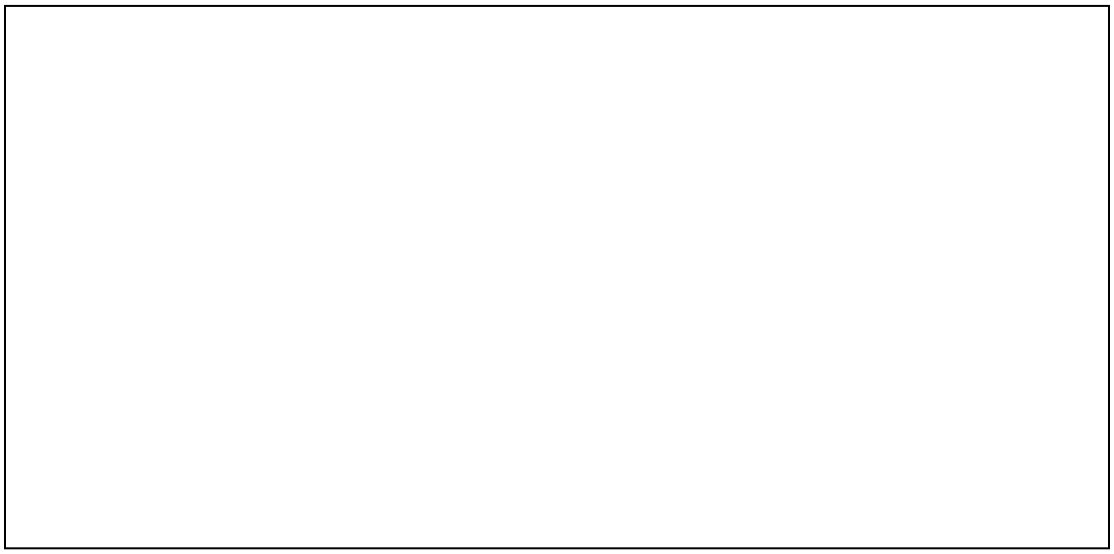
ALESIS
MATICA 500/900
(A4/A8)
Service Manual

P/N: 8-31-0030-A



Preface

This document is intended to assist the service technician in the operation, maintenance and repair of the Alesis device. Together with the User Reference Manual, this document provides a complete description of the functionality and serviceability of the Device. Any comments or suggestions you may have pertaining to the document are welcome and encouraged.

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TO REDUCE THE RISK OF ELECTRIC SHOCK OR FIRE, DO NOT EXPOSE THIS PRODUCT TO WATER OR MOISTURE.

The arrowhead symbol on a lightning flash inside a triangle is intended to alert the user to the presence of un-insulated "dangerous voltage" within the enclosed product which may be of sufficient magnitude to constitute a risk of electric shock to persons.

The exclamation point inside a triangle is intended to alert the user to the presence of important operating, maintenance and servicing instructions in the literature which accompanies the product.

REPAIR BY ANY PERSON OR ENTITY OTHER THAN AN AUTHORIZED ALESIS SERVICE CENTER WILL VOID THE ALESIS WARRANTY.

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Regarding the Power Supply Fuse

CAUTION: The product under service may employ the use of a replaceable fuse. Danger of fire or electrocution if fuse is incorrectly replaced. Replace with only the same type or equivalent type recommended by the equipment manufacturer.

Regarding the Internal Battery

CAUTION: The product under service may employ the use of a internal battery. Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instruction.

Safety Instructions

Carefully read the applicable items of the operating instructions and these safety suggestions before using this product. Use extra care to follow the warnings written on the product itself and in the operating instructions. Keep the operating instructions and safety suggestions for reference in the future.

1. Power Source. The product should only be connected to a power supply which is described either in the operating instructions or in markings on the product.

2. Power Cord Protection. AC power supply cords should be placed such that no one is likely to step on the cords and such that nothing will be placed on or against them.

3. Periods of Non-use. If the product is not used for any significant period of time, the product's AC power supply cord should be unplugged from the AC outlet.

4. Foreign Objects and Liquids. Take care not to allow liquids to spill or objects to fall into any openings of the product.

5. Water or Moisture. The product should not be used near any water or in moisture.

6. Heat. Do not place the product near heat sources such as stoves, heat registers, radiators or other heat producing equipment.

7. Ventilation. When installing the product, make sure that the product has adequate ventilation. Improperly ventilating the product may cause overheating, which may damage the product.

8. Mounting. The product should only be used with a rack which the manufacturer recommends. The combination of the product and rack should be moved carefully. Quick movements, excessive force or uneven surfaces may overturn the combination which may damage the product and rack combination.

9. Cleaning. The product should only be cleaned as the manufacturer recommends.

10. Service. The user should only attempt the limited service or upkeep specifically described in the operating instructions for the user. For any other service required, the product should be taken to an authorized service center as described in the operating instructions.

11. Damage to the Product. Qualified service personnel should service the unit in certain situations including without limitation when:
    a. Liquid has spilled or objects have fallen into the product,
    b. The product is exposed to water or excessive moisture,
    c. The AC power supply plug or cord is damaged,
    d. The product shows an inappropriate change in performance or does not operate normally, or
    e. The enclosure of the product has been damaged.

General Troubleshooting

While this manual assumes that the reader has a fundamental understanding of electronics and basic troubleshooting techniques, a review of some of the techniques used by our staff may help.

1. Visual Inspection - A short visual inspection of the unit under test will often yield results without the need of complex signal analysis (burnt, or loose components are a dead giveaway).
2. Self Test - Alesis products that utilize microprocessor control contain built in test software which exercises many of the units' primary circuit functions. Self test should always be done following any repair to ensure basic functionality.
3. Environmental Testing - Applying heat and cold (heat gun/freeze spray) will often reveal thermally intermittent components (Clock crystals, I.C.s, and capacitors are particularly prone to this type of failure).
4. Burn in Testing - Leaving a unit running overnight often reveals intermittent failures such as capacitors that begin to leak excess current after a significant amount of time.
5. Cable Checks - Wiggling cables can reveal intermittent failures such as loose cables or poorly soldered headers. Remember to check power supply cables as well.
6. Flexing the PC Board - Poor solder joints and broken traces can often be found by pressing the PC Board in various places.
7. Tapping Components - Sometimes tapping on a component (particularly crystals) will cause it to fail.
8. Power Down/up - Turning the unit off and back on rapidly several times may reveal odd reset and/or power supply failures.
9. Reset Threshold - A Variac (variable transformer) can be used to check reset threshold levels. This can be particularly useful in helping customers with low line problems.
10. Compressors - Using a compressor/limiter is often helpful when attempting to solve low level noise problems, as well as assisting with DAC adjustments.
11. Sweep Tests - Sweep generators are very useful in checking the frequency response envelopes of anti-aliasing filters.
12. Piggybacking - Piggybacking I.C.s is particularly useful when troubleshooting large sections of logic. This is especially true when working with older units.

Table of Contents

1.00 Theory of Operation

The A4/A8 amplifiers are basic stereo amplifiers. They have 0dBm input sensitivities for rated output at 4Ω, with the ability to drive any load impedance from 2Ω to an open circuit. They have balanced inputs via Neutrik combination connectors providing XLR and 1/4" TRS connections and also a barrier strip. The output of the amplifier is obtained by way of four five way binding posts. Reference designations in the text refer specifically to the A4 amplifier except where otherwise noted. Though reference designations between the two units are different, the designs are virtually identical. The only significant differences occur in the output section (since the A8 is required to handle much more power than the A4).

Here are some of the major features and building blocks of the Matica:

- An input balanced to unbalanced converter.
- A second stage pre-amp and an amplifier gain stage utilizing a monolithic front end with discrete complimentary transconductance stage and a complimentary output stage in a common collector configuration.
- Output device protection is accomplished with a conventional volt-amp current limiter circuit. The output devices use a new perforated emitter technology unique to ***MOTOROLA.*** The output devices are driven by similar technology devices, but they have been optimized for extremely linear current gain with a unity gain bandwidth (F_t) of 50 MHz.
- The speakers are protected by output relays. They are activated during the first 3 to 5 seconds the amplifier is turned on. Also, if a DC condition exists at the output of the amplifier or the amplifier is driven to full output below 5Hz the relays will be activated.
- Thermal management and protection are accomplished with a large heavy aluminum extruded heat sink the is fan cooled. If the sink gets warmer than 55 deg. C, the fan is automatically stepped up in speed and if the heat sink gets warmer than 80 deg. C the fan is run at high speed and the output relays are activated to disconnect the load until the unit has cooled to 65 deg. C. There is also a unique feature of the amplifier fan circuit in that when the amplifier is providing an output signal of a little more that a watt the fan speed is modulated or increased by the signal. This will help get longer run times with the amplifier under extreme load conditions.

1.10 Input Section

The input stage is made up of a dual ***Signetics*** 5532A op amp. This is a low noise selected version of the 5532. One half of the dual is used for each channel. The circuit is a basic balanced to unbalanced converter. It can be driven unbalanced but 6dB differences in gain may result for various hookups. If the (+) input is driven with the (-) input grounded the gain will be unity. If the (+) input is driven with the (-) input left open there will be a gain reduction of 6dB. This is not recommended as a noisier condition may result. If the (-) input is driven, gain will be unity and will not change with the grounding or ungrounding the (+) input The maximum input level before clipping in about +21dBm. Since there is no level control in front of the converter this is the maximum input level for the amplifier. Connections to the Alink connector are between R1, R2 and R3, R4. These are provided so an outboard impedance may be connected to modify the gain and overload characteristics as well as its frequency response. Following the amplifier is a passive low pass (R7, C1) filter that begins to limit the high frequency gain of the amplifier.

1.20 Pre-Amp Section

The pre-amp section also uses the ***Signetics*** 5532A op amp. The circuits of the pre-amp are of opposing signal polarity to provide push pull characteristics and are connected via the stereo/bridge switch. Each of the two pre-amp channels has 15.7 dB of gain but channel A is inverting and channel B is not.

Since the main amplifier is inverting, channel A will not invert the signal and channel B will. Doing this facilitates two things. When the stereo/bridge switch is in the bridge mode channel B will already be out of phase with A so no signal inversion will have to be done to achieve bridge operation. Also by operating B out of phase all the time, (even in stereo operation) getting the phase of the signal flipped back at the speaker terminals, the amplifiers low frequency power bandwidth will be increased. This allows the power supply to be utilized more efficiently.

This section also shapes the bandwidth of the amplifier further via another low pass pole being added to each stage. First and second stage high pass filtering occurs via the 100uf coupling capacitors preceding the volume pots and after the pre-amp stages. The pre-amp stages drive the main amplifier directly.

ALINK connections at the junction between R8, C2 and R13, C5 are for sending the output signal of the input stage at a low impedance for use with auxiliary equipment. The connection between R9, R10 and R14, R17 are to be used to for defeating the level controls by supplying an input signal from a very low source impedance to swamp out the signal from the pots.

