

9450 DIGITAL OSCILLOSCOPE

SERVICE MANUAL

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ACKNOWLEDGEMENTS

We would like to thank Texas Instruments, Motorola and Signal Processing Technologies (Honeywell) for their kind permission in allowing us to reproduce drawings from their technical literature.

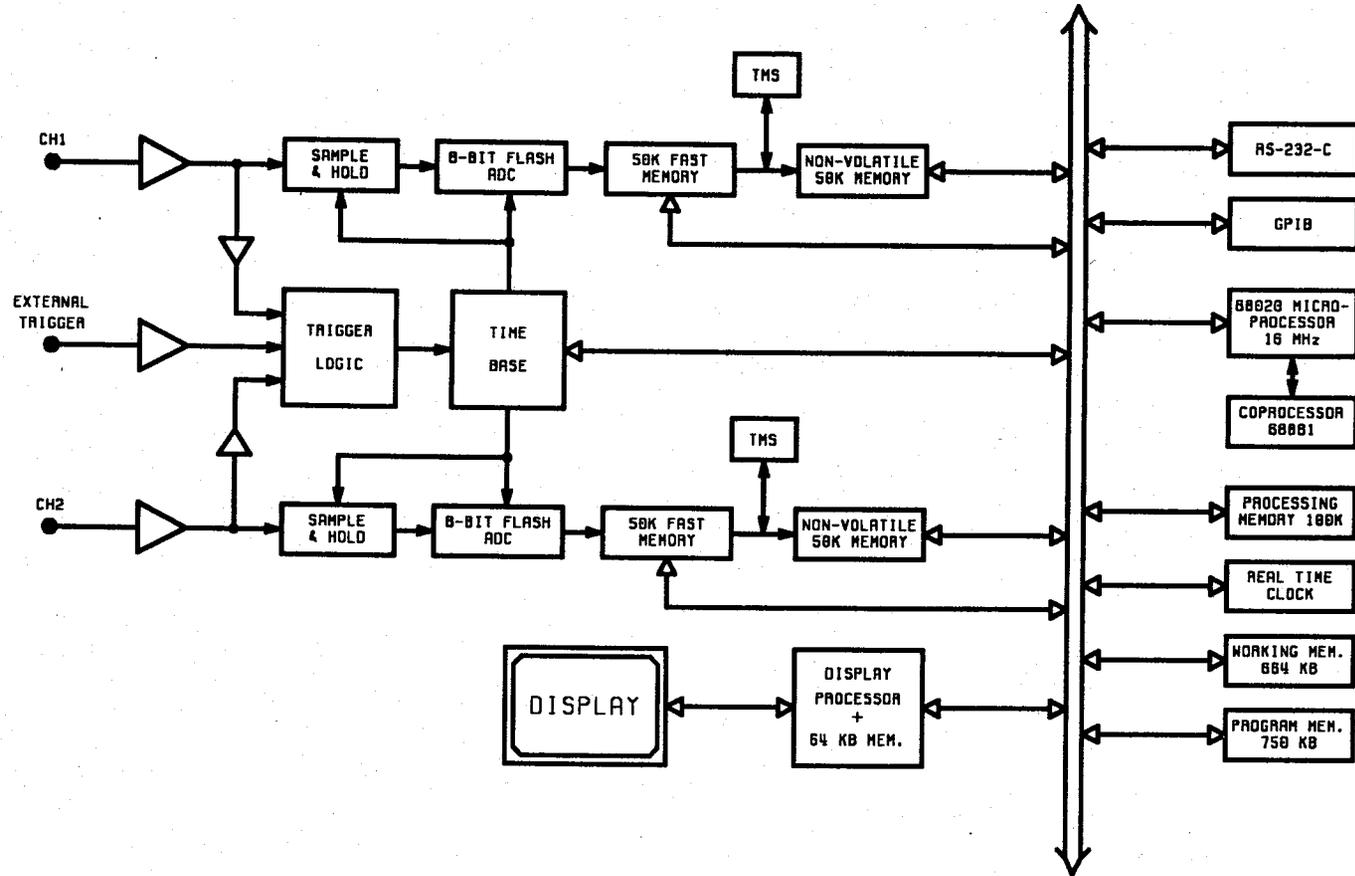
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and
Internal Diagnostics and Calibration
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SPECIFICATIONS

**BASIC OPERATION
AND
BLOCK DIAGRAMS**

9450 HARDWARE OVERVIEW

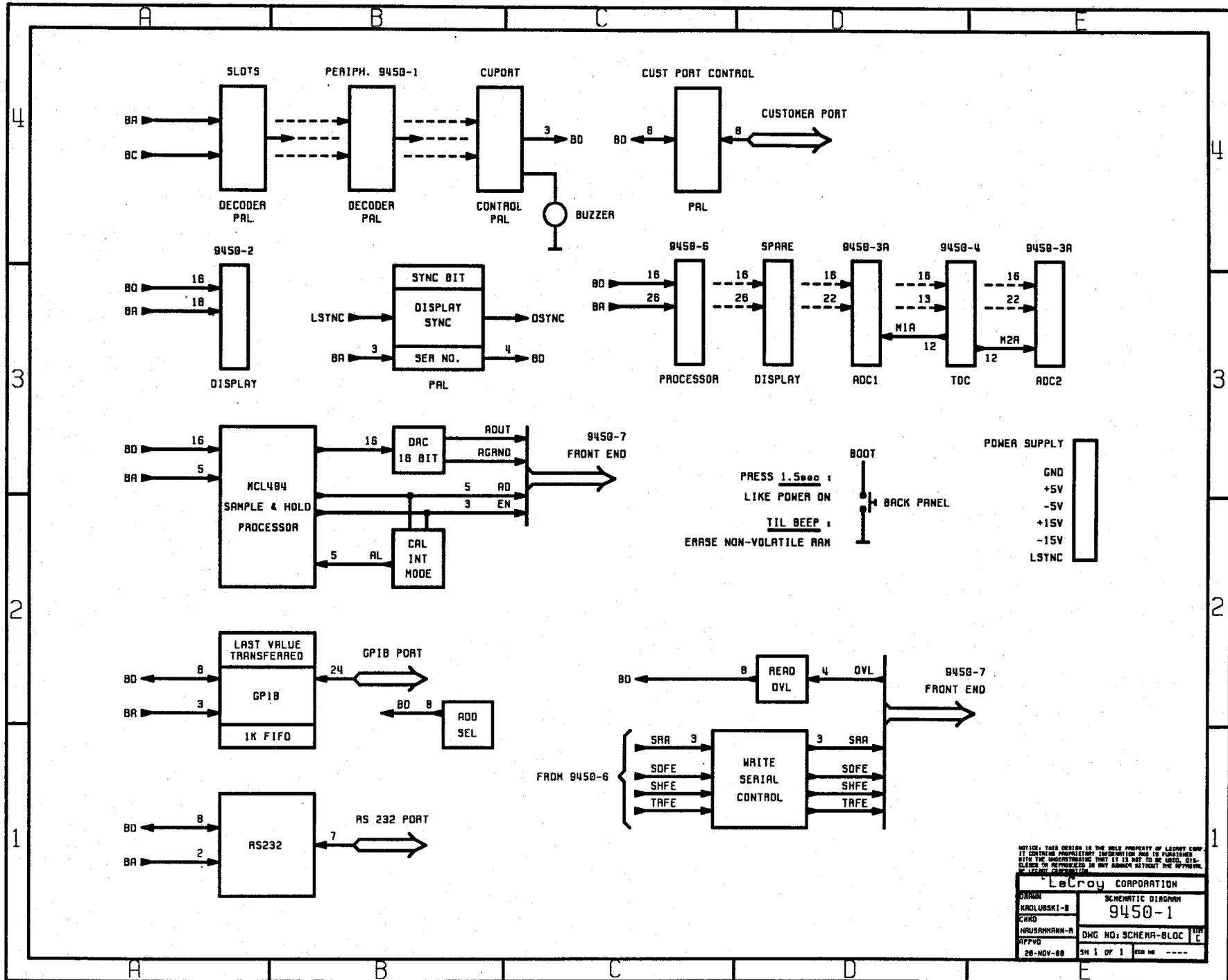


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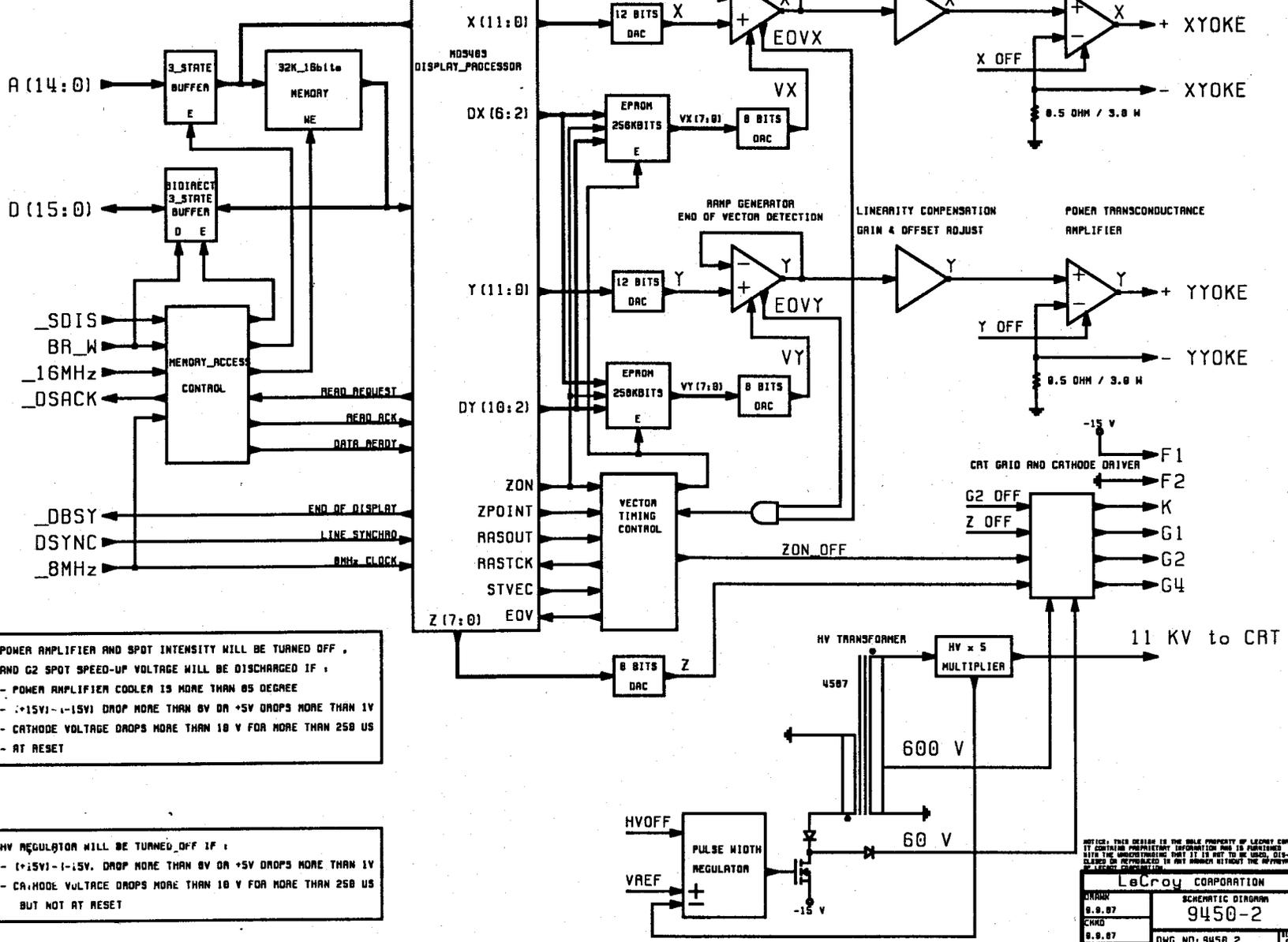
LeCroy CORPORATION	
SCHEMATIC DIAGRAM	
OVERVIEW	
DESIGNER KROLUBSKI-B	DWG NO: SCHEM-BLK
CHECKED CRAO	REV E
APPROVED HAUSMAN-N	DATE 15-OCT-88
SIZE SH 1 OF 1	SCALE ---

9450 SUB-ASSEMBLIES

9450-1	Base Board
9450-2	Display
-3A	ADC
-4	Time base
-5	Front panel
-6	Processor (compatible with 9420-6)
-7	Front-end
-8	Clock bus
9451-1	Power supply



BLOCK SCHEMATIC OF 9450-2



POWER AMPLIFIER AND SPOT INTENSITY WILL BE TURNED OFF, AND G2 SPOT SPEED-UP VOLTAGE WILL BE DISCHARGED IF:

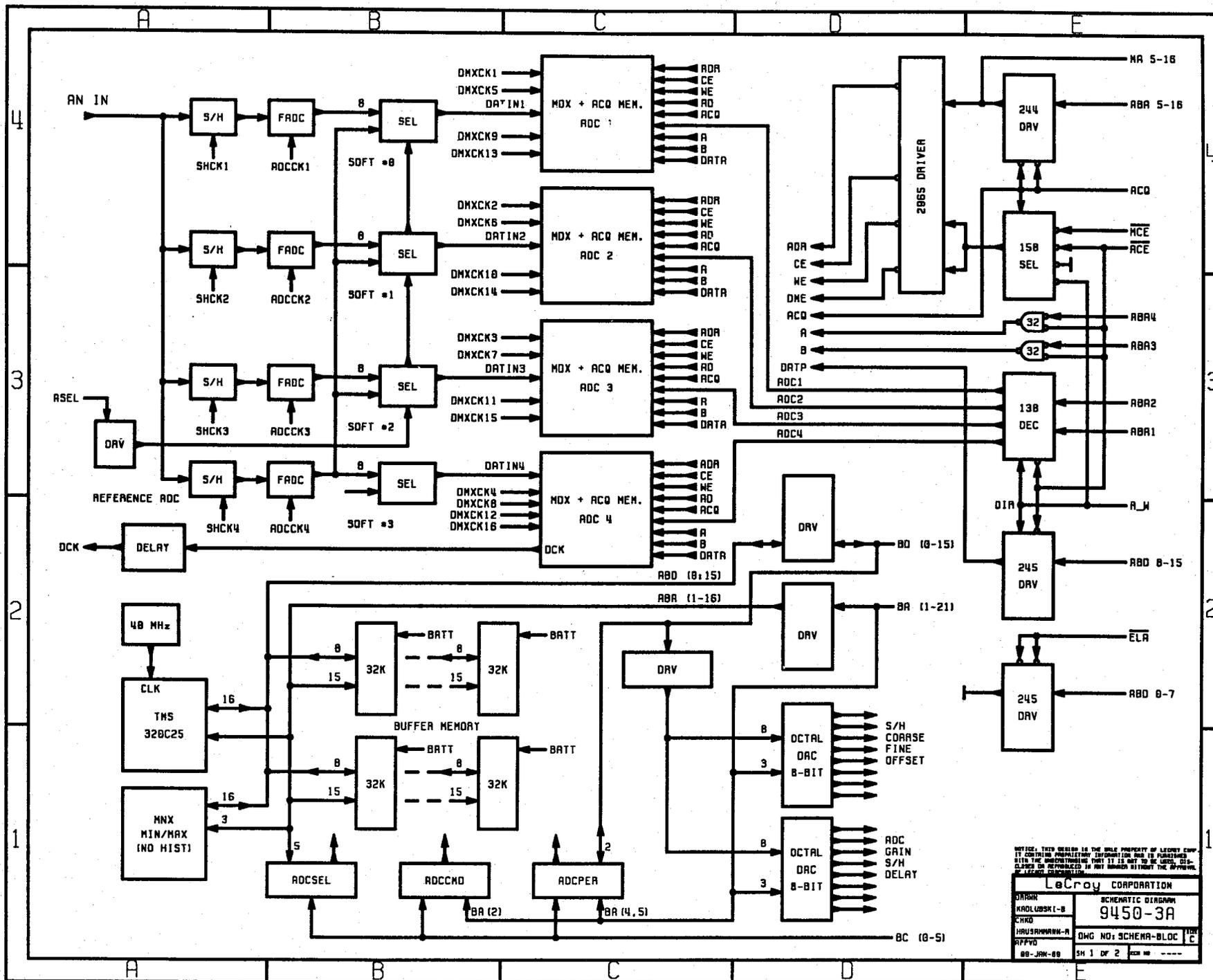
- POWER AMPLIFIER COOLER IS MORE THAN 85 DEGREE
- (-15V) - (-15V) DROP MORE THAN 8V OR +5V DROPS MORE THAN 1V
- CATHODE VOLTAGE DROPS MORE THAN 10 V FOR MORE THAN 250 US
- AT RESET

HV REGULATOR WILL BE TURNED OFF IF:

- (-15V) - (-15V) DROP MORE THAN 8V OR +5V DROPS MORE THAN 1V
- CATHODE VOLTAGE DROPS MORE THAN 10 V FOR MORE THAN 250 US BUT NOT AT RESET

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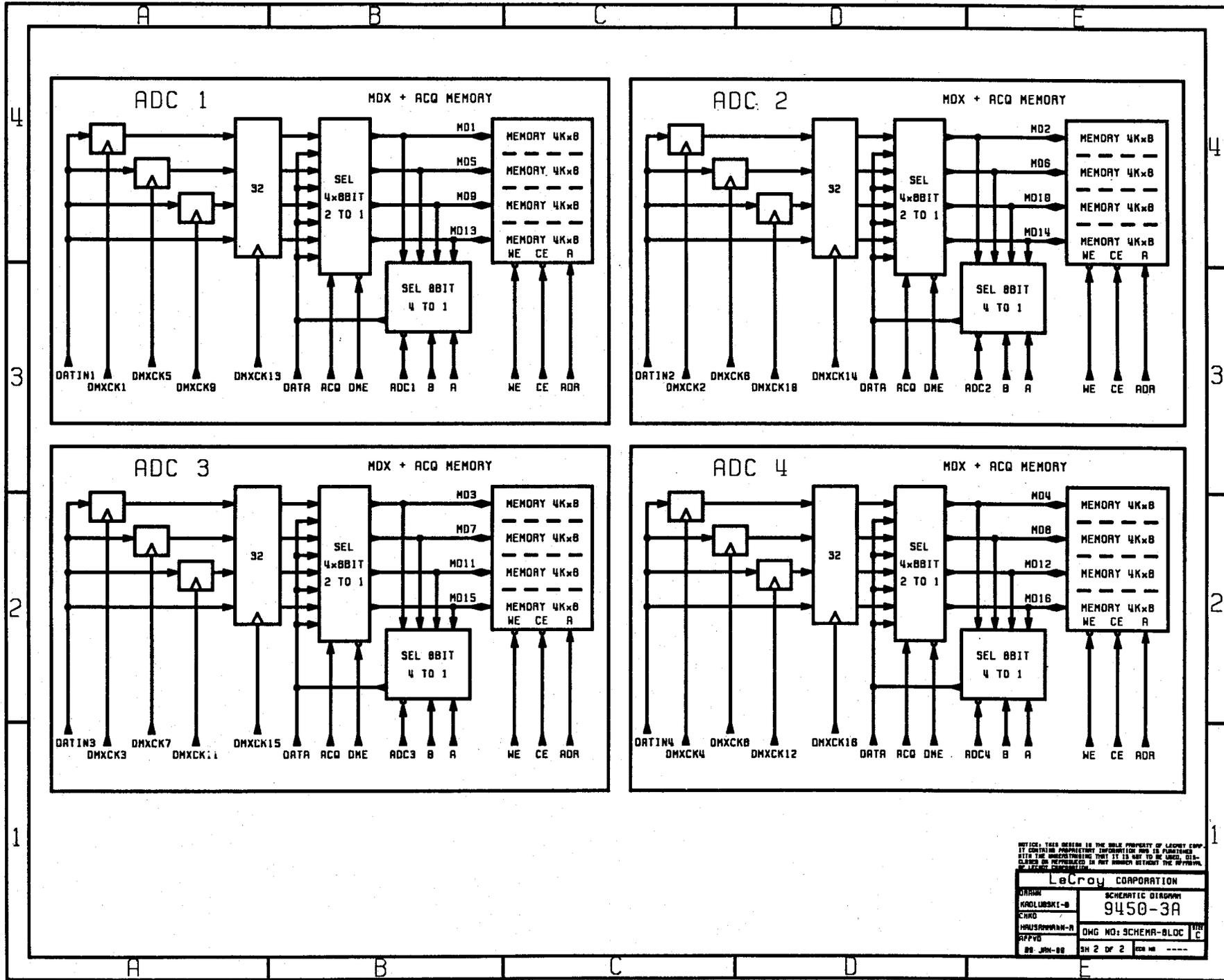
LeCroy CORPORATION	
DRWNG	SCHEMATIC DIAGRAM
REV	9450-2
DATE	08.0.87
APP'D	DRG NO: 9450_2
REV	SH 1 DF 1
DATE	REV NO 1000



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DESIGN	SCHEMATIC DIAGRAM
DRWN	KRDLUBSK-L-B
CHKD	9450-3A
DRWSMANN-R	DWG NO: SCHEM-BLOC
APPVD	
88-JAN-88	SH 1 OF 2



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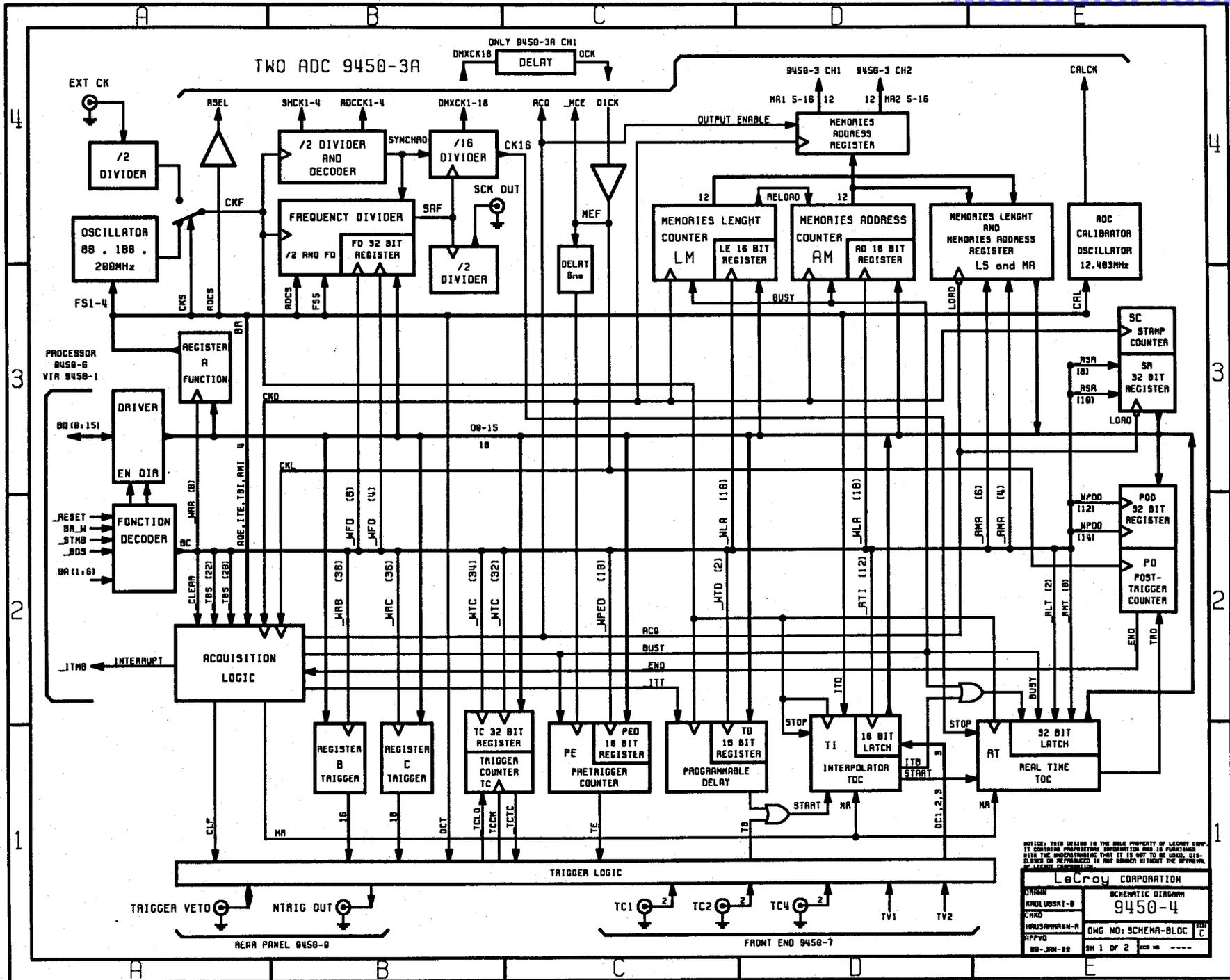
LeCroy CORPORATION

DESIGN	SCHEMATIC DIAGRAM
KROLUBSKI-B	9450-3A
CWD	DWG NO: SCHEM-810C
HANSEN/WHAN-N	REV
APPVD	SH 2 OF 2
89 JAN 88	REV NO

ADC Numbering Scheme

		HARD	SOFT (Internal Diag)
Reference ==>		4	3
First in time ==>		1	0
		2	1
		3	2

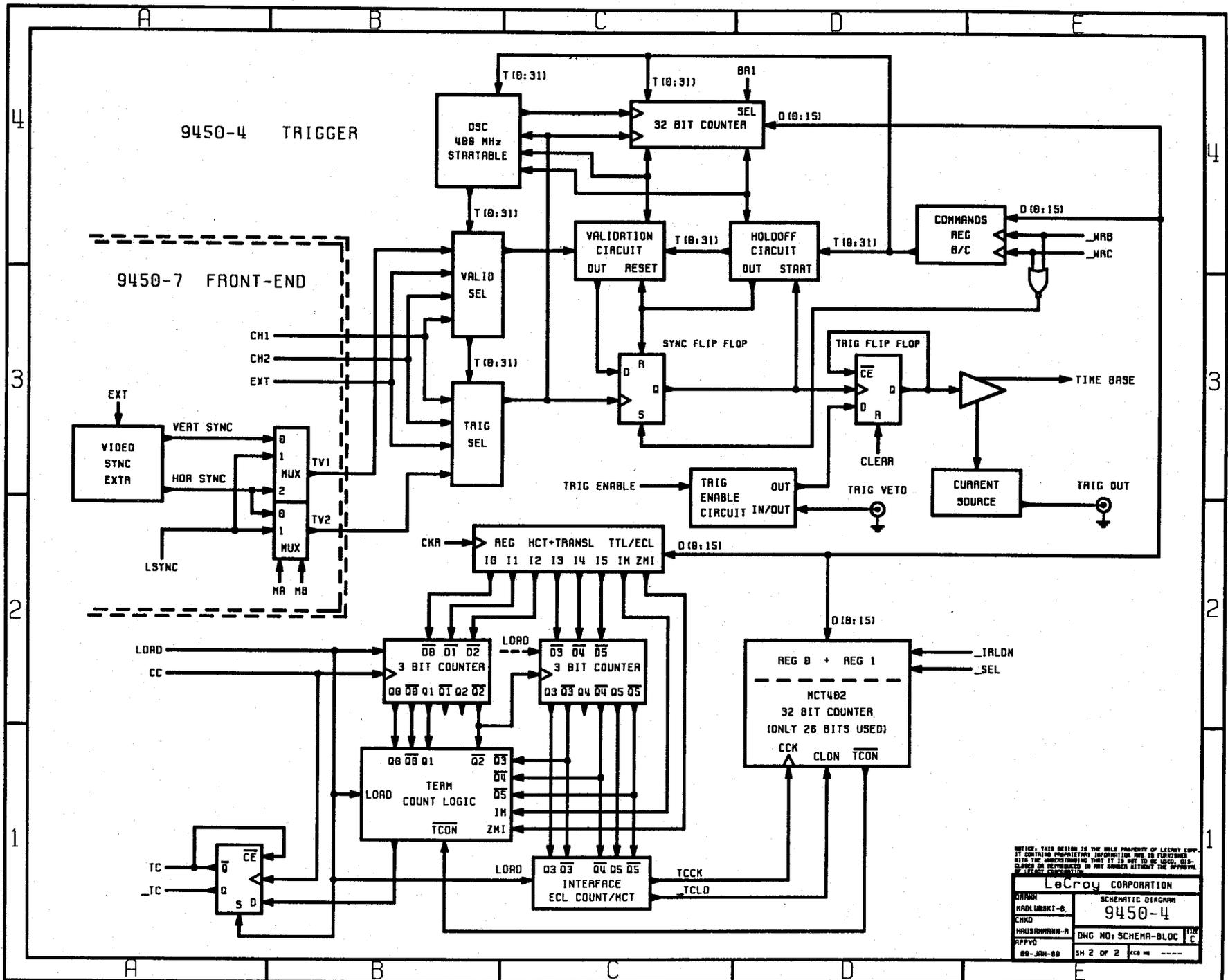
The reference ADC is used in Single-ADC Sampling Mode.



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MODEL: 9450-4
 SCHEMATIC DIAGRAM
 DWG NO: SCHEM-9450-4
 REV: 1
 DATE: 89-JAN-88



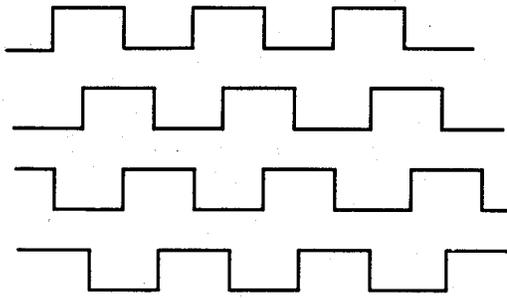
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 SCHEMATIC DIAGRAM
9450-4
 DWG NO: SCHEM-BLOC
 SH 2 OF 2
 88-JAN-88

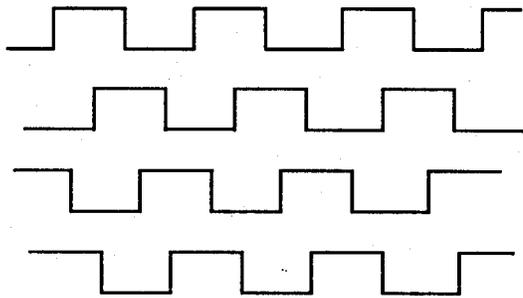
SAMPLING CLK TIMING



INT OSC
80 / 100 / 200 MHz



S/H # 1
2
3
4



ADC # 1
2
3
4

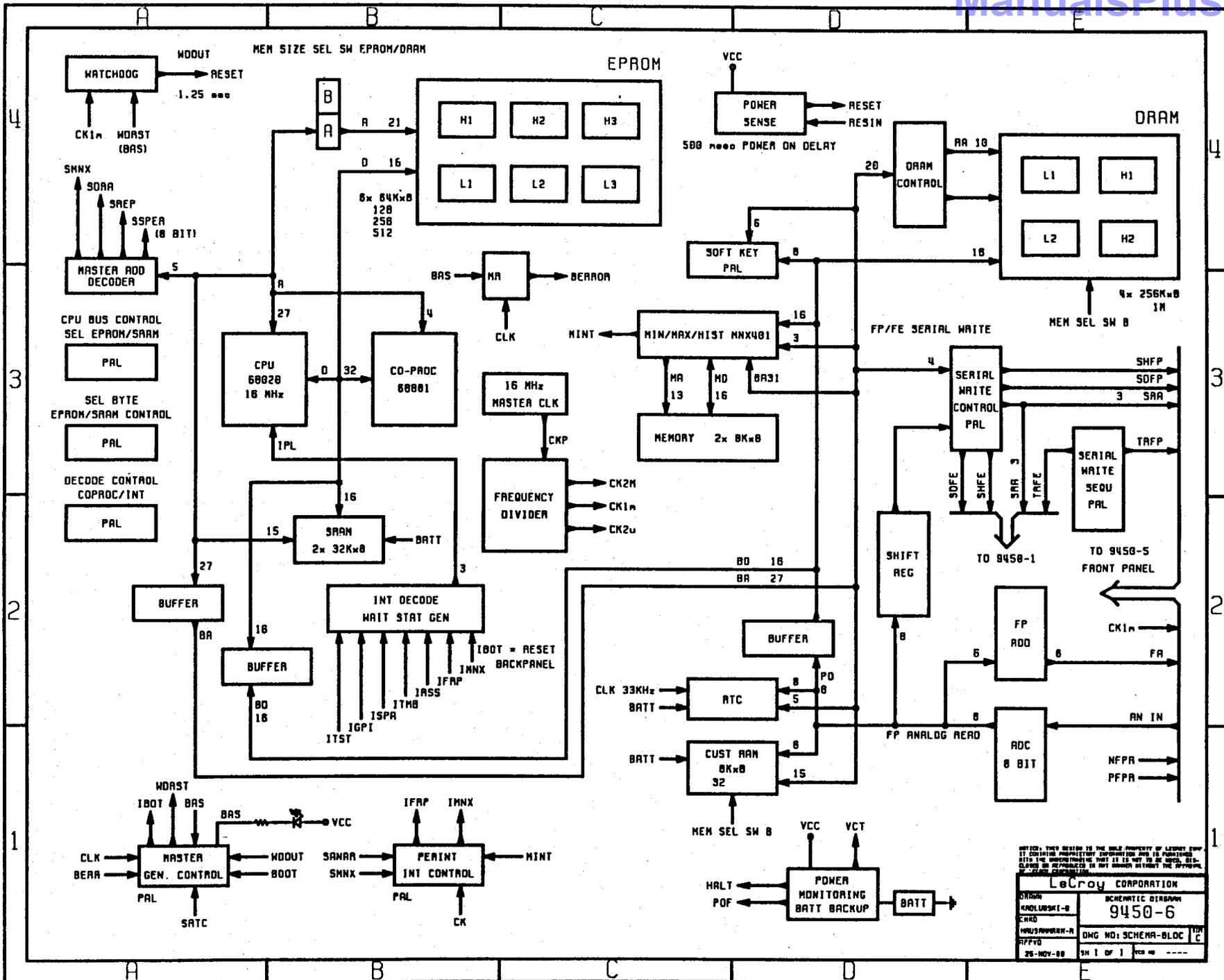
9450 SAMPLING CLOCK RATES vs TIME/DIV

Single-shot:

INT OSC MHz	Sampl Rate Ms/sec	Sample Intvl nsec	S/H CLK MHz	# ADC	Time/div
200	400	2.5	100	4	10 nsec
					.
100	200	5.0	50	4	20 μ sec
200	100	10.0	100	1	50 μ sec
80	40	25	40	1	.1 msec
80	20	50	40	1	.2 msec
80	10	100	40	1	.5 msec
80	4	250	40	1	1 msec
80	2	500	40	1	2 msec
80	1	1000	40	1	5 msec
.
.
.
80	1 Hz	1 sec	40	1	5 ksec

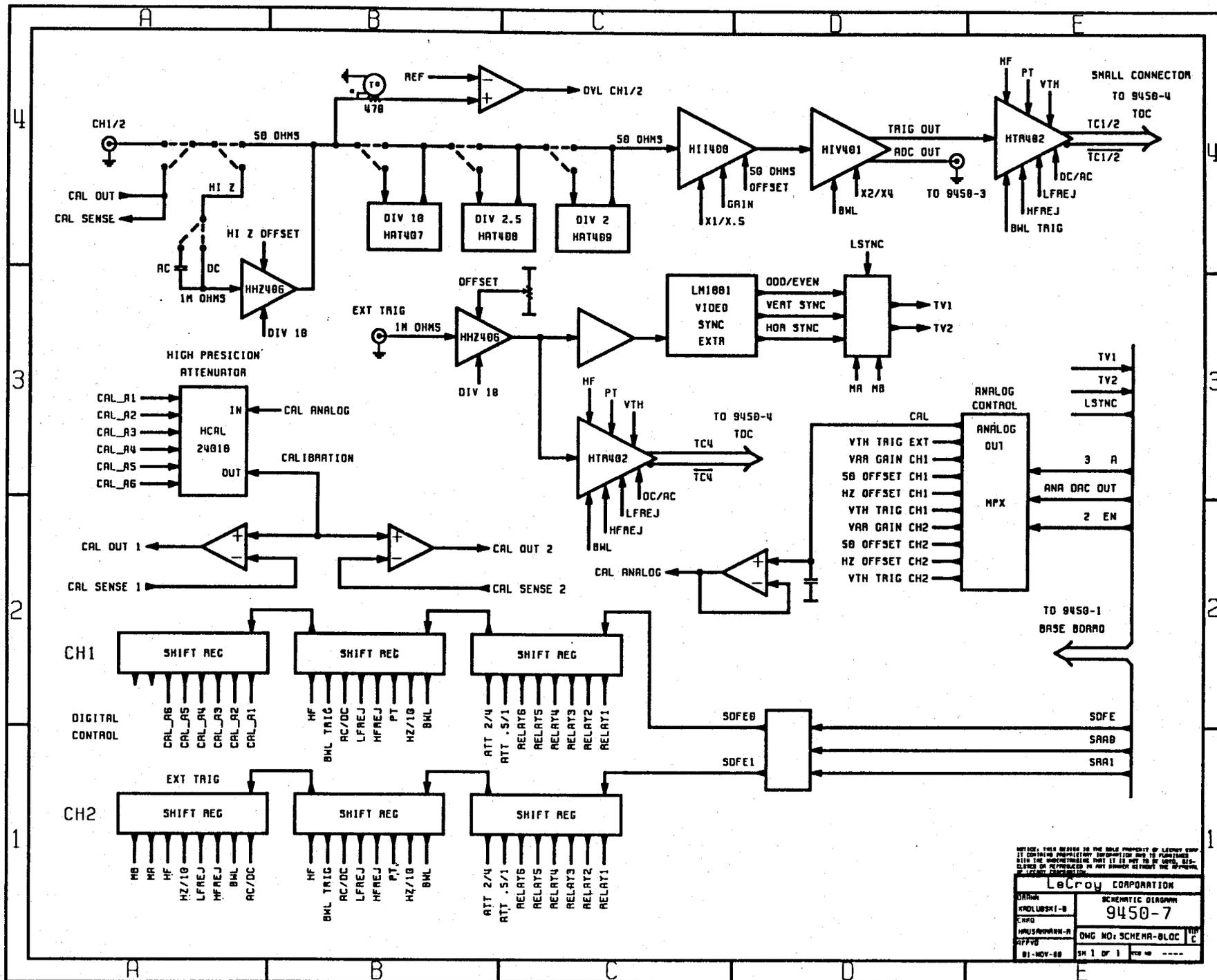
RIS:

INT OSC MHz	Sampl Rate Ms/sec	Equiv Rate Gs/sec	Sampl Intvl	S/H CLK MHz	# ADC	Time/div
200	100	10	100 psec	100	1	1 nsec
						.
200	100	4	250 psec	100	1	1 μ sec
200	100	2	500 psec	100	1	2 μ sec
200	100	1	1 nsec	100	1	5 μ sec



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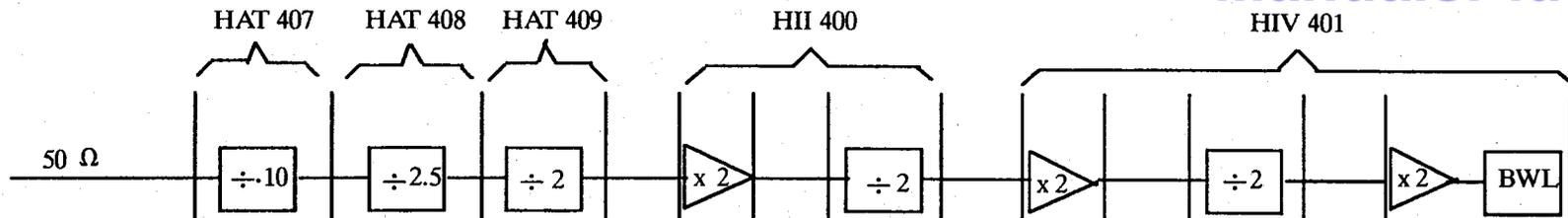
LeCroy CORPORATION	
Doc No	SCHEMATIC DIAGRAM
Model	9450-6
Rev	
Part No	DWG NO: SCHEM-BLOC
Date	25-NOV-88
Sheet	SM 1 OF 1



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DATE: 01-NOV-88	SCHEMATIC DIAGRAM	REV: E
DESIGNER: HANLUSKI-B	9450-7	
ENGR: HANLUSKI-B	DWG NO: SCHEM-BLOC	
DATE: 01-NOV-88	SH 1 OF 1	REV NO: ----



RANGE [mV]	FS [mV]	OFFSET 10v = 600 mV				HII 400 input /56Ω			HII 400 output /37.5 Ω			HIV 401 /37.5 Ω	HIV 401 output/25 Ω	GAIN
5	40	± 600 mV				± 20	± 40	OFF	± 40	± 80	OFF	± 80	± 160 mV	8 x
10	80	± 300 mV				± 40	± 80	OFF	± 80	± 160	ON			4 x
20	160	± 150 mV				± 80	± 160	ON	± 80					2 x
50	400	± 375 mV		ON		↓	↓	↓	↓					0.8
100	800	± 750 mV		ON	ON	↓	↓	↓	↓					0.4
200	1600	± 1500 mV	ON			↓	↓	↓	↓					0.2
500	4000	± 3750 mV	ON	ON		↓	↓	↓	↓					0.08
1000	8000	± 7500 mV	ON	ON	ON	↓	↓	↓	↓					0.04

HZ ÷ 10 HZ out

50	400	OFF	± 200	OFF	ON		± 80							
100	800	OFF	± 400	↓	ON	ON	± 80		± 80			± 80	± 160	
200	1600	ON	± 80	↓			± 80		± 80			± 80	± 160	
500	4000	ON	± 200	↓	ON		± 80		± 80			± 80	± 160	
1000	8000	ON	± 400	↓	ON	ON	± 80		± 80			± 80	± 160	

MODEL 9451-1 POWER SUPPLY

Specifications

Input voltage:	90 to 132 V _{AC} , 180 to 264 V _{AC} , selected by the user
Input frequency:	45 to 440 Hz
Inrush current:	max. 10 A at start-up
Operating temperature range:	0° C to 65° C at full load
Hold-up time:	min. 20 msec, at full load and minimal input
Conducting EMI:	VDE 0871 curve B, IEC 801
Isolation:	VDE 0411/0730/0804/0806, IEC 348/380/435 3750 V _{AC} , 4000 V _{DC} input lines to ground leakage current <5 mA _{AC} , 50 Hz
Input over-voltage protection:	yes
Outputs:	four, with common return (ground)
Output voltage:	out 1, +15 V: +15.00 V ±1%, nom. 3.2 A _{RMS} out 2, -15 V: -15.04 V ±1%, nom. 3.8 A _{RMS} out 3, +5 V: +5.07 V ±1%, nom. 8.6 A _{RMS} out 4, -5 V: -5.16 V ±1%, nom. 10.8 A _{RMS}
Output voltage adjustment:	min. ±5%
Output over-voltage protection:	no
Line regulation:	max. 0.1% at any load
Output voltage regulation:	+15 V and -15 V: ±1% 1.5 A to 4.5 A load +5 V: ±1% 6 A to 11 A load -5 V: ±1% 9 A to 13 A load
Transient response (100 Hz):	+15 V and -15 V: <0.5 V, 500 µsec: 2 A to 4.5 A + 5 V: <0.2 V, 500 µsec: 6 A to 11 A

Output ripple and noise:

+15 V and -15 V: max. 100 mV_{pp} (100 MHz)

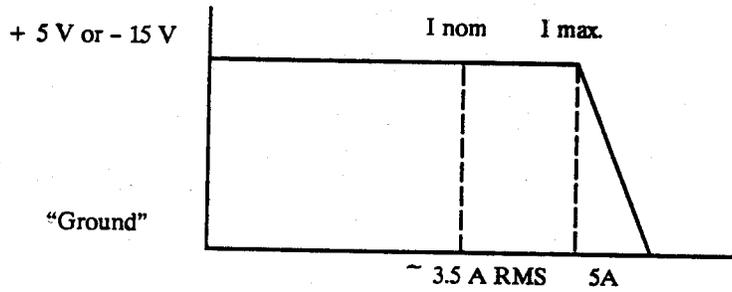
+5 V and -5 V: max. 80 mV_{pp} (100 MHz)

50 Hz output ripple:

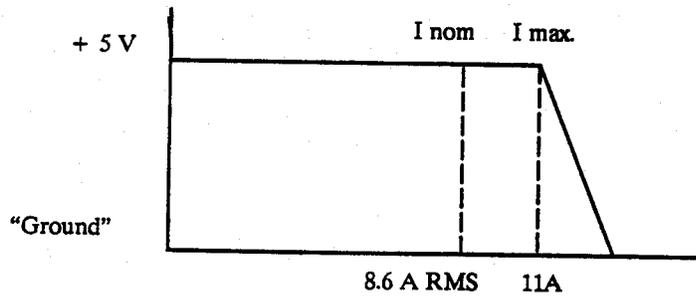
max. 5 mV

Maximum output current:

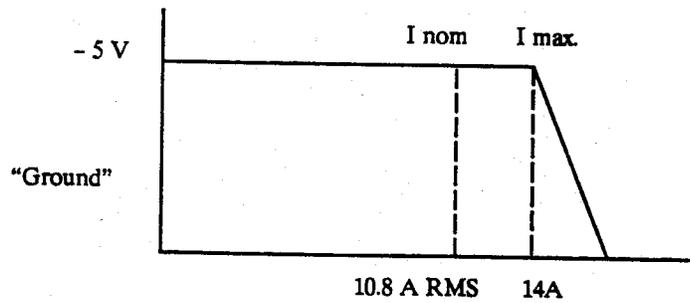
+ 15 V and - 15 V: $I_{max} = 5 A_{+1}^{-0}$



+ 5 V : $I_{max} = 11 A_{+2}^{-0}$

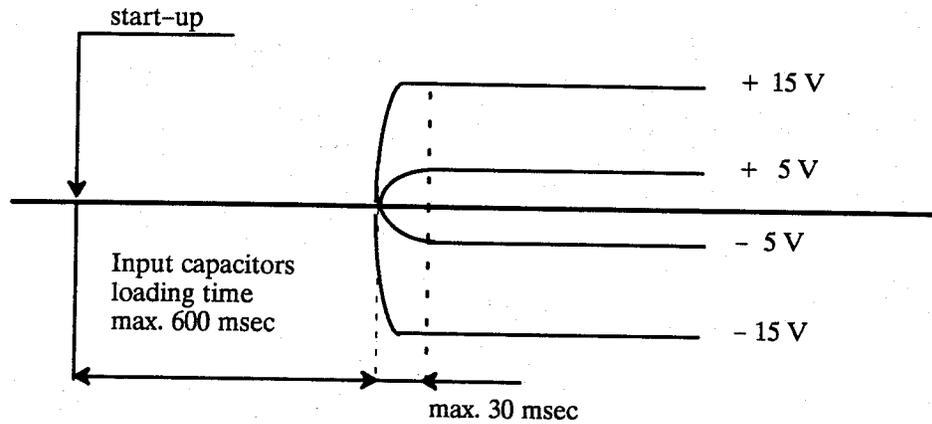


+ 5 V : $I_{max} = 14 A_{+2}^{-0}$



Max. output current adjustment: min. $\pm 20\%$

Soft-start: input 90 V_{AC} , 45 Hz: outputs I_{nominal}



Power output: nominal 204 W

maximum 240 W

Line sync output: square signal, duty cycle 50%, 45 to 440 Hz

levels: 0 = 0 V , 1 = +5 V

rise and fall time $< 100\text{ nsec}$

isolation: line-line sync output 2.5 kV_{AC}

Fan power supply output: 15 V_{DC} , max. 0.15 A

Safety: designed to meet the following international safety requirements:

VDE 0411/0730/0804/0806, IEC 348/380/435

Line input connector: CEE 22/VI (XIV), ASE type 113

X2 Base card connector:

header 10 pins 94V0 material

AMP

pin assignment

1: positive line sync

2: common return

3 to 5: +5 V

7 to 8: -5 V

4 to 6: common return

9: +15 V

10: -15 V

X3 display cord connector:

header 3 pins, 94V0 material

AMP 350789-1

pin assignment

1: -15 V, with fuse slow 2 A

2: common return

3: +15 V, with fuse slow 2 A

X1 Fan connector:

header 2 pins, 94V0 material

AMP 350786-1

pin assignment

1: common return

2: +15 V

Probe power connector:

two, located on the switchboard

LEMO RA 0304 N

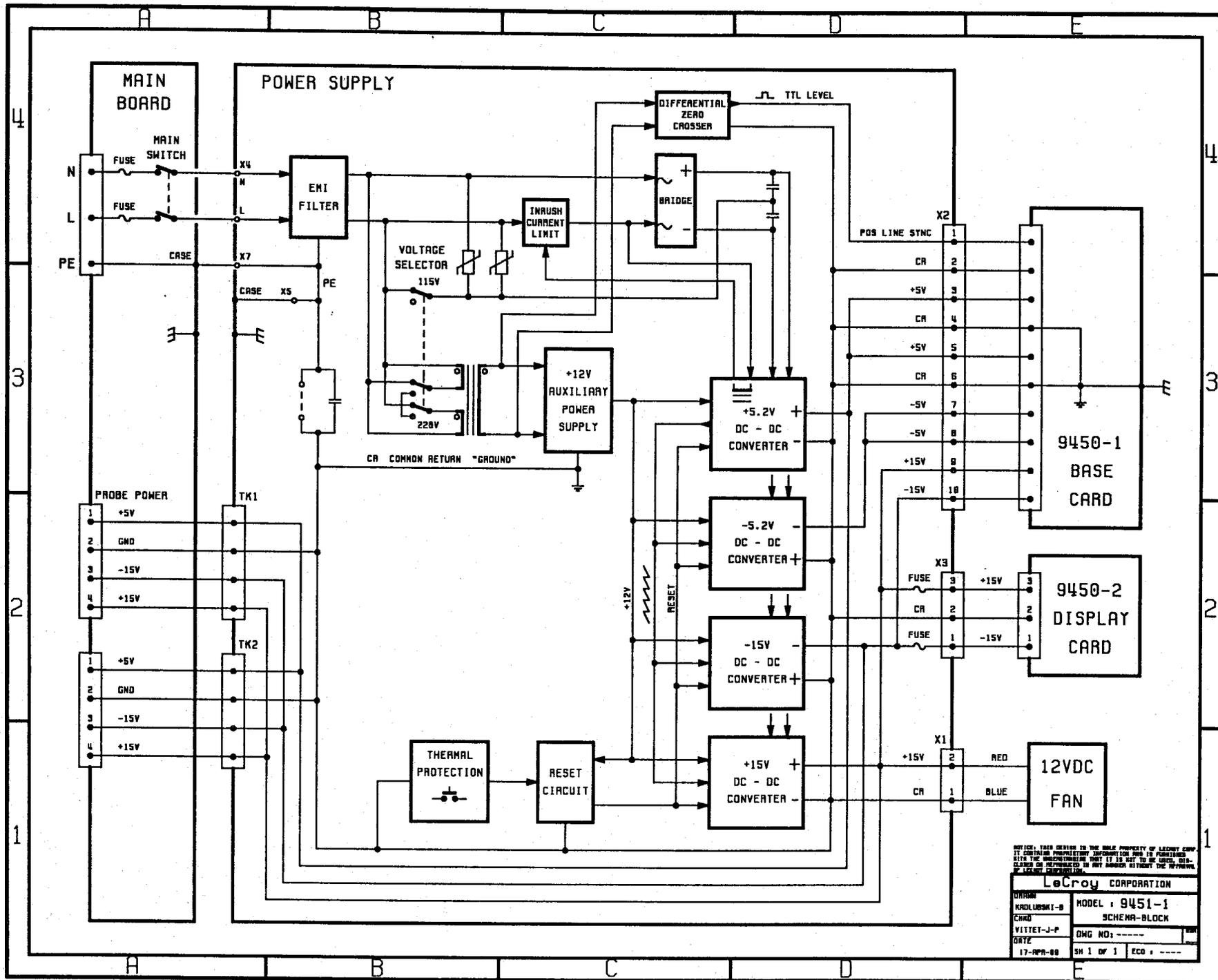
pin assignment

1: +5 V

2: ground, common return

3: -15 V

4: +15 V



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LeCroy CORPORATION

UNFORM	MODEL: 9451-1
KRDL0SKI-B	SCHEMA-BLOCK
CRAD	DWG NO: -----
VITTEI-J-P	DATE
17-APR-88	SH 1 OF 1 ECO: -----

**BASIC PERFORMANCE TEST PROCEDURE
AND
INTERNAL DIAGNOSTICS AND CALIBRATION**

BASIC PERFORMANCE TEST PROCEDURE FOR THE 9450 DIGITAL OSCILLOSCOPE

1 Turn-On

Before switching on the digital oscilloscope (DSO), check that the correct line voltage is set at the rear-panel power selector. Switch on the power using the power switch on the rear panel. Then check:

- that the display turns on after about 10 seconds
- that the display is stable
- that the range of INTENSITY and GRID INTENSITY is reasonable

Wait for about 20 minutes for the scope to reach a stable operating temperature.

