

PRODUCT AFFECTED

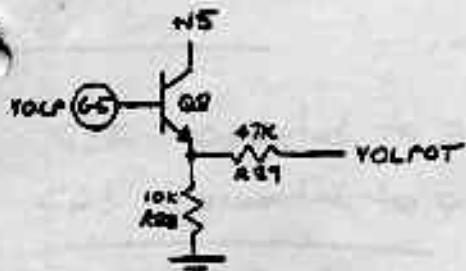
OB-8

DRAWINGS AFFECTED

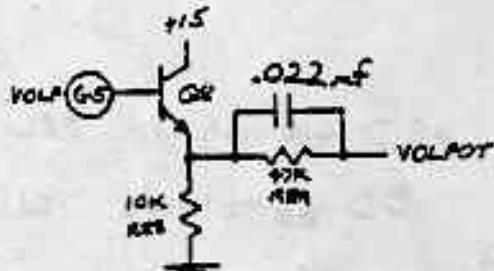
SCHEMATIC 1679A SHEET 2

DESCRIPTION OF CHANGE

OLD:



NEW:



ADD .022MF CAPACITOR IN
PARALLEL WITH R28.

REASON FOR CHANGE

TO ELIMINATE NOISE WHEN CONTROLLING THE VOLUME WITH
AN EXTERNAL LOW IMPEDANCE VOLTAGE SOURCE.

(FOR EXAMPLE, A CV OUTPUT OF THE DSX PLUGGED INTO THE VOLUME CONTROL INPUT.)

EFFECTIVITY

- FUTURE PRODUCTION ONLY
- RETROFIT UNITS IN PRODUCTION AND INVENTORY
- RETROFIT UNITS IN FIELD
- DRAWING CORRECTION ONLY; HARDWARE NOT Affected
- RETROFIT IF NEEDED IN FIELD

WRITTEN BY

MICHEL

DATE

12/9/82

APPROVED BY

DATE

12/9/82

PRODUCT AFFECTED

DRAWINGS AFFECTED

OB-B

1682 SHEET 2 of 3

DESCRIPTION OF CHANGE

REVERSE POSITION OF D101 + R101 on drawing
 " " D201 + R201 "
 " " D301 + R301 "
 " " D401 + R401 "

C32 connected to pin 5 of U35 should be C34

C23 connected to pins 5 of U21 should be C3

ADD R32 to 100K 1% connected to pin 2 of U23

ADD R33 to 187K 1% connected to pin 2 & pin 1 of U33

CHANGE R33 (560Ω) to R35 sheet 1 of 3

ADD R36 to 47K connected to pin 4 of U26.

CHANGE pin 4 (output control) U13 to pin 1

AS FOR CHANGE

To match schematic to board layout.

FECTIVITY

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

WRITTEN BY

DATE

7dec82

APPROVED BY

DATE

12-7-82

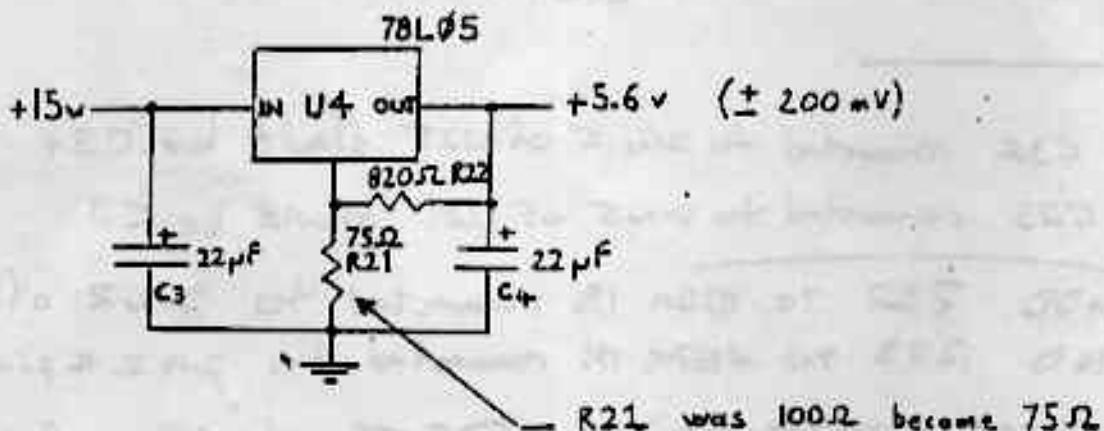
ENGINEERING CHANGE ORDER

404

PRODUCT AFFECTED	DRAWINGS AFFECTED
OB-8	OB-8 POT. Board 1 & 2 1681A

DESCRIPTION OF CHANGE

Reduce output of 5.6v Supply.



REASON FOR CHANGE

Increase the active range of the front panel pots.

AFFECTIVITY	WRITTEN BY	DATE
<input checked="" type="checkbox"/> FUTURE PRODUCTION ONLY	PETER MURSON	12/10/82
<input type="checkbox"/> RETROFIT UNITS IN PRODUCTION AND INVENTORY		
<input type="checkbox"/> RETROFIT UNITS IN FIELD		
<input type="checkbox"/> DRAWING CORRECTION ONLY: HARDWARE NOT Affected		
<input type="checkbox"/>		
APPROVED BY	DATE	
<i>[Signature]</i>	12/10/82	

REVISED 1-5-83 + -

OBERHEIM ELECTRONICS, INC.

ECO NO.

ENGINEERING CHANGE ORDER

405

PRODUCT AFFECTED

DRAWINGS AFFECTED

O B - 8

OB-8 VOICE BOARD 1682A

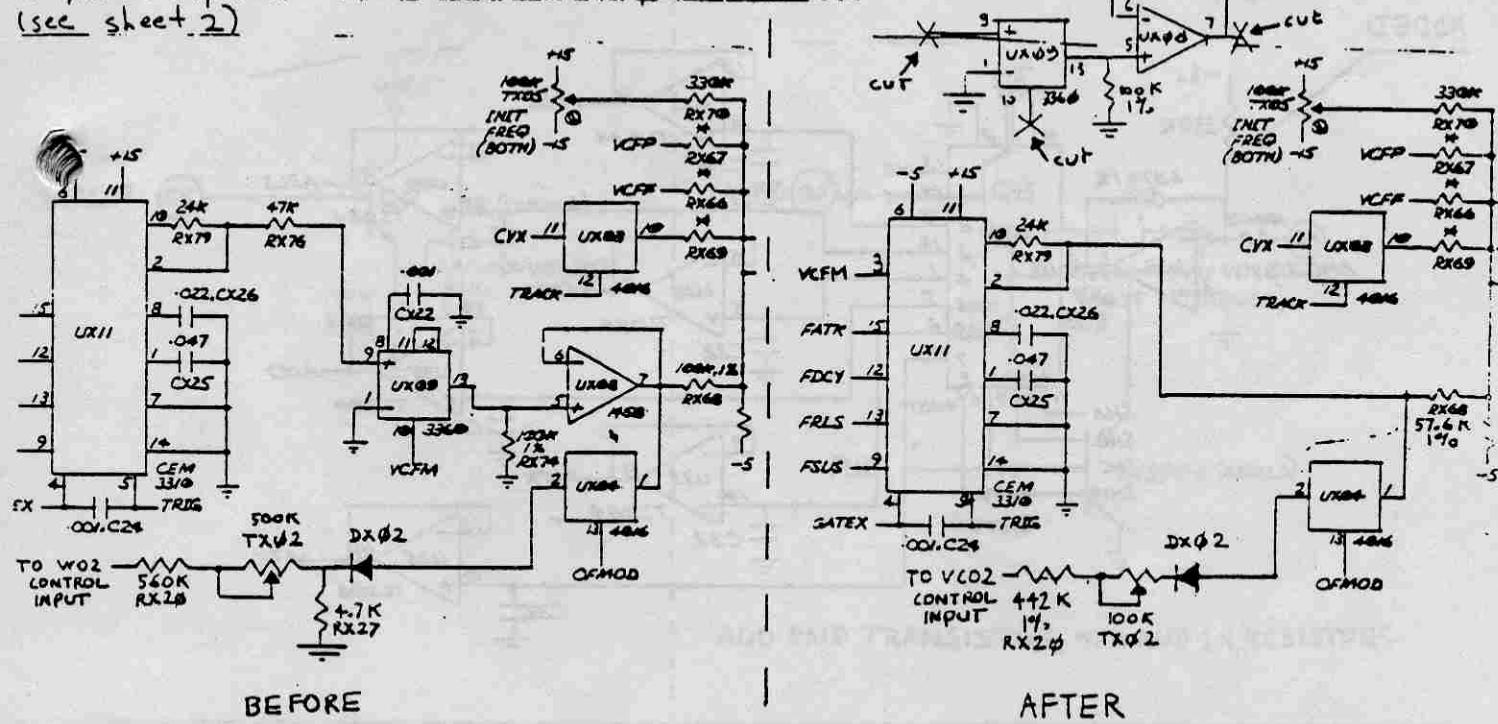
DESCRIPTION OF CHANGE

DESCRIPTION OF CHANGE The 336 ϕ VCA is bypassed and the 331 ϕ in conjunction with the software modulates the amplitude of the envelope. A software revision A-4 or posterior must be installed.

31, at the output of U27 is short circuited. & R30 is removed
(see sheet 2)

UNUSED





REASON FOR CHANGE

Improve temperature stability and tracking of VCO₂ filter envelope modulation

EFFECTIVITY

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

WRITTEN BY

DATE

MICHEL DOUDIC

12/12/8

APPROVED BY

DATE

160

12/12/82

* REVISED 1-5-83 *

oberheim electronics, inc.

engineering change order

ECO NO.

406

PRODUCT AFFECTED

OB-8

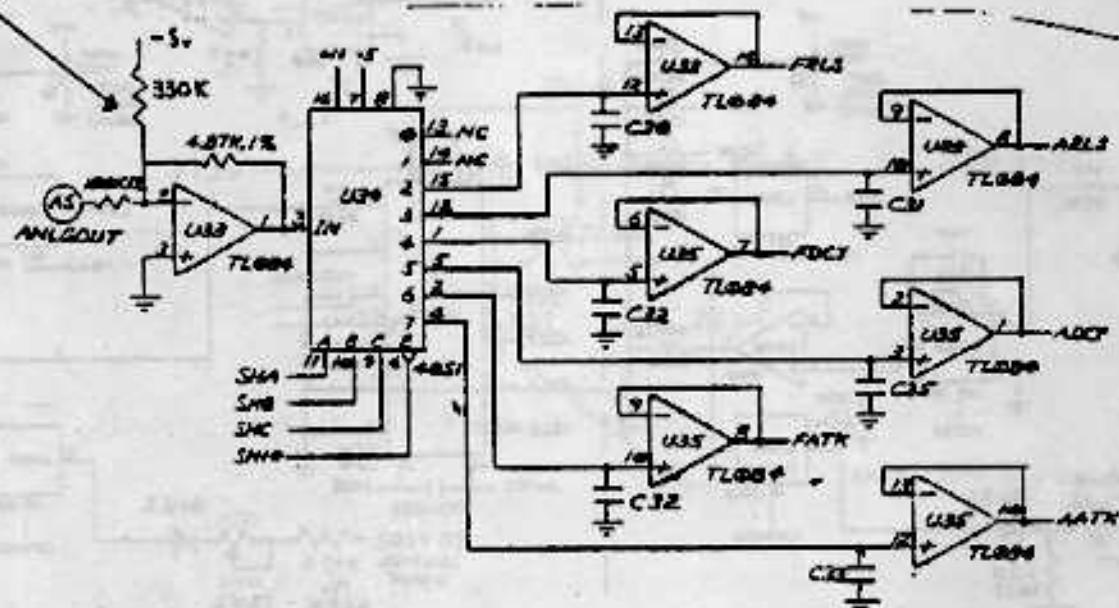
DRAWINGS AFFECTED

OB-8 VOICE BOARD 1682A

DESCRIPTION OF CHANGE

Add a resistor between -5v and pin 2 of U33 (upper & lower voice). A software revision A-4 or posterior must be installed and the offset calibration of the service center test must be performed.

ADDED



ECO NO.
06

OBERHEIM ELECTRONICS, INC.

ECO NO.

ENGINEERING CHANGE ORDER

407

CIRCUIT AFFECTED

OB-8

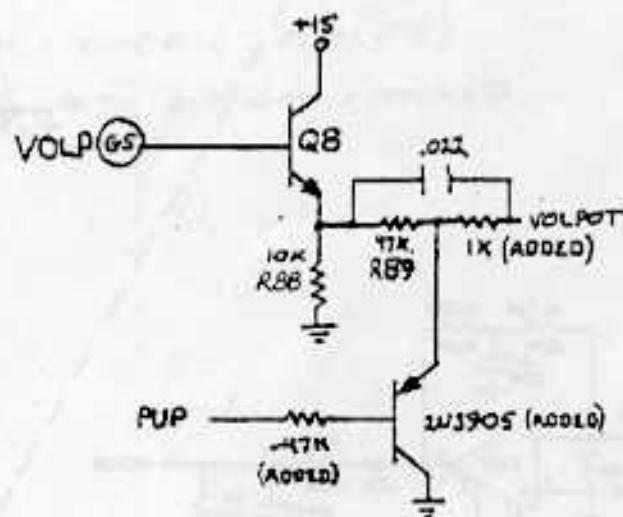
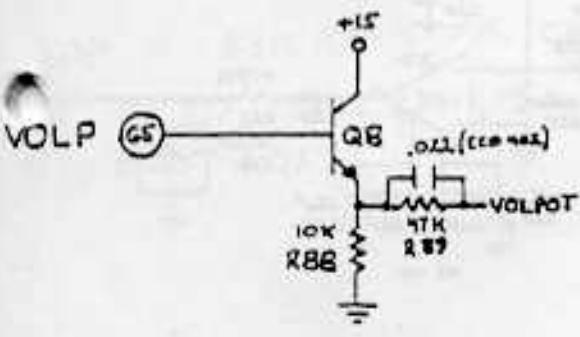
DRAWINGS AFFECTED

SCHEMATIC 1679 A, SHEET 2
OB-8 PROCESSOR BOARD

DESCRIPTION OF CHANGE

OLD:

NEW:



ADD PNP TRANSISTOR, 47K AND 1K RESISTORS

SON FOR CHANGE

TO REDUCE POWER-DOWN GLITCH AT OUTPUTS

EFFECTIVITY

- FUTURE PRODUCTION ONLY
- RETROFIT UNITS IN PRODUCTION AND INVENTORY
- RETROFIT UNITS IN FIELD
- DRAWING CORRECTION ONLY; HARDWARE NOT Affected
- RETROFIT AS NEEDED

WRITTEN BY

Randy Evans

DATE

12-15-82

APPROVED BY

DATE

12-15-82

PRODUCT AFFECTED

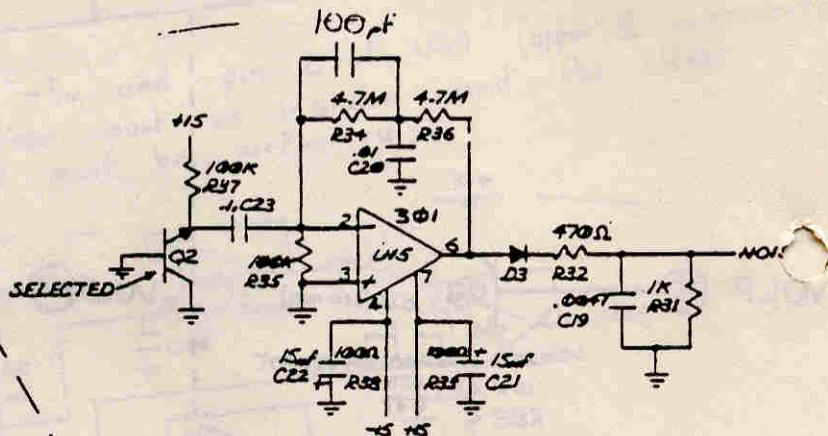
OB-8

DRAWINGS AFFECTED

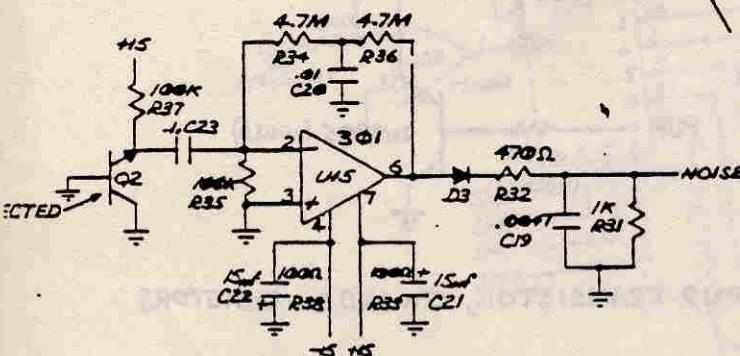
NONE

DESCRIPTION OF CHANGE

OLD:



NEW

ADD A 100pF CAPACITOR
IN PARALLEL WITH R34

REASON FOR CHANGE

ON REVISION A PROCESSOR BOARDS, WHEN A SEQUENCER IS CONNECTED,
DISTORTION BECOMES PRESENT IN THE NOISE GENERATOR.

EFFECTIVITY

- FUTURE PRODUCTION ONLY
- RETROFIT UNITS IN PRODUCTION AND INVENTORY
- RETROFIT UNITS IN FIELD
- DRAWING CORRECTION ONLY; HARDWARE NOT Affected
- RETROFIT REV. "A" BOMKDS DAILY

WRITTEN BY

M. DC

DATE

12/24/82

APPROVED BY

RE

DATE

12/22/82

oberheim electronics, inc.
engineering change order

ECO NO.
409

PRODUCT AFFECTED	DRAWINGS AFFECTED
OB-8	1682A

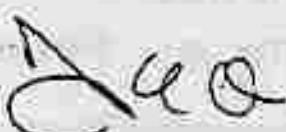
DESCRIPTION OF CHANGE

ADD A 33K RESISTOR ON EACH VOICE (2 PLACES)
TO RX27. THIS RESISTOR WAS 4.7K BUT WAS REMOVED
BY ECO 405.

REASON FOR CHANGE

TO KEEP OSC 2 FROM GOING SHARP WHEN
THE SAWTOOTH WAVE IS SELECTED.

EFFECTIVITY	WRITTEN BY	DATE
<input checked="" type="checkbox"/> FUTURE PRODUCTION ONLY	RANDY EVANS	12/22/82
<input type="checkbox"/> RETROFIT UNITS IN PRODUCTION AND INVENTORY		
<input type="checkbox"/> RETROFIT UNITS IN FIELD		
<input type="checkbox"/> DRAWING CORRECTION ONLY; HARDWARE NOT AFFECTED		
<input type="checkbox"/>		

APPROVED BY	DATE
	12/22/82

* REVISED 1-5-83 *

oberheim electronics, inc.

engineering change order

ECO NO.

410

PRODUCT AFFECTED

OB-8

DRAWINGS AFFECTED

NONE

DESCRIPTION OF CHANGE

REMOVE EPROMS A3-0 - A3-3 FROM SOCKETS
U21 THROUGH U24, AND REPLACE WITH NEW
SOFTWARE, EPROMS A4-0 - A4-3.

- ECO's 405, 406, 409 must be implemented. -

REASON FOR CHANGE

TO ADD THE OUTPUT 3080 (U503) OFFSET
CALIBRATION PROCEDURE TO THE TEST SOFTWARE

EFFECTIVITY

- FUTURE PRODUCTION ONLY
- RETROFIT UNITS IN PRODUCTION AND INVENTORY
- RETROFIT UNITS IN FIELD
- DRAWING CORRECTION ONLY; HARDWARE NOT Affected
-

WRITTEN BY

MICHEL DOIDIC 12/22/82

DATE

APPROVED BY

JRC 12/22/82

DATE

ENGINEERING CHANGE ORDER

411

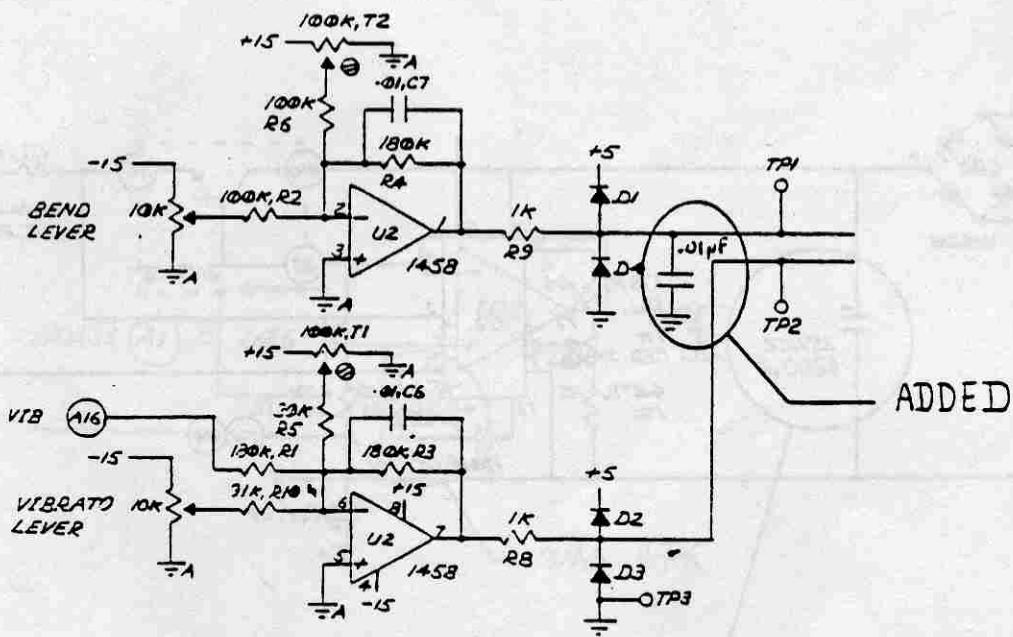
PRODUCT AFFECTED

OB-8

DRAWINGS AFFECTED

OB-8 BEND BOX 1680A SHEET 1 OF 1

DESCRIPTION OF CHANGE



REASON FOR CHANGE

- REMOVES NOISE MODULATION FROM BENDER LEVER

EFFECTIVITY

WRITTEN BY

DATE

FUTURE PRODUCTION ONLY

MICHEL DOUDIC

1/6/83

RETROFIT UNITS IN PRODUCTION AND INVENTORY

APPROVED BY

DATE

RETROFIT UNITS IN FIELD

DRAWING CORRECTION ONLY; HARDWARE NOT Affected

Dre 1/6/83

ENGINEERING CHANGE ORDER

412

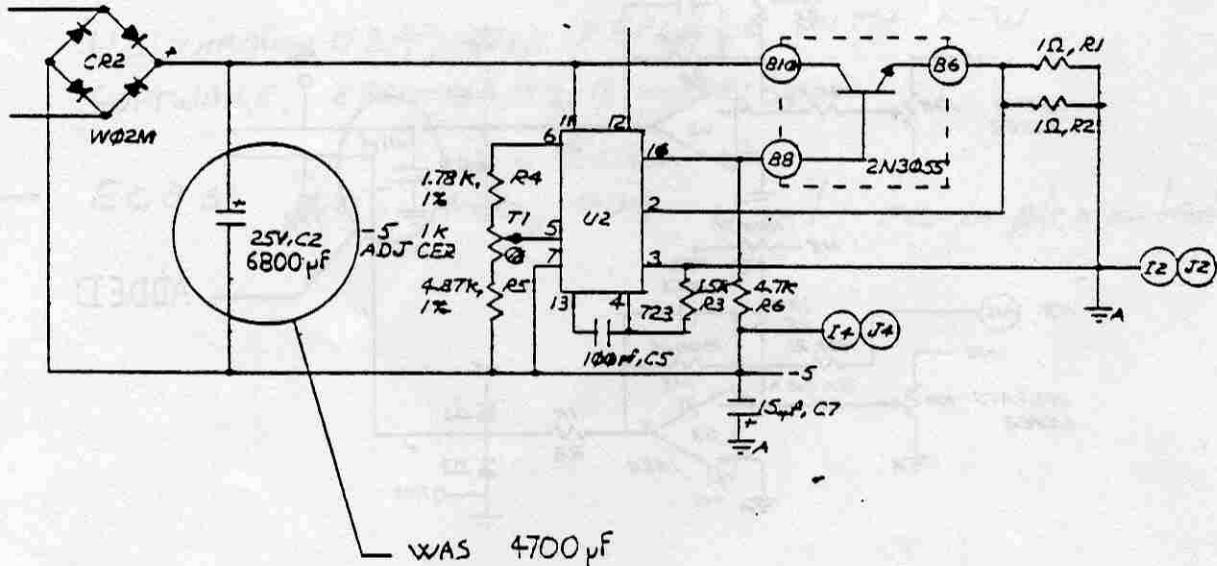
PRODUCT AFFECTED

OB-8

DRAWINGS AFFECTED

PROCESSOR BOARD- POWER SUPPLY
1679A SHEET 4 of 4

DESCRIPTION OF CHANGE



(REFERENCE ECO #401)

REASON FOR CHANGE

WHEN THE NEW POWER SUPPLY TRANSFORMER (REF. 561021) IS USED, THIS CHANGE DECREASES THE OUTPUT THUMP ON POWER OFF.

