

**ALESIS
QUADRAVERB II SERVICE MANUAL
V2.00 12/12/95**

PREFACE

This document is intended to assist the service technician in the operation, maintenance and repair of the QuadraVerb II Digital Stereo Effects Processor. Together with the QVII Reference Manual, this document provides a complete description of the functionality and serviceability of the QVII. Any comments or suggestions you may have pertaining to the document are welcome and encouraged.

WARNINGS

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.

CAUTION

Danger of explosion if battery is incorrectly replaced.
Replace only with the same type or equivalent type
recommended by the equipment manufacturer.

Battery Manufacturer: Panasonic/Matsushita
Type: BR2325
Rating 3V, 5mA

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SAFETY SUGGESTIONS

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. Grounding the Plug. This product has a 3-wire grounding type of plug (a plug with a grounding pin) for safety purposes. This plug can only be used in a grounding power outlet. If the plug does not insert into the outlet you are using, the outlet probably is not a grounding type of power outlet. Contact your electrician to replace the obsolete outlet with a grounding type of outlet instead of defeating the safety feature of the grounding type of plug.
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.

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1.00 General Description

The QuadraVerb II, and other digital reverbs, achieve their results by slicing analog signals into segments, and then converting them to a numeric value, corresponding to the amplitude of the signal at that particular instant. These values are then mathematically manipulated, and stored at various locations in a memory "loop" for eventual playback. By varying the placement and amplitude of incoming samples, discrete time delays are achieved. When mixed together, and converted back into analog, these delays simulate the reflections associated with natural reverbs, and delays, as well as non natural effects such as reverse reverbs, and gated reverbs. The added capabilities of an 80C31 micro controller allow for user manipulation and storage of algorithm parameters. Some of the PCBs in the unit have undergone revision. The reference designators used in the text apply to the REV. C Main PCB schematic and Comp. I.D. unless otherwise noted.

2.00 Power Supply

J13 is the AC power input. Its voltage is derived from the a 20 volt/ampere external transformer. The Q2 draws about three quarters of an amp while in operation.

SW1 connects the AC power jack to the input of the power supply which generates +12V, +5V, and -12V. The +12V rail is generated by a voltage doubler (C4, D8, D6, and C20) supplying roughly +20V DC (and about a volt of ripple) to the input of regulator U15. The +12V output of U15 is filtered by C23. The -12V rail is generated in a similar method through a negative voltage doubler (C13, D9, D10, and C21), a -12V regulator (U17), and filtered by C31. The +5V rail requires a rectifier diode (D4), five input filter capacitors (C9, C19, C22, C24, C51), a +5V regulator (U16), and an output filter capacitor (C29).

2.10 PUP Circuit

Since the Q2 is used as outboard gear in audio recording studios, it is important not to generate audible thumps at the outputs during power up. These are caused by applying power to the output amplifiers in a non symmetrical manner, and in extreme cases this could actually damage studio monitors. To prevent this situation the Q2 employs a Power UP mute circuit that effectively eliminates any power up transients at the output jacks.

The *RESET* signal (see section 5.11) is routed through R116 to the base of Q9, which in turn controls other transistors that apply power to the output amplifier U18.

C49 adds a reasonable delay after the *RESET* signal goes high, so that the power supply is fully stabilized before it is engaged to the output amplifier.

D21 acts as a switch to quickly discharge C49 in case of intermittent power loss.

When Q9 is turned on it starts a chain of events that turns on Q6, Q8 and finally Q7. The biasing resistors for these transistors are: R118, R115, R177, R112, R113, R110, and R111. C27 is a bypass capacitor for the positive supply while C25 serves to bypass the negative supply.

3.00 Analog Signal Paths

3.10 Audio Input Section

The Q2 can be used in several stereo or mono audio applications. Additionally it can support both balanced and single ended configurations. A balanced circuit requires three analog connections per channel (i.e. signal +, signal -, and ground). A single ended application requires only two connections (signal and ground). Regardless of the application, the audio signals are routed to and from the unit via balanced stereo 1/4" phono plugs which utilize tip, ring, and sleeve connections.

The input jacks J6 and J7 are interconnected such that any signal plugged into J7 will be automatically routed to J6 as long as a phone plug is not already inserted into J6.

The input signal from J7's tip is routed to op amp U22A by means of a simple RC network. C17 filters any high frequency while R57 sets the op amps ground reference while also acting as a fairly high input impedance (510K). Finally, R48 protects the op amps input from transients.

Op amp U22B is used for balanced signals. If a mono plug is used, the non inverting input is automatically grounded through the RC network of C79, R97, and R96. If however a stereo plug is used, that RC network is used to match the input impedance as well as to provide a high frequency filter. Since tip and ring input impedances must be matched, these resistors are all 1% tolerance.

The output from op amp U22B is now sent to U26A. It's input resistor (R56) is used with the right input potentiometer to allow for a gain of 10. Finally this signal is routed to the A to D converter (U14) through a DC blocking capacitor (C10) and current limiting resistor R81. Also clamping diodes (D16 and D17) limit the A to D input from roughly ground to 5 volts.

J6 has an identical input section built around op amp U26C, U22D, and U22A.

3.20 Audio Output Section

The left output channel is routed from the D-A (see sec. 4.20) through R58 and R65 to the inputs of op amp U26D, which is configured as a differential amp with R55 and R59 setting the gain to two. C28 and C46 act as high frequency attenuators. Note that single ended mode occurs when a mono plug is inserted into the output jack.

The output of op amp U26D is routed through a DC blocking capacitor (C26) and is then scaled by the output potentiometer for proper output level.

Op amp U18C and U18D are the left channel's output amplifiers and have 6dB when single ended mode is selected on the output jack. This is accomplished through a series of input and feedback resistors (R68, R67, R99, R104, R105, R98, R15, R77, R69, and R74).

The output jack is terminated with R106 and R107, along with C80 and C15 to ensure amplifier stability.

The right output channel is identical and is built around op amps U26D, U18A, and U18B.

4.00 A-D/D-A Converters

4.10 Analog to Digital

The A to D is a 128 times over sampling Philips 7360 high performance device. It is a stereo part utilizing high Sigma-Delta conversion techniques that eliminates the need for sample and holds, and extensive anti aliasing filters.

The right channel is input through R81, while R45 and C74 are the feedback network to the A to D's internal input buffer amplifier. R47 and R46 provide negative and positive inputs to the A to D's internal sigma delta modulator. C25 is a small filter cap placed between these inputs.

The left input is identical and uses R43, C69, C33, R37, and R38.

C68, C71, C72, and C73 are the bypass filters for the internal voltage reference. C44 along with R49 and R52 act as filters for the negative and positive internal DAC reference inputs. Analog power is supplied through current limiters (R53, and R91) which help suppress current spikes. C76, C42, and C43 act as bypass filters for the analog supply. The digital supply is filtered by C45, C77, and R2.

R54 is a current reference and has a tolerance of 1% for precision.

The A to D's stereo output is transmitted from the *A/D-IN* line to the DSP chip (U6).

4.20 Digital to Analog

The digital to analog converter is U12 which is an AKM 4318 DAC. Like the A to D, this D to A is a high performance over sampling stereo device. It can achieve an outstanding signal to noise ratio of 98 dB which is unprecedented in it's price range. Also, the over sampling nature significantly reduces output filter requirements.

The analog power supply filter consists of C59, and C81, while the digital is supplied via resistor R78, and is filtered by C53, and C55. It's bit clock, which is 3.072MHz, is buffered by nand gate U23B.

The D to A outputs are balanced and routed through differential amplifiers to the unit's output jacks, via the analog output section (see sec. 3.20).

5.00 Digital Signal Paths

5.10 The 8031

The Q2's operation is directed by U8 which is the 8031 micro controller. It has an internal clock generator that drives the crystal (M2) to provide a 12MHz master clock. C7 and C8 are small capacitors from each side of the crystal to ground that provide oscillator stability.

The software is stored in the EPROM (U2) which as of this time is a 1 Megabyte part.

To access external memory devices the 8031 utilizes a multiplexed lower address buss. U7 is a 74HC573 octal latch that is used to decode these lower address bits from the data buss. It is controlled by the *ALE* output from the 8031.

U5 is a 74HC138 3 to 8 decode device. Controlled by the 8031, it enables data transfers to various circuit locations. It clocks octal registers U10, U11, U25, provides the LCD enable, and also allows for extended EPROM addressing by clocking the D flip flop U20A.

U10 lights front panel LEDs by pulling the select lines low. Each output is followed by a 270 Ω resistor to provide current limiting.

U25 lights the front panel LED bar graph display and also utilizes 270 Ω current limiting resistors on it's outputs.

In the same manner U11 lights four of the front panel LEDs, and with it's four additional outputs it pulses the front panel switch matrix columns. Rows are then read back by four dedicated port pins on the 8031 to identify any switch closures that might have occurred.

5.11 Reset

This is an especially important circuit that safely halts processing when power is removed or briefly disturbed. The two transistors, Q4 and Q5 turn on when external power is connected. Q5 is biased by resistive divider R13 and R10. C1 works with D1 to prevent engaging reset mode too easily. R11 is a bias resistor for Q4 which triggers a reset that is delayed by the RC network of R12 and C3.

U4B generates the *RESET* signal while U4C generates the compliment *RESET* signal. C6 is a feedback capacitor that provides hysteresis to the reset generator.

Note that reset is active on power down as well as power up. This is necessary to prevent noise on the microprocessor data and address busses from corrupting SRAM data.

5.12 SRAM

The 8031 utilizes two 32K X 8 SRAMs (U1 and U13) to store program data. These memory chips are necessary for proper command execution and must be powered even when the unit is turned off.

A 3 volt battery (B1) supplies power to the SRAMs when the unit is turned off.

WARNING: Danger of explosion if battery is incorrectly replaced. Replace only with the same type or equivalent type recommended by the equipment manufacturer.

Battery Manufacturer: Panasonic/Matsushita

Type: BR2325

Rating 3V, 5mA

D2 acts as a switch to apply battery current to the SRAMs through R50, when the power supply is off.

When the power supply is on, Q1 switches memory power over to the power supply which causes D2 to be reversed biased thereby cutting off battery current.

R51 supplies base current to Q1. D7 pulls the base voltage up by one diode drop ($\approx 0.7V$) thus allowing the emitter voltage, which supplies the SRAMs, to be at 5V. Without D7 the SRAM supply would be below the address and data voltages which would cause the SRAMs to malfunction.

U3 is also powered from the SRAM supply voltage (+5MEM) and it serves to decode and chip enable the SRAMs.

5.20 DSP

The heart of the Q2 is U6, it's custom VLSI audio DSP ASIC which handles all data processing requirements, timing for the A/D and D/A converters, DRAM interface control, and optical input/output communication protocol. The chip was designed specifically by Alesis engineers with the intent of providing the new standard in state of the art multi effects processors.

The DSP chip is programmed by the host 8031 microprocessor and the interface consists of the 8 bit data buss, 4 low order address bits, RD, WR, and FX-CS which is the ASIC's chip select.

Convincing signal processing requires large amounts of memory to implement long delays in order to achieve excellent sonic results. For example, in this case, we wanted to achieve a maximum delay of about 5 seconds. With a sample period 20 microseconds (48KHz sample rate) this would equate to nearly one quarter of a million samples. This is accomplished by utilizing U21, which is a 16M DRAM arraigned as 256K words of 16 bits each. It's interface consists of a 16 bit data buss, a 9 bit multiplexed address buss, and control signals RAS, CAS, and WRN.

The digital I/O package (J9) is a fully integrated transmitter and receiver device. It takes the input from a fiber optic cable, from which it derives logic level outputs to present to the ASIC. In turn, the ASIC presents logic levels to J9, that get converted and transmitted via second output fiber optic cable. This digital I/O is broadcast and received in an NRZ format that ranges from about 1 MHz to 6MHz, and it is nearly a DC free code.

5.21 Clock Sources and VCOs

The DSP ASIC has four clock sources that are required to cover the full range of Q2 applications. The simplest is the 48KHz external sync clock which is provided by J12. R89 in conjunction with clamping diodes D19 and D20 protect the ASIC's input from unruly transients that could otherwise inflict damage thereby reducing the chips longevity.

This ASIC also has an internal clock generator that is driven by M3, a 6.144MHz crystal which is stabilized by C63, C64 and a high impedance parallel resistor R119.

The sample VCO which operates at 24.576MHz, is constructed around U24, a CMOS unbuffered inverting amplifier.

L1 and D12 comprise a tank circuit that has a voltage controlled resonant frequency. The capacitance value of D12 varies as function of the control voltage. This voltage is set by the DSP ASIC's phase control output pin contributing to a storage capacitor (C2).

R28, R29, C2, and C67 make up a stabilizing filter that allows the VCO to track over it's entire frequency range. C65 and C66 act as coupling capacitors to effectively connect the tank circuit to the amplifier. R27 acts as a self biasing resistor to keep the inverter (U24A) biased to it's midpoint, which allows it to behave essentially as a linear amplifier.

The remaining clock source is the digital VCO which is constructed around U19. It's operation is very similar to the sample VCO with the addition of coupling capacitor C39, an additional bias resistor (R42), and a tank coupling resistor (R40).

The digital VCO operates at half the speed of the sample VCO, or 12.288MHz.

The digital VCO's control voltage is derived through a charge pumping scheme that is controlled by the DSP ASIC. When *DVCO+* is pulsed high, C40 delivers small quantized packets of charge to gradually increase the control voltage which effectively speeds up the VCO (and thus increasing DSP speed for maintaining sample rate accuracy). This charge is delivered through D14, while Q2 supplies current to replenish C40 when the brief charge transfer is completed.

Conversely, when *DVCO-* is pulsed high, small charge packets are effectively removed for the storage capacitor C2. This gradually reduces the control voltage and causes the VCO to slow down (and thus decreasing DSP speed, again maintaining sample rate accuracy). Again this charge is transferred through D13 while Q3 allows C41 to retain it's nominal voltage without bleeding the storage capacitor.

R1 and R30 act as current limiters to suppress current spikes that could degrade the VCO's performance.

Note that the Revision E Main PC Board incorporates a new custom digital VCO IC (UX)

5.30 MIDI Hardware

MIDI protocol is a standard that all manufacturers follow when designing MIDI systems so that electronic music products can communicate via a common protocol.

MIDI IN is provided by J8. The opto isolator (U9) prevents unwanted electrical interference, and is required by the MIDI specifications, as is R18 and D3.

U9's output is sent to the 8031's RXD port pin so that serial MIDI information can be deciphered. R22 provides a current source for the opto, while R21 acts as a pullup.

J2 is the MIDI output jack and is driven through R17, by inverters U4D and U4E, which are buffering the 8031's TXD port. R14 is a pullup resistor.

5.40 Encoder Interface

U27 is a quad XOR gate package which conditions the outputs from the front panel encoder such that they can be easily interfaced to the 8031.

U27A is a transition detector pulse generator. One input is routed directly to the encoder while the other is delayed by an RC time constant of R123 and C52. R122 is a pullup resistor.

U27C is an identical transition detector pulse generator. Its output is used to clock D flip flop U20B which produces an output that allows the 8031 to determine if the encoder is moving in a clockwise or counter clockwise direction.

U27D is used as an inverter since one of its inputs is connected to +5V. Its output is used to reset the direction D flip flop (U20B).

5.50 Footswitch interface

J3 is the footswitch jack. The footswitch can be used for program advance or tap tempo delay. It is coupled to an 8031 port pin through a transient protection resistor (R6). It is also connected to pullup resistor R3.

J4 is the bypass foot switch jack and is coupled to the 8031 through R5, and utilizes R4 as a pullup resistor.

Both foot switches default to the normally open momentary type unless a normally closed type is installed before power up, in which case the processor will

6.00 Appendix 1 Updates and Corrections

6.10 Important Production Changes

6.11 VCO Mod

The following changes (Diagrams 1 and 2) improve VCO (Voltage Controlled Oscillator) performance, and prevents the unit from possibly detuning by itself.

Q2 REV. A PCB VCO MOD

- 1.) REMOVE C65
- 2.) CHANGE R27 TO 100K OHM.
- 3.) SOLDER ONE LEAD OF A 10pF CER. DISC CAP TO ONE LEAD OF A 220 OHM 1/8W RES.
- 4.) SOLDER LEAD OF 10pF CAP TO TOP SIDE PAD OF C65 AND SOLDER LEAD OF 220 OHM RESISTOR TO BOTTOM SIDE PAD OF C66 (SEE DRAWING).

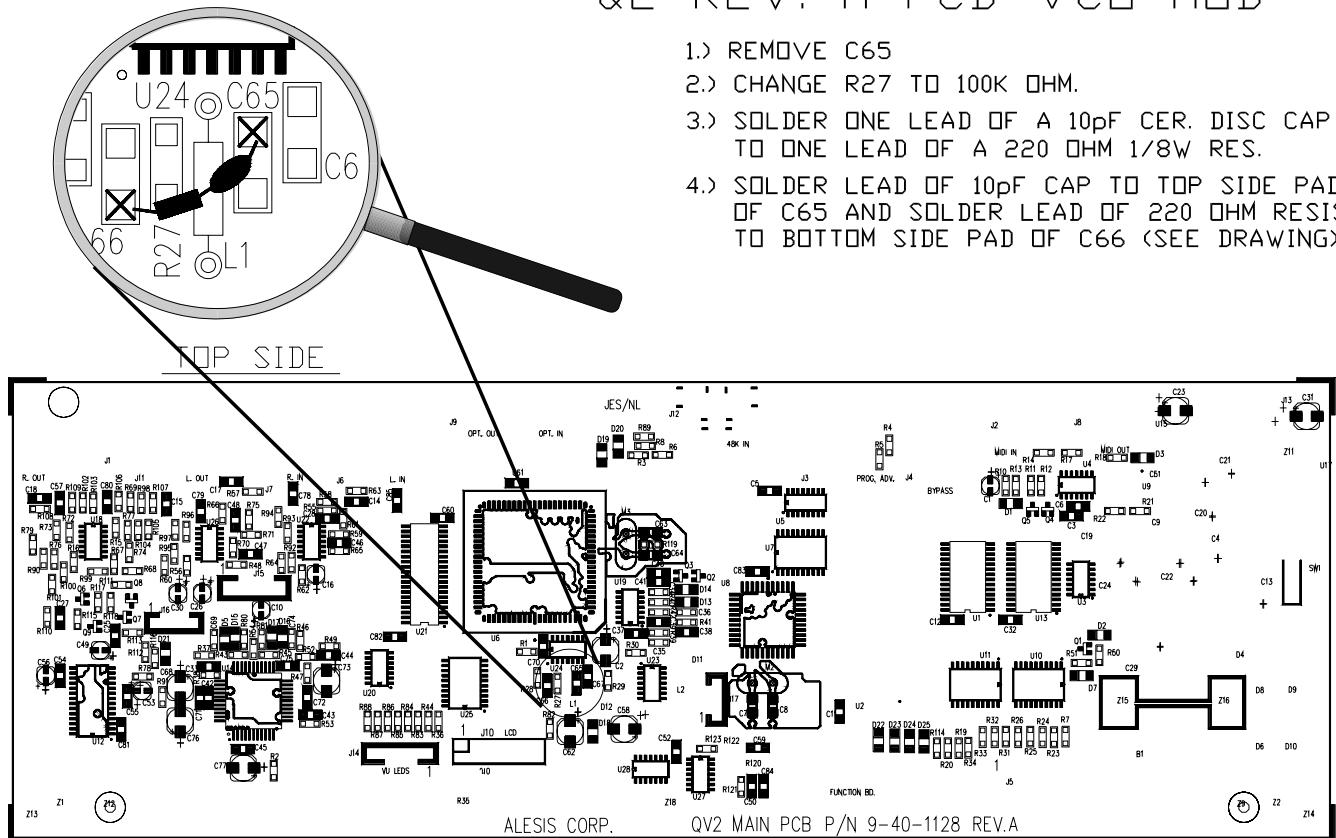


Diagram 1

1. REMOVE C65
2. CHANGE R27 TO 100K OHM.
3. SOLDER ONE LEAD OF 10PF CER. DISC CAP TO ONE LEAD OF A 220 OHM 1/8W RES.
4. SOLDER LEAD OF 10PF CAP TO TOP PAD OF C65 AND SOLDER LEAD OF 220 OHM RESISTOR TO BOTTOM PAD OF C66.