2 Noise on the Inputs

This is to verify the proper operation of all front-end components. With no signal connected to the inputs, set the DSO as follows:

- turn on traces CH1 and CH2
- Grid: single
- Input couplings CH1 and CH2: 1 M Ω DC
- Input gain: 5 mV/div
- Trigger:
 - SMART (COMPLEX) Trigger: OFF
 - Source: LINE
 - Coupling: AC
 - Mode: NORM
- Time/div: 10 msec/div
- BWL: OFF

Check:

- displayed waveforms should have a constant band of less than 3 minor divisions
- there is no discernible periodic structure

Repeat the test for Time/div = 5 msec/div, 2 msec/div, 1 msec/div, and .5 msec/div and check as above.

3 Test of the ADCs

This is to verify proper operation of the ADCs at the four nominal sampling frequencies: 400, 200, 100, and 40 Ms/sec.

With both Channel 1 and Channel 2 inputs open, set the DSO as follows:

- turn on the CH1 trace
- Grid single
- Input couplings CH1 and CH2: 1 M Ω DC
- Input gain 50 mV/div
- Trigger:

SMART (COMPLEX) Trigger: OFF
Source: LINE
Coupling: AC
Mode: NORM

- Time/div = 10, 20, 50, 100 μ sec/div

For each of the four time bases above, check for CH1 and CH2:

- displayed waveform should lie within a band of less than 3 minor divisions
- Using the offset control move the trace for CH1 and CH2 slowly through the entire range and check that there is no significant change in the displayed trace. Repeat for channel 2.

4 Offset

Set the DSO as follows:

- turn on the trace for CH1
- Grid single
- Input set to GND
- Input gain 5 mV/div, offset zero
- Trigger:

SMART (COMPLEX) Trigger: OFF
Source: LINE
Coupling: AC
Mode: NORM

- Time/div = 50 μ sec/div
- BWL OFF

Switch between 50 Ω DC and GND, and 1 M Ω DC and GND.
Check:

- the trace should not move more than a minor division or 1 mV

Repeat the same test for CH2.

5 Input Impedance

Set the DSO CH1 input to 1 M Ω DC with any time base and gain.
Check with an ohmmeter:

- input impedance must be 1 M Ω \pm 2%

Set DSO CH1 input to 50 Ω , 20 mV/div with any time base.
Check:

- input impedance must be 50 Ω \pm 2%

Repeat 50 Ω test for 50, 100, 200, 500 and 1000 mV/div.

Repeat all impedance checks for CH2.

6 Front-End

Set the DSO as follows:

- turn on the trace for CH1
- Grid normal
- Input 50 Ω , gain 100 mV/div, offset zero
- Trigger:

SMART (COMPLEX) Trigger:	OFF
Source:	CH1
Coupling:	DC
Mode:	NORM
Delay:	50%
Level:	zero

- Time/div = .1 μ sec/div
- BWL OFF

Apply a 600 mV peak-to-peak 1 MHz square wave from a fast (less than 1 nsec) risetime function generator (for example TEK PG502) to CH1 input. Press the Interleaved Sampling button on the oscilloscope to turn on the RIS mode.

Check:

- There should be no large over-shoot at the rising and falling edge:
50 Ω : less than 10% overshoot
- Check the same at 10 mV/div, input 60 mV peak-to-peak
- Repeat the above for CH2, trigger source CH2

7

Internal Diagnostics and Calibration

The 9450 Internal Diagnostics and Calibration menu is entered by pressing the "Main Menu" button while keeping the lowest menu button depressed. To quickly check the performance of the scope, press the 'CALIBRATION Constants' button and then press 'Full Recalibration'. It is advisable to perform this type of check when the scope is in a stable condition after about 20 minutes of warm-up. Then enter 'Calibration Error Log' and you get a comprehensive summary of the scope's calibration status. If all the error status codes are zero, it is very likely that everything is OK, except for the linearity which is best checked by 'Chan 1+2 Full Test'. If you find error codes different from zero, you can find more information on the problem from the other 'Constants' menus or from the various 'Curves' menus. Before we turn to a description of the menus relevant to service, let us give the interpretation of the calibration error log.

7.1

Calibration Error Log

This is a handy tool to perform a quick and comprehensive internal performance check, without touching the acquisition settings. Just push 'Full Recalibration', then go to 'Calibration Error Log'. The result displayed is independent of your current time base, sensitivity and other acquisition settings. The conditions to be tested are set automatically during the recalibration. The error conditions are coded into binary bits, i.e. each bit set represents a certain error. The error status is represented in a hexadecimal number (4 bits = 1 nibble) for each acquisition condition, see Figure 1.

27-Apr-89
15:31:30

LeCroy

CALIBRATION ERROR LOG			
Vertical Calibration			
Chan 1+2 Calib Const	4 nibbles=(BWL OFF, 50Ω) (OFF, 1MΩ) (ON, 50Ω) (ON, 1MΩ) (8=Offset Range, 4=Offset Conv, 2=Gain Range, 1=Gain Conv)		
	CHAN1	CHAN2	
	5 mV	0	0
	10 mV	0	0
Chan 1+2 Full Test	20 mV	0	0
	50 mV	0	0
	.1 V	0	0
	.2 V	0	0
	.5 V	0	0
Full Re- calibration	1 V	0	0
	TMS Status	Working	Working
Calibration Error Log	4 nibbles = (400Ms) (200Ms) (100Ms) (40Ms)		
	Trigger Cal.	0	0 (2=No BWL, 1=BWL)
	Leveling Cal.	0	0 (2=Offset, 1=Gain Conv.)
More Consts	Phase Cal.	0	0 (4=Limits, 2=Fit, 1=Conv)
Return	TDC Calibration		0

Figure 1: Calibration Error Log

Vertical Calibration:

BWL ON/OFF and 50/1M input coupling makes 4 acquisition conditions per channel. The error status of each is represented by a nibble as explained on the display. The 4 error bits have the following meaning:

1=gain convergence: One or more of the 8 nominal DAC calibration points cannot be reached.

2=gain range: A multiplicative calibration parameter becomes too small (dgain < 0.95) such that there may not be sufficient variable gain.

4=offset convergence: One or more of the nominal points to calibrate the offset DAC cannot be reached.

8=offset range: The calibration found may go out of DAC range for certain offset values chosen (this problem should never occur at 5/10 mV)

Examples:

Code 303: Gain range and gain conv. problem at 1 M Ω , BWL ON and OFF

Code 4c6d: Offset conv. problem on all 4 coupling conditions
 Offset range problem at 1 M Ω BWL ON and OFF
 Gain range problem at 50 Ω BWL ON
 Gain conv. problem at 1 M Ω BWL ON

TMS status: Status must be 'working'. 'No memory' is indicated if the ADC board is not present. Other fatal messages may come up, like 'TMS Broken'.

The following tests report problems for each of the 4 possible sampling rates:

Ms/sec	400	200	100	40
μ sec/div	≤ 10	20	50	≥ 100
Int. osc. MHz	200	100	200	80
Number of ADC used	4	4	1	1

When sampling with one ADC, the reference ADC (No. 3 by soft. Wave numbered 0, 1, 2, 3 for software, 1, 2, 3, 4 for hardware) is used. RIS mode runs always at 100 Ms/sec with 1 ADC.

Trigger Calibration:

1=BWL ON
 2=BWL OFF

Example:

Code 3311: Problem at BWL ON for all 4 sampling rates.
 Problem BWL OFF at 400 and 200 Ms.

Leveling Calibration:

This part of the calibration levels all ADCs to reference ADC No. 3 (which is always at 80). For this it adjusts the offsets and gains associated to each S/H and ADC, respectively. The procedure may encounter the following problems:

- 1=gain convergence: ADC gain correction not possible for one or more ADCs.
- 2=offset: Offset cannot be adjusted for one or more ADCs.

Phase Calibration:

This part aligns the 4 S/Hs in time to better than 20 psec by an iterative procedure. There is no need to go into more detail. The error code should be zero. However, for the moment ls may appear on some units. It is acceptable for the time being, as correct operation is not impaired by this.

TDC Calibration:

The Interpolating TDC is calibrated at 40, 100 and 200 Ms/sec. If it is OK, error code is equal to zero.

Examples:

Leveling Cal. Code 2300: Offset problem at 400 and 200 Ms
Gain conv. problem at 200 Ms

That's all that is required for a quick but complete internal check of the scope. If there remain error codes (not equal to zero) the following menus may be used to get more detailed information on possible problems and failures.

7.2 Chan 1+2 Full Test

The DC non-linearity is analyzed automatically for BWL ON/OFF, 50/1M Ω coupling and both channels for the sampling rate you have set. The last two lines at the bottom of the table list the largest non-linearities found for 5 mV/div and all other gains. The test should be done for the 4 possible sampling rates 40, 100, 200 and 400 Ms/sec, i.e. for time bases 100, 50, 20 and 10 μ sec/div. However, the current sampling rate is not displayed. In order to change the rate, one has to leave the menu and set the time/div appropriate to the required sampling rate, see table in 7.1. The non-linearities should not be larger than 3% for 5 mV/div, and 2% for > 5 mV/div, see Figure 2.

27-Apr-89
16:10:15

LeCroy

		FULL DC NON-LINEARITY ANALYSIS Srate 400Ms/s							
		CH1				CH2			
Chan 1+2	BW-Limit	OFF	ON	OFF	ON	OFF	ON	OFF	ON
Calib Const	50 Ω: Max. Deviations (in %)								
	5 mV	-.5/ .4	-.4/ .4	-.2/ .5	-.2/ .5	-.2/ .5	-.2/ .5	-.2/ .5	-.2/ .5
	10 mV	-.6/ .5	-.4/ .7	-.8/ .1	-.8/ .1	-.8/ .1	-.8/ .1	-.8/ .1	-.8/ .1
Chan 1+2	20 mV	-.7/ .9	-.6/ .4	-.9/ .1	-.9/ .1	-.9/ .1	-.9/ .1	-.9/ .1	-.9/ .1
Full Test	50 mV	-.7/ .2	-.6/ .4	-.8/ .1	-.8/ .1	-.8/ .1	-.8/ .1	-.8/ .1	-.8/ .1
	.1 V	-.7/ .2	-.6/ .3	-.8/ .2	-.8/ .2	-.8/ .2	-.8/ .2	-.8/ .2	-.8/ .2
	.2 V	-.8/ .2	-.6/ .3	-.9/ .2	-.9/ .2	-.9/ .2	-.9/ .2	-.9/ .2	-.9/ .2
	.5 V	-.7/ .3	-.5/ .3	-.8/ .2	-.8/ .2	-.8/ .2	-.8/ .2	-.8/ .2	-.8/ .2
Full Re-calibration	1 V	-.5/ .4	-.4/ .5	-.5/ .4	-.5/ .4	-.5/ .4	-.5/ .4	-.5/ .4	-.5/ .4
Calibration Error Log	1 MΩ: Max. Deviations (in %)								
	5 mV	-.2/ .8	-.2/ .5	-.4/ .3	-.4/ .3	-.4/ .3	-.4/ .3	-.4/ .3	-.4/ .3
	10 mV	-.2/ .4	-.5/ .1	-.6/ .1	-.6/ .1	-.6/ .1	-.6/ .1	-.6/ .1	-.6/ .1
	20 mV	-.6/ -.0	-.4/ .1	-.5/ .2	-.5/ .2	-.5/ .2	-.5/ .2	-.5/ .2	-.5/ .2
	50 mV	-.5/ .1	-.4/ .1	-.6/ -.1	-.6/ -.1	-.6/ -.1	-.6/ -.1	-.6/ -.1	-.6/ -.1
	.1 V	-.0/ .6	-.4/ .2	-.7/ .0	-.7/ .0	-.7/ .0	-.7/ .0	-.7/ .0	-.7/ .0
More Consts	.2 V	-.7/ -.0	-.5/ .2	-.6/ .2	-.6/ .2	-.6/ .2	-.6/ .2	-.6/ .2	-.6/ .2
	.5 V	-.6/ .1	-.5/ .2	-.6/ .0	-.6/ .0	-.6/ .0	-.6/ .0	-.6/ .0	-.6/ .0
	1 V	.0/ .7	-.5/ .2	-.6/ -.0	-.6/ -.0	-.6/ -.0	-.6/ -.0	-.6/ -.0	-.6/ -.0
Return	Summary	5mV **	-0.5/ 0.8 **	**	**	-0.4/ 0.6 **	**	-0.4/ 0.6 **	**
	> 5mV	**	-0.8/ 0.7 **	**	**	-0.9/ 0.7 **	**	-0.9/ 0.7 **	**

Figure 2: CH 1+2 Linearity Analysis

7.3 Chan 1+2 Gain Curves (optional)

The variable gain curve is displayed for both channels for the acquisition parameters set. The center line is at inverse gain 1.75 (e.g. 1.75 V/div total gain for fixed gain at 1 V/div) and vertical units are 0.25/div. So the top border is at 2.75 and the bottom at 0.75. Horizontally the curve goes from DAC -8 V at the left to 0 V at the right. The curves should be smooth and go well above the inverse gain 2.5 and 1.0 limits indicated, where the variable gain is at .4 and 1., see Figure 3.

20-Apr-89
16:00:09

erate 400Ms/s bw1 OFF Ch 1: 10 mV 50 Ch 2: 10 mV 50 LeCroy

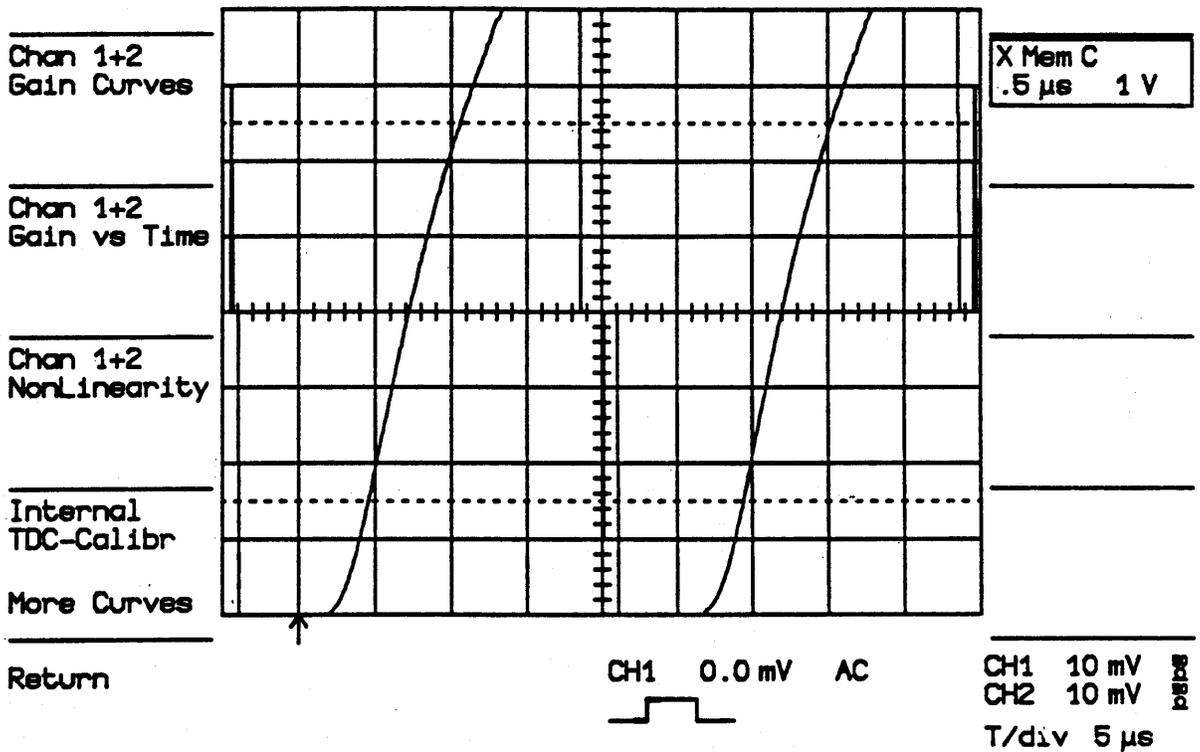


Figure 3: CH 1+2 Gain Curves

7.4 Chan 1+2 Gain vs Time (optional)

The gain variations over time are displayed for both channels for the acquisition parameters set. One vertical div is 0.5%. At present, the variations should stay within $\pm 3\%$, see Figure 4.

20-Apr-89
16:13:00

srate 400Ms/s bwl ON Ch 1: 10 mV 50 Ch 2: 10 mV 50 LeCroy

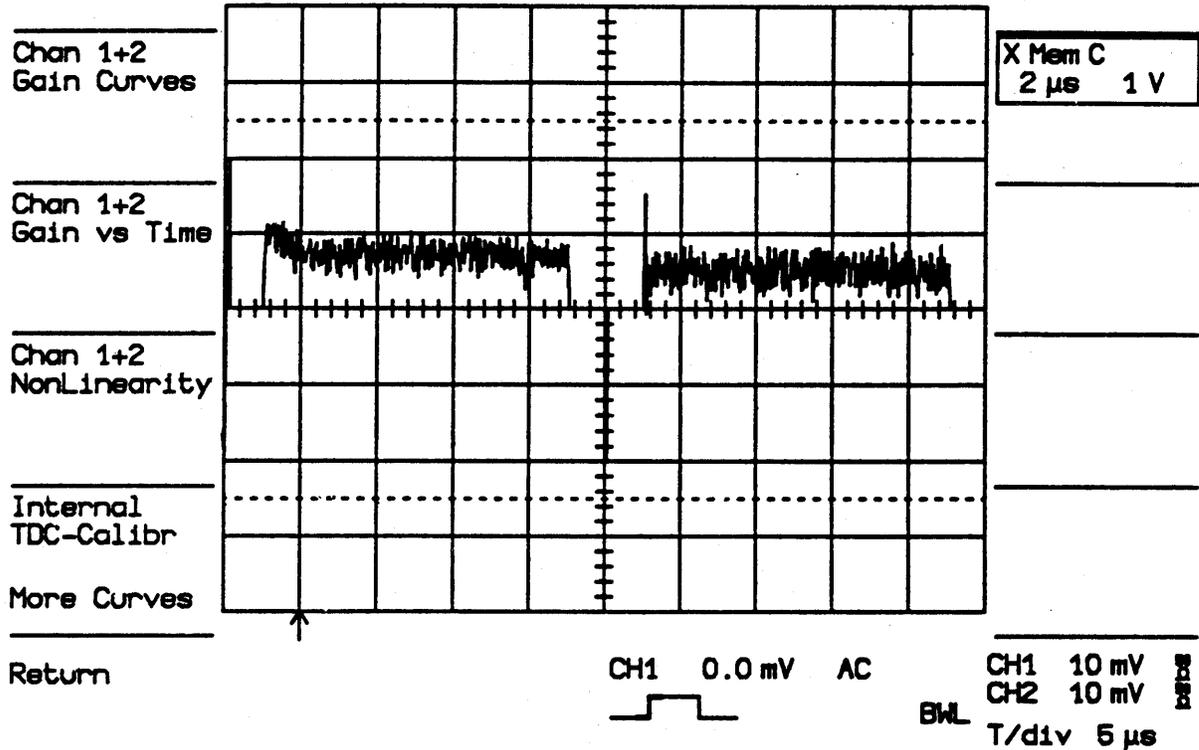


Figure 4: CH 1+2 Gain vs Time

8 Bandwidth at 50 Ω Input Impedance

The purpose of this test is to ensure that the entire 9450 system has a bandwidth of at least 350 MHz at 50 Ω input impedance.

Set up a Leveled Sine Wave Generator (for example Marconi 2019A):

- Frequency .5 MHz
- Amplitude 2.8 V p-p (maximum for Marconi)

Connect the generator output to CH1 input.

Turn off all the traces except CH1.

Set the trigger:

SMART (COMPLEX) Trigger: OFF
 Source: CH1
 Coupl: HF
 Mode: NORM
 Delay: zero
 Level: zero

Set input CH1:

Coupl: 50 Ω
 Gain: 1V/div
 Var Gain: 1
 Offset: zero

Set the time base:

-Time/div .5 μ sec/div
 -Interleaved ON

Bandwidth limit: OFF

Adjust the generator output amplitude and CH1 offset to get a 5 division p-p sine wave, or maximum possible from the generator for the large V/div gains (Marconi 2.8 V p-p maximum).

Increase the generator frequency, while decreasing the Time/div until the sine wave p-p amplitude is $.7 * 5$ divisions = 3.5 divisions (3 dB point), or 70% of the initial amplitude at .5 MHz.

Check:

- the frequency of the generator must be at least 350 MHz

Repeat the above for CH1 and CH2 for input Volts/div = .5 V, .2 V, .1 V, 50 mV, 20mV, 10 mV, 5 mV.

Set the bandwidth limiter ON.

Repeat the same test as for the bandwidth limiter OFF.

Check:

- the frequency of the generator at the 3 dB point must be 70 MHz \pm 20%

9 Bandwidth at 1 M Ω Input Impedance (at Probe Tip)

The purpose of this test is to ensure that the entire 9450 system has a bandwidth of at least 200 MHz at probe tip at 1 M Ω input impedance.

Set up a Tektronix SG 503 Leveled Sine Wave Generator or equivalent (note for the Marconi that the maximum amplitude is smaller than 5 V):

- Frequency .5 MHz
- Amplitude 5 V p-p

Terminate the output of the SG 503 via a 50 Ω feedthrough and connect it to the CH1 input through a 300 MHz 10 M Ω /10 probe using the probe tip - BCN jack. Make sure the probe has a 300 MHz bandwidth (for example our model P9020 M15x10HF), and is perfectly adjusted, low frequency and high frequency (see brochure enclosed with probe).

Turn off all the traces except CH1.

Trigger:

```

SMART (COMPLEX) Trigger: OFF
Source:                  CH1
Coupl:                   HF
Mode:                    NORM
Delay:                   zero
Level:                   zero

```

Set the input of CH1:

```

- Coupl:                 1 M $\Omega$  AC
- Gain:                  .1 V/div
- Var:                   Gain 1
- Offset:                zero

```

Set the time base:

```

- Time/div               .5  $\mu$ sec/div
- Interleaved            ON

```

Bandwidth limit OFF

Adjust the SG 503 output amplitude and the CH1 offset to provide a 5 division p-p sine wave.

Increase the SG 503 frequency, while decreasing the Time/div until the sine wave p-p amplitude is $.7 * 5$ divisions = 3.5 divisions (3 dB point).

Check:

- the frequency of the SG 503 must be at least 200 MHz
Repeat the above for CH1 and CH2 for input Volts/div = 50 mV, 20 mV, 10 mV, and 5 mV.

Set the bandwidth limiter ON.

Repeat the same test as for bandwidth limiter OFF.

Check:

- the frequency of the SG 503 at the 3 dB point must be $75 \text{ MHz} \pm 20\%$

10 Trigger Level for DC and HFRej

Set up any sine wave generator, capable of generating sine waves to 500 Hz, for example Intron IFG-422 or Topward TFG-8101:

- frequency 500 Hz

Connect the output of the generator to EXT input and to CH1 via a coaxial T-connector. The cable length from EXT to CH1 must be short, at most 2 nsec.

Set up the DSO:

Turn off all the traces except CH1.

Set the trigger:

SMART (COMPLEX) Trigger:	OFF
Source:	CH1
Coupl:	DC
Mode:	NORM
Delay:	50% Pretrigger
Level	zero

Set the input CH1:

- Coupl:	1 M Ω , DC
- Gain:	.5 V/div
- Var:	Gain 1
- Offset:	zero

Set the time base:

- Time/div:	.2 msec/div
-------------	-------------

Adjust the sine wave generator's output amplitude to get 8 divisions p-p, corresponding to a 2 V amplitude. It is important that the offset of the input is set to zero (use Panel Status to verify). Use the offset adjustment of the sine wave generator to center the signal with respect to the screen. Later, the test on the EXT trigger level requires that the signal has an absolute range of ± 2 V.

Check:

- the sine wave must pass through the horizontal center of the screen (50% pretrigger line) at the vertical position zero (vertical center) within ± 3 minor divisions

Repeat for the following conditions:

- trigger slope POS and NEG (verify slope at check point)
- trigger coupling DC and HFRej

Set the trigger level to + 1.5 V.

Check:

- the sine wave must pass the horizontal center at + 3 divisions within ± 3 minor divisions

Repeat for the following conditions:

- trigger slope POS and NEG (verify slope at check point)
- trigger coupling DC and HFRej

Set the trigger level to - 1.5 V.

Check:

- the sine wave must pass the horizontal center at - 3 divisions within ± 3 minor divisions

Repeat for the following conditions:

- trigger slope POS and NEG (verify slope at check point)
- trigger coupling DC and HFRej

Disconnect the input from CH1 and connect it to input of CH2.

Turn off all the traces except for CH2.

Set input CH2:

- Coupl:	1 M Ω , DC
- Gain:	.5 V/div
- Var:	Gain 1
- Offset:	zero

Set the trigger source to CH2.

Repeat the above check procedure for CH2.

Leave the input connected to CH2, leave the trace of CH2 on.

Set trigger source to EXT.

Repeat the above check procedure for EXT trigger, but observing the effect on CH2. The tolerance for the level crossing is ± 4 minor divisions for the EXT trigger level.

11 Bandwidth for EXT Trigger

Set up a sine wave generator (for example Marconi 2019A):

- Frequency 250 MHz
- Amplitude 2.8 V p-p (maximum for Marconi)

Connect the output of the generator to EXT input and to CH1 using a coaxial T-connector. The cable length between EXT and CH1 must be short (at most 2 nsec).

Set up the DSO:

Turn off all the traces except CH1.

Set the trigger:

SMART (COMPLEX) Trigger:	OFF
Source:	EXT
Coupl:	DC
Mode:	NORM
Delay	50%
Level	zero

Apply sine wave signal 3 V p-p of 75 MHz. Adjust PULSE Width to 7.5 nsec for both < and >, and switch between WIDTH < and WIDTH >.

Check:

- Width < 7.5 nsec scope should trigger
- Width > 7.5 nsec scope should NOT trigger

Set the sine wave generator to 230 MHz. Adjust PULSE WIDTH to 2.5 nsec and switch between WIDTH < and WIDTH >.

Check:

- Width < 2.5 nsec scope should trigger
- Width > 2.5 nsec scope should NOT trigger

Repeat the above test for CH2.

12.2 Trigger on Interval Width <

Set up the DSO:

Turn off all the traces except CH1.

Set the trigger:

- Smart/Complex Trigger ON
- Trigger Type SINGLE SOURCE
- Width Type INTERVAL WIDTH
- Source CH1
- Coupl AC
- Slope +
- Level zero
- Delay 20% Pretrigger

Set the input of CH1:

- Coupl 50 Ω
- Gain .5 V/div
- Var Gain 1
- Offset zero

Set the time base:

- Time/div 2 nsec/div
- Interleaved ON

Apply a sine wave signal 3 V p-p of 200 MHz to CH1. Turn to INTERVAL Width < and adjust width to 10 nsec.

Check:

- 200 MHz: Width < 10 nsec, scope should trigger
- 110 MHz: Width < 10 nsec, scope should trigger
- 91 MHz: Width < 10 nsec, scope should NOT trigger

Set frequency to 7 MHz and INTERVAL Width to < 15 nsec.

Check:

- 74 MHz: Width < 15 nsec, scope should trigger
- 61 MHz: Width < 15 nsec, scope should NOT trigger

12.3 Trigger on Interval Width >

Set up the DSO:

Turn off all the traces except CH1.

Set the trigger:

- Smart/Complex Trigger ON
- Trigger Type SINGLE SOURCE
- Width Type INTERVAL WIDTH
- Source CH1
- Coupl AC
- Slope +
- Level zero
- Delay 20% Pretrigger

Set the input of CH1:

- Coupl 50 Ω
- Gain .5 V/div
- Var Gain 1
- Offset zero

Set the input of CH1:

- Coupl 50 Ω
- Gain .5 V/div
- Var Gain 1
- Offset zero

Set the time base:

- Time/div 2 μ sec/div
- Interleaved ON

Set the sine wave generator to 1 MHz and put a signal on to CH1. Adjust amplitude to get about a 6 division p-p signal.

Select trigger mode SINGLE (HOLD).

Turn DUAL GRID ON.

Turn ON EXPAND A with CH1 as the source.

Adjust TIME MAGNIFIER to .1 μ sec/div.

Turn horizontal POSITION on DISPLAY CONTROL to select the 3rd period of the displayed waveform.

Put the expanded trace on the second grid using the vertical POSITION knob, see Figure 5.

21-Apr-89
10:12:18

LeCroy

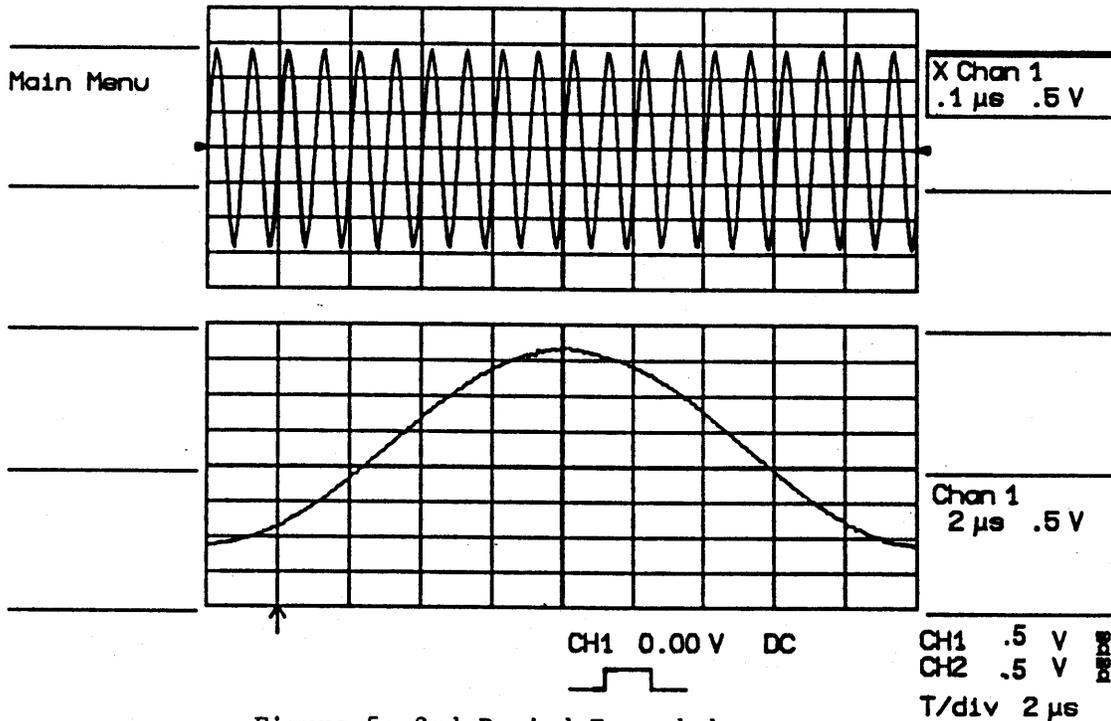


Figure 5: 3rd Period Expanded

Turn ON EXPAND B with CH1 as the source.

Adjust TIME MAGNIFIER to $.1 \mu\text{sec}/\text{div}$.

Turn the horizontal POSITION on DISPLAY CONTROL to select the 13th period.

Overlay the 2 expanded traces on the lower grid using vertical and horizontal POSITION knobs on DISPLAY CONTROL, see Figure 6.

26-Apr-89
16:28:42

LeCroy

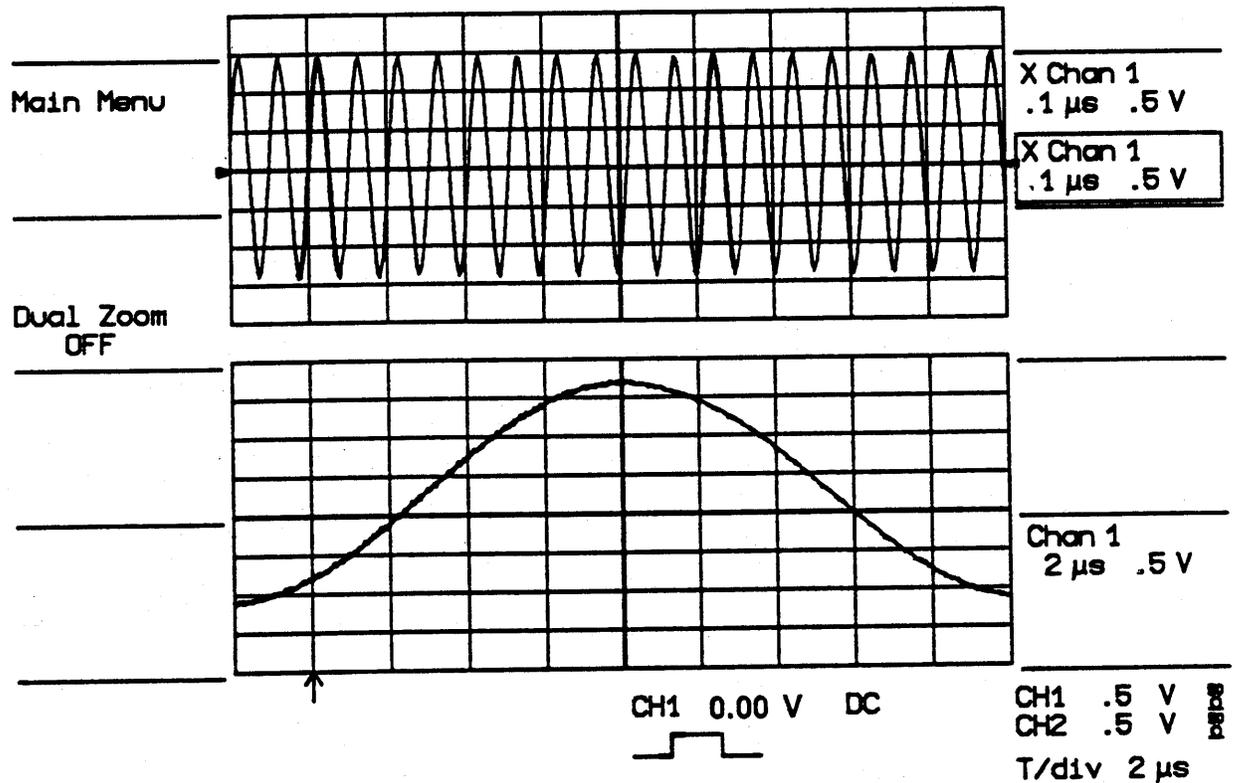


Figure 6: 3rd and 13th period overlaid

Measurement of the time difference:

- turn the RELATIVE TIME CURSORS ON
- put the REFERENCE cursor on top of the 3rd period (check on upper grid)
- Put the DIFFERENCE cursor on top of the 13th period (check on upper grid) and adjust alignment of the two cursors (check on lower grid), see Figure 7.

25-Apr-89
17:01:35

LeCroy

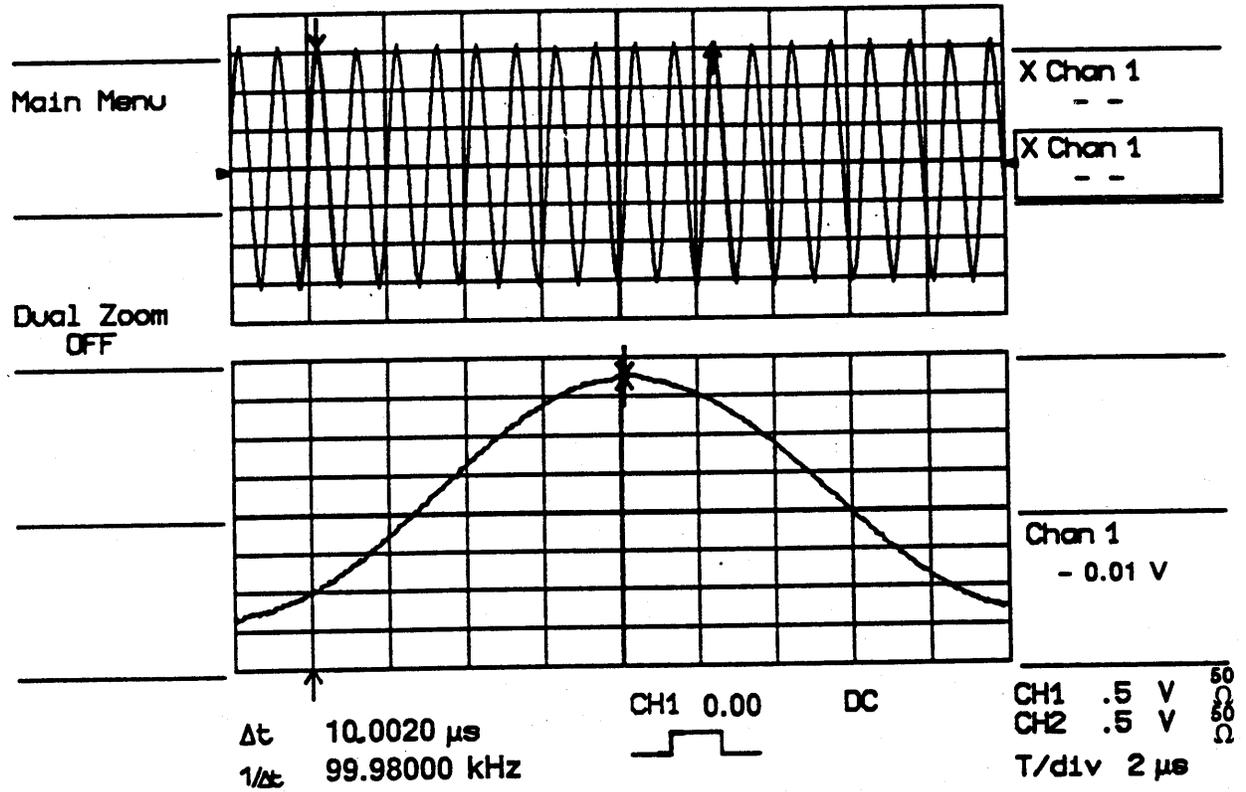


Figure 7: Aligned cursors

Turn DUAL ZOOM ON.

Turn TIME MAGNIFIER (DISPLAY CONTROL) to select the maximum expansion.
Refine adjustment of the two cursors, see Figure 8.

26-Apr-89
9:52:13

LeCroy

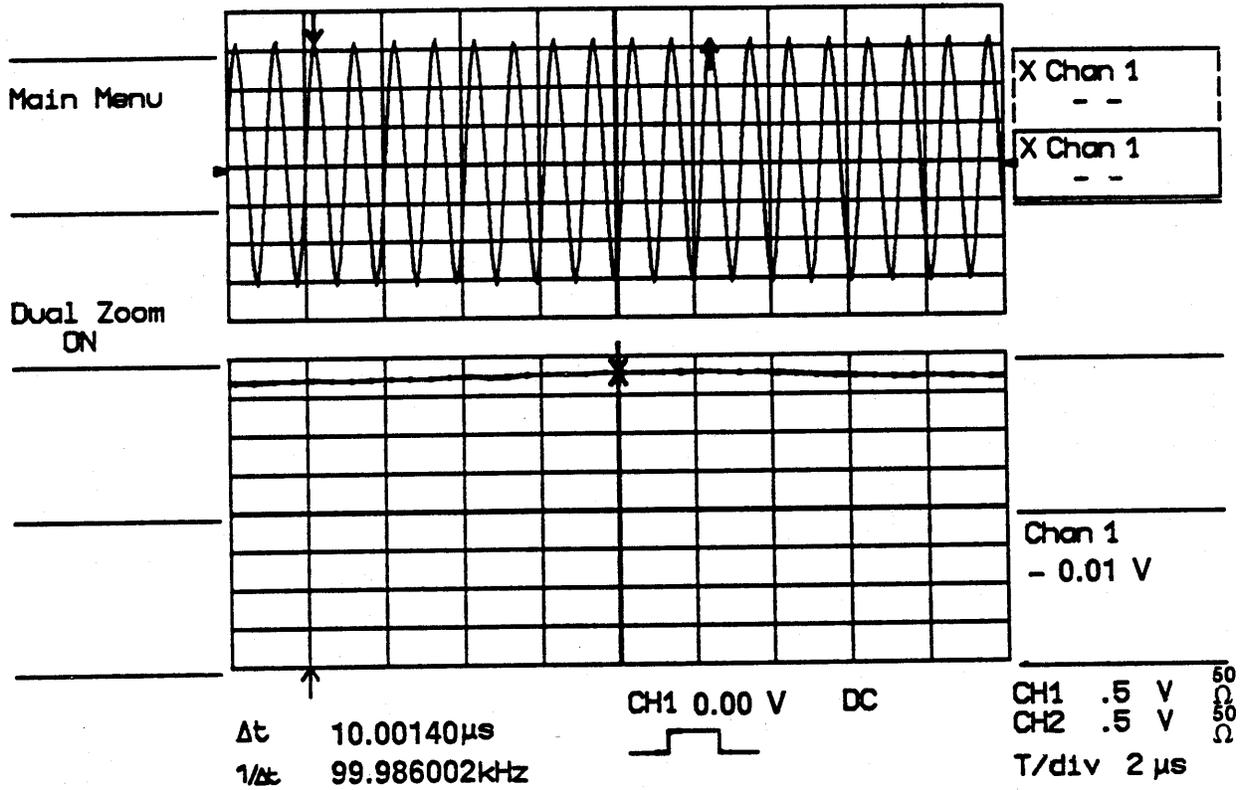


Figure 8: Alignment of cursors with maximum expansion.

Check:

- The difference time reading must be within 9.998 and 10.002 μs

RH/10.11.89

SERVICE INFORMATION

AND

PROCEDURES

The following two adjustments have to be made after the front-end 9450-7 has been mounted into the scope:

1. 9420 50 Ohm Overload Protection Adjustment Procedure

Two different thermocouples exist; an old type wrapped in a heat shrink tube and a new type wrapped in copper wire. The adjustment procedures are the same for old and new thermocouple, but they depend on the Revision of the 9450-7 front-end board:

Procedure for 9450-7 up to Rev D:

- The front-end has to be in the DSO with the RF shields (aluminum covers) mounted and the upper DSO cover closed. Warm the scope up for 20 minutes.
- Make sure the 9450-7 front-end board is at ECO 1003, MCN 1 or up.
- Apply 5.5 V to CH1 set to 50 Ohm. Wait for 30 sec. Adjust CH1 overload detection (potentiometer through opening in 9450-7 aluminum cover) such that pin 10 of A21 is about 200 mV below threshold on pin 11 of A21 (about 1.6 V).
- Apply 7.0 V to CH1. Adjust potentiometer such that the overload trips within 5 to 20 seconds. Between each test, allow the thermocouple to cool to ambient temperature. Make sure it does not come on by itself after power on. It should not come on with a voltage of 5.0 V applied to the input.
- The same for CH2, where the adjustment is made at pin 8 of A21 for the threshold at pin 9 of A21.

Procedure for 9450-7 at Rev F and up:

- The front-end has to be in the DSO with the RF shields (aluminum covers) mounted and the upper DSO cover closed. Warm the scope for 20 minutes.
- Put jumpers on pins 1 and 2 of J12 (CH1) and 1 and 2 of J10 (CH2). This disables triggering of the overload system. Pins 1 and 3 off J12 are on the side facing the potentiometers:

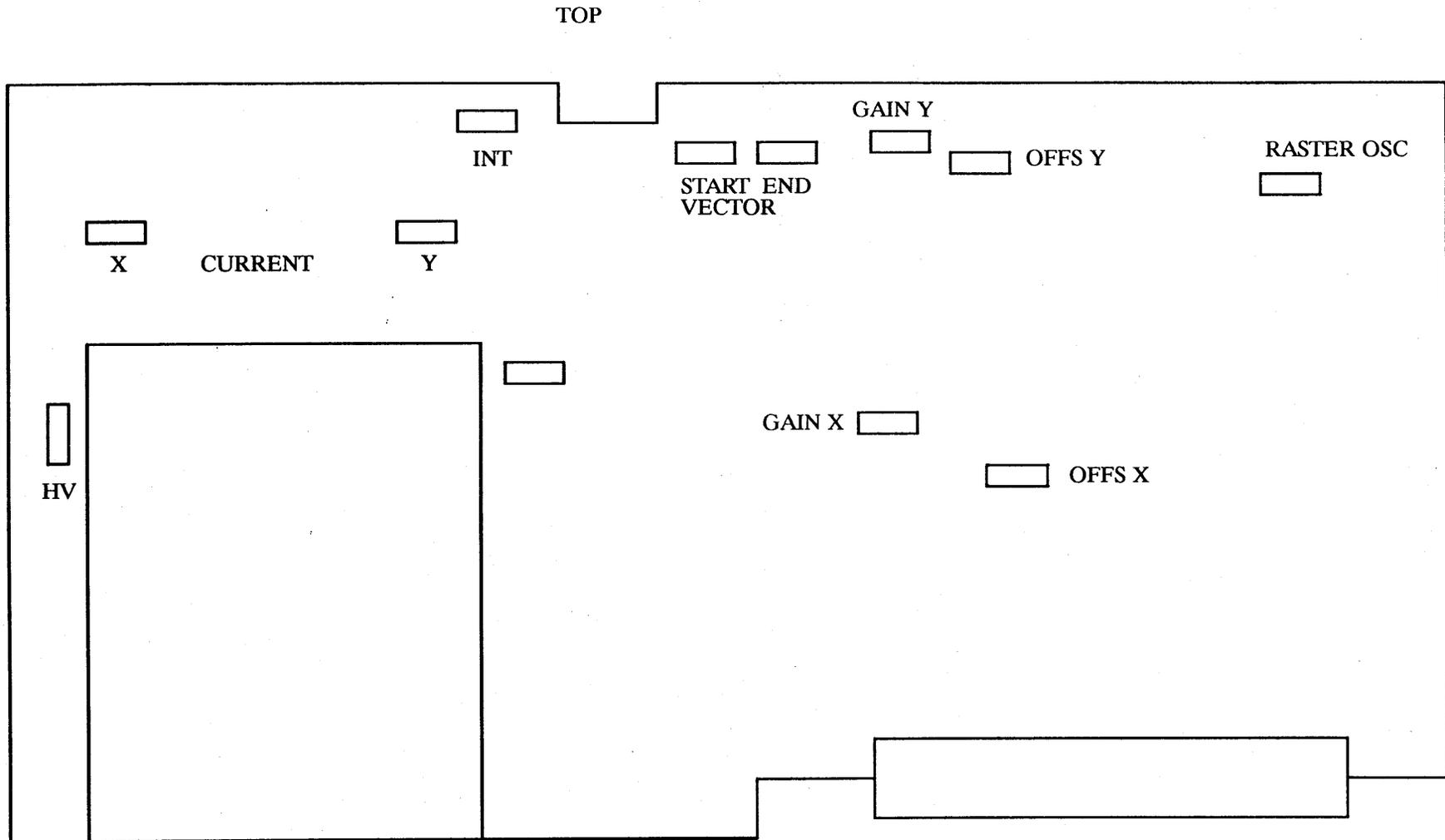
J10	pin2 pin4 pin2 pin4		J12
	pin1 pin3 pin1 pin3		

R15
R16

- Select 0.1 V/div, 50 Ohm, 1 sec/div for the channel to be adjusted.
- Probe on pins 3 of J10 and J12.
- Apply 6.0 V on the input and wait for 30 sec. Adjust potentiometer R15 (CH1) or R16 (CH2) such that you get on pins 3 of J12 (CH1) or J10 (CH2) 0 V within 40 mV.
- Remove the jumpers. Check that for an applied voltage of 5.2 v the system does not trigger. It should switch to overload within less than 10 seconds for 7.0 V. Between each test, allow the thermocouple to cool to ambient temperature.