EFFECTIVITY

- FUTURE PRODUCTION ONLY
- RETROFIT UNITS IN PRODUCTION AND INVENTORY
- RETROFIT UNITS IN FIELD
- DRAWING CORRECTION ONLY; HARDWARE NOT Affected
-

WRITTEN BY

MICHEL DOLDIC

DATE

1/18/83

APPROVED BY

DATE

1/18/83

ENGINEERING CHANGE ORDER

413

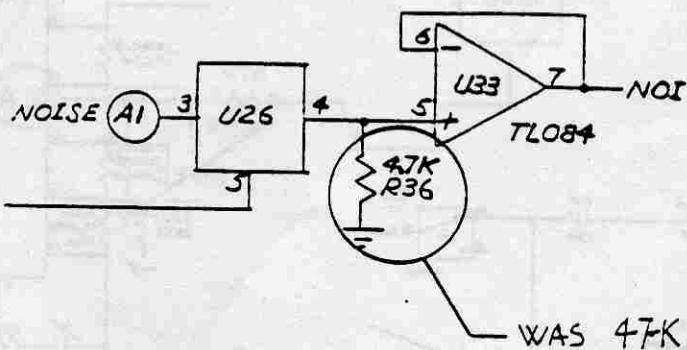
PRODUCT AFFECTED

OB-8

DRAWINGS AFFECTED

VOICE BOARD 1682A SHEET 2 OF 3

DESCRIPTION OF CHANGE



REASON FOR CHANGE

REMOVE LEAK OF NOISE GENERATOR WHEN A VOICE IS GATED

EFFECTIVITY

- FUTURE PRODUCTION ONLY
- RETROFIT UNITS IN PRODUCTION AND INVENTORY
- RETROFIT UNITS IN FIELD
- DRAWING CORRECTION ONLY; HARDWARE NOT Affected
-

WRITTEN BY

MICHEL DOLDIC

DATE

1/18/83

APPROVED BY

D.R.O. 1/18/83

DATE

ENGINEERING CHANGE ORDER

414

PRODUCT AFFECTED

OB-8

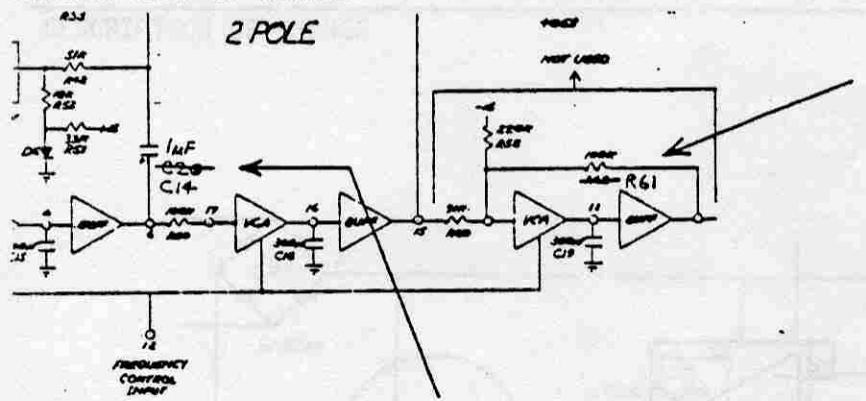
DRAWINGS AFFECTED

1682A VOICE BOARD

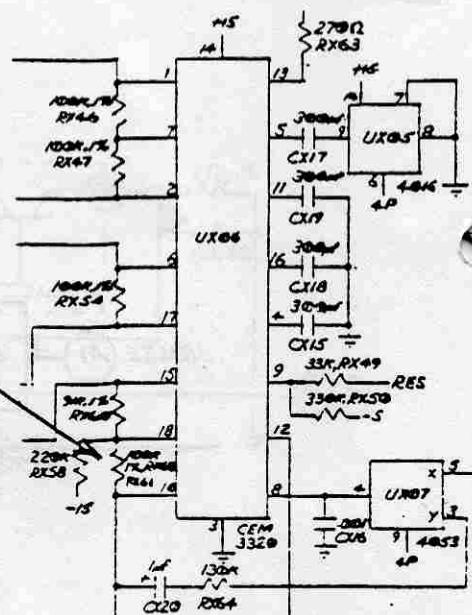
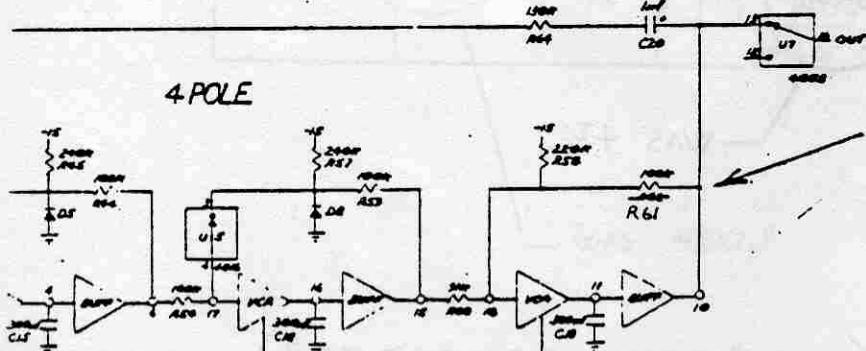
2 POLE/4 POLE CONFIGURATION

DESCRIPTION OF CHANGE

2 POLE



4 POLE



REASON FOR CHANGE

RESISTOR AT UX06 PINS 10, 18 MARKED RX68 SHOULD BE RX61.

CAPACITOR IN 2 POLE/4 POLE CONFIGURATION DRAWING MARKED C20 SHOULD BE C14.

EFFECTIVITY

- FUTURE PRODUCTION ONLY
- RETROFIT UNITS IN PRODUCTION AND INVENTORY
- RETROFIT UNITS IN FIELD
- DRAWING CORRECTION ONLY; HARDWARE NOT Affected
-

WRITTEN BY

PAUL WHITE 1/20/83

APPROVED BY

JES 1/20/83

DATE

DATE

ENGINEERING CHANGE ORDER

415

PRODUCT AFFECTED

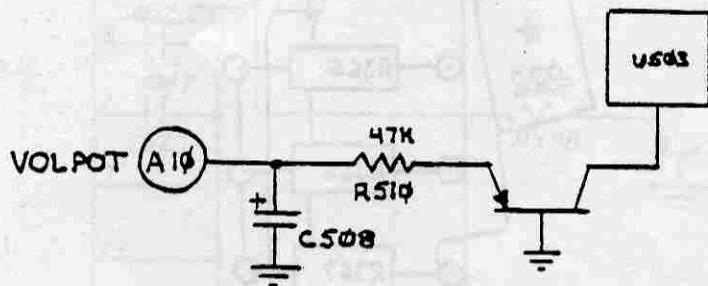
OB-8

DRAWINGS AFFECTED

SCHEMATIC

1682 B OB-8 VOICE BOARD (UPPER)

DESCRIPTION OF CHANGE



Change C508 from 0.1uf Mylar To 2.2 Electrolytic (Upper Voice only)

EARTH FOR CHANGE

To eliminate noise at output at low master volume levels

EFFECTIVITY

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

WRITTEN BY

DATE

Randy Evans

1-26-83

APPROVED BY

DATE

1-27-83

ENGINEERING CHANGE ORDER

416

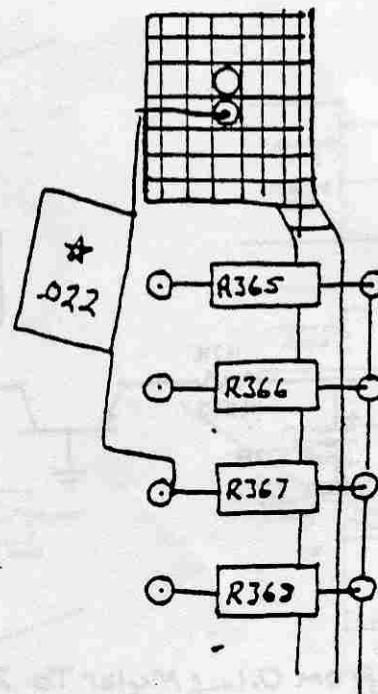
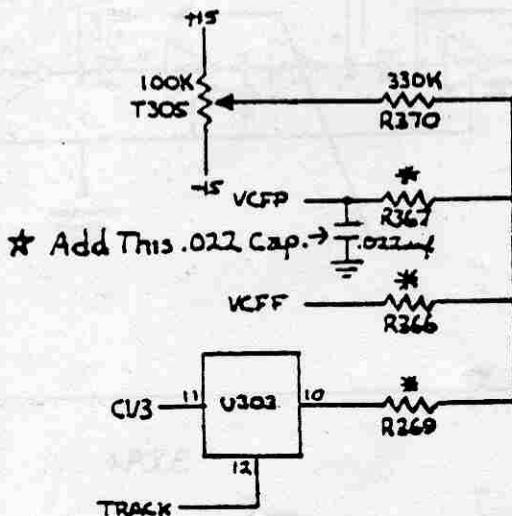
DUCT AFFECTED

OB-8

DRAWINGS AFFECTED

1632B OB-8 Voice Board
1689B

DESCRIPTION OF CHANGE



Add a .022 Mylar Capacitor To both The Top and bottom Voice Boards

REASON FOR CHANGE

To Filter-out digital noise picked-up along The Filter Pedal line (VCFP)
when a Sequencer (05X) is connected

EFFECTIVITY

FUTURE PRODUCTION ONLY

RETROFIT UNITS IN PRODUCTION AND INVENTORY

RETROFIT UNITS IN FIELD

DRAWING CORRECTION ONLY; HARDWARE NOT Affected

As Required in Test

WRITTEN BY

Randy Evans

2-3-83

APPROVED BY

JG

DATE

DATE

2-3-83

ENGINEERING CHANGE ORDER

417

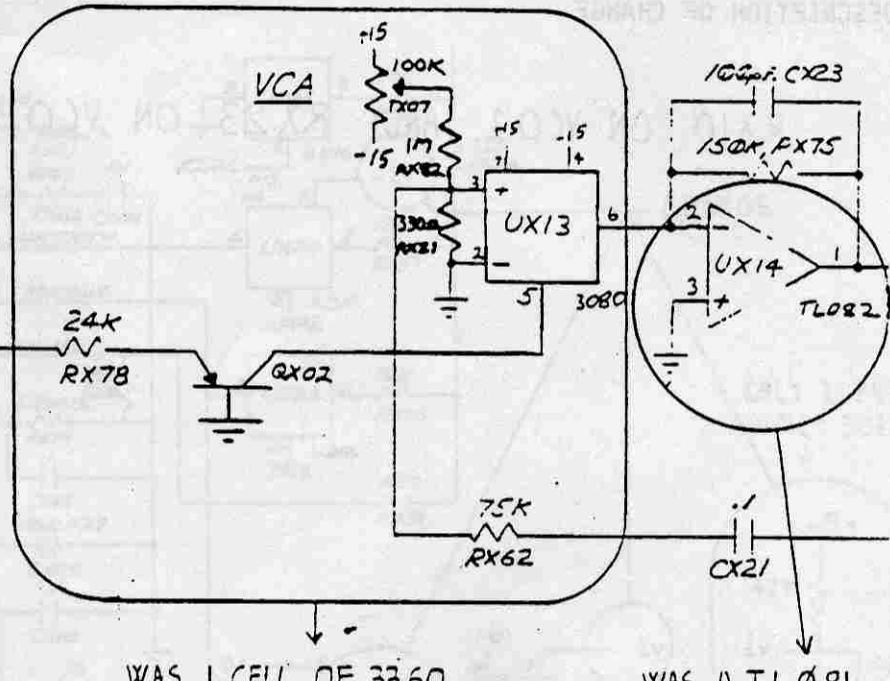
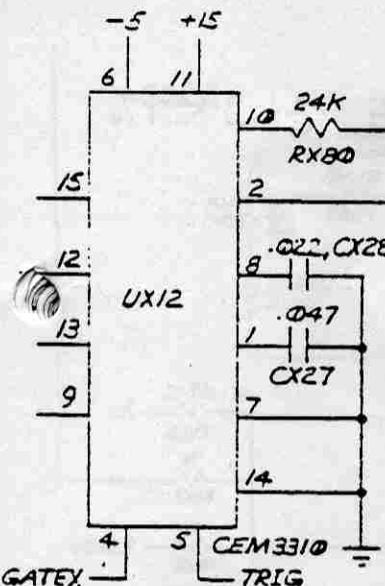
PRODUCT AFFECTED

OB-8

DRAWINGS AFFECTED

OB-8 VOICE BOARD 1682 B SHEET 3 of 3

DESCRIPTION OF CHANGE



- ALSO: UX08 IS DELETED AND REPLACED BY THE OTHER CELL OF THE TL082 UX14

REASON FOR CHANGE

- RATIONALIZE THE CIRCUITRY

EFFECTIVITY

- FUTURE PRODUCTION ONLY, START WITH VOICE BOARD PC1658B
- RETROFIT UNITS IN PRODUCTION AND INVENTORY
- RETROFIT UNITS IN FIELD
- DRAWING CORRECTION ONLY; HARDWARE NOT Affected
-

WRITTEN BY

MICHEL DOIDIC 2/11/83

APPROVED BY

J.W. 2/15/83

DATE

DATE

OVERHEIM ELECTRONICS, INC.
ENGINEERING CHANGE ORDER

ECO NO.

1-5

PRODUCT AFFECTED	DRAWINGS AFFECTED
OB-8	OB-8 VOICE BOARD 16826 SHEET 3 of 3

DESCRIPTION OF CHANGE

RATIO ON VCO1 AND RX23 ON VCO2 BECOME 44.2 < 1%

REASON FOR CHANGE

- BRING THE TRACKING TRIMMER IN THE MIDDLE -

EFFECTIVITY	WRITTEN BY	DATE
<input checked="" type="checkbox"/> FUTURE PRODUCTION ONLY, START WITH VOICE BOARD PC16828	MICHEL DOLDIC	2/11/83
<input type="checkbox"/> RETROFIT UNITS IN PRODUCTION AND INVENTORY		
<input type="checkbox"/> RETROFIT UNITS IN FIELD		
<input type="checkbox"/> DRAWING CORRECTION ONLY; HARDWARE NOT Affected		
<input type="checkbox"/>		

APPROVED BY	DATE
	2/15/83

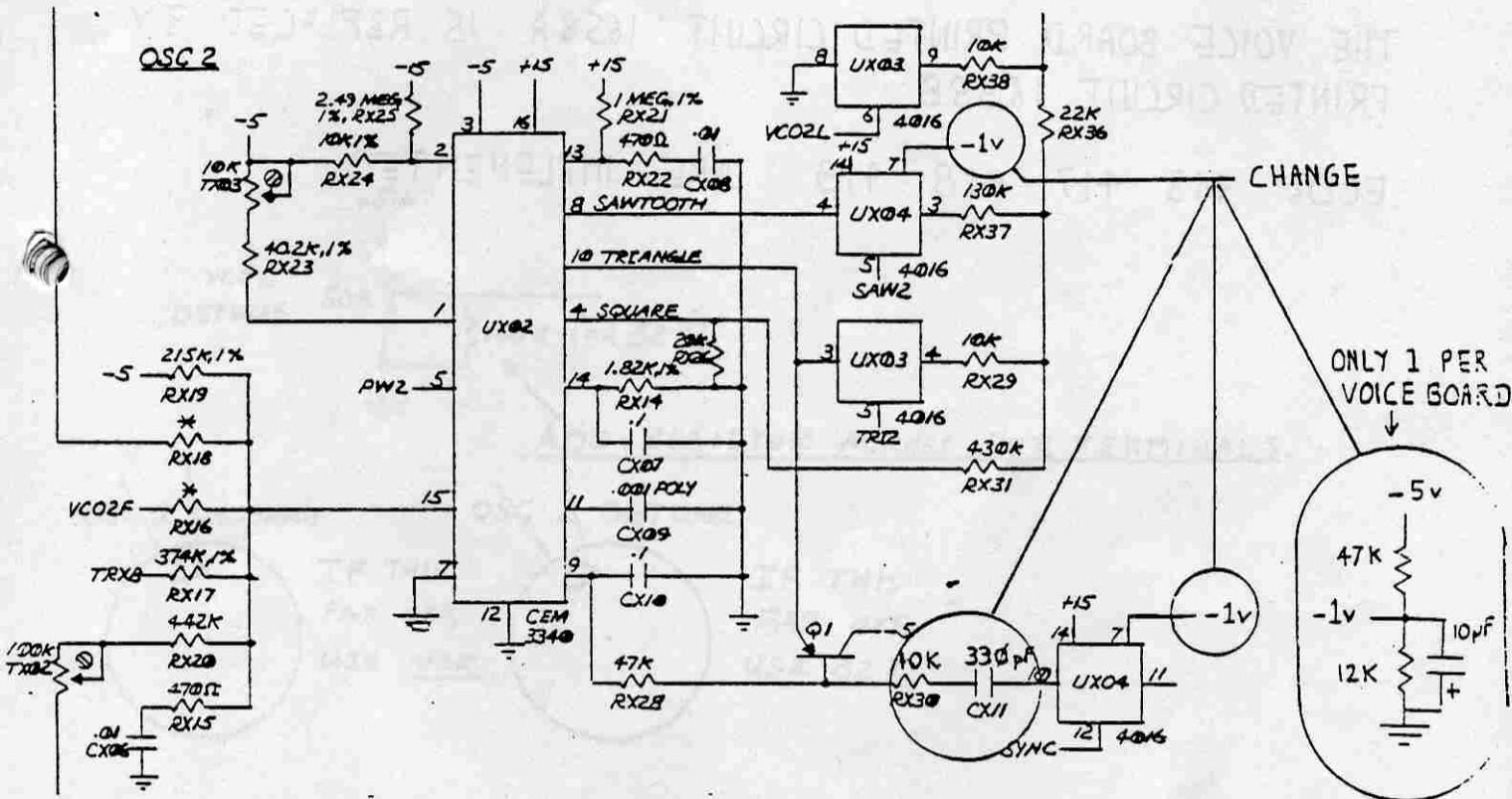
PRODUCT AFFECTED

DRAWINGS AFFECTED

OB-8

OB-8 VOICE BOARD 1682A SHEET 3 OF 3

DESCRIPTION OF CHANGE



REASON FOR CHANGE

- #### - IMPROVES SYNCHRO SOUND

EFFECTIVITY

- FUTURE PRODUCTION ONLY, START WITH VOICE BOARD PC 1658B
 - RETROFIT UNITS IN PRODUCTION AND INVENTORY
 - RETROFIT UNITS IN FIELD
 - DRAWING CORRECTION ONLY; HARDWARE NOT Affected
 - _____

WRITTEN BY

MICHEL DOUDIC

2/11/93

APPROVED BY

2 | 15 | 83.

oberheim electronics, inc.
engineering change order

ECO #
420

PRODUCT AFFECTED OB-8	DRAWINGS AFFECTED VOICE BOARD 1682B SHEET 1,2,3
--------------------------	--

DESCRIPTION OF CHANGE

THE VOICE BOARD PRINTED CIRCUIT 1658A IS REPLACED BY
PRINTED CIRCUIT 1658B

ECOs 413 417 418 419 ARE IMPLEMENTED

REASON FOR CHANGE

- REMOVES CUTS AND JUMPERS

EFFECTIVITY	WRITTEN BY	DATE
<input checked="" type="checkbox"/> FUTURE PRODUCTION ONLY <input type="checkbox"/> RETROFIT UNITS IN PRODUCTION AND INVENTORY <input type="checkbox"/> RETROFIT UNITS IN FIELD <input type="checkbox"/> DRAWING CORRECTION ONLY; HARDWARE NOT Affected <input type="checkbox"/>	MICHEL DOUDIC	2/11/93
	APPROVED BY	DATE
		2/15/93

DUCT AFFECTED

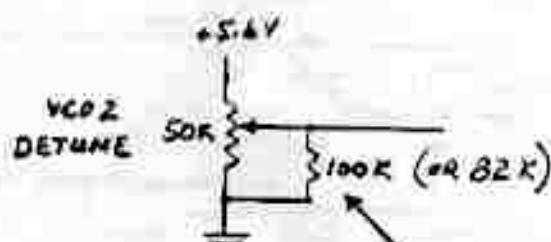
OB-8

DRAWINGS AFFECTED

POT BOARD

1681 B

DESCRIPTION OF CHANGE

ADD RESISTOR ACROSS POT TERMINALS.IF THIS
FAR OFF,
USE 100KIF THIS
FAR OFF,
USE 82K

AS FOR CHANGE

TO CENTER OSC 2 DETUNE CONTROL WHEN LED GOES OFF
WITH KNOB SIGNIFICANTLY COUNTER CLOCKWISE OF CENTER.

FECTIVITY

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

WRITTEN BY

BILL CAWTHORNE 2-22-83

APPROVED BY

2-24-83

CANCELLS BY ECO # 433

OBERHEIM ELECTRONICS, INC.

ENGINEERING CHANGE ORDER

ECO NO.

422

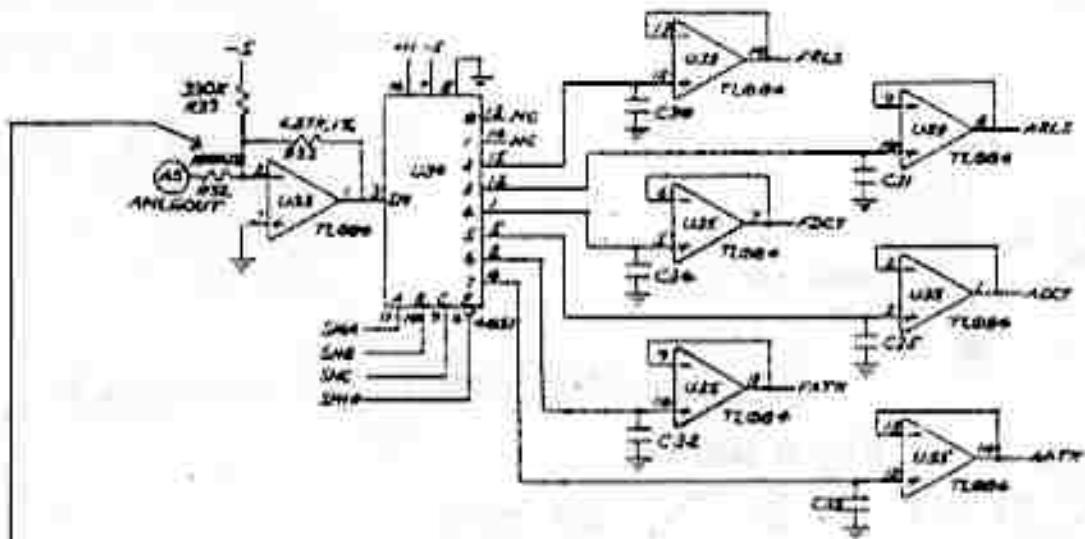
PRODUCT AFFECTED

OB-8

DRAWINGS AFFECTED

OB-8 VOICE BOARD 1682B SHEET 2

DESCRIPTION OF CHANGE



R32 100K 1% are 50Ω matched
between Lower and upper tray.