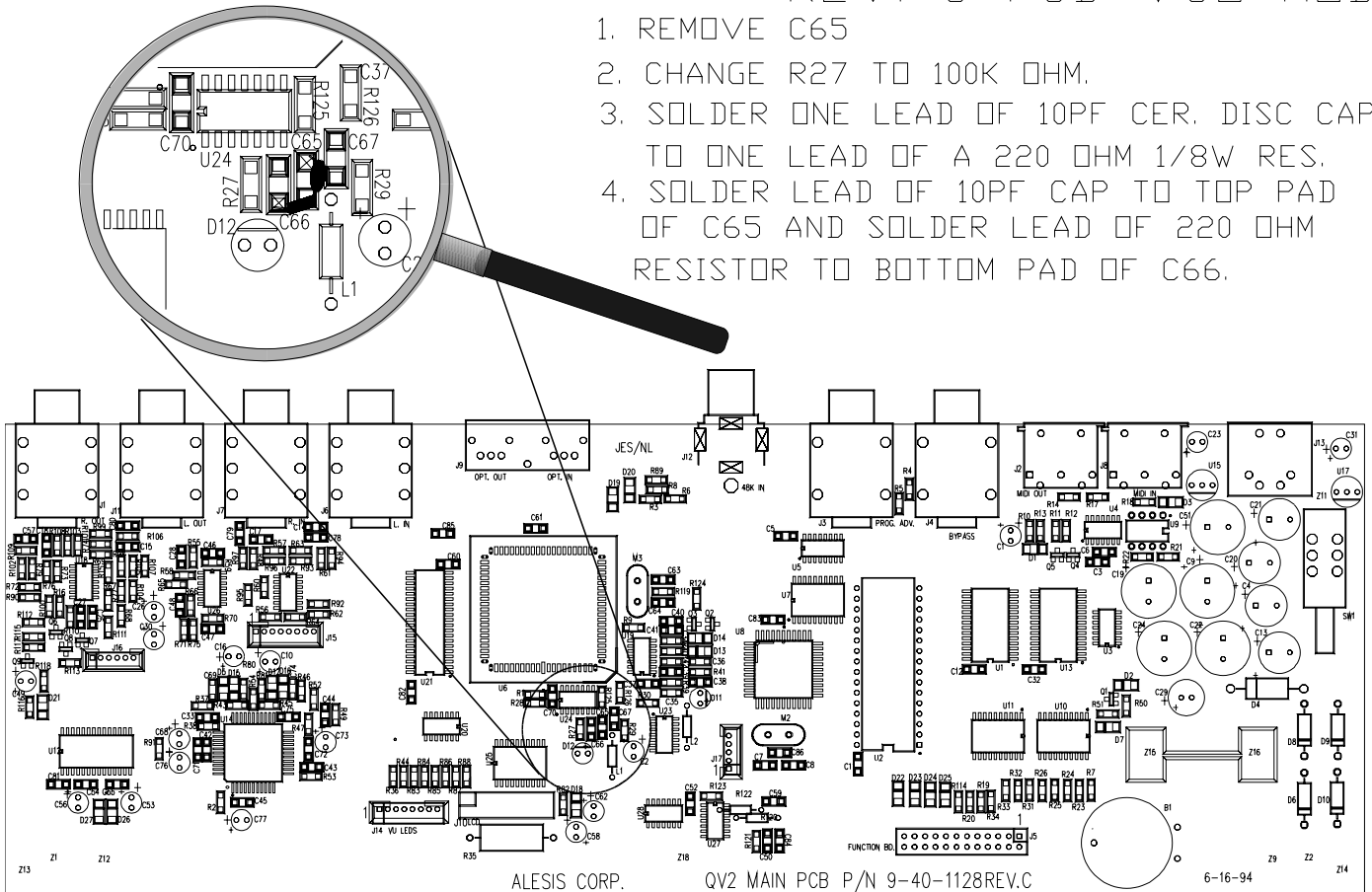


Diagram 2

6.12 SRAM Current Increase

R50 was changed from 100K to 10K. R51 was changed from 100K to 4.7K. These changes ensure that the SRAM gets enough current to hold its memory by making Q1 switch faster.

6.13 Main PCB change.

The Q2 Main PCB has changed from Revision A to Revision C. The new board offers improved performance and incorporates several earlier changes.

6.14 Reset Circuit Change

The following three pages reflect changes made to the Q2 reset circuit. These changes must be made to all Revision A and C Main PC Boards in order to maintain data integrity. The first page applies to both Revision A and C PCBs, while sheet 2 applies to Revision A only, and sheet 3 applies to Revision C only.

6.15 Revision A & C Input Changes

Add 2 3K resistors (AIPartNo.s 0-10-0302 {Surface Mount} or 0-00-0302 {Through Hole}) across capacitors C33 and C75 (See diagram 6 for locations). This change prevents the audio outputs from inverting when the unit is clipping, reducing noise under these conditions.

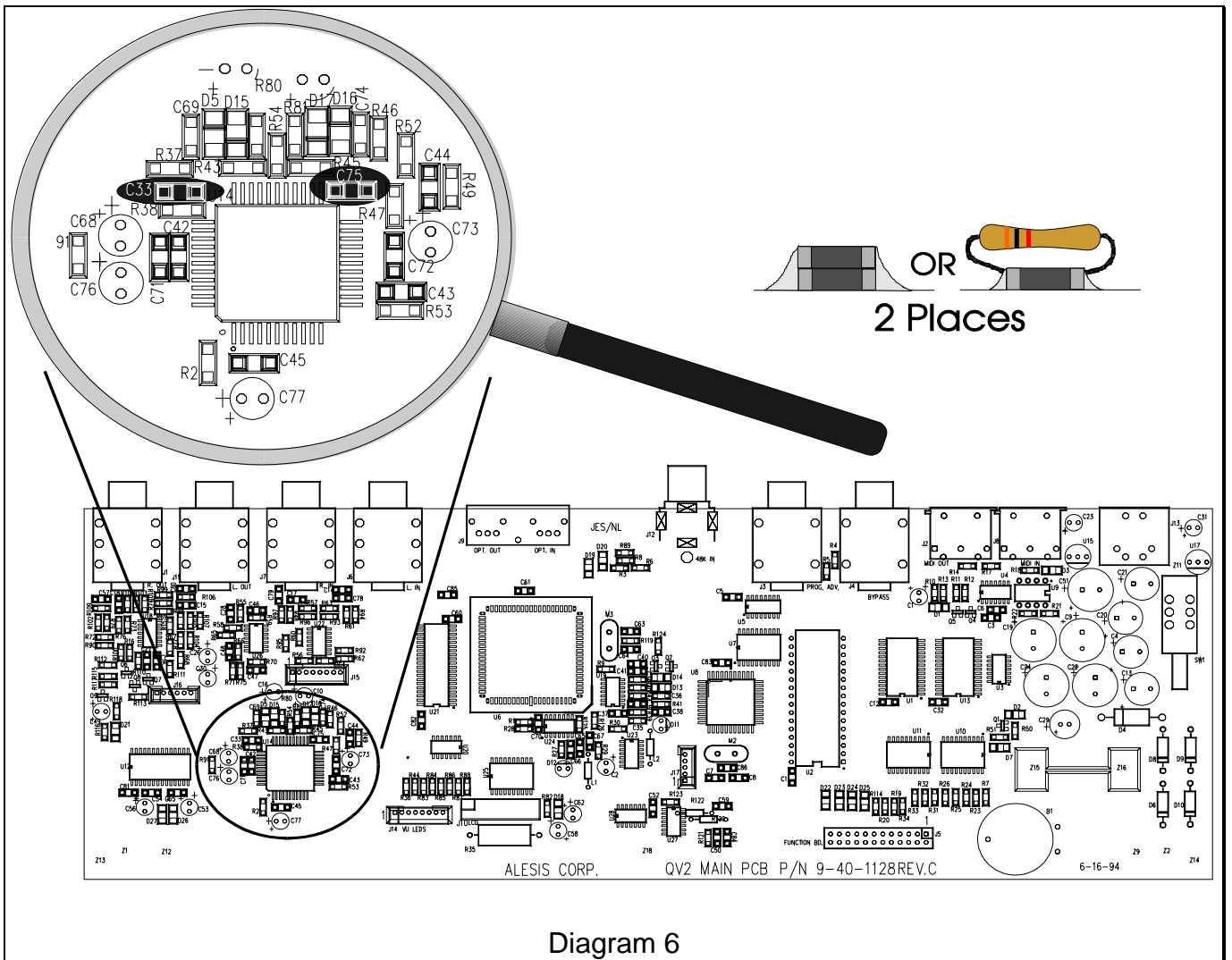


Diagram 6

6.16 Revision A. Sampling Modification

To take advantage of the sampling feature included in software version 2.00 or higher it will be necessary modify Revision A PCBs. The details of the modification are shown in Diagram 7. If this modification is not performed when upgrading the software will display "UNIT NEEDS SAMPLING UPGRADE" any time the sampling configuration is called up.

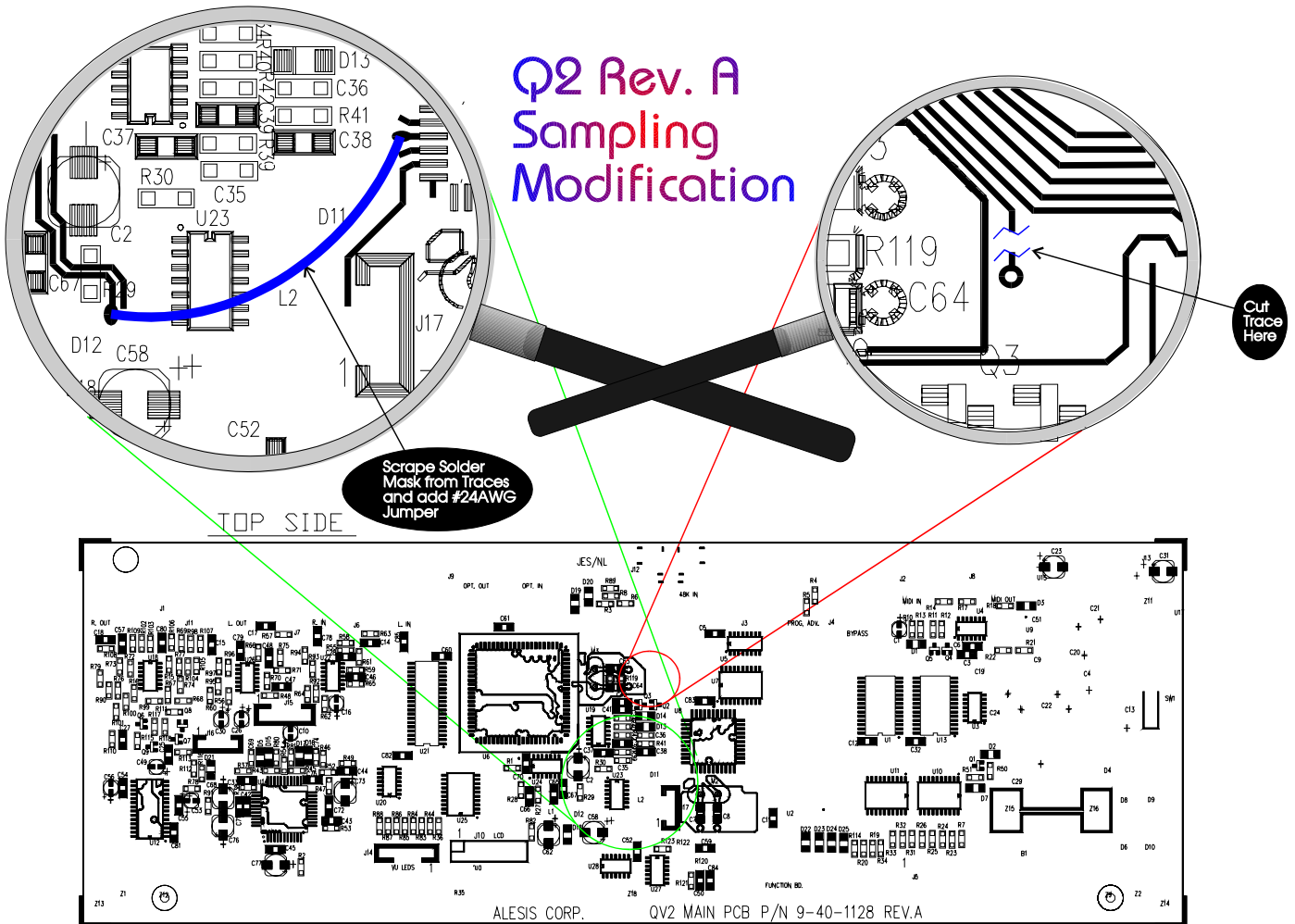
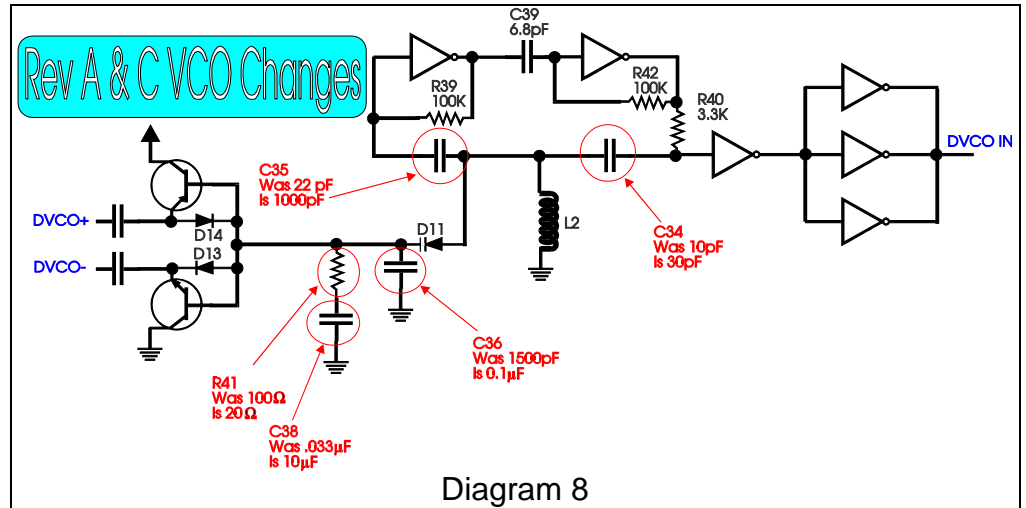


Diagram 7

6.17 Revision A & C VCO Changes

This update eliminates clock jitter that can cause some "crackling" sounds when using digital I/O. Note that this modification can only work on units that have software version 2.01 or higher, and thus should only be performed on older units if there is a specific complaint of Dig I/O noise.



7.00 Appendix 2 Test Procedures

If possible, user data should be saved (a DataDisk is recommended) prior to any servicing. This, of course, may not always be possible (i.e. dead power supply, bad reset signal, corrupt data, etc.). Saving user data may also be accomplished after unit functionality is restored (i.e. power supply, or reset line, is repaired), and prior to further servicing, and testing. The unit should always be reinitialized (power unit up while holding "PROGRAM", "COMPARE", and "←BLOCK" buttons down) after changing the EPROM, SRAM, or any part of the battery backup.

7.10 Self Test

The following Steps outline the use of the Q2's self test routines. To initiate the self test hold "PROGRAM" and "BLOCK →" while powering the unit up. The unit will then proceed to test the following:

- ⊖ LEDs-All front panel LEDs are lit sequentially and immediately proceeds to the next test.
- ⊖ SWITCHES -Pressing Individual front panel buttons toggles the LEDs for each button ("BLOCK ←", "BLOCK →", "PAGE ←", and "PAGE →" toggle the LED of the adjacent button.) All LEDs are toggled if "VALUE/ENTER" is pressed. Holding the buttons down causes the LEDs to flash. Press "PROGRAM" and "BLOCK →" simultaneously to exit to the next test.
- ⊖ CUSTOM CHARACTERS (All)-Displays all custom LCD segments simultaneously. Press "PROGRAM" and "BLOCK →" simultaneously to exit to the next test.
- ⊖ CUSTOM CHARACTERS (Single)-Use the "VALUE/ENTER" wheel to select individual custom LCD characters. Press "PROGRAM" and "BLOCK →" simultaneously to exit to the next test.
- ⊖ ROM CKSUM-Checks the ROM's checksum for accuracy. Press "PROGRAM" and "BLOCK →" simultaneously to exit the test routines.

7.20 Further Testing

7.21 Audio

Using a clean audio source (CD or DAT preferred) set up the Q2 according to the user manual. Listen to the output of the Q2 for any distortion or unusual clicks and pops.

7.22 Digital I/O

The digital fiber optic input can be tested by connecting an optical cable from the optical input of the Q2 to the output of any compatible unit (such as ADAT or QuadraSynth), and turning on the Q2's "DIGITAL INPUT" (in the "GLOBAL" functions). Audio output should sound clean and undistorted.

Similarly, the digital output can tested with either a digital or audio input using a unit that is compatible (such as ADAT).

7.23 MIDI

MIDI is easily tested with a system exclusive storage unit (such as DataDisk or MIDI equipped computer) by sending all programs to, and receiving them back from the storage unit. Keyboard controllers, and patch changers also be used to test MIDI in.

8.00 Appendix 3 Helpful Hints & Common Solutions

Troubleshooting a complex device, such as the QuadraVerb II, can range from the simplicity of looking, seeing, and reseating a loose cable, to examining complex timing relationships of data and control, and replacing the "slightly" bad latch. The following table is presented in an effort to relieve the beleaguered technician from having to "discover" some of the common fixes we have seen. Please note that we only cover the most likely causes, not all of them.

SYMPTOM	POSSIBLE CAUSE	SOLUTION
Unit is Dead (No lights, no function).	Faulty A.C. adapter.	Replace and retest.
	Faulty digital (+5V) power supply.	Troubleshoot and repair as necessary (see section 2.00 for details)
No LCD.	Loose LCD cable.	Check LCD cable and retest.
	Faulty LCD cable.	Replace and retest.
	Faulty RESET signal.	Troubleshoot and repair as necessary (see section 5.11 for details)
	Faulty LCD.	Replace and retest.
	Software parameters out of range.	Reinitialize unit and retest.
Distortion.	Faulty Power analog (+12V, -12V) supply.	Troubleshoot and repair as necessary (see section 2.00 for details)
	Faulty DAC (U12).	Replace and retest.
	Software parameters out of range.	Reinitialize unit and retest.
	Faulty PUP circuit.	Troubleshoot and repair as necessary (see section 2.10 for details)
	Faulty RESET signal.	Troubleshoot and repair as necessary (see section 5.11 for details)
No MIDI in.	Faulty opto-isolator (U9).	Replace and retest.
No MIDI out.	Hex inverter (U4) is faulty.	Replace and retest.
No digital I/O.	Faulty F/X ASIC (U6)	Replace and retest.
No 48K in.	Faulty F/X ASIC (U6)	Replace and retest.

9.00 Appendix 4 Software History

<u>DATE</u>	<u>VERSION</u>	<u>COMMENTS</u>
07/26/94	1.00	Checksum: F3AAH. Initial software release.
07/26/94	1.01	Checksum: F6D5H. 1. Changed the names of a couple presets.
08/04/94	1.02	Checksum: 8896H. 1. Block move has been extended to include modulations. 2. The default footswitch range is now 0 Preset to 99 User. 3. The FX are updated when in ROUTE & COMPARE. 4. VUs reflect digital input selections and are turned off when the channel is 3 through 8. 5. A stack overflow was fixed which happened when using processor effects and editing a reverb decay parameter. 6. MIDI sysex receive ON/OFF works. 7. Changing modulation parameters no longer affect parameters on the same page. 8. MIDI controller 0 can be used for program bank select when the table is off (0 = Preset, 1 to 127 = User). 9. MIDI mods will no longer affect the program table and the program table will no longer affect MIDI mods. 10. Defaults are added to the envelope and peak followers in blank programs upon user memory clear. 11. PROGRAM switch goes to program page 1 if in page 2. 12. Program title now displays "User" or "Preset". 13. Data from the ADC is in 18 bit mode.
08/24/94	1.03	Checksum: 3ED2H. 1. The preset programs were changed
10/28/94	1.05	Checksum: 6ADDH. 1. Hold time was added to the ENVELOPE local generator. 2. The RAMP local generator was added. 3. Tap tempo delays are set by to MIDI clock. 4. Programs load 2x faster. 5. A program write protect was added under the Store pages. 6. VU meters no longer freeze when using external 48kHz clock. 7. MIDI sysex bugs were fixed. 8. Test routines for MIDI, optical I/O, and sram were added. 9. Reverb gate not affected by changing other parameters. 10. Modulation of parameters is more time consistent. 11. Modulation of Leslie speed is smoother. 12. Error message displayed when "MEMORY FULL" is caused by a delay note value change. occasional 13. Program change to a program containing a Leslie will not cause audio glitches.
07/06/95	2.00	Checksum: 9BFDH.

1. Added features are:
 - Sampling
 - Phase Inversion
 - Triggered Panning
 - Triggered Mono/Stereo Flanging
 - Soft/Hard Overdrive
 - Block Copy/Paste
 - Advance and Bypass pedals as local modulation generators
 - 100 more user programs
 - Negative flanger feedback
 - Block Bypass
 - Improved Stereo Leslie with Linear/Circular mode
 - Quick routing when a block is added
 - LFO local modulation generator
 - "DIG" indicator flashes when digital input not valid
2. The MIDI sysex additions are:
 - In MIDI EDIT, Block Type can be edited
 - The MIDI Global Dump accommodates the larger footswitch range
 - An "ENTER" command
 - User Bank 1 dump and dump request
 - Block Bypass dump and dump request
 - MIDI program table dump and dump request

10/23/95 2.01

Checksum: D9ABH.

1. The test constraints to determine if the sampling hardware mod is working have been loosened. This corrects the hardware problem that is causing "SAMPLE HARDWARE UPDATE NEEDED" error messages, allowing units with the VCO chip mod to sample; pre-VCO chip units still work.
2. The test for the sampling hardware mod has been added to the self test routines.
3. The footswitch local generator won't retain modulation after power-down.
4. If adding "quick" routes causes a "DSP FULL" message the display is updated immediately to not show the routes.
5. On power-up the FX RAM (DRAM) is completely cleared so quick power cycles won't cause stuttering audio remnants to play.
6. The program bank selection by controller 0 is fixed.
7. The spelling of "ATTACK TIME" in the footswitch mod. pages is corrected.
8. Transmitting MIDI to the Q2 during power-up will no longer cause problems.

10.00 Appendix 5 MIDI Implementation

10.10 V1.0X

V1.0X September 9, 1994

SYSTEM EXCLUSIVE FORMAT

The QuadraVerb II MIDI System Exclusive message format is as follows:

F0	System exclusive status
00 00 0E	Alesis manufacturer id#
0F	QuadraVerb id#
cc	Opcode
dd	Data
:	:
:	:
F7	End-Of-Exclusive

OPCODES:

01 - MIDI Edit F0 00 00 0E 0F 01<function#> <block#> <page#> <parameter#> <data 16> F7

<function#> = 0= PARAMETER, 1= MIX, 2= GLOBAL
<block#> = (1-8) # of block to be edited. Doesn't matter for GLOBAL edits.
<page#> = (1-#of last page under function) page # for value to be edited.
<parameter#> = (1-#of last parameter on page) parameter # of value

<data 16> is in format described below. It is a 16-bit value, which is transmitted in three MIDI bytes, LSB first.