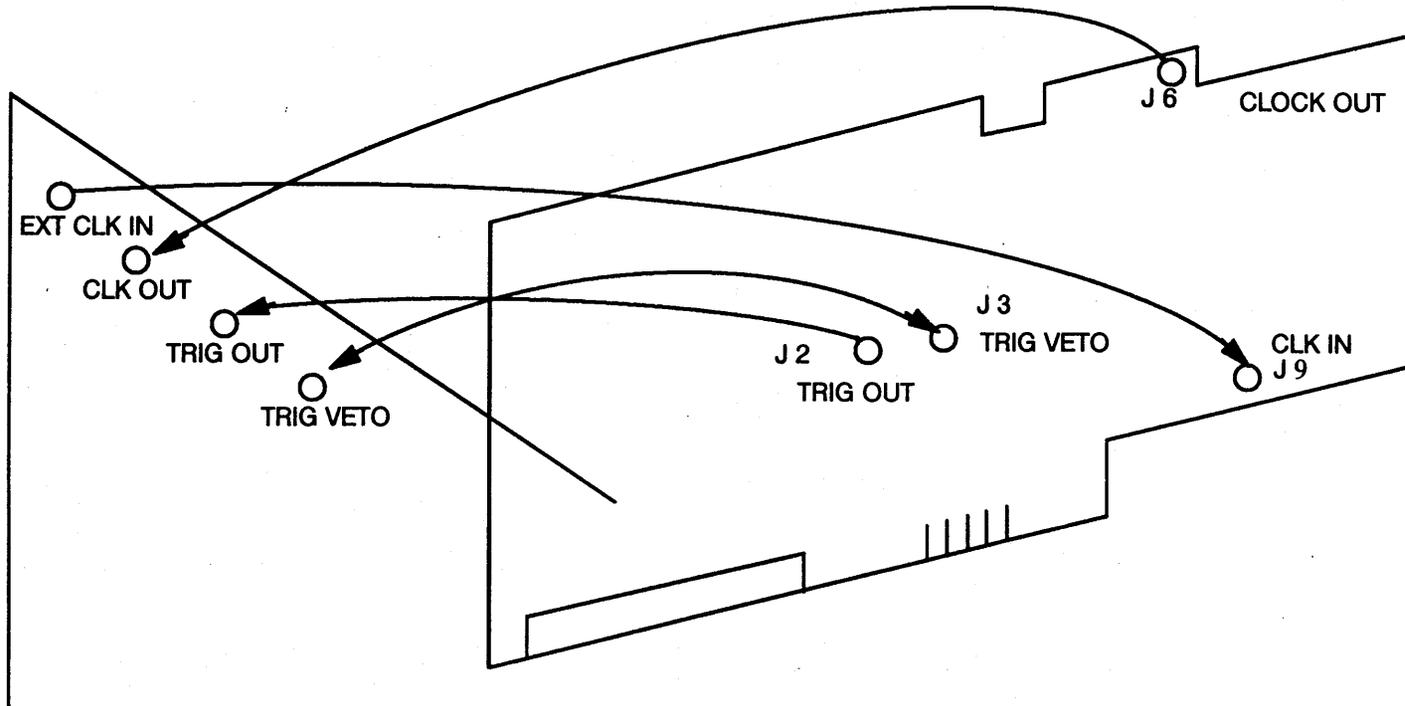
2. 9450 EXT Trigger Level and Compensation

- 1) Set scope to CH1 50 Ohm, 20 mV/div, offset zero, 10 usec/div, BWL OFF.
Normal Trigger EXT DC NORM, offset zero, delay 50%.
- 2) Apply 1 kHz sine wave 120 mV peak-to-peak with zero offset to CH1 through EXT.
- 3) Adjust EXT trigger level with potentiometer R29 on 9450-7 in order to center the POS and NEG slope signal crossing at trigger point around zero.
- 4) Set time base to 0.1 usec/div.
Recheck trigger levels according to points 2) and 3) with a 1 MHz sine wave.
If not OK at 1 MHz, adjust the EXT HHZ406 as follows, using the 9450-7 Extension Cable Set:
 - a. Set time base to 10 usec/div. Set TRIG to EXT. Apply a 10 KHz 3 V peak-to-peak square wave from a TFG-8101/FG-422 or equivalent signal generator to EXT. Probe HHZ406 output at pin 6 with an adjusted probe and adjust the 3 capacitors on the HHZ406 to get a flat square wave without under/overshoot.
 - b. Set scope to EXT/10. Apply a 20 v peak-to-peak square wave to EXT and probe at pin 6 of the TRIG HHZ406 output. Adjust the 3 capacitors to get a flat square wave without over/undershoot. Go back to point a. and check again.



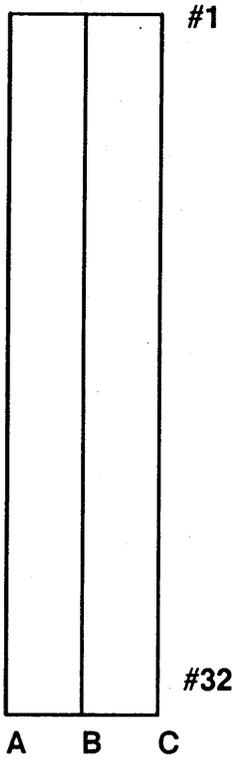
9450 - 2 POT LAYOUT

9450-4 CABLING DIAGRAM

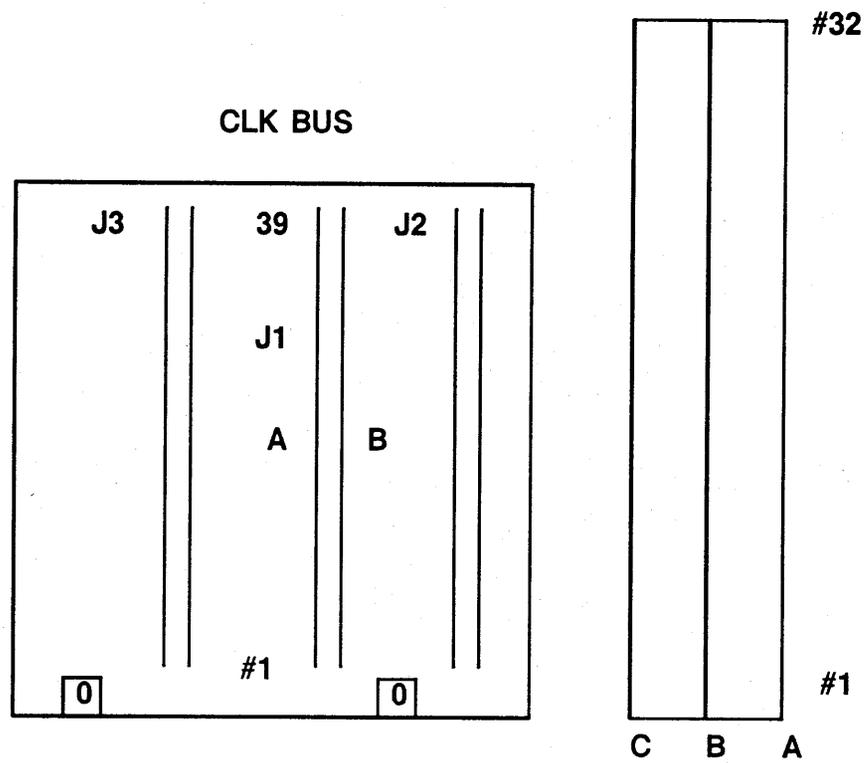


BOARD CONNECTOR PIN-OUT

DISPLAY



PROCESSOR, ADC, TDC

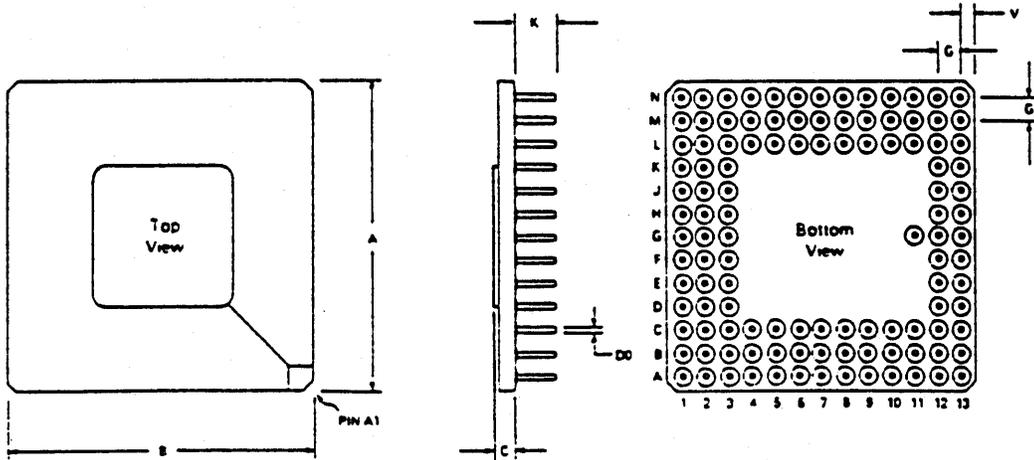


SEEN
FROM
TOP - FRONT

11.2 PACKAGE DIMENSIONS AND PIN ASSIGNMENT

MC68020
 RC Suffix Package
 Preliminary
 Mechanical
 Detail

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	34.18	34.90	1.345	1.375
B	34.18	34.90	1.345	1.375
C	2.67	3.17	.100	.150
DB	.46	.51	.017	.019
E	2.54 BSC		.100 BSC	
K	4.32	4.82	.170	.190
V	1.74	2.28	.065	.095



11

Pin Number	Function	Pin Number	Function	Pin Number	Function
A1	\overline{BSACK}	D1	VCC	K1	GND
A2	A1	D2	VCC	K2	\overline{HALT}
A3	A31	D3	VCC	K3	GND
A4	A28	D4-D11	-	K12	D1
A5	A26	D12	A4	K13	D0
A6	A23	D13	A3	L1	\overline{AS}
A7	A22	E1	$\overline{FC0}$	L2	$\overline{R \overline{W}}$
A8	A19	E2	\overline{RMC}	L3	D30
A9	VCC	E3	VCC	L4	D27
A10	GND	E12	A2	L5	D23
A11	A14	E13	\overline{OCS}	L6	D19
A12	A11	F1	SIZ0	L7	GND
A13	A8	F2	FC2	L8	D15
B1	GND	F3	FC1	L9	D11
B2	\overline{BG}	F12	GND	L10	D7
B3	\overline{BR}	F13	\overline{IPEND}	L11	GND
B4	A30	G1	\overline{ECS}	L12	D3
B5	A27	G2	SIZ1	L13	D2
B6	A24	G3	\overline{DBEN}	M1	\overline{DS}
B7	A20	G11	VCC	M2	D29
B8	A18	G12	GND	M3	D26
B9	GND	G13	VCC	M4	D24
B10	A15	H1	\overline{CDIS}	M5	D21
B11	A13	H2	\overline{AVEC}	M6	D18
B12	A10	H3	$\overline{DSACK0}$	M7	D16
B13	A6	H12	IPL2	M8	VCC
C1	\overline{RESET}	H13	GND	M9	D13
C2	CLOCK	J1	$\overline{DSACK1}$	M10	D10
C3	GND	J2	\overline{BERR}	M11	D6
C4	A0	J3	GND	M12	D5
C5	A29	J12	$\overline{IPL0}$	M13	D4
C6	A25	J13	$\overline{IPL1}$	N1	D31
C7	A21	J2	$\overline{IPL1}$	N2	D28
C8	A17	J3	GND	N3	D25
C9	A16	J12	$\overline{IPL0}$	N4	D22
C10	A12	J13	$\overline{IPL1}$	N5	D20
C11	A9	J2	$\overline{IPL1}$	N6	D17
C12	A7	J3	GND	N7	GND
C13	A5	J12	$\overline{IPL0}$	N8	VCC
		J13	$\overline{IPL1}$	N9	D14
				N10	D12
				N11	D9
				N12	D8
				N13	VCC

The VCC and GND pins are separated into three groups to provide individual power supply connections for the address bus buffers, data bus buffers, and all other output buffers and internal logic.

Group	VCC	GND
Address Bus	A9, D3	A10, B9, C3, F12
Data Bus	M8, N8, N13	L7, L11, N7, K3
Logic	D1, D2, E3, G11, G13	G12, H13, J3, K1
Clock		B1

SECTION 11 ORDERING INFORMATION AND MECHANICAL DATA

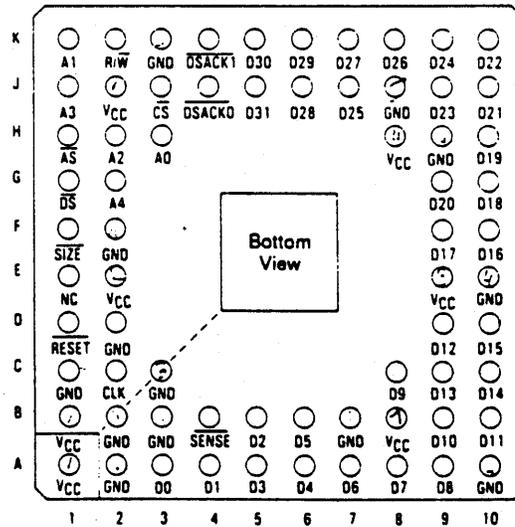
This section contains the pin assignments and package dimensions of the MC68881. In addition, detailed information is provided to be used as a guide when ordering.

11.1 STANDARD MC68881 ORDERING INFORMATION

Package Type	Frequency (MHz)	Temperature	Order Number
Pin Grid Array	12.5	0°C to 70°C	MC68881RC12
RC Suffix	16.67	0°C to 70°C	MC68881RC16

11.2 PIN ASSIGNMENTS

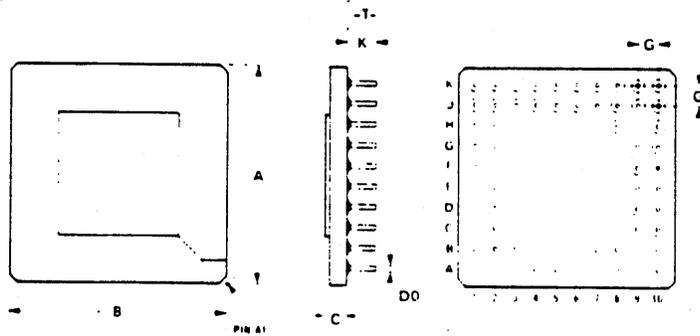
68-PIN GRID ARRAY



11

11.3 PACKAGE DIMENSIONS

RC SUFFIX
PIN GRID ARRAY
CASE 765A-03



- NOTES
1. DIMENSIONS A AND B ARE DATUMS AND THE DATUM SURFACE.
 2. POSITIONAL TOLERANCE FOR LEADS BE PLACES @ 0.010 (0.004) IN (0.254) MM.
 3. DIMENSIONS C AND TOLERANCE PER ANSI Y14.5M (1987).
 4. CONTROLLING DIMENSION INCH.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	26.67	27.14	1.051	1.071
B	26.67	27.14	1.051	1.071
C	1.91	2.66	0.075	0.105
D	1.43	1.68	0.057	0.066
G	1.27	1.27	0.050	0.050
K	4.00	4.81	0.157	0.190

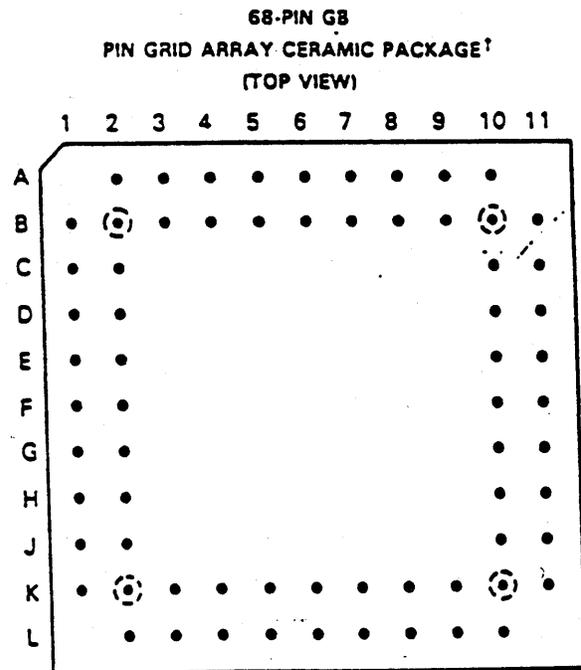
TMS32020 DIGITAL SIGNAL PROCESSOR

MARCH 1985—REVISED MAY 1986

- 200-ns Instruction Cycle Time
- 544 Words of Programmable On-Chip Data RAM
- 128K Words of Data/Program Space
- Sixteen Input and Sixteen Output Channels
- 16-Bit Parallel Interface
- Directly Accessible External Data Memory Space
- Global Data Memory Interface
- 16-Bit Instruction and Data Words
- 32-Bit ALU and Accumulator
- Single-Cycle Multiply/Accumulate Instructions
- 0 to 16-Bit Scaling Shifter
- Bit Manipulation and Logical Instructions
- Instruction Set Support for Floating-Point Operations
- Block Moves for Data/Program Management
- Repeat Instructions for Efficient Use of Program Space
- Five Auxiliary Registers and Dedicated Arithmetic Unit for Indirect Addressing
- Serial Port for Direct Codec Interface
- Synchronization Input for Synchronous Multiprocessor Configurations
- Wait States for Communication to Slow Off-Chip Memories/Peripherals
- On-Chip Timer for Control Operations
- Three External Maskable User Interrupts
- Input Pin Polled by Software Branch Instruction
- Programmable Output Pin for Signalling External Devices
- 2.4-Micron NMOS Technology
- Single 5-V Supply
- On-Chip Clock Generator

PIN ASSIGNMENTS

PIN	FUNCTION	PIN	FUNCTION	PIN	FUNCTION
A2	D8	C11	CLKOUT1	J10	\overline{PS}
A3	D10	D1	D4	J11	\overline{IS}
A4	D12	D2	D3	K1	A0
A5	D14	D10	CLKOUT2	K2	A1
A6	VCC	D11	XF	K3	A3
A7	\overline{HOLD}	E1	D2	K4	A5
A8	\overline{RS}	E2	D1	K5	A7
A9	CLKX	E10	\overline{HOLDA}	K6	A8
A10	VCC	E11	DX	K7	A10
B1	VSS	F1	D0	K8	A12
B2	D7	F2	\overline{SYNC}	K9	A14
B3	D9	F10	FSX	K10	\overline{DS}
B4	D11	F11	X2/CLKIN	K11	VSS
B5	D13	G1	$\overline{INT0}$	L2	VSS
B6	D15	G2	$\overline{INT1}$	L3	A2
B7	\overline{BIO}	G10	X1	L4	A4
B8	READY	G11	\overline{BR}	L5	A6
B9	CLKR	H1	$\overline{INT2}$	L6	VCC
B10	VCC	H2	VCC	L7	A9
B11	\overline{TACK}	H10	\overline{STRB}	L8	A11
C1	D6	H11	$\overline{R/W}$	L9	A13
C2	D5	J1	DR	L10	A15
C10	\overline{MSC}	J2	FSR		

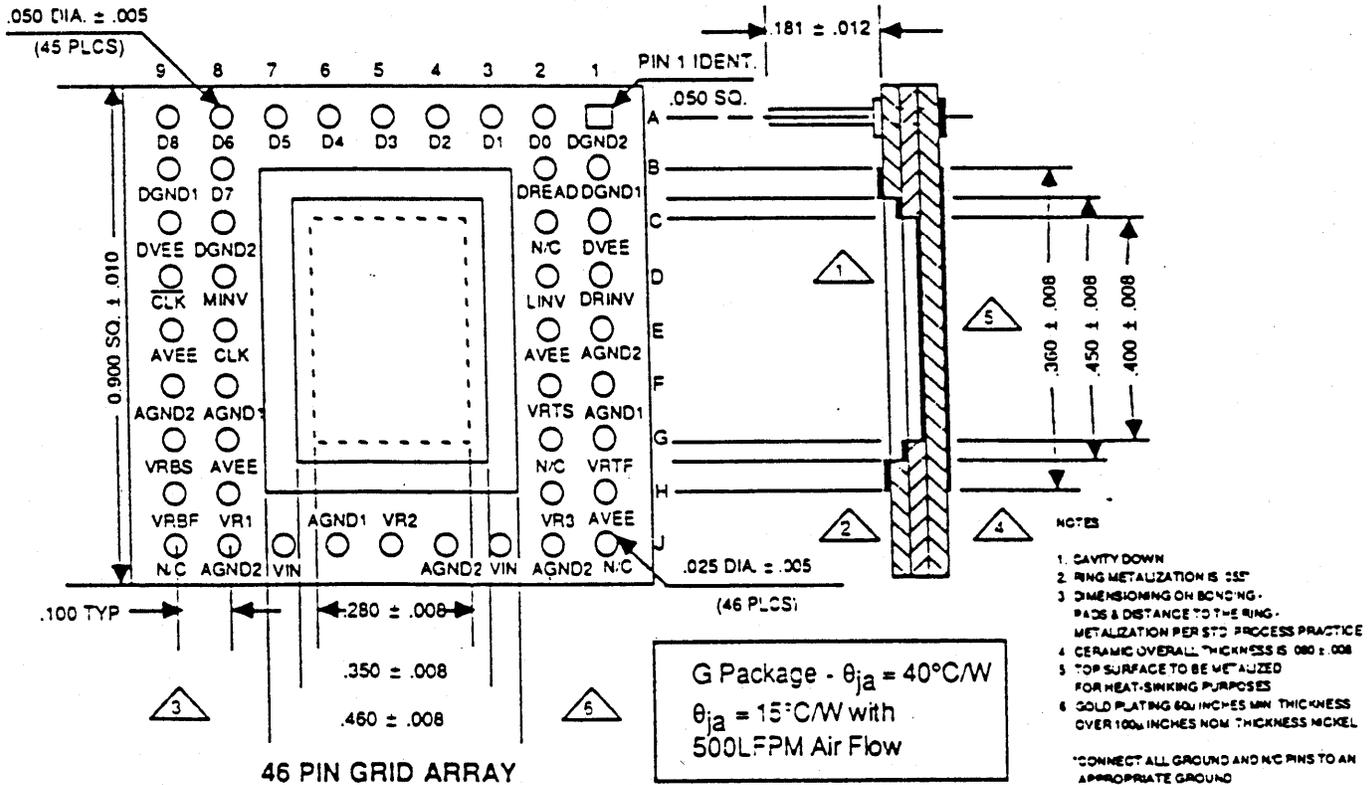


[†] See Pin Assignments Table (Page 1) and Pin Nomenclature Table (Page 2) for location and description of all pins.

PIN ASSIGNMENT HADC77200

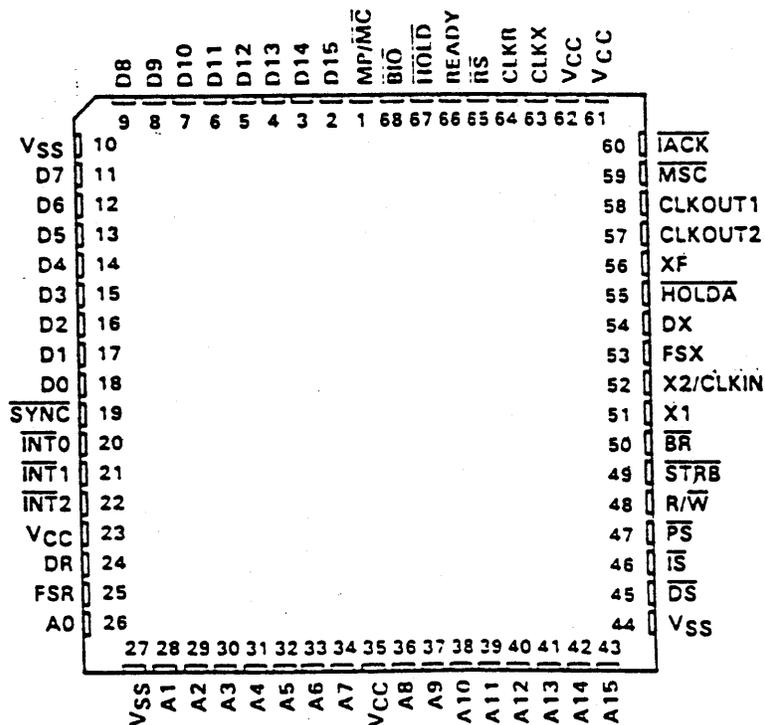
TOP VIEW				NAME	FUNCTION	NAME	FUNCTION
1	N/C	AVEE	48	DRINV	Data Ready Inverse	$\overline{\text{CLK}}$	Inverse ECL Clock Input Pin
2	N/C	AGND2	47	LINV	D0 through D6 Output Inversion Control Pin	CLK	ECL Clock Input Pin
3	DRINV	AGND1	46			VRBS	Reference Voltage Bottom, Sense Nominally -2.0V
4	LINV	VRTS	45	AVEE	Negative Analog Supply Nominally -5.2V	VRBF	Reference Voltage Bottom, Force Nominally -2.0V
5	DVEE	VRTF	44	DVEE	Digital Analog Supply Nominally -5.2V	VR1	Reference Voltage Tap 1
6	DGND1	AVEE	43	DVEE	Digital Analog Supply Nominally -5.2V	AGND1	Analog Ground 1
7	DGND2	AVEE	42	DVEE	Digital Analog Supply Nominally -5.2V	VIN	Analog Input, can be connected to the input signal or used as a Sense
8	DREAD	VR3	41	DVEE	Digital Analog Supply Nominally -5.2V	AGND2	Analog Ground 2
9	D0 (LSB)	AGND2	40	DGND1	Digital Ground 1	VR2	Reference Voltage Tap 2
10	D1	VIN	39	DGND2	Digital Ground 2	VIN	Analog Input, can be connected to the input signal or used as a Sense.
11	D2	AGND1	38	DREAD	Data Ready Output	VR3	Reference Voltage Tap 3
12	D3	VR2	37	DO	Digital Data Output Pin 1 (LSB)	VRTS	Reference Voltage Top, Sense Nominally 0V
13	D4	AGND1	36	D1_D6	Digital Data Output Pin 2 Through 6	VRTF	Reference Voltage Top, Force Nominally 0V
14	D5	VIN	35	D7	Digital Data Output Pin 7 (MSB)		
15	D6	AGND2	34	D8	Overrange Output		
16	D7 (MSB)	VR1	33	MINV	D7 Output Inversion Control Pin		
17	D8 (OVERRANGE)	AVEE	32				
18	DGND2	AVEE	31				
19	DGND1	N/C	30				
20	DVEE	VRBF	29				
21	MINV	VRBS	28				
22	$\overline{\text{CLK}}$	AGND1	27				
23	CLK	AGND2	26				
24	N/C	AVEE	25				

48 LEAD CERAMIC SIDEBRAZED DIP



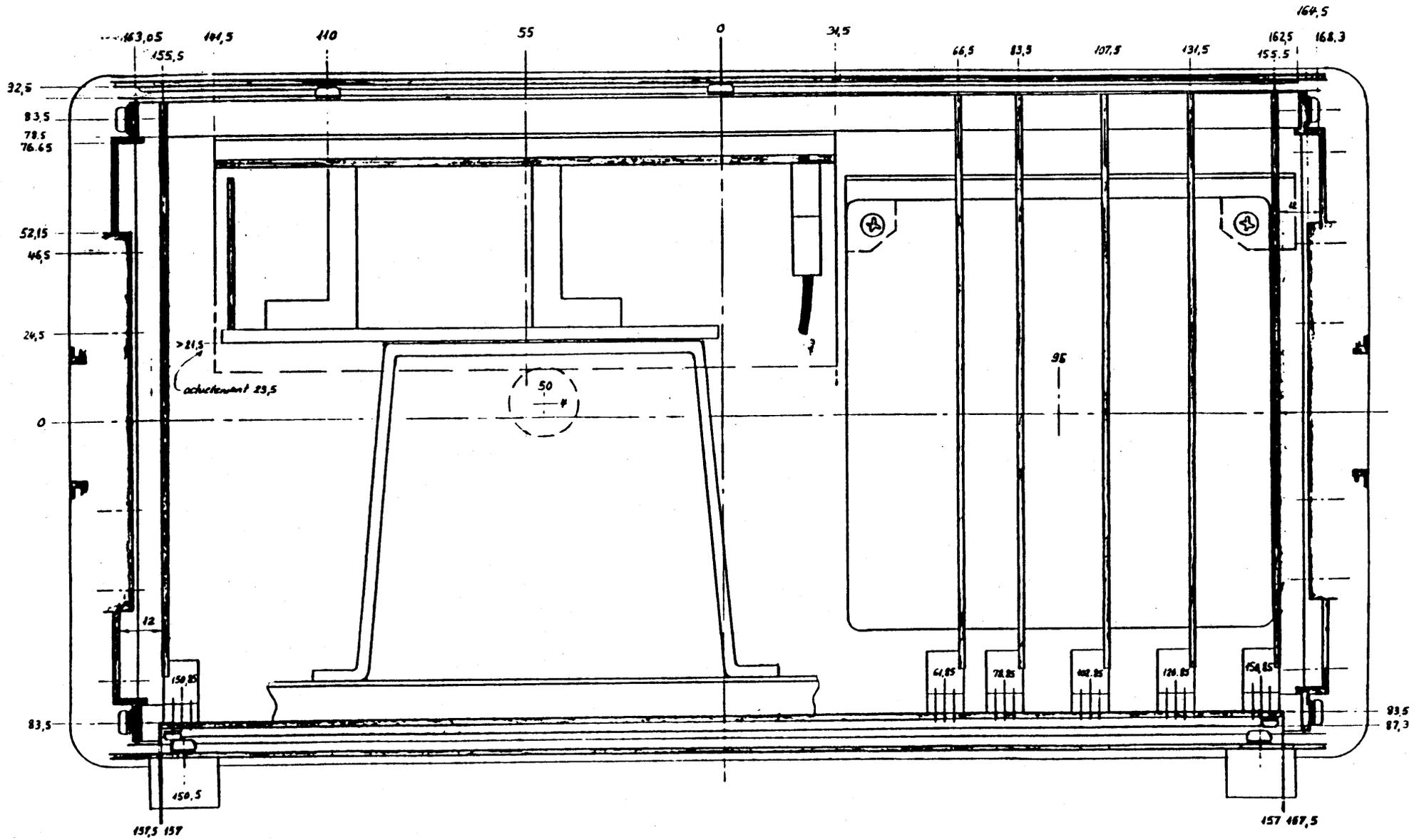
- 100-ns Instruction Cycle Time
- 544 Words of Programmable On-Chip Data RAM
- 4K Words of On-Chip Program ROM
- 128K Words of Data/Program Space
- Sixteen Input and Sixteen Output Channels
- 16-Bit Parallel Interface
- Directly Accessible External Data Memory Space
- Global Data Memory Interface
- 16-Bit Instruction and Data Words
- 32-Bit ALU and Accumulator
- Single-Cycle Multiply/Accumulate Instructions
- 0 to 16-Bit Scaling Shifter
- Bit Manipulation and Logical Instructions
- Instruction Set Support for Floating-Point Operations, Adaptive Filtering, and Extended-Precision Arithmetic
- Block Moves for Data/Program Management
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- Serial Port for Direct Codec Interface
- Synchronization Input for Synchronous Multiprocessor Configurations
- Wait States for Communication to Slow Off-Chip Memories/Peripherals
- On-Chip Timer for Control Operations
- Three External Maskable User Interrupts
- Input Pin Polled by Software Branch Instruction
- Programmable Output Pin for Signalling External Devices
- 1.8- μ m CMOS Technology
- Single 5-V Supply
- On-Chip Clock Generator

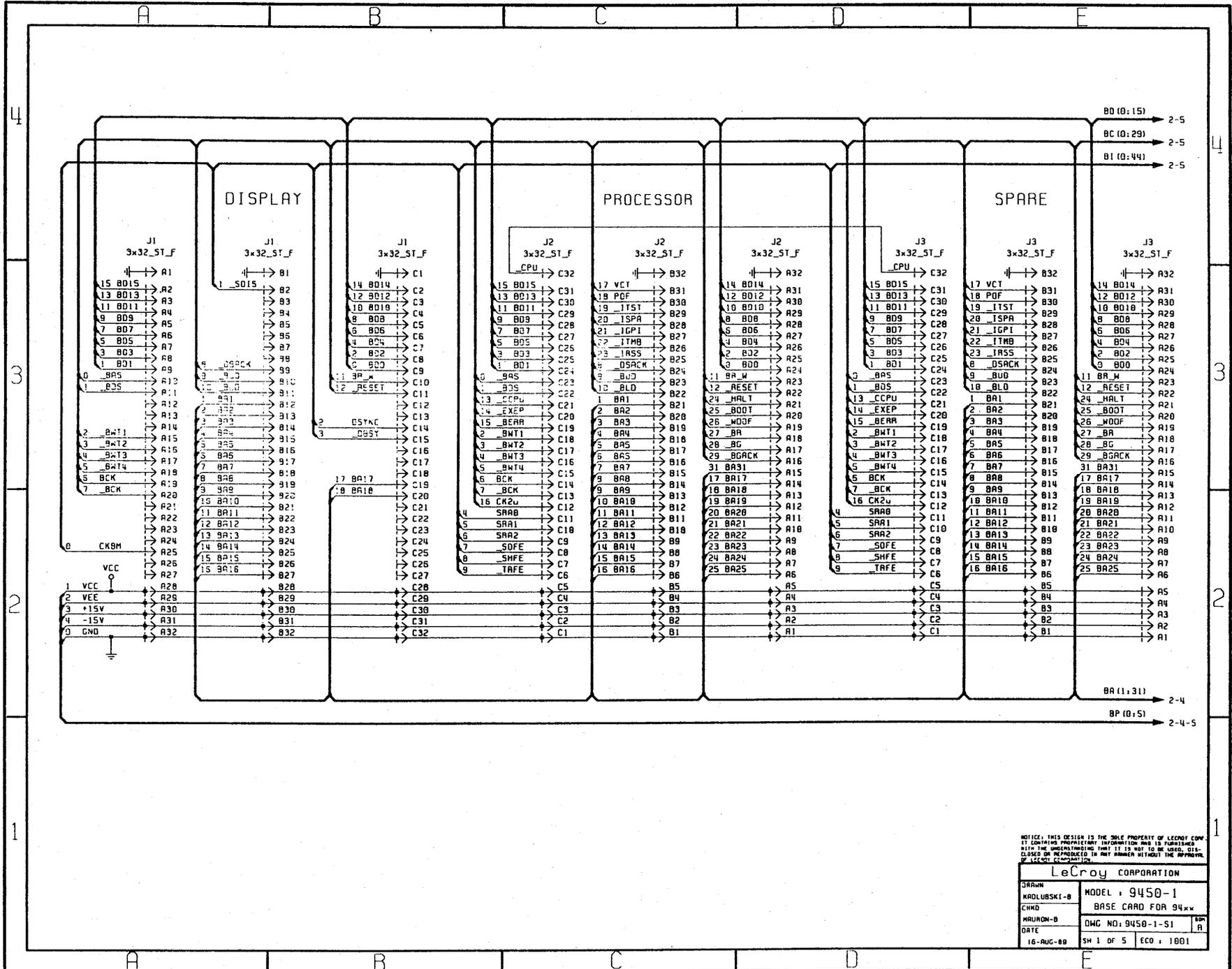
68-PIN FN
PLASTIC LEADED CHIP CARRIER PACKAGE
(TOP VIEW)



Section 5

MECHANICAL DRAWINGS

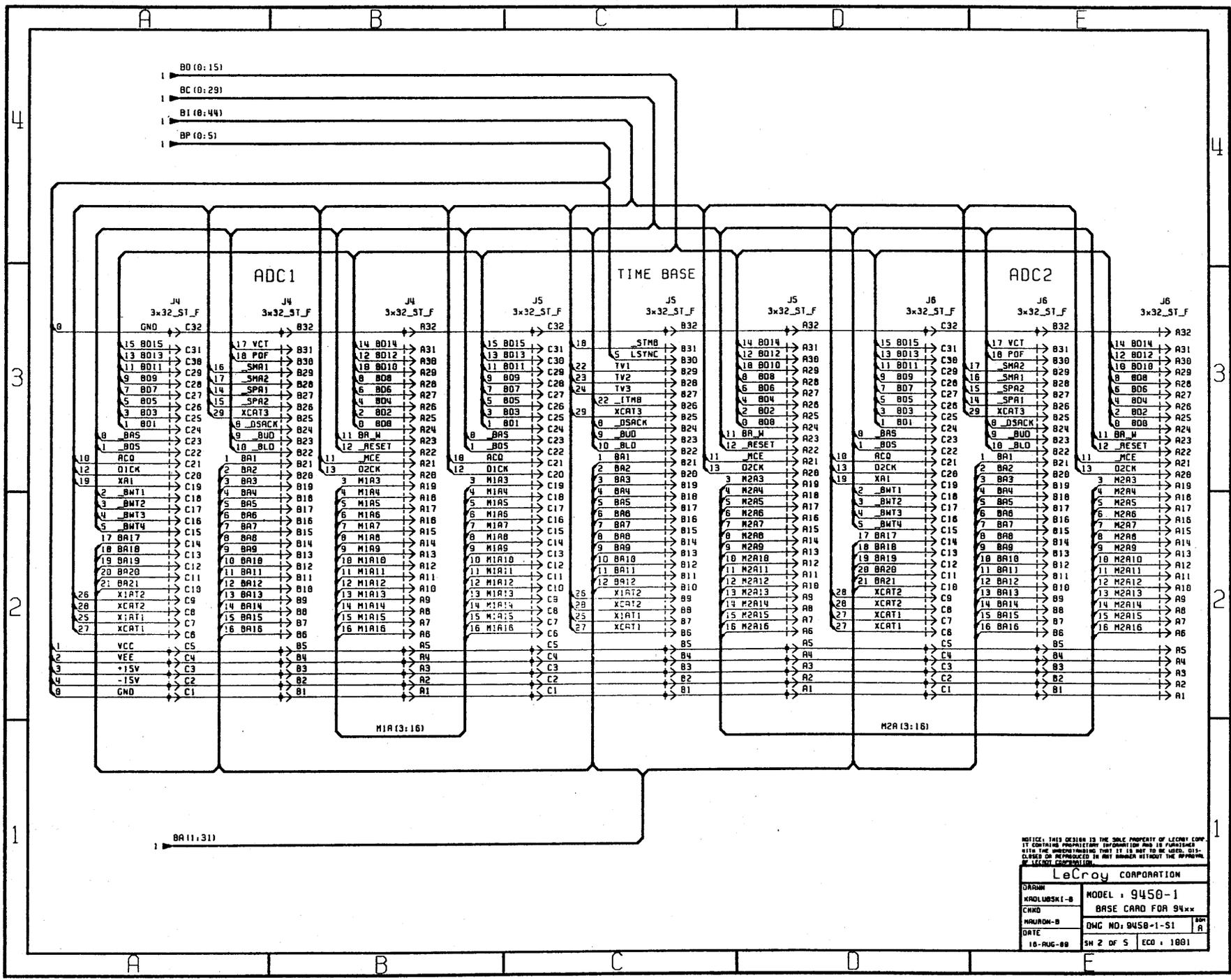




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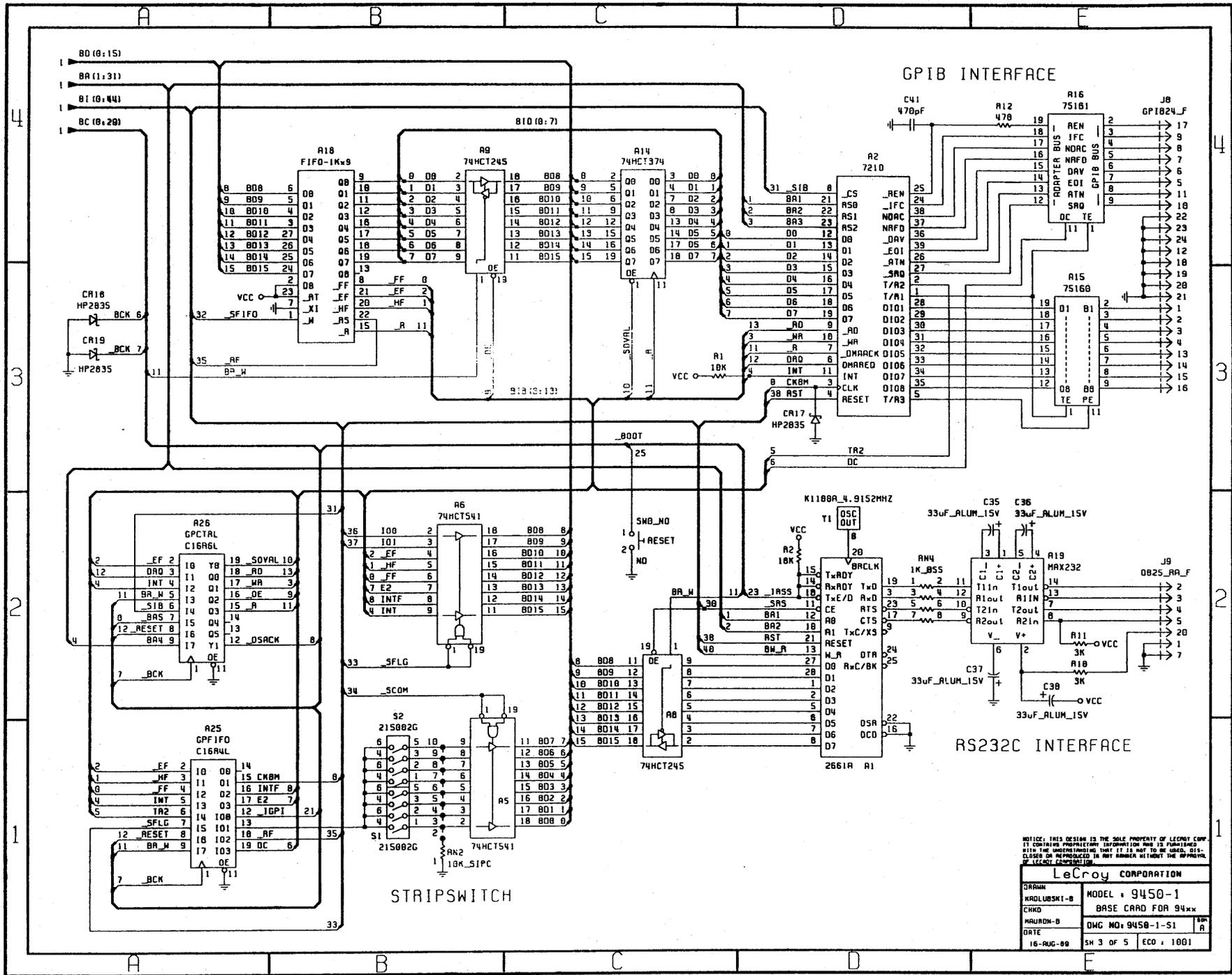
LeCroy CORPORATION

DRAWN	MODEL: 9450-1
KROLUSSKI-B	BASE CARD FOR 94xx
CHKD	DWG NO: 9450-1-S1
MALRON-B	SM 1 OF 5
DATE	ECO: 1001
16-AUG-89	



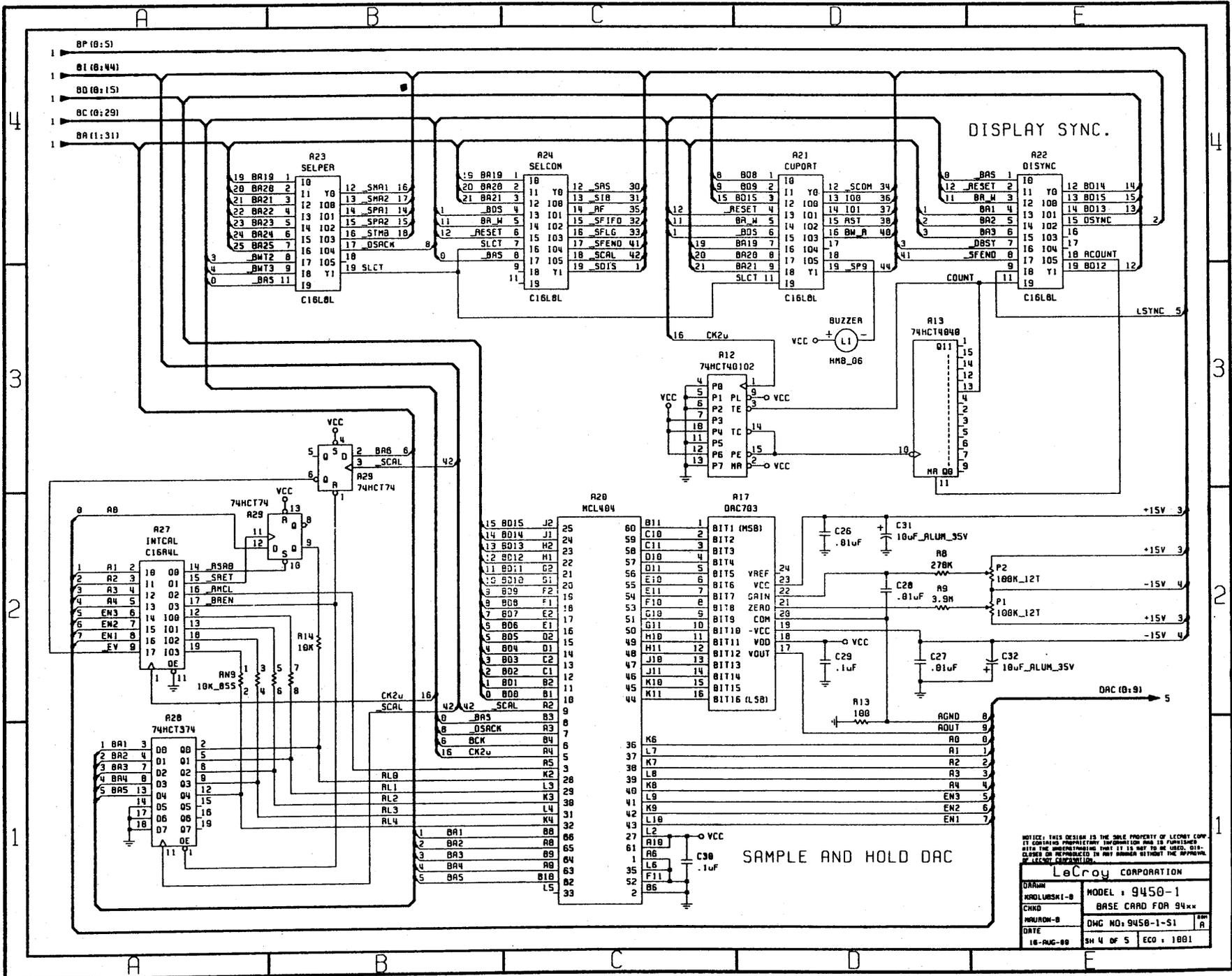
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LeCroy CORPORATION	
DRAWN KADLUBSKI-B CKWD MURPHY-B DATE 10-AUG-88	MODEL : 9450-1 BASE CARD FOR 94xx DMC NO: 9450-1-51 SH 2 OF 5 ECD : 1081



