

*WAVE*

# **SERVICE MANUAL**

**Version 0.50 english**

**Sun Jan 9 14:35:01 MET 1994**

**Preliminary Description - subject to change**

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# Diagnostic System

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## Preface

The current release of the Wave Diagnostic System is part of the WAVE OS, which is to be booted during system startup. Due to this it is currently not possible to run the diagnostic software without booting the system. Future releases will be part of the Boot PROM and can then be used even if the hardware fails to boot.

The current Wave Diagnostic System contains self test functions for the CPU Board itself, the WDV Boards as well as all Front Panel Boards. Wherever possible, diagnostic functions do not need the users attention but try to figure out if a part of the system is working or not by your own.

In contrast to that, the Front Panel Diagnostics need the user's attention, simply because the WAVE has no chance to find out wether a LED, for example, is working or not.

To improve the Diagnostic System we need some response. Please let us know what could be improved, or what you may find completely useless.

VCF calibration:

Press <sup>store</sup>  
Hold shift & display ?

Diag: Press cancel & OK during startup

## Starting the Diagnostic System

The Diagnostic System is started by pressing both CANCEL and OK buttons during system startup. Hold both buttons until following menu screen appears:

```
WAVE DIAGNOSTIC SYSTEM (V 0.50) MAIN PAGE
1 - CPU Board Check
2 - WDV Board Check
3 - PANEL Check
4 - DEBUGGER
0 - SYSTEM RESTART
```

After this menu appeared the Diagnostic System is both controllable from a terminal connected through the Wave Debug Interface and from the WAVE's Front Panel.

To allow control from the Front Panel, some buttons got special meanings, representing parts of an ASCII keyboard:

<i>Button</i>	<i>ASCII Keyboard</i>
OK	RETURN, ENTER etc.
STORE	- " -
CANCEL	ESCAPE
+ (plus)	+ (plus)
- (minus)	- (minus)
0 ... 9	0 ... 9
HOLD	. (decimal dot)

In the following only ASCII keyboard names will be used, ie. RET or RETURN means both RETURN on an ASCII keyboard and OK on the WAVE's Front Panel.

To select a menu item simply press the corresponding number. Either a submenu will appear or a function will be called.

The Self Test Main Page contains 5 functions:

<i>Display</i>	<i>Description</i>
1 - CPU Board Check	Check the main CPU Board
2 - WDV Board Check	Check WDV Boards 1-3
3 - PANEL Check	Check the WAVE's Front Panel
4 - DEBUGGER	Call the built-in Debugger
0 - SYSTEM RESTART	Restart the WAVE OS

## CPU Board Check

The CPU Board Check Sub Menu contains six sub-functions:

<i>Display</i>	<i>Description</i>
1 - Do all checks	Do some functions automatically
2 - Memory Check	Check the on-board memory
3 - Interrupt Check	Check the CPU interrupts
4 - I/O System Check	Check the CPU I/O subsystem
5 - System Configuration Check	Print configuration information
0 - RETURN TO MAIN MENU	Return to the Self Test Main Page

Pressing the corresponding number will take you to one of the sub-functions.

Pressing '0' will return you to the SELFTEST MAIN PAGE.

### Do all checks

The "Do all checks" subfunction calls the subfunctions "Memory Check", "Interrupt Check", "I/O System Check" and "System Configuration Check" in this order, plus the WDV Board check for all installed WDV Boards.

Each check prints a status message as its own, a final status message telling whether the complete check has passed or failed is printed last.

For a detailed description of these tests please refer to the corresponding sections.

### Memory Check

The Memory Check subfunction checks all memory systems on the WAVE CPU Board. While running, it will print the following information:

```
----- Memory Check -----
Checking Bus Error Exception: OK
Checking DRAM [1024 kB expected]: [kB] OK
Checking SRAM [ 512 kB expected]: [kB] OK
Checking VRAM [ 16 kB expected]: [kB] OK
Memory Check: PASSED [FAILED]
Press RET to continue.
```

If in any of the memory subsystem less memory than expected is found, the Memory Check failed.

After completing the check, press ENTER to return to the CPU Board Check menu.

### Interrupt Check

The Interrupt Check subfunction checks all on-board generated interrupts of the the WAVE CPU Board.

While running it will print the following information:

```
----- Interrupt Check -----
Saving Vectors...
Checking Timer Interrupt: OK [269]
Checking Midi 1 Interrupt: OK [0]
Checking Midi 2 Interrupt: OK [0]
Checking Serial Interrupt: OK [0]
Checking Floppy Interrupt: OK [573]
Restoring Vectors...
Interrupt Check PASSED
Press RET to continue.
```

If any of the tested interrupts failed the test functions will print "TIMED OUT" instead of "OK".

The number displayed in brackets behind the "OK" is just informational. It may differ from the numbers given here.

The Serial Interrupt Check has a third possible result. It might print "INTERFACE NOT CONNECTED" telling you that the WAVE Debug Interface is not connected. This is not an error condition since this Interface is optional and not necessary for normal operation of the WAVE and its Diagnostic System.

Press RETURN to return to the CPU Board Check menu.

## I/O System Check

The I/O System Check prints information about the functionality of the I/O subsystem of the WAVE CPU Board. You need a special cable and a formatted floppy disk to successfully run this test.

While running the I/O System Check will print the following information:

```
----- I/O System Check -----
Checking RTC: OK
Checking Midi Out 1: OK
Checking Midi Out 2: OK
Checking Floppy: Init: OK Read: OK Write: OK
I/O Check PASSED
Press RET to continue.
```

If a test failed, "FAILED" will be printed instead of "OK". Without a special midi cable and a formatted disk the MIDI Out 1 and 2 as well as the Floppy Check will fail.

*Please see the Appendix for a description of the MIDI Test Cable.*

## System Configuration Check

The System Configuration Check is an half-automated test function printing information about the WAVE's hardware configuration. You'll need to find out if the information printed is correct:

Display	Description
CPU Clock:	CPU clock in kHz
CPU Board Revision:	Board Revision, current = 2
WDV Board Type:	NOT PRESENT, OLD, NEW
WDV Boards found:	No. of WDV Boards installed
Optional Boards:	NOT PRESENT, PRESENT
Keyboard Type:	STANDARD, EXTENDED
Press RET to continue.	

The System Configuration Check cannot fail since it simply reads some IO ports and interprets them, except the CPU clock measure which fails when the RTC (Realtime Clock) isn't working. In this case the CPU Clock is displayed with 0 kHz. Please make sure that your system configuration is as displayed, then press RETURN to return to the CPU Board Check menu.

## WDV Board Check

The WDV Board checks consists of 4 subfunctions:

```
WDV BOARD TEST
1 - Board 1
2 - Board 2
3 - Board 3
0 - RETURN TO MAIN MENU
```

Pressing buttons 1,2,3 starts a check of WDV Board 1, 2 or 3, respective. Pressing button 0 returns you to the main menu.

## Checking a WDV Board

After selecting a WDV Board to check, the Diagnostic System will print following informations:

```
----- Digital Voice Boards Check -----
Checking Board [1,2,3] :
Resetting all WDV Boards...
Checking Presence of Board [1,2,3] : OK
Starting Board [1,2,3] : OK
Checking Communication : OK
WDV Board Check PASSED
Press RET to continue.
```

Any other message indicates an error.

**Note:** The WDV Board check ignores the system configuration port. You can try to check a WDV Board which is not installed. This will obviously fail but is not recognized as a general error condition.

## PANEL Check

The PANEL Check consists of several subfunctions again. After selecting the PANEL check from the Diagnostic System Main Page the following menu will appear:

<i>Display</i>	<i>Description</i>
PANEL AND KEYBOARD TEST	
1 - Button Test	Test all panel buttons
2 - Fader/Pot Test	Test all panel pots and faders
3 - Led Test	Test all panel LEDs
4 - Keyboard Test	Test the keyboard
0 - RETURN TO MAIN MENU	Return to the Main Menu

Select a subfunction by pressing the corresponding button 1,2,3,4 or 0. Pressing '0' will return you to the Diagnostic System main menu.

**Note:** The function Keyboard Test isn't available in this version. Selecting it will again print the PANEL and KEYBOARD TEST menu.

## Button Test

The Button Test consists of 5 pages, each displaying a number of buttons on the WAVE's Front Panel, in order from the left to the right. Within each page you can skip to the next page by pressing RET or cancel the complete Button Test by pressing ESC.

Pressing a displayed button twice will let this button disappear from the Display, but only if this button works fine, ie. both 'press' and 'release' states could be identified, and no other button was affected by pressing or releasing it.

The last received button state message is displayed in the upper right corner of the display.

## Fader/Pot Test

The Button Test consists of 4 pages, each displaying a number of pots or faders on the WAVE's Front Panel, in order from the left to the right.

Page 4 displays the three wheels, the keyboard pressure sensor and the three pedal inputs. Within each page you can skip to the next page by pressing RET or cancel the complete Fader/Pot Test by pressing ESC.

Turning a pot first to the right and then to left will let this pot disappear from the Display, but only if this pot works fine, i.e. both minimum (0) and maximum (127) values were detected.

The last received pot value message is displayed in the upper right corner of the display.

## LED Test

The LED Test consists of 8 pages, each displaying a number of LEDs on the WAVE's Front Panel, in order from the left to the right. The current LED is highlighted on the Display. The corresponding LED on the WAVE's Front Panel must be on, otherwise it's an error.

Pressing RET always selects the next LED and/or page. Pressing ESC cancels the complete LED Test.

There's no way for the WAVE to find out whether a LED is working or not. You have to watch if the highlighted LED is on or not yourself.

## Keyboard Test

The Keyboard Test isn't available in this version, nor has been decided how it will look like. Future releases of the Diagnostic System will include this test and its documentation.

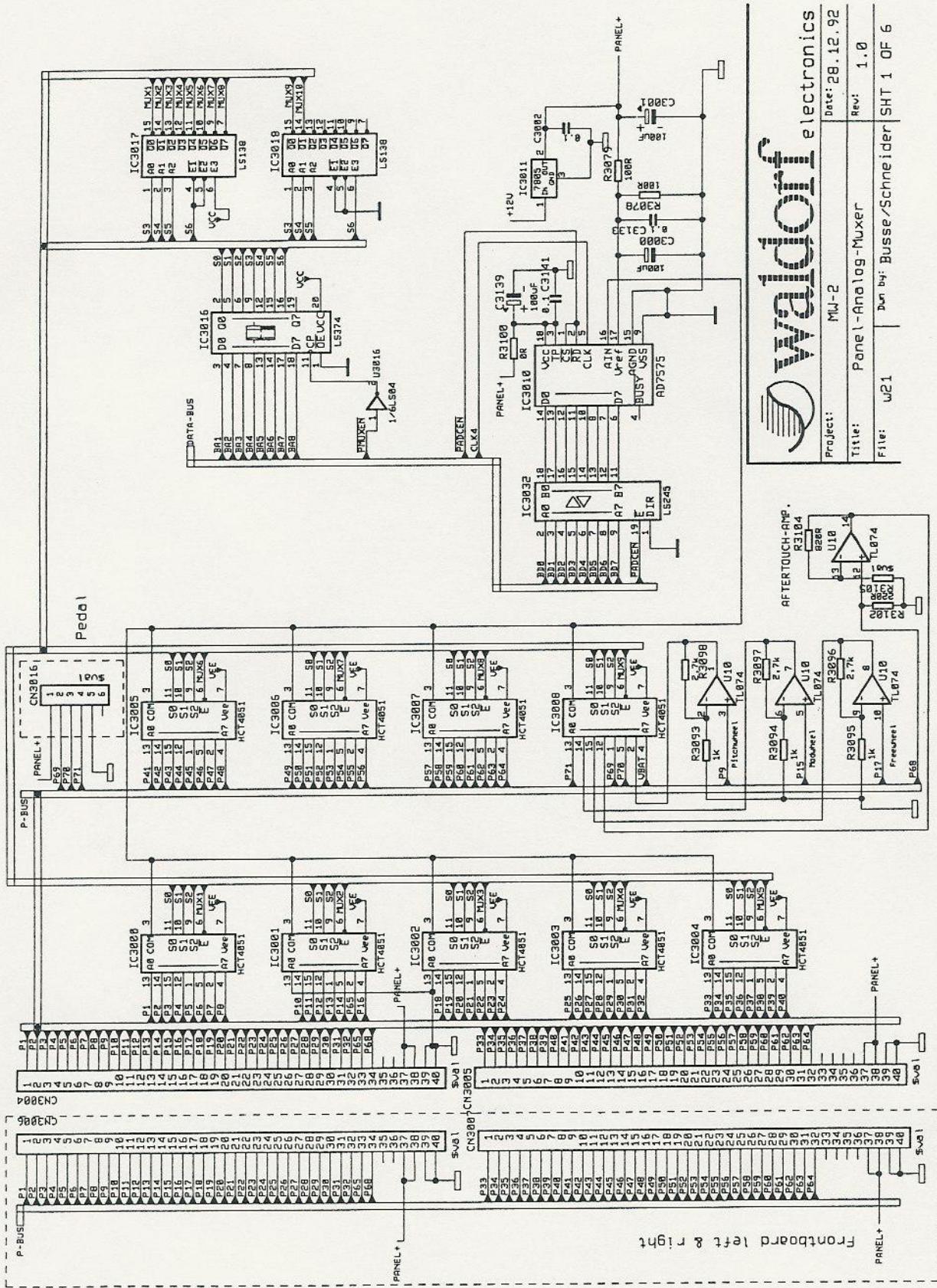
## Debugger

The build-in Debugger of the WAVE OS is not part of the Diagnostic System but accessible from there. Unless you are controlling the Diagnostic System from a terminal you should not start the Debugger since there's no way to return to the Diagnostic System without an ASCII keyboard. The Debugger will be described in another document not yet available.

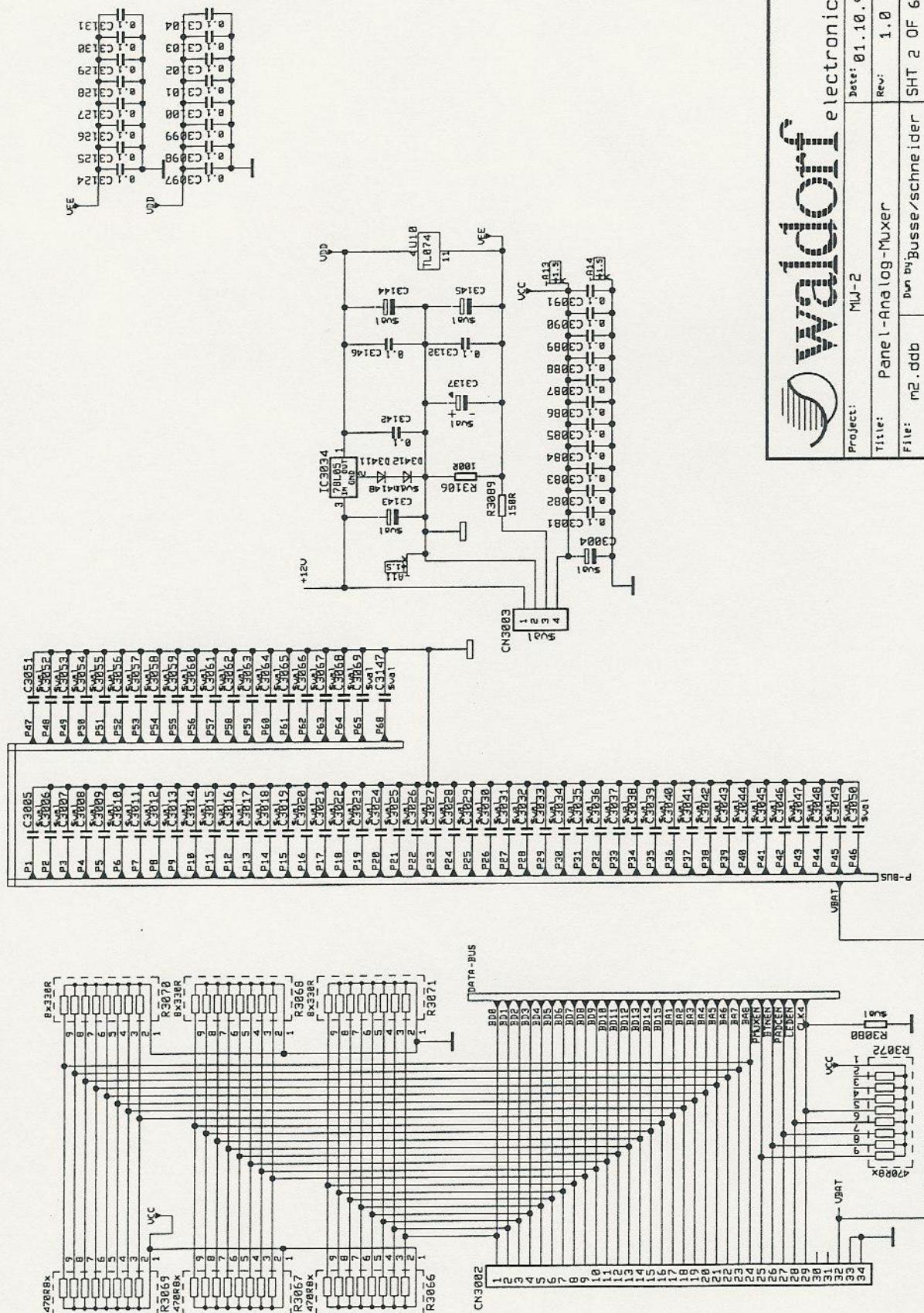
# Schematic Diagrams

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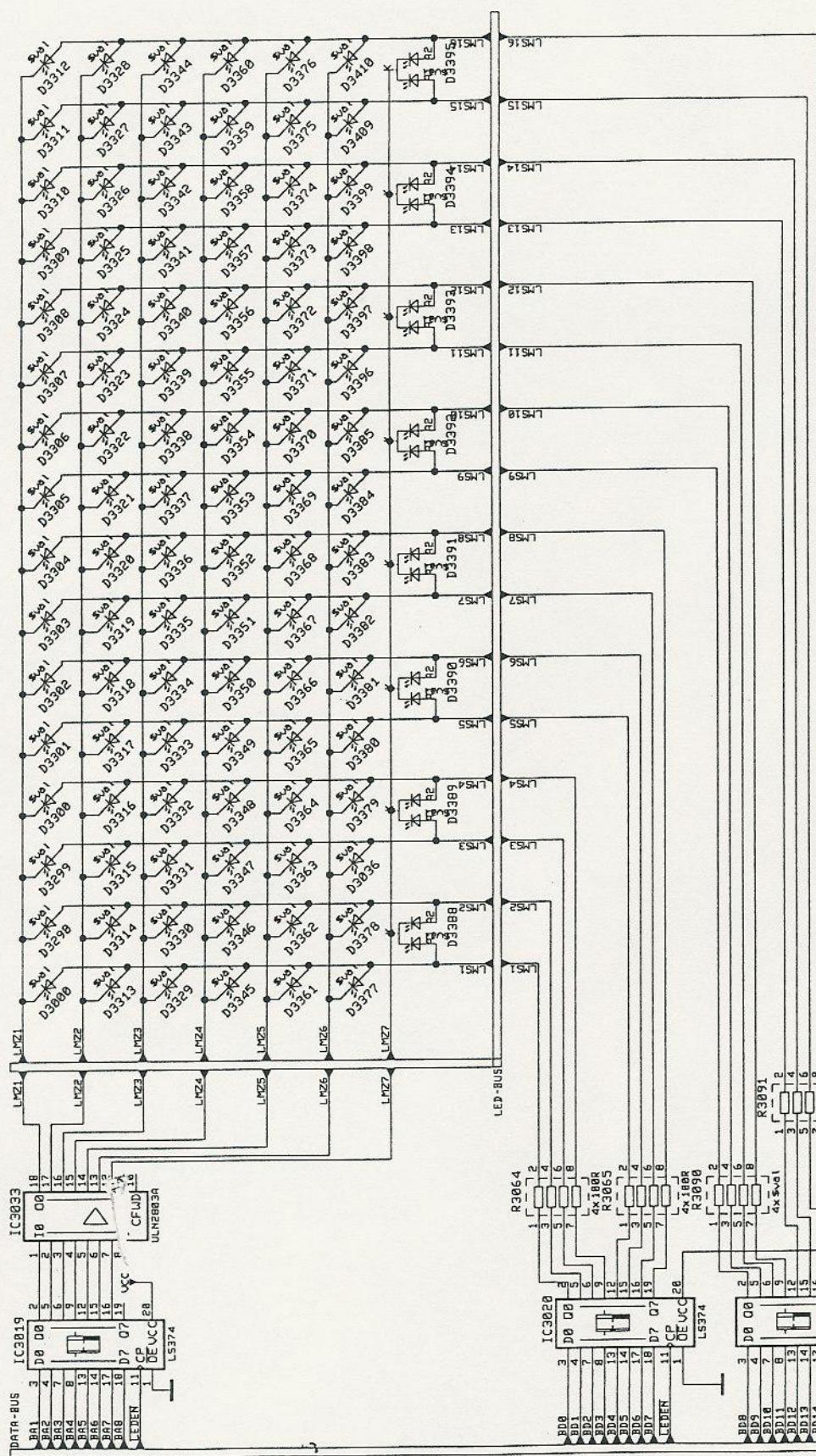
# **Panel Boards**