TWO QUADRAVERB II BYTES:

0:	A7	A6	A5	A4	A3	A2	A1	A0	(LSB)
1:	B7	B6	B5	B4	B3	B2	B1	B0	(MSB)

TRANSMITTED AS:

0:	0	A7	A6	A5	A4	A3	A2	A1
1:	0	A0	B7	B6	B5	B4	B3	B2
2:	0	B1	B0	0	0	0	0	0

02 - MIDI User Program Dump F0 00 00 0E 0E 02 <prog.#> <data> F7

<program#>= 0..99 selects individual user programs, 100 selects edit

<data> is in a packed format in order to optimize data transfer. Eight MIDI bytes are used to transmit each block of 7 QuadraVerb II data bytes. If the 7 data bytes are looked at as one 56-bit word, the format for transmission is eight 7-bit words beginning with the most significant bit of the first byte, as follows:

SEVEN QUADRAVERB II BYTES:

0: A7 A6 A5 A4 A3 A2 A1 A0
1: B7 B6 B5 B4 B3 B2 B1 B0
2: C7 C6 C5 C4 C3 C2 C1 C0
3: D7 D6 D5 D4 D3 D2 D1 D0
4: E7 E6 E5 E4 E3 E2 E1 E0
5: F7 F6 F5 F4 F3 F2 F1 F0
6: G7 G6 G5 G4 G3 G2 G1 G0

TRANSMITTED AS:

0: 0 A6 A5 A4 A3 A2 A1 A0
1: 0 B5 B4 B3 B2 B1 B0 A7
2: 0 C4 C3 C2 C1 C0 B7 B6
3: 0 D3 D2 D1 D0 C7 C6 C5
4: 0 E2 E1 E0 D7 D6 D5 D4
5: 0 F1 F0 E7 E6 E5 E4 E3
6: 0 G0 F7 F6 F5 F4 F3 F2
7: 0 G7 G6 G5 G4 G3 G2 G1

There are 306 data bytes sent for a single program dump, which corresponds to 256 bytes of program data. With the header, the total number of bytes transmitted with a program dump is 314. The location of each parameter within a program dump is shown in the next section: **QuadraVerb II Program Data Format**.

03 - MIDI User Program Dump Request F0 00 00 0E 0F 03 <program#> F7

<program#>= 0..99 selects individual user programs, 100 selects current edit, 101 is a dump all request in which all user programs are dumped as individual program dumps (02) followed by a global dump (07)

When received, the QuadraVerb II will respond to this message with a MIDI user program dump (02) of the program number selected.

07 - MIDI Global Data Dump F0 00 00 0E 0F 07 <data> F7

<data> is in the same format as described in 00, but with a different number of bytes due to the difference in the global parameter size. The total number of data bytes sent for a global data dump is 16, which corresponds to 14 bytes of global data.

08 - MIDI Global Data Dump Request F0 00 00 0E 0F 08 F7

When received, the QuadraVerb II will respond to this message with a MIDI global data dump (07).

09 - MIDI Bypass or Compare F0 00 00 0E 0F 09 <function> <off/on> F7

<function> = 0= BYPASS, 1= COMPARE
<off/on> = 0= function off, 1= function on

When received, the QuadraVerb II will respond to this message by turning BYPASS/COMPARE OFF/ON.

0A - MIDI DSP Error Message F0 00 00 0E 0F 0A <data> F7

<data> = 1= "EFFECT MEMORY IS FULL"
2= "OUT OF LFOs"
4= "DSP IS FULL"
8= "BLOCK COMBINATION NOT ALLOWED"

PARAMETER FORMAT

The following specific parameter information shows the locations in which each parameter resides after unpacking the data from its 7 bit MIDI format into the 8 bit format as described in opcode 00, program data dump.

GLOBAL DATA FORMAT

The Global parameters are comprised of 14 bytes of data. Unlike the Program, the Global parameters are not packed so that each parameter occupies its own byte. This results in unused bits for most global bytes. These bits must remain at 0. For direct parameter editing (sysex command 01H), the Page# and Parameter# are given in the table below. The Function# should be set to 2 (=Global), and the Block# should be 1-8.

#	Parameter name	Page	Parm	lo	lim	hi	lim	bits	bit address
0.	LCD contrast	1	1	1	10			8	0:7-0:0
1.	Footswitch range head	2	1	0	199			8	1:7-1:0
2.	Footswitch range tail	2	2	0	199			8	2:7-2:0
3.	VU meter peak hold	3	1	0	1			8	3:7-3:0
4.	Input audio source	4	1	0	1			8	4:7-4:0
5.	Sample clock source	5	1	0	1			8	5:7-5:0
6.	Digital left input channel	6	2	1	8			8	6:7-6:0
7.	Digital right input channel	6	3	1	8			8	7:7-7:0
8.	Digital left output channel	6	4	1	8			8	8:7-8:0
9.	Digital right output channel	6	1	1	8			8	9:7-9:0
10.	Digital output mode	7	1	0	1			8	10:7-10:0
11.	Tap tempo footswitch	8	1	0	2			8	11:7-11:0
12.	Global direct signal	9	1	0	1			8	12:7-12:0
13.	Reserved for future use (set to 0)	9	1	0	1			8	13:7-13:0

QUADRAVERB II PROGRAM DATA FORMAT

Programs contain 256 bytes of packed parameter data. The first 92 bytes are common parameters for all programs. The next 164 bytes depend on the number of bytes required for parameters of the effect blocks and the number of routes enabled. Usually, not all of these bytes are used, and in this case the end of the routing is designated by 0FFH, 0FFH. Only numbers with negative offsets are in 2's complement form.

#	Parameter name	lo	lim	hi	lim	bits	byte:msb-byte:lsb
---	----------------	----	-----	----	-----	------	-------------------

PROGRAM NAME:

0.	Program name ASCII digit 0	32	127			8	0:7-0:0
1.	Program name ASCII digit 1	32	127			8	1:7-1:0
...							

13. Program name ASCII digit 13 32 127 8 13:7-13:0

BLOCK TYPES:

14a. Block 1 type definition	0	4 *	3	14:7-14:5
14b. Block 1 subtype definition	0	**	5	14:4-14:0
15a. Block 2 type definition	0	4 *	3	15:7-15:5
...				
20b. Block 7 subtype definition	0	**	5	20:4-20:0
21a. Block 8 type definition	0	4 *	3	21:7-21:5
21b. Block 8 subtype definition	0	**	5	21:4-21:0

* Block type definitions are given in the next section: **Block type definitions**

** The upper limit and definition for the block subtype depend on the block type. The upper limit and definition for the subtype are given in the section: **Block subtype definitions**

MODULATION:

22. Mod. 1 source	0	129 *	8	22:7-22:0
23. Mod. 1 target block #	1	11 **	8	23:7-23:0
24a. Mod. 1 target type: parameter, route, or mix	0	2 ***	2	24:7-24:6
24b. Mod. 1 target #	0	***	6	24:5-24:0
25. Mod. 1 amplitude	-99	+99	8	25:7-25:0
26. Mod. 2 source	0	129 *	8	26:7-26:0
...				
49. Mod. 7 amplitude	-99	+99	8	49:7-49:0
50. Mod. 8 source	0	129 *	8	50:7-50:0
51. Mod. 8 target block #	1	11 **	8	51:7-51:0
52a. Mod. 8 target type: parameter, route, or mix	0	2 ***	2	52:7-52:6
52b. Mod. 8 target #	0	***	6	52:5-52:0
53. Mod. 8 amplitude	-99	+99	8	53:7-53:0

* Definitions of the modulation sources are in the section: **Modulation source definitions**

** Target block # definition: 1 = block 1, ..., 8 = block 8, 9 = left out, 10 = right out, 11 = mix parameters.

*** Definitions of the modulation targets are in the section: **Modulation target definitions**

BLOCK MIXES:

54. Direct level	0	100	8	54:7-54:0
55. Block 1 level	0	100	8	55:7-55:0
56. Block 1 inmix level	0	100	8	56:7-56:0
57. Block 2 level	0	100	8	57:7-57:0
...				
68. Block 7 inmix level	0	100	8	68:7-68:0
69. Block 8 level	0	100	8	69:7-69:0
70. Block 8 inmix level	0	100	8	70:7-70:0
71. Master effects level	0	100	8	71:7-71:0

LOCAL GENERATORS:

72. Generator 1 type	0	1 *	8	72:7-72:0
73. Generator 1 trigger source channel	0	2 **	8	73:7-73:0
74. Generator 1 attack threshold	-32	0	8	74:7-74:0
75. Generator 1 release threshold	-48	0	8	75:7-75:0
76. Generator 1 attack time	0	250 ***	8	76:7-76:0
77. Generator 1 release or decay time	0	250 ***	8	77:7-77:0
78. Generator 1 input gain	0	99	8	78:7-78:0
79. Reserved for future use (set to 0)			8	79:7-79:0
80. Reserved for future use (set to 0)			8	80:7-80:0
81. Reserved for future use (set to 0)			8	81:7-81:0
82. Generator 2 type	0	1 *	8	82:7-82:0
83. Generator 2 trigger source channel	0	2 **	8	83:7-83:0
84. Generator 2 attack threshold	-32	0	8	84:7-84:0
85. Generator 2 release threshold	-48	0	8	85:7-85:0
86. Generator 2 attack time	0	250 ***	8	86:7-86:0
87. Generator 2 release or decay time	0	250 ***	8	87:7-87:0
88. Generator 2 input gain	0	99	8	88:7-88:0
89. Reserved for future use (set to 0)			8	89:7-89:0
90. Reserved for future use (set to 0)			8	90:7-90:0
91. Reserved for future use (set to 0)			8	91:7-91:0

* Generator type: 0 = Envelope generator, 1 = Peak follower

** Trigger source channel: 0 = Left channel, 1 = Right channel, 2 = Left & Right channels

*** This number is multiplied by 0.04 to get the decay in seconds.

BLOCK PARAMETERS

92. Parameter #1 for 1st defined block* (MSB)	**	**	**	**
93. Parameter #1 for 1st defined block* (LSB) ***	**	**	**	**
94. Parameter #2 for 1st defined block* (MSB)	**	**	**	**

...

* Block parameters are not stored for blocks that are off. Parameters are stored in order of appearance on the QuadraVerb II display - by block #, parameter page #, and from left to right within the page; the 1st stored parameter appears on the display at the left most block that is not off, on it's 1st parameter page, at the left.

** The parameter definitions are given for each block type and subtype in the section: **Block parameter definitions**

*** Exists only if the block parameter requires two bytes.

BLOCK ROUTING

92* Route #1 position byte (LSB)	0	255 **	8	92*:7-92*:0
----------------------------------	---	--------	---	-------------

93*	Route #1 position byte (MSB)	0	1	**	1	93*:7-93*:7
93*	Route #1 level	0	58	***	7	93*:6-93*:0
94*	Route #2 position byte (LSB)	0	255	**	8	94*:7-94*:0

...

* This number is offset by the number of block parameter bytes that are stored.

** An equation for calculating the route position byte is given in the section: **Route position definitions**

*** This number has a corresponding dB level given by the table in the section: **Route level definitions**

BLOCK TYPE DEFINITIONS

This table defines the block types for a given parameter:

Parameter:	Block type:
0	OFF
1	EQ
2	PCH
3	DLY
4	RVB

BLOCK SUBTYPE DEFINITIONS

These tables define the block subtypes for a given parameter. Different block subtype tables are defined for each block type.

Type = EQ

Parameter:	Block subtype
0	Lowpass filter
1	Bandpass filter
2	Highpass filter
3	Lowpass shelf eq
4	1 Band low parametric
5	1 Band high parametric
6	Highpass shelf eq
7	2 Band sweep shelf eq
8	3 Band parametric eq
9	4 Band parametric eq
10	5 Band graphic eq
11	Resonator
12	Mono tremolo
13	Stereo tremolo
14	Stereo simulator

Type = PCH

Parameter:	Block subtype
0	Mono chorus
1	Stereo chorus
2	Quad chorus
3	Mono flanging
4	Stereo flanging
5	Phasor
6	Mono lezlie
7	Stereo lezlie
8	Pitch shifter
9	Pitch detune
10	Ring modulator

Type = DLY

Parameter:	Block subtype
0	Mono delay
1	Stereo delay
2	Ping pong delay
3	Multi tap delay
4	Tap tempo mono delay
5	Tap tempo ping pong dela

Type = RVB

Parameter:	Block subtype
0	Mono room
1	Room 1
2	Hall 1
3	Plate 1
4	Chamber 1
5	Room 2
6	Hall 2
7	Plate 2
8	Chamber 2
9	Large plate
10	Large room
11	Spring
12	Nonlinear
13	Reverse

MODULATION SOURCE DEFINITIONS

Parameter:	Block subtype
0	Pitch bend
1	After touch
2	Note number
3	Note velocity
4	Controller 000
...	...
127	Controller 123
128	Local generator 1
129	Local generator 2

MODULATION TARGET DEFINITIONS

The modulation target type and target # make up an 8 bit word: TTNNNNNN (where TT denotes the target type and NNNNNN denotes the target #). The targets are for the effect block or mix specified by the target block #.

TT	Modulation target type
00	Block parameter
01	Route level
10	Mix level

If TT = 00

NNNNNN	Modulation target parameter
0	Parameter #1
1	Parameter #2
...	...
32	Parameter #33

If TT = 01

NNNNNN	Modulation target route
0	In left
1	In right
2	Block 1 inmix
3	Block 1 mix
4	Block 1 left
5	Block 1 right
6	Block 2 inmix
...	...
33	Block 8 right

If TT = 10

NNNNNN	Modulation target mix
0	Direct level
1	Block 1 out level
2	Block 1 inmix level
3	Block 2 out level
4	Block 2 inmix level
...	...
16	Block 8 inmix level
17	Master fx level

BLOCK PARAMETER DEFINITIONS

These parameters are packed as 8 or 16 bit words MSB first in programs, but are always considered 16 bit words LSB first in parameter edits.

EQ:

Parameter	Page	Param	Bytes	Low limit	Hi limit	Step
LOWPASS FILTER: type = 1, subtype = 0						
lowpass fc	1	1	2	20	10,000	10
BANDPASS FILTER: type = 1, subtype = 1						
bandpass fc	1	1	2	20	4,000	10
bw	1	2	1	20	200	1
HIGHPASS FILTER: type = 1, subtype = 2						
highpass fc	1	1	2	200	20,000	10
LOWPASS SHELF EQ: type = 001, subtype = 3						
lowpass	1	1	2	20	10,000	10
gain	1	2	2	-140	+140	1
1 BAND LOW PARAMETRIC: type = 1, subtype = 4						
bandpass	1	1	2	20	2,000	10
gain	1	2	2	-140	+140	1
oct	1	3	1	20	200	1
1 BAND HIGH PARAMETRIC: type = 1, subtype = 5						
bp	1	1	2	1500	10,000	10
gain	1	2	2	-140	+140	1
oct	1	3	1	20	250	1
HIGHPASS SHELF EQ: type = 1, subtype = 6						
highpass	1	1	2	100	20,000	10
gain	1	2	2	-140	+140	1
2 BAND SWEEP SHELF EQ: type = 1, subtype = 7						
lowpass	1	1	2	20	10,000	10
gain	1	2	2	-140	+140	1
highpass	2	1	2	100	20,000	10
gain	2	2	2	-140	+140	1
3 BAND PARAMETRIC EQ: type = 1, subtype = 8						
lowpass	1	1	2	20	10,000	10
gain	1	2	2	-140	+140	1
mid band	2	1	2	20	2,000	1

dB	2	2	2	-140	+140	1
oct	2	3	1	20	200	1
highpass	3	1	2	100	20,000	10
gain	3	2	2	-140	+140	1
4 BAND PARAMETRIC EQ: type = 1, subtype = 9						
lowpass	1	1	2	20	10,000	10
gain	1	2	2	-140	+140	1
low mid	2	1	2	20	2,000	1
dB	2	2	2	-140	+140	1
oct	2	3	1	20	200	1
high mid	3	1	2	1500	10,000	10
dB	3	2	2	-140	+140	1
oct	3	3	1	20	250	1
highpass	4	1	2	100	20,000	10
gain	4	2	2	-140	+140	1
5 BAND GRAPHIC EQ: type = 1, subtype = 10						
63Hz	1	1	1	-14	+14	1
250Hz	1	2	1	-14	+14	1
1KHz	1	3	1	-14	+14	1
4KHz	1	4	1	-14	+14	1
16kHz	1	5	1	-14	+14	1
RESONATOR: type = 1, subtype = 11						
tuning	1	1	1	0	60	1
decay	1	2	1	0	99	1
MONO TREMOLO: type = 1, subtype = 12						
speed	1	1	1	0	99	1
depth	1	2	1	0	99	1
shape	1	3	1	0	1	1
STEREO TREMOLO: type = 1, subtype = 13						
speed	1	1	1	0	99	1
depth	1	2	1	0	99	1
shape	1	3	1	0	1	1
STEREO SIMULATOR: type = 1, subtype = 14						
degrees	1	1	1	0	99	1

PCH:

Parameter	Page	Param	Bytes	Low limit	Hi limit	Step
MONO CHORUS: type = 2, subtype = 0						
speed	1	1	1	0	99	1
depth	1	2	1	0	99	1
feedback	1	3	1	0	99	1
chorus predelay	2	1	1	0	100	1
STEREO CHORUS: type = 2, subtype = 1						
speed	1	1	1	0	99	1
depth	1	2	1	0	99	1
feedback	1	3	1	0	99	1
predelay chr1	2	1	1	0	100	1
chr2	2	2	1	0	100	1
STEREO CHORUS: type = 2, subtype = 2						
speed	1	1	1	0	99	1
depth	1	2	1	0	99	1
feedback	1	3	1	0	99	1
predelay chr1	2	1	1	0	100	1
chr2	2	2	1	0	100	1
predelay chr3	3	1	1	0	100	1
chr4	3	2	1	0	100	1
MONO FLANGING: type = 2, subtype = 3						
speed	1	1	1	0	99	1
depth	1	2	1	0	99	1
feedback	1	3	1	0	99	1
flanging shape	2	1	1	0	1	1
STEREO FLANGING: type = 2, subtype = 4						
speed	1	1	1	0	99	1
depth	1	2	1	0	99	1
feedback	1	3	1	0	99	1
flanging shape	2	1	1	0	1	1
PHASOR: type = 2, subtype = 5						
phasor speed	1	1	1	0	99	1
depth	1	2	1	0	99	1
MONO LEZLIE: type = 2, subtype = 6						
lezzlie motor	1	1	1	0	1	1
speed	1	2	1	0	1	1
high rotor level	2	1	1	-12	+6	1
STEREO LEZLIE: type = 2, subtype = 7						
lezzlie motor	1	1	1	0	1	1
speed	1	2	1	0	1	1
high rotor level	2	1	1	-12	+6	1
stereo separation	3	1	1	0	99	1
PITCH SHIFTER: type = 2, subtype = 8						
pitch shift fine	1	1	1	-99	+99	1
coarse	1	2	1	-12	+12	1
PITCH DETUNE: type = 2, subtype = 9						
detune amount	1	1	1	-99	+99	1

DLY:

Parameter	Page	Param	Bytes	Low limit	Hi limit	Step
MONO DELAY: type = 3, subtype = 0						
delay	1	1	2	1	50,000	1
note value	1	2	1	0	12	1
feedback	2	1	1	0	99	1
STEREO DELAY: type = 3, subtype = 1						
L dly	1	1	2	1	50,000	1
note value	1	2	1	0	12	1
L feedback	2	1	1	0	99	1
R dly	3	1	2	1	50,000	1
note value	3	2	1	0	12	1
R feedback	4	1	1	0	99	1
PING PONG DELAY: type = 3, subtype = 2						
delay	1	1	2	1	25,000	1
note value	1	2	1	0	12	1
feedback	2	1	1	0	99	1
MULTI TAP DELAY: type = 3, subtype = 3						
delay	1	1	2	1	50,000	1
tap level	1	2	1	0	38	1
L<- ->R	1	3	1	1	99	1
fb	1	4	1	0	99	1
delay	2	1	2	1	50,000	1
tap level	2	2	1	0	38	1
L<- ->R	2	3	1	1	99	1
fb	2	4	1	0	99	1
delay	3	1	2	1	50,000	1
tap level	3	2	1	0	38	1
L<- ->R	3	3	1	1	99	1
fb	3	4	1	0	99	1
delay	4	1	2	1	50,000	1
tap level	4	2	1	0	38	1
L<- ->R	4	3	1	1	99	1
fb	4	4	1	0	99	1
delay	5	1	2	1	50,000	1
tap level	5	2	1	0	38	1
L<- ->R	5	3	1	1	99	1
fb	5	4	1	0	99	1
master feedback	6	1	1	0	99	1
TAP TEMPO MONO DELAY: type = 3, subtype = 4						
delay	1	1	2	1	50,000	1
note value	1	2	1	0	38	1
feedback	2	1	1	0	99	1
TAP TEMPO PING PONG DELAY: type = 3, subtype = 5						
delay	1	1	2	1	25,000	1
note value	1	2	1	0	38	1
feedback	2	1	1	0	99	1

RVB:

