DMX

SERVICE MANUAL

DMX
PROGRAMMABLE DIGITAL DRUM MACHINE

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MARCH 1982

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OBERHEIM ELECTRONICS, INC.
2250 S. Barrington Ave.
Los Angeles, CA 90064

Number of Sounds: 24

3 Bass Drum (loud, medium, soft)	1 Crash Cymbal
3 Snare Drum (loud, medium, soft)	2 Tambourine (loud, soft)
3 Hi-Hat (closed, accent, open)	1 Rim shot
6 Tom-Toms (high to low)	2 Shakers (loud, soft)
2 Ride Cymbal (loud, soft)	1 Clap

Frequency Response: 10-16,000 Hz (varies among voices, and is dependent on tuning)

Dynamic Range: 80 dB

Maximum number of notes: 2000 events, each of which may contain up to 8 notes occuring simultaneously

Number of Sequences: 100

Number of Songs: 50

Maximum Typical Sequence Length: 6 minutes of 1/8th notes at 80 beats per minute

Maximum Sequence Length: 5 hours at 25 beats per minute

Tempo Range: 25-250 beats per minute

Recording Modes: REAL-TIME: Records rhythms as buttons are pressed. Selectable Quantize Mode rounds off rhythms from 1/48 note to 1/4 note.

STEP: Notes and rests are programmed seperatly, one note at a time. Value of beat may be between 1/4 note and 1/48 note.

Inputs:
- Trigger (one for each voice)
- Control Voltage (one for each voice)
- External Clock
- Sync To Tape
- Footswitch: Start/Stop, Next Sequence

Outputs:
- Stereo and Mono mixed outputs, direct outputs for each voice
- Metronome
- Sync To Tape
- External Clock

Power: 95-130, 190-260 Volts AC, 50-60 Hz, 30 Watts

Dimensions: 18" (45.7cm) wide, 11.8" (30.0cm) deep, 5" (12.7cm) high

Weight: 12 lbs. (5.4 kg)

Since the introduction of the DMX Programmable Digital Drum Machine in November 1981, several changes have been made. These changes are documented in the Engineering Change Orders in the back of this manual. The following is a brief explanation of the improvements and additions.

ECO #301: Changing diode D3 on the processor board from 1N4148 to 1N4002 will prevent the battery back-up circuit from failing.

ECO #302: Removing the ground wire from the cassette "TO OUTPUT" jack eliminates hum in the output of the DMX. Note that the cassette output now relies on the cassette for it's ground, so BOTH cassette cables must be connected for proper operation. It is also necessary to remove the cassette cables from the DMX when not using the cassette interface. Noise can be picked up by the cables even if they are not connected to the cassette, which can cause false triggering in STEP mode.

ECO #304: This circuit change improves the performance of the metronome and makes the CLICK OUT signal useable as a trigger for external equipment.

ECO #305: The voice board printed circuit artwork has been re-done to accomodate an improved pitch trim pot which is easier to adjust.

ECO #306: This change to voice #7 implements an improved "handclaps" sound.

ECO #308: This change implements software Revision C (DMX V. 2.00). Following is a description of the software problems cured by version 2.00 (REV. C). Update kits are available from the factory to upgrade units prior to serial number B820801 to the new software.

COMPLAINT	SOLUTION
1) Cassette interface does not work reliably	Software REV.C has new cassette routine which should solve the problem of unreliability. Cassettes made with REV.A or REV.B software will NOT work with REV.C machines, and vice-versa.
2) There is a delay between parts when playing a song	DMX software REV.C eliminates the pause between sequences while playing a song
3) DMX occasionally drops it's memory	DMX software REV.C cures this problem which is mainly asscociated with SONG EDIT, COPY, and OUT OF MEMORY modes

4) Sync to tape is not compatable between DMX and DSX	Software REV.C will make the sync-to-tape signals compatable between the two machines
5) When syncronizing to tape, there are glitches; DMX falls behind 6) When playing a song, DMX will occasionally play the wrong sequence	Software REV.C reduces the discontinuities in sync signal DMX software REV.C cures this problem with SONG PLAY mode
7) In PLAY mode, all of memory is lost if the ">" key is being held held down when the end of sequence 99 is reached	DMX software REV.C cures this problem
8) When entering STEP mode with QUANTIZE OFF, there is a display error - " RONG QUANT MODE"	The display has been changed to read "WRONG QUANT"
9) Can't enter CASSETTE MODE from SONG MODE	DMX software REV.C cures this problem
10) If you record in STEP mode, and exit STEP mode while on the last beat of the sequence, then press LENGTH, the length of the sequence will be changed, and data may be lost	DMX software REV.C cures this problem

In addition to these fixes, there are some features which have been added, changed, or deleted:

1) Pressing the LENGTH button not only displays the length of the selected sequence, but also displays the amout of memory left. For example: "2 BARS-85% LEFT". Note that the amount of memory left depends on the length of the currently selected sequence. This is because some memory is allocated for overdubbing on the selected sequence, and the amount is proportional to the length of the sequence.

2) The cassette interface software has been changed, so that tapes recorded on DMX's prior to serial number B820801 cannot be played into the newer DMX's and vice versa.

3) The "Punching In" feature (page 4 of the Owner's Manual) has been deleted. Record mode can only be entered from Stop mode.

4) It is now possible to erase notes "on-the-fly" while in RECORD mode: Pressing any drum button while holding the ERASE button will remove that drum note from the sequence.

5) The error message "WRONG QUANT MODE" (see page 10 of the Owner's Manual) has been changed to "WRONG QUANT".

To determine the software version number in a DMX, press and hold the 3, 5, and 7 buttons on the keypad. The display will show the version number of the currently installed software while the buttons are being held down.

"DMX 1.00 (C)1981"	First DMX software release. Should be updated to version 2.00 by implementing ECO #308. Version 1.00 EPROMS are labled B0, and B1.
"DMX 2.00 (C)1982"	Released February 1982, this version incorporates the updates described in "IMPROVEMENTS & ADDITIONS" at the front of this manual. Version 2.00 software is recognized by the labels C0 and C1.

The DMX combines a set of voice cards and a Z80 microprocessor based controller. In basic operation the Z80 scans the keyboard, stores the depressions in a format relating the switch to the time at which it is played, and generates triggers for the voice cards. The voice cards are essentially independant drum synthesizers optimized for some particular drum sound.

OPERATION OF PROCESSOR

The processor hardware includes the reset circuit, the clock generator, and the memory and I/O decoding and latches.

The RESET circuit:

This simple resistor (R21), diode (D5), capacitor (C13) circuit causes the RESET* input to the Z80 to be held low on power up to allow levels to stabilize before beginning processing.

The CLOCK GENERATOR:

The DMX uses a TTL crystal driver circuit (U36) to drive a 4.912MHz precision crystal. The output is divided by two and shaped up by the 'LS74 flipflop (U35) with an active pullup and risetime enhancer at its output (Q9) to provide an effective clock frequency of 2.456MHz.

MEMORY and I/O DECODING:

The DMX controller uses a total of 16k of memory including 8K of read only program memory and 8K of programmable memory. The program data is contained in two 2732 4Kx8 EPROMS. These chips are numbered B0 and B1 and are installed in sockets U18 and U17 respectively. The RAM chips in the DMX are 6116 2Kx8 CMOS memories screened to draw less than .3mA in standby mode. The 'LS42 (U2) decodes bits 11, 12, and 13 of the address bus to select one of the memory chips. Bits 14, and 15 are ignored. This places the ROM beginning at 0000H and the RAM beginning at 2000H.

All other hardware in the DMX is I/O mapped with an 'LS42 (U7 on the Processor Board, and U2 and U9 on the Switch Board) decoding address bits 0 thru 6. The decoder U7 controls 8 bit latches for driving the voice card triggers (U8,9), the interrupt clock generator (U10), and I/O of various discrete bits of data primarily concerning cassette circuitry (U19,20). The I/O decoder also directly activates the click generator (U33), and accesses a single bit latch (U35) to enable/disable the click input to the mixed outputs. Output decoder U2 on the Switch Board directly selects the Display Devices (U3,4,5,6) which have data latches built-in. Input decoder U9 on the Switch Board is used to scan the buttons on the front panel. The output from the switches is placed on the data buss by buffers U7 and U8.

OPERATION OF METRONOME

When the processor outputs to port 40H, output decoder U7 clocks the flip-flop U33, which is configured as a one-shot. The RC network consisting of R62 and C32 determines the width of the output at U33-2. The pulse width of the metronome click is set to 1 mS. The output of U33 is steped up to +10 volts via common-emitter Q8 (see ECO #304). This output then goes to the CLICK OUT jack on the rear panel.

The CLICK OUT signal can be used as a programable trigger for external devices. However, it has been found that certain instruments require a longer pulse width. For instance, to trigger a Sequential Circuits Pro-One synthesizer, the pulse width of the CLICK OUT must be increased to about 40 mS. This can be accomplished by changing the value of C32 from 0.1mF to 4.7mF. This modification will alter the sound of the metronome click, which should be taken into consideration before making the change. An alternate aproach which won't affect the sound of the click is to use an external one-shot to "stretch" the pulse before feeding it to the external device.

The metronome click is also routed to the built-in mixer via Q7 and C24. Q7 is toggled on or off by U35 (from output port 60H), so that the metronome click is removed from the mixed output during PLAY MODE. The volume of the click in the mixed output is controlled via output port 50H, bit 4 and R46 to create the accent on the downbeat.

OPERATION OF CASSETTE INTERFACE

The cassette interface allows data stored in the unit's memory to be preserved on audio cassette tape. The circuitry consists of an Output-to-Tape section and an Input-from-Tape section.

OUTPUT-TO-TAPE SECTION:

For each "1" which the microprocessor finds in memory and sends to the Cassette Interface Output-to-Tape section, the circuitry will generate one period of a 4800 Hz. sine wave, and for each "0" one period of a 2400 Hz. sine wave. This is accomplished as follows:

1. U34 divides the system clock in order to produce a 38.4 KHz. clock on pin 10. The differentiator consisting of C31 and R56 takes this signal and produces a narrow pulse which is applied to U32-8.

2. U33-12 is the 38.4 KHz. clock divided by two. It is applied to U32-6.

3. CDATO is the data bit stream supplied by the microprocessor and is applied to U32-5.

4. The result of this logic is U32-10 which goes to U31-14. This signal is a pulse train with pulses occuring at a 19.2 KHz. rate if CDATO is a "0" and at 38.4 KHz. if CDATO is a "1".

5. U31 is a Johnson counter (shift register-counter) which is combined with three resistors in a simple D-to-A configuration to both divide the incoming pulse train by 8, and produce a rough approximation of a sine wave at either a 2400 Hz. rate (CDATO = "0"), or a 4800 Hz. rate (CDATO = "1").

6. The signal CD2 (U31-4) informs the microprocessor that the next data bit can be transmitted on CDATO.

7. Q6 and the associated capacitors and resistors are a low pass filter which smooths the rough sine wave output. This final signal is then sent to the recorder.

The general fcrmat for data recorded on tape is:

- LEADER (6 seconds at 2400 Hz.)

- SYNCHRONIZATION BYTE (0101 0101)
- VERSION NUMBER
- 16 BYTES OF ZEROS

- SYNCHRONIZATION BYTE (0101 0101)
- LENGTH OF TRANSMISSION TO FOLLOW
- DATA (Sequences)
- CHECKSUM
- TRAILER (2400 Hz. Tone)

INPUT-FROM-TAPE SECTION

The purpose of the Input-from-Tape section is to notify the microprocessor that a signal is being received from the recorder and to convert each period of an incoming 2400 Hz. signal into a "0" and each period of an incoming 4800 Hz. signal into a "1". This is accomplished as follows:

1. The circuitry surrounding U21-7 is a signal detector which produces a logic signal (CD1) to inform the microprocessor that a signal of sufficient level is being received from the recorder. A 4 second delay is provided by R33 and C20, and two gates in U24 provide a Schmitt trigger to convert the delayed signal to logic levels. Transistor Q3 resets C20 during the initialization period.

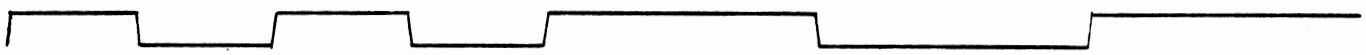
2. U21-1 is a high gain amplifier which converts the incoming audio signal into a logic signal (CDO) for use by the microprocessor.

3. The microprocessor, by interrogating CDO, can measure the the length of each incoming half-period. Depending upon the length, it stores into memory either a "0" or a "1". Since only the positive half-period is reliable, A NON SIGNAL INVERTING CASSETTE RECORDER MUST BE USED. That is, the input and output signals of the recorder must be in phase.

4. At the end of the read process, an error message will be displayed if the checksum which is calculated while the data is being read in does not equal the checksum recorded on tape.

OPERATION OF SYNC-TO-TAPE CIRCUIT

The Sync-to-tape circuit provides the necessary hardware to allow a signal on a tape recorder to control the speed of operation of the unit. Synchronization information is communicated by a 2400/4800 Hz tone. The actual useful information is the number of times per second that the tone changes frequency between 2400 and 4800 Hz. The frequency CHANGES can occur anywhere between 40 Hz and 400 Hz. For example, a typical section of the detected signal may look like:

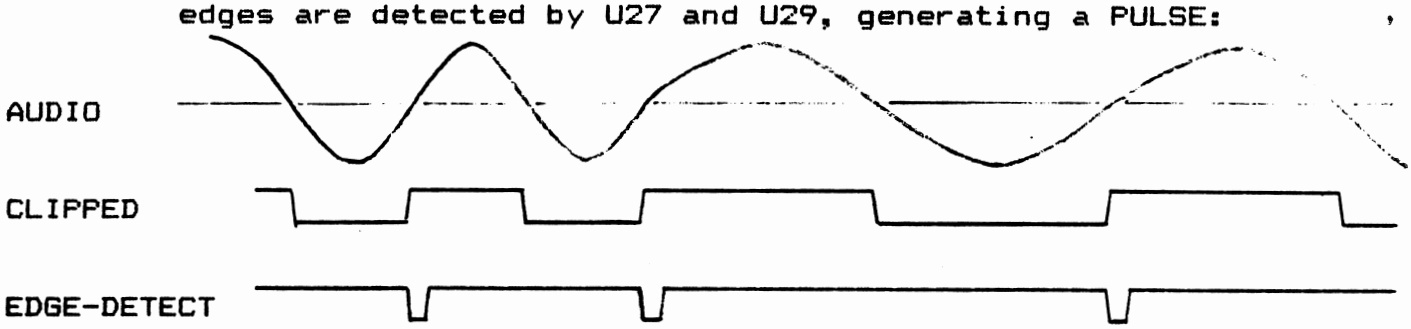


In this area, freq = 4800 Hz ----------> <---------- In this area, freq = 2400 Hz

This is a section showing a CHANGE and the changes can occur anywhere from 40 times/second up to 400 times/second.

The detection circuit works as described below.

1. The input audio waveform is first clipped by U21, and then the edges are detected by U27 and U29, generating a PULSE:



2. The pulse generated by positive zero-crossings of the waveform is about 6 usec. wide and the pulses are either 1/4800 of a second or 1/2400 of a second apart.

3. The heart of the detection circuit is an 8-bit binary counter U26, which works in conjunction with two flip-flops. When a PULSE occurs, the down counter is loaded with a count of 47. This counter is counted down by a 154 KHz (6.51 usec.period) clock.

4. With the counter preset to 47, it takes 48 clock periods to count it down to zero. Since the clocks occur every 6.51 usec. it takes 312 usec. for the counter to reach zero.

5. If the input frequency is 2400 Hz (417 usec. between PULSE's), the counter reaches zero after 312 usec. When it does, the counter is stopped until the next PULSE and a flip-flop U25, is set. This flip-flop will stay set as long as the input frequency is 2400 Hz.

6. If the input frequency is 4800 Hz (208 usec. between PULSE's), the counter never reaches zero and is continually preset by PULSE. In this case, the above mentioned flip-flop is reset and stays reset.

7. The turning on and off of this flip-flop represents a change from 2400 Hz to 4800 Hz. A second edge detector circuit, U28, U24, and U25, produces a pulse when this change occurs and this pulse drives the CPU interrupt logic, U23.

VOICE BOARDS

The voice cards come in three basic types:

1. Normal; provides 3 variations of one sound. Variation may be either pitch or volume (see section on EXT TRIGGERS & C.V.'S).

2. Split; where the sound memory is divided into two separate sounds. The first sound has two variations (pitch or volume), while triggering both inputs to the card plays a completely seperate sound.

3. Dual slot; the cymbal voice is currently the only one of these. The combination of high bandwidth and long decay requires more memory than can be fit with the encoding circuitry onto one board. Thus one board contains all the control circuitry and the other contains all the memory. The Cymbal 1 and Cymbal 2 slots are connected by a data and control bus which is not present on any of the other slots so the cymbal boards must be plugged into only those slots.

The voice boards consist of a clock (U5), a triggerable 12-bit counter (U6), a 4096 x 8 EPROM for voice data storage (U7), and an 8-bit companding DAC (U8) with associated output filter (U9). Each voice has 2 trigger inputs (TR0, TR1) which are decoded by U1, 2, 3, and 4 to produce the three drum variations. When the voice card receives a trigger pulse, the counter is started, and data is clocked out of the EPROM into the DAC at a rate set by T1. The current output of the DAC is converted to a voltage via U9-1, and the following three op-amps (U9), comprise a six-pole elliptic response low-pass filter. The cutoff frequency of the filter is set above the frequency band of the sound, and is used as a smoothing filter to integrate between the discrete samples coming out of the DAC.

The output is a monophonic audio signal available pre-fader on the back panel. This signal is also mixed into the main outputs via the front panel fader.

EXTERNAL TRIGGERS & CONTROL VOLTAGES

EXTERNAL TRIGGERS:

The DMX has inputs on the rear panel for external triggers and control voltages. The EXT. TRIG connections provide a means of triggering the drums from an external controller. A positive voltage between 1 and 5 volts will trigger the drums. These inputs will trigger the bottom row of drums (loud snare, open hi-hat, rimshot, etc.). The selection of what drums are played by the external triggers is a software function, and cannot be changed by the user. If it is desired to control the other drums, this can be accomplished by wiring a contact closure or TTL gate in parallel with the buttons on the front panel.

When using the external triggers with an audio source (triggering from the output of a microphone pre-amp or electric instrument, for instance) you may get multiple triggers. In this case, adjust the level of the trigger signal so that it only triggers on peaks, or use an envelope follower. FIG 1 shows a simple envelope follower which will improve triggering from an audio source.

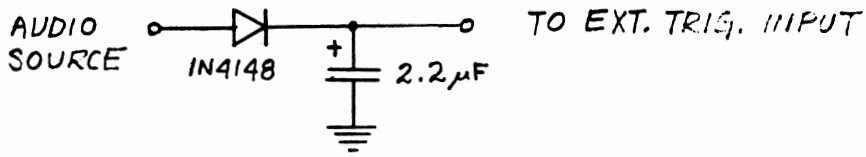
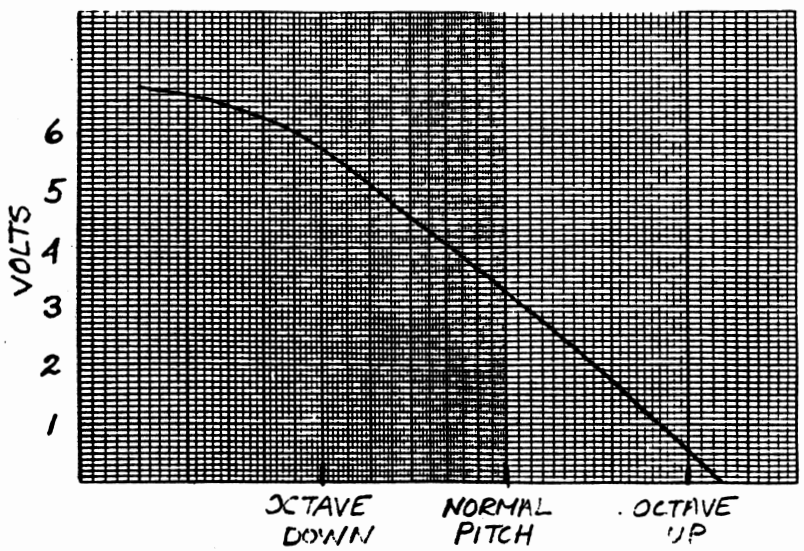


FIG. 1 - ENVELOPE FOLLOWER

EXTERNAL CONTROL VOLTAGES:

The external control voltage inputs (one for each voice), can be used to control either the pitch or the volume of the voice. All voices come from the factory strapped for control of pitch. To convert to volume control, change jumper "Y" on the voice board from position 1 to position 2. The characteristic of the pitch control is shown in FIG.2. Note that the response is approximately 2-1/2 volts per octave, and that the pitch decreases with increasing voltage. If you want to control the pitch directly from a keyboard and have the pitch increase as you play up the keyboard, you must invert the control voltage before feeding it to the DMX.

FIG. 2
CONTROL VOLTAGE
VS.
PITCH



The control voltage inputs also provide a voltage source, so that it is possible to control the pitch/volume with only a potentiometer. When controlling the pitch in this manner, the lower pitch limit will be controlled by the trim pot T1 on the voice board, which should be tuned to lowest pitch for maximum range at the external input. FIG. 3 shows how to hook up a footpedal to control the external CV's.

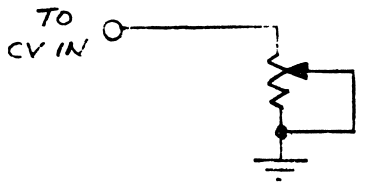


FIG. 3 - FOOTPEDAL WIRING DIAGRAM

The value of the pot should be 50k ohms for maximum range. For best results the pot should have an audio taper.

HI-HAT DECAY:

The decay of the CLOSED and ACCENT Hi-Hat may be changed by changing the value of C3. A useful range is about 2 mF to 10 mF. A smaller value will give a shorter decay, and a larger value will provide a longer decay time.