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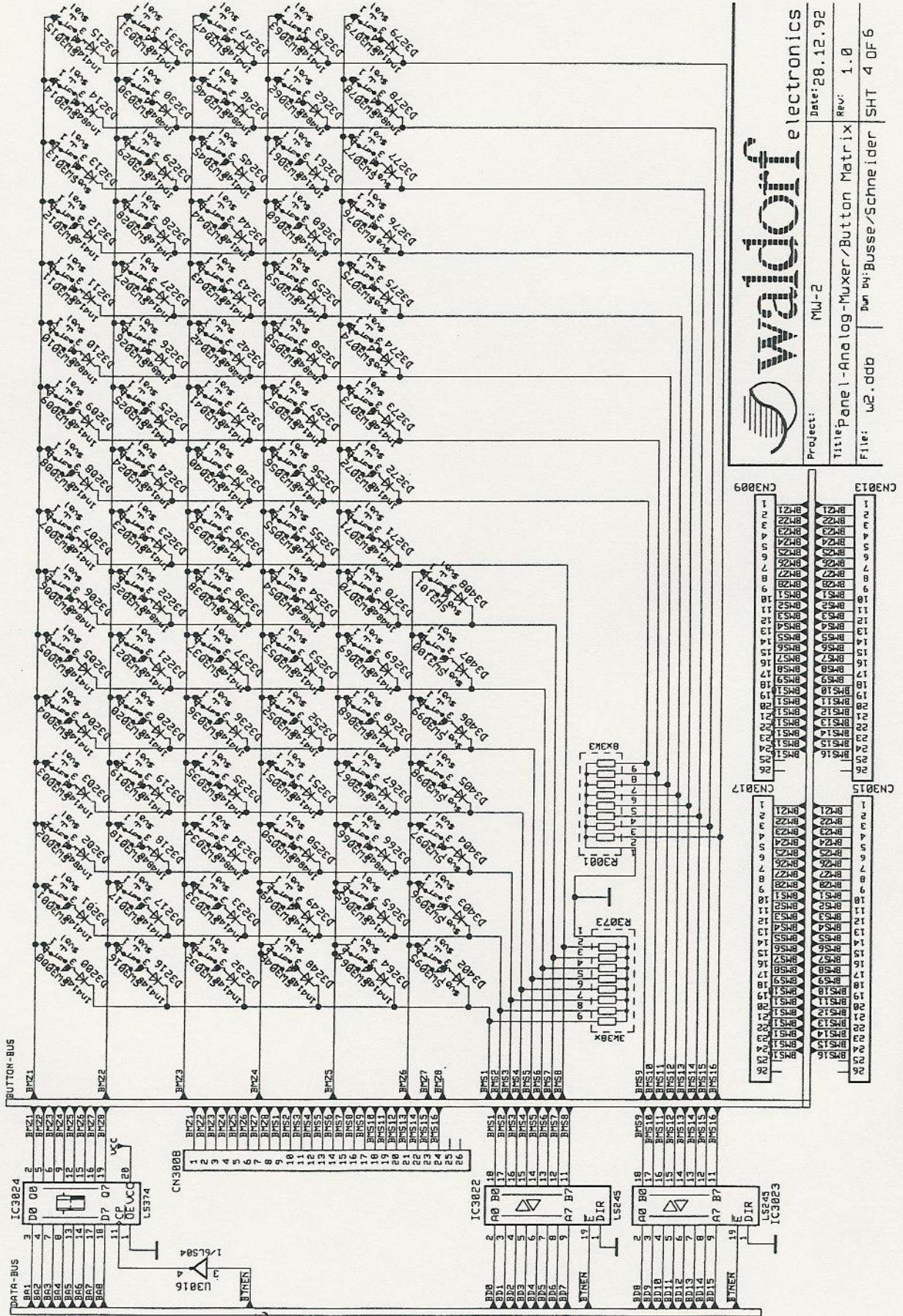


**VYCOOL electronics**

Project:	MW2	Date:	28.12.92
Title:	Panel - Analog Muxer-Led Matrix	Rev:	1.0
File:	M2	Draw by:	Busse/Schneider
		SHT	3 OF 6

25

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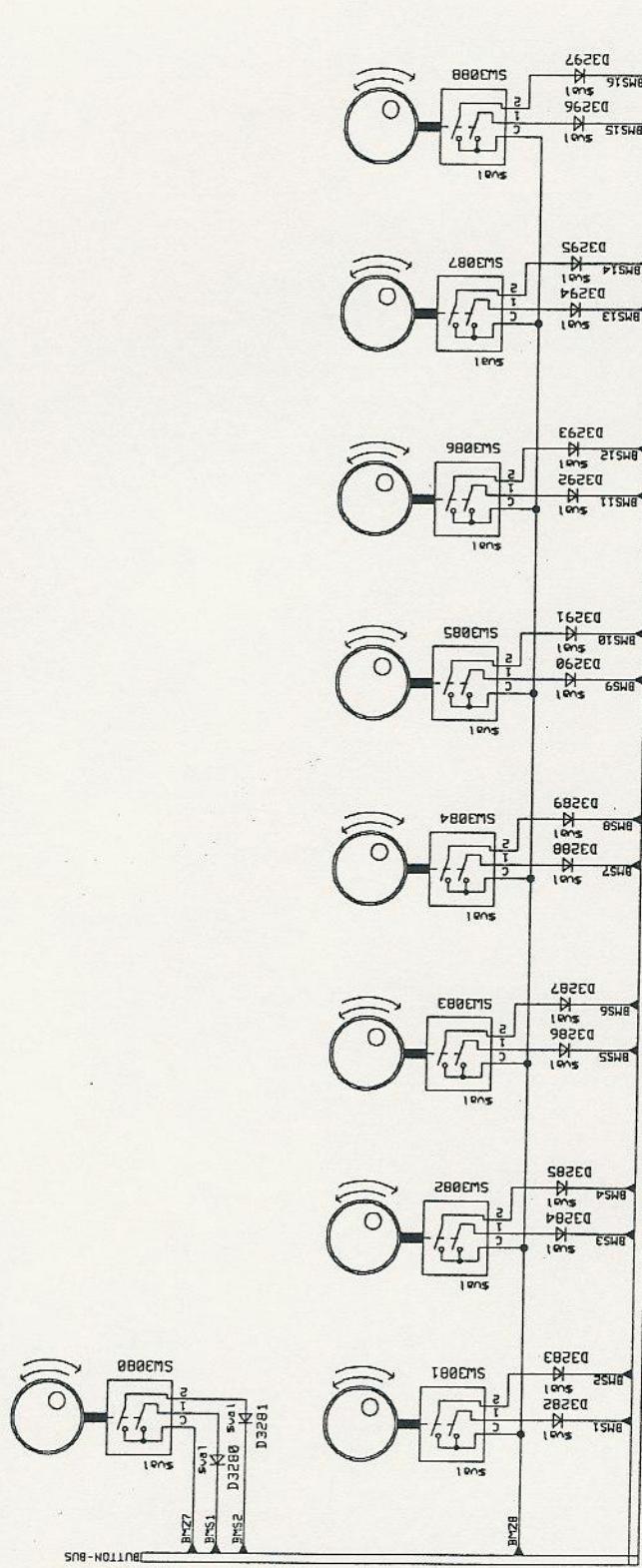


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WAVE SERVICE MANUAL

10  
9  
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2  
1

WaveTables



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Date: 28.12.92

Rev: 1

SHT 5 OF 6

10

W2

DIALS

1

9

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7

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5

4

3

2

1

A

B

C

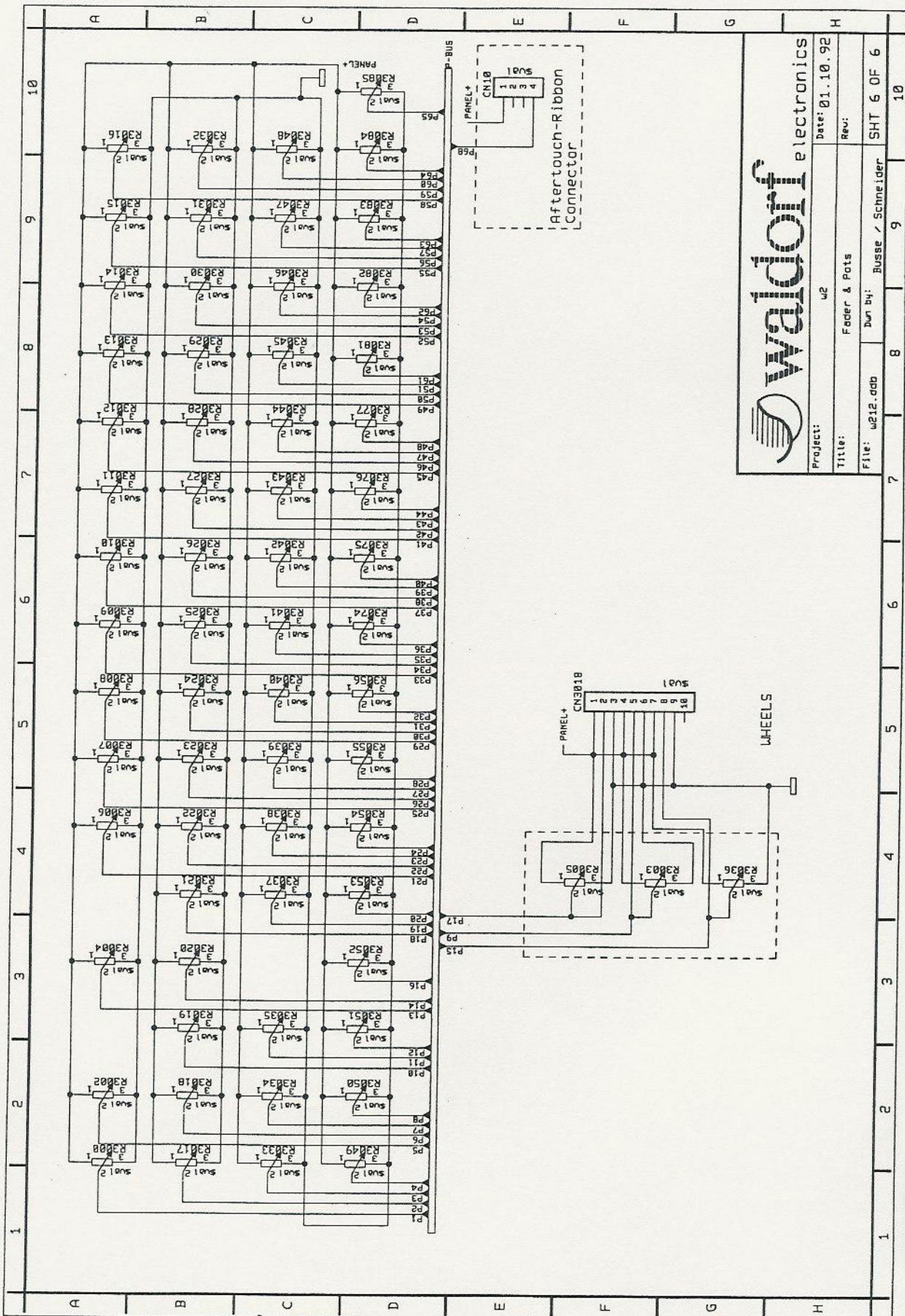
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E

F

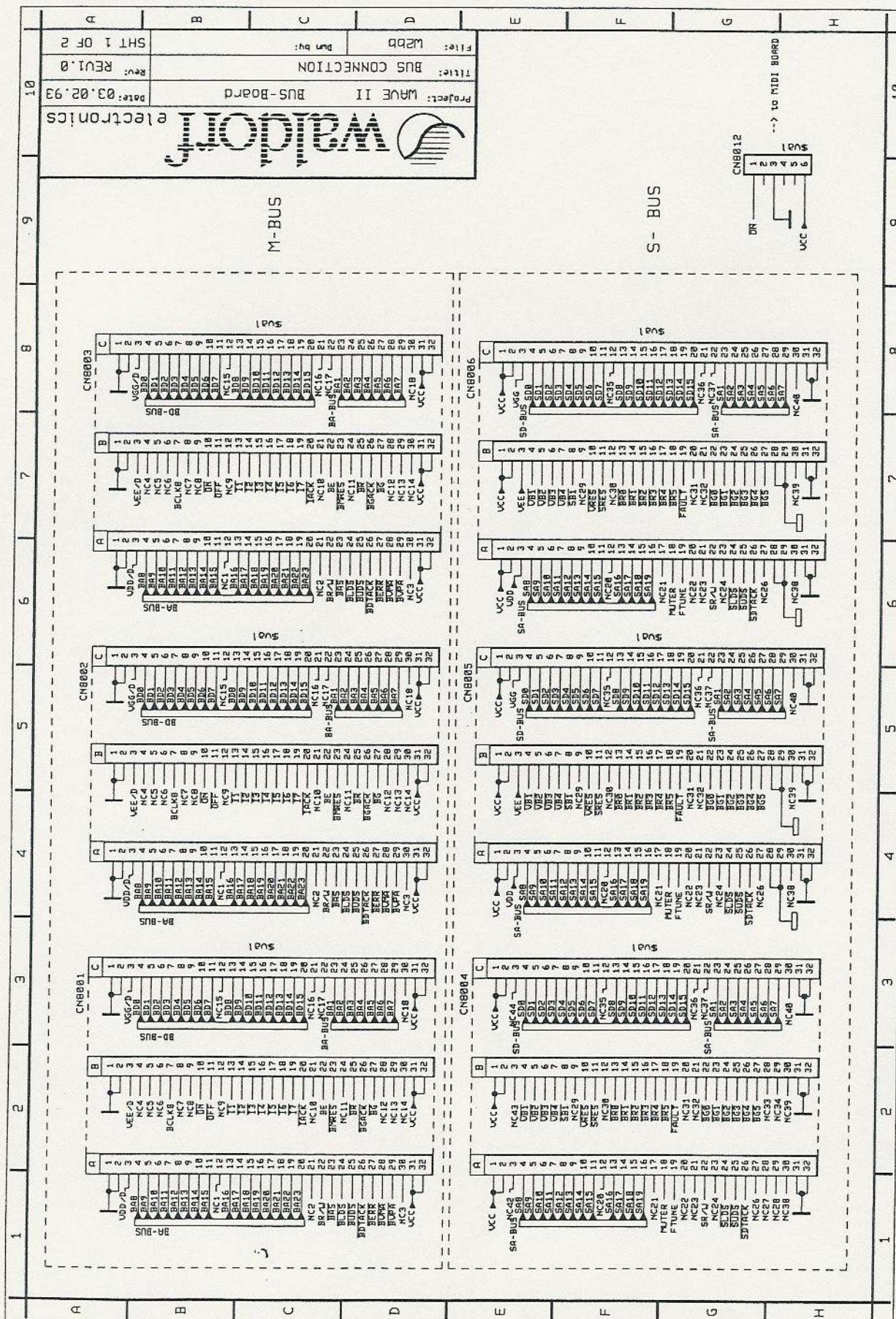
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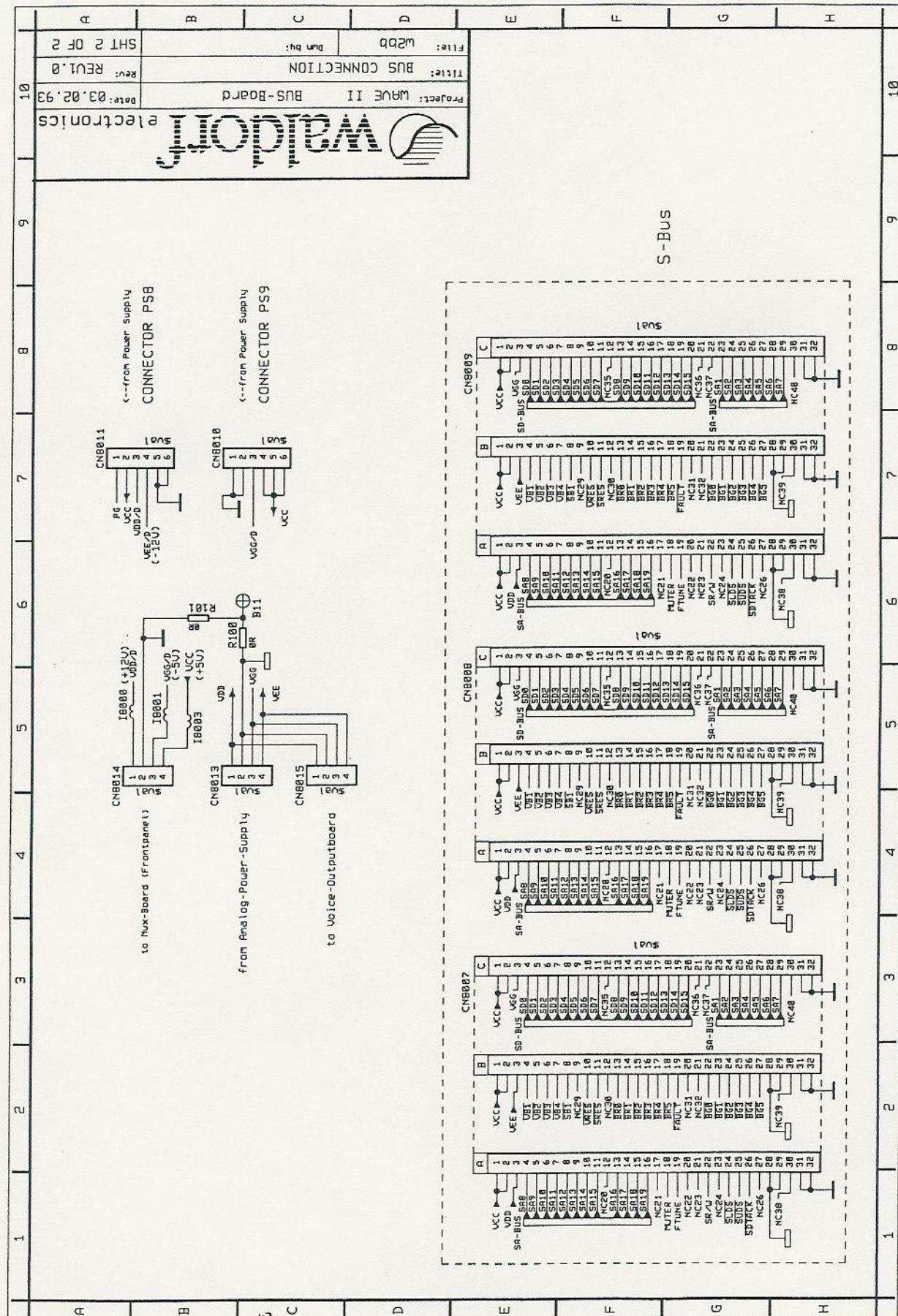
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## Panel Boards Position Prints