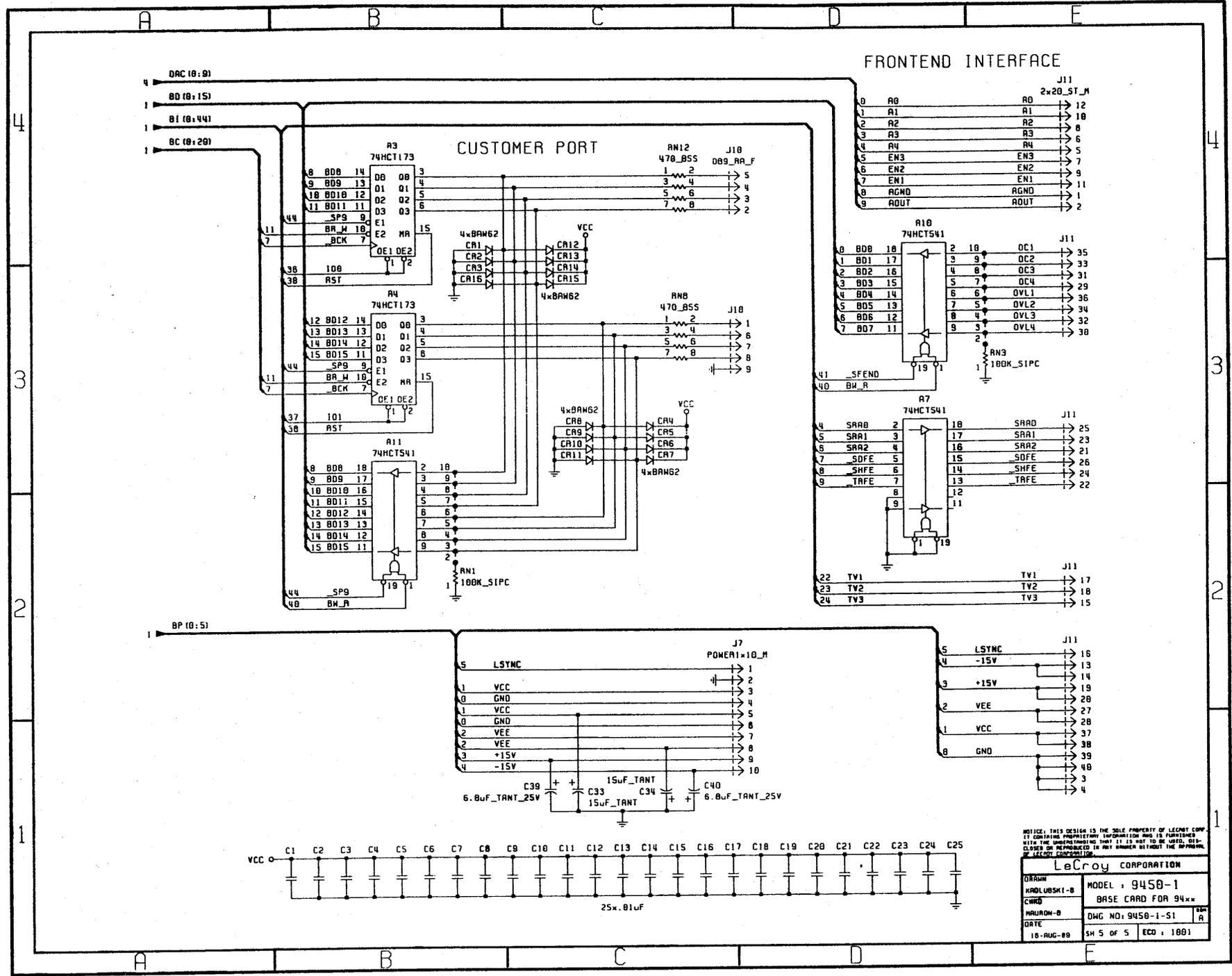
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LeCroy CORPORATION	
DRWNG	MODEL : 9450-1
DRWNG	BASE CARD FOR 94xx
DATE	DWG NO: 9450-1-S1
16-AUG-88	SH 3 OF 5 ECO : 1001



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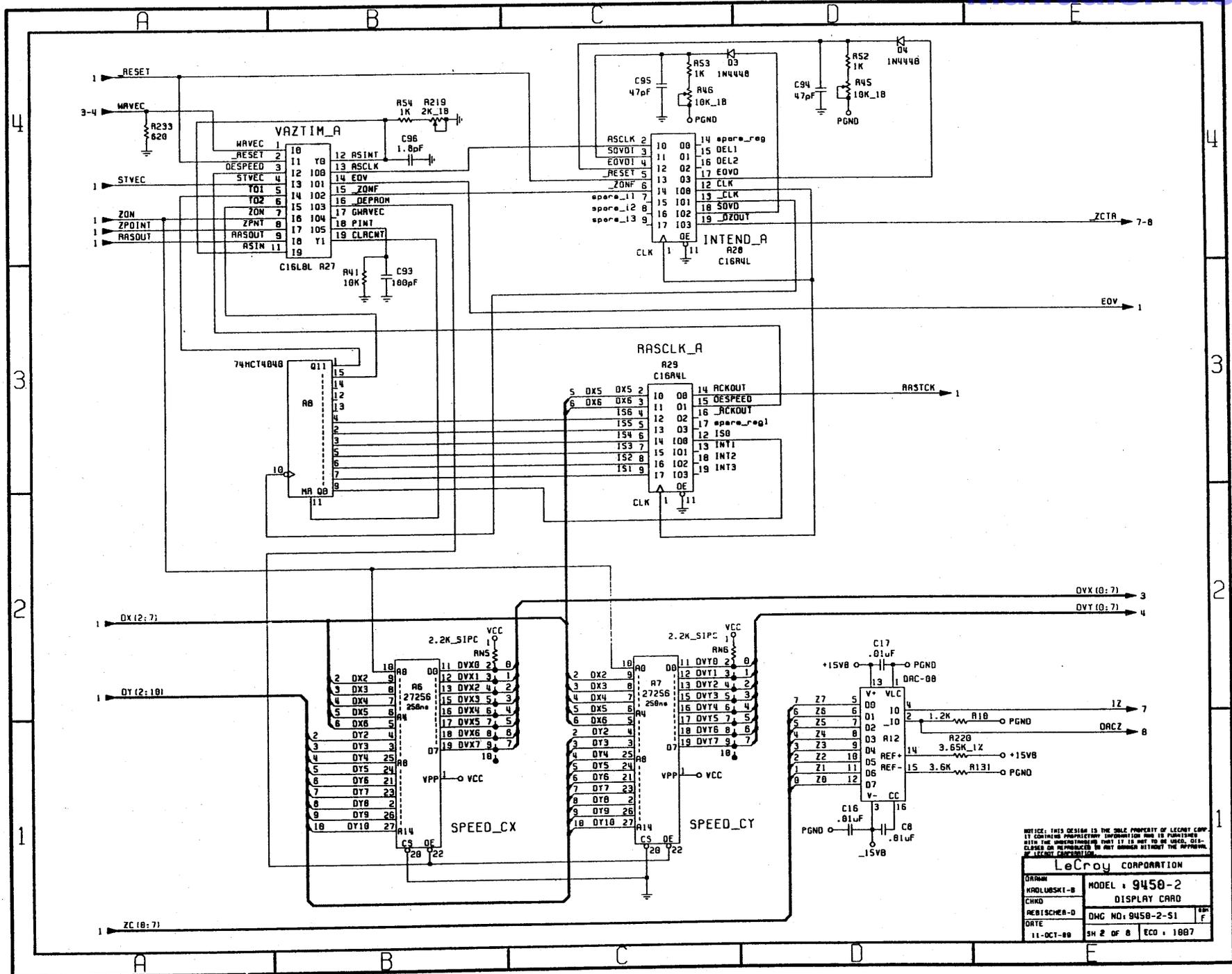
LeCroy CORPORATION	
DRAWN: MRO/LRS/K1-B CHECKED: MRO/LRS/B DATE: 18-AUG-88	MODEL: 9450-1 BASE CARD FOR 94xx DWG NO: 9450-1-S1 SH 4 OF 5 ECO: 1881



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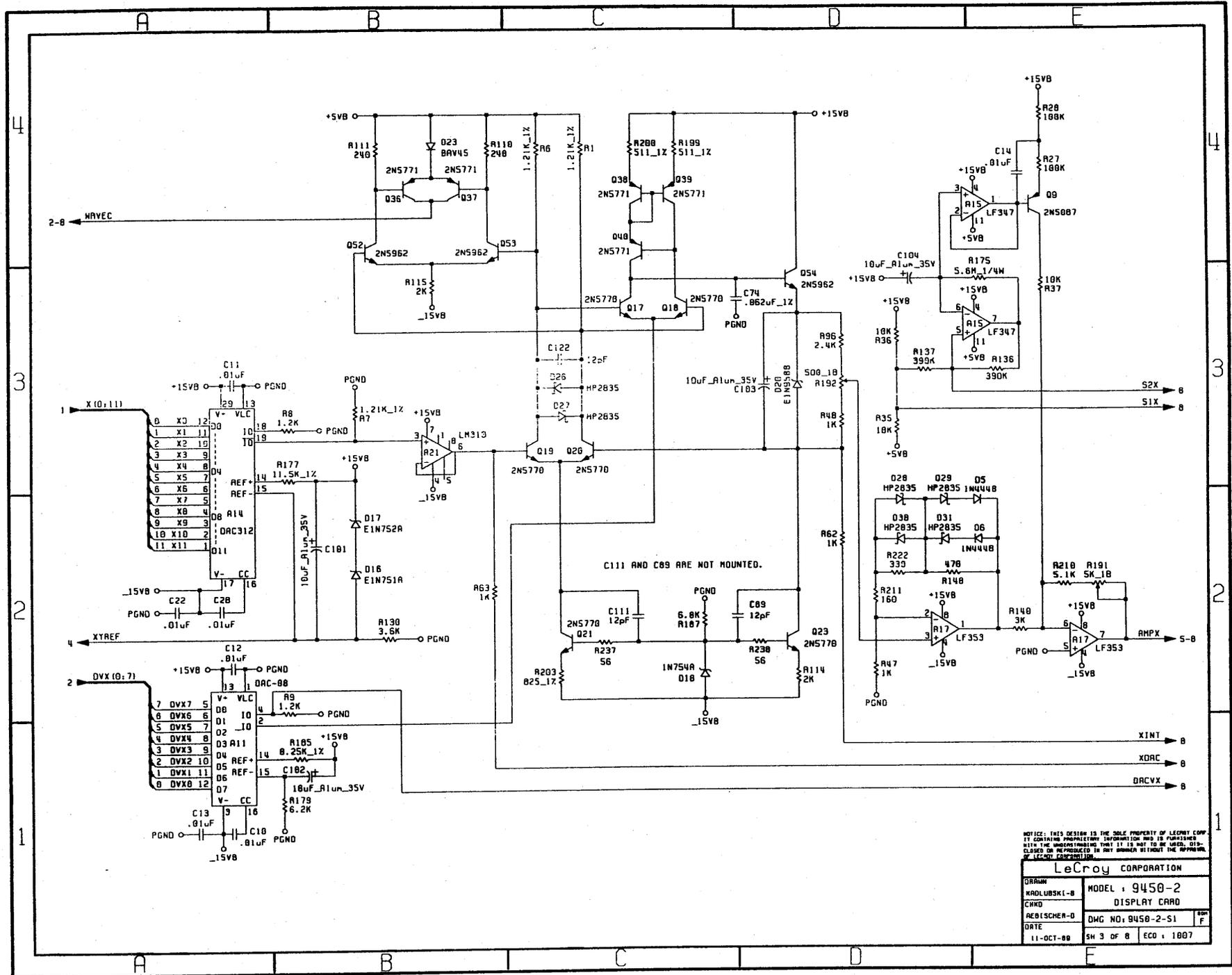
LeCroy CORPORATION

DRAWN KADLUBSKI-B	MODEL : 9450-1
CHWD	BASE CARD FOR 94xx
MANUFD-B	DWG NO: 9450-1-S1
DATE 16-AUG-89	SH 5 OF 5 ECD : 1801



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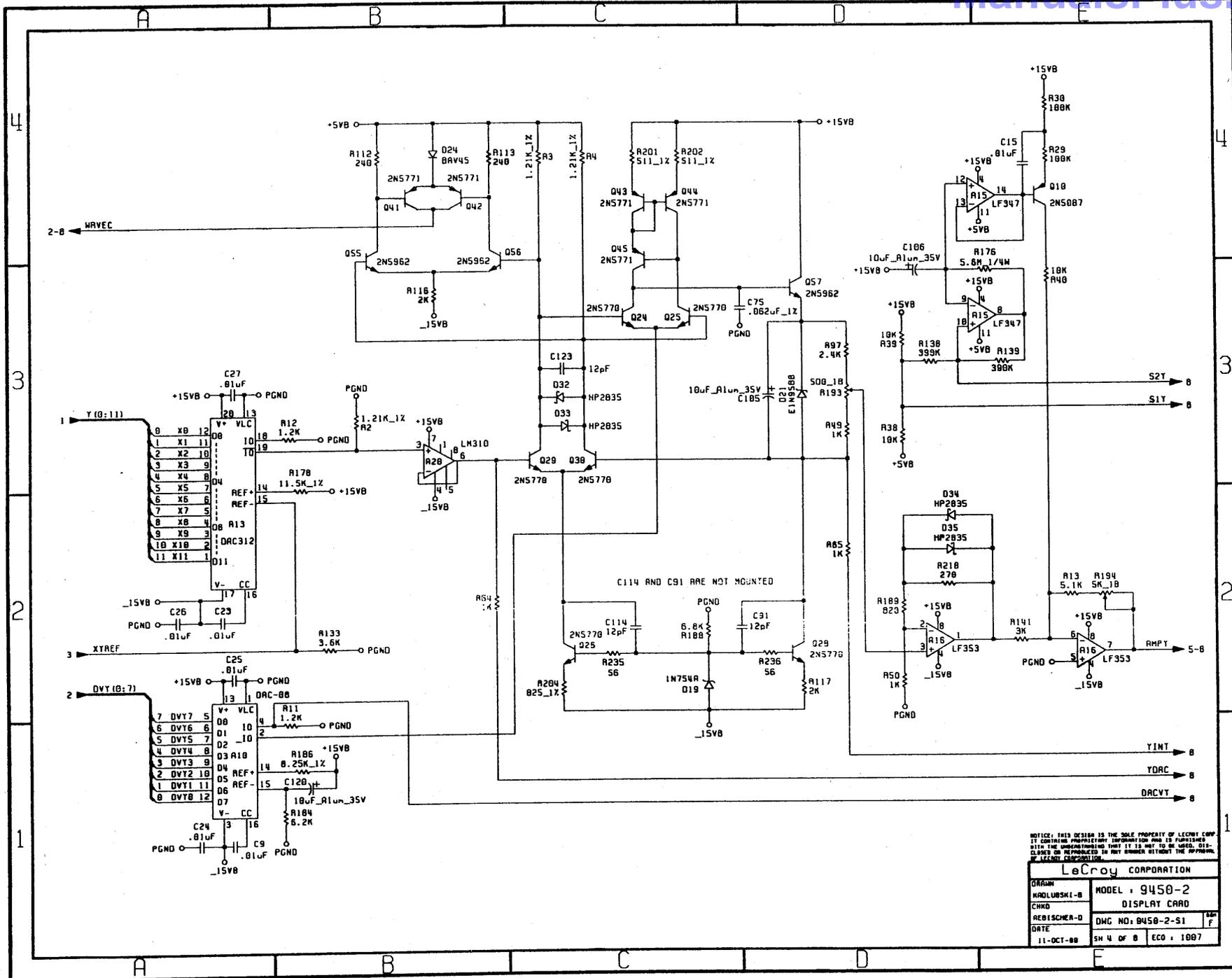
LeCroy CORPORATION	
DRWNG	MODEL : 9450-2
KRODUBSKI-B	DISPLAY CARD
CHND	DWG NO: 9450-2-51
REBISCHER-D	SH 2 OF 8
DATE	ECO : 1987
11-OCT-88	



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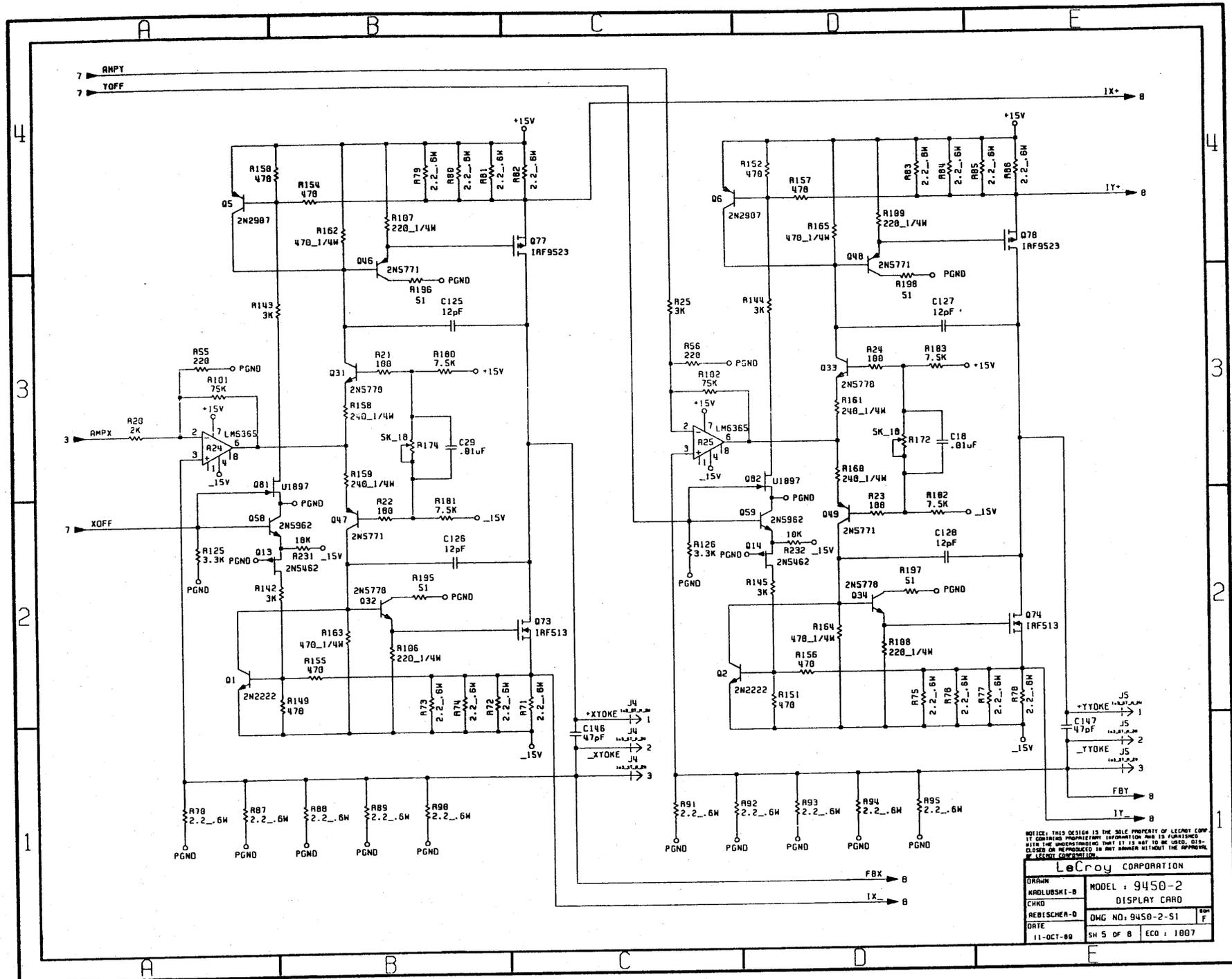
LeCroy CORPORATION

DRAWN MADLUBSKI-B	MODEL : 9450-2
CHKD REBLSCHER-D	DISPLAY CARD
DATE 11-OCT-88	QWG NO: 9450-2-S1
	SH 3 OF 8 ECO : 1007



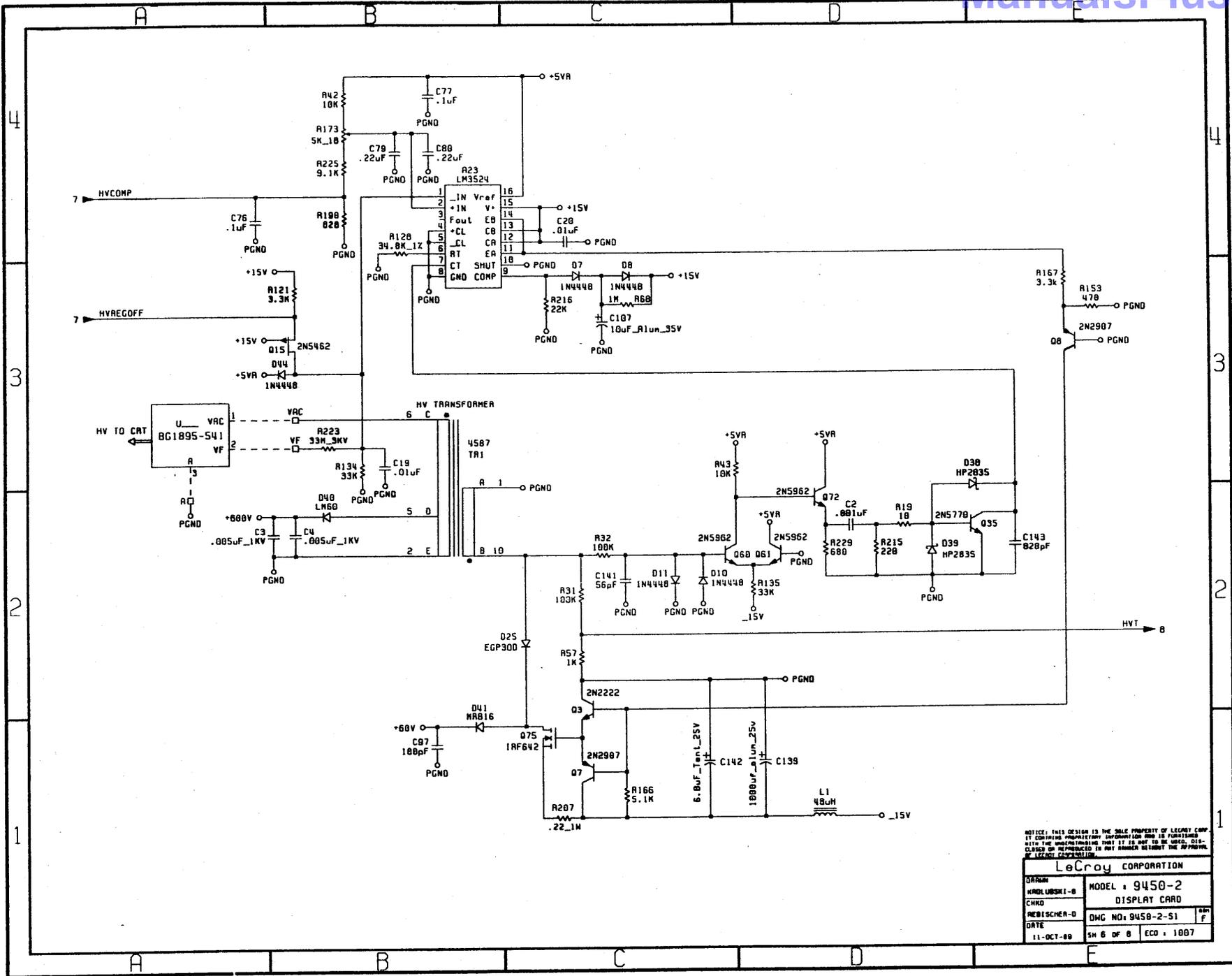
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LeCroy CORPORATION	
DRAWN KADLUBSKI-B CHKD REBISCHER-D DATE 11-OCT-88	MODEL: 9450-2 DISPLAY CARD DWG NO: 0450-2-S1 SH 4 OF 8 ECO: 1987



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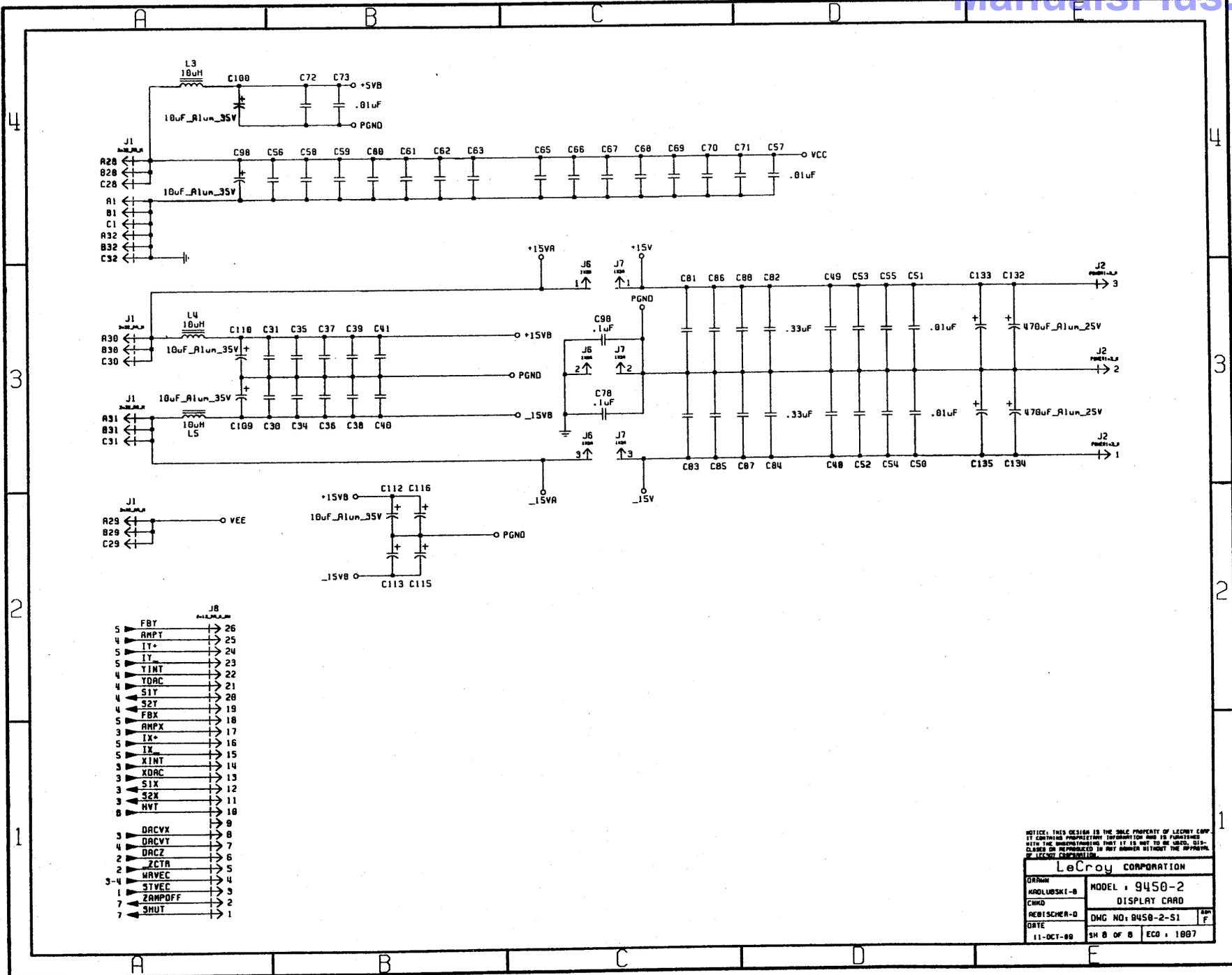
LeCroy CORPORATION	
DRAWN KROLUSSK-I-B	MODEL: 9450-2
CHKD REBISCHER-D	DISPLAY CARD
DATE 11-OCT-89	DWG NO: 9450-2-51
	SH 5 OF 8
	ECO: 1807



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LeCroy CORPORATION

DATE	11-OCT-89	REV	F
DRAWN	MAHLUSKI-B	MODEL	9450-2
CHKD	REBISCHER-D	DISPLAY CARD	
DATE	11-OCT-89	DWG NO.	9450-2-51
		SH 6 OF 8	ECD + 1007

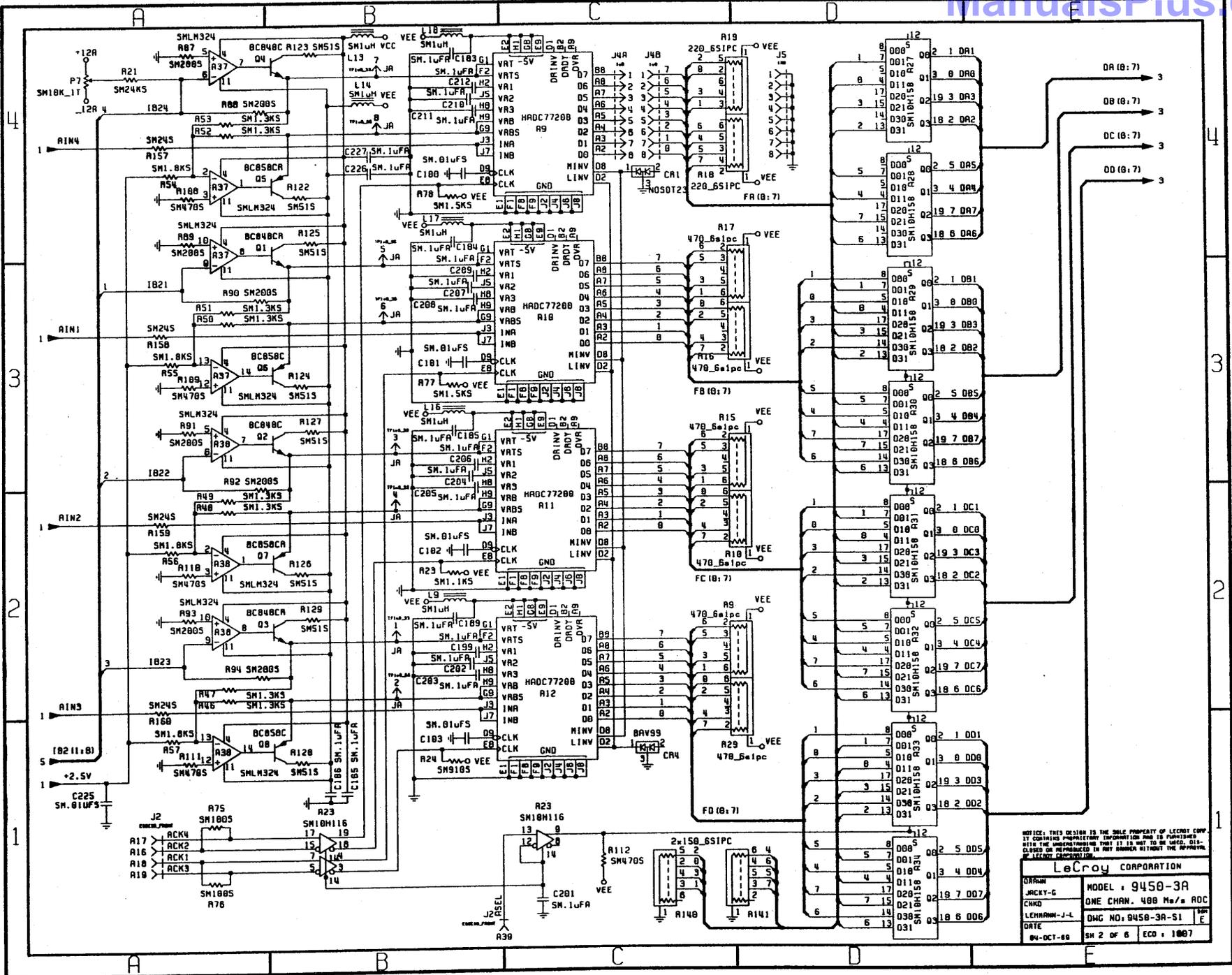


J8	
5	FBI
4	ARPT
5	IT+
5	IT-
4	YINT
4	YDAC
4	S1Y
4	S2Y
5	FBX
3	AMPX
5	IX+
5	IX-
3	XINT
3	XDAC
3	S1X
3	S2X
3	MVT
8	
3	DACVX
4	DACVY
7	DACZ
2	ZCTA
2	HAVEC
3-4	STVEC
1	ZAMPOFF
7	
7	SMUT

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LeCroy CORPORATION

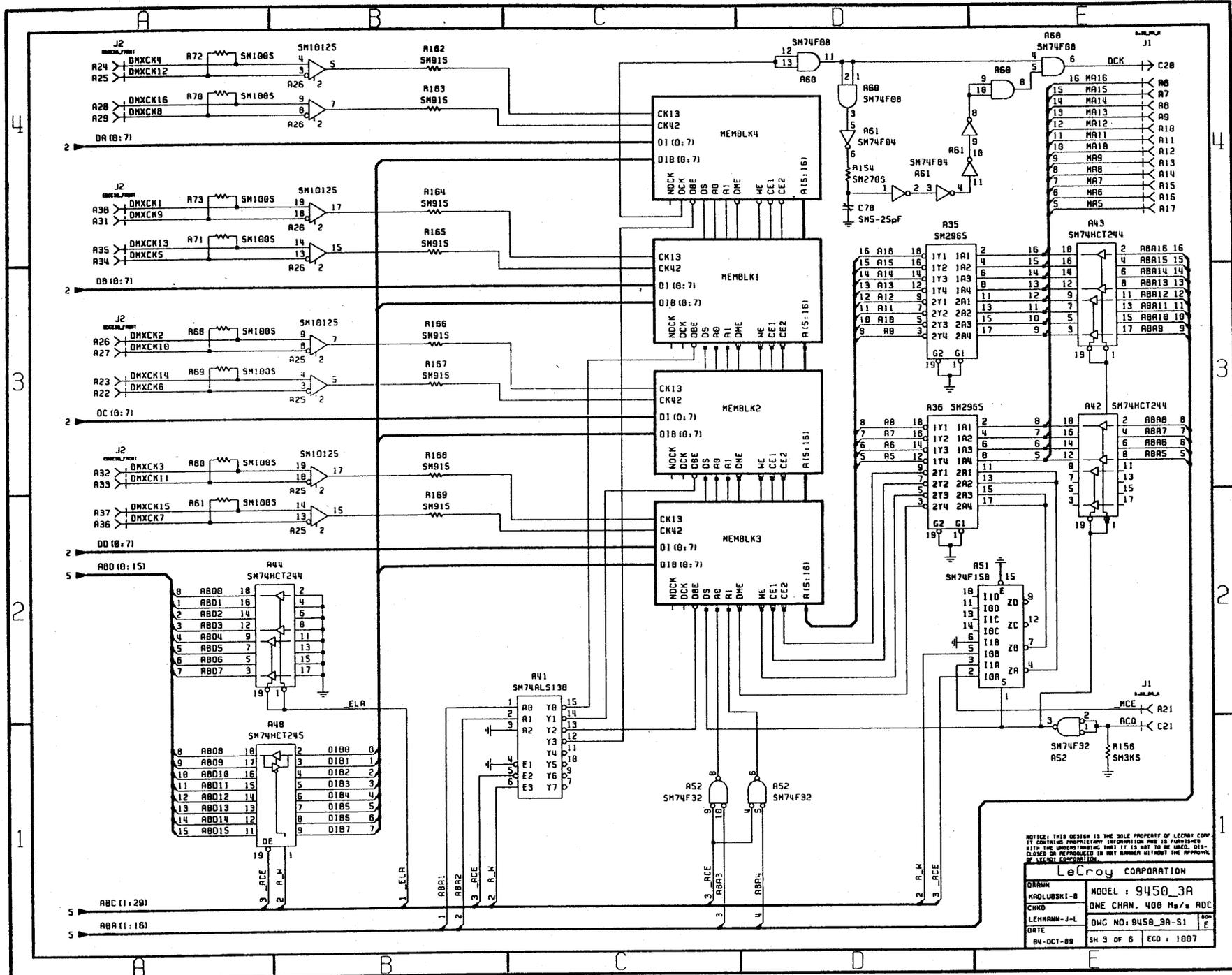
DRWNR	MODEL : 9450-2
HWLUBSKI-B	DISPLAY CARD
CHKD	
REBISCHER-D	DMG NO: 9450-2-51
DATE	11-OCT-88
	SH 8 OF 8
	ECO : 1887



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LeCroy CORPORATION

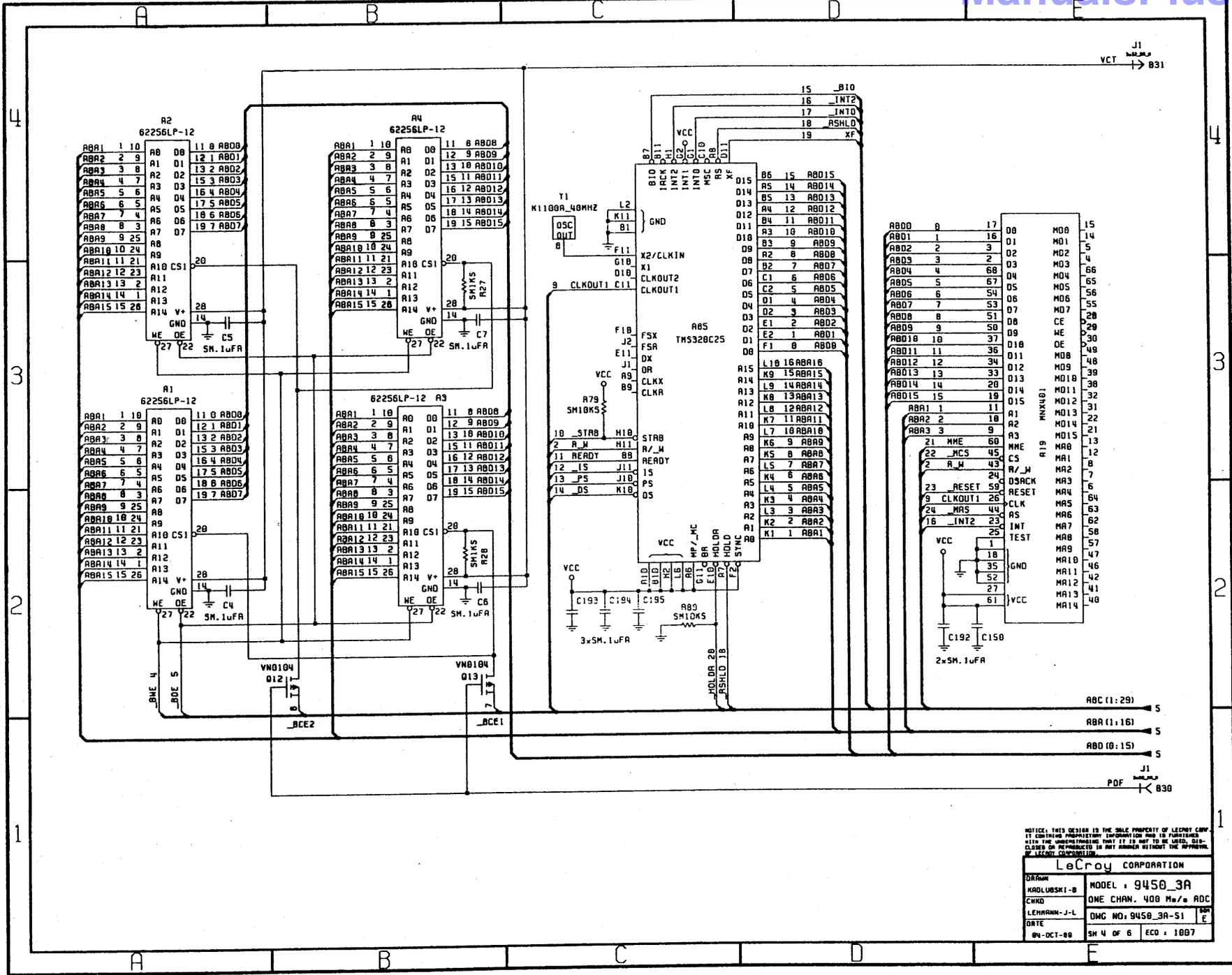
Model	MODEL : 9450-3A
Part	ONE CHAN. 400 Ms/s ADC
Part No.	DMG NO: 9450-3A-51
Date	SM 2 OF 6 ECO : 1007



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Leadley CORPORATION

DRAWN	MODEL : 9450_3A
CHKD	ONE CHAN. 400 MHz ADC
LEADLEY-J-L	DWG NO: 9450_3A-51
DATE	SH 3 OF 6 ECO : 1987



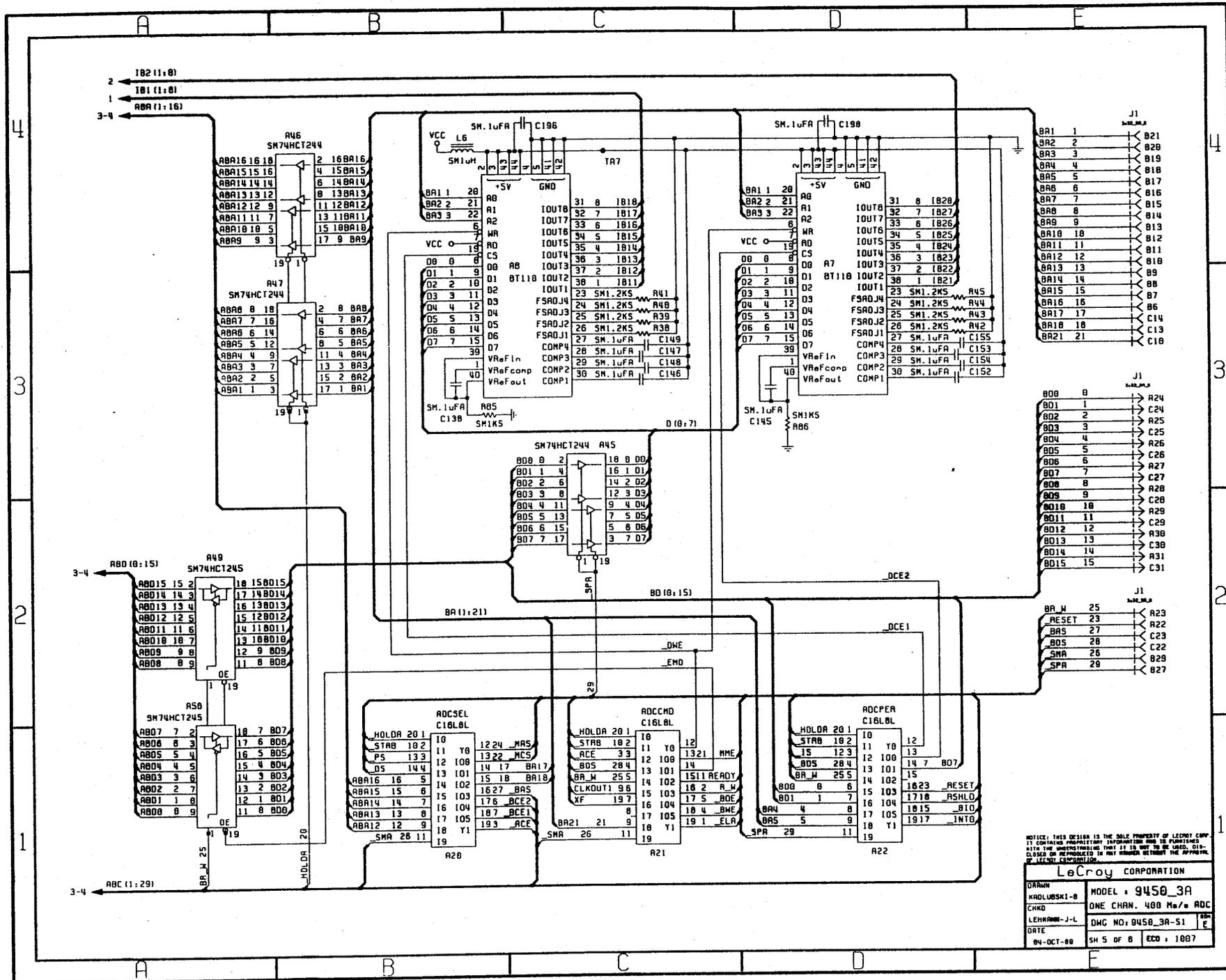
AB00	0	17	08	MD0	15
AB01	1	16	01	MD1	14
AB02	2	9	02	MD2	5
AB03	3	2	03	MD3	4
AB04	4	68	04	MD4	66
AB05	5	67	05	MD5	65
AB06	6	54	06	MD6	56
AB07	7	53	07	MD7	55
AB08	8	51	08	CE	28
AB09	9	50	09	WE	30
AB010	10	37	10	OE	48
AB011	11	36	11	MD8	48
AB012	12	34	12	MD9	39
AB013	13	33	13	MD10	38
AB014	14	20	14	MD11	32
AB015	15	19	15	MD12	31
AB01	1	11	A1	MD13	22
AB02	2	10	A2	MD14	21
AB03	3	9	A3	MD15	13
AB04	4	68	A4	MA0	12
AB05	5	67	CS	MA1	8
AB06	6	54	R/W	MA2	7
AB07	7	53	D3ACK	MA3	6
AB08	8	51	RESET	MA4	6
AB09	9	50	CLK	MA5	64
AB010	10	37	AS	MA6	63
AB011	11	36	INT	MA7	62
AB012	12	34	TEST	MA8	58
AB013	13	33	VCC	MA9	57
AB014	14	20	GND	MA10	47
AB015	15	19	VCC	MA11	46
				MA12	42
				MA13	41
				MA14	40

J1
VCT → 831

J1
PDF → 830

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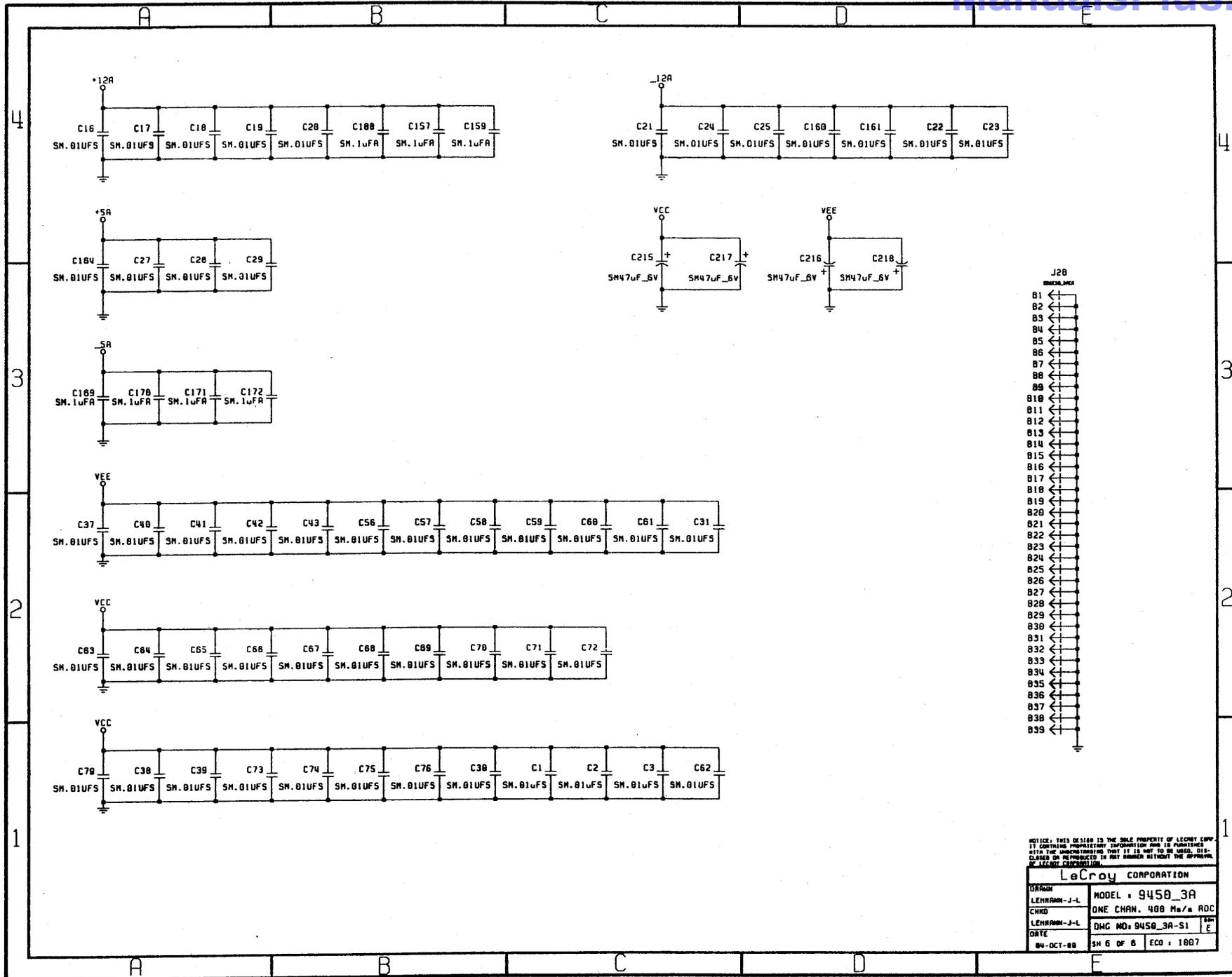
LeCROY CORPORATION	
DRAWN	MODEL: 9450_3A
CHECKED	ONE CHAN. 400 MHz/a ADC
DATE	DWG NO: 9450_3A-51
84-OCT-80	SM 4 OF 6 ECO: 1807



