Owner's Manual

Model LS2

LINE STAGE AMPLIFIER

audio research
HIGH DEFINITION®

5740 GREEN CIRCLE DRIVE / MINNETONKA, MINNESOTA 55343-4424 / PHONE 612/939-0600 FAX 612/939-0604

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Model LS2

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PREFACE

Please take the time to carefully read this Instruction Manual prior to installation or use of your LS2 Line Stage Amplifier. Because it is a highly advanced electronic instrument, there are several facts and procedures you should know before you place it in operation.

Just as you would not purchase and attempt to operate an expensive camera, computer system or high-performance automobile without first learning something about performance parameters and correct operating procedures, so too your line stage amplifier requires some familiarization before you make it part of your music reproduction system. Your reward, in terms of maximum performance and a long service life, will be well worth the effort.

INTRODUCTION

The LS2 Line Stage Amplifier breaks new ground: there has simply never been a product which so decisively advances the state-of-the-art in a price range approachable by so many music lovers.

With the flexibility of five inputs plus the "Direct Gain Path", and three sets of main outputs (two with balanced XLR's), the LS2 has enough connective options to suit most any ardent music lover. At the same time, only the most often-used control functions have been included, making the LS2 a "hotrod" in the best sense. Unnecessary controls and expense have been expunged.

Internally there are two transformers, and there is twice the amount of regulation of any previous single-chassis Audio Research preamp. New active feedback circuitry negates the effects of output coupling caps, which also contributes to the lower output impedance of the LS2. That impedance is maintained at lower frequencies, in turn allowing greater bass control. As expected, the LS2 is a pure Class A design which is capable of swinging 45 volts peak-to-peak. With higher current capability, long interconnects or low input impedance amplifiers can be driven with remarkable ease.

Continuing the hybrid design concept which Audio Research has been renowned for, the LS2 also continues the tradition of solidly built, handcrafted products constructed to provide a lifetime of musical pleasure. We hope you enjoy it for many years.

WARNINGS

1. To prevent fire, or shock hazard, do not expose your LS2 to rain or moisture.

2. This unit contains voltages which can cause serious injury or death. Do not operate with cover removed. Refer servicing to your authorized Audio Research dealer or other qualified personnel.

3. The power cord on your LS2 is equipped with an 18-gauge, 3-conductor cable and a standard three-prong grounding plug. In addition, your LS2 uses an isolating power transformer with a 4 KV-rated insulation. For absolute protection, do not defeat the ground power plug. This provides powerline grounding of the LS2 chassis to provide absolute protection from electrical shock.

4. For continued protection against fire hazard, replace the fuse only with the same type and rating as specified at the fuse holder.

PACKAGING

Save all packaging in a dry place away from fire hazard. Your LS2 line stage amplifier is a precision electronic instrument and should be properly cartoned any time shipment is made. You may not have occasion to return your unit to the factory for service, but if that should prove necessary, or other occasion requiring shipment occurs, the original packaging will protect your LS2 from unnecessary damage or delay.

Note that your LS2 has been shipped with the vacuum tube installed in its proper high-retention socket. You may do likewise if the complete, original packaging is used for shipment.

DESCRIPTION OF CONTROLS

GAIN CONTROL: A high-quality, metal-film segmented control with 41 steps and accurate tracking. Use it to control volume. Rotation to the left attenuates gain, rotation to the right increases gain.

INPUT SELECTOR: Detents indicate selection of various source material options: "Tape" for cassette DAT, or other tape formats; "Tuner" for FM/AM radio tuners; "CD" for digital disc players or processors; "Video" for audio input from Beta or VHS Hi-Fi videotape decks; "Aux" for any additional high level source - tape, tuner, CD, video, etc.

The signal source chosen by the input selector is fed to the Tape outputs when the Record/Defeat toggle switch is set to "Record".

The signal source chosen by the input slector is fed to the Main outputs when the Direct/Normal switch is set to "Normal".

POWER SWITCH: Supplies power from AC wall outlet to LS2 when in "Power" position. Although not strictly necessary, it is nonetheless good practice to put the LS2 in "Mute" before turning on power for maximum protection of your power amplifer(s) and speakers.

MUTE/OPERATE SWITCH: In "Mute" position, shorts the main outputs of the line stage amplifier to allow listening interruptions for telephone answering or other reasons. This switch should always be activated between listening uses or switching of inputs, in addition to turning the Gain (volume) control counter-clockwise. These two simple precautions will prevent inadvertent misuse of your LS2 and help protect your power amplifier(s) and speakers from unexpected transient signal pulses. In "Operate" position, this switch allows the signal to pass normally to the outputs.

CAUTION: Do not turn up the gain control beyond normal listening positions when the LS2 is in the mute mode. Always turn the gain control down when changing program sources, even when it is muted. The LS2 has an extremely wide dynamic range, and switching to Operate at loud levels may be too much for amplifiers, speakers or ears. Furthermore, at extremely high signal levels in the Mute mode, the LS2 could overload

internally. This will not harm the LS2, but it may take 10-15 seconds to stabilize from the overload. If you switch to Operate before the LS2 has recovered from the overload, you will hear a "pop" when the mute switch is actuated, indicating the presence of unwanted subsonic energy that may damage some amplifiers and poorly-fused speakers, if the LS2 is left in Operate. If you hear a "pop", switch immediately back to Mute, turn down the gain control and wait 15 seconds or so and try again. Under normal conditions the LS2 muting has no "pops." Subsonic program energy may also cause small, harmless mute "pops." These "pops" may be eliminated by turning down the LS2 gain control before muting.

