9450 DIGITAL OSCILLOSCOPE

SERVICE MANUAL

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AND

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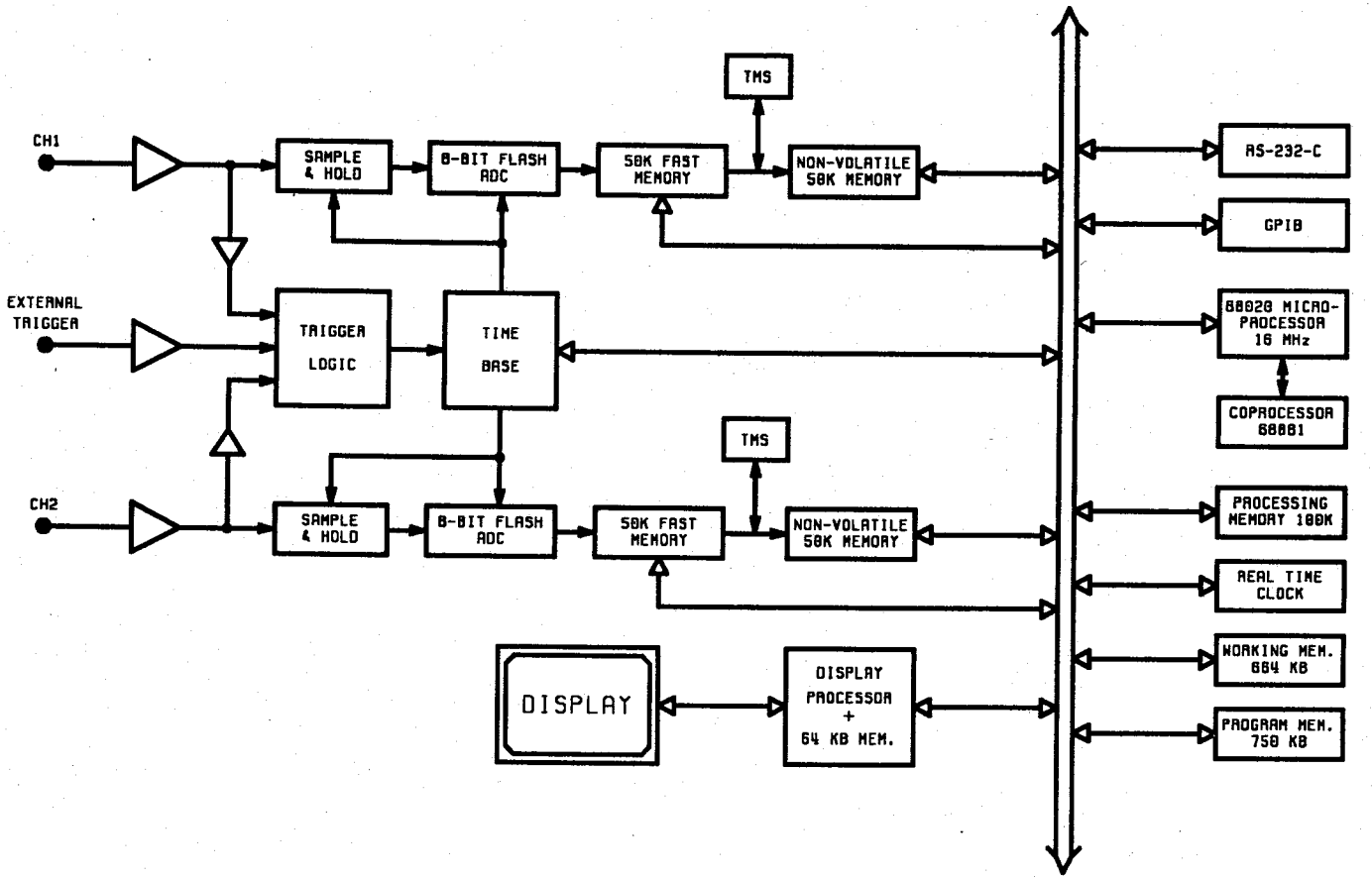
9450 HARDWARE OVERVIEW



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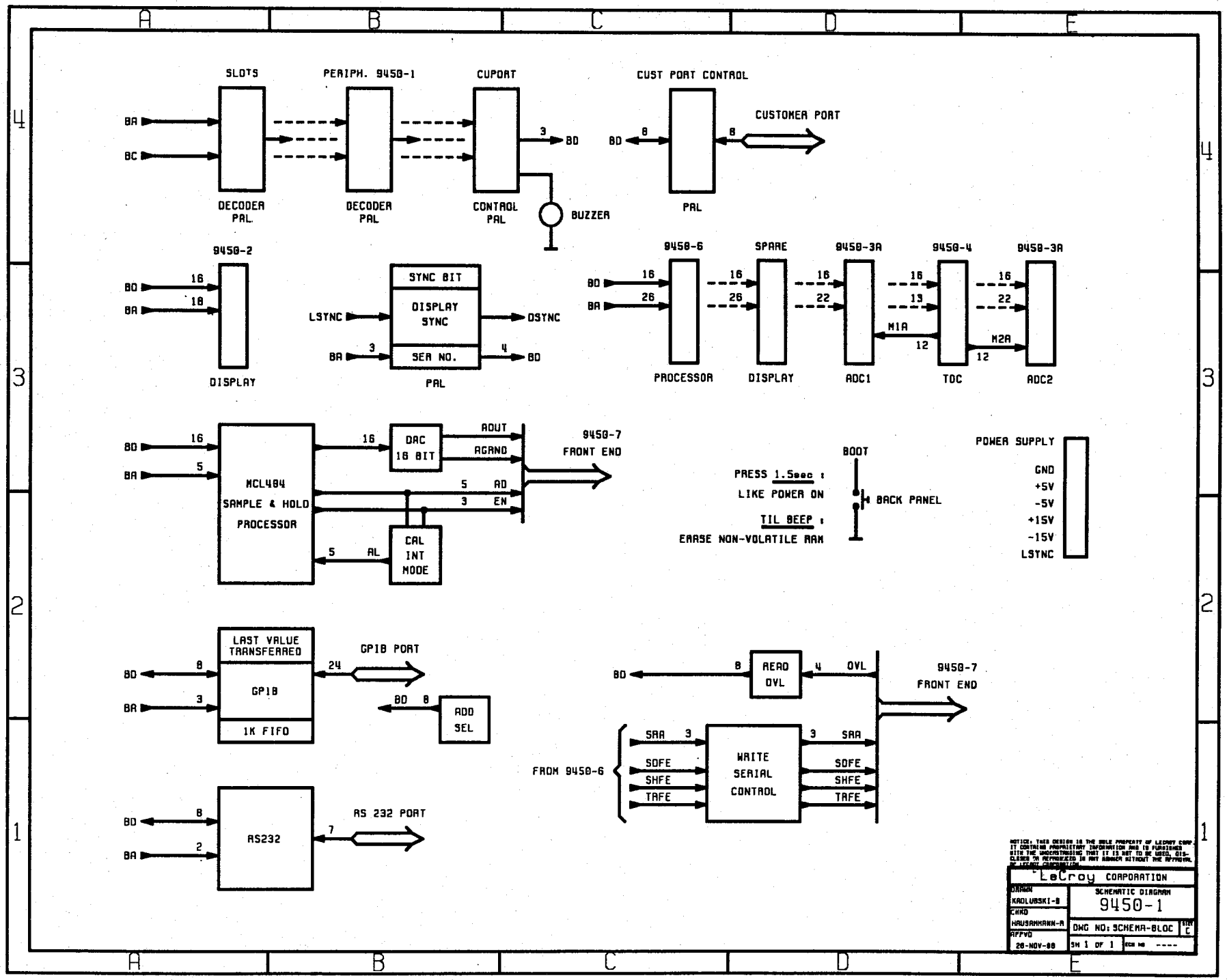
DRAWN: KROLUBSKI-B	SCHEMATIC DIAGRAM: OVERVIEW
CHKD: HAUSAMANN-R	DWG NO: SCHEMA-BLK, REV: C
APPVD: 13-OCT-88	SH 1 OF 1, ECO NO: ----

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



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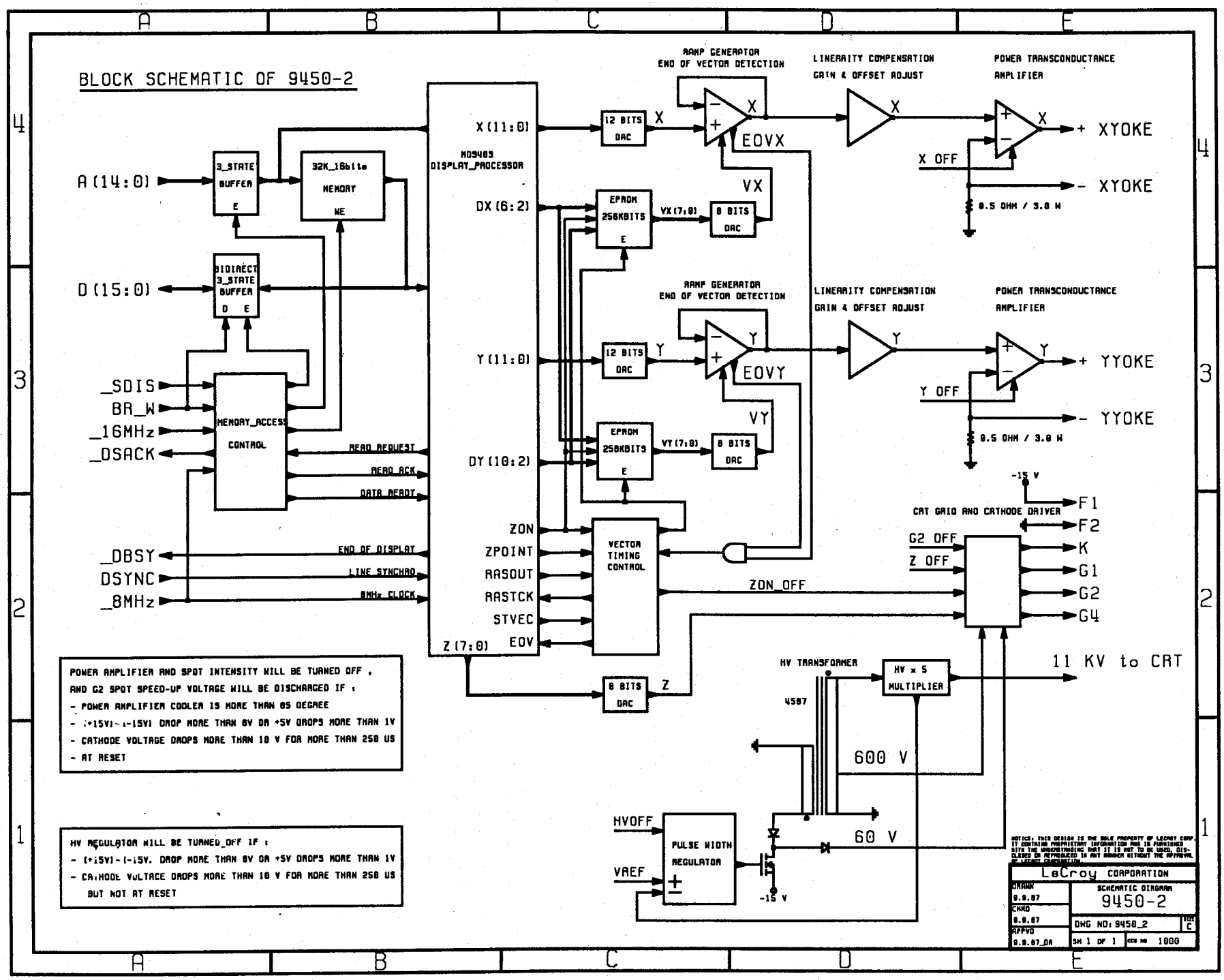
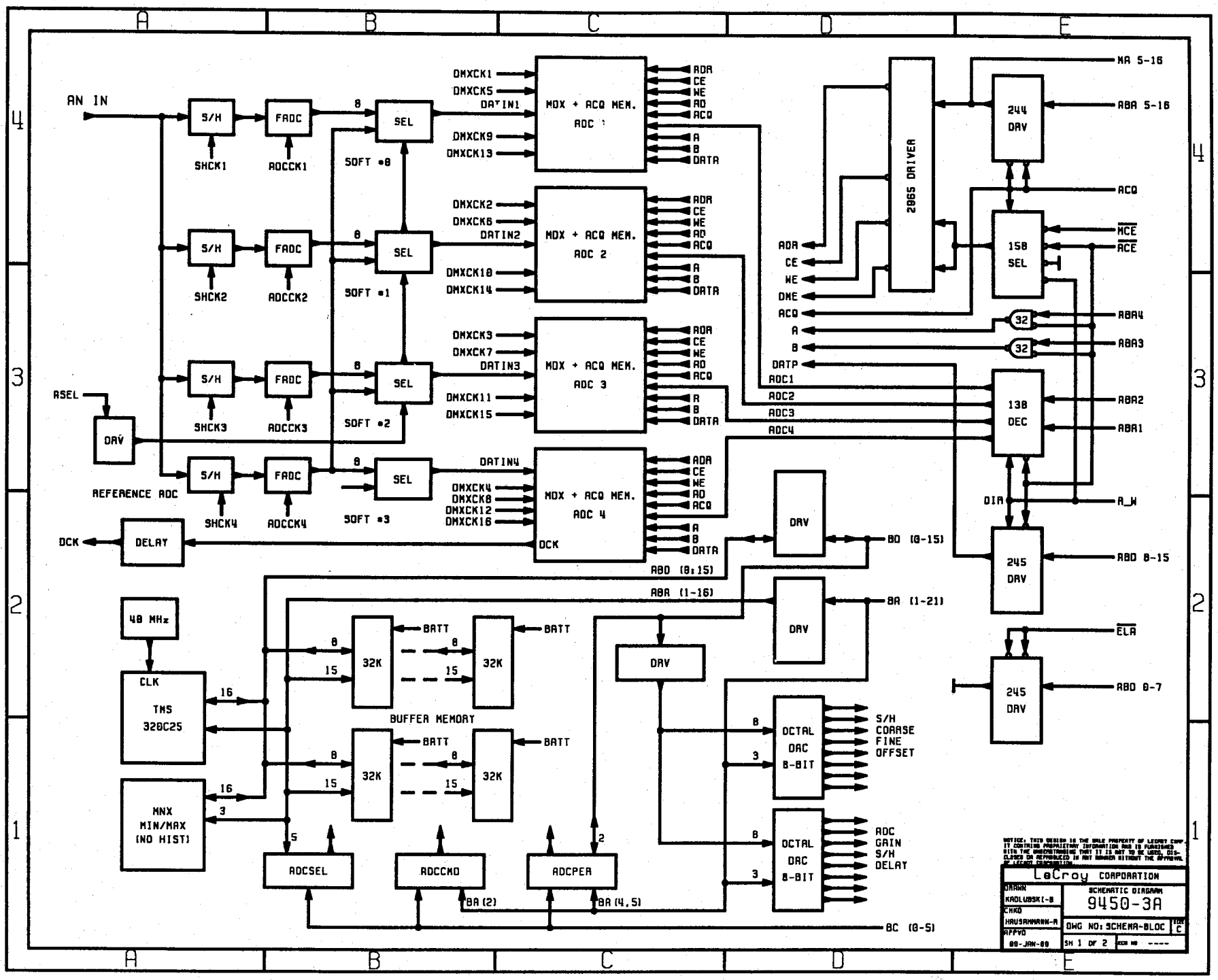
DRAWN: KADLUBSKI-B	SCHEMATIC DIAGRAM 9450-1
CHKD: HAUSAMMANN-A	DWG NO: SCHEMA-BLOC REV C
APPVD: 26-NOV-86	SH 1 OF 1 ECN NO ----


BLOCK SCHEMATIC OF 9450-2
A(14:0)
D(15:0)
_SDIS
BR_W
_16MHz
_DSACK
_DBSY
DSYNC
_8MHz
3_STATE BUFFER
32K_16bits MEMORY
BIDIRECT 3_STATE BUFFER
MEMORY_ACCESS CONTROL
READ REQUEST
READ ACK
DATA READY
END OF DISPLAY
LINE SYNCHRO
8MHz CLOCK
MD9403 DISPLAY_PROCESSOR
X(11:0)
DX(6:2)
Y(11:0)
DY(10:2)
ZON
ZPOINT
RASOUT
RASTCK
STVEC
Z(7:0)
EOV
12 BITS DAC
8 BITS DAC
EPROM 256KBITS
VX(7:0)
VY(7:0)
RAMP GENERATOR END OF VECTOR DETECTION
EOVX
EOVY
VX
VY
LINEARITY COMPENSATION GAIN & OFFSET ADJUST
POWER TRANSCONDUCTANCE AMPLIFIER
X OFF
Y OFF
+ XYOKE
- XYOKE
+ YYOKE
- YYOKE
0.5 OHM / 3.0 W
VECTOR TIMING CONTROL
ZON_OFF
CRT GRID AND CATHODE DRIVER
-15 V
F1
F2
K
G1
G2
G4
G2 OFF
Z OFF
HV TRANSFORMER
4587
HV x 5 MULTIPLIER
11 KV to CRT
600 V
60 V
HVOFF
VREF
PULSE WIDTH REGULATOR
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
LeCroy CORPORATION
SCHEMATIC DIAGRAM
9450-2
DWG NO: 9450_2
SIZE C
SH 1 OF 1
ECO NO 1000



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DRAWN	KADLUBSKI-B
CHKD	HAUSAMANN-A
APPVD	88-JAN-88

SCHEMATIC DIAGRAM

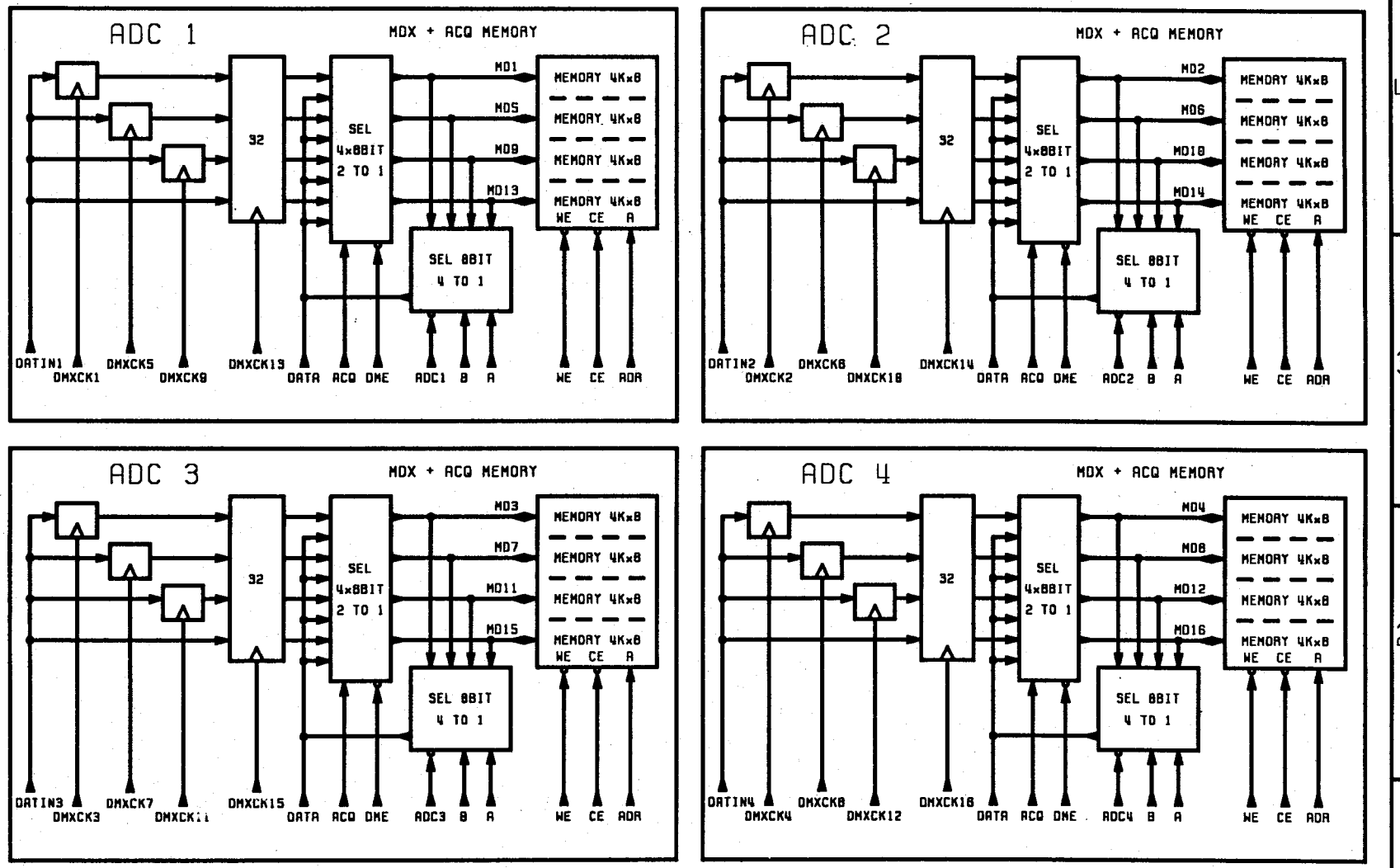
9450-3A

DWG NO: SCHEMA-BLOC

REV C

SH 1 OF 2

DCN NO ----



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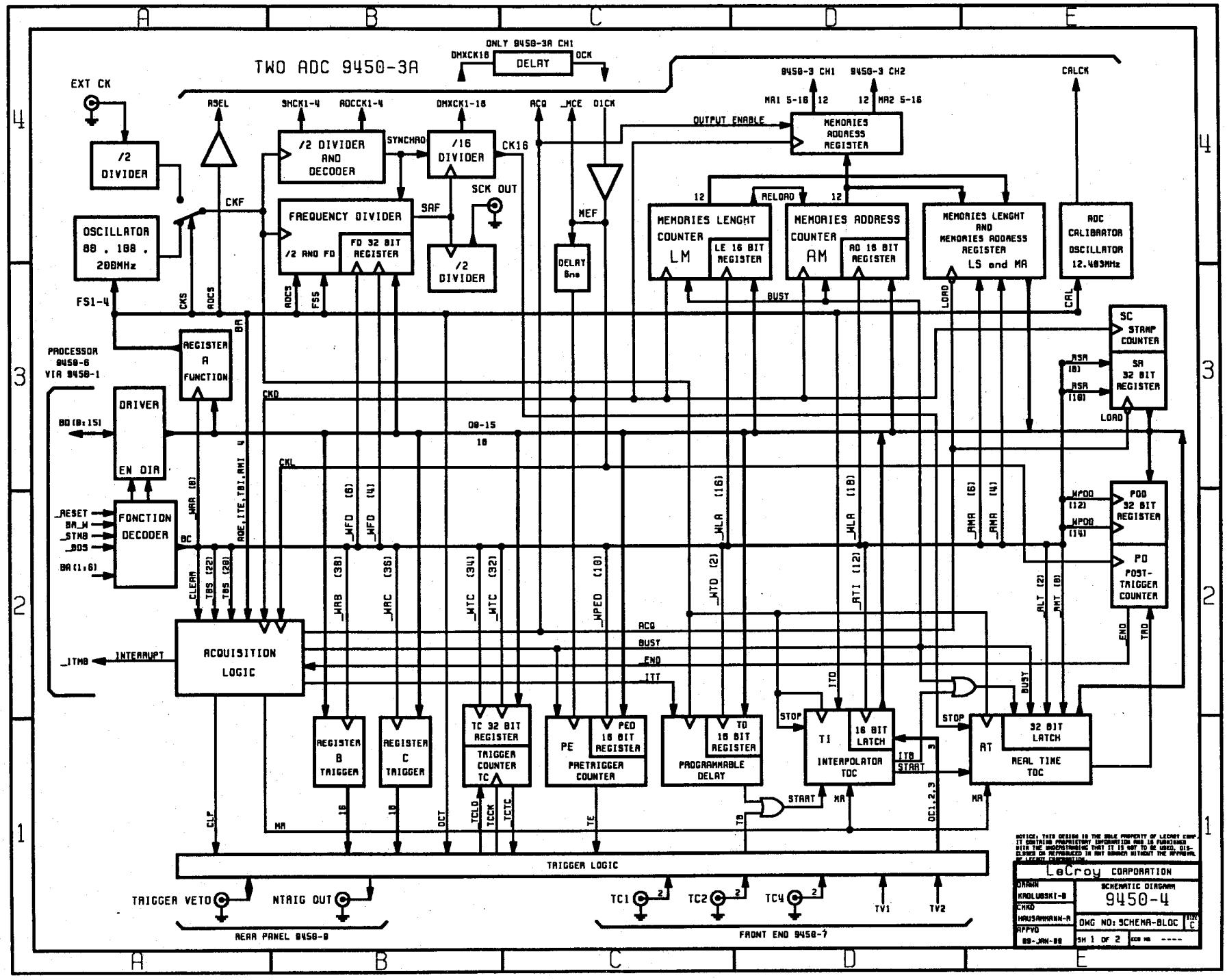
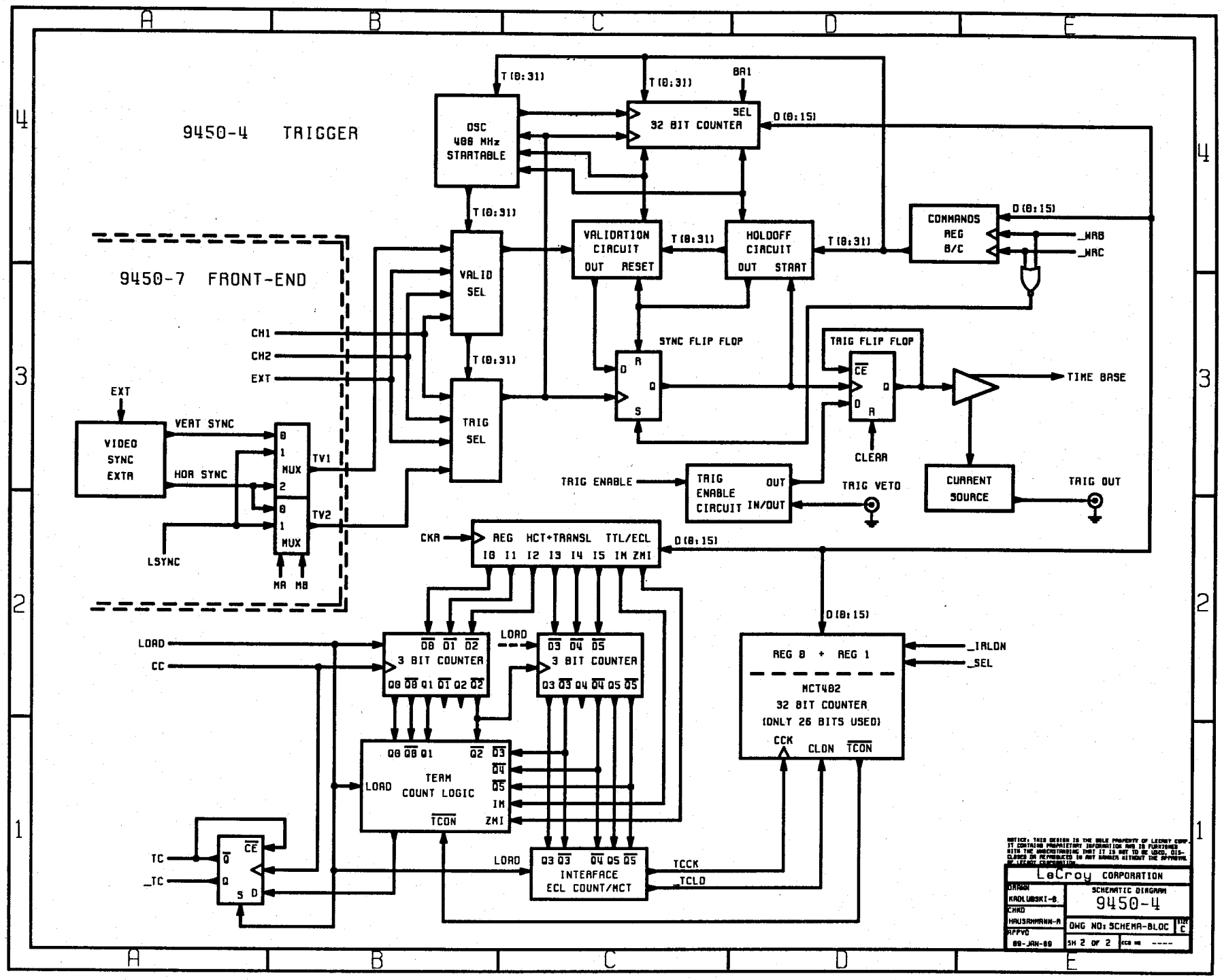
DRAWN KADLUBSKI-B	SCHEMATIC DIAGRAM 9450-3A
CHKD HAUSAMANN-A	DWG NO: SCHEMA-BLOC REV C
APPVD 09-JAN-89	SH 2 OF 2 ECO NO ----

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.