POWER SUPPLY & PUP CIRCUIT

The +5 volt power for the logic circuitry is provided by one of the secondaries of the power transformer, rectifier CR1, filter capacitor C18, regulator U30, and the pass transistor on the rear panel heatsink. The +5 volt supply is adjustable via T1, although this trimmer is set at the factory and should not require adjustment unless components in the regulator circuit have been changed. Jumper J5 provides a convenient way to disconnect the power supply from the circuitry for trouble-shooting.

An additional center-tapped secondary on the power transformer provides + and - 12 volts via rectifier CR2, filter capacitors C3 and C4, and regulators U38 and U39. These regulators are fixed voltage output, and are not adjustable. The +/- 12 volt supplies power the audio circuitry on the voice and switch boards. In addition, the +12 supply is used to charge the battery used for memory retention.

The battery is charged at a constant rate through D1 and R7. Zener diode Z1 prevents the charging voltage from getting too high. Power is supplied to the CMOS RAM's through D4 when the power is turned on, and from the battery through D3 when the power is turned off. The RAMs are selected so that total current draw in standby mode is 300 micro-amps or less. In normal use, the battery should last for about one month without re-charging. Charging time for a fully discharged battery is 14 hours.

The PUP (Power UP) circuitry consisting of U29, Q5, and associated components, ensures that the CMOS RAM's are maintained in standby mode whenevers the power is turned off. It also makes it impossible to accidently write to the memories after the AC power has been switched off (for instance, as the +5 volt supply decays). The signal PUPIN comes directly from the secondary of the power transformer, and is active only when AC power is switched on. When power is turned off, C39 is charged from the +5M supply (battery) through R73. U29-3 acts as a Schmitt trigger and is turned on, thus charging C40 though D8, and maintaining PUP* at a logic one. PUP* high inhibits the write strobe WR* and memory select lines RAM0* - RAM3* (via U3), thus placing the memories in standby mode. When AC power is turned on, C39 is discharged through Q5, causing U29-3 to go low and discharge C40 through R74. The time constant of C40 and R74 is sufficient to allow the +5 volt supply to come up to full voltage before U29-4 goes low. This pulls PUP* low, enabling the memory select and write lines.

AUDIO OUTPUT

The audio mixing and output circuitry is located on the Switch-Board. The audio outputs of the voice cards are carried from the Processor Board to the volume sliders (P1-P8) by the audio ribbon cable. The outputs of the volume controls go to two active summing amplifiers, U1. Each voice has a left and right summing resistor (R9-R26) feeding the left and right summing amps. The relative value of these resistors determines the panning location of that voice in the stereo image. The two summing amps then feed a stereo master volume control, which then goes to two buffer amps, and out to the jacks on the rear panel. The mono output is derived by the passive summing network R33 and R34.

A. Test Power Supplies

1. Turn on AC power, and check +5v. Adjust to 5v,+/-50mv.

2. Check 12 volt supplies. Should be +/- 600mv.

3. Check +5 MEM. Should be +/- 1 volt. With power off, +5MEM may vary considerably depending on charge of battery.

4. Check battery voltage with power off. At the time of final test, the battery should be fully charged (4.2v.). Disconnect battery with UNGROUNDED solder iron, insert an amp meter, and check current. Should be less than 300 micro-amps.

5. PUP TEST: Check the voltage at U29 pin 4. With the AC power on, the voltage should be zero. With the power off, the voltage should be approximately equal to the battery voltage (3.5 to 4.0v).

B. Diagnostic Test Program

The DMX TEST EPROM is inserted in the socket for EPROM 0 (U 18). EPROM 1 may be in the system or not; it has no effect on the diagnostic program.

The Diagnostic Test EPROM contains 8 subroutines that exercise and test various circuits and wiring in the DMX. When the DMX is initially turned on with a Test EPROM installed, the display reads "SELECT TEST 0-8". Any of the 8 tests can now be accessed by pushing a numbered button 0-8. Pressing the STEP button will cause the DMX to list the names and numbers of the tests on the display. The DMX will then return to "SELECT TEST" mode.

> NOTE: Some routines take a few seconds to run, and the buttons are not scanned until the end of a routine or the end of a timed display, so sometimes it is necessary to keep a button depressed a few seconds before the system responds to it. The routines are as follows:

TEST 0 - Display test

Test 0 outputs a condenced ASCII set to the displays. Check to see that all display segments are working. To exit test, press Play/Stop button.

The displays are enabled by ID* and address lines A2 and A3.

TEST 1 - Memory Test

Test 1 writes to each RAM chip and reads the data back to find any bad memory chips that may exist in the system. The socket number of the memory chip is displayed after it is tested. If the memories are good the display will read "MEMORY OK" and exit test automatically. If there is an error, the socket number will be displayed in a message that reads "MEMORY 13 ERROR" , for example. The DMX will "beep" and wait for the RECORD button to be pushed before continuing with the test. This gives the technician time to notate the error.

The PUP* line should be low. The RD*, WRA*, and RAM select lines (RAM0* through RAM3*) are activated during this test.

TEST 2 - Switch Reading Test

Test 2 will display the name of each switch as it is pressed. Use this routine to test:

1. All the switches on the front panel

2. The cassette enable and memory protect switches on the rear panel

3. The external drum triggers on the rear panel. (Use a jumper connected to +5v. to trigger the drums.)

NOTE: A mono phone plug installed in the SYNC IN jack shows up as a switch closure: "SYNC FROM TAPE".

NOTE: The Play/Stop button exits the test, so check it last. Signals that go active during this test are IORD*, SW6*, and CASI* . I.C.'s used are U7, U8, and U9 on the switchboard.

TEST 3 - Interrupt Test
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1. Test 3 checks the interrupt generator by sounding the metronome on each interrupt. You should hear a fast tempo click.

2. Listen to the external clock out. You should hear a buzz.

3. Listening to regular audio out again, plug an oscillator into the EXTERNAL CLOCK IN jack. Vary the frequency of the oscillator. You should hear the click frequency change. The Play/Stop button exits this test.

A signal on STIM* (U10, pin 11) latches a number that a count-down counter (U11) starts counting from if it is enabled by CLEN. The overflow can be seen on pin 14 of U11 and is used to generate the INT* signal seen on pin 12 of U23. When INT* goes low the Z80 jumps to a

routine that outputs a "click". U33, U7, U35, transistors Q8 and Q7 in the metronome circuit are all involved in this test. If this test fails, use TEST 6 to help isolate the problem.

TEST 4 - Drum Triggers Test

Test 4 sounds all the voice cards at once, starting with drum 3, which corresponds to the bottom row of buttons.

1. Use the faders to single out one voice at a time and use the numbered buttons 1-3 to select each one of the three drums on a voice card. Check all drums on all voices.

2. See that the volume and/or pitch intervals are correct.

3. Test the pitch trimmers to see that they vary the pitch.

4. Listen to each individual drum output on rear panel. Also listen to the left, right, and mono outputs.

5. Connect a jumper from +5v. to the EXTERNAL C.V.'s and play the selected drum. The pitch of the drum should should change when the voltage is applied.

The trigger signals (TR1 - TR16), come from latches (U8 and U9) which are strobed by GEN0* and GEN1*.

TEST 5 - Battery Back-Up Test

Test 5 has two running modes: "write-record", and "test-copy". To test the battery back-up system, this test should be run two times, once in each mode, in order.

1. When test 5 is selected, the display will prompt you for the mode you want. Press RECORD. This causes data to be written into memory. Now the display will tell you to: "TURN POWER OFF, AND WAIT 10SEC". Do this, then turn power on again. Now you are ready for part 2.

2. Select test 5 once again. This time press COPY. This causes the contents of memory to be checked. If the data survived power-down, the display will read: "BATTERY OK" and return to "SELECT TEST" mode. If there is bad data, the display will flash "BATTERY ERROR" and wait for RECORD to be pressed before exiting test.

> NOTE: The Memory test leaves a HEX 55 in the memory, which is the same pattern the battery test uses. Therefore it is possible to get a "Battery Good" message even if you did not run the "Write-Record" part of this test first.

TEST 6 - Beep Test

This test uses the metronome hardware to make a beep tone. The purpose of this test is to make it posible to isolate an interrupt problem from a metronome hardware problem. This test is necessary only if test #3 fails.

TEST 7 - Cassette Test

This test works the same way the regular cassette routine works. NOTE: Turn CASSETTE ENABLE switch ON before selecting test 7. To exit test, turn CASSETTE ENABLE off.

1. Connect audio out to amplifier or headphones.

2. Connect cassette recorder to DMX.

3. Set playback volume to 3/4 of MAXIMUM.

4. Enable cassette mode with switch on rear panel.

5. Select test 7.

6. Load factory sequence tape (PLAY). You should be able to hear the cassette tone by turning up METRONOME volume.

7. Check cassette RECORD function by dumping back to cassette. Make sure that cassette record level control is set on automatic, or set to OVU.

8. Rewind cassette and playback in CHECK mode to check recording.

9. Listen to SYNC OUT while cassette routine is RECORDING. You should be able to hear the data being output.

The cassette routine used in the diagnostic program is the same one used in the regular software, and is subject to the same compatability restrictions; the DMX TEST EPROM will not work with cassette tapes produced on DMX's prior to serial number B820801.

TEST 8 - Sync From Tape Test

A cassette which has already been recorded with sync tone is required for this test. Connect the cassette recorder out to SYNC TO TAPE IN. Play the tape. When the sync tone starts, the metronome should click.

* NOTE: On tape recorders equiped with Automatic Level Control, there may be sufficient hum and noise generated in PAUSE mode, that the DMX will trigger spontaneously. Either do not use PAUSE mode, or reduce the playback volume to the point where the DMX will not trigger.

This test routine is the same as the metronome test, except that the counter is NOT enabled (CLEN), so the INT* will not happen until a signal appears on SYNC IN from a tape. In this case INT* goes low when the D-latch is "preset" by CSYN (U23 pin8 and U24 pin 4). Normal software disables CLEN when a mono jack inserted in SYNC IN pulls TSYN* low. Uses U24, 25, 26, 27, 28, 19, 23.

CABLE #4 - Audio Ribbon Cable from Processor Board to Potboard:

Processor board end			Potboard end
C1	-	Metronome	- A1
C2	-	Spare	- A2
C3	-	Perc 2	- A3
C4	-	Spare	- A4
C5	-	Perc 1	- A5
C6	-	Spare	- A6
C7	-	Cymbal	- A7
C8	-	+12 volts	- A8
C9	-	Tom 2	- A9
C10	-	Analog Ground	- A10
C11	-	Tom 1	- A11
C12	-	Analog Ground	- A12
C13	-	Hi-Hat	- A13
C14	-	-12 volts	- A14
C15	-	Snare	- A15
C16	-	Mono mix	- A16
C17	-	Bass	- A17
C18	-	Right mix	- A18
C19	-	Spare	- A19
C20	-	Left mix	- A20

CABLE XFMR - Power Transformer:

PIN		CONNECTION
I1	-	5 volt AC
I2	-	5 volt AC
I3	-	N.C. (key)
I4	-	Ground (5 volt CT)
I5	-	Ground (12 volt CT)
I6	-	N.C.
I7	-	12 volt AC
I8	-	12 volt AC

CABLE #5 - Digital Ribbon Cable from Processor Board to Potboard:

Processor board end				Potboard end
G1	-	IORD*	-	B1
G2	-	CASI*	-	B2
G3	-	Digital Ground	-	B3
G4	-	Digital Ground	-	B4
G5	-	Digital Ground	-	B5
G6	-	Spare	-	B6
G7	-	+5 volts	-	B7
G8	-	Spare	-	B8
G9	-	+5 volts	-	B9
G10	-	Spare	-	B10
G11	-	SW6*	-	B11
G12	-	D7	-	B12
G13	-	Digital Ground	-	B13
G14	-	D6	-	B14
G15	-	ID*	-	B15
G16	-	D5	-	B16
G17	-	Spare	-	B17
G18	-	D4	-	B18
G19	-	A3	-	B19
G20	-	D3	-	B20
G21	-	A2	-	B21
G22	-	D2	-	B22
G23	-	A1	-	B23
G24	-	D1	-	B24
G25	-	A0	-	B25
G26	-	D0	-	B26

CABLE #1 - External Control Voltage Inputs:

Processor board				Rear Panel Molex
D1	-	Ground	-	pin 2,5,8,11
D2	-	Key	-	N.C.
D3	-	Cymbal	-	pin 4
D4	-	Perc 2	-	pin 1
D5	-	Perc 1	-	pin 3
D6	-	Tom 2	-	pin 6
D7	-	Tom 1	-	pin 7
D8	-	Hi-Hat	-	pin 9
D9	-	Snare	-	pin 10
D10	-	Bass	-	pin 12

CABLE #2 - External Trigger Inputs:

Processor board				Rear Panel Molex
E1	-	Ground	-	pin 2,5,8,11
E2	-	Key	-	N.C.
E3	-	Cymbal	-	pin 4
E4	-	Perc 2	-	pin 1
E5	-	Perc 1	-	pin 3
E6	-	Tom 2	-	pin 6
E7	-	Tom 1	-	pin 7
E8	-	Hi-Hat	-	pin 9
E9	-	Snare	-	pin 10
E10	-	Bass	-	pin 12

CABLE #3 - Processor Board to Rear Panel:

PIN		CONNECTION
F1	-	Ground
F2	-	To Cassette In
F3	-	CASIN
F4	-	MET
F5	-	N.C.
F6	-	CASEN*
F7	-	PROT*
F8	-	N.C.
F9	-	N.C. (key)
F10	-	+5 Volts

CABLE #6 - Power Regulator Transistor:

PIN		CONNECTION
H1	-	Collector
H2	-	N.C. (key)
H3	-	Base
H4	-	Emitter

QTY	PART #	LOCATION	DESCRIPTION
*	720065		PROCESSOR BOARD PCB-SUB ASSY.
2	151010	C3,4	CAP ALUM ELECT 470 MF 25V
1	151018	C40	CAP ALUM ELECT 2.2 MF RADIAL
3	151024	C1,2,26	CAP ALUM ELECT 15 MF 25V
1	151029	C18	CAP ALUM ELECT 4700 MF 25V
2	153004	C15,37	CAP MYLAR FLM .01
5	153013	C14,17,23,32,39	CAP MYLAR FLM .1
1	153014	C22	CAP MYLAR FLM .0022
1	153020	C25	CAP MYLAR FLM .0033
3	157003	C13,20,24	CAP TANTALUM 6.8 MF 35V
3	157005	C29,31,76	CAP CER DISC 100 PF 1000V
1	157008	C38	CAP CER DISC 10 PF 1000V
1	157012	C35	CAP CER DISC 30 PF 1000V
13	157021	C5,6,7,8,9,10,11 12,28,30,34,36,41	CAP MONOLITHIC CERAMIC K5M .1MF
1	157024	C21	CAP CER DISC 470 PF
2	219020	S16,17	PHONE JACK 3C PCMT RN-112BPC
15	219021	S1-15	PHONE JACK 2C PCMT RN-111PC
1	219022	S18	PHONE JACK 3C+N PC RN-114PC
1	219313	D8	CONN PCMT 3-CKT M L.64 09-64-1032
12	219317	I,A1-A9,B8,B9	CONN PCMT 8-CKT M L.64 09-64-1082
10	219330	B1-B8,C8,C9	CONN PCMT 6-CKT M L.64 09-64-1062
1	219901	U21	IC SOCKET 8 PIN
17	219902	U3,4,5,22,23, 24,25,27,28, 29,32,30,33, 34,35,36,37	IC SOCKET 14 PIN
6	219903	U2,7,11,20,26,31	IC SOCKET 16 PIN
6	219906	U13,14,15,16,17,18	IC SOCKET 24 PIN
1	219907	U12	IC SOCKET 40 PIN
5	219909	U6,8,9,10,19	IC SOCKET 20 PIN
1	230001	X1	CRYSTAL 4.9152 MHZ
2	261003	RG1,RG2	HEATSINK TO-220 X 1/2" H371
1	311021	U35	IC 74LS74 D F/F
1	311022	U36	IC 74LS04 HEX INVERTER
4	311031	U6,8,9,19	IC 74LS244
1	311033	U10	IC 74LS374
1	311034	U34	IC 74LS393
1	313003	U21	IC 1458 DUAL OP AMP
2	313008	U4,5	IC 3086 TRANSISTOR ARRAY NPN
1	313014	U30	IC 723 VOLTAGE REG
1	313036	RG1	IC 7812 VOLTAGE REG +12V
1	313044	RG2	IC 7912 VOLTAGE REG -12V
1	315002	U28	IC 4011 QUAD 2IN NAND
4	315006	U23,25,27,33	IC 4013 DUAL TYPE D F/F
1	315009	U24	IC 4030 QUAD EX OR GATE
1	315015	U20	IC 74C174 HEX D F/F
1	315026	U32	IC 4001 QUAD 2IN NOR

QTY	PART #	LOCATION	DESCRIPTION
1	315027	U31	IC 4018 PRESET /N COUNT NSC
2	315029	U2,7	IC 74C42 BCD-DECODER
2	315041	U11,26	IC 40103
2	315044	U3,29	IC 4071 QUAD 2-IN OR GATE
1	316001	U12	Z80 MICROPROCESSOR MK3880N
4	317009	U13,14,15,16	RAM 6116 2KX8 CMOS HM6116P-4
2	317010	U17,18	EPROM 2732 4096X8
1	401004	BAT	BATTERY
2	478010	R25,26	RESISTOR FXD 1/4W 2-5% .5 OHM
2	478102	R38,42	RESISTOR FXD 1/4W 2-5% 1K
7	478103	R21,34,37,57, 62,75,77	RESISTOR FXD 1/4W 2-5% 10K
2	478104	R33,74	RESISTOR FXD 1/4W 2-5% 100K
1	478105	R59	RESISTOR FXD 1/4W 2-5% 1 MEG
1	478122	R68	RESISTOR FXD 1/4W 2-5% 1.2K
2	478152	R30,46	RESISTOR FXD 1/4W 2-5% 1.5K
1	478204	R73	RESISTOR FXD 1/4W 2-5% 200K
1	478220	R66	RESISTOR FXD 1/4W 2-5% 22 OHM
3	478221	R42,43,67	RESISTOR FXD 1/4W 2-5% 220 OHM
1	478222	R21	RESISTOR FXD 1/4W 2-5% 2.2K
1	478223	R53	RESISTOR FXD 1/4W 2-5% 22K
2	478224	R32,45	RESISTOR FXD 1/4W 2-5% 220K
1	478225	R72	RESISTOR FXD 1/4W 2-5% 2.2 OHM
6	478333	R31,48,49,51, 52,76	RESISTOR FXD 1/4W 2-5% 33K
1	478361	R7	RESISTOR FXD 1/2W 360 OHM
1	478471	R54	RESISTOR 470 OHM
29	478472	R8,9,10,11,12, 13,14,15,16, 17,18,19,20, 23,24,27,39, 40,41,47,50, 55,56,58,60, 63,64,65,69	RESISTOR FXD 1/4W 2-5% 4.7K
3	478473	R35,36,61	RESISTOR FXD 1/4W 2-5% 47K
2	478821	R70,71	RESISTOR FXD 1/4W 2-5% 820 OHM
1	475326	R28	RESISTOR FXD 1.78K 1% 1/8W
1	475369	R29	RESISTOR FXD 4.87K 1% 1/8W
1	476012	T1	TRIMMER 375E102B CERMET
6	479003	R1,2,3,4,5,6	RESISTOR NETWORK 4.7K SIP 10P
6	481001	D1,5,6,7,8,3	DIODE SIGNAL 1N4148
1	482015	D4	DIODE GERMANIUM 1N34A
1	482016	Z1	DIODE ZENER 1N752A
2	483006	CR1,CR2	RECTIFIER BRIDGE GI-W02M
7	485003	Q1,2,3,4,5, Q7,8	TRANSISTOR SS NPN MPS5172
2	486002	Q6,9	TRANSISTOR SS PNP 2N3905
1	651585		DMX PROCESSOR PC BOARD 1583A/1584A
1	750156		CABLE SUB-ASSY DMX #4
1	750157		CABLE SUB-ASSY DMX #5

QTY	PART #	LOCATION	DESCRIPTION
*	720066		SWITCH BOARD PCB SUB-ASSY.
3	151024	C1,2,5	CAP ELECT 15MF 25V RADIAL
2	151031	C3,4	CAP ELECT 47MF 35V AXIAL
1	219512	B	CONN RIBBON 26P RT ANGLE HEADER
1	219518	A	CONN RIBBON 20P RT ANGLE HEADER
4	219903	U2,7,8,9	IC SOCKET 16 PIN
1		U1	IC SOCKET 14 PIN
4	241008	U3,4,5,6	ALPHA-NUMERIC DSPLY DL1414
2	311019	U2,9	IC 74LS42 BCD-TO-DEC DECODER
1	313024	U1	IC TL084 QUAD BI-FET OP-AMP
2	315030	U7,8	IC 80C98 TRI-STATE INVERTER
9	477034	P1-P9	SLIDE POT VJ608N D1-20 10K 15A
1	477035	P10	SLIDE POT DUAL VJ608GN D1-20 10K 15A
2	478102	R33,34	RESISTOR FXD 1/4W 2-5% 1K
4	478103	R9,10,31,32	RESISTOR FXD 1/4W 2-5% 10K
4	478104	R15,18,21,24	RESISTOR FXD 1/4W 2-5% 100K
3	478203	R11,14,19	RESISTOR FXD 1/4W 2-5% 20K
2	478273	R29,30	RESISTOR FXD 1/4W 2-5% 27K
1	478472	R1,2,3,4,5,6,7,8	RESISTOR FXD 1/4W 2-5% 4.7K
2	478562	R25,26	RESISTOR FXD 1/4W 2-5% 5.6K
4	478682	R16,17,22,23	RESISTOR FXD 1/4W 2-5% 6.8K
3	478822	R12,13,20,	RESISTOR FXD 1/4W 2-5% 8.2K
48	481001	D1-D48	DIODE SIGNAL 1N4148
2	510013-A		SWITCH SPST MOM 1300-BLK/V
34	510013-B		SWITCH SPST MOM 1300-BLK/PLAIN
1	510013-C		SWITCH SPST MOM 1300-BEIGE/PLAIN
1	510013-D		SWITCH SPST MOM 1300-RED/PLAIN
1	510013-0		SWITCH SPST MOM 1300-BLK/0
1	510013-1		SWITCH SPST MOM 1300-BLK/1
1	510013-2		SWITCH SPST MOM 1300-BLK/2
1	510013-3		SWITCH SPST MOM 1300-BLK/3
1	510013-4		SWITCH SPST MOM 1300-BLK/4
1	510013-5		SWITCH SPST MOM 1300-BLK/5
1	510013-6		SWITCH SPST MOM 1300-BLK/6
1	510013-7		SWITCH SPST MOM 1300-BLK/7
1	510013-8		SWITCH SPST MOM 1300-BLK/8
1	510013-9		SWITCH SPST MOM 1300-BLK/9
1	651541		DMX SWITCH BOARD PC 1542A-1543A