# Bus Board



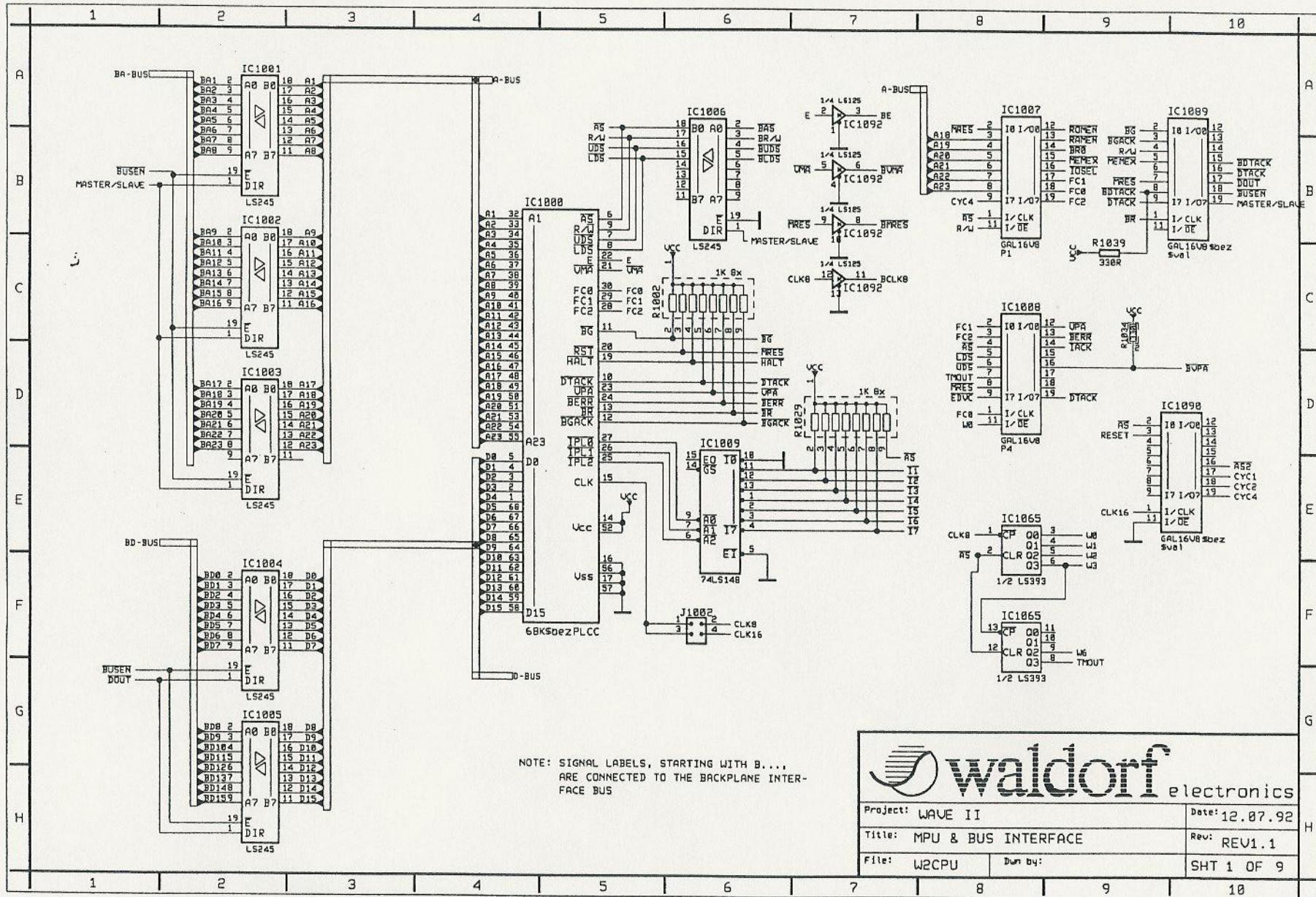


## Bus Board Position

# CPU Board

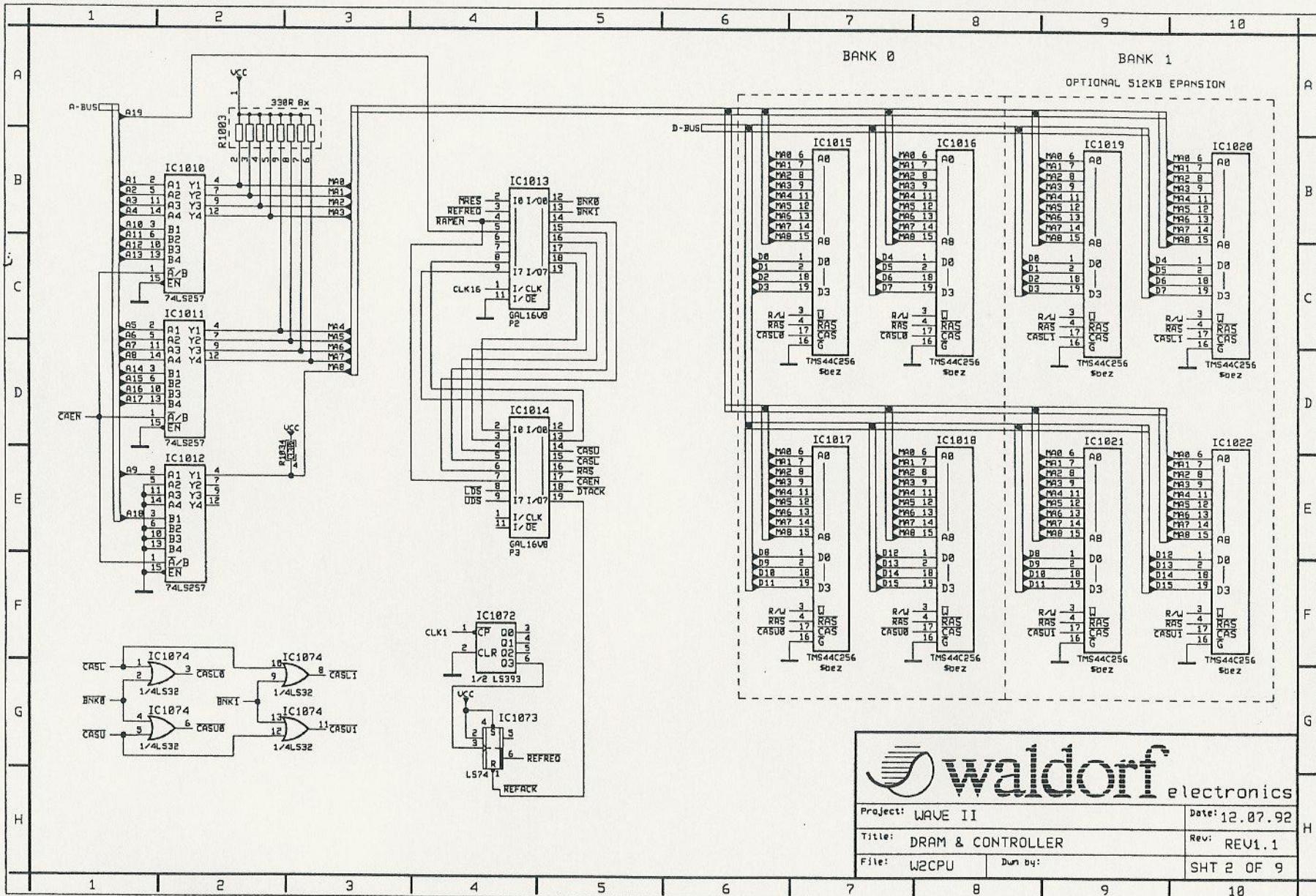
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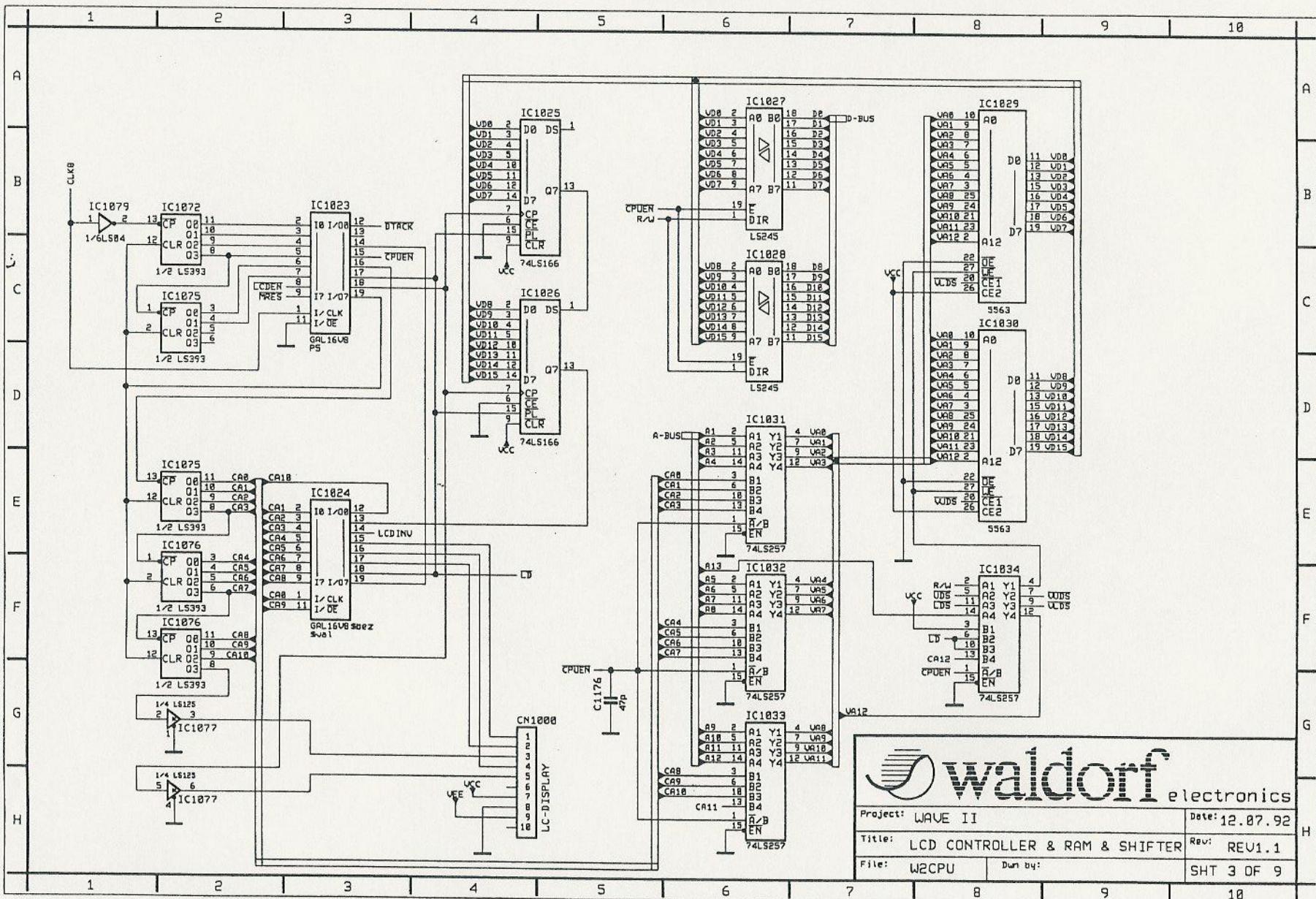
22



**waldorf** electronics

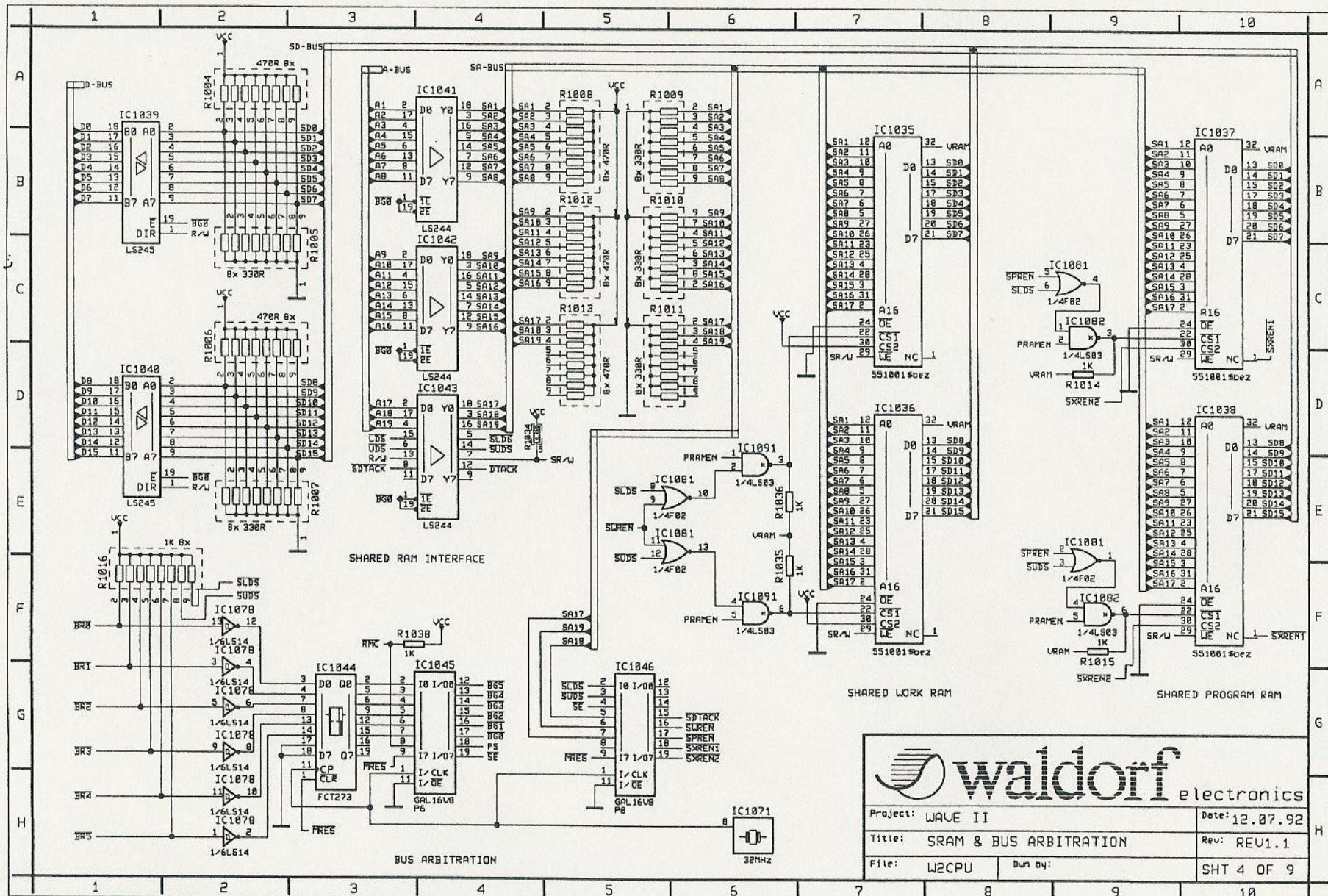
Project: WAVE II	Date: 12.07.92
Title: MPU & BUS INTERFACE	Rev: REV1.1
File: W2CPU	Dra by: SHT 1 OF 9





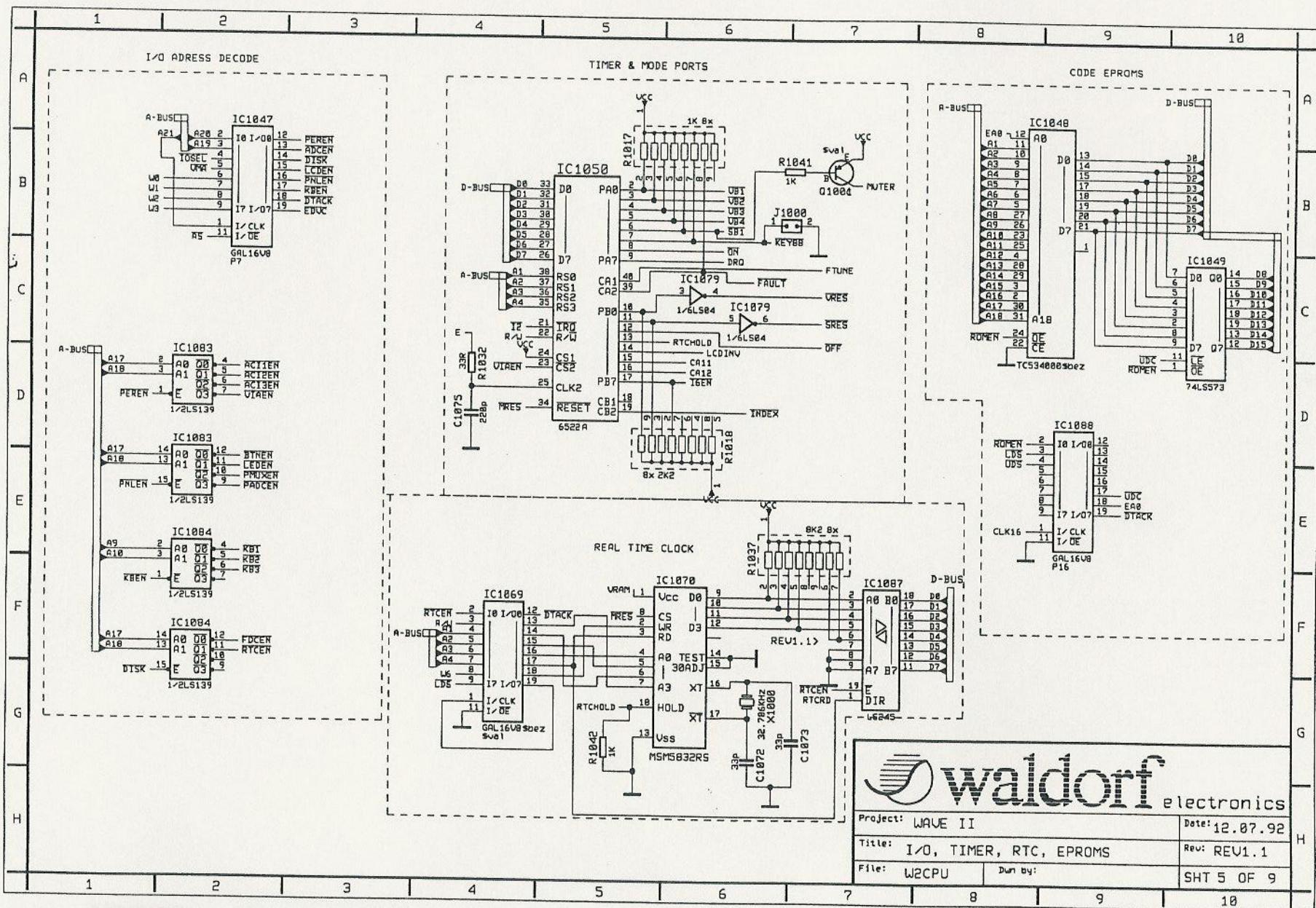
 **waldorf** electronics

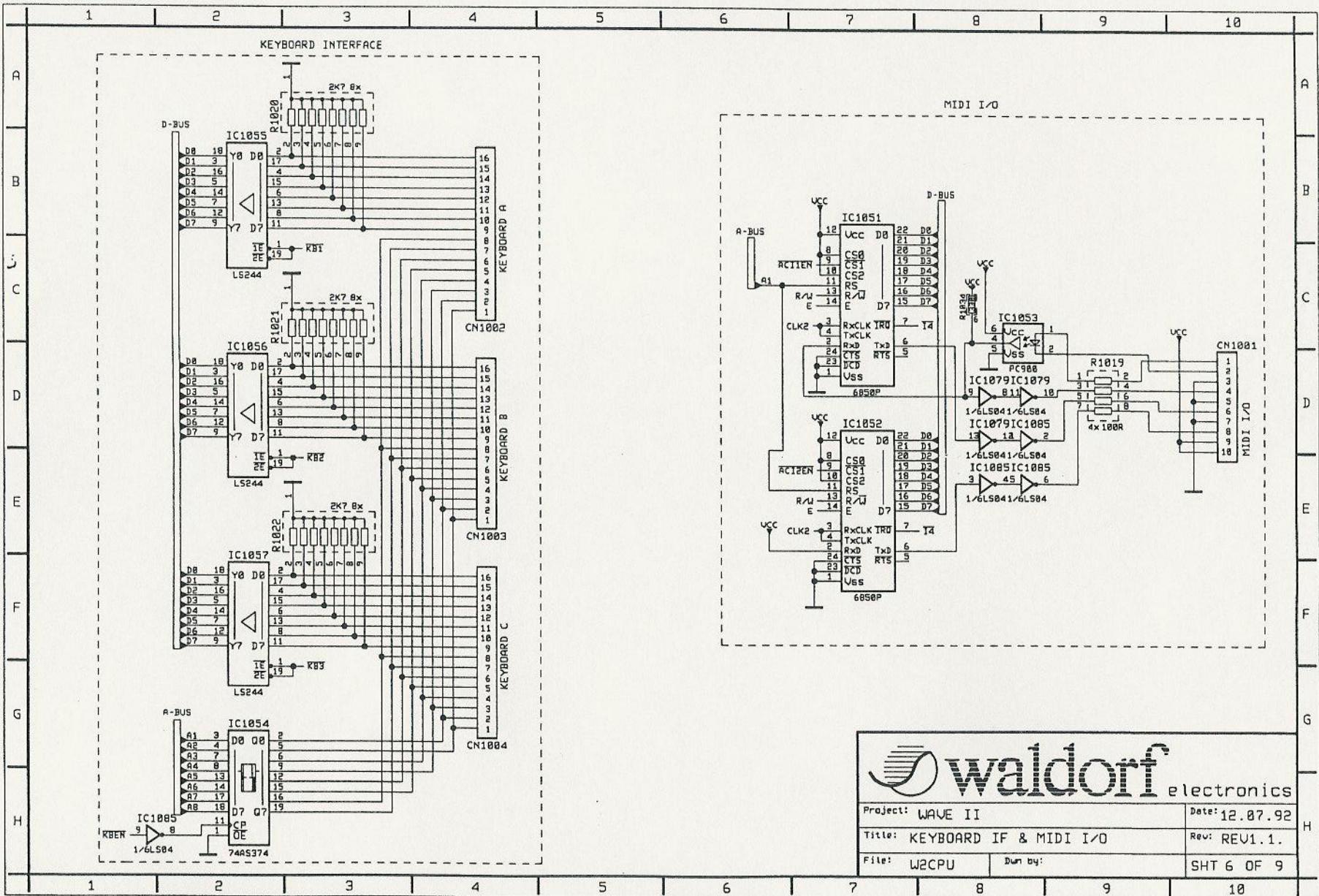
Project:	WAVE II	Date:	12.07.92
Title:	LCD CONTROLLER & RAM & SHIFTER	Rev:	REV1.1
File:	W2CPU	Dun by:	SHT 3 OF 9



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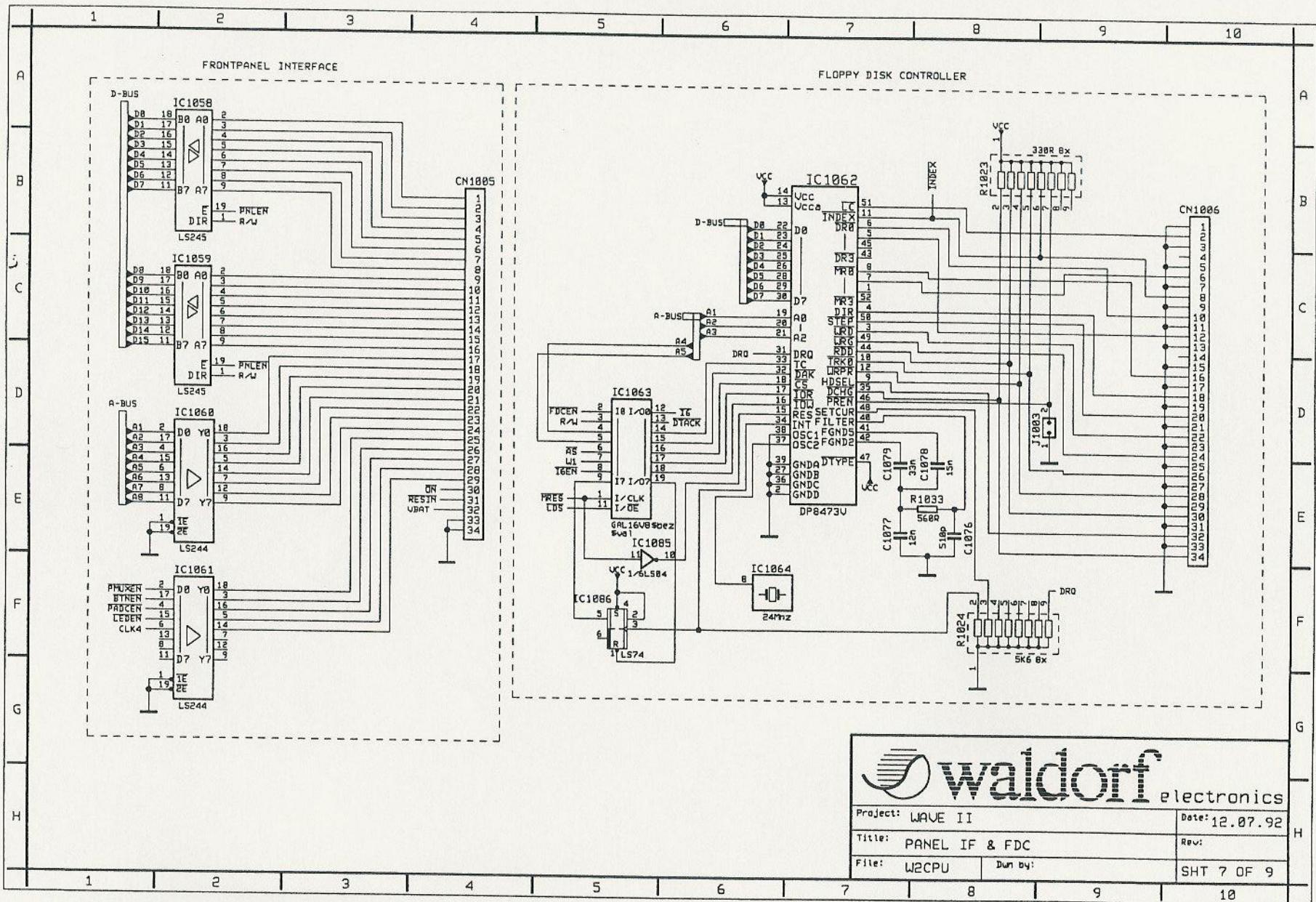
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Title: SRAM & BUS ARBITRATION	Rev: REV1.1
File: W2CPU	Draw by:
SHT 4 OF 9	