POWER/MUTING CIRCUIT LED: Glows green to indicate unit is on and receiving power from the power supply. Note that for approximately 45 seconds after start-up or in "Mute" mode, this LED will glow more dimly, indicating proper operation of the muting circuit. In the "Operate" mode (after warm-up) the LED brightens and your LS2 is ready for normal operation.

TAPE/DEFEAT SWITCH: In "Tape" position, the source chosen by the input selector is fed to the Tape outputs. In "Defeat" position, the Tape outputs are disconnected, with no signal being fed to them.

It is recommended that the Tape/Defeat switch be left in the "Defeat" position at all times (unless a tape recording is being made) for best sound quality.

DIRECT/NORMAL SWITCH: Allows the use of either the "Direct Gain Path" set of inputs or the "Normal" inputs otherwise found on the Input Selector switch. The "Direct" position provides the highest possible resolution for the high level source (CD player, DAC processor, etc.) routed through it, bypassing the "Input Selector" control. Since the Direct Gain Path inputs are wholly independent from the other inputs, it is not possible to record off the "Direct" inputs (see also "Tape Dubbing Procedure").

CONNECTIONS

INPUT CONNECTORS: All are clearly marked to indicate use. The inputs are 50K ohms impedance.

MAIN OUTPUT CONNECTORS: There are three sets of output connectors; one utilizes (unbalanced) RCA connectors; the other two have (balanced) XLR type connectors. Any combination of these should be connected to your crossover or amplifier(s) as necessary.

NOTE: The XLR connector pin leads are as follows: 1-shield; 2-positive; 3-negative. If used with a power amplifier which utilizes different pin leads for positive, negative and/or shield, the signal being fed to the loudspeakers will be incorrect. Please consult your Audio Research dealer.

NOTE: At the performance level of the LS2, high-quality audio signal interconnect cables are critical to preserving maximum fidelity. Audio Research RFI-shielded or unshielded interconnect cables are highly recommended for connection to your power amplifier(s) and to other ancillary equipment. See your authorized Audio Research dealer for recommended lengths.

TAPE OUTPUT CONNECTORS: The LS2's Tape Outputs should be connected to your tape deck's "REC" or "LINE" inputs. These outputs supply whatever is selected by the Input Selector Control to the tape deck for recording when the Record/Defeat swith is set to "Record." Level is non-variable and approximately the same as the selected input source. The "Direct" inputs cannot be routed to the Tape Outputs in any way.

"Hot rodding" the LS2 by connecting a power amplifier to the "Tape" outputs instead of the "Main" outputs is not recommended. Sound quality will be degraded somewhat, instead of being enhanced, when routed in this manner.

All input/output connectors have heavy gold plating and connect "ground" before "hot." (On disconnect, "hot" is first.)

INSTALLLATION INSTRUCTIONS

While the LS2 does not dissipate an unusual amount of heat, it is important that it be provided with reasonable airflow to assure long, trouble-free operation. In addition, the following installation guidelines will help insure maximum sonic performance as well as reliable service.

1. Upright and horizontal mounting is suggested if extended operation (longer than one hour) is contemplated.

2. Do not "stack" the LS2 on top of a power amplifier: not only could this cause overheating, but "hum" may be introduced into the LS2 from the proximity of the amplifier's power transformer.

3. Do not place or operate your LS2 on a soft or irregular surface such as a rug. This will prevent proper ventilation.

4. Do not operate your LS2 without the top and bottom covers installed. These are required both for safety as well as shielding from interference (except in service operations, obviously).

5. If rack mounting is employed, use Audio Research Rack Mount Ventilators (RMV-3) below and above your LS2.

6. If side-by-side mounting with other equipment is employed, place the LS2 to the left of the other chassis, so as to provide maximum spacing between the transformer of the LS2 and the other component.

7. In a cabinet or rack-mount installation which has an enclosed back, an exhaust fan is desirable so as not to operate the LS2 in overheated ambient air. Operation of vacuum tube equipment for long periods of time in hot ambient air will shorten tube life and increase chance of failure of other component parts.

OPERATING PROCEDURE

START-UP:

1. Make sure Power switch is set to "Off" position; Mute switch should be in "Mute"

position; and "Gain" Control should be at minimum (full counter-clockwise rotation).

2. Secure all rear-panel connections between LS2, power amplifier(s) and input sources. Note: Given the advanced performance capabilities of the LS2, it is extremely important that high-quality interconnects be used for connection to ancillary electronics. Audio Research brand interconnects, in either unshielded or RFI-shielded configurations, are strongly recommended. Your authorized Audio Research dealer can assist you in determining optimal lengths for your system.

3. Plug 3-prong powerline cord from rear of LS2 into grounded AC wall receptacle.

4. Turn Power switch to "On." Green LED will glow dimly for approximately 45 seconds while power supply stabilizes, indicating operation of automatic muting circuit. After this warm-up muting period, the LED will brighten when "Operate" is selected, indicating that your LS2 is ready for operation.

Note: For superior sonic performance, a warm-up period of at least one hour is recommended. In addition, your LS2 may be safely left "on" continuously for maximum performance at all times, but at the expense of higher maintenance costs (more frequent tube replacement).

5. Rotate input selector to source desired; set switch options to positions desired.

6. Activate input source, then deactivate Mute switch and adjust Gain Control as necessary.

TAPE RECORDING PROCEDURE:

When using the LS2 as a control center for recording, the program source to be recorded must be connected to one of the five inputs controlled by the "Input Selector." This routes the selected program to the Tape outputs. The "Direct" inputs cannot be routed through the Tape outputs at any time.

If you own a three-head tape deck, and wish to monitor the actual tape while making a recording (for a true "A-B" comparison of signals before and after recording), follow this procedure:

a) Remove the tape deck's outputs from the "Tape" inputs on the LS2.
b) Insert the tape deck's outputs in the "Direct" inputs of the LS2.