Parameter	Page	Param	Bytes	Low limit	Hi limit	Step
MONO ROOM: type = 4, subtype = 0						
decay	1	1	1	0	99	1
damping hi	1	2	1	0	99	1
lo	1	3	1	0	99	1
reverb density	2	1	1	0	99	1
diffusion	2	2	1	0	99	1
input high freq roll off	3	1	2	200	20,000	50
predelay	4	1	1	1	250	1
mix direct<- ->dly	4	2	1	1	99	1
gate trig	5	1	1	0	2	1
gated level	5	2	1	0	99	1
gate hold	6	1	2	0	500	10
release	6	2	2	10	500	10
ROOM 1: type = 4, subtype = 1						
decay	1	1	1	0	99	1
damping hi	1	2	1	0	99	1
lo	1	3	1	0	99	1
reverb density	2	1	1	0	99	1
diffusion	2	2	1	0	99	1
input high freq roll off	3	1	2	200	20,000	50
predelay	4	1	1	1	250	1
mix direct<- ->dly	4	2	1	1	99	1
gate trig	5	1	1	0	2	1
gated level	7	2	1	0	99	1
gate hold	5	2	2	0	500	10
release	6	1	2	10	500	10
HALL 1: type = 4, subtype = 2						
decay	1	1	1	0	99	1
damping hi	1	2	1	0	99	1
lo	1	3	1	0	99	1
reverb density	2	1	1	0	99	1
diffusion	2	2	1	0	99	1
input high freq roll off	3	1	2	200	20,000	50
predelay	4	1	1	1	250	1
mix direct<- ->dly	4	2	1	1	99	1
gate trig	5	1	1	0	2	1
gated level	5	2	1	0	99	1
gate hold	6	1	2	0	500	10
release	6	2	2	10	500	10
ROOM 1: type = 4, subtype = 3						
decay	1	1	1	0	99	1
damping hi	1	2	1	0	99	1
lo	1	3	1	0	99	1
reverb density	2	1	1	0	99	1
diffusion	2	2	1	0	99	1
input high freq roll off	3	1	2	200	20,000	50

predelay	4	1	1	1	250	1
mix direct<- ->dly	4	2	1	1	99	1
gate trig	5	1	1	0	2	1
gated level	5	2	1	0	99	1
gate hold	6	1	2	0	500	10
release	6	2	2	10	500	10
PLATE 1: type = 4, subtype = 4						
decay	1	1	1	0	99	1
damping hi	1	2	1	0	99	1
lo	1	3	1	0	99	1
reverb density	2	1	1	0	99	1
diffusion	2	2	1	0	99	1
input high freq roll off	3	1	2	200	20,000	50
predelay	4	1	1	1	250	1
mix direct<- ->dly	4	2	1	1	99	1
gate trig	5	1	1	0	2	1
gated level	5	2	1	0	99	1
gate hold	6	1	2	0	500	10
release	6	2	2	10	500	10
CHAMBER 1: type = 4, subtype = 5						
decay	1	1	1	0	99	1
damping hi	1	2	1	0	99	1
lo	1	3	1	0	99	1
reverb density	2	1	1	0	99	1
diffusion	2	2	1	0	99	1
input high freq roll off	3	1	2	200	20,000	50
predelay	4	1	1	1	250	1
mix direct<- ->dly	4	2	1	1	99	1
gate trig	5	1	1	0	2	1
gated level	5	2	1	0	99	1
gate hold	6	1	2	0	500	10
release	6	2	2	10	500	10
ROOM 2: type = 4, subtype = 6						
decay	1	1	1	0	99	1
damping hi	1	2	1	0	99	1
lo	1	3	1	0	99	1
reverb density	2	1	1	0	99	1
diffusion	2	2	1	0	99	1
input high freq roll off	3	1	2	200	20,000	50
predelay	4	1	1	1	250	1
mix direct<- ->dly	4	2	1	1	99	1
reflection level	5	1	1	0	99	1
spread	5	2	1	0	99	1
reverberation swirl	6	1	1	0	99	1
gate trig	7	1	1	0	2	1
gated level	7	2	1	0	99	1
gate hold	8	1	2	0	500	10
release	8	2	2	10	500	10

HALL 2: type = 4, subtype = 7						
decay	1	1	1	0	99	1
damping hi	1	2	1	0	99	1
lo	1	3	1	0	99	1
reverb density	2	1	1	0	99	1
diffusion	2	2	1	0	99	1
input high freq roll off	3	1	2	200	20,000	50
predelay	4	1	1	1	250	1
mix direct<- ->dly	4	2	1	1	99	1
reflection level	5	1	1	0	99	1
spread	5	2	1	0	99	1
reverberation swirl	6	1	1	0	99	1
gate trig	7	1	1	0	2	1
gated level	7	2	1	0	99	1
gate hold	8	1	2	0	500	10
release	8	2	2	10	500	10
PLATE 2: type = 4, subtype = 8						
decay	1	1	1	0	99	1
damping hi	1	2	1	0	99	1
lo	1	3	1	0	99	1
reverb density	2	1	1	0	99	1
diffusion	2	2	1	0	99	1
input high freq roll off	3	1	2	200	20,000	50
predelay	4	1	1	1	250	1
mix direct<- ->dly	4	2	1	1	99	1
reflection level	5	1	1	0	99	1
spread	5	2	1	0	99	1
reverberation attack	6	1	1	0	99	1
gate trig	7	1	1	0	2	1
gated level	7	2	1	0	99	1
gated hold	8	1	2	0	500	10
release	8	2	2	10	500	10
CHAMBER 2: type = 4, subtype = 9						
decay	1	1	1	0	99	1
damping hi	1	2	1	0	99	1
lo	1	3	1	0	99	1
reverb density	2	1	1	0	99	1
diffusion	2	2	1	0	99	1
input high freq roll off	3	1	2	200	20,000	50
predelay	4	1	1	1	250	1
mix direct<- ->dly	4	2	1	1	99	1
reflection level	5	1	1	0	99	1
spread	5	2	1	0	99	1
reverberation attack	6	1	1	0	99	1
gate trig	7	1	1	0	2	1
gated level	7	2	1	0	99	1
gate hold	8	1	2	0	500	10
release	8	2	2	10	500	10

LARGE PLATE: type = 4, subtype = 10						
decay	1	1	1	0	99	1
damping hi	1	2	1	0	99	1
lo	1	3	1	0	99	1
reverb density	2	1	1	0	99	1
diffusion	2	2	1	0	99	1
input high freq roll off	3	1	2	200	20,000	50
predelay	4	1	1	1	250	1
mix direct<- ->dly	4	2	1	1	99	1
reflection level	5	1	1	0	99	1
spread	5	2	1	0	99	1
reverberation swirl	6	1	1	0	99	1
gate trig	7	1	1	0	2	1
gated level	7	2	1	0	99	1
gate hold	8	1	2	0	500	10
release	8	2	2	10	500	10
LARGE ROOM: type = 4, subtype = 11						
decay	1	1	1	0	99	1
damping hi	1	2	1	0	99	1
lo	1	3	1	0	99	1
reverb density	2	1	1	0	99	1
diffusion	2	2	1	0	99	1
input high freq roll off	3	1	2	200	20,000	50
predelay	4	1	1	1	250	1
mix direct<- ->dly	4	2	1	1	99	1
reflection level	5	1	1	0	99	1
spread	5	2	1	0	99	1
reverberation swirl	6	1	1	0	99	1
gate trig	7	1	1	0	2	1
gate level	7	2	1	0	99	1
gate hold	8	1	2	0	500	10
release	8	2	2	10	500	10
SPRING: type = 4, subtype = 12						
decay	1	1	1	0	99	1
damping hi	1	2	1	0	99	1
lo	1	3	1	0	99	1
reverb density	2	1	1	0	99	1
diffusion	2	2	1	0	99	1
input high freq roll off	3	1	2	200	20,000	50
predelay	4	1	1	1	250	1
mix direct<- ->dly	4	2	1	1	99	1
gate trig	5	1	1	0	2	1
gate level	5	2	1	0	99	1
gate hold	6	1	2	0	500	10
release	6	2	2	10	500	10

NONLINEAR: type = 4, subtype = 13						
gate hold time	1	1	1	0	99	1
reverb density	2	1	1	0	99	1
diffusion	2	2	1	0	99	1
input high freq roll off	3	1	2	200	20,000	50
predelay	4	1	1	1	250	1
mix direct<- ->dly	4	2	1	1	99	1

ROUTE POSITION DEFINITIONS

$$\text{Route position byte (9bits)} = \text{Srout} + [4 * (\text{Sblock} - 1)] + [34 * (\text{Dblock} - 1)]$$

where,

Srout= route source #: 0= Input L, 1= Input R, 2= Block inmix, 3= Block mix, 4= Block L, 5= Block R

Sblock= route source block #: 1= Input, 1= Block 1, ..., 8= Block 8

Dblock= route destination block #: 1= Block 1, ..., 8= Block 8, 9= Out L, 10= Out R

ROUTE LEVEL DEFINITIONS

Below is a table that gives the corresponding dB level for a given route level #:

Route level #	Parameter dB
0	OFF
1	-48.0 dB
2	-42.0 dB
3	-38.0 dB
4	-36.0 dB
5	-34.0 dB
6	-32.0 dB
7	-31.0 dB
8	-30.0 dB
9	-29.0 dB
10	-28.0 dB
11	-27.0 dB
12	-26.0 dB
13	-25.0 dB
14	-24.0 dB
15	-23.0 dB
16	-22.0 dB
17	-21.0 dB
18	-20.0 dB
19	-19.5 dB
20	-19.0 dB

21	-18.5 dB
22	-18.0 dB
23	-17.5 dB
24	-17.0 dB
25	-16.5 dB
26	-16.0 dB
27	-15.5 dB
28	-15.0 dB
29	-14.5 dB
30	-14.0 dB
31	-13.5 dB
32	-13.0 dB
33	-12.5 dB
34	-12.0 dB
35	-11.5 dB
36	-11.0 dB
37	-10.5 dB
38	-10.0 dB
39	-9.5 dB
40	-9.0 dB
41	-8.5 dB
42	-8.0 dB
43	-7.5 dB
44	-7.0 dB
45	-6.5 dB
46	-6.0 dB
47	-5.5 dB
48	-5.0 dB
49	-4.5 dB
50	-4.0 dB
51	-3.5 dB
52	-3.0 dB
53	-2.5 dB
54	-2.0 dB
55	-1.5 dB
56	-1.0 dB
57	-0.5 dB
58	-0.0 dB

SYSTEM EXCLUSIVE FORMAT

The QuadraVerb 2 MIDI System Exclusive message format is as follows:

F0	System exclusive status
00 00 0E	Alesis manufacturer id#
0F	QuadraVerb id#
cc	Opcode
dd	Data
:	:
:	:
F7	End-Of-Exclusive

OPCODES:

01 - MIDI Edit F0 00 00 0E 0F 01 <function#> <block#> <page#>
<parameter#> <data> F7

<function#> = 0= PARAMETER, 1= MIX, 2= GLOBAL, 3= TYPE*
<block#> = (1-8) # of block to be edited. Doesn't matter for GLOBAL edits.
<page#> = (1-#of last page under function) page # for value to be edited.
<parameter#> = (1-#of last parameter on page) parameter # of value

<data> is in format described below. It is a 16-bit value, which is transmitted in three MIDI bytes, LSB first.

TWO QUADRAVERB 2 BYTES:

0:	A7 A6 A5 A4 A3 A2 A1 A0	(LSB)
1:	B7 B6 B5 B4 B3 B2 B1 B0	(MSB)

TRANSMITTED AS:

0:	0 A7 A6 A5 A4 A3 A2 A1
1:	0 A0 B7 B6 B5 B4 B3 B2
2:	0 B1 B0 0 0 0 0 0

* Editing of a flashing TYPE parameter should be followed by an 'ENTER' MIDI sysex message (0B).

02 - MIDI User Program Dump F0 00 00 0E 0E 02 <prog.#> <data> F7

<program#>= 0..99 selects individual user bank 0 programs, 100 selects edit

<data> is in a packed format in order to optimize data transfer. Eight MIDI bytes are used to transmit each block of 7 QuadraVerb 2 data bytes. If the 7 data bytes are looked at as one 56-bit word, the format for transmission is eight 7-bit words beginning with the most significant bit of the first byte, as follows:

SEVEN QUADRAVERB 2 BYTES:

0: A7 A6 A5 A4 A3 A2 A1 A0
1: B7 B6 B5 B4 B3 B2 B1 B0
2: C7 C6 C5 C4 C3 C2 C1 C0
3: D7 D6 D5 D4 D3 D2 D1 D0
4: E7 E6 E5 E4 E3 E2 E1 E0
5: F7 F6 F5 F4 F3 F2 F1 F0
6: G7 G6 G5 G4 G3 G2 G1 G0

TRANSMITTED AS:

0: 0 A6 A6 A5 A4 A3 A2 A1
1: 0 A0 B7 B6 B5 B4 B3 B2
2: 0 B1 B0 C7 C6 C5 C4 C3
3: 0 C2 C1 C0 D7 D6 D5 D4
4: 0 D3 D2 D1 D0 E7 E6 E5
5: 0 E4 E3 E2 E1 E0 F7 F6
6: 0 F5 F4 F3 F2 F1 F0 G7
7: 0 G6 G5 G4 G3 G2 G1 G0

There are 306 data bytes sent for a single program dump, which corresponds to 256 bytes of program data. With the header, the total number of bytes transmitted with a program dump is 314. The location of each parameter within a program dump is shown in the next section: **QuadraVerb 2 Program Data Format.**

03 - MIDI User Bank 0 Program Dump Request F0 00 00 0E 0F 03 <program#> F7

<program#>= 0..99 selects individual user programs in User Bank 0, 100 selects current edit, 101 is a dump all request

When received, the QuadraVerb 2 will respond to this message with a MIDI user program dump (02) of the User Bank 0 program or edit selected.

For the dump all request User Bank 0 programs are dumped as individual program dumps (02) followed by all User Bank 1 programs dumped as individual program dumps (0C), a global parameter dump (07), and finally a MIDI program table dump (11).

07 - MIDI Global Data Dump F0 00 00 0E 0F 07 <data> F7

<data> is in the same MIDI data format as described in 02, but with a different number of bytes due to the difference in the global parameter size. The global parameters for the MIDI dump are packed into 14 Quadraverb 2 bytes (see below) and transferred as 16 MIDI bytes. The last byte packs the most significant bit of the footswitch head parameter into bit address 13:0 and the msb of the footswitch tail into bit address 13:1. The following table outlines this:

GLOBAL PARAMETER PACKING:

<u>Parameter name</u>	<u>lo</u>	<u>lim</u>	<u>hi</u>	<u>lim</u>	<u>bits</u>	<u>bit address</u>
LCD contrast	1	10	8	0:7-0:0		
Footswitch range head LSB*	0	299	8	1:7-1:0		
Footswitch range tail LSB*	0	299	8	2:7-3:0		
VU meter peak hold	0	1	8	3:7-3:0		
Input audio source	0	1	8	4:7-4:0		
Sample clock source	0	1	8	5:7-5:0		
Digital left input channel	1	8	8	6:7-6:0		
Digital right input channel	1	8	8	7:7-7:0		
Digital left output channel	1	8	8	8:7-8:0		
Digital right output channel	1	8	8	9:7-9:0		
Digital output mode	0	1	8	10:7-10:0		
Tap tempo footswitch	0	2	8	11:7-11:0		
Global direct signal	0	1	8	12:7-12:0		
Footswitch range head MSB, tail MSB*	0	299	2	13:1-13:0		

*The MSBs for the footswitch parameters are stored in bit address 13:1 and 13:0. Bits 13:7 through 13:2 should be set to 0.

08 - MIDI Global Data Dump Request F0 00 00 0E 0F 08 F7

When received, the QuadraVerb 2 will respond to this message with a MIDI global data dump (07).

09 - MIDI Bypass or Compare F0 00 00 0E 0F 09 <function> <off/on> F7

<function> = 0= BYPASS, 1= COMPARE

<off/on> = 0= function off, 1= function on

When received, the QuadraVerb 2 will respond to this message by turning BYPASS/COMPARE OFF/ON.

0A - MIDI DSP Error Message F0 00 00 0E 0F 0A <data> F7

<data> = 1= "EFFECT MEMORY IS FULL"

2= "OUT OF LFOs"

4= "DSP IS FULL"

8= "BLOCK COMBINATION NOT ALLOWED"

0B - MIDI Enter Message F0 00 00 0E 0F 0B F7

This performs the ENTER function on the current parameter. It is useful for acting on flashing parameters.

0C - MIDI User Bank 1 Program Dump F0 00 00 0E 0E 0C <prog.#> <data> F7

<program#>= 0..99 selects individual User Bank 1 programs, 100 selects edit

<data> is the same format as the <data> of the User Bank 0 Dump opcode (02)

0D - MIDI User Bank 1 Program Dump Request F0 00 00 0E 0F 0D<program#>F7

<program#>= 0..99 selects individual user programs in User Bank 1, 100 selects current edit, 101 is a dump all request

When received, the QuadraVerb 2 will respond to this message with a MIDI user program dump (0C) of the User Bank 1 program or edit selected.

For the dump all request User Bank 0 programs are dumped as individual program dumps (02) followed by all User Bank 1 programs dumped as individual program dumps (0C), a global parameter dump (07), and finally a MIDI program table dump (11).

0F - MIDI Block Bypass Dump F0 00 00 0E 0F 0F <data> F7

<data> is in format described below. It is an 8-bit value, which is transmitted in two MIDI bytes. Bit A7 corresponds to the block bypass of block #8, likewise, A6 corresponds to block #7 ... and A0 corresponds to block#1. If thebit value= 1, the block is bypassed; if thebit value= 0, the block is not bypassed.

ONE QUADRAVERB 2 BYTE:

```
0: A7 A6 A5 A4 A3 A2 A1 A0
   TRANSMITTED AS:
0: 0 A7 A6 A5 A4 A3 A2 A1
1: 0 A0 0 0 0 0 0 0
```

10 - MIDI Block Bypass Dump Request F0 00 00 0E 0F 10 F7

When received, the QuadraVerb 2 will respond to this message with a MIDI Block Bypass Dump (0F).

11 - MIDI Program Table Dump F0 00 00 0E 0F 11 <data> F7

<data> is in format described below. The 128 MIDI program table entries are 9-bits each, and are transmitted in two MIDI bytes. Values in the range 0-99 correspond to Presets 0-99, values 100-199 correspond to User bank 0 programs 0-99, and values 200-299 correspond to User bank 1 programs 0-99.

TWO QUADRAVERB 2 MIDI TABLE ENTRIES:

```
0: A7 A6 A5 A4 A3 A2 A1 A0
1: 0 0 0 0 0 0 0 A8
2: B7 B6 B5 B4 B3 B2 B1 B0
3: 0 0 0 0 0 0 0 B8
   TRANSMITTED AS:
0: 0 A6 A5 A4 A3 A2 A1 A0
1: 0 0 0 0 0 0 A8 A7
2: 0 B6 B5 B4 B3 B2 B1 B0
3: 0 0 0 0 0 0 B8 B7
```

12 - MIDI Program Table DumpRequest F0 00 00 0E 0F 12 F7

When received, the QuadraVerb 2 will respond to this message with a MIDI Program Table Dump (11).

PARAMETER FORMAT

The following specific parameter information shows the locations in which each parameter resides after unpacking the data from its 7 bit MIDI format into the 8 bit format as described in opcode 02, program data dump.

GLOBAL DATA FORMAT

The Global parameters are comprised of 14 bytes of data. Unlike the Program, the Global parameters are not packed. This results in unused bits for most global bytes. These bits must remain at 0. For direct parameter editing (sysex command 01H), the Page# and Parameter# are given in the table below. The Function# should be set to 2 (=Global), and the Block# should be 1-8.

#	Parameter name	Page	Parm	lo lim	hi lim	bits	bit address
0.	LCD contrast	1	1	1	10	8	0:7-0:0
1.	Footswitch range head	2	1	0	299	16	2:7-1:0
2.	Footswitch range tail	2	2	0	299	16	4:7-3:0
3.	VU meter peak hold	3	1	0	1	8	5:7-5:0
4.	Input audio source	4	1	0	1	8	6:7-6:0
5.	Sample clock source	5	1	0	1	8	7:7-7:0
6.	Digital left input channel	6	2	1	8	8	8:7-8:0
7.	Digital right input channel	6	3	1	8	8	9:7-9:0
8.	Digital left output channel	6	4	1	8	8	10:7-10:0
9.	Digital right output channel	6	1	1	8	8	11:7-11:0
10.	Digital output mode	7	1	0	1	8	12:7-12:0
11.	Tap tempo footswitch	8	1	0	2	8	13:7-13:0
12.	Global direct signal	9	1	0	1	8	14:7-14:0

QUADRAVERB 2 PROGRAM DATA FORMAT

Programs contain 256 bytes of packed parameter data. The first 92 bytes are common parameters for all programs. The next 164 bytes depend on the number of bytes required for parameters of the effect blocks and the number of routes enabled. Usually, not all of these bytes are used, and in this case the end of the routing is designated by 0FFH, 0FFH. Only numbers with negative offsets are in 2's complement form.