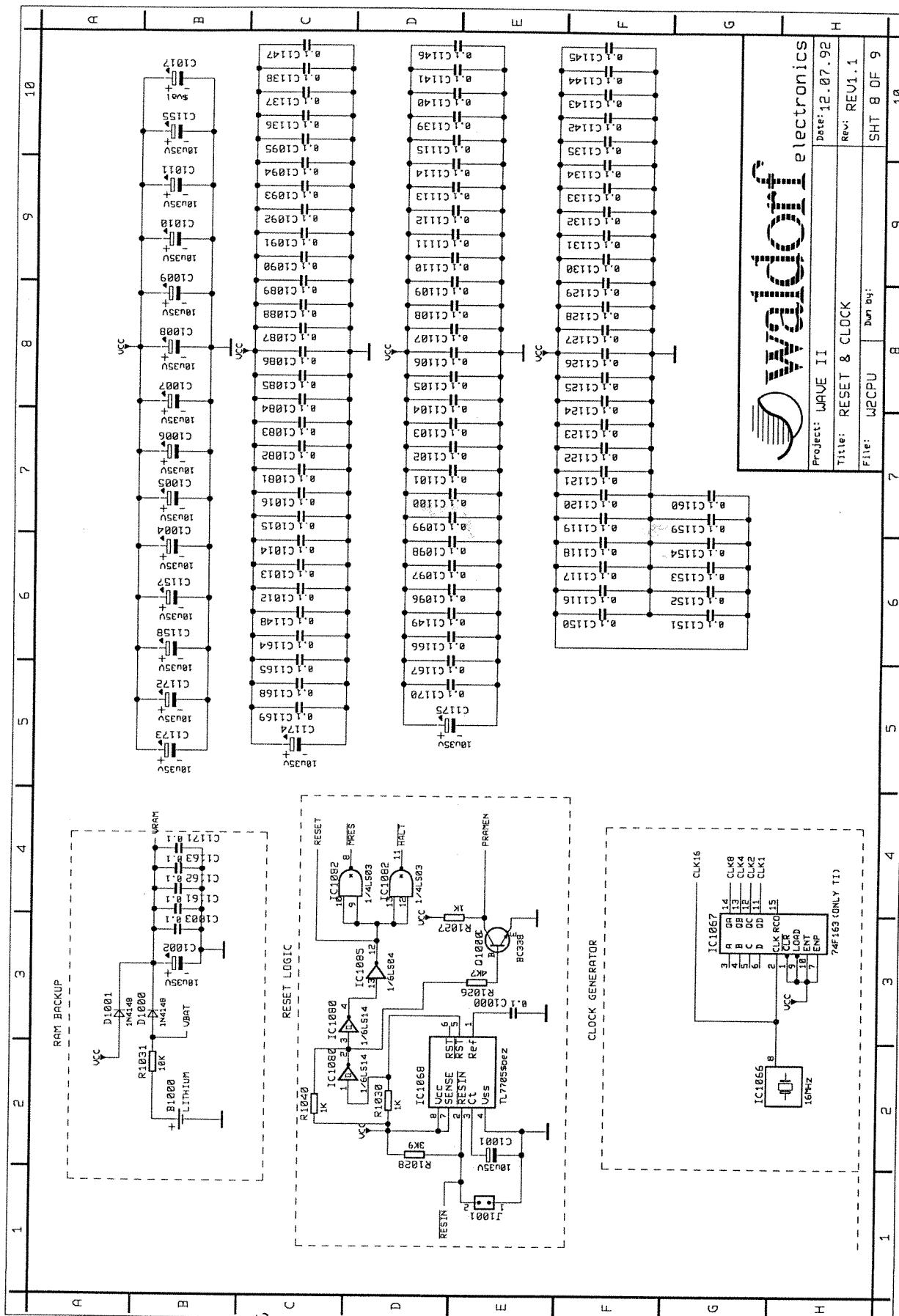




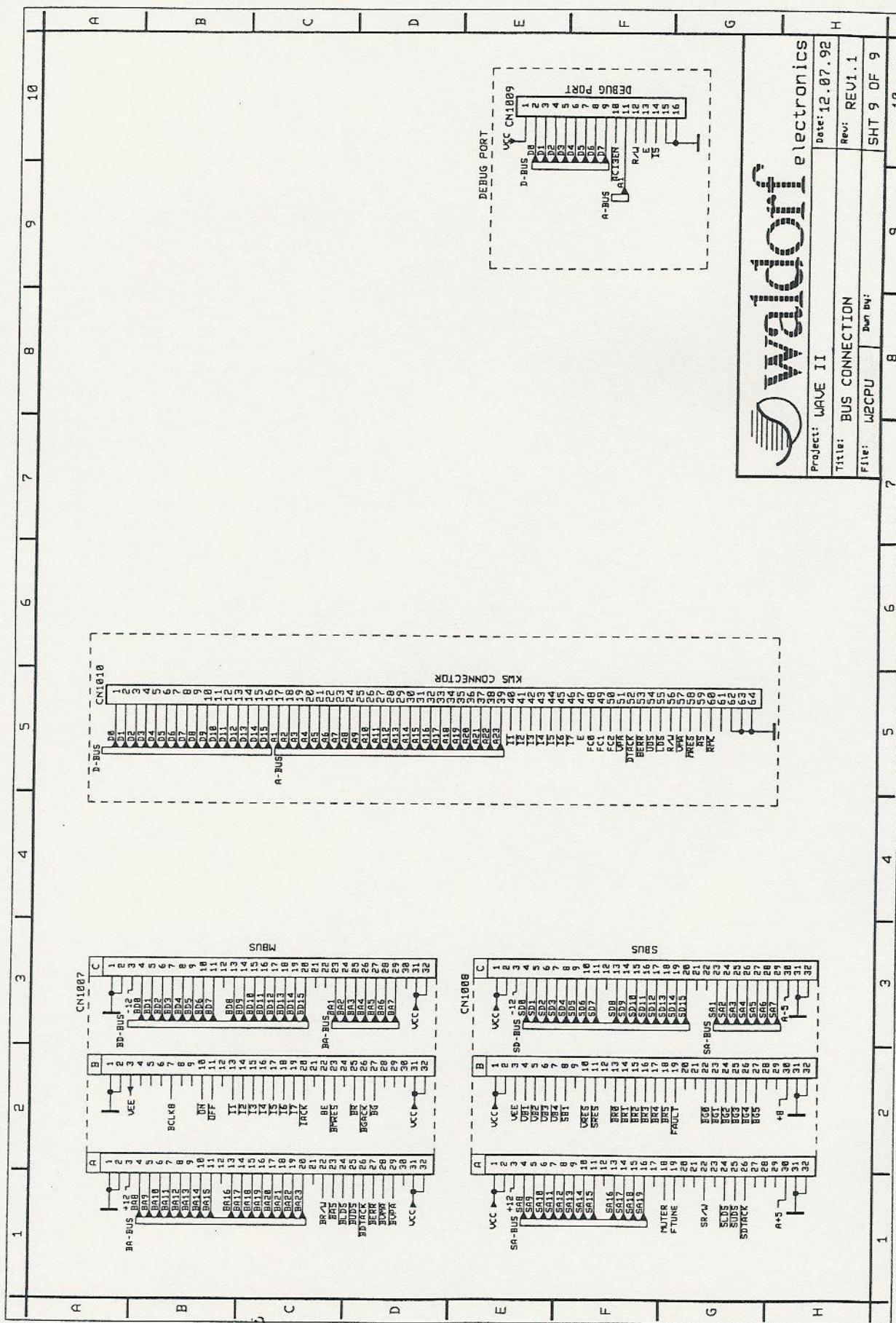
**waldorf** electronics

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Title: KEYBOARD IF & MIDI I/O	Rev: REV1.1.
File: W2CPU	Draw by:
SHT 6 OF 9	

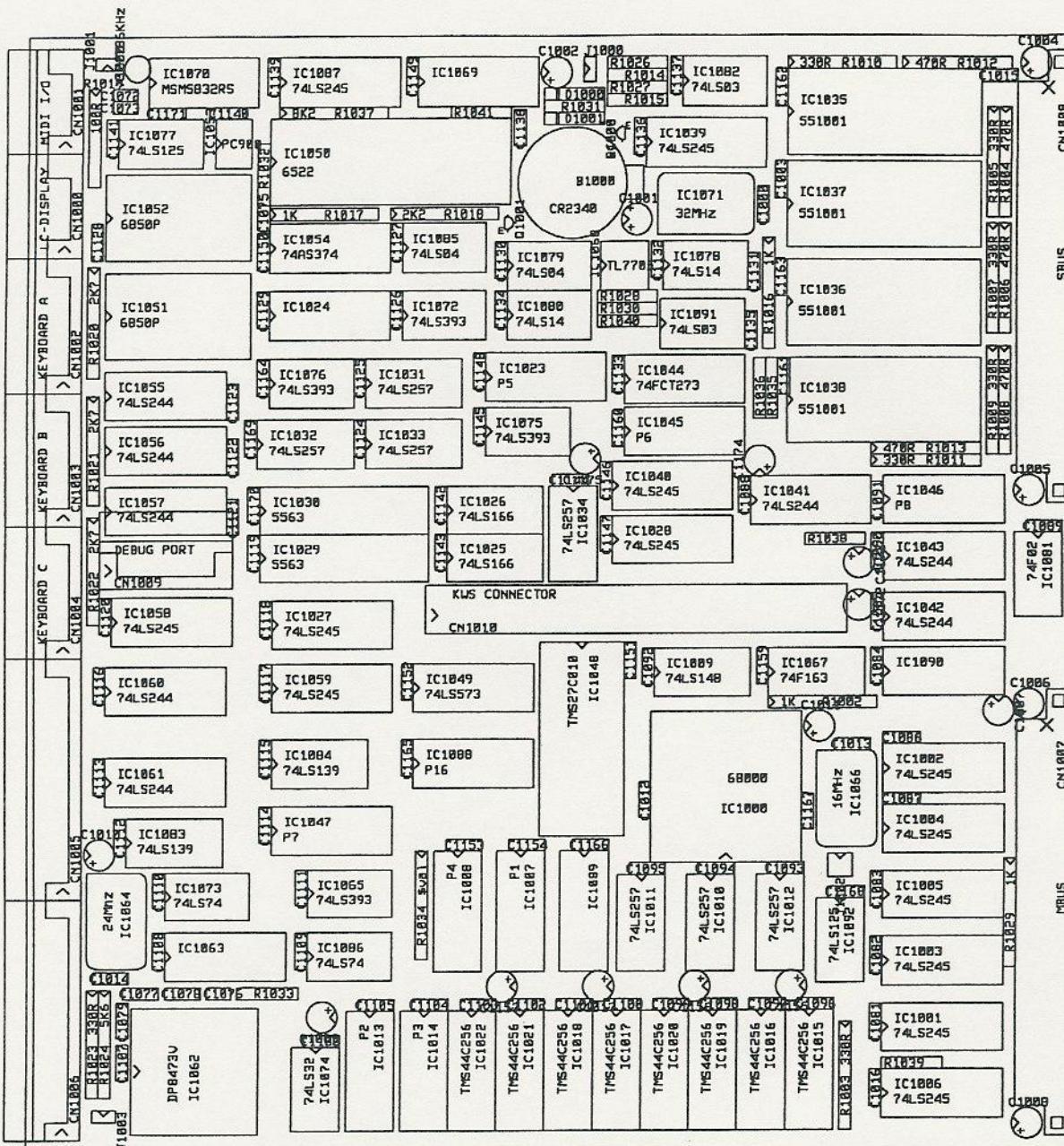




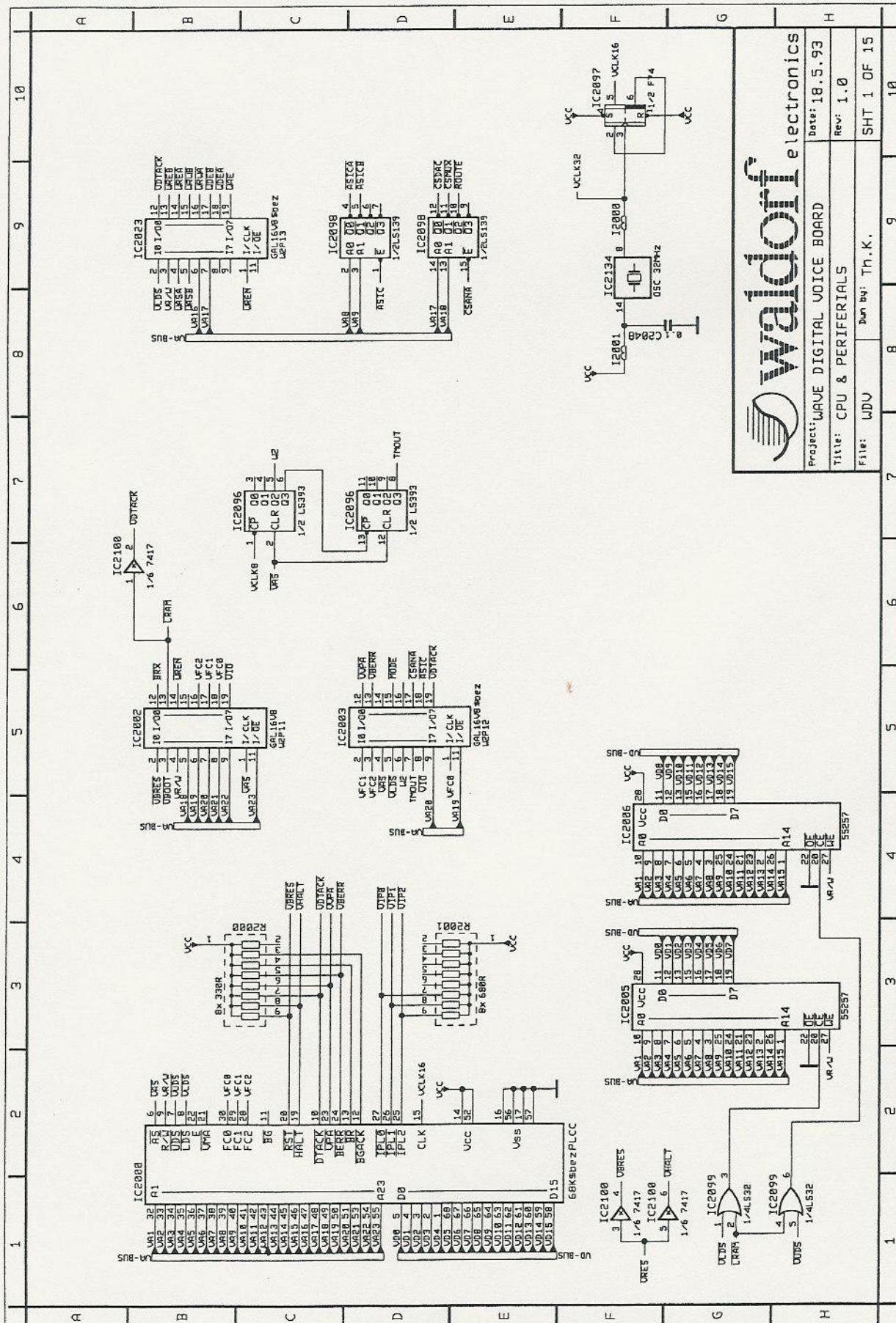
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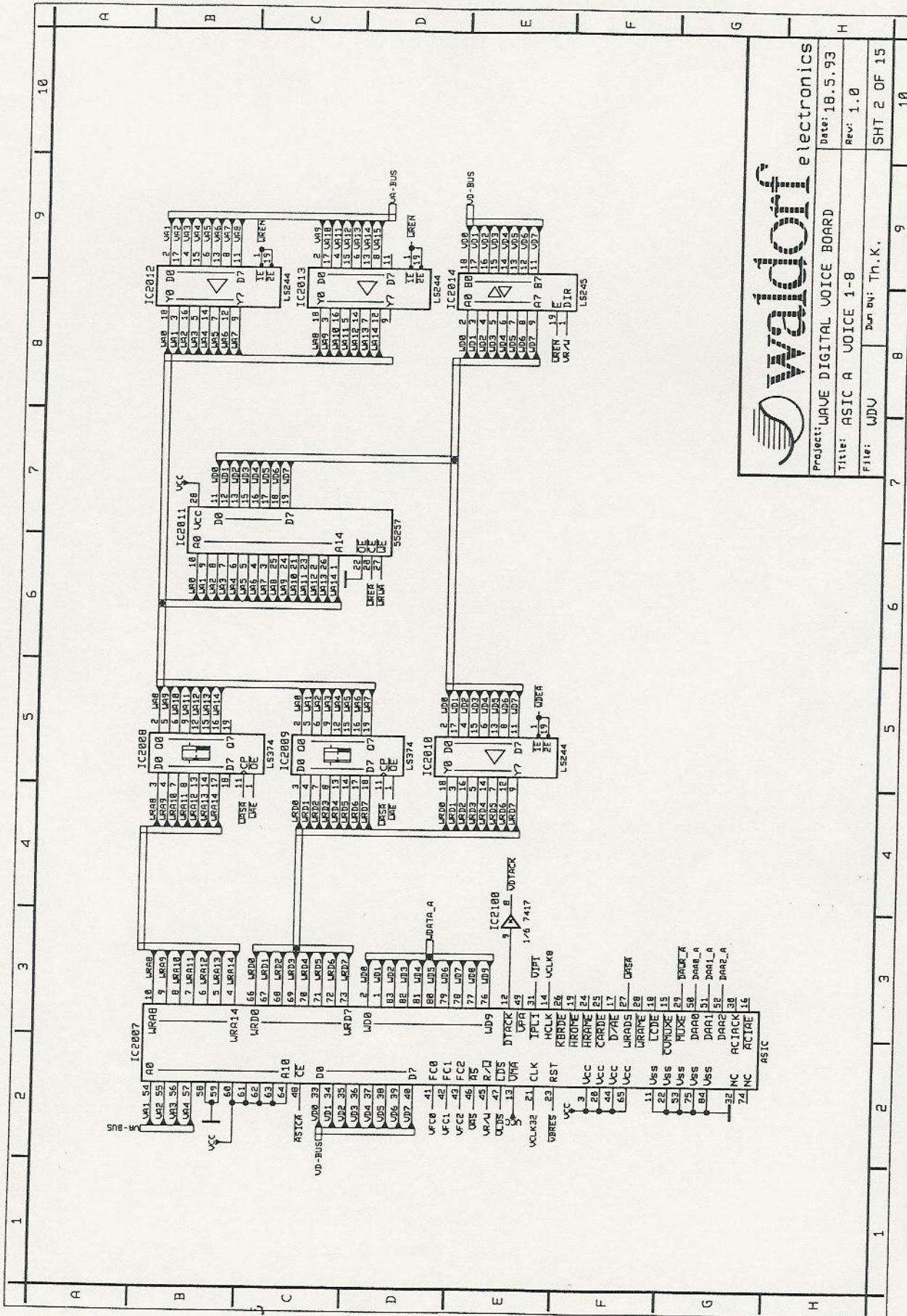
## CPU Board Position Print