1.30 Main Amplifier Section

The main amplifier is composed of four sections:

- The monolithic front end.
- A complimentary voltage gain stage or transconductance stage
- The output driver
- The output stage

The amplifier is configured in the inverting mode. This allows for the inputs of the op amp to remain at a 0 voltage potential and ease operation on a +/- 15 volt supply. The large voltage swing is accomplished with a discrete, complimentary darlington connected transconductance stage Q1, Q2, Q3, and Q4. The current in the transconductance stage is set by the voltage divider network made up of R19, R20, R21, and R22. The first transistor in the darlington is a TO-92 packaged device with the current set by R27, and R28. The collector of this transistor is not tied to the second collector in the darlington connection but rather to the +/-15 volt supply to help increase the bandwidth of the stage and reduce the dissipation in the TO-92 devices. The closed loop gain of the amplifier has been set for 10X or 20dB. The DC output offset is a function of the input offset voltage error of the op amp times the gain of the system. With the offset error of the op amp at about +/- 1mv the amplifier will have less than +/- 10mv of output offset. The feedback network is composed of R25, R18, and C11. C11 reduces the bandwidth of the amplifier. The large low frequency gain of the op amp helps to reduce the supply ripple that is introduced into the system by the lack of supply rejection in the voltage gain stage. Under driven conditions at mild loads of 4 or 8Ω at mid and high frequencies, the output of the op amp will appear not to have any signal or very little signal on it. When the amplifier is clipped, or driven to its rail, the output of the op amp will be driven to its rail, or about +/- 14 volts. It is trying to correct the loop error or non linearity of clipping in the amplifier. The only other time the output of the op amp will become a large signal is at a 2Ω condition at lower frequencies. This is due to the loss of loop gain when the transconductance stage is required to deliver large amounts of current to the output stage drivers. CR1 and CR2 are connected as clamps to the discrete

darlingtons (causing the transconductance stage not to saturate, which reduces the possibility of saturation in the gain stage).

The drivers and output devices are mounted on the large extruded aluminum heat sink. The drivers have extremely linear gain with changes in current. They also have an F_t of 50mHz keeping the gain linear with frequency. The output devices are 16 amp, 250 volt, 200 watt devices. These are very strong devices. The output stage is configured in a common collector, or emitter follower configuration. The drivers are connected again in a discrete complimentary darlington configuration. This allows for a class A bias and protection scheme that offers very close bias tracking and simple current limiting. Also there are 1.2Ω resistors in the bases of all the output devices. This helps linearize the gain with frequency and reduce high current parasitics. When the output stage is biased properly, the DC voltage drop across the emitter resistors should by 2-3mv cold and may rise to as much as 6-10mv when hot. Finally the output of the amplifier is de coupled from the load with a traditional termination network. This network isolates the amplifier and feedback loop from loads at high frequencies, especially capacitive ones. This is how unconditional loop stability is achieved. Under bench test conditions it is recommended that the amplifier not be driven to full power at 20kHz and above for periods longer than a few minutes as this will cause R53 to over heat. Under music conditions there is never enough energy to have this be a problem.

1.40 Output Device Protection

Output device protection is accomplished with a relatively simple circuit. The protection circuit is broken up into Q17 that protects the NPN output devices and Q18 that protects the PNP output devices. These devices are complimentary as are the output devices but they also have similar V_{be} N to P. This allows selection of a point of protection that will be about equal for each half of the output stage. R55 and R56 sense the voltage at the emitter of two of the output devices and sum them. The emitter of Q17 is connected to the output of the amplifier. When a voltage across the emitter resistors of the output devices reaches about 0.7 volts, Q17 will conduct if there is no voltage across R54. This condition exists for a short circuit or something very close. As the amplifier impresses a voltage across a load it also has that same voltage across R54. As the voltage across R54 gets larger more current must flow through the emitter resistors of the output devices to cause enough voltage to be developed at the base of the protection device to turn it on. This is what is known as the load line. As the voltage across the output devices gets lower they can deliver more current in keeping with a constant power. When the protection device is conducting the current from the transconductance stage is essentially being diverted around the output stage to the load. Everything described for the positive half cycle is the same for the negative half. C18 and C19 slow down the protection device and keep it from any possible oscillation condition. CR3 and CR4 are used to protect possible reverse V_{be} conduction of the protection devices and CR4 and CR5 prevent conduction of the protection devices while in the opposite half cycle.

1.50 Bias Circuit

The bias circuit is more that just a single device V_{be} multiplier seen in many audio amplifiers. The circuit consists of an active shunt regulator. The reason for this is two fold. The shunt regulator has a much lower impedance than the single device regulator. This helps control the bias voltage better when there is a change in the quiescent operating current of the transconductance stage. Since the operating, or quiescent current of the transconductance stage is supply dependent, the need for a bias circuit that doesn't change voltage with current is imperative. Also by reducing the current through the bias sense transistor a larger change in V_{be} with temperature can be realized. This tracks the needs of the output stage better. The 5k pot in the bias circuit adjusts the potential of the regulator. A 1.5k resistor (R55) sets the current

through the bias sense transistor (Q18) making the current in the sense transistor relatively constant. Q17 is the pass transistor of the regulator. Note that any time the output transistors are replaced, the pass and bias transistors must also be replaced. Failure to do so will probably result in the output transistors failing again.

1.60 Speaker Protection

There are two sections to the speaker protection circuit. A section made up of a quad comparator with a low pass filter before it and a discrete bipolar transistor circuit that controls the two speaker relays. The transistor circuit and +15 volt three terminal regulator make up the power up delay circuit and "instant off" power down circuit. When the unit is turned on the 15 volt regulator supplies power to the discrete circuit. Q24 controls the speaker relays and is held off during power up by Q23. During power up C24 is not charged and must be charged before Q23 will turn off. This delays the turn on of the output relays to protect against any transients that may occur at power up. Once on, there are four ways the relays can be opened again.

- The first is if the heat sink gets to 80 deg. C. then TH1 will open and release the relays.
- Second is by shut down of the amplifier. Upon the removal of AC to the amplifier, the three terminal regulator will fall out of regulation that forces Q21 on because C23 acts like a battery and momentarily turns on Q21. This pulse will cause Q22 to dump the charge on C24, turning on Q23.
- The third way is if the line voltage get low (about 90 volts in the 120v unit). At this time the regulator will fall out of regulation and the first pulse from the 50 or 60 Hz that gets through the regulator will cause C24 to be dumped again and the 3-5 second charge time will occur again.
- The fourth way is to have the circuit be triggered by the comparator circuit.

The comparator is DC coupled to the output of the amplifier before the speaker relays. They are set up with each one of their inputs tied to a +/- 1.2v reference derived from CR7, CR8, CR9, and CR10. The low pass filter is comprised of R64, R65, R66, R67, C21, and C22. When the output of the amplifier is driven to full output at or below 5Hz, or 1.2v of DC offset appears at the output of the amplifier, it will trigger one of the comparators which in turn opens the output relays. When this happens the same 3 to 5 second period must occur before the relays will engage again. If the fault condition persists then the relays will remain open.

The 18 volt AC winding which runs this circuit is rectified by a half wave rectifier. This is allows one side of the winding to be grounded. The 18 volt winding is also provided at the Alink connector to facilitate generation a +/- 15 volt supply to run auxiliary accessories requiring phantom power.

1.70 Fan Speed Control

The fan circuit has three modes of operation in which it varies the speed of the fan depending on demand or condition. At power up of the amplifier Q25 and Q26 will be saturated until the relay circuit enables the speaker relays. This condition lasts for 3 to 5 seconds. During this time Q27 is also saturated. This forces the fan to run at an elevated speed momentarily. After this time only R85 will be delivering current to the fan. The fan will be running at a very slow speed. The reason for the accelerated speed of the fan at turn on is that the current delivered by R85 may not be sufficient to start the fan, especially at low power line levels. Signals from both channels are detected by Q25 and Q26 as the amplifier is driven harder. They act as rectifiers of the signal, and when they conduct the 40Ω resistor connected to Q27 delivers more current to the fan motor, causing the fan speed to increase with the drive of the amplifier. The fan motor itself acts as a flywheel or filter to smooth the modulation and the speed of the fan is proportional to the average of the drive to the amplifier. If the heat sink gets hotter than 55 deg.C. then an additional 20Ω resistor is switched in to deliver more current to the fan. The fan

speed will still be modulated by the drive to the amplifier. If the heat sink gets hot enough to trip the 80deg. C. breaker, then the relay circuit will disconnect the load and also turn on Q25 and Q26. This will increase the fan to its highest speed and cool the amplifier. Upon cooling below 65deg. C. the amplifier will resume normal operation.

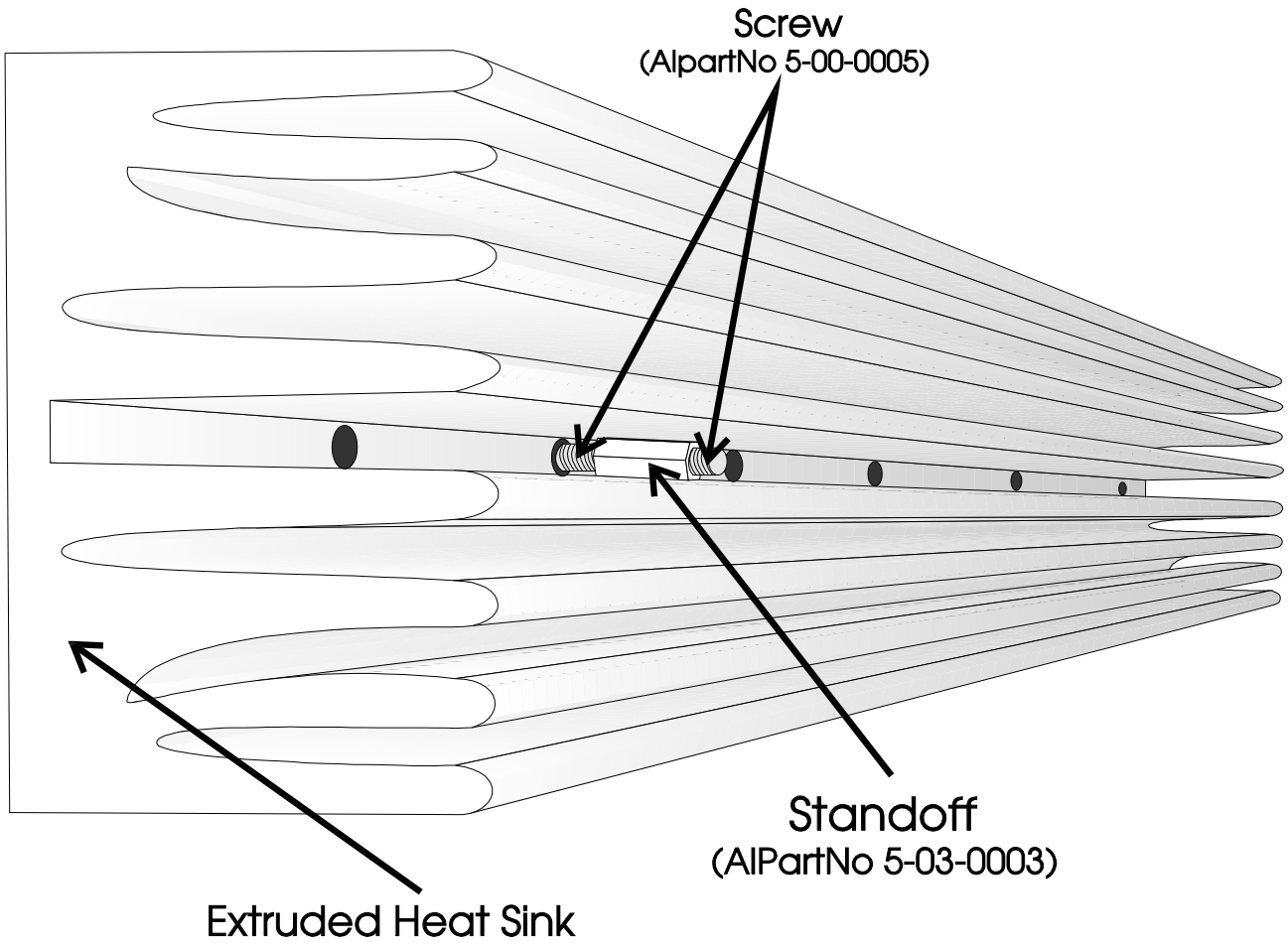
1.80 Thermal Management System

The large extruded aluminum heat sink in the center of the chassis is the heart of the amplifiers heat dissipation scheme. It is a forced air cooling system. In the A8 the heat sink has a thermal resistance of .075 deg. C. per watt when the fan is at full speed. This is equal to about 800 watts of heat. The air from the fan is forced into the center of the side of the heat sink with fins and the air flows around the sink and out over the amplifier circuitry. It has an air intake at the front of the amplifier and exhaust at the left rear. As explained in the fan speed control section, the speed of the fan is determined by the demands on the amplifier. If for some reason the fan should stop but not fail there is enough dissipation in the main heat sink as well as the four TO-220 stand up heat sinks on the PCB to allow operation indefinitely while at a quiescent condition.