#	Parameter name	lo lim	hi lim	bits	byte:msb-byte:lsb
PROGRAM NAME:					
0.	Program name ASCII digit 0	32	127	8	0:7-0:0
...					
13.	Program name ASCII digit 13	32	127	8	13:7-13:0

BLOCK TYPES:

14a. Block 1 type definition	0	4 *	3	14:7-14:5
14b. Block 1 subtype definition	0	**	5	14:4-14:0
15a. Block 2 type definition	0	4 *	3	15:7-15:5
...				
20b. Block 7 subtype definition	0	**	5	20:4-20:0
21a. Block 8 type definition	0	4 *	3	21:7-21:5
21b. Block 8 subtype definition	0	**	5	21:4-21:0

* Block type definitions are given in the next section: **Block type definitions**

** The upper limit and definition for the block subtype depend on the block type. The upper limit and definition for the subtype are given in the section: **Block subtype definitions**

MODULATION:

22. Mod. 1 source	0	129 *	8	22:7-22:0
23. Mod. 1 target block #	1	11 **	8	23:7-23:0
24a. Mod. 1 target type: parameter, route, or mix		0 2 ***	2	24:7-24:6
24b. Mod. 1 target #	0	***	6	24:5-24:0
25. Mod. 1 amplitude	-99	+99	8	25:7-25:0
26. Mod. 2 source	0	129 *	8	26:7-26:0
...				
49. Mod. 7 amplitude	-99	+99	8	49:7-49:0
50. Mod. 8 source	0	129 *	8	50:7-50:0
51. Mod. 8 target block #	1	11 **	8	51:7-51:0
52a. Mod. 8 target type: parameter, route, or mix		0 2 ***	2	52:7-52:6
52b. Mod. 8 target #	0	***	6	52:5-52:0
53. Mod. 8 amplitude	-99	+99	8	53:7-53:0

* Definitions of the modulation sources are in the section: **Modulation source definitions**

** Target block # definition: 1 = block 1, ..., 8 = block 8, 9 = left out, 10 = right out, 11 = mix parameters.

*** Definitions of the modulation targets are in the section: **Modulation target definitions**

BLOCK MIXES:

54. Direct level	0	100	8	54:7-54:0
55. Block 1 level	0	100	8	55:7-55:0
56. Block 1 inmix level	0	100	8	56:7-56:0
57. Block 2 level	0	100	8	57:7-57:0
...				
68. Block 7 inmix level	0	100	8	68:7-68:0
69. Block 8 level	0	100	8	69:7-69:0
70. Block 8 inmix level	0	100	8	70:7-70:0
71. Master effects level	0	100	8	71:7-71:0

LOCAL GENERATORS:

72. Generator 1 type	0	4 *	8	72:7-72:0
73. Generator 1 trigger source channel	0	2 **	8	73:7-73:0
74. Generator 1 attack threshold	-32	0	8	74:7-74:0
75. Generator 1 release threshold	-48	0	8	75:7-75:0
76. Generator 1 attack time	0	250 ***	8	76:7-76:0
77. Generator 1 release / decay time or period		0 250 ***	8	77:7-77:0
78. Generator 1 input gain	0	99	8	78:7-78:0
79. Generator 1 envelope hold time	0	250 ***	8	79:7-79:0
80. Generator 1 footswitch source	0	1	8	80:7-80:0

81. Generator 1 footswitch mode	0	1	8	81:7-81:0
82. Generator 2 type	0	4 *	8	82:7-82:0
83. Generator 2 trigger source channel	0	2 **	8	83:7-83:0
84. Generator 2 attack threshold	-32	0	8	84:7-84:0
85. Generator 2 release threshold	-48	0	8	85:7-85:0
86. Generator 2 attack time	0	250 ***	8	86:7-86:0
87. Generator 2 release / decay time or period		0 250 ***	8	77:7-77:0
88. Generator 2 input gain	0	99	8	88:7-88:0
89. Generator 2 envelope hold time	0	250 ***	8	89:7-89:0
90. Generator 2 footswitch source	0	1	8	90:7-90:0
91. Generator 2 footswitch mode	0	1	8	91:7-91:0

* Generator type: 0 = Envelope generator, 1 = Peak follower, 2 = Ramp, 3 = LFO, 4 = Footswitch
** Trigger source channel: 0 = Left channel, 1 = Right channel, 2 = Left & Right channels
*** This number is multiplied by 0.04 to get the decay in seconds.

BLOCK PARAMETERS

92. Parameter #1 for 1st defined block* (MSB)	**	**	**	**
93. Parameter #1 for 1st defined block* (LSB)*****	**	**	**	**
94. Parameter #2 for 1st defined block* (MSB)	**	**	**	**

...

* Block parameters are not stored for blocks that are off. Parameters are stored in order of appearance on the QuadraVerb 2 display - by block #, parameter page #, and from left to right within the page; the 1st stored parameter appears on the display at the left most block that is not off, on it's 1st parameter page, at the left.

** The parameter definitions are given for each block type and subtype in the section: **Block parameter definitions**

*** Exists only if the block parameter requires two bytes.

BLOCK ROUTING

92* Route #1 position byte (LSB)	0	255 **	8	92*:7-92*:0
93* Route #1 position byte (MSB)	0	1 **	1	93*:7-93*:7
93* Route #1 level	0	58 ***	7	93*:6-93*:0
94* Route #2 position byte (LSB)	0	255 **	8	94*:7-94*:0

...

* This number is offset by the number of block parameter bytes that are stored.

** An equation for calculating the route position byte is given in the section: **Route position definitions**

*** This number has a corresponding dB level given by the table in the section: **Route level definitions**

BLOCK BYPASS

255a. Block Bypass for block #1 (1= Bypassed)	0	1	1	255:0-255:0
255b. Block Bypass for block #2 (1= Bypassed)	0	1	1	255:1-255:1
255c. Block Bypass for block #3 (1= Bypassed)	0	1	1	255:2-255:2
255d. Block Bypass for block #4 (1= Bypassed)	0	1	1	255:3-255:3
255e. Block Bypass for block #5 (1= Bypassed)	0	1	1	255:4-255:4
255f. Block Bypass for block #6 (1= Bypassed)	0	1	1	255:5-255:5
255g. Block Bypass for block #7 (1= Bypassed)	0	1	1	255:6-255:6
255h. Block Bypass for block #8 (1= Bypassed)	0	1	1	255:7-255:7

TYPE DATA FORMAT

The number of Type parameters, and their location depend on whether the selected block is defined or off . The Type parameters are not packed. This results in unused bits for most parameters. These bits must remain at 0. For direct parameter editing (sysex command 01H), the Page# and Parameter# are given in the table below. The Function# should be set to 3 (=Type), and the Block# should be 1-8.

For blocks that are off:

#	Parameter name	Page	Parm	lo lim	hi lim	bits	bit address
0.	Block type	1	1	0	4	8	0:7-0:0
1.	Block move source	2	1	1	8	8	1:7-1:0
2.	Block move destination	2	2	1	8	8	2:7-2:0
3.	Block copy / paste	3	1	0	1	8	3:7-3:0

For blocks that are defined:

#	Parameter name	Page	Parm	lo lim	hi lim	bits	bit address
0.	Block type	1	1	0	4	8	0:7-0:0
1.	Block subtype	2	1	0	*	8	1:7-1:0
2.	Block move source	3	1	1	8	8	2:7-2:0
3.	Block move destination	3	2	1	8	8	3:7-3:0
4.	Block copy / paste	4	1	0	1	8	4:7-4:0

* The high limit depends on the block type, see the table **Block subtype definitions**.

BLOCK TYPE DEFINITIONS

This table defines the block types for a given parameter:

Parameter:	Block type:
0	OFF
1	EQ
2	PCH
3	DLY
4	RVB

BLOCK SUBTYPE DEFINITIONS

These tables define the block subtypes for a given parameter. Different block subtype tables are defined for each block type.

Type = EQ

Parameter:	Block subtype
0	Lowpass filter
1	Bandpass filter
2	Highpass filter
3	Lowpass shelf eq
4	1 Band low parametric
5	1 Band high parametric
6	Highpass shelf eq
7	2 Band sweep shelf eq
8	3 Band parametric eq
9	4 Band parametric eq
10	5 Band graphic eq
11	Resonator
12	Mono tremolo
13	Stereo tremolo
14	Stereo simulator
15	Soft overdrive
16	Hard overdrive
17	Triggered Panning
18	Phase Inverter

Type = PCH

Parameter:	Block subtype
0	Mono chorus
1	Stereo chorus
2	Quad chorus
3	Mono flanging
4	Stereo flanging
5	Phasor
6	Mono lezlie
7	Stereo lezlie
8	Pitch shifter
9	Pitch detune
10	Ring modulator
11	Mono triggered flange
12	Stereo triggered flange

Type = DLY

Parameter:	Block subtype
0	Mono delay
1	Stereo delay
2	Ping pong delay
3	Multi tap delay
4	Tap tempo mono delay
5	Tap tempo ping pong dela
6	Sampling

Type = RVB

Parameter:	Block subtype
0	Mono room
1	Room 1
2	Hall 1
3	Plate 1
4	Chamber 1
5	Room 2
6	Hall 2
7	Plate 2
8	Chamber 2
9	Large plate
10	Large room
11	Spring
12	Nonlinear
13	Reverse

MODULATION SOURCE DEFINITIONS

Parameter:	Block subtype
0	Pitch bend
1	After touch
2	Note number
3	Note velocity
4	Controller 000
...	...
127	Controller 123
128	Local generator 1
129	Local generator 2

MODULATION TARGET DEFINITIONS

The modulation target type and target # make up an 8 bit word: TTNNNNNN (where TT denotes the target type and NNNNNN denotes the target #). The targets are for the effect block or mix specified by the target block #.

TT	Modulation target type
00	Block parameter
01	Route level
10	Mix level

If TT = 00

NNNNNN	Modulation target parameter
0	Parameter #1
1	Parameter #2
...	...
32	Parameter #33

If TT = 01

NNNNNN	Modulation target route
0	In left
1	In right
2	Block 1 inmix
3	Block 1 mix
4	Block 1 left
5	Block 1 right
6	Block 2 inmix
...	...
33	Block 8 right

If TT = 10

NNNNNN	Modulation target mix
0	Direct level
1	Block 1 out level
2	Block 1 inmix level
3	Block 2 out level
4	Block 2 inmix level
...	...
16	Block 8 inmix level
17	Master fx level

BLOCK PARAMETER DEFINITIONS

These parameters are packed as 8 or 16 bit words MSB first in programs, but are always considered 16 bit words LSB first in parameter edits.

EQ:

Parameter	Page	Param	Bytes	Low limit	Hi limit	Step
LOWPASS FILTER: type = 1, subtype = 0						
lowpass fc	1	1	2	20	10,000	10
BANDPASS FILTER: type = 1, subtype = 1						
bandpass fc	1	1	2	20	4,000	10
bw	1	2	1	20	200	1
HIGHPASS FILTER: type = 1, subtype = 2						
highpass fc	1	1	2	200	20,000	10
LOWPASS SHELF EQ: type = 001, subtype = 3						
lowpass	1	1	2	20	10,000	10
gain	1	2	2	-140	+140	1
1 BAND LOW PARAMETRIC: type = 1, subtype = 4						
bandpass	1	1	2	20	2,000	10
gain	1	2	2	-140	+140	1
oct	1	3	1	20	200	1
1 BAND HIGH PARAMETRIC: type = 1, subtype = 5						
bp	1	1	2	1500	10,000	10
gain	1	2	2	-140	+140	1
oct	1	3	1	20	250	1
HIGHPASS SHELF EQ: type = 1, subtype = 6						
highpass	1	1	2	100	20,000	10
gain	1	2	2	-140	+140	1
2 BAND SWEEP SHELF EQ: type = 1, subtype = 7						
lowpass	1	1	2	20	10,000	10
gain	1	2	2	-140	+140	1
highpass	2	1	2	100	20,000	10
gain	2	2	2	-140	+140	1
3 BAND PARAMETRIC EQ: type = 1, subtype = 8						
lowpass	1	1	2	20	10,000	10
gain	1	2	2	-140	+140	1
mid band	2	1	2	20	2,000	1
dB	2	2	2	-140	+140	1
oct	2	3	1	20	200	1
highpass	3	1	2	100	20,000	10
gain	3	2	2	-140	+140	1
4 BAND PARAMETRIC EQ: type = 1, subtype = 9						
lowpass	1	1	2	20	10,000	10
gain	1	2	2	-140	+140	1
low mid	2	1	2	20	2,000	1
dB	2	2	2	-140	+140	1
oct	2	3	1	20	200	1
high mid	3	1	2	1500	10,000	10
dB	3	2	2	-140	+140	1
oct	3	3	1	20	250	1
highpass	4	1	2	100	20,000	10
gain	4	2	2	-140	+140	1
5 BAND GRAPHIC EQ: type = 1, subtype = 10						

63Hz	1	1	1	-14	+14	1
250Hz	1	2	1	-14	+14	1
1KHz	1	3	1	-14	+14	1
4KHz	1	4	1	-14	+14	1
16kHz	1	5	1	-14	+14	1
RESONATOR: type = 1, subtype = 11						
tuning	1	1	1	0	60	1
decay	1	2	1	0	99	1
MONO TREMOLO: type = 1, subtype = 12						
speed	1	1	1	0	99	1
depth	1	2	1	0	99	1
shape	1	3	1	0	1	1
STEREO TREMOLO: type = 1, subtype = 13						
speed	1	1	1	0	99	1
depth	1	2	1	0	99	1
shape	1	3	1	0	1	1
STEREO SIMULATOR: type = 1, subtype = 14						
degrees	1	1	1	0	99	1
SOFT OVERDRIVE type = 1, subtype =15						
effect mix	1	1	1	0	99	1
brightness	2	1	1	0	99	1
dirve level	2	2	1	10	110	1
HARD OVERDRIVE type = 1, subtype =16						
effect mix	1	1	1	0	99	1
brightness	2	1	1	0	99	1
dirve level	2	2	1	10	110	1
TRIGGERED PANNING type = 1, subtype =17						
(modulation trig. 1 parm)	1	1	1	0	1	1
(modulation trig. 2 parm)	1	2	1	0	1	1
speed	1	3	1	0	99	1
doppler	1	4	1	0	99	1
distance	1	5	1	0	99	1
retrigger point	2	1	1	0	255	1
sweeping mode	3	1	1	0	1	1
trigger source	4	1	1	0	4	1
PHASE INVERTER type = 1, subtype =18						
output phase	1	1	1	0	4	1

PCH:

Parameter	Page	Param	Bytes	Low limit	Hi limit	Step
MONO CHORUS: type = 2, subtype = 0						
speed	1	1	1	0	99	1
depth	1	2	1	0	99	1
feedback	1	3	1	0	99	1
chorus predelay	2	1	1	0	100	1
STEREO CHORUS: type = 2, subtype = 1						
speed	1	1	1	0	99	1
depth	1	2	1	0	99	1
feedback	1	3	1	0	99	1
predelay chr1	2	1	1	0	100	1
chr2	2	2	1	0	100	1
QUAD CHORUS: type = 2, subtype = 2						
speed	1	1	1	0	99	1
depth	1	2	1	0	99	1
feedback	1	3	1	0	99	1
predelay chr1	2	1	1	0	100	1
chr2	2	2	1	0	100	1
predelay chr3	3	1	1	0	100	1
chr4	3	2	1	0	100	1
MONO FLANGING: type = 2, subtype = 3						
speed	1	1	1	0	99	1
depth	1	2	1	0	99	1
feedback	1	3	1	-99	99	1
flanging shape	2	1	1	0	1	1
STEREO FLANGING: type = 2, subtype = 4						
speed	1	1	1	0	99	1
depth	1	2	1	0	99	1
feedback	1	3	1	-99	99	1
flanging shape	2	1	1	0	1	1
PHASOR: type = 2, subtype = 5						
phasor speed	1	1	1	0	99	1
depth	1	2	1	0	99	1
MONO LEZLIE: type = 2, subtype = 6						
lezzlie motor	1	1	1	0	1	1
speed	1	2	1	0	1	1
high rotor level	2	1	1	-12	+6	1
STEREO LEZLIE: type = 2, subtype = 7						
lezzlie motor	1	1	1	0	1	1
speed	1	2	1	0	1	1
high rotor level	2	1	1	-12	+6	1
stereo separation	3	1	1	-99	99	1
PITCH SHIFTER: type = 2, subtype = 8						
pitch shift fine	1	1	1	-99	+99	1
coarse	1	2	1	-12	+12	1
PITCH DETUNE: type = 2, subtype = 9						
detune amount	1	1	1	-99	+99	1

RING MODULATOR: type = 2, subtype = 10						
spectrum shift	1	1	1	-100	+100	1
TRIGGERED MONO FLANGING type = 2, subtype =11						
(modulation trig. 1 parm)	1	1	1	0	1	1
(modulation trig. 2 parm)	1	2	1	0	1	1
speed	1	3	1	0	99	1
depth	1	4	1	0	99	1
feedback	1	5	1	-99	99	1
retrigger point	2	1	1	0	255	1
sweeping mode	3	1	1	0	1	1
trigger source	4	1	1	0	4	1
TRIGGERED STEREO FLANGING type = 2, subtype =12						
(modulation trig. 1 parm)	1	1	1	0	1	1
(modulation trig. 2 parm)	1	2	1	0	1	1
speed	1	3	1	0	99	1
depth	1	4	1	0	99	1
feedback	1	5	1	-99	99	1
retrigger point	2	1	1	0	255	1
sweeping mode	3	1	1	0	1	1
trigger source	4	1	1	0	4	1

DLY:

Parameter	Page	Param	Bytes	Low limit	Hi limit	Step
MONO DELAY: type = 3, subtype = 0						
delay	1	1	2	1	50,000	1
note value	1	2	1	0	12	1
feedback	2	1	1	0	99	1
STEREO DELAY: type = 3, subtype = 1						
L dly	1	1	2	1	50,000	1
note value	1	2	1	0	12	1
L feedback	2	1	1	0	99	1
R dly	3	1	2	1	50,000	1
note value	3	2	1	0	12	1
R feedback	4	1	1	0	99	1
PING PONG DELAY: type = 3, subtype = 2						
delay	1	1	2	1	25,000	1
note value	1	2	1	0	12	1
feedback	2	1	1	0	99	1
MULTI TAP DELAY: type = 3, subtype = 3						
delay	1	1	2	1	50,000	1
tap level	1	2	1	0	38	1
L<- ->R	1	3	1	1	99	1
fb	1	4	1	0	99	1
delay	2	1	2	1	50,000	1
tap level	2	2	1	0	38	1
L<- ->R	2	3	1	1	99	1
fb	2	4	1	0	99	1

delay	3	1	2	1	50,000	1
tap level	3	2	1	0	38	1
L<- ->R	3	3	1	1	99	1
fb	3	4	1	0	99	1
delay	4	1	2	1	50,000	1
tap level	4	2	1	0	38	1
L<- ->R	4	3	1	1	99	1
fb	4	4	1	0	99	1
delay	5	1	2	1	50,000	1
tap level	5	2	1	0	38	1
L<- ->R	5	3	1	1	99	1
fb	5	4	1	0	99	1
master feedback	6	1	1	0	99	1
TAP TEMPO MONO DELAY: type = 3, subtype = 4						
delay	1	1	2	1	50,000	1
note value	1	2	1	0	38	1
feedback	2	1	1	0	99	1
TAP TEMPO PING PONG DELAY: type = 3, subtype = 5						
delay	1	1	2	1	25,000	1
note value	1	2	1	0	38	1
feedback	2	1	1	0	99	1
SAMPLING: type = 3, subtype = 6						
(modulation play trig. parm	1	1	1	0	1	1
(modulation rec trig. parm)	1	2	1	0	1	1
play	1	3	1	0	2	1
rec	1	4	1	0	1	1
maximum sample length	2	1	2	2500	50,000	1
start	3	1	2	0	49,500	1
end	3	2	2	500	50,000	1
play trigger	4	1	1	0	6	1
rec trigger	5	1	1	0	6	1
midi note#	6	1	1	0	128	1
rec output	6	2	1	0	1	1

RVB:

Parameter	Page	Param	Bytes	Low limit	Hi limit	Step
MONO ROOM: type = 4, subtype = 0						
decay	1	1	1	0	99	1
damping hi	1	2	1	0	99	1
lo	1	3	1	0	99	1
reverb density	2	1	1	0	99	1
diffusion	2	2	1	0	99	1
input high freq roll off	3	1	2	200	20,000	50
predelay	4	1	1	1	250	1
mix direct<- ->dly	4	2	1	1	99	1
gate trig	5	1	1	0	2	1
gated level	5	2	1	0	99	1
gate hold	6	1	2	0	500	10
release	6	2	2	10	500	10
ROOM 1: type = 4, subtype = 1						
decay	1	1	1	0	99	1
damping hi	1	2	1	0	99	1
lo	1	3	1	0	99	1
reverb density	2	1	1	0	99	1
diffusion	2	2	1	0	99	1
input high freq roll off	3	1	2	200	20,000	50
predelay	4	1	1	1	250	1
mix direct<- ->dly	4	2	1	1	99	1
gate trig	5	1	1	0	2	1
gated level	7	2	1	0	99	1
gate hold	5	2	2	0	500	10
release	6	1	2	10	500	10
HALL 1: type = 4, subtype = 2						
decay	1	1	1	0	99	1
damping hi	1	2	1	0	99	1
lo	1	3	1	0	99	1
reverb density	2	1	1	0	99	1
diffusion	2	2	1	0	99	1
input high freq roll off	3	1	2	200	20,000	50
predelay	4	1	1	1	250	1
mix direct<- ->dly	4	2	1	1	99	1
gate trig	5	1	1	0	2	1
gated level	5	2	1	0	99	1
gate hold	6	1	2	0	500	10
release	6	2	2	10	500	10
PLATE 1: type = 4, subtype = 3						
decay	1	1	1	0	99	1
damping hi	1	2	1	0	99	1
lo	1	3	1	0	99	1
reverb density	2	1	1	0	99	1
diffusion	2	2	1	0	99	1
input high freq roll off	3	1	2	200	20,000	50

predelay	4	1	1	1	250	1
mix direct<- ->dly	4	2	1	1	99	1
gate trig	5	1	1	0	2	1
gated level	5	2	1	0	99	1
gate hold	6	1	2	0	500	10
release	6	2	2	10	500	10
CHAMBER 1: type = 4, subtype = 4						
decay	1	1	1	0	99	1
damping hi	1	2	1	0	99	1
lo	1	3	1	0	99	1
reverb density	2	1	1	0	99	1
diffusion	2	2	1	0	99	1
input high freq roll off	3	1	2	200	20,000	50
predelay	4	1	1	1	250	1
mix direct<- ->dly	4	2	1	1	99	1
gate trig	5	1	1	0	2	1
gated level	5	2	1	0	99	1
gate hold	6	1	2	0	500	10
release	6	2	2	10	500	10
ROOM 2: type = 4, subtype = 5						
decay	1	1	1	0	99	1
damping hi	1	2	1	0	99	1
lo	1	3	1	0	99	1
reverb density	2	1	1	0	99	1
diffusion	2	2	1	0	99	1
input high freq roll off	3	1	2	200	20,000	50
predelay	4	1	1	1	250	1
mix direct<- ->dly	4	2	1	1	99	1
reflection level	5	1	1	0	99	1
spread	5	2	1	0	99	1
reverberation swirl	6	1	1	0	99	1
gate trig	7	1	1	0	2	1
gated level	7	2	1	0	99	1
gate hold	8	1	2	0	500	10
release	8	2	2	10	500	10
HALL 2: type = 4, subtype = 6						
decay	1	1	1	0	99	1
damping hi	1	2	1	0	99	1
lo	1	3	1	0	99	1
reverb density	2	1	1	0	99	1
diffusion	2	2	1	0	99	1
input high freq roll off	3	1	2	200	20,000	50
predelay	4	1	1	1	250	1
mix direct<- ->dly	4	2	1	1	99	1
reflection level	5	1	1	0	99	1
spread	5	2	1	0	99	1
reverberation swirl	6	1	1	0	99	1
gate trig	7	1	1	0	2	1

gated level	7	2	1	0	99	1
gate hold	8	1	2	0	500	10
release	8	2	2	10	500	10
PLATE 2: type = 4, subtype = 7						
decay	1	1	1	0	99	1
damping hi	1	2	1	0	99	1
lo	1	3	1	0	99	1
reverb density	2	1	1	0	99	1
diffusion	2	2	1	0	99	1
input high freq roll off	3	1	2	200	20,000	50
predelay	4	1	1	1	250	1
mix direct<- ->dly	4	2	1	1	99	1
reflection level	5	1	1	0	99	1
spread	5	2	1	0	99	1
reverberation attack	6	1	1	0	99	1
gate trig	7	1	1	0	2	1
gated level	7	2	1	0	99	1
gated hold	8	1	2	0	500	10
release	8	2	2	10	500	10
CHAMBER 2: type = 4, subtype = 8						
decay	1	1	1	0	99	1
damping hi	1	2	1	0	99	1
lo	1	3	1	0	99	1
reverb density	2	1	1	0	99	1
diffusion	2	2	1	0	99	1
input high freq roll off	3	1	2	200	20,000	50
predelay	4	1	1	1	250	1
mix direct<- ->dly	4	2	1	1	99	1
reflection level	5	1	1	0	99	1
spread	5	2	1	0	99	1
reverberation attack	6	1	1	0	99	1
gate trig	7	1	1	0	2	1
gated level	7	2	1	0	99	1
gate hold	8	1	2	0	500	10
release	8	2	2	10	500	10
LARGE PLATE: type = 4, subtype = 9						
decay	1	1	1	0	99	1
damping hi	1	2	1	0	99	1
lo	1	3	1	0	99	1
reverb density	2	1	1	0	99	1
diffusion	2	2	1	0	99	1
input high freq roll off	3	1	2	200	20,000	50
predelay	4	1	1	1	250	1
mix direct<- ->dly	4	2	1	1	99	1
reflection level	5	1	1	0	99	1
spread	5	2	1	0	99	1
reverberation swirl	6	1	1	0	99	1
gate trig	7	1	1	0	2	1

gated level	7	2	1	0	99	1
gate hold	8	1	2	0	500	10
release	8	2	2	10	500	10
LARGE ROOM: type = 4, subtype = 10						
decay	1	1	1	0	99	1
damping hi	1	2	1	0	99	1
lo	1	3	1	0	99	1
reverb density	2	1	1	0	99	1
diffusion	2	2	1	0	99	1
input high freq roll off	3	1	2	200	20,000	50
predelay	4	1	1	1	250	1
mix direct<- ->dly	4	2	1	1	99	1
reflection level	5	1	1	0	99	1
spread	5	2	1	0	99	1
reverberation swirl	6	1	1	0	99	1
gate trig	7	1	1	0	2	1
gate level	7	2	1	0	99	1
gate hold	8	1	2	0	500	10
release	8	2	2	10	500	10
SPRING: type = 4, subtype = 11						
decay	1	1	1	0	99	1
damping hi	1	2	1	0	99	1
lo	1	3	1	0	99	1
reverb density	2	1	1	0	99	1
diffusion	2	2	1	0	99	1
input high freq roll off	3	1	2	200	20,000	50
predelay	4	1	1	1	250	1
mix direct<- ->dly	4	2	1	1	99	1
gate trig	5	1	1	0	2	1
gate level	5	2	1	0	99	1
gate hold	6	1	2	0	500	10
release	6	2	2	10	500	10
NONLINEAR: type = 4, subtype = 12						
gate hold time	1	1	1	0	99	1
reverb density	2	1	1	0	99	1
diffusion	2	2	1	0	99	1
input high freq roll off	3	1	2	200	20,000	50
predelay	4	1	1	1	250	1
mix direct<- ->dly	4	2	1	1	99	1
REVERSE: type = 4, subtype = 13						
reverse time	1	1	1	0	99	1
reverb density	2	1	1	0	99	1
diffusion	2	2	1	0	99	1
input high freq roll off	3	1	2	200	20,000	50
predelay	4	1	1	1	250	1
mix direct<- ->dly	4	2	1	1	99	1

ROUTE POSITION DEFINITIONS

$$\text{Route position byte (9bits)} = \text{Sroute} + [4*(\text{Sblock}-1)] + [34*(\text{Dblock}-1)]$$

where,

Sroute= route source #: 0= Input L, 1= Input R, 2= Block inmix, 3= Block mix, 4= Block L, 5= Block R

Sblock= route source block #: 1= Input, 1= Block 1, ..., 8= Block 8

Dblock= route destination block #: 1= Block 1, ..., 8= Block 8, 9= Out L, 10= Out R

ROUTE LEVEL DEFINITIONS

Below is a table that gives the corresponding dB level for a given route level #:

Rout level #	Parameter dB
0	OFF
1	-48.0 dB
2	-42.0 dB
3	-38.0 dB
4	-36.0 dB
5	-34.0 dB
6	-32.0 dB
7	-31.0 dB
8	-30.0 dB
9	-29.0 dB
10	-28.0 dB
11	-27.0 dB
12	-26.0 dB
13	-25.0 dB
14	-24.0 dB
15	-23.0 dB
16	-22.0 dB
17	-21.0 dB
18	-20.0 dB
19	-19.5 dB
20	-19.0 dB
21	-18.5 dB
22	-18.0 dB
23	-17.5 dB
24	-17.0 dB
25	-16.5 dB
26	-16.0 dB
27	-15.5 dB
28	-15.0 dB
29	-14.5 dB
30	-14.0 dB
31	-13.5 dB
32	-13.0 dB

33	-12.5 dB
34	-12.0 dB
35	-11.5 dB
36	-11.0 dB
37	-10.5 dB
38	-10.0 dB
39	-9.5 dB
40	-9.0 dB
41	-8.5 dB
42	-8.0 dB
43	-7.5 dB
44	-7.0 dB
45	-6.5 dB
46	-6.0 dB
47	-5.5 dB
48	-5.0 dB
49	-4.5 dB
50	-4.0 dB
51	-3.5 dB
52	-3.0 dB
53	-2.5 dB
54	-2.0 dB
55	-1.5 dB
56	-1.0 dB
57	-0.5 dB
58	-0.0 dB

11.00 Appendix 4 Service Manual History

09/06/94	V 1.00	1st Release.
11/8/94	V1.01	Page 2 Op amp reference designations changed according to revision C schematic. Page 3 Description of DAC power supply filtering changed to match actual operation. Page 6 Description of DSP ASIC internal clock changed to matched actual operations. Pages E1-E2 Added software version 1.05 to Software History. Pages F1-F19 Added Midi System Exclusive Implementation.
1/??/95	V1.02	Page A2 Added chapter 6.14 Reset Circuit Changes
11/29/95	V2.00	Page 1 Specified REV. C PCBs as type referenced in text. Appendix 1 Added several updates. Appendix 5 Added V2.00 and 2.01 to software history. Appendix 6 Added Chapter 11.20 V2.0X [Sys-Ex]. Appendix 8 Added column headings to all BOM pages. Appendix X (Schematics) moved to end of manual to accommodate use of the larger 11X17 size. Consequently most appendix #s and appendix page #s have changed. Added REV. E to schematics and BOM sections. Updated Table of Contents.

the

12.00 Appendix 5 Service Parts List

Group	Part.#	Description	Qty	PCB	Ref.Designator	Comment
ASY	9-79-0053	ASSY PCB MAIN Q2	1			
ASY	9-96-1234	ASSY LCD BACKLIGHT	1			
ASY	9-96-1235	ASSY FRAME BUTTON Q2	1			
CAB	4-18-1403	CABLE 16-PIN 6 0.1 DIL	1			
CAB	4-18-1623	CABLE DIL 24-PIN 98MM 0.1	1			
CAB	4-19-1302	CABLE SIL 6-PIN 225MM 2MM	1			
CAB	4-19-1332	CABLE SIL 8-PIN COAX 225MM	1			
CAB	4-19-1333	CABLE SIL 5-PIN 70MM	1			
CAB	4-19-1334	CABLE SIL 8-PIN 160MM	1			
CAP	1-07-0101	CAP 100 MF ELEC 10V	1	MAIN	C29	
CAP	1-08-0101	CAP 10 MF ELEC 16V	5	MAIN	C2, C53, C56, C58, C62	
CAP	1-08-0105	CAP 1.0 MF ELEC 16V	2	MAIN	C1, C49	
CAP	1-09-0022	CAP 22 MF ELEC 25V	2	MAIN	C23, C31	
CAP	1-09-0475	CAP 4.7 UF ELEC 50V 20%	4	MAIN	C10, C16, C26, C30	
CAP	1-09-0476	CAP 47 MF ELEC 25V	4	MAIN	C68, C73, C76-77	
CAP	1-10-0471	CAP 470UF ELEC 35V 0.2 CTR	4	MAIN	C4, C13, C20-21	
CAP	1-10-1000	CAP 1000UF ELEC 35V 0.2 CTR	5	MAIN	C9, C19, C22, C24, C51	
CER	1-02-0100	CAP 10 PF CERDISC 10% 50V	1	MAIN	SEE ECO 418702 FOR MOD INST.	
CON	4-04-0003	CON BNC (WAKA)	1	MAIN	J12	
CON	4-11-0001	CON DIGITAL I/O SHARP	1	MAIN	J9	
HDR	4-14-0016	HEADER 16-PIN 0.1 DIL XR/M	1	MAIN	J10	
HDR	4-14-0024	HEADER 24-PIN DIL XR	2	MAIN/BUT	J5 (MAIN), J1 (BUTTON)	
HDR	4-15-1005	HEADER 5-PIN SIL 2MM SHROUDED	1	MAIN	J17	
HDR	4-15-1006	HEADER 6-PIN SIL 2MM CTR (SHROUDED)	2	MAIN/POT	J16 (MAIN), J1 (POT)	
HDR	4-15-1008	HEADER 8-PIN SIL 2MM CTR (SHROUDED)	3	MAIN/POT	J14, J15 (MAIN), J2 (POT)	
HDW	5-00-0016	SCREW 6-32 x 1/4 PP ZNC	4		PCB (3), HEATSINK (1)	
HDW	5-00-0020	SCREW M-3 x 7mm PHIL SLOT	9		CASE	
HDW	5-00-1005	SCREW 3 x 6MM KEYPAD	1		OPTICAL JACK (BLK)	
HDW	5-00-2005	SCREW 2.6 x 6 KEYPAD	2	BUTTON	BUTTON PCB	
HDW	5-02-6320	NUT KEP 6-32	1		HEATSINK	
IC	2-11-7805	REG 7805 +5V TO220 NATIONAL	1	MAIN	U16	
IC	2-13-7812	REG 78L12 +12V TO92 NATIONAL	1	MAIN	U15	
IC	2-13-7912	REG 79L12 -12V TO92 NATIONAL	1	MAIN	U17	
IC	2-19-0101	IC HN27C101AG-12 EPROM	1	MAIN	U2	
IC	2-24-0138	IC 6N138 OPTO ISO HEWLETT	1	MAIN	U9	
IC	2-27-0022	ASIC DIG FX PROCESSOR 84-PIN DSP1	1	MAIN	U6	
JAC	4-00-0001	JACK 5-PIN DIN (MIDI)	2	MAIN	J2, J8	
JAC	4-00-0004	JACK 4-PIN DIN (P4)	1	MAIN	J13	
JAC	4-02-0001	JACK 1/4 MONO CLIFF	2	MAIN	J3-4	
JAC	4-03-0001	JACK 1/4 STEREO	4	MAIN	J1, J6-7, J11	
LCD	9-44-1113	ASSY LCD Q2	1			
LED	3-02-0014	LED RED T1 HP HLMP 1340	12	BUTTON		
LIT	7-51-1093	MANUAL REFERENCE Q2	1			
ME	1-92-0001	VARICAP MVAM108 (MOT)	2	MAIN	D11-12	
ME	2-01-4003	DIODE POWER 1N4003	4	MAIN	D6, D8-10	
ME	2-01-5400	DIODE POWER 1N5400	1	MAIN	D4	
ME	6-02-0002	SWITCH DPDT	1	MAIN	SW1	
ME	7-01-0009	CRYSTAL 12 MHz	1	MAIN	M2	
ME	7-01-0011	CRYSTAL 6.144 MHz (SERIES)	1	MAIN	M3	
ME	7-05-0003	BATTERY 3V LITHIUM PANASONIC	1	MAIN	B1	
ME	7-20-0006	INDUCTOR 0.68uH 0.5 CTR	1	MAIN	L2	
ME	7-20-0018	INDUCTOR 0.15 uH 0.5 CTR	1	MAIN	L1	
Group	Part.#	Description	Qty	PCB	Ref.Designator	Comment

MIS	9-13-1028	STRIP PVC 159mm X 7.5mm Q2	2		F/P ASSY	
MIS	9-13-1029	STRIP PVC 203mm X 6.5mm Q2	2		F/P ASSY	
MIS	9-23-1014	STRIP FOAM (F/P) 7 x 185mm	4			
MIS	9-23-1017	STRIP FOAM (SIDE) 7x95mm D4	4			
MIS	9-00-1010	ENCODER DATA ALPS EC11B	1	MAIN		
MTL	9-02-1007	RACK EAR (CURVED FRONT PANEL)	2			
MTL	9-03-1036	LUG SOLDER PCB MNT	6			
MTL	9-03-1097	PANEL FRONT Q2	1			
MTL	9-03-1098	PANEL REAR Q2	1			
MTL	9-03-1100	CASE TOP Q2	1			
MTL	9-03-1132	HEATSINK Q2/S4/S6	1			
PCB	9-40-1152	PCB SWITCH Q2	1	BUTTON		
PCB	9-40-1153	PCB POT Q2	1	POT		
PLS	9-11-1040	BEZEL DISPLAY Q2	1	LCD		
PLS	9-15-1078	BUTTON POWER Q2/S4/M4	1			
PLS	9-15-1111	FRAME POT Q2	1	POT		
PLS	9-15-1112	KNOB STANDARD Q2	1		F/P ASSY	
PLS	9-15-1113	KNOB CONCENTRIC (UPPER) Q2	1		F/P ASSY	
PLS	9-15-1114	KNOB CONCENTRIC (LOWER) Q2	1		F/P ASSY	
PLS	9-15-1115	KNOB VALUE Q2	1		F/P ASSY	
PLS	9-15-1117	EXTENDER SWITCH Q2	1			
POT	0-09-1001	POT 10KA DUAL CONTROL	1			
POT	0-09-1033	POT 10KB DUAL CONCENTRIC ALPS RK1612220055-10KBX2 (DZ)	1	POT		
RES	0-00-0221	RES 220 OHM 1/8W 5%	1	MAIN	SEE ECO 418702 FOR MOD INST.	
RES	0-05-0200	RES 2 OHM 1/2W 5%	1	MAIN	R35	
SMC	1-50-0100	CAP 10 PF NPO 1206	1	MAIN	C34	
SMC	1-50-0101	CAP 100 PF NPO 1206	4	MAIN	C28, C46-48	
SMC	1-50-0102	CAP 1000 PF NPO 1206	9	MAIN	C6, C14-15, C17-18, C57, C78-80	
SMC	1-50-0103	CAP 0.01 MF NPO 1206	2	MAIN	C50, C52	
SMC	1-50-0152	CAP 1500 PF NPO 1206 50V	1	MAIN	C36	
SMC	1-50-0220	CAP 22 PF NPO 1206	3	MAIN	C7, C8, C35	
SMC	1-50-0270	CAP 27 PF NPO 1206	2	MAIN	C33, C75	
SMC	1-50-0330	CAP 33 PF NPO 1206	5	MAIN	C40-41, C63-64, C66	
SMC	1-50-0334	CAP 0.033 MF NPO 1206	1	MAIN	C38	
SMC	1-50-0680	CAP 68 PF NPO 1206	2	MAIN	C69, C74	
SMC	1-50-0682	CAP 6.8 PF NPO 1206	1	MAIN	C39	
SMC	1-51-0104	CAP 0.1 MF X7R 1206	26	MAIN	C3, C5, C11-12, C25, C27, C32, C37, C42-45, C54-55, C59-61, C67, C70-72, C81-85	
SMI	2-64-0138	IC 74HC138 DEMUX/DEC SMD	1	MAIN	U5	
SMI	2-64-0573	IC 74HC573 OCTAL D LATCH S	1	MAIN	U7	
SMI	2-64-0574	IC 74HC574 OCTAL D FF SMD	3	MAIN	U10-11, U25	
SMI	2-64-7400	IC 74HC00 QUAD 2-IN POS-NAND GATE	1	MAIN	U23	
SMI	2-64-7404	IC 74HC04 HEX INVERTER SMD	1	MAIN	U4	
SMI	2-64-7405	IC 74HCU04 HEX INVERTER SM	2	MAIN	U19, U24	
SMI	2-64-7410	IC 74HC10 TRIPLE 3-IN POS-NAND GATE	1	MAIN	U3	
SMI	2-64-7414	IC 74HC14 HEX INVERTER	1	MAIN	U28	
SMI	2-64-7474	IC 74HC74 DUAL D FF SMD	1	MAIN	U20	
SMI	2-64-7486	IC 74HC86 QUAD 2-IN EXOR S	1	MAIN	U27	
SMI	2-66-5160	IC HM514260AJ-7 DRAM SMD	1	MAIN	U21	
SMI	2-67-0257	IC 32K x 8 SRAM (HS) SMD	2	MAIN	U1, U13	
SMI	2-70-8031	IC 80C31 MPU PLCC SMD	1	MAIN	U8	
SMI	2-71-0084	IC TL084 QUAD OPAMP SMD	3	MAIN	U18, U22, U26	
SMI	2-75-4319	IC AK4318A DUAL 18-BIT DAC	1	MAIN	U12	
Group	Part.#	Description	Qty	PCB	Ref.Designator	Comment
SMI	2-75-7360	IC SAA7360 ADC PQFP-44 SMD	1	MAIN	U14	

SMM	2-50-0914	DIODE 1N914 SOD-80 (SMD)	20	MAIN	D1-3, D5, D7, D13-27
SMM	2-51-4401	TRANS 2N4401 NPN SMD	6	MAIN	Q1-2, Q4-5, Q7, Q9
SMM	2-51-4403	TRANS 2N4403 PNP SMD	3	MAIN	Q3, Q6, Q8
SMR	0-10-0047	RES 4.7 OHM 1/8W 5% 1206	2	MAIN	R2, R91
SMR	0-10-0100	RES 10 OHM 1/8W 5% 1206	3	MAIN	R49, R52, R53
SMR	0-10-0101	RES 100 OHM 1/8W 5% 1206	1	MAIN	R41
SMR	0-10-0102	RES 1K OHM 1/8W 5% 1206	8	MAIN	R8, R48, R56, R61, R62, R89, R115
SMR	0-10-0103	RES 10K OHM 1/8W 5% 1206	7	MAIN	R3-4, R22, R28, R43, R45, R50
SMR	0-10-0104	RES 100K OHM 1/8W 5% 1206	5	MAIN	R11, R13, R27, R39, R42
SMR	0-10-0105	RES 1M OHM 1/8W 5% 1206	3	MAIN	R12, R119, R124
SMR	0-10-0123	RES 12K OHM 1/8W 5% 1206	2	MAIN	R80-81
SMR	0-10-0150	RES 15 OHM 1/8W 5% 1206	2	MAIN	R1, R30
SMR	0-10-0151	RES 150 OHM 1/8W 5% 1206	6	MAIN	R37-38, R46-47, R125, R126
SMR	0-10-0203	RES 20K OHM 1/8W 5% 1206	8	MAIN	R68, R73-74, R76-77, R90, R100, R104
SMR	0-10-0221	RES 220 OHM 1/8W 5% 1206	3	MAIN	R14, R17-18
SMR	0-10-0222	RES 2.2K OHM 1/8W 5% 1206	6	MAIN	R5, R6, R110-112, R118
SMR	0-10-0271	RES 270 OHM 1/8W 5% 1206	20	MAIN	R7, R19-20, R23-26, R31-34, R36, R44, R83-88, R114
SMR	0-10-0332	RES 3.3K OHM 1/8W 5% 1206	1	MAIN	R40
SMR	0-10-0393	RES 39K OHM 1/8W 5% 1206	8	MAIN	R15-16, R67, R69, R72, R79, R103, R105
SMR	0-10-0471	RES 470 OHM 1/8W 5% 1206	1	MAIN	R21
SMR	0-10-0472	RES 4.7K OHM 1/8W 5% 1206	7	MAIN	R51, R106-109, R113, R117
SMR	0-10-0473	RES 47K OHM 1/8W 5% 1206	3	MAIN	R10, R121, R123
SMR	0-10-0474	RES 470K OHM 1/8W 5% 1206	1	MAIN	R116
SMR	0-10-0511	RES 510 OHM 1/8W 5% 1206	4	MAIN	R98-99, R101-102
SMR	0-10-0514	RES 510K OHM 1/8W 5% 1206	2	MAIN	R57, R63
SMR	0-10-0681	RES 680 OHM 1/8W 5% 1206	1	MAIN	R82
SMR	0-10-0821	RES 820 OHM 1/8W 5% 1206	1	MAIN	R29
SMR	0-10-0822	RES 8.2K OHM 1/8W 5% 1206	2	MAIN	R120, R122
SMR	0-11-0103	RES 10K OHM 1/8W 1% 1206	12	MAIN	R58, R60, R64, R65, R71, R75, R92-97
SMR	0-11-0153	RES 15K OHM 1/8W 1% 1206	1	MAIN	R54
SMR	0-11-0203	RES 20K OHM 1/8W 1% 1206	4	MAIN	R55, R59, R66, R70
SMS	4-12-0244	SOCKET 44 PIN PLCC SMD	1	MAIN	U8
SMS	4-12-0284	SOCKET 84 PIN PLCC SMD	1	MAIN	U6
SWT	6-02-0011	SWITCH TACT	16	BUTTON	