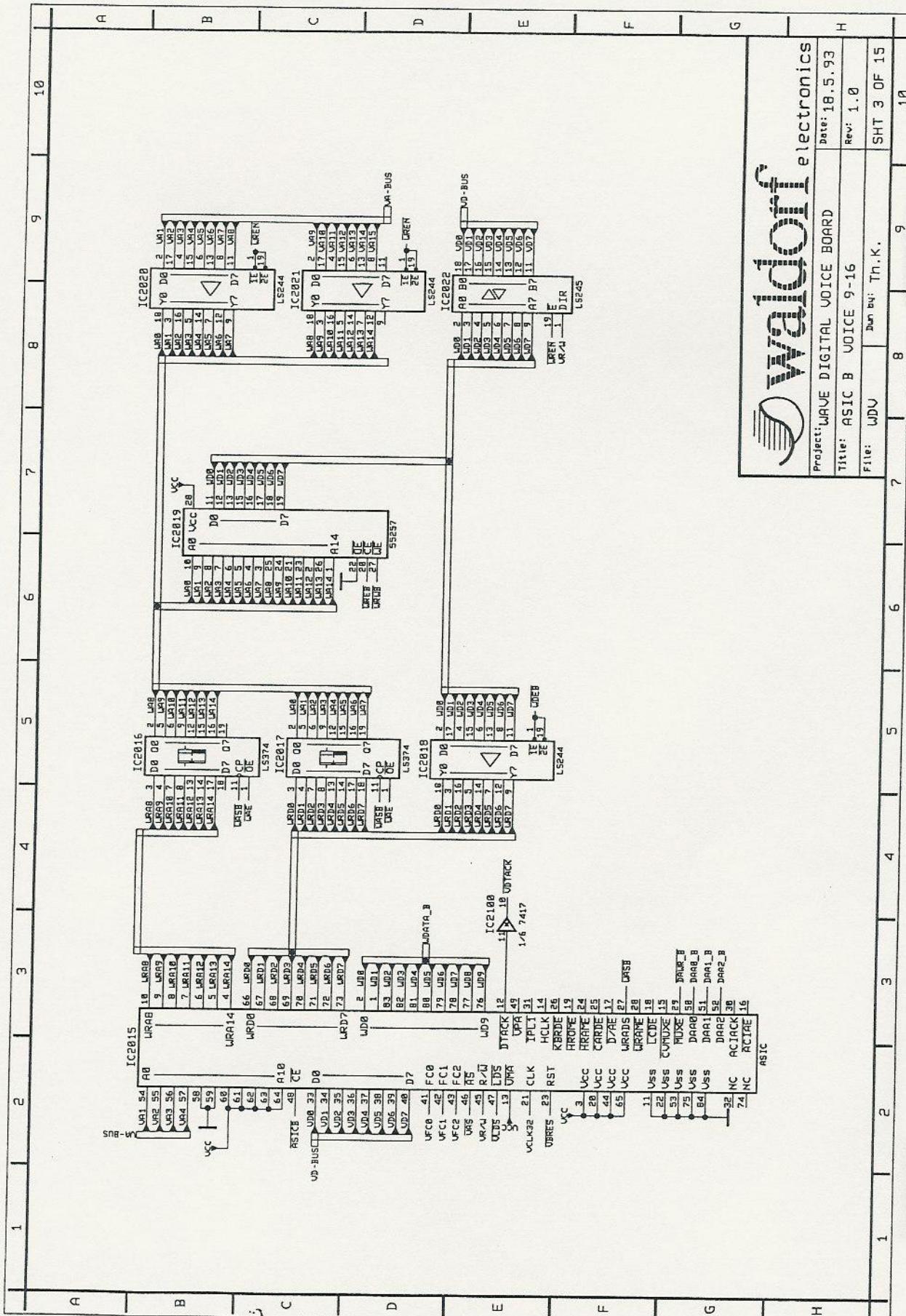
# WDV Board

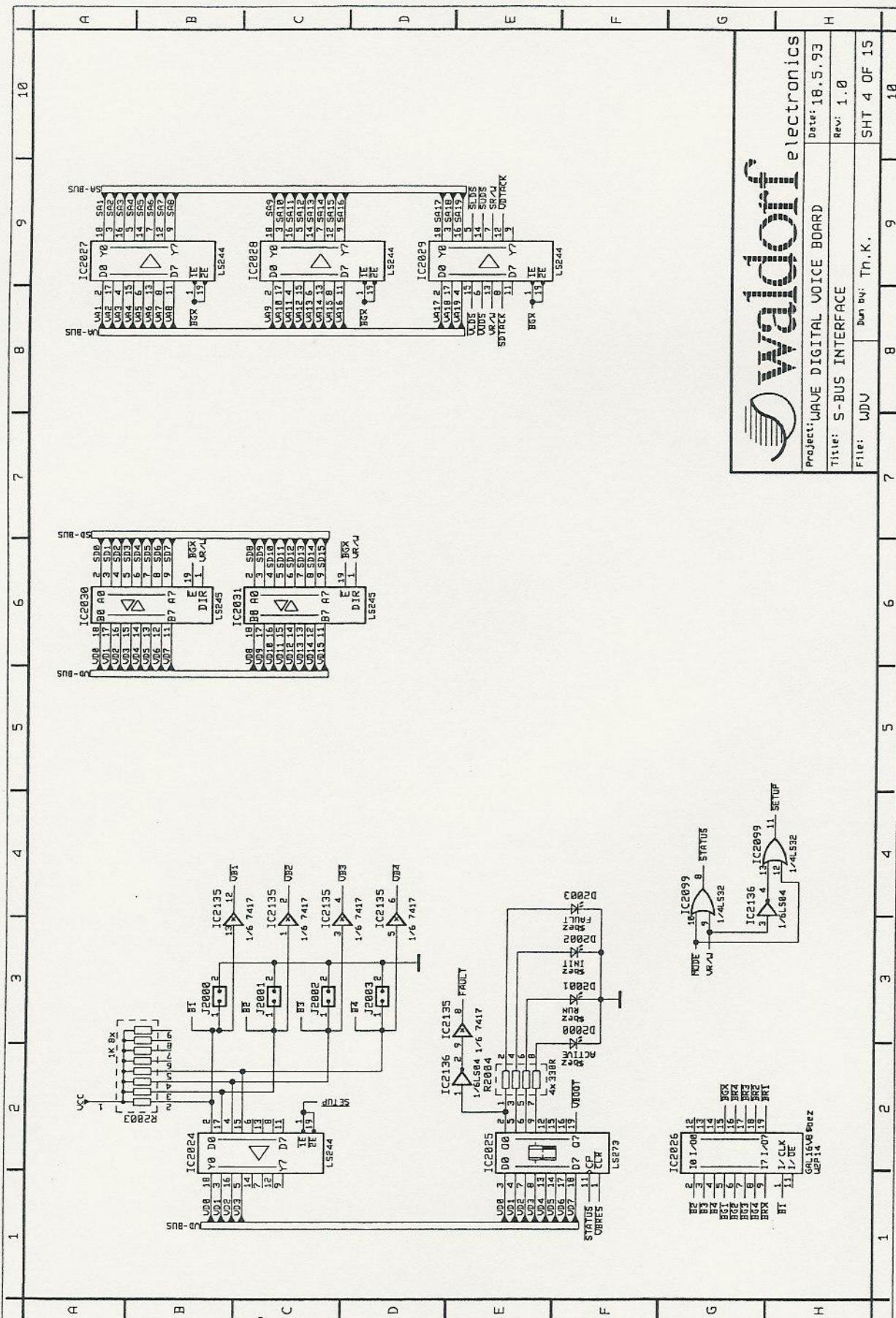


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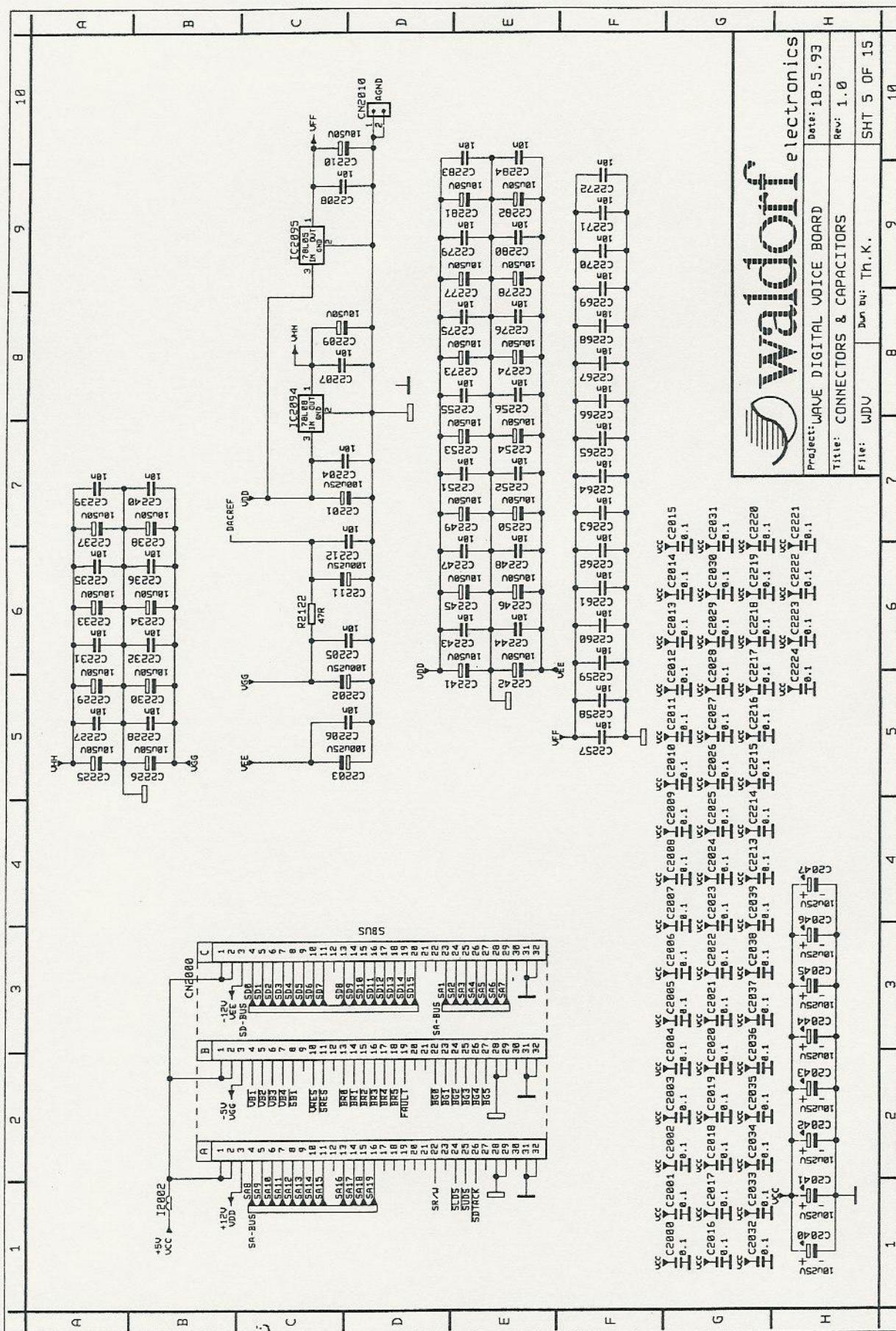


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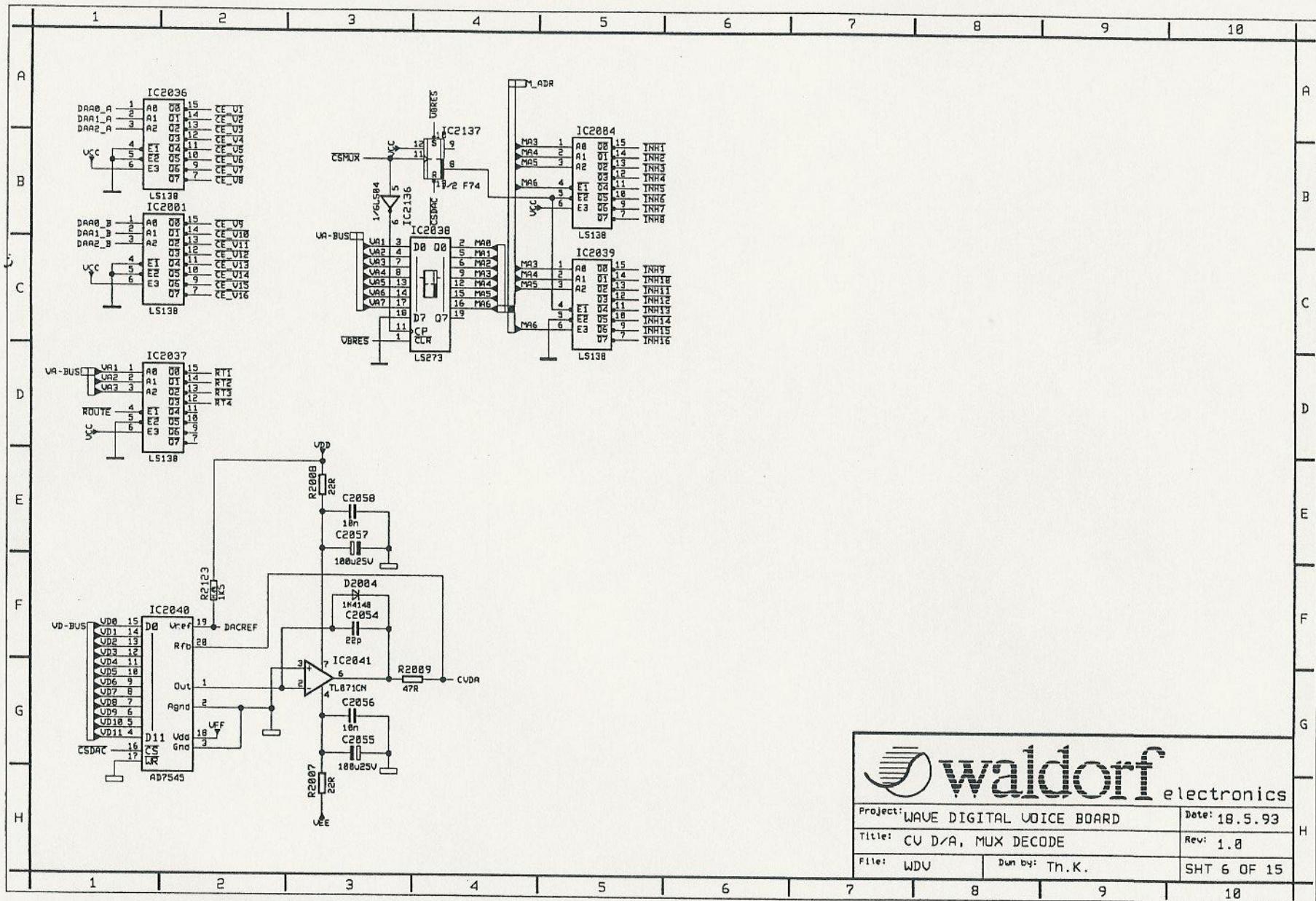
Project: WAVE DIGITAL VOICE BOARD Date: 18.5.93

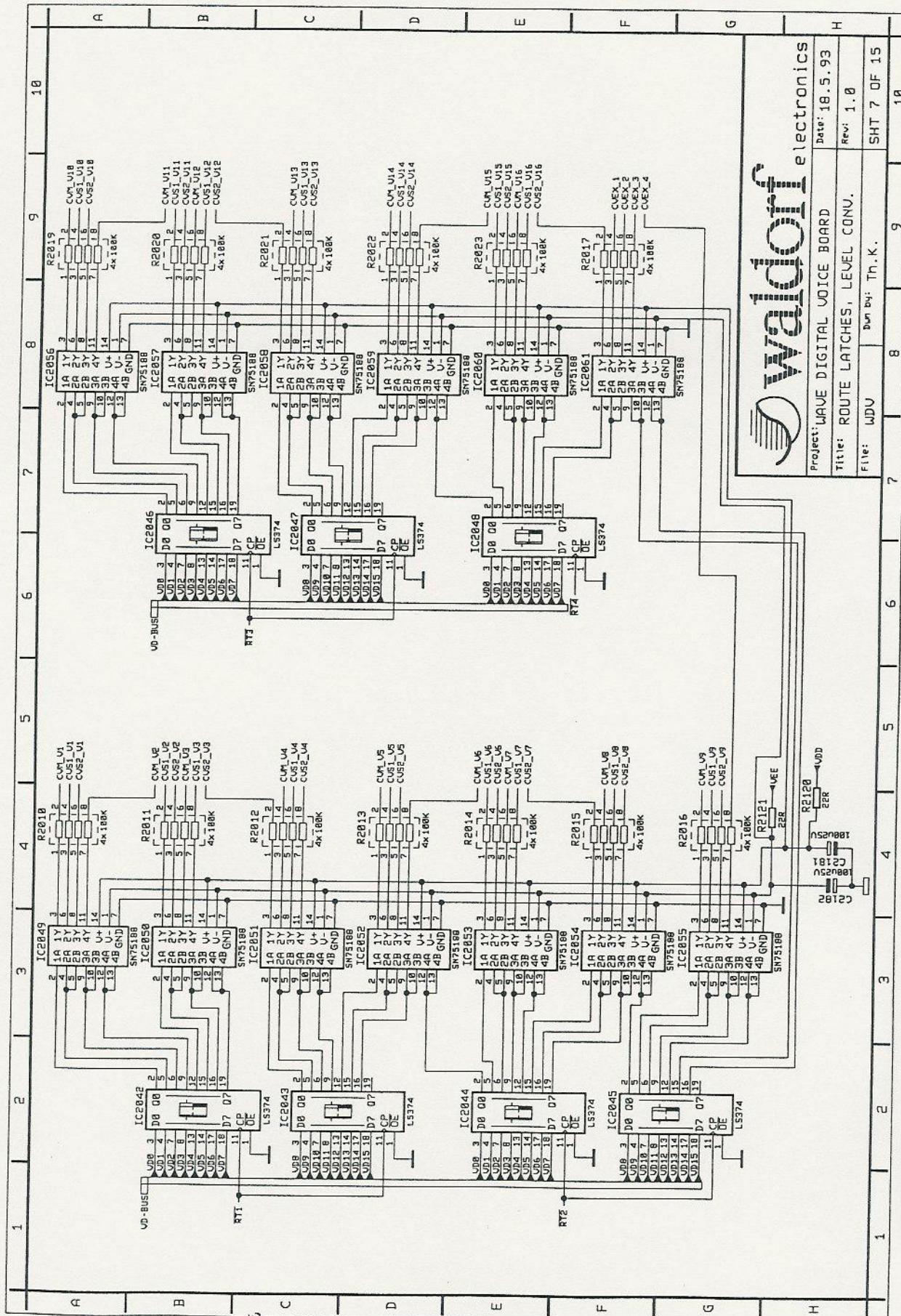
Title: S-BUS INTERFACE Rev: 1.0

File: WDJU Done by: Th.K. SHT 4 OF 15



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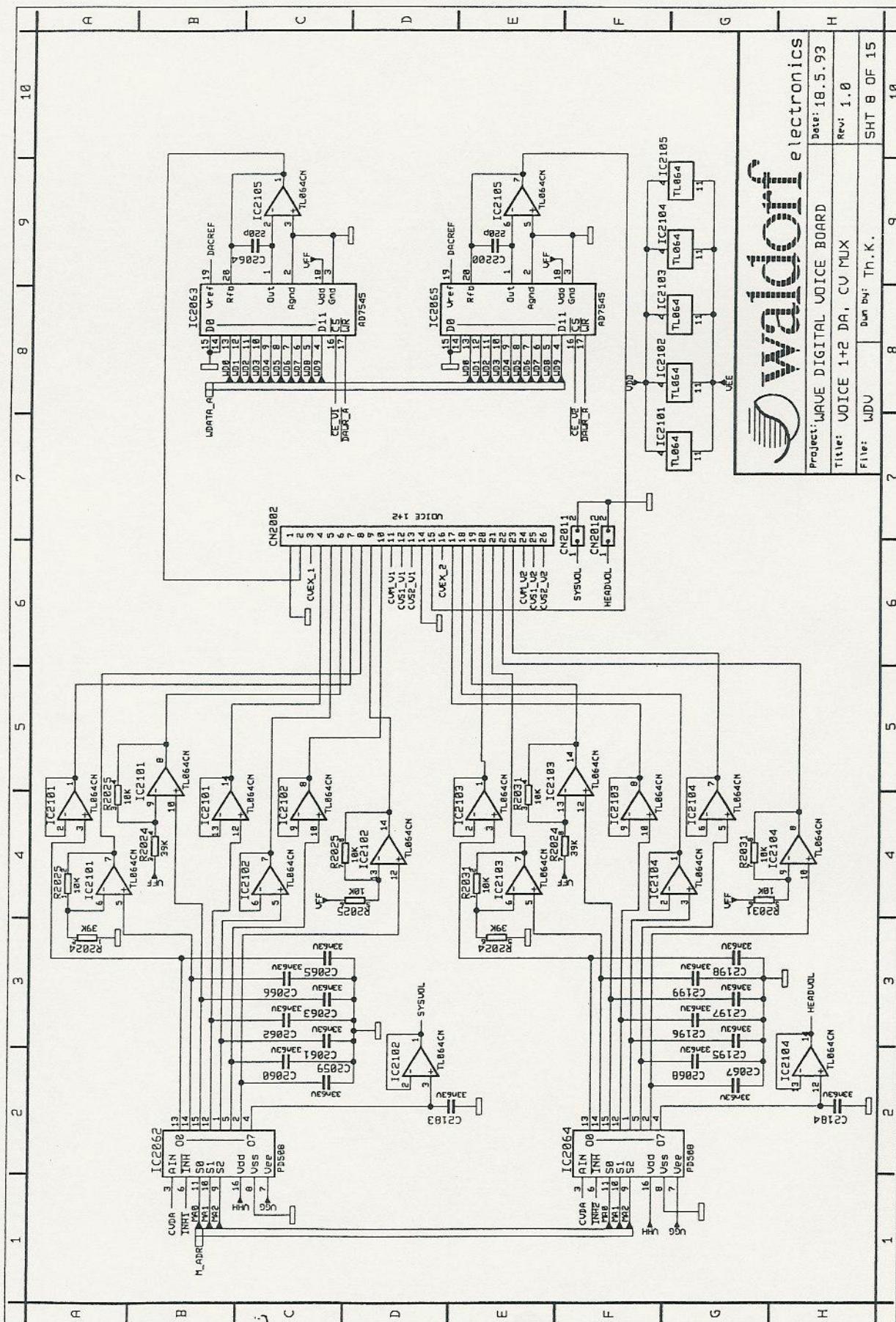
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Title: ROUTE LATCHES, LEVEL CONV.  
File: WDU  
Run by: Th.K.  
SHT 7 OF 15

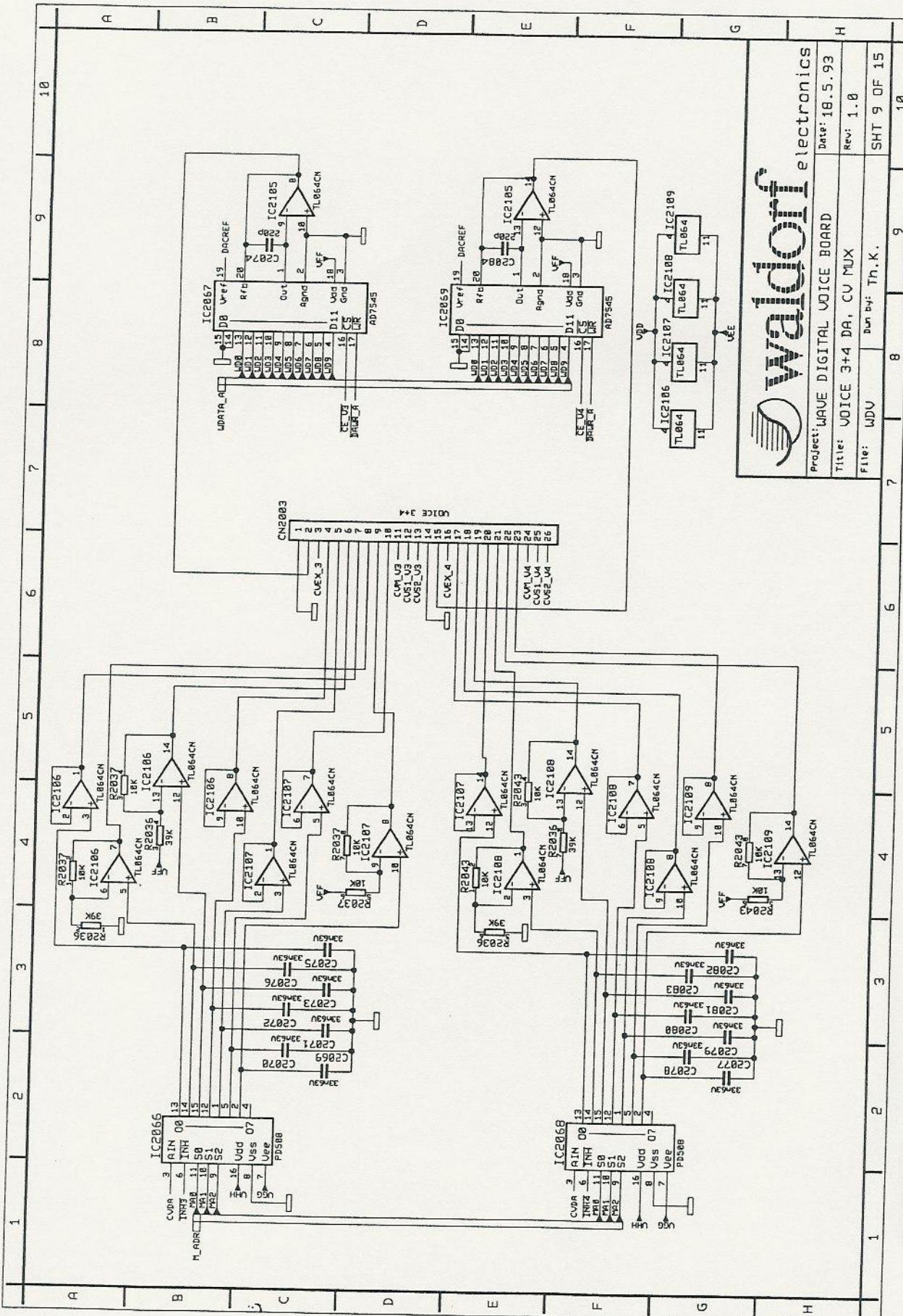
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Rev: 1.0