If you are recording from a compact disc player, for example, you will hear the signal going to the tape deck when the Input Selector is set to CD and the Record/Defeat switch is set to "Record." You can then monitor off the tape as it is being recorded by switching to "Direct" on the Direct/Normal switch.

It is also possible to dub from one tape deck to another. Simply connect the output from one tape deck to an unused set of inputs controlled by the "Input Selector" (Aux, Video, etc.) on the LS2. This signal will then be routed to the second tape deck when the Record/Defeat switch is set to Record, and the appropriate input is selected on the Input Selector.

MUTING PROVISIONS:

The LS2 has several provisions to help protect against misuse of the exceptional dynamic range and wide bandwidth that it offers. It is not subject to damage itself, but some power amplifiers and speakers are more limited in their ability to withstand signal extremes. These provisions, both manual and automatic, are designed not to interfere with a flawless listening experience of unprecedented realism, while giving reasonable protection against warm-up surges and power line interruptions. However, for absolute protection of associated equipment some operator understanding, and responsibility, is required.

Initial "settling" time of all circuit parameters within the LS2 requires approximately 5 to 10 minutes. The automatic muting circuitry timer is adjusted for about 45 seconds. (This is because recurrent interruption "settling" time is much less. You would not want to wait for 5-10 minutes each time such an interruption occurred.)

The Mute/Operate Switch allows manual disabling of the LS2 outputs during the switching of equipment. Use of this switch will minimize stress on your amplifier even if it is "off." It is also highly recommended that manual muting be employed during the initial 45 second warm-up period as well as during turn-off for maximum protection.

While it is true that the automatic muting will provide reasonably adequate protection against speaker burnout during these periods, it has limitations. At the 45 second point the automatic timer "releases" the output, and since full subsonic stabilization has not yet occurred, some sonic unpleasantness may occur. Although this is normally adequate protection, utilization of the manual mute provision will completely avoid this stress to your speakers, as well as the associated sonic unpleasantness.

Some solid-state power amplifers have a DC offset present at their input connections. (This, of course, should not be.) Operation of the manual muting switch with such an amplifier connected will result in a "click" or "pop" in your loudspeaker (commensurate in level with the amount of the offset) each time the switch is activated. Repair or replacement of such amplifiers is suggested.

The automatic muting operates as follows:

1. The manual mute switch always disables all "main" outputs and overrides any automatic provisions, even when the LS2 is turned off. (The "Operate" position of the manual mute switch is functional only when the unit is not in the automatic mute mode.)

2. The 45 second warm-up timer will restart automatically and the LED will dim if the power is temporarily interrupted for 0.1 second or more. Note: Power supply regulation of the LS2 is effective down to 100VAC without serious sonic degredation.

3. The automatic muting of the LS2 is designed to be effective only against power line interruptions and power line failures. It will not mute gainst subsonic signal transmissions from your input source. Proper fusing of speakers is essential to protect against excessive audio level or power amplifier faults.

SHUT-DOWN:

1. Set "Mute" switch to "mute" position.
2. Rotate "Gain" control counter-clockwise to minimum setting.
3. Turn off power amplifier(s).
4. Turn off all input sources.
5. Set LS2 Power Switch to "Off" position.

REDUCING GAIN

If the overall gain of the LS2 is too high with some sources, please consult your Audio Research dealer or call Audio Research customer service, (612) 566-7570 (CST).

SERVICING

Because of its careful design and exacting standards of manufacture, your LS2 should normally require only minimal routine service to maintain its high level of performance.

CAUTION: Your LS2 contains sufficient levels of voltage and current to be lethal. Do not tamper with a component or part inside the unit. Refer any needed service to your authorized Audio Research dealer or other qualified technician.

The vacuum tube inside your LS2 is a quality 6DJ8 type, and with normal use should not need to be changed for approximately 5,000 to 10,000 hours of use. Replacement 6DJ8 tubes need not be low-noise or matched for gain characteristics, and are available from Audio Research.

At the back of the Manual you will find a schematic diagram for your LS2 which is fully annotated with operating voltages and component part values. Should service be necessary, please contact your Audio research dealer, or Audio Research Corp.

CLEANING

To maintain the visual appearance of your LS2 line stage amplifier, occasionally wipe the front panel and top cover surfaces with a soft damp (not wet) cloth to remove dust. A mild, non-alkaline soap solution may be used to remove fingerprints or similar smudges. Cleaners containing abrasives should not be used as they will damage the "brushed" grain of the front panel finish.

3-Year Limited Warranty

Terms and Conditions

1. LIMITED WARRANTY

Audio Research warrants the product designated herein to be free of manufacturing defects in material and workmanship, subject to the conditions hereinafter set forth, for a period of three (3) years from the date of purchase by the original purchaser or no later than five (5) years from the date of shipment to the authorized Audio Research dealer, whichever comes first, excepting vacuum tubes which are warranted for 90 days only (See 6).

2. CONDITIONS

This Warranty is subject to the following conditions and limitations. The Warranty is void and inapplicable if the product has been used or handled other than in accordance with the instructions in the owner's manual, abused, or misused, damaged by accident or neglect or in being transported, or the defect is due to the product being repaired or tampered with by anyone other than Audio Research or an authorized Audio Research repair center. The product must be packed and returned to Audio Research or an authorized Audio Research repair center by the customer at his or her sole expense. Audio Research will pay return freight of its choice. A RETURNED PRODUCT MUST BE ACCOMPANIED BY A WRITTEN DESCRIPTION OF THE DEFECT AND A PHOTOCOPY OF THE ORIGINAL PURCHASE RECEIPT. This receipt must clearly list model and serial number, the date of purchase, the name and address of the purchaser and authorized dealer and the price paid by the purchaser. Audio Research reserves the right to modify the design of any product without obligation to purchasers of previously manufactured products and to change the prices or specifications of any product without notice or obligation to any person.