2.00 Updates and Corrections.

2.10 Stripped Heat Sinks

Occasionally when tightening down the heat sink clamps one of the screws will strip the threads out of the heat sink itself. Because heat sink is a rather expensive and bulky item, a way was found to reuse stripped heat sinks. Use a long (at least 1 1/4") machine screw from the clamp side, and a threaded hex standoff inserted into the heat sink fin side. Do not use just a hex nut, as it will probably not be able to hold the clamp pressure any more then the heat sink did. See diagram on next page.


Screw
(AlpartNo 5-00-0005)
Standoff
(AlPartNo 5-03-0003)
Extruded Heat Sink

2.20 New Case Bracket Insulator(s)

It was found that it was possible for the insulation on the wires from the main power transformer(s) could over time be cut by the case bracket(s) (one in A4, two in A8). This could in turn make it possible for the end-user to be shocked through the case itself. The solution was to replace the insulators with a version that covered those areas of the metal that could potentially cut the insulation.

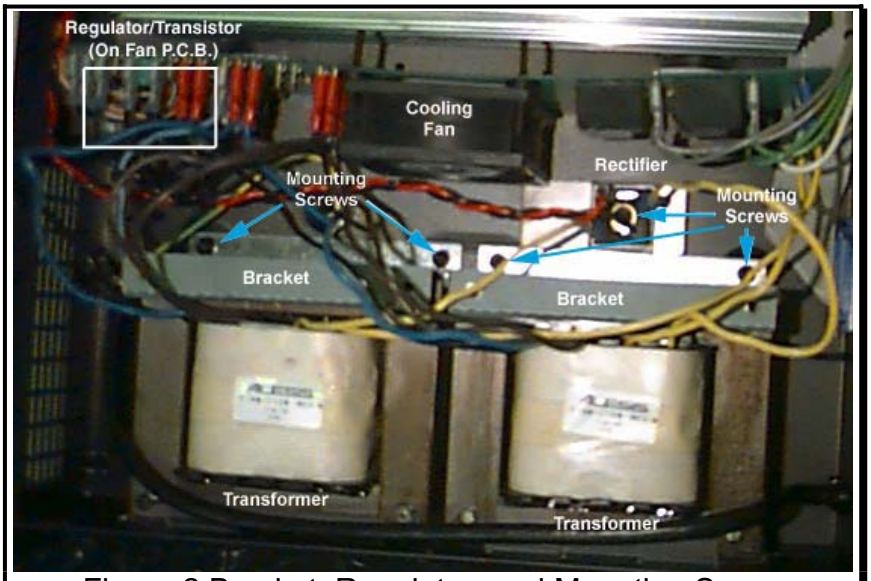
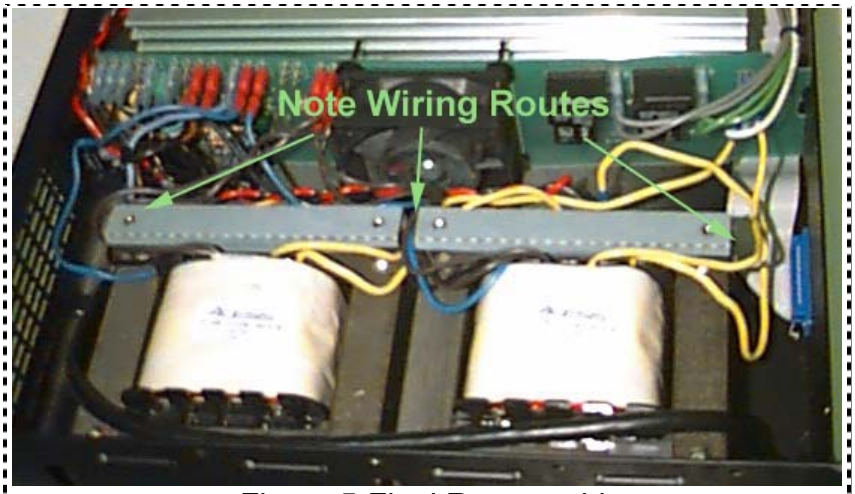


Figure 2 Bracket, Regulator, and Mounting Screw Locations

To replace the old insulators, first remove the rectifier and move the cables away from the case brackets. Be sure to examine the wires for any damage that have already occurred. Then remove the bracket(s) from the chassis. Figure 2 shows the locations of the bracket mounting screws while Figures 3 and 4 show the new and old styles of insulator (New style Alesis Part # 5-04-1018). Replace the old insulators and reassemble the brackets and rectifier. Route the wires around the transformer bracket(s) as shown in Figure 5. In addition, the regulator U5 (A8) U4 (A4) and transistor Q53 (A8) Q39 (A4) on the Fan PCB (See Figure 2) should be checked to ensure that they do not short to the case. If necessary, bend these components away from the case bottom and resolder both of them to ensure a solid connection.

Figure 3-New and Old Inserts

Figure 4-New and Old Inserts On Brackets



.Figure 5-Final Reassembly

2.30 Transformer Insulators

These foam insulators were added for two purposes:

- Electrical Isolation
- Added resistance to mechanical shock.

The insulators stick to the case top as shown in Figure 6 (A8) so that they are directly over the transformer(s) when the casetop is reassembled. The part numbers for the foam insulators are 9-23-1067 for the A8, and 9-23-1068 for the A4.

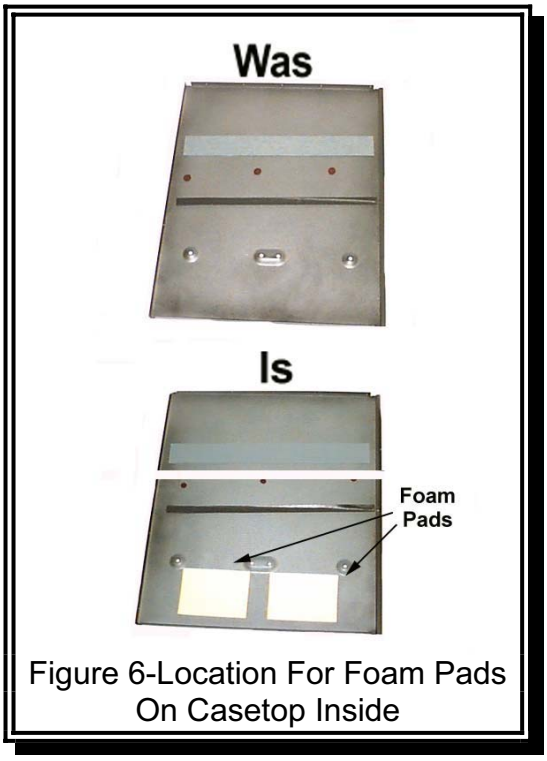
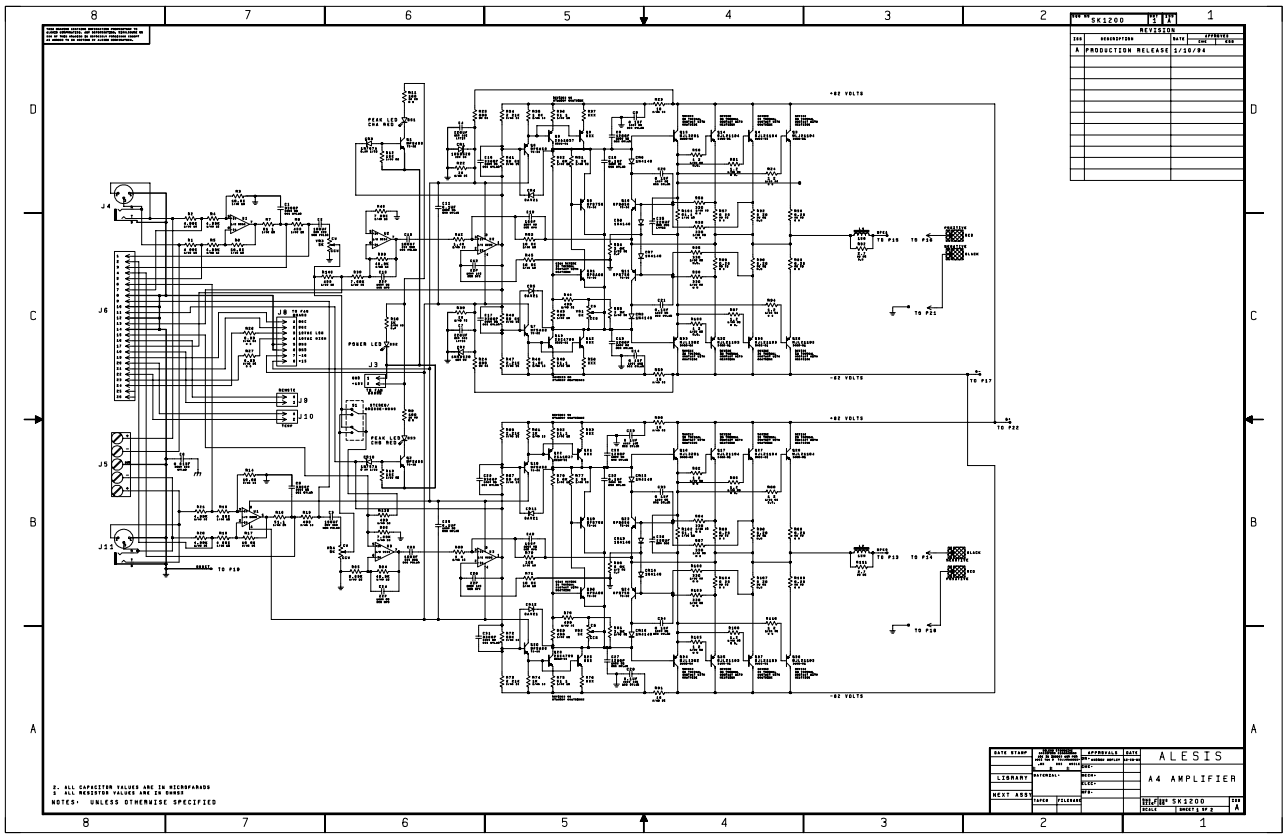