TWO ADC 9450-3A
ONLY 9450-3A CH1
DMXCK16
DELAY
DCK
EXT CK
/2 DIVIDER
OSCILLATOR
88 . 188 .
200MHz
FS1-4
CKS
ADCS
ASEL
SMCK1-4
ADCCK1-4
/2 DIVIDER
AND
DECODER
SYNCHRO
DMXCK1-16
/16
DIVIDER
CK16
CKF
FREQUENCY DIVIDER
/2 AND FD
FD 32 BIT
REGISTER
SAF
/2
DIVIDER
SCK OUT
ADCS
FSS
ACQ
_MCE
DICK
MEF
DELAY
6ns
9450-3 CH1
9450-3 CH2
CALCK
MA1 5-16
12
12
MA2 5-16
OUTPUT ENABLE
MEMORIES
ADDRESS
REGISTER
12
RELOAD
12
MEMORIES LENGHT
COUNTER
LM
LE 16 BIT
REGISTER
MEMORIES ADDRESS
COUNTER
AM
AD 16 BIT
REGISTER
MEMORIES LENGHT
AND
MEMORIES ADDRESS
REGISTER
LS and MA
ADC
CALIBRATOR
OSCILLATOR
12.483MHz
BUSY
LOAD
CAL
PROCESSOR
9450-6
VIA 9450-1
REGISTER
A
FUNCTION
BA
CKD
SC
STAMP
COUNTER
ASA
(8)
ASA
(10)
SA
32 BIT
REGISTER
LOAD
DRIVER
EN DIR
BD(0:15)
D0-15
16
CKL
_RESET
BA_W
_STM8
_BDS
BA(1:6)
FONCTION
DECODER
BC
WRA (8)
ADE,ITE,TBI,AMI
4
_WFD (6)
_WFD (4)
_WLA (16)
_WLA (18)
_AMA (6)
_AMA (4)
_WPOD
(12)
_WPOD
(14)
POD
32 BIT
REGISTER
PD
POST-
TRIGGER
COUNTER
CLEAR
TBS (22)
TBS (28)
_WAB (38)
_WAC (36)
_WTC (34)
_WTC (32)
_WPED (18)
_WTD (2)
_RTI (12)
_RLT (2)
_RNT (8)
END
TRD
ACQ
BUSY
_END
ITT
_ITM8
INTERRUPT
ACQUISITION
LOGIC
ITD
BUSY
STOP
STOP
REGISTER
B
TRIGGER
REGISTER
C
TRIGGER
TC 32 BIT
REGISTER
TRIGGER
COUNTER
TC
PE
PED
16 BIT
REGISTER
PRETRIGGER
COUNTER
TD
16 BIT
REGISTER
PROGRAMMABLE
DELAY
TI
16 BIT
LATCH
INTERPOLATOR
TDC
ITB
START
3
AT
32 BIT
LATCH
REAL TIME
TDC
START
MA
MA
CLP
16
16
DCT
TCLD
TCCK
TCTC
TE
TB
DC1,2,3
TRIGGER LOGIC
TRIGGER VETO
NTRIG OUT
REAR PANEL 9450-8
TC1
2
TC2
2
TC4
2
TV1
TV2
FRONT END 9450-7
LeCroy CORPORATION
DRAWN
KROLUBSKI-B
CHKD
HAUSAMANN-A
APPVD
08-JAN-88
SCHEMATIC DIAGRAM
9450-4
DWG NO: SCHEMA-BLOC
REV
C
SH 1 OF 2
ECO NO. ----



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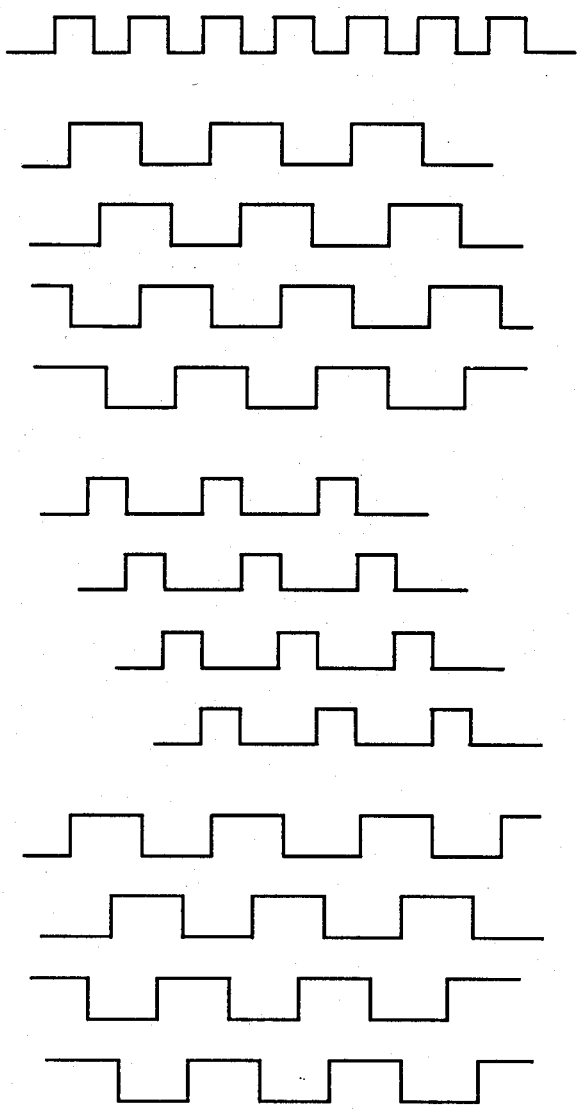
DRAWN KADLUBSKI-B.	SCHEMATIC DIAGRAM 9450-4
CHKD HAUSAMMANN-A	DWG NO: SCHEMA-BLOC REV C
APPVD 09-JAN-89	SH 2 OF 2 ECO NO ----

SAMPLING CLK TIMING



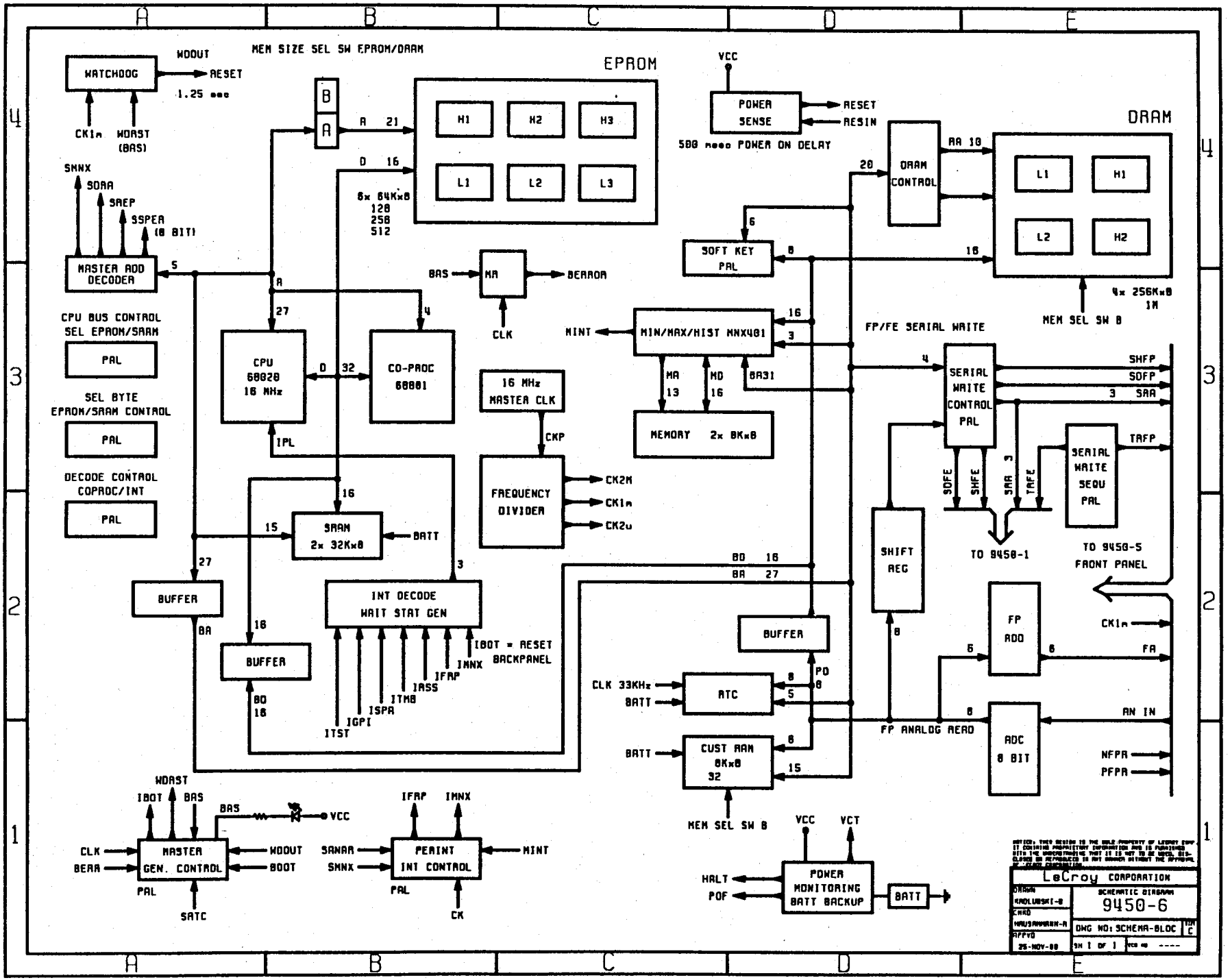
9450 SAMPLING CLOCK RATES vs TIME/DIV

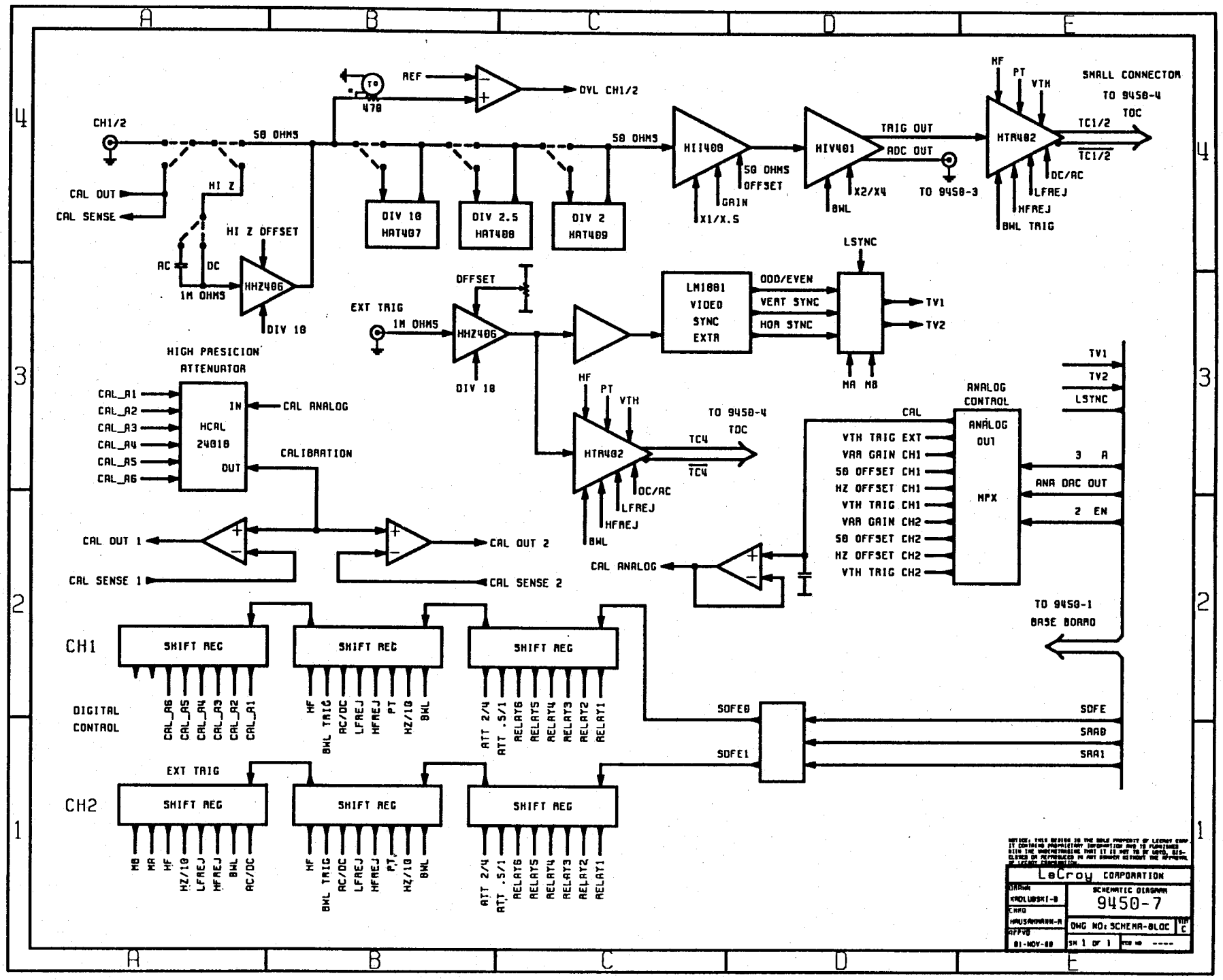
Single-shot:

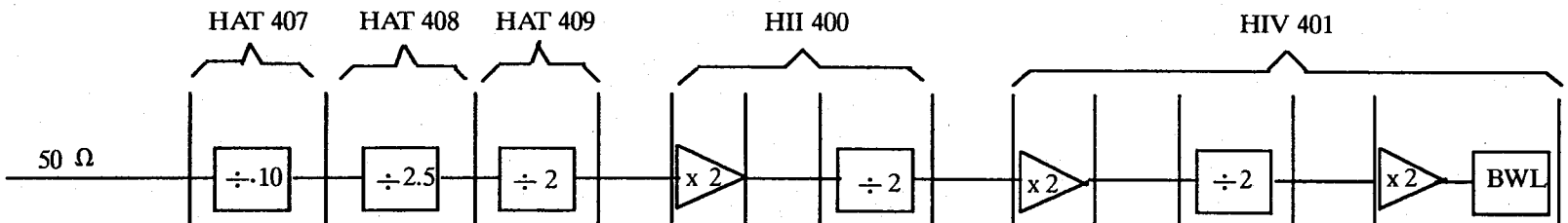
INT OSC MHz	Sampl Rate Ms/sec	Sample Intvl nsec	S/H CLK MHz	# ADC	Time/div
200	400	2.5	100	4	10 nsec
					.
					.
100	200	5.0	50	4	20 µsec
200	100	10.0	100	1	50 µsec
80	40	25	40	1	.1 msec
80	20	50	40	1	.2 msec
80	10	100	40	1	.5 msec
80	4	250	40	1	1 msec
80	2	500	40	1	2 msec
80	1	1000	40	1	5 msec
.	.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


MEM SIZE SEL SW EPROM/DRAM
EPROM
DRAM
WATCHDOG
WDOUT
RESET
1.25 sec
CKin
WDRST
(BAS)
POWER SENSE
RESET
RESIN
500 msec POWER ON DELAY
VCC
8x 64Kx8
128
256
512
H1
H2
H3
L1
L2
L3
4x 256Kx8
1M
MEM SEL SW 8
SMNX
SDAA
SAEP
SSPEA
(8 BIT)
MASTER ADD DECODER
SOFT KEY PAL
DRAM CONTROL
CPU BUS CONTROL
SEL EPROM/SRAM
PAL
SEL BYTE
EPROM/SRAM CONTROL
DECODE CONTROL
COPROC/INT
BAS
MA
BERROR
CLK
CPU
68020
16 MHz
CO-PROC
68881
MINT
MIN/MAX/HIST MNX401
MEMORY 2x 8Kx8
FP/FE SERIAL WRITE
16 MHz
MASTER CLK
CKP
FREQUENCY DIVIDER
CK2M
CK1m
CK2u
IPL
SRAM
2x 32Kx8
BATT
BUFFER
INT DECODE
WAIT STAT GEN
IBOT = RESET
BACKPANEL
IMNX
IFAP
IASS
ITMB
ISPA
IGPI
ITST
SERIAL WRITE CONTROL PAL
SERIAL WRITE SEQU PAL
SHFP
SOFP
SAA
TAFP
SDFE
SHFE
TAFE
TO 9450-1
TO 9450-5
FRONT PANEL
SHIFT REG
FP ADD
CKin
FA
AN IN
ADC
8 BIT
NFPA
PFPA
FP ANALOG READ
CLK 33KHz
BATT
RTC
PD
CUST RAM
8Kx8
32
MEM SEL SW 8
WDRST
IBOT
BAS
VCC
MASTER
GEN. CONTROL
CLK
BERR
WDOUT
BOOT
PAL
SATC
IFAP
IMNX
PERINT
INT CONTROL
SANAR
SMNX
MINT
PAL
CK
HALT
POF
POWER MONITORING
BATT BACKUP
VCT
LeCroy CORPORATION
SCHEMATIC DIAGRAM
9450-6
DWG NO: SCHEMA-BLOC
SIZE C
25-NOV-88
SH 1 OF 1


CH1/2
50 OHMS
CAL OUT
CAL SENSE
HI Z
HI Z OFFSET
AC
DC
1M OHMS
HHZ406
DIV 10
REF
470
OVL CH1/2
DIV 10
HAT407
DIV 2.5
HAT408
DIV 2
HAT409
50 OHMS
HII408
50 OHMS
OFFSET
GAIN
X1/X.5
HIV401
TRIG OUT
ADC OUT
X2/X4
BWL
TO 9450-3
HF
PT
VTH
SMALL CONNECTOR
TO 9450-4
TDC
HTR402
TC1/2
TC1/2
DC/AC
LFREJ
HFREJ
BWL TRIG
EXT TRIG
1M OHMS
OFFSET
HHZ406
DIV 10
LM1881
VIDEO
SYNC
EXTR
ODD/EVEN
VERT SYNC
HOR SYNC
LSYNC
TV1
TV2
MA
MB
HIGH PRESICION
ATTENUATOR
CAL_A1
CAL_A2
CAL_A3
CAL_A4
CAL_A5
CAL_A6
HCAL
24010
IN
OUT
CAL ANALOG
CALIBRATION
HF
PT
VTH
HTR402
TO 9450-4
TDC
TC4
TC4
DC/AC
LFREJ
HFREJ
BWL
ANALOG
CONTROL
CAL
VTH TRIG EXT
VAR GAIN CH1
50 OFFSET CH1
HZ OFFSET CH1
VTH TRIG CH1
VAR GAIN CH2
50 OFFSET CH2
HZ OFFSET CH2
VTH TRIG CH2
ANALOG
OUT
MPX
TV1
TV2
LSYNC
3 A
ANA DAC OUT
2 EN
CAL OUT 1
CAL SENSE 1
CAL OUT 2
CAL SENSE 2
CAL ANALOG
TO 9450-1
BASE BOARD
CH1
SHIFT REG
SHIFT REG
SHIFT REG
DIGITAL
CONTROL
CAL_A6
CAL_A5
CAL_A4
CAL_A3
CAL_A2
CAL_A1
HF
BWL TRIG
AC/DC
LFREJ
HFREJ
PT
HZ/10
BWL
ATT 2/4
ATT .5/1
RELAY6
RELAY5
RELAY4
RELAY3
RELAY2
RELAY1
SOFE0
SOFE1
SOFE
SAA0
SAA1
EXT TRIG
CH2
SHIFT REG
SHIFT REG
SHIFT REG
MB
MA
HF
HZ/10
LFREJ
HFREJ
BWL
AC/DC
HF
BWL TRIG
AC/DC
LFREJ
HFREJ
PT
HZ/10
BWL
ATT 2/4
ATT .5/1
RELAY6
RELAY5
RELAY4
RELAY3
RELAY2
RELAY1
LeCroy CORPORATION
SCHEMATIC DIAGRAM
9450-7
DWG NO: SCHEMA-BLOC
SH 1 OF 1



RANGE [mV]	FS [mV]	OFFSET 10v = 600 mV				HII 400 input /56Ω				HII 400 output /37.5 Ω				/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 frequeny:	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

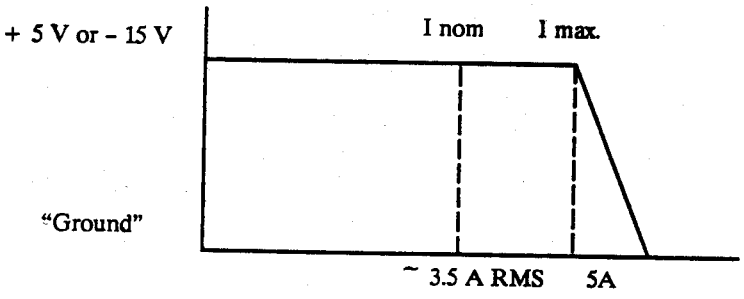
Output ripple and noise: +15 V and -15 V: max. 100 mV_{pp} (100 MHz)

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

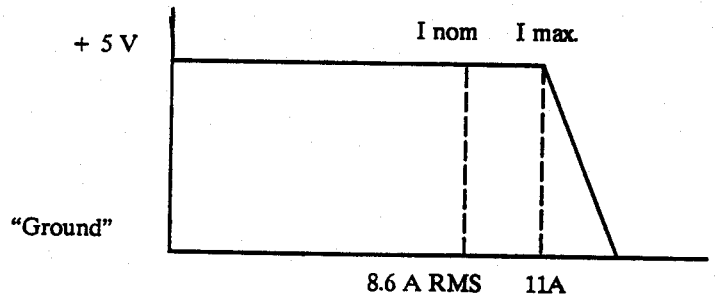
50 Hz output ripple: max. 5 mV

Maximum output current:

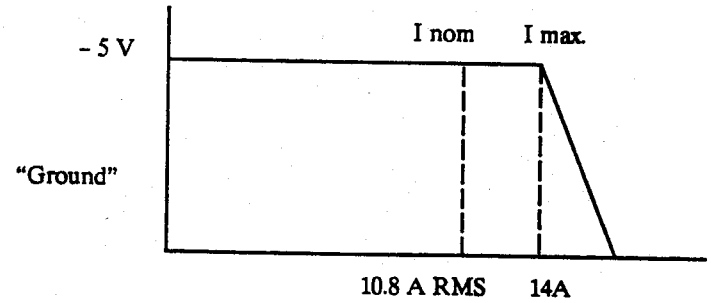
+ 15 V and - 15 V: I max. = $5\ A^{-0}_{+1}$



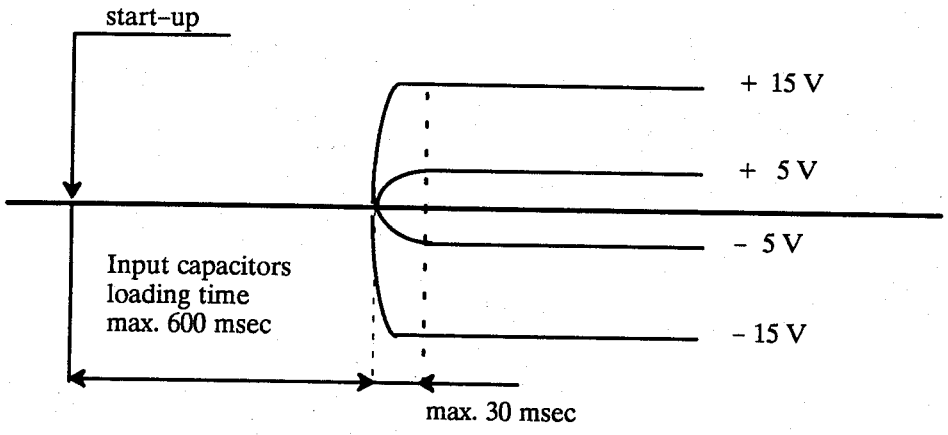
+ 5 V : I max. = $11\ A^{-0}_{+2}$



+ 5 V : I max. = $14\ A^{-0}_{+2}$

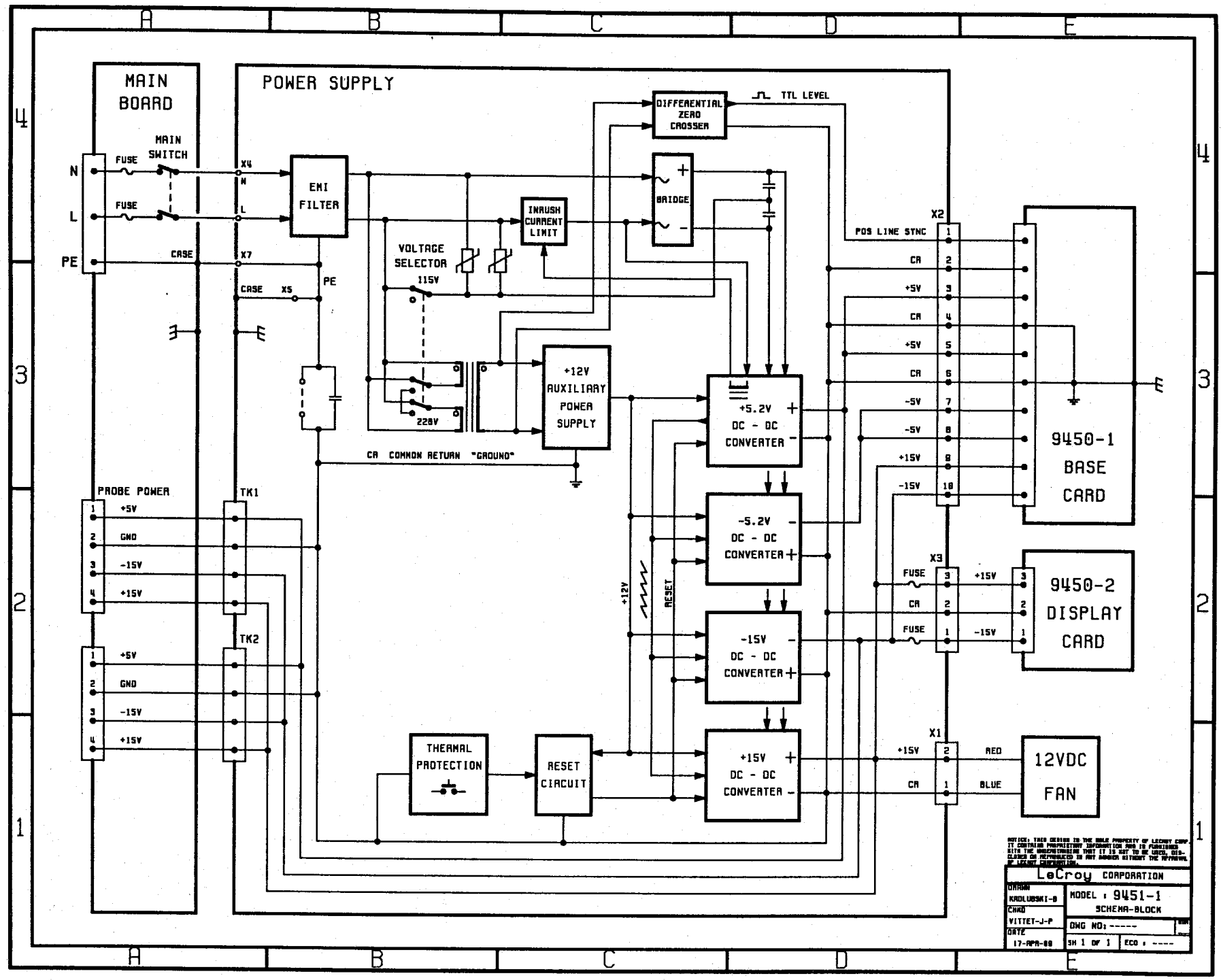


Max. output current adjustment:	min. ±20%
Soft-start:	input 90 V_{AC}, 45 Hz: outputs $I_{nominal}$



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 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



LeCroy CORPORATION

DRAWN KADLUBOWSKI-B	MODEL : 9451-1 SCHEMA-BLOCK
CHKD VITTET-J-P	DWG NO: ------
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 MΩ 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 MΩ DC
- Input gain 50 mV/div
- Trigger:

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

- Time/div = 10, 20, 50, 100 µsec/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 µsec/div
- BWL OFF

Switch between 50 Ω DC and GND, and 1 MΩ 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 MΩ DC with any time base and gain.
Check with an ohmmeter:

- input impedance must be 1 MΩ ± 2%

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

- input impedance must be 50 Ω ± 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 µsec/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.

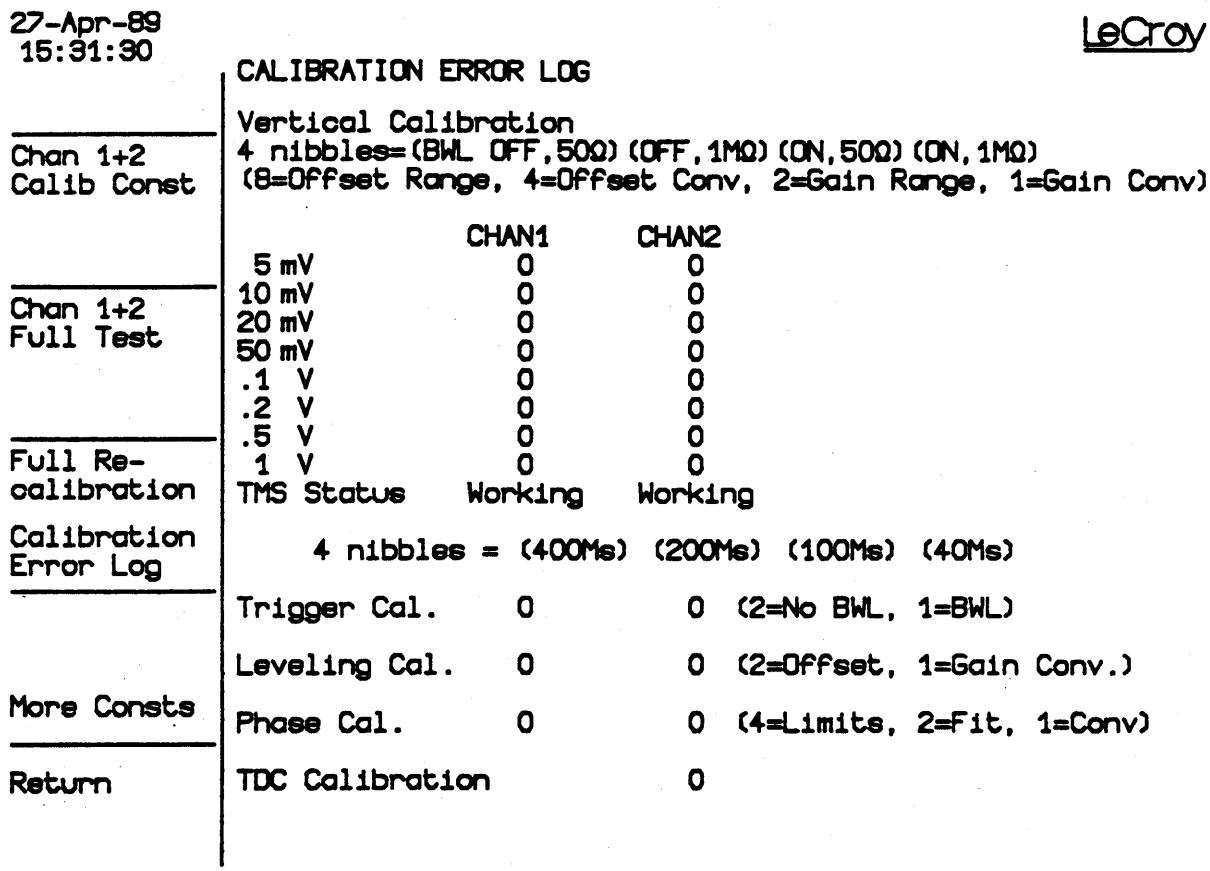


Figure 1: Calibration Error Log

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 MΩ, BWL ON and OFF

Code 4c6d: Offset conv. problem on all 4 coupling conditions
Offset range problem at 1 MΩ BWL ON and OFF
Gain range problem at 50 Ω BWL ON
Gain conv. problem at 1 MΩ 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
µsec/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 1s 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, 50/1MΩ 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 µsec/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.

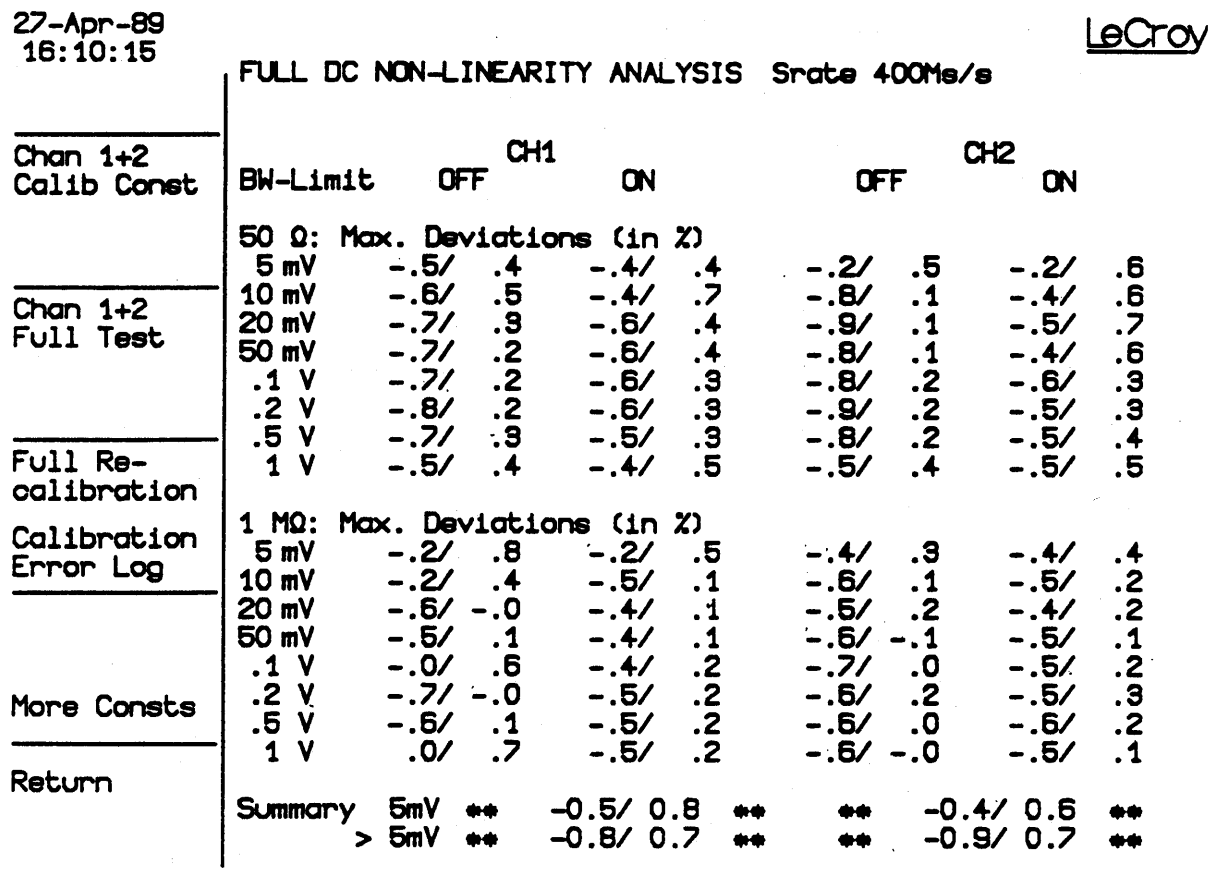


Figure 2: CH 1+2 Linearity Analysis

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.

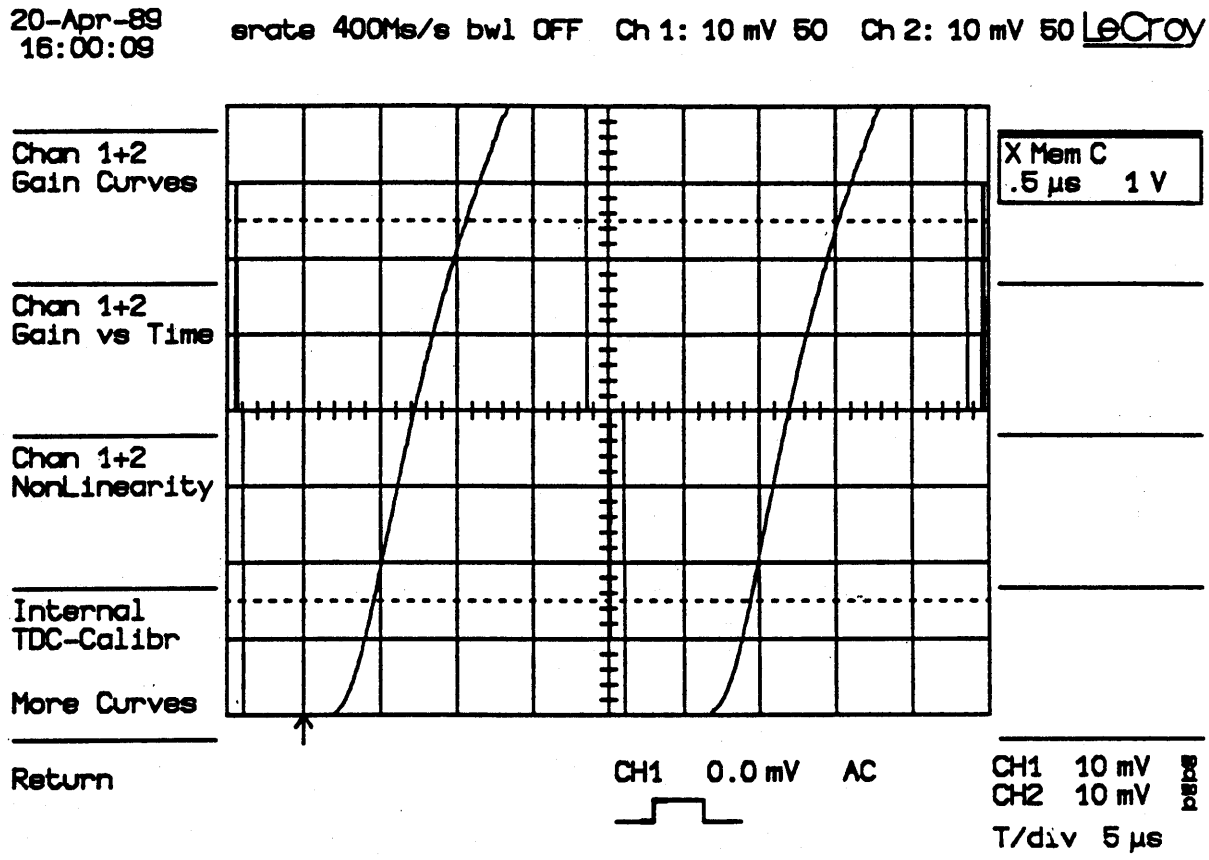


Figure 3: CH 1+2 Gain Curves

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 ± 3%, see Figure 4.

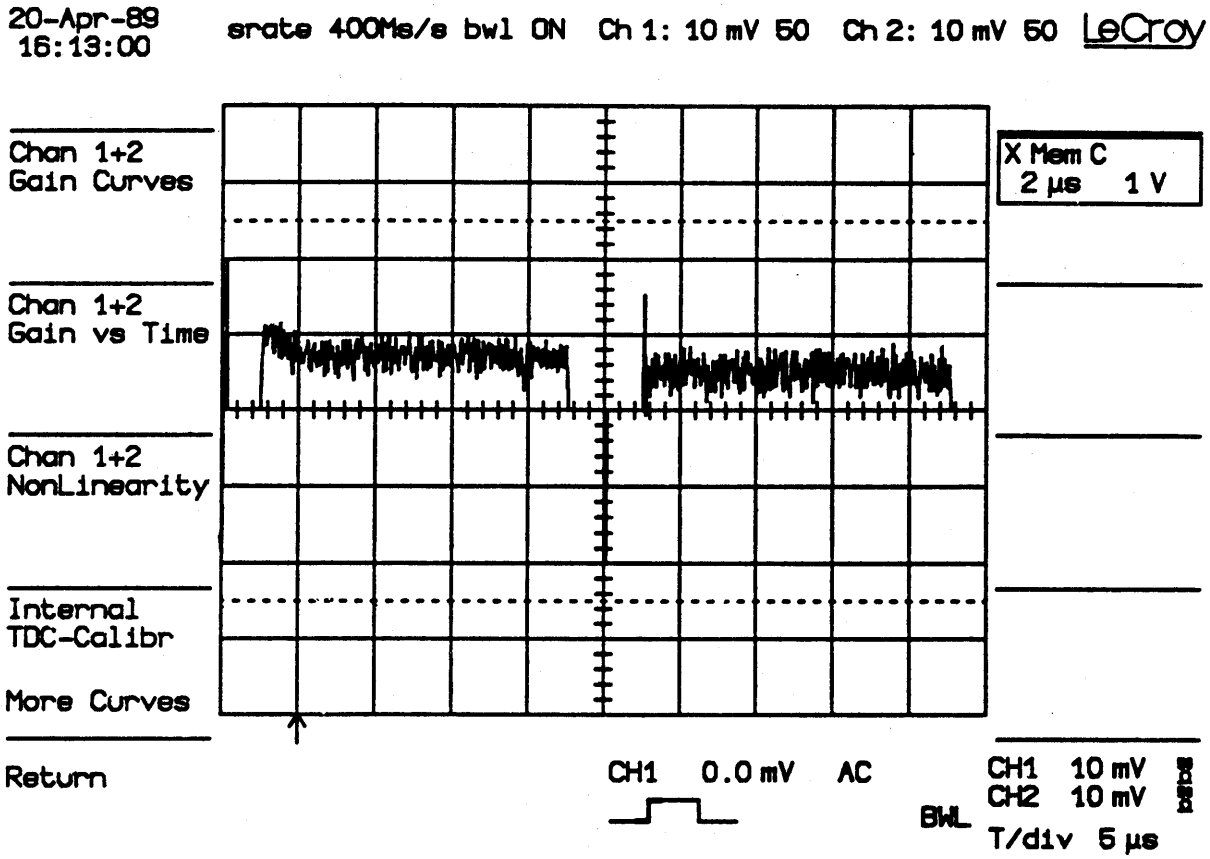


Figure 4: CH 1+2 Gain vs Time

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 µsec/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 ± 20%

9 Bandwidth at 1 MΩ 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 MΩ 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 MΩ /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 MΩ AC
- Gain:	.1 V/div
- Var:	Gain 1
- Offset:	zero

Set the time base:

- Time/div	.5 µsec/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 MHz ± 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 MΩ, 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 MΩ, 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

Set input CH1:

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

Set the time base:

- Time/div	5 nsec/div
- Interleaved ON	

Check:

- The scope must keep triggering in a stable way (i.e., a smooth 250 MHz sine wave must be visible on the display).

12 Smart/Complex Trigger

12.1 Trigger on Pulse 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:	PULSE 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:	20 nsec/div
- Interleaved:	ON

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 time base:

- Time/div 5 nsec/div
- Interleaved ON

Apply sine wave signal 3 V p-p of 100 MHz to CH1. Turn to INTERVAL Width > and adjust width to 25 nsec.

Check:

- 100 MHz: Width > 25 nsec, scope should NOT trigger

- 44 MHz: Width > 25 nsec, scope should NOT trigger

- 37 MHz: Width > 25 nsec, scope should trigger

Set the frequency to 40 MHz and INTERVAL Width to > 27.5 nsec.

Check:

- 40 MHz: Width > 27.5 nsec, scope should NOT trigger

- 33 MHz: Width > 27.5 nsec, scope should trigger

Repeat the above test for CH2.

13 Time Base Accuracy

In order to verify the time base, use a sine wave generator of 1 MHz with a frequency accuracy of better than 10 ppm (for example Marconi 2019A).

Set up the DSO:

Turn off all the traces except CH1.

Set the trigger:

- SMART (COMPLEX) Trigger OFF
- Source CH1
- Coupl DC
- Mode NORM
- Slope +
- Delay 0%
- Level 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 µsec/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 µsec/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.

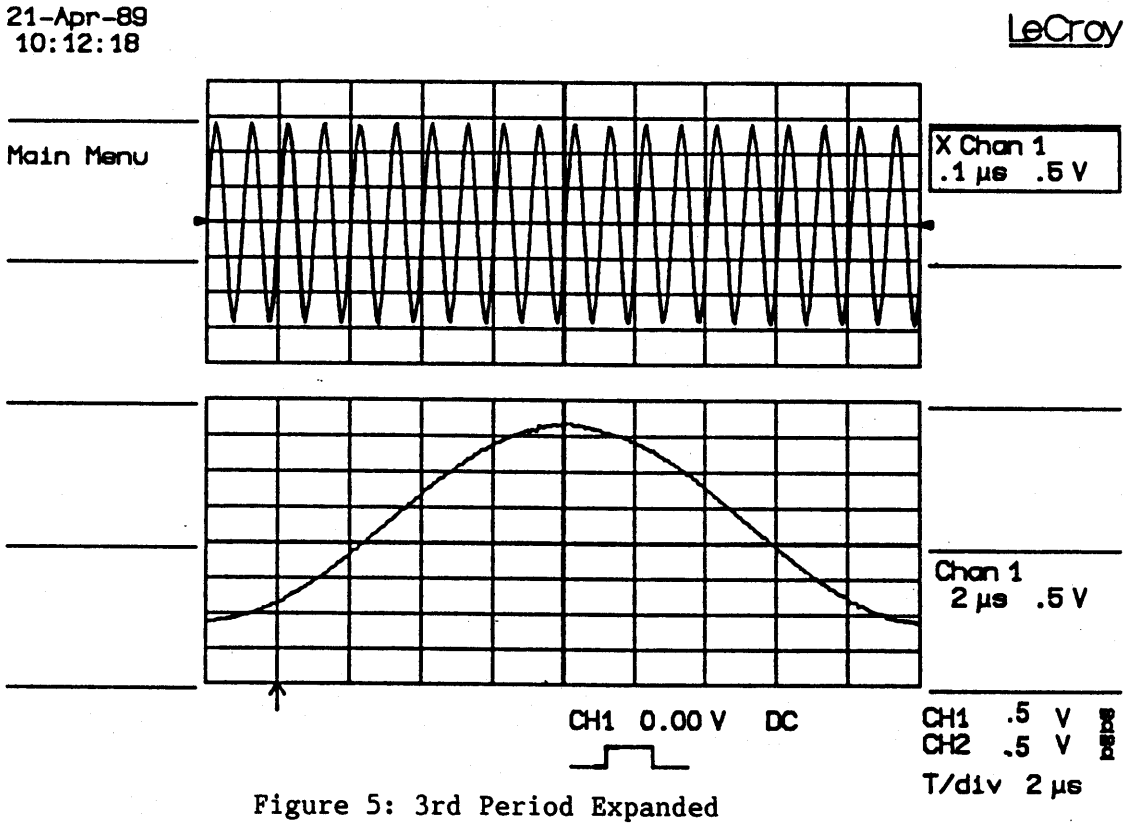


Figure 5: 3rd Period Expanded

Turn ON EXPAND B with CH1 as the source.

Adjust TIME MAGNIFIER to .1 µsec/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.

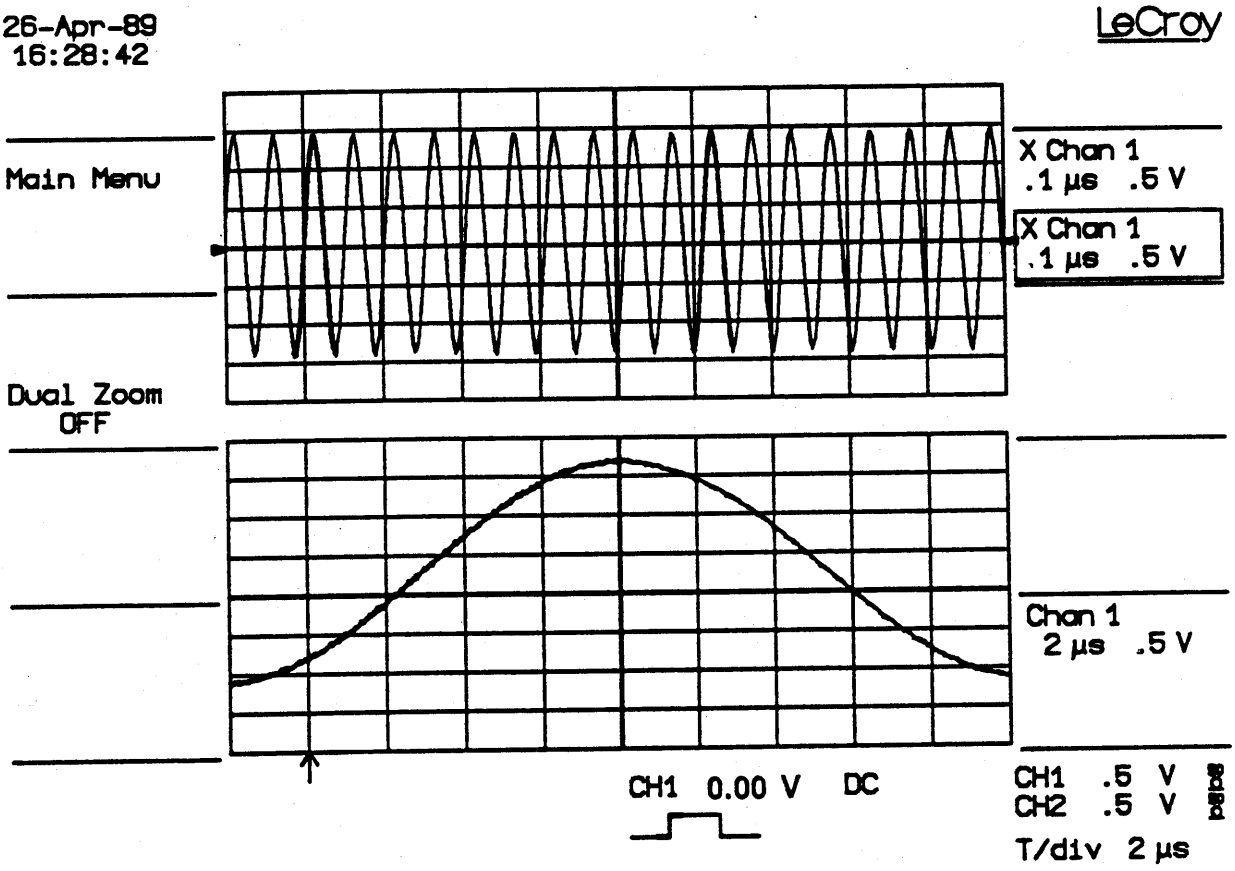


Figure 6: 3rd and 13th period overlaid

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.

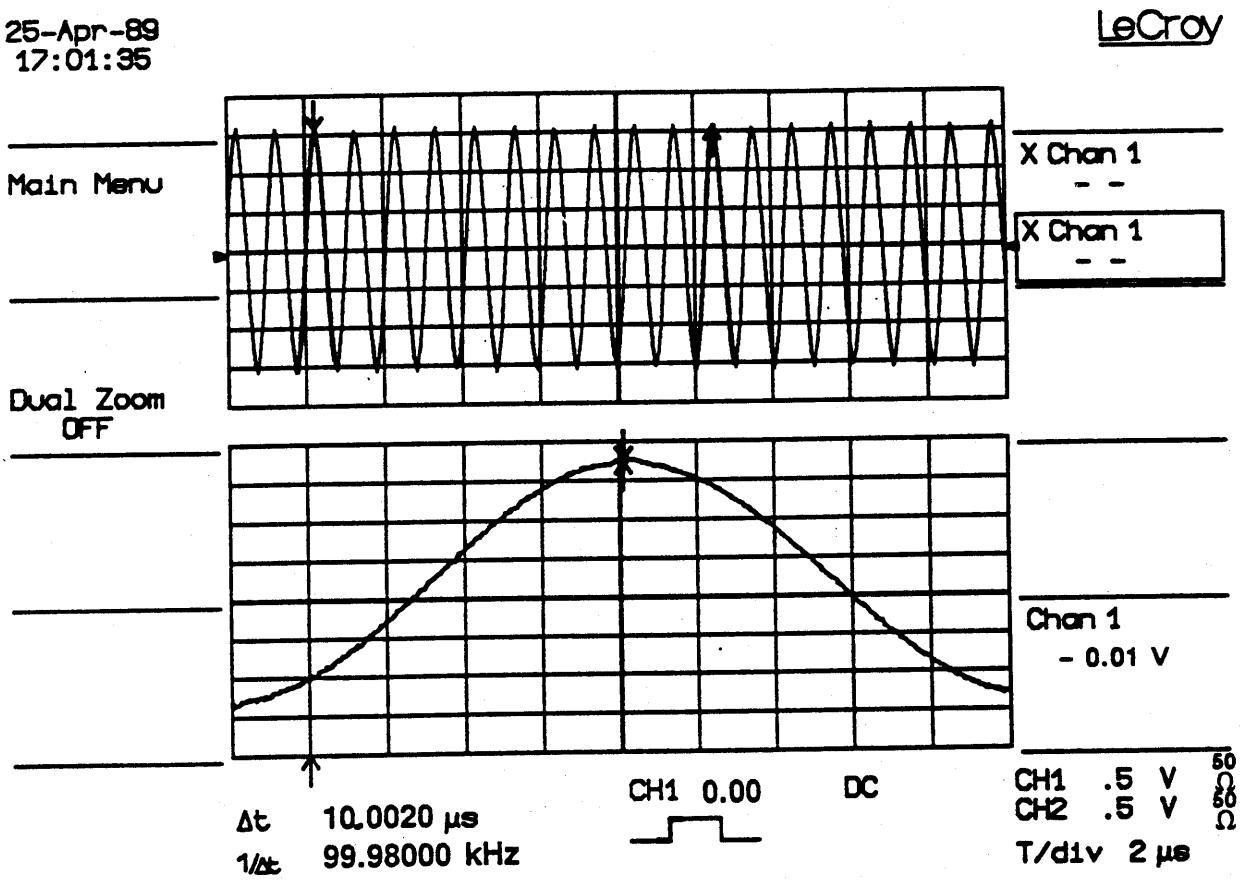


Figure 7: Aligned cursors

Turn DUAL ZOOM ON.

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

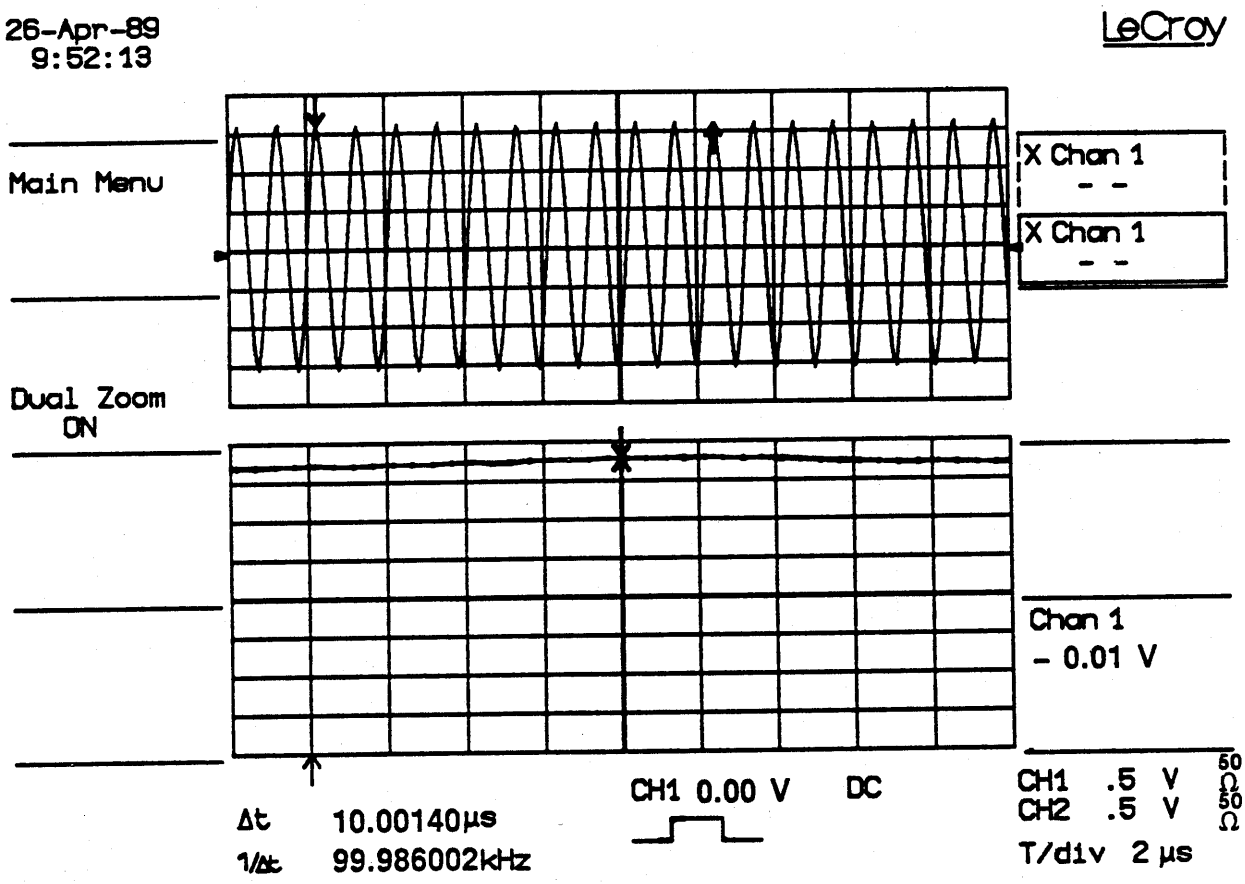


Figure 8: Alignment of cursors with maximum expansion.

Check:

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

RH/10.11.89

SERVICE INFORMATION

AND

PROCEDURES

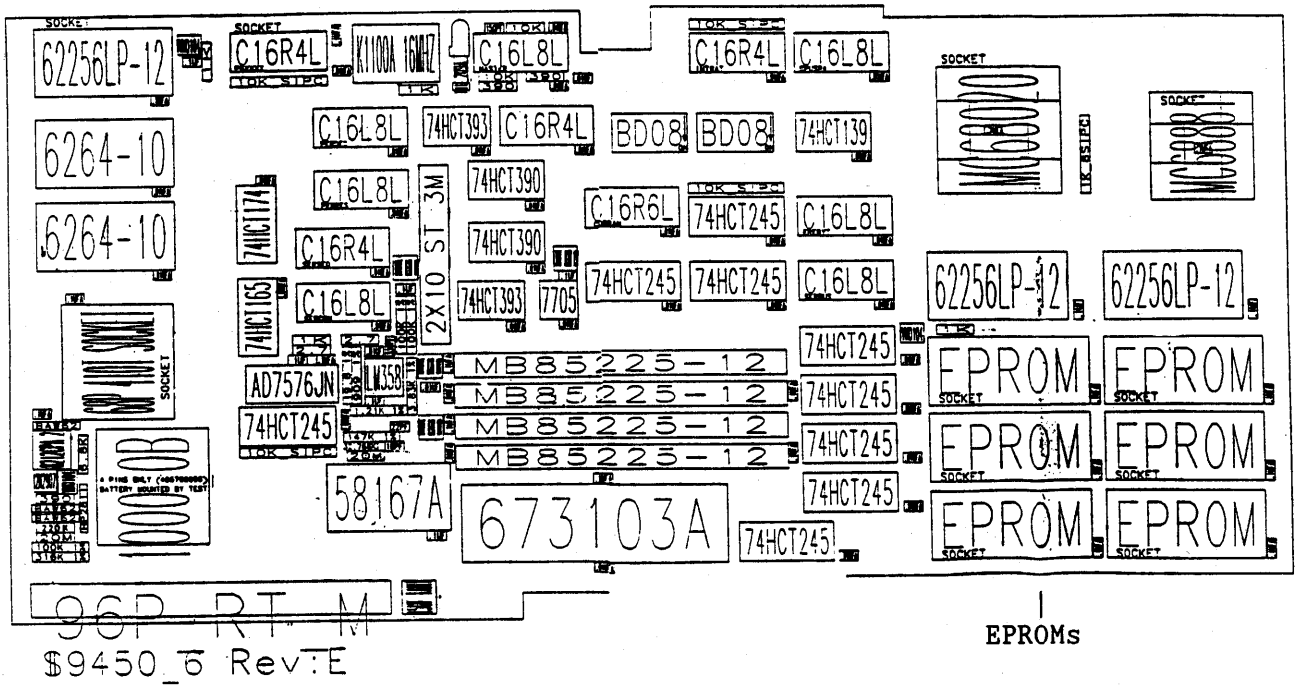
SOFTWARE UPGRADE PROCEDURE
or 9420-6

1. Remove the 9450-6 processor board from the oscilloscope.

2. Replace EPROMs at location A1 to A6 with the latest version. Make sure that the guiding notch in the chip is aligned with the PCB.

3. Insert the Software Option Selection PAL into location A45. Make sure that the guiding notch is correctly aligned.

4. Reassemble scope and check that it boots up properly.



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).

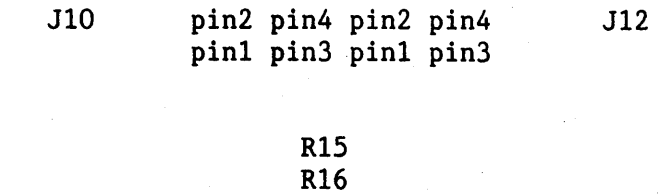
- Apply 7.0 V to CH1. Adjust potentiometer such that the overload trips within 5 to 20 seconds. Between each test, allow the thermocouple to cool to ambient temperature. Make sure it does not come on by itself after power on. It should not come on with a voltge of 5.0 V applied to the input.

- 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:



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%.

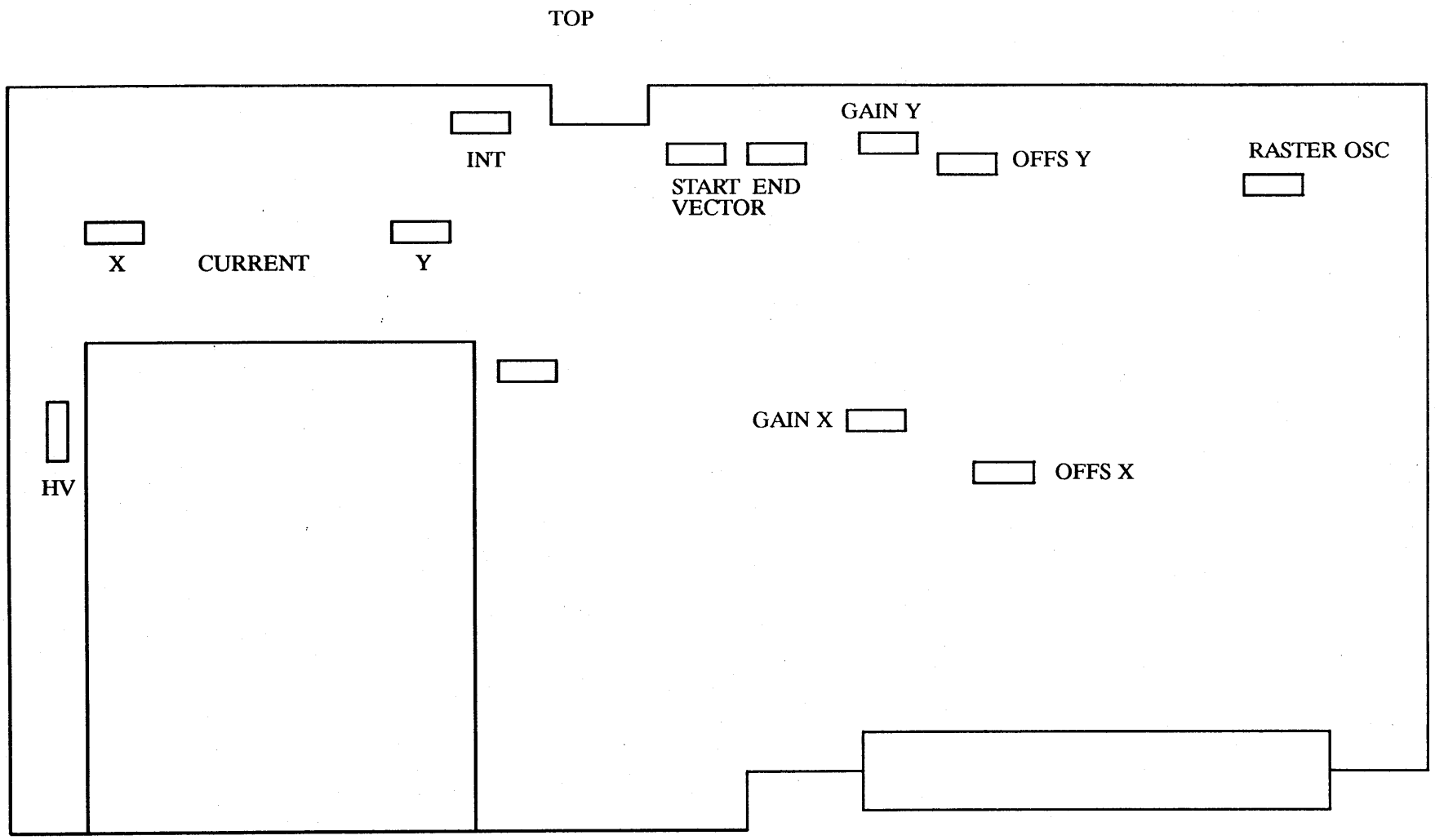
2) Apply 1 kHz sine wave 120 mV peak-to-peak with zero offset to CH1 through EXT.

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 usc/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:

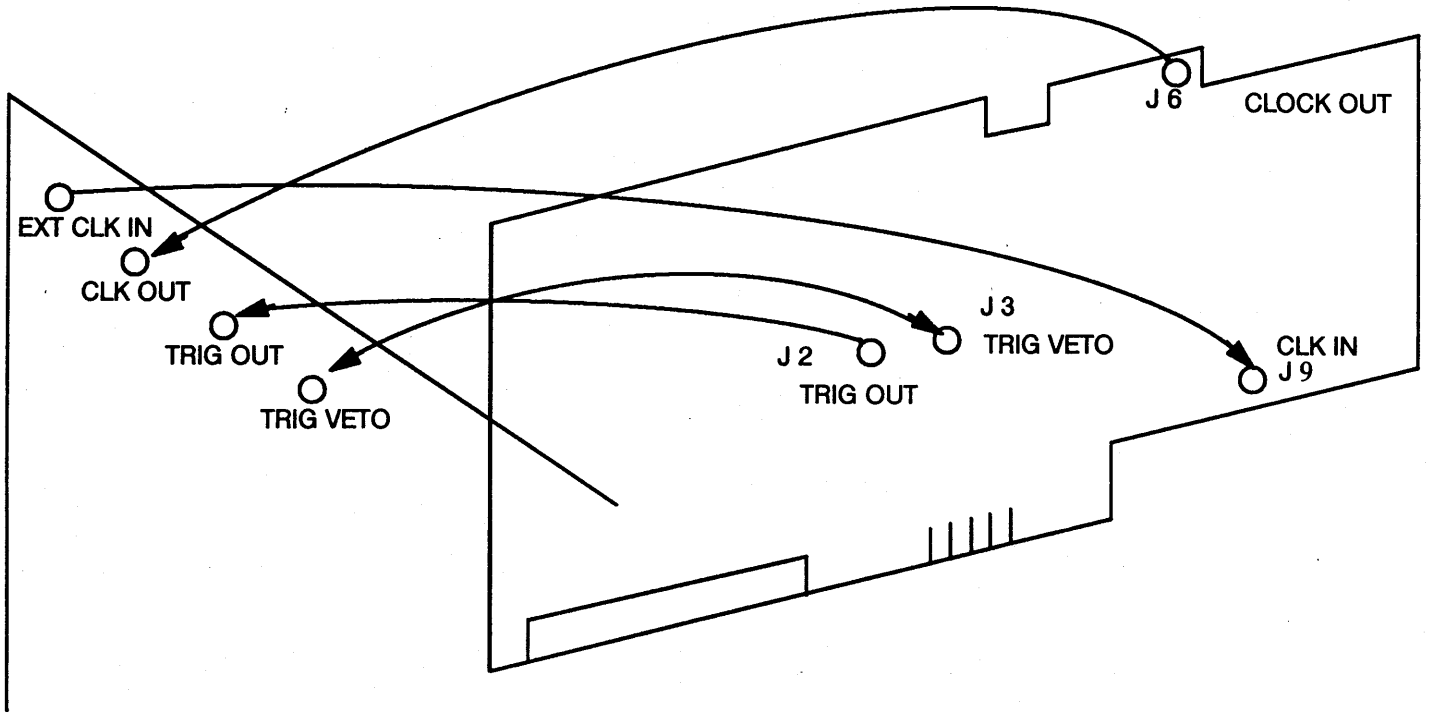
a. Set time base to 10 usec/div. Set TRIG to EXT. Apply a 10 KHz 3 V peak-to-peak square wave from a TFG-8101/FG-422 or equivalent signal generator to EXT. Probe HHZ406 output at pin 6 with an adjusted probe and adjust the 3 capacitors on the HHZ406 to get a flat square wave without under/overshoot.

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.

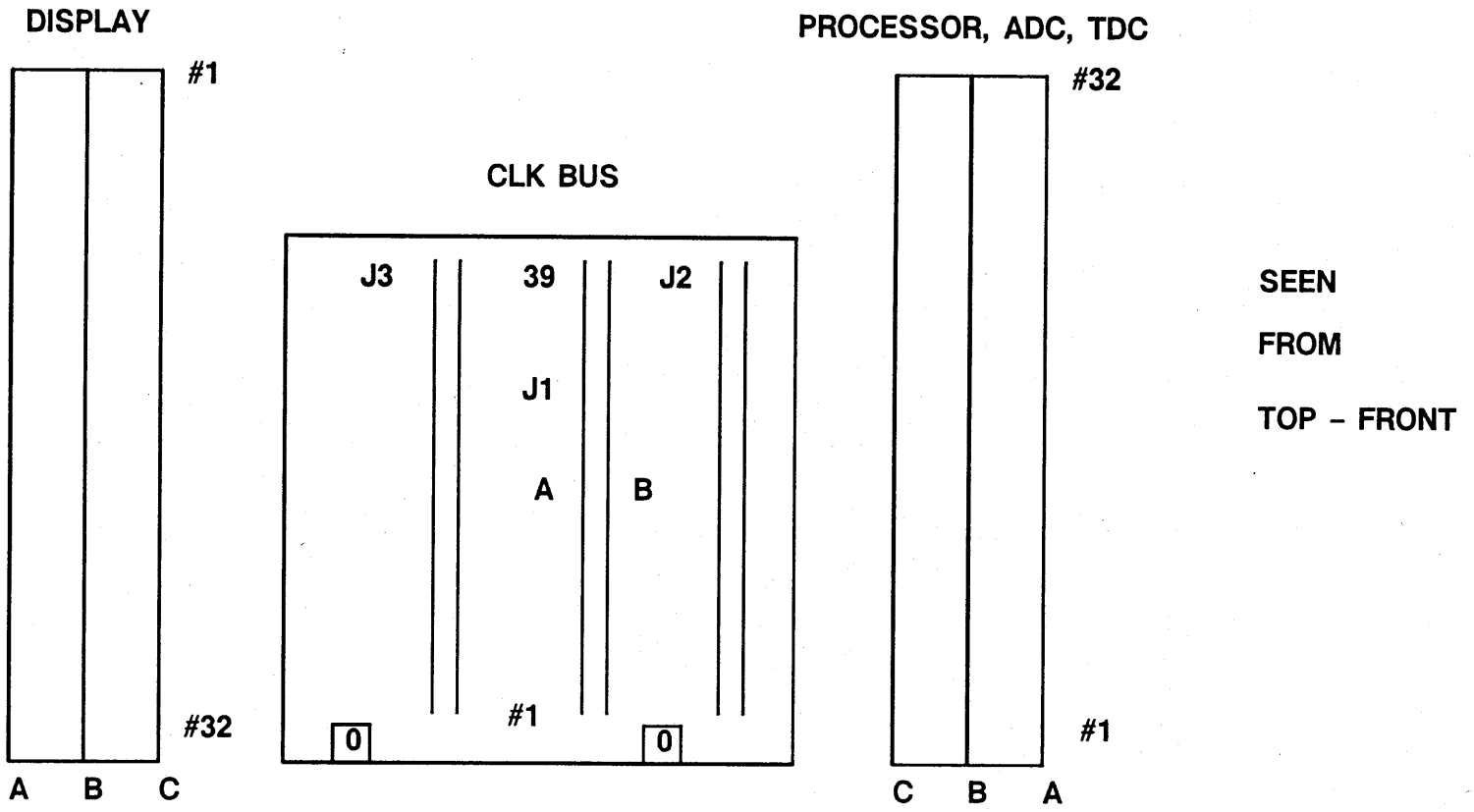


9450 - 2 POT LAYOUT

9450–4 CABLING DIAGRAM



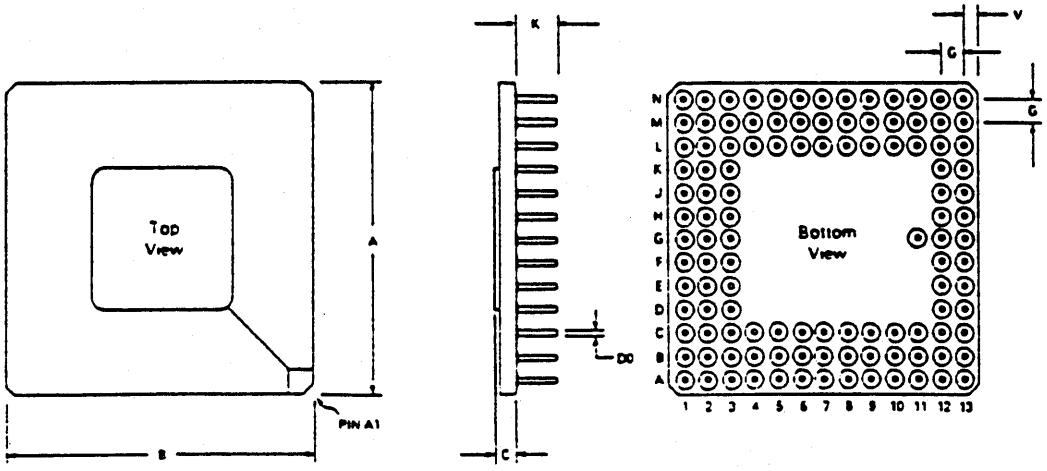
BOARD CONNECTOR PIN-OUT



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
D0	.46	.51	.017	.019
G	2.54 BSC		.100 BSC	
K	4.32	4.82	170	.190
V	1.74	2.28	.065	.095



11

Pin Number	Function
A1	$\overline{BGACK}$
A2	A1
A3	A31
A4	A28
A5	A26
A6	A23
A7	A22
A8	A19
A9	V_{CC}
A10	GND
A11	A14
A12	A11
A13	A8
B1	GND
B2	$\overline{BG}$
B3	$\overline{BR}$
B4	A30
B5	A27
B6	A24
B7	A20
B8	A18
B9	GND
B10	A15
B11	A13
B12	A10
B13	A6
C1	$\overline{RESET}$
C2	CLOCK
C3	GND
C4	A0
C5	A29
C6	A25
C7	A21
C8	A17
C9	A16
C10	A12
C11	A9
C12	A7
C13	A5

Pin Number	Function
D1	V_{CC}
D2	V_{CC}
D3	V_{CC}
D4-D11	–
D12	A4
D13	A3
E1	FC0
E2	$\overline{RMC}$
E3	V_{CC}
E12	A2
E13	$\overline{OCS}$
F1	SIZ0
F2	FC2
F3	FC1
F12	GND
F13	$\overline{IPEND}$
G1	$\overline{ECS}$
G2	SIZ1
G3	$\overline{DBEN}$
G11	V_{CC}
G12	GND
G13	V_{CC}
H1	$\overline{CDIS}$
H2	$\overline{AVEC}$
H3	$\overline{DSACK0}$
H12	IPL2
H13	GND
J1	$\overline{DSACK1}$
J2	$\overline{BERR}$
J3	GND
J12	$\overline{IPL0}$
J13	$\overline{IPL1}$

Pin Number	Function
K1	GND
K2	$\overline{HALT}$
K3	GND
K12	D1
K13	D0
L1	$\overline{AS}$
L2	R/$\overline{W}$
L3	D30
L4	D27
L5	D23
L6	D19
L7	GND
L8	D15
L9	D11
L10	D7
L11	GND
L12	D3
L13	D2
M1	$\overline{DS}$
M2	D29
M3	D26
M4	D24
M5	D21
M6	D18
M7	D16
M8	V_{CC}
M9	D13
M10	D10
M11	D6
M12	D5
M13	D4
N1	D31
N2	D28
N3	D25
N4	D22
N5	D20
N6	D17
N7	GND
N8	V_{CC}
N9	D14
N10	D12
N11	D9
N12	D8
N13	V_{CC}

The V_{CC} 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	V_{CC}	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

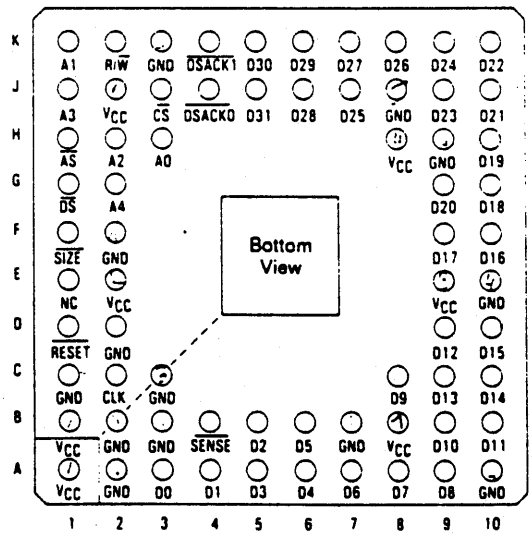
This section contains the pin assignments and package dimensions of the MC68881. In addition, detailed information is provided to be used as a guide when ordering.

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

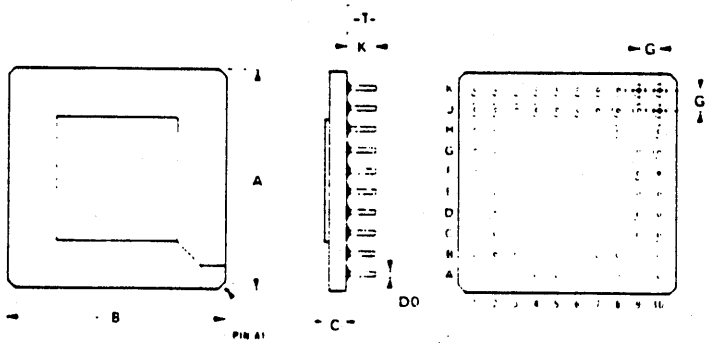
11.2 PIN ASSIGNMENTS

68-PIN GRID ARRAY



11.3 PACKAGE DIMENSIONS

RC SUFFIX
PIN GRID ARRAY
CASE 765A-03



NOTES
1. DIMENSIONS A AND B ARE DATUMS AND T IS DATUM SURFACE
2. POSITIONAL TOLERANCE FOR LEADS (66 PLACES)
3. DIMENSION D0 AND TOLERANCING PER ANSI Y14.5M, 1982.
4. CONTROLLING DIMENSION: INCH.

DIM	MILLIMETERS MIN	MAX	INCHES MIN	MAX
A	26.67	27.17	1.050	1.070
B	26.67	27.17	1.050	1.070
C	1.91	2.66	0.075	0.105
D	0.43	0.56	0.017	0.022
G	2.54 BSC		0.100 BSC	
R	4.31	5.82	0.170	0.229

11

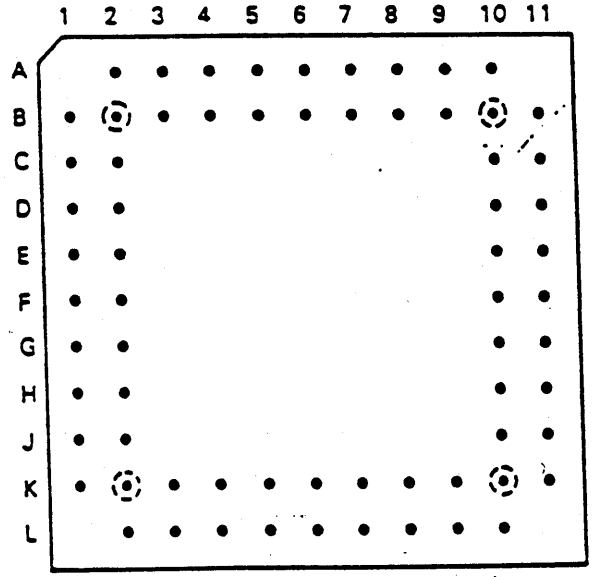
MARCH 1985—REVISED MAY 1986

- 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	V_{CC}	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	V_{CC}	E11	DX	K7	A10
B1	V_{SS}	F1	D0	K8	A12
B2	D7	F2	$\overline{SYNC}$	K9	A14
B3	D9	F10	FSX	K10	$\overline{DS}$
B4	D11	F11	X2/CLKIN	K11	V_{SS}
B5	D13	G1	$\overline{INT0}$	L2	V_{SS}
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	V_{CC}
B10	V_{CC}	H2	V_{CC}	L7	A9
B11	$\overline{IACK}$	H10	$\overline{STRB}$	L8	A11
C1	D6	H11	R/$\overline{W}$	L9	A13
C2	D5	J1	DR	L10	A15
C10	$\overline{MSC}$	J2	FSR		

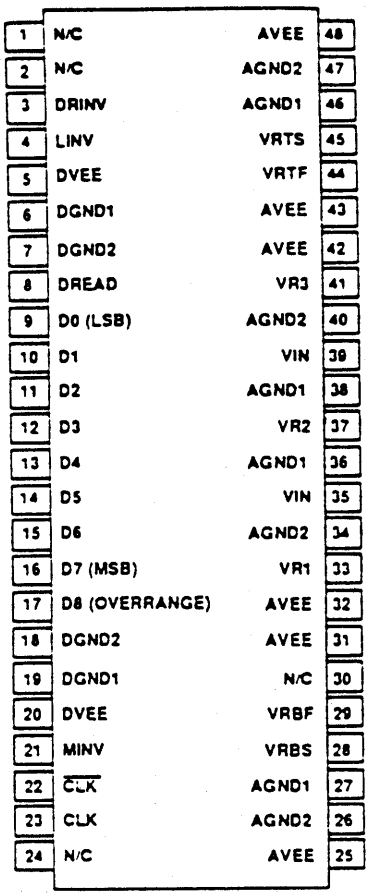
68-PIN GB
PIN GRID ARRAY CERAMIC PACKAGE†
(TOP VIEW)



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

PIN ASSIGNMENT HADC77200

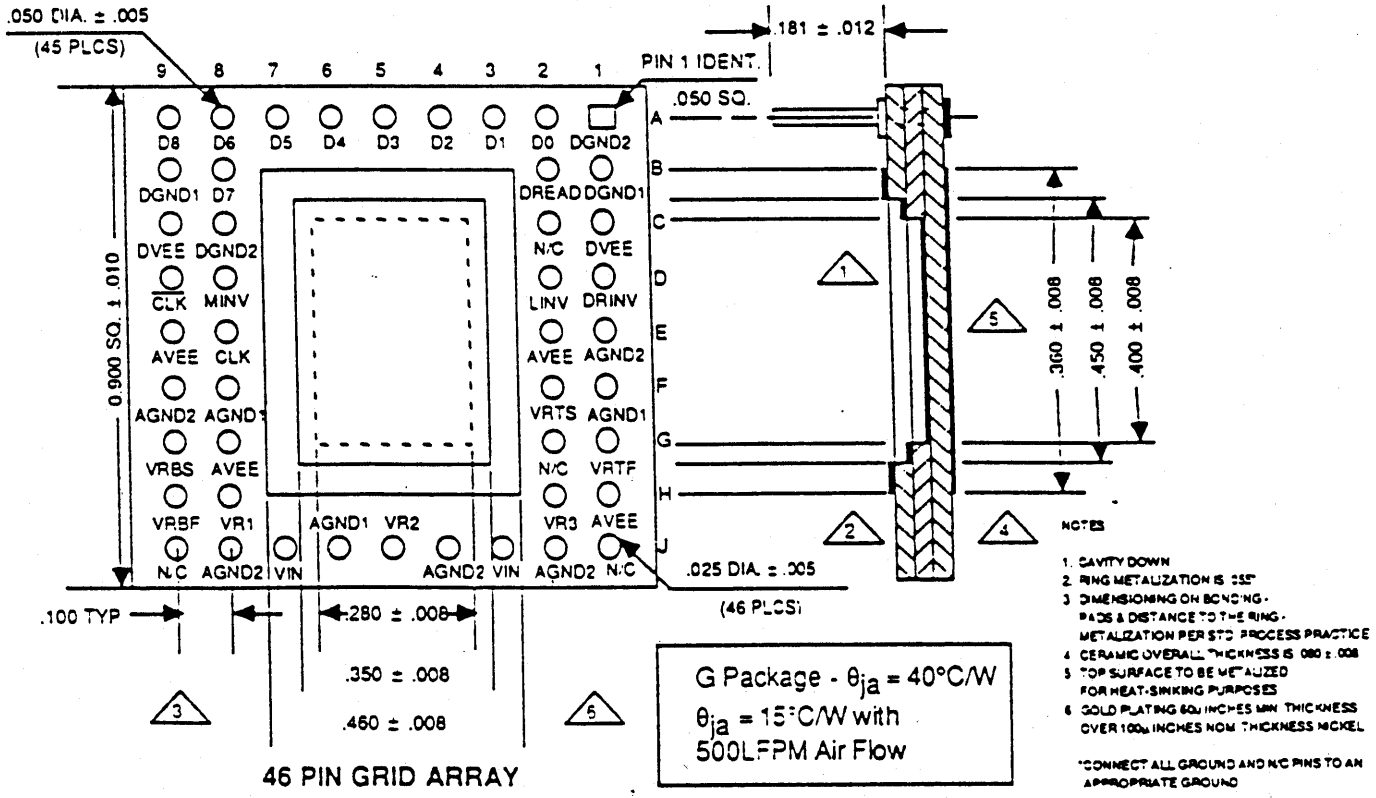
TOP VIEW



48 LEAD CERAMIC SIDEBRAZED DIP

NAME	FUNCTION
DRINV	Data Ready Inverse
LINV	D0 through D6 Output Inversion Control Pin
AVEE	Negative Analog Supply Nominally -5.2V
DVEE	Digital Analog Supply Nominally -5.2V
DGND1	Digital Ground 1
DGND2	Digital Ground 2
DREAD	Data Ready Output
DO	Digital Data Output Pin 1 (LSB)
D1_D6	Digital Data Output Pin 2 Through 6
D7	Digital Data Output Pin 7 (MSB)
D8	Overrange Output
MINV	D7 Output Inversion Control Pin

NAME	FUNCTION
$\overline{CLK}$	Inverse ECL Clock Input Pin
CLK	ECL Clock Input Pin
VRBS	Reference Voltage Bottom, Sense Nominally -2.0V
VRBF	Reference Voltage Bottom, Force Nominally -2.0V
VR1	Reference Voltage Tap 1
AGND1	Analog Ground 1
VIN	Analog Input , can be connected to the input signal or used as a Sense
AGND2	Analog Ground 2
VR2	Reference Voltage Tap 2
VIN	Analog Input , can be connected to the input signal or used as a Sense.
VR3	Reference Voltage Tap 3
VRTS	Reference Voltage Top, Sense Nominally 0V
VRTF	Reference Voltage Top, Force Nominally 0V



46 PIN GRID ARRAY

G Package - θ_{ja} = 40°C/W
θ_{ja} = 15°C/W with 500LFPM Air Flow

Honeywell Inc. SIGNAL PROCESSING TECHNOLOGIES 1150 E. Cheyenne Mountain Blvd. Colorado Springs, CO. U.S.A. 80906 (303) 577-1000 Telex 45 52 43 Easylink 62 32 51 48

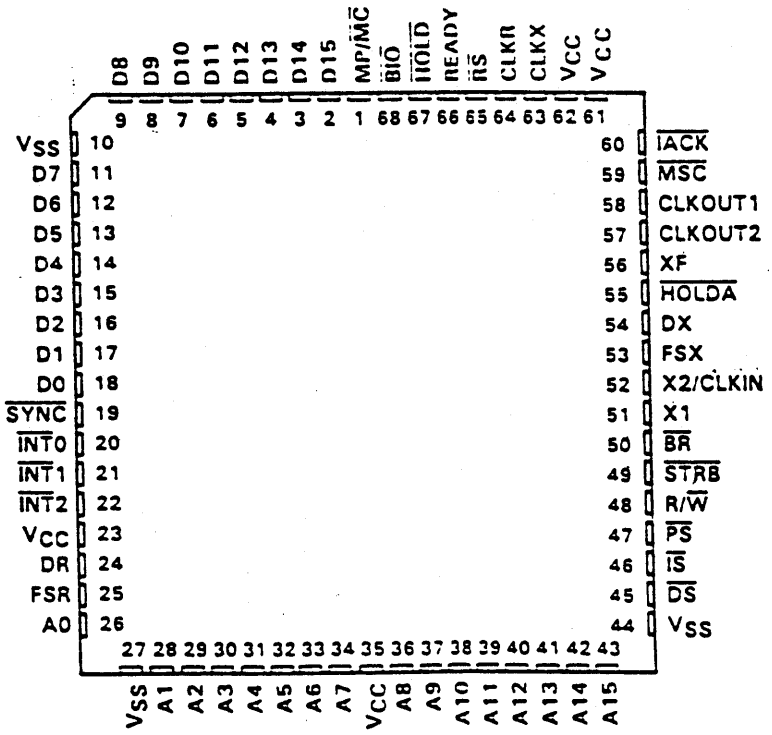
ADVANCE
INFORMATION

TMS320C25
DIGITAL SIGNAL PROCESSOR

MAY 1986

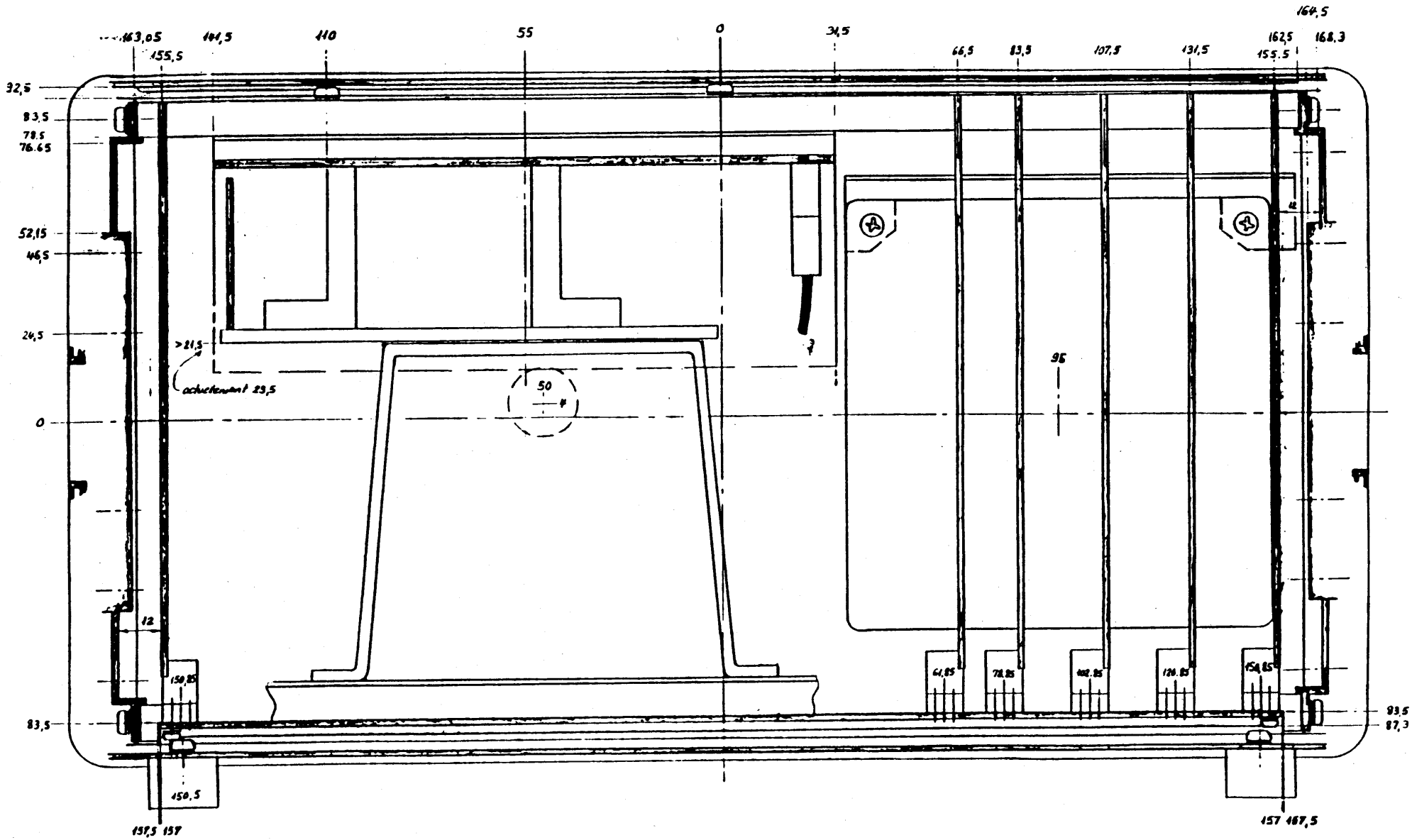
- 100-ns Instruction Cycle Time
- 544 Words of Programmable On-Chip Data RAM
- 4K Words of On-Chip Program ROM
- 128K Words of Data/Program Space
- Sixteen Input and Sixteen Output Channels
- 16-Bit Parallel Interface
- Directly Accessible External Data Memory Space
- Global Data Memory Interface
- 16-Bit 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
- Repeat Instructions for Efficient Use of Program Space
- Eight 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
- 1.8-μm CMOS Technology
- Single 5-V Supply
- On-Chip Clock Generator

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

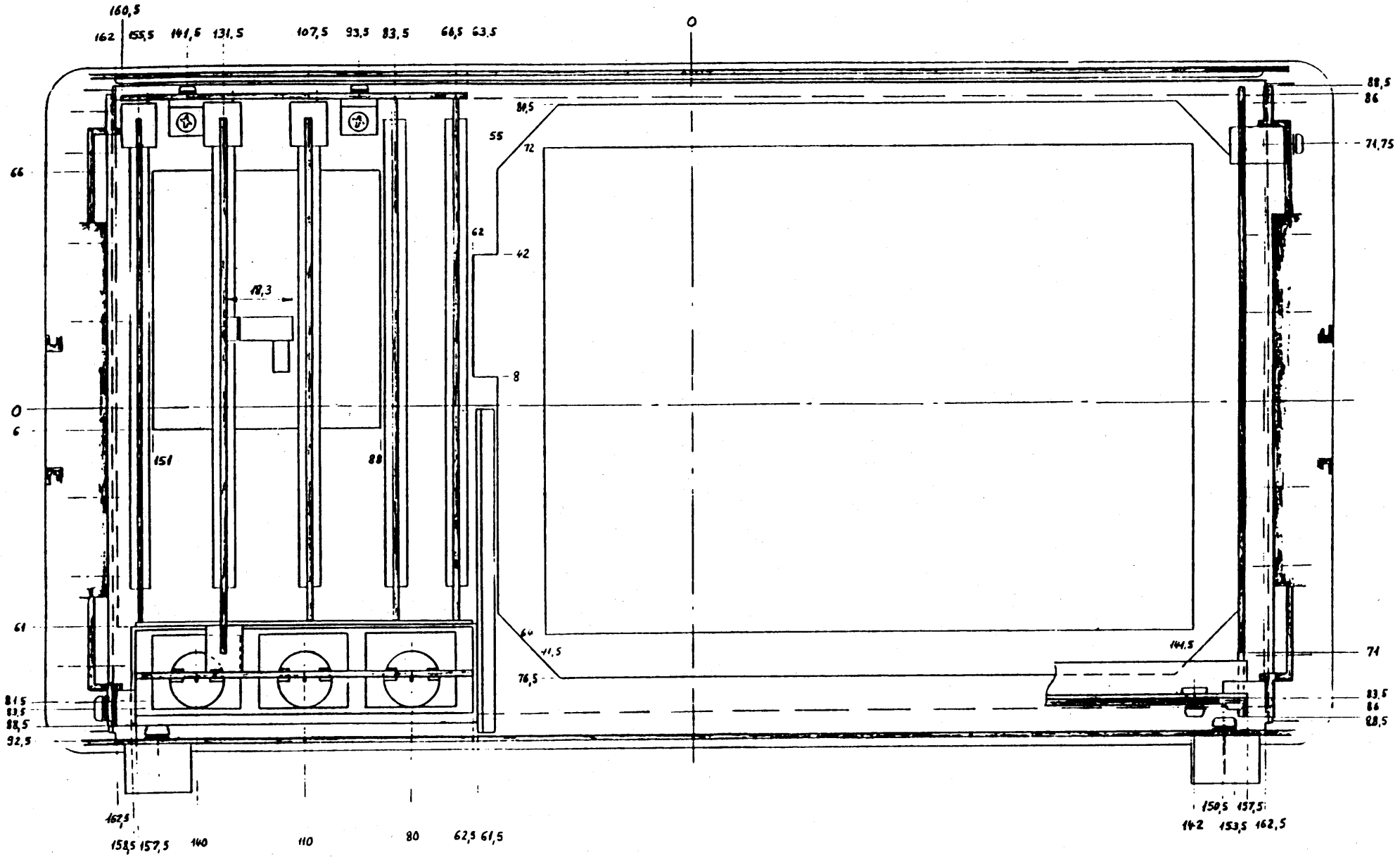


Section 5

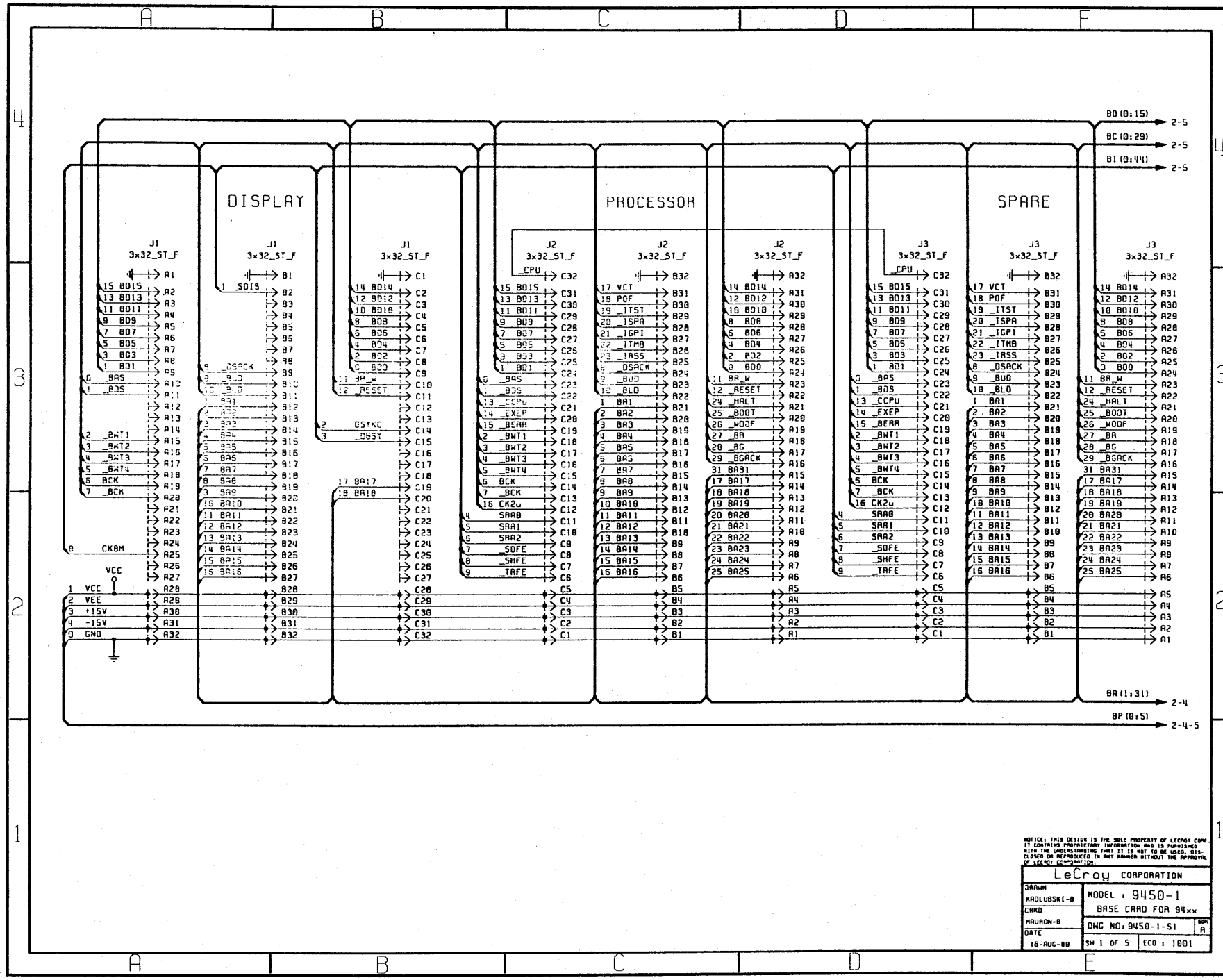
MECHANICAL DRAWINGS



DSO 9450 Corriga 21.1.88

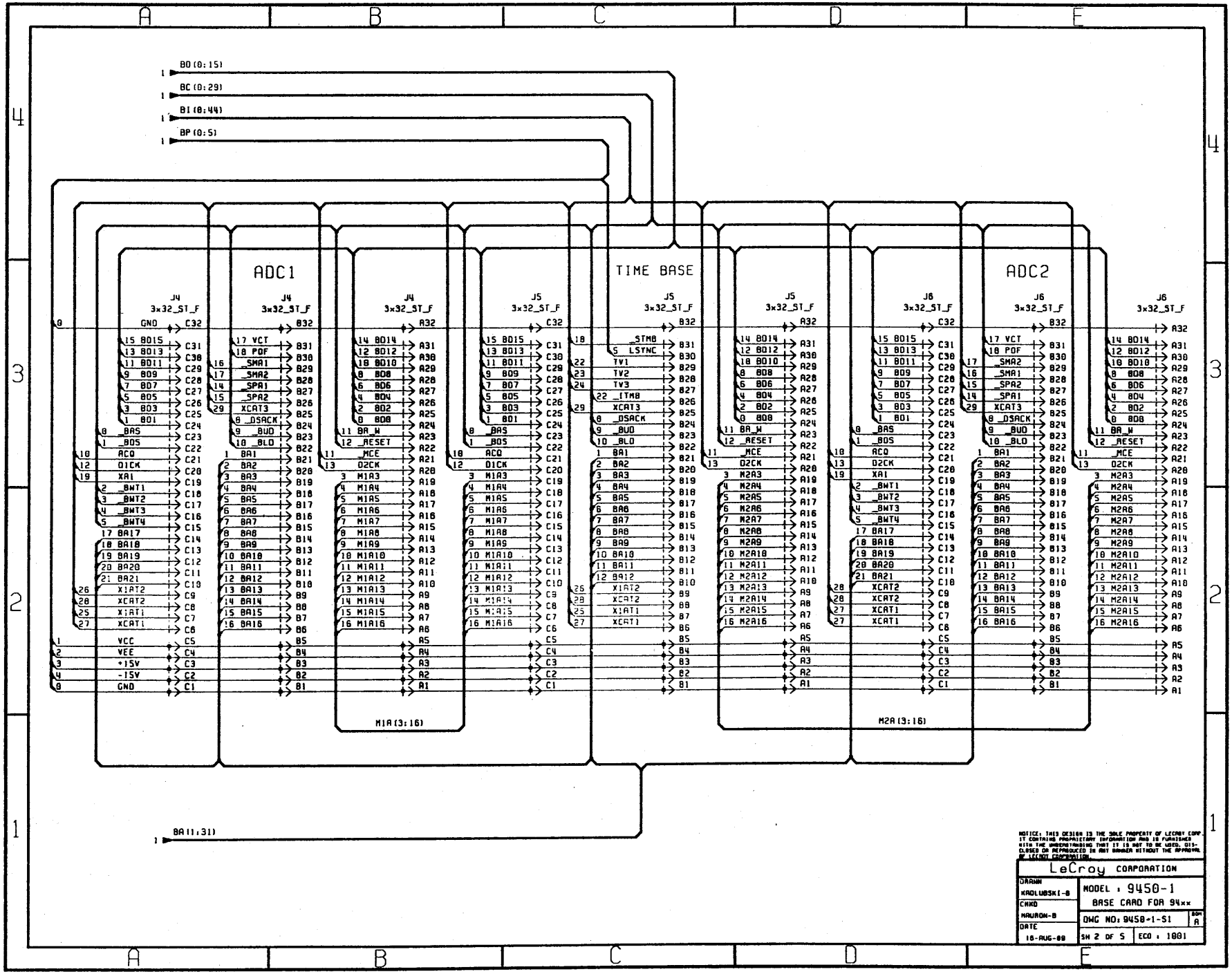


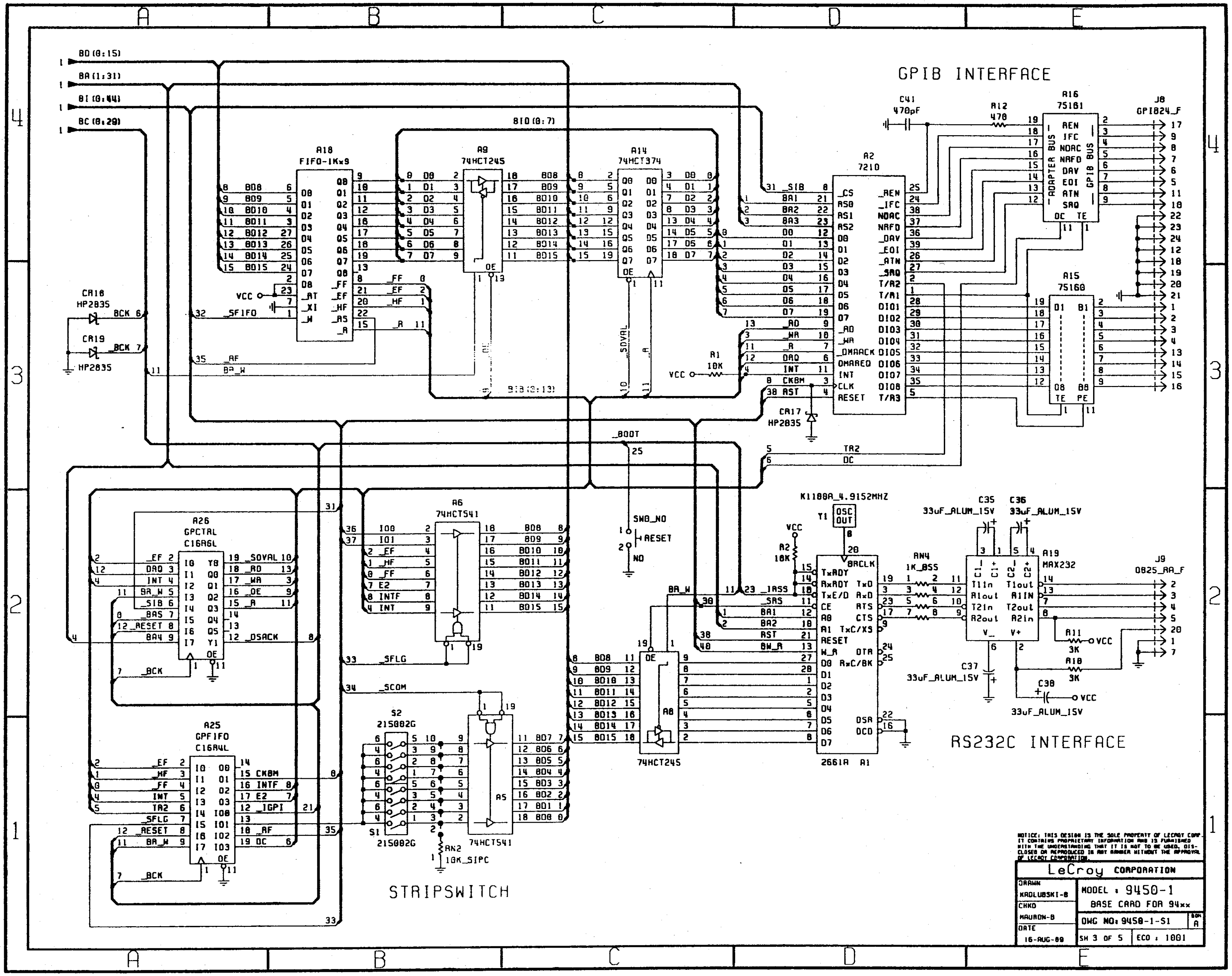
DSO 9450 Corrigé 15.1.88



LeCroy CORPORATION

DRAWN KADLUBSKI-B	MODEL : 9450-1
CHKD MAURON-B	BASE CARD FOR 94xx
DATE 16-AUG-89	DWG NO: 9450-1-S1 REV A
SH 1 OF 5	ECO : 1001


BD(0:15)
BC(0:29)
BI(0:44)
BP(0:5)
ADC1
TIME BASE
ADC2
J4
J5
J6
3x32_ST_F
M1A(3:16)
M2A(3:16)
BA(1:31)
LeCroy CORPORATION
MODEL : 9450-1
BASE CARD FOR 94xx
DWG NO: 9450-1-S1
SH 2 OF 5
ECO : 1001
DRAWN
KADLUBSKI-B
CHKD
MAURON-B
DATE
16-AUG-89


GPIB INTERFACE
RS232C INTERFACE
STRIPSWITCH
A18 FIFO-1Kx9
A9 74HCT245
A14 74HCT374
A2 7210
A16 75161
A15 75160
J8 GPI824_F
A26 GPCTRL C16R6L
A25 GPFIFO C16R4L
A6 74HCT541
A5 74HCT541
A8 74HCT245
A1 2661A
A19 MAX232
J9 DB25_RA_F
K1100A_4.9152MHZ
S2 215082G
S1 215082G
RN2 10K_SIPC
RN4 1K_BSS
CR18 HP2835
CR19 HP2835
CR17 HP2835
C41 470pF
R12 470
C35 33uF_ALUM_15V
C36 33uF_ALUM_15V
C37 33uF_ALUM_15V
C38 33uF_ALUM_15V
BD(0:15)
BA(1:31)
BI(0:44)
BC(0:29)
BID(0:7)
NOTICE: THIS DESIGN IS THE SOLE PROPERTY OF LECROY CORP. IT CONTAINS PROPRIETARY INFORMATION AND IS FURNISHED WITH THE UNDERSTANDING THAT IT IS NOT TO BE USED, DISCLOSED OR REPRODUCED IN ANY MANNER WITHOUT THE APPROVAL OF LECROY CORPORATION.
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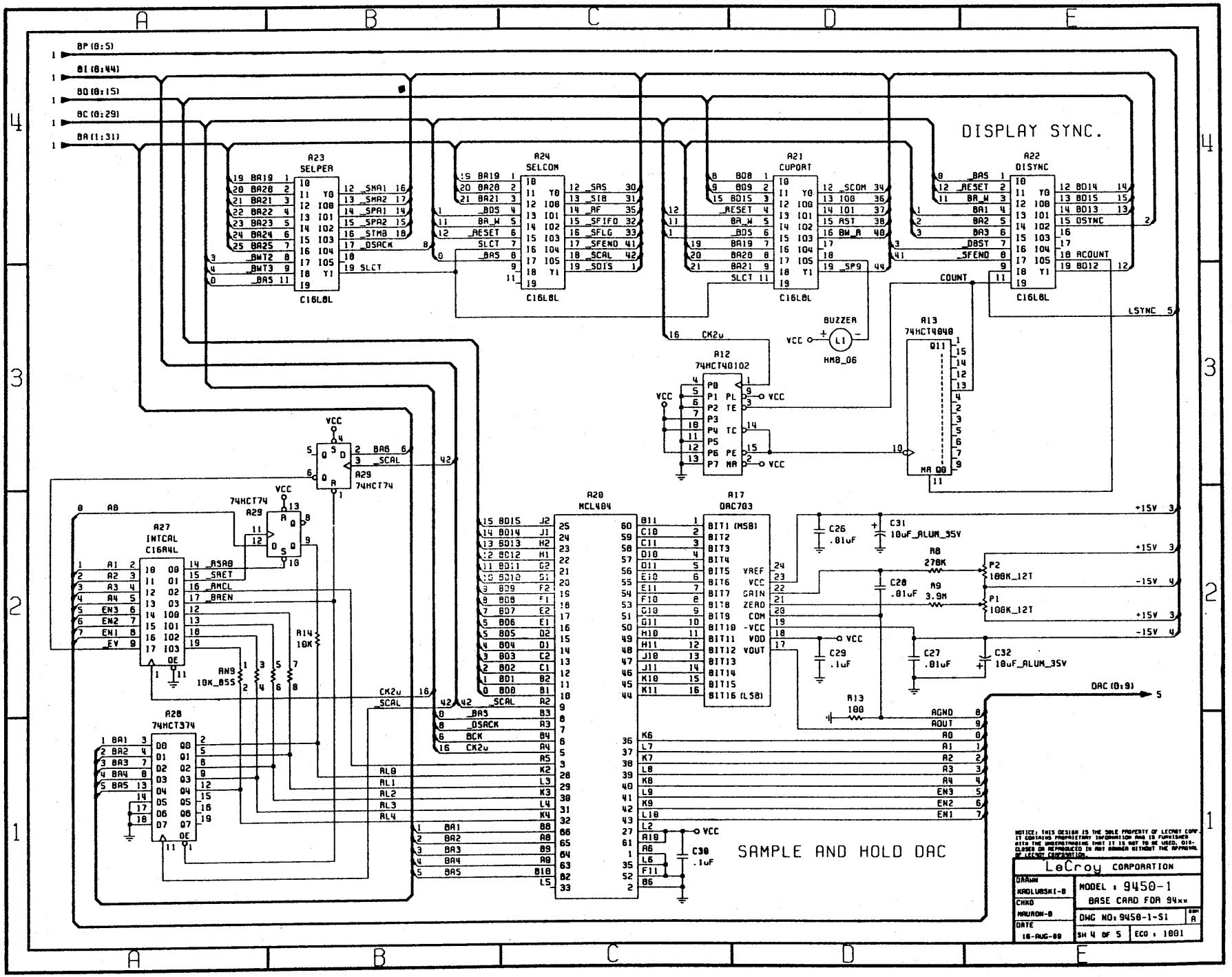
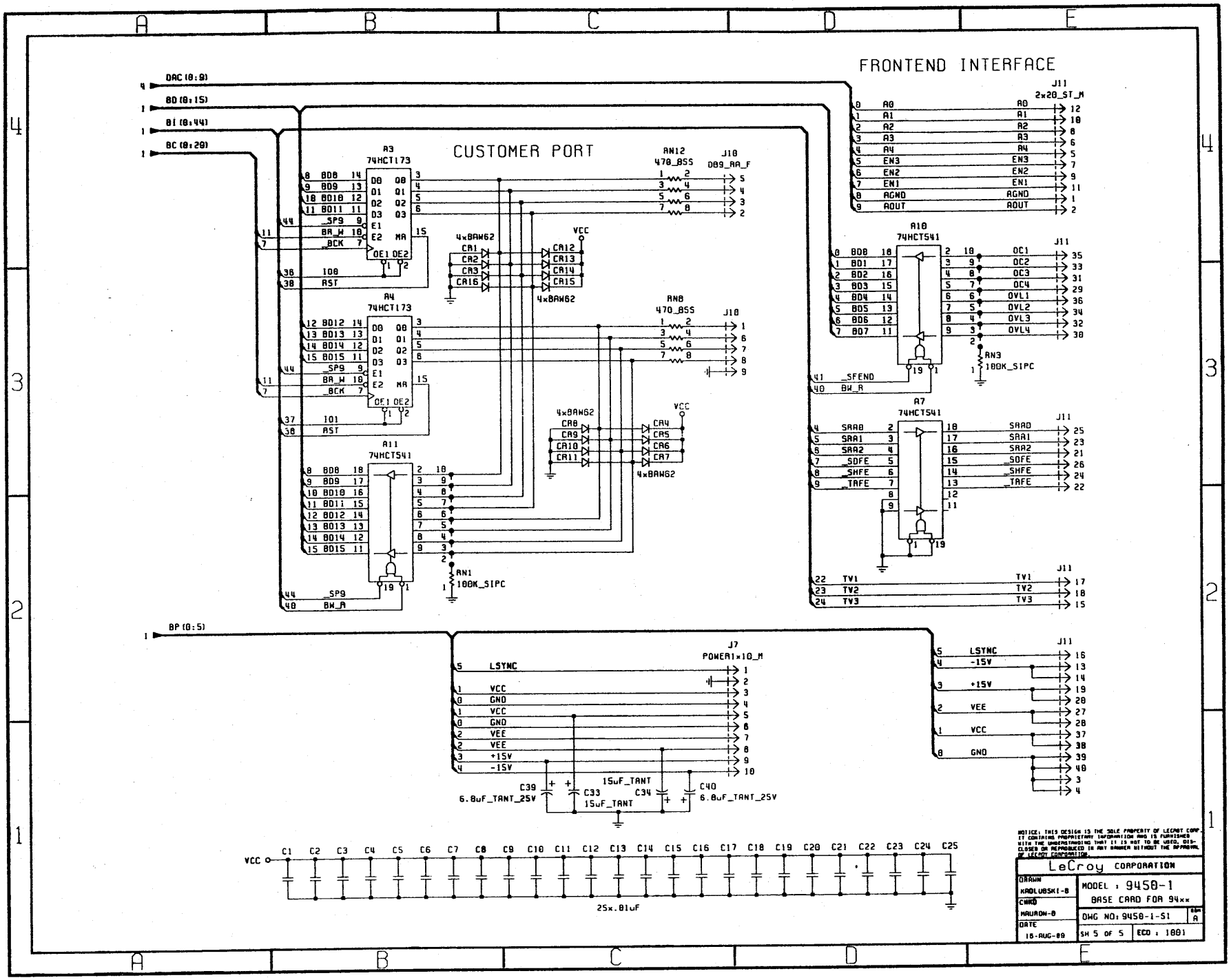
DRAWN KAOLUBSKI-B
CHKD MAURON-B
DATE 16-AUG-89
MODEL : 9450-1
BASE CARD FOR 94xx
DWG NO: 9450-1-S1
REV A
SH 3 OF 5
ECO : 1001


DISPLAY SYNC.
SAMPLE AND HOLD DAC
A23 SELPER
A24 SELCOM
A21 CUPORT
A22 DISYNC
A12 74HCT40102
A13 74HCT4040
A29 74HCT74
A27 INTCAL C16A4L
A28 74HCT374
A20 MCL484
A17 DAC703
BUZZER
HM8_06
C16L8L
BP(0:5)
BI(0:44)
BD(0:15)
BC(0:29)
BA(1:31)
DAC(0:9)
LSYNC
COUNT
+15V
-15V
LeCroy CORPORATION
MODEL : 9450-1
BASE CARD FOR 94xx
DWG NO: 9450-1-S1
SH 4 OF 5
ECO : 1001
DRAWN KROLUWSKI-B
CHKD MAURON-B
DATE 16-AUG-88


FRONTEND INTERFACE
CUSTOMER PORT
DAC (8:9)
BD (8:15)
BI (8:44)
BC (8:29)
BP (8:5)
A3
74HCT173
A4
74HCT173
A11
74HCT541
A10
74HCT541
A7
74HCT541
RN12
470_8SS
RN8
470_8SS
J10
DB9_RA_F
J11
2x20_ST_M
4xBAW62
RN1
100K_SIPC
RN3
100K_SIPC
J7
POWER1x10_M
LSYNC
-15V
+15V
VEE
VCC
GND
C39
6.8uF_TANT_25V
C33
15uF_TANT
C34
15uF_TANT
C40
6.8uF_TANT_25V
25x.01uF
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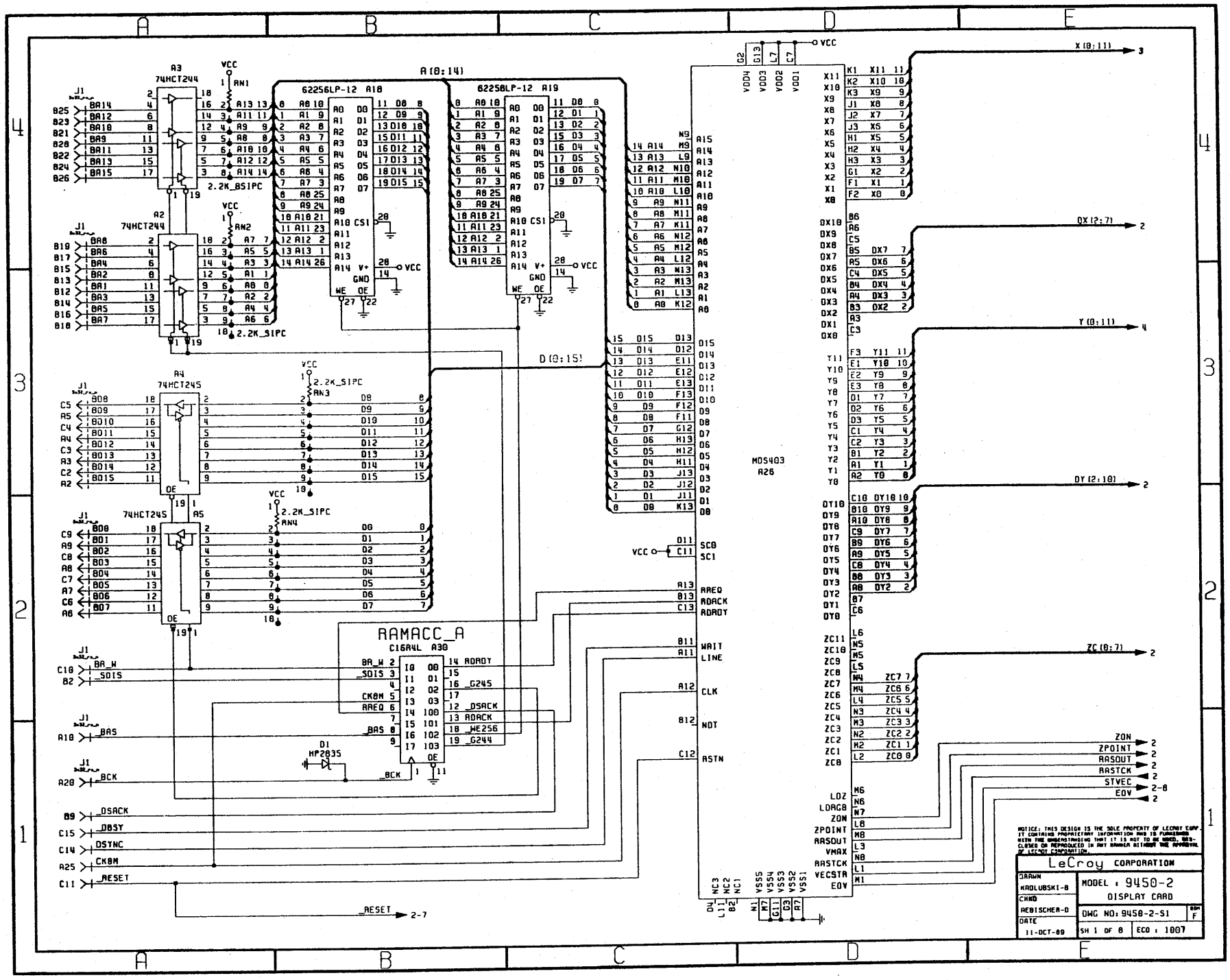
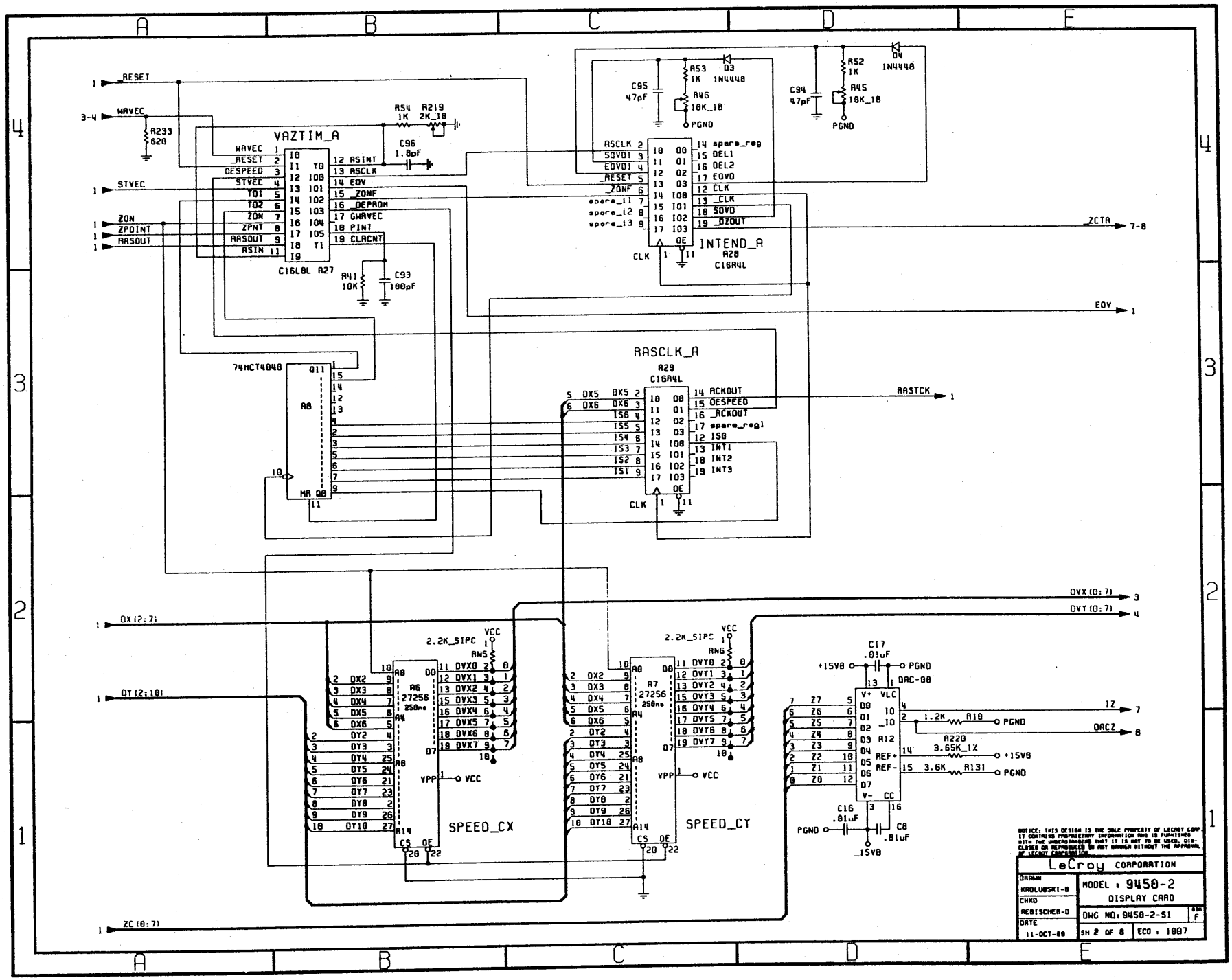
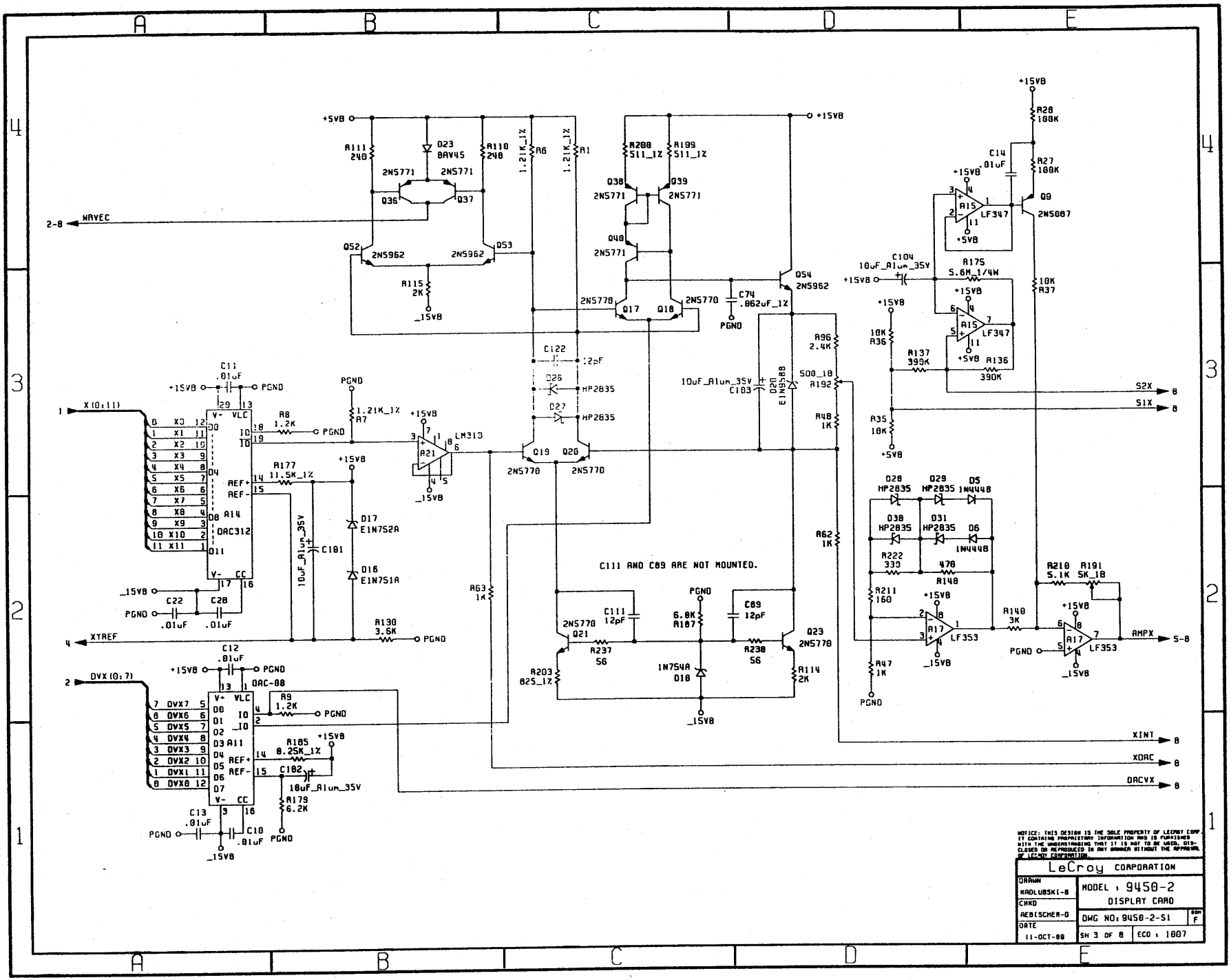
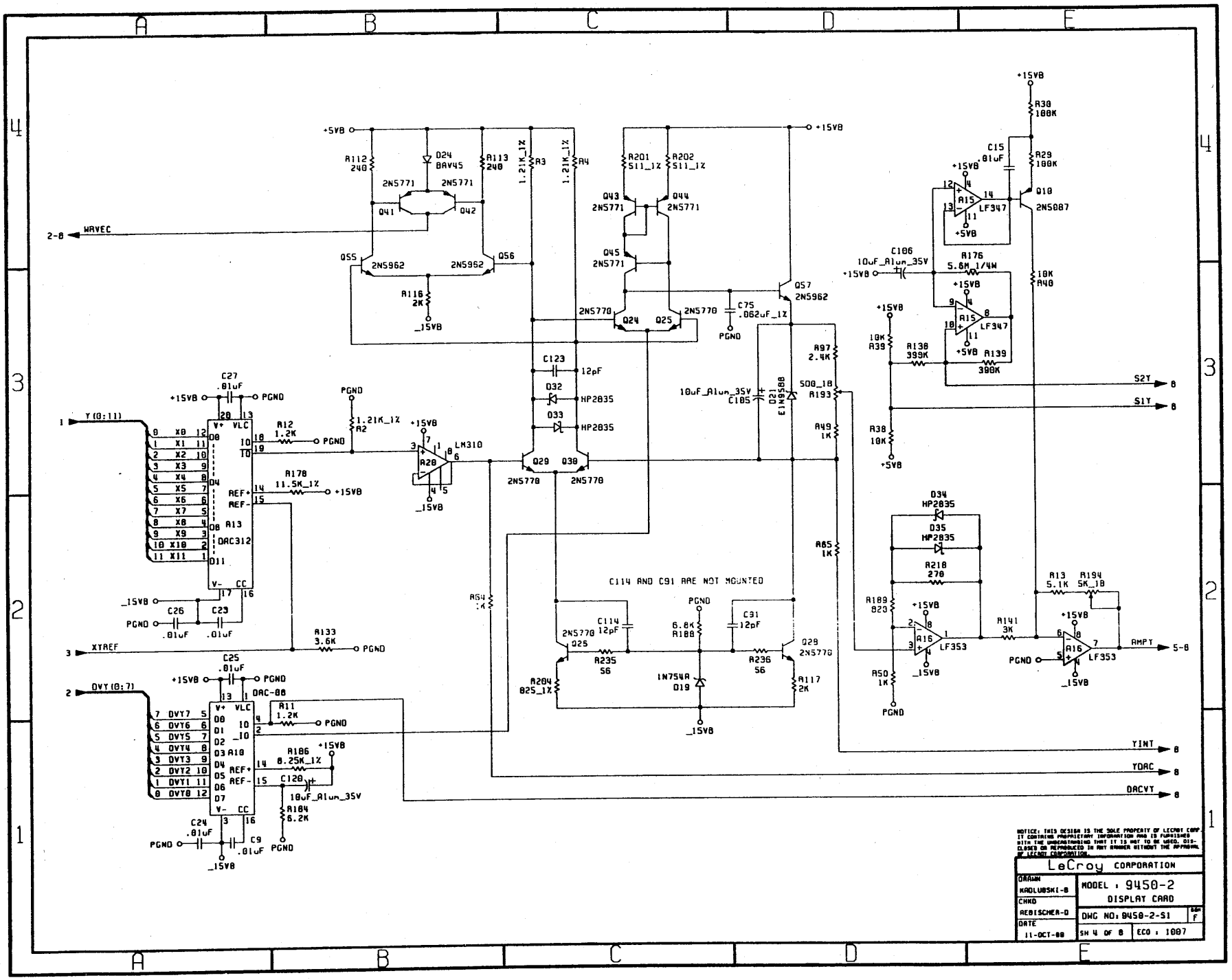
DRAWN
KADLUBSKI-B
CHKD
MAURON-B
DATE
16-AUG-89
MODEL : 9450-1
BASE CARD FOR 94xx
DWG NO: 9450-1-S1
REV A
SH 5 OF 5
ECO : 1881


A(0:14)
D(0:15)
62256LP-12 A18
62256LP-12 A19
74HCT244
74HCT245
2.2K_8SIPC
2.2K_5IPC
RAMACC_A
C16R4L A30
MDS403
A26
X(0:11)
DX(2:7)
Y(0:11)
DY(2:10)
ZC(0:7)
LeCroy CORPORATION
MODEL : 9450-2
DISPLAY CARD
DWG NO: 9450-2-S1
SH 1 OF 8
ECO : 1007
DRAWN KADLUBSKI-B
CHKD REBISCHER-D
DATE 11-OCT-89


VAZTIM_A
INTEND_A
RASCLK_A
74HCT4048
SPEED_CX
SPEED_CY
DAC-08
_RESET
WAVEC
STVEC
ZON
ZPOINT
RASOUT
ZCTR 7-8
EOV 1
RASTCK 1
DX(2:7)
DY(2:10)
DVX(0:7) 3
DVY(0:7) 4
ZC(8:7)
IZ 7
DACZ 8
+15V8
-15V8
PGND
VCC
2.2K_SIPC
1N4448
LeCroy CORPORATION
MODEL : 9450-2
DISPLAY CARD
DWG NO: 9450-2-S1
SH 2 OF 8
ECO : 1007
DRAWN KADLUBSKI-B
CHKD REBISCHEA-D
DATE 11-OCT-88


C111 AND C89 ARE NOT MOUNTED.
DAC312
DAC-08
LM313
LF347
LF353
2N5771
2N5962
2N5770
2N5887
HP2835
1N4448
E1N752A
E1N751A
1N754A
BAV45
XINT
XDAC
DACVX
AMPX
XTREF
WAVEC
LeCroy CORPORATION
MODEL : 9450-2
DISPLAY CARD
DWG NO: 9450-2-S1
SH 3 OF 8
ECO : 1807
DRAWN
KADLUBSKI-B
CHKD
AEBISCHER-D
DATE
11-OCT-89


+5V8
+15V8
-15V8
PGND
WAVEC
2-8
Q41 2N5771
Q42 2N5771
Q55 2N5962
Q56 2N5962
Q43 2N5771
Q44 2N5771
Q45 2N5771
Q24 2N5770
Q25 2N5770
Q57 2N5962
Q29 2N5770
Q38 2N5770
Q10 2N5087
D24 BAV45
D32 HP2835
D33 HP2835
D34 HP2835
D35 HP2835
D21 1N5711
D19 1N754A
A13 DAC312
DAC-88
LM310
LF347
LF353
Y(0:11)
DVY(0:7)
XYREF
S2Y
S1Y
YINT
YDAC
DACVY
AMPY
C114 AND C91 ARE NOT MOUNTED
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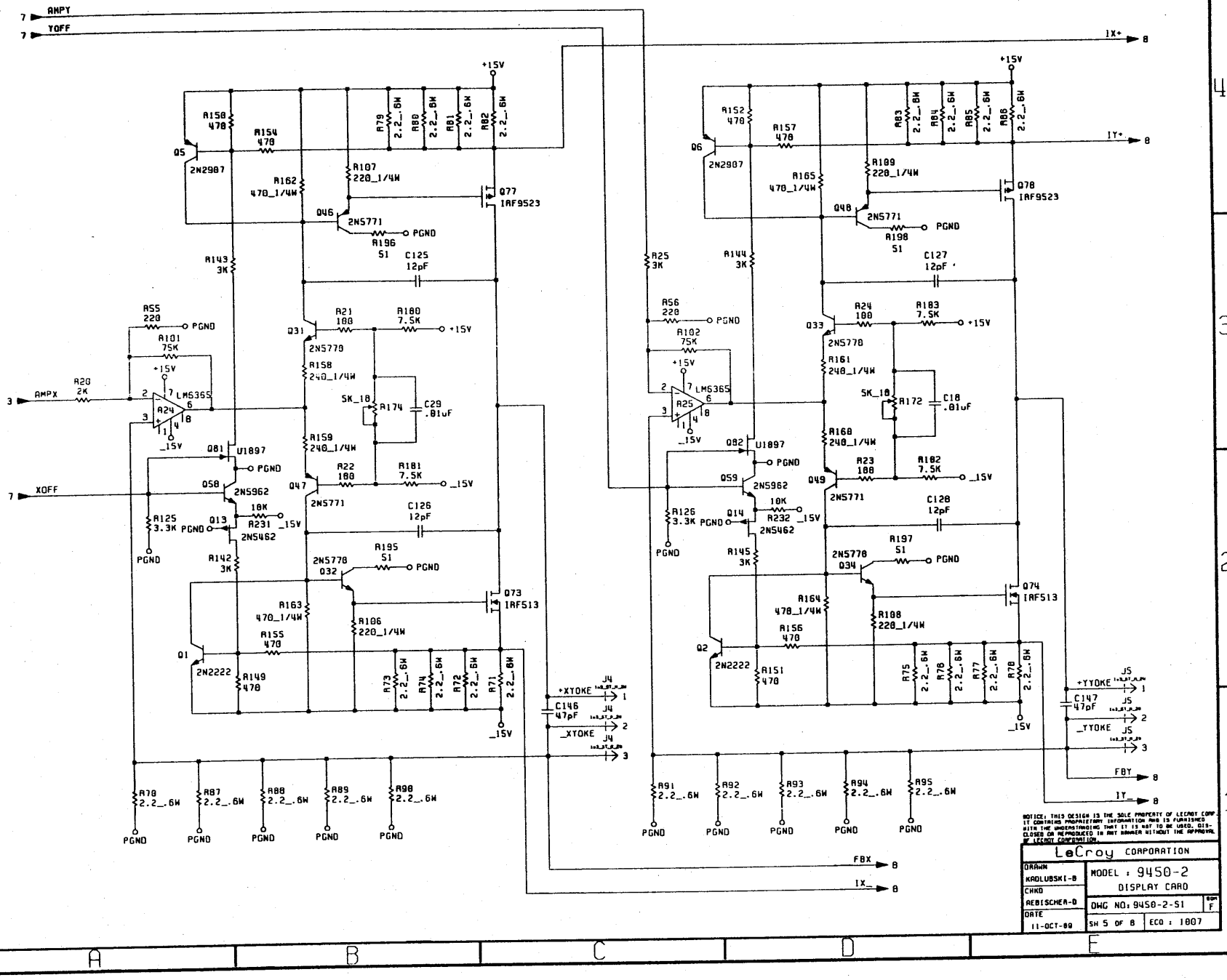
LeCroy CORPORATION
DRAWN KADLUBSKI-B
CHKD REBISCHER-D
DATE 11-OCT-88
MODEL : 9450-2
DISPLAY CARD
DWG NO: 9450-2-S1
SIZE F
SH 4 OF 8
ECO : 1007


AMPY
YOFF
IX+
IY+
+15V
Q5
2N2907
R158 470
R154 470
R162 470_1/4W
R107 220_1/4W
Q77 IRF9523
Q46 2N5771
R196 51
PGND
C125 12pF
R143 3K
R79 2.2_.6W
R80 2.2_.6W
R81 2.2_.6W
R82 2.2_.6W
Q6
2N2907
R152 470
R157 470
R165 470_1/4W
R109 220_1/4W
Q78 IRF9523
Q48 2N5771
R198 51
C127 12pF
R144 3K
R83 2.2_.6W
R84 2.2_.6W
R85 2.2_.6W
R86 2.2_.6W
R25 3K
R56 220
R102 75K
R55 220
R101 75K
AMPX
R20 2K
LM6365
R24
R25
_15V
Q31 2N5770
R21 100
R180 7.5K
R158 240_1/4W
5K_10
R174
C29 .01uF
Q33 2N5770
R24 100
R183 7.5K
R161 240_1/4W
R172
C18 .01uF
R160 240_1/4W
Q81 U1897
Q82 U1897
XOFF
Q58 2N5962
Q59 2N5962
R159 240_1/4W
Q47 2N5771
R22 100
R181 7.5K
Q49 2N5771
R23 100
R182 7.5K
10K
R231
R232
Q13 2N5462
Q14 2N5462
R125 3.3K
R126 3.3K
C126 12pF
C128 12pF
R195 51
R197 51
R142 3K
R145 3K
Q32 2N5770
Q34 2N5770
Q73 IRF513
Q74 IRF513
R163 470_1/4W
R106 220_1/4W
R164 470_1/4W
R108 220_1/4W
R155 470
R156 470
Q1 2N2222
Q2 2N2222
R149 470
R151 470
R73 2.2_.6W
R74 2.2_.6W
R72 2.2_.6W
R71 2.2_.6W
R75 2.2_.6W
R76 2.2_.6W
R77 2.2_.6W
R78 2.2_.6W
J4
J5
+XTOKE
_XTOKE
+YTOKE
_YTOKE
C146 47pF
C147 47pF
R70 2.2_.6W
R87 2.2_.6W
R88 2.2_.6W
R89 2.2_.6W
R90 2.2_.6W
R91 2.2_.6W
R92 2.2_.6W
R93 2.2_.6W
R94 2.2_.6W
R95 2.2_.6W
FBX
FBY
IX_
IY_
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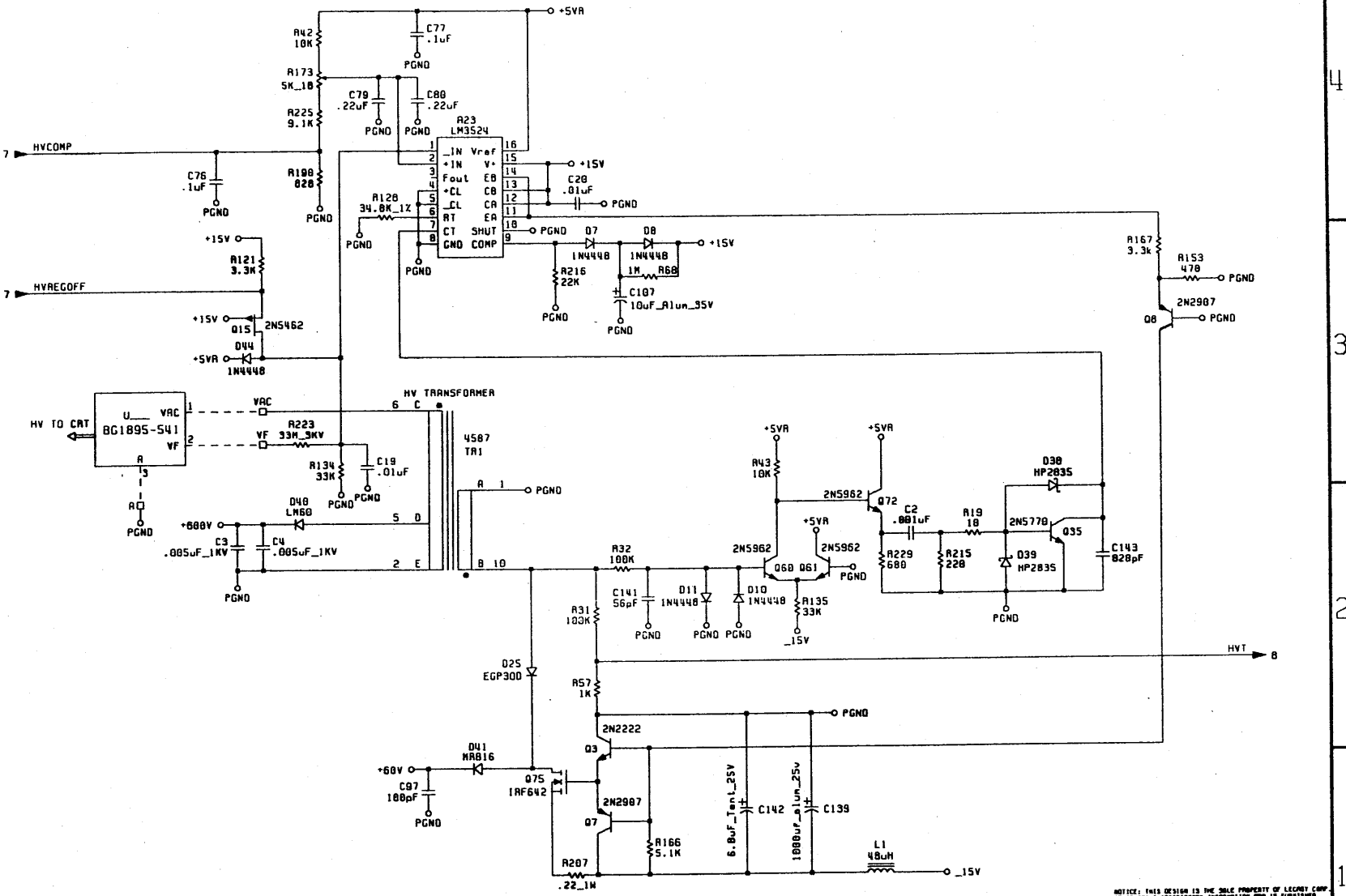
LeCroy CORPORATION
DRAWN KADLUBSKI-B
CHKD AEBISCHER-D
DATE 11-OCT-89
MODEL : 9450-2
DISPLAY CARD
DWG NO: 9450-2-S1
REV F
SH 5 OF 8
ECO : 1807


+5VR
C77 .1uF
PGND
R42 10K
R173 5K_1%
C79 .22uF
C80 .22uF
R225 9.1K
A23 LM3524
HVCOMP
C76 .1uF
R198 82%
+15V
C20 .01uF
R128 34.8K_1%
D7 1N4448
D8 1N4448
R216 22K
C107 10uF_Alum_35V
R167 3.3k
R153 470
2N2907
Q8
HVREGOFF
R121 3.3K
Q15 2N5462
D44 1N4448
HV TRANSFORMER
HV TO CRT
BG1895-541
VAC
VF
R223 33M_3KV
R134 33K
C19 .01uF
4587 TR1
D48 LM60
+600V
C3 .005uF_1KV
C4 .005uF_1KV
R43 10K
2N5962 Q72
2N5962 Q60 Q61
C2 .001uF
R19 10
R229 680
R215 220
D38 HP2835
2N5770 Q35
D39 HP2835
C143 820pF
R32 100K
C141 56pF
D11 1N4448
D10 1N4448
R135 33K
R31 100K
-15V
HVT
D25 EGP30D
R57 1K
2N2222 Q3
D41 MR816
Q75 IRF642
C97 100pF
2N2907 Q7
R166 5.1K
6.8uF_Tant_25V
C142
1000uF_alum_25V
C139
L1 48uH
R207 .22_1W
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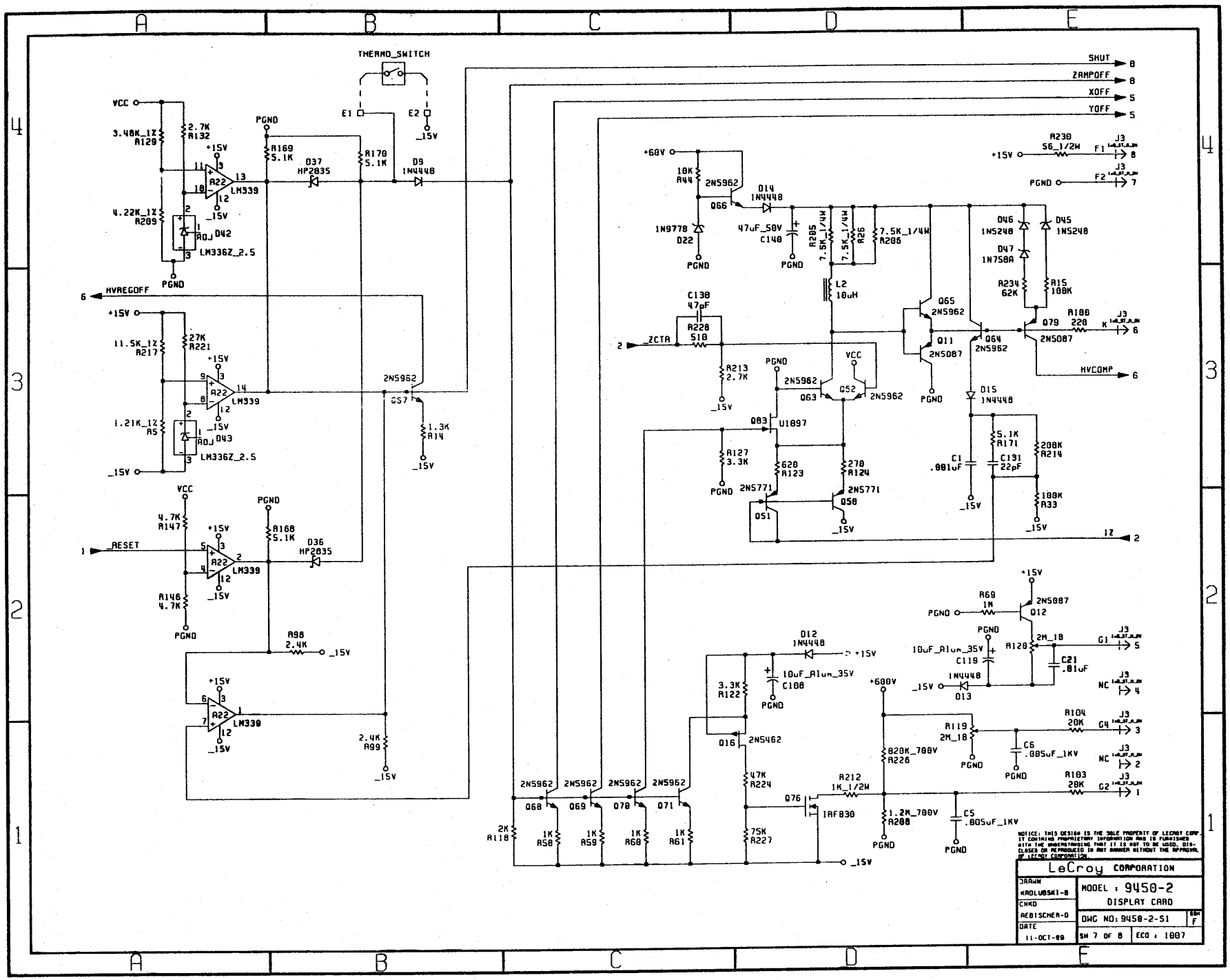
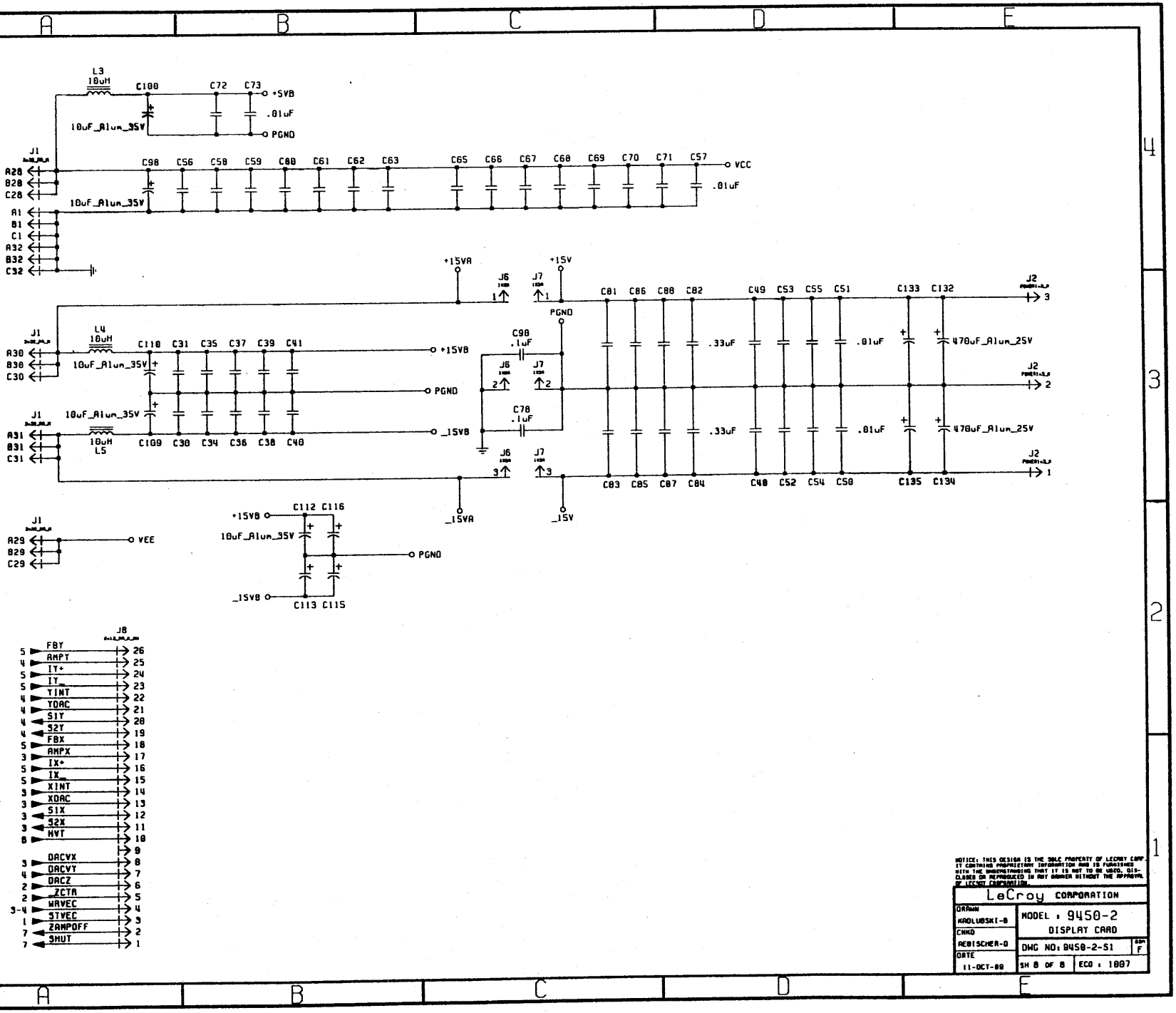
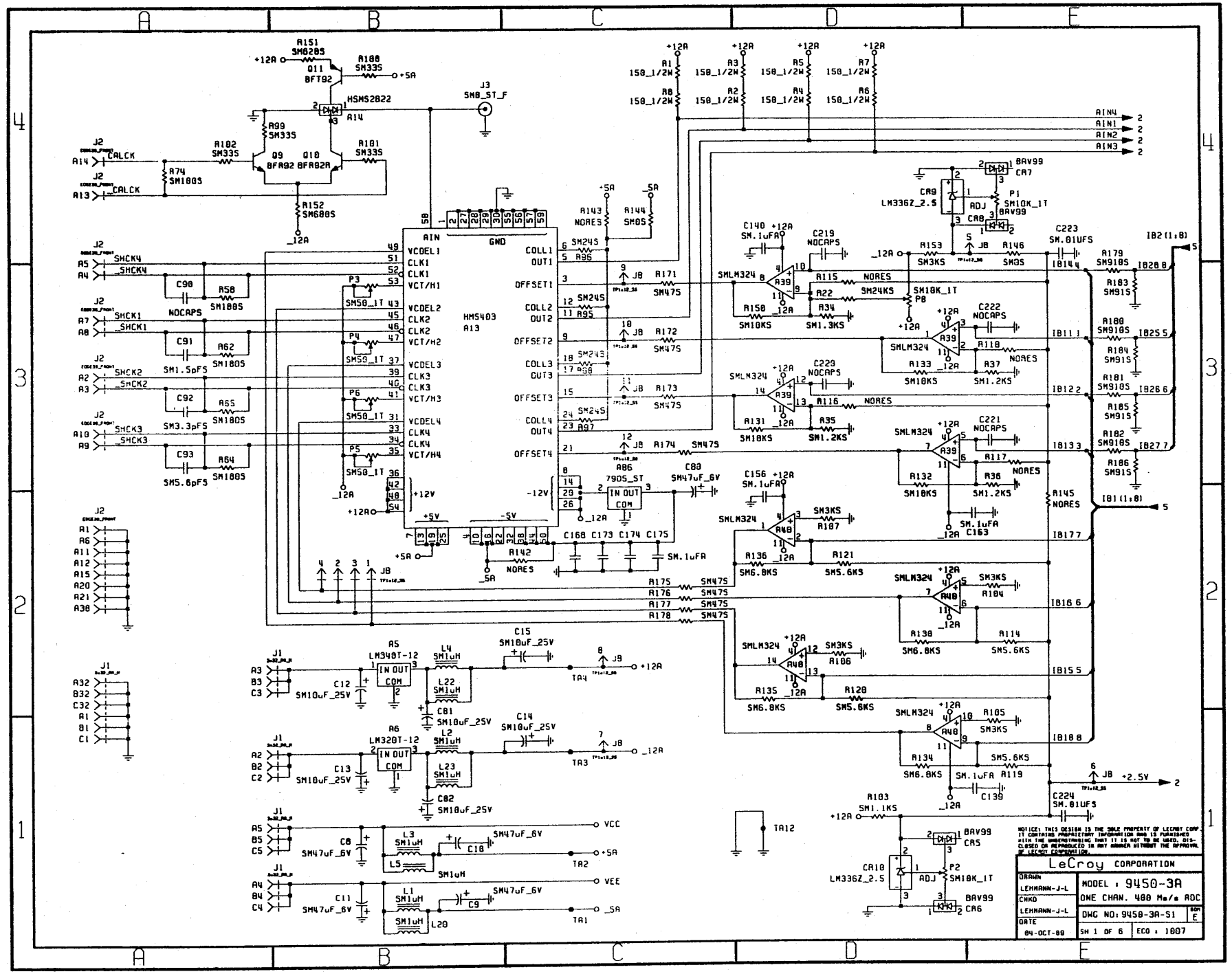
LeCroy CORPORATION
DRAWN KAOLUBSKI-B
CHKD REBISCHER-D
DATE 11-OCT-89
MODEL : 9450-2
DISPLAY CARD
DWG NO: 9458-2-S1
SH 6 OF 8
ECO : 1007

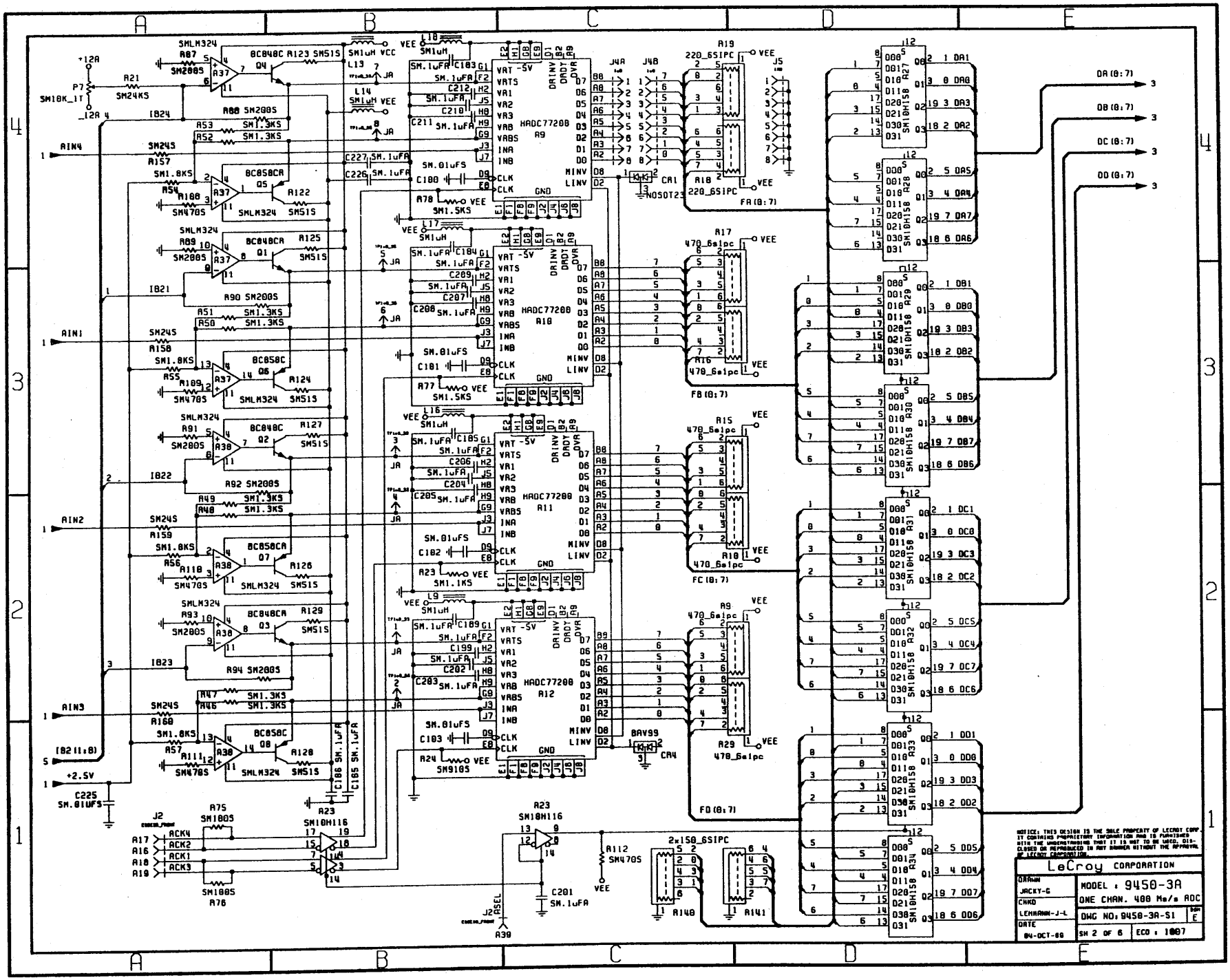

THERMO_SWITCH
E1
E2
_15V
VCC
3.48K_1Z
A129
2.7K
A132
+15V
A22
LM339
PGND
A169
5.1K
D37
HP2835
A170
5.1K
D9
1N4448
4.22K_1Z
A209
ADJ
D42
LM336Z_2.5
HVREGOFF
11.5K_1Z
A217
27K
A221
1.21K_1Z
A5
D43
2N5962
Q57
1.3K
A14
4.7K
A147
_RESET
A168
5.1K
D36
HP2835
A146
4.7K
A98
2.4K
2.4K
A99
SHUT
ZAMPOFF
XOFF
YOFF
+60V
18K
A44
2N5962
Q66
D14
1N4448
1N9778
D22
47uF_50V
C140
A205
7.5K_1/4W
A26
7.5K_1/4W
A206
7.5K_1/4W
L2
10uH
C138
47pF
A228
510
_ZCTA
A213
2.7K
Q63
Q52
Q83
U1897
A127
3.3K
620
A123
270
A124
2N5771
Q58
Q51
Q65
2N5962
Q11
2N5087
Q64
2N5962
Q79
2N5087
A180
220
HVCOMP
D15
1N4448
C1
.001uF
5.1K
A171
C131
22pF
200K
A214
100K
A33
A230
56_1/2W
F1
F2
D46
1N5248
D45
1N5248
D47
1N758A
A234
62K
A15
100K
J3
IZ
D12
1N4448
10uF_Alum_35V
C108
3.3K
A122
Q16
2N5462
47K
A224
75K
A227
2K
A118
1K
A58
1K
A59
1K
A60
1K
A61
2N5962
Q68
Q69
Q70
Q71
IRF830
Q76
A212
1K_1/2W
820K_700V
A226
1.2M_700V
A208
C5
.805uF_1KV
R69
1M
Q12
2N5087
A120
2M_1B
C21
.01uF
10uF_Alum_35V
C119
D13
1N4448
A119
2M_1B
C6
.005uF_1KV
A104
20K
A103
20K
G1
G4
G2
NC
LeCroy CORPORATION
DRAWN
KROLUBSKI-B
CHKD
AEBISCHER-D
DATE
11-OCT-89
MODEL : 9450-2
DISPLAY CARD
DWG NO: 9450-2-S1
SH 7 OF 8
ECO : 1007
REV
F

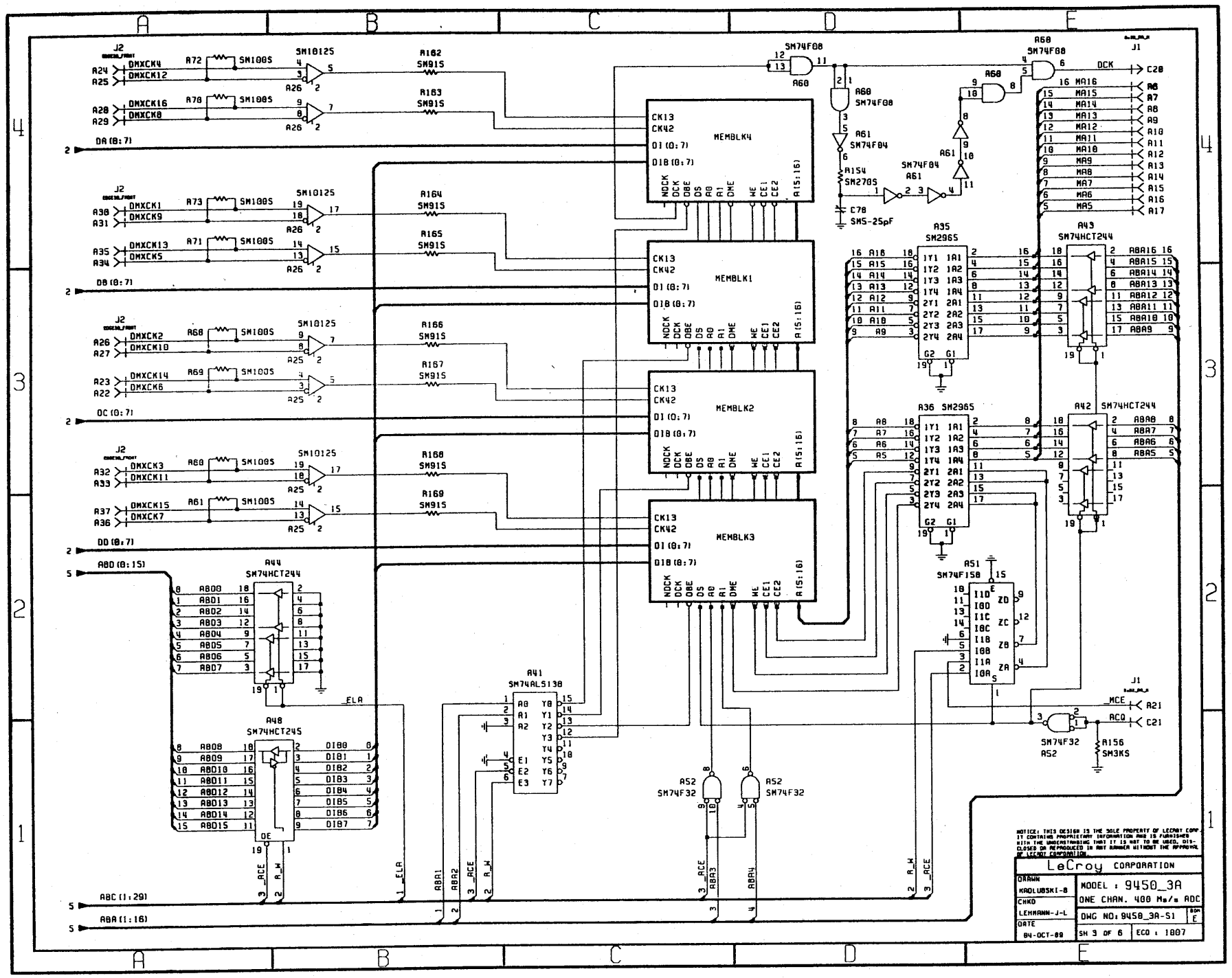


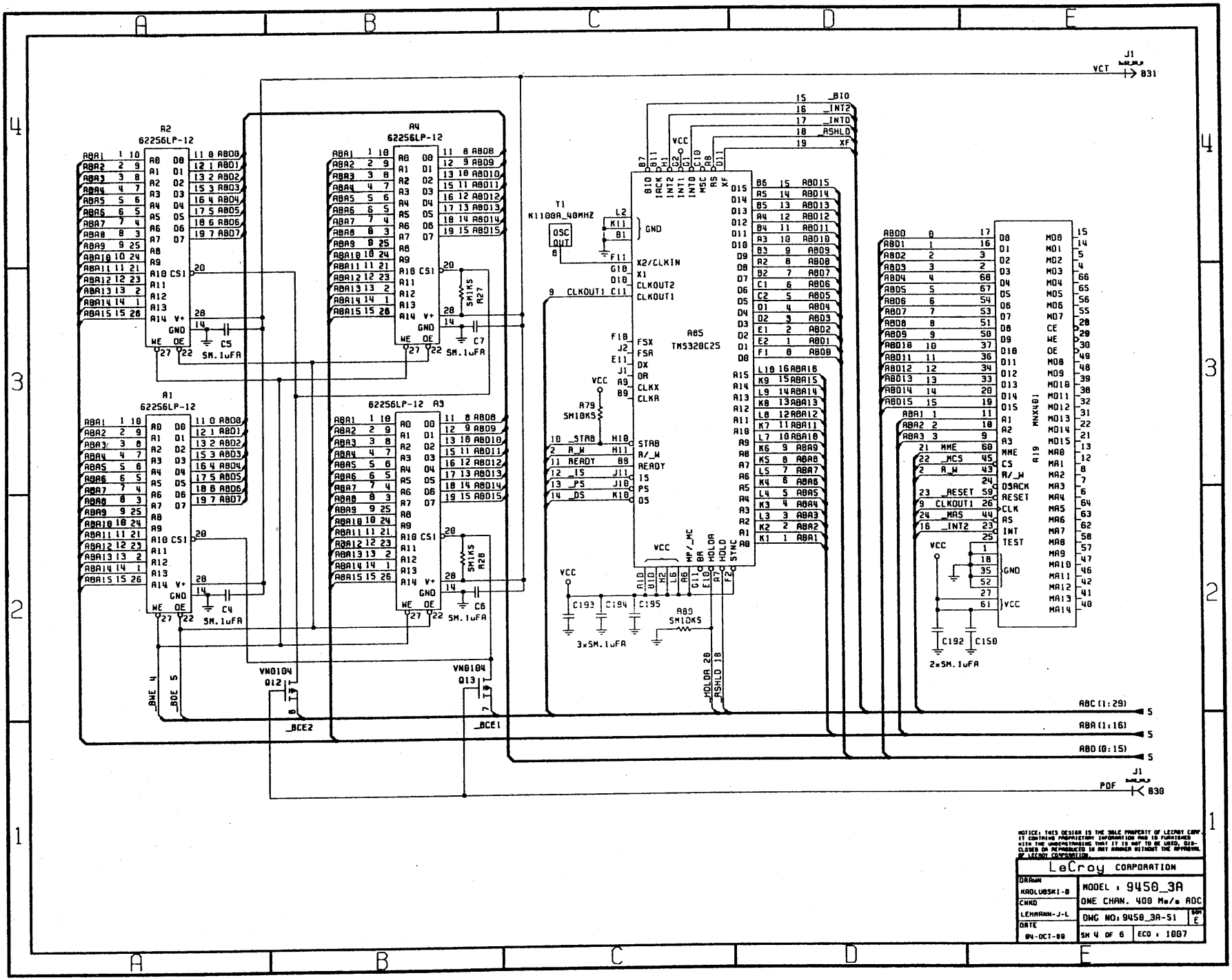
LeCroy CORPORATION

DRAWN KADLUBSKI-B	MODEL : 9450-2 DISPLAY CARD
CHKD REDISCHER-D	DWG NO: 9450-2-S1 ASM F
DATE 11-OCT-88	SH 8 OF 8 ECO : 1887


HMS403
A13
AIN
GND
VCDEL1
CLK1
CLK1
VCT/H1
VCDEL2
CLK2
CLK2
VCT/H2
VCDEL3
CLK3
CLK3
VCT/H3
VCDEL4
CLK4
CLK4
VCT/H4
COLL1
OUT1
OFFSET1
COLL2
OUT2
OFFSET2
COLL3
OUT3
OFFSET3
COLL4
OUT4
OFFSET4
+12A
-12A
+5A
-5A
+12V
AIN1
AIN2
AIN3
AIN4
+2.5V
VCC
VEE
CALCK
SHCK1
SHCK2
SHCK3
SHCK4
LeCroy CORPORATION
MODEL : 9450-3A
ONE CHAN. 400 Ms/s ADC
DWG NO: 9450-3A-S1
SH 1 OF 6
ECO : 1007
04-OCT-00
LEHMANN-J-L


DA(8:7)
DB(8:7)
DC(8:7)
DD(8:7)
FA(8:7)
FB(8:7)
FC(8:7)
FD(8:7)
HADC77208
LeCroy CORPORATION
MODEL : 9450-3A
ONE CHAN. 400 Ms/s ADC
DWG NO: 9450-3A-S1
SH 2 OF 6
ECO : 1087
DRAWN
JACKY-G
CHKD
LEHMANN-J-L
DATE
04-OCT-88


J2
DMXCK4
DMXCK12
DMXCK16
DMXCK0
DMXCK1
DMXCK9
DMXCK13
DMXCK5
DMXCK2
DMXCK10
DMXCK14
DMXCK6
DMXCK3
DMXCK11
DMXCK15
DMXCK7
SM10125
SM100S
SM91S
SM270S
SM5-25pF
DA (0:7)
DB (0:7)
DC (0:7)
DD (0:7)
MEMBLK4
MEMBLK1
MEMBLK2
MEMBLK3
CK13
CK42
DI (0:7)
DI8 (0:7)
A (15:16)
SM74F08
SM74F04
SM74F32
SM74HCT244
SM74HCT245
SM74ALS138
SM74F158
SM2965
ABD (0:15)
ABA (1:16)
ABC (1:29)
_ELA
_ACE
R_W
MCE
ACQ
DCK
MA16
MA15
MA14
MA13
MA12
MA11
MA10
MA9
MA8
MA7
MA6
MA5
LeCroy CORPORATION
MODEL : 9450_3A
ONE CHAN. 400 Ma/s ADC
DWG NO: 9450_3A-S1
SH 3 OF 6
ECO : 1807
DRAWN
KROLUBSKI-B
CHKD
LEHMANN-J-L
DATE
04-OCT-89


A2
62256LP-12
A4
62256LP-12
A1
62256LP-12
62256LP-12 A3
T1
K1100A_40MHZ
A85
TMS320C25
A79
SM10K5
A83
SM10K5
VCC
GND
C5
SM.1uFA
C7
SM.1uFA
C4
SM.1uFA
C6
SM.1uFA
C193
C194
C195
3xSM.1uFA
C192
C150
2xSM.1uFA
VN0104
Q12
VN0104
Q13
_BWE
_BDE
_BCE2
_BCE1
_MOLDA
_ASHLD
MNX401
A19
J1
VCT
831
J1
PDF
830
ABC(1:29)
ABA(1:16)
ABD(0:15)
S
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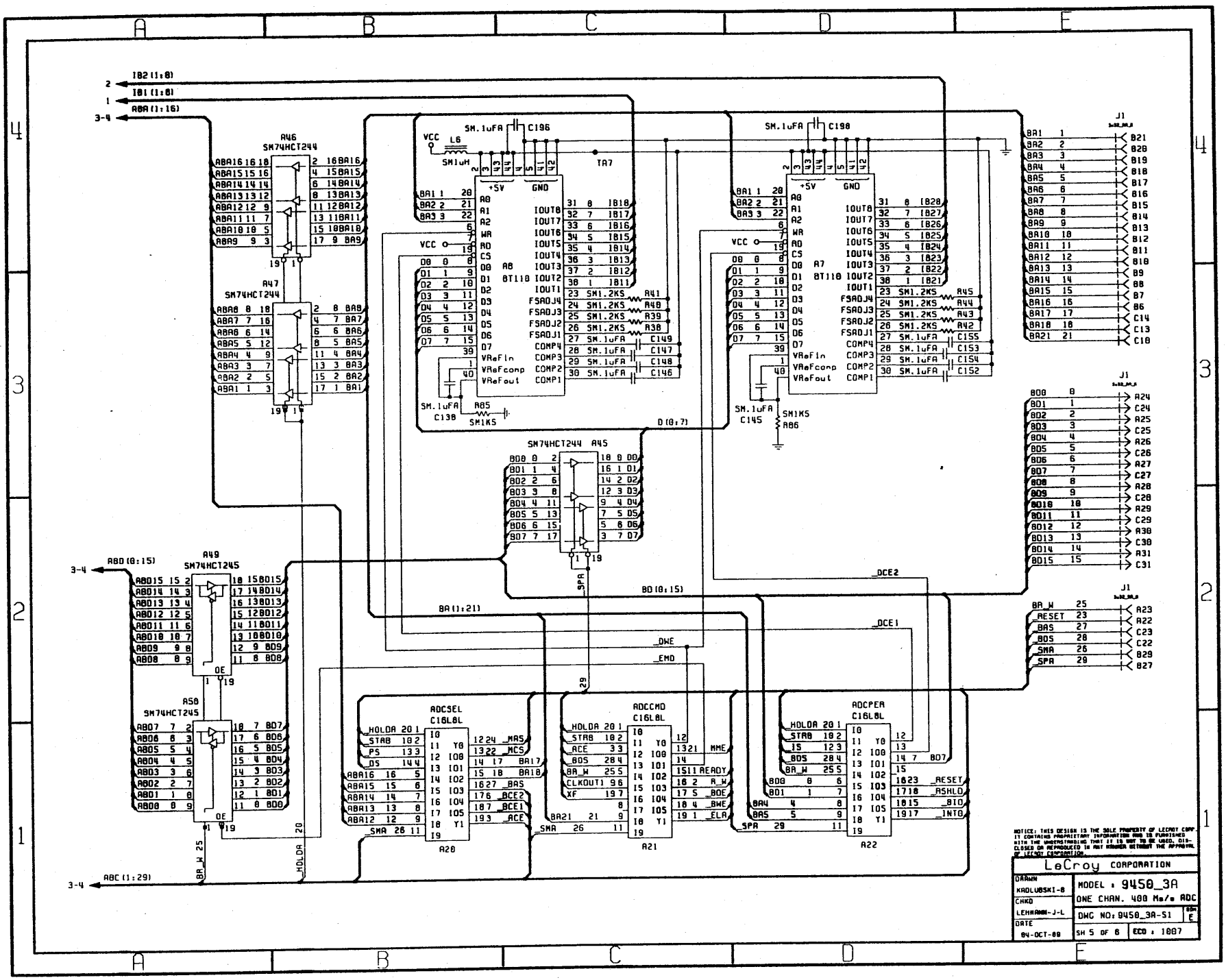
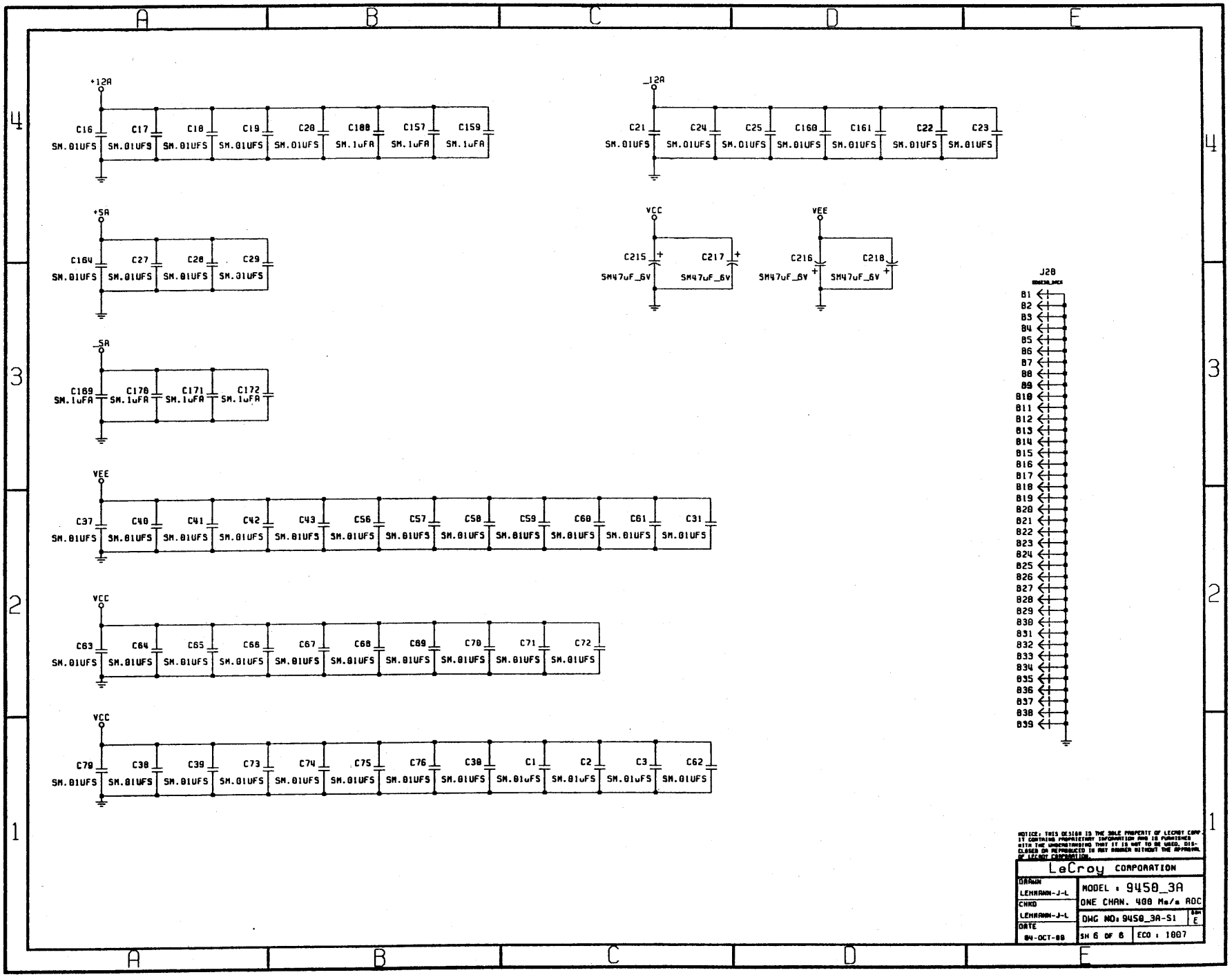
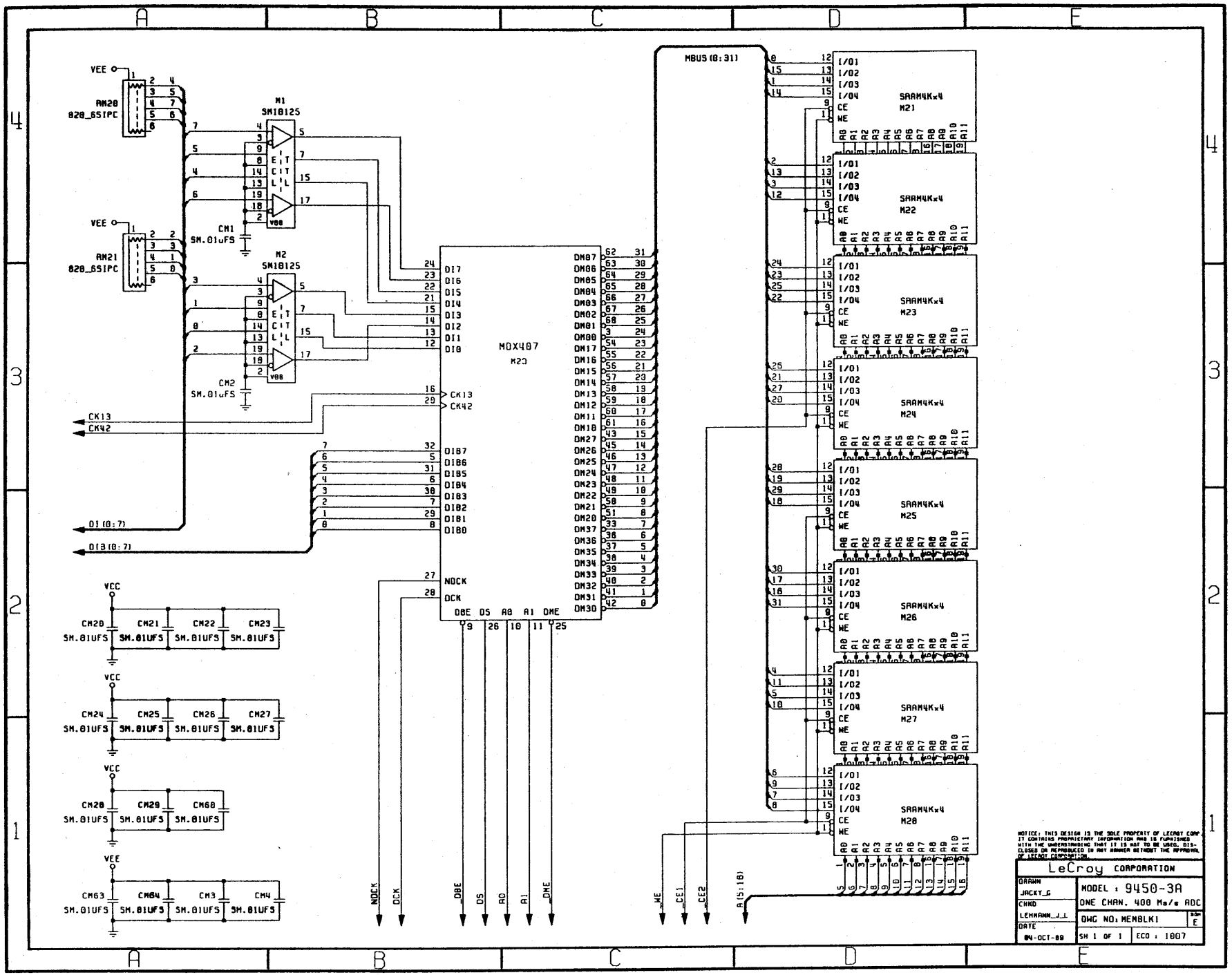
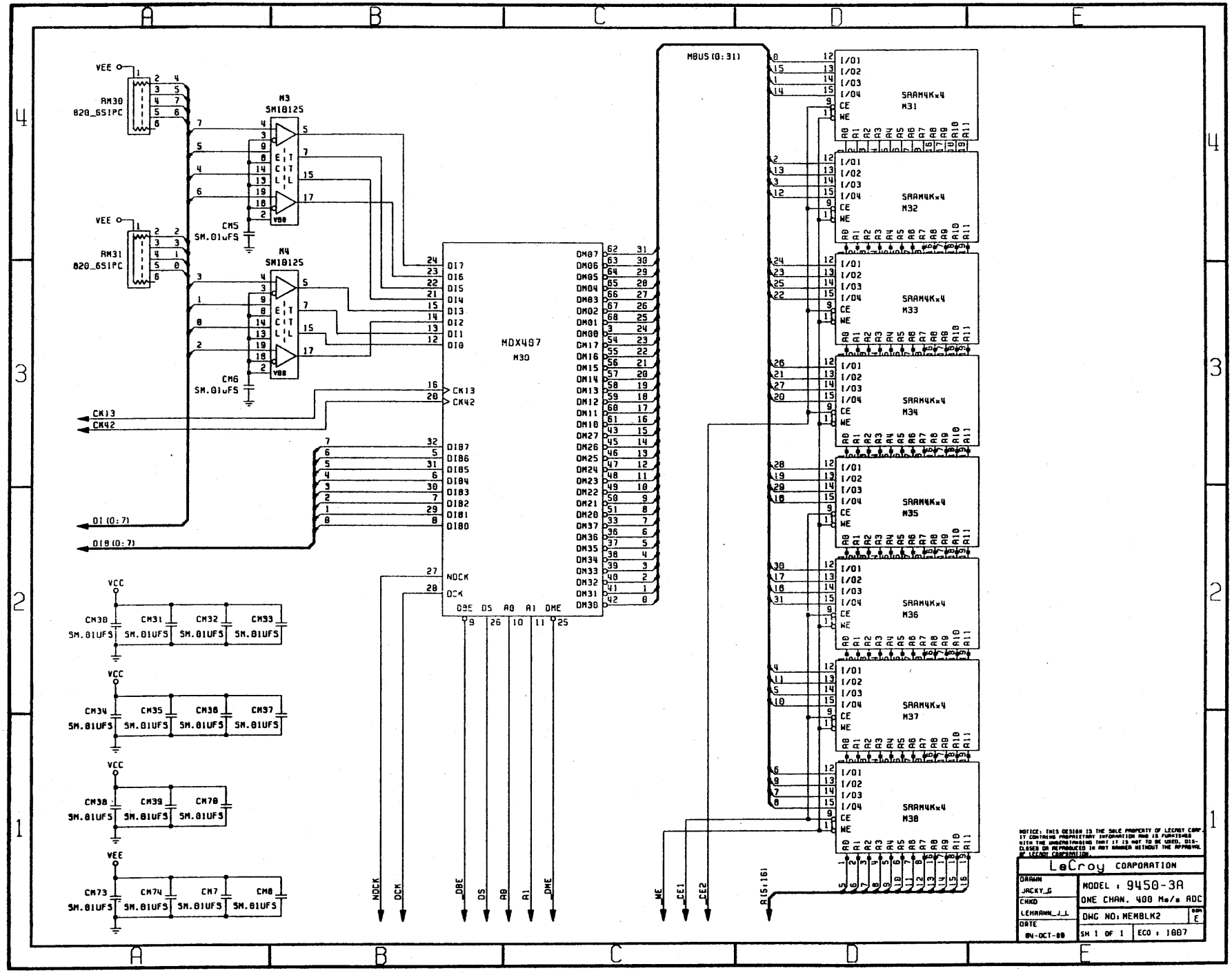
LeCroy CORPORATION
DRAWN
KADLUBSKI-B
CHKD
LEHMANN-J-L
DATE
04-OCT-88
MODEL : 9450_3A
ONE CHAN. 400 Ms/s ADC
DWG NO: 9450_3A-S1
SHT 4 OF 6
ECO : 1887

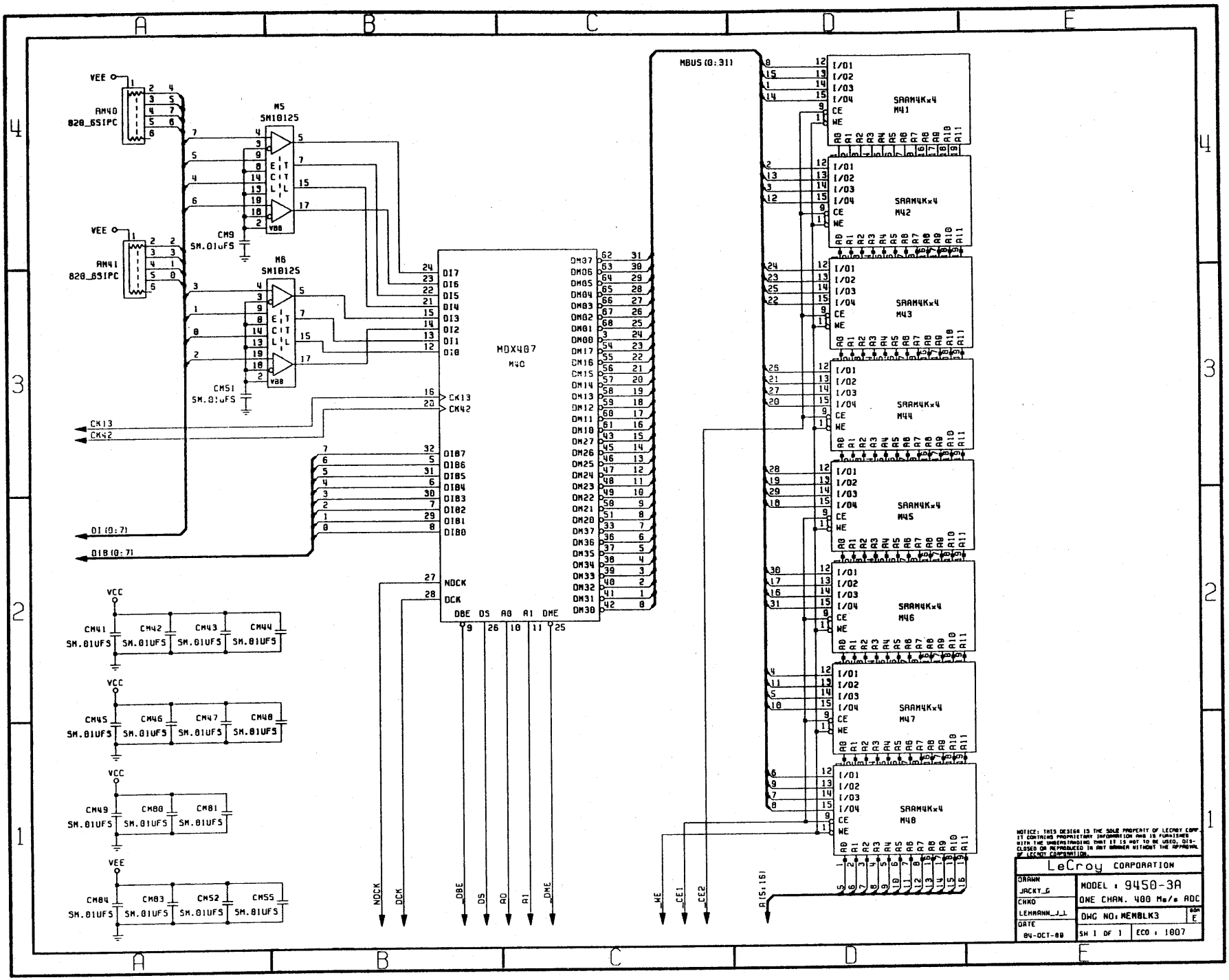

A46
SM74HCT244
A47
SM74HCT244
A49
SM74HCT245
A50
SM74HCT245
SM74HCT244 A45
A8
A7
SM.1uFA
SM1uH
SM1.2KS
SM1KS
ADCSEL
C16L8L
ADCCMD
C16L8L
ADCPER
C16L8L
A20
A21
A22
J1
LeCroy CORPORATION
MODEL : 9450_3A
ONE CHAN. 400 Ma/s ADC
DWG NO: 9450_3A-S1
SH 5 OF 8
ECO : 1007
DRAWN
KADLUBSKI-B
CHKD
LEHMANN-J-L
DATE
04-OCT-00

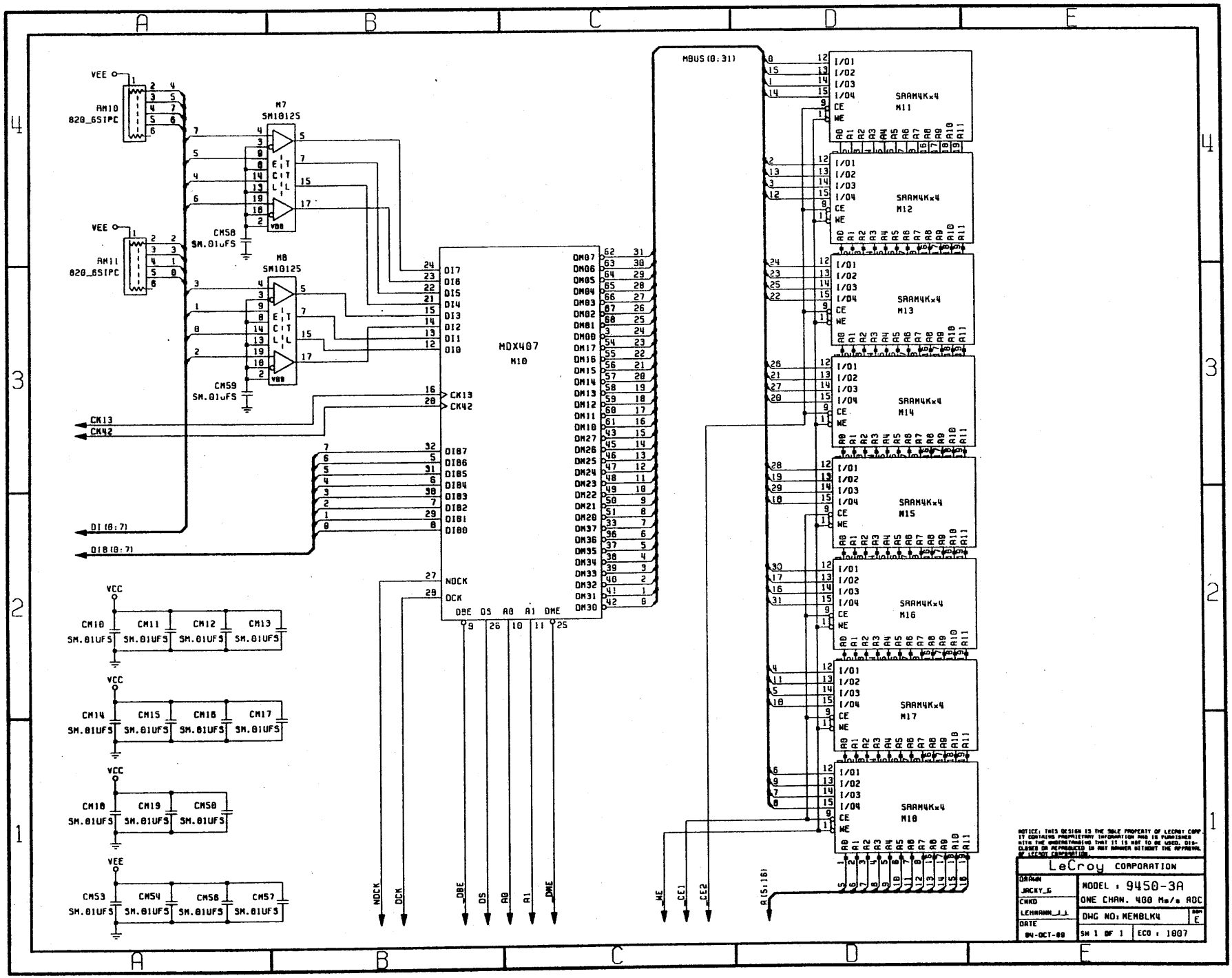