QTY	PART #	LOCATION	DESCRIPTION
*	720067-1,2,3,4,5,6,7		VOICE BOARD PCB SUB-ASSY.
3	151025	C1,11,12	CAP ALUM ELECT 10MF/25V AXIAL
1	151032	C10	CAP ALUM ELECT 33MF 35V AXIAL
1	151034	C3	CAP ALUM ELECT 3.3MF 25V AXIAL
2	153004	C5,6	CAP MYLAR FLM .01 C280AE/A10K
1	153007	C4	CAP MYLAR FLM .0047 C350AF/A4K7
1	153008	C8	CAP MYLAR FLM .047 C280AE/A47K
1	157022	C9	CAP CER DISC 200PF +/-10% X7R
1	157023	C7	CAP CER DISC 560PF +/-10% X7R
1	219210	B	6-PIN PC MOUNT MOLEX 3061
1	219211	A	8-PIN PC MOUNT MOLEX 3081
1	219901	U5	8-PIN IC SOCKET
5	219902	U9,1,3,4,2	14-PIN IC SOCKET
1	219903	U6	16-PIN IC SOCKET
1	219905	U8	18-PIN IC SOCKET
1	219906	U7	24-PIN IC SOCKET
1	313024	U9	IC TL084 BI-FET QUAD OP-AMP
1	313045	U5	IC NE555 TIMER
1	315002	U2	IC 4011 QUAD 2IN NAND
2	315006	U1,3	IC 4013 DUAL TYPE D F/F
1	315023	U4	IC 4001 QUAD 2IN NOR
1	315032	U6	IC 4040 12-BIT COUNTER
1	315043	U8	IC AM6070 8-BIT DAC
1	317010	U7	IC 2732 4KX8 EPROM
1	476010	T1	TRIMMER 10K CERMET
1	478102	R3	RESISTOR FXD 1/4W 2-5% 1K
4	478103	R1,2,4,10	RESISTOR FXD 1/4W 2-5% 10K
2	478242	R11,16	RESISTOR FXD 1/4W 2-5% 2.4K
1	478272	R8	RESISTOR FXD 1/4W 2-5% 2.7K
1	478332	R5	RESISTOR FXD 1/4W 2-5% 3.3K
1	478470	R21	RESISTOR FXD 1/4W 2-5% 47 OHM
1	478471	R22	RESISTOR FXD 1/4W 2-5% 470 OHM
1	478472	R6	RESISTOR FXD 1/4W 2-5% 4.7K
1	478562	R9	RESISTOR FXD 1/4W 2-5% 5.6K
5	481001	D1,2,3,W,X	DIODE SIGNAL 1N4148
1	485003	Q1	TRANSISTOR SS NPN MPS5172
1	651552		DMX VOICE PC 1553A-1554A

*	720067-1		VOICE PCB SUB-ASSY. KICK
1	151034	C3	CAP ALUM ELECT 3.3MF 25V AXIAL
1	153020	C2	CAP MYLAR FLM .0033 C280AE/A3K3
1	478470	R12	RESISTOR FXD 1/4W 2-5% 47 OHM
2	478512	R19,20	RESISTOR FXD 1/4W 2-5% 5.1K
1	478622	R14	RESISTOR FXD 1/4W 2-5% 6.2K
1	478682	R15	RESISTOR FXD 1/4W 2-5% 6.8K
1	478751	R17	RESISTOR FXD 1/4W 2-5% 750 OHM
2	478912	R13,18	RESISTOR FXD 1/4W 2-5% 9.1K

QTY	PART #	LOCATION	DESCRIPTION
*	720067-2		VOICE PCB SUB-ASSY. SNARE
1	153014	C2	CAP MYLAR FLM .0022 C280AE/A2K2
1	478150	R12	RESISTOR FXD 1/4W 2-5% 15 OHM
1	478152	R17	RESISTOR FXD 1/4W 2-5% 1.5K
2	478332	R19,20	RESISTOR FXD 1/4W 2-5% 3.3K
3	478472	R7,14,15	RESISTOR FXD 1/4W 2-5% 4.7K
2	478562	R13,18	RESISTOR FXD 1/4W 2-5% 5.6K
*	720067-3		VOICE PCB SUB-ASSY. HI-HAT
1	151033	C3	CAP ALUM ELECT 6.8MF 25V AXIAL
1	153020	C2	CAP MYLAR FLM .0033 C280AE/A3K3
1	478150	R12	RESISTOR FXD 1/4W 2-5% 15 OHM
1	478152	R17	RESISTOR FXD 1/4W 2-5% 1.5K
2	478332	R19,20	RESISTOR FXD 1/4W 2-5% 3.3K
3	478472	R7,14,15	RESISTOR FXD 1/4W 2-5% 4.7K
2	478562	R13,18	RESISTOR FXD 1/4W 2-5% 5.6K
*	720067-4		VOICE PCB SUB-ASSY. TOM1
1	151033	C3	CAP ALUM ELECT 6.8MF 25V AXIAL
1	153020	C2	CAP MYLAR FLM .0033 C280AE/A3K3
1	478183	R12	RESISTOR FXD 1/4W 2-5% 18K
1	478333	R17	RESISTOR FXD 1/4W 2-5% 33K
2	478512	R19,20	RESISTOR FXD 1/4W 2-5% 5.1K
1	478622	R14	RESISTOR FXD 1/4W 2-5% 6.2K
1	478682	R15	RESISTOR FXD 1/4W 2-5% 6.8K
2	478912	R13,18	RESISTOR FXD 1/4W 2-5% 9.1K
*	720067-5		VOICE PCB SUB-ASSY. TOM2
1	151033	C3	CAP ALUM ELECT 6.8MF 25V AXIAL
1	153020	C2	CAP MYLAR FLM .0033 C280AE/A3K3
1	478183	R12	RESISTOR FXD 1/4W 2-5% 18K
1	478333	R17	RESISTOR FXD 1/4W 2-5% 33K
2	478512	R19,20	RESISTOR FXD 1/4W 2-5% 5.1K
1	478622	R14	RESISTOR FXD 1/4W 2-5% 6.2K
1	478682	R15	RESISTOR FXD 1/4W 2-5% 6.8K
2	478912	R13,18	RESISTOR FXD 1/4W 2-5% 9.1K
*	720067-6		VOICE PCB SUB-ASSY. PERC1
1	153020	C2	CAP MYLAR FLM .0033 C280AE/A3K3
1	478300	R12	RESISTOR FXD 1/4W 2-5% 30 OHM
1	478152	R17	RESISTOR FXD 1/4W 2-5% 1.5K
2	478332	R19,20	RESISTOR FXD 1/4W 2-5% 3.3K
3	478472	R7,14,15	RESISTOR FXD 1/4W 2-5% 4.7K
2	478562	R13,18	RESISTOR FXD 1/4W 2-5% 5.6K

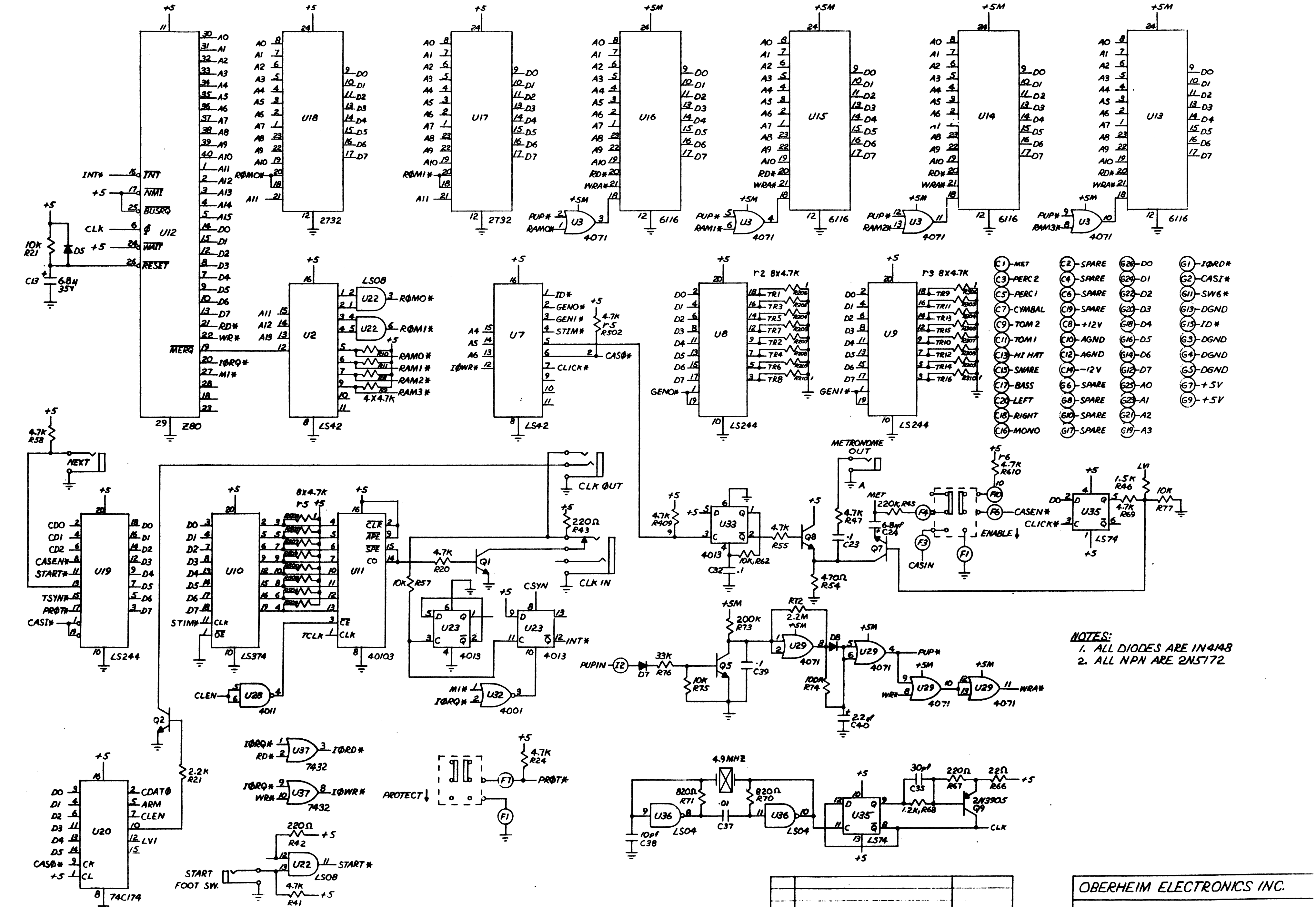
QTY	PART #	LOCATION	DESCRIPTION
*	720067-7		VOICE PCB SUB-ASSY. PERC2
1	153020	C2	CAP MYLAR FLM .0033 C280AE/A3K3
1	478300	R12	RESISTOR FXD 1/4W 2-5% 30 OHM
1	478152	R17	RESISTOR FXD 1/4W 2-5% 1.5K
2	478332	R19,20	RESISTOR FXD 1/4W 2-5% 3.3K
3	478472	R7,14,15	RESISTOR FXD 1/4W 2-5% 4.7K
2	478562	R13,18	RESISTOR FXD 1/4W 2-5% 5.6K
*	720068		VOICE PCB SUB-ASSY. #2
3	151025	C1,11,12	CAP ALUM ELECT 10MF/25V AXIAL
1	151032	C10	CAP ALUM ELECT 33MF 35V AXIAL
1	151034	C3	CAP ALUM ELECT 3.3MF 25V AXIAL
2	153004	C5,6	CAP MYLAR FLM .01 C280AE/A10K
1	153007	C4	CAP MYLAR FLM .0047 C350AF/A4K7
1	153008	C8	CAP MYLAR FLM .047 C280AE/A47K
1	153020	C2	CAP MYLAR FLM .0033 C280AE/A3K3
1	157022	C9	CAP CER DISC 200PF +/-10% X7R
1	157023	C7	CAP CER DISC 560PF +/-10% X7R
1	219210	B	6-PIN PC MOUNT MOLEX 3061
1	219211	A	8-PIN PC MOUNT MOLEX 3081
1	219901	U5	8-PIN IC SOCKET
5	219902	U9,1,3,4,2	14-PIN IC SOCKET
1	219905	U8	18-PIN IC SOCKET
1	313024	U9	IC TL084 BI-FET QUAD OP-AMP
1	313045	U5	IC NE555 TIMER
1	315002	U2	IC 4011 QUAD 2IN NAND
2	315006	U1,3	IC 4013 DUAL TYPE D F/F
1	315023	U4	IC 4001 QUAD 2IN NOR
1	315043	U8	IC AM6070 8-BIT DAC
1	476010	T1	TRIMMER 10K CERMET
1	478101	R12	RESISTOR FXD 1/4W 2-5% 100 OHM
1	478102	R3	RESISTOR FXD 1/4W 2-5% 1K
4	478103	R1,2,4,10	RESISTOR FXD 1/4W 2-5% 10K
2	478242	R11,16	RESISTOR FXD 1/4W 2-5% 2.4K
1	478272	R8	RESISTOR FXD 1/4W 2-5% 2.7K
3	478332	R5,19,20	RESISTOR FXD 1/4W 2-5% 3.3K
1	478470	R21	RESISTOR FXD 1/4W 2-5% 47 OHM
1	478471	R22	RESISTOR FXD 1/4W 2-5% 470 OHM
5	478472	R6,7,14,15,23	RESISTOR FXD 1/4W 2-5% 4.7K
3	478562	R9,13,18	RESISTOR FXD 1/4W 2-5% 5.6K
1	478681	R17	RESISTOR FXD 1/4W 2-5% 680 OHM
5	481001	D1,2,3,W,X	DIODE SIGNAL 1N4148
1	485003	Q1	TRANSISTOR SS NPN MPS5172
1	651552		DMX VOICE PC 1553A-1554A

QTY	PART #	LOCATION	DESCRIPTION
*	720069		VOICE PCB SUB-ASSY. #3
1	151025	C2	CAP ALUM ELECT 10 25V AXIAL
1	153008	C1	CAP MYLAR FLM .047 C280AE/A47K
1	219209	D	3-PIN PC MOUNT MOLEX 3031
1	219210	C	6-PIN PC MOUNT MOLEX 3061
2	219211	A,B	8-PIN PC MOUNT MOLEX 3081
2	219902	U1,2	14-PIN IC SOCKET
2	219903	U3,4	16-PIN IC SOCKET
8	219906	U5-12	24-PIN IC SOCKET
1	311019	U3	IC 74LS42 BCD-TO-DEC DECODER
2	315006	U1,2	IC 4013 DUAL TYPE D F/F
1	315032	U4	IC 4040 12-BIT COUNTER
8	317010	U5-12	EPROM 2732 4096X8
2	478103	R1,3	RESISTOR FXD 1/4W 2-5% 10K
1	478332	R2	RESISTOR FXD 1/4W 2-5% 3.3K
1	485003	Q1	TRANSISTOR SS NPN MPS5172
1	651559		DMX VOICE PC 1559A-1560A
*	730104		CHASSIS MECH. SUB-ASSY.
1	219018		AC REC 3-COND PAN MT SCRFT EAC-301
2	248309		CAP 11MM DIA BLK MATT 040-3025
10	248705		KNOB ROGAN SC-35-L
1	281004		SCREW 6-32X3/8 PHIL FLAT BLK OX
21	281018		SCREW 6-32X5/16 PHIL PAN BLK OX
2	281033		SCREW 8-32X3/8 PHIL PAN BLK OX
6	281044		SCREW 6-32X1/4 PHIL PAN BLK OX
5	281050		SCREW 6-32X3/8 PHIL PAN BLK OX
38	282009		NUT 6-32 SMALL PAT W/LOCKWSHR KEPS
2	282011		NUT 8-32 W/LOCKWSHR KEPS CAD
15	286001		SPACER 1/4X1/4 .140 ID BR CD 2100
2	286006		SPACER 1/4X1/8 .140 ID NYLON
17	286506		WASHER #8 FLAT .172IDX.375ODX.032 CD
1	286508		WASHER 1/4 INT LOCK 15/32 OD 1132
1	287501		WASHER 1/4X1/2X1/32 FIB KFW/378
1	287503		WASHER .500ODX.260IDX.071X.031 SH
1	289010		SOLDER LUG #6 SCREW CLEAR BT 1414-6
4	289058		FOOT 3/4" SQX1/4 RBR SJ-5023BLK
1	510211		SWITCH RK SPST RED LENS
1	510406		SWITCH SPDT 115-230 SWRT 46256LFR
1	515004		FUSE 1/2 AMP SLO-BLO 3AG 313500
1	515507		FUSE BLOCK 1 POLE 3AG SOLDER LUG
55	606900		WIRE 22 19/34 BLK
1	711537		DSX STOP
1	711561		DMX/DSX HINGE 16 7/8 L
1	711572		DMX/DSX AC SHIELD
1	711574		DMX FRONT PANEL
1	711576		DMX FRAME
1	811502		DMX/DSX HINGE BLACK ANODIZE
1	811579		DMX FRONT PANEL BLK TEX & SCREEN
1	811581		DSX STOP BLK TEX
1	811582		DMX FRAME BLK TEX & SCREEN

QTY	PART #	LOCATION	DESCRIPTION
1	942014		LABEL FUSE WARNING 1/2A SLO-BLO
1	942015		LABEL CAUTION SHOCK
1	720065		PCB SUB-ASSY DMX PROCESSOR
1	720066		PCB SUB-ASSY DMX SWITCH BOARD
1	720067-1		PCB SUB-ASSY DMX VOICE KICK
1	720067-2		PCB SUB-ASSY DMX VOICE SNARE
1	720067-3		PCB SUB-ASSY DMX VOICE HI-HAT
1	720067-4		PCB SUB-ASSY DMX VOICE TOM1
1	720067-5		PCB SUB-ASSY DMX VOICE TOM2
1	720067-6		PCB SUB-ASSY DMX VOICE PERC1
1	720067-7		PCB SUB-ASSY DMX VOICE PERC2
1	720068		PCB SUB-ASSY DMX VOICE #2
1	720069		PCB SUB-ASSY DMX VOICE #3
1	730107		MECH SUB-ASSY DMX REGULATOR
1	730108		MECH SUB-ASSY DMX XFMR
1	750153-0		CABLE SUB-ASSY DMX #1
1	750154-0		CABLE SUB-ASSY DMX #2
1	750155-1		CABLE SUB-ASSY DMX #3
*	730107		MECH SUB-ASSY. DMX REGULATOR
1	261008		HEATSINK DSX/DMX
2	281018		SCREW 6-32X5/16 PHIL PAN BLK OX
2	281047		SCREW 6-32X1/2 PHIL PAN BLK OX
2	282009		NUT 6-32 SMALL PAT W/LOCKWSR KEPS
1	289010		SOLDR LUG #6 SCREW CLR BT 1414-6
1	289026		INSULATOR FOR TO-3 TRANSISTOR DBX-103
1	289027		TRANSISTOR COVER TO-3 C-TO-3
1	289032		MOUNTING INSULATOR TO-3 INS-3
1	487008		TRANSISTOR PWR NPN 2N3055
1	750158-0		CABLE SUB-ASSY #6
*	730108		MECH SUB-ASSY. DMX XFMR
1	211045		CONN 8-CKT NAT 09-50-7081
1	211207		POLARIZING KEY MOLEX 256D 15-04-0219
6	211210		CONN TERM F #18 CRIMP 2478 08-50-0106
1	561020		POWER XFMR DMX/DSX EX 1627
*	750153		CABLE SUB-ASSY. DMX #1
1	211038		CONN 10 CKT NAT 09-50-7101
1	211042		CONN 12 CKT R NAT W/EARS 03-06-1121
9	211204		CONN PIN F 24 CRIMP 1875 02-06-1132
9	211205		CONN TERM F 22 CRIMP 2578 08-50-0108
1	211207		POLARIZING KEY MOLEX 2560 15-04-0219
3	211209		CONN PIN F 18 CRIMP 1561 02-06-1103
5	604000		WIRE 24 7/32 BLK PVC U
3	604100		WIRE 24 7/32 BRN PVC U
2	604100		WIRE 24 7/32 BRN PVC U
3	604300		WIRE 24 7/32 ORN PVC U