3. REMEDY

In the event the above product fails to meet the above Warranty and the above conditions have been met, the purchaser's sole remedy under this Limited Warranty shall be to return the product to Audio Research or an authorized Audio Research repair center where the defect will be rectified without charge for parts or labor, except vacuum tubes (See 6).

4. LIMITED TO ORIGINAL PURCHASER

This Warranty is for the sole benefit of the original purchaser of the covered product and shall not be transferred to a subsequent purchaser of the product.

5. DURATION OF WARRANTY

This Warranty expires on the third anniversary of the date of purchase or no later than the fifth anniversary of the date of shipment to the authorized Audio Research dealer, whichever comes first.

6. VACUUM TUBES

Vacuum tubes are warranted for the original 90-day period only.

7. DEMONSTRATION EQUIPMENT

Equipment used by an authorized dealer for demonstration purposes is warranted to be free of manufacturing defects in materials and workmanship for a period of three (3) years from the date of shipment to the dealer. Vacuum tubes are warranted for 90 days. After the first year, demo equipment needing warranty service must be packed and returned to Audio Research by the dealer at his sole expense. Audio Research will pay return freight of its choice. A returned product must be accompanied by a written description of the defect on an AUDIO RESEARCH RETURNED GOODS AUTHORIZATION form. Dealer-owned demonstration equipment sold at retail within three (3) years of date of shipment to the dealer is warranted to the first retail customer to be free of manufacturing defects in materials and workmanship for the duration of the 3-Year Limited Warranty remaining (as measured from the date of shipment of the equipment to the dealer). Vacuum tubes are not warranted for any period under these conditions of sale. In the event warranty service is needed under these conditions, the owner of the equipment must provide a copy of his purchase receipt, fulfilling the requirements described under "2. Conditions" above. The product must be packed and returned to Audio Research or an authorized Audio Research repair center by the customer at his or her sole expense. Audio Research will pay return freight of its choice.

8. MISCELLANEOUS

ANY IMPLIED WARRANTIES RELATING TO THE ABOVE PRODUCT SHALL BE LIMITED TO THE DURATION OF THIS WARRANTY. THE WARRANTY DOES NOT EXTEND TO ANY INCIDENTAL OR CONSEQUENTIAL COSTS OR DAMAGES TO THE PURCHASER. Some states do not allow limitations on how long an implied warranty lasts or an exclusion or limitation of incidental or consequential damages, so the above limitations or exclusions may not apply to you. This Warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

9. WARRANTOR

Inquiries regarding the above Limited Warranty may be sent to the following address:

Audio Research
5740 Green Circle Drive, Minnetonka, Minnesota 55343-4424.
ATTN: Customer Services

Warranty Outside the U.S.A.

Audio Research has authorized distribution in many countries of the world. In each country, the authorized importing retailer or distributor has accepted the responsibility for warranty of our products. Warranty service should normally be obtained from the importing retailer or distributor from whom you purchased your product.

In the unlikely event of service required beyond the capability of the importer, Audio Research will fulfill the conditions of the warranty. Such product must be returned at the owner's expense to the Audio Research factory, together with a photocopy of the bill of sale for that product, a detailed description of the problem, and any information necessary for return shipment.

Specifications

LS2 LINE STAGE AMPLIFIER SPECIFICATIONS

Frequency Response:
±.5dB, 1Hz to 100kHz
-3dB points below 0.1Hz and above 300kHz

Distortion:
Less than .01% at 2V RMS output. (Typically less than .005% in midband)

Gain:
Main output: 18dB
Balanced output: 24dB
Tape output: 0dB
(Optional 12dB gain reduction)

Input Impedance:
50K ohms

Output Impedance:
250 ohms main output; 500 ohms Balanced 1, Balanced 2 (10K ohms minimum load and 2000pF maximum capacitance)

Maximum Input:
20V maximum.

Rated Outputs:
2V RMS 1Hz to 100kHz into 60K ohm load (maximum output capability is 10V RMS [20V RMS balanced] output at .05% THD at 1kHz into a 10K ohm load).

Power Supplies:
Electronically-regulated low and high voltage supplies.
Two transformers (toroid for high voltage). Line regulation better than .01%.

Noise:
20uV RMS residual IHF weighted noise at main output with gain control minimum (100dB below 2V RMS output)

