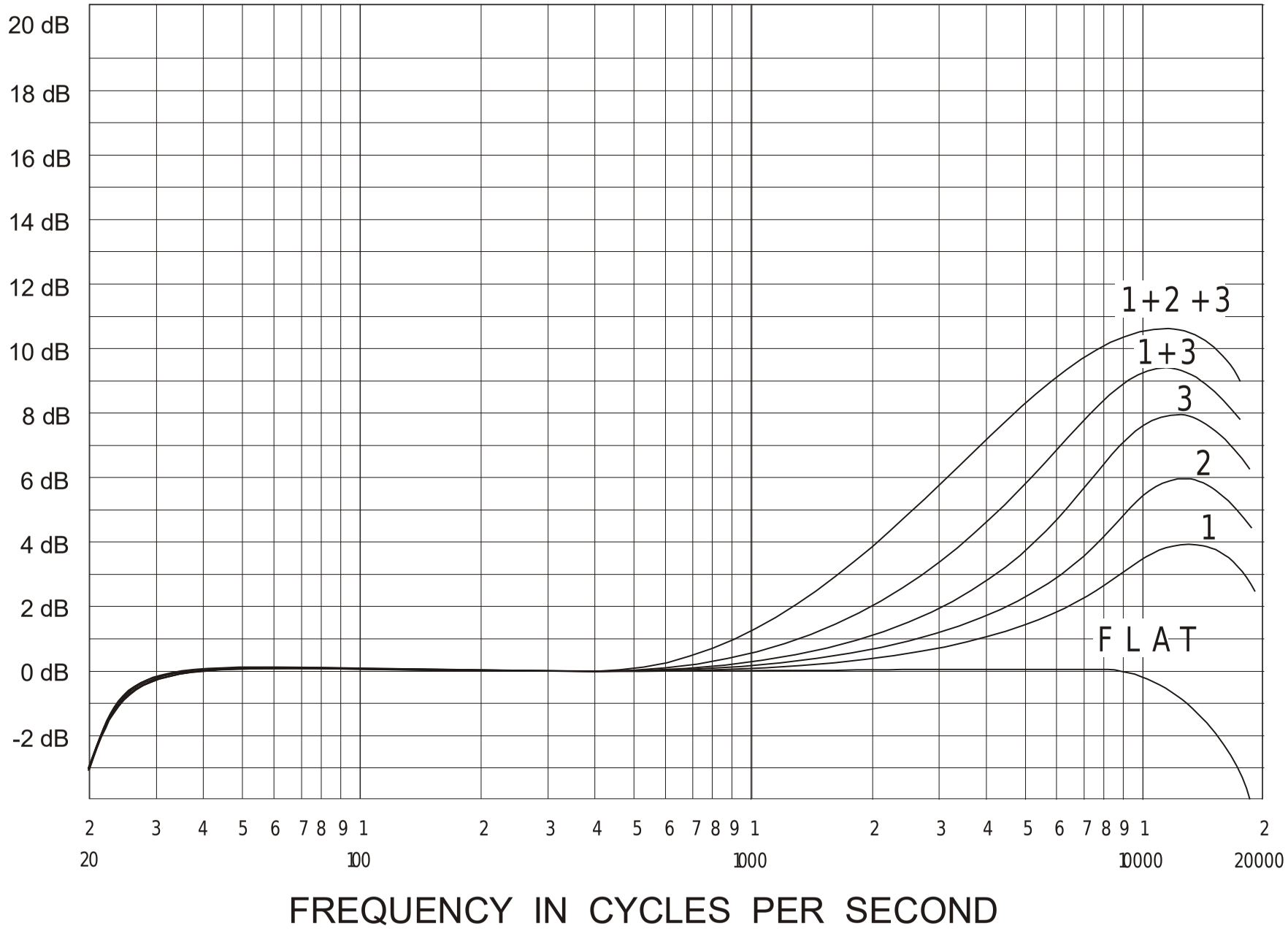
The pre-emphasis and de-emphasis circuits are complimentary to each other and therefore all dip switches must always be set in the same condition. Refer to the SORS PRINT LOSS EQUALIZATION curves to select the appropriate position. Position 2 is normal for 35mm recording. The goal is to have the pink noise spectral frequency response match the Dolby CAT 69P pink noise test film. You must have a high quality print made, and must be using a high quality reproducer.

NOTE: Light valve equalization and film loss equalization are very different.

Print loss equalization compensates for printer loss, therefore emphasis must be recorded on the sound negative producing a flat frequency response on the print. Since print loss equalization is prior to the noise reduction, the ribbons will open appropriately as not to cause ribbon clash and damage your light valve.

On the other hand, the light valve equalization circuit is after the noise reduction, any compensation here will cause the ribbons to clash resulting in damage to your light valve.

SORS PRINT LOSS EQUALIZATION



7.0 MAINTENANCE (CONTINUED)

7.6 P.E.C. AMPLIFIER ADJUSTMENTS;

Unplug the recording lamp from the back panel of the SORS. Rotate the mode switch to the SETUP position and rotate the SETUP pot on the front panel fully clockwise. Adjust the OFFSET pot (R53) so that the front panel meters read zero. (Caution: The PEC offset can be effected if bright light is allowed to fall on the visual track window. The window size has been reduced to minimize the problem but care should still be exercised.) Reconnect the recording lamp and set to the nominal recording lamp current. Adjust the SETUP controls for the proper "slack" ribbon width readings. Rotate the mode switch to BIAS and adjust for a 1.5 mil bias line. Change to RECORD mode and adjust the input to 80% at 400 Hz. With the DIRECT/P.E.C. in the DIRECT position, adjust the MONITOR level control on the front panel for +10 dBm at TP8. Now toggle the switch to the P.E.C. position and adjust the PEC trimpots (R51) for +10 dBm. This adjustment matches the direct and P.E.C. levels. Connect the input to the LEFT channel only. Adjust CROSS (R52) for minimum signal appearing at TP8 of the right channel board. Connect the input to the RIGHT channel only and adjust CROSS (R52) for minimum signal appearing at TP8 of the left channel board. This adjustment cancels any crosstalk that may have accumulated in the optical system.