QTY	PART #	LOCATION	DESCRIPTION
3	604400		WIRE 24 7/32 YEL PVC U
4	604500		WIRE 24 7/32 GRN PVC U
4	604600		WIRE 24 7/32 BLU PVC U
4	604700		WIRE 24 7/32 VIO PVC U
4	604800		WIRE 24 7/32 GRY PVC U
5	604900		WIRE 24 7/32 WHT PVC U
*	750154		CABLE SUB-ASSY. DMX #2
1	211038		CONN 10 CKT NAT 09-50-7101
1	211042		CONN 12 CKT R NAT W/EARS 03-06-1121
9	211204		CONN PIN F 24 CRIMP 1875 02-06-1132
9	211205		CONN TERM F 22 CRIMP 2578 08-50-0108
1	211207		POLARIZING KEY MOLEX 2560 15-04-0219
3	211209		CONN PIN F 18 CRIMP 1561 02-06-1103
9	604000		WIRE 24 7/32 BLK PVC U
7	604100		WIRE 24 7/32 BRN PVC U
2	604100		WIRE 24 7/32 BRN PVC U
7	604300		WIRE 24 7/32 ORN PVC U
7	604400		WIRE 24 7/32 YEL PVC U
7	604500		WIRE 24 7/32 GRN PVC U
8	604600		WIRE 24 7/32 BLU PVC U
8	604700		WIRE 24 7/32 VIO PVC U
8	604800		WIRE 24 7/32 GRY PVC U
9	604900		WIRE 24 7/32 WHT PVC U
*	750155		CABLE SUB-ASSY. DMX #3
1	211038		CONN 10 CKT NAT 09-50-7101
7	211205		CONN TERM F 22 CRIMP 2578 08-50-0108
1	211207		POLARIZING KEY MOLEX 2560 15-04-0219
2	219004		PHONE JACK 2 COND MIN ENCL 142A
1	510407		SWITCH SL DPDT SHORT SCRFT 46206LSR
1	510408		SWITCH SL DPDT FLUSH SCRFT 11A1211
6	604000		WIRE 24 7/32 BLK PVC U
4	604100		WIRE 24 7/32 BRN PVC U
3	604100		WIRE 24 7/32 BRN PVC U
2	604100		WIRE 24 7/32 BRN PVC U
7	604200		WIRE 24 7/32 RED PVC U
7	604300		WIRE 24 7/32 ORN PVC U
3	604300		WIRE 24 7/32 ORN PVC U
6	604400		WIRE 24 7/32 YEL PVC U
6	604600		WIRE 24 7/32 BLU PVC U
5	604700		WIRE 24 7/32 VIO PVC U

QTY	PART #	LOCATION	DESCRIPTION
*	750156		CABLE SUB-ASSY. DMX #4
1	219508		CONN RIBBON 20P STANDARD FEMALE
1	219517		CONN RIBBON 20P SOLDER-TO-BOARD
9	605020		CABLE RIBBON 20-COND 28 AWG
*	750157		CABLE SUB-ASSY. DMX #5
1	219507		CONN RIBBON 26P SOLDER-TO-BOARD
1	219509		CONN RIBBON 26P STANDARD FEMALE
9	605026		CABLE RIBBON 26-COND 28 AWG
*	750158		CABLE SUB-ASSY. DMX #6
1	211036		CONN 4 CKT NAT 09-50-7041
1	211207		POLARIZING KEY MOLEX 2560 15-04-0219
3	211210		CONN TERM F 18 CRIMP 2478 08-50-0106
3	289019		CABLE TIE 4" T18R
5	608100		WIRE 20 19/32 BRN PVC U
5	608300		WIRE 20 19/32 ORN PVC U
5	608400		WIRE 20 19/32 YEL PVC U
*	760047		SHIPPABLE SUB-ASSY. FINAL
4	281054		SCREW 8-32X3/4 100 OVAL PHIL BLK OX
2	281055		SCRAW 8-32X3/8 100 OVAL PHIL BLK OX
4	286511		WASHER #8 CUP BLK OX
4	289016		FILLER #8 CUP WSHR NYL NW-15-8
2	711544		DMX/DSX END BELL SET WALNUT
1	730104		MECH SUB-ASSY DMX CHASSIS
1	940017		I.D. TAG DMX
1	942008		LABEL CAUTION VOLTAGE SETTING
*	770015		SHIPABLE SUB-ASSY. DMX SHIPPING
1	131005		MAG TAPE CASSETTE 2 MIN DMX DAK EC-2
1	600011		LINE CORD 3-COND 7.5 FT GY EUROPEAN
1	760047		SHIPABLE SUB-ASSY DMX FINAL
1	920003		BAG POLY 18X24 2 MIL DSX/DMX
1	921009		CARTON DMX/DSX 22X16X10 200# RSC
1	950012		MANUAL DMX
1	951001		WARRANTY CARD 5X7 ONE YEAR P+L



NOTES:

1. ALL DIODES ARE IN4148
2. ALL NPN ARE 2N5172

A	INITIAL RELEASE	12-21-81
LTR	REVISION	DATE

OBERHEIM ELECTRONICS INC.

-SCHEMATIC-

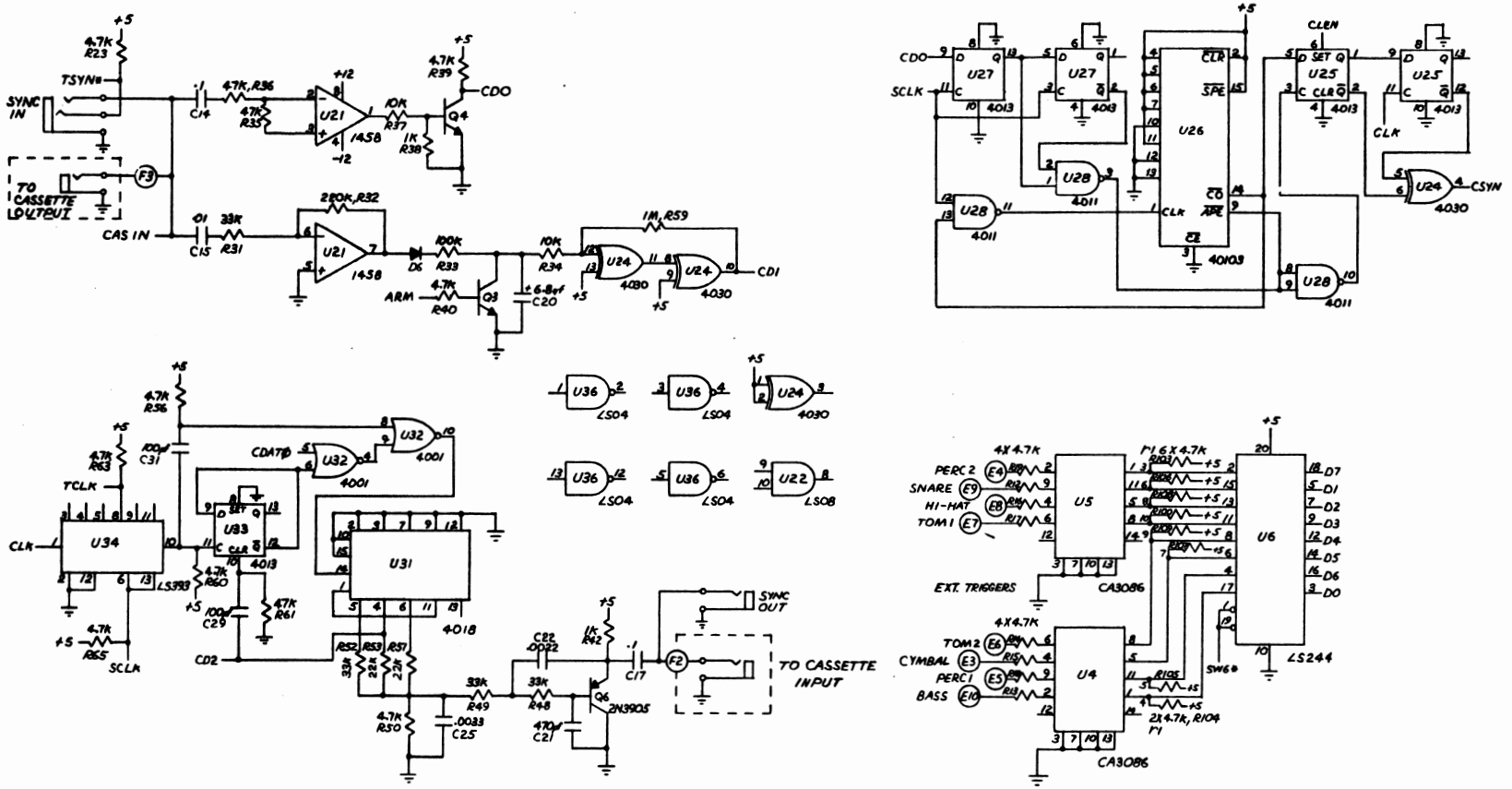
DMX PROCESSOR BOARD

J.R.

12-21-81

SHEET

1587



NOTES: 1. ALL DIODES ARE IN4148
2. ALL NPN ARE 2N5172

LTR	REVISION	DATE	PAGE
A	INITIAL RELEASE	12-21-81	2 OF 3

OBERHEIM ELECTRONICS INC.

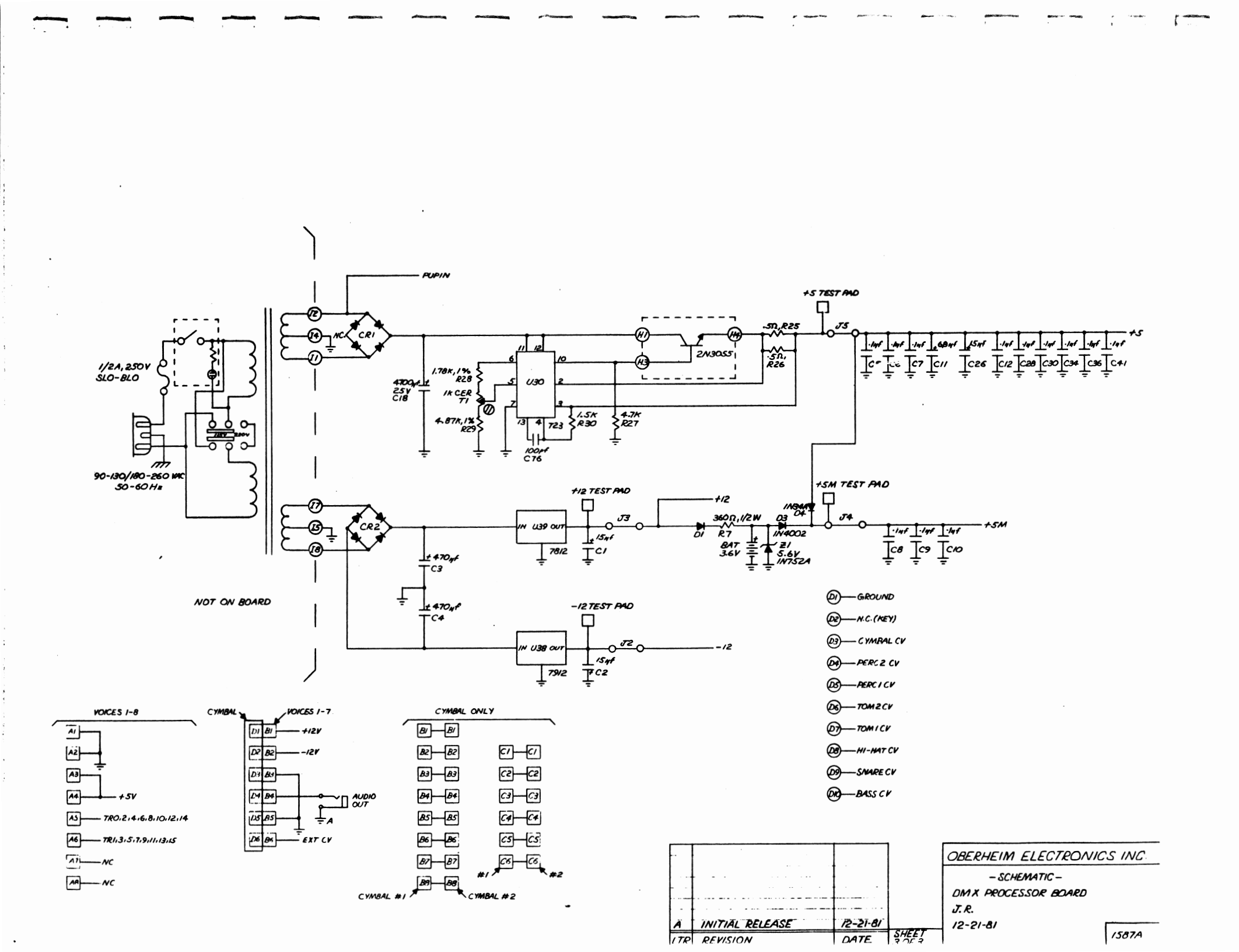
-SCHEMATIC-

DMX PROCESSOR BOARD

J. R.

12-21-81

1587A



LTR	REVISION	DATE
A	INITIAL RELEASE	12-21-81

SHEET 3 OF 3

OBERHEIM ELECTRONICS INC.

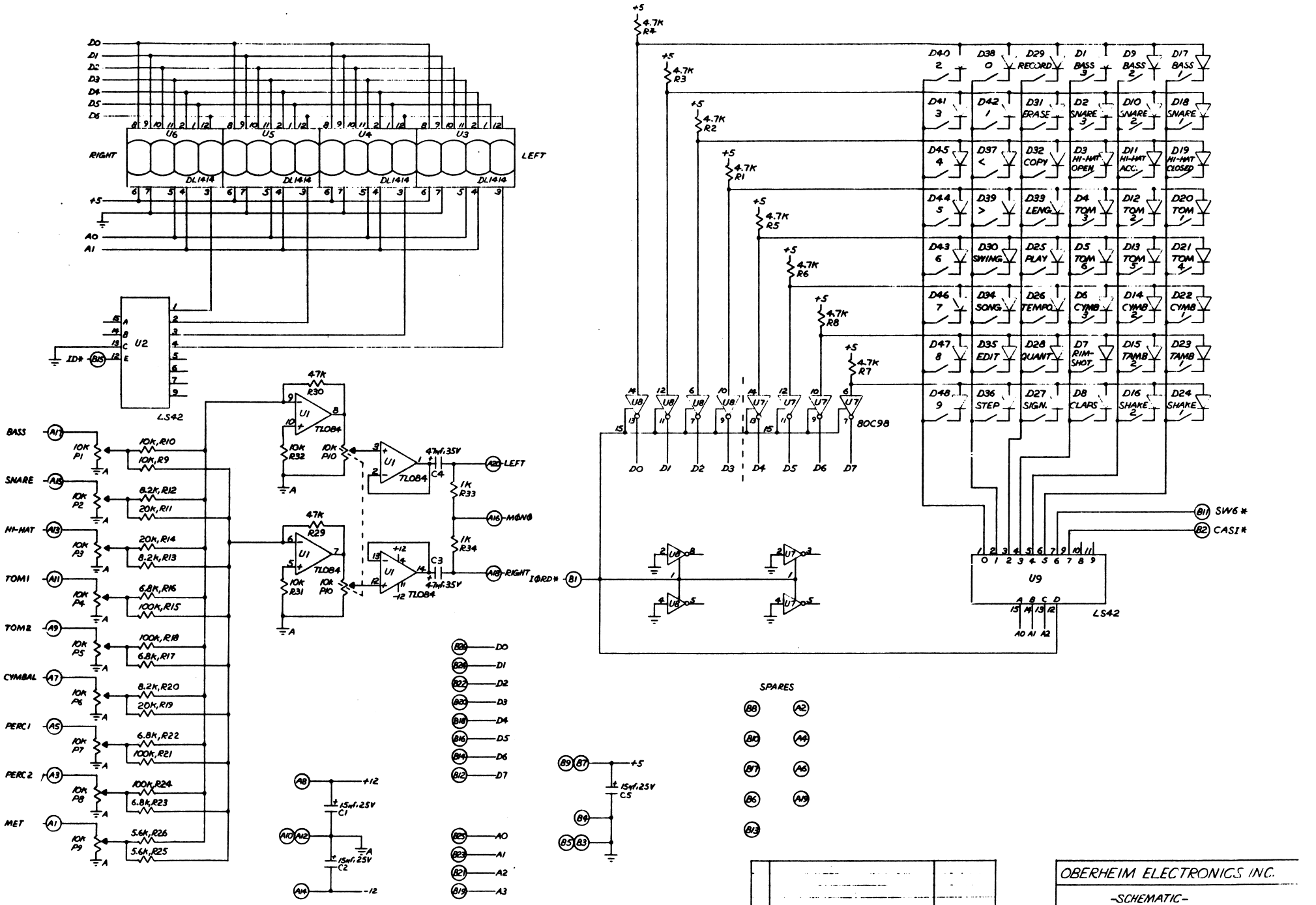
- SCHEMATIC -

DMX PROCESSOR BOARD

J. R.

12-21-81

1587A



LTR	REVISION	DATE
A	INITIAL RELEASE	12-21-81

OBERHEIM ELECTRONICS INC.

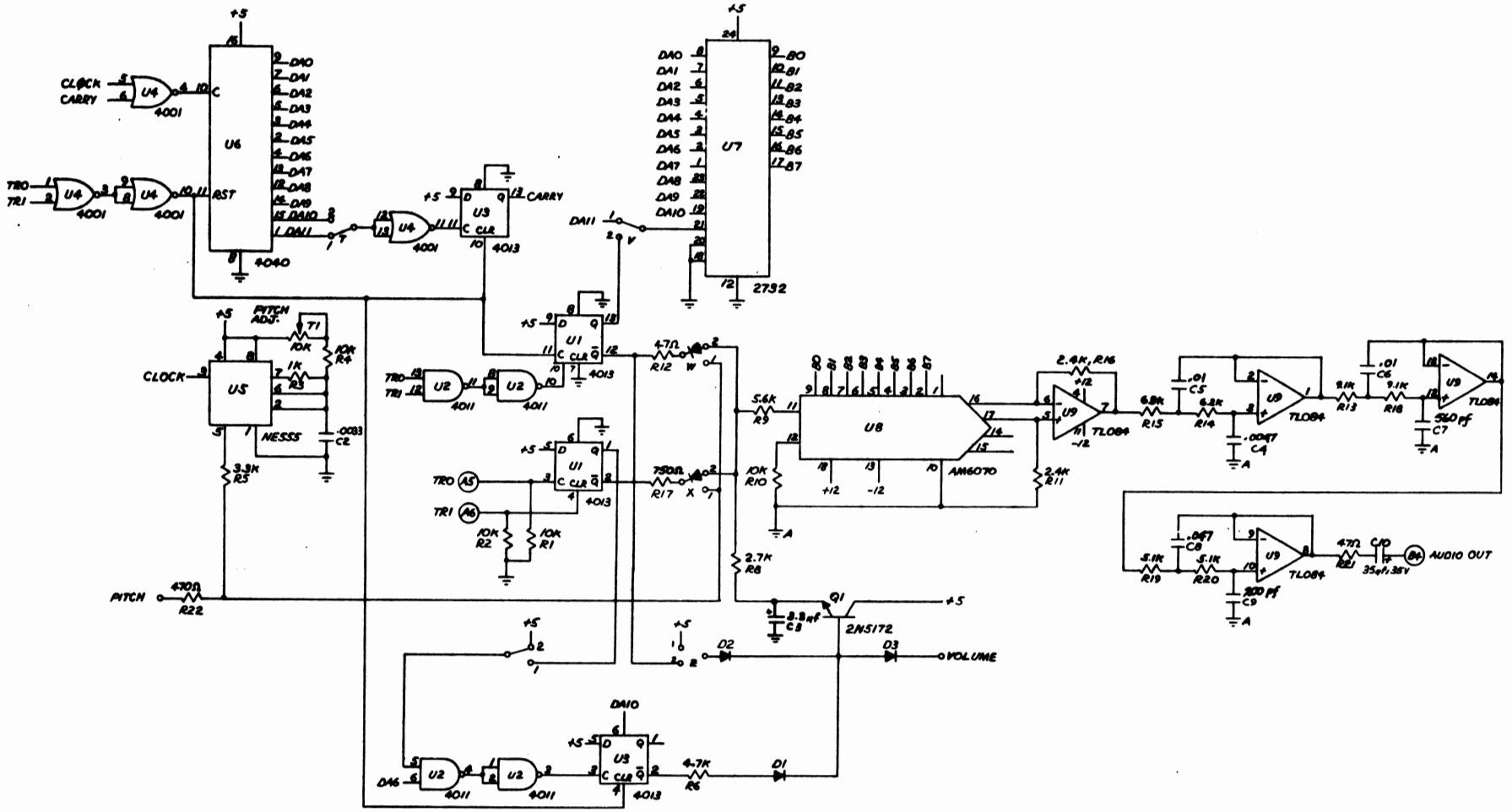
-SCHEMATIC-

DMX SWITCH BOARD

12-21-81

J.R.

1586A



NOTES

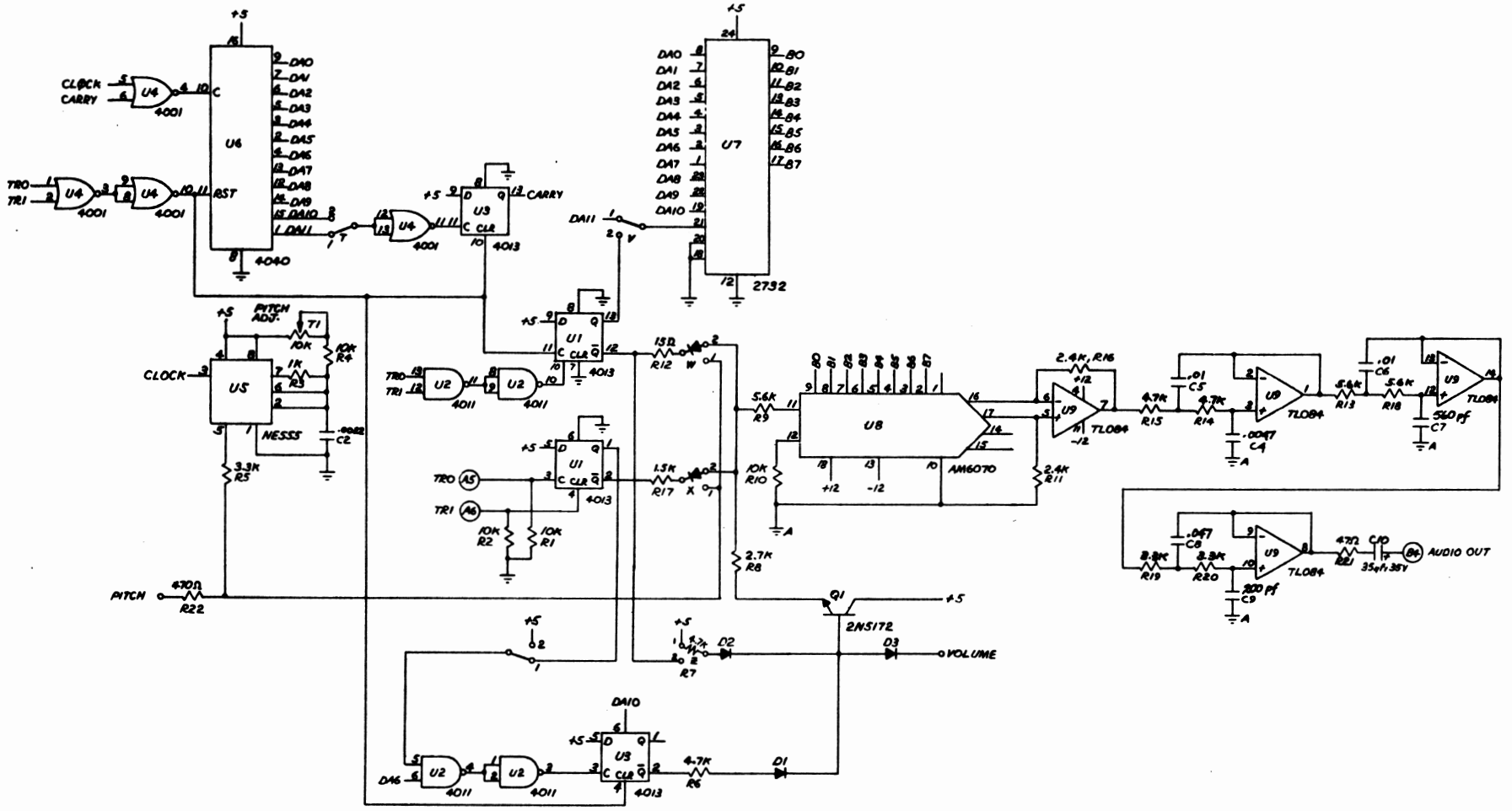
1) ALL RESISTORS ARE 1/4 W, 5%
2) ALL DIODES ARE IN4148
3 ALL UNSPECIFIED GROUNDS ARE DIGITAL.