R32 on the Lower and upper tray are mounted after the -20
boards are screwed together.

REASON FOR CHANGE

— IMPROVES MATCHING OF TIMING BETWEEN ENVELOPES OF UPPER,
AND LOWER TRAY.

EFFECTIVITY

- FUTURE PRODUCTION ONLY
- RETROFIT UNITS IN PRODUCTION AND INVENTORY
- RETROFIT UNITS IN FIELD
- DRAWING CORRECTION ONLY; HARDWARE NOT Affected
-

WRITTEN BY

MICHEL BOUDREAU

DATE

3/10/83

APPROVED BY

D.GG

DATE

3/10/83

CANCELED 3/1 ECO # 429

OBERHEIM ELECTRONICS, INC.

ENGINEERING CHANGE ORDER

ECO NO.

423

PRODUCT AFFECTED

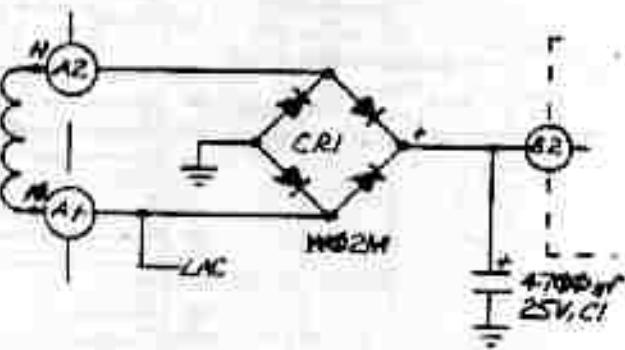
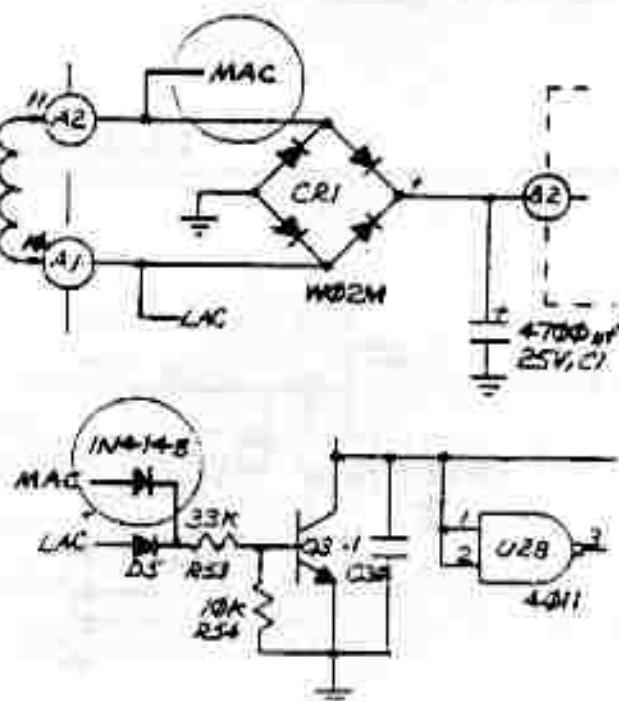
OB-8

DRAWINGS AFFECTED

1679B - SHEET 1

1679C - SHEET 4

DESCRIPTION OF CHANGE

WASSHOULD BE

REASON FOR CHANGE

IMPROVE MARGIN OF "PUP" CIRCUIT TO INVERTER TURN-OFF, ESPECIALLY AT 50 Hz.

EFFECTIVITY

- FUTURE PRODUCTION ONLY
- RETROFIT UNITS IN PRODUCTION AND INVENTORY
- RETROFIT UNITS IN FIELD
- DRAWING CORRECTION ONLY; HARDWARE NOT Affected
-

WRITTEN BY

JES

DATE

3-28-93

APPROVED BY

JES

DATE

3-28-93

OBERTHEIM ELECTRONICS, INC.

ENGINEERING CHANGE ORDER

ECO NO.

424

PRODUCT AFFECTED

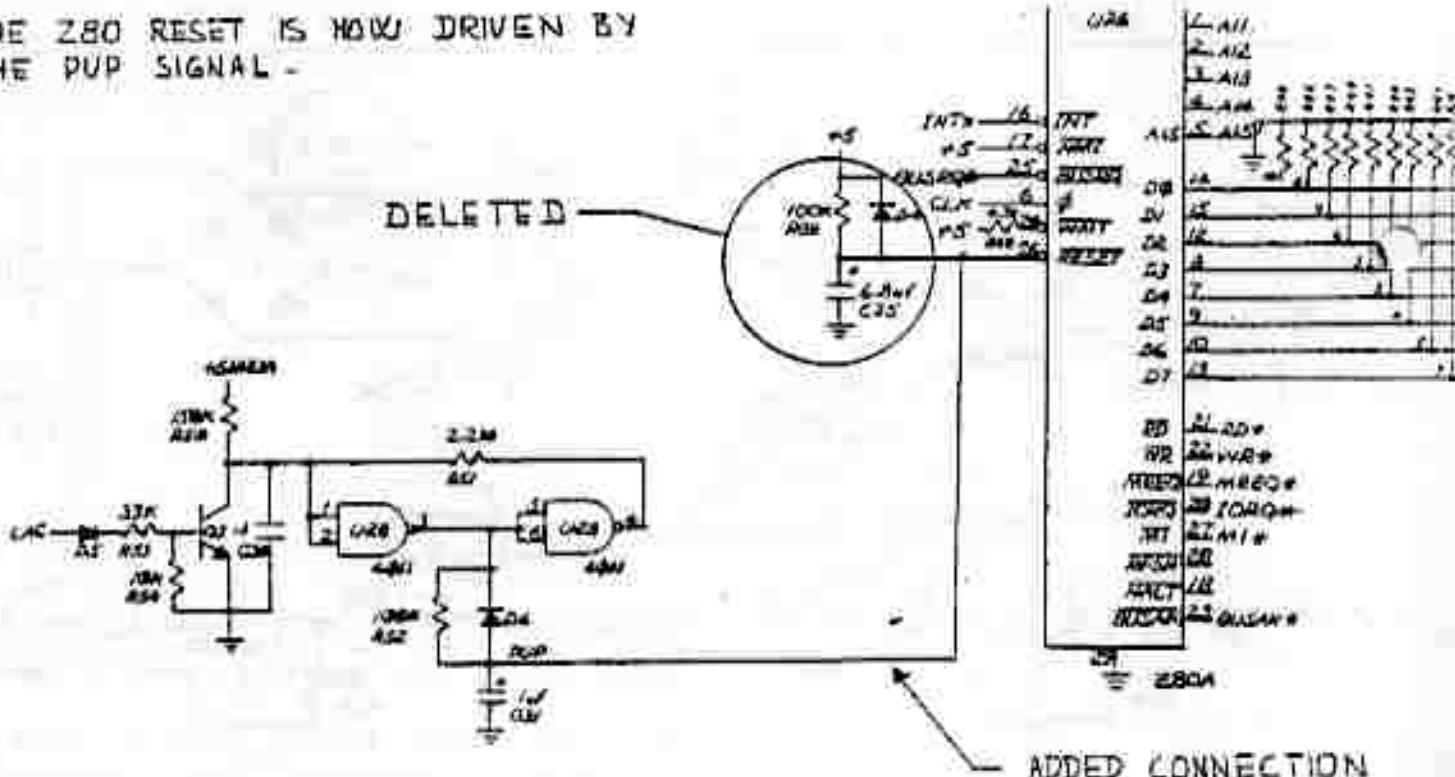
DRAWINGS AFFECTED

OB-8

PROCESSOR BOARD 1679B SHEET 1 OF 4

DESCRIPTION OF CHANGE

THE Z80 RESET IS NOW DRIVEN BY
THE PUP SIGNAL -



REASON FOR CHANGE

TO AVOID POSSIBLE MEMORY DROP CAUSED BY SHORT POWER DROP

EFFECTIVITY

- FUTURE PRODUCTION ONLY
 - RETROFIT UNITS IN PRODUCTION AND INVENTORY
 - RETROFIT UNITS IN FIELD
 - DRAWING CORRECTION ONLY; HARDWARE NOT Affected
 -

WRITTEN BY

DATE

MICHELE DODDIO

4 / 11 / 33

— 30 —

DATE

248

4 | V1 | 9-2

ENGINEERING CHANGE ORDER

425

PRODUCT AFFECTED	DRAWINGS AFFECTED
OB-8	NONE

DESCRIPTION OF CHANGE

REMOVE EPROMS A5-0, A5-1, A5-2, A5-3 FROM SOCKET U21 THROUGH U24, AND REPLACE WITH NEW SOFTWARE EPROMS A6-0, A6-1, A6-2, A6-3

REASON FOR CHANGE

The version A6 adds two new features to the version A5:

----- a) Every time a cassette is recorded from an OB-8, the envelope offset values of this very machine are stored at the end of the patch transfer.

When this cassette is played back the envelope offset values may be retrieved from the cassette. To do so, you must hold down simultaneously the six following switches and then push PLAY:

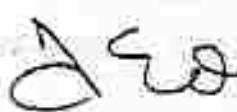
OSC1 ON, OSC2 HALF, OSC2 FULL, NOISE, 4 POLE, TRACK

This feature lets you save the envelope offset data before you change the battery or a memory chip and in a more general way anytime you intend to service an OB-8. It also gives to the user the possibility of retrieving the envelope offset value after an unfortunate memory drop.

----- b) The program data may be reinitialized like at the first power on. To do so, the memory protect switch must be off and you must hold down simultaneously the program 1 to 8 switches and then push SPLIT just now

This procedure is useful if you cannot retrieve the envelope offset data from a cassette after another unfortunate memory drop. The initialization will set the offsets to their mid value and the envelope will be playable even if they are not well matched.

EFFECTIVITY	WRITTEN BY	DATE
<input checked="" type="checkbox"/> FUTURE PRODUCTION ONLY	MICHEL DOUDIC	4/11/83
<input type="checkbox"/> RETROFIT UNITS IN PRODUCTION AND INVENTORY		
<input type="checkbox"/> RETROFIT UNITS IN FIELD		
<input type="checkbox"/> DRAWING CORRECTION ONLY; HARDWARE NOT AFFECTED		
<input type="checkbox"/>		

APPROVED BY	DATE
	4/11/83

oberheim electronics, inc.
engineering change order

ECO NO.

426

PRODUCT AFFECTED

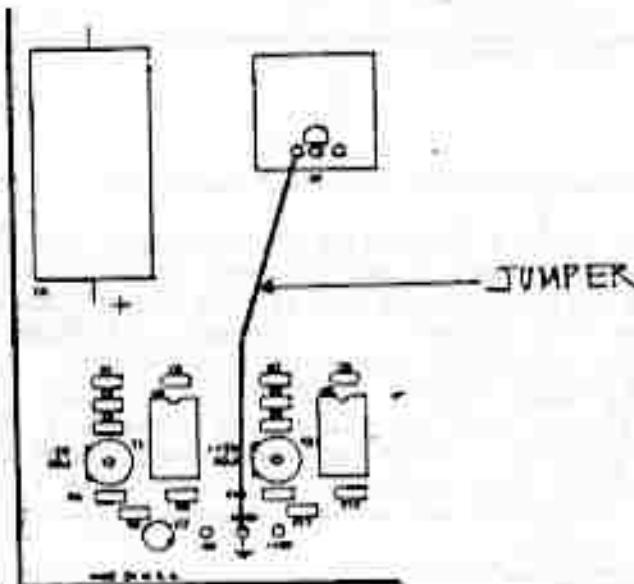
OB-8

DRAWINGS AFFECTED

POWER SUPPLY

DESCRIPTION OF CHANGE

ADD A JUMPER BETWEEN PIN 1 OF THE -15 REGULATOR
7915 (GND) AND THE GROUND REFERENCE TEST POINT.
THE JUMPER MUST BE MADE OF A 18 AWG WIRE (.04 inch / 1 mm)
MINIMUM AND MUST BE SHORT.



REASON FOR CHANGE

TO REMOVE AC HUM ON AUDIO OUTPUT.

EFFECTIVITY

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

WRITTEN BY

MICHEL DODDIE

DATE

+ / 11 / 83

APPROVED BY

J. E. S.

DATE

4 / 11 / 83

ENGINEERING CHANGE ORDER

427

PRODUCT AFFECTED OB-8	DRAWINGS AFFECTED OB-8 SERVICE MANUAL
DESCRIPTION OF CHANGE SOFTWARE REVISION A7 : USE EPROMS A7-0, A7-1, A7-2, A7-3	- SERVICE SOFTWARE ONLY - CHANGE PROCEDURE OF OFFSET CALIBRATION AS FOLLOWS. 1. THE FIRST 16 PARAMETERS (FILTER RLS, VCA RLS, FILTER DCY, VCA DCY, FILTER ATTACK, AND VCA ATTACK) ARE TO BE CALIBRATED FOR THEIR MAXIMUM VALUE (-.2560V.) INSTEAD OF THEIR MINIMUM (0.0V). 2. ACTIVATE CONTINUOUS RAM TEST BY PRESSING "LINEAR" SWITCH. LOOK AT THE LEDS ON THE PROGRAM SECTION. NO LIGHTS MEANS ALL ARE FINE. FAILURE IN RAM0 (U20) IS INDICATED BY "A" BEING LIT. RAM1 (U19) - "B" ON AND IF "C" IS ON, THERE IS A FAILURE IN RAM2 (U18). THIS TEST RUNS CONTINUOUSLY UNTIL A NEW TEST IS SELECTED AND WHILE AN IC FAILS THE LED STAYS ON UNTIL THE TEST IS RESELECTED. OF COURSE, <u>MEMORY PROTECT MUST BE OFF!</u> 3. DURING LED TEST MODE, THE VOLUME IS TURNED ON, AND THE POTS MAY BE EASILY CHECKED FOR DEAD ZONES. THE FREQUENCY OF THE OSC. IS DETERMINED BY POSITION OF THE "LAST EDITED" POT. CONTROL JUMPS TO POT THAT IS BEING MOVED AND STAYS THERE UNTIL A NEW POT IS MOVED. BENDO BOX RATE POTS ARE INCLUDED.

REASON FOR CHANGE

IMPLEMENT TWO NEW TESTS, AND IMPROVE OFFSET CAL.

EFFECTIVITY	WRITTEN BY	DA
<input checked="" type="checkbox"/> FUTURE PRODUCTION ONLY AND AS NEEDED. <input type="checkbox"/> RETROFIT UNITS IN PRODUCTION AND INVENTORY <input type="checkbox"/> RETROFIT UNITS IN FIELD <input type="checkbox"/> DRAWING CORRECTION ONLY; HARDWARE NOT AFFECTED <input type="checkbox"/>	ANNE GRAHAM 5/9/83	
	APPROVED BY	DA
	 5/13/83	

OBERHEIM ELECTRONICS, INC.

ECO NO.

ENGINEERING CHANGE ORDER

428

PRODUCT AFFECTED

28-6

DRAWINGS AFFECTED

VOICE SCHEMATIC 16325

BILL OF MATERIALS 720073-000

DESCRIPTION OF CHANGE

COMPONENT NO'S CX25 AND CX27

IN THE 08-6 VOICE BOARDS, ENVELOPE SECTION, 110 PIECES PER OEM

WAS: PART NO. 1530C8 .047 μ F ±20% CAPACITOR.IS NOW: PART NO. 1530Z1 .047 μ F ±5% CAPACITOR.

REASON FOR CHANGE

TIGHTEN TOLERANCE ON ENVELOPE SPEED CAPACITOR.

EFFECTIVITY

- FUTURE PRODUCTION ONLY
 RETROFIT UNITS IN PRODUCTION AND INVENTORY
 RETROFIT UNITS IN FIELD
 DRAWING CORRECTION ONLY; HARDWARE NOT Affected

WRITTEN BY

ANNE GRAHAM

5-23-93

APPROVED BY



5-23-93

ENGINEERING CHANGE ORDER

429

PRODUCT AFFECTED

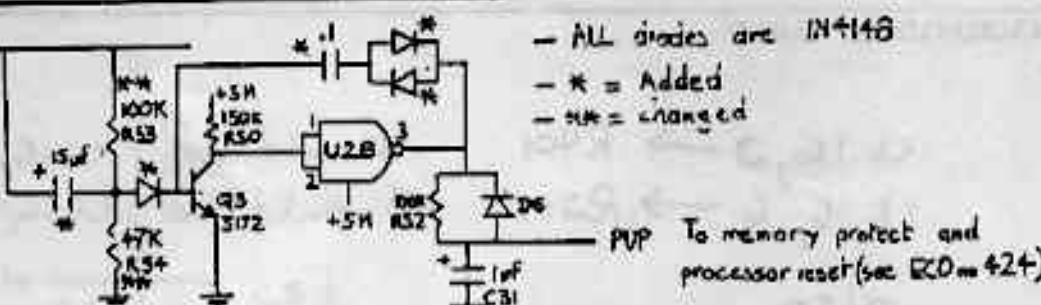
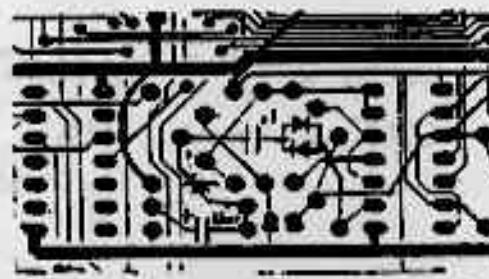
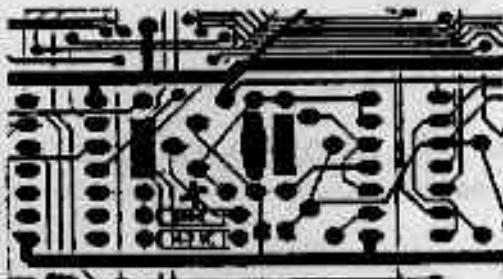
OB-8

DRAWINGS AFFECTED

OB-8 PROCESSOR BOARD 1679B sheet 1 of 1

DESCRIPTION OF CHANGE

+5

NEW PUP CIRCUITRY:

- Remove D5, C30, R53 (Darkened components)
- Cut between Q3 base and R53
- Remove diode added by ECO #23 (under the board)
- Replace R53 with a 100K and R54 with a 47K
- Replace C1 (4700μF cap. on 5v power supply) with a 10,000μF 16V

- Add a jumper between +5 and R53
- Add from under the board: 2 caps and 3 diodes

REASON FOR CHANGE

- Avoid memory drop.

EFFECTIVITY

- FUTURE PRODUCTION ONLY
- RETROFIT UNITS IN PRODUCTION AND INVENTORY
- RETROFIT UNITS IN FIELD
- DRAWING CORRECTION ONLY; HARDWARE NOT Affected
-

WRITTEN BY

MICHEL DOLDIC

DATE

6/21/83

APPROVED BY

Jeo

DATE

6/21/83

PRODUCT AFFECTED	DRAWINGS AFFECTED
OB-8 Voice upper/lower	1682 20F3 1682B 20F3

DESCRIPTION OF CHANGE

U 16,2 → R401 Should be U 16,2 → R201
 U 16,6 → R201 Should be U 16,6 → R401

also,

U 15,6 → U 16,5 Should be U 15,6 → U 16,1
 U 15,2 → U 16,1 Should be U 15,2 → U 16,5

REASON FOR CHANGE

to correct OB-8 voice Board Schematic

EFFECTIVITY	WRITTEN BY	DATE
<input type="checkbox"/> FUTURE PRODUCTION ONLY	J.M.	4-7-83
<input type="checkbox"/> RETROFIT UNITS IN PRODUCTION AND INVENTORY		
<input type="checkbox"/> RETROFIT UNITS IN FIELD		
<input checked="" type="checkbox"/> DRAWING CORRECTION ONLY; HARDWARE NOT AFFECTED	APPROVED BY	DATE
<input type="checkbox"/>	J.G.Q	4-7-83

OBERHEIM ELECTRONICS, INC.

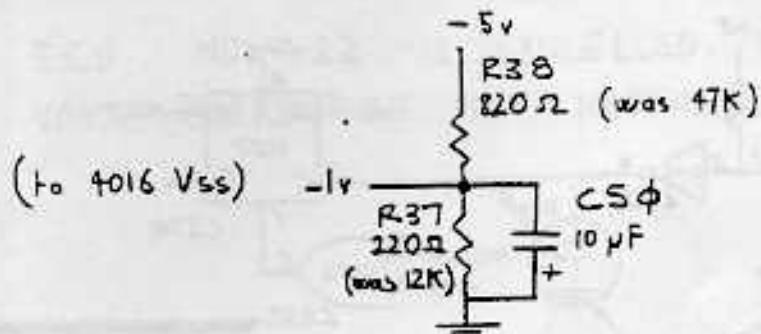
ENGINEERING CHANGE ORDER

ECO NO.

431

PRODUCT AFFECTED	DRAWINGS AFFECTED
OB-8	ECO #: 419

DESCRIPTION OF CHANGE



change value of -1. divider on each voice board

REASON FOR CHANGE

- ALLOWS USE OF SIGNETICS' 4016 &
- IDENTIFIES COMPONENTS

EFFECTIVITY	WRITTEN BY	DATE
<input checked="" type="checkbox"/> FUTURE PRODUCTION ONLY	MICHEL DOLDIC	6/27/83
<input type="checkbox"/> RETROFIT UNITS IN PRODUCTION AND INVENTORY		
<input type="checkbox"/> RETROFIT UNITS IN FIELD		
<input type="checkbox"/> DRAWING CORRECTION ONLY; HARDWARE NOT Affected		
APPROVED BY		DATE
		6-27-93

ENGINEERING CHANGE ORDER

432

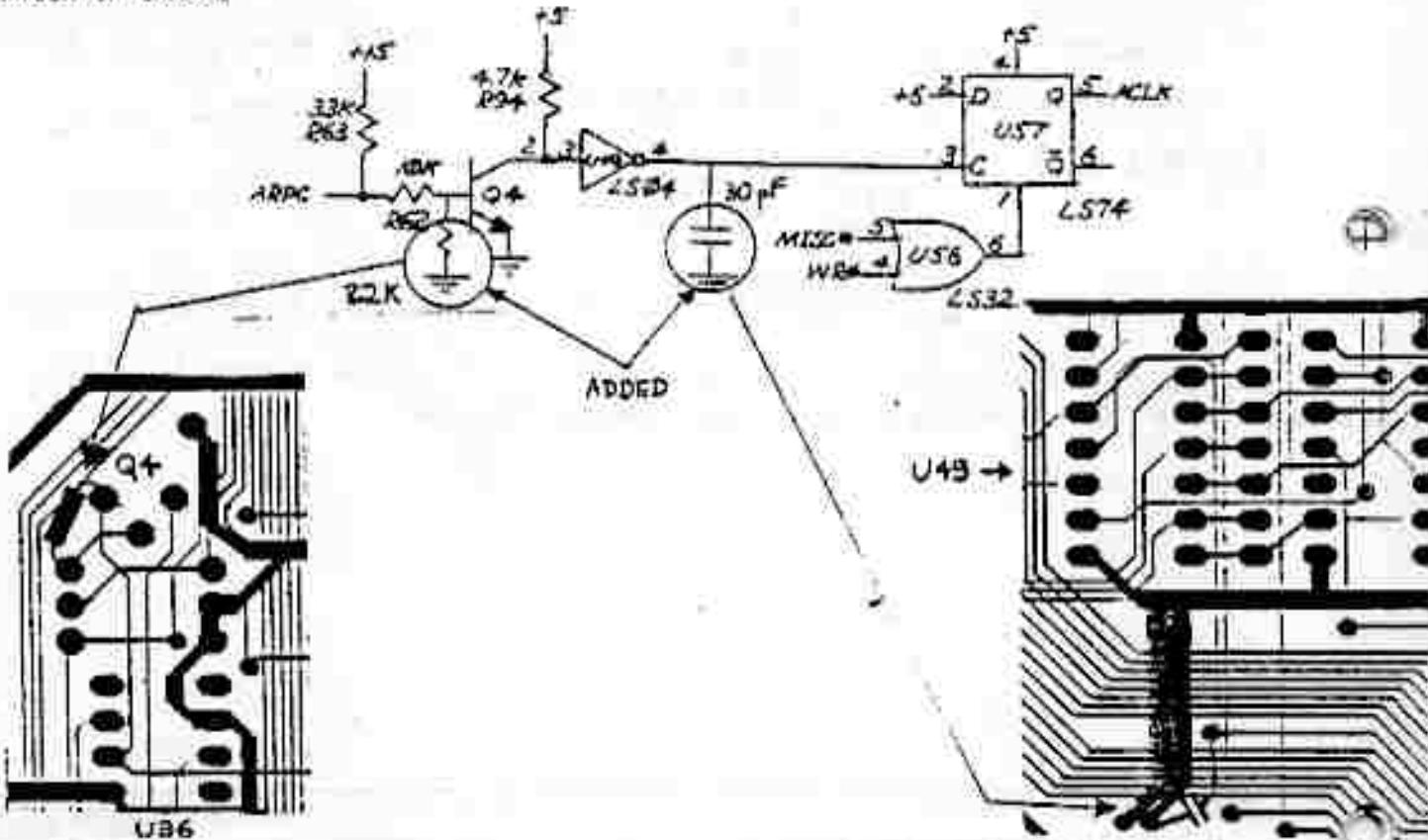
PRODUCT AFFECTED

OB-8

DRAWINGS AFFECTED

OB-8 PROCESSOR BOARD 1679B sheet 2 of 4

DESCRIPTION OF CHANGE



REASON FOR CHANGE

- AVOID MISSING PULSE ON ARPEGIATOR EXTERNAL CLOCK

EFFECTIVITY

- FUTURE PRODUCTION ONLY
- RETROFIT UNITS IN PRODUCTION AND INVENTORY
- RETROFIT UNITS IN FIELD
- DRAWING CORRECTION ONLY; HARDWARE NOT Affected
-

WRITTEN BY

MICHAEL DOIDIC

DATE

6/27/83

APPROVED BY

DATE

6-27-83

ENGINEERING CHANGE ORDER

433

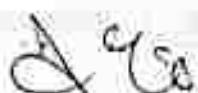
PRODUCT AFFECTED OB-8	DRAWINGS AFFECTED OB-8 VOICE BOARD 1681B sheet 2
--------------------------	---

DESCRIPTION OF CHANGE

ECO NO. 422 IS CANCELLED. R32 ON LOWER AND UPPER VOICE BOARD ARE NOT HATCHED ANYMORE.