Figure 6-Location For Foam Pads On Casetop Inside

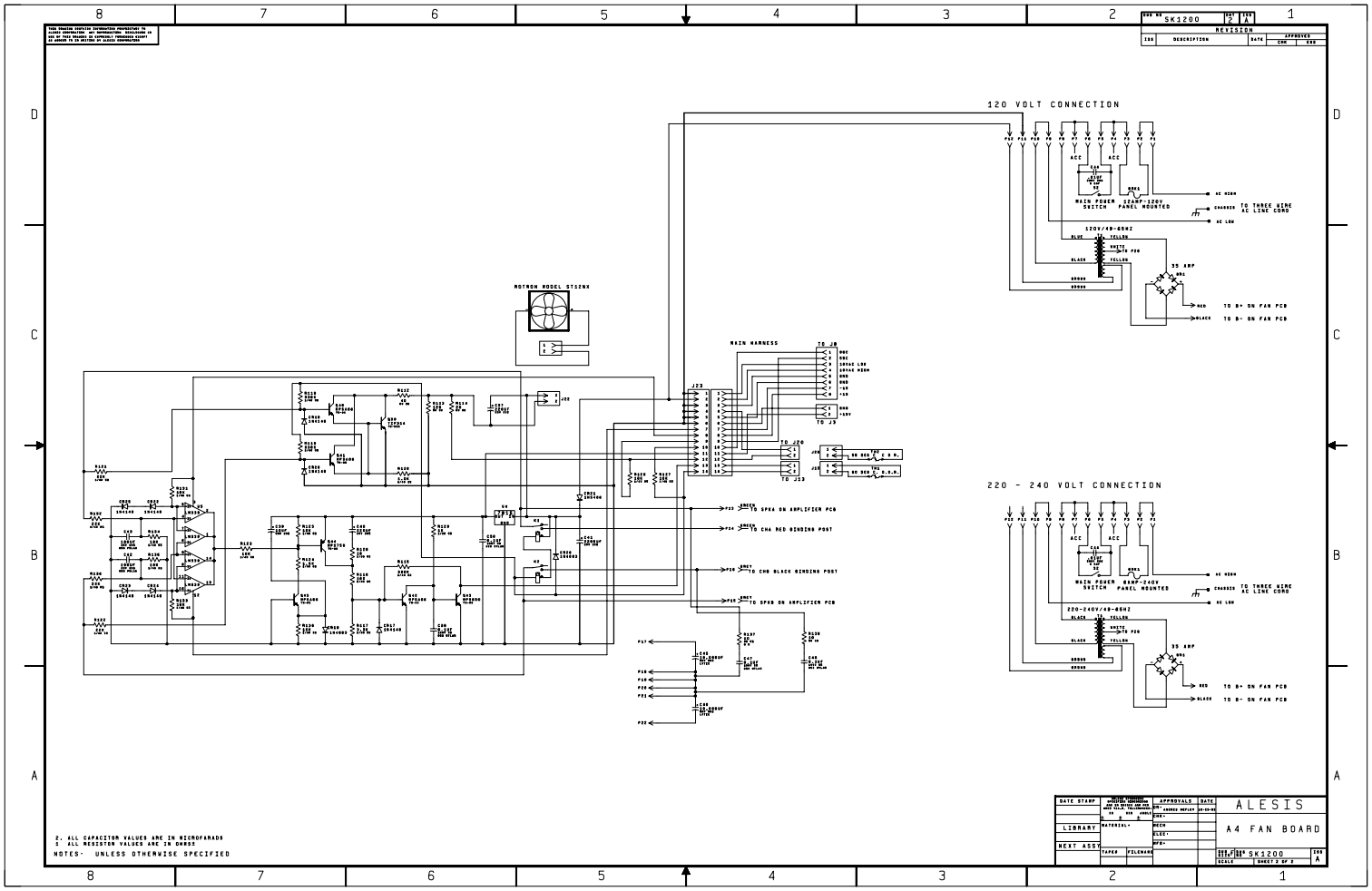
3.00 Troubleshooting

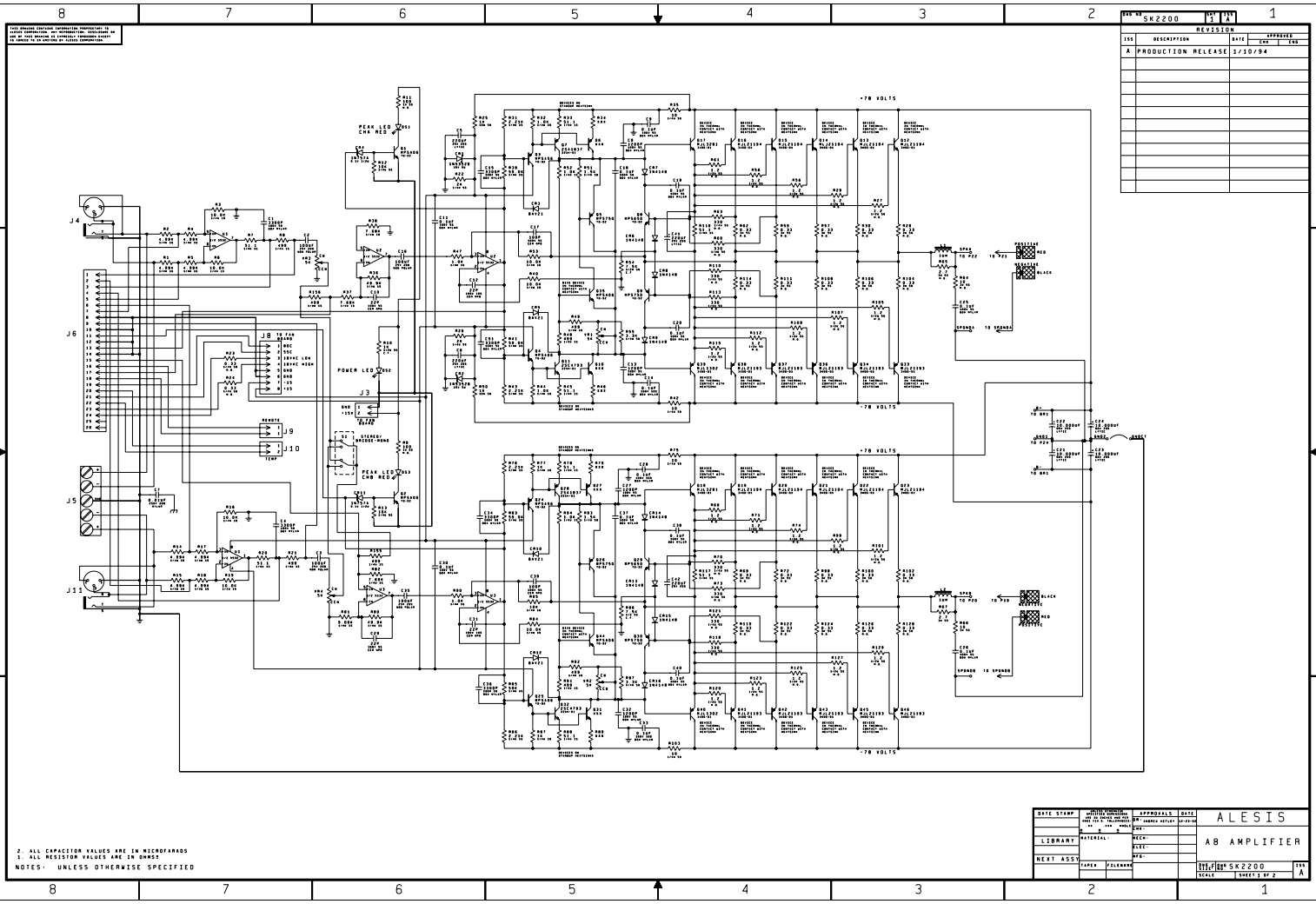
The following chart is intended to help point a technician in the right direction. Unfortunately there isn't space to provide an absolutely comprehensive list, however this should help with some of the more common solutions.

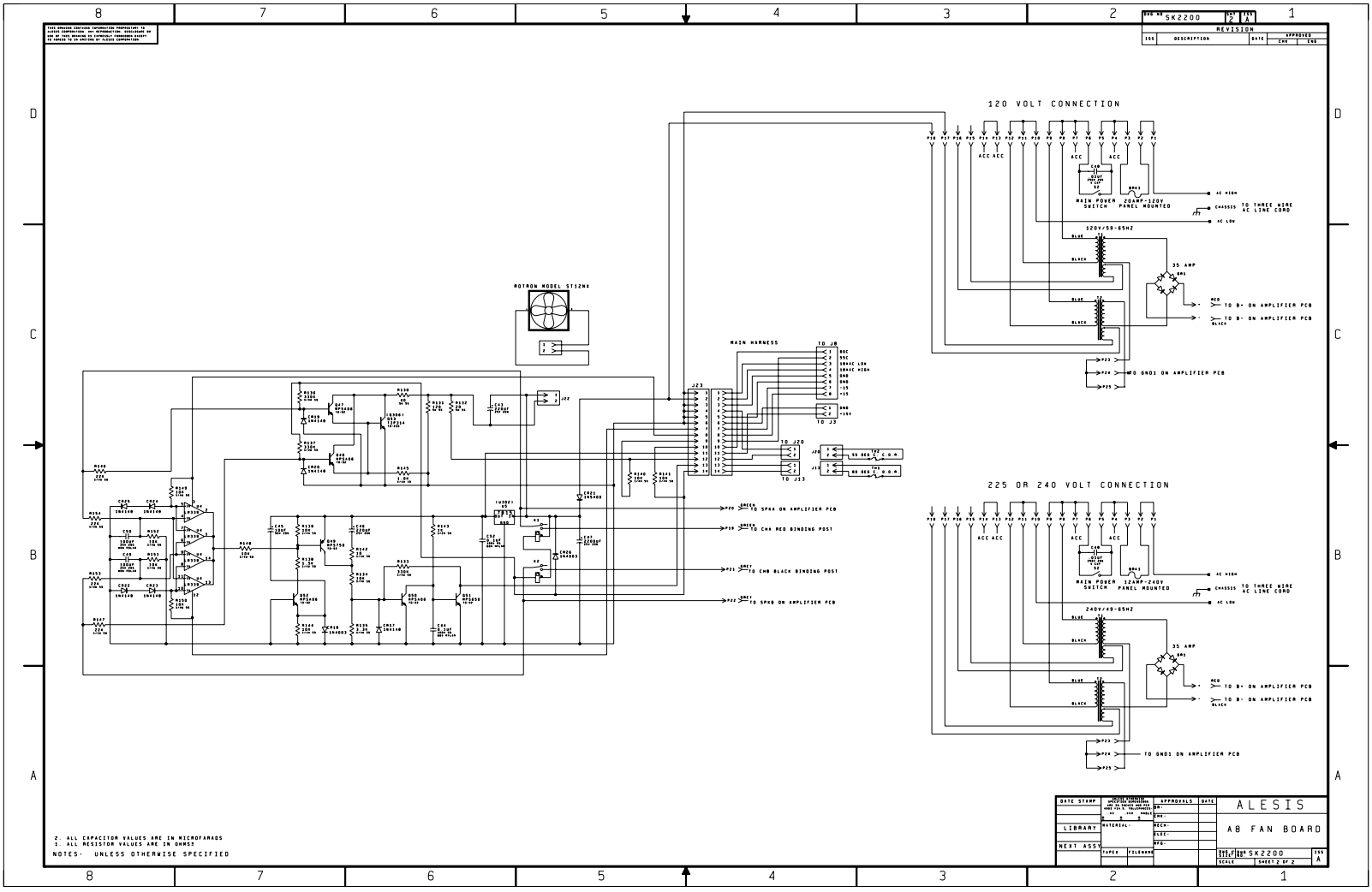
Symptoms	Probable Cause	Solution
No Power (No LED, No Fan)	Tripped breaker.	Reset breaker.
	Faulty breaker.	Replace breaker.
	Faulty transformer.	Replace transformers and retest.
	Faulty A.C.	Be sure that 30 amp service is available without significant voltage drop.
No output, no LED, Fan running full on.	Fan board/Main harness disconnected.	Reconnect and retest.
	Faulty +15V regulator.	Troubleshoot and repair as necessary.
Clip LED on, no output.	Blown output section.	Replace all active components following the diver I.C. (U2-channel A U3 channel B) in blown channel. Also replace any out of tolerance resistors in the output section.
	Poor solder on the large power supply capacitors. (Causes ground reference to drift).	Troubleshoot and repair as necessary.
	J1 or J14 loose.	Reseat cable and apply hot glue to prevent re loosening.
One channel out.	Poor solder connections at the Neutrik connector or the high pass capacitors (see section 1.20).	Troubleshoot and repair as necessary.