X.XX Revision E Service Parts List

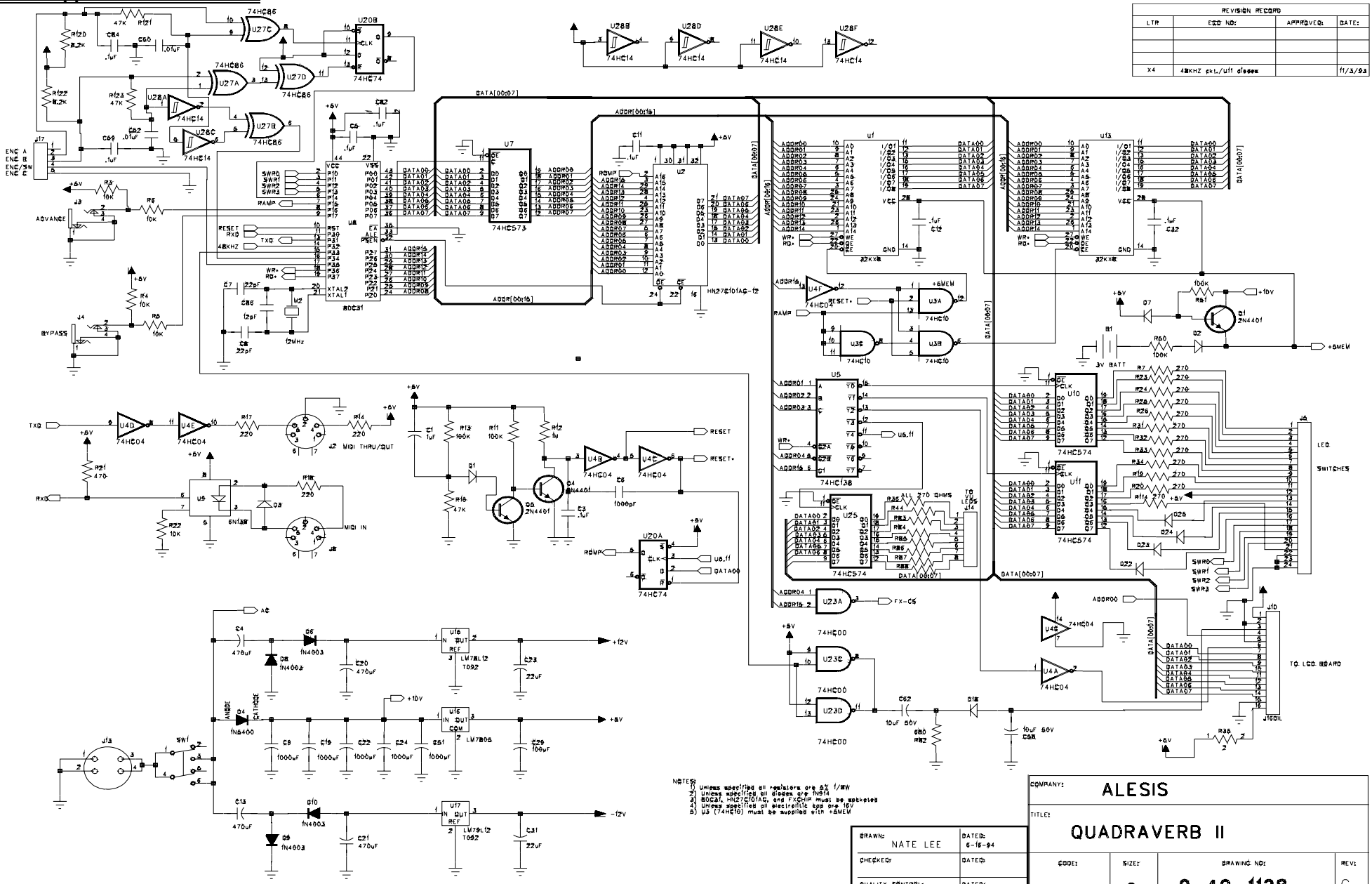
Group	AIPartNo	Description	Qty	PCB	Ref.Designator	Comment
ASY	9-44-1113	ASSY LCD Q2	1			
ASY	9-79-0076	ASSY PCB SWITCH Q2	1			
ASY	9-79-0077	ASSY PCB POT Q2	1			
ASY	9-79-0147	ASSY PCB MAIN (REV. E) Q2	1			
ASY	9-96-1235	ASSY FRAME BUTTON Q2	1			
ASY	9-96-1235	ASSY FRAME BUTTON Q2	1			
ASY	9-96-1247	ASIC PCVCO CD (TESTED)	2	MAIN	U10, U18	
ASY	9-96-1262	ASSY BACKLIGHT (REV B.) Q2/S4	1			
CAB	4-18-1403	CABLE 16-PIN 6 0.1 DIL	1			
CAB	4-18-1623	CABLE DIL 24-PIN 98MM 0.1	1			
CAB	4-19-1302	CABLE SIL 6-PIN 225MM 2MM	1			
CAB	4-19-1332	CABLE SIL 8-PIN COAX 225MM	1			
CAB	4-19-1333	CABLE SIL 5-PIN 70MM	1			
CAB	4-19-1334	CABLE SIL 8-PIN 160MM	1			
CAP	1-07-0101	CAP 100 uF ELEC 10V	1	MAIN	C77	
CAP	1-08-0101	CAP 10 uF ELEC 16V	5	MAIN	C48, 67, 69, 75, 78	
CAP	1-08-0105	CAP 1.0 uF ELEC 16V	1	MAIN	C44	
CAP	1-08-0228	CAP 2200 uF ELEC 16V	3	MAIN	C14, C31, C43	
CAP	1-09-0022	CAP 22 uF ELEC 25V	2	MAIN	C1, 2	
CAP	1-09-0475	CAP 4.7 uF ELEC 50V 20%	4	MAIN	C33, 36, 38, 39	
CAP	1-09-0476	CAP 47 uF ELEC 25V	4	MAIN	C55, 59, 60, 73	
CAP	1-10-0471	CAP 470 uF ELEC 35V 0.2 CTR	4	MAIN	C15, 16, 24, 25	
CON	4-04-0003	CON BNC (WAKA)	1	MAIN	J6	
CON	4-11-0001	CON DIGITAL I/O SHARP	1	MAIN	J5	
DIO	2-01-4003	DIODE POWER 1N4003	4	MAIN	D5-8	
DIO	2-01-5400	DIODE POWER 1N5400	1	MAIN	D16	
DIO	2-02-5231	DIODE ZENER 1N5231B	1	MAIN	D4	
HDR	4-14-0016	HEADER 16-PIN 0.1 DIL XR/M	1	MAIN	J17	
HDR	4-14-0016	HEADER 16-PIN 0.1 DIL XR/M	1	LCD		
HDR	4-14-0024	HEADER 24-PIN DIL XR	1	BUTTON	J1 (BUTTON)	
HDR	4-14-0024	HEADER 24-PIN DIL XR	1	MAIN	J16 (MAIN)	
HDR	4-15-1005	HEADER 5-PIN SIL 2MM SHROUDED	1	LCD		
HDR	4-15-1005	HEADER 5-PIN SIL 2MM SHROUDED	1	MAIN	J14	
HDR	4-15-1006	HEADER 6-PIN SIL 2MM CTR (SHROUDED)	1	POT	J1 (POT)	
HDR	4-15-1006	HEADER 6-PIN SIL 2MM CTR (SHROUDED)	1	MAIN	J13 (MAIN)	
HDR	4-15-1008	HEADER 8-PIN SIL 2MM CTR (SHROUDED)	1	POT	J2 (POT)	
HDR	4-15-1008	HEADER 8-PIN SIL 2MM CTR (SHROUDED)	2	MAIN	J12, J15 (MAIN)	
HDR	4-15-1008	HEADER 8-PIN SIL 2MM CTR (SHROUDED)	1	LCD		
HDW	5-00-0016	SCREW 6-32 x 1/4 PP ZNC	4		PCB (3) HEATSINK (1)	
HDW	5-00-0020	SCREW M-3 x 7mm PHIL SLOT	9		CASE	
HDW	5-00-1005	SCREW 3 x 6MM KEYPAD	1		OPTIACL JACK (BLK)	
HDW	5-00-2005	SCREW 2.6 x 6 KEYPAD	2		BUTTON PCB	
HDW	5-00-2005	SCREW 2.6 x 6 KEYPAD	4	LCD		
HDW	5-02-6320	NUT KEP 6-32	1		HEATSINK	
IC	2-11-7805	REG 7805 +5V TO220 NATIONA	1	MAIN	U28	
IC	2-13-7812	REG 78L12 +12V TO92 NATION	1	MAIN	U1	
IC	2-13-7912	REG 79L12 -12V TO92 NATION	1	MAIN	U2	
IC	2-24-0138	IC 6N138 OPTO ISO HEWLETT	1	MAIN	U3	
IC	2-27-0022	ASIC DIG FX PROCESSOR 84-PIN DSP1	1	MAIN	U9	
IC	2-31-0059	IC SOFTWARE EPROM Q2 (Ver. 2.01)	1		U24	
JAC	4-00-0001	JACK 5-PIN DIN (MIDI)	2	MAIN	J9, J10	
Group	AIPartNo	Description	Qty	PCB	Ref.Designator	Comment

JAC	4-00-0004	JACK 4-PIN DIN (P4)	1	MAIN	J11	
JAC	4-02-0001	JACK 1/4 MONO CLIFF	2	MAIN	J7, 8	
JAC	4-03-0001	JACK 1/4 STEREO	4	MAIN	J1-4	
LED	3-02-0007	LED ORG 2x5MM RECT.	2		VU	
LED	3-02-0009	LED GRN 2x5mm RECT	6		VU	
LED	3-02-0014	LED RED T1 HP HLMP 1340	12	BUTTON		
LED	3-02-0016	LED BACKLIGHT (GRN) Q2	6			
LIT	7-51-1093	MANUAL REFERENCE Q2	1			
LIT	7-51-1115	CHART PRESET PROGRAM (VER. 2.00) Q2	1			
LIT	7-51-1118	CHART USER 0 PROGRAM (VER 2.00) Q2	1		LIT PACK	
LIT	7-51-1138	ADDENDUM (VER. 2.00) Q2 REFERANCE MANUAL	1			
LIT	7-51-1167	QUICK REFERENCE GUIDE Q2	1			
LIT	7-51-1168	CHART USER 1 PROGRAM (VER. 2) Q2	1			
ME	7-01-0009	CRYSTAL 12 MHz	1	MAIN	M2	
ME	7-01-0011	CRYSTAL 6.144 MHZ (SERIES)	1	MAIN	M1	
ME	7-05-0003	BATTERY 3V LITHIUM PANASONIC	1	MAIN	B1	
MIS	9-00-1010	ENCODER DATA (ALPS EC11B)	1	LCD		
MIS	9-13-1028	STRIP PVC 159mm X 7.5mm Q2	2		F/P ASSY	
MIS	9-13-1029	STRIP PVC 203mm X 6.5mm Q2	2		F/P ASSY	
MIS	9-23-1014	STRIP FOAM (F/P) 7 x 185mm	4			
MIS	9-23-1017	STRIP FOAM (SIDE) 7x95mm D4	4			
MTL	9-02-1007	RACK EAR (CURVED FRONT PANEL)	2			
MTL	9-03-1036	LUG SOLDER PCB MNT	6			
MTL	9-03-1097	PANEL FRONT Q2	1			
MTL	9-03-1098	PANEL REAR Q2	1			
MTL	9-03-1100	CASE TOP Q2	1			
MTL	9-03-1132	HEATSINK Q2/S4/S6	1			
MTL	9-03-1165	CLIP STRIP RETAINER	8			
PKG	7-80-0057	BOX GIFT Q2	1			
PKG	7-81-0064	FOAM MOLDED END PCS D5	2			
PKG	7-81-0065	FOAM MOLDED SET P/S HLDR D5	1			
PLS	9-11-1039	BEZEL VU Q2	1	LCD		
PLS	9-11-1040	BEZEL DISPLAY Q2	1	LCD		
PLS	9-11-1044	SHELL BACKLIGHT Q2/S4	1			
PLS	9-15-0097	DIFFUSER BACKLIGHT Q2 (REV. B)	1			
PLS	9-15-1078	BUTTON POWER Q2/S4/M4	1			
PLS	9-15-1109	FRAME DISPLAY Q2	1	LCD		
PLS	9-15-1111	FRAME POT Q2	1	POT		
PLS	9-15-1112	KNOB STANDARD Q2	1		F/P ASSY	
PLS	9-15-1112	KNOB STANDARD Q2	1			
PLS	9-15-1113	KNOB CONCENTRIC (UPPER) Q2	1		F/P ASSY	
PLS	9-15-1114	KNOB CONCENTRIC (LOWER) Q2	1		F/P ASSY	
PLS	9-15-1115	KNOB VALUE Q2	1			
PLS	9-15-1117	EXTENDER SWITCH Q2	1			
POT	0-09-1001	POT 10KA DUAL CONTROL	1	POT	PCB POT	
POT	0-09-1033	POT 10KB DUAL CONCENTRIC ALPS RK1612220055-10KBX2 (DZ)	1	POT		
RES	0-00-0302	RES 3K OHM 1/8W 5%	2	MAIN	R131, 132	
RES	0-05-0200	RES 2 OHM 1/2W 5%	1	MAIN	R130	
SMC	1-50-0101	CAP 100 PF NPO 1206	4	MAIN	C18, 19, 27, 28	
SMC	1-50-0102	CAP 1000 PF NPO 1206	8	MAIN	C3-5, 7-10, 17	
SMC	1-50-0103	CAP 0.01 uF NPO 1206	2	MAIN	C70, 76	
SMC	1-50-0220	CAP 22 PF NPO 1206	2	MAIN	C62, 63	
SMC	1-50-0270	CAP 27 PF NPO 1206	2	MAIN	C51, 52	
Group	AIPartNo	Description	Qty	PCB	Ref.Designator	Comment
SMC	1-50-0271	CAP 270 PF NPO 1206	2	MAIN	C22, C37	
SMC	1-50-0330	CAP 33 PF NPO 1206	4	MAIN	C23, 29, 49, 50	

SMC	1-50-0331	CAP 330 PF NPO 1206	2	MAIN	C6, C34	
SMC	1-50-0334	CAP 0.033 uF NPO 1206	1	MAIN	C40	
SMC	1-50-0680	CAP 68 PF NPO 1206	2	MAIN	C45, 46	
SMC	1-51-0104	CAP 0.1 uF X7R 1206	25	MAIN	C11-13, 20, 21, 26, 30, 32, 35, 41, 42, 47, 53, 54, 56-58, 61, 64-66, 68, 71, 72, 74	
SMI	2-64-0138	IC 74HC138 DEMUX/DEC SMD	1	MAIN	U5	
SMI	2-64-0573	IC 74HC573 OCTAL D LATCH S	1	MAIN	U11	
SMI	2-64-0574	IC 74HC574 OCTAL D FF SMD	3	main	u20, 21, 27	
SMI	2-64-7400	IC 74HC00 QUAD 2-IN POS-NAND GATE	1	main	u19	
SMI	2-64-7410	IC 74HC10 TRIPLE 3-IN POS-NAND GATE	1	MAIN	U13	
SMI	2-64-7414	IC 74HC14 HEX INVERTER	2	MAIN	U6, 23	
SMI	2-64-7474	IC 74HC74 DUAL D FF SMD	1	MAIN	U17	
SMI	2-64-7486	IC 74HC86 QUAD 2-IN EXOR S	1	MAIN	U22	
SMI	2-66-5160	IC HM514260AJ-7 DRAM SMD	1	MAIN	U16	
SMI	2-67-0257	IC 32K x 8 SRAM (HS) SMD	2	MAIN	U14, U15	
SMI	2-70-8031	IC 80C31 MPU PLCC SMD	1	MAIN	U8	
SMI	2-71-0084	IC TL084 QUAD OPAMP SMD	3	MAIN	U4, 7, 8	
SMI	2-75-4319	IC AK4318A DUAL 18-BIT DAC	1	MAIN	U25	
SMI	2-75-7360	IC SAA7360 ADC PQFP-44 SMD	1	MAIN	U26	
SMM	2-50-4148	DIODE SIGNAL 1N4148 SMD	19	MAIN	D1-3, 9-15, 17-25	
SMM	2-51-4401	TRANS 2N4401 NPN SMD	6	MAIN	Q1, 2, 5-7, 9	
SMM	2-51-4403	TRANS 2N4403 PNP SMD	3	MAIN	Q3, 4, 8	
SMR	0-10-0047	RES 4.7 OHM 1/8W 5% 1206	2	MAIN	R110, 124	
SMR	0-10-0100	RES 10 OHM 1/8W 5% 1206	3	MAIN	R95, 96, 111	
SMR	0-10-0101	RES 100 OHM 1/8W 5% 1206	1	MAIN	R78	
SMR	0-10-0102	RES 1K OHM 1/8W 5% 1206	7	MAIN	R1, 2, 28, 32, 35, 67, 71	
SMR	0-10-0103	RES 10K OHM 1/8W 5% 1206	12	MAIN	R3, 5, 12, 24, 38, 59, 70, 79, 86, 92, 94, 99	
SMR	0-10-0105	RES 1M OHM 1/8W 5% 1206	3	MAIN	R37, 49, 80	
SMR	0-10-0123	RES 12K OHM 1/8W 5% 1206	2	MAIN	R83, 84	
SMR	0-10-0150	RES 15 OHM 1/8W 5% 1206	2	MAIN	R72, 97	
SMR	0-10-0151	RES 150 OHM 1/8W 5% 1206	4	MAIN	R85, 91, 100, 101	
SMR	0-10-0203	RES 20K OHM 1/8W 5% 1206	12	MAIN	R16, 23, 25, 41, 43, 45, 46, 51, 52, 56, 60, 69	
SMR	0-10-0221	RES 220 OHM 1/8W 5% 1206	5	MAIN	R7-9, 88, 89	
SMR	0-10-0222	RES 2.2K OHM 1/8W 5% 1206	7	MAIN	R4, 6, 34, 54, 66, 68, 81	
SMR	0-10-0271	RES 270 OHM 1/8W 5% 1206	20	MAIN	R102-109, R112-123	
SMR	0-10-0393	RES 39K OHM 1/8W 5% 1206	8	MAIN	R15, 18, 20 40, 42, 44, 53, 55	
SMR	0-10-0471	RES 470 OHM 1/8W 5% 1206	1	MAIN	R50	
SMR	0-10-0472	RES 4.7K OHM 1/8W 5% 1206	8	MAIN	R11, 13, 14, 22, 36, 73, 74, 98	
SMR	0-10-0473	RES 47K OHM 1/8W 5% 1206	2	MAIN	R126,129	
SMR	0-10-0474	RES 470K OHM 1/8W 5% 1206	1	MAIN	R90	
SMR	0-10-0511	RES 510 OHM 1/8W 5% 1206	4	MAIN	R10, 17, 19, 39	
SMR	0-10-0512	RES 5.1K OHM 1/8W 5% 1206	8	MAIN	R21, R47, R57, R58, R75-77, R82	
SMR	0-10-0514	RES 510K OHM 1/8W 5% 1206	2	MAIN	R27, 30	
SMR	0-10-0621	RES 620 OHM 1/8W 5% 1206	2	MAIN	R62, R65	
SMR	0-10-0681	RES 680 OHM 1/8W 5% 1206	1	MAIN	R125	
SMR	0-10-0821	RES 820 OHM 1/8W 5% 1206	1	MAIN	R87	
SMR	0-10-0822	RES 8.2K OHM 1/8W 5% 1206	2	MAIN	R127, 128	
SMR	0-11-0103	RES 10K OHM 1/8W 1% 1206	8	MAIN	R26, 29, 31, 33, 48, 61, 63, 69	
SMR	0-11-0153	RES 15K OHM 1/8W 1% 1206	1	MAIN	R93	
SMR	0-15-1102	RES 1K OHM 1/10W 5% 0805	5	LCD	R1-5	
SMR	0-15-1913	RES 91K OHM 1/10W 5% 0805	1	LCD	R6	
Group	AIPartNo	Description	Qty	PCB	Ref.Designator	Comment
SMS	4-12-0244	SOCKET 44 PIN PLCC SMD	1	MAIN	U12	
SMS	4-12-0284	SOCKET 84 PIN PLCC SMD	1	MAIN	U9	
SWT	6-02-0002	SWITCH DPDT	1	MAIN	SW1	
SWT	6-02-0011	SWITCH TACT	16	BUTTON		