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LeCroy CORPORATION

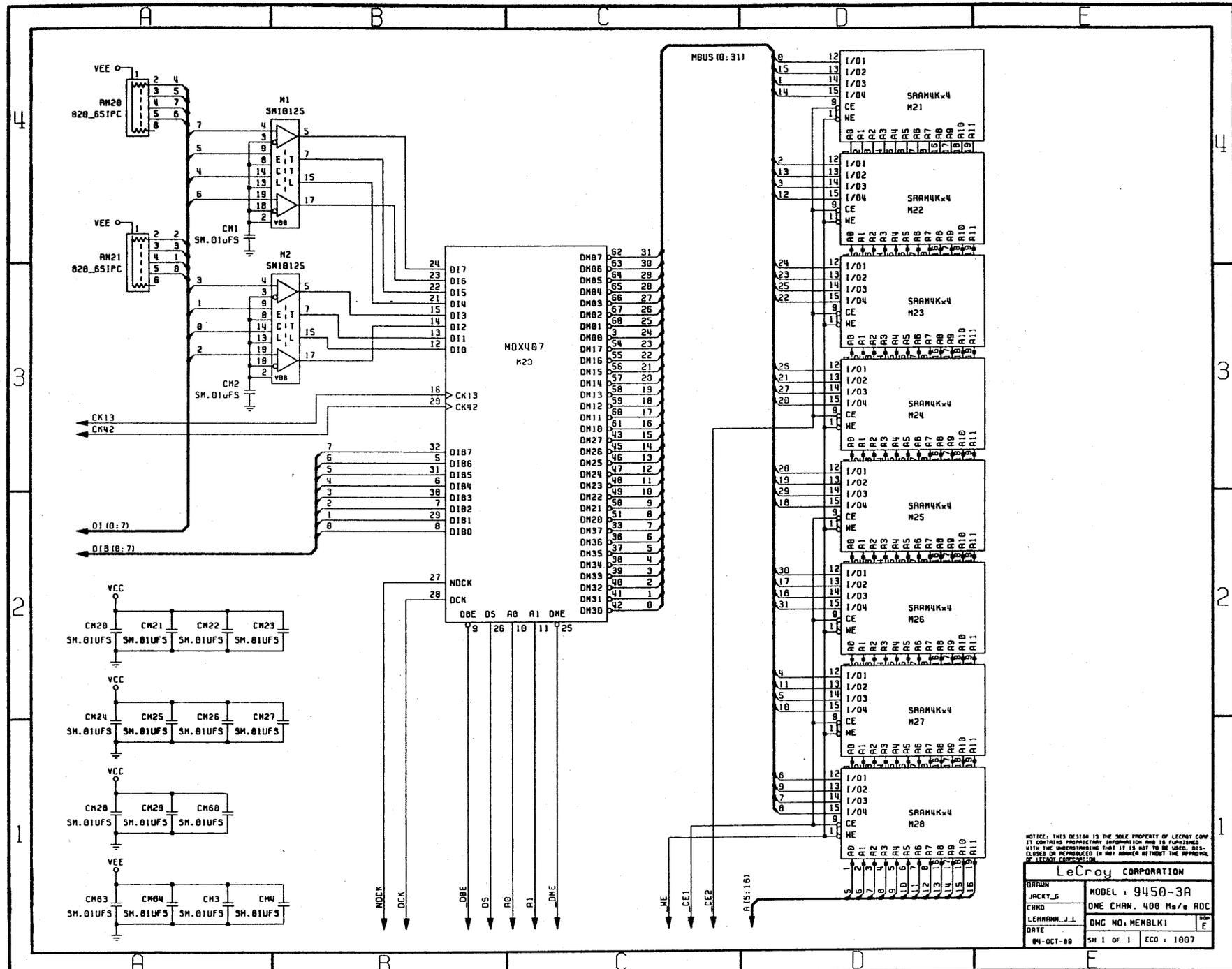
DRAWN	MODEL	9450_3A
CHKD	ONE CHAN.	480 MHz ADC
LEHMAN-J-L	DMC NO.	9450_3A-51
DATE	SH	5 OF 8
84-OCT-88	ECD	1887



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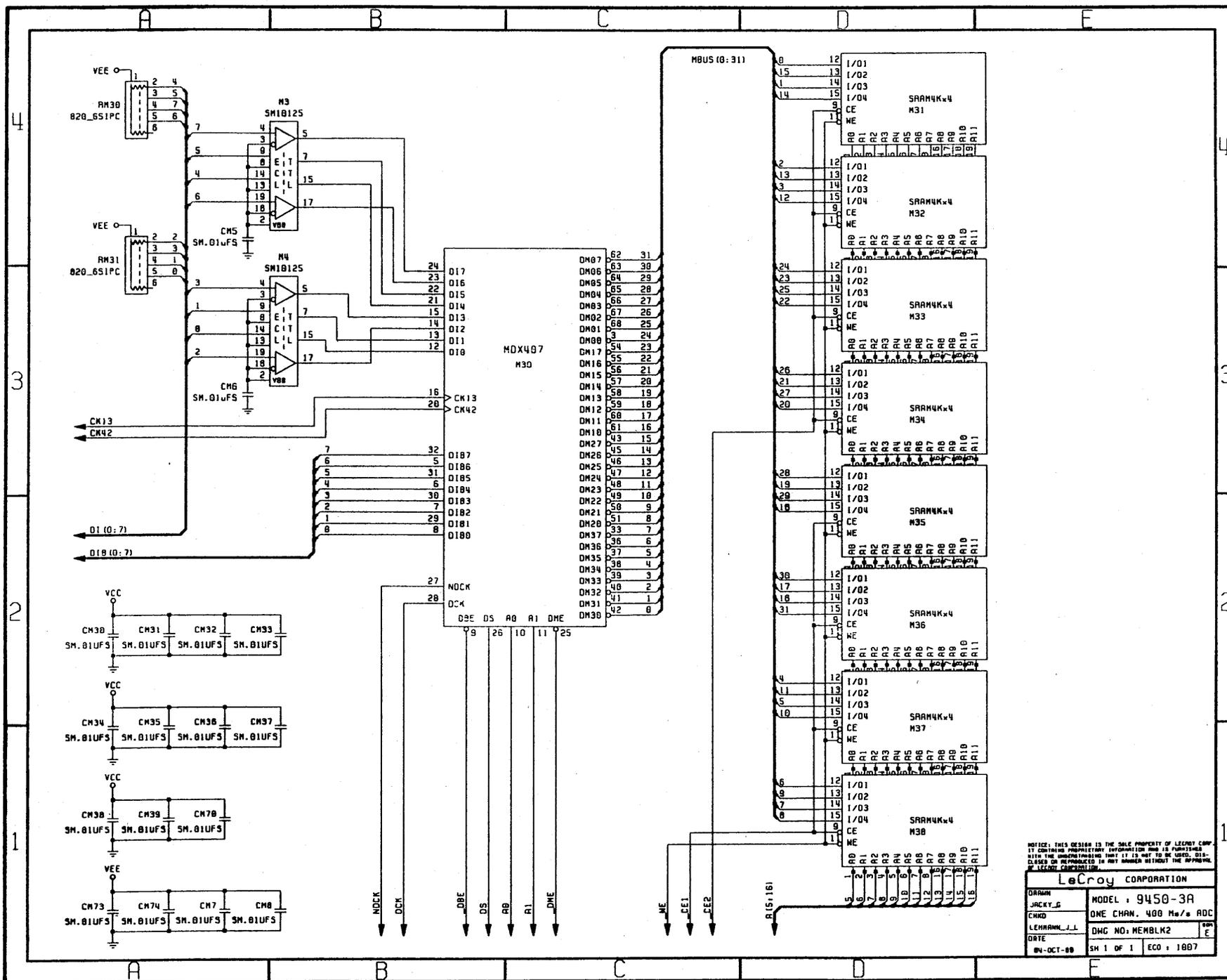
LeCroy CORPORATION

DRWING	MODEL: 9450_3A
LENHANN-J-L	ONE CHAN. 400 Ms/s ADC
CHKD	DWG NO: 9450_3A-S1
LENHANN-J-L	SH 6 OF 6 ECO: 1007
DATE	
94-OCT-88	



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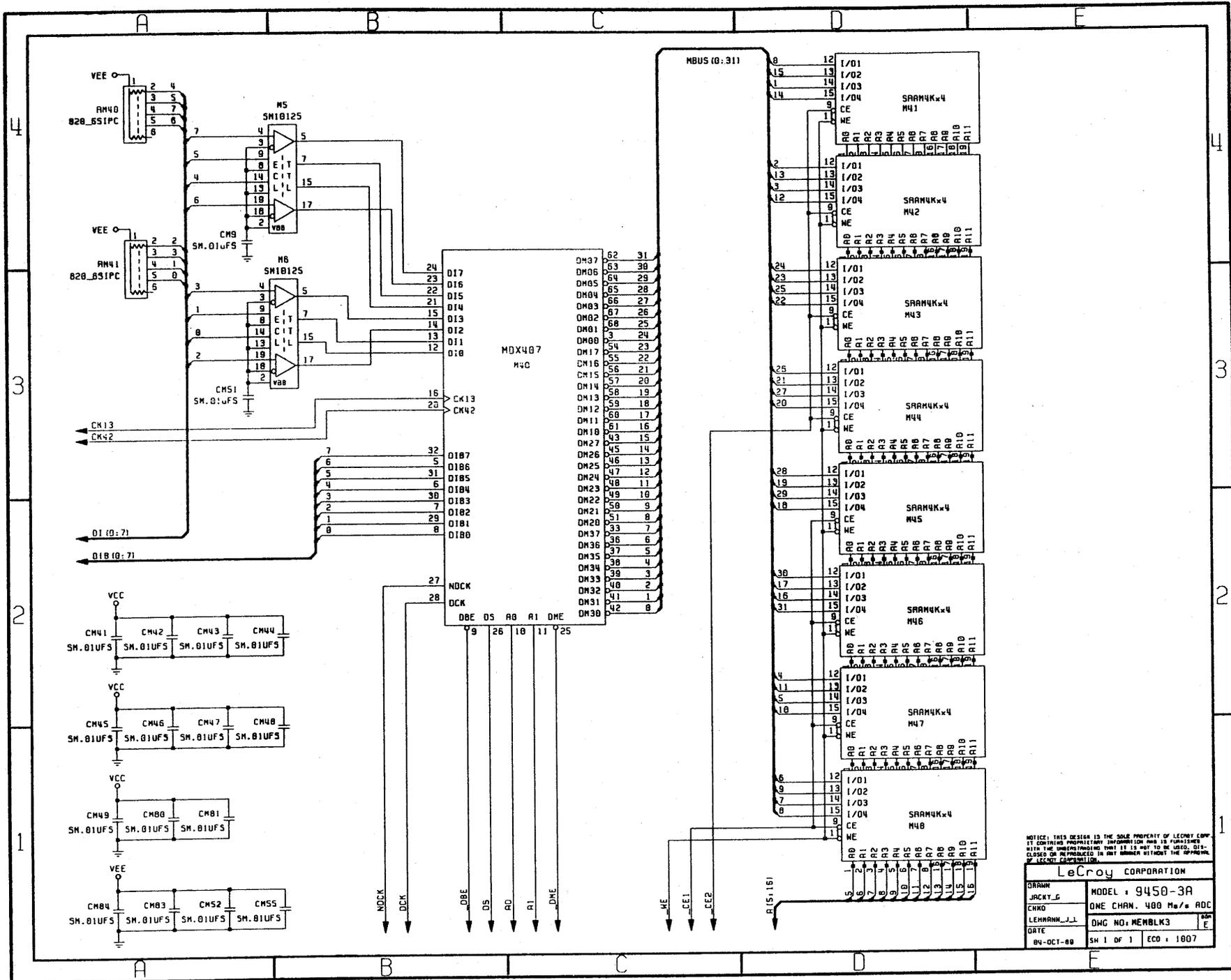
LeCroy CORPORATION	
DRAWN: JACKY_G	MODEL: 9450-3A
CHND	ONE CHAN. 400 Ms/s ADC
LEHMANN, J.J.	DMG NO: MENBLK1
DATE: 04-OCT-88	SH 1 OF 1 ECO: 1807



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LeCroy CORPORATION

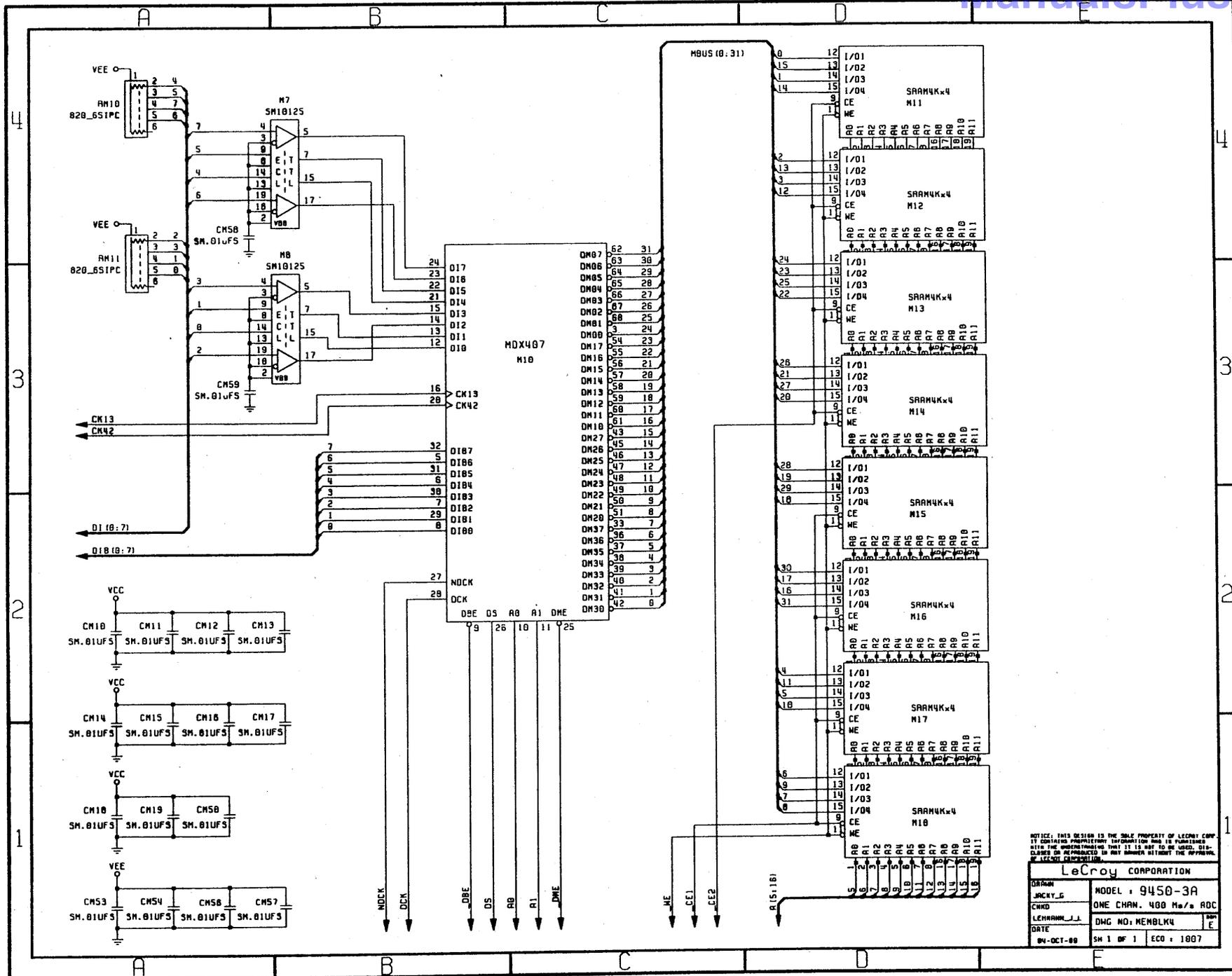
DRAWN JACKY_G	MODEL: 9450-3A
CHKD	ONE CHAN. 400 Ma/s ADC
LEHMAN, J.L.	DWG NO: MEHBLK2
DATE	SH 1 OF 1 ECO: 1987
04-OCT-88	



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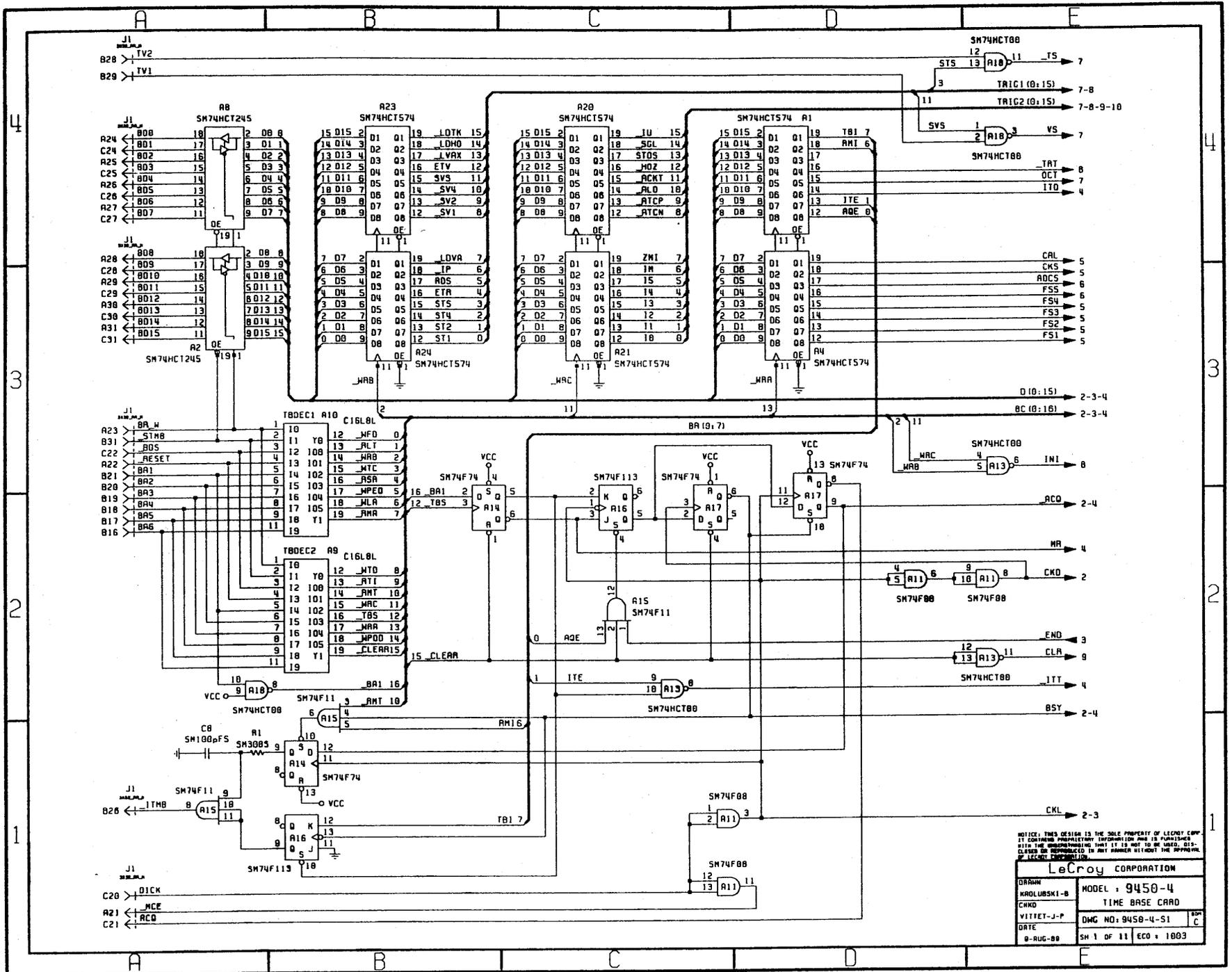
LeCroy CORPORATION

DRAWN	JACKY_G	MODEL	9450-3A
CHKD		ONE CHAN. 480 MHz ADC	
LEHMANH_U_L		DWG NO: MEMBLK3	DATE
DATE	04-OCT-89	SH 1 OF 1	ECO: 1807



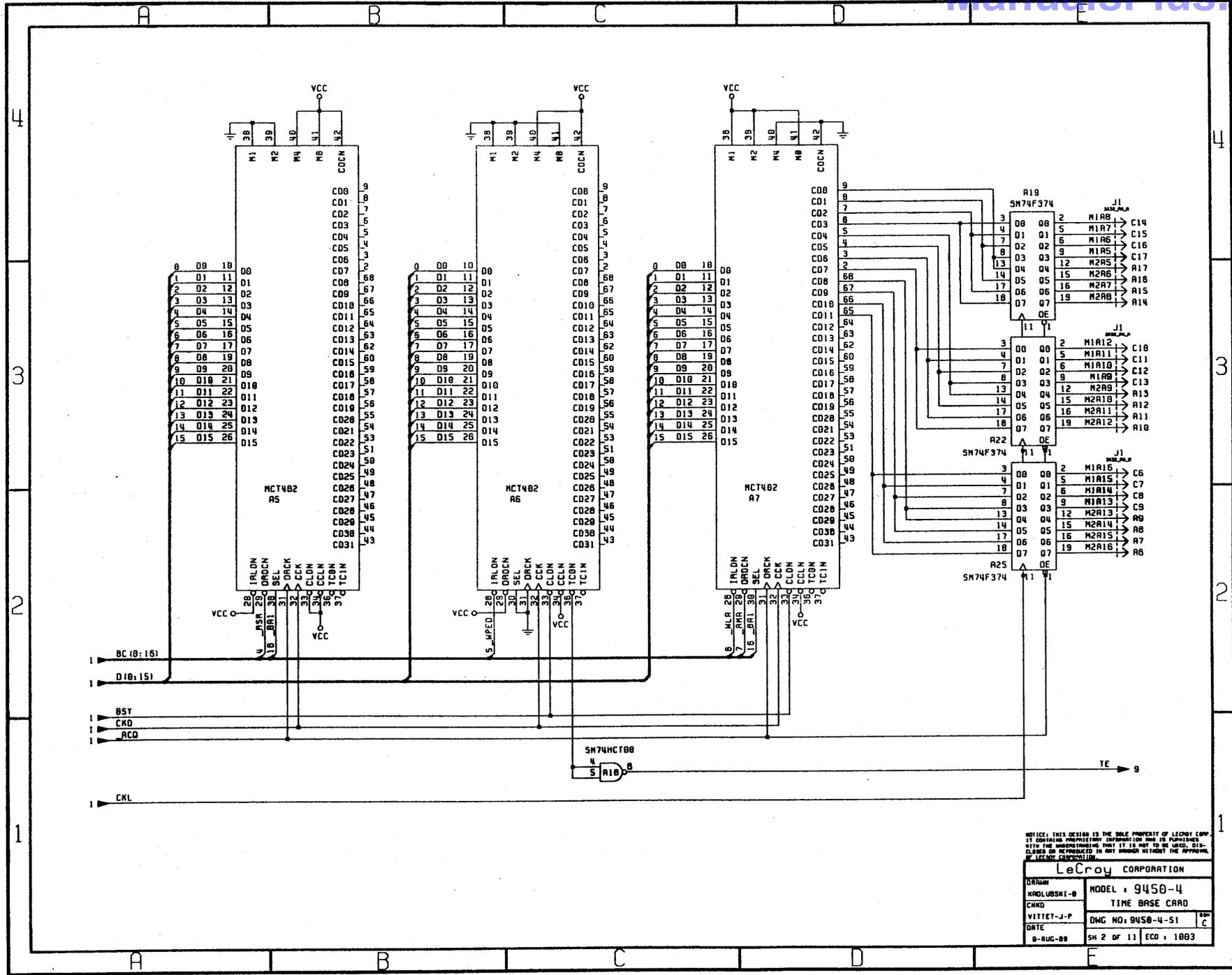
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LeCroy CORPORATION	
DESIGN	MODEL : 9450-3A
JACKY_G	ONE CHAN. 400 Ma/μs ADC
CWWD	LENHAM
DATE	DWG NO: MEMBLK4
84-OCT-88	SH 1 OF 1 ECO : 1807



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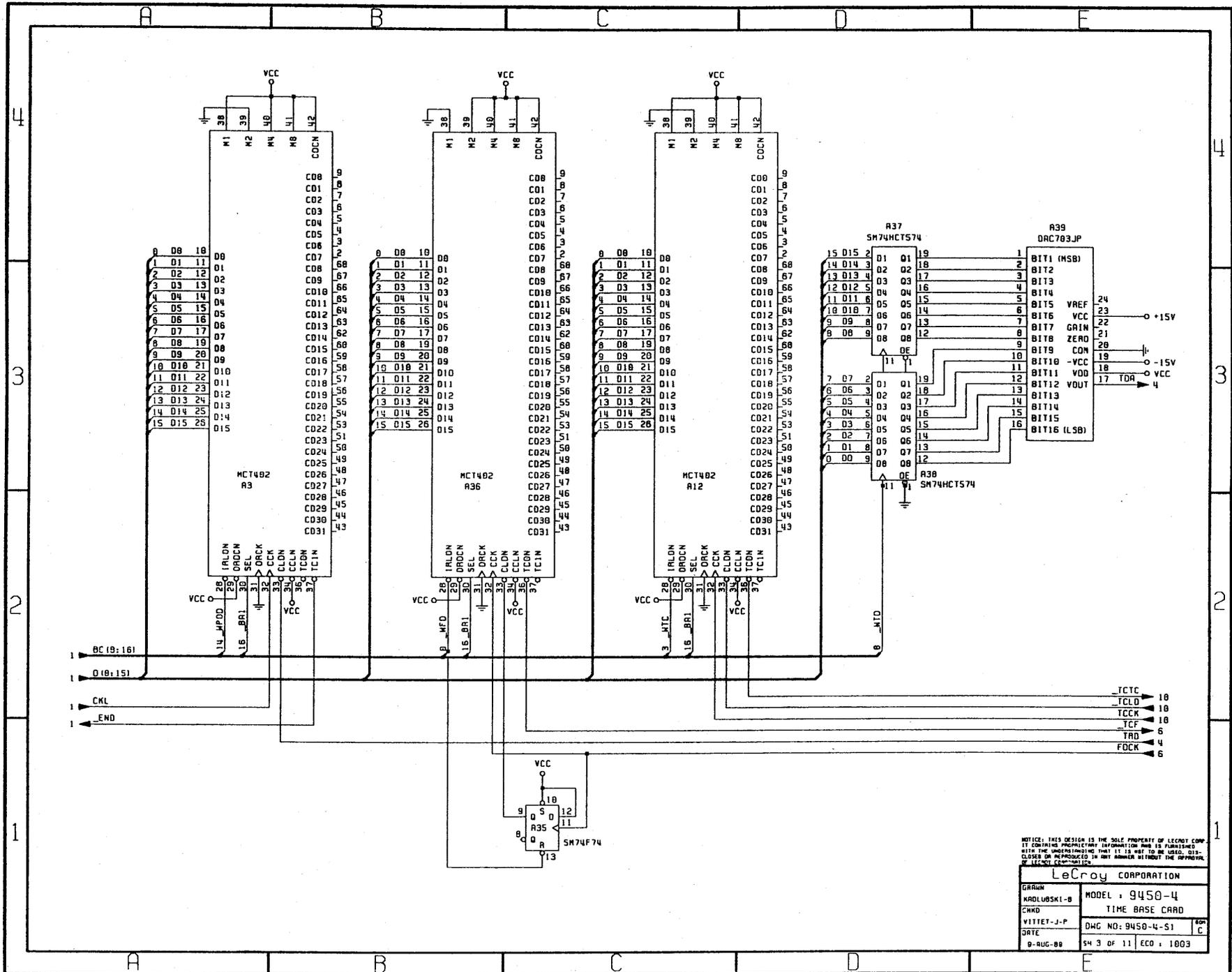
LeCroy CORPORATION	
DRAWN KROLUBSKI-B	MODEL: 9450-4
CHKD VITFET-J-P	TIME BASE CARD
DATE 9-AUG-88	DWG NO: 9450-4-S1
	SH 1 OF 11 ECO x 1803



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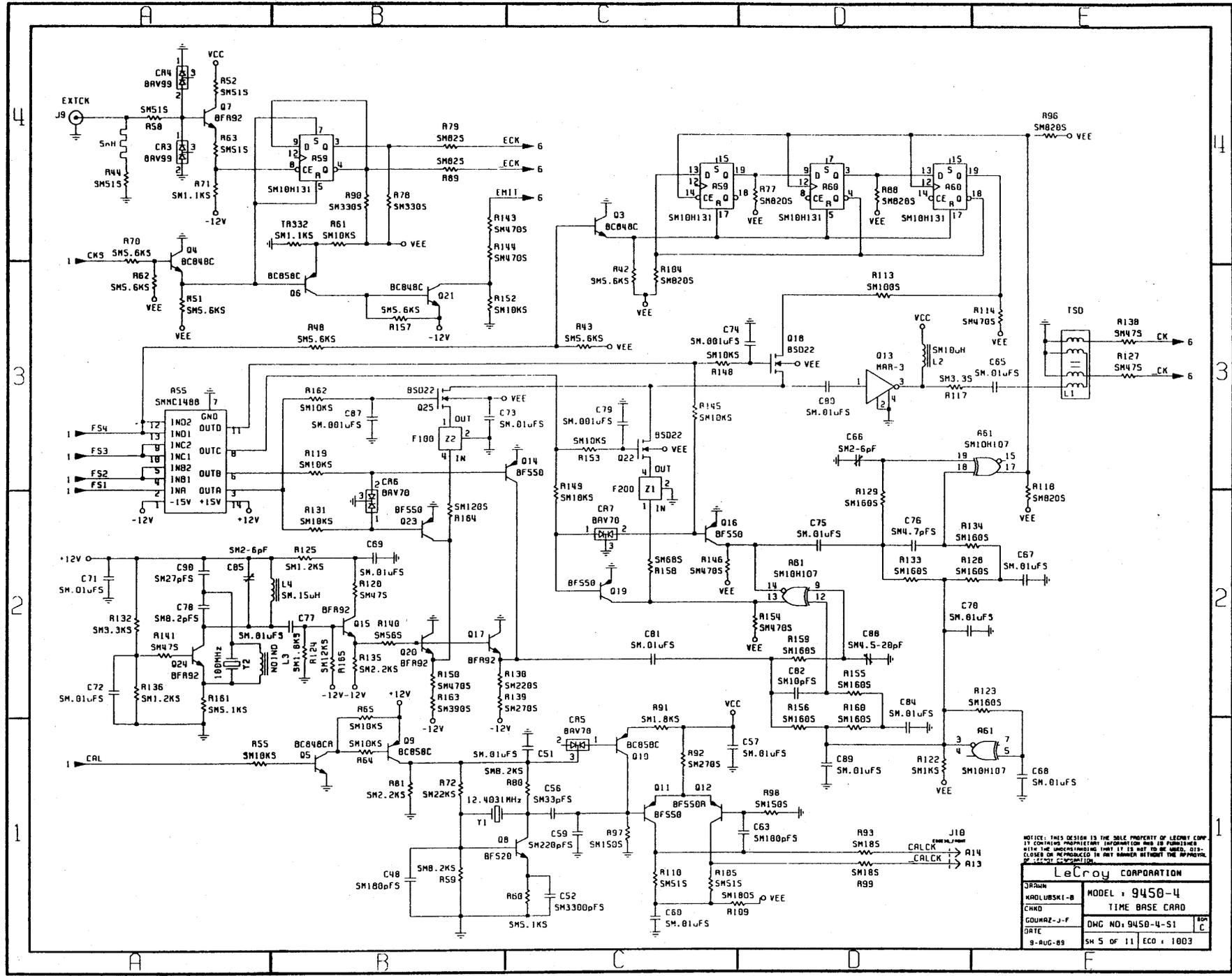
LeCroy CORPORATION

DRWNR	KADLUBSKI-B	MODEL	9450-4
CHKD	VITTEY-J-P		TIME BASE CARD
DATE	8-AUG-88	DWG NO.	0450-4-S1
		SH	2 OF 11
		ECO	1993



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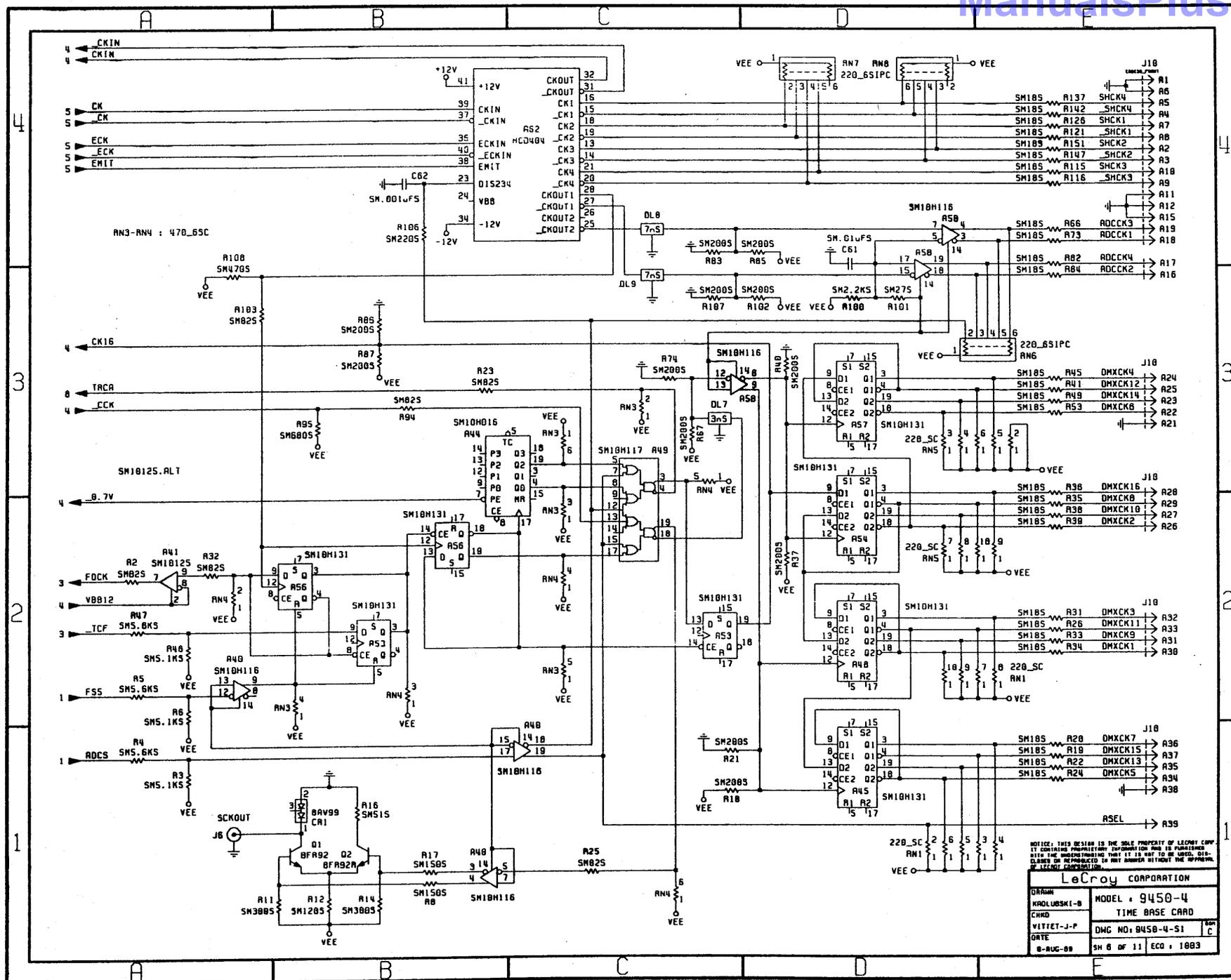
LeCroy CORPORATION			
GARWIN	KADLUBSKI-B	MODEL: 9450-4	
CHWD	WITTET-J-P	TIME BASE CARD	
DATE	9-AUG-88	DWG NO: 9450-4-S1	800 C
		54 3 OF 11	ECO : 1003



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LeCroy CORPORATION

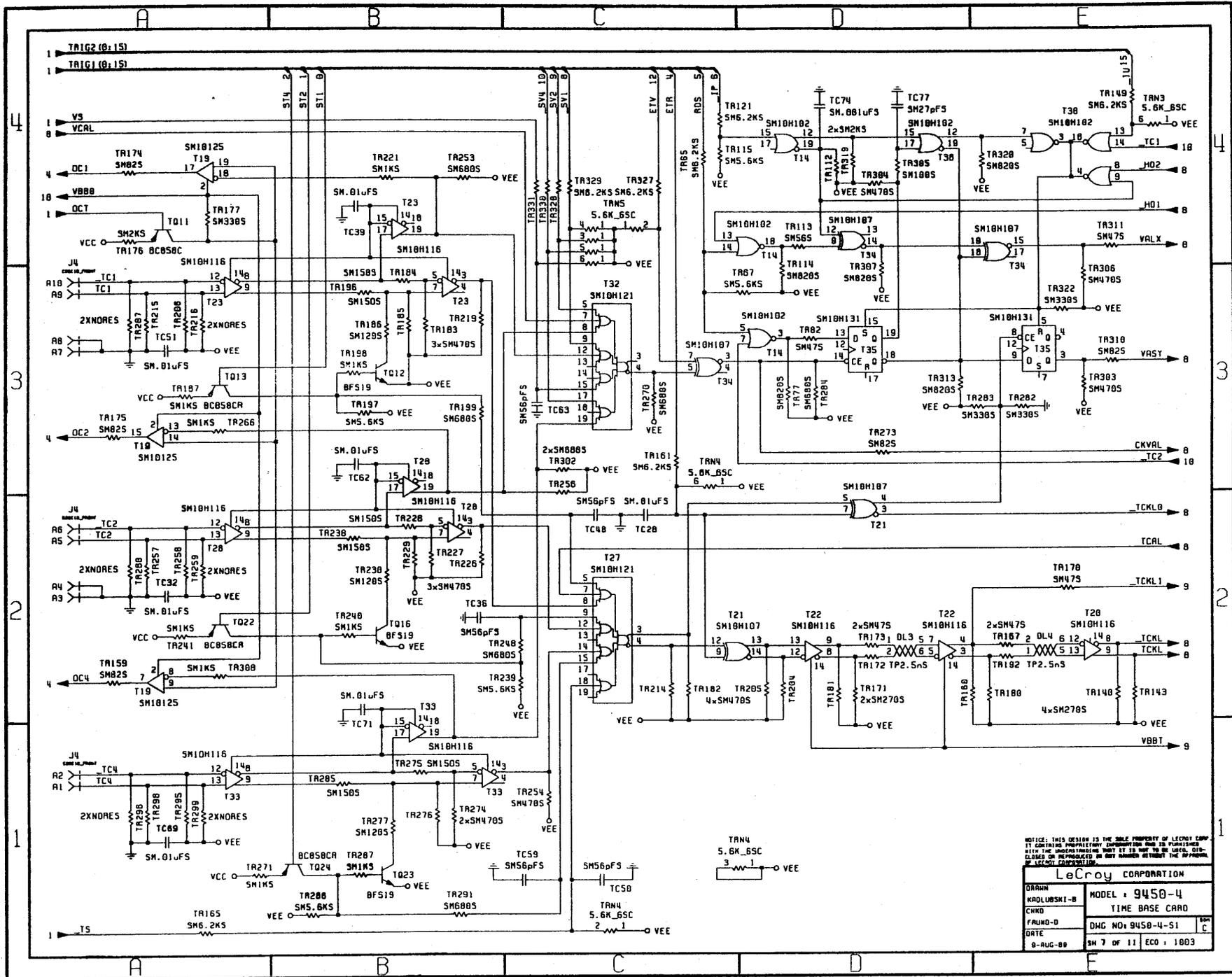
DRAWN	KADLUBSKI-B	MODEL	9450-4
CHKD		TIME BASE CARD	
GOVERNOR	J-F	DWG NO.	9450-4-S1
DATE	9-AUG-89	SH 5 OF 11	ECD - 1003



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LeCroy CORPORATION

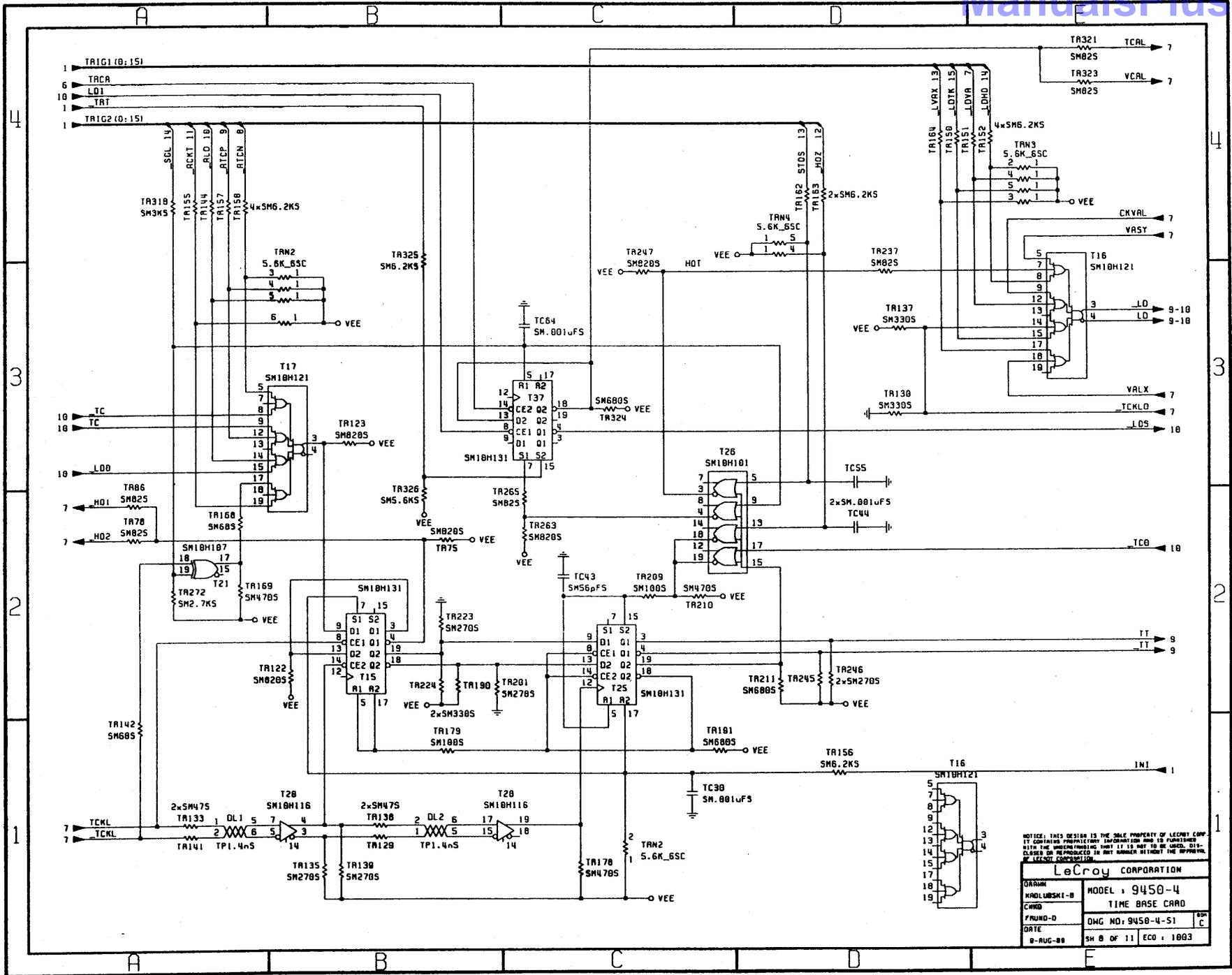
DRAWN KROULSKI-B	MODEL # 9450-4
CHWD	TIME BASE CARD
VITRET-J-P	DWG NO. 9450-4-51
DATE 8-AUG-88	SH 6 OF 11 ECO # 1883



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LeCroy CORPORATION

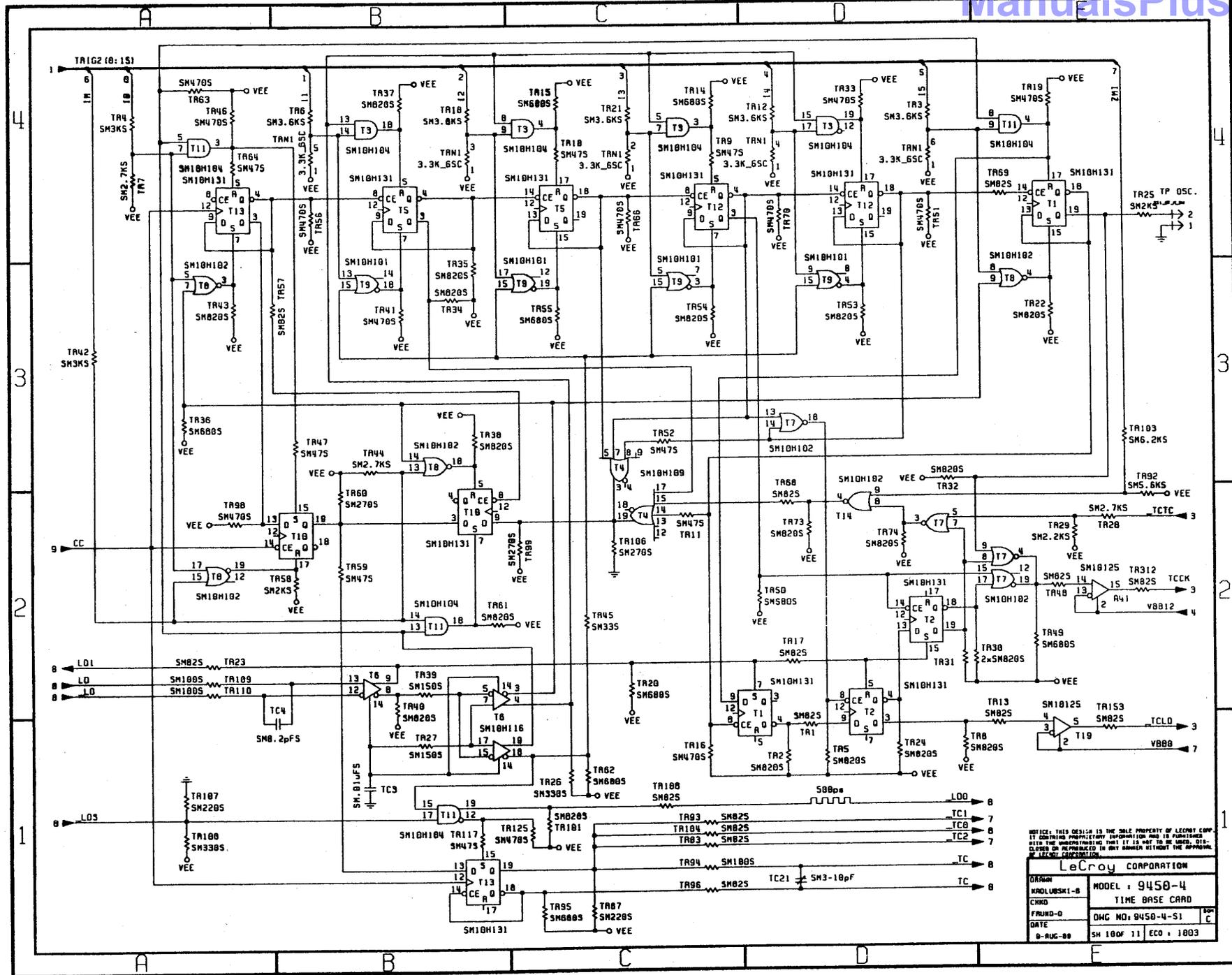
DRAWN KROUBSKI-B	MODEL : 9450-4
CHKD FALVO	TIME BASE CARD
DESIGNED DMC	DMC NO: 9450-4-51
DATE 8-AUG-69	SM 7 DF 11 ECO : 1003



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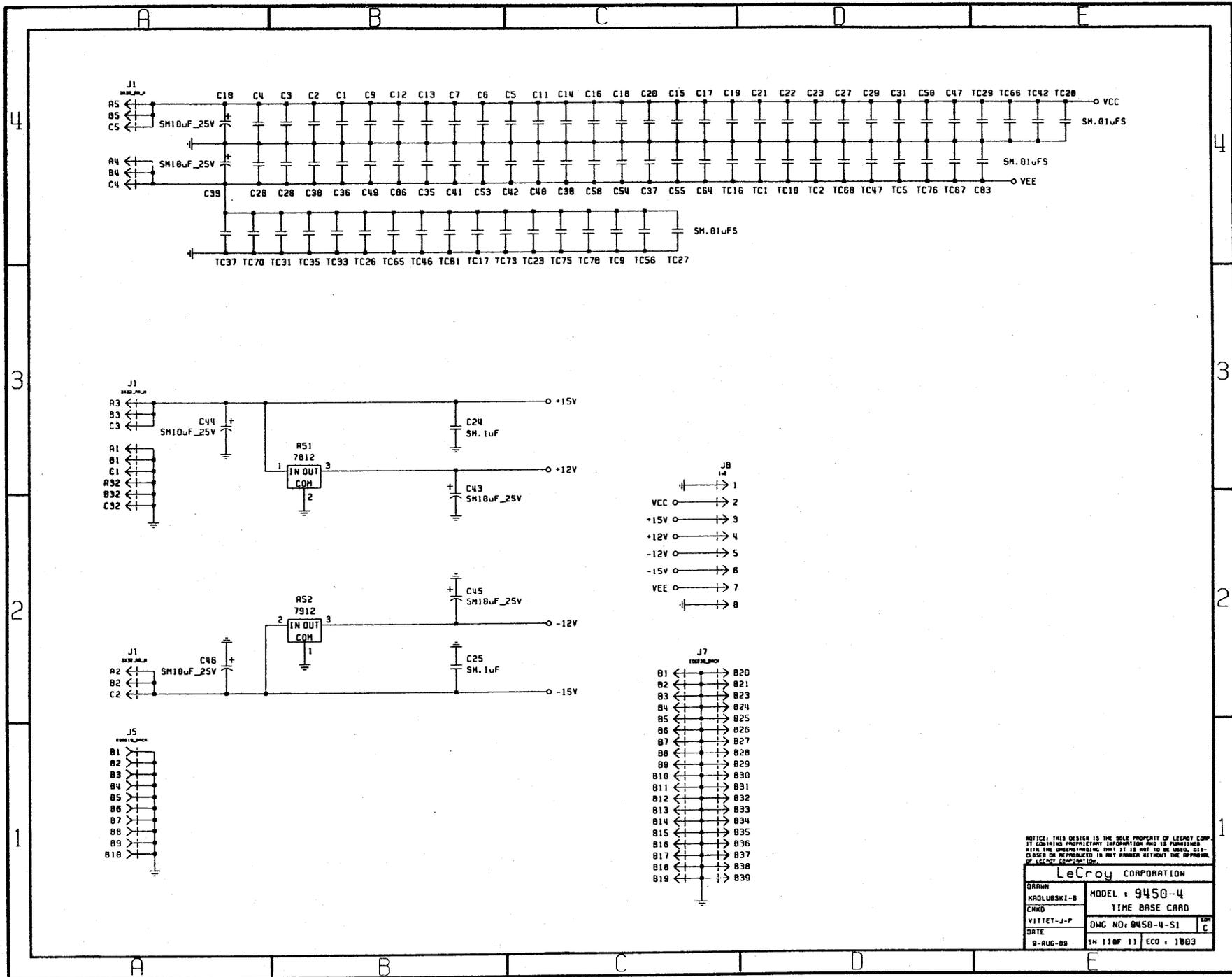
LeCroy CORPORATION

DRAWN	MODEL : 9450-4
WADLUBSKI-B	TIME BASE CARD
CHKD	
FRUNG-D	DMG NO: 9450-4-S1
DATE	
B-AUG-88	SH 8 OF 11 ECO : 1003



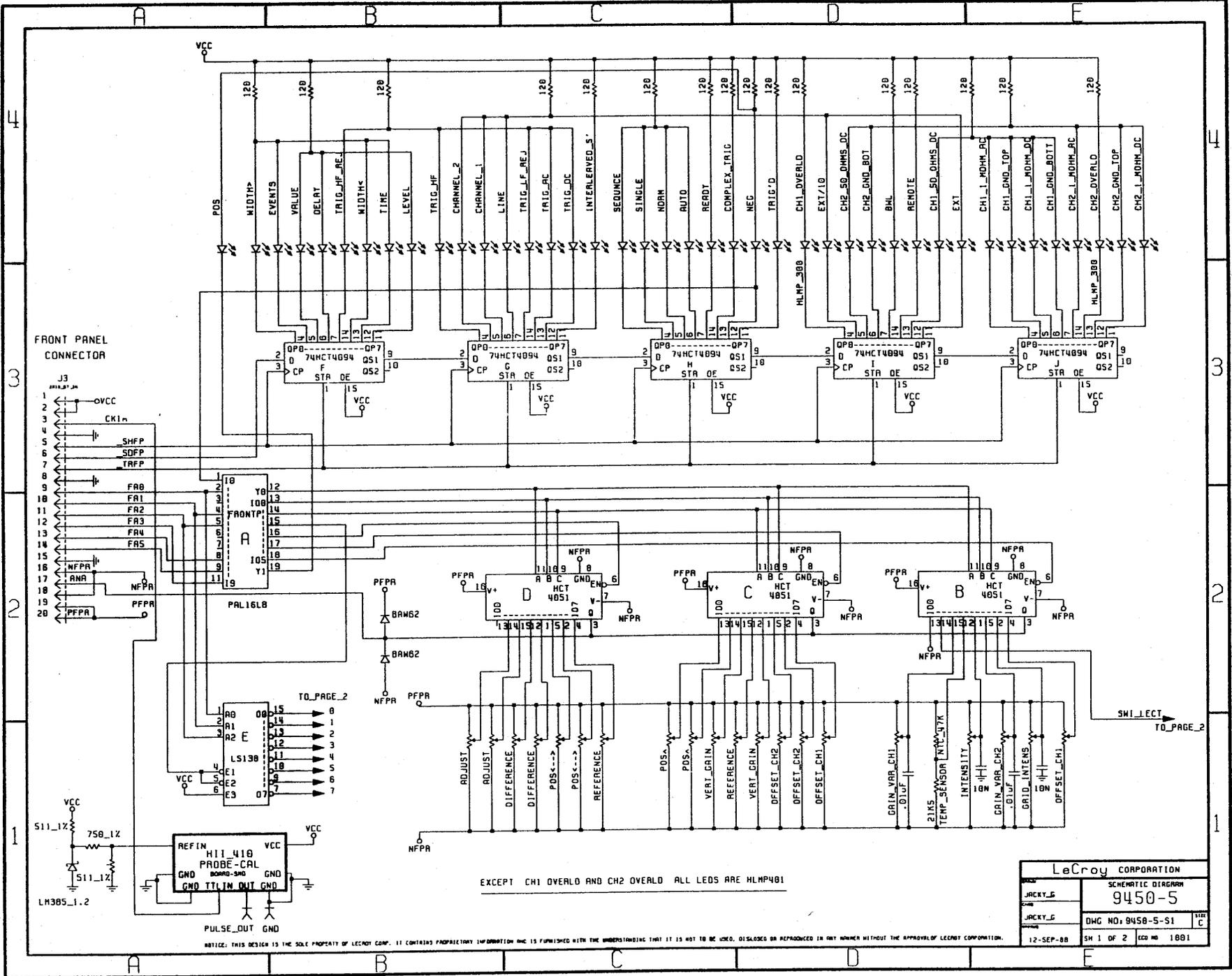
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LeCroy CORPORATION	
DRAWN MADLUSKI-B	MODEL : 9450-4
CHKD	TIME BASE CARD
FRWHD-D	DWG NO: 9450-4-51
DATE	SH 100F 11 ECO : 1803
9-AUG-88	



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LeCroy CORPORATION	
DRAWN KROUBSKI-B	MODEL : 9450-4
CHECKED VITTET-J-P	TIME BASE CARD
DATE 9-AUG-89	DOC NO. 9450-4-S1 REV C
	SH 110P 11 ECO : 1983



FRONT PANEL CONNECTOR

- 1 OVCC
- 2 CK1
- 3
- 4
- 5 SHFP
- 6 SDFP
- 7 TRFP
- 8
- 9
- 10 FAB
- 11 FA1
- 12 FA2
- 13 FA3
- 14 FAN
- 15 FAS
- 16 NFPA
- 17 ANA
- 18 NFPA
- 19 PFPA
- 20 PFPA

511.1K
750.1K
511.1K
VCC
GND
LH385_1.2

REFIN H11410 VCC
PROBE-CAL BOARD-SHO
GND TT IN OUT GND
PULSE_OUT GND

EXCEPT CH1 OVERLO AND CH2 OVERLO ALL LEDS ARE HLMF481

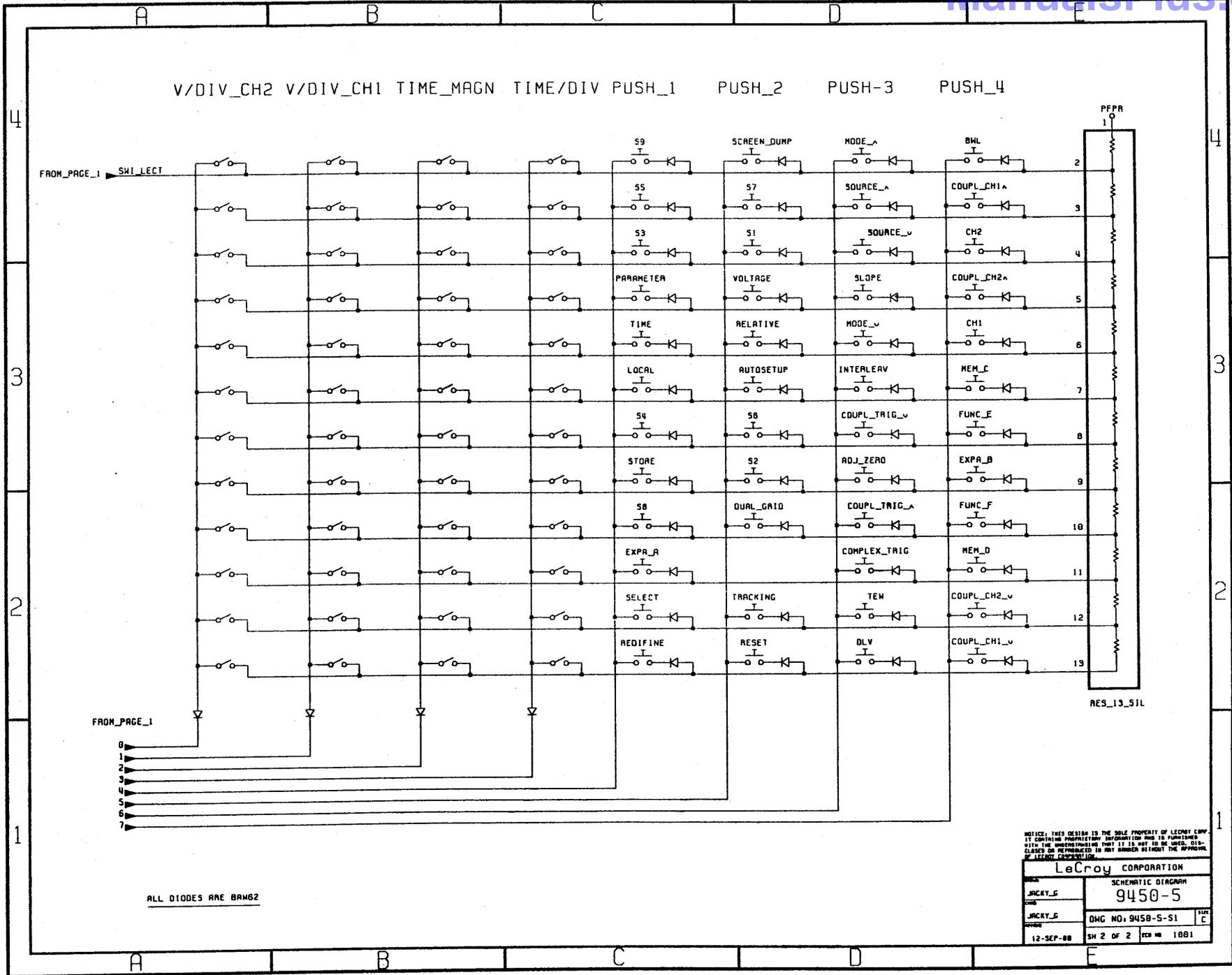
LeCroy CORPORATION

JACKY_G 9450-5

JACKY_G DMG NO. 9450-5-S1

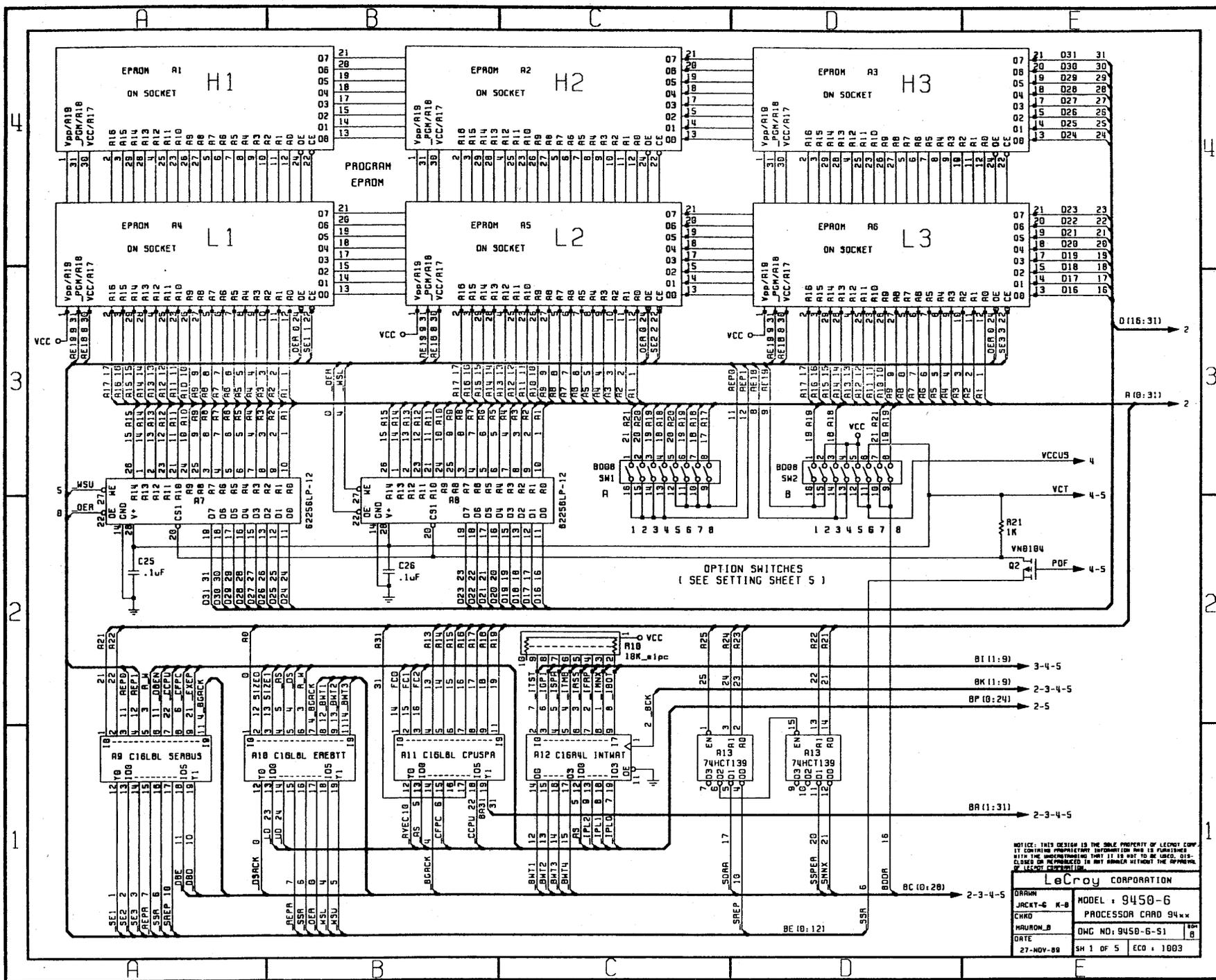
12-SEP-88 SH 1 OF 2 CSD NO. 1881

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LeCroy CORPORATION	
DESIGNER JACKY_G	SCHEMATIC DIAGRAM 9450-5
DATE JACKY_G	DWG NO: 9450-5-S1
ISSUE 12-SEP-88	SH 2 OF 2 ECR NO 1001

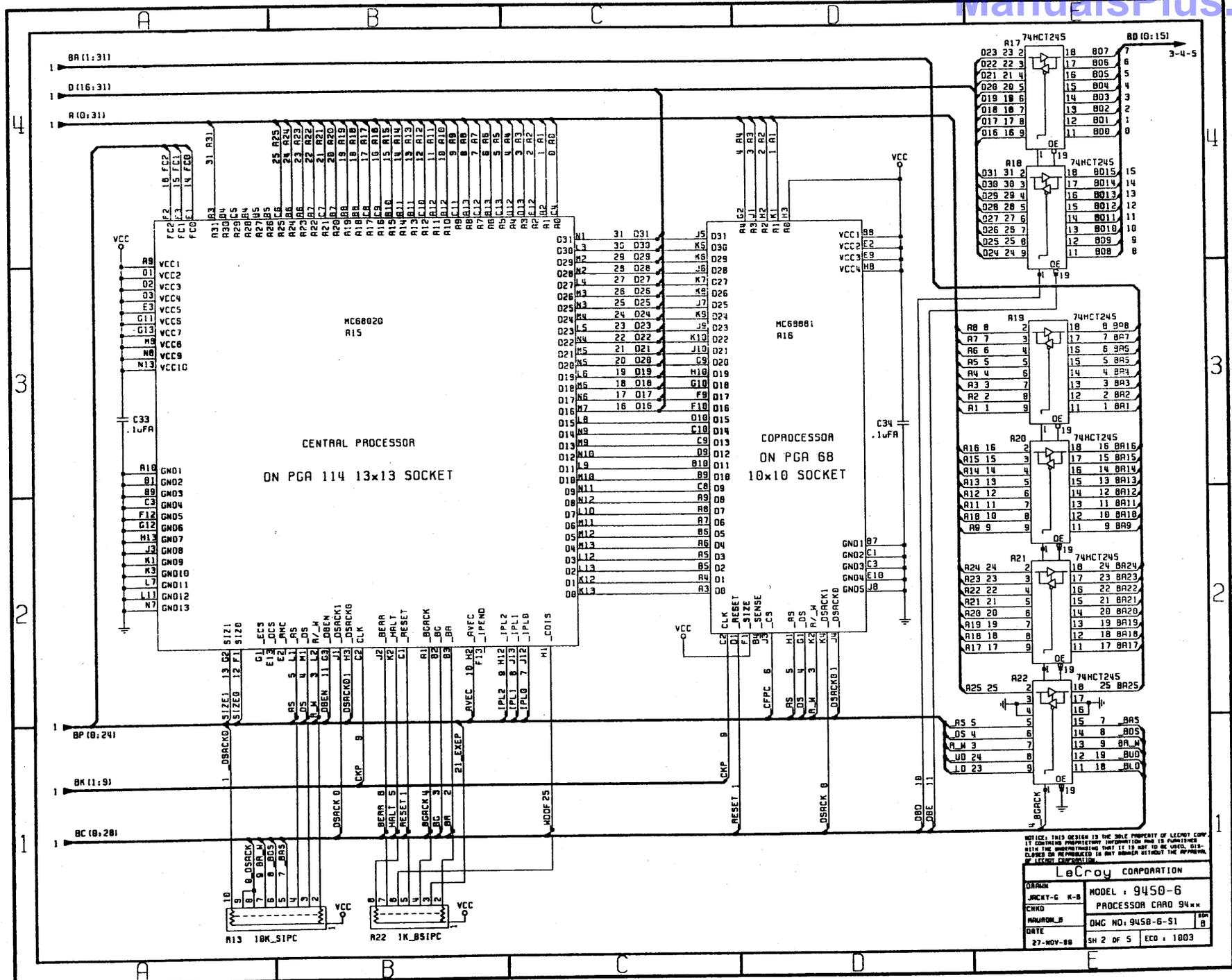


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LeCroy CORPORATION

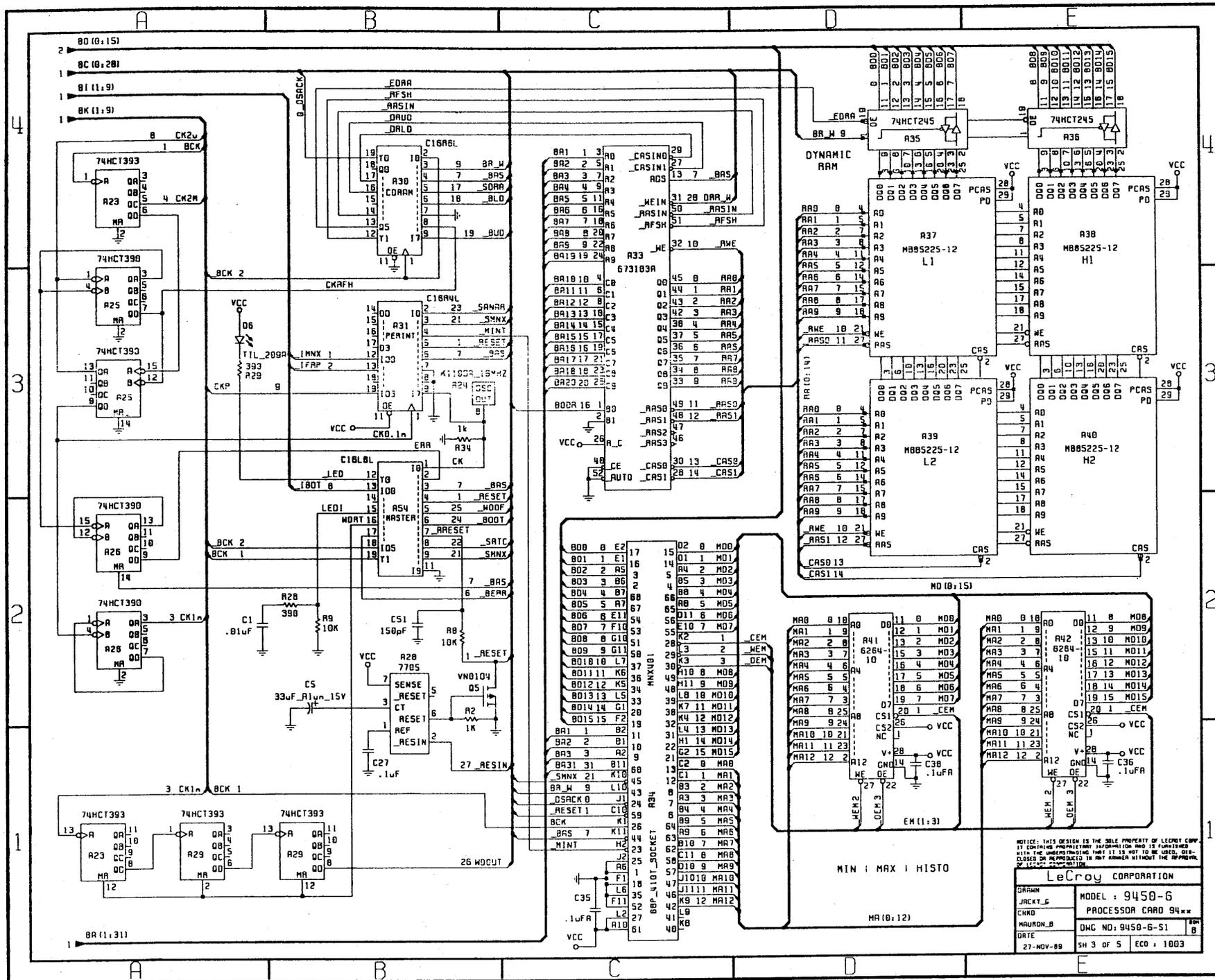
DRAWN	JACKY-G K-B	MODEL	9450-6
CHKD		PROCESSOR CARD	94xx
MAUNDR		DWG NO:	9450-6-51
DATE	27-NOV-89	SH	1 OF 5

ECO 1803



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LeCroy CORPORATION	
DRAWN	MODEL : 9450-6
JACKY-G K-B	PROCESSOR CARD 94x.x
CHKD	DMC NO. 9450-6-51
MANUWAL_B	SH 2 OF 5
DATE	27-NOV-88
	ECO : 1003

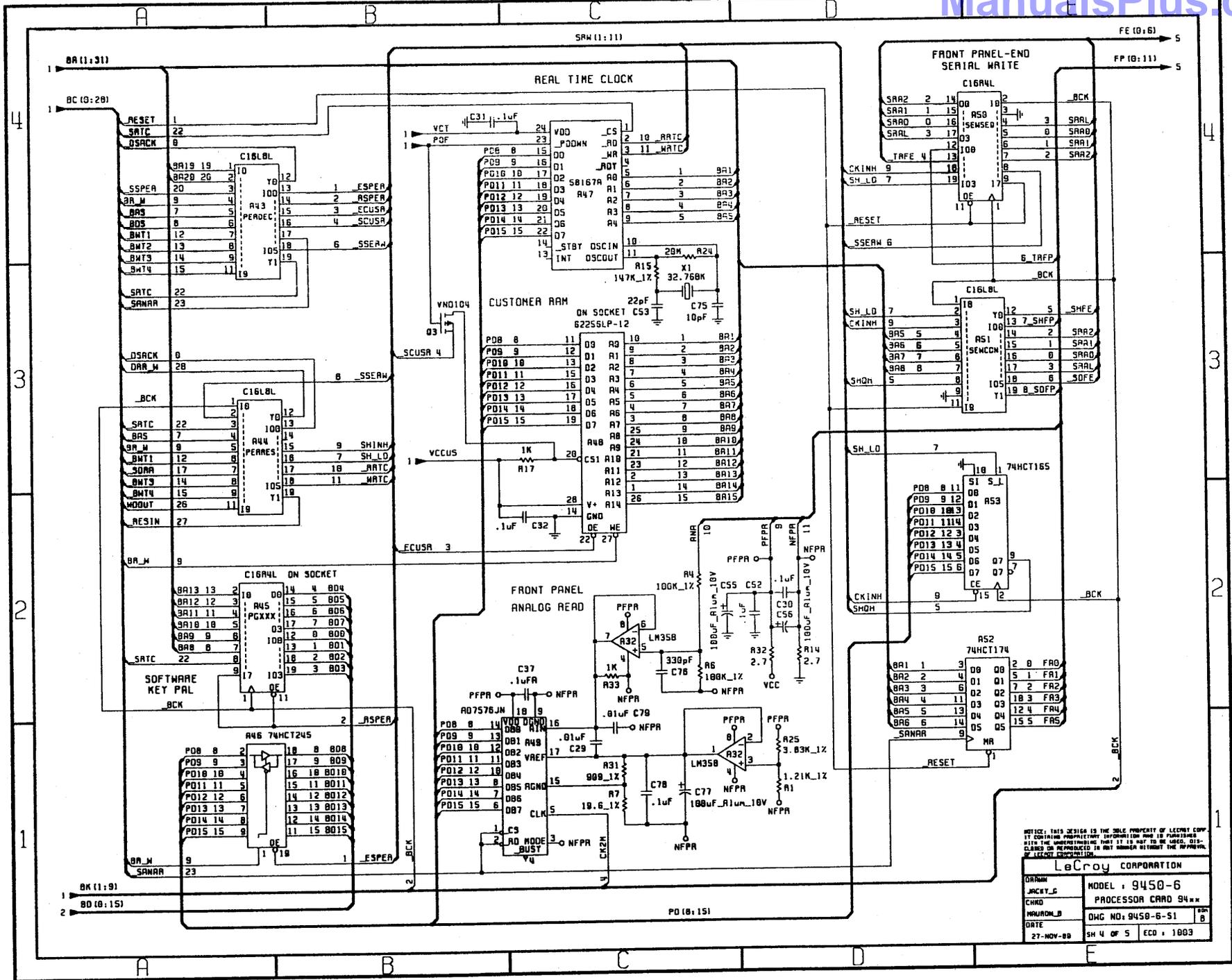


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MIN | MAX | HISTO

MA(0:12)

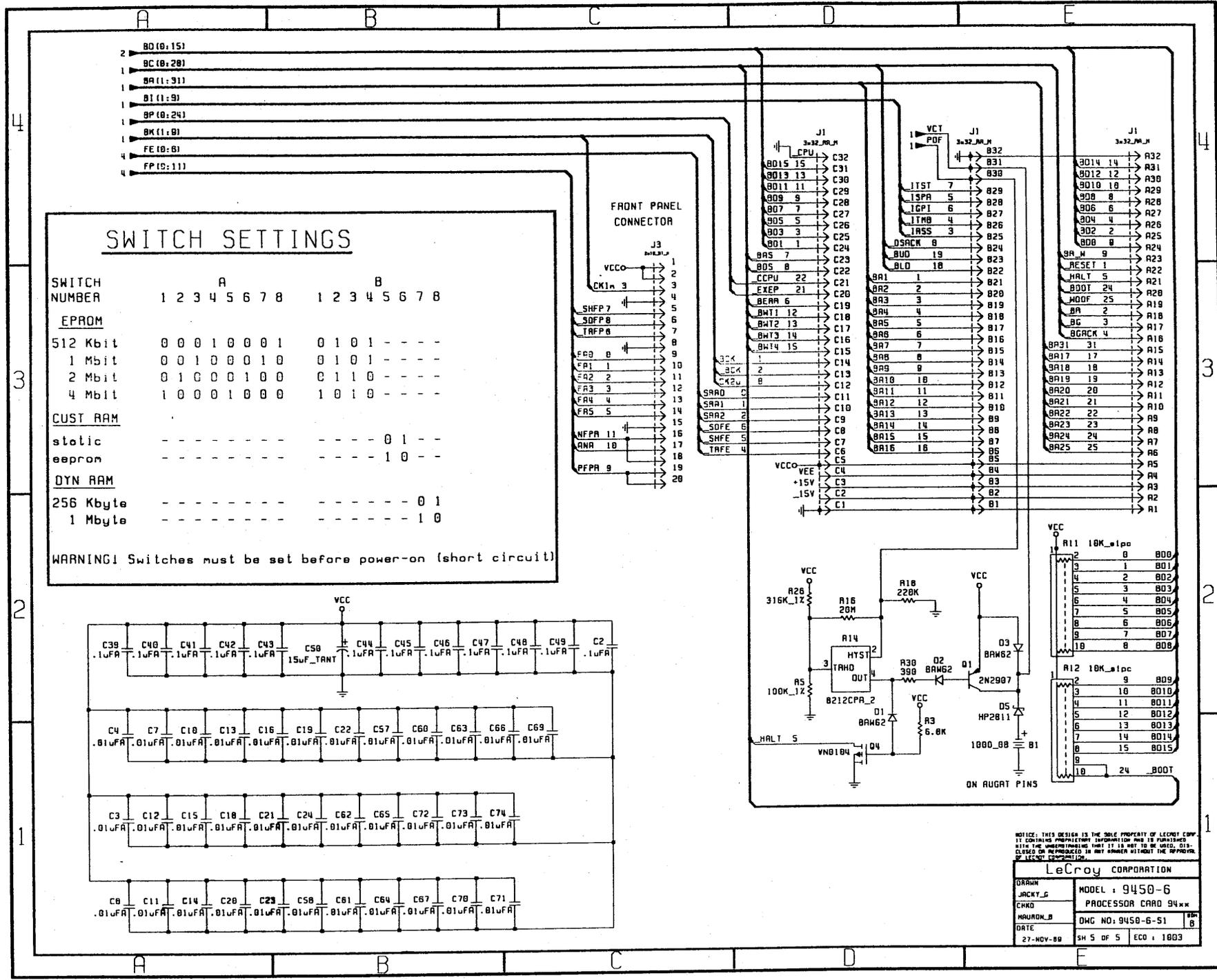
LeCroy CORPORATION	
DRAWN	MODEL : 9450-6
JACKY_S	PROCESSOR CARD 94**
CHWD	DWC NO: 9450-6-51
MAURON_B	SH 3 OF 5
DATE	ECC : 1003
27-NOV-89	



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LeCroy CORPORATION

DRWNG	MODEL : 9450-6
JACKET_S	PROCESSOR CARD 94mm
CHRD	DMC NO: 9450-6-S1
MAURON_B	SH 4 OF 5
DATE	27-NOV-88
	CCD : 1003

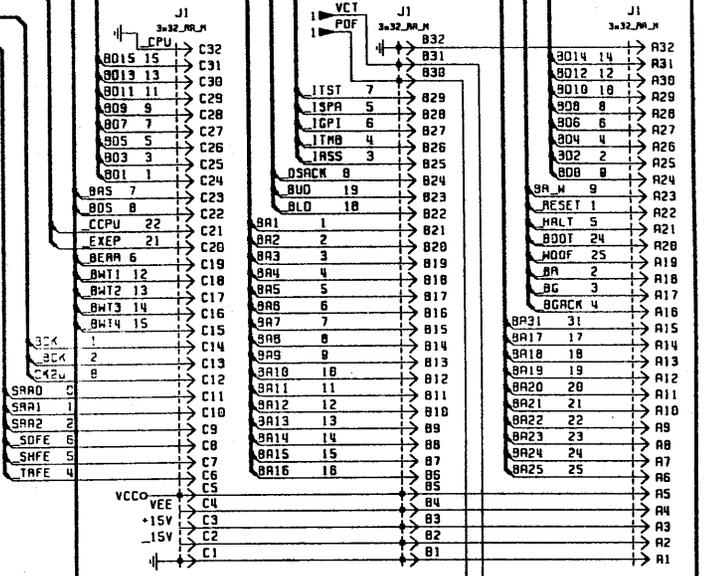
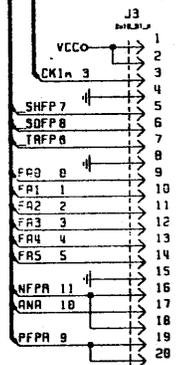


SWITCH SETTINGS

SWITCH NUMBER	A								B							
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
EPRAM																
512 Kbit	0	0	0	1	0	0	0	1	0	1	0	1	-	-	-	-
1 Mbit	0	0	1	0	0	0	1	0	0	1	0	1	-	-	-	-
2 Mbit	0	1	0	0	0	1	0	0	0	1	1	0	-	-	-	-
4 Mbit	1	0	0	0	1	0	0	0	1	0	1	0	-	-	-	-
CUST RAM																
static	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	1
eepron	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	0
DYN RAM																
256 Kbyte	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	1
1 Mbyte	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	0

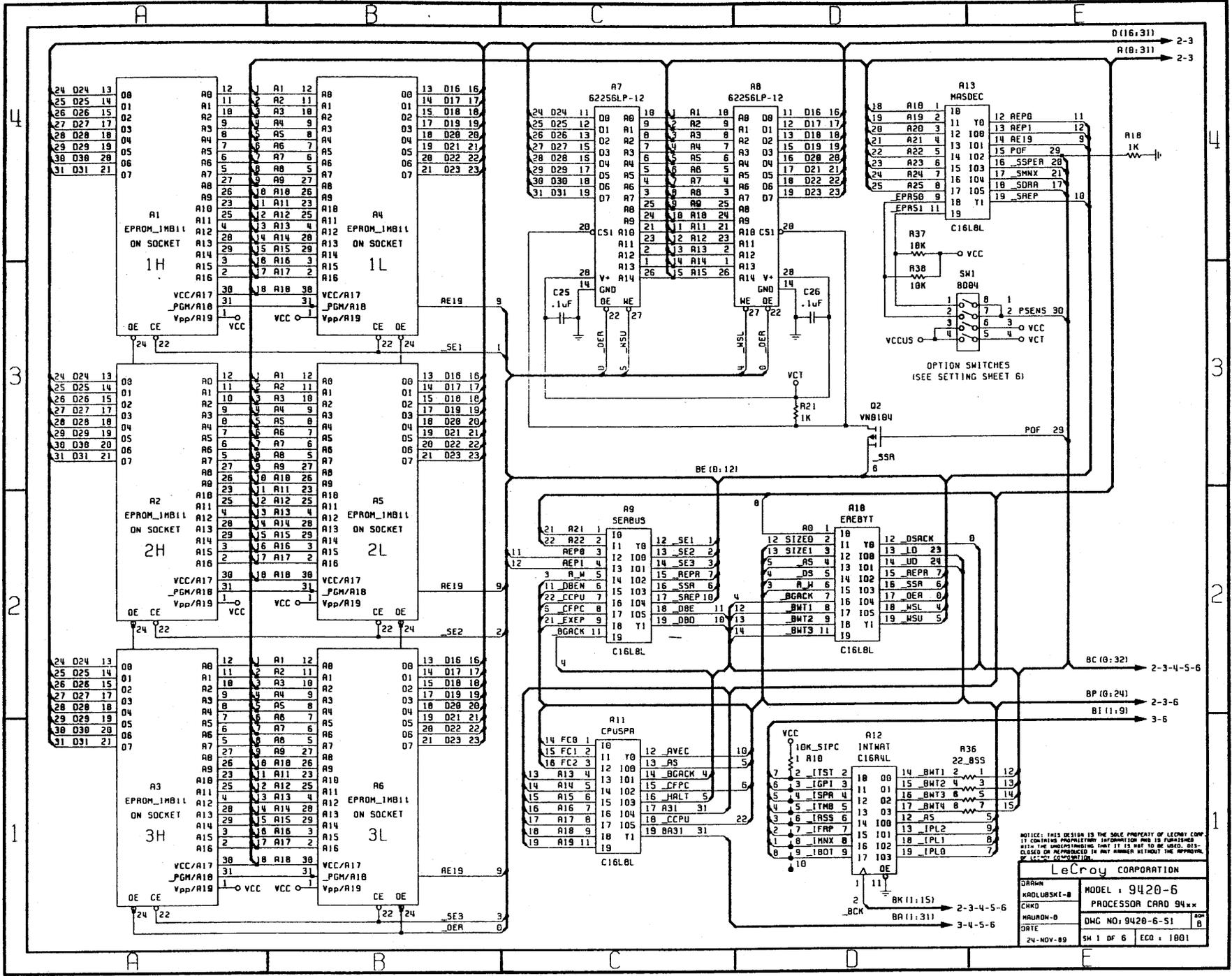
WARNING! Switches must be set before power-on (short circuit)

FRONT PANEL CONNECTOR



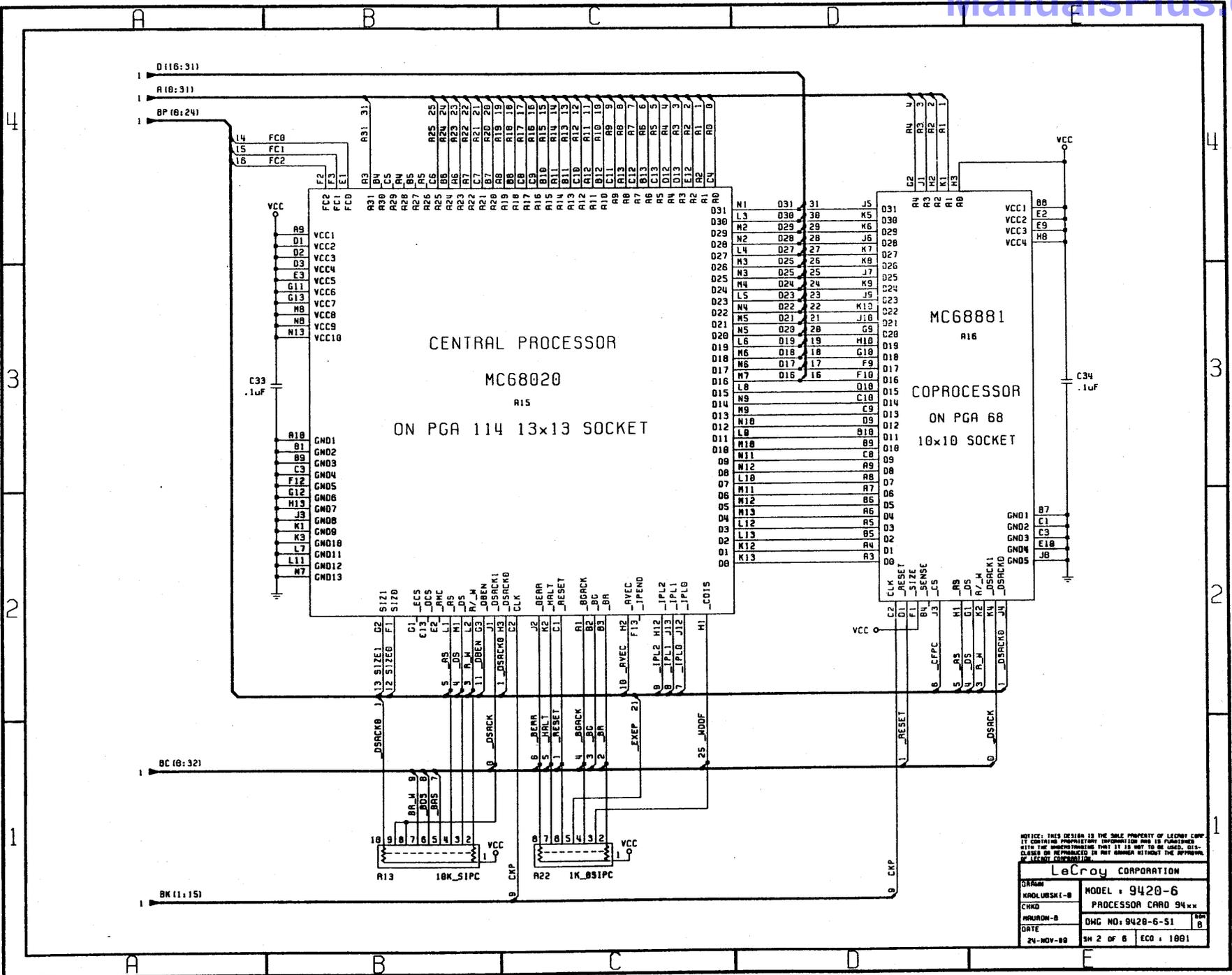
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LeCroy CORPORATION			
DRAWN	JACKY_G	MODEL	9450-6
CHKD		PROCESSOR CARD 94xx	
MAUNDR_B		DWG NO:	9450-6-51
DATE	27-NOV-89	SH 5 OF 5	ECO : 1803



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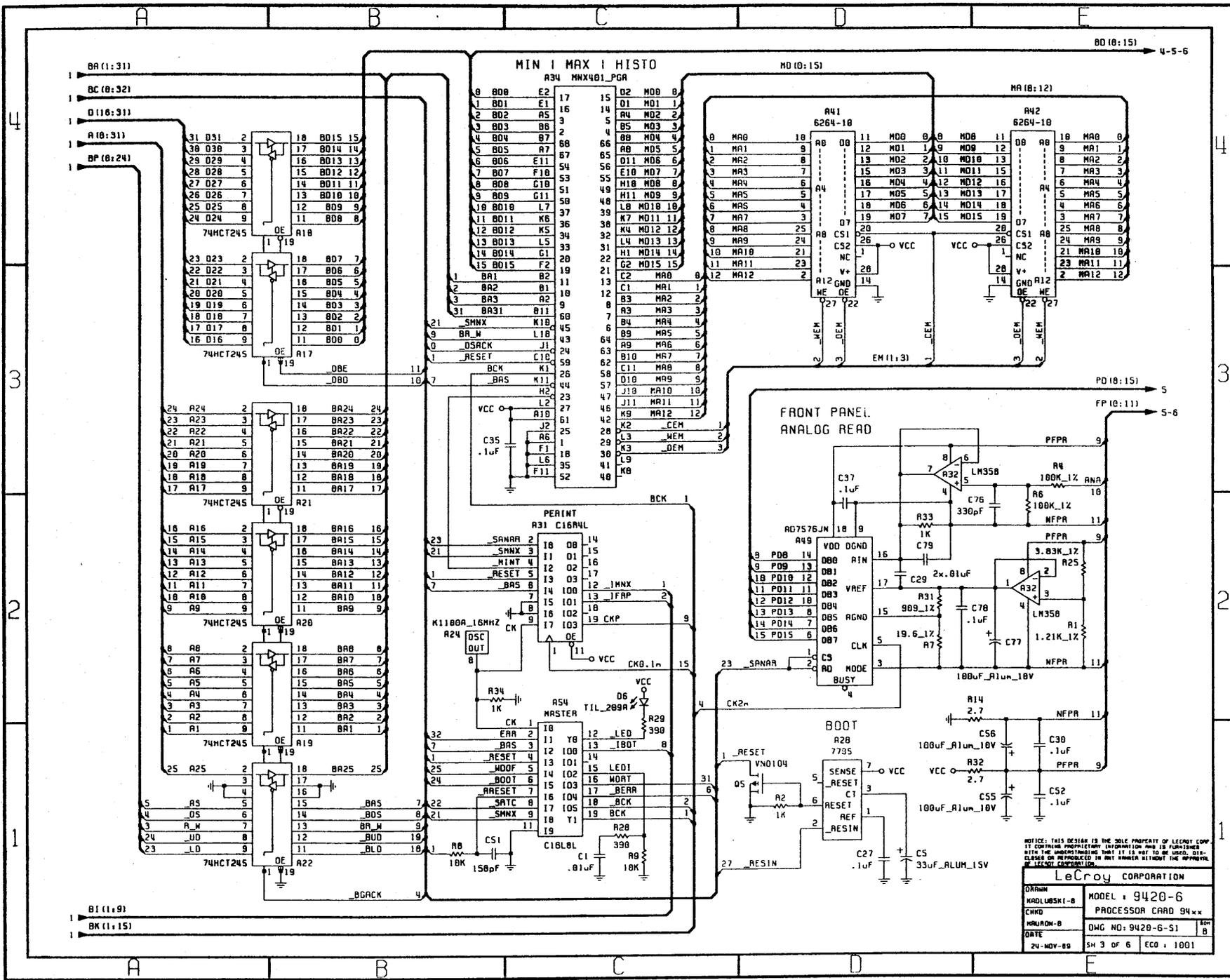
LeCroy CORPORATION	
DRAWN KADLUBSKI-B	MODEL : 9420-6
CHECK MORAND-B	PROCESSOR CARD 94xx
DATE 24-NOV-89	DWG NO: 9420-6-51
	SH 1 DF 6 ECO : 1801



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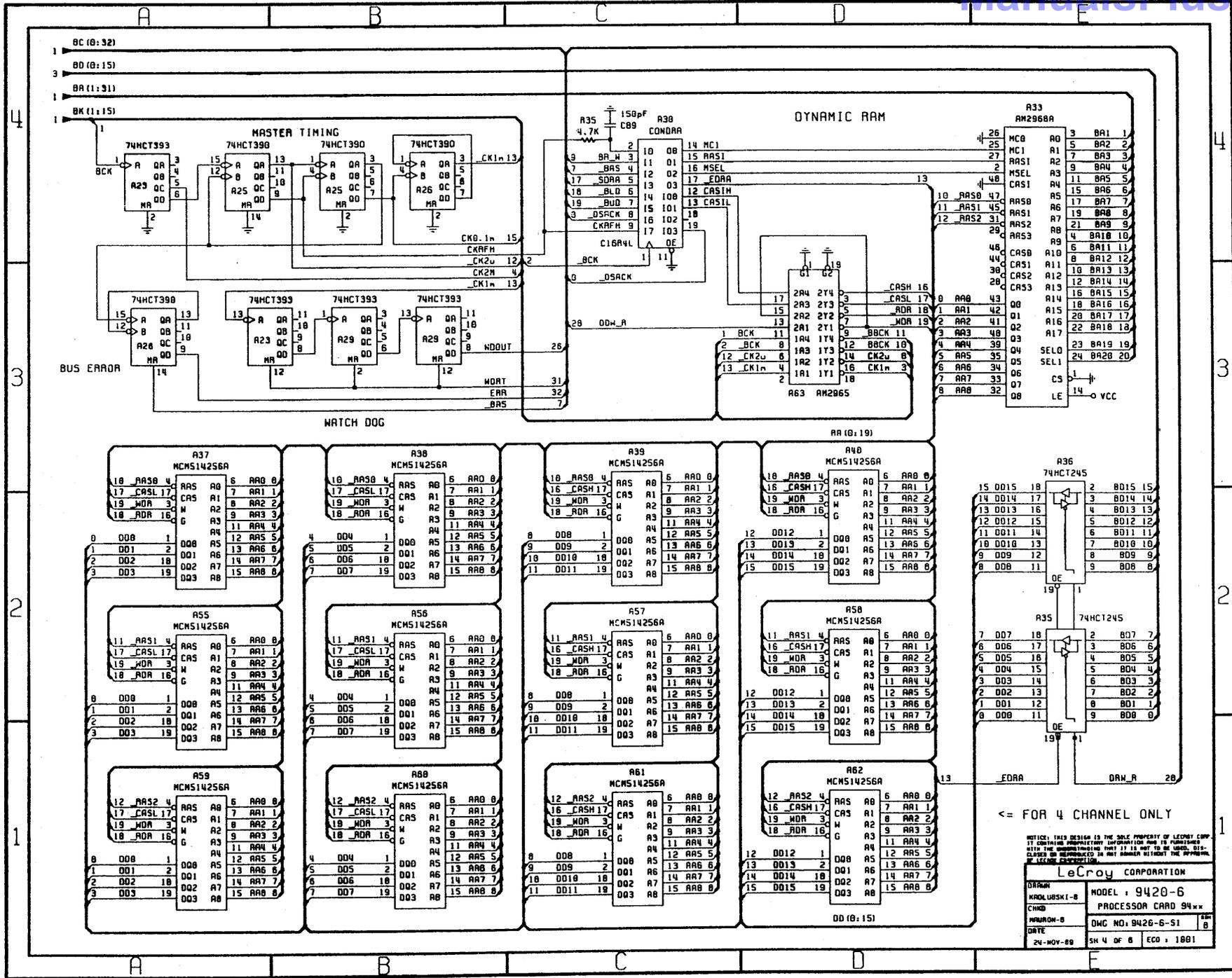
LeCroy CORPORATION

DRUM	MODEL: 9420-6
HWOLUBSH1-B	PROCESSOR CARD 94**
CRWD	DWG NO: 9420-6-51
HWOLUBSH1-B	DATE: 24-NOV-88
SH 2 OF 8	ECD: 1801



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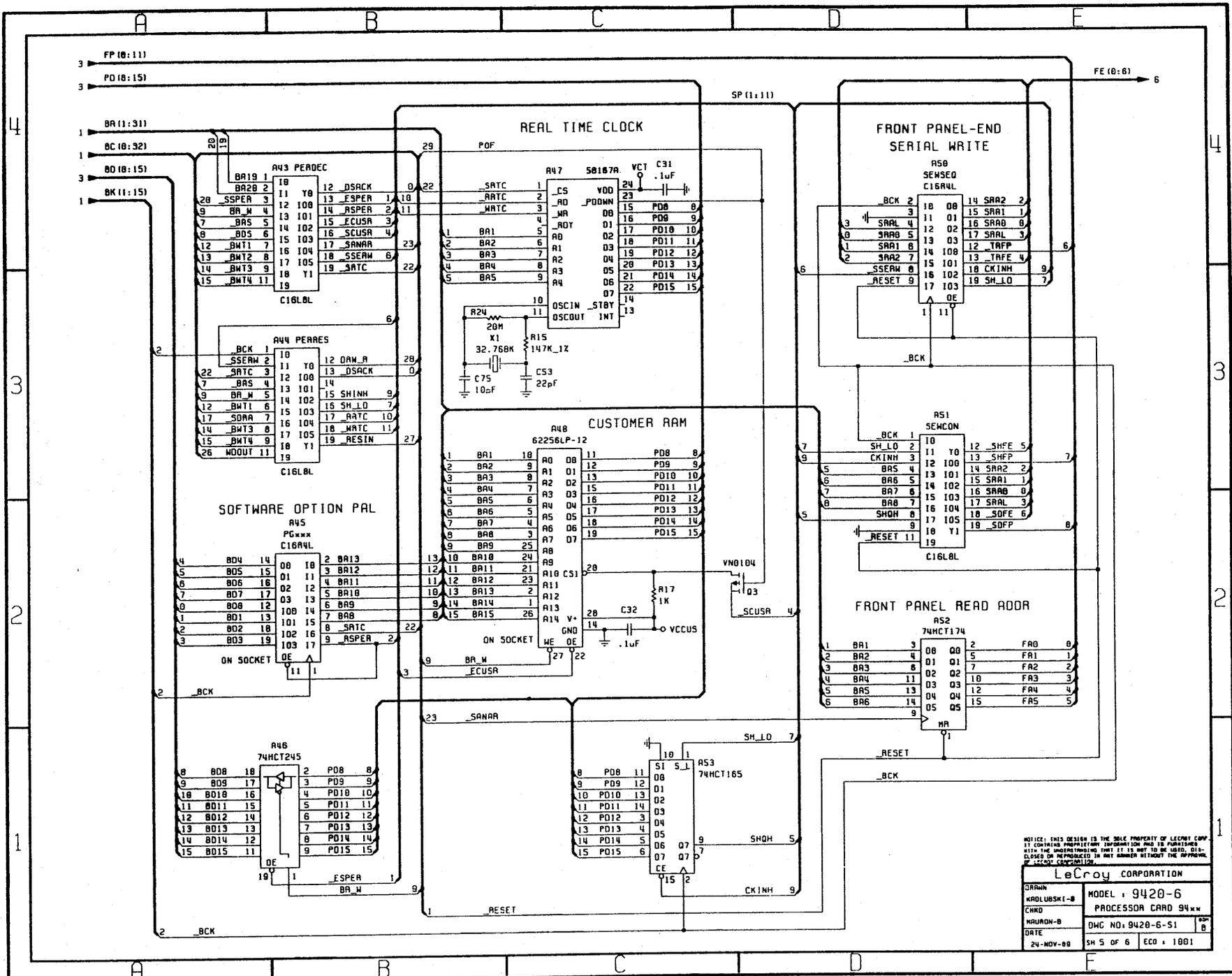
LeCroy CORPORATION	
DRAWN MADLWSK1-B	MODEL + 9420-6
CHKD MADLWSK1-B	PROCESSOR CARD 94xx
DATE 24-NOV-89	DWG NO: 9420-6-S1
SH 3 OF 6	ECO + 1001



= FOR 4 CHANNEL ONLY

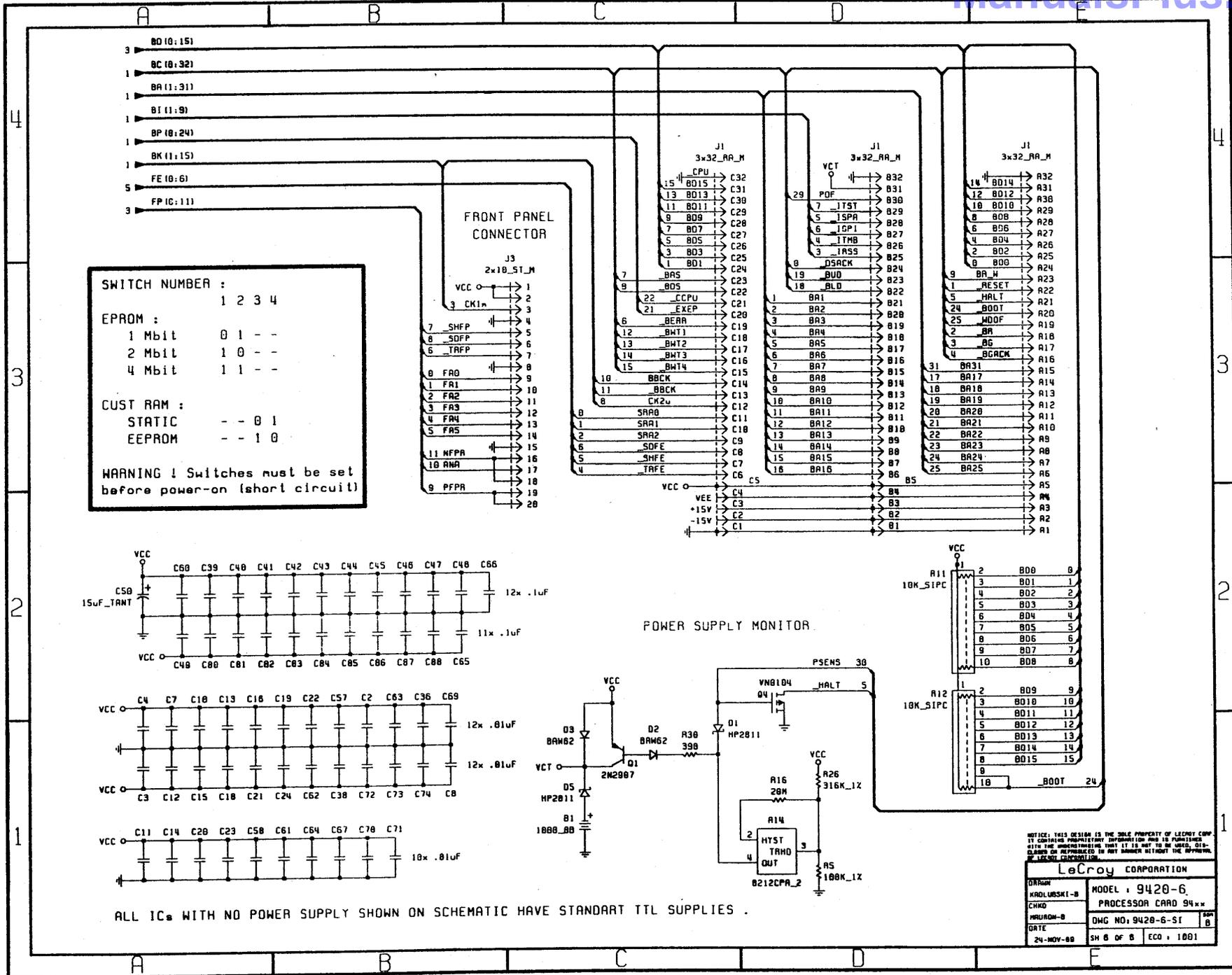
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LeCroy CORPORATION	
DESIGN KADLUSKI-B	MODEL: 9420-6
CHWG	PROCESSOR CARD 94xx
MANUFACTURED BY DATE	DWG NO: 9426-6-S1
DATE 24-NOV-89	SH 4 OF 6 ECO: 1801



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LeCroy CORPORATION	
DRAWN KADLUBSKI-B	MODEL : 9420-6
CHKD MOURDAN-B	PROCESSOR CARD 94xxx
DATE 24-NOV-88	DWG NO: 9420-6-51
	SH 5 OF 6 ECO : 1801

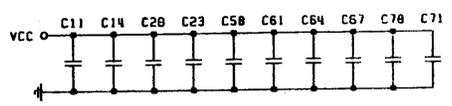
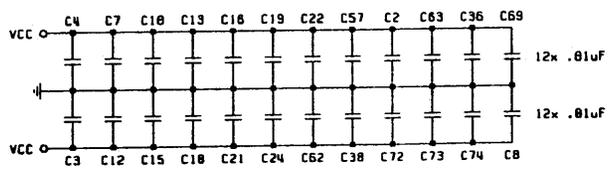
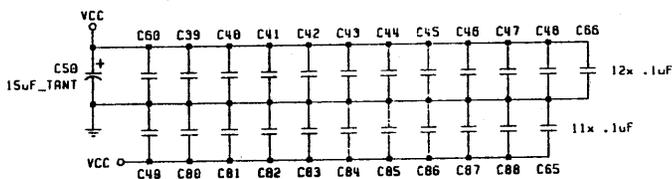


SWITCH NUMBER :
1 2 3 4

EPROM :
1 Mbit 0 1 --
2 Mbit 1 0 --
4 Mbit 1 1 --

CUST RAM :
STATIC -- 0 1
EEPROM -- 1 0

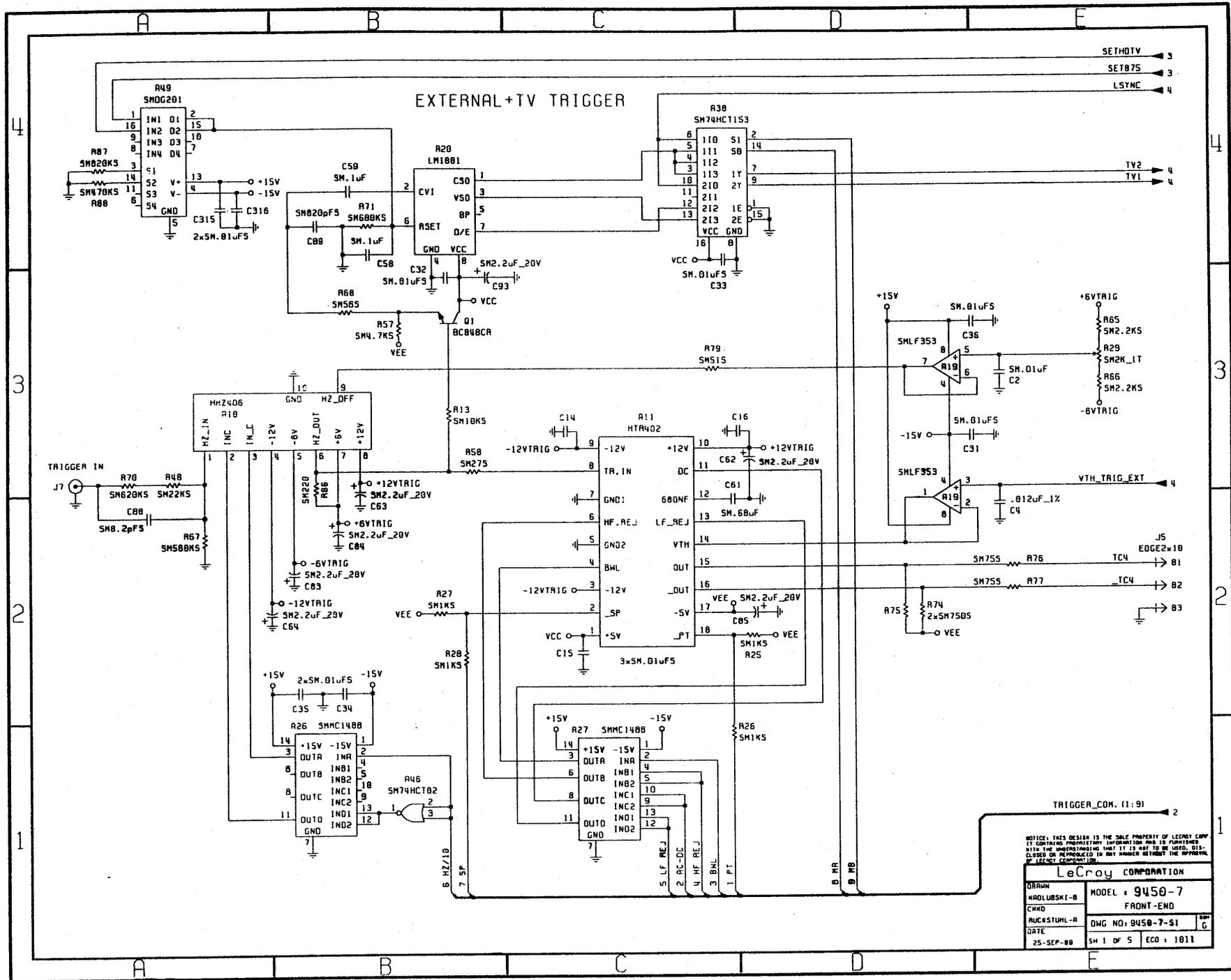
WARNING ! Switches must be set before power-on (short circuit!)



ALL ICs WITH NO POWER SUPPLY SHOWN ON SCHEMATIC HAVE STANDART TTL SUPPLIES .

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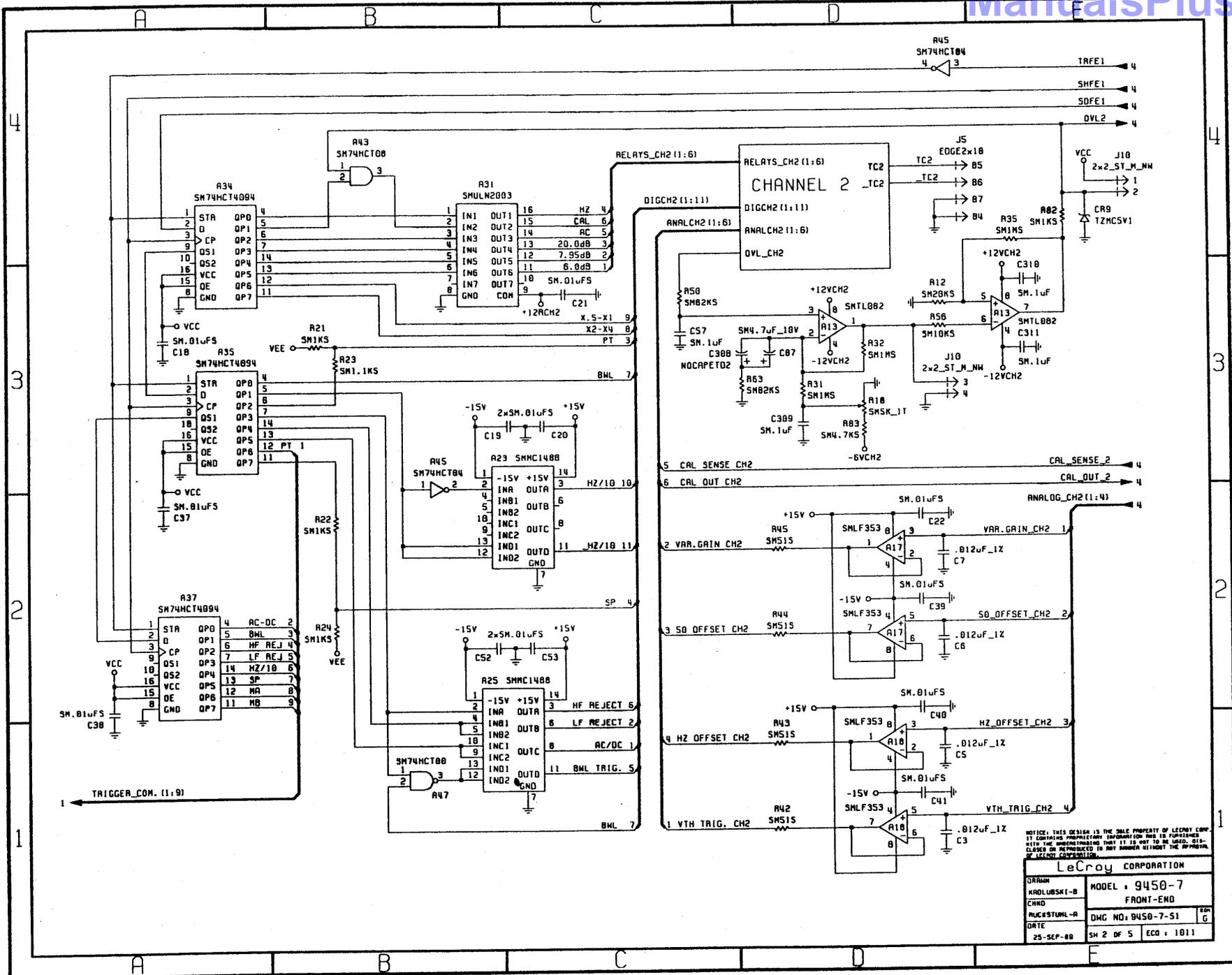
LeCroy CORPORATION	
DRWING KADLUSKI-B	MODEL : 9420-6
CHKD HARRISON-B	PROCESSOR CARD 94xxx
DATE 24-NOV-89	DWG NO: 9420-6-S1
	SH 8 OF 8 ECO : 1001



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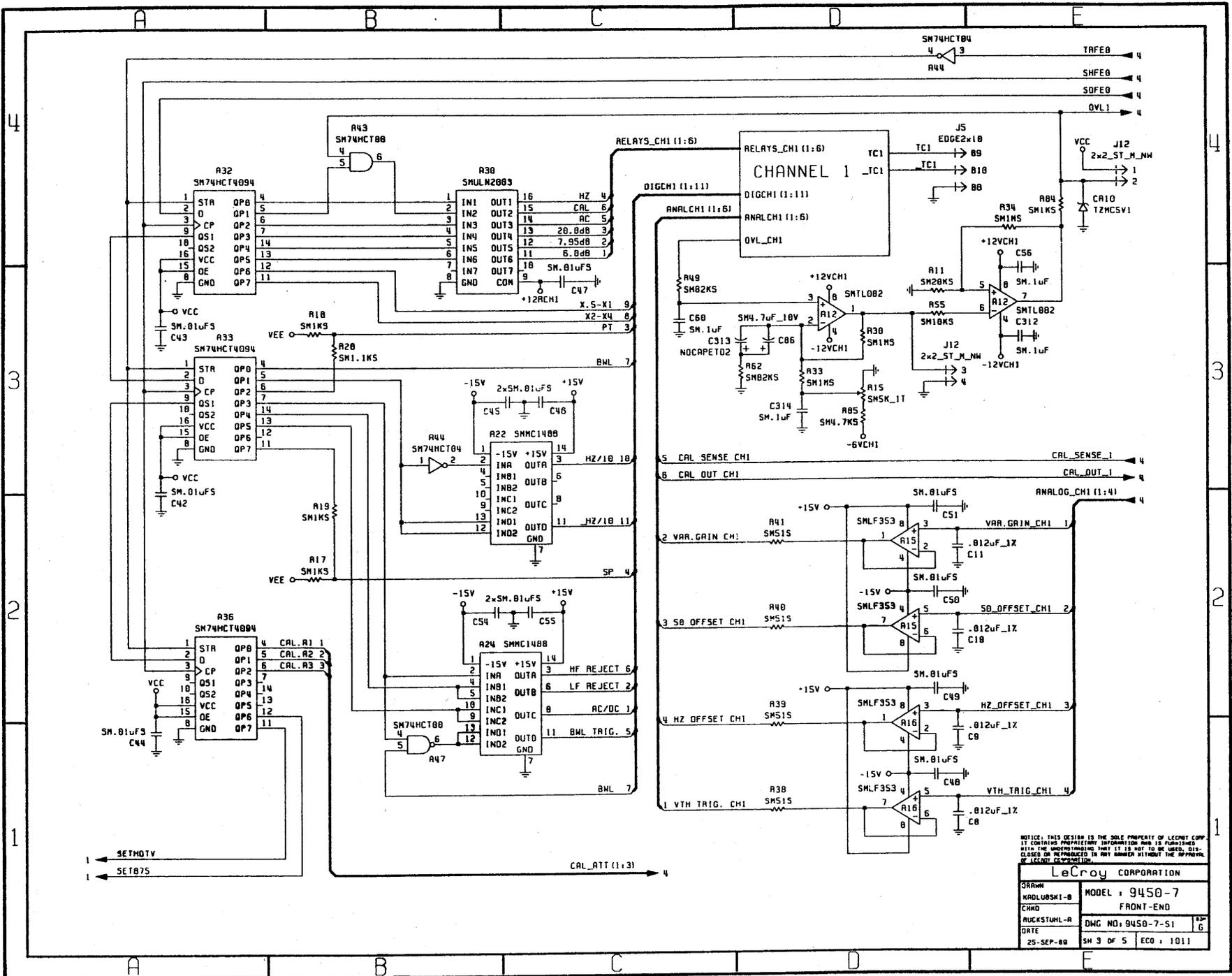
LeCroy CORPORATION

DRAWN	KRAOLUBSKI-B	MODEL	9450-7
CHKD			FRONT-END
AUCTIONSTUHL-A		DWG NO:	9450-7-S1
DATE	25-SEP-89	SH	1 OF 5
		ECO	1011



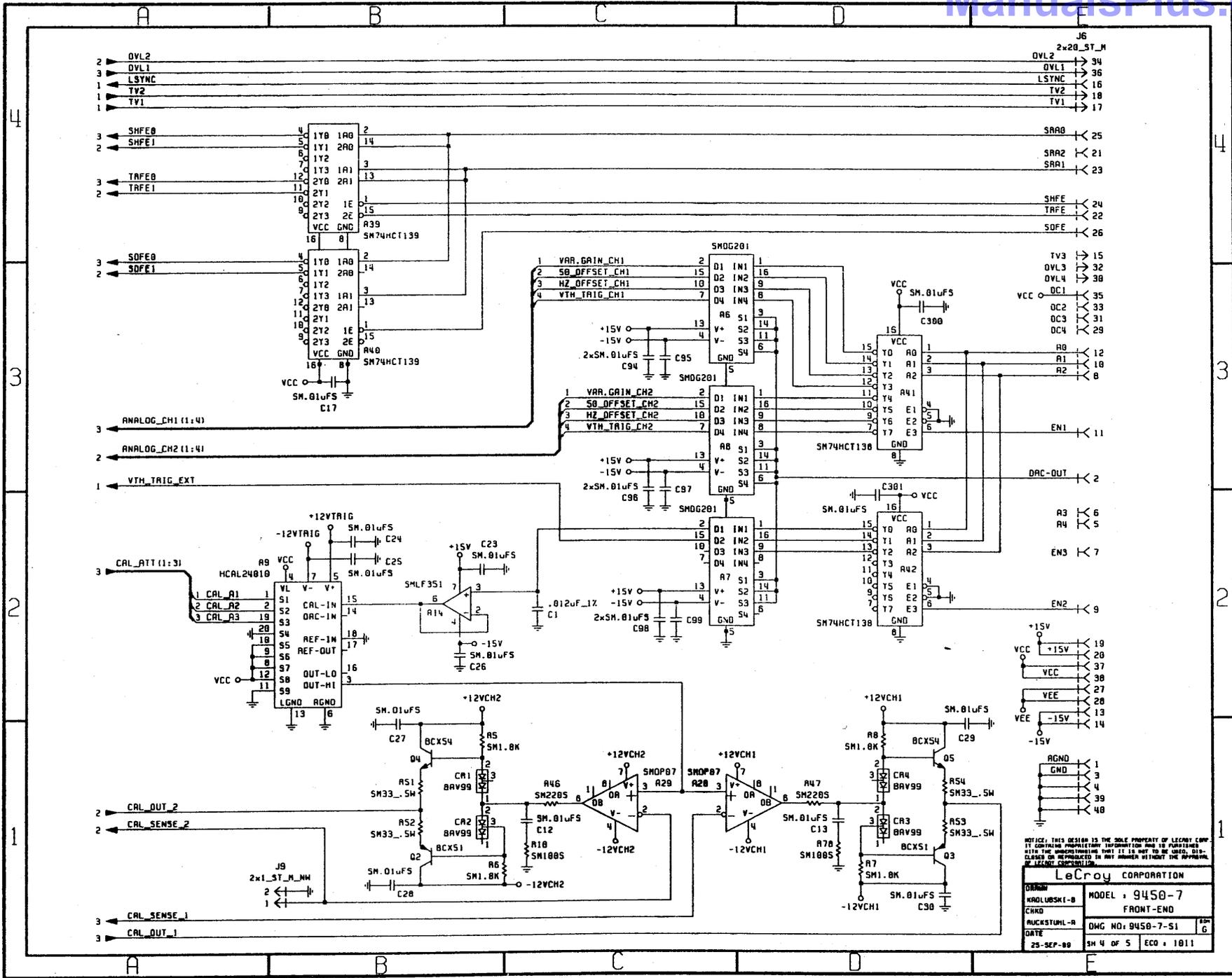
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LeCroy CORPORATION	
DRAWN MADLUBSKI-B CHKD PULCHSTUM-A DATE 25-SEP-88	MODEL = 9450-7 FRONT-END DWG NO: 9450-7-51 SH 2 OF 5 ECO : 1011



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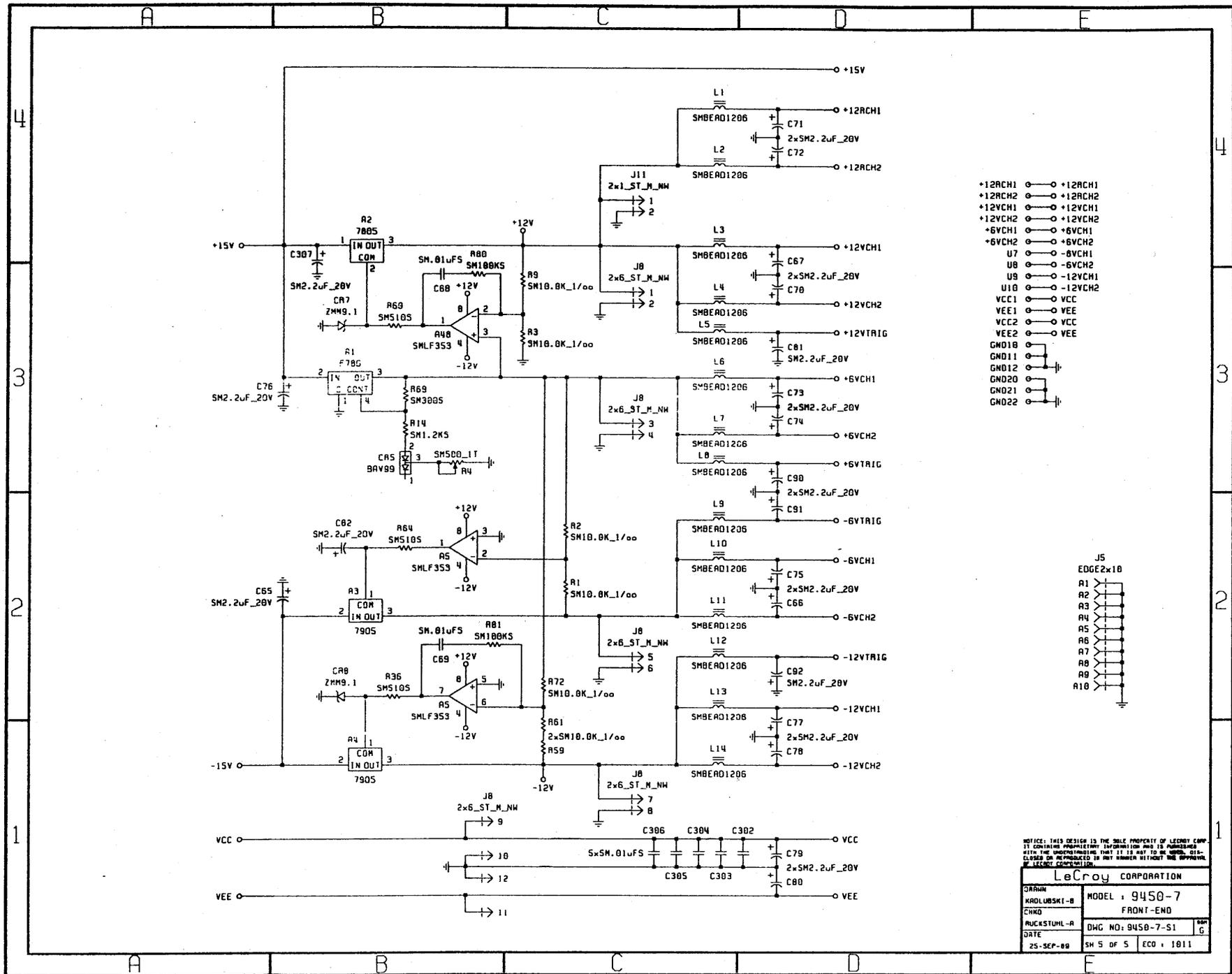
LeCroy CORPORATION	
DRAWN KADLUBSKI-B CHKD RUCKSTUHL-R DATE 25-SEP-88	MODEL : 9450-7 FRONT-END DWG NO: 9450-7-51 SH 3 OF 5 ECO : 1011



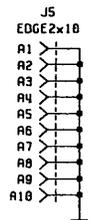
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LeCroy CORPORATION

DRAWN	KADLUSKI-B	MODEL	9450-7
CHKD			FRONT-END
DATE	25-SEP-88	DWG NO:	9450-7-S1
		SH	4 OF 5
		ECO	1811



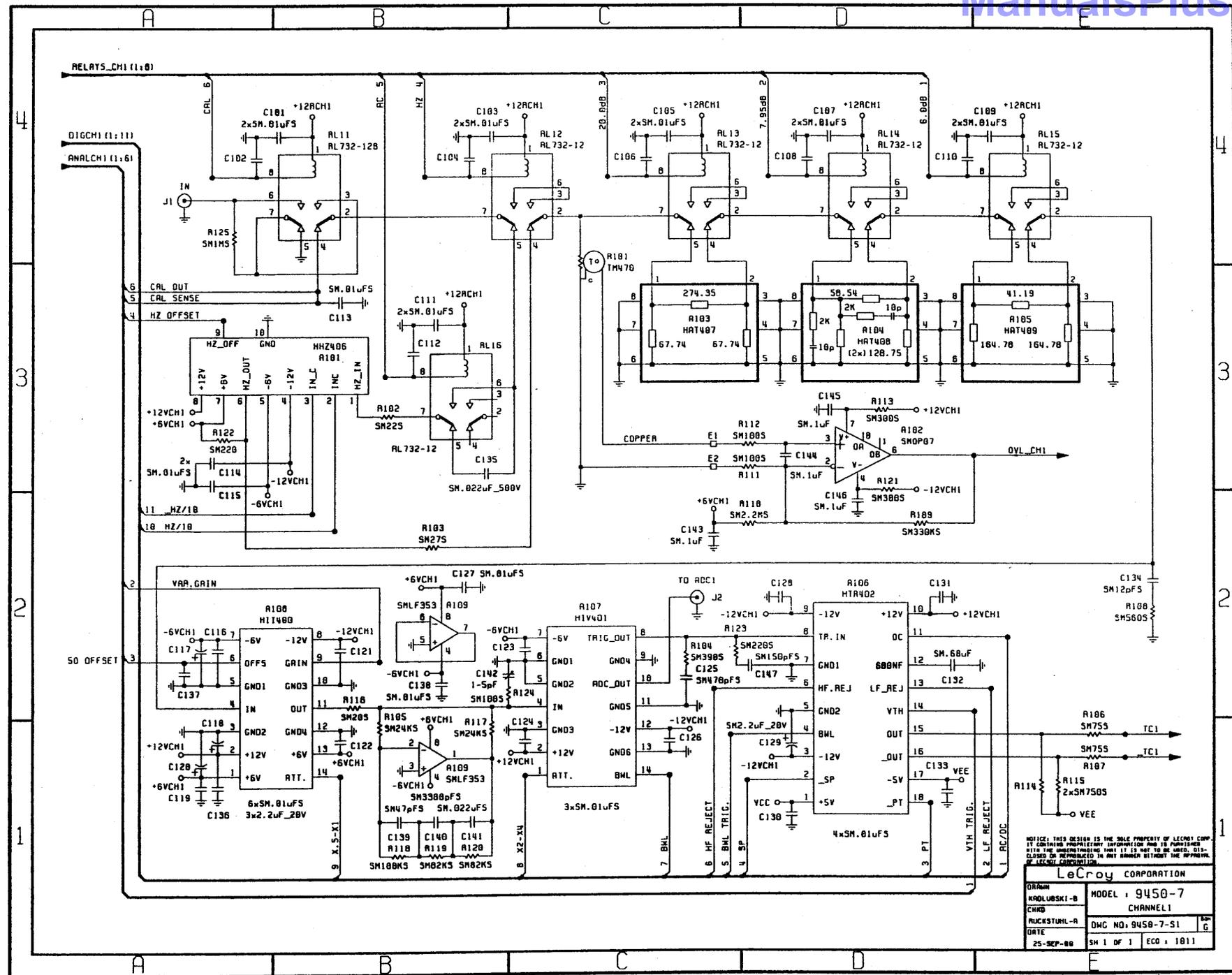
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- +12ACH2 ○ ○ +12ACH2
- +12VCH1 ○ ○ +12VCH1
- +12VCH2 ○ ○ +12VCH2
- +6VCH1 ○ ○ +6VCH1
- +6VCH2 ○ ○ +6VCH2
- U7 ○ ○ -6VCH1
- U8 ○ ○ -6VCH2
- U9 ○ ○ -12VCH1
- U10 ○ ○ -12VCH2
- VCC1 ○ ○ VCC
- VEE1 ○ ○ VEE
- VCC2 ○ ○ VCC
- VEE2 ○ ○ VEE
- GND18 ○ ○
- GND11 ○ ○
- GND12 ○ ○
- GND20 ○ ○
- GND21 ○ ○
- GND22 ○ ○



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LeCroy CORPORATION

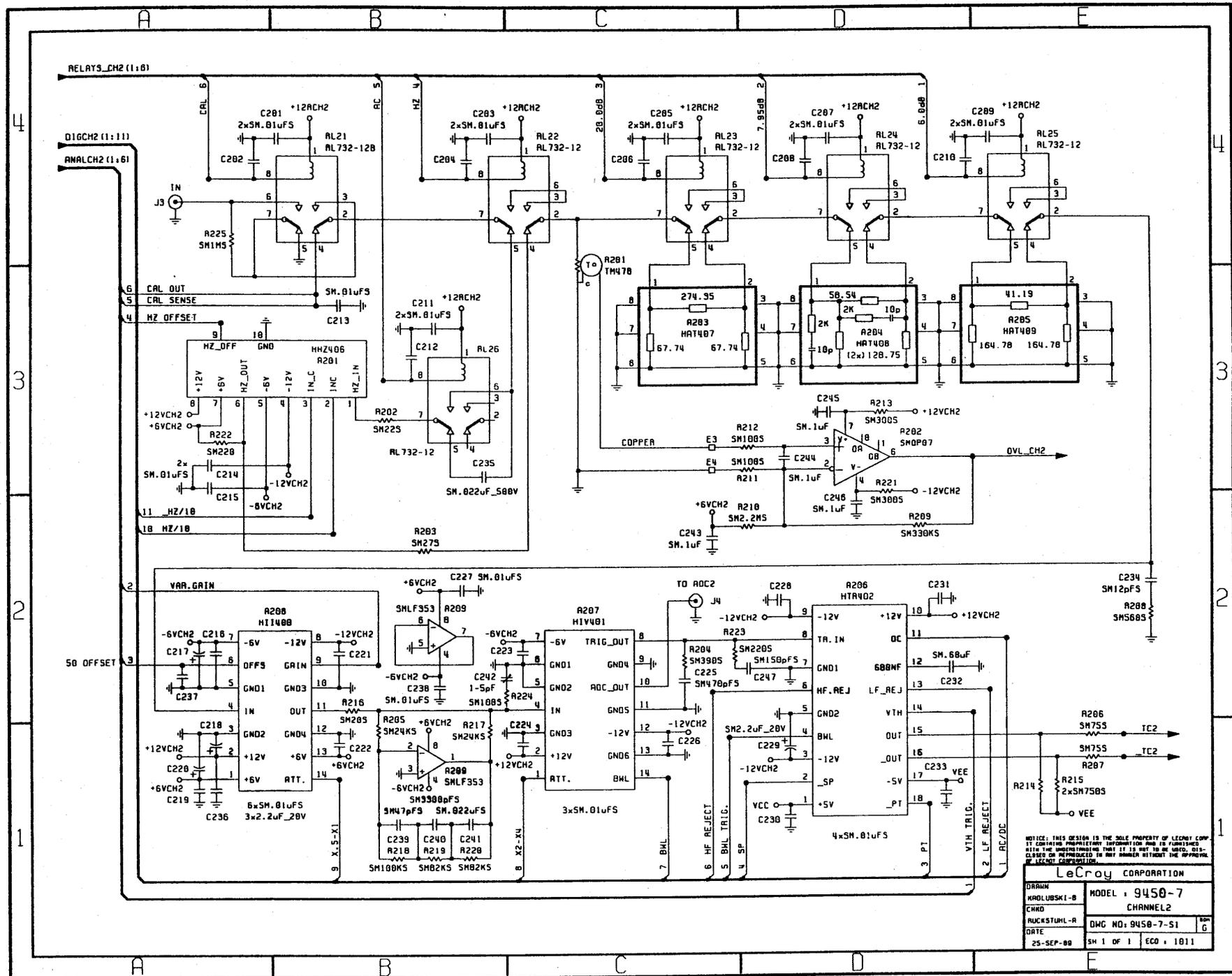
DRAWN KRODLUBSKI-B CHKD RUCKSTUHL-R DATE 25-SEP-88	MODEL : 9450-7 FRONT-END DWG NO: 9450-7-51 5H 5 OF 5 ECO : 1011
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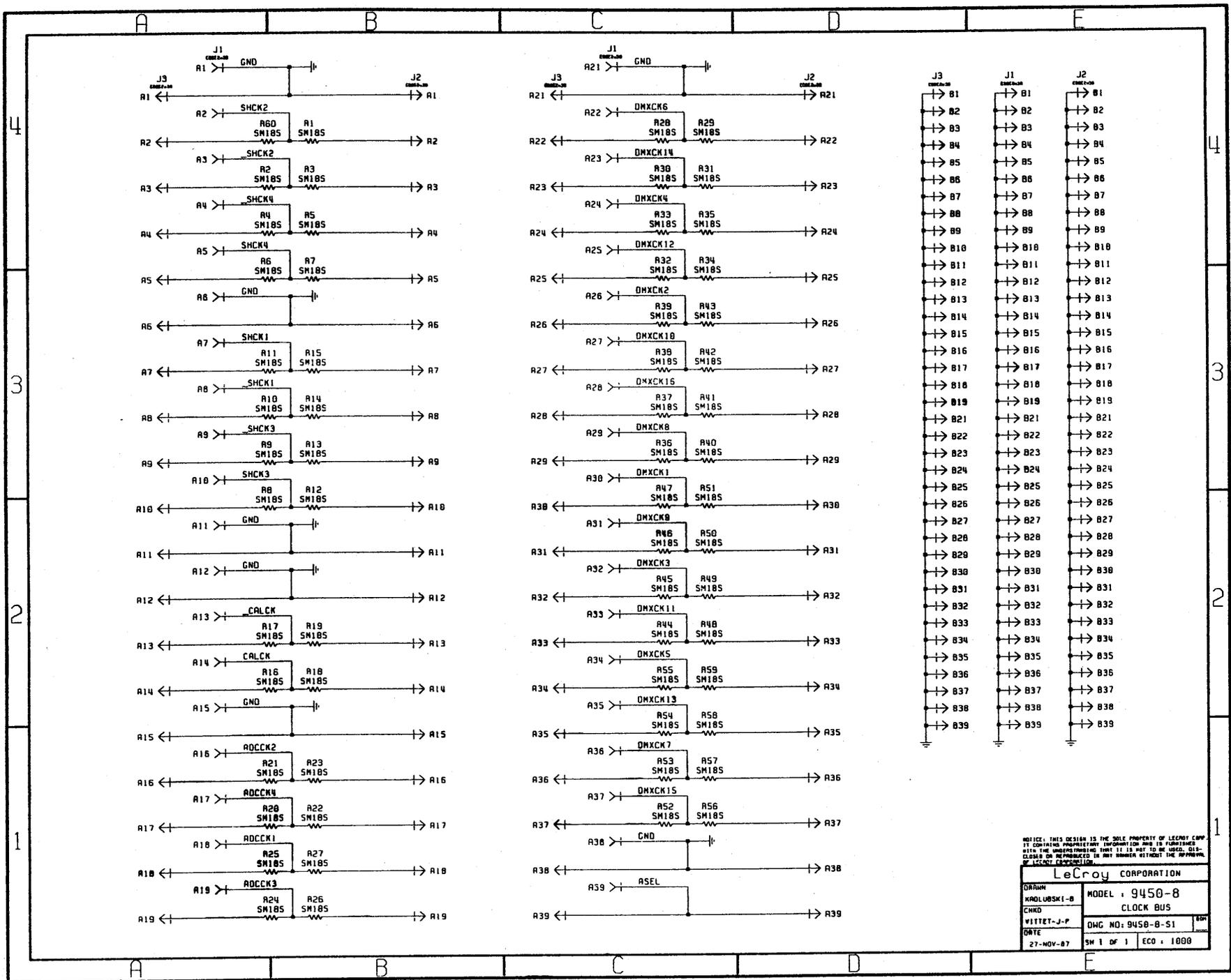
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LeCroy CORPORATION

DRAWN	KADLUBSKI-B	MODEL	9450-7
CHKD		CHANNEL	1
REWORKED		DWG NO.	9450-7-51
DATE	25-SEP-88	SH 1 OF 1	ECO - 1011



LeCroy CORPORATION	
DRAWN KRODLUBSKI-B	MODEL: 9450-7
CHKD RUCKSTUHL-R	CHANNEL 2
DATE 25-SEP-88	DMG NO: 9450-7-S1
	SH 1 OF 1 ECO: 1011



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LeCroy CORPORATION	
GRAPHIC: KINOLUBSKI-B	MODEL: 9450-8
CIRCUIT: WITTET-J-P	CLOCK BUS
DATE: 27-NOV-87	DWG NO: 9450-8-51
SW 1 OF 1	ECO: 1000

Parts List

CLASS CODE: 1
 FINISHED GOODS-MANUFACTURED
 PART: 9450
 DESC: FINAL ASSEMBLY 9450

UOM: EA SC: M REV: B

COMPONENT PART NUMBER	DESCRIPTION	QTY IN TOP R ASSEMB
123456789-----		
F9450-1	COMPLETED BOARD F9450-1	A 1.00
102484471	CAP CERA DISC 100V 470 PF	1.00
103307103	CAP CERA MOND 50V .01 UF	28.00
103427104	CAP CERA MOND 100V .1 UF	2.00
142214156	CAP TANT DIP CASE 15 UF	2.00
142714685	CAP TANT DIP CASE 6.8UF	2.00
146634106	CAP MINI ALUM 20% 10 UF	2.00
147436033	CAP ALUM METAL CAN 33 UF	4.00
161225101	RES COMP 1/8W 5% 100 OHMS	1.00
161225103	RES COMP 1/8W 5% 10 K	3.00
161225274	RES CARBON FILM 270 K	1.00
161225302	RES COMP 1/8W 5% 3 K	2.00
161225395	RES CARBON FILM 3.9 MEG	1.00
161225471	RES COMP 1/8W 5% 470 OHMS	1.00
181447104	RES VARI CERMET 100 K	2.00
190042103	RESISTOR NETWORK 10 K	1.00
190042104	RESISTOR NETWORK 100K	2.00
190832102	RES NETWORK 1 K	1.00
190832103	RESISTOR NETWORK 10K	1.00
190832471	RESISTOR NETWORK 470 OHMS	2.00
200331074	IC DUAL FLOP 74HCT74	1.00
200340173	IC D-TYP FLOP HCT173	2.00
200373374	IC D-TYP FLOP 74HCT374	2.00
200440040	IC12-ST BIN COUNT HCT4040	1.00
200440102	IC COWN COUNT. 74HCT40102	1.00
205277202	FIFO 1024X9 BITS	1.00
205751116	IC 8-IN AND-OR ARRAY 16R6	1.00
205752164	IC AND-OR GATE ARRAY 16R4	2.00
205752168	IC AND-OR GATE ARRAY 16L8	3.00
207171541	IC BUFFER/LINE DRI.HCT541	5.00
207197210	IC BUS INTER CONTR 7210	1.00
207280703	IC 16-BIT DAC 703	1.00
207440232	IC XMTR/RCVR MAX 232	1.00
207470160	IC DCTL BUS XCVR 75160A	1.00
207470161	IC DCTL BUS XCEIR 75161A	1.00
207472245	IC BUS TRANSCVR HCT245	2.00
207552661	IC INTERFACE 2661A	1.00
230020062	DIODE SWITCHING BAW62	16.00
253010835	DIODE HOT CARRIER HP2835	3.00
309040005	CRYSTAL OSCIL. 4.9152MHZ	1.00
400331020	SOCKET IC ST DIP-20	1.00
400412068	IC SOCKET GRID TYP 68-PIN	1.00
403950002	POLARIZING KEY	2.00
412022022	SWITCH ROTARY BCD-1248	2.00
416132008	SWITCH PUSHBUT (MOM) SPDT	1.00
453520024	RTANGLE PCB CONN. FEM.24	1.00
454110010	HDR SOLD TAIL/MALE PIN 10	1.00
454211040	HDR SOLD TAIL TO MALE 40	1.00

CLASS CODE: 1
 FINISHED GOODS-MANUFACTURED
 PART: 9450
 DESC: FINAL ASSEMBLY 9450

UDM: EA SC: M REV: B

COMPONENT PART NUMBER	DESCRIPTION	QTY IN TOP R ASSEMB
123456789-----	-----	-----
454320096	HDR DIP SOLD TO FEM 96	6.00
454611009	HDR SOLD TAIL/MALE 9	1.00
454611025	HDR SOLD TAIL/MALE 25	1.00
455980001	MOUNT. HDW FOR CONN SHELL	2.00
530040006	BUZZER 85DB 4 TO 7V	1.00
550130108	SCREW CYL HD M3X8	4.00
550130110	SCREW CYL HD M3X10	2.00
551430100	FLAT WASHER M3	6.00
552130101	NUT HEX M3	6.00
585252236	RIVET HOLLOW 2.5X6MM	12.00
719450103	PC BD PREASS'Y 9450-1	1.00
MCL404	IC MEM GATE ARRAY MCL404	1.00
F9450-2	COMPLETED BOARD F9450-2	F 1.00
102412018	CAP CERA DISC 100V 1.8 PF	1.00
102412220	CAP CERA DISC 100V 22 PF	1.00
102412470	CAP CERA DISC 100V 47 PF	5.00
102412560	CAP CERA DISC 100V 56 PF	1.00
102484821	CAP CERA DISC 100V 820 PF	1.00
102940502	CAP CERA DISC 1KV .005 UF	4.00
103307103	CAP CERA MONO 50V .01 UF	57.00
103327102	CAP CERA MONO 50V .001 UF	2.00
103327224	CAP CERA MONO 50V .22UF	2.00
103427104	CAP CERA MONO 100V .1 UF	4.00
103437334	CAP CERA MONO 100V .33 UF	8.00
124171623	CAP POLYSTYR 1% .062 UF	2.00
142714685	CAP TANT DIP CASE 6.8UF	1.00
146544471	CAP MINI ALUM 20% 470UF	4.00
146634106	CAP MINI ALUM 20% 10 UF	18.00
146754470	CAP MINI ALUM 20% 47 UF	1.00
147634102	CAP MINI ALUM 20% 1000 UF	1.00
161335100	RES COMP 1/4W 5% 10 OHMS	1.00
161335101	RES COMP 1/4W 5% 100 OHMS	4.00
161335102	RES COMP 1/4W 5% 1 K	16.00
161335103	RES COMP 1/4W 5% 10 K	12.00
161335104	RES COMP 1/4W 5% 100 K	8.00
161335105	RES COMP 1/4W 5% 1 MEG	2.00
161335122	RES COMP 1/4W 5% 1.2 K	5.00
161335132	RES COMP 1/4W 5% 1.3 K	1.00
161335161	RES COMP 1/4W 5% 160 OHMS	1.00
161335202	RES COMP 1/4W 5% 2 K	6.00
161335203	RES COMP 1/4W 5% 20 K	2.00
161335204	RES COMP 1/4W 5% 200 K	1.00
161335221	RES COMP 1/4W 5% 220 OHMS	8.00
161335223	RES COMP 1/4W 5% 22 K	1.00
161335241	RES COMP 1/4W 5% 240 OHMS	8.00
161335242	RES COMP 1/4W 5% 2.4 K	4.00
161335271	RES COMP 1/4W 5% 270 OHMS	2.00
161335272	RES COMP 1/4W 5% 2.7 K	2.00

CLASS CODE: 1
 FINISHED GOODS-MANUFACTURED
 PART: 9450
 DESC: FINAL ASSEMBLY 9450

UDM: EA SC: M REV: B

COMPONENT PART NUMBER	DESCRIPTION	QTY IN TOP R ASSEMB
123456789-----		
161335273	RES COMP 1/4W 5% 27 K	1.00
161335302	RES COMP 1/4W 5% 3 K	7.00
161335331	RES COMP 1/4W 5% 330 OHMS	1.00
161335333	RES COMP 1/4W 5% 33 K	2.00
161335362	RES COMP 1/4W 5% 3.6 K	3.00
161335394	RES COMP 1/4W 5% 390 K	4.00
161335471	RES COMP 1/4W 5% 470 OHMS	14.00
161335472	RES COMP 1/4W 5% 4.7 K	2.00
161335473	RES COMP 1/4W 5% 47 K	1.00
161335510	RES COMP 1/4W 5% 51 OHMS	4.00
161335511	RES COMP 1/4W 5% 510 OHMS	1.00
161335565	RES COMP 1/4W 5% 5.6 MEG	2.00
161335621	RES COMP 1/4W 5% 620 OHMS	2.00
161335622	RES COMP 1/4W 5% 6.2 K	2.00
161335623	RES COMP 1/4W 5% 62 K	1.00
161335681	RES COMP 1/4W 5% 680 OHMS	1.00
161335682	RES COMP 1/4W 5% 6.8 K	2.00
161335752	RES COMP 1/4W 5% 7.5 K	7.00
161335753	RES COMP 1/4W 5% 75 K	3.00
161335821	RES COMP 1/4W 5% 820 OHMS	2.00
161335912	RES COMP 1/4W 5% 9.1 K	1.00
161445102	RES COMP 1/2W 5% 1K	1.00
161445560	RES CARBON FILM 56 OHMS	1.00
165375824	RES METAL FILM HV 820 K	1.00
168031022	RES METAL FILM 2.2 OHMS	26.00
168035125	RES METAL FILM HV 1.2 MEG	1.00
168045336	RES HV 33M	1.00
168531365	RES PREC RN55D 511 OHMS	4.00
168531385	RES PREC RN55D 825 OHMS	2.00
168531401	RES PREC RN55D 1.21 K	7.00
168531445	RES PREC RN55D 3.48K	1.00
168531447	RES PREC RN55D 3.65 K	1.00
168531453	RES PREC RN55D 4.22 K	1.00
168531481	RES PREC RN55D 8.25 K	2.00
168531495	RES PREC RN55D 11.5K	3.00
168531541	RES PREC RN55D 34.8 K	1.00
172137022	RES WIREWOUND .22 OHMS	1.00
180487103	RES VARI CERMET 10K	2.00
180487202	RES VARI CERMET 2K	1.00
180487205	RES VARI CERMET 2 MEG	2.00
180487501	RES VARI CERMET 500 OHMS	2.00
180487502	RES VARI CERMET 5K	5.00
190042222	RESISTOR NETWORK 2.2 K	5.00
190842222	RESISTOR NETWORK 2.2 K	1.00
200440040	IC12-ST BIN COUNT HCT4040	1.00
205271256	HITACHI HM62256LP-12	2.00
205370256	IC UV E-PROM 27256G-25	2.00
205752164	IC AND-OR GATE ARRAY 16R4	3.00

CLASS CODE: 1
 FINISHED GOODS-MANUFACTURED
 PART: 9450
 DESC: FINAL ASSEMBLY 9450

UOM: EA SC: M REV: B

COMPONENT PART NUMBER	DESCRIPTION	QTY IN TOP R ASSEMB
123456789-----	-----	-----
205752168	IC AND-OR GATE ARRAY 16L8	1.00
207174244	IC OCTAL BUFFER HCT244	2.00
207270312	IC 12-BIT C/A CONV DAC312	2.00
207472245	IC BUS TRANSVR HCT245	2.00
208011005	IC VOLT FOLLOWER LM310N	2.00
208031010	IC QUAD DIFF COMP LM339N	1.00
208041001	IC 8-BIT DAC MONODAC-08E0	3.00
208041524	IC PULSE WIDTH MODUL 3524	1.00
208110353	IC DUAL OP AMP LF353N	2.00
208116365	IC OP AMP LM6365	2.00
208130347	IC QUAD JFET OP AMP LF347	1.00
208590336	IC VOLT REFERENCE LM336	2.00
230110005	DIODE SWITCHING 1N4448	14.00
230150045	DIODE PICODAMPERE BAV 45	2.00
232990641	DIODE ARRAY (HV CASCADE)	1.00
235040060	DIODE RECTIFIER LM60	1.00
235820030	DIODE RECTIFIER EGP30D	1.00
235930816	DIODE RECTIFIER 1A MR816	1.00
240225720	DIODE ZENER 18V 1N720A	2.00
240415754	DIODE ZENER 6.8V 1N754A	2.00
240423958	DIODE ZENER 7.5V 1N958B	2.00
240425751	DIODE ZENER 5.1V 1N751A	1.00
240425752	DIODE ZENER 5.6V 1N752A	1.00
240425758	DIODE ZENER 10V 1N758A	1.00
240513977	DIODE ZENER 47V 1N977B	1.00
253010835	DIODE HOT CARRIER HP2835	15.00
270170001	TRANSISTOR NPN 2N5770	17.00
270170002	TRANSISTOR NPN 2N5962	21.00
275110001	TRANSISTOR PNP 2N2907A	4.00
275170001	TRANSISTOR PNP 2N5087	5.00
275170002	TRANSISTOR PNP 2N5771	16.00
280180001	TRANSISTOR FET "N" U1897	3.00
280190513	TRANSISTOR FET "N" IRF513	2.00
280190642	TRANSISTOR FET "N" IRF642	1.00
280190830	TRANSISTOR FET "N" IRF830	1.00
281170001	TRANSISTOR FET "P" 2N5462	4.00
281190523	TRANSISTOR FET "P" 9523	2.00
301016103	INDUCTOR MOLDED 10 UH	4.00
302380480	FILTER CHOKE 2 AMP 48 UH	1.00
377051004	LABEL "DANGER HI VOLTAGE"	1.00
400360028	SOCKET IC ST DIP-28	2.00
400410121	IC SOCKET GRID TYP 121PIN	1.00
429220001	SWITCH THERMAL 1A N.O.	1.00
440290001	TRANSFORMER HV SWITCHING	1.00
454110003	HDR SOLD TAIL/MALE PIN 3	2.00
454111008	HDR SOLD TAIL/MALE PIN 8	1.00
454121003	BLOC FOR SOCKETS 3-PIN	1.00
454311003	HDR DIP SOLDER TO MALE 3	2.00

CLASS CODE: 1
 FINISHED GOODS-MANUFACTURED
 PART: 9450
 DESC: FINAL ASSEMBLY 9450

UOM: EA SC: M REV: B

COMPONENT PART NUMBER	DESCRIPTION	QTY IN TOP R ASSEMB
123456789-----		
454610096	HDR DIP SOLD TO MALE 96	1.00
454711026	HDR DBL ROW RT ANGL 26	1.00
454902001	KEYING PLUG (SNAP IN) BLK	3.00
485011001	GROMMET 10MM OD 5MM ID	1.00
500460005	MOUNTING KIT FOR TO-220	6.00
550430105	SCREW CYL HD PHIL M3X5	7.00
550440106	SCREW CYL HD PHIL M4X6	2.00
550440108	SCREW CYL HD PHIL M4X8	2.00
551430300	WASHER SHAKEPROOF M3	11.00
551440300	WASHER SHAKEPROOF M4	4.00
500110001	TRANSIPAD "SMALL"	2.00
560440004	SCREW PHILIPS 4-40X1/4	6.00
585252354	RIVET HOLLOW 2,5X9MM	2.00
709400231	HV MULTIPLIER SUPPORT	1.00
709450201	HV UPPER COVER	1.00
709450211	HV LOWER COVER	1.00
709450221	FET SUPPORT	1.00
709450231	SPACER HEX M3X6MM	3.00
719450203	PC BD PREASS'Y 9450-2	H 1.00
MDS403	DISPLAY PROCESSOR MDS403	1.00
161335332	RES COMP 1/4W 5% 3.3 K	6.00
161335512	RES COMP 1/4W 5% 5.1 K	7.00
270110003	TRANSISTOR NPN PN2222A	3.00
161335560	RES COMP 1/4W 5% 56 OHMS	4.00
102412101	CAP CERA DISC 100V 100PF	2.00
102412120	CAP CERA DISC 100V 12 PF	6.00
550430106	SCREW CYL HD PHIL M3X6	4.00
554435401	RIVET "RIVSCREW" M 3.5	2.00
F9450-3A	COMPLETED BOARD F9450-3A	E 2.00
SM158102025	CAP VARIABLE 5 - 25 PF	2.00
161445151	RES CARBON FILM 150 OHMS	16.00
SM185248103	RES VARI CERMET 10K	8.00
SM185457500	RES VARI CERMET 50 OHMS	8.00
190642151	RESISTOR NETWORK 150	4.00
190642221	RESISTOR NETWORK 220 OHMS	4.00
190642471	RESISTOR NETWORK 470 OHMS	12.00
190642821	RESISTOR NETWORK 820 OHMS	16.00
SM200170032	IC 2-IN OR GATE 74F32	2.00
SM200170138	IC DECODER 74ALS138	2.00
SM200172004	IC HEX INVERTER 74F04	2.00
SM200172008	IC AND GATE 74F08	2.00
SM205220168	IC 16K SRAM 6168SD-25	64.00
205271256	HITACHI HM62256LP-12	8.00
205752168	IC AND-OR GATE ARRAY 16L8	6.00
SM207162965	IC MEMORY DRIVER 2965	4.00
SM207179244	IC BUF/LINE DRIV HCT244	12.00
207200200	IC 8-BIT FLASH ADC 77200	8.00
SM207244110	IC 8-BIT DAC BT110	4.00

CLASS CODE: 1
 FINISHED GOODS-MANUFACTURED
 PART: 9450
 DESC: FINAL ASSEMBLY 9450

UOM: EA SC: M REV: B

COMPONENT PART NUMBER	DESCRIPTION	QTY IN TOP R ASSEMB
123456789-----		
SM207360125	IC TRANSLATO MC10125	20.00
SM207460116	IC LINE RECEIVER 10H116	2.00
SM207878245	IC BUS TRANSCVR HCT 245	6.00
SM207960158	IC 2-IN MPX 10H158	16.00
MDX407	IC DEMULTIPLEXER MDX407	8.00
SM207970158	IC 2-IN MPX 74F158A	2.00
208124002	IC VOLT REG -5V UA7905UC	2.00
SM208470324	IC OP AMP LM324M	8.00
208590336	IC VOLT REFERENCE LM336	4.00
208591320	IC NEG VOLT REG LM320	2.00
208591340	IC POS VOLT REG LM340	2.00
SM227060320	IC DIG SIG PRODC 320C25	2.00
SM232022822	DIDDE ARRAY SCHTTKY 2822	2.00
SM236030099	DIDDE SO-PKG BAV99	10.00
SM270030092	TRANSISTOR NPN BFR92	2.00
SM270040092	TRANSISTOR NPN BFR92R	2.00
SM270330848	TRANSISTOR NPN BC848C	4.00
SM270340848	TRANSISTOR NPN 848CR	4.00
SM275030092	TRANSISTOR PNP BFT92	2.00
SM275330858	TRANSISTOR PNP BC858C	4.00
SM275340858	TRANSISTOR PNP 858CR	4.00
280170104	TRANSISTOR FET N VN0104N3	4.00
SM300327102	INDUCTOR WOUND FERRITE 1UH	30.00
309040040	CRYSTAL OSCILLATOR 40MHZ	2.00
400412068	IC SOCKET GRID TYP 68-PIN	2.00
402610002	CONN CO-AX FC MTG SMB	2.00
403181008	HEADER STRT BREAKAW 8-PIN	6.00
405764112	SOCKET SINGLE WIRE 12-POS	2.00
454370002	SHUNT 2 POS	16.00
454610096	HDR DIP SOLD TO MALE 96	2.00
500460006	INSULATOR THERMAFILM	4.00
709450321	HEAT SINK FOR FADC	A 8.00
550430104	SCREW CYL HD PHIL M3X4	2.00
554900201	SHOULDER WASHER	8.00
585252354	RIVET HOLLOW 2,5X9MM	4.00
SM652101101	RES CHIP (E24) 1% 100 OHM	22.00
SM652101102	RES CHIP (E24) 1% 1 K	8.00
SM652101103	RES CHIP (E24) 1% 10 K	12.00
SM652101112	RES CHIP (E24) 1% 1.1 K	4.00
SM652101122	RES CHIP (E24) 1% 1.2 K	22.00
SM652101132	RES CHIP (E24) 1% 1.3 K	18.00
SM652101152	RES CHIP (E24) 1% 1.5 K	4.00
SM652101181	RES CHIP (E24) 1% 180 OHM	8.00
SM652101182	RES CHIP (E24) 1% 1.8 K	8.00
SM652101201	RES CHIP (E24) 1% 200 OHM	16.00
SM652101240	RES CHIP (E24) 1% 24 OHMS	16.00
SM652101243	RES CHIP (E24) 1% 24 K	4.00
SM652101271	RES CHIP (E24) 1% 270 OHM	2.00

CLASS CODE: 1
 FINISHED GOODS-MANUFACTURED
 PART: 9450
 DESC: FINAL ASSEMBLY 9450

UOM: EA SC: M REV: B

COMPONENT PART NUMBER	DESCRIPTION	QTY IN TOP R ASSEMB
123456789-----	-----	-----
SM652101302	RES CHIP (E24) 1% 3 K	12.00
SM652101330	RES CHIP (E24) 1% 33 OHMS	8.00
SM652101470	RES CHIP (E24) 47 OHMS	16.00
SM652101471	RES CHIP (E24) 1% 470 OHM	10.00
SM652101510	RES CHIP (E24) 1% 51 OHMS	16.00
SM652101562	RES CHIP (E24) 1% 5.6 K	8.00
SM652101621	RES CHIP (E24) 1% 620 OHM	2.00
SM652101681	RES CHIP (E24) 1% 680 OHM	2.00
SM652101682	RES CHIP (E24) 1% 6.8 K	8.00
SM652101910	RES CHIP (E24) 1% 91 OHMS	24.00
SM652101911	RES CHIP (E24) 1% 910 OHM	10.00
SM661127104	CAP CERA CHIP 20% .1 UF	114.00
SM661207103	CAP CERA CHIP 20% .01UF	250.00
SM666237476	CAP MOLD TANT CHIP 47 UF	18.00
SM666247106	CAP MOLD TANT CHIP 10 UF	12.00
709450301	SPACER	B 2.00
709450311	HEAT SINK	E 2.00
719450313	PC BD PREASS'Y 9450-3A	D 2.00
HMS403-S	4-CH SAMP/HOLD HMS403-S ITI	B 2.00
MNX401	ICMIN MAX GATEARR. MNX401	2.00
402912077	MOUNTING INSULATOR SMB	2.00
405764108	SOCKET SINGLE WIRE 8-POS	2.00
400410046	IC SOCKET GRID TYP 46	8.00
385351009	INSULATING STOCK	2.00
CH599011061	ADHESIVE (THERMAL COND) 709	0.16
SM654101000	CHIP JUMPER ZERO OHMS	4.00
SM661255015	CAP CERA CHIP 1.5 PF	2.00
SM661255033	CAP CERA CHIP 3.3 PF	2.00
SM661255056	CAP CERA CHIP 5.6 PF	2.00
550430106	SCREW CYL HD PHIL M3X6	8.00
709424941	SCREW FOR SELECTOR COVER	A 4.00
709450331	SPIRAL SPRING	A 4.00
709450341	SPRING CONTACT	A 2.00
551430300	WASHER SHAKEPROOF M3	2.00
F9450-4	COMPLETED BOARD F9450-4	C 1.00
103336474	CAP CERA MOND 50V .47UF	1.00
SM158043006	CAP VARIABLE 2 - 6 PF	2.00
SM158043020	CAP VARIABLE 4.5-20 PF	2.00
SM158044010	CAP VARIABLE 3-10PF	3.00
190042221	RESISTOR NETWORK 220 OHMS	2.00
190042563	RESISTOR NETWORK 56K	1.00
190642221	RESISTOR NETWORK 220 OHMS	3.00
190642332	RESISTOR NETWORK 3.3 K	1.00
190642471	RESISTOR NETWORK 470 OHMS	2.00
190642562	RESISTOR NETWORK 5.6 K	4.00
SM200160101	IC DR/NDR GATE 10H101	2.00
SM200160402	IC 16-BIT SCALER MCT402	6.00
SM200167102	IC NOR GATE 10H102	5.00

CLASS CODE: 1
 FINISHED GOODS-MANUFACTURED
 PART: 9450
 DESC: FINAL ASSEMBLY 9450

UDM: EA SC: M REV: B

COMPONENT PART NUMBER	DESCRIPTION	QTY IN TOP R ASSEMB
123456789-----	-----	-----
SM200167104	IC 2-IN AND GATE 10H104	2.00
SM200167107	IC 2-IN EXCL OR/NDR10H107	3.00
SM200167109	IC 4-5 IN OR/NDR 10H109	1.00
SM200167117	IC OR-AND/D-A-INV 10H117	1.00
SM200167121	IC OR-AND/D-A-INV 10H121	4.00
SM200167131	IC M-S TYP D FLOP 10H131	20.00
SM200172008	IC AND GATE 74F08	1.00
SM200172011	IC 3-INPUT AND 74F11	1.00
SM200172074	IC D-TYP FLOP 74F74	3.00
SM200172113	IC J-K TYP FLOP 74F113	1.00
SM200172374	IN D-TYP FLOP 74F374	3.00
SM200178000	IC 2-INPUT NAND HCT00	2.00
SM200178574	IC D-TYP FLOP HCT 574	8.00
SM200267016	IC BINARY COUNTER 10H016	3.00
SM200278040	IC COUNTER HCT4040	3.00
SM200478573	IC D-TYP LATCH 74HCT573	6.00
205752168	IC AND-OR GATE ARRAY 16L8	2.00
SM207160192	IC BUS DRIV MC10192	1.00
SM207171488	IC QUAD LINE DRIVER 1488	1.00
207281703	IC MONO DAC 16 BIT 703JP	1.00
SM207360125	IC TRANSLATO MC10125	4.00
SM207460116	IC LINE RECEIVER 10H116	10.00
SM207878245	IC BUS TRANSCVR HCT 245	2.00
208124003	IC VOLT REG NEG LM320T-12	1.00
SM208400003	IC RF/IF AMPLIFIER MAR-3	1.00
208570812	IC VOLT REG +12V LM7812CT	1.00
SM232120070	DIODE ARRAY BAV70	4.00
SM236030099	DIODE SD-PKG BAV99	9.00
SM270030019	TRANSISTOR NPN BFS19	3.00
SM270030020	TRANSISTOR NPN BFS20	1.00
SM270030092	TRANSISTOR NPN BFR92	8.00
SM270040092	TRANSISTOR NPN BFR92R	3.00
SM270130092	TRANSISTOR NPN BFR92A	1.00
SM270140092	TRANSISTOR NPN BFR92AR	2.00
SM270330848	TRANSISTOR NPN BC848C	4.00
SM270340848	TRANSISTOR NPN 848CR	1.00
SM275030550	TRANSISTOR PNP BF550	7.00
SM275040550	TRANSISTOR PNP BF550R	3.00
SM275330858	TRANSISTOR PNP BC858C	6.00
SM275340858	TRANSISTOR PNP 858CR	3.00
SM280160022	TRANSISTOR FET N-CH BSD22	3.00
SM289240061	TRANSISTOR NPN BCV61	1.00
SM289240062	TRANSISTOR ARRAY BCV62	2.00
290120003	DELAY LINE 3 N-SEC	1.00
290120007	DELAY LINE 7 N-SEC	2.00
300330350	FERRITE CORE	1.00
SM300446150	INDUCTOR .015UH	2.00
SM300446330	INDUCTOR .033 UH	3.00

CLASS CODE: 1
 FINISHED GOODS-MANUFACTURED
 PART: 9450
 DESC: FINAL ASSEMBLY 9450

UOM: EA SC: M REV: B

COMPONENT PART NUMBER	DESCRIPTION	QTY IN TOP R ASSEMB
123456789-----	-----	-----
SM300546103	INDUCTOR 10 UH	1.00
SM300546151	INDUCTOR .15 UH	1.00
310060012	CRYSTAL 10PPM 12.4031MHZ	1.00
310062100	CRYSTAL 10PPM 100MHZ	1.00
402610002	CONN CO-AX PC MTG SMB	4.00
403181008	HEADER STRT BREAKAW 8-PIN	1.00
454340002	HDR MALE PIN TO WW 02	2.00
454610096	HDR DIP SOLD TO MALE 96	1.00
554435401	RIVET "RIVSCREW" M 3.5	2.00
585252354	RIVET HOLLOW 2,5X9MM	2.00
SM652101101	RES CHIP (E24) 1% 100 OHM	12.00
SM652101102	RES CHIP (E24) 1% 1 K	13.00
SM652101103	RES CHIP (E24) 1% 10 K	18.00
SM652101112	RES CHIP (E24) 1% 1.1 K	2.00
SM652101122	RES CHIP (E24) 1% 1.2 K	2.00
SM652101161	RES CHIP (E24) 1% 160 OHM	9.00
SM652101180	RES CHIP (E24) 1% 18 OHMS	30.00
SM652101182	RES CHIP (E24) 1% 1.8 K	1.00
SM652101202	RES CHIP (E24) 1% 2 K	8.00
SM652101222	RES CHIP (E24) 1% 2.2 K	6.00
SM652101223	RES CHIP (E24) 1% 22 K	1.00
SM652101270	RES CHIP (E24) 1% 27 OHMS	1.00
SM652101272	RES CHIP (E24) 1% 2.7 K	4.00
SM652101301	RES CHIP (E24) 1% 300 OHM	3.00
SM652101302	RES CHIP (E24) 1% 3 K	3.00
SM652101330	RES CHIP (E24) 1% 33 OHMS	3.00
SM652101332	RES CHIP (E24) 1% 3.3 K	5.00
SM652101362	RES CHIP (E24) 1% 3.6 K	5.00
SM652101510	RES CHIP (E24) 1% 51 OHMS	9.00
SM652101512	RES CHIP (E24) 1% 5.1 K	6.00
SM652101560	RES CHIP (E24) 1% 56 OHM	2.00
SM652101562	RES CHIP (E24) 1% 5.6 K	20.00
SM652101622	RES CHIP (E24) 1% 6.2 K	24.00
SM652101681	RES CHIP (E24) 1% 680 OHM	27.00
SM652101820	RES CHIP (E24) 1% 82 OHMS	47.00
SM652101821	RES CHIP (E24) 1% 820 OHM	41.00
SM652101822	RES CHIP (E24) 1% 8.2 K	2.00
SM661127104	CAP CERA CHIP 20% .1 UF	2.00
SM661186180	CAP CERA CHIP 10% 18 PF	2.00
SM661186470	CAP CERA CHIP 10% 47 PF	2.00
SM661207102	CAP CERA CHIP 10% .001UF	10.00
SM661207103	CAP CERA CHIP 20% .01UF	114.00
SM661250047	CAP CERA CHIP 4.7 PF	3.00
SM661250082	CAP CERA CHIP .1% 8.2 PF	4.00
SM661255100	CAP CERA CHIP 10PF	1.00
SM661255101	CAP CERA CHIP 5% 100 PF	2.00
SM661255181	CAP CERA CHIP 5% 180 PF	1.00
SM661255221	CAP CERA CHIP 5% 220 PF	1.00

CLASS CODE: 1
 FINISHED GOODS-MANUFACTURED
 PART: 9450
 DESC: FINAL ASSEMBLY 9450

UDM: EA SC: M REV: B

COMPONENT PART NUMBER	DESCRIPTION	QTY IN TOP R ASSEMB
123456789-----	-----	-----
SM661255330	CAP CERA CHIP 5% 33 PF	2.00
SM661255332	CAP CERA CHIP 5% 3300 PF	1.00
SM661255560	CAP CERA CHIP 56PF	9.00
SM666247106	CAP MOLD TANT CHIP 10 UF	6.00
719450403	PC BD PREASS'Y 9450-4	D 1.00
719450423	PC BD PREASS'Y 9450-42	C 2.00
719450433	PC BD PREASS'Y 9450-43	C 4.00
780390008	TRANSFO FOR 9450-4	1.00
HCD404	HYB CLOCK DIVIDER HCD404	1.00
HTD405	HYBID TIME DIGIT. HTD405	A 1.00
SM652101123	RES CHIP (E24) 1% 12 K	1.00
SM652101121	RES CHIP (E24) 1% 120 OHM	5.00
SM652101151	RES CHIP (E24) 1% 150 OHM	13.00
SM652101162	RES CHIP (E24) 1% 1.6 K	2.00
SM652101181	RES CHIP (E24) 1% 180 OHM	4.00
SM652101201	RES CHIP (E24) 1% 200 OHM	16.00
SM652101221	RES CHIP (E24) 1% 220 OHM	8.00
SM652101271	RES CHIP (E24) 1% 270 OHM	21.00
SM652101331	RES CHIP (E24) 1% 330 OHM	17.00
SM652101391	RES CHIP (E24) 1% 390 OHM	2.00
SM652101470	RES CHIP (E24) 47 OHMS	36.00
SM652101471	RES CHIP (E24) 1% 470 OHM	50.00
SM652101680	RES CHIP (E24) 1% 68 OHMS	3.00
SM653125033	RES THICK FILM 5% 3.3 OHM	3.00
SM661255270	CAP CERA CHIP 27PF	5.00
690000000	PINS/CLIP ON	6.00
690681001	PIN EDGE CLIP STRAIGHT	36.00
719450413	PC BD PREASS'Y 9450-41	2.00
F9450-5	COMPLETED BOARD F9450-5	1.00
103307103	CAP CERA MOND 50V .01 UF	4.00
103427104	CAP CERA MOND 100V .1 UF	10.00
142824685	CAP TANT DIP CASE 6.8 UF	1.00
161225121	RES COMP 1/8W 5% 120 OHMS	16.00
168531365	RES PREC RN55D 511 OHMS	2.00
168531381	RES PREC RN55D 750 OHMS	1.00
168531521	RES PREC RN55D 21.5 K	1.00
169416473	RESISTOR DISC NTC 47 K	1.00
184417502	RES VARI COND PLASTIC 5 K	8.00
184427502	RES VARI COND PLASTIC 5 K	2.00
184437502	RES VARI COND PLASTIC 5 K	2.00
190001001	RES NETWORK SPECIAL	1.00
200344138	IC DECODER 3TO8 74HCT138	1.00
205644094	IC 8-BIT SHIFT REGHCT4094	5.00
205752168	IC AND-OR GATE ARRAY 16L8	1.00
207345051	IC MUX/DEMUX HCT4051	3.00
208590385	IC VOLT REF LM385	1.00
230020062	DIODE SWITCHING BAW62	53.00
256243300	DIODE LED RED HLMP-0300	2.00

CLASS CODE: 1
 FINISHED GOODS-MANUFACTURED
 PART: 9450
 DESC: FINAL ASSEMBLY 9450

UOM: EA SC: M REV: B

COMPONENT PART NUMBER	DESCRIPTION	QTY IN TOP R ASSEMB
123456789-----	-----	-----
256443421	DIODE LED YEL HLMP-0421	39.00
403950002	POLARIZING KEY	2.00
412001012	SWITCH ROT N/STOP 12-PINS	4.00
416161002	SWITCH PUSHBUTTON SPST	47.00
454211020	HDR SOLDER TAIL TO MALE 20	1.00
550430106	SCREW CYL HD PHIL M3X6	8.00
551430300	WASHER SHAKEPROOF M3	8.00
553230108	SPACER HEX M3X8MM	4.00
709400511	LED COVER 9400-5	A 41.00
709450511	CALIBR.TERMIN. 9450-5	2.00
709450523	PUSH SWITCH EXTENDER	C 47.00
719450513	PC BD PREASS'Y 9450-5A	1.00
719450523	PC BD PREASS'Y 9450-5B	1.00
HPC411AIH	PROBE CALIBRATOR	A 1.00
SM208470358	IC DUAL OP AMP 358D	1.00
SM232022822	DIODE ARRAY SCHTTKY 2822	1.00
SM275030092	TRANSISTOR PNP BFT92	1.00
SM275040092	TRANSISTOR PNP BFT92R	1.00
SM652101103	RES CHIP (E24) 1% 10 K	2.00
SM652101106	RES CHIP (E24) 1% 10 MEG	1.00
SM652101470	RES CHIP (E24) 47 OHMS	1.00
SM652101510	RES CHIP (E24) 1% 51 OHMS	2.00
SM652101751	RES CHIP (E24) 1% 750 OHM	1.00
SM653185820	RES THICK FILM 82 OHMS	1.00
SM661207103	CAP CERA CHIP 20% .01UF	2.00
690671001	PIN EDGE CLIP RT ANGLE	8.00
710411003	PC BD PREASS'Y HPC411A	A 0.05
SM666317475	CAP MOLD TANT CHIP 4.7 UF	3.00
142224476	CAP TANT DIP CASE 47UF	1.00
SM652101334	RES CHIP (E24) 1% 330 K	1.00
536068001	KNOB FOR 6MM SHAFT	4.00
536068002	KNOB FOR 3MM SHAFT	2.00
536068003	CAP (FOR KNOB 020-2215)	9.00
536068005	CAP FOR 020-3215 OR -3415	3.00
536068006	CAP FOR 021-1110 OR -2215	2.00
536168001	KNOB FOR 1/8" SHAFT	7.00
536168002	KNOB FOR 1/8" SHAFT	1.00
536168003	KNOB FOR 1/8" SHAFT	2.00
709400501	DISPLAY FRAME 9400-5	1.00
485000060	GROMMET 4.8MM ID/10.2 OD	2.00
552425500	SPEED NUT ID 2.5MM	4.00
729450503	FRONT PANEL 9450-5	1.00
550430106	SCREW CYL HD PHIL M3X6	12.00
551430300	WASHER SHAKEPROOF M3	12.00
F9420-6	COMPLETED BOARD F9420-6	B 1.00
103307103	CAP CERA MOND 50V .01 UF	37.00
103427104	CAP CERA MOND 100V .1 UF	31.00
161225027	RES COMP 1/8W 5% 2.7 OHMS	2.00

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 FINISHED GOODS-MANUFACTURED
 PART: 9450
 DESC: FINAL ASSEMBLY 9450

UOM: EA SC: M REV: B

COMPONENT PART NUMBER	DESCRIPTION	QTY IN TOP R ASSEMB
123456789-----		
102412100	CAP CERA DISC 100V 10 PF	1.00
103625151	CAP CERA MOND 100V 150 PF	2.00
102412220	CAP CERA DISC 100V 22 PF	1.00
103506331	CAP CERA MOND 100V 330 PF	1.00
142214156	CAP TANT DIP CASE 15 UF	1.00
146354107	CAP MINI ALUM 20% 100 UF	3.00
147436033	CAP ALUM METAL CAN 33 UF	1.00
161225102	RES 1/8W 5% 1K	6.00
161225103	RES COMP 1/8W 5% 10 K	4.00
161225206	RES CARBON FILM 20 MEG	2.00
161225391	RES COMP 1/8W 5% 390 OHMS	3.00
161225472	RES COMP 1/8W 5% 4.7 K	1.00
168531229	RES PREC RN55D 19.6 OHMS	1.00
168531389	RES PREC RN55D 909 OHMS	1.00
168531401	RES PREC RN55D 1.21 K	1.00
168531449	RES PREC RN55D 3.83 K	1.00
168531585	RES PREC RN55D 100 K	3.00
168531601	RES PREC RN55D 147 K	1.00
168531633	RES PREC RN55D 316 K	1.00
190042103	RESISTOR NETWORK 10 K	4.00
190832220	RESISTOR NETWORK 22 OHMS	1.00
190842102	RES NETWORK 1 K	1.00
200344174	IC HEX D-FLOP 74HCT174	1.00
200430393	IC BIN COUNTER HCT393	2.00
200440390	IC DEC COUNTER 74HCT390	2.00
200480167	IC REAL TIME CLOCK 58167	1.00
205271256	HITACHI HM62256LP-12	2.00
205272064	IC8192X8 RAM 6264LP-10	2.00
205301000	UV E-PROM CMOS 1MBIT	6.00
205640165	IC SHIFT REG HCT165	1.00
205752164	IC AND-OR GATE ARRAY 16R4	4.00
205752168	IC AND-OR GATE ARRAY 16L8	8.00
207367576	IC 8-BIT ADC AD7576	1.00
207472245	IC BUS TRANSVR HCT245	9.00
208011007	IC DUAL OP AMP LM358N	1.00
208517705	IC VOLTAGE REG 7705	1.00
208618212	IC VOLT DETECTOR 8212	1.00
227468020	IC 32-BIT U-PROC 68020	1.00
227668881	IC CO-PROCESSOR 68881	1.00
253010811	DIODE SCHOTTKY BAR HP2811	2.00
256233209	DIODE LED (RED) TIL209A	1.00
230020062	DIODE SWITCHING BAW62	2.00
275110001	TRANSISTOR PNP 2N2907A	1.00
280170104	TRANSISTOR FET N VN0104N3	4.00
309041016	CRYSTAL OSCILLATOR 16MHZ	1.00
310111032	CRYSTAL RESONATOR 32KH	1.00
312660030	BATTERY PC MTG LITH 3V	1.00
400331020	SOCKET IC ST DIP-20	1.00

CLASS CODE: 1
 FINISHED GOODS-MANUFACTURED
 PART: 9450
 DESC: FINAL ASSEMBLY 9450

UDM: EA SC: M REV: B

COMPONENT PART NUMBER	DESCRIPTION	QTY IN TOP R ASSEMB
123456789-----	-----	-----
400360028	SOCKET IC ST DIP-28	1.00
400360032	SOCKET IC ST DIP-32	6.00
400411114	IC SOCKET GRID TYP 114PIN	1.00
400412068	IC SOCKET GRID TYP 68-PIN	1.00
400415068	IC SOCKET GRID TYP 68-PIN	1.00
403950002	POLARIZING KEY	2.00
411430002	SWITCH ROCKER PC MTG (4)	1.00
454211020	HDR SOLD TAIL TO MALE 20	1.00
454610096	HDR DIP SOLD TO MALE 96	1.00
585252354	RIVET HOLLOW 2,5X9MM	2.00
719420603	PC BD PREASS'Y 9420-6	1.00
MX401	ICMIN MAX GATEARR. MNX401	1.00
227792968	IC RAM CONTROLLER 2968A	1.00
205254256	IC 256 X 4 RAM 424256C	8.00
207172965	IC MEMORY DRIVER 2965	1.00
F9450-7	COMPLETED BOARD F9450-7	G 1.00
124471123	CAP POLYPROP 1% .012 UF	10.00
SM168659489	RES METAL FILM .1% 10 K	7.00
SM185457202	RES VARI CERMET 2 K	1.00
SM185457501	RES VARI CERMET 500 OHMS	1.00
SM200178000	IC 2-INPUT NAND HCT00	1.00
SM200178002	IC 2-INPUT NDR HCT02	1.00
SM200178004	IC HEX INVERTER HCT04	2.00
SM200178008	IC 2-INPUT AND HCT08	1.00
SM200178138	IC 3-8 LINE DECOD HCT 138	2.00
SM200178139	IC 2-TO-4-LINE DEC HCT139	2.00
SM205616094	IC 8-ST.SHIFT REG HCT4094	6.00
SM207171488	IC QUAD LINE DRIVER 1488	6.00
SM207978153	IC 4-INPUT MUX HCT153	1.00
208122002	IC VOLT REG POS UA7805	1.00
208124002	IC VOLT REG -5V UA7905UC	2.00
208144001	IC ADJ POS VOLT REG UA78G	1.00
SM208470007	IC OP AMP OP-07	4.00
208870240	IC CALIBRATOR 24010	1.00
208911881	IC SYNC SEPARATOR 1881	1.00
SM236030099	DIODE SD-PKG BAV99	5.00
SM240050091	DIODE ZENER ZMM9.1	2.00
SM270080054	TRANSISTOR NPN BCX54	2.00
SM270340848	TRANSISTOR NPN 848CR	1.00
SM275080051	TRANSISTOR PNP BCX51	2.00
SM289772003	TRANSISTOR ARRAY 2003	2.00
SM301502001	BEAD (FERRITE CHIP)	14.00
402110300	CONN CO-AX PC MTG BNC	3.00
403950002	POLARIZING KEY	2.00
430440732	RELAY 2 FORM C DPDT	12.00
454150010	HDR SOLD TAIL/PC EDG10	1.00
454211040	HDR SOLD TAIL TO MALE 40	1.00
454340002	HDR MALE PIN TO WW 02	2.00

CLASS CODE: 1
 FINISHED GOODS-MANUFACTURED
 PART: 9450
 DESC: FINAL ASSEMBLY 9450

UOM: EA SC: M REV: B

COMPONENT PART NUMBER	DESCRIPTION	QTY IN TOP R ASSEMB
123456789-----		
454340012	HDR MALE PIN TO WW 12	1.00
500560001	INSULATOR MICA FOR TO-220	4.00
SM653185182	RES THICK FILM 1.8 K	4.00
SM653505330	RES THICK FILM 33 OHMS	4.00
SM661250082	CAP CERA CHIP .1% 8.2 PF	1.00
SM661255332	CAP CERA CHIP 5% 3300 PF	2.00
SM661255821	CAP CERA CHIP 5% 820 PF	1.00
SM661256120	CAP CERA CHIP 10% 12 PF	2.00
SM661286103	CAP CERA CHIP 10% .01 UF	1.00
SM661486223	CAP CERA CHIP 10% .022UF	2.00
SM661506684	CAP CERA CHIP 10% .68UF	3.00
719450703	PC BD PREASS'Y 9450-7	J 1.00
780261129	SMB-SMC CABLE 29	2.00
HAT407	HYBRID ATTENUATOR HAT407	2.00
HAT408	HYBRID ATTENUATOR HAT408	2.00
HAT409	HYBRID ATTENUATOR HAT409	2.00
HTR402-S	HYBRID TRIGGER HTR402-S ITI	D 3.00
HHZ406A	HYBRID AMPLIFIER HHZ406A	E 3.00
HII400A-S	HYB AMP HII400A-S ITI	B 2.00
HIV401A-S	HYB AMP HIV401A-S ITI	A 2.00
SM208470351	IC J-FET OP AMP 351	1.00
SM208470353	IC DUAL OP AMP 353	9.00
454312004	HDR MALE PIN TO WW (2X2)4	2.00
SM661127104	CAP CERA CHIP 20% .1 UF	18.00
SM666327225	CAP MOLD TANT CHIP 2.2 UF	35.00
158849010	CAP VARIABLE 1 - 5 PF	2.00
SM208470082	IC J-FET OP AMP 082C	2.00
SM240050051	DIDDE ZENER TZM-C-5V1	2.00
SM661207223	CAP CERA CHIP 20% .022 UF	2.00
9450-7-SUB	SUBCONTRACTOR BOM	D 0.00
SM652101103	RES CHIP (E24) 1% 10 K	0.00
SM652101105	RES CHIP (E24) 1% 1 M	0.00
SM652101200	RES CHIP (E24) 1% 20 OHMS	0.00
SM652101220	RES CHIP (E24) 1% 22 OHMS	0.00
SM652101223	RES CHIP (E24) 1% 22 K	0.00
SM652101334	RES CHIP (E24) 1% 330 K	0.00
SM652101510	RES CHIP (E24) 1% 51 OHMS	0.00
SM652101511	RES CHIP (E24) 1% 510 OHM	0.00
SM652101560	RES CHIP (E24) 1% 56 OHM	0.00
SM652101561	RES CHIP (E24) 1% 560 OHM	0.00
SM652101564	RES CHIP (E24) 1% 560 K	0.00
SM652101624	RES CHIP (E24) 1% 620 K	0.00
SM652101684	RES CHIP (E24) 1% 680 K	0.00
SM652101750	RES CHIP (E24) 1% 75 OHMS	0.00
SM652101751	RES CHIP (E24) 1% 750 OHM	0.00
SM652101122	RES CHIP (E24) 1% 1.2 K	0.00
SM652101222	RES CHIP (E24) 1% 2.2 K	0.00
SM652101301	RES CHIP (E24) 1% 300 OHM	0.00

CLASS CODE: 1
 FINISHED GOODS-MANUFACTURED
 PART: 9450
 DESC: FINAL ASSEMBLY 9450

UDM: EA SC: M REV: B

COMPONENT PART NUMBER	DESCRIPTION	QTY IN TOP R ASSEMB
123456789-----		
SM652101472	RES CHIP (E24) 1% 4.7 K	0.00
SM652101104	RES CHIP (E24) 1% 100 K	0.00
SM652101203	RES CHIP (E24) 1% 20 K	0.00
SM652101225	RES CHIP (E24) 1% 2.2 MEG	0.00
SM652101243	RES CHIP (E24) 1% 24 K	0.00
SM652101270	RES CHIP (E24) 1% 27 OHMS	0.00
SM652101102	RES CHIP (E24) 1% 1 K	0.00
SM652101823	RES CHIP (E24) 1% 82 K	0.00
SM652101391	RES CHIP (E24) 1% 390 OHM	0.00
SM652101221	RES CHIP (E24) 1% 220 OHM	0.00
SM652101112	RES CHIP (E24) 1% 1.1 K	0.00
SM652101824	RES CHIP (E24) 1% 820 K	0.00
SM652101474	RES CHIP (E24) 1% 470 K	0.00
SM652101101	RES CHIP (E24) 1% 100 OHM	0.00
SM661255470	CAP CERA CHIP 47PF	2.00
SM661255471	CAP CERA CHIP 5% 470 PF	2.00
SM661255151	CAP CERA CHIP 5% 150 PF	2.00
709450771	THERMO-COUPLE 2	A 2.00
SM666317475	CAP MOLD TANT CHIP 4.7 UF	2.00
SM207770201	IC ANALOG SWITCH DG201	4.00
SM661207103	CAP CERA CHIP 20% .01UF	121.00
SM185457502	RES VARI CERMET 5 K	2.00
SM653185221	RES THICK FILM 220 OHMS	3.00
550425106	SCREW CYL HD PHIL M2.5X6	4.00
550425520	SCREW FLAT HD PHIL 2.5X20	12.00
550430105	SCREW CYL HD PHIL M3X5	4.00
709450711	FRONT SHIELD	1.00
709450721	LOWER RF SHIELD	1.00
709450731	UPPER RF SHIELD	1.00
F9450-8	COMPLETED BOARD F9450-8	A 1.00
454150039	HDR SOLDER TAIL/PC EDG 39	3.00
719450803	PC BD PREASS'Y 9450-8	1.00
9450-8-SUB	SUBCONTRACTOR BOM	0.00
SM652101180	RES CHIP (E24) 1% 18 OHMS	0.00
F9450-9	COMPLETED BOARD F9450-9	E 1.00
205752168	IC AND-OR GATE ARRAY 16L8	1.00
315040015	POWER SUPPLY 9451-1	1.00
455021018	CONNECTOR PIN (FEMALE)	2.00
455210002	BLOCK FOR CRIMP MALE PIN2	1.00
530409996	FILTER FOR PAPST FAN 4014	1.00
550425505	SCREW FLAT HD PHIL M2.5X5	1.00
550440506	SCREW FLAT HD PHIL M4X6	4.00
551440100	FLAT WASHER M4	4.00
554500001	TAPPING SCREW W/U-THREAD	2.00
709450911	SERIAL NUMBER PLATE	1.00
709450921	VOLT SELECT COVER 9450-9	B 1.00
780249945	BNC-SMD CABLE 45	2.00
780259927	BNC-SMB CABLE 27	2.00

CLASS CODE: 1
 FINISHED GOODS-MANUFACTURED
 PART: 9450
 DESC: FINAL ASSEMBLY 9450

UOM: EA SC: M REV: B

COMPONENT PART NUMBER	DESCRIPTION	QTY IN TOP R ASSEMB
123456789-----	-----	-----
552440300	NUT OPEN-END ACORN M4	4.00
433162400	FUSE SLO-BLO 250V 4 AMP	2.00
433162200	FUSE SLO-BLO 250V 2AMP	2.00
205752164	IC AND-OR GATE ARRAY 16R4	1.00
550440620	SCREW OVAL HD PHIL	4.00
RP9450-9	COMPLETED REAR PANEL 9450-9	1.00
709450901	REAR PANEL F9450-9	E 1.00
530409125	FAN AXIAL 12V DC	1.00
550430105	SCREW CYL HD PHIL M3X5	2.00
M9450	LOOSE PARTS M9450	C 1.00
300090001	DEFLECTION YOKE	1.00
455020001	CONNECTOR PIN (FEMALE)	4.00
455121003	CONNECTOR HOUSING 3	2.00
455950002	CLAMP WITH STRAIN RELIEF	2.00
594120003	TIEWRAP	2.00
321220009	CRT ORANGE 90 DEG DEFL 9"	1.00
377051005	LABEL "DANGER-----ONLY"	A 1.00
512021867	BRACKET RIGHT ANGLE SMALL	2.00
530010024	FOOT FOR COMPAC ENCLOSURE	4.00
530301005	HANDLE (U-SHAPE)	1.00
530410001	CARD GUIDE NON METALLIC	5.00
544310001	SPRING EXT TYPE 190 MM	1.00
550430104	SCREW CYL HD PHIL M3X4	10.00
550430106	SCREW CYL HD PHIL M3X6	18.00
550430120	SCREW CYL HD PHIL M3X20	3.00
550430508	SCREW FLAT HD PHIL M3X8	2.00
550440108	SCREW CYL HD PHIL M4X8	4.00
550440110	SCREW CYL HD PHIL M4X10	6.00
550440416	CYL INT HEX M4X16	4.00
550440640	SCREW OVAL HD PHIL M4X40	4.00
550450108	SCREW CYL HD PHIL M5X8	6.00
551430300	WASHER SHAKEPROOF M3	24.00
551440300	WASHER SHAKEPROOF M4	14.00
551450300	WASHER SHAKEPROOF M5	6.00
552430300	NUT OPEN-END ACORN M3	4.00
552440100	NUT HEX M4	8.00
554040901	NUT GUIDE FOR 554440101	4.00
554440101	NUT SQUARE M4	4.00
554440201	GND WASHER FOR 554440101	1.00
554440202	FLAT WASHER M4	4.00
594120003	TIEWRAP	3.00
594230002	CABLE CLIP ADHESIVE BACK	1.00
709400000	DSD COMPLETED BOX	1.00
709400071	REAR PANEL FOOT	A 4.00
709450001	DISPLAY SUPPORT	D 1.00
709450011	MOTHER CARD SUPPORT	C 1.00
709450021	SPACER	C 1.00
709450031	SUPP.ANGLE BRACKET (REAR)	A 2.00

CLASS CODE: 1
 FINISHED GOODS-MANUFACTURED
 PART: 9450
 DESC: FINAL ASSEMBLY 9450

UDM: EA SC: M REV: B

COMPONENT PART NUMBER	DESCRIPTION	R	QTY IN TOP ASSEMB
123456789-----	-----	-----	-----
709450051	POWER SUPPLY SUPPORT	C	1.00
709450061	REAR PANEL ANCHOR	B	2.00
709450071	NEOPRENE WASHER	A	4.00
780210030	DISPLAY POWER CABLE	A	1.00
780220015	BASE CARD POWER CABLE	A	1.00
780231120	FRONT END BASE CABLE	B	1.00
780299025	CRT CABLE	A	1.00
780411236	FRONT PANEL CABLE	A	1.00
551430301	WASHER SHAKEPROOF LGE M3		7.00
ACCESSORIES-9450	ACCESSORIES FOR 9450	A	1.00
P9020	PROBE DC-300MHZ/ATTN 10:1		2.00
597940011	SHIPPING CARTON 9400		1.00
597940012	SHIPPING INSERT 9400		2.00
597940014	PLASTIC BAG FOR 9400		2.00
597940015	MANUAL/ACCESSORY CTN 9400		1.00
589203218	AC CORD/US-CANADA PLUG		0.60
589203100	AC CORD/"SEV-ASE" PLUG		0.05
589202100	AC CORD/PLUG FOR FRANCE		0.10
589202200	AC CORD/PLUG FOR GERMANY		0.15
407099008	PLUG FOR AC LINE -ENGLAND		0.10
433162200	FUSE SLO-BLD 250V 2AMP		2.00
433162400	FUSE SLO-BLD 250V 4 AMP		2.00

9450 DIGITAL OSCILLOSCOPE

SERVICE MANUAL

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