PIN OUT CONNECTS FOR THE SORS AND THE AOS

1. Left, Right & Mono Signal Inputs (3 pin female XLR)
   - Pin 1 Analog Common
   - Pin 2 High
   - Pin 3 Low

2. Left & Right Channel Monitor Outputs (3 pin male XLR)
   - Pin 1 No Connect
   - Pin 2 High
   - Pin 3 Analog Common

3. Optical Preamplifier (5 pin male XLR on chassis)

		PREAMP
Pin 1	Right Input	E8
Pin 2	+15 V Supply	E5
Pin 3	Analog Common	E6
Pin 4	–15 V Supply	E7
Pin 5	Left Input	E9

4. Light Valve Output (5 pin female XLR on chassis)

	Signal name	LV
Pin 1	–Left (Sprocket Side)	1
Pin 2	+Left (Picture Side)	2
Pin 3	Analog Common	3
Pin 4	–Right (Sprocket Side)	4
Pin 5	+Right (Picture Side)	5

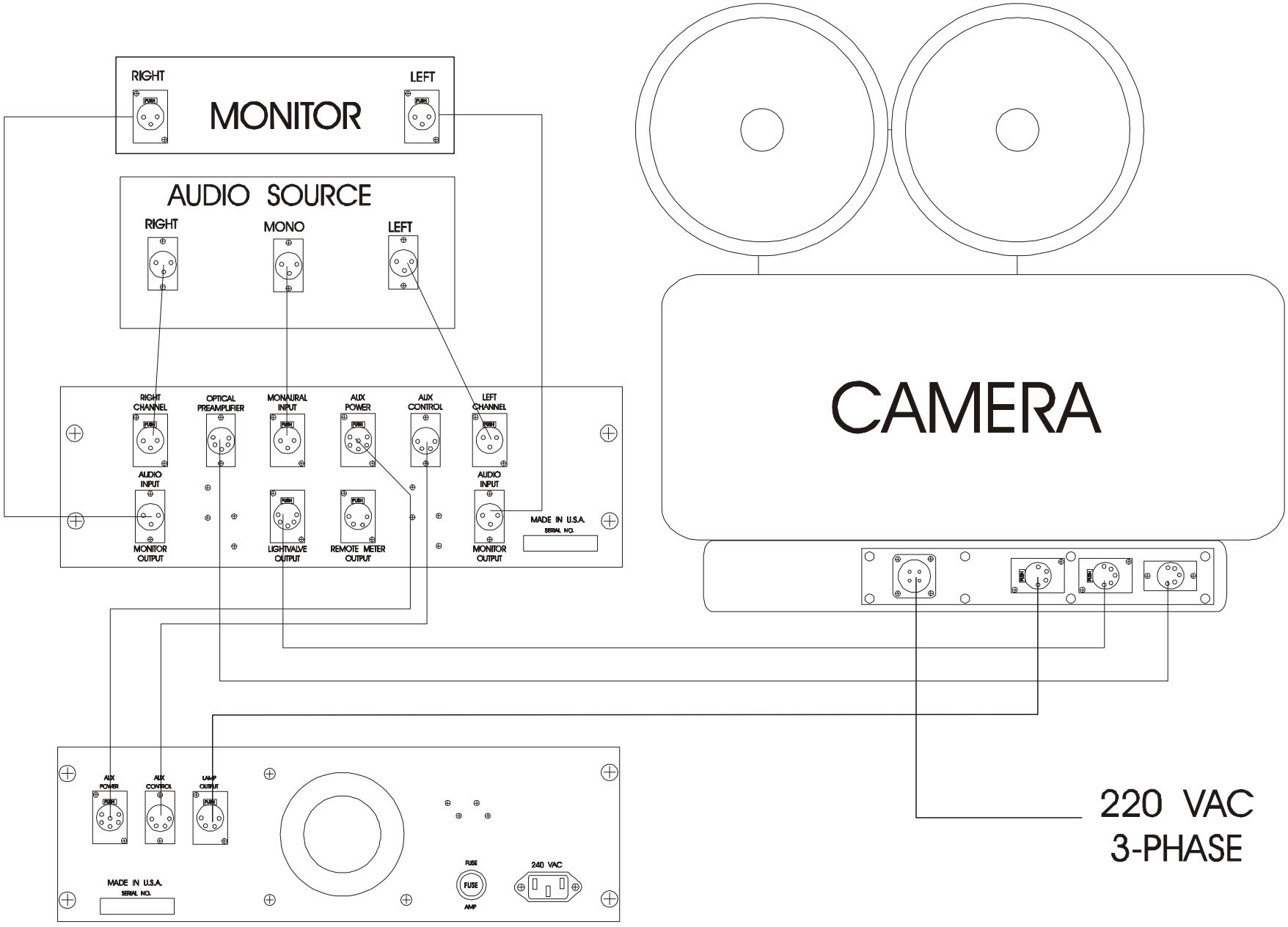
5. Remote Meter Output (4 pin female XLR on chassis)
   - Pin 1 Left Output
   - Pin 2 Analog Common
   - Pin 3 Analog Common
   - Pin 4 Right Output