REASON FOR CHANGE

- THE NEW ENVELOPE CALIBRATION SOFTWARE STARTING WITH A7 (SEE ECO 427) DOES NOT REQUIRE THOSE RESISTORS TO BE HATCHED

EFFECTIVITY	WRITTEN BY	DATE
<input checked="" type="checkbox"/> FUTURE PRODUCTION ONLY	MICHEL DODDIL	7/5/83
<input type="checkbox"/> RETROFIT UNITS IN PRODUCTION AND INVENTORY		
<input type="checkbox"/> RETROFIT UNITS IN FIELD		
<input type="checkbox"/> DRAWING CORRECTION ONLY; HARDWARE NOT AFFECTED		
	APPROVED BY	DATE
		7/5/83

ENGINEERING CHANGE ORDER

434

PRODUCT AFFECTED

OB-8

DRAWINGS AFFECTED

NONE

DESCRIPTION OF CHANGE

- REPLACE EPROMS IN SOCKET U21 THROUGH U24 WITH NEW SOFTWARE EPROMS A8-0, A8-1, A8-2, A8-3

The software version A8 contains the following new features:

- 1) -- LEGATO PORTAMENTO
- 2) -- EQUAL TIME LINEAR PORTAMENTO
- 3) -- EXPONENTIAL PORTAMENTO
- 4) -- INVERT LFO FREQUENCY MODULATION ON VCO 1
- 5) -- INVERT LFO PULSE WIDTH MODULATION ON VCO 1
- 6) -- VCF TRACKING OF THE BEND LEVER
- 7) -- REVERSABLE BEND LEVER
- 8) -- REVERSABLE MODULATION LEVER

- IF THE PREVIOUS SOFTWARE WAS A3 OR PREVIOUS, ECO'S 405, 406, 405 MUST BE IMPLEMENTED AND THE OFFSET CALIBRATIONS MUST BE DONE AS DESCRIBED BY ECO 427
- IF THE PREVIOUS SOFTWARE WAS A4 THE OFFSET CALIBRATION MUST BE DONE AS DESCRIBED BY ECO 427

REASON FOR CHANGE

- ADD NEW FEATURES.

EFFECTIVITY

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

WRITTEN BY

MICHEL DOUDIC

DATE

7/12/83

APPROVED BY

D. Doudic

DATE

7/12/83

ENGINEERING CHANGE ORDER

PRODUCT AFFECTED:

OB-8

DRAWINGS AFFECTED:

OB-8 UNIT ASSY NO.

ECO NO.

436

EFFECTIVITY:

- AS REQUIRED IN TEST
- FUTURE PRODUCTION
- RETROFIT PRODUCTION & INVENTORY
- RETROFIT IN FIELD. AS NEEDED
- DRAWING CORRECTION ONLY
-

REASON FOR CHANGE:

ADD OB-8 MIDI INTERFACE
TO OB-8

WRITTEN BY:



DATE:

1-31-84

APPROVED BY:



DATE:

1-31-84

DESCRIPTION OF CHANGE: ADD PCB ASSY NO. (OB-8 MIDI INTERFACE PCB)
PER ATTACHED INSTRUCTIONS.



OBERHEIM ELECTRONICS, INC.

2250 South Barrington Avenue, Los Angeles, California 90064, (213) 473-6574

Oberheim MIDI Interface Update
Installation Instructions
1/31/84

The Oberheim MIDI Interface can be retrofitted to all existing OB-8s. The installation requires removal of two I.C.s, changing one endbell, and installation of a printed circuit board. The installation should be performed only by qualified personnel.

1. This procedure will clear the offsets stored in memory and will destroy patch data. So the data should be stored to cassette BEFORE any further actions are taken.
2. Disconnect the power cord.
3. Remove the 2 screws located along the top edge of the endbells that secure the front panel (4 total) and raise the cover to expose the main processor board.
4. Remove the left endbell, and replace with new endbell with MIDI din connectors on it. Return old endbell to Oberheim Electronics.
5. Remove the 40-pin I.C. from socket 26 of the main processor board. Install this chip in socket 8 of the interface board, being careful to match the notches on the chip and on the socket.
6. Remove the 16 pin 74LS139 chip from socket 41 of the processor board and put into socket 5 of the interface board, again being careful to match the notches on the socket and the chip.
7. Remove the 24-pin 2732 chips from sockets 21,22,23, and 24 of the main processor board and return to Oberheim Electronics.
8. Install the 24-pin 2732 chips as follows:
 - 1) Insert chip labeled B3-0 into socket 24 of the processor board, again being careful to line up the notch on the chip with the one on the socket.
 - 2) Install chip B3-1 into socket 23 of processor board.
 - 3) Install chip B3-2 into socket 22 of processor board.
 - 4) Install chip B3-3 into socket 21 of processor board.
 - 5) Install chip B3-4 into socket 7 of the interface board.
9. Remove the four screws from the main processor board located at:
 - 1) the upper right hand corner of the processor board
 - 2) middle of the top edge of the processor board.
 - 3) middle of the right hand edge of the processor board.
 - 4) the middle of the processor board (near U40).

10. Turn the Interface board chip-side down with the ribbon cables sticking out to the left. The 16-pin ribbon will be above the 40-pin ribbon. Pin 1 of both ribbon cables is located at the tops of the sockets. Insert the 16-pin ribbon header into socket 26 on the processor board, being careful to line up pin-1 of cable with notch on socket.

11. Insert the 16-pin ribbon header into socket 41 on the processor board. When the header is properly installed, the cable will stick straight out from the right side of socket 41.

12. Position the four spacers over the four empty screw holes in the processor board. Turn the Interface board over and position the four holes in the corners over the spacers. Insert the long screws through the corner holes in the Interface board through the spacers and into the holes in the processor board.

13. The middle cable on the endbell assembly is "MIDI OUT". Connect this cable to the molex connector on the Interface board labeled "MIDI OUT". The rear cable on the endbell assembly is labeled "MIDI IN" and should be connected to the molex labeled "MIDI IN" on the interface board. "MIDI THRU" should be connected to "MIDI THRU".

14. To insure proper operation after changing the EPROMS, the RAM chips should be cleared. To do this carefully remove each RAM from it's socket and then carefully put it back in. Do this with all three RAM chips. They are I.C.'s 18,19, and 20.

14. Close the front cover and replace the front cover screws.

15. Re-connect the AC power cord.

16. With the memory protect switch OFF (rear panel), turn the power on. Load the saved data from cassette, including the offsets. See page 43 of the OB-8 owners manual (included).

17. Press AUTOTUNE.

18. Apply sticker to the rear of the OB-8 above Computer Interface connector.

.1. Tape Storage of Calibrations

The calibrations of your particular OB-8 stored in computer memory are recorded on tape automatically each time you save your programs. If for some reason your OB-8 gets out of calibration (due to memory drop), the calibrations on tape can be loaded back into the OB-8 in much the same manner as patch programs are loaded into the OB-8 from tape:

- 1) Enable the Cassette Interface with the switch on the rear panel.
- 2) Press PLAY on the tape recorder. You will be able to monitor the tape through the main outputs of the OB-8. The MASTER VOLUME will control the volume for monitoring the tape.
- 3) Hold down all six buttons in the FILTER section (OSC 1 ON, OSC 2 HALF, OSC 2 FULL, NOISE, 4 POLE, and TRACK).
- 4) As soon as the "leader" tone is heard, press the PLAY switch on the OB-8. At least three seconds of the "leader" tone must come between pressing PLAY and the rough sound of the memory information. The light on the PLAY switch will be lit from the time the switch is pressed until the first of the memory information is recognized. At that point, the GROUP lights (A, B, C, D) come on in sequential order.

If the MEMORY PROTECT switch on the Rear Panel of the OB-8 is set to PROTECT, the PLAY light will not operate.

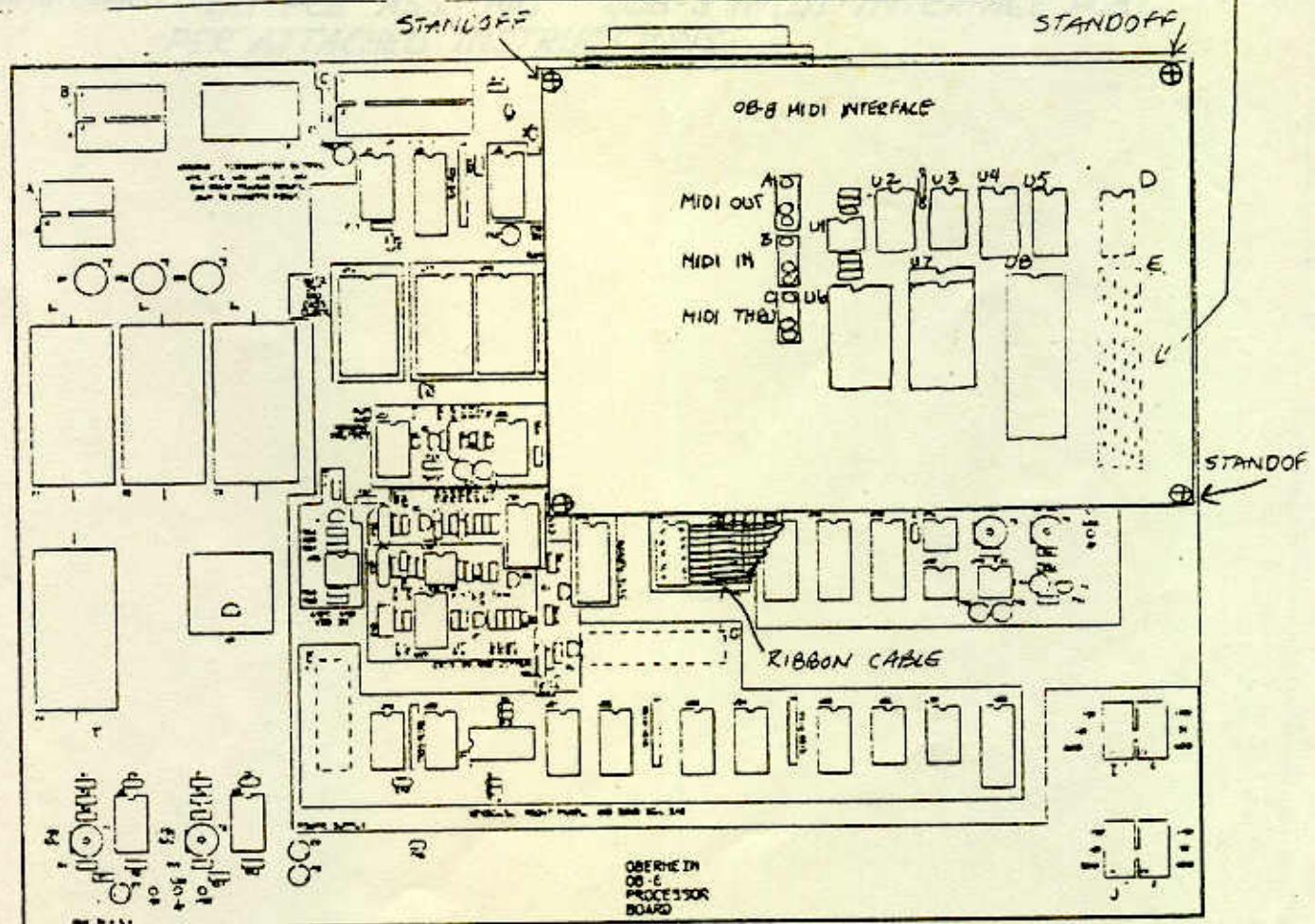
- 4) If an error is detected, the PLAY light will flash.

The PLAY Function can be cancelled by pressing the HOLD button.

The calibrations should only be loaded in if the OB-8 has lost its programs, or the envelope generators do not seem to be operating properly. It is important that these calibrations are loaded in only from a tape made from the same OB-8, otherwise the wrong calibrations will be loaded in.

Checking a data tape will also check the calibrations on that tape (See CASSETTE INTERFACE).

40 PIN RIBBON CABLE
UNDER MIDI BOARD



ENGINEERING CHANGE ORDER

PRODUCT AFFECTED:

OB-8

DRAWINGS AFFECTED:

1679 A Sheet
4 of 4

ECO NO.

437

EFFECTIVITY:

- AS REQUIRED IN TEST
- FUTURE PRODUCTION
- RETROFIT PRODUCTION & INVENTORY
- RETROFIT IN FIELD AS NEEDED
- DRAWING CORRECTION ONLY
-

REASON FOR CHANGE:

To stop loss of offsets in memory
on power down. (like DSX)

WRITTEN BY:

Peter Munson

DATE:

6/15/84

APPROVED BY:



DATE:

6/15/84

DESCRIPTION OF CHANGE:

Add. MOV 150v Varistors to primary of X-former



OBERHEIM ELECTRONICS, INC.

2250 South Barrington Avenue, Los Angeles, California 90064, (213) 473-6574

ENGINEERING CHANGE ORDER

PRODUCT AFFECTED

OB-8 and OB-8 MIDI KIT

DRAWINGS AFFECTED

ECO No.
439

EFFECTIVITY.

- AS REQUIRED IN TEST
 FUTURE PRODUCTION
 RETROFIT PRODUCTION & INVENTORY
 RETROFIT IN FIELD AS NEEDED
 DRAWING CORRECTION ONLY

REASON FOR CHANGE

- Adds DSX CV to OB-8 MIDI feature
Adds MIDI Sustain pedal feature
Improves OB-8 performance w/ DSX
Changes MIDI Vibrato scaling
Changes MIDI Note Off velocity

WRITTEN BY:

ANNE GRAHAM

DATE:

AUG. 15, 1984

APPROVED BY:



DATE:

8-15-84

DESCRIPTION OF CHANGE:

SOFTWARE WAS VERSION 8-3, IS NOW VERSION 8-5

ON PROCESSOR BOARD;

- Change EPROM labeled B3-0 to B5-0 (location U24)
Change EPROM labeled B3-1 to B5-1 (location U23)
Change EPROM labeled B3-2 to B5-2 (location U22)
Change EPROM labeled B3-3 to B5-3 (location U21)

ON MIDI INTERFACE BOARD;

- Change EPROM labeled B3-4 to B5-4 (location U7)

ADDENDUMS TO MANUAL: pn. 950033 and 950034

DELETE MANUAL ADDENDUM pn. 950028



oberheim electronics, inc.

2250 South Barrington Avenue, Los Angeles, California 90064, (213)473-6574

OB-8 Revision 85 Software
Operation Guide
8/15/84

This revision of OB-8 software (version 85) has been made to improve the operation of the OB-8 with the DSX, as well as to add some new MIDI features. For a complete explanation of the OB-8's existing features, please refer to the OB-8 Owner's Manual and the OB-8 Revision 83 Software Operation Guide. To verify the software version number of an OB-8, press the PAGE 2 button twice and hold it down the second time it is pressed (the PAGE 2 led should now be lit). While holding down the PAGE 2 button, press and hold the SYNC button. While holding both switches down, the PROGRAMMER leds will display the OB-8's software version number. If the 8 led in the GROUP section and the 5 led in the PROGRAM section are now lit, the software version is 85. This version has all of the features of version 83, as well as the following NEW FEATURES:

1. The Sustain Footswitch on the OB-8 has now been added to the MIDI interface. This means that when two OB-8s are connected together through MIDI, the Sustain Footswitch on the MASTER OB-8 (the one using MIDI OUT) will also control the Sustain on the SLAVE OB-8 (the one using MIDI IN). This feature can also be used by other synthesizers that transmit and receive Sustain Footswitch information on MIDI.
2. When an OB-8 with MIDI is connected to a DSX Digital Sequencer, the MIDI output of the OB-8 will send out the notes played by the DSX through the MIDI output. This allows additional synthesizers with MIDI to play the same thing that the OB-8 is playing from the DSX. Now with version 85 (and a DSX with version 3.00 or above), it is possible to have the DSX control the OB-8 AND a synthesizer connected to the OB-8's MIDI OUT INDEPENDENTLY. By assigning the DSX's CV outputs to the OB-8 MIDI (see "DSX REVISION 3.00 INSTRUCTIONS"), the DSX will send whatever the DSX's CVs are playing to the OB-8's MIDI OUT without the OB-8 playing it. The notes that the OB-8 are playing will NOT be sent to the MIDI OUT, so that the two synthesizers can play completely independently. This also means that when this feature is used, and the DSX is not playing anything on the CVs, no notes will be sent to the OB-8's MIDI OUT regardless of what is being played on the OB-8.
3. The overall speed of operation on the OB-8 has been increased to allow the DSX to communicate with the OB-8 faster, resulting in increased accuracy of the timing of notes played by the DSX.
4. The range of vibrato lever has been changed for better compatibility.

PV

8/14/84 D

OB-8 MIDI IMPLEMENTATION VERSION B-5

TRANSMITTED DATA - CHANNEL VOICE MESSAGES

Status	Data Bytes	Description
1000 xxxx	0kkk kkkk 0vvv vvvv	Note off. (See notes no. 1-2.) 0vvv vvvv = note off velocity: always 40H.
1001 xxxx	0kkk kkkk 0vvv vvvv	Note on. (see notes no. 1-2.) 0vvv vvvv = 40H
1011 xxxx	0ccc cccc 0vvv v000	Control Change. (if enabled). 0ccc cccc = Control number (01=mod lever). 0vvv v000 = control value.(range 0-78H. Lowest 3 bits are ignored).
1011 xxxx	0ccc cccc 0vvv vvvv	Control Change. (if enabled). 0ccc cccc = Control number (40H = Sustain footswitch) 0vvv vvvv = control value.(0 = off. 7FH = on.)
1100 xxxx	0nnn nnnn	Program select. (if enabled). 0nnn nnnn = 0 through 77H.
1110 xxxx	0vvv vvvv 0vvv vvvv	Pitch Bend change LSB (see note 3). Pitch Bend change MSB

TRANSMITTED DATA - SYSTEM MESSAGES

1111 0000	10H 0ddd dddd 01H 0ccc cccc data F7H	System Exclusive . Oberheim I.D. no. Device number . OB-8 = 01H Command Byte 1 : Program data dump follows. Command Byte 2 : Program number. Program data. (see note 4) End of System Exclusive Status Byte.
-----------	---	---

note 3:000 = 017 7FH = Mod wheel
vvvv vvvv = 0. The 3- is always set to 0
note 4:000 = 000 000. All notes are muted until
they are turned on by MIDI.

RECOGNIZED RECEIVE DATA - CHANNEL VOICE MESSAGES

Status	Data Bytes	Description
1000 xxxx	Okkk(kkkk Ovvv vvvv	Note off. (See notes no. 1-2.) Ovvv vvvv = note off velocity: ignored
1001 xxxx	Okkk kkkk Ovvv vvvv	Note on. (see notes no. 1-2.) Ovvv vvvv = 0: Note Off. Ovvv vvvv not = 0, velocity ignored.
1011 xxxx	Occc cccc Ovvv v000	Control Change. (if enabled). Occc cccc = Control number (01=mod lever). Ovvv v000 = control value.(0-78H. Lower 3 bits are ignored.)
1100 xxxx	Onnn nnnn	Program select. (if enabled). Onnn nnnn = 0 through 77H
1110 xxxx	Ovvv vvvv Ovvv vvvv	Pitch Bend change LSB (see note 3). Pitch Bend change MSB

RECOGNIZED RECEIVE DATA - CHANNEL MODE MESSAGES

1011 xxxx	0111 1011 0000 0000	cccc cccc = 123 (7BH) : All notes off. vvvv vvvv = 0. The OB-8 turns off all notes that were turned on by MIDI.
1011 xxxx	0111 1100 0000 0000	cccc cccc = 124 (7CH) : OMNI mode off. vvvv vvvv = 0. The OB-8 turns OMNI mode off and turns off all notes that were turned on by MIDI.
1011 xxxx	0111 1101 0000 0000	cccc cccc = 125 (7DH) : OMNI mode on. vvvv vvvv = 0. The OB-8 turns OMNI mode on and turns off all notes that were turned on by MIDI.
1011 xxxx	0111 1110 0000 0000	cccc cccc = 126 (7EH) : MONO mode on. vvvv vvvv = 0. The OB-8 has no MONO mode. When this command is received the OB-8 switches to OMNI on / POLY mode and turns off all notes that were turned on by MIDI.
1011 xxxx	0111 1111 0000 0000	cccc cccc = 127 (7FH) : POLY mode on. vvvv vvvv = 0. The OB-8 is always in POLY so no mode change occurs. All notes are turned off that were turned on by MIDI.

RECOGNIZED RECEIVE DATA - SYSTEM MESSAGES

1111 0000	10H	System Exclusive . Oberheim I.D. no.
	0ddd dddd	Device number : OB-8 = 01H
	01H	Command Byte 1 : Program data dump follows.
	0ccc cccc	Command Byte 2 Program Number
	data	data (see note 4 for data format)
	F7H	End of System Exclusive Status Byte.
1111 0000	10H	System Exclusive . Oberheim I.D. no.
	0ddd dddd	Device number . OB-8 = 01H
	00H	Command Byte 1 Program data dump Request.
	0ccc cccc	Command Byte 2 Program Number
	F7H	End of System Exclusive Status Byte.
1111 0110	-	System Common Message : Tune Request

NOTES:

1. xxxx : Basic Channel number minus 1. i.e. 0000 is CH.1, and 0001 is CH.2. range : CH.1-8.
2. kkk kkkk = note number. Range 24H-60H
3. Sensitivity of the pitch bender is selected in the receiver. Center position (no pitch change) is 2000H, which is transmitted ExH-00H-40H. Maximum transmitted value is 7F40H. (The 6 lsb's are not looked at by the 08-8).
4. OBERHEIM 08-8 PROGRAM BIT MAP :

Sent as 4 bit nibbles, right justified, LS nibble sent first.