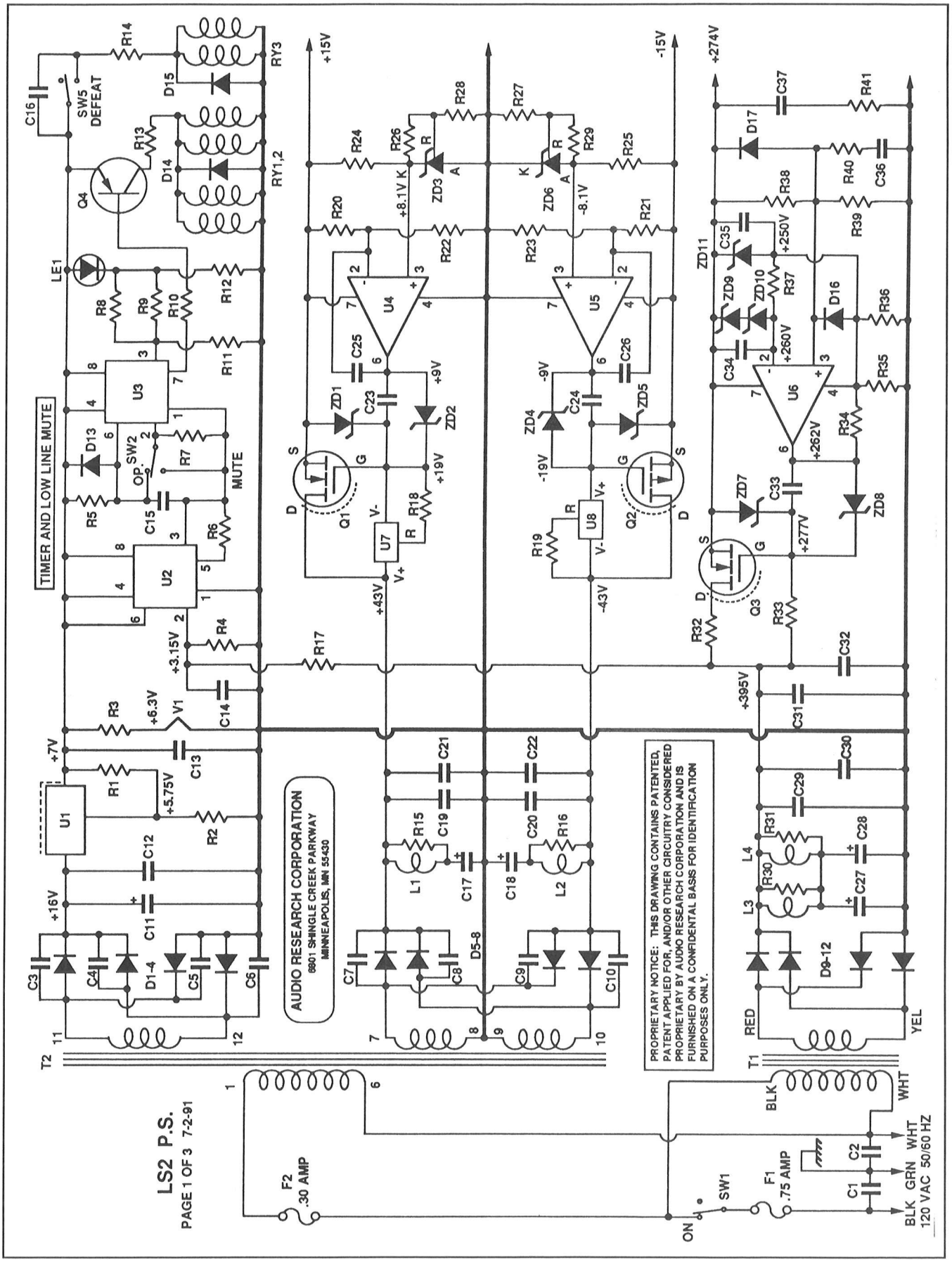
Tube Complement:
1 - 6DJ8/ECC88 dual triode
(Hybrid FET/Tube audio circuit, solid-state power supply)

Power Requirements:
100-135VAC 60Hz (200-270VAC 50/60Hz) 60 watts maximum

Dimensions:
19" (48 cm) W x 5 1/4" (13.4 cm) H (standard rack panel) x 10 1/4" (26 cm) D. Handles extend 1 5/8" (4.1 cm) forward of front panel. Rear chassis fittings extend 7/8" (2.3 cm)