6. Aux Power (6 pin female XLR on chassis)

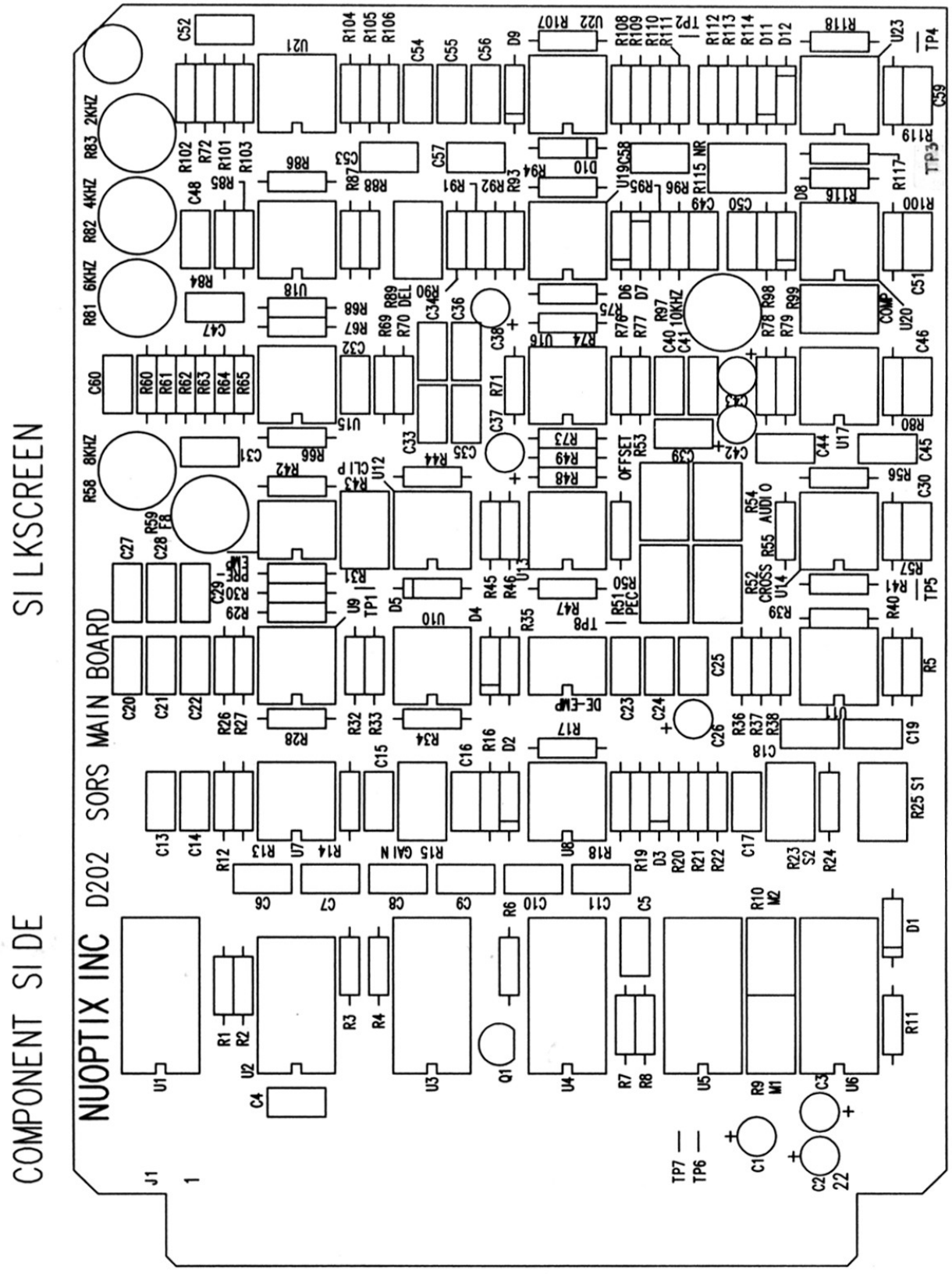
SORS Input	AOS Output	Signal
Pin 1	Pin 1	+15V Supply
Pin 2	Pin 2	–15V Supply
Pin 3	Pin 3	Audio Common
Pin 4	Pin 4	Digital Ground
Pin 5	Pin 5	+5 Volts

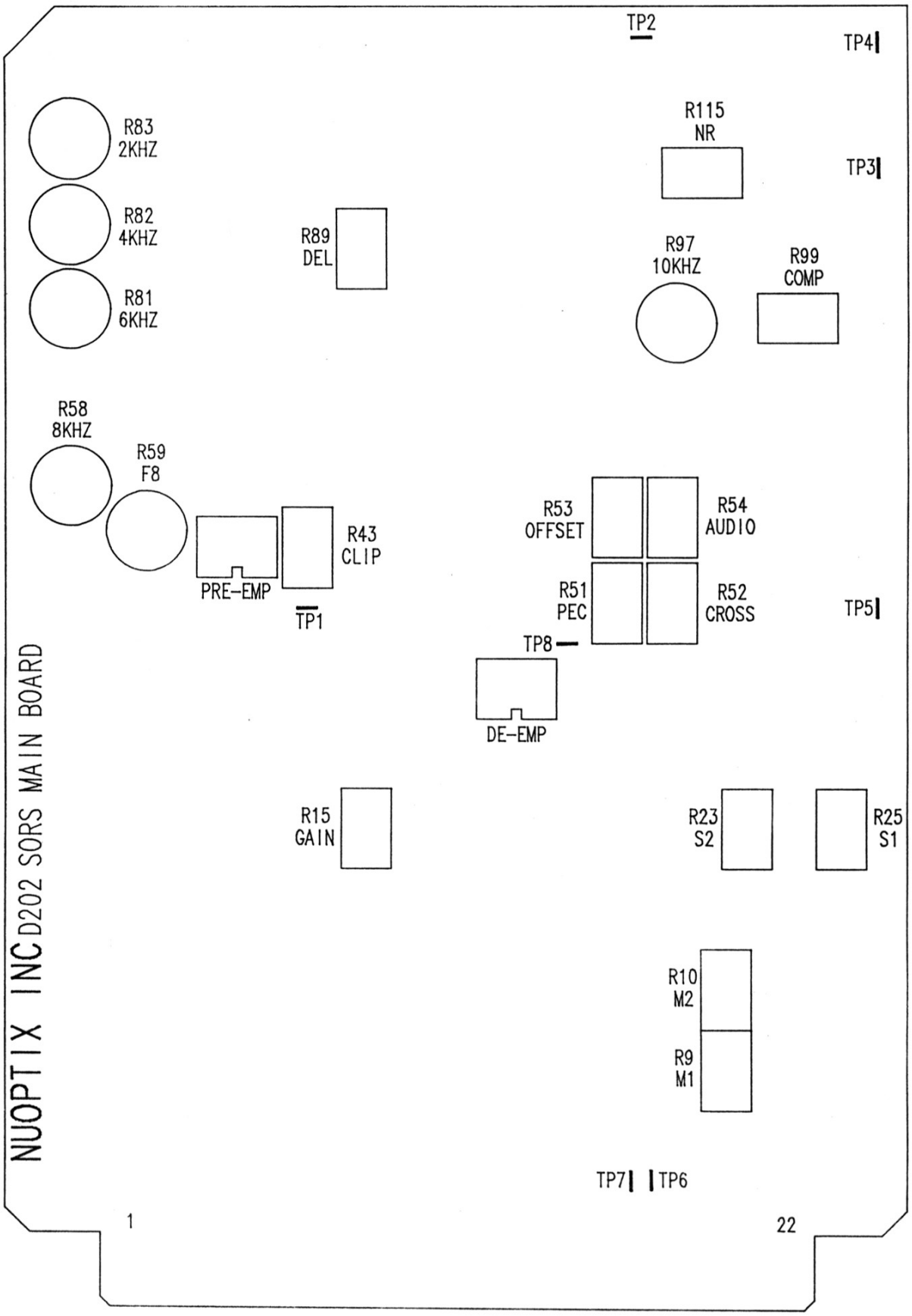
7. Aux Control (4 pin male XLR on chassis)
   - Pin 1 Aux Signal Generator Audio
   - Pin 2 Aux Signal Generator On/Off

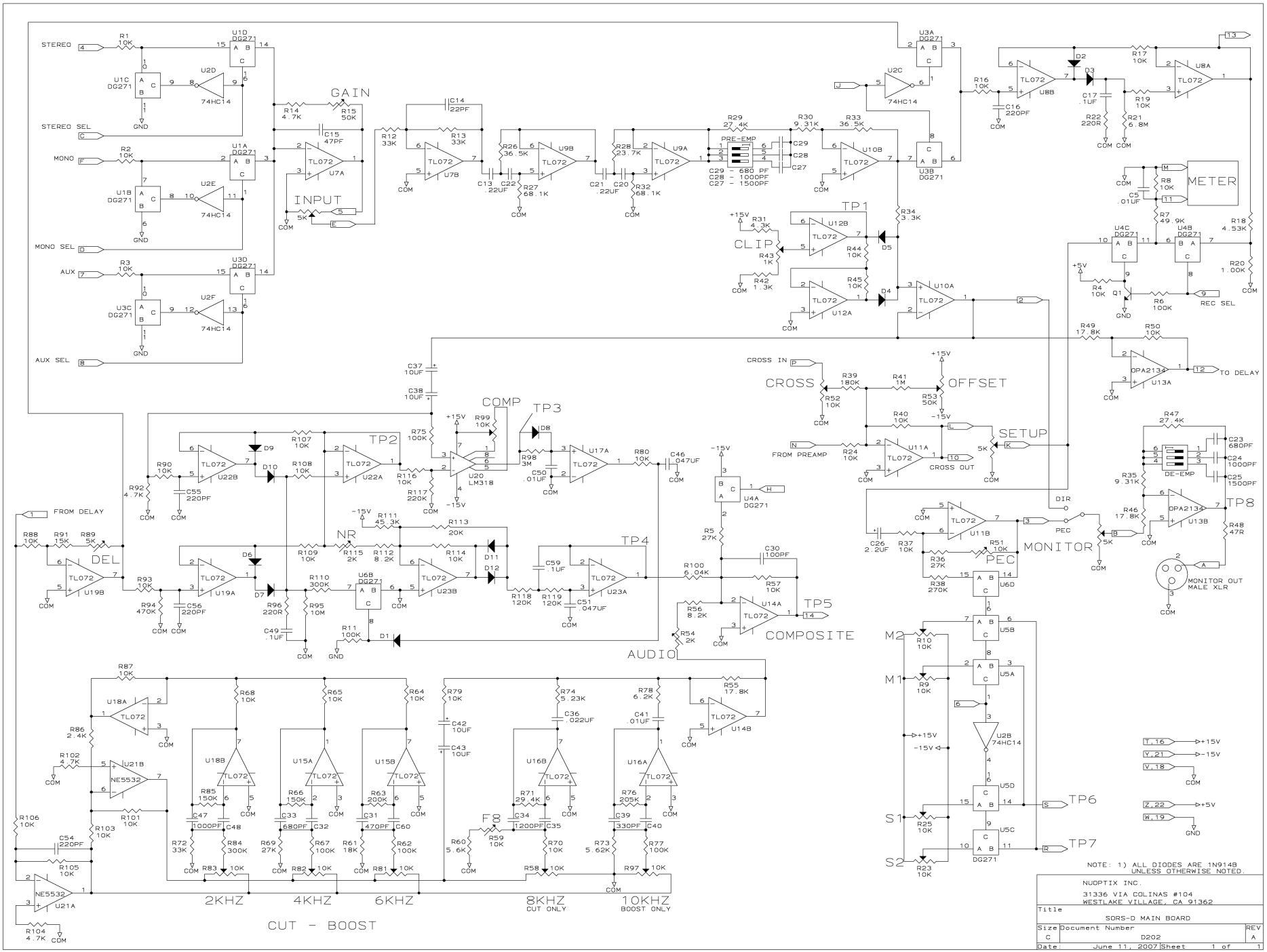
8. Lamp Output (4 pin female XLR on chassis)
   - Pin 1 Low Side
   - Pin 2 Low Side
   - Pin 3 High Side
   - Pin 4 High Side