: BIT 7 : BIT 6 : BIT 5 : BIT 4 : BIT 3 : BIT 2 : BIT 1 : BIT 0 :

BYTE 0 :	VCF REL	(6 BITS)	:	LFO WAVE	:
:			:	2	1
BYTE 1 :	VCA REL	(6 BITS)	:	:UNISON	:
:			:	0	:
BYTE 2 :	VCF DCY	(6 BITS)	:	FILTER : OSC 2	:
:			:	FM	FM
BYTE 3 :	VCA DCY	(6 BITS)	:	OSC 2 WAVEFORM	:
:			:	1	0
BYTE 4 :	VCF ATK	(6 BITS)	:	OSC 1 WAVEFORM	:
:			:	1	0
BYTE 5 :	VCA ATK	(6 BITS)	:	OSC 2 : OSC 1	:
:			:	PWM	PWM
BYTE 6 :	VCF SUS	(6 BITS)	:	NOISE : 4 POLE	:
:			:		:
BYTE 7 :	VCA SUS	(6 BITS)	:	OSC 2 : OSC 2	:
:			:	ON	HALF
BYTE 8 :	VCF MOD	(6 BITS)	:	OSC 1 : TRACK	:
:			:	ON	:
BYTE 9 :	VCF RES	(6 BITS)	:	PW1 : VCO1	:
:			:	180	180
BYTE 10 :	VCO 1 PW	(6 BITS)	:	VCA : F-ENV	:
:			:	MOD	:
BYTE 11 :	LFO FREQ	(6 BITS)	:	SYNC : OSC 1	:
:			:	FM	:

BYTE 12 :	FM AMNT (6 BITS)	:	5	:	4	:
:				VOLUME		
BYTE 13 :	PWM AMNT (6 BITS)	:	3	:	2	:
:						
BYTE 14 :	PORT AMT (6 BITS)	:	1	:	0	:
:						
BYTE 15 :	VCO2 DETUNE (6 BITS)	:	VCO 2 PW			:
:			5	:	4	:
BYTE 16 :	VCF FREQ (6 BITS)	:				:
:			3	:	2	:
BYTE 17 :	VCO2 FREQ (6 BITS)	:				:
:			1	:	0	:
BYTE 18 :	VCO1 FREQ (6 BITS)	:	SPARE	:	LEGATO:	:
:					: PORT.	:
BYTE 19 :	RETRIG POINT (6 BITS)	:	RETRIG LFO WAVE:			:
:			2	:	1	:
BYTE 20 :	PEDAL SUSTAIN(6 BITS)	:			: PORT	:
:					: BEND	:
BYTE 21 :	FM VIB RAISE(6 BITS)	:	LFO	:	FM DLY	:
:					: TRACK	: INVERT..
BYTE 22 :	PWM VIB RAISE(6 BITS)	:	PORT	:	PORT	:
:					: QUANT	: MATCH
BYTE 23 :	FM VIB DELAY(6 BITS)	:	180	:	90	:
:						
BYTE 24 :	PWM VIB DELAY(6 BITS)	:	PWM DLY	:	PWM	:
:					: INVERT..	: QUANT
BYTE 25 :	VOICE DETUNE (6 BITS)	:	EXPO	:	CONST.	:
:					: PORT.	: PORT.
BYTE 26 :	BEND AMOUNT (6 BITS)	:	LFORATE	:	FM	:
:					: DELAY	: QUANT

MODES

The OB-8 defaults to OMNI ON upon power up. If the OB-8 is a receiver, it will receive on all channels. If the OB-8 is the transmitter, it will transmit on one channel. (selectable)

The OB-8 may also be operated in OMNI OFF mode. If the OB-8 is a receiver, it will now receive ONLY on the selected Basic Channel. If the OB-8 is used as transmitter, it will now transmit the upper half of the keyboard on the Basic Channel, and the lower half will be transmitted on the Basic Channel + 1. Pitch bend, program select, etc. will be transmitted on both channels. The Channel Split Point is the same as the regular Split Point. (default is middle C.) THIS MODE IS INDEPENDENT OF SPLIT MODE.

The OB-8 is always in POLY MODE.

FRONT PANEL SELECTABLE FUNCTIONS (ON PAGE TWO OF FRONT PANEL)

NOTE: Functions must be enabled on source AND destination machines to work.

Switch	Function
A	Enable/Disable program change and program dump. Power-On default: disabled.
B	Enable/Disable Pitch bend and modulation controls. Default: disabled.
C	OMNI ON/OFF. Toggle OMNI status. Power-On default is OMNI ON (led is lit.) (see MODES)
D	Channel display/select. Press and hold down D button to display or select the Basic Channel.
WRITE	Dump current STORED program to MIDI. NOTE: SWITCH "A", "PROGRAM ENABLE", MUST BE ENABLED FOR A DUMP TO OCCUR.
TRACK	Sequencer Re-Enable / Turn off MIDI Notes. IMPORTANT: The OB-8 cannot RECEIVE MIDI info and be run by the DSX sequencer simultaneously (due to hardware design.) So, to prevent MIDI data errors, the sequencer is DISABLED upon receiving any data from MIDI IN. This condition is displayed by the TRACK led on page 2. When you no longer wish to use the OB-8 as a receiver, and you want to use the DSX, disconnect MIDI IN and press the TRACK button. The led will go out, the sequencer will work normally, and any notes turned on by MIDI will be turned off. Power-On default: TRACK light off, Sequencer Enabled.

ENGINEERING CHANGE ORDER

PRODUCT AFFECTED

08-8 ASSY#730114

DRAWINGS AFFECTED

08-8 MOD CAN SCHEMATIC
SHEET 1 OF 1.

ECO No

44

AFFECTIVITY

- AS REQUIRED IN TEST
 FUTURE PRODUCTION
 RETROFIT PRODUCTION & INVENTORY
 RETROFIT IN FIELD AS NEEDED
 DRAWING CORRECTION ONLY

REASON FOR CHANGE

REMOVE NOISE MODULATION FROM
VIBRATO LEVER, AND CORRECT
SCHEMATIC.

WRITTEN BY:

PETE MUNSON

DATE:

9-7-84

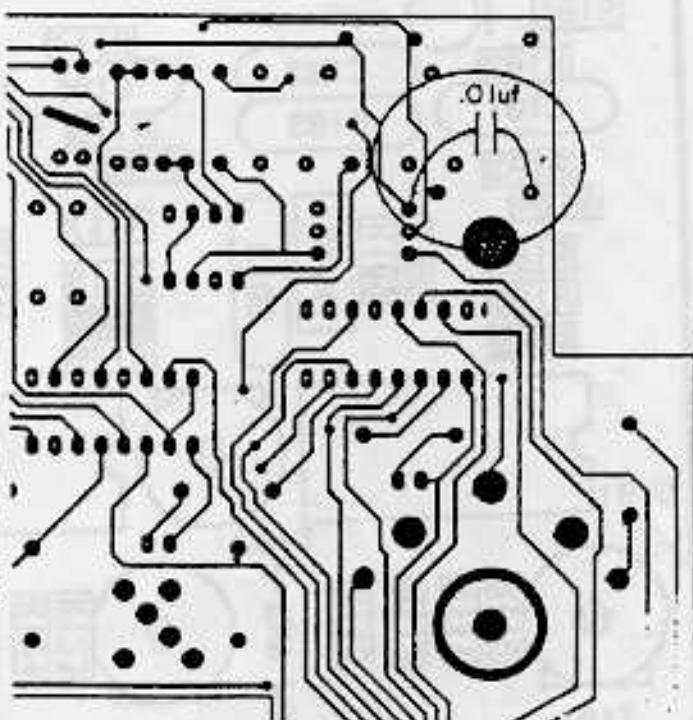
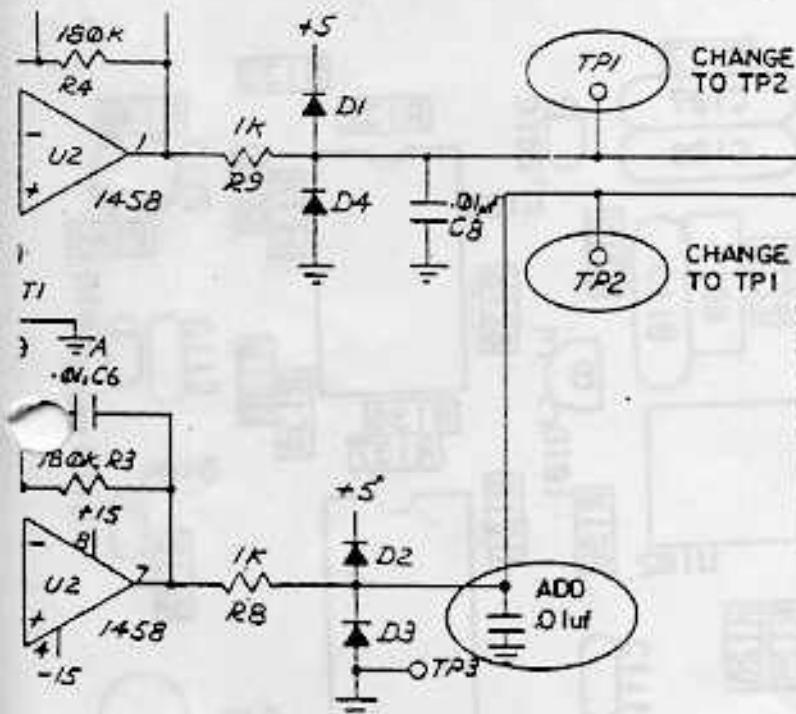
APPROVED BY:

DATE

9-7-84

DESCRIPTION OF CHANGE:

1. CHANGE SCHEMATIC AS SHOWN.

2. ADD .01uf CAP (08.153004) FROM GROUND TO TEST
POINT (T.P. 2) OF MOD CAN PCB ON 1666 SIDE OF BOARD.

OBERHEIM ELECTRONICS, INC.

2250 South Barrington Avenue, Los Angeles, California 90064, (213)473-6574

ENGINEERING CHANGE ORDER

PRODUCT AFFECTED
08-6 ASSY. #720073

DRAWINGS AFFECTED VOICE BOARD
SCHEMATIC 16828 SHEET 3 OF 3

ECO No
44

AFFECTIVITY

- AS REQUIRED IN TEST
 - FUTURE PRODUCTION
 - RETROFIT PRODUCTION & INVENTORY
 - RETROFIT IN FIELD AS NEEDED
 - DRAWING CORRECTION ONLY
 -

REASON FOR CHANGE

LOWER INITIAL FREQUENCY OF 3340
TO ACCOMMODATE A WIDER RANGE
OF CHARACTERISTIC VARIATIONS ON
THE 3340.

WRITTEN BY

DATE

10-4-84

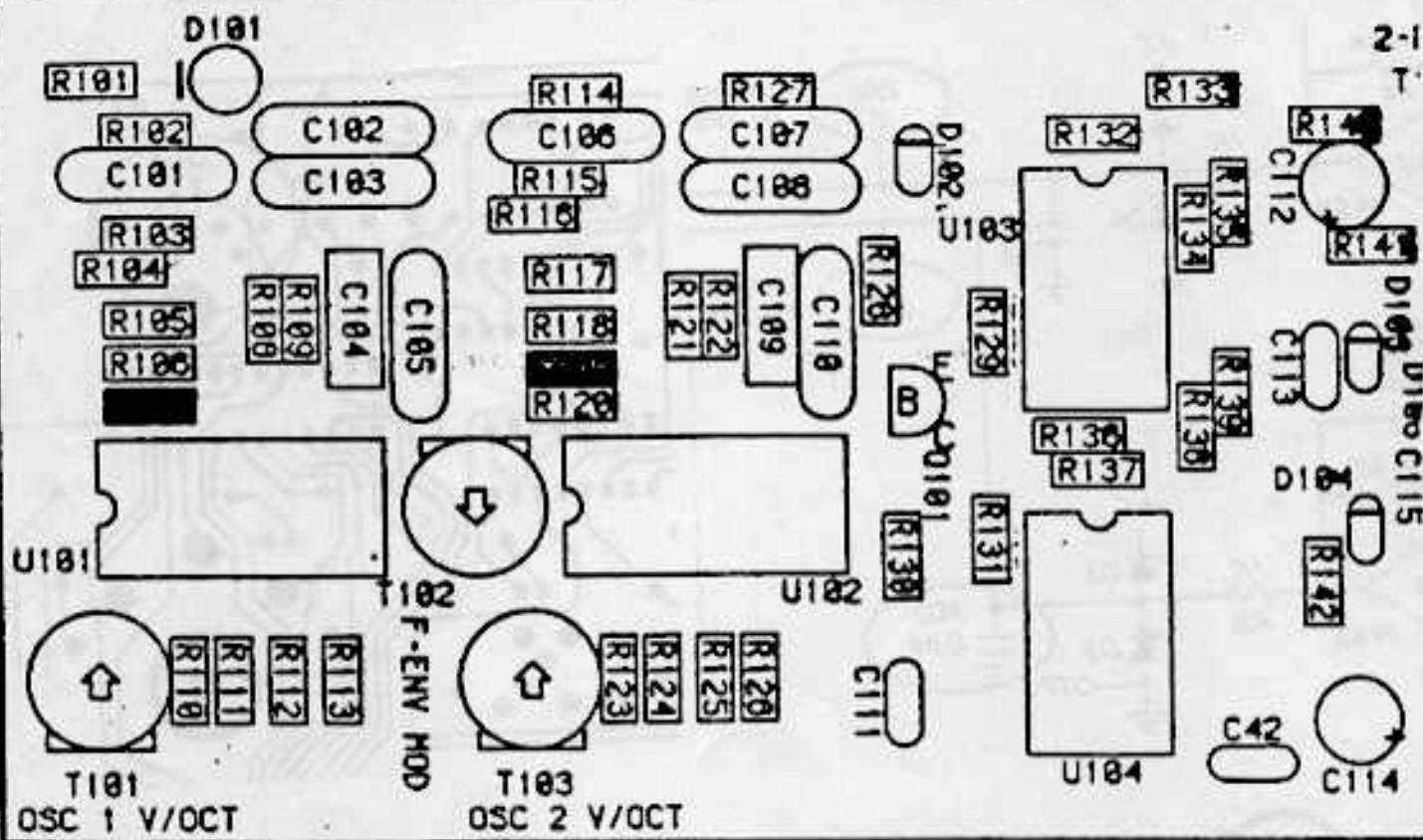
APPROVED BY

DATE

10-4-84

DESCRIPTION OF CHANGE

**REPLACE RESISTOR RX07 AND RX19 (215K, 1%)
WITH 174K, 1% (OB#475520).**



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2250 South Barrington Avenue, Los Angeles, California 90064, (213)473-6574

INTRODUCTION

INTRODUCTION

The OB-8 is the latest development in the evolution of Oberheim synthesizers. The design philosophy behind it was to take all of the features of the OB-Xs, add as many new features as were economically feasible, and redesign all of the circuitry for increased reliability and lower cost. The result is a synthesizer with 90 fewer calibrations and 11 less circuit boards, and with many of the remaining calibrations microprocessor assisted. The circuitry and the trimmers that were eliminated have been replaced with software functions in the microprocessor which simulate the replaced hardware. Some of these functions are explained below.

VCO TRACKING

The volts per octave (scaling) parameters of the 16 oscillators in the OB-8 are adjusted by the microprocessor whenever the AUTO button is pressed. The processor samples 5 different frequencies for each oscillator and calculates the proper correction voltage to bring each oscillator in tune. This voltage changes depending on the final pitch desired from the oscillator. There is a rough trimmer adjustment for each oscillator's volts per octave in order to get the oscillator within the range in which the processor can calibrate it. If this calibration is out of the acceptable range, it may be noticed by either AUTO TUNE failing that oscillator, or excessive beating between it and other oscillators while it is BETWEEN half steps. The reason for this is that the processor compensates for scaling of the oscillators for each half step, requiring that the oscillator be calibrated well enough so that the tracking between half steps is a volt per octave. If this is out of calibration it can also be perceived as steps in the LFO modulation, since the oscillator will jump slightly in pitch as the modulation amount reaches each half step.

LFOs

All of the LFOs in the OB-8 are generated in software. What this means is, the voltage necessary at any given time to simulate LFO modulation is output through the DAC to whatever destination is selected. If, for example, the triangle wave of the LFO should be at its peak, then a high voltage will be output to the destination. When the LFO should ramp down, the voltage is decreased. All of the electronic switches and VCAs normally required with a hardware LFO in order to determine its destination and amplitude are eliminated since these functions are now accomplished in software.

OSCILLATOR DRIFT TEST

This test is used to determine if any of the oscillators drift an unreasonable amount over a given time and temperature. To enter this mode, press the UPPER button in the Bend Box. The UPPER LED will flash and the processor will wait 10 minutes to allow the internal temperature to stabilize, after which it will autotune all of the voices. The UPPER LED will continue to flash as the processor waits another 10 minutes, and then autotunes the oscillators again, comparing them to the last tuning. After the second tuning, the UPPER LED will stay on to indicate that the test is over, and if any of the oscillators have drifted more than + or - 10 cents (hundredths of a semitone), the processor will light a corresponding LED for the drifting oscillator(s). The bottom row of LEDs in the programmer section of the front panel except for the MANUAL LED will show which oscillator(s) drifted out of range. The SPLIT LED is for voice 1 oscillator 1, the DOUBLE LED is for voice 1 oscillator 2, LOWER is for voice 2 osc 1, UPPER is voice 2 osc 2, GROUP A is voice 3 osc 1, GROUP B is voice 3 osc 2, GROUP C is voice 4 osc 1, GROUP D is voice 4 osc 2, and PROGRAM 1-8 are for voices 5-8. If any of these LEDs came on, the test should be performed again to verify that the lit oscillator is bad, since this test requires that the temperature remains stable to determine accuracy, and could fail an oscillator due to room temperature changes. If the oscillator fails the test twice, it should be replaced and recalibrated, and the test should be performed again, to insure that the new oscillator is within stability range.

This test is accomplished by tuning each oscillator at A-Sharp 3 (466.16 Hz), waiting 10 minutes, tuning again at A-Sharp 3 and comparing the amount of correction necessary to tune. If the difference between the 2 tunings is more than plus or minus a half a cycle, the oscillator is displayed. It is important to note that this test can only check for long term drift, and not short term stability since the tuning is done only twice within the 10 minute interval. If it is desired to interrupt this test while it is in process, press any of the other test switches to enter a new test.

*

REMAINING BEND SWITCHES

The remaining Bend Box switches (LOWER, UP TRANSPOSE) do not currently have any test function and will be ignored when pressed. These switches have been left for possible future test procedures.

All of the microprocessor assisted calibrations and tests have now been done. Return the synthesizer to its normal operating mode by turning the TEST 1 switch inside the front panel to its off position before performing the following calibrations.

FILTER CALIBRATION

There are three more calibrations necessary per voice before the voices are calibrated, and these are for the filter. This calibration procedure can be done by ear, or with a strobe tuner. First, put the front panel into manual mode, and turn off all of the switches except TRACK in the Filter section. Turn the RESONANCE, VOLUME ENVELOPE SUSTAIN, and PROGRAM VOL/BAL knobs all the way up, center the MASTER TUNE control, and turn everything else all the way down. Set the master volume to a desired listening level. Go into page 2 by pressing the CHORD/PAGE 2 button twice, and turn off all of the voices except the one to be calibrated by using the program 1-8 buttons. Play a note on the keyboard and adjust the resonance trimmer (T104 for voice 1) up until sound can be heard. While playing alternate octaves on the keyboard, adjust the volts per octave trimmer² (T106) until the interval is one octave. Verify this adjustment by playing notes 2 or 3 octaves apart and determining that the octaves are in tune. Next, adjust the resonance trimmer (T104) down while holding down a key until just after the filter stops oscillating. To adjust the filter initial frequency (T105), Turn on oscillator 1 and adjust the trimmer for maximum volume. This sets the filter to the same frequency as the oscillator. Repeat this procedure for all 8 voices by enabling the voice to be calibrated and following the steps stated above. After all 8 voices have been calibrated, turn all 8 voices back on and verify that all 8 voices sound the same.

OUTPUT VCA VOLUME ADJUSTMENT

The only two remaining adjustments are the final volume trimmers (T501) on each Voice Board). While listening in MONO, turn both trimmers to maximum volume (clockwise). Turn the MASTER VOLUME and the PROGRAM VOL/BAL knobs to maximum, and check for even volume between the two Voice Boards by playing through the voices and seeing if four voices are louder than the other four. If uneven, adjust the trimmer on the board that is louder to match the other. While still in mono, turn the Master volume half way up. Check for about the same volume between Voice Boards. If the difference is very noticeable, the output volume offsets may need to be calibrated. This procedure was mentioned under ADJUSTING ENVELOPE OFFSETS. If the software version is A1, A2, or A3, replace U503 on the louder board with a 3080 with low offset and recalibrate T501.

FREERUNNING

FREERUNNING THE OB-8 PROCESSOR BOARD

By removing the jumper plug at location U25 on the OB-8 Processor Board the Z80 will be placed in a freerun mode. To do this turn off AC power, remove the jumper and reapply AC power.

Theory:

In cases when the uP locks up, troubleshooting can be a nightmare. Because the uP bus forms a complex feedback loop, failure here causes many components to behave abnormally or vice-versa. The answer is to break the feedback path. By removing the jumper plug, the data bus is isolated from the system. The pull-down resistors cause the uP to see only NOP instructions (00H for a Z80 CPU). Therefore on power up the first instruction fetch is a NOP. This instruction increments the program counter and causes a fetch of the next instruction (another NOP in this case). This technique forces the processor to address the entire memory-address space despite failures in the bus, address decoder or ROM.

Troubleshooting Technique:

The test set-up used is relative to the "Instruction Op-Code Fetch" cycle (refer to any Z80 data book). With the uP freerunning attach the EXT. trigger of an oscilloscope to the RD* signal (pin 21 on the Z80), trigger on the falling edge.

An ascending binary count can now be observed on address lines A00 through A15. Address decoding can be verified by checking all logical outputs for any type of transistion.

If the uP is not stepping through the address field (no movement on the address pins of the Z80) then a failure is likely in one of the following:

- The Z80.
- The system clock.
- The BUSRQ* is stuck low.
- The power supply.
- The RESET input is stuck low.