LTR	REVISION	DATE
A	INITIAL RELEASE	12-21-81

OBERHEIM ELECTRONICS INC.

- SCHEMATIC -
DMX VOICE CARD - BASS
J.R.
12-1-81

1616A



NOTES

1) ALL RESISTORS ARE 1/4 W, 5%
2) ALL DIODES ARE 1N4148
3 ALL UNSPECIFIED GROUNDS ARE DIGITAL.

LTR	REVISION	DATE
A	INITIAL RELEASE	12-21-81

OBERHEIM ELECTRONICS INC.

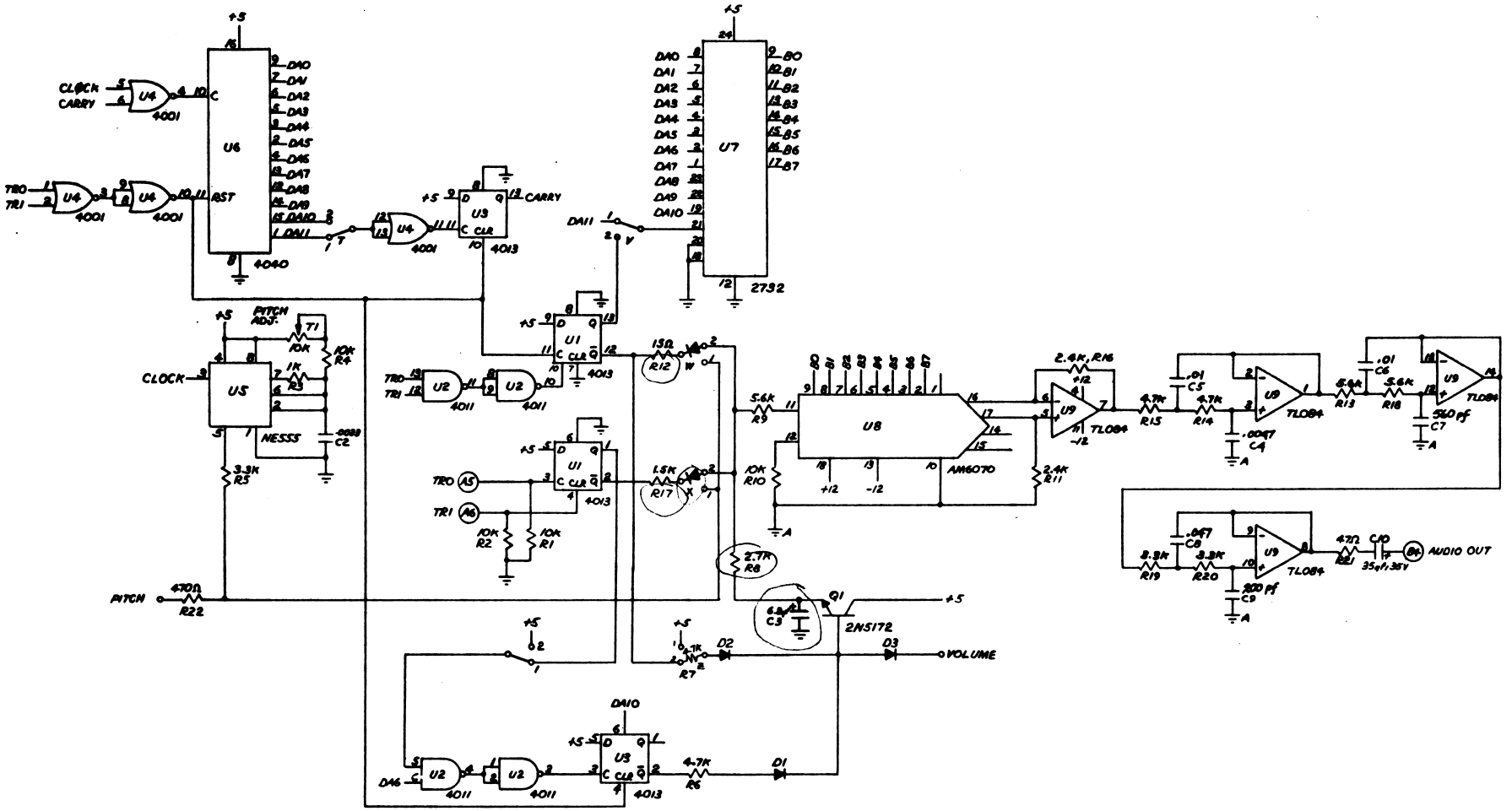
- SCHEMATIC -

DMX VOICE CARD - SNARE

J.R.

12-1-81

1617A



NOTES

1) ALL RESISTORS ARE 1/4 W, 5%
2) ALL DIODES ARE 1N4148
3 ALL UNSPECIFIED GROUNDS ARE DIGITAL.

LTR	REVISION	DATE
A	INITIAL RELEASE	12-21-81

OBERHEIM ELECTRONICS INC.

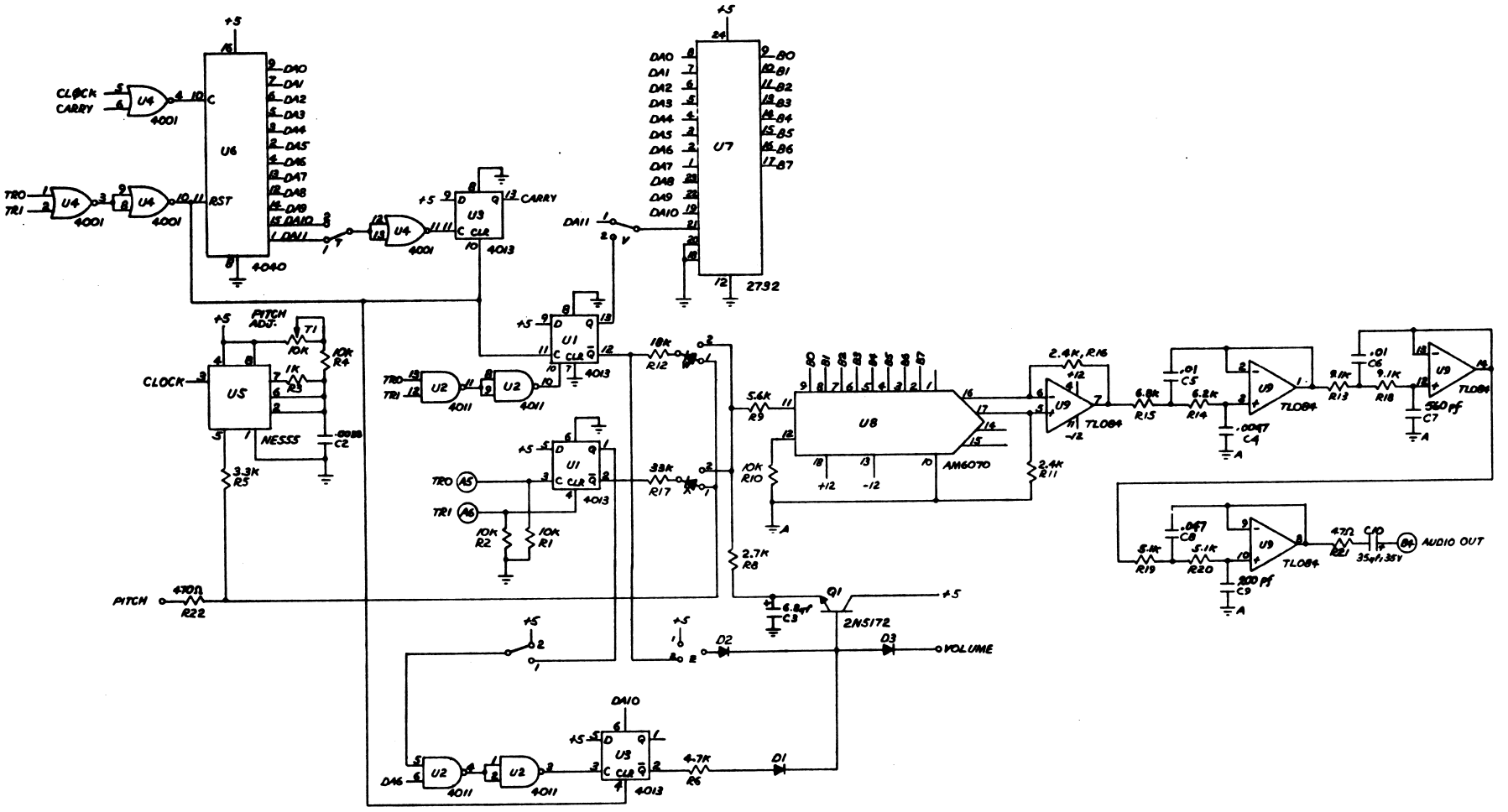
- SCHEMATIC -

DMX VOICE CARD - HI-HAT

J.R.

12-1-81

1618A



NOTES

1) ALL RESISTORS ARE 1/4 W, 5%
2) ALL DIODES ARE IN4148
3 ALL UNSPECIFIED GROUNDS ARE DIGITAL.

LTR	REVISION	DATE
A	INITAL RELEASE	12-21-81

OBERHEIM ELECTRONICS INC.

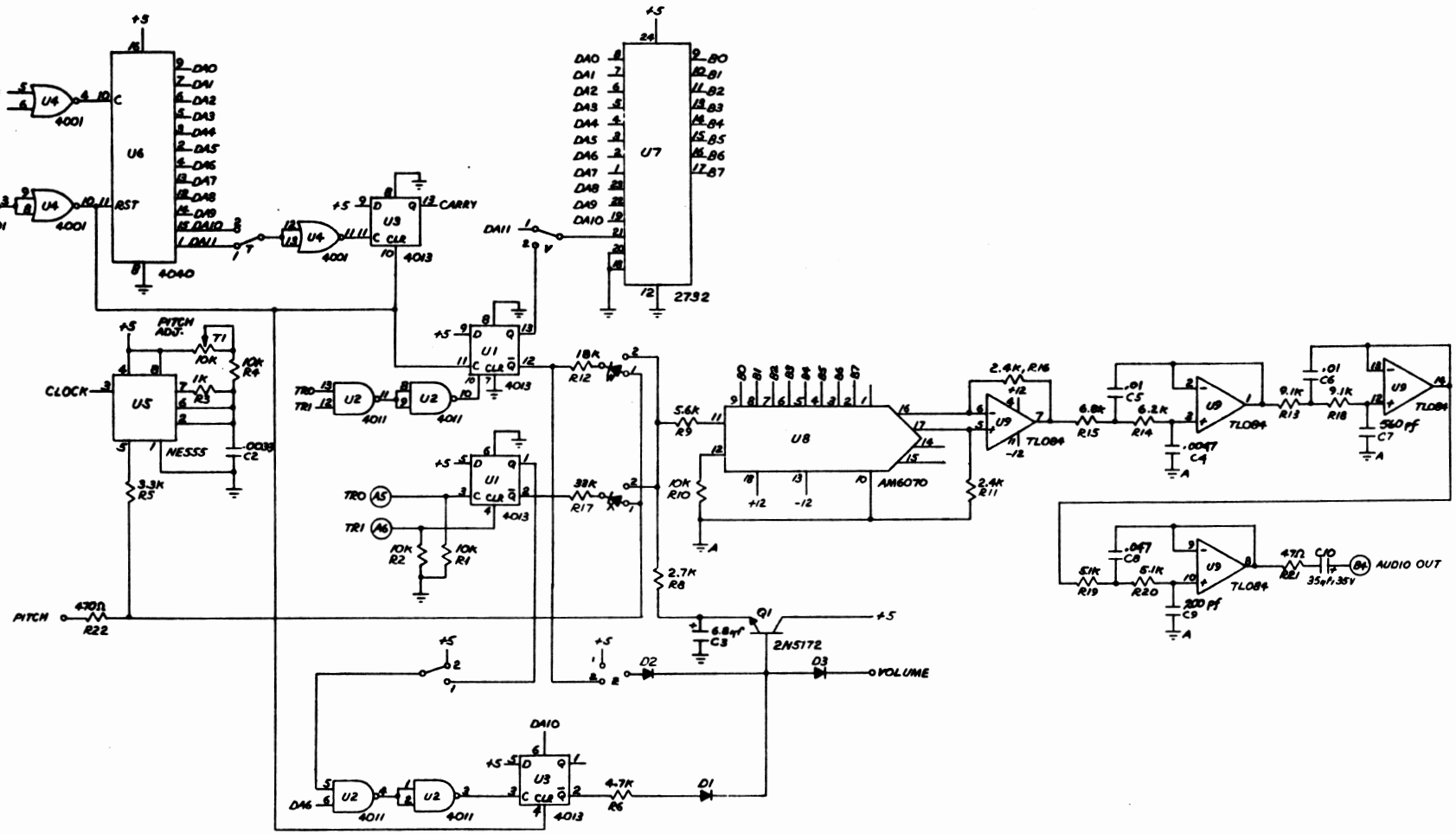
- SCHEMATIC -

DMX VOICE CARD - TOM 1

J.R.

12-1-81

1619A



NOTES

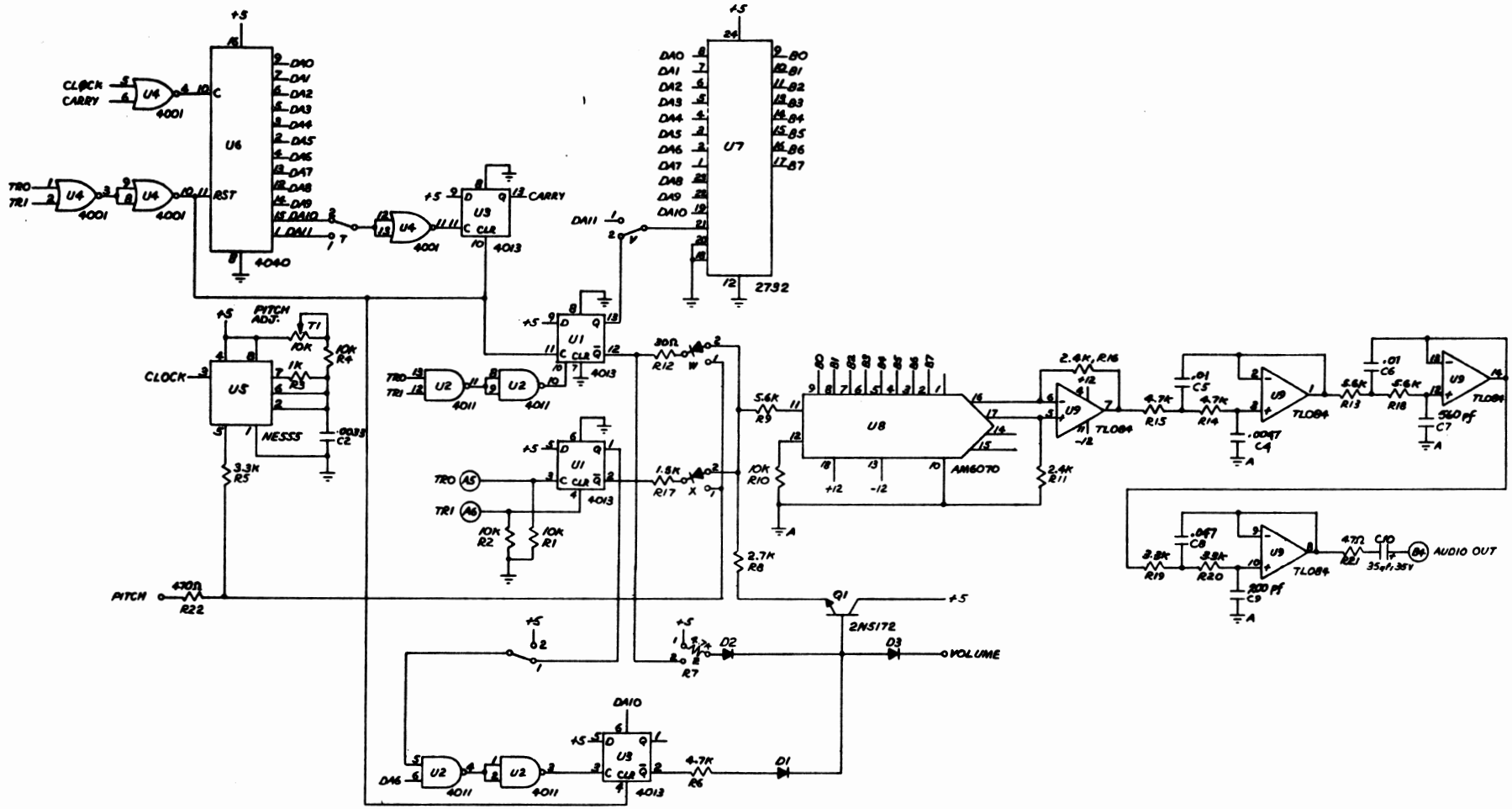
1) ALL RESISTORS ARE 1/4 W, 5%
2) ALL DIODES ARE IN4148
3 ALL UNSPECIFIED GROUNDS ARE DIGITAL.

LTR	REVISION	DATE
A	INITIAL RELEASE	12-21-81

OBERHEIM ELECTRONICS INC.

- SCHEMATIC -
DMX VOICE CARD - TOM 2
J.R.
12-1-81

1620A



NOTES

1) ALL RESISTORS ARE 1/4 W, 5%
2) ALL DIODES ARE IN4148
3 ALL UNSPECIFIED GROUNDS ARE DIGITAL.

LTR	REVISION	DATE
A	INITIAL RELEASE	12-21-81

OBERHEIM ELECTRONICS INC.

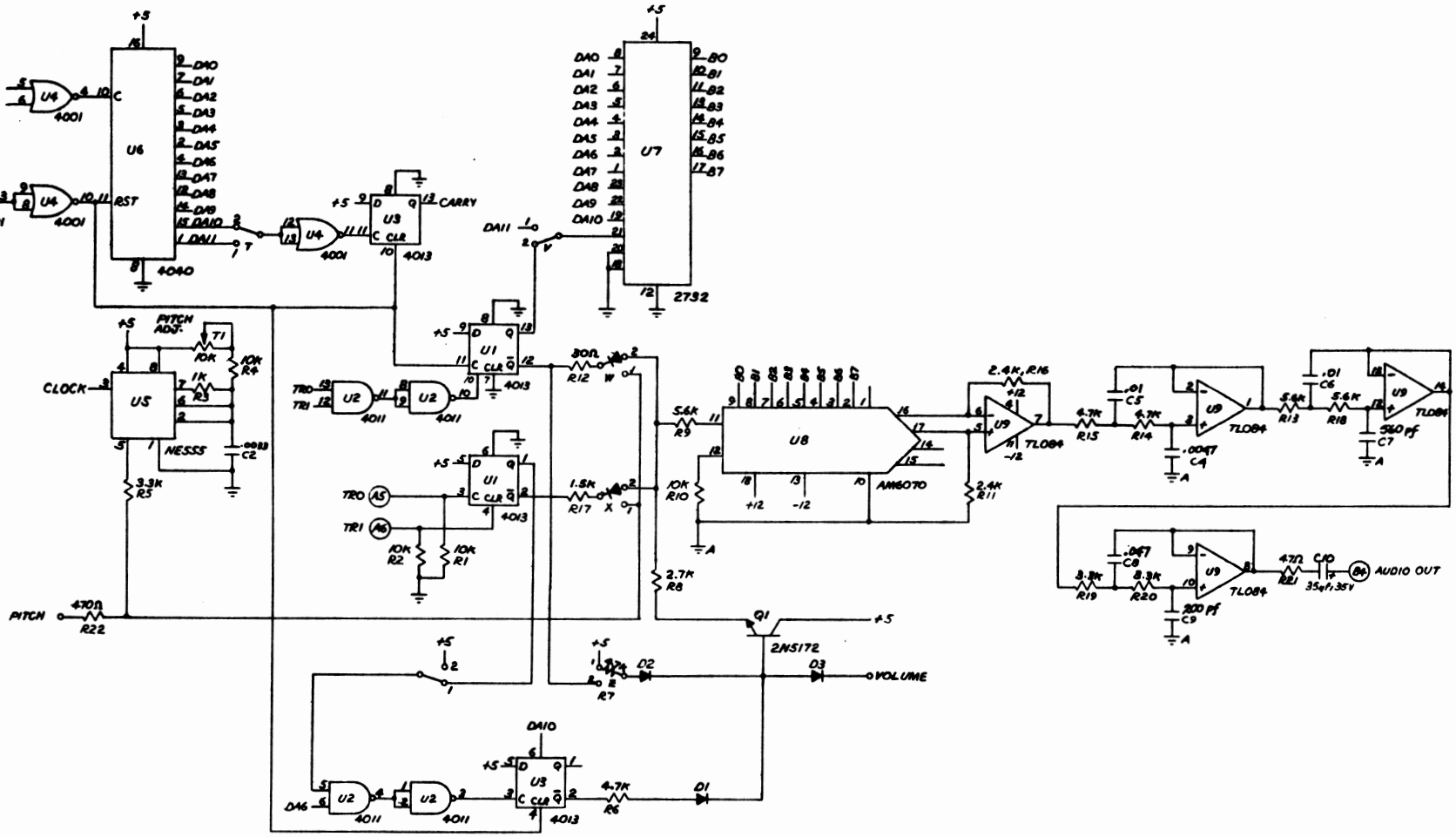
- SCHEMATIC -

DMX VOICE CARD - PERC I

J.R.