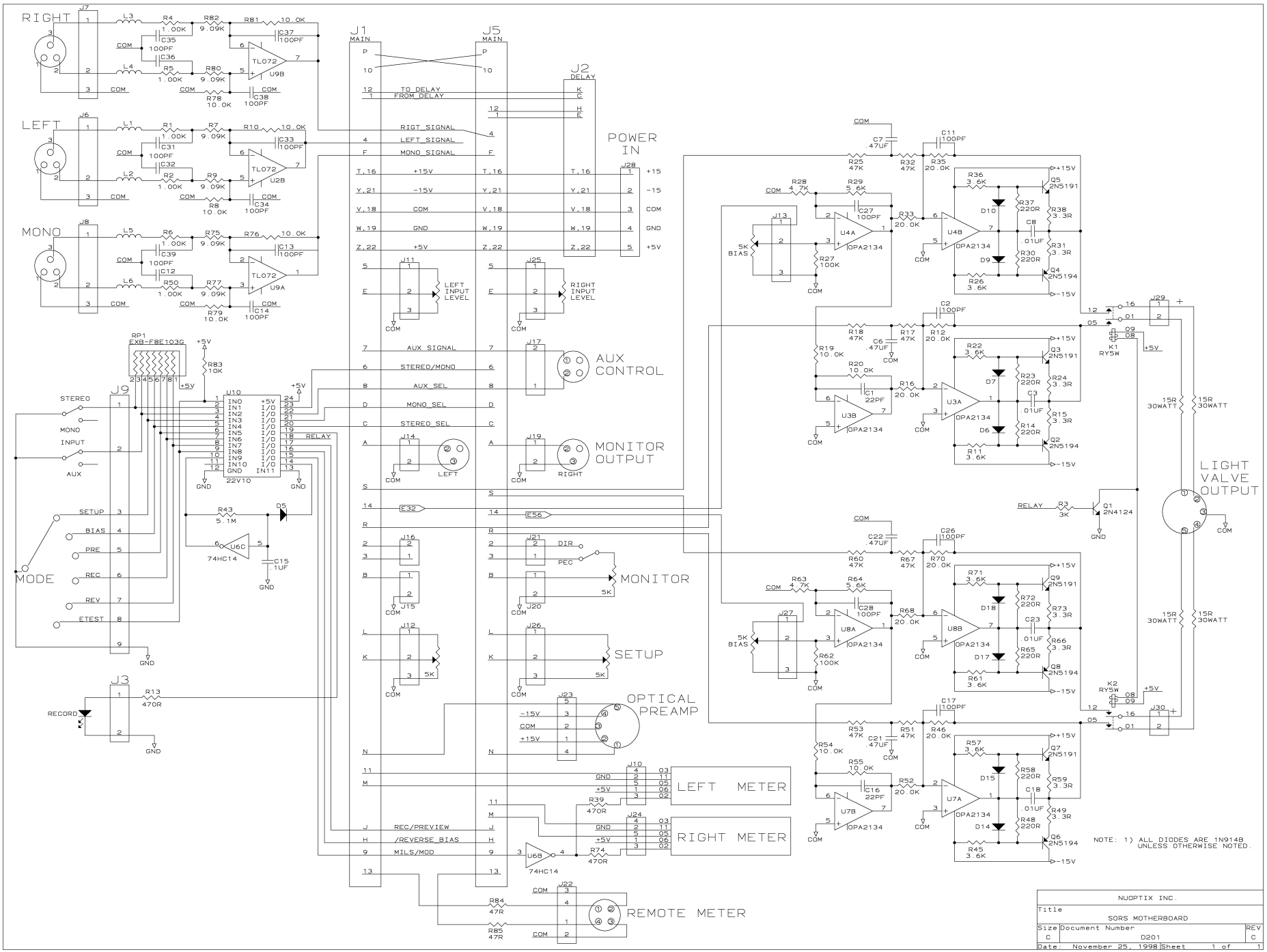

RIGHT
LEFT
MONITOR
AUDIO SOURCE
RIGHT
MONO
LEFT
CAMERA
RIGHT CHANNEL
OPTICAL PREAMPLIFIER
MONAURAL INPUT
AUX POWER
AUX CONTROL
LEFT CHANNEL
AUDIO INPUT
AUDIO INPUT
MONITOR OUTPUT
LIGHTVALVE OUTPUT
REMOTE METER OUTPUT
MONITOR OUTPUT
MADE IN U.S.A.
SERIAL NO.
AUX POWER
AUX CONTROL
LAMP OUTPUT
MADE IN U.S.A.
SERIAL NO.
FUSE
AMP
240 VAC
220 VAC
3-PHASE