Weight:
13 lbs. (5.9 kg) net; 21 lbs. (9.5 kg) Shipping

Schematics


LS2 P.S.
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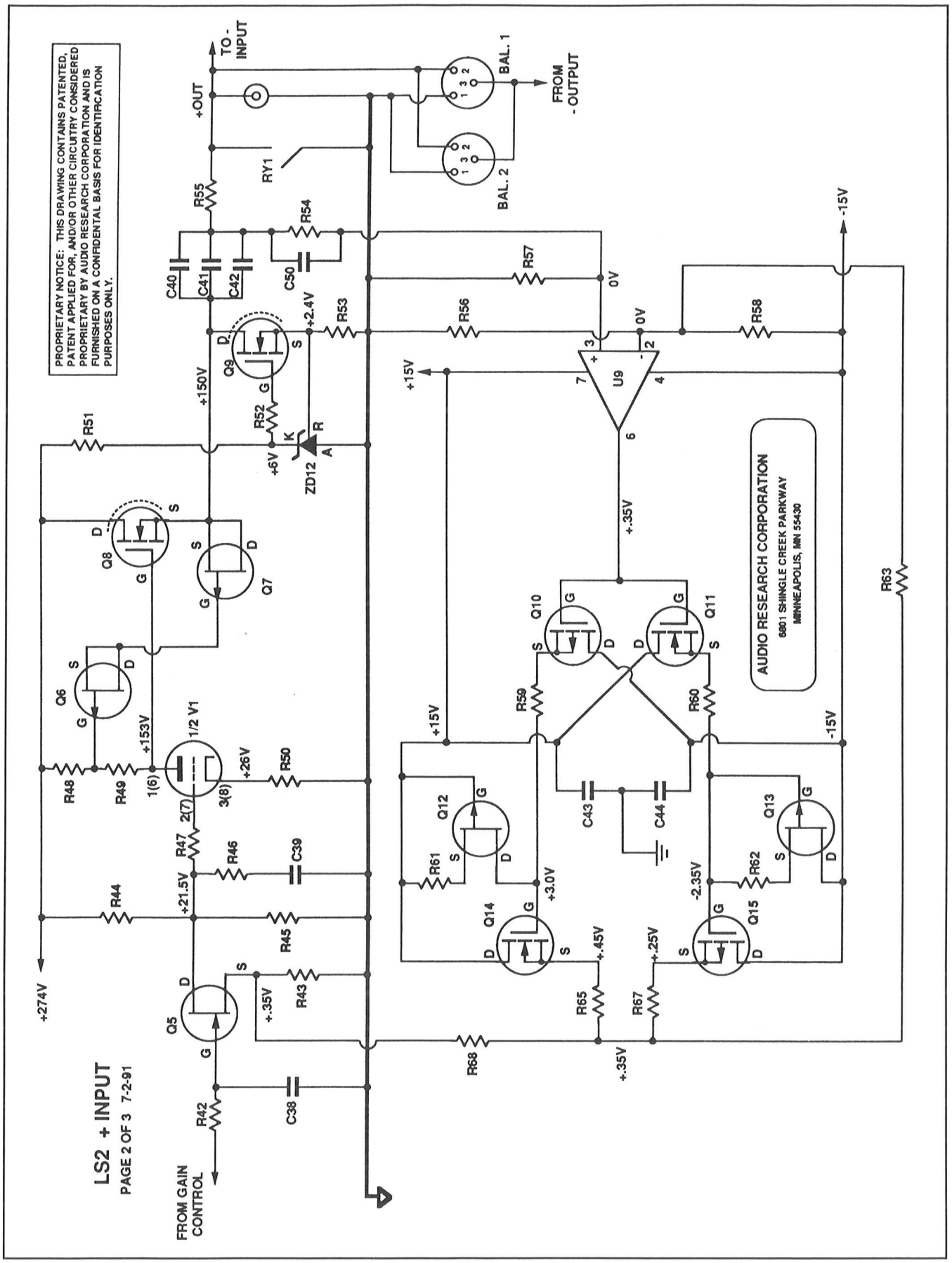
AUDIO RESEARCH CORPORATION
8801 SHINGLE CREEK PARKWAY
MINNEAPOLIS, MN 55430
PROPRIETARY NOTICE: THIS DRAWING CONTAINS PATENTED, PATENT APPLIED FOR, AND/OR OTHER CIRCUITRY CONSIDERED PROPRIETARY BY AUDIO RESEARCH CORPORATION AND IS FURNISHED ON A CONFIDENTAL BASIS FOR IDENTIFICATION PURPOSES ONLY.
TIMER AND LOW LINE MUTE
+15V
-15V
+274V
+43V
-43V
+395V
+277V
+262V
+260V
+250V
+8.1V
-8.1V
+9V
-9V
+19V
-19V
+7V
+6.3V
+5.75V
+3.15V
+16V
MUTE
OP
SW1
SW2
SW5 DEFEAT
F1 .75 AMP
F2 .30 AMP
ON
BLK GRN WHT
120 VAC 50/60 HZ
BLK
WHT
RED
YEL

Schematics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6801 SHINGLE CREEK PARKWAY
MINNEAPOLIS, MN 55430
LS2 + INPUT
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TO - INPUT
+OUT
FROM - OUTPUT
BAL. 1
BAL. 2
RY1
FROM GAIN CONTROL
+274V
+153V
+26V
+21.5V
+.35V
+150V
+2.4V
+6V
0V
+15V
-15V
+.35V
+3.0V
-2.35V
+.45V
+.25V
1/2 V1
ZD12
U9
Q5
Q6
Q7
Q8
Q9
Q10
Q11
Q12
Q13
Q14
Q15
R42
R43
R44
R45
R46
R47
R48
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R50
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R59
R60
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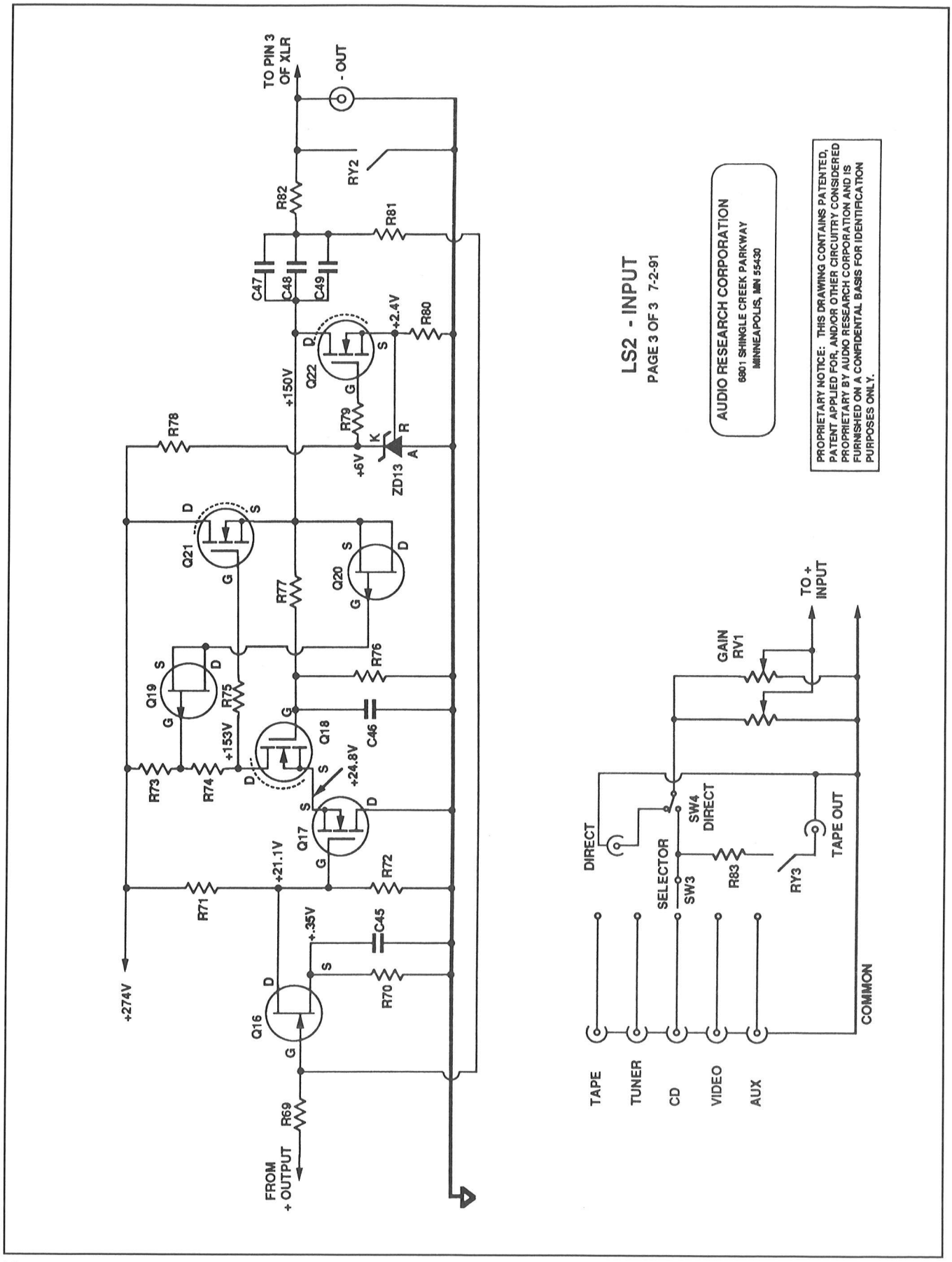
C43
C44
C50

Schematics


LS2 - INPUT
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TO PIN 3 OF XLR
- OUT
RY2
R82
R81
C47
C48
C49
+2.4V
R80
Q22
+150V
R79
+6V
ZD13
R78
Q21
Q20
R77
R76
Q19
R75
+153V
Q18
C46
+24.8V
R73
R74
Q17
+21.1V
R72
R71
+274V
+.35V
C45
R70
Q16
R69
FROM + OUTPUT
TO + INPUT
GAIN RV1
DIRECT
SW4 DIRECT
SELECTOR
SW3
R83
RY3
TAPE OUT
TAPE
TUNER
CD
VIDEO
AUX
COMMON

Parts List

PRODUCT: LS2 NOTES:

Schematic Symbol			Quantity	ARC Part #	Description
	C	CAPACITORS			
C 1,2			2	52500300	CAP. .005 UF 20% CERAMIC DISC
C 3-10,16			9	52100400	CAP. .01 UF 200V
C 11			1	50220902	CAP. 2200 UF 25V
C 12,13,14,23,24,33,34,35			8	53220507	CAP. .22 UF 10% 160V
C 15			1	51330702	CAP. 33 UF+/-10% 16V
C 17,18			2	50100908	CAP. 1000 UF 63V
C 19,20			2	53330602	CAP. 3.3 UF 160V +/-10%
C 21,22			2	53470402	CAP. 0.047 UF 160V 10%
C 25,26			2	53100101	CAP. 10 PF +/-1 PF 630V PPN
C 27,28			2	50100802	CAP. 100 UF 450V
C 29,30			2	53100608	CAP. 1.0 UF 1-20% 425V TYPE V
C 31,32,36,40,41,47,48			11	53100406	CAP. .01 UF+/-10% 630V
C 37			1	53200602	CAP. 2 UF +/-10% 450V
C 38			2	53560103	CAP. 56 PF+/-2% 630V DPN
C 39			2	53560201	CAP. 560 PF+/-2.5% 630V
C 42			2	53500606	CAP. 5 UF+/-20% 250V
C 43,44			4	53100506	CAP. 0.1 UF 160V
C 45			4	53150202	CAP. 150 PF 2 1/2% 630V PPN
C 46,50			4	53500001	CAP. 5 PF +/-1PF 630V DPN
C 49			2	53100606	CAP. 1.0 UF +/-10% 250V
	D	DIODES			
D 1-8			8	30500400	IN4005 GENERAL INSTRUMENT
D 9-12			4	30502200	IN4006
D 13-17			5	30500910	1N916B
	F	FUSES			
F 1			1	34500230	FUSE, MDL 3/4
F 2			1	34500121	FUSE, MDQ 3/10 SL. BL.220
	J	CONNECTORS			
J 1-8(RIGHT)			8	23201509	CHASSIS JACK,RED
J 1-8(LEFT)			8	23201510	CHASSIS JACK,WHITE
J 9,10			4	23201910	SP15 MIC CONN. CH. MNT.
	L	INDUCTORS			
L 1,2			2	61000160	CHOKE, 2.7 UH +/- 10%
L 3,4			2	61000170	CHOKE, 5.5 UH
	LE	PANEL INDICATOR			
LE 1			1	34300102	L.E.D.COLLAR & RETAINING RING

Parts List

PRODUCT: LS2 NOTES:

Schematic Symbol	Quantity	ARC Part #	Description
Q TRANSISTORS			
Q 1	1	30006805	FET, YELLOW GREEN
Q 2	1	30007029	FET, GRAY WHITE
Q 3	1	30006836	FET, GREEN BLUE
Q 4	1	30002900	TRANSISTOR,2N4403
Q 5,16	4	30006503	FET, WHITE ORANGE
Q 6,7,19,20	8	30005901	FET, RED BROWN
Q 8,18,21	6	30006716	FET, ORANGE,GREEN,BLUE
Q 9,22	4	30006706	FET, ORANGE BLUE
Q 10,15	4	30008000	FET, VPO116N5 SUPERTEX
Q 11,14	4	30007900	FET, VNO116N5 SUPERTEX
Q 12,13	4	30006420	J270
Q 17	2	30007006	FET, GRAY BLUE
R RESISTORS			
R 1,11	2	42237203	RES. 237 OHM 1% MK-3 50PPM
R 2,2A	2	42221303	RES. 2.21K 1% MK-3 50PPM
R 3,3A	2	42432003	RES. 4.32 OHM 1% MK-3 50PPM
R 4,38A	2	42255403	RES. 25.5K 1% MK-3 50PPM
R 5	1	42100603	RES. 1 MEG 1% MK-3 50PPM
R 6	1	42768403	RES. 76.8K 1% MK-3 50PPM
R 7,17A	2	42100703	RES. 10 MEG 1% MK-3 50PPM
R 8,61,62	5	42357203	RES. 357 OHM 1% MK-3 50PPM
R 9	1	42750203	RES. 750 OHM 1% MK-3 50PPM
R 10,20A,21A,56,63	7	42100403	RES. 10K+/-1% MK-3 50PPM
R 12	1	42681203	RES. 681 OHM 1% MK-3 50PPM
R 13	1	42383103	RES. 38.3 OHM 1% MK-3 50PPM
R 14	1	42750103	RES. 75 OHM 1% MK-3 50PPM
R 15,16,52,65,65A,67,67A,79	14	42549103	RES. 54.9 OHM 1% MK-3 50PPM
R 17	1	42464603	RES. 4.64 MEG. 1% MK-3 50PPM
R 18,19,30,31,46,47	8	42100203	RES. 100 OHM 1% MK-3 50PPM
R 20,21	2	42511303	RES. 5.11K 1% MK-3 50PPM
R 22,23	2	42178403	RES. 17.8K 1% MK-3 50PPM
R 24,25,45,45A,72,72A	10	42681303	RES. 6.81K 1% MK-3 50PPM
R 26,27	2	42499403	RES. 49.9K 1% MK-3 50PPM
R 28,29	2	42221403	RES. 22.1K 1% MK-3 50PPM
R 32,32A,43,70	6	42200205	RES. 200 OHM+/-1% MK8 50PPM
R 33	1	42158513	RES. 158K 1% MK-4 50PPM
R 34,34A	2	42392403	RES. 39.2K 1% MK-3 50PPM
R 35,36	2	42100505	RES. 100K 1% MK-8 50PPM
R 37	1	42499303	RES. 4.99K 1% MK-3 50PPM
R 38,57,57A	5	42357403	RES. 35.7K 1% MK-3 50PPM
R 39	1	42280513	RES. 280K1% MK-4 50PPM
R 40,42,42A,69,69A	5	42332203	RES. 332 OHM 1% MK-3 50PPM
R 41	1	43100002	RES. 1 OHM 2W 5% W.W.
R 44,48,48A,71	8	42750405	RES. 75K 1% MK-8 50PPM
R 49,53,59,60,74,80	12	42267203	RES. 267 OHM 1% MK-3 50PPM
R 49A,74A	4	42619203	RES. 619 OHM 1% MK-3 50PPM
R 50,50A	4	42402303	RES. 4.02K 1% MK-3 50PPM
R 51,78	4	42562513	RES. 562K 1% MK-4 50PPM
R 54	2	42130503	RES. 130K 1% MK-3 50PPM
R 55,55A,82,82A	8	42475203	RES. 475 OHM 1% MK-3 50PPM
R 58	2	42301503	RES. 301K 1% MK-3 50PPM

Parts List

PRODUCT: LS2 NOTES:

Schematic Symbol			Quantity	ARC Part #	Description
R 58A			2	42127503	RES. 127K 1% MK-3 50PPM
R 68			2	42100303	RES. 1K 1% MK-3 50PPM
R 69,81			4	42205503	RES. 205K 1% MK-3 50PPM
R 73,77			4	42274405	RES. 27.4K 1% MK-8 50PPM
R 75			2	42150203	RES. 150 OHM 1% MK-3 50PPM
R 76			2	42619314	RES. 6.19K 1% MK-5 50PPM
R 81A			2	42200303	RES. 2K MK-3 1% 50PPM
R 83			2	42499203	RES. 499 OHM 1% MK-3 50PPM
	RV	CONTROLS			
RV 1			1	45100536	QUAD 100K GAIN POT.
	RY	RELAYS			
RY 1,2,3			6	64101010	RELAY, 5V DAC1
	SW	SWITCHES			
SW 1			1	24102000	TOGGLE SWITCH,LS2
SW 2,5			3	24101610	TOGGLE SWITCH,LS2
SW 3			1	24002400	LS-2 SWITCH WAFER
SW 4			1	24101900	TOGGLE SWITCH,LS2
	T	TRANSFORMERS			
T 1			1	60009500	LS2 TOROID 120V
T 2			1	60009600	LS2 120V TRANSFORMER
	U	INTEGRATED CIRCUITS			
U 1			1	31004000	ADJ. O.P. VLTG. REG.
U 2,3			2	31000801	TIMER MC1455P1
U 4,5,6			3	31002200	MC34071P
U 7,8			2	31004100	ADJ. CURRENT SOURCE
U 9			2	31002300	IC, OP-AMP
	V	VACUUM TUBES			
V 1			1	32001120	VAC.TUBE, 6DJ8 CHINESE
	ZD	ZENER DIODES			
ZD 1,5,7			3	30500300	IN4740A
ZD 2,4			2	30504400	IN5240B
ZD 3,6,12,13			6	31002600	ZENER DIODE, TL431CLP ADJ
ZD 8			1	30504200	IN5535A
ZD 9,10			2	31000705	LM329DZ GREEN
ZD 11			1	30503500	IN5359 B