12-1-81

1621A



NOTES

1) ALL RESISTORS ARE 1/4 W, 5%
2) ALL DIODES ARE 1N4148
3 ALL UNSPECIFIED GROUNDS ARE DIGITAL.

LTR	REVISION	DATE
A	INITIAL RELEASE	12-21-81

OBERHEIM ELECTRONICS INC.

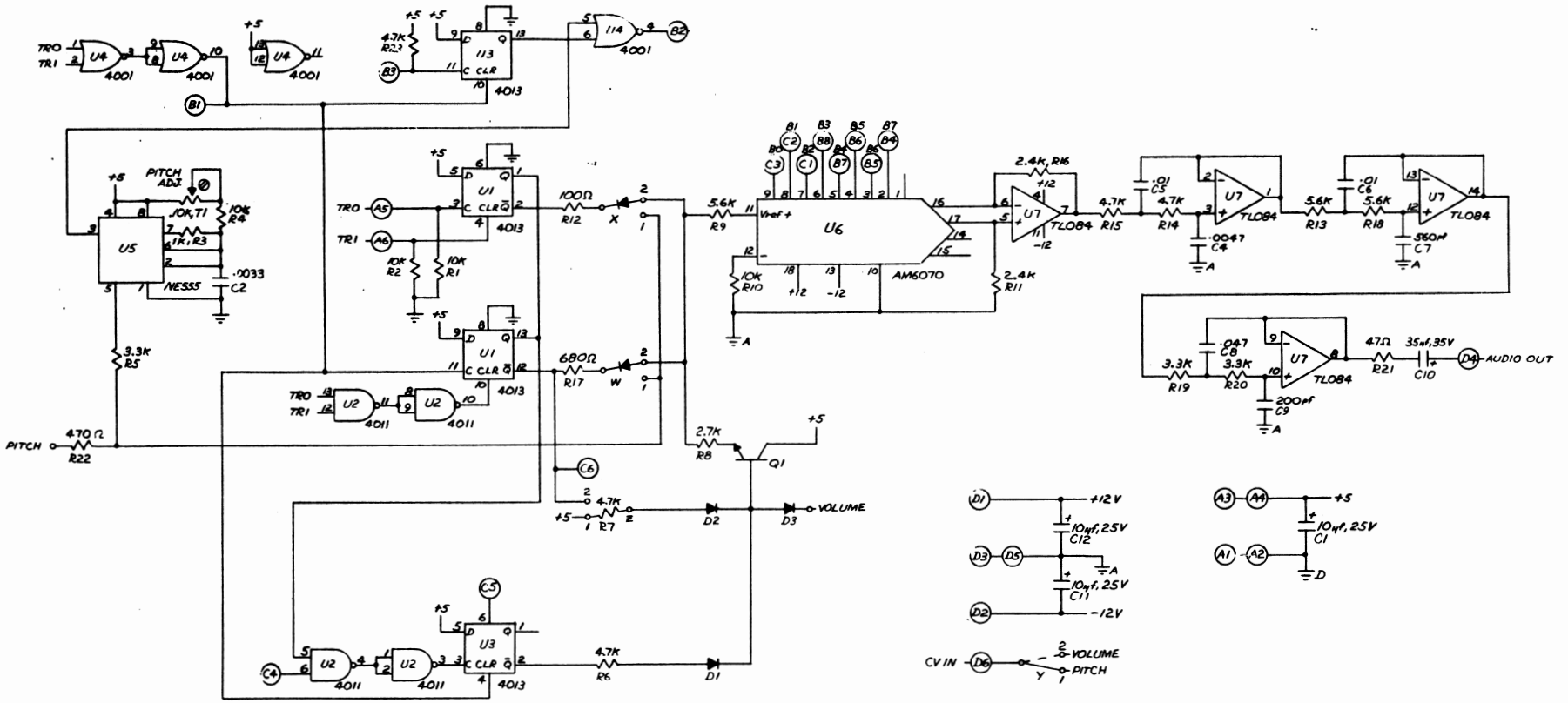
- SCHEMATIC -

DMX VOICE CARD - PERC 2

J.R.

12-1-81

1622A



1. ALL NPN ARE 2N5172
2. ALL DIODES ARE IN4148
3. A = ANALOG GROUND
4. D = DIGITAL GROUND

LTR	REVISION	DATE
A	INITIAL RELEASE	12-21-81

OBERHEIM ELECTRONICS INC.

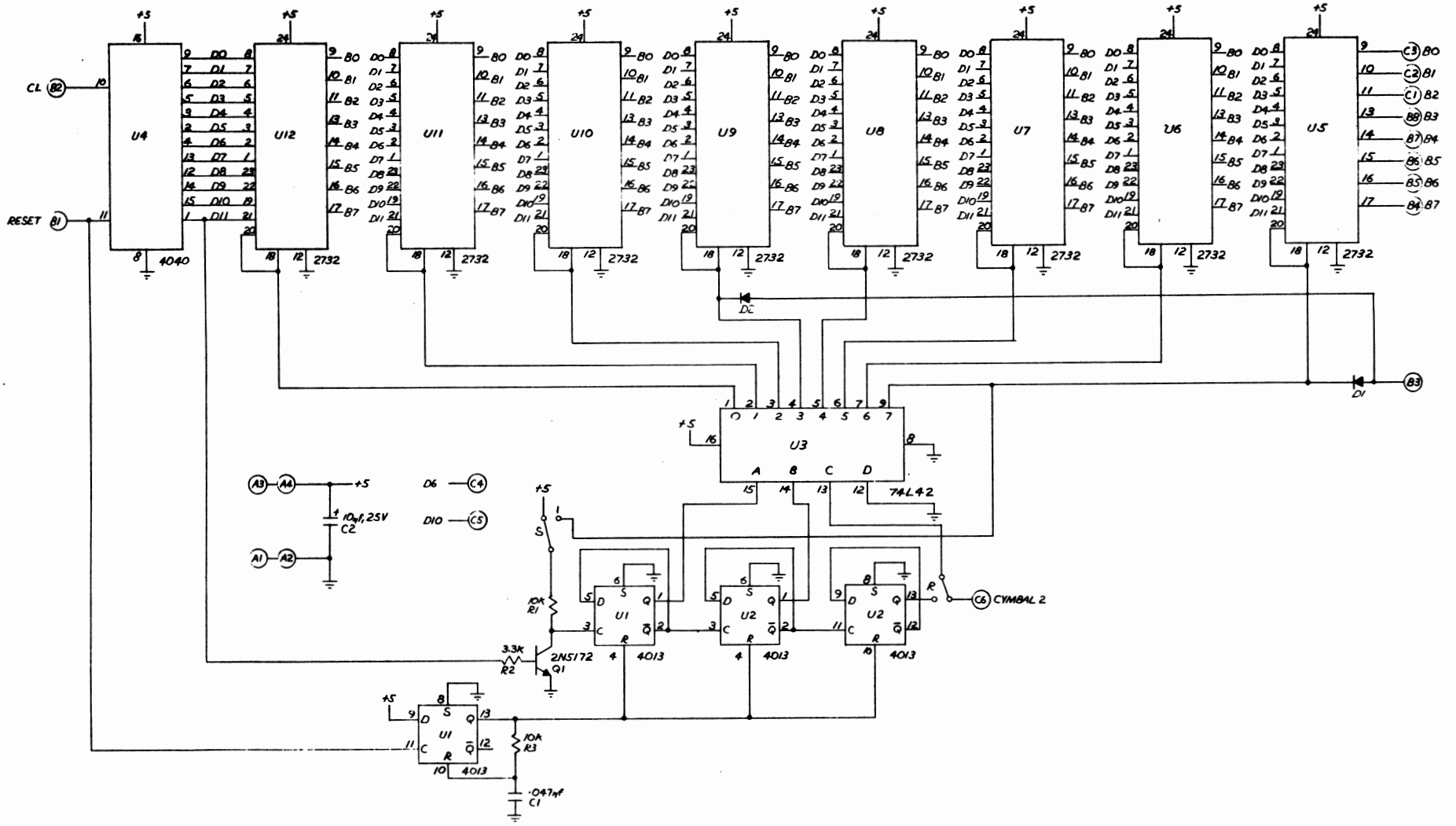
-SCHEMATIC-

DMX VOICE CARD - CYMBAL #1

J.R.

12-1-81

1c14A



LTR	REVISION	DATE
A	INITIAL RELEASE	12-21-81

OBERHEIM ELECTRONICS INC.

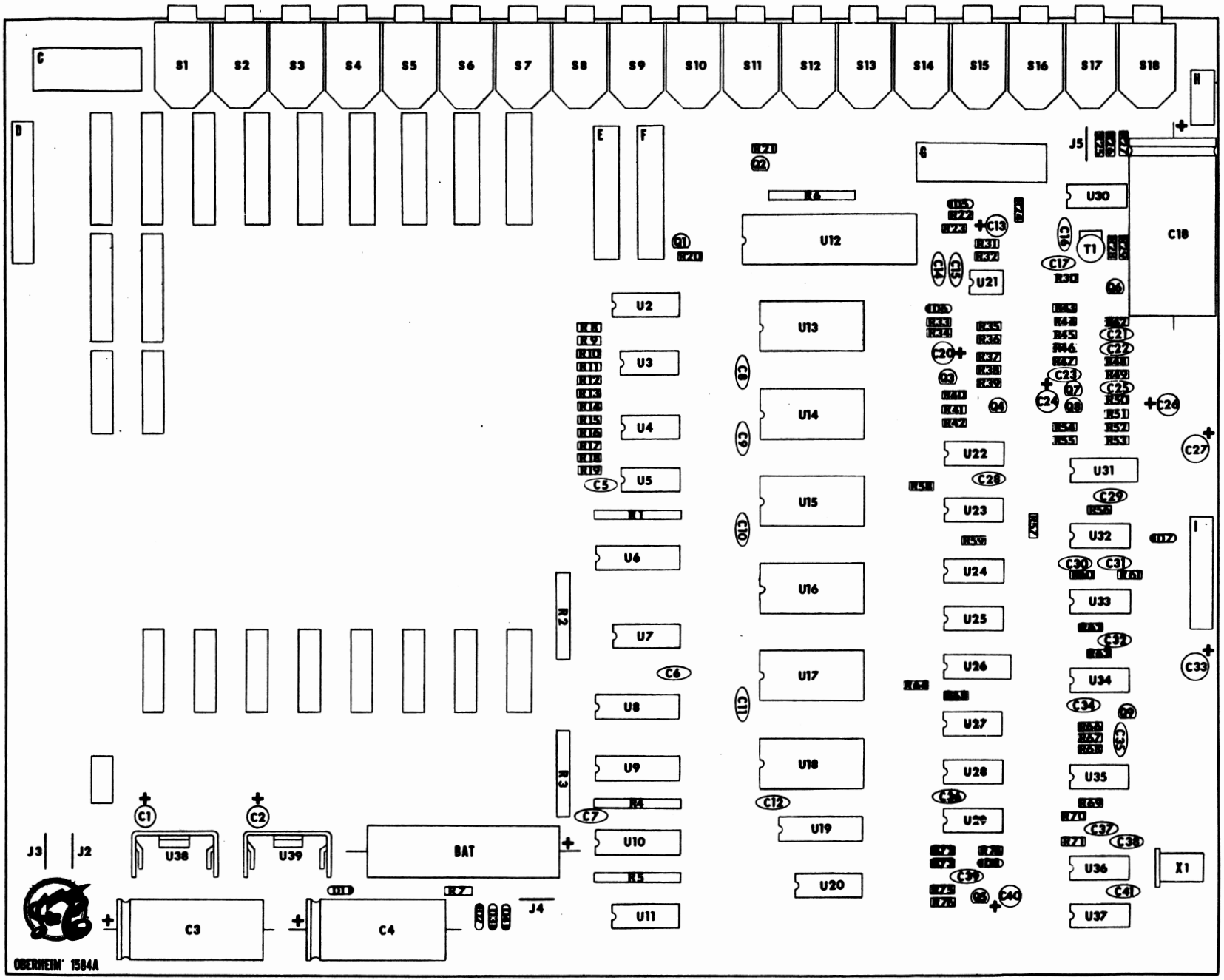
-SCHEMATIC-

DMX VOICE CARD - CYMBAL #2

J.R.

12-1-81

1615A



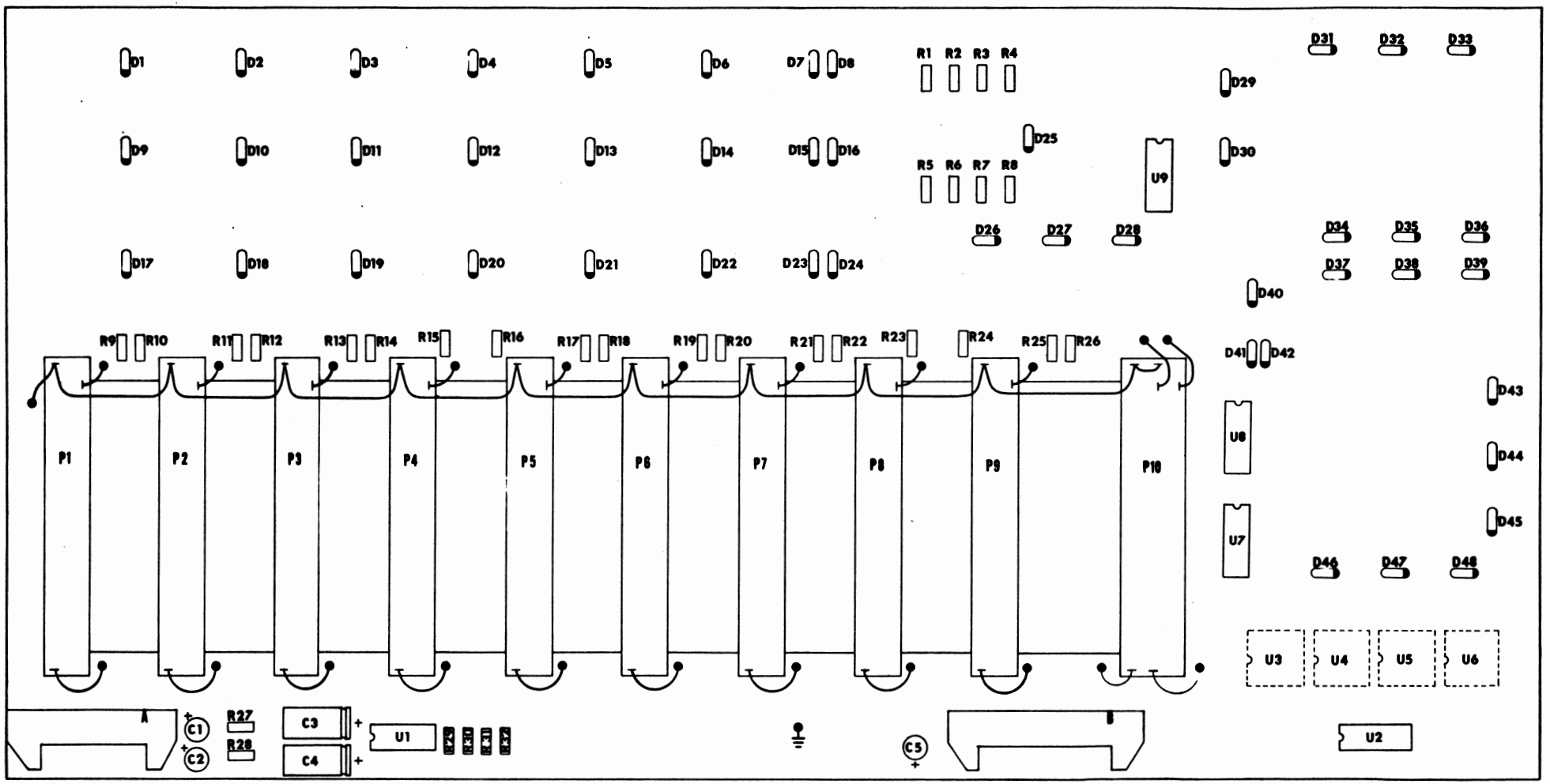
LTR	REVISION	DATE
A	INITIAL RELEASE	1-22-82

OBERHEIM ELECTRONICS INC.

- PARTS LAYOUT -

DMX PROCESSOR BOARD

1-22-82



LTR	REVISION	DATE
A	INITIAL RELEASE	1-22-81

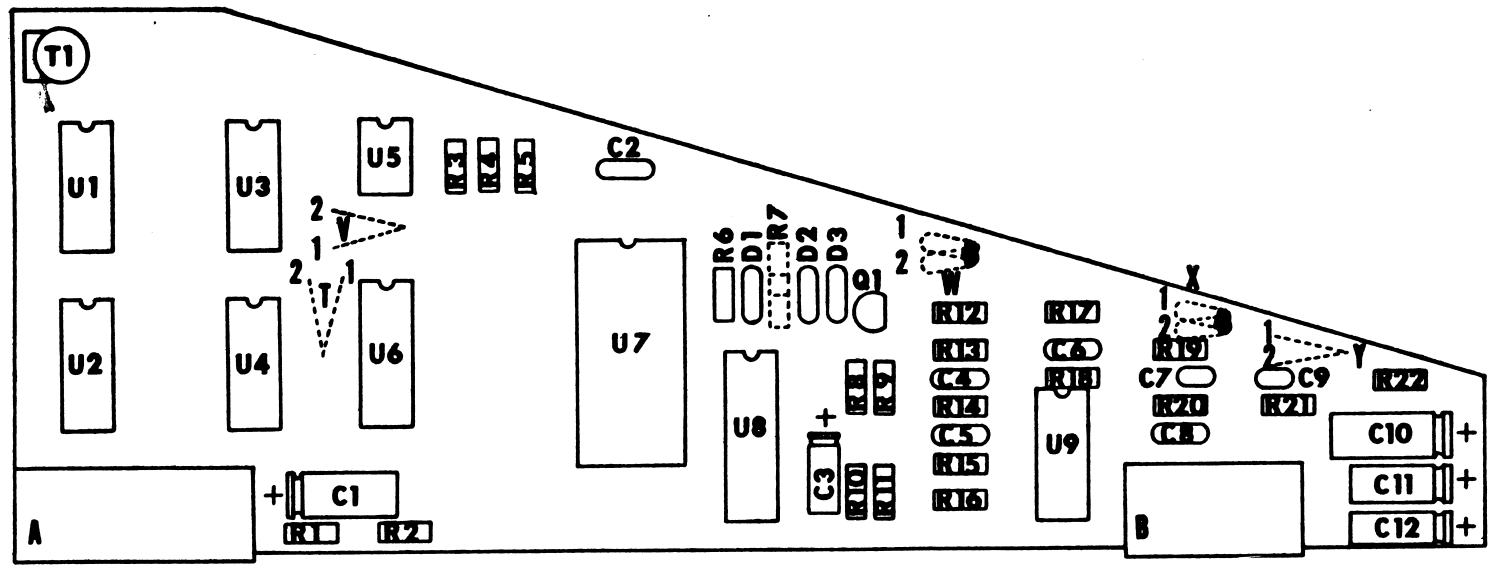
OBERHEIM ELECTRONICS INC.

-PARTS LAYOUT-

DMX SWITCH BOARD

1-22-82

15.RKA



LTR	REVISION	DATE
A	INITIAL RELEASE	4-1-82

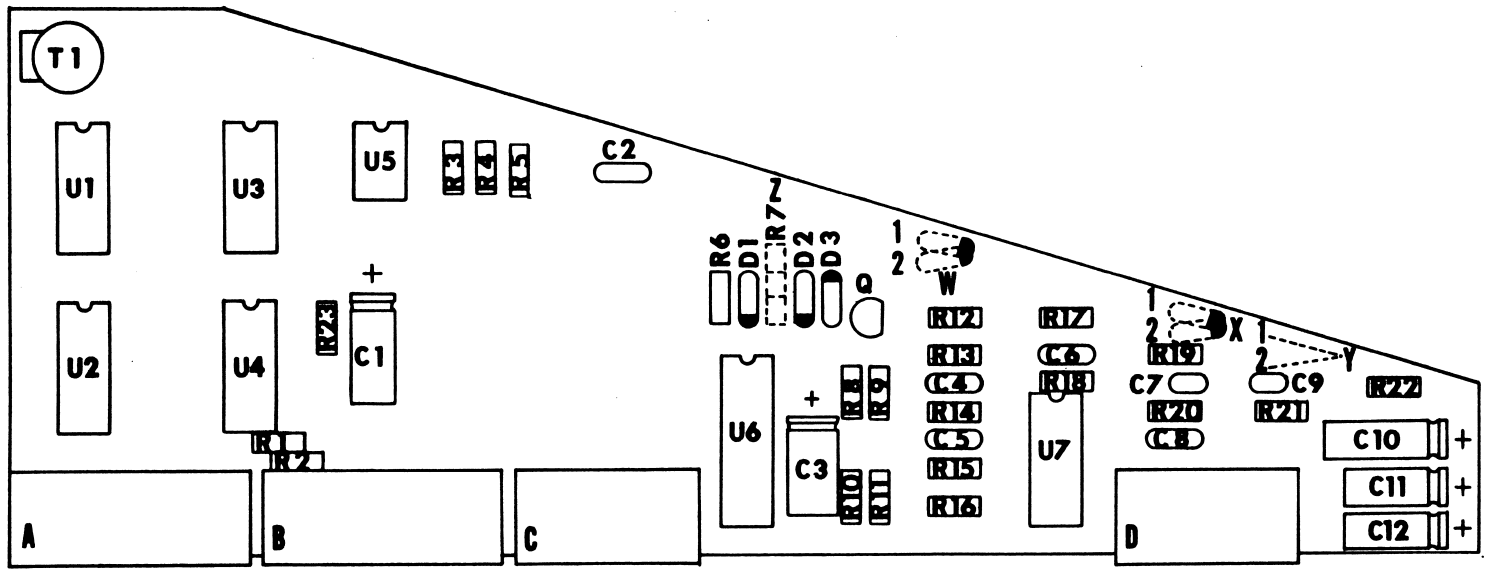
OBERHEIM ELECTRONICS INC.