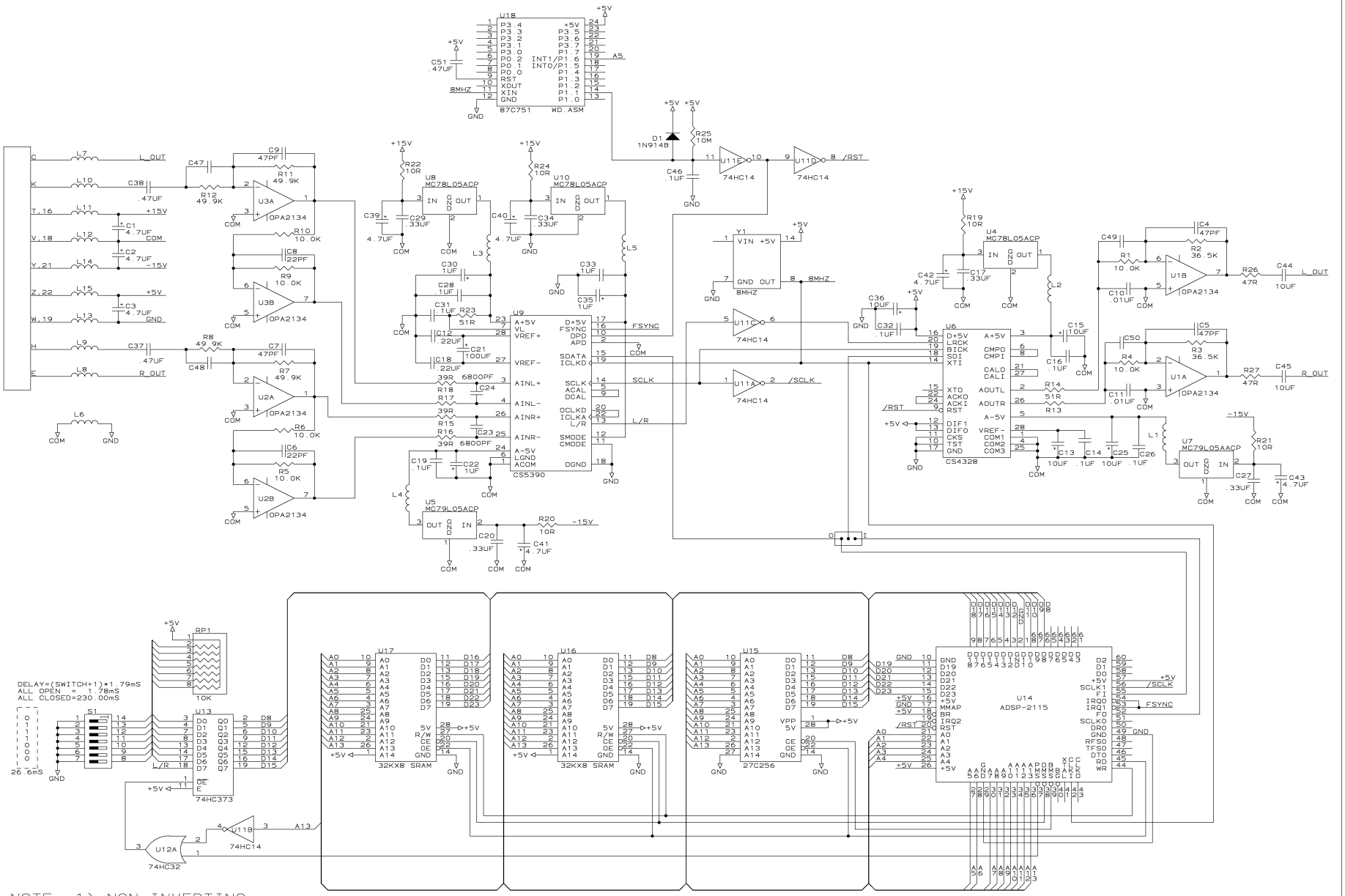
8.0 SCHEMATICS AND LAYOUTS

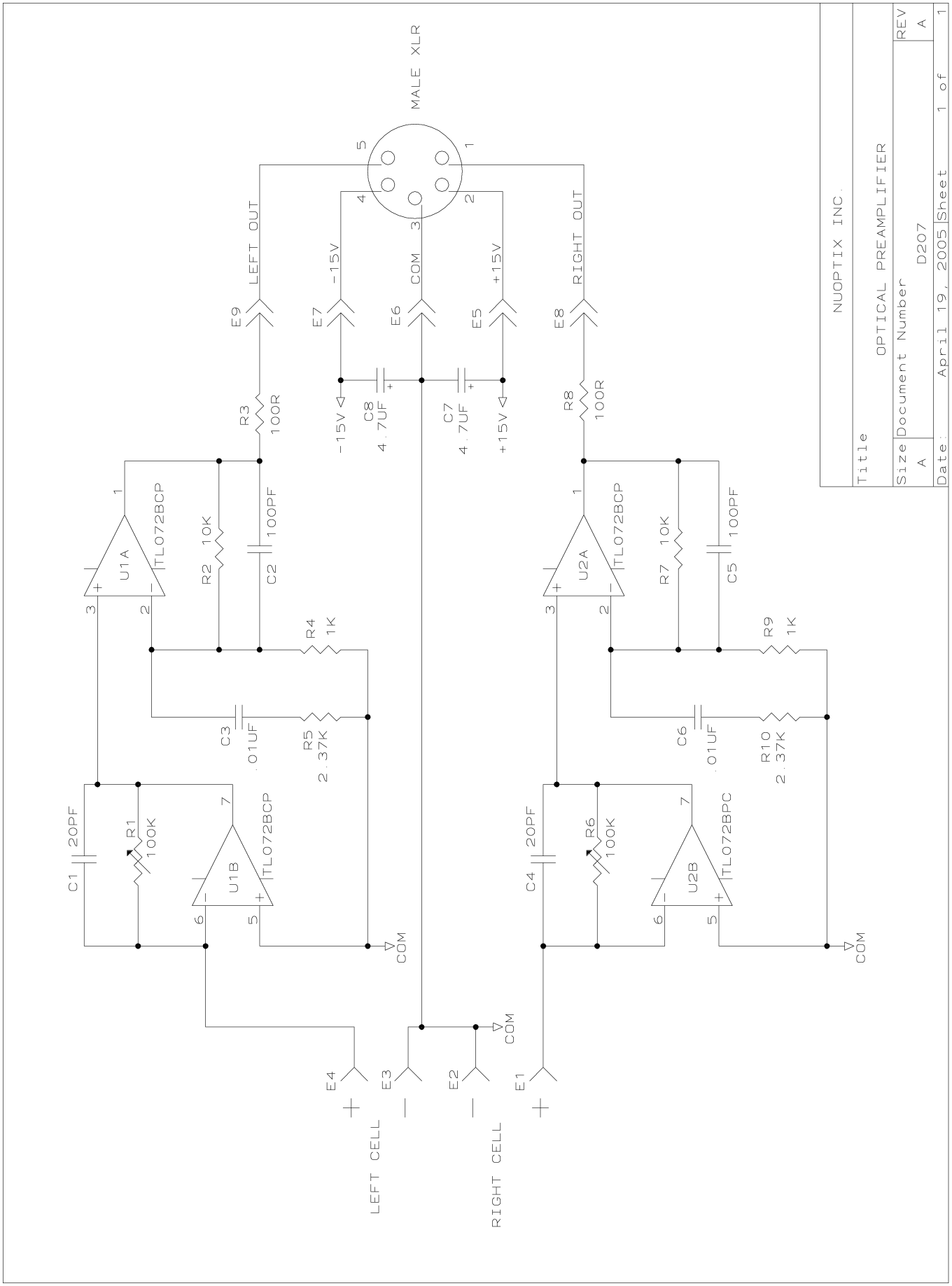


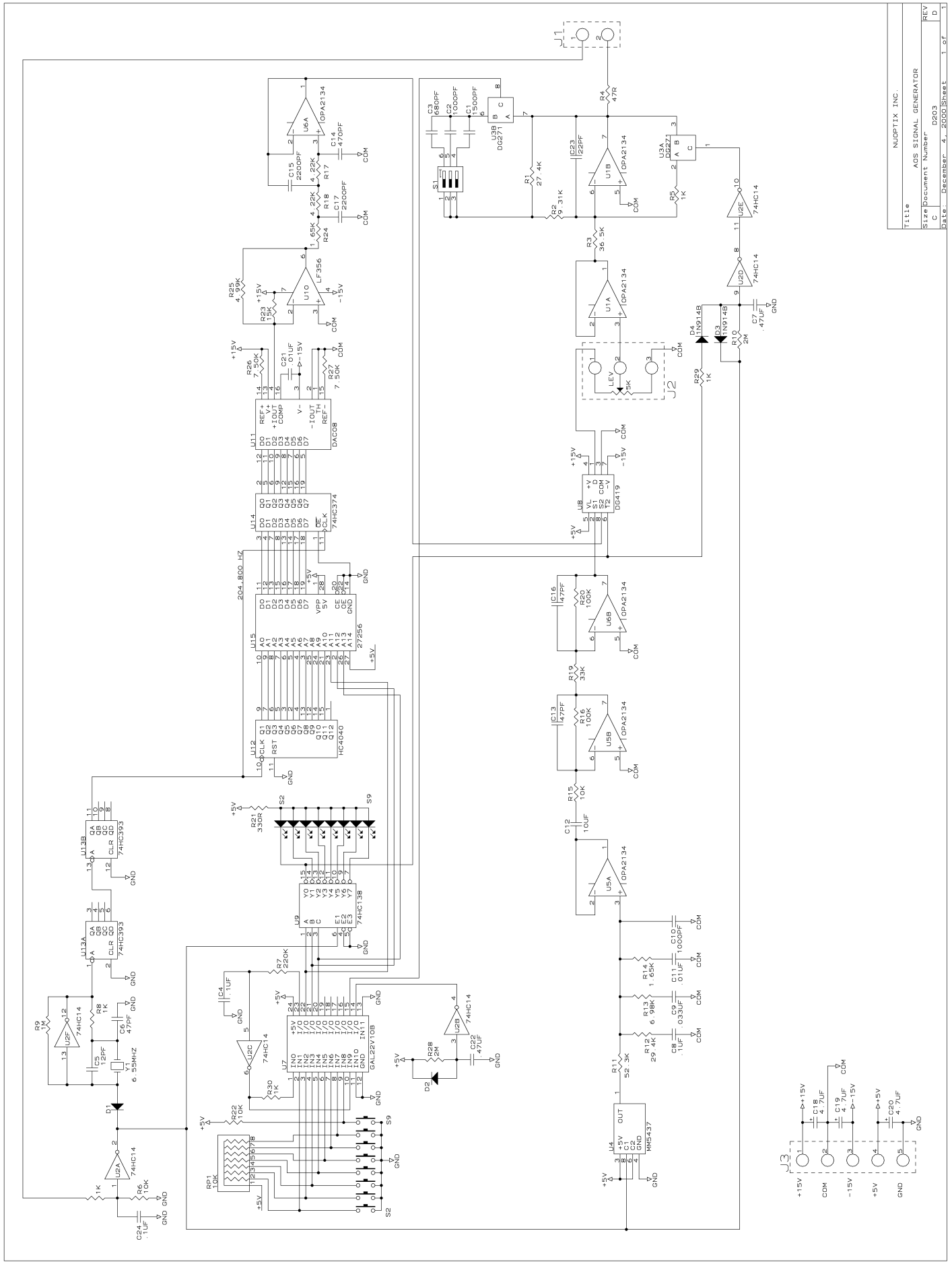

TP2
TP4
R83
2KHZ
R82
4KHZ
R81
6KHZ
R89
DEL
R115
NR
TP3
R97
10KHZ
R99
COMP
R58
8KHZ
R59
F8
R43
CLIP
PRE-EMP
TP1
R53
OFFSET
R54
AUDIO
R51
PEC
R52
CROSS
TP5
TP8
DE-EMP
R15
GAIN
R23
S2
R25
S1
R10
M2
R9
M1
TP7
TP6
1
22
NUOPTIX INC D202 SORS MAIN BOARD

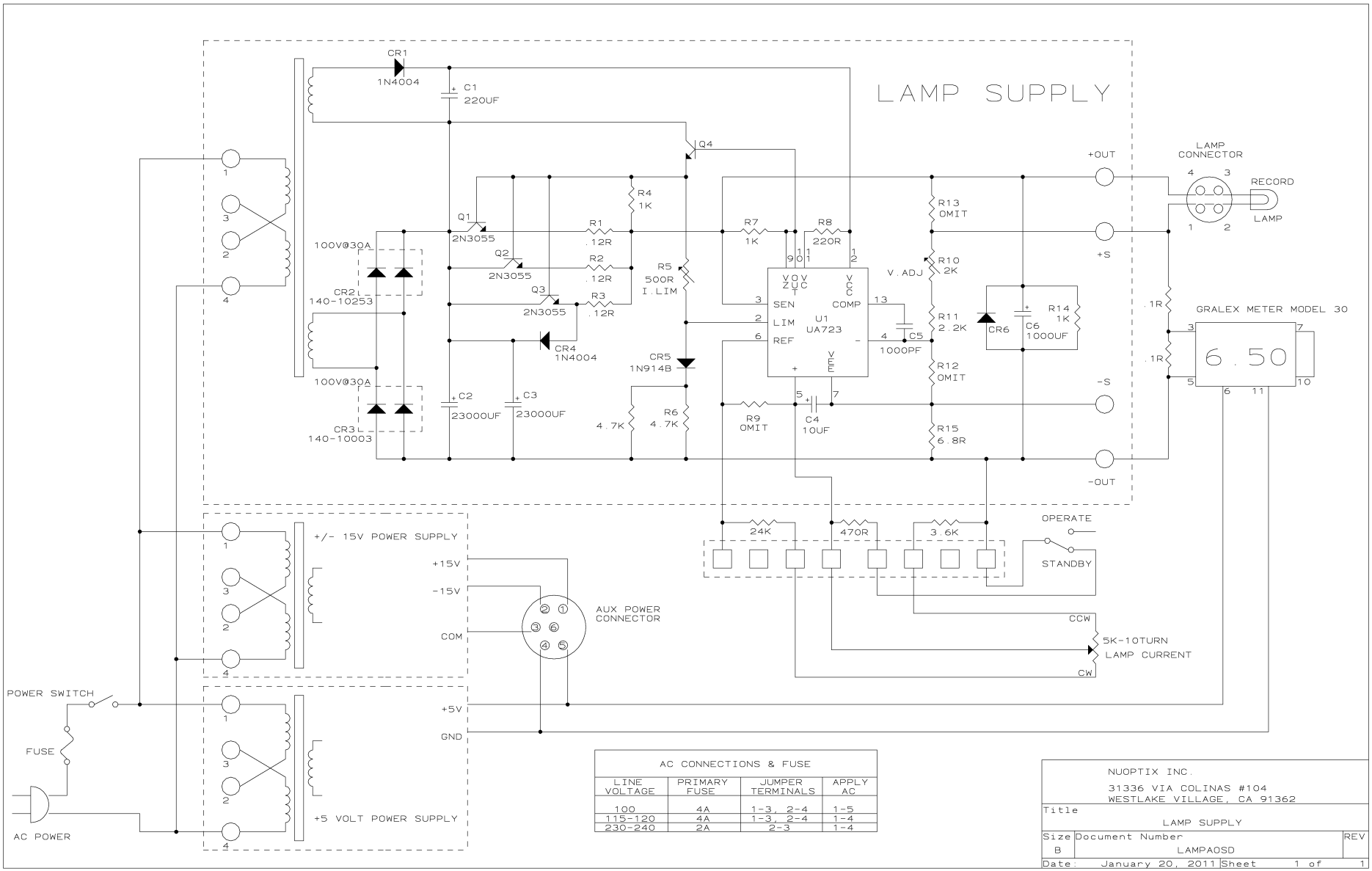

STEREO
STEREO SEL
MONO
MONO SEL
AUX
AUX SEL
GAIN
INPUT
CLIP
TP1
COMP
TP3
TP2
NR
TP4
DEL
FROM DELAY
AUDIO
TP5
COMPOSITE
CROSS IN
CROSS
OFFSET
FROM PREAMP
SETUP
CROSS OUT
TO DELAY
METER
REC SEL
DE-EMP
MONITOR
PEC
DIR
MONITOR OUT
MALE XLR
TP8
M2
M1
S1
S2
TP6
TP7
2KHZ
4KHZ
6KHZ
8KHZ
CUT ONLY
10KHZ
BOOST ONLY
CUT - BOOST
NOTE: 1) ALL DIODES ARE 1N914B
UNLESS OTHERWISE NOTED.
NUOPTIX INC.
31336 VIA COLINAS #104
WESTLAKE VILLAGE, CA 91362
SORS-D MAIN BOARD
D202
June 11, 2007