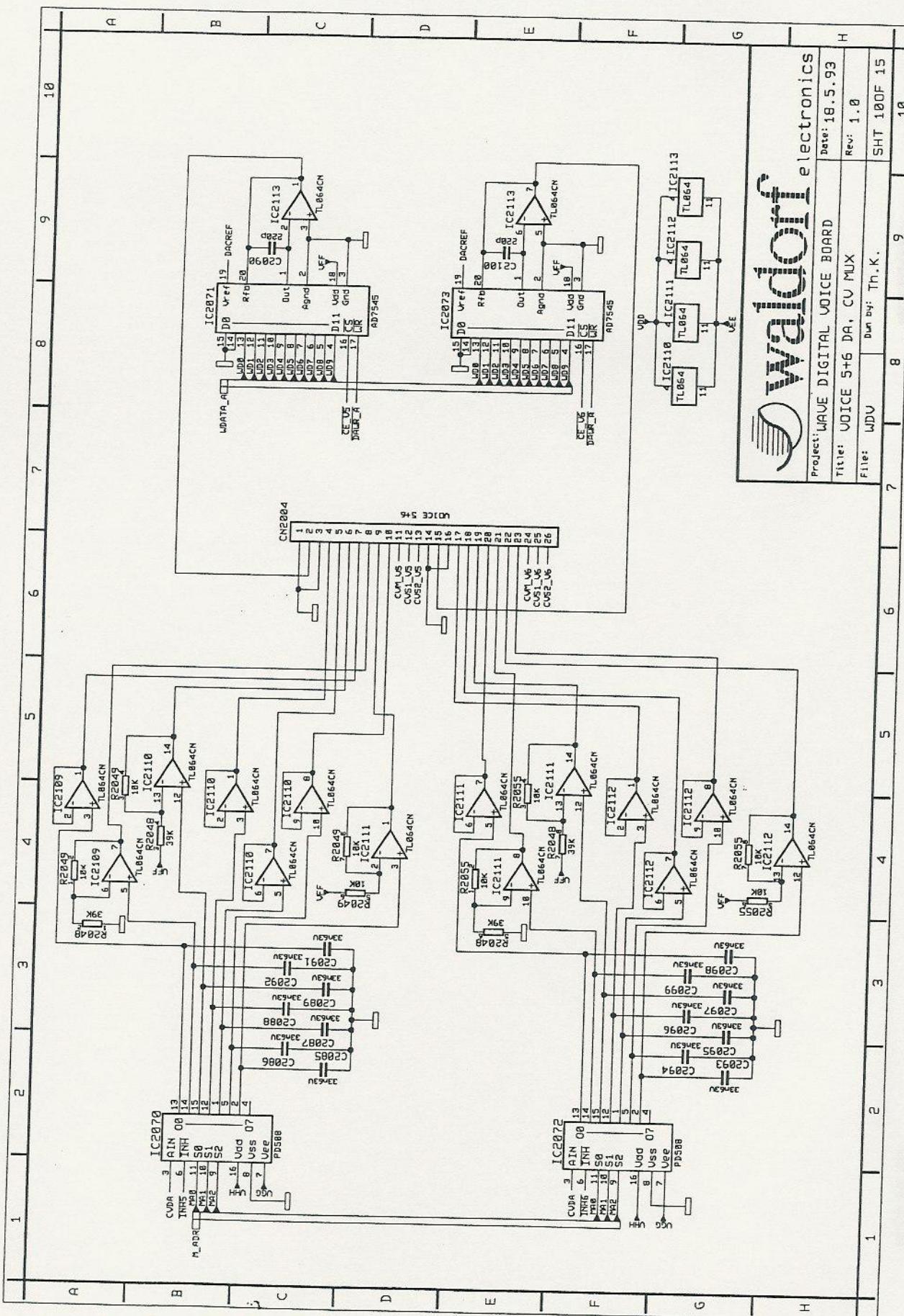
SHT 7 OF 15

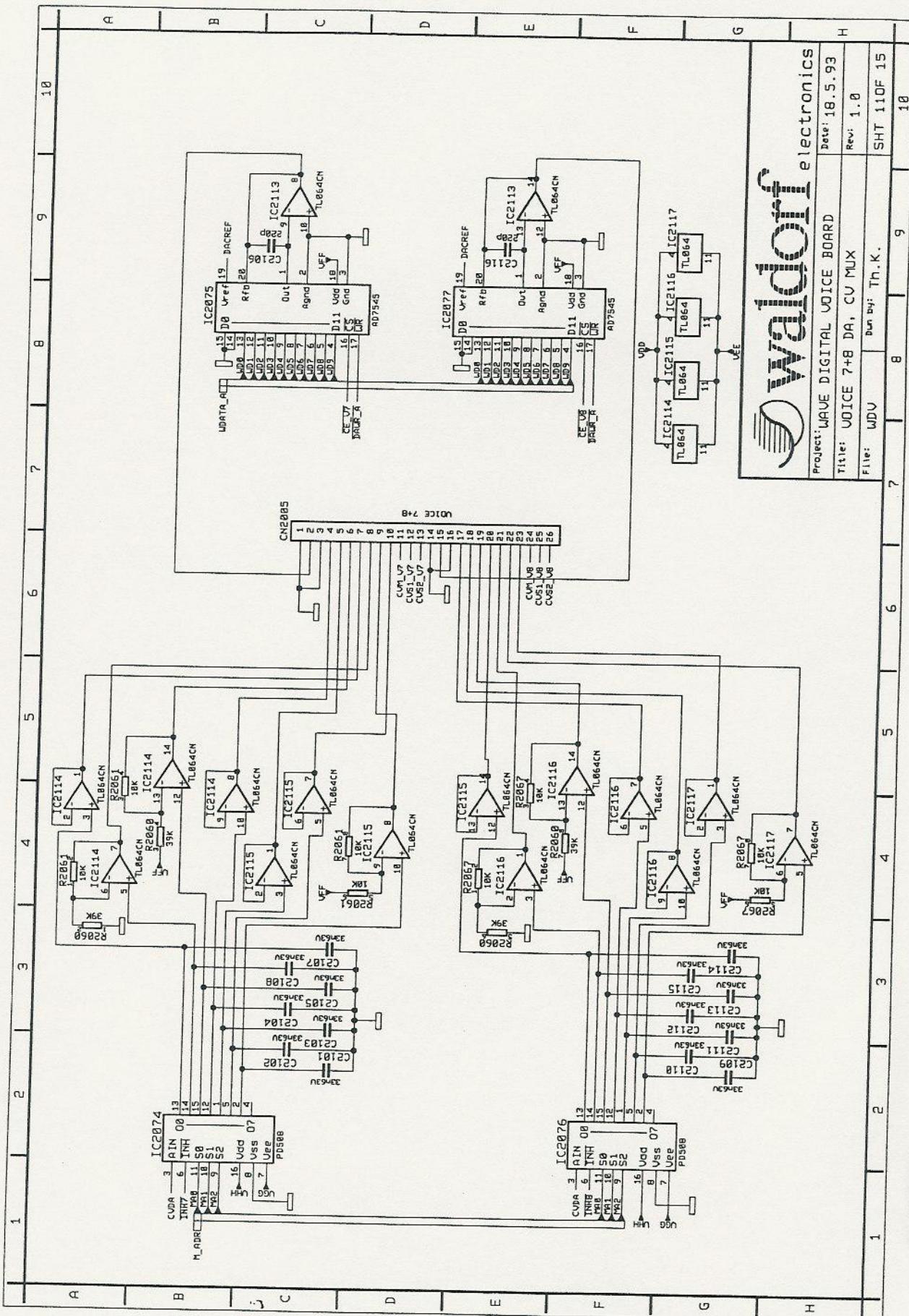
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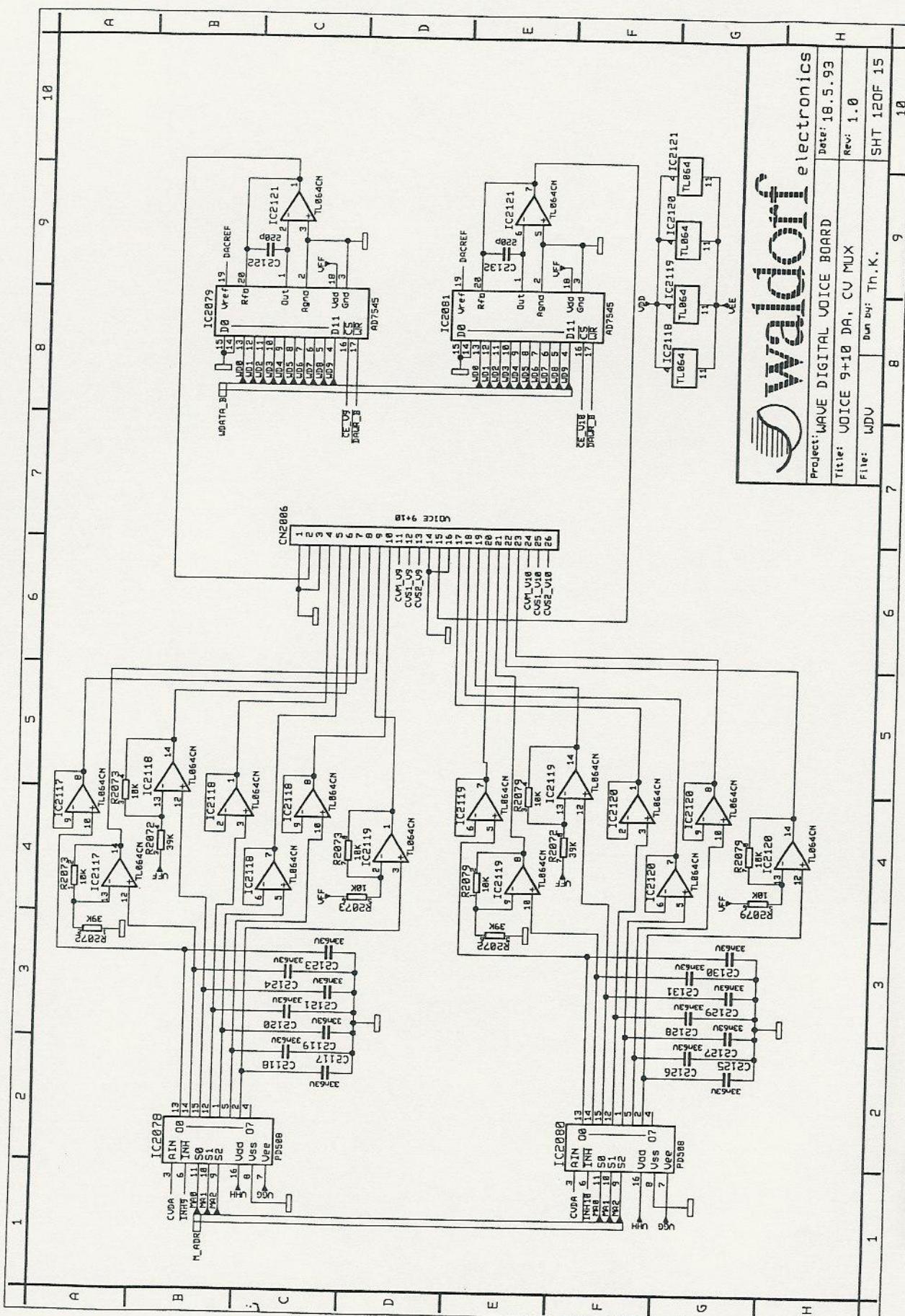


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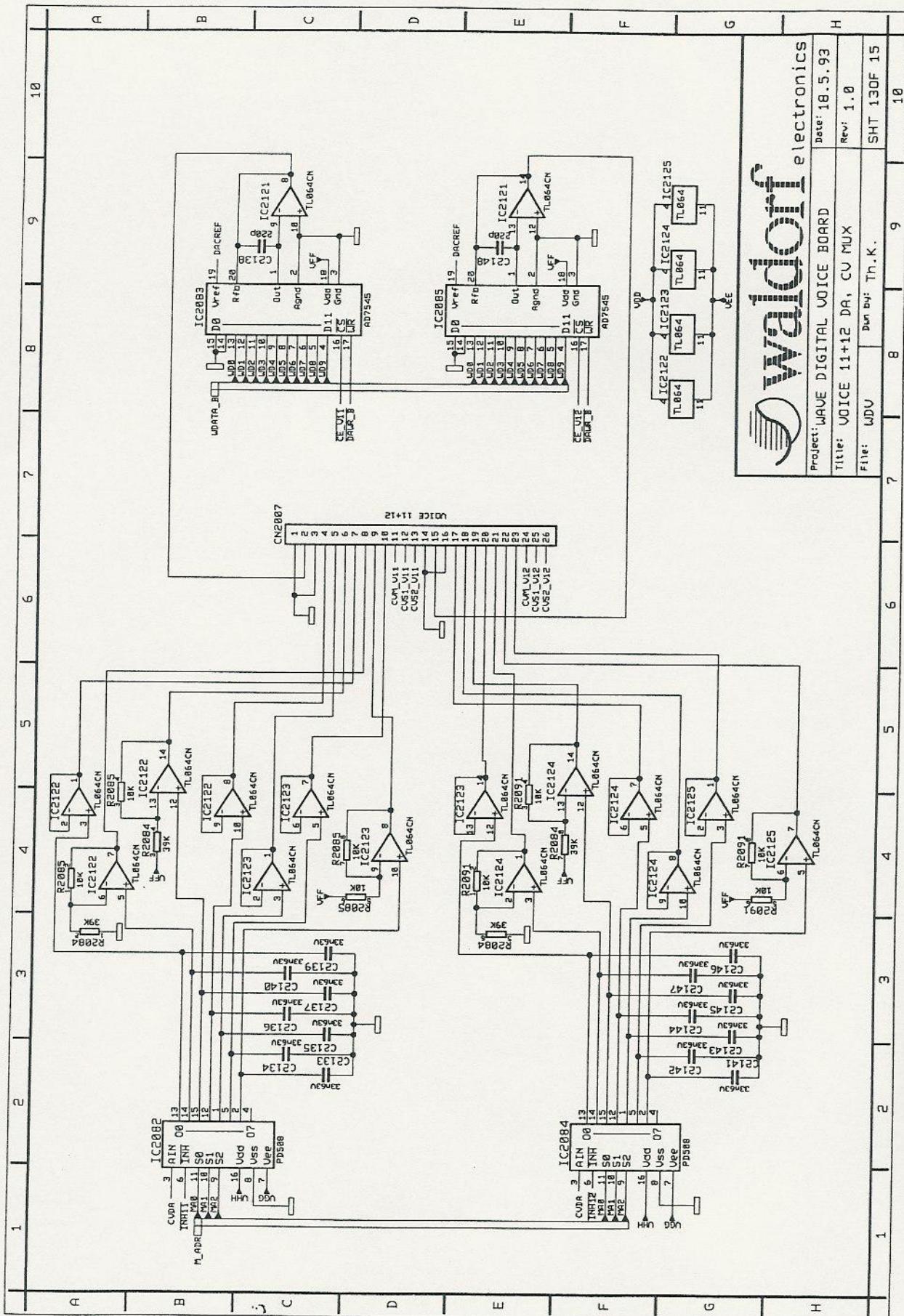




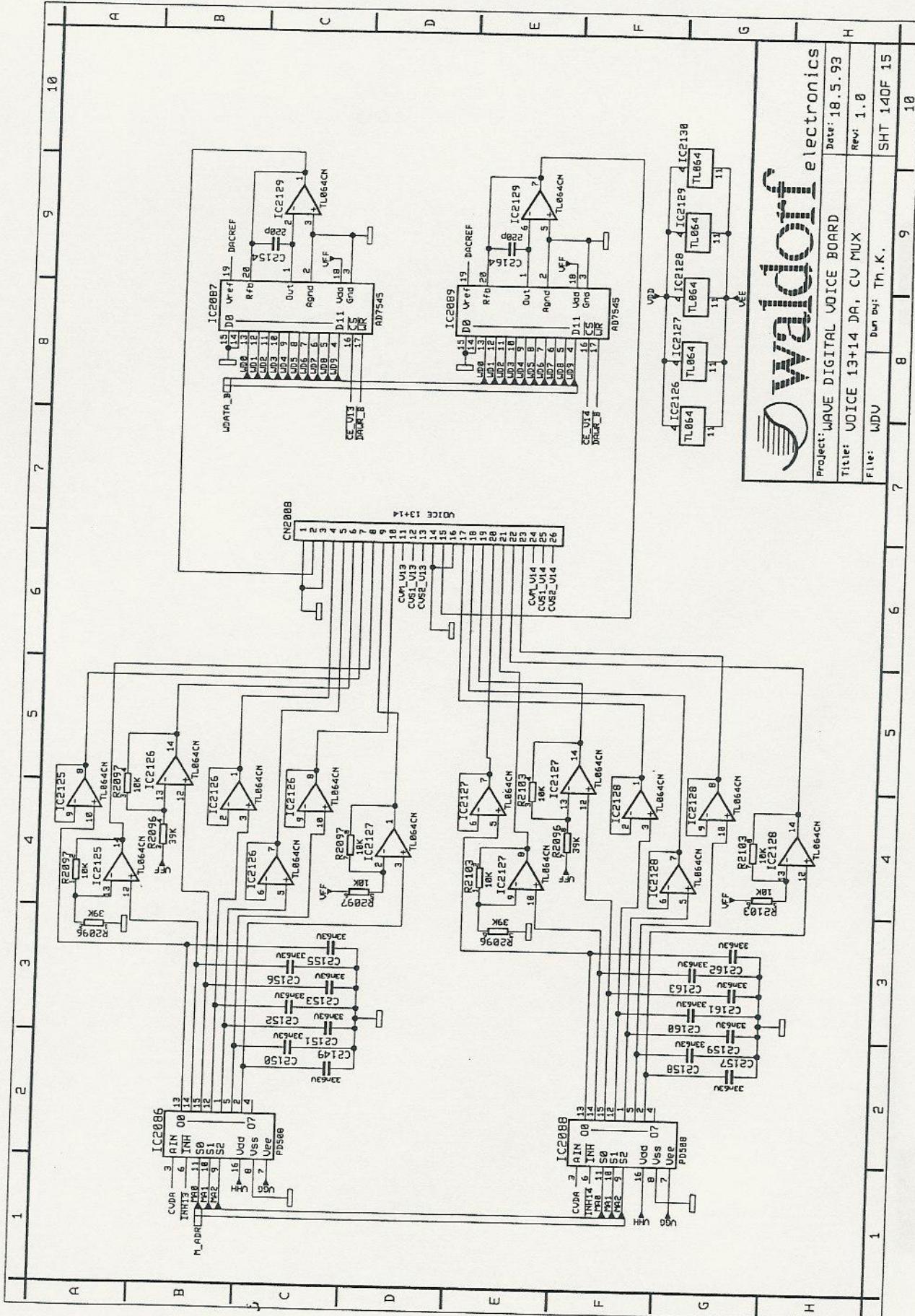
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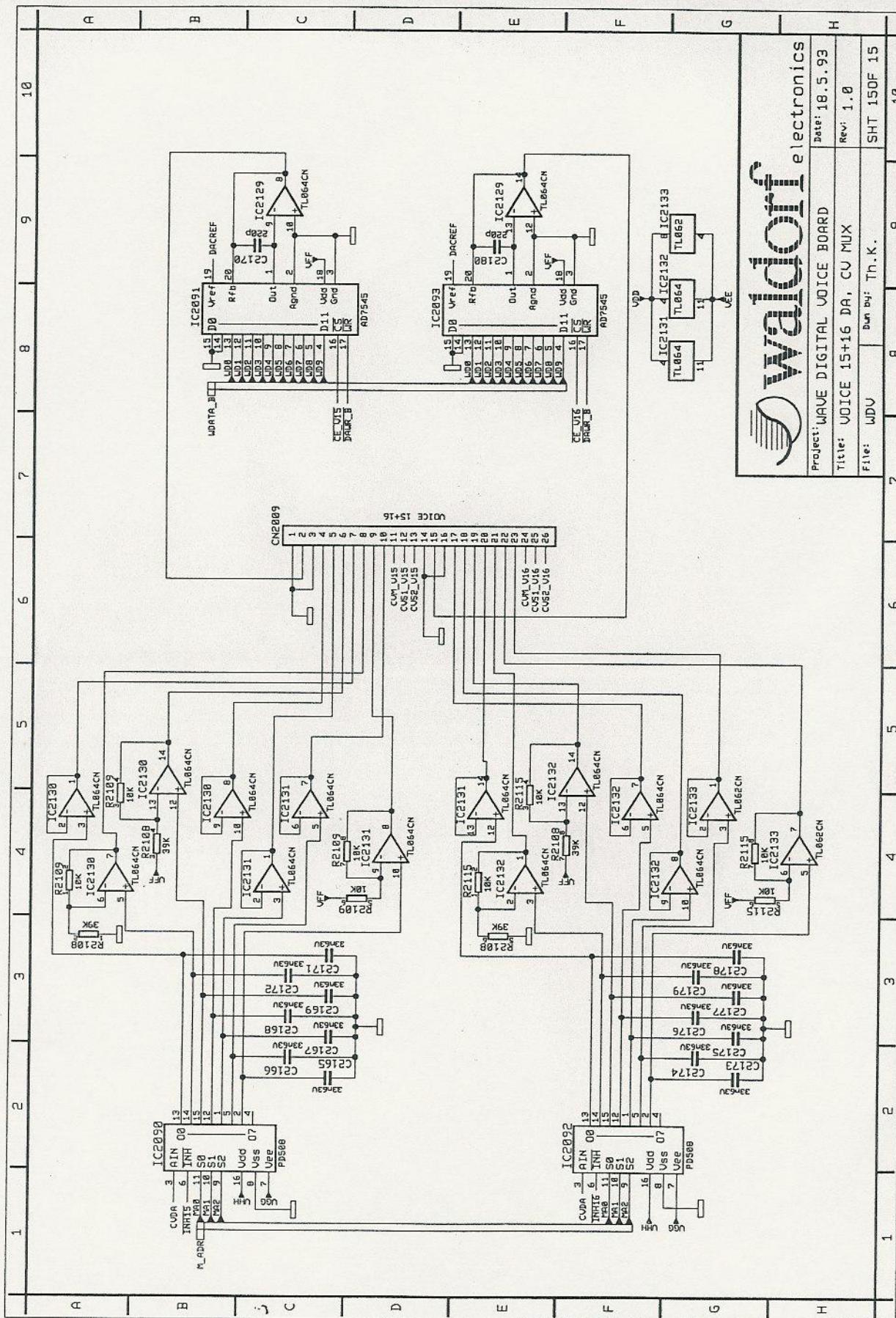


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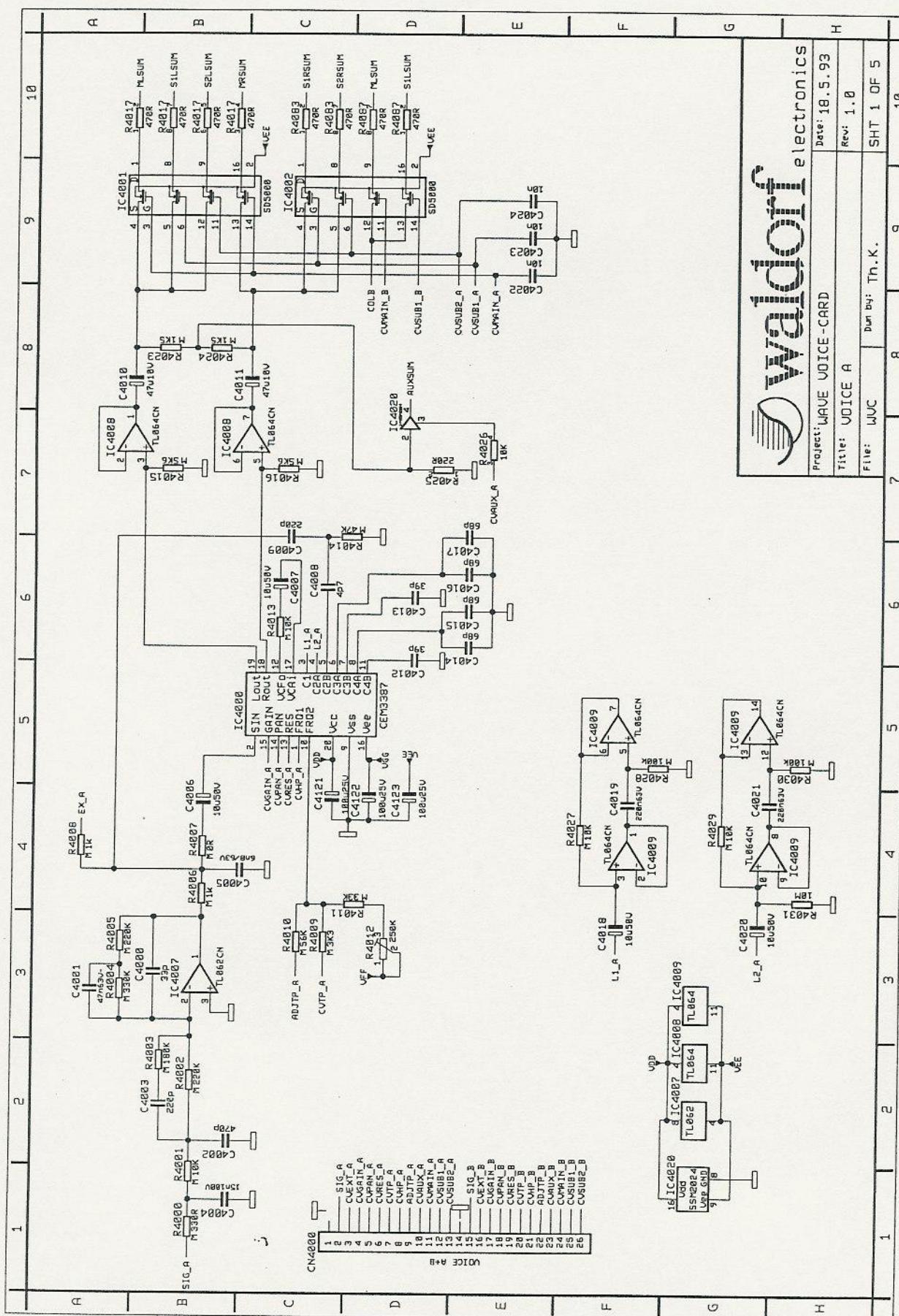