-PARTS LAYOUT-

DMX VOICE CARD

4-1-82

1623A



LTR	REVISION	DATE
A	INITIAL RELEASE	4-1-82

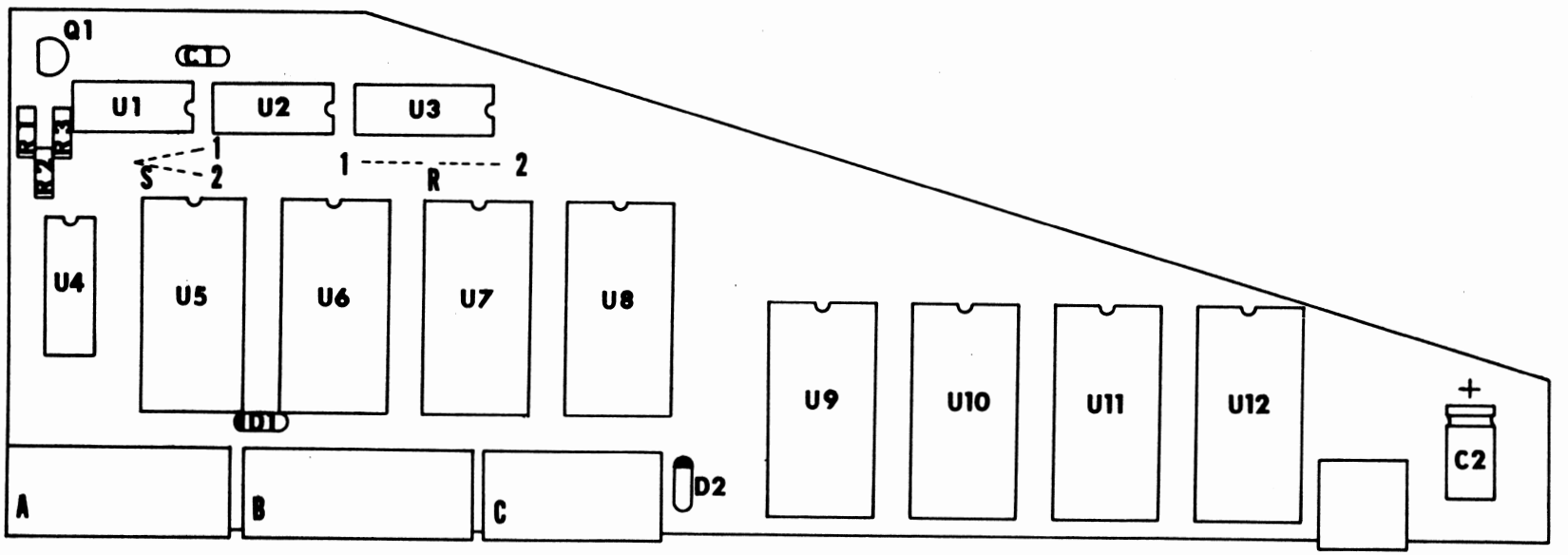
OBERHEIM ELECTRONICS INC.

-PARTS LAYOUT-

DMX VOICE CARD - CYMBAL #1

4-1-82

1624A



LTR	REVISION	DATE
A	INITIAL RELEASE	4-1-82

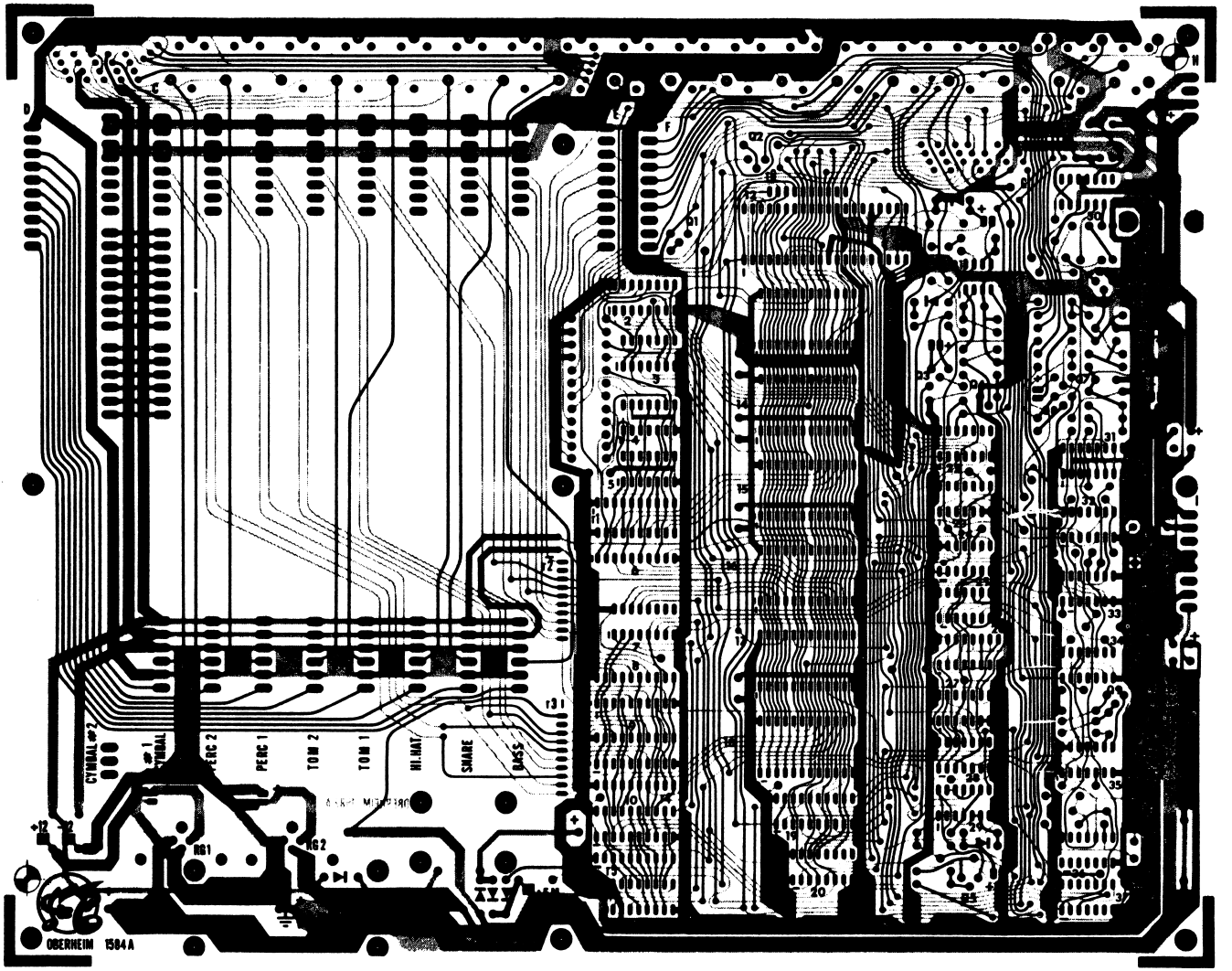
OBERHEIM ELECTRONICS INC.

-PARTS LAYOUT-

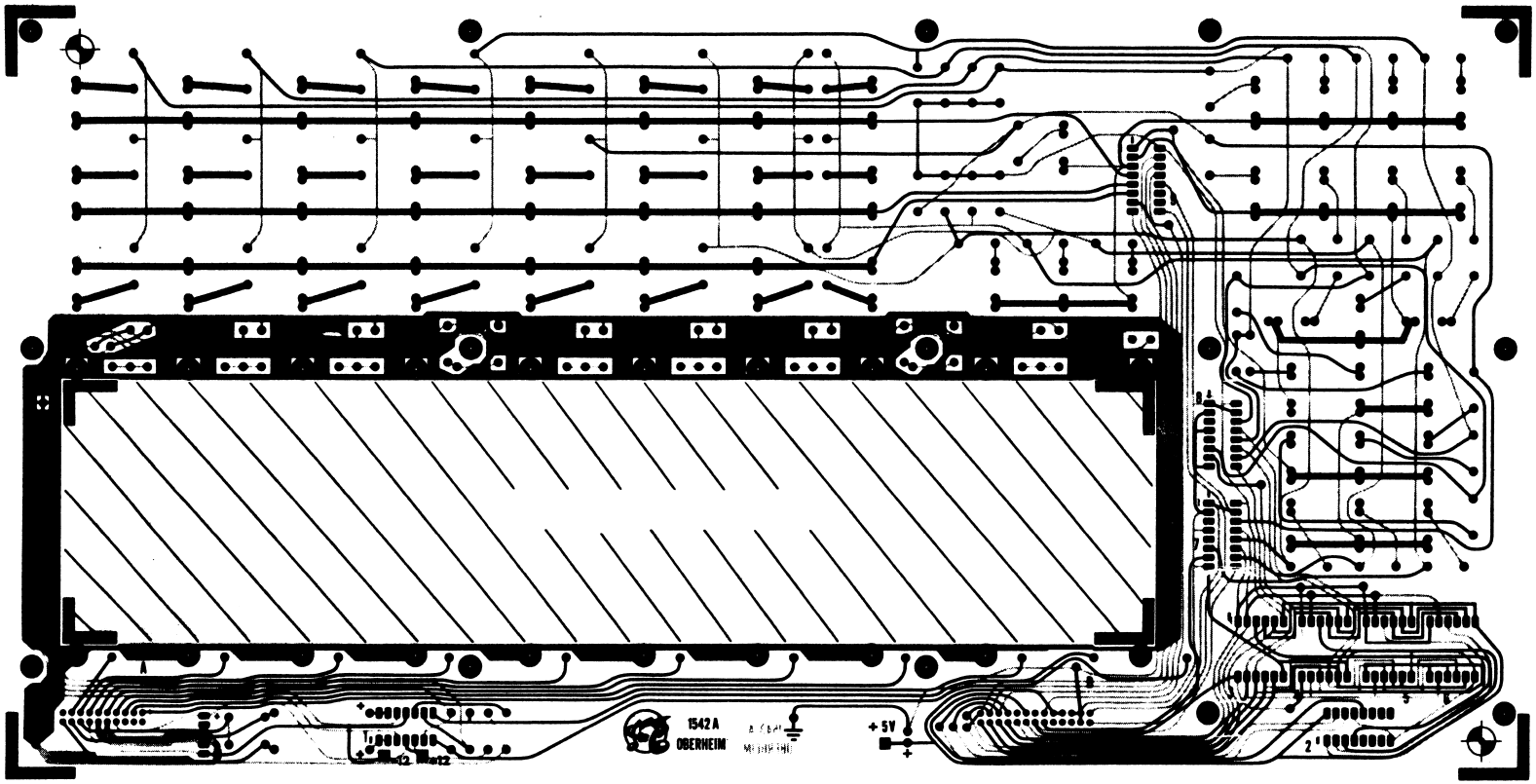
DMX VOICE CARD - CYMBAL #2

4-1-82

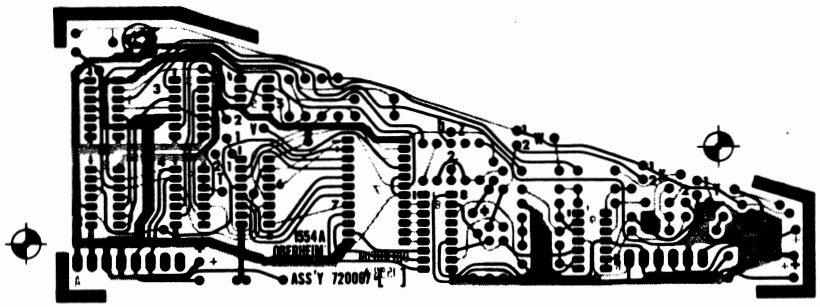
1625A



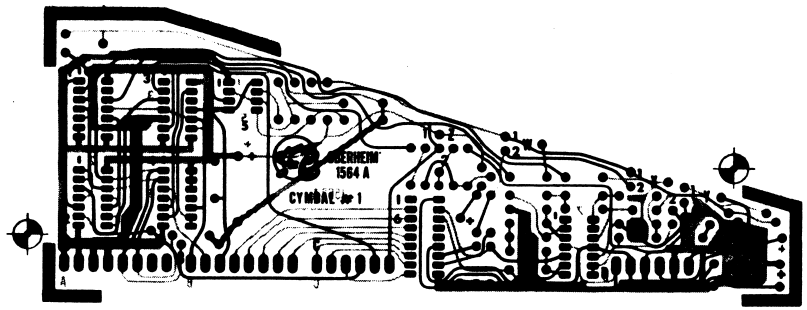
OBERHEIM ELECTRONICS INC.		
SCALE	APPROVED BY:	DRAWN BY
DATE 12-21-81		REVISED
P.C. COMPOSITE		
DMX PROCESSOR BOARD		DRAWING NUMBER 1626 A



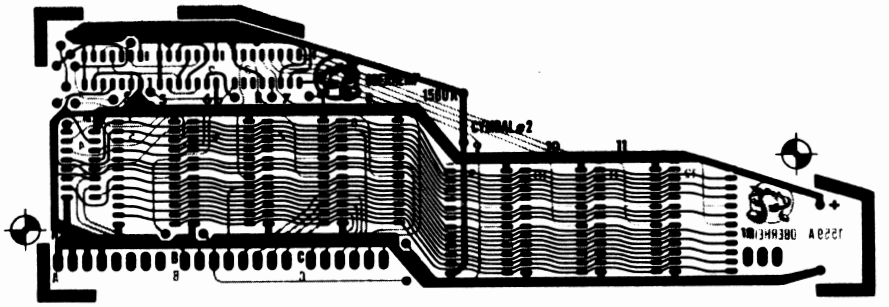
OBERHEIM ELECTRONICS INC.		
SCALE:	APPROVED BY:	DRAWN BY:
DATE: 12-21-81		REVISED
P.C. COMPOSITE.		
DMX SWITCH BOARD		DRAWING NUMBER 1627A



OBERHEIM ELECTRONICS INC.		
SCALE	APPROVED BY	DRAWN BY
DATE 12-21-81		REVISED
P.C. COMPOSITE		
DMX VOICE CARD		DRAWING NUMBER 1628A



OBERHEIM ELECTRONICS INC.		
SCALE	APPROVED BY	DRAWN BY
DATE 12-21-81		REVISED
P.C. COMPOSITE		
DMX VOICE CARD - CYMBAL #1		DRAWING NUMBER 1629 A



OBERHEIM ELETRONICS INC.		
SCALE	APPROVED BY	DRAWN BY
DATE 12-21-81		REVISED
P.C. COMPOSITE		
DMX VOICE CARD – CYMBAL #2		DRAWING NUMBER 1630 A

OBERHEIM ELECTRONICS, INC.

ENGINEERING CHANGE ORDER

ECO NO. 301

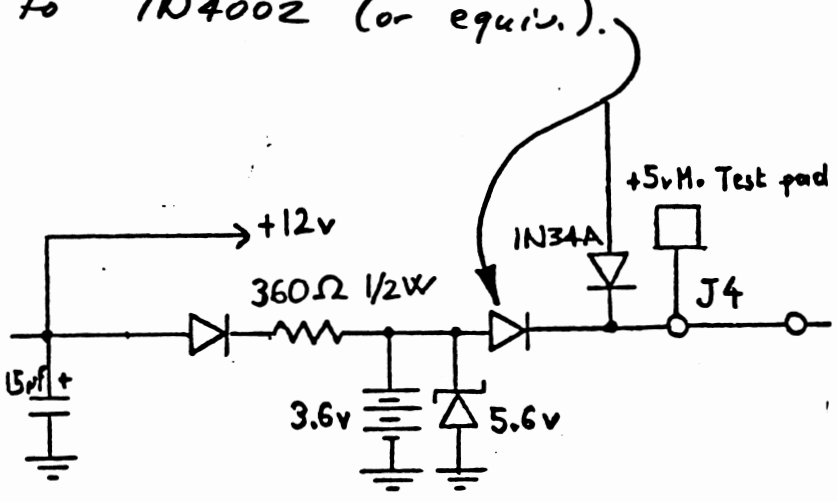
PRODUCT AFFECTED

DMX

DRAWINGS AFFECTED

DESCRIPTION OF CHANGE

Change IN4148 diode in battery backup circuit to IN4002 (or equiv.).



REASON FOR CHANGE

Occasionally the IN4148 opens & then battery backup does not work.

EFFECTIVITY

- ☐ FUTURE PRODUCTION ONLY
- ☒ RETROFIT UNITS IN PRODUCTION AND INVENTORY
- ☒ RETROFIT UNITS IN FIELD
- ☐ DRAWING CORRECTION ONLY; HARDWARE NOT AFFECTED
- ☐ _____

WRITTEN BY — DATE

AEO — 1-4-82

APPROVED BY — DATE

AEO — 1-4-82

OBERHEIM ELECTRONICS, INC.

ENGINEERING CHANGE ORDER

ECO NO. 302

PRODUCT AFFECTED

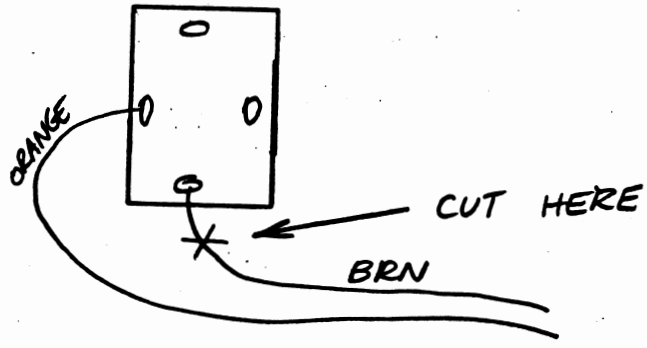
DMX

DRAWINGS AFFECTED

OWNERS MANUAL

DESCRIPTION OF CHANGE

REMOVE GROUND WIRE FROM "TO OUTPUT" JACK (CASSETTE INTERFACE) ON REAR PANEL.



REAR VIEW OF JACK

* NOTE: AFTER MODIFICATION, UNIT WILL HUM WHEN BOTH CABLES TO CASSETTE ARE CONNECTED. REMOVAL OF EITHER OR BOTH CABLES WILL ELIMINATE HUM.

} ADD TO OWNER'S MANUAL

REASON FOR CHANGE

ELIMINATES 60HZ HUM IN OUTPUT DUE TO GROUND LOOP

EFFECTIVITY

- ☐ FUTURE PRODUCTION ONLY
- ☒ RETROFIT UNITS IN PRODUCTION AND INVENTORY
- ☒ RETROFIT UNITS IN FIELD
- ☐ DRAWING CORRECTION ONLY; HARDWARE NOT AFFECTED
- ☐ _____

WRITTEN BY: GR — DATE: 1-13-82

APPROVED BY: JSO — DATE: 1-14-82

OBERHEIM ELECTRONICS, INC.

ENGINEERING CHANGE ORDER

ECO NO. 304 (3 SHEETS)

PRODUCT AFFECTED

DMX

DRAWINGS AFFECTED

PROCESSOR BOARD SCHEMATIC 1587
POT BOARD SCHEMATIC 1586
PROCESSOR BOARD ASSY DWG 1589
POT BOARD ASSY DWG 1588

DESCRIPTION OF CHANGE

METRONOME CIRCUIT ON PROCESSOR BOARD:

1. CHANGE Q8 TO 2N3905 (SEE PAGE 3)
2. ADD 470Ω 1/4W 5% FROM Q8 EMITTER TO BASE
3. REMOVE 10K RESISTOR FROM Q7 BASE TO GROUND (ON BACK OF BOARD)
4. CHANGE R46 FROM 1.5K TO 10K
5. CUT TRACES TO EMITTER OF Q8 (BOTH SIDES OF BOARD), AND CONNECT EMITTER PAD TO U21 PIN 8.
6. CUT TRACE FROM R54 TO GROUND (BOTTOM OF BOARD), AND CONNECT RESISTOR PAD TO CONNECTOR I PIN 4. (ANALOG GROUND)
7. CHANGE R47 TO 470Ω 1/4 5%
8. CHANGE C23 TO A JUMPER

ON POT BOARD:

1. CHANGE R25 & R26 TO 10K 1/4W 5%

REASON FOR CHANGE

1. Makes METRONOME OUT a 10 volt positive pulse (useable as trigger).
2. Eliminates Hum & noise in metronome.
3. Makes click accent independent of volume setting.

EFFECTIVITY

- [x] FUTURE PRODUCTION ONLY
- [ ] RETROFIT UNITS IN PRODUCTION AND INVENTORY
- [ ] RETROFIT UNITS IN FIELD
- [ ] DRAWING CORRECTION ONLY; HARDWARE NOT AFFECTED
- [ ] _____

WRITTEN BY	DATE
GR	1-22-82

APPROVED BY	DATE
[signature]	1-28-82

OBERHEIM ELECTRONICS, INC.

ENGINEERING CHANGE ORDER

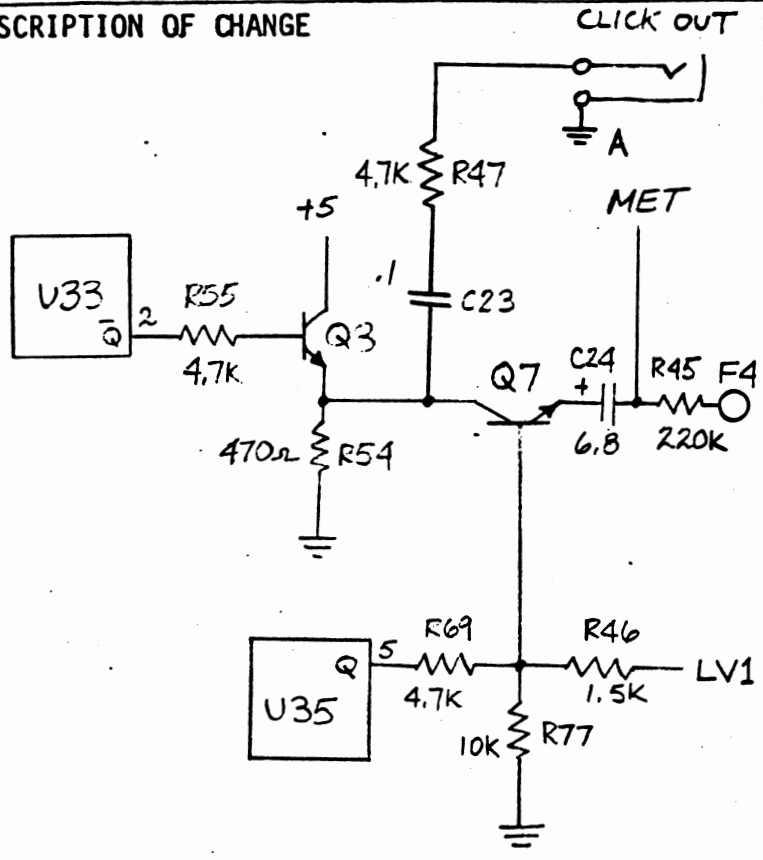
ECO NO. 304 PAGE 2

RODUCT AFFECTED

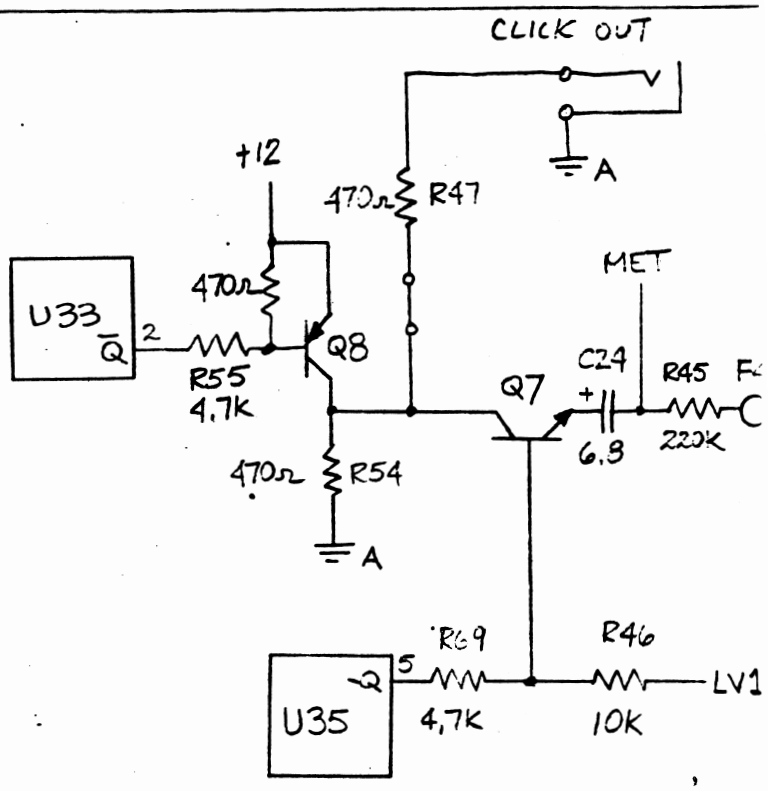
DMX

DRAWINGS AFFECTED

ESCRIPTION OF CHANGE



OLD CIRCUIT



NEW CIRCUIT

EASON FOR CHANGE

FFECTIVITY

- ☐ FUTURE PRODUCTION ONLY
- ☐ RETROFIT UNITS IN PRODUCTION AND INVENTORY
- ☐ RETROFIT UNITS IN FIELD
- ☐ DRAWING CORRECTION ONLY; HARDWARE NOT AFFECTED
- ☐ _____

WRITTEN BY: GR — DATE: 1-22-82

APPROVED BY — DATE

OBERHEIM ELECTRONICS, INC.

ENGINEERING CHANGE ORDER

ECO NO. 304 PAGE 3

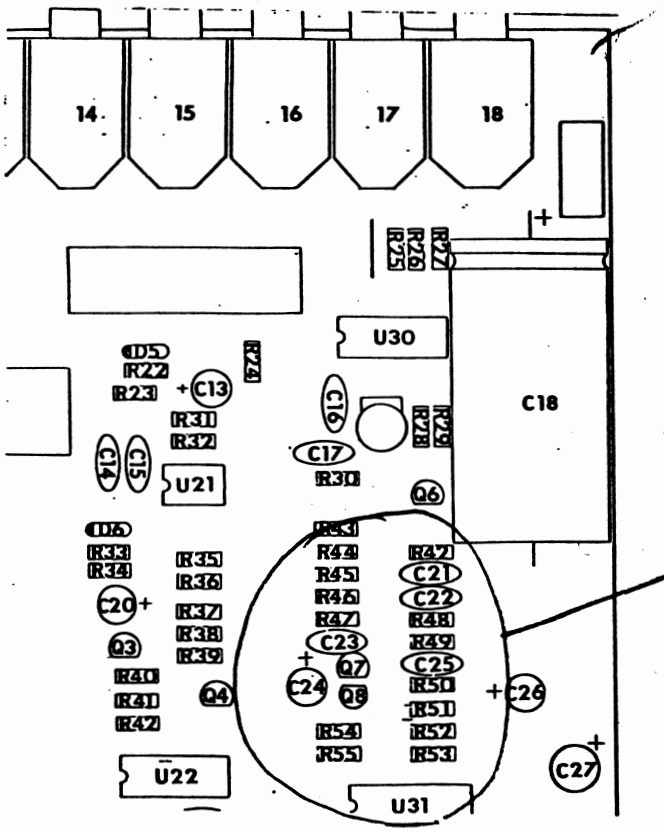
PRODUCT AFFECTED

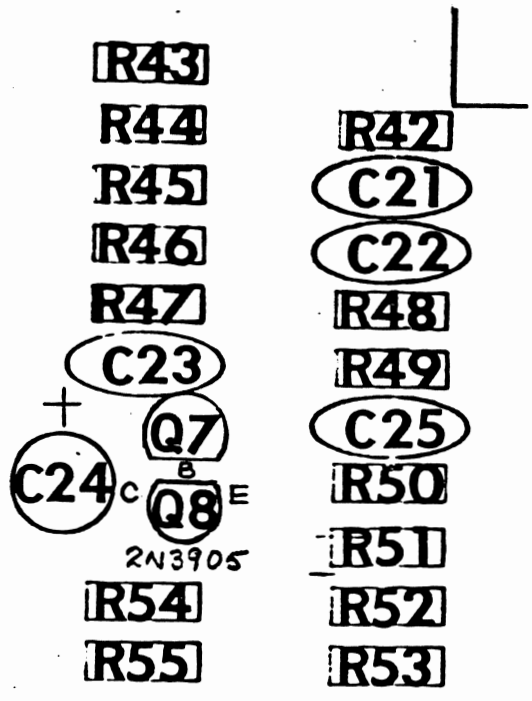
DMX

DRAWINGS AFFECTED

DESCRIPTION OF CHANGE

RIGHT REAR PROCESSOR BOARD.





INSTALLATION DETAIL OF Q8

REASON FOR CHANGE

EFFECTIVITY

- ☐ FUTURE PRODUCTION ONLY
- ☒ RETROFIT UNITS IN PRODUCTION AND INVENTORY
- ☒ RETROFIT UNITS IN FIELD
- ☐ DRAWING CORRECTION ONLY; HARDWARE NOT AFFECTED
- ☐ _____

WRITTEN BY GR DATE 1-22-82

APPROVED BY DATE

OBERHEIM ELECTRONICS, INC.

ENGINEERING CHANGE ORDER

ECO NO. 305

PRODUCT AFFECTED

DMX

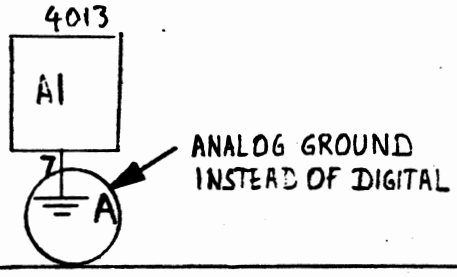
EFFECTIVE FROM PC N: 1564B

DRAWINGS AFFECTED

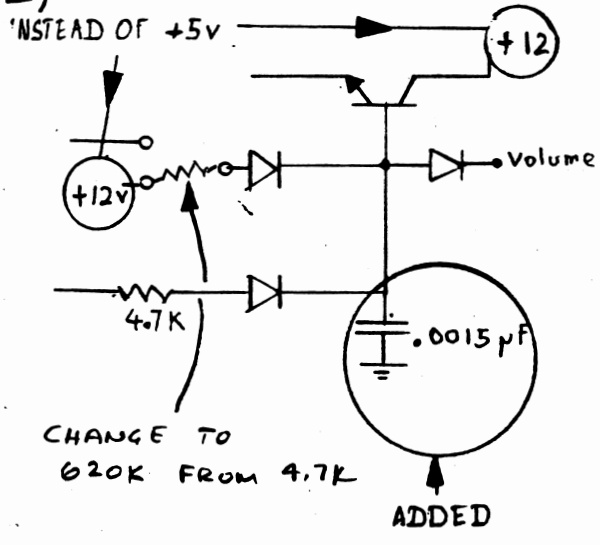
ALL VOICE BOARDS EXCEPT CYMBAL #2

DESCRIPTION OF CHANGES

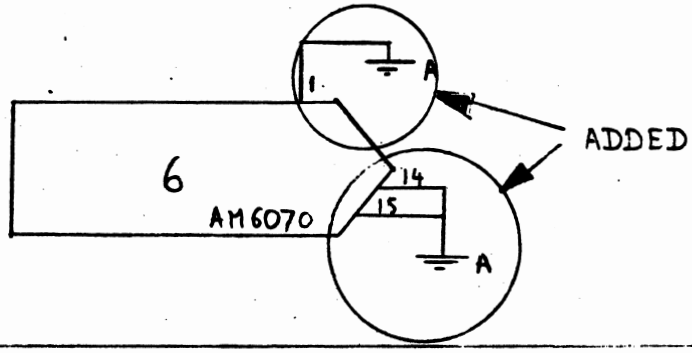
1)



2)



3)



4) NEW PITCH TRIM POT.

REASON FOR CHANGE

DECREASE NOISE

EFFECTIVITY

- [x] FUTURE PRODUCTION ONLY
- [ ] RETROFIT UNITS IN PRODUCTION AND INVENTORY
- [ ] RETROFIT UNITS IN FIELD
- [ ] DRAWING CORRECTION ONLY; HARDWARE NOT AFFECTED
- [ ] _____

WRITTEN BY — DATE

MICHEL — 11/17/81

REVISED 3-28-82

APPROVED BY — DATE

11/18/81

OBERHEIM ELECTRONICS, INC.

ENGINEERING CHANGE ORDER

ECO NO. 306

PRODUCT AFFECTED

DMX

DRAWINGS AFFECTED

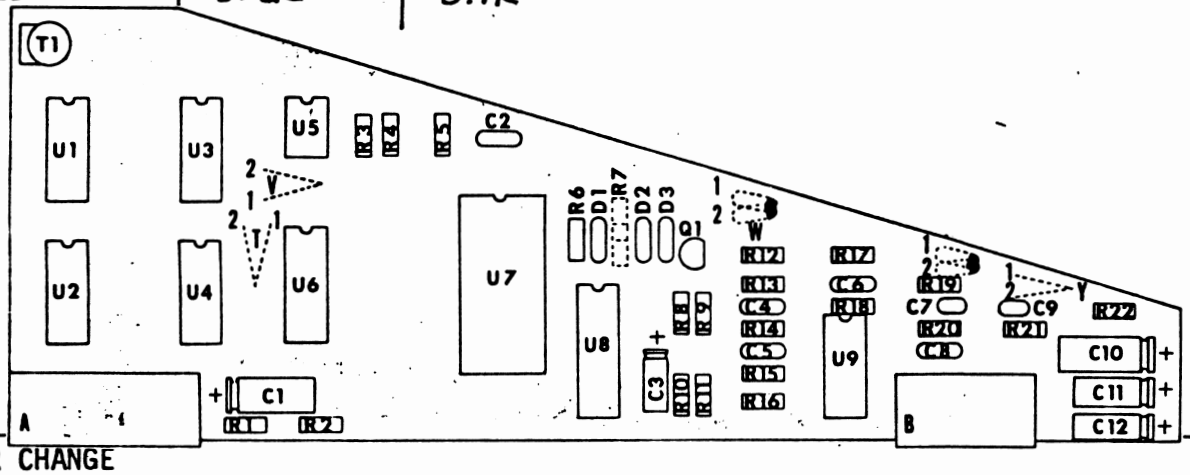
VOICE #7 SCHEMATIC
VOICE #7 LAYOUT

DESCRIPTION OF CHANGE

1. CHANGE U7 (2732) FROM "SHAKE 1" TO "SHAKE 6"

2.

COMP. #	WAS	CHANGE TO
C2	.0033 μF	.0047 μF
R13	5.6K	9.1K
R14	4.7K	6.2K
R15	4.7K	6.8K
R18	5.6K	9.1K
R19	3.3K	5.1K
R20	3.3K	5.1K



REASON FOR CHANGE

TO IMPLEMENT IMPROVED HANDCLAPS

EFFECTIVITY

- [x] FUTURE PRODUCTION ONLY
- [ ] RETROFIT UNITS IN PRODUCTION AND INVENTORY
- [ ] RETROFIT UNITS IN FIELD
- [ ] DRAWING CORRECTION ONLY; HARDWARE NOT AFFECTED
- [ ] _____

WRITTEN BY: GR — DATE: 3-1-82

APPROVED BY: JRO — DATE: 3/2/82

OBERHEIM ELECTRONICS, INC.

ENGINEERING CHANGE ORDER

ECO NO. 307

PRODUCT AFFECTED

DMX

DRAWINGS AFFECTED

VOICE BOARD SCHEMATICS
VOICE BOARD COMPONENT LAYOUTS

DESCRIPTION OF CHANGE

ALL VOICES: T1 WAS 10K, IS NOW 4.7K
R4 WAS 10K, IS NOW 4.7K

ALL VOICES EXCEPT #2:
C2 WAS .0033μF, IS NOW .0068μF

VOICE #2: C2 WAS .0022μF, IS NOW .0047μF

REASON FOR CHANGE

UN-AVAILABILITY OF 10K TRIM POTS

EFFECTIVITY

- [X] FUTURE PRODUCTION ONLY
- [ ] RETROFIT UNITS IN PRODUCTION AND INVENTORY
- [ ] RETROFIT UNITS IN FIELD
- [ ] DRAWING CORRECTION ONLY; HARDWARE NOT AFFECTED
- [ ] _____

WRITTEN BY GR DAT DEC '81

APPROVED BY DAT

OBERHEIM ELECTRONICS, INC.

ENGINEERING CHANGE ORDER

ECO NO. 310

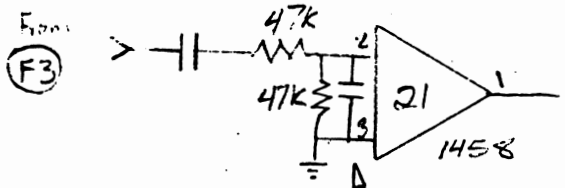
PRODUCT AFFECTED

DMX

DRAWINGS AFFECTED

SCHEMATIC
PARTS LAYOUT
PARTS LIST

DESCRIPTION OF CHANGE



Add 100pF cap.
Pads are provided
next to IC 21

REASON FOR CHANGE

Decrease noise sensitivity in sync to tape circuit to eliminate spurious interrupts while in step mode

EFFECTIVITY

- ☐ FUTURE PRODUCTION ONLY
- ☒ RETROFIT UNITS IN PRODUCTION AND INVENTORY
- ☐ RETROFIT UNITS IN FIELD
- ☐ DRAWING CORRECTION ONLY; HARDWARE NOT AFFECTED
- ☐ _____

WRITTEN BY Jim Letts **DATE** 3/[illegible]

APPROVED BY [signature] **DATE** 3/30/[illegible]

OBERHEIM ELECTRONICS, INC.

ENGINEERING CHANGE ORDER

ECO NO. 308

RODUCT AFFECTED

DMX

DRAWINGS AFFECTED

PROCESSOR ASSY

ESCRIPTION OF CHANGE

PROGRAM EPROMS ARE CHANGED FROM: B0 , B1

TO: C0 , C1

EASON FOR CHANGE

IMPLEMENTS DMX SOFTWARE V. 2.00 (REV. C)

FFECTIVITY

- [ ] FUTURE PRODUCTION ONLY
- [x] RETROFIT UNITS IN PRODUCTION AND INVENTORY
- [x] RETROFIT UNITS IN FIELD
- [ ] DRAWING CORRECTION ONLY; HARDWARE NOT AFFECTED
- [ ] _____

WRITTEN BY GR DA 2/20/82

APPROVED BY ASO DA 3/31-/82

OBERHEIM ELECTRONICS, INC.

ENGINEERING CHANGE ORDER

ECO NO. 309

PRODUCT AFFECTED

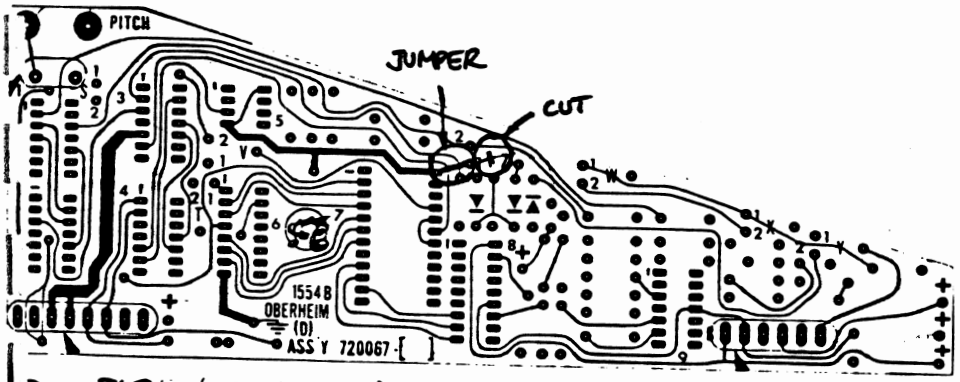
DMX

DRAWINGS AFFECTED

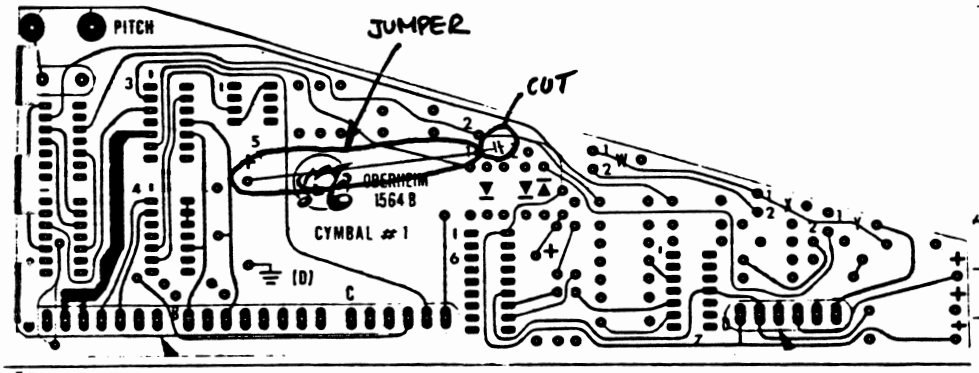
VOICE SCHEMATICS: ASSY 720067-2
-6
-7
720068

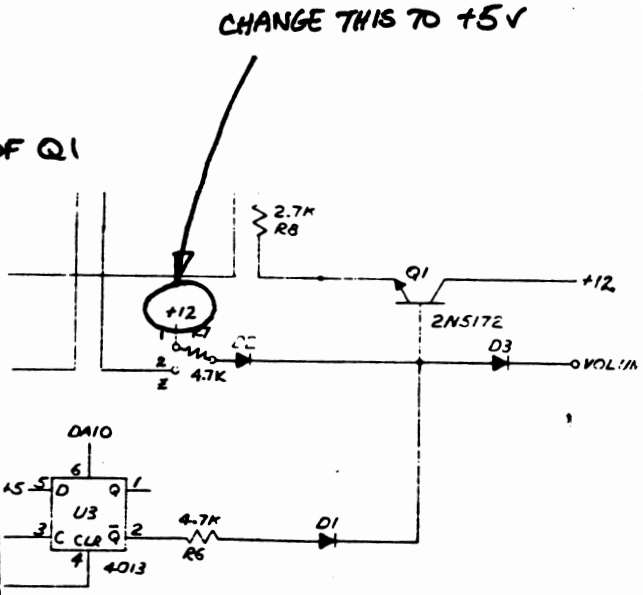
DESCRIPTION OF CHANGE

PC 1553B/1554B: 1) CUT TRACE FROM Z1 TO COLLECTOR OF Q1
2) INSTALL JUMPER FROM Z1 TO U7 PIN 24



PC 1563B/1564B: 1) CUT TRACE FROM Z1 TO COLLECTOR OF Q1
2) INSTALL JUMPER FROM Z1 TO C1+





REASON FOR CHANGE

CHANGE BASE VOLTAGE ON Q1 FROM +12V TO +5V

EFFECTIVITY

- [ ] FUTURE PRODUCTION ONLY
- [X] RETROFIT UNITS IN PRODUCTION AND INVENTORY
- [ ] RETROFIT UNITS IN FIELD
- [ ] DRAWING CORRECTION ONLY; HARDWARE NOT AFFECTED
- [ ] _____

WRITTEN BY: GR — DATE: 3-23-82

APPROVED BY — DATE: 3/31/82