SK1200
REVISION
A PRODUCTION RELEASE 1/10/94
+82 VOLTS
-82 VOLTS
TO P18
TO P20
TO P21
TO P17
TO P22
TO P19
TO P23
TO P24
TO P25
TO P26
POWER LED
J1
J2
J3
J4
J5
J6
J8
J9
J10
J11
J12
2. ALL CAPACITOR VALUES ARE IN MICROFARADS
3. ALL RESISTOR VALUES ARE IN OHMS
NOTES: UNLESS OTHERWISE SPECIFIED
ALESIS
A4 AMPLIFIER
SK1200
SHEET 1 OF 2


MAIN POWER SWITCH
IEC CONN.
120V/60HZ
20 AMP
TO P28 HEADER


120 VOLT CONNECTION
220 - 240 VOLT CONNECTION
MOTRON MODEL ST22NX
MAIN HARNESS
TO J8
TO J9
TO J20
TO J53
J23
MAIN POWER SWITCH
4AMP-240V PANEL MOUNTED
120V/60-60HZ
220-240V/48-60HZ
35 AMP
TO THREE WIRE AC LINE CORD
TO B+ ON FAN PCB
TO B- ON FAN PCB
TO SPKA ON AMPLIFIER PCB
TO CHA RED BINDING POST
TO CHB BLACK BINDING POST
TO SPKB ON AMPLIFIER PCB
2. ALL CAPACITOR VALUES ARE IN MICROFARADS
3. ALL RESISTOR VALUES ARE IN OHMS
NOTES- UNLESS OTHERWISE SPECIFIED
ALESIS
A4 FAN BOARD
SK1200


+78 VOLTS
-78 VOLTS
PEAK LED CHA RED
PEAK LED CHB RED
POWER LED
J3
J4
J5
J6
J8 TO A2B
J9
J10
J11
REMOTE
TEMP
STEREO/ BRIDGE MONO
TO P22
TO P20
TO SPKRA
TO SPKRB
BLACK
RED
SK2200
REVISION
A PRODUCTION RELEASE 1/10/94
ALESIS
A8 AMPLIFIER
SCALE
SHEET 1 OF 2
NOTES: UNLESS OTHERWISE SPECIFIED
1. ALL RESISTOR VALUES ARE IN OHMS.
2. ALL CAPACITOR VALUES ARE IN MICROFARADS



NOTES: UNLESS OTHERWISE SPECIFIED

1. ALL RESISTOR VALUES ARE IN OHMS.
2. ALL CAPACITOR VALUES ARE IN MICROFARADS

ALESIS

AB FAN BOARD

SK2200

ALESIS
MATICA 500/900
(A4/A8)

BOM

4.00 A4 Service Parts List

Group	Part.Number	Description	Qty	PCB	Ref.Designator	Comment
ASY	7-40-0120	TRANSFORMER 120V A4	1			
ASY	9-79-0109	ASSY PCB MAIN A4	1			
ASY	9-79-0130	ASSY DISPLAY/VOL A4	1			
ASY	9-79-0132	MODULE OUTPUT A4	1			
ASY	9-79-0134	ASSY FAN/RELAY/PS A4	1			
ASY	9-96-1259	ASSY BINDING POSTS COMPLETE A4/A8	1		FINAL ASSEMBLY	
CAB	4-18-1676	CABLE 6" BLK (TWO WIRES TWISTED)	2			
CAB	4-18-1678	CABLE 7" RED/BLK (TWO WIRES TWISTED)	1	FAN	B+ B-	
CAB	4-19-1753	CABLE 3-PIN CHNL B I/P A4	1	MAIN	J1 TO J14 MAIN	
CAB	4-19-1754	CABLE 8-PIN LEVEL CONTROL	1		J2 to J14 (GRAY)	
CAB	4-19-1755	CABLE 14-PIN TO 4-CON MAIN HARNESS	1		J23 TO J20,J13,J8,J3	
CAB	4-19-1759	CABLE 3-PIN BIAS CH B	1		J12 TO J19 (YELLOW,GRN,BLUE)	
CAB	4-19-1760	CABLE 6-PIN LED	1			
CAB	4-19-1761	CABLE 3-PIN BIAS CH A	1		J15 TO J21 (BRN,RED,ORANGE)	
CAB	4-74-0013	ASSY WIRE HARNESS 14" (25-PIN D-CON & 26-PIN DIL HDR CON) 26 AWG	1			
CAB	7-41-0006	CABLE POWER W/SPADE LUG (UL/CSA) A4/A8	1			
CFC	1-99-0010	CAP 10uF ELEC 35V 20%	1	FAN	C39	
CFC	1-99-0100	CAP 100PF 100V 5% NPO MC	2	MAIN	C 19, 49	
CFC	1-99-0101	CAP 100uF 25V 20% MUSE	4	MAIN	C 2, 3, 16, 30	
CFC	1-99-0101	CAP 100uF 25V 20% MUSE	2	FAN	C42, 43	
CFC	1-99-0102	CAP 0.1uF 100V 5% FILM	12	MAIN	C 9, 11, 14, 18, 20, 21, 23, 25, 28, 32, 33, 34	
CFC	1-99-0102	CAP 0.1uF 100V 5% FILM	4	FAN	C38, 47, 48, 50	
CFC	1-99-0103	CAP .01uF 250V 20% XCAP	1	MAIN	C 6	
CFC	1-99-0103	CAP .01uF 250V 20% XCAP	1	FAN	C44	
CFC	1-99-0104	CAP 10000uF ELEC 80V 20%	2	FAN	C45, 46	
CFC	1-99-0220	CAP 22PF 100V 5% NPO MC	4	MAIN	C 10, 12, 24, 26	
CFC	1-99-0221	CAP 220uF ELEC 25V 20%	2	MAIN	C 4, 7	
CFC	1-99-0221	CAP 220uF ELEC 25V 20%	2	OUTPUT M	C35, 36	
CFC	1-99-0221	CAP 220uF ELEC 25V 20%	2	FAN	C37, 40	
CFC	1-99-1200	CAP 1200PF 100V 5% FILM	4	MAIN	C 8, 13, 22, 27	
CFC	1-99-2200	CAP 2200uF ELEC 25V 20%	1	FAN	C41	
CFC	1-99-3300	CAP 3300PF 100V 5% FILM	6	MAIN	C 1, 5, 15, 17, 29, 31	
CFD	2-99-0021	DIODE BAV21	4	MAIN	CR 4, 5, 11, 12	
CFD	2-99-1757	DIODE ZENER 1N757A (9.1V)	2	MAIN	CR 3, 10	
CFD	2-99-4003	DIODE POWER 1N4003	2	FAN	CR18,26	
CFD	2-99-4148	DIODE SIGNAL 1N4148	8	MAIN	CR 6-9, 13-16	
CFD	2-99-4148	DIODE SIGNAL 1N4148	7	FAN	CR 17, 19, 20, 22-25	
CFD	2-99-5400	DIODE POWER 1N5400	1	FAN	CR21	
CFM	2-02-5352	DIODE 1N5352BRL 15V 5W 5%	2	MAIN	CR 1, 2	
CFR	0-99-0002	RES 0.2 OHM 3W 5% MO	6	MAIN	R30, 32, 57, 83,86, 89	
CFR	0-99-0002	RES 0.2 OHM 3W 5% MO	6	OUTPUT M	R93, 96, 99, 104, 107, 109	
CFR	0-99-0010	RES 10 OHM 1/4W 5% CF	4	MAIN	R 23, 59, 90, 91	
CFR	0-99-0010	RES 10 OHM 1/4W 5% CF	1	FAN	R128	
CFR	0-99-0011	RES 10 OHM 3W 5% MO	2	FAN	R137, 138	
CFR	0-99-0012	RES 1.2 OHM 1/2W 5% MO	6	MAIN	R 29, 31, 56, 82, 85, 88	
CFR	0-99-0012	RES 1.2 OHM 1/2W 5% MO	6	OUTPUT	R94, 97, 100, 105, 108, 110	
CFR	0-99-0020	RES 20 OHM 5W 5% WW	1	FAN	R114	
CFR	0-99-0027	RES 2.7 OHM 3W 5% MO	2	OUTPUT	R92, 111	
CFR	0-99-0040	RES 40 OHM 5W 5% WIRE WOUND	1	FAN	R112	
CFR	0-99-0100	RES 100 OHM 1W 5% MO	2	MAIN	R 9, 11	
CFR	0-99-0103	RES 10K 1/4W 1% MF	8	MAIN	R 3, 6, 14, 17, 45, 53, 71, 79	
CFR	0-99-0104	RES 10K 1/4W 5% CF	2	MAIN	R 12, 13	
CFR	0-99-0104	RES 10K 1/4W 5% CF	10	FAN	R116, 123, 125-127, 130, 131, 133-135	
CFR	0-99-0120	RES 120 OHM 5W 5% WW	1	FAN	R113	
CFR	0-99-0202	RES 2K OHM 1/4W 5% CF	2	MAIN	R 22, 28	
CFR	0-99-0223	RES 22K 1/4W 5% CF	1	MAIN	R 136	
CFR	0-99-0223	RES 22K 1/4W 5% CF	3	FAN	R121, 122, 132	
CFR	0-99-0330	RES 330 OHM 1/4W 5% MO	4	MAIN	R33, 58, 84, 87	
CFR	0-99-0330	RES 330 OHM 1/4W 5% MO	4	OUTPUT	R95, 98, 103, 106	
CFR	0-99-0511	RES 51.1 OHM 1/4W 1% MF	6	MAIN	R 7, 18, 36, 49, 62, 75	
Group	**Part.Number**	**Description**	**Qty**	**PCB**	**Ref.Designator**	**Comment**
CFR	0-99-0511	RES 51.1 OHM 1/4W 1% MF	2	OUTPUT M	R101, R102	

CFR	0-99-0563	RES 5.6K 1/2W 5% CF	2	MAIN	R 54, 80	
CFR	0-99-0593	RES 59K 1/4W 1% MF	4	MAIN	R 41, 46, 67, 72	
CFR	0-99-0680	RES 680 OHM 5W 5% WIRE WOUND	2	MAIN	R 24, 25	
CFR	0-99-1000	RES 1K OHM 1/4W 1% MF	6	MAIN	R 35, 48, 52, 61, 74, 78	
CFR	0-99-1000	RES 1K OHM 1/4W 1% MF	1	FAN	R120	
CFR	0-99-1001	RES 1K OHM 1/2W 5% CF	1	MAIN	R 10	
CFR	0-99-1001	RES 1K OHM 1/2W 5% CF	1	FAN	R129	
CFR	0-99-1402	RES 1.40K OHM 1/4W 1% MF	2	MAIN	R 42, 68	
CFR	0-99-1500	RES 1.5K OHM 1/4W 5% CF	2	MAIN	R 51, 77	
CFR	0-99-1500	RES 1.5K OHM 1/4W 5% CF	1	FAN	R124	
CFR	0-99-2210	RES 2.21K OHM 1/4W 1% MO	4	MAIN	R 34, 47, 60, 73	
CFR	0-99-3033	RES 0.33 OHM 1/4W 5% METAL OXIDE (FLAMEPROOF)	2	MAIN	R 26, 27	
CFR	0-99-3300	RES 3.3K 1/4W 5% CF	2	MAIN	R 55, 81	
CFR	0-99-3300	RES 3.3K 1/4W 5% CF	1	FAN	R117	
CFR	0-99-3303	RES 330K 1/4W 5% CF	3	FAN	R115, 118, 119	
CFR	0-99-4990	RES 4.99K 1/4W 1% CF	8	MAIN	R 1, 2, 4, 5, 15, 16, 20, 21	
CFR	0-99-4991	RES 499 OHM 1/4W 1% MF	8	MAIN	R 8, 19, 43, 44, 69, 70, 139, 140	
CFR	0-99-4992	RES 49.9K OHM 1/4W 1% MF	2	MAIN	R 38, 64	
CFR	0-99-5001	RES 5K LINEAR TRIM POT	2	MAIN	VR 1, 2	
CFR	0-99-7682	RES 7.68K OHM 1/4W 1% MF	3	MAIN	R 39, 40, 66	
CFR	0-99-9092	RES 9.09K OHM 1/4W 1% MF	1	MAIN	R 65	
CON	4-10-0007	CON BINDING POST A4, A8	1		Final Assembly	REPLACED BY 9-96-1259 ASSY.
CON	4-10-0007	CON BINDING POST A4, A8	1			
CON	4-98-0003	STRIP BARRIER (5-POS) DT-55-B-14N-05	1	MAIN	J5	
CON	4-98-0004	TAB FASTON 1/4" (AMP 62650-1)	22	FAN	P1-22	
HDR	4-15-2002	HEADER 2-PIN SIL 0.1 SPC LOCKING (AMP 640456-2)	1	FAN	J22	
HDR	4-15-2003	HEADER 3-PIN SIL 2MM CTR (SHROUDED)	4	MAIN	J 1, 12, 14, 15	
HDR	4-15-2003	HEADER 3-PIN SIL 2MM CTR (SHROUDED)	2	OUTPUT M	J19, 21	
HDR	4-15-1002	HEADER 2-PIN SIL 2mm SPC (shrouded)	4	MAIN	J 3, 9, 10, 13	
HDR	4-15-1002	HEADER 2-PIN SIL 2mm SPC (shrouded)	1	OUTPUT M	J20	
HDR	4-15-1006	HEADER 6-PIN SIL 2MM CTR (SHROUDED)	1	MAIN	J16	
HDR	4-15-1006	HEADER 6-PIN SIL 2MM CTR (SHROUDED)	1	CONTROL	J 17	
HDR	4-15-1008	HEADER 8-PIN SIL 2MM CTR (SHROUDED)	2	MAIN	J 2, 8	
HDR	4-15-1008	HEADER 8-PIN SIL 2MM CTR (SHROUDED)	1	CONTROL	J 18	
HDR	4-15-1014	HEADER 14 PIN SIL 2mm SHROUDED	1	FAN	J23	
HDR	4-99-0026	HEADER 26-PIN DIL .100 SPC	1	MAIN	J6	
HDW	5-00-0076	SCREW 6-32 x 3/8 TAP TIGHT THREAD ROLLING PAN HEAD TROX BLK	11		COVER AND MTG 8	
HDW	5-00-0077	SCREW 10-32 x 5/16 TAP TIGHT THREAD ROLLING PAN HEAD TROX BLK	5		TRANSFORMER MTG AND AC GND	
HDW	5-00-0078	SCREW 6-32 x 1/2 TAP TIGHT THREAD ROLLING PAN HEAD TROX ZINC	1		BINDING POST	
HDW	5-00-0079	SCREW 10-32 x 7/8 TAP TIGHT THREAD ROLLING PAN HEAD TROX ZINC	1		BRIDGE RECTIFIER	
HDW	5-00-0085	SCREW 8-32 x 1/2 #6 PH TAPTITE TORX BLACK OXIDE W/WAX	4		HEATSINK ASSY/TRANSISTOR CLAMP	
HDW	5-00-0086	SCREW M3 x 6MM PPZ MACHINE	4		COMBO CONNECTOR	
HDW	5-00-0088	SCRW,6-32x3/8 PPH THRD LNGR CAD	1		REAR PANEL	
HDW	5-00-2006	SCREW, JACK, 3/16 X 1/4	2		REAR PANEL	
HDW	5-01-0020	WASHER #10 FLAT SPLIT RING	1		AC GROUND SCREW	
HDW	5-01-0022	RING RETAINING F/P A4/A8	5		FRONT PANEL FASTENER	
HDW	5-02-0005	STANDOFF,.400,24AWG,PVC TUBING	4		E AND C LEADS OF Q31,Q36	
HDW	5-04-0016	FASTENER STUD RECEIVER (PUSH-ON)	10			
HDW	5-04-0017	SPACER LED (LTM-480)	3	CONTROL	DS 1-3	
HDW	5-04-0018	WASHER #10 FLAT BRASS	1		BRIDGE RECTIFIER	
HDW	5-04-0019	WASHER .140 ID x .375 OD x .047 VFP	2		PCB MTG SPACERS	
HDW	5-04-0022	SPACER #10 x .125	1			
HDW	5-04-0023	INSULATOR TO220 SIL-PAD A4/A8	4	MAIN	ADD TO THERMALLOY HEATSINK	
HDW	5-05-0001	CLIP STRAIN RELIEF HEYCO 1207	1		Power cord	
HDW	5-07-0005	SPACER PCB 5/16 x 1/4 NYLON (RICHCO SSRS-8-4-01)	3	MAIN	MIG 1-3	
HDW	5-07-0005	SPACER PCB 5/16 x 1/4 NYLON (RICHCO SSRS-8-4-01)	3	OUTPUT	MIG 5-7	
IC	2-22-1339	IC LMT339N QUAD COMP (MOT)	1	FAN	U5	
JAC	4-05-0007	JACK XLR + 1/4" FEMALE	2	MAIN	J 4, 11	
LED	3-99-0001	LED RED HIGH EFF (LED TECH LT5241R)	2	CONTROL	DS 1,3	
LED	3-99-0002	LED GREEN (LED TECH LT5221)	1	CONTROL	DS 2	
LIT	7-51-1107	MANUAL REFERENCE A4/A8	1		LITERATURE PACK	
Group	**Part.Number**	**Description**	**Qty**	**PCB**	**Ref.Designator**	**Comment**
LIT	7-53-0001	STICKER BUMPER	1			
ME	7-03-0006	BRIDGE CM3502 35AMP/200V	1		BR1	
ME	7-06-0004	RELAY SPST 901CS-DC12	2	FAN	K1,2	Relay MUST be 'C'-config