CONNECTORS

<u>CONNECTOR D</u> Computer Interface (Rear Panel)	<u>CONNECTOR E</u> Bend Box Connector (On Processor Board)	<u>CONNECTOR G</u> Pot Board Connector (on Processor Board)
1 - HRO*	E1 - +15	G1 - AGND
2 - GROUND	E2 - -15	G2 - ANLGIN
3 - GROUND	E3 - +15	G3 - AGND
4 - GROUND	E4 - DGND	G4 - -15
5 - GROUND	E5 - +5	G5 - VOLP
6 - GROUND	E6 - DGND	G6 - +15
7 - OSC MUX	E7 - AR1	G7 - SWENF*
8 - HD 4	E8 - +5	G8 - POT1*
9 - HD 5	E9 - ARO	G9 - ARJ*
10 - HD 6	E10 - AGND	G10 - DGND
11 - HD 7	E11 - POT3*	G11 - +5
12 - HA 0	E12 - AGND	G12 - ARO
13 - HA 2	E13 - ANLGIN	G13 - LCOO
14 - HA 4	E14 - AGND	G14 - AR1
15 - HA 6	E15 - BSWO*	G15 - LCO2
16 - HA 15	E16 - VIB	G16 - AR2
17 - HA 14	E17 - BLEDO*	G17 - LCO1
18 - HA 13	E18 - BLED1*	G18 - POT2*
19 - HA 12	E19 - BSW1*	G19 - CEN*
20 - HMRQ*	E20 - D1A	G20 - POTO*
21 - HWR*	E21 - D5A	G21 - SWD7*
22 - HINT*	E22 - D0A	G22 - SWD0*
23 - BUSAKA*	E23 - D3A	G23 - LR07
24 - BUSRQ*	E24 - D4A	G24 - SWD1*
25 - HRV*	E25 - D2A	G25 - LR06
26 - HD 3	E26 - BSWEN*	G26 - SWD4*
27 - HD 2		G27 - LR05
28 - HD 1		G28 - SWD2*
29 - HD 0		G29 - SWD6*
30 - HA 1		G30 - SWD5*
31 - HA 3		G31 - LR04
32 - HA 5		G32 - SWD3*
33 - HA 7		G33 - LR03
34 - HA 8		G34 - LR02
35 - HA 9		
36 - HA 10		
37 - HA 11		

CONNECTOR H
Voice Board Connector
(on Processor Board)

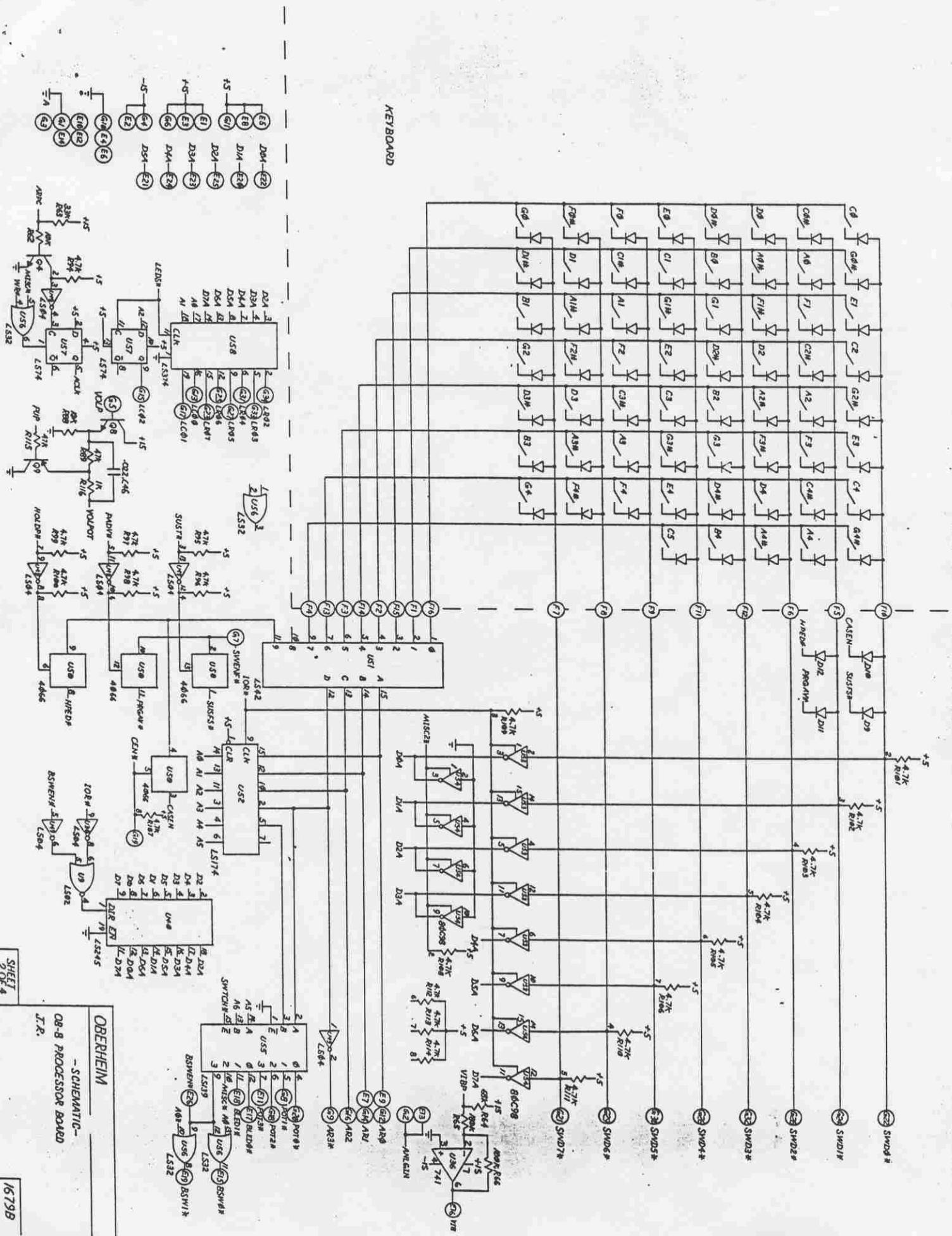
H1	-	NOISE
H2	-	VCFP
H3	-	AGND
H4	-	AGND
H5	-	ANLGOUT
H6	-	AGND
H7	-	AGND
H8	-	AGND
H9	-	AGND
H10	-	VOLPOT
H11	-	CASSIN
H12	-	OSCMUX
H13	-	VOICE3*
H14	-	CASSIN
H15	-	VOICE4*
H16	-	D3A
H17	-	VOICE2*
H18	-	D7A
H19	-	VOICE1*
H20	-	D2A
H21	-	A3
H22	-	D6A
H23	-	A2
H24	-	D1A
H25	-	A1
H26	-	D5A
H27	-	CLR*
H28	-	DOA
H29	-	A4
H30	-	D4A
H31	-	A5
H32	-	DGND
H33	-	A6
H34	-	DGND

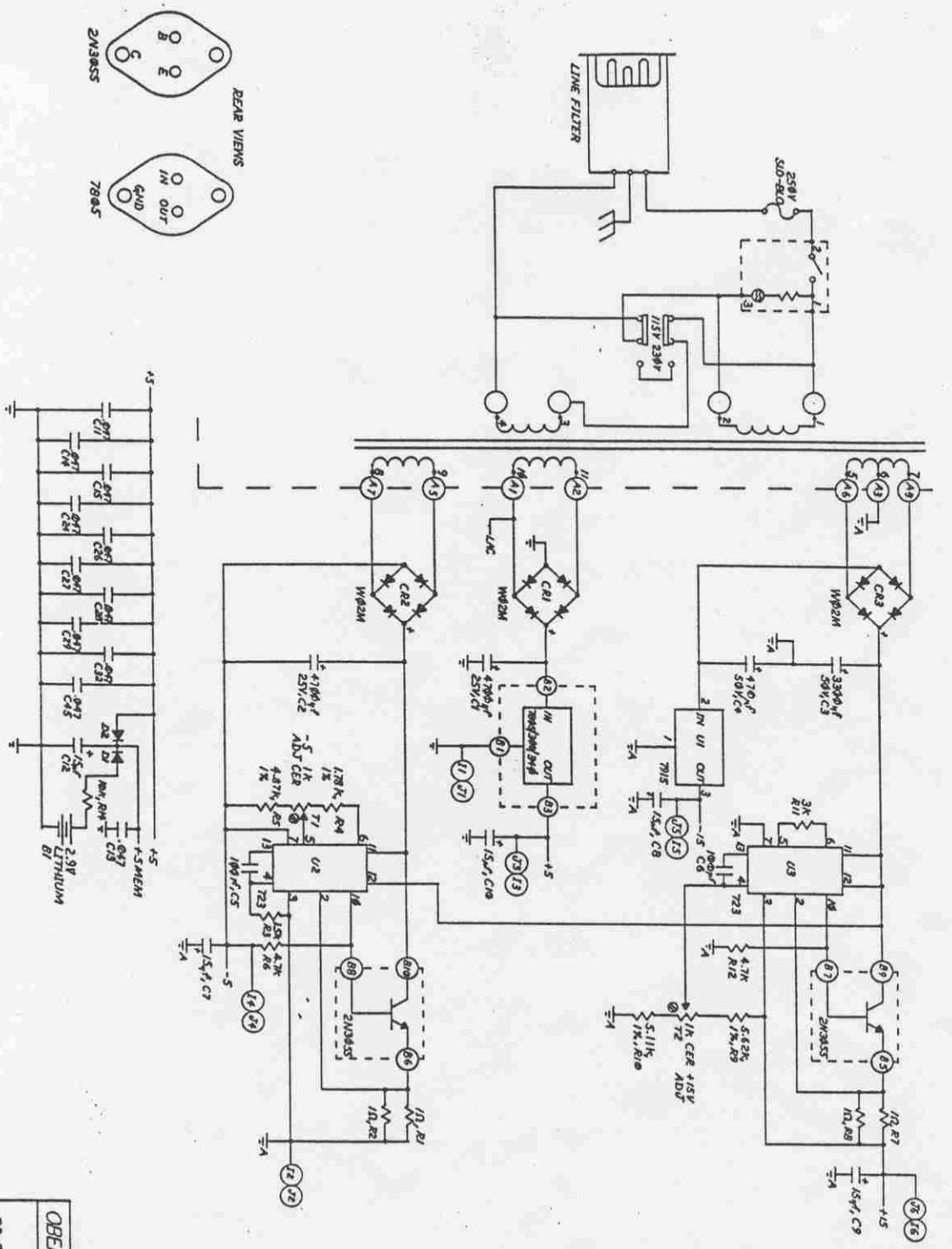
POT BOARD INTERCONNECTIONS

NOTE:

These connectors are not labeled. The connectors are described from top to bottom with the unit opened up.

		POT BOARD 1	POT BOARD 2
		A1	SWD7*
		A2	LEDR5
		A3	SWD5*
		A4	SWENC*
		A5	LEDR3
		A6	SWD6*
		A7	SWEN9*
		A8	SWD3*
		B1	LEDR1
		B2	LEDC0
		B3	LEDC7
		B4	SWD1*
		B5	SWD0*
		B6	N.C.
		B7	SWD4*
		B8	LEDR2
		C1	SWD2*
		C2	SWENA*
		C3	LEDC1
		C4	LEDC3
		C5	LEDR0
		C6	LEDR4
		C7	+15
		C8	+5.6
		D1	AGND
		D2	AGND
		D3	MOD 1
		D4	MOD 2
		D5	RATE
		D6	PORT
		D7	DETUNE
		D8	TUNE
		D9	BALANCE
		D10	VOLPOT





OBERHEIM

-SCHEMATIC-

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PITCH BEND

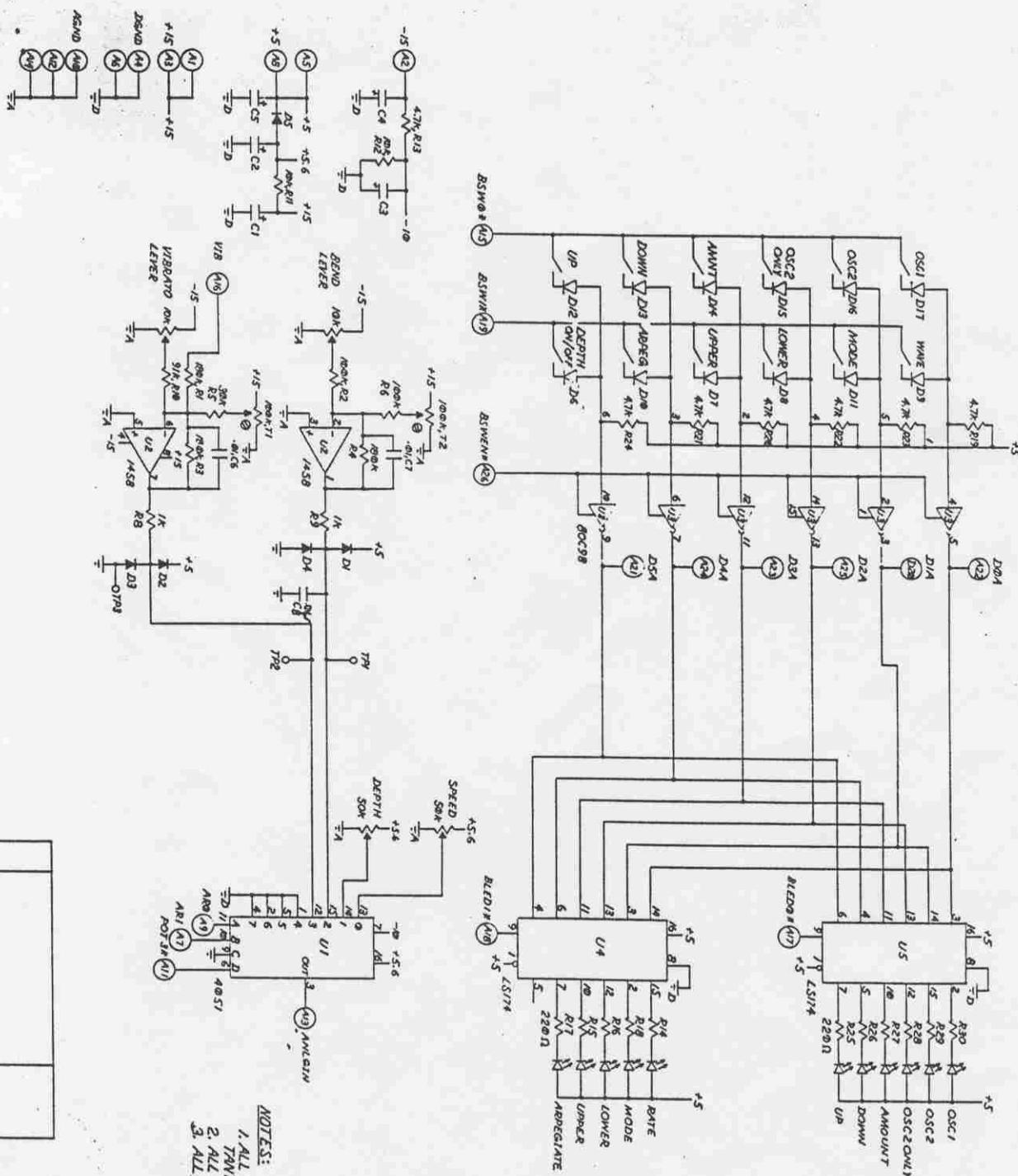
The pitch bend and vibrato levers are scanned by the microprocessor and their relative positions are calculated to determine the voltage necessary to bend a pitch up or down, or how much vibrato to add. This eliminates all problems associated with matching 100k resistors in order to send equal voltages to all voices, op amp offsets, and scaling trimmers. There are 2 rough trimmers used to bring the levers into range so that the processor can read them. Once they are in range, the processor re-calculates the center dead-zone of each lever each time AUTO is pressed.

4-POLE FILTER

The OB-Xa had separate 2-pole and 4-pole filters for each voice, each filter utilizing a CEM3320 with different external components to implement the filter functions. In the OB-8, There is one 3320 per voice, and the external components are electronically switched to generate either a 2-pole or a 4-pole slope. This eliminates the need to calibrate the two filters separately, since they are now the same filter.

OP AMP OFFSETS

Many sample and hold op amps can affect a parameter if their offset is large. To correct for this, the processor uses a software calibration procedure described later to assist in setting the offset to 0 volts. This adjustment is most critical for the envelope time parameters, since the CEM3310 envelope chips require a control voltage range from 0 to 300 millivolts. The software is able to correct for the offsets by outputting a voltage to the sample and holds that will compensate for the offset. If an op amp has +30 millivolts of offset, the processor will output 30 millivolts less than the final voltage required for that sample and hold, effectively canceling the offset.



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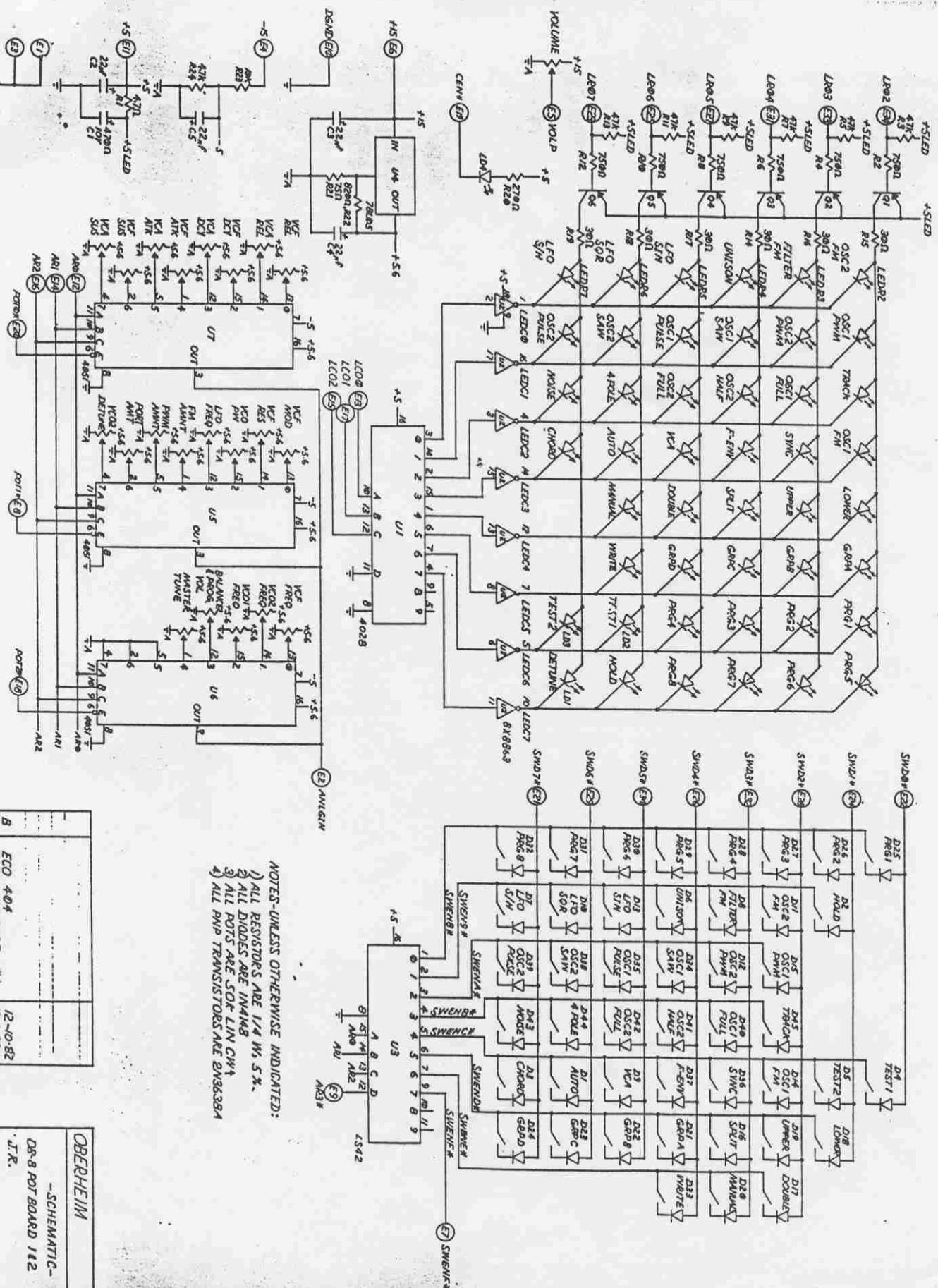
- SCHEMATIC -

OB-B BEND BOARD
27.

B	ECO #11	1-6-83
A	INITIAL RELEASE	12-1-82
CTR	REVISION	DATE

SHEET

1 OF 1



NOTES-UNLESS OTHERWISE INDICATED:

- 1) ALL RESISTORS ARE 1/4 W, 5%.
 - 2) ALL DIODES ARE IN4MB
 - 3) ALL POTS ARE 50K LIN CNT
 - 4) ALL PNP TRANSISTORS ARE 2N3639A

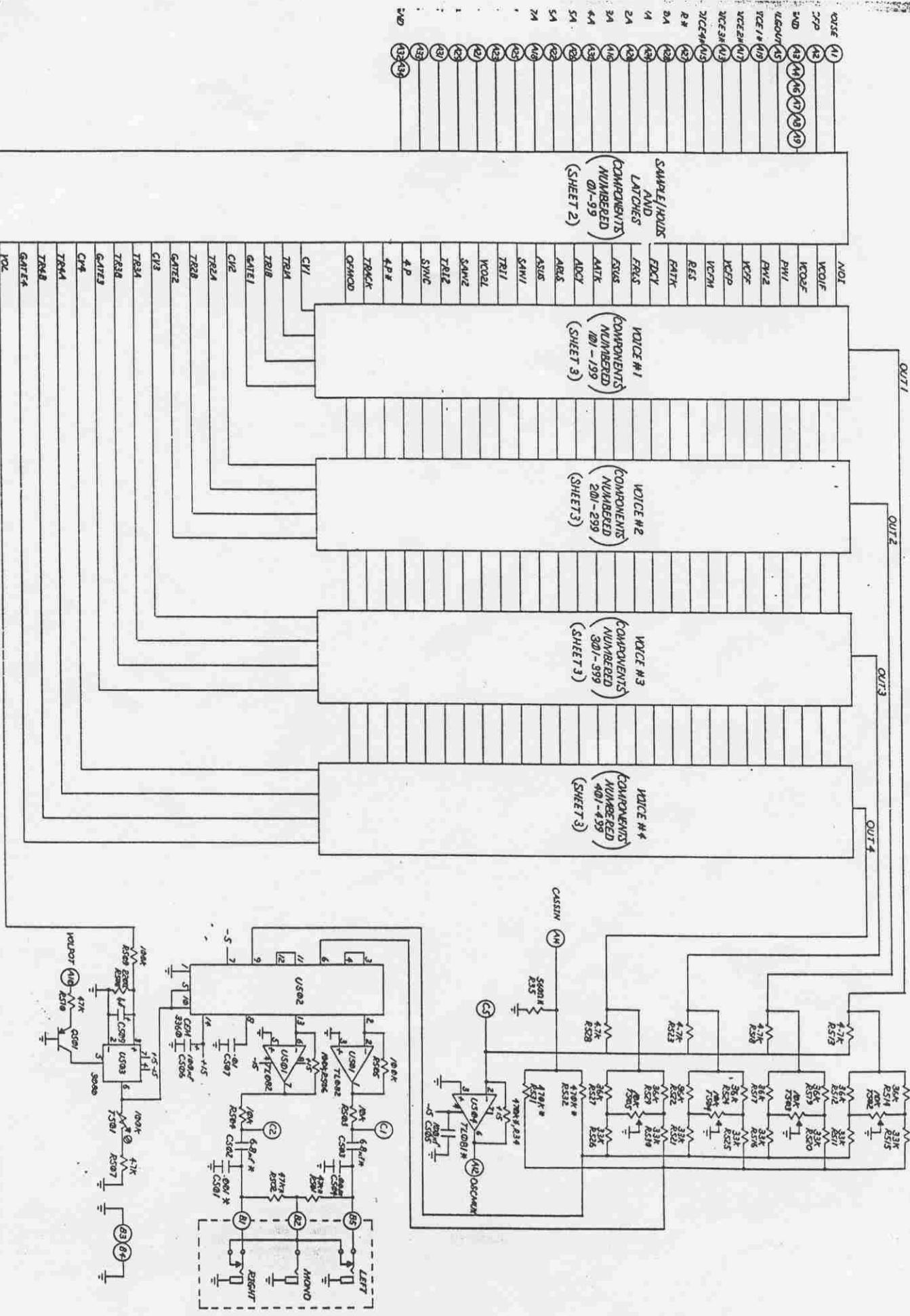
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NOTES:
1. ALL COMPONENTS MARKED "*" ARE ON
LOWER VOICE BOARD ONLY.