NOTES

13.00 Appendix 6 Schematics



REVISION RECORD			
LTR	ESD NO:	APPROVED:	DATE:
X4	48KHZ ckt./U1 of 68000		11/3/94

- NOTES:
- 1) Unless specified all resistors are 5% 1/WV
 - 2) Unless specified all diodes are 1N4148
 - 3) 8024, 8027, 8028, and 74HC14 must be specified
 - 4) Unless specified all electrolytic caps are 10V
 - 5) U3 (74HC10) must be supplied with +5V

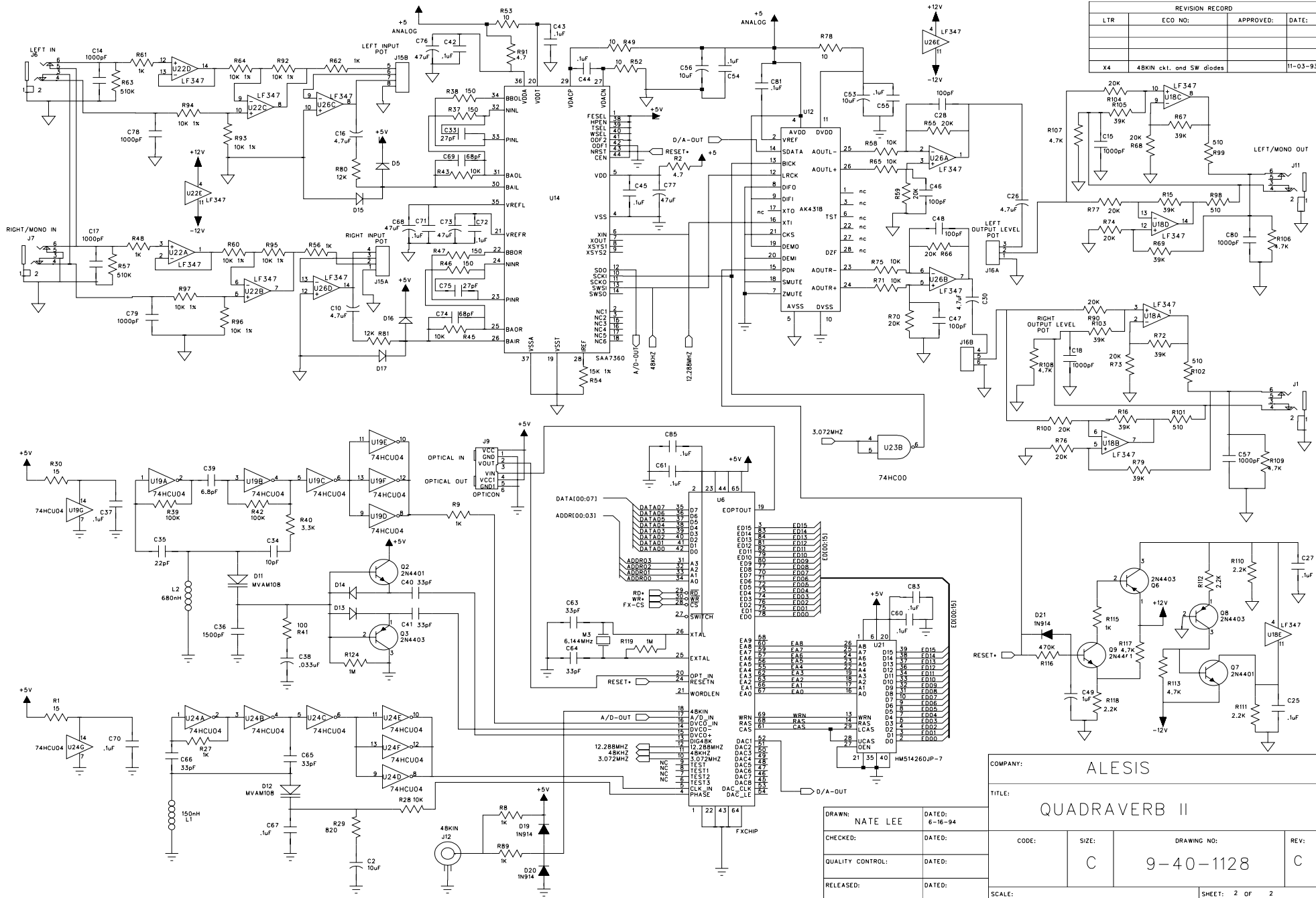
COMPANY: **ALESIS**

TITLE: **QUADRAVERB II**

DRAWN: NATE LEE	DATE: 6-16-94
CHECKED:	DATE:
QUALITY CONTROL:	DATE:
RELEASED:	DATE:

CODE:	SIZE: C	DRAWING NO: 9-40-1128	REV: C
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SCALE: SHEET: 1 of 2

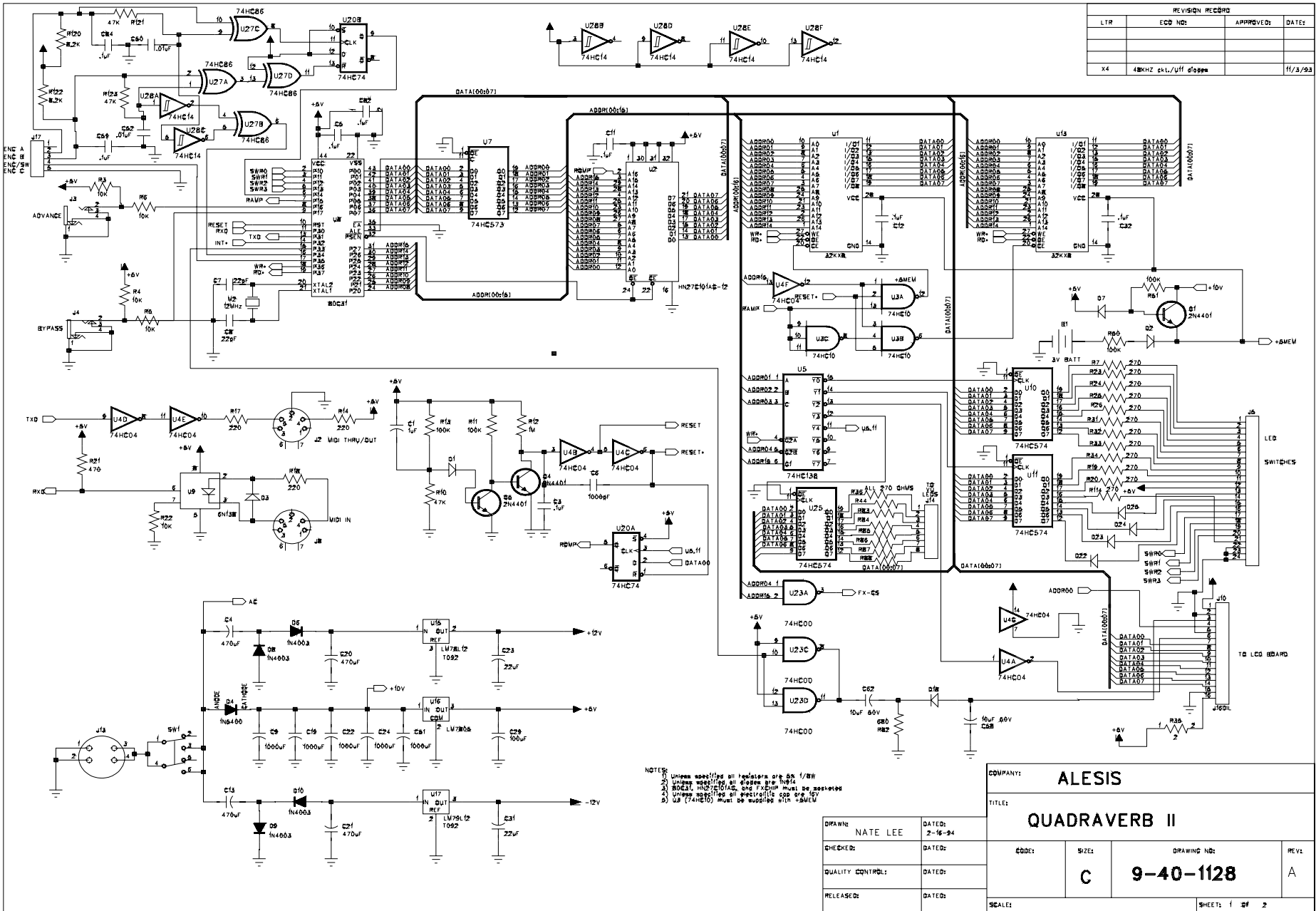


REVISION RECORD			
LTR	ECO NO:	APPROVED:	DATE:
X4	48KIN ckt. and SW diodes		11-03-95

COMPANY:		ALESIS	
TITLE:			
QUADRAVERB II			
CODE:	SIZE:	DRAWING NO:	REV:
C		9-40-1128	C
SCALE:		SHEET: 2 OF 2	

DRAWN:	NATE LEE	DATED:	6-16-94
CHECKED:		DATED:	
QUALITY CONTROL:		DATED:	
RELEASED:		DATED:	

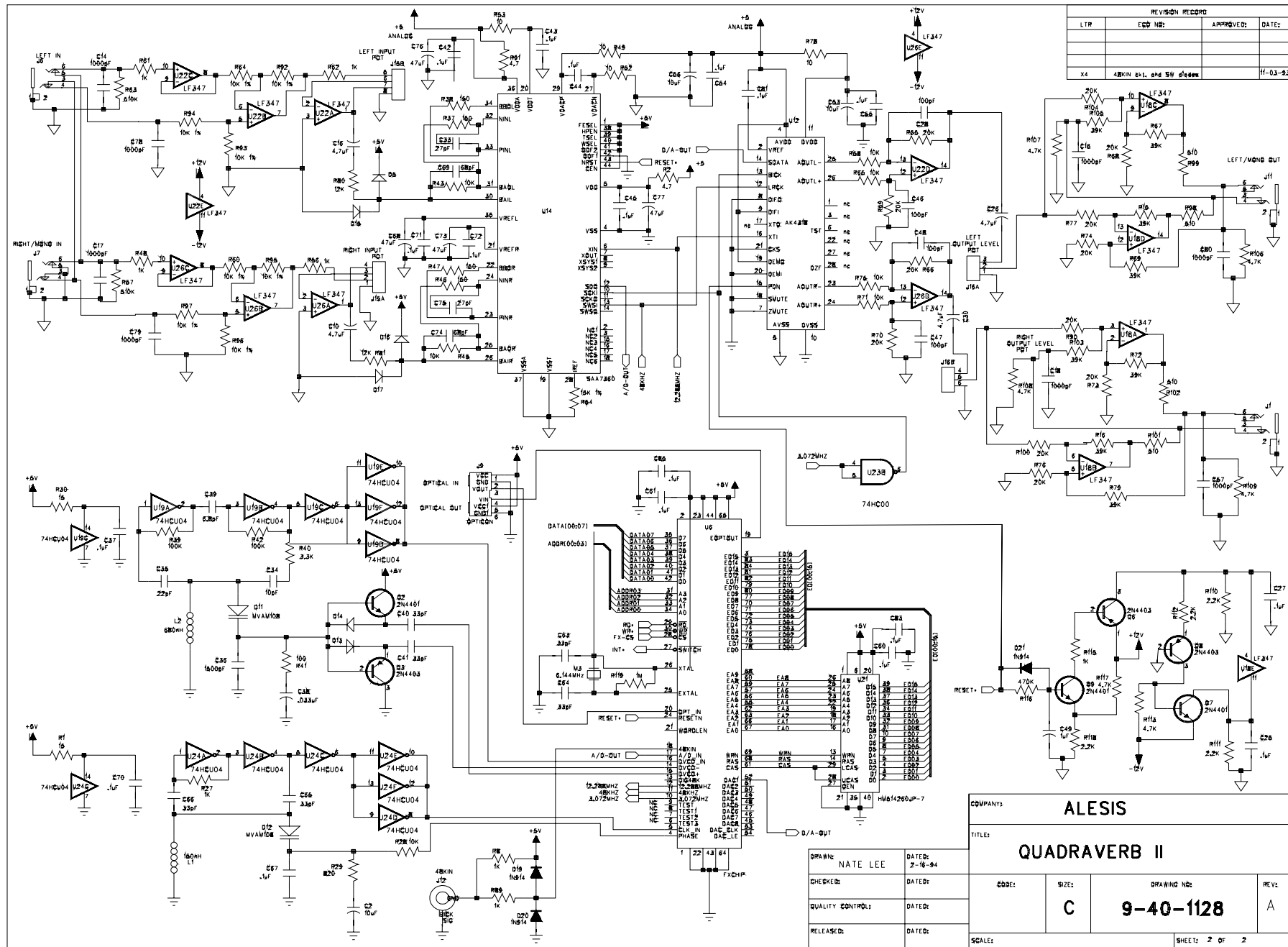
8.10 Revision A



REVISION RECORD			
LTR	ECD NO:	APPROVED:	DATE:
X4	4MHz clk./off d/opp		11/3/93

- NOTES:
 1) Unless specified all resistors are 5% 1/8W
 2) Unless specified all capacitors are 50V
 3) B0627, H0627, H0628, and H0629 must be assembled
 4) Unless specified all electrolytic caps are 10V
 5) U3 (74HC10) must be supplied with +5VCM

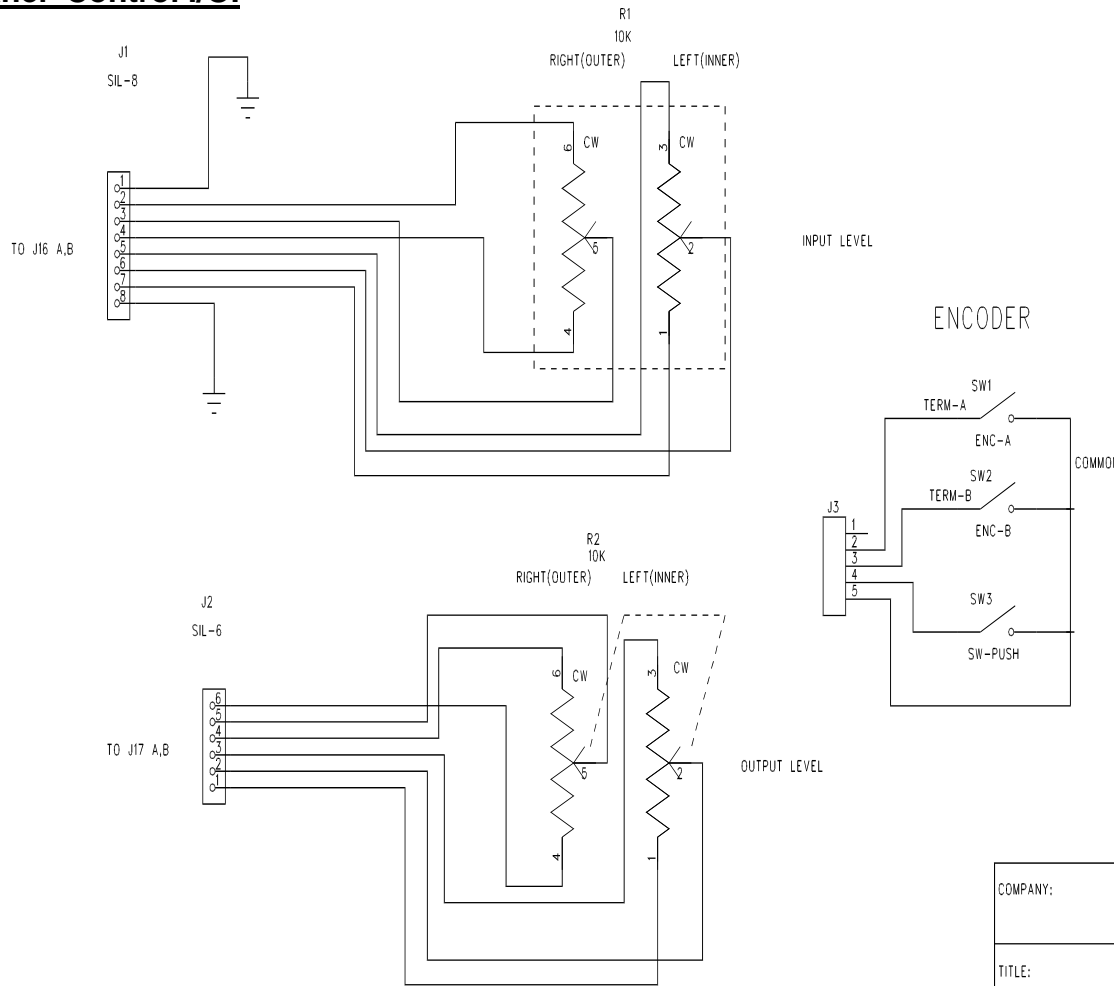
COMPANY:		ALESIS		
TITLE:		QUADRAVERB II		
DRAWN:	NATE LEE	DATED:	2-16-94	
CHECKED:		DATED:		
QUALITY CONTROL:		DATED:		
RELEASED:		DATED:		
CODE:	C	SIZE:		
DRAWING NO:	9-40-1128		REV:	A
SCALE:			SHEET:	1 of 2



REVISION RECORD			
LTR	EQB NO:	APPROVED:	DATE:
X4	48KIN 64L and 5W of 6000		11-03-93

COMPANY: ALESIS			
TITLE: QUADRAVERB II			
DRAWN: NATE LEE	DATE: 2-16-94		
CHECKED:	DATE:	CODE: C	REV: A
QUALITY CONTROL:	DATE:	DRAWING NO: 9-40-1128	
RELEASED:	DATE:	SCALE:	
		SHEET: 2 OF 2	

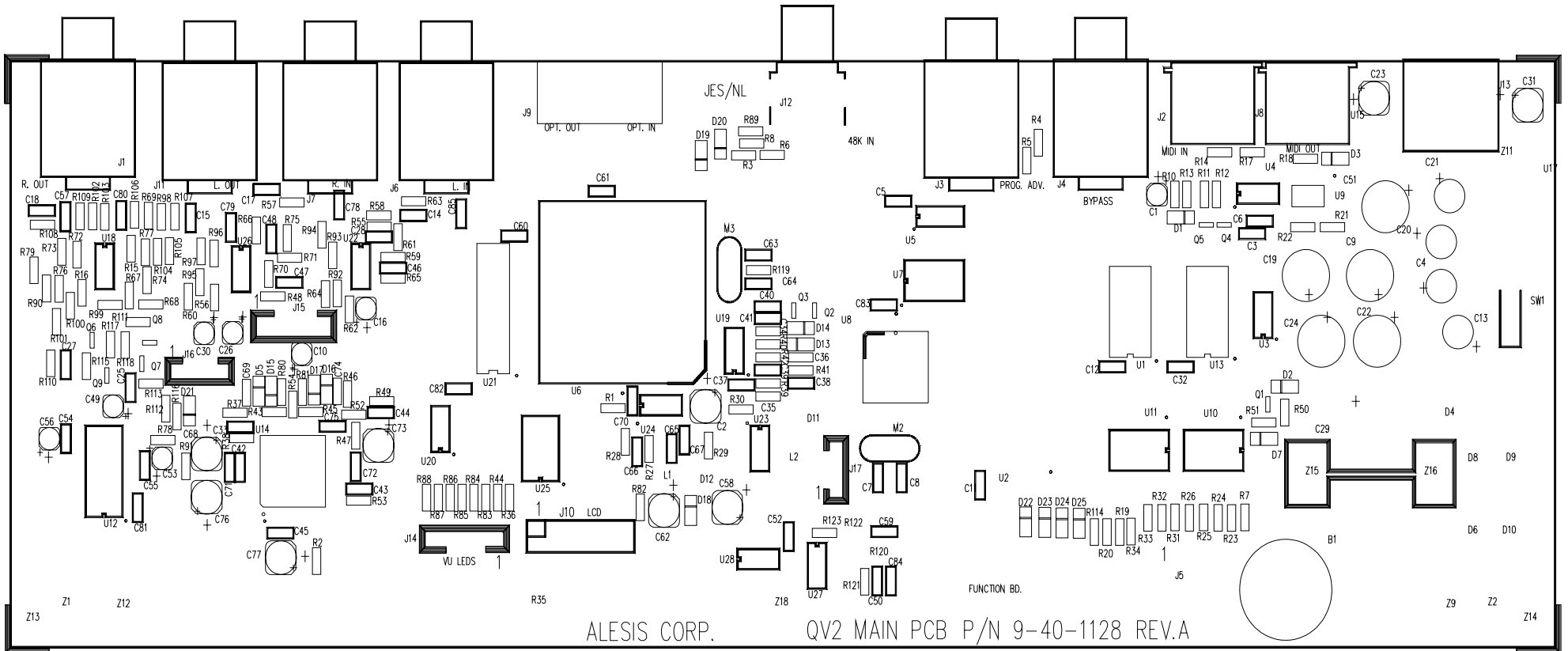
8.20 Front Panel Control I/O.



REVISION RECORD			
LTR	ECO NO:	APPROVED:	DATE:

COMPANY:				ALESIS			
TITLE:				QUADRAVERB II INPUT/OUTPUT CONTROL WIRING			
DRAWN:	NATE LEE	DATED:	2-18-93	CODE:	SIZE:	DRAWING NO:	REV:
CHECKED:		DATED:			B	9-40-1153	XB
QUALITY CONTROL:		DATED:					
RELEASED:		DATED:		SCALE:		SHEET: 1	OF 1

8.30 Revision A Component I.D.



8.40 Revision C Component I.D.