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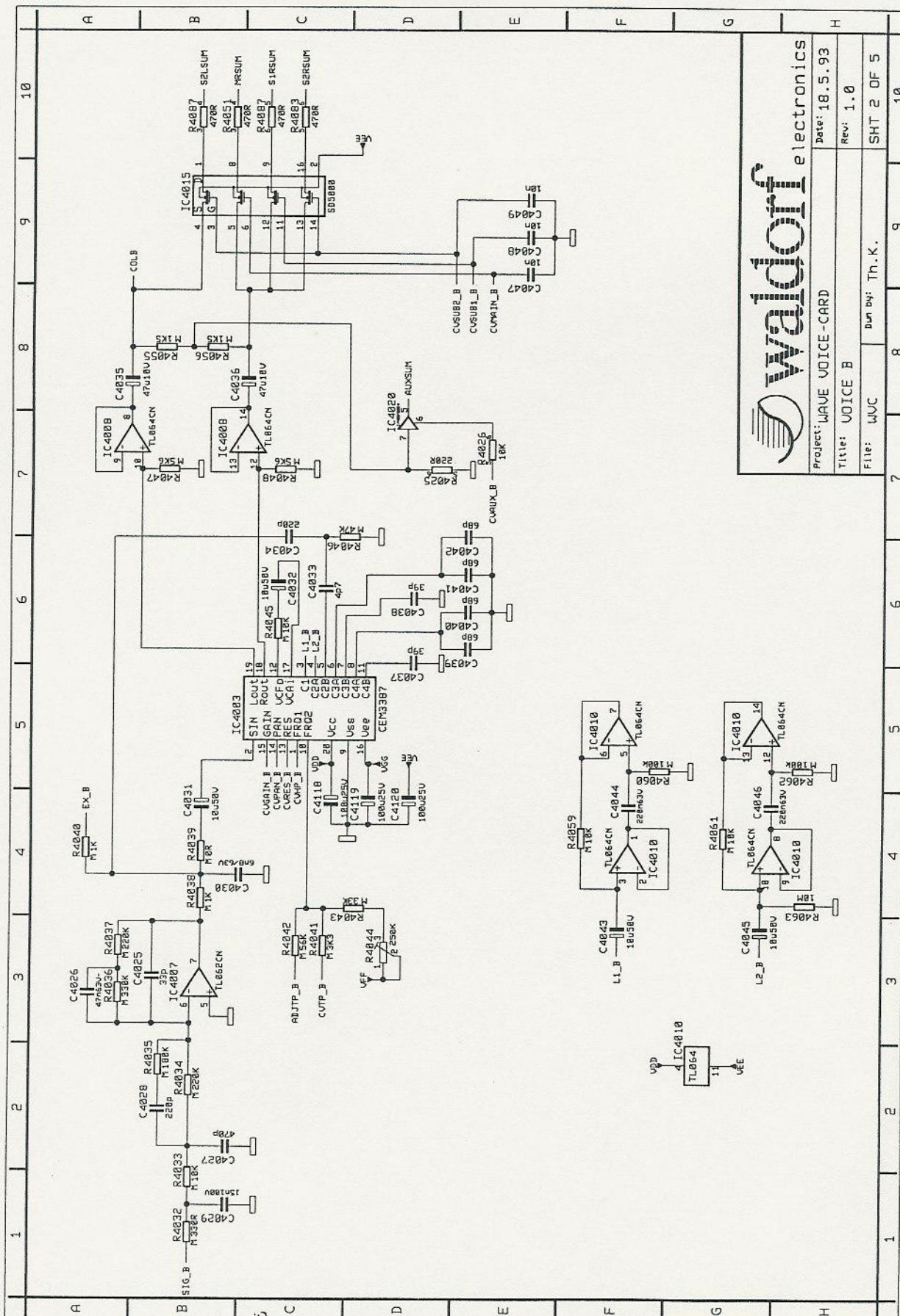




WVC Board



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Project: WAVE VOICE-CARD

Date: 18.5.93

Title: VOICE B

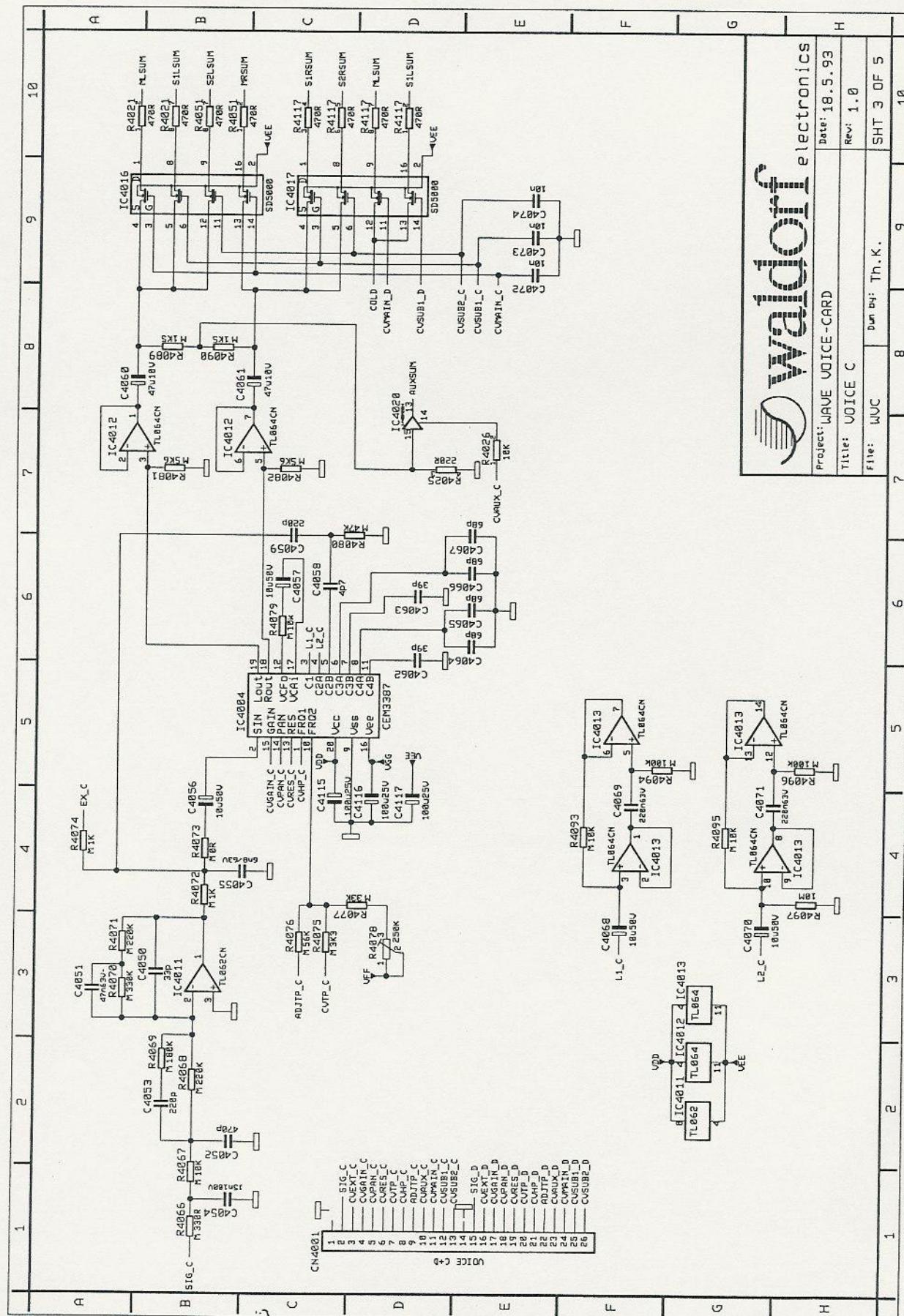
Rev: 1.0

File: WUC

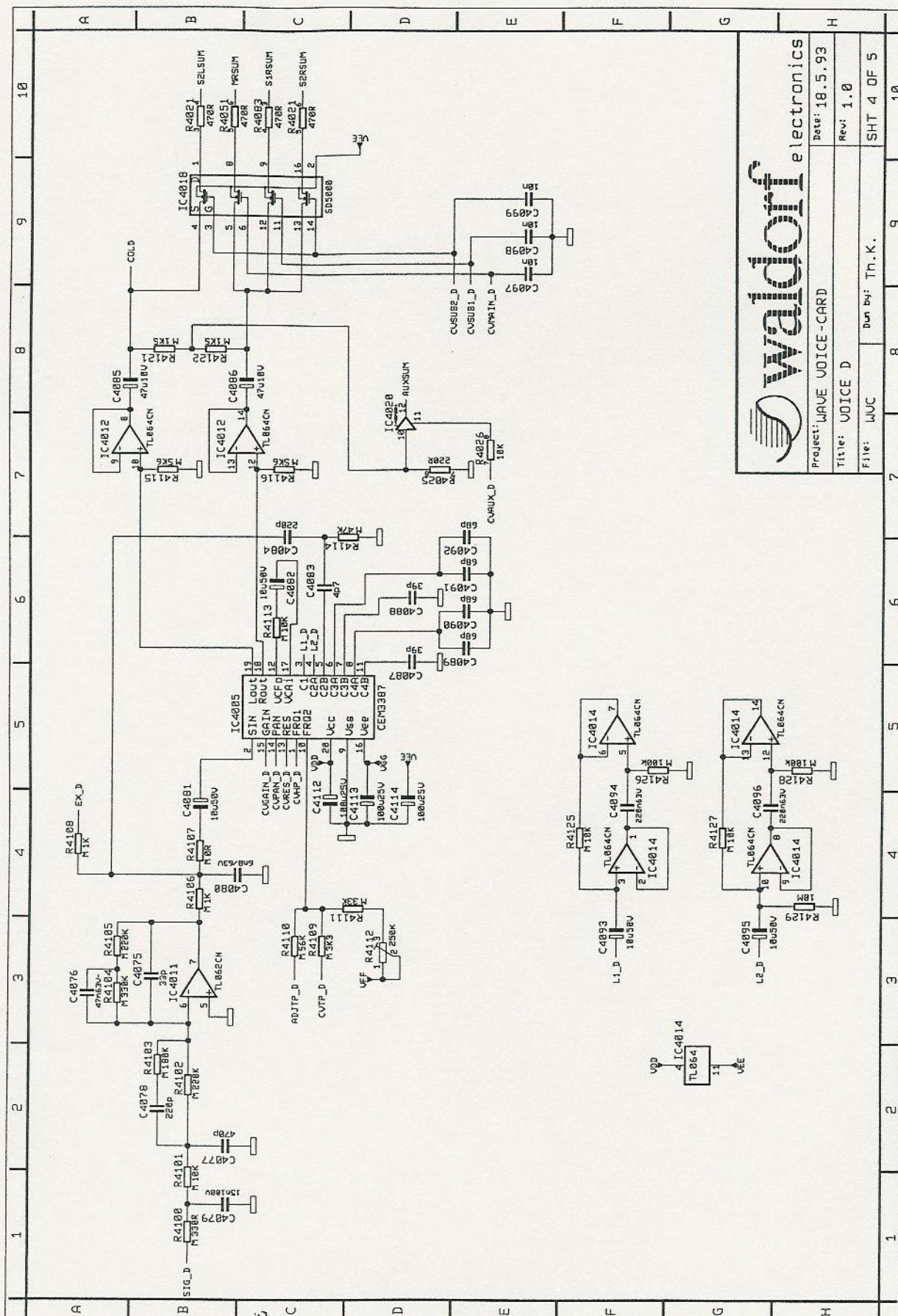
Drawn by: Th.K.

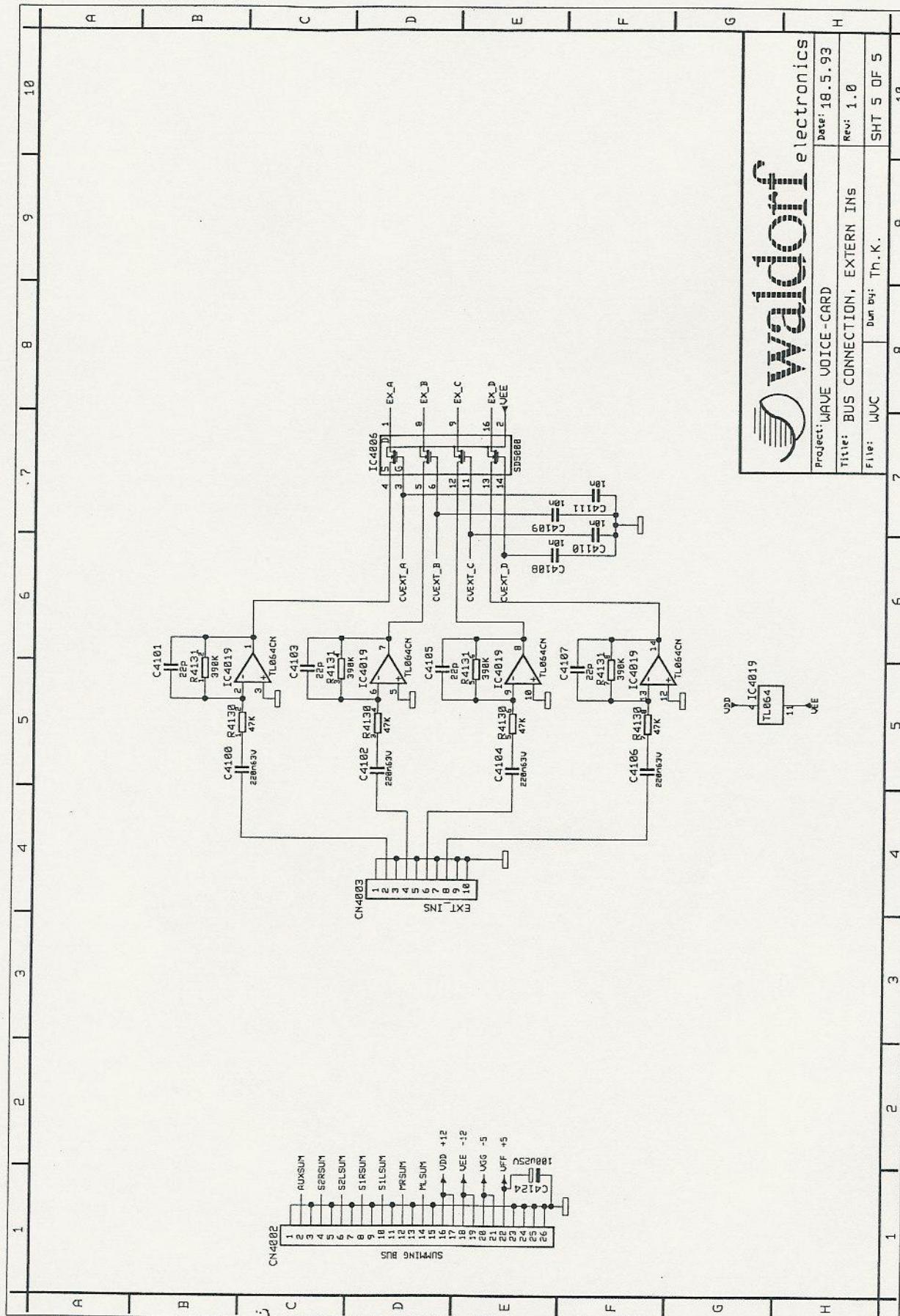
SHT 2 OF 5

Page: 1 2 3 4 5 6 7 8 9 10



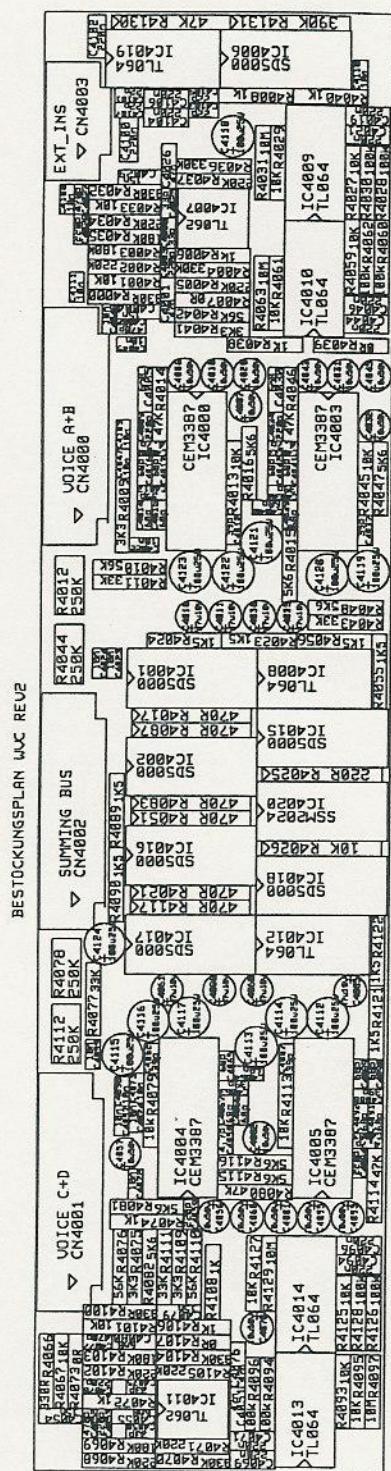
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## **WVC Board Position Print**



# Appendix

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## Special MIDI cable for CPU Board I/O Check

The MIDI cable for CPU Board I/O Check is simply a MIDI cable with one MIDI connector on one end and two MIDI connectors on the other side.

Date: April 7th 1995

Version: 1.640

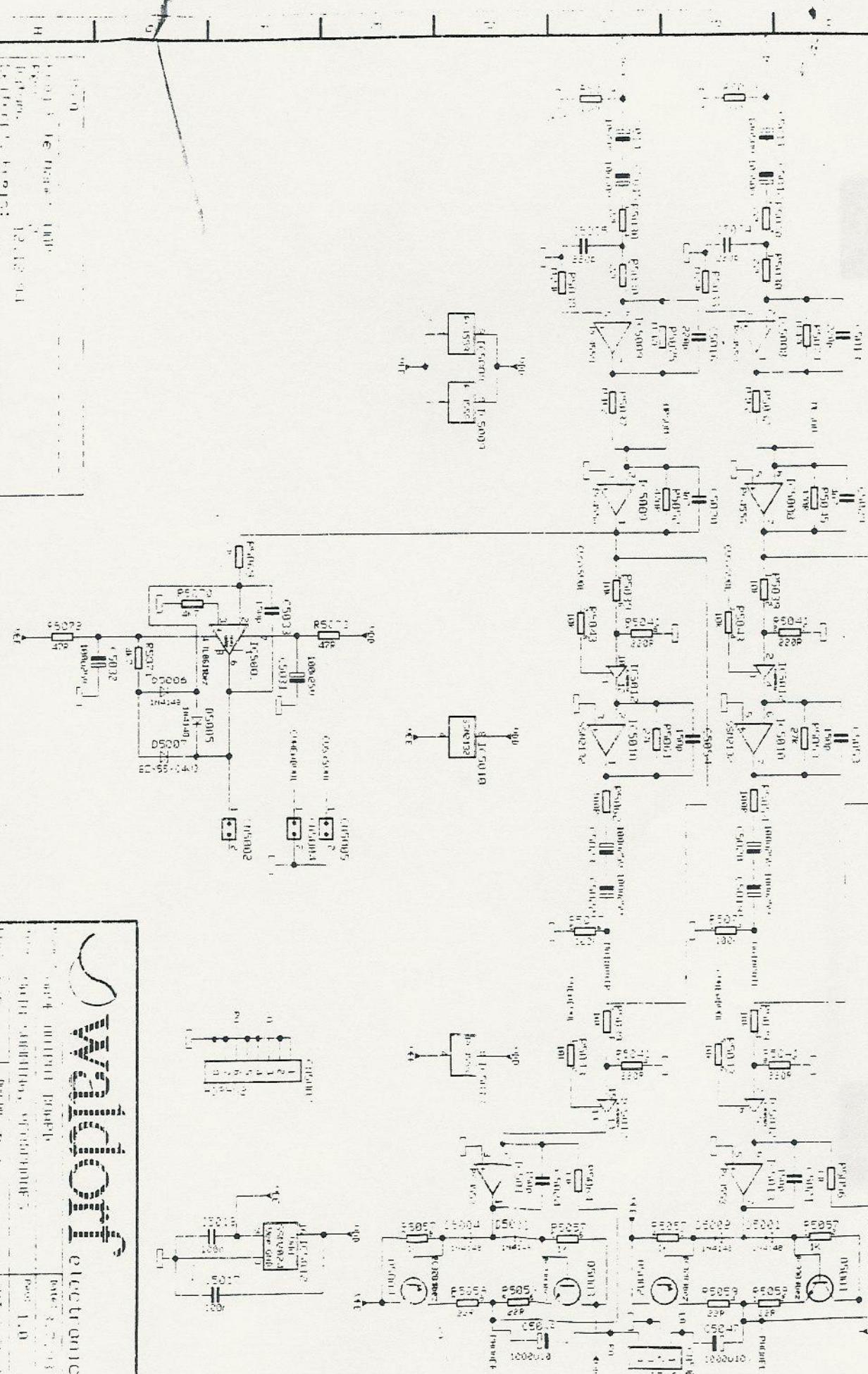
## Waldorf Wave MIDI Implementation Chart