B	ECOS #03405-406-409 INITIAL RELEASE 12-22-82 12-1-82
A	
LTR	REVISION

SHEET
1 OF 3

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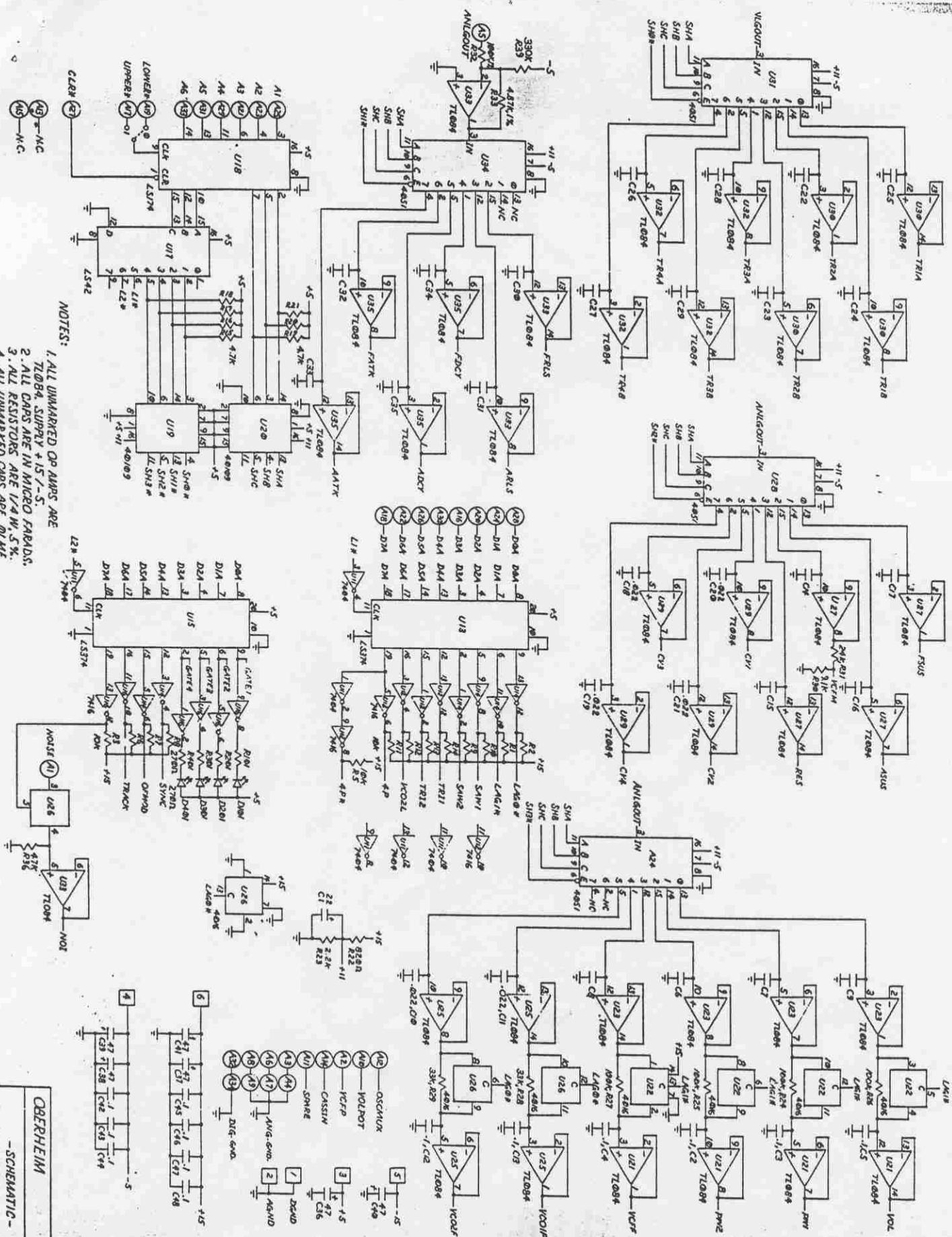
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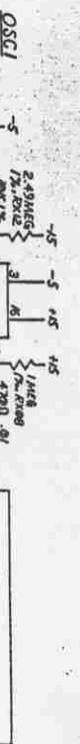
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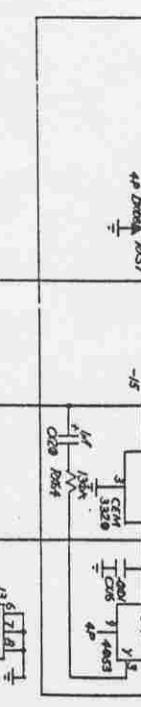
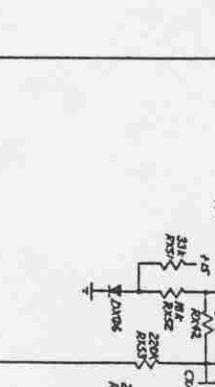
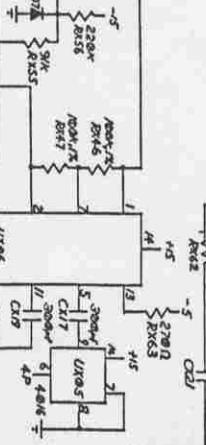
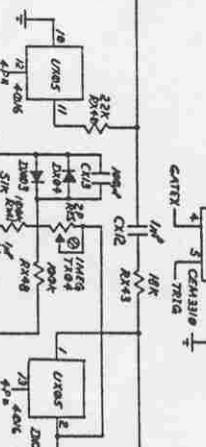
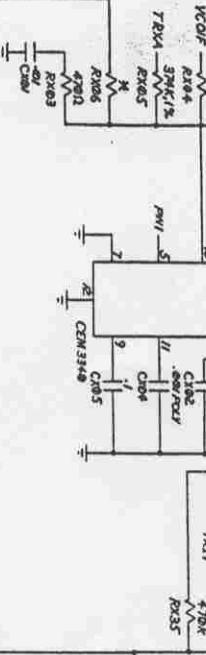
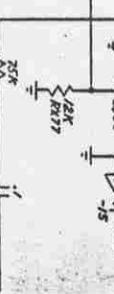
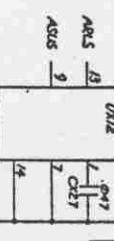
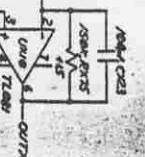


NOTES:

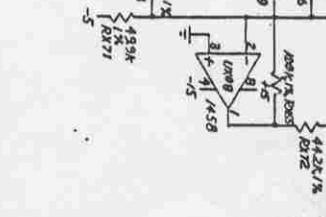
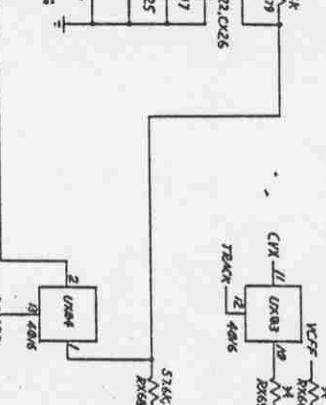
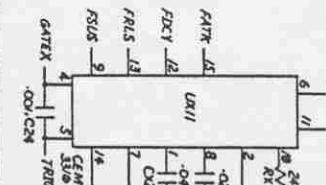
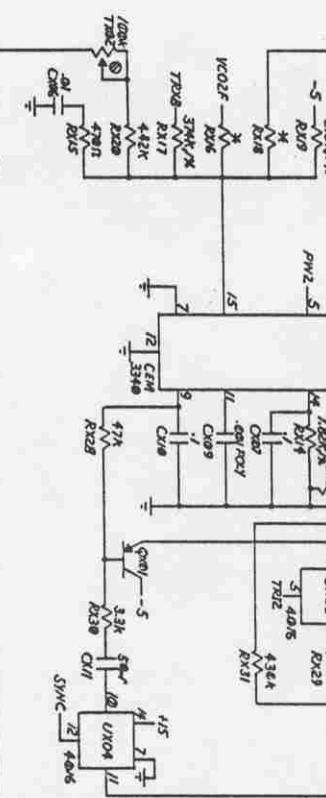
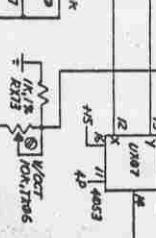
1. ALL UNMARKED QD MARS ARE TL084, SUPPLY +15V-5
2. ALL CAPS ARE IN MICRO FARAD.
3. ALL REVISTORS ARE 1/4W, 5%
4. ALL UNMARKED CAPS ARE OMNIK.
5. #022 CARS ARE ROUNSTRENE.



AMPLIFIER ENVELOPE



ELLIPSE ENVELOPE



NOTES:

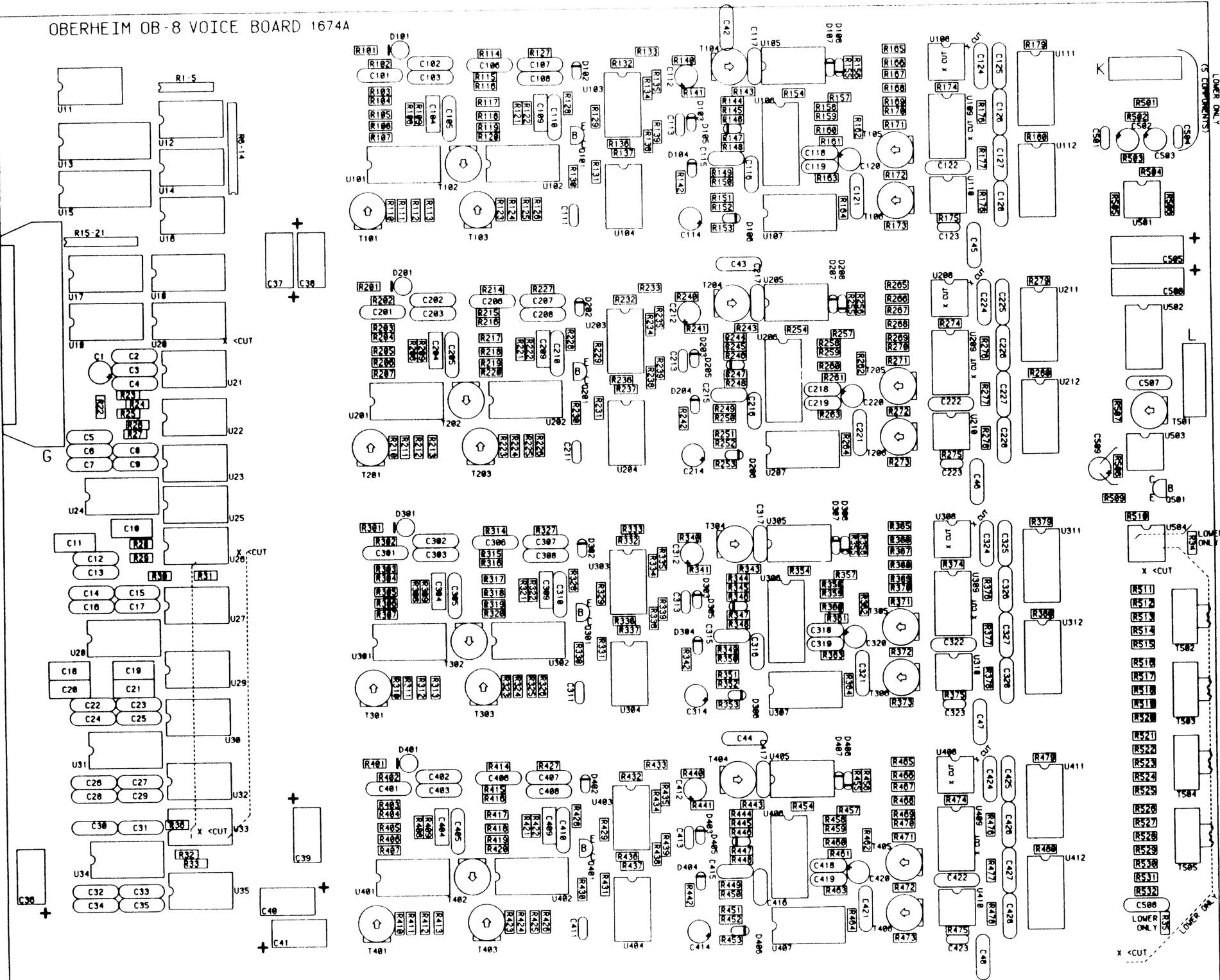
1. ALL NPN TRANSISTORS ARE MASSIVE.
2. ALL PNP TRANSISTORS ARE 2N3905.
3. ALL DIODES ARE INVERSE.
4. "X" DENOTES VOICE NO. (1,2,3,4).
5. "M" DENOTES MATCHED, 100K, 1% RESISTORS.

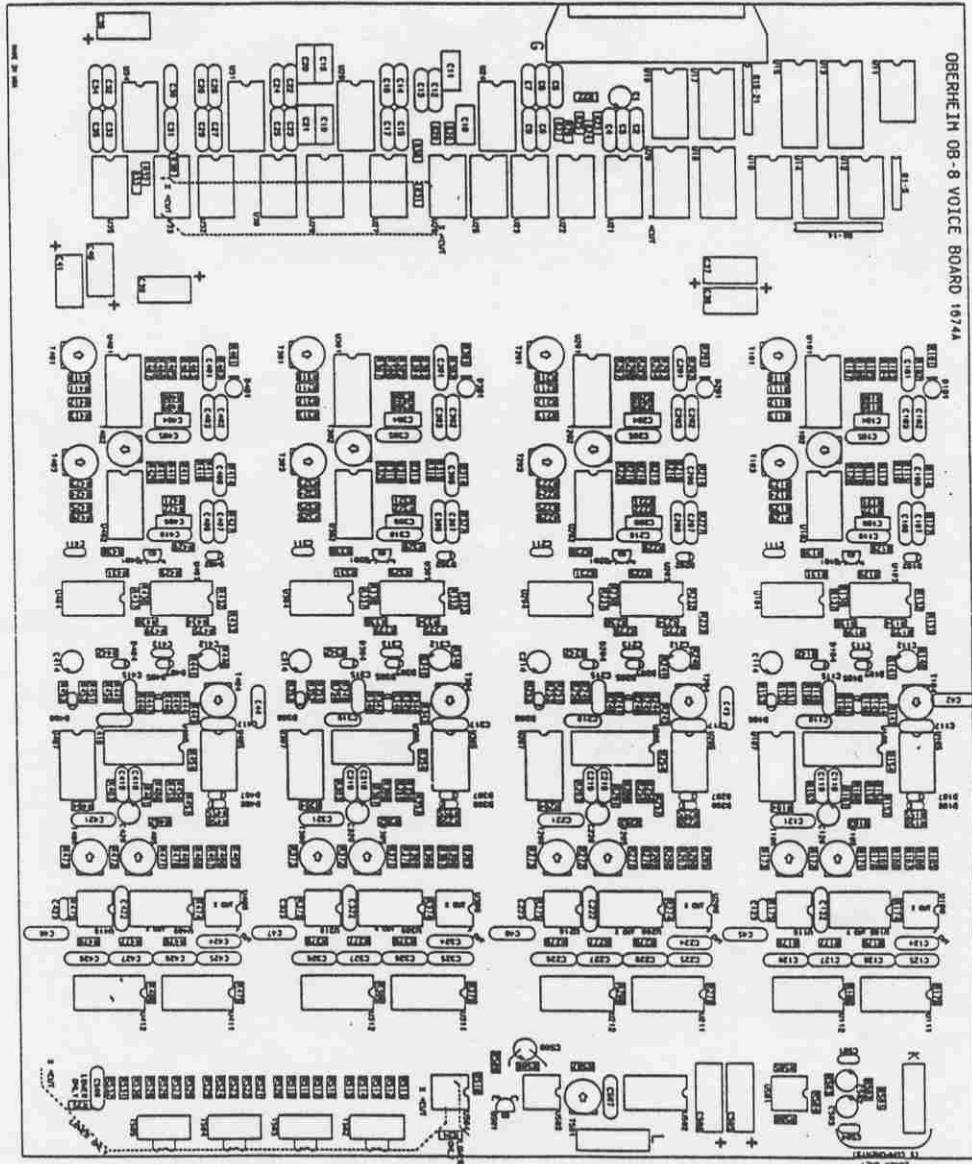
OPMOD

OBERHEIM

- SCHEMATIC -
OB-8 VOICE BOARD
J.R.

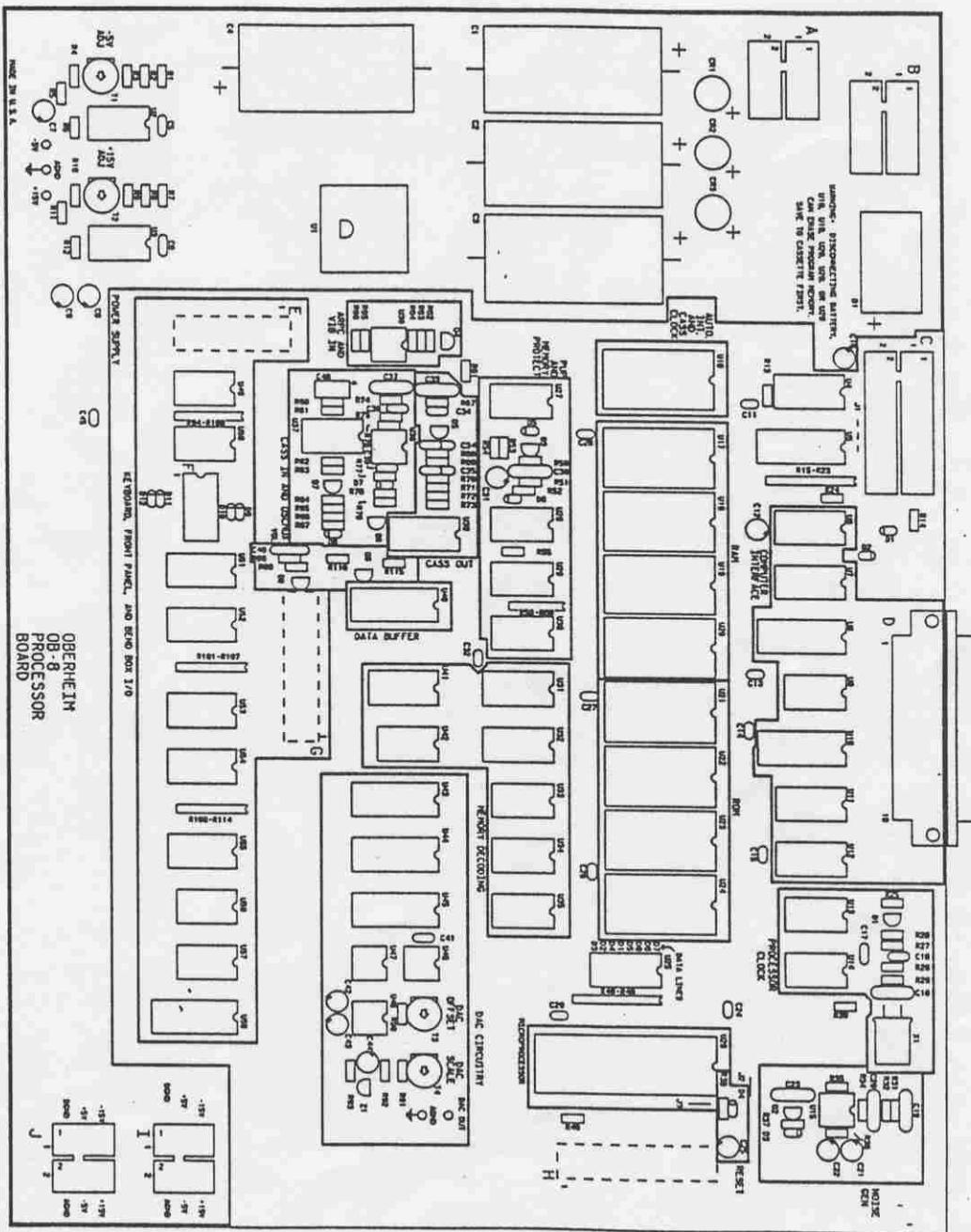
oberheim ob-8 voice board 1674a





OB-8 VOICE BOARD

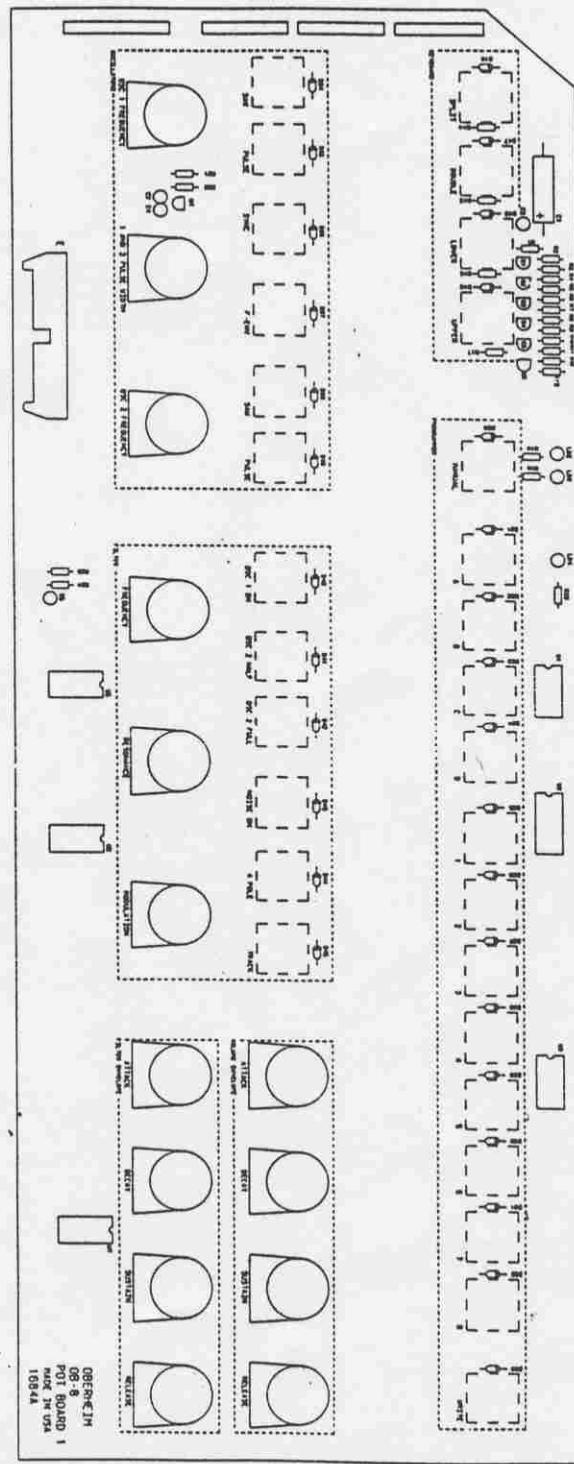
1689B



OBERHEIM

- PARTS LAYOUT -

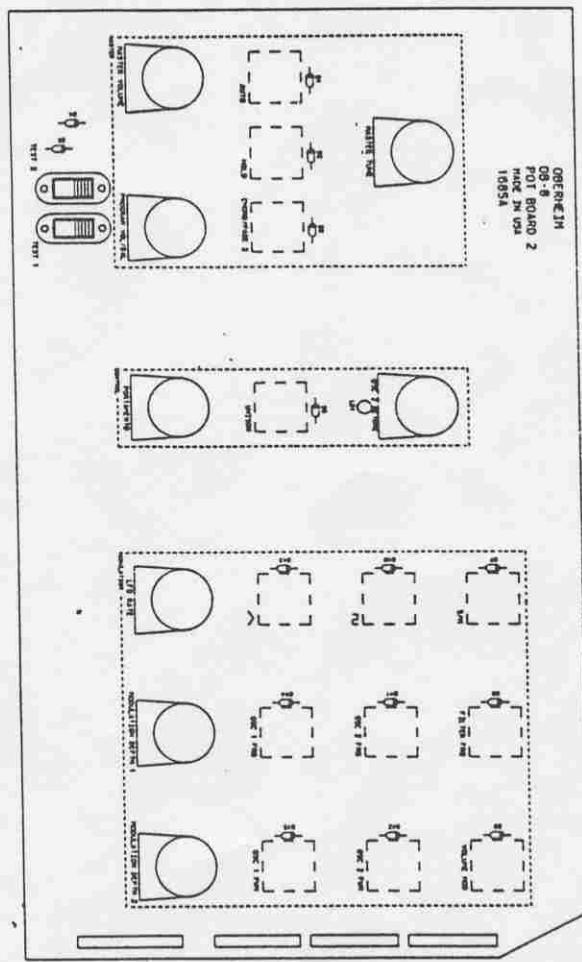
LTR	
B	ECCIS 402,407
A	INITIAL RELEASE
REVISION	
DATE	12-15-82 12-1-82



OBERHEIM

- PARTS LAYOUT -

1691



OBERHEIM				
- PARTS LAYOUT -				
OB-8 POT BOARD #2				
A				
ECHO FOX				
A				
INITIAL RELEASE				
LTR				
REVISION				
DATE				

16928

CALIBRATION

OB-8 CALIBRATION PROCEDURE

The following calibration instructions are those followed by the technicians at Oberheim prior to the shipment of an OB-8. The microprocessor assists in many of the necessary calibrations by indicating which direction to turn a trimmer, and indicating when a trimmer is calibrated by using the test LEDs located on the inside of the front panel circuit boards (they are visible when the lid is open). Even though these calibrations seldom need adjustment, it is a good idea to check them whenever servicing an OB-8.