RIGHT
LEFT
MONO
J1
MAIN
J5
MAIN
J2
DELAY
POWER IN
TO DELAY
FROM DELAY
RIGT SIGNAL
LEFT SIGNAL
MONO SIGNAL
+15V
-15V
COM
GND
+5V
LEFT INPUT LEVEL
RIGHT INPUT LEVEL
AUX SIGNAL
STEREO/MONO
AUX SEL
MONO SEL
STEREO SEL
AUX CONTROL
MONITOR OUTPUT
LEFT
RIGHT
E32
E56
MONITOR
SETUP
OPTICAL PREAMP
LEFT METER
RIGHT METER
REMOTE METER
REC/PREVIEW
/REVERSE BIAS
MILS/MOD
RELAY
STEREO
MONO
INPUT
AUX
SETUP
BIAS
PRE
REC
REV
ETEST
MODE
RECORD
LIGHT VALVE OUTPUT
NOTE: 1) ALL DIODES ARE 1N914B UNLESS OTHERWISE NOTED.
NUOPTIX INC.
SORS MOTHERBOARD
D201
November 25, 1998


U18
87C751
WD.ASM
8MHZ
+5V
GND
D1
1N914B
R25
10M
U11E
74HC14
U11D
74HC14
/RST
C46
.1UF
U8
MC78L05ACP
U10
MC78L05ACP
R22
10R
R24
10R
+15V
C39
.33UF
4.7UF
C40
.33UF
4.7UF
L3
L5
C29
.33UF
C34
.33UF
COM
Y1
VIN +5V
GND OUT
8MHZ
U11C
74HC14
U11A
74HC14
/SCLK
SCLK
L/R
FSYNC
U9
CS5390
A+5V
VL+
VREF+
VREF-
AINL+
AINL-
AINR+
AINR-
A-5V
LGND
ACOM
D+5V
FSYNC
DPD
APD
SDATA
ICLKD
SCLK
ACAL
DCAL
OCLKD
ICLKA
L/R
SMODE
CMODE
DGND
C28
.1UF
C30
1UF
C31
1UF
C12
.22UF
C21
100UF
C18
.22UF
C24
6800PF
C23
6800PF
C19
.1UF
C22
1UF
C20
.33UF
C41
4.7UF
R23
51R
R18
39R
R17
39R
R15
39R
R16
39R
R20
10R
-15V
U5
MC79L05ACP
L4
L6
C33
1UF
C35
1UF
U6
CS4328
D+5V
LRCK
BICK
SDI
XTI
XTO
ACKO
ACKI
RST
DIF1
DIFO
CKS
TST
GND
A+5V
CMPO
CMPI
CALO
CALI
AOUTL
AOUTR
A-5V
VREF-
COM1
COM2
COM3
C32
.1UF
C36
10UF
C42
4.7UF
C17
.33UF
C13
10UF
C14
.1UF
C25
10UF
C26
.1UF
C15
10UF
C16
.1UF
C11
.01UF
C10
.01UF
C27
.33UF
C43
4.7UF
C44
10UF
C45
10UF
L1
L2
U7
MC79L05AACP
U4
MC78L05ACP
R19
10R
R21
10R
R14
51R
R13
R26
47R
R27
47R
U1A
U1B
OPA2134
R1
10.0K
R2
36.5K
R3
36.5K
R4
10.0K
C4
47PF
C5
47PF
C49
C50
U3A
U3B
U2A
U2B
R11
49.9K
R12
49.9K
R10
10.0K
R9
10.0K
R8
49.9K
R7
49.9K
R6
10.0K
R5
10.0K
C8
22PF
C6
22PF
C9
47PF
C7
47PF
C47
C48
C38
.47UF
C37
.47UF
C1
4.7UF
C2
4.7UF
C3
4.7UF
L_OUT
R_OUT
+15V
-15V
COM
GND
L7
L10
L11
L12
L14
L15
L13
L9
L8
C
K
T,16
V,18
Y,21
Z,22
W,19
H
F
RP1
10K
S1
DELAY=(SWITCH+1)*1.79mS
ALL OPEN = 1.78mS
ALL CLOSED=230.00mS
26.6mS
U13
74HC373
U12A
74HC32
U11B
74HC14
A13
L/R
U17
U16
U15
32KX8 SRAM
27C256
U14
ADSP-2115
FSYNC
/SCLK
GND
+5V
NOTE: 1) NON INVERTING
2) UNITY GAIN
3) +10dBm = 100%
4) S/N > 94DB A WT
NUOPTIX INC.
31336 VIA COLINAS #104
WESTLAKE VILLAGE, CA 91362
Title
18 BIT STEREO DIGITAL DELAY
Size C
Document Number D217
REV C
Date: May 26, 2000 Sheet 1 of 1


NUOPTIX INC.
Title
OPTICAL PREAMPLIFIER
Size
A
Document Number
D207
REV
A
Date: April 19, 2005
Sheet 1 of 1
MALE XLR
LEFT OUT
-15V
COM
+15V
RIGHT OUT
E9
E7
E6
E5
E8
R3 100R
R8 100R
C8 4.7UF
C7 4.7UF
-15V
+15V
U1A TL072BCP
U2A TL072BCP
U1B TL072BCP
U2B TL072BPC
R2 10K
R7 10K
C2 100PF
C5 100PF
R4 1K
R9 1K
C3 .01UF
C6 .01UF
R5 2.37K
R10 2.37K
C1 20PF
C4 20PF
R1 100K
R6 100K
COM
E4
E3
E2
E1
LEFT CELL
RIGHT CELL


NUOPTIX INC.
Title
AGS SIGNAL GENERATOR
Size C
Document Number D203
REV D
Date December 4, 2000 Sheet 1 of 1



AC CONNECTIONS & FUSE			
LINE VOLTAGE	PRIMARY FUSE	JUMPER TERMINALS	APPLY AC
100	4A	1-3, 2-4	1-5
115-120	4A	1-3, 2-4	1-4
230-240	2A	2-3	1-4

NUOPTIX INC.
31336 VIA COLINAS #104
WESTLAKE VILLAGE, CA 91362

Title: LAMP SUPPLY

Size: B | Document Number: LAMPAOSD | REV:

Date: January 20, 2011 | Sheet 1 of 1