ME	7-06-0008	CIRCUIT BREAKER 28-XQ1A-12	1			
ME	7-06-0010	BREAKER THERMAL CUTOUT 80 DEG.O.O.R.	1	MAIN	TH 1	
ME	7-06-0011	BREAKER THERMAL CUTOUT 55 DEG. C.O.R.	1	OUTPUT M	TH2	
ME	7-10-0029	FAN,DC ST12N6X	1	FAN	FAN 1	
ME	7-20-0015	INDUCTOR,AIR CORE 1uH	2	OUTPUT M	L1, 2	
MIS	5-04-0000	INSULATOR, RECTIFIER 1.250X1.250 .200 HOLE	1		BRIDGE RECTIFIER	
MIS	5-04-1018	INSULATOR XFMR BRACKET	2		TRANSFORMER MOUNTING	
MIS	7-70-0001	FISH PAPER 6x5	1			
MIS	7-70-0006	FISH PAPER 10.0 A4	1		CHASSIS	
MIS	7-70-0008	FISH PAPER 1.5 x 9 A4	1		COVER	
MIS	7-70-0010	INSULATOR, FELT DISC. .375 DIA. X .032	3		COVER	
MIS	7-90-0007	TWIST TIE,PLASTC WIRE 7"	1			
MIS	9-23-1058	INSULATOR FOAM A4, A8	1			
MTL	9-03-1145	CHASSIS A4	1			
MTL	9-03-1147	COVER TOP A4	1		Top Assembly	
MTL	9-03-1149	BRACKET TRANSFORMER A4/A8	1		Final Assembly	
MTL	9-03-1151	CLAMP TRANSISTOR A4/A8	2		Module Assembly	
MTL	9-03-1152	HEATSINK EXTRUSION,150 inch stick (REV C.)	8			
MTL	9-03-1154	HEATSINK A4	1		Module assembly	
MTL	9-03-1156	HEATSINK THM7022B-MT	4	MAIN	HS 1-4	
MTL	9-03-1157	CLIP HEAT SINK CLP-201	4			
MTL	9-03-1164	HEATSINK RECTIFIER 3 x 1.250 x .125	1			
PLS	5-10-1008	TIE WRAP 3.250 BLACK PLASTIC RICHO (WIT-18SF-BK)	14			
PLS	9-15-0040	KNOB 35MM PA	2		Final Assembly	
PLS	9-15-0095	INSULATOR K6 A4	2		Module Assembly	
PLS	9-15-1189	PANEL FRONT A4, A8	1		Final assembly	
PLS	9-15-1190	LABEL A4 F/P LOGO	1		Chassis assembly	
PLS	9-15-1194	BLOCK BINDING POST A4,A8	1			
POT	0-09-1037	POT 5K SINGLE W/RIGHT ANGLE LEADS	2	CONTROL	VR 3,4	
RES	0-00-0000	RES 0 OHM 1/8W 5%	1			
RUB	9-23-1056	FASTENER FAN (A4 A8)	4	FAN		
RUB	9-23-1057	FEET RUBBER .30 x .81 BLK (3M SJ5023)	4		Packing Assembly	
SWT	6-01-0002	SWITCH SLIDE DPDT	1	MAIN	S1	
SWT	6-02-1500	SWITCH SPST 16A POWER 1500H11E	1		S2	
TRN	2-03-0006	TRANS MPSA06RLRA	4	MAIN	Q 1, 2, 7, 20	
TRN	2-03-0006	TRANS MPSA06RLRA	2	OUTPUT M	Q31, 36	
TRN	2-03-0006	TRANS MPSA06RLRA	4	FAN	Q40, 41, 42, 45	
TRN	2-03-0056	TRANS MPSA56RLRA	2	MAIN	Q 5, 18	
TRN	2-03-0650	TRANS MPS650RLRA	2	MAIN	Q 10, 23	
TRN	2-03-0650	TRANS MPS650RLRA	1	FAN	Q43	
TRN	2-03-0750	TRANS MPS750RLRA	4	MAIN	Q 6, 11, 19, 24	
TRN	2-03-0750	TRANS MPS750RLRA	1	FAN	Q44	
TRN	2-03-1193	TRANS MJL21193	6	OUTPUT M	Q29, 30, 32, 35, 37, 38	
TRN	2-03-1194	TRANS MJL21194	6	MAIN	Q 3, 4, 14, 17, 27, 28	
TRN	2-03-1302	TRANS MJL1302A	2	OUTPUT	Q33, 34	
TRN	2-03-3281	TRANS MJL3281A	2	MAIN	Q 15, 16	
TRN	2-04-1837	TRANS 2SA1837	2	MAIN	Q 9, 22	
TRN	2-07-4793	TRANS 2SC4793	2	MAIN	Q 13, 26	
WIR	4-19-1404	WIRE 3.75" BLK W/AMP CRIMP CONS	3	MAIN	A, D, J	
WIR	4-19-1405	WIRE 3.25" WHT W/AMP CRIMP CONS	1	MAIN	BGND-GNDB	
WIR	4-19-1407	WIRE 13" GRN W/AMP CRIMP CONS	1			
WIR	4-19-1408	WIRE 13" GREY W/AMP CRIMP CONS	1			
WIR	4-19-1413	WIRE 18.5" GREY W/AMP CRIMP CONS	1	OUTPUT	SPKR B	
WIR	4-19-1414	WIRE 13" GRN W/AMP CRIMP CONS (REV. B)	1	OUTPUT	SPKR A	
WIR	4-19-1415	WIRE 17" RED W/AMP CRIMP CONS	1	MAIN	B+	
WIR	4-19-1416	WIRE 14" BLK W/AMP CRIMP CONS	2			
WIR	4-19-1419	WIRE 17" BLK W/ AMP CRIMP CONNS	1	MAIN	B-	
WIR	4-19-1420	WIRE 4" BLUE W/ AMP CRIMP CONNS	7	MAIN	B, C, E, F, H, K, AGND-GNDA	
WIR	4-19-1421	WIRE 13" WHITE W/AMP CRIMP ON	1	MAIN	GNDCT	
Group	**Part.Number**	**Description**	**Qty**	**PCB**	**Ref.Designator**	**Comment**
	2-99-0031	IC TIP31A NPN (FF)	1	FAN	Q 39	
	2-99-5532	IC NE5532AN DUAL OPAMP (FF)	3	MAIN	U 1-3	
	2-99-7815	REG MCT7815CT +15V TO220 (MOT)	1	FAN	U4	
	9-23-1068	FOAM PAD TRANSFORMER A4	1			

4.10 A8 Service Parts List

Group	Part.Number	Description	Qty	PCB	Ref.Designator	Comments
ASY	7-40-1120	TRANSFORMER 120V A8	2			
ASY	9-79-0115	MODULE DISPLAY/VOL A8	1			
ASY	9-79-0117	MODULE MAIN AMP A8	1			
ASY	9-79-0118	MODULE OUTPUT A8	1			
ASY	9-79-0119	ASSY FAN/RELAY/PS A8	1			
ASY	9-96-1259	ASSY BINDING POSTS COMPLETE A4/A8	1		FINAL ASSY	
CAB	4-18-1676	CABLE 6" BLK (TWO WIRES TWISTED)	2			
CAB	4-18-1677	CABLE 26" RED/BLK (TWO WIRES TWISTED)	1			
CAB	4-18-1677	CABLE 26" RED/BLK (TWO WIRES TWISTED)	1		B+ RED, B- BLACK	
CAB	4-19-1756	CABLE 3-PIN CHNL B I/P A8	1	MAIN	J1-J14 (RED)	
CAB	4-19-1757	CABLE 8-PIN LEVEL CONTROL	1		J2 to J18 (gray)	
CAB	4-19-1758	CABLE 14-PIN TO 4-CON MAIN HARNESS	1		J23 TO J20, J13, J8, J3	
CAB	4-19-1759	CABLE 3-PIN BIAS CH B	1		J12-J19 (YEL,GRN,BLUE)	
CAB	4-19-1760	CABLE 6-PIN LED	1		J15 to J17	
CAB	4-19-1761	CABLE 3-PIN BIAS CH A	1		J16-J21 (BRN,RED,ORANGE)	
CAB	4-74-0013	ASSY WIRE HARNESS 14" (25-PIN D-CON & 26-PIN DIL HDR CON) 26 AWG	1			
CAB	7-41-0006	CABLE POWER W/SPADE LUG (UL/CSA) A4/A8	1			
CFC	1-99-0010	CAP 10uF ELEC 35V 20%	1	FAN	C45	
CFC	1-99-0100	CAP 100PF 100V 5% NPO MC	2	MAIN	C17, C39	
CFC	1-99-0101	CAP 100uF 25V 20% MUSE	4	MAIN	C2, C3, C16, C35	
CFC	1-99-0101	CAP 100uF 25V 20% MUSE	2	FAN	C49, C50	
CFC	1-99-0102	CAP 0.1uF 100V 5% FILM	14	MAIN	C9, C11, C14, C18-20, C25, C26, C28, C30, C33, C37, C38, C40	
CFC	1-99-0102	CAP 0.1uF 100V 5% FILM	2	FAN	C44, C52	
CFC	1-99-0103	CAP .01uF 250V 20% XCAP	1	MAIN	C7	
CFC	1-99-0103	CAP .01uF 250V 20% XCAP	1	FAN	C48	
CFC	1-99-0104	CAP 10000uF ELEC 80V 20%	4	MAIN	C21-24	
CFC	1-99-0220	CAP 22PF 100V 5% NPO MC	4	MAIN	C10, C12, C29, C31	
CFC	1-99-0221	CAP 220uF ELEC 25V 20%	2	MAIN	C5, C6	
CFC	1-99-0221	CAP 220uF ELEC 25V 20%	2	OUTPUT M	C41, C42	
CFC	1-99-0221	CAP 220uF ELEC 25V 20%	2	FAN	C43, C46	
CFC	1-99-1200	CAP 1200PF 100V 5% FILM	4	MAIN	C8, C13, C27, C32	
CFC	1-99-2200	CAP 2200uF ELEC 25V 20%	1	FAN	C47	
CFC	1-99-3300	CAP 3300PF 100V 5% FILM	6	MAIN	C1, C4, C15, C34, C36, C51	
CFD	2-99-0021	DIODE BAV21	4	MAIN	CR3, CR5, CR10, CR12	
CFD	2-99-1757	DIODE ZENER 1N757A (9.1V)	2	MAIN	CR4, CR11	
CFD	2-99-4003	DIODE POWER 1N4003	2	FAN	CR18, CR26	
CFD	2-99-4148	DIODE SIGNAL 1N4148	8	MAIN	CR6-9, CR13-16	
CFD	2-99-4148	DIODE SIGNAL 1N4148	7	FAN	CR17, CR19, CR20, CR22-25	
CFD	2-99-5400	DIODE POWER 1N5400	1	FAN	CR21	
CFM	2-02-5352	DIODE 1N5352BRL 15V 5W 5%	2	MAIN	CR1, CR2	
CFR	0-99-0010	RES 10 OHM 1/4W 5% CF	4	MAIN	R35, R42, R75, R103	
CFR	0-99-0010	RES 10 OHM 1/4W 5% CF	1	FAN	R142	
CFR	0-99-0011	RES 10 OHM 3W 5% MO	2	MAIN	R64, R66	
CFR	0-99-0012	RES 1.2 OHM 1/2W 5% MO	10	MAIN	R27, R29, R56, R58, R61, R68, R71, R74, R99, R101	
CFR	0-99-0012	RES 1.2 OHM 1/2W 5% MO	10	OUTPUT M	R105, R107, R109, R112, R115, R120, R123, R125, R127, R129	
CFR	0-99-0020	RES 20 OHM 5W 5% WW	1	FAN	R132	
CFR	0-99-0027	RES 2.7 OHM 3W 5% MO	2	MAIN	R65, R67	
CFR	0-99-0040	RES 40 OHM 5W 5% WIRE WOUND	1	FAN	R130	
CFR	0-99-0100	RES 100 OHM 1W 5% MO	2	MAIN	R9, R11	
CFR	0-99-0102	RES 1K OHM 10W 5% W.W. FORMED	2	MAIN	R25, R50	
CFR	0-99-0103	RES 10K 1/4W 1% MF	8	MAIN	R3, R6, R16, R19, R40, R53, R84, R95	
CFR	0-99-0104	RES 10K 1/4W 5% CF	2	MAIN	R12, R13	
CFR	0-99-0104	RES 10K 1/4W 5% CF	10	FAN	R134, R139-141, R144, R148-152	
CFR	0-99-0120	RES 120 OHM 5W 5% WW	1	FAN	R131	
CFR	0-99-0202	RES 2K OHM 1/4W 5% CF	2	MAIN	R22, R26	
CFR	0-99-0223	RES 22K 1/4W 5% CF	4	FAN	R146, R147, R153, R154	
CFR	0-99-0330	RES 330 OHM 1/4W 5% MO	4	MAIN	R60, R63, R70, R73	
CFR	0-99-0330	RES 330 OHM 1/4W 5% MO	4	OUTPUT M	R110, R113, R118, R121	
CFR	0-99-0511	RES 51.1 OHM 1/4W 1% MF	6	MAIN	R7, R20, R33, R45, R78, R88	
CFR	0-99-0511	RES 51.1 OHM 1/4W 1% MF	2	OUTPUT M	R116, R117	
CFR	0-99-0593	RES 59K 1/4W 1% MF	4	MAIN	R39, R41, R83, R85	
Group	Part.Number	Description	Qty	PCB	Ref.Designator	Comments

CFR	0-99-0752	RES 7.5K OHM 1/2W 5% CF	2	MAIN	R54, R96	
CFR	0-99-1000	RES 1K OHM 1/4W 1% MF	8	MAIN	R32, R44, R47, R52, R77, R87, R90, R94	
CFR	0-99-1000	RES 1K OHM 1/4W 1% MF	1	FAN	R145	
CFR	0-99-1001	RES 1K OHM 1/2W 5% CF	1	MAIN	R10	
CFR	0-99-1001	RES 1K OHM 1/2W 5% CF	1	FAN	R143	
CFR	0-99-1500	RES 1.5K OHM 1/4W 5% CF	2	MAIN	R51, R93	
CFR	0-99-1500	RES 1.5K OHM 1/4W 5% CF	1	FAN	R138	
CFR	0-99-2210	RES 2.21K OHM 1/4W 1% MO	4	MAIN	R31, R43, R76, R86	
CFR	0-99-3033	RES 0.33 OHM 1/4W 5% METAL OXIDE (FLAMEPROOF)	2	MAIN	R23, R24	
CFR	0-99-3300	RES 3.3K 1/4W 5% CF	2	MAIN	R55, R97	
CFR	0-99-3300	RES 3.3K 1/4W 5% CF	1	FAN	R135	
CFR	0-99-3303	RES 330K 1/4W 5% CF	3	FAN	R133, R136, R137	
CFR	0-99-4990	RES 4.99K 1/4W 1% CF	8	MAIN	R1, R2, R4, R5, R14, R15, R17, R18	
CFR	0-99-4991	RES 499 OHM 1/4W 1% MF	8	MAIN	R8, R21, R48, R49, R91, R92, R155, R156	
CFR	0-99-4992	RES 49.9K OHM 1/4W 1% MF	2	MAIN	R36, R80	
CFR	0-99-5001	RES 5K LINEAR TRIM POT	2	MAIN	VR1, VR2	
CFR	0-99-7682	RES 7.68K OHM 1/4W 1% MF	3	MAIN	R37, R38, R82	
CFR	0-99-9092	RES 9.09K OHM 1/4W 1% MF	1	MAIN	R81	
CON	4-10-0007	CON BINDING POST A4, A8	1			
CON	4-10-0007	CON BINDING POST A4, A8	1			
CON	4-98-0003	STRIP BARRIER (5-POS) DT-55-B-14N-05	1	MAIN	J5	
CON	4-98-0004	TAB FASTON 1/4" (AMP 62650-1)	25	FAN	P1-25	
HDR	4-15-2002	HEADER 2-PIN SIL 0.1 SPC LOCKING (AMP 640456-2)	1	FAN	J22	
HDR	4-15-2003	HEADER 3-PIN SIL 2MM CTR (SHROUDED)	4	MAIN	J1, J12, J14, J16	
HDR	4-15-2003	HEADER 3-PIN SIL 2MM CTR (SHROUDED)	2	OUTPUT M	J19, J21	
HDR	4-15-1002	HEADER 2-PIN SIL 2mm SPC (shrouded)	4	MAIN	J3, J9, J10, J13	
HDR	4-15-1002	HEADER 2-PIN SIL 2mm SPC (shrouded)	1	OUTPUT M	J 20	
HDR	4-15-1006	HEADER 6-PIN SIL 2MM CTR (SHROUDED)	1	DISPLAY	J17	
HDR	4-15-1006	HEADER 6-PIN SIL 2MM CTR (SHROUDED)	1	MAIN	J15	
HDR	4-15-1008	HEADER 8-PIN SIL 2MM CTR (SHROUDED)	1	DISPLAY	J 18	
HDR	4-15-1008	HEADER 8-PIN SIL 2MM CTR (SHROUDED)	2	MAIN	J2, J8	
HDR	4-15-1014	HEADER 14 PIN SIL 2mm SHROUDED	1	FAN	J23	
HDR	4-99-0026	HEADER 26-PIN DIL .100 SPC	1	MAIN	J6	
HDW	5-00-0076	SCREW 6-32 x 3/8 TAP TIGHT THREAD ROLLING PAN HEAD TROX BLK	13		MTG 8 AND COVER	
HDW	5-00-0077	SCREW 10-32 x 5/16 TAP TIGHT THREAD ROLLING PAN HEAD TROX BLK	10		TRANSFORMER MOUNTING/AC GND	
HDW	5-00-0078	SCREW 6-32 x 1/2 TAP TIGHT THREAD ROLLING PAN HEAD TROX ZINC	1		BINDING POST BLOCK	
HDW	5-00-0079	SCREW 10-32 x 7/8 TAP TIGHT THREAD ROLLING PAN HEAD TROX ZINC	1		BRIDGE RECT.	
HDW	5-00-0085	SCREW 8-32 x 1/2 #6 PH TAPTITE TORX BLACK OXIDE W/WAX	6		TRANSISTOR CLAMP	
HDW	5-00-0086	SCREW M3 x 6MM PPZ MACHINE	4		XLR CONNECTOR	
HDW	5-00-0088	SCRW,6-32x3/8 PPH THRD LNGR CAD	1		Rear panel	
HDW	5-00-2006	SCREW, JACK, 3/16 X 1/4	2		Rear panel	
HDW	5-01-0020	WASHER #10 FLAT SPLIT RING	1		AC ground screw	
HDW	5-01-0022	RING RETAINING F/P A4/A8	5		FRONT PANEL FASTENER	
HDW	5-02-0005	STANDOFF,.400,24AWG,PVC TUBING	4	OUTPUT	E AND C LEADS Q35, Q44	
HDW	5-04-0016	FASTENER STUD RECEIVER (PUSH-ON)	5			
HDW	5-04-0017	SPACER LED (LTM-480)	3	DISP.	DS 1,2,3	
HDW	5-04-0018	WASHER #10 FLAT BRASS	2		BRIDGE RECTIFIER	
HDW	5-04-0019	WASHER .140 ID x .375 OD x .047 VFP	2		PCB MOUNTING SPACER	
HDW	5-04-0023	INSULATOR TO220 SIL-PAD A4/A8	4		APPLY TO Q7, Q11, Q28, Q32	
HDW	5-05-0001	CLIP STRAIN RELIEF HEYCO 1207	1			
HDW	5-07-0005	SPACER PCB 5/16 x 1/4 NYLON (RICHCO SSRS-8-4-01)	10	MAIN	MTG1-7, MTG9-11	
IC	2-22-1339	IC LMT339N QUAD COMP (MOT)	1	FAN	U4	
JAC	4-05-0007	JACK XLR + 1/4" FEMALE	2	MAIN	J4, J11	
LED	3-99-0001	LED RED HIGH EFF (LED TECH LT5241R)	2	DISPLAY	DS 1, 3	
LED	3-99-0002	LED GREEN (LED TECH LT5221)	1	DISPLAY	DS 2	
LIT	7-51-1107	MANUAL REFERENCE A4/A8	1			
ME	7-03-0006	BRIDGE CM3502 35AMP/200V	1			
ME	7-06-0004	RELAY SPST 901CS-DC12	2	FAN	K1, K2	
ME	7-06-0010	BREAKER THERMAL CUTOUT 80 DEG.O.O.R.	1	MAIN	TH1	
ME	7-06-0011	BREAKER THERMAL CUTOUT 55 DEG. C.O.R.	1	OUTPUT M	TH2	
ME	7-06-0012	CIRCUIT BREAKER 28-XQ1A-20	1			
ME	7-10-0029	FAN,DC ST12N6X	1	FAN		
Group	**Part.Number**	**Description**	**Qty**	**PCB**	**Ref.Designator**	**Comments**
ME	7-20-0015	INDUCTOR,AIR CORE 1uH	2	MAIN	L1, L2	
MIS	5-04-0000	INSULATOR, RECTIFIER 1.250X1.250 .200 HOLE	1		Bridge rectifier	

MIS	5-04-1018	INSULATOR XFMR BRACKET	4			
MIS	7-70-0007	FISH PAPER 5.7 x 14.0 A8	1		CHASSIS	
MIS	7-70-0009	FISH PAPER 1.5 x 13 A8	1		TOP COVER	
MIS	7-70-0010	INSULATOR, FELT DISC. .375 DIA. X .032	3		Cover	
MTL	9-03-1146	CHASSIS A8	1			
MTL	9-03-1148	COVER TOP A8	1			
MTL	9-03-1149	BRACKET TRANSFORMER A4/A8	2			
MTL	9-03-1151	CLAMP TRANSISTOR A4/A8	3		HEATSINK ASSEMBLY	
MTL	9-03-1152	HEATSINK EXTRUSION,150 inch stick (REV C.)	12			
MTL	9-03-1155	HEATSINK A8	1			
MTL	9-03-1156	HEATSINK THM7022B-MT	4	MAIN	HS1-4	
MTL	9-03-1157	CLIP HEAT SINK CLP-201	4			
MTL	9-03-1157	CLIP HEAT SINK CLP-201	4			
MTL	9-03-1164	HEATSINK RECTIFIER 3 x 1.250 x .125	1			
PLS	9-15-0040	KNOB 35MM PA	2			
PLS	9-15-0096	INSULATOR K6 A8	2			
PLS	9-15-1189	PANEL FRONT A4, A8	1			
PLS	9-15-1194	BLOCK BINDING POST A4,A8	1			
POT	0-09-1037	POT 5K SINGLE W/RIGHT ANGLE LEADS	2	DISPLAY	VR 3,4	
RES	0-99-0033	RES .33 OHM 3W 5%	10	MAIN	R28, R30, R57, R59, R62, R69, R72, R98, R100, R102	
RES	0-99-0033	RES .33 OHM 3W 5%	10	OUTPUT M	R104, R106, R108, R111, R114, R119, R122, R124, R126, R128	
RUB	9-23-1056	FASTENER FAN (A4 A8)	4	FAN		
RUB	9-23-1057	FEET RUBBER .30 x .81 BLK (3M SJ5023)	4		INFORMATION PACK	
SWT	6-01-0002	SWITCH SLIDE DPDT	1	MAIN	S1	
SWT	6-02-1500	SWITCH SPST 16A POWER 1500H11E	1		S2	
TRN	2-03-0006	TRANS MPSA06RLRA	4	MAIN	Q1, Q2, Q4, Q25	
TRN	2-03-0006	TRANS MPSA06RLRA	2	OUTPUT M	Q35, Q44	
TRN	2-03-0006	TRANS MPSA06RLRA	4	FAN	Q47, Q48, Q50, Q52	
TRN	2-03-0056	TRANS MPSA56RLRA	2	MAIN	Q3, Q24	
TRN	2-03-0650	TRANS MPS650RLRA	2	MAIN	Q8, Q29	
TRN	2-03-0650	TRANS MPS650RLRA	1	FAN	Q51	
TRN	2-03-0750	TRANS MPS750RLRA	4	MAIN	Q5, Q9, Q26, Q30	
TRN	2-03-0750	TRANS MPS750RLRA	1	FAN	Q49	
TRN	2-03-1193	TRANS MJL21193	10	OUTPUT M	Q33, Q34, Q36-38, Q41-43, Q45, Q46	
TRN	2-03-1194	TRANS MJL21194	10	MAIN	Q12-16, 19-23	
TRN	2-03-1302	TRANS MJL1302A	2	OUTPUT	Q39, Q40	
TRN	2-03-3281	TRANS MJL3281A	2	MAIN	Q17, Q18	
TRN	2-04-1837	TRANS 2SA1837	2	MAIN	Q7, Q28	
TRN	2-07-4793	TRANS 2SC4793	2	MAIN	Q11, Q32	
	2-99-0031	IC TIP31A NPN (FF)	1	FAN	Q306	
	2-99-5532	IC NE5532AN DUAL OPAMP (FF)	3	MAIN	U1-3	
	2-99-7815	REG MCT7815CT +15V TO220 (MOT)	1	FAN	U 5	
	9-23-1067	FOAM PAD TRANSFORMER A4	1			