A digital voltmeter with 4 & 1/2 digits is required to perform some of these calibrations. The rest can be done without any test equipment.

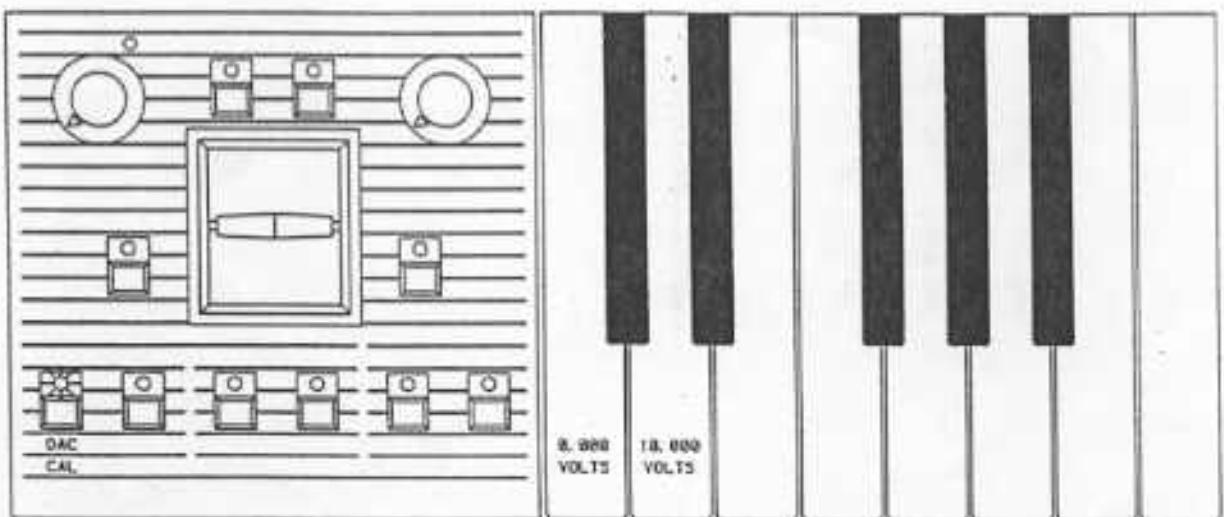
For access to all voices when servicing an OB-8, it is necessary to remove the right wood endbell completely and to remove the top two screws from the left endbell. The four screws holding down the circuit board with the Upper four voices should also be removed, to allow access to the Lower Voices.

The test procedures to follow assume the OB-8 has software version A4 or above. To determine the software version, press the CHORD/PAGE 2 button twice and hold it down the second time (the LED should now be lit), and while holding it, press and hold the SYNC button. The LEDs being displayed in the PROGRAMMER section now show the current version number. If the LEDs light up as version A1 or A2, a few special procedures are required which will be mentioned later in the test descriptions. For software version A3, the only difference is that the output volume offset cannot be calibrated (unless updated to A4 with ECO 410).

First, power the unit on. Verify all voltage sources (+5, -5, +15, and -15) at connectors I and J. Calibrate the +15 supply using T2 to + or -10mv. Calibrate the -5 supply using T1 to + or - 5mv. The +5 and the -15 supplies do not require calibration, but should be verified to be within + or - 5% of their rated value.

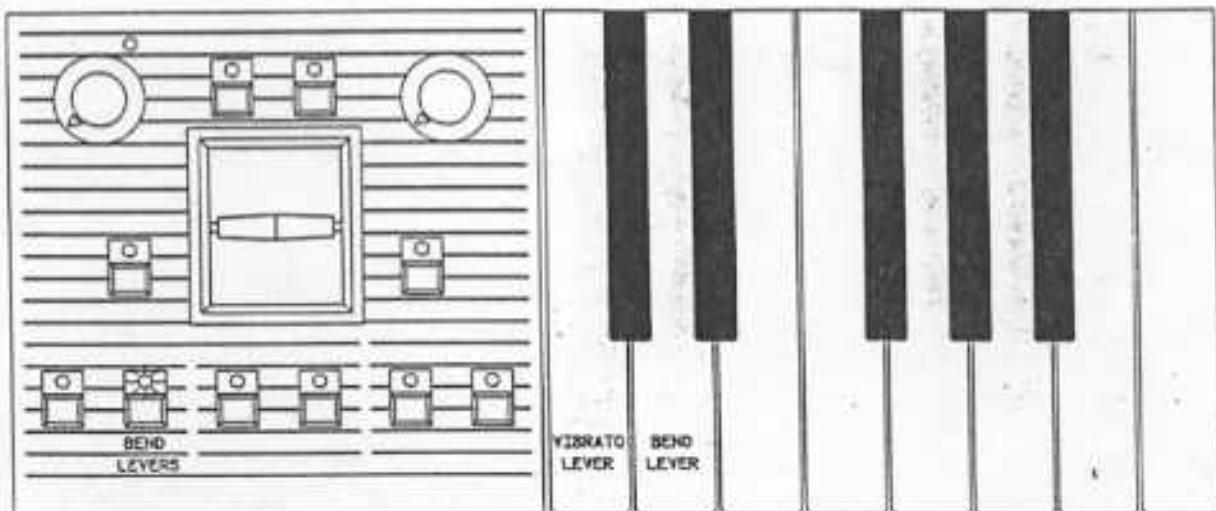
Now, enter the calibration mode by turning the TEST 1 switch on (up). This switch is located inside the synthesizer at the lower left corner of the front panel. All LEDs should now be off except for the OSC 1 MOD LED in the Bend Box. The Bend Box in conjunction with the two leds on the inside of the pot board and the first eight keys of the keyboard can now assist in many of the necessary calibrations. Each button performs a different test or calibration procedure and assists in calibrating 28 of the 56 trimmers in the OB-8.

CALIBRATING THE DAC



Pressing the OSC 1 MOD button in the Bend Box enables the DAC calibration mode. This procedure allows for the DAC offset and scaling to be calibrated, and should be done before any other calibrations (excluding the power supply). Connect a voltmeter to the DAC OUTPUT and AGND test points on the processor board. If there are no test points, the DAC output can be found at pin 20 of U45. Be sure to connect to a ground closest to the DAC. Press C0 on the keyboard. Adjust the DAC OFFSET trimmer (T3) until the meter reads 0.000 volts. Now press D0. Adjust the DAC SCALE trimmer (T4) until the meter reads 10 volts +/- 5mv. Then press C0 again and check that the meter still reads 0.000 volts and recalibrate if necessary. NOTE: The sample/holds to the attack, decay and release controls of the filter and VCA envelopes are enabled during this test so that op-amp offsets may be checked. This is necessary only if version A1 is being used. The procedure is described under SETTING ENVELOPE OFFSETS.

SETTING THE BEND TRIMMERS



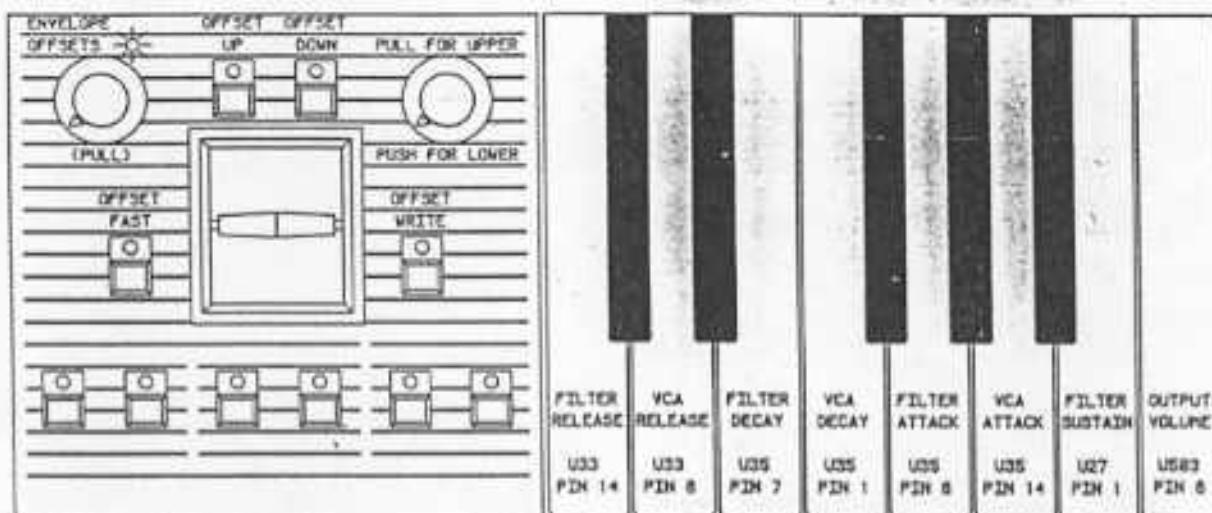
When the OSC 2 MOD switch is selected, the Bend Box trimmers can be calibrated. These trimmers are used to roughly center the Pitch Bend and Modulation Levers. First, flick the levers back and forth a little to make sure that they are in their rest position. Press C0. The LOWER LED has come on to indicate that the Modulation Lever trimmer can now be adjusted. Either one or both of the inside Pot Board LEDs (hereafter called test LEDs) will be on. If both LEDs are on, this trimmer is already properly calibrated. If only one LED is on, Adjust the RIGHT trimmer on the Bend Board until both test LEDs are on. Now press D0. The UPPER LED has come on to indicate that the Bend Lever trimmer can now be adjusted. Adjust the LEFT trimmer on the Bend Board until both leds are on. The Bend and Modulation Lever trimmers are now calibrated.

SUBSTITUTE REFER DCO 427.

* 0.000 V for ~~KA21500~~ (-0.2560)

ADJUSTING ENVELOPE OFFSETS

The following procedure should only be done if the envelope parameter times are not matched between the upper and lower four voices. This can be determined by listening for more than a 2 second variation from voice to voice when holding a note with the filter attack set to maximum and the filter sustain and decay set to minimum. This calibration is stored in the memory of the microprocessor and should not have to be reset unless the memory, the battery, or U33, U35, or U27 have been removed or replaced. The purpose of this calibration is to allow the microprocessor to compensate for the offsets of the envelope sample and holds, since these offsets can cause the envelopes to have different time constants. This calibration procedure exists only on software versions A3 and above. For units with A1 or A2 software, envelope matching is done by selecting low offset op amps for use at U33 and U35. The offsets of these op amps can be checked while in the DAC CALIBRATION mode, and should be selected to as close to 0 volts as possible.



Pull up on the RATE knob. The RATE LED should come on to indicate that the Envelope Offset mode has been selected. Connect the DVM to U33 pin 14 on the Lower Voice Board. Connect the ground of the DVM to a ground near pin U33 (The ground side of one the nearby electrolytic capacitors will do). Be sure that the DEPTH knob is pushed in so that the Lower Voice Board is selected. Press CO. Using the UPPER and LOWER buttons, adjust the offset until the meter reads 0.000 volts, + or - 1 millivolt. To adjust it up or down fast, hold down the MODE button while holding down UPPER or LOWER. When not holding the MODE button, the offset will move up or down slowly. When the offset is set, press the ARPEGGIATE button to write the offset into memory. None of the calibrations set in this mode will be remembered unless each is written

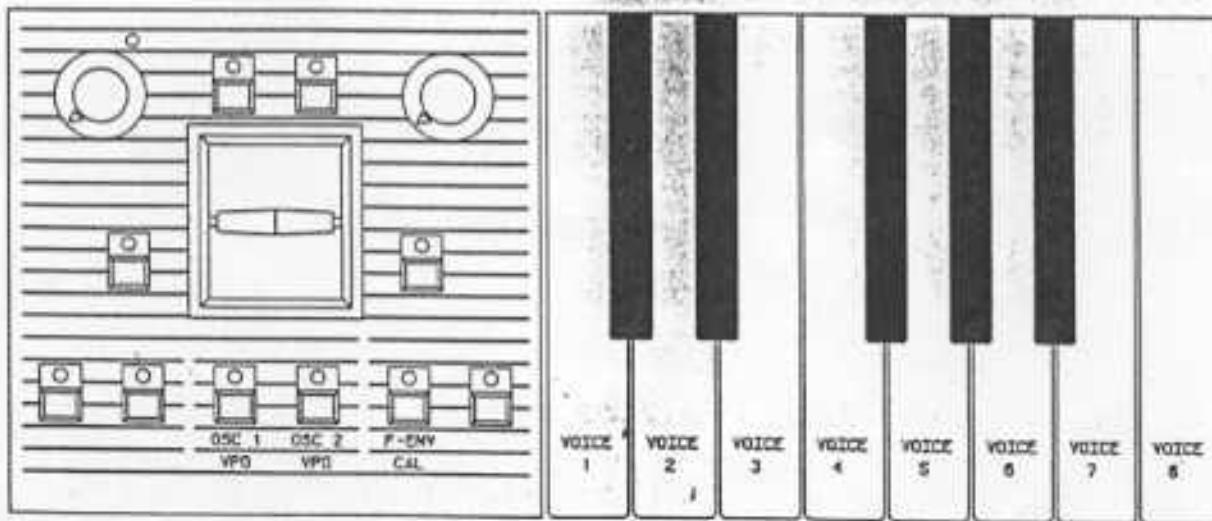
into memory. Now attach the DVM to U33 pin 8. Press D0. Adjust for 0.000V offset using the UPPER and LOWER buttons and write it into memory with the ARPEGGIATE button. Using the diagram as a guide, repeat this procedure for the Filter and VCA Decay, and the Filter and VCA Attack by selecting the proper parameter using the first six white keys on the keyboard. Do not adjust the Filter Sustain or the Volume Offset yet.

Now, pull up on the DEPTH knob to select the Upper Voice Board. Connect the meter to the Upper Voice Board and repeat the procedure of the Lower Board. Be sure to write each offset into memory with the ARPEGGIATE button.

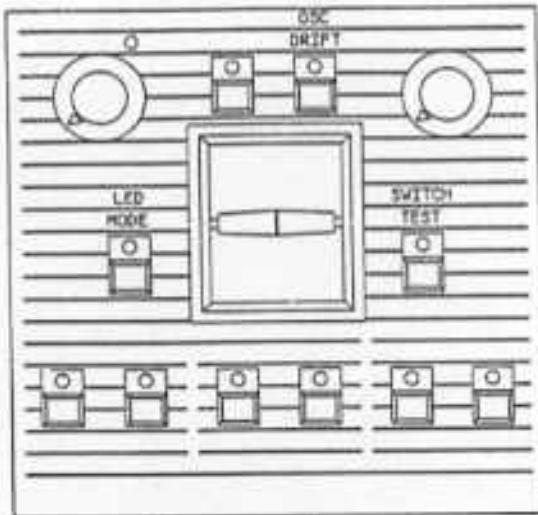
After the Release, Decay, and Attack parameters have been calibrated, the Filter Sustain can be calibrated. This calibration only requires that the Upper and Lower Voice Boards be matched, but it is not necessary for them to be adjusted for 0.000 volts offset. With the DEPTH knob still pulled up, connect the meter to U27 pin 1 on the Upper Voice Board. Press B0. Adjust the offset for zero volts, or as close as it can be adjusted to zero volts. If the offset is not zero volts, remember the offset value. Write the offset into memory with the ARPEGGIATE button. Push down the DEPTH knob and connect the meter to U27 pin 1 on the Lower Voice Board. Press B0. Adjust the offset so that it is the same as the Upper Voice Board. If the offset will not go low enough, set it as low as it can go, store it in memory, and readjust the Upper Board offset to match the Lower Board.

The final offset calibration is the output volume offset. This adjustment is made to insure equal volume between Voice Boards at any volume setting. This calibration only exists in software versions A4 and above. Like the Filter Sustain calibration, the important thing is to match the 2 boards, even if they are not set for 0 offset. Make sure that the MASTER VOLUME and trimmers T501 on each Voice Board are all the way up before making this adjustment. First on the Lower Voice Board, connect the meter to U503 pin 6. This is a high impedance signal so be sure to use a shielded cable on the meter. Press the DEPTH knob into its down position and press C1 on the keyboard. Using the same procedure as for the Filter Sustain, adjust the offset until the meter reads 0.000 volts or is as close to 0 as possible. Write the offset into memory with the ARPEGGIATE button. If the offset is more than 150 millivolts, replace U503 with another 3080 and repeat the procedure. If the offset is below 150 mv but above 0, remember the offset. Repeat the procedure for the Upper Voice Board by pulling up on the DEPTH knob, pressing C1, and connecting the meter to U503 on the Upper Board. Adjust the offset so that it matches the Lower Board. If the offset cannot be adjusted low enough, set it as low as it will go below 150 mv (otherwise it should be replaced), write it into memory with the ARPEGGIATE button and reset the Lower Board so that the offset matches the Upper Board. Write the new offset into memory. After all of the offset calibrations have been completed, press down on the RATE knob.

OSCILLATOR VOLTS PER OCTAVE ADJUSTMENTS



To calibrate the volts per octave of oscillator 1 of each voice, press the OSC 2 ONLY button. The voice to be calibrated is selected using the first 8 white keys on the keyboard (C0-C1). The gate LED will be lit on the voice that is currently selected. Select voice 1 by pressing C0 on the keyboard. If both test LEDs are on, this oscillator is in calibration. If only one LED is on, adjust the volts per octave trimmer (T101) until both test LEDs are on. If both test LEDs are off or seem to be flashing randomly, then this oscillator is not functioning properly and should be repaired or replaced. Select D0 now to calibrate voice 2 and repeat the procedure stated above for voices 2 through 8 using trimmers T201, T301, T401, etc. After calibrating all 8 voices, both test LEDs should be on whenever pressing any of the first 8 white keys. To calibrate oscillator 2 of each voice, press the BEND AMOUNT button. Follow the procedure for calibrating oscillator 1 using the first 8 white keys to select which voice is being calibrated. Adjust oscillator 2's volts per octave trimmers (T103, T203, T303, etc.) until all 8 voices are calibrated. To calibrate the amount of filter envelope modulation into oscillator 2, press the DOWN TRANSPOSE button and select a voice using the first 8 white keys. Adjust the F-ENV trimmer for each voice (T102, T202, etc.) until both test LEDs are on. Again, if both test LEDs are off or flashing randomly, oscillator 2 of the selected voice is not functioning correctly. NOTE: The volts per octave for Osc 2 and the envelope offsets must be calibrated before this adjustment is made. Also, on software version A1 and A2, the F-ENV calibration may not be able to be calibrated so that both LEDs are always on. This is due to the temperature instability and the nonlinearity of the CEM3360 VCA on each voice (U109). If this is a problem, it can be rectified by implementing ECOs 405 and 406 and replacing the eproms (U21-U24) with the most recent version of software. This change requires many cuts and jumpers as well as component value changes and should only be attempted if absolutely necessary.



LED TEST

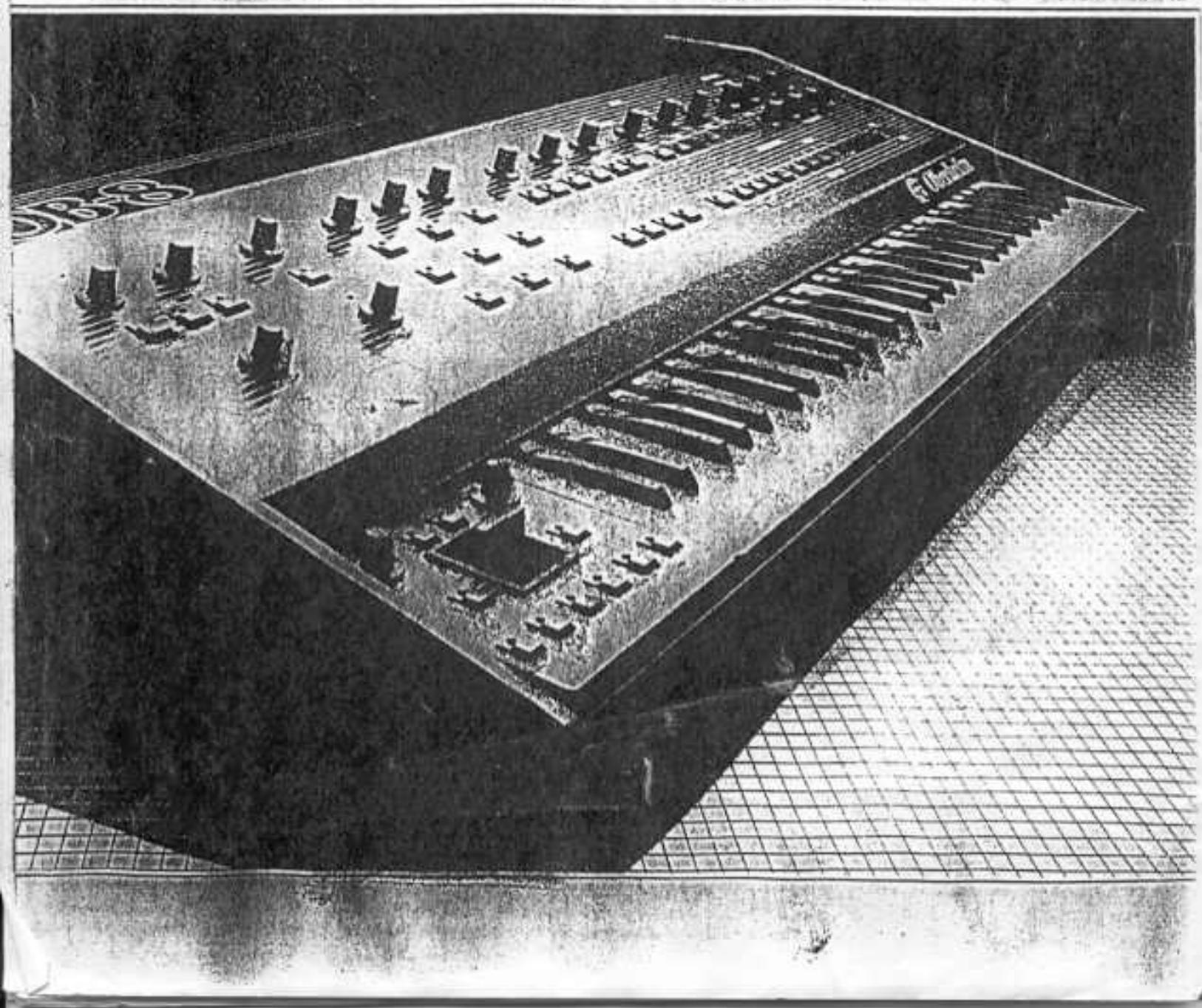
To test all of the LEDs, press the MODE button. This test will turn on all of the LEDs on the front panel and in the Bend Box except for the CASSETTE LED which must be turned on with the Cassette Enable switch. Any LEDs that do not light are not functioning properly. To leave this mode, select another test.

SWITCH TEST

Enter the switch test mode by pressing the ARPEGGIATE button. When in the switch test mode, each switch on the front panel will light its respective LED when pressed. The AUTO switch will light the detune LED. This test, in conjunction with the LED test, can be used to determine whether a switch or a LED is not functioning. To leave this mode, select another test.

SERVICE MANUAL

OB8





Oberheim

A Division of ECC Development Corporation

Corporate Offices: 11650 W. Olympic Blvd., Los Angeles, CA 90064 (213) 479-4948

OB-8

SERVICE MANUAL

First Edition
January 1983

This manual applies to units starting with
Serial Number C30101.

Part Number 950020

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