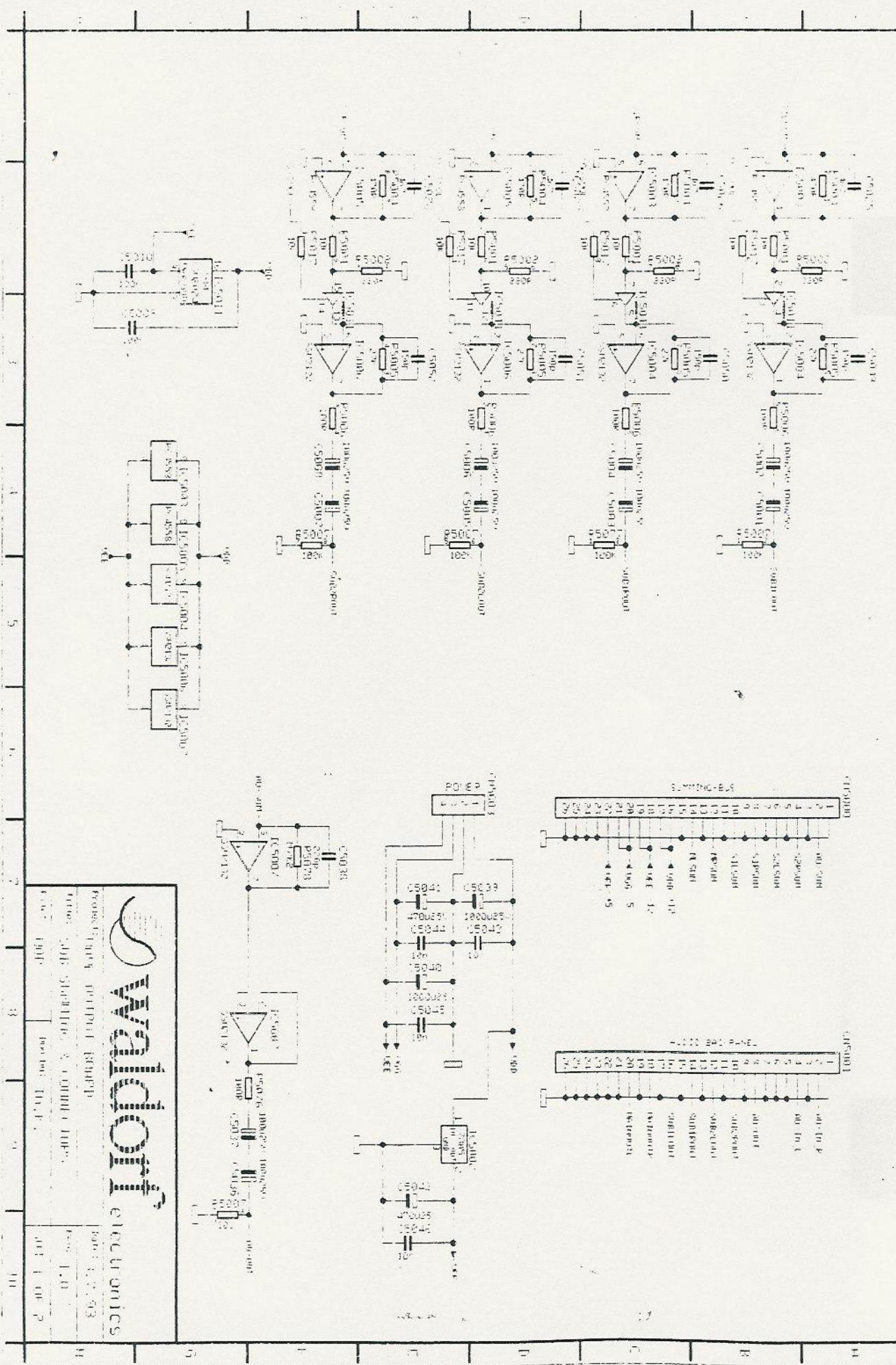
Function		Transmitted	Recognized	Remarks
Basic Channel	Default Changed	1 1 - 16	1 1 - 16	
Mode Messages	Default Altered	x x	2 x x	No Modes supported
Note Number	True Voice	0 - 127	0 - 127 0 - 108	
Velocity	Note ON Note OFF	o o	o o	
After Touch	Key's Ch,s	x o	o o	
Pitch Bender		o	o	
Control Change	0 1 7 10 64 0 - 120	o o o o o o	o o o o o o	Bank Switch Mod. Wheel Main Volume Panning Sustain Pedal Assignable to Buttons, Faders and Free Wheel
Program Change	True #	o	o 0 - 127	P.-Change via Editable Maps
System Exclusive		o	o	
System Common	Song Pos. Song Sel. Tune	x x x	x x x	
System Real time	Clocks Commands	x x	o x	Clock usable as modulator
Aux Mes- sages	Local ON/OFF All Notes Off Active Sense Reset	x o o x	x o o x	selectable
Notes	Supports MIDI Tuning Standard			

Mode 1: OMNI ON, POLY  
Mode 2: OMNI OFF, POLYMode 3: OMNI ON, MONO  
Mode 4: OMNI OFF, MONOo : Yes  
x : No

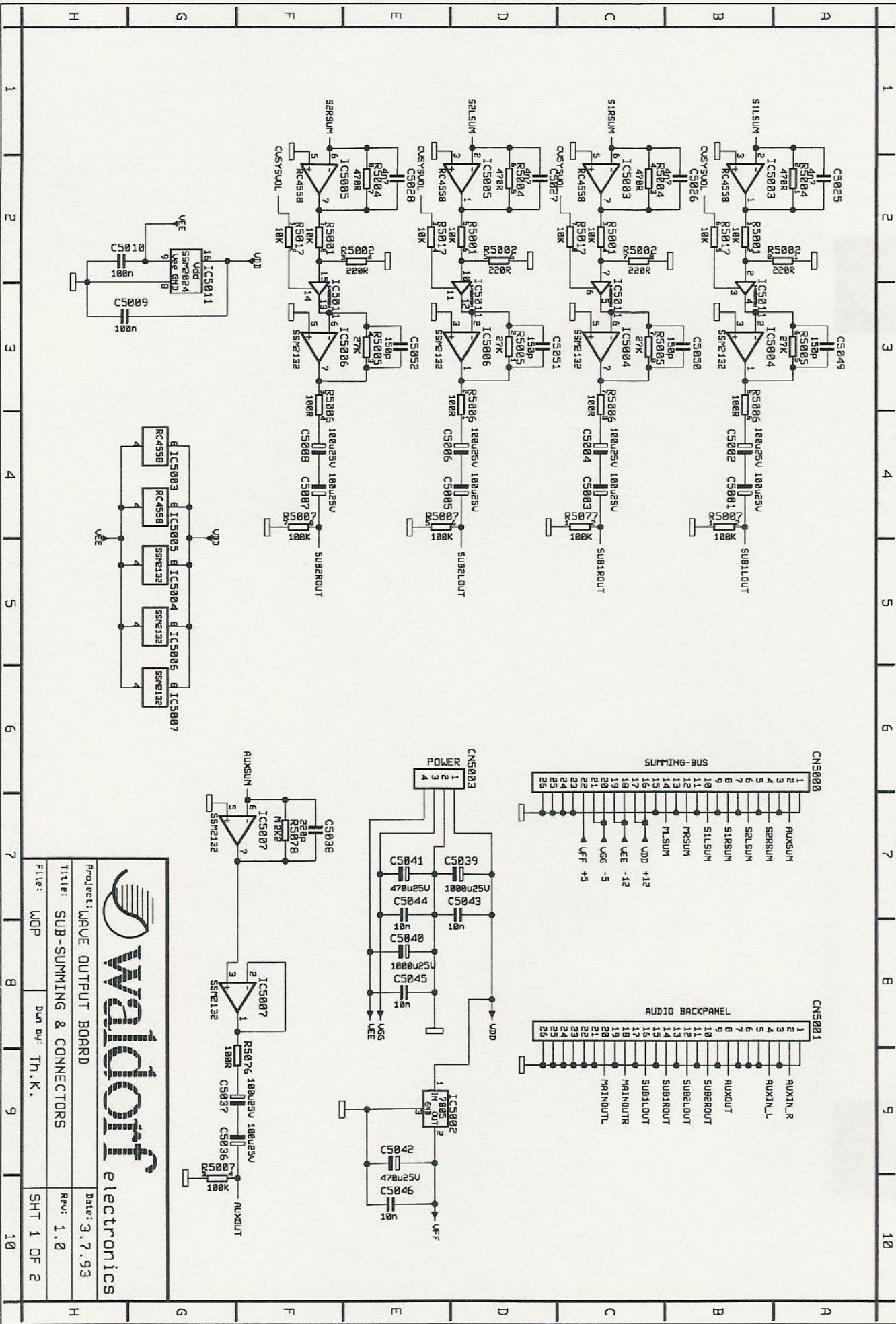
卷之三

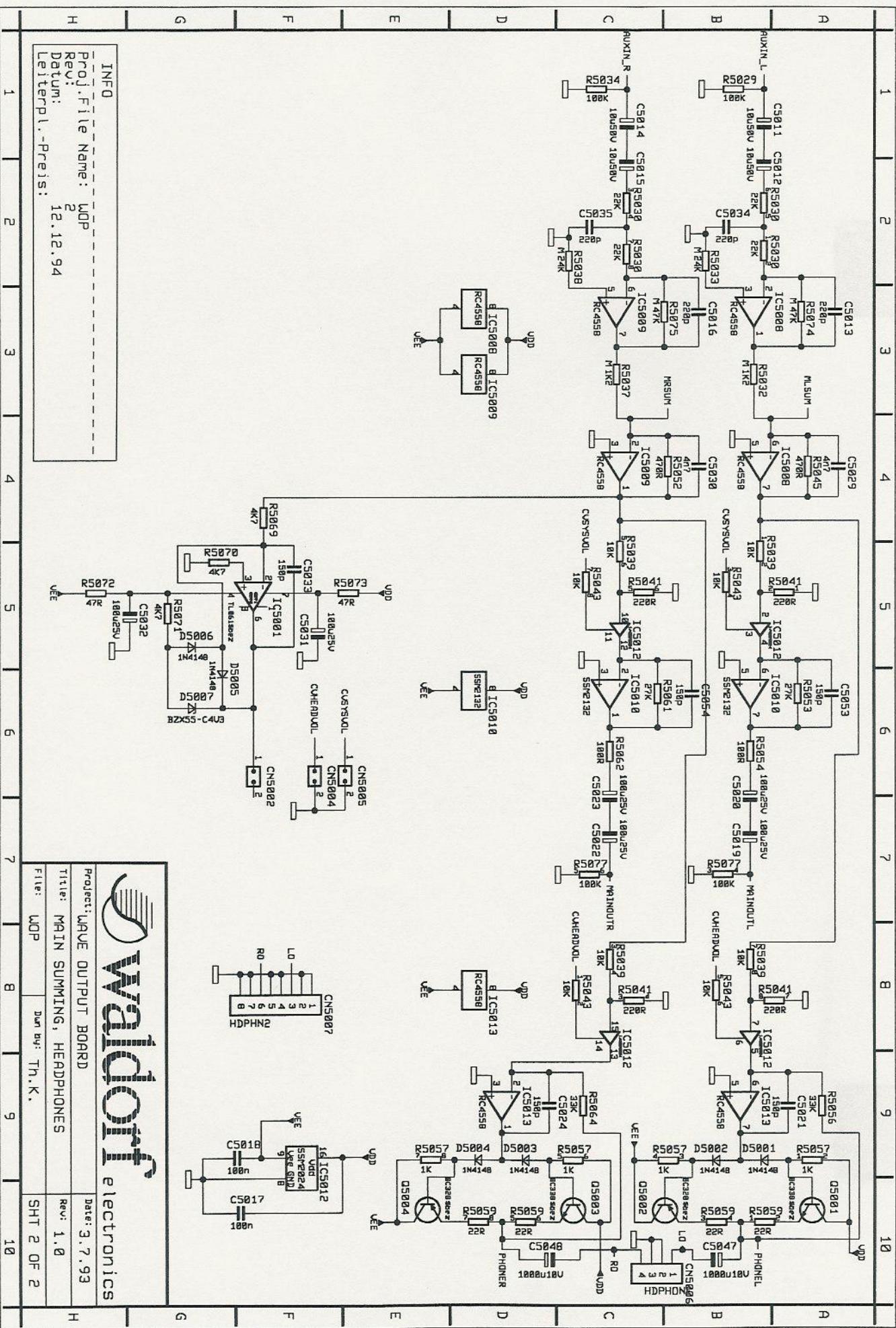
Year	Population	Rate	Rate	Rate	Rate
1850	3,143,000	1.00	1.00	1.00	1.00
1860	3,645,000	1.00	1.00	1.00	1.00
1870	4,147,000	1.00	1.00	1.00	1.00
1880	4,649,000	1.00	1.00	1.00	1.00
1890	5,151,000	1.00	1.00	1.00	1.00
1900	5,653,000	1.00	1.00	1.00	1.00
1910	6,155,000	1.00	1.00	1.00	1.00
1920	6,657,000	1.00	1.00	1.00	1.00
1930	7,159,000	1.00	1.00	1.00	1.00
1940	7,661,000	1.00	1.00	1.00	1.00
1950	8,163,000	1.00	1.00	1.00	1.00
1960	8,665,000	1.00	1.00	1.00	1.00
1970	9,167,000	1.00	1.00	1.00	1.00
1980	9,669,000	1.00	1.00	1.00	1.00
1990	10,171,000	1.00	1.00	1.00	1.00
2000	10,673,000	1.00	1.00	1.00	1.00
2010	11,175,000	1.00	1.00	1.00	1.00
2020	11,677,000	1.00	1.00	1.00	1.00





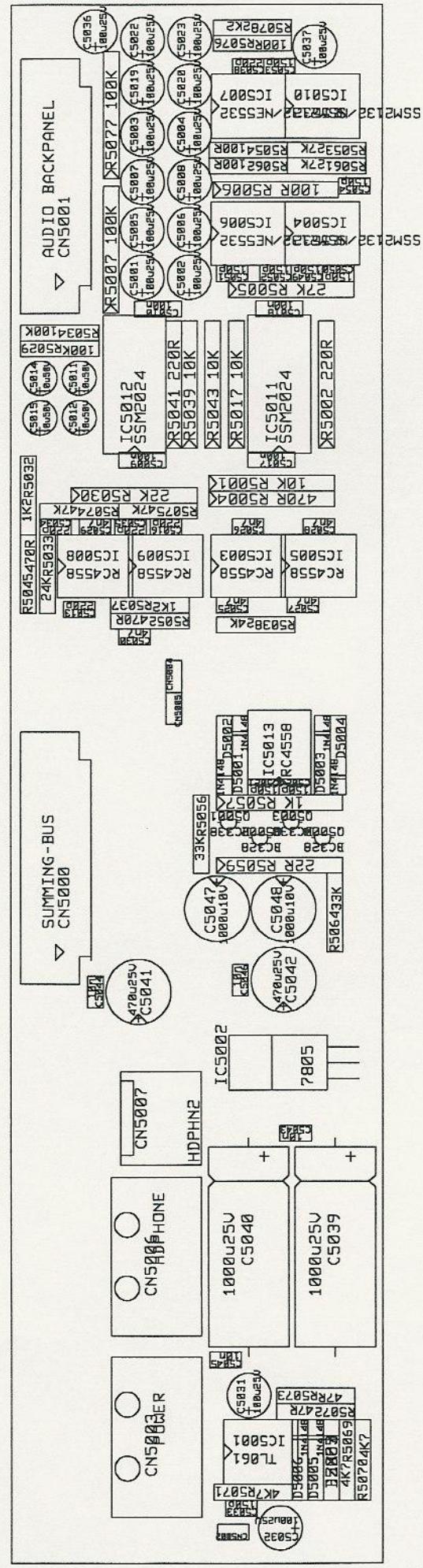
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Bestückungsplan WOP Rev.

12, 12, 94



Right panel

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<< 13  
>> 76  
□ 77  
> 84  
o 80  
in 81  
out 82  
shift 83

Edit Amp 67  
Edit Env 66  
Edit Panning 61  
Edit P, H, R 60  
Type 43  
Select 75  
Edit E-H En 59

SIB

IS

<<	13	3013	28	soft 6
>>	76	3076	93	
□	77	3077	92	
>	84	3079	69	-
○	80	3095	65	Control Delay / 547H
■	81	3096	64	Control Mixer / Comp
out	82	3077	67	Amp Edit
shift	83	3098	66	Amp Env Edit

Edit Amp 67

Ed. + Am Env 66

Ed. + Panning 61

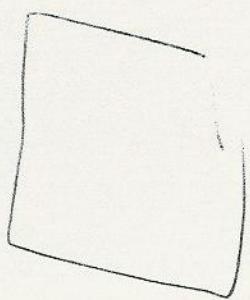
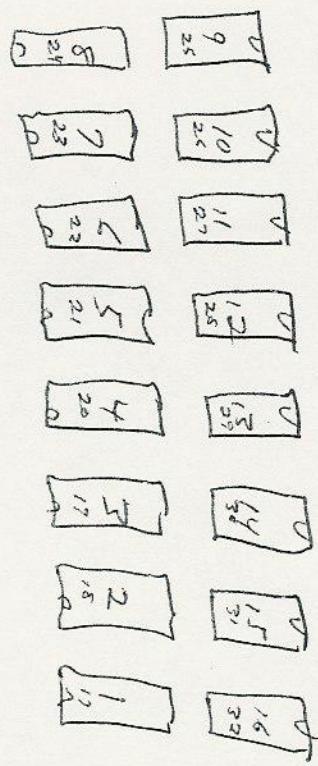
Edit F, H8 60

Type 43

Select 75

Edit F+HEnv 59

Connections

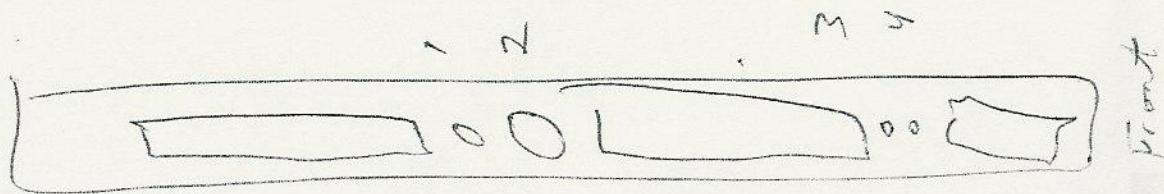


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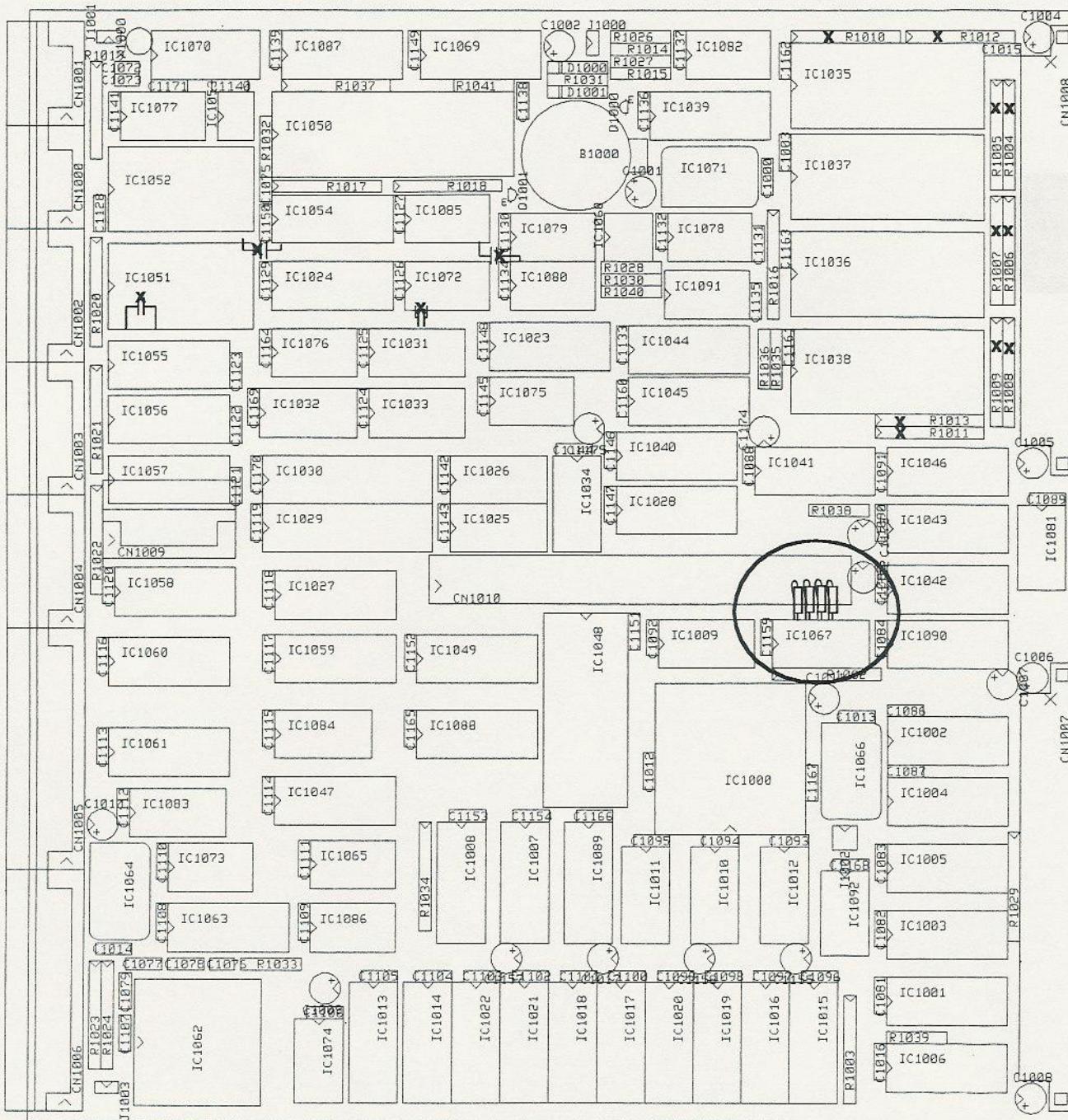
SERVICES

Electronic Repairs for the Entertainment Industry

Back



x=remove





electronics gmbh

# TECHNICAL INFORMATION OF CHANGE

**PROJECT:** WAVE

**TIOC #:** 7 / 970630

**ATTACH TO DOCU:** REV1.0 / 1.1

**PCB REV:** REV1

**COMPONENT LAYOUT:** REV1.1

**CHANGED BY:** Th. Kircher

**SUBJECT:** Improvement of System Stability

**No. of Pages:** 2

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The following changes should be made on all Waves coming into service.  
The subject to change is the master clock generator on the CPU-Board (W2CPU  
schematics page 8).

- I) IC1067 must be a LS type (74LS163A) as stated in the schematics
- II) Connect resistors (47 Ohms, 1/8W) in series to the outputs of the LS163 (pin 11, 12, 13, 14) to reduce the reflections on the clock lines. Lift the four pins of the IC out of the PCB and solder the resistors between PCB and IC pins.
- III) On the component side of the PCB there are some caps soldered to IC pins.  
Remove them all.
- IV) Remove Resistor Packs :  
R1004  
R1005  
R1006  
R1007  
R1008  
R1009  
R1010  
R1011  
R1012  
R1013

Component locations are marked on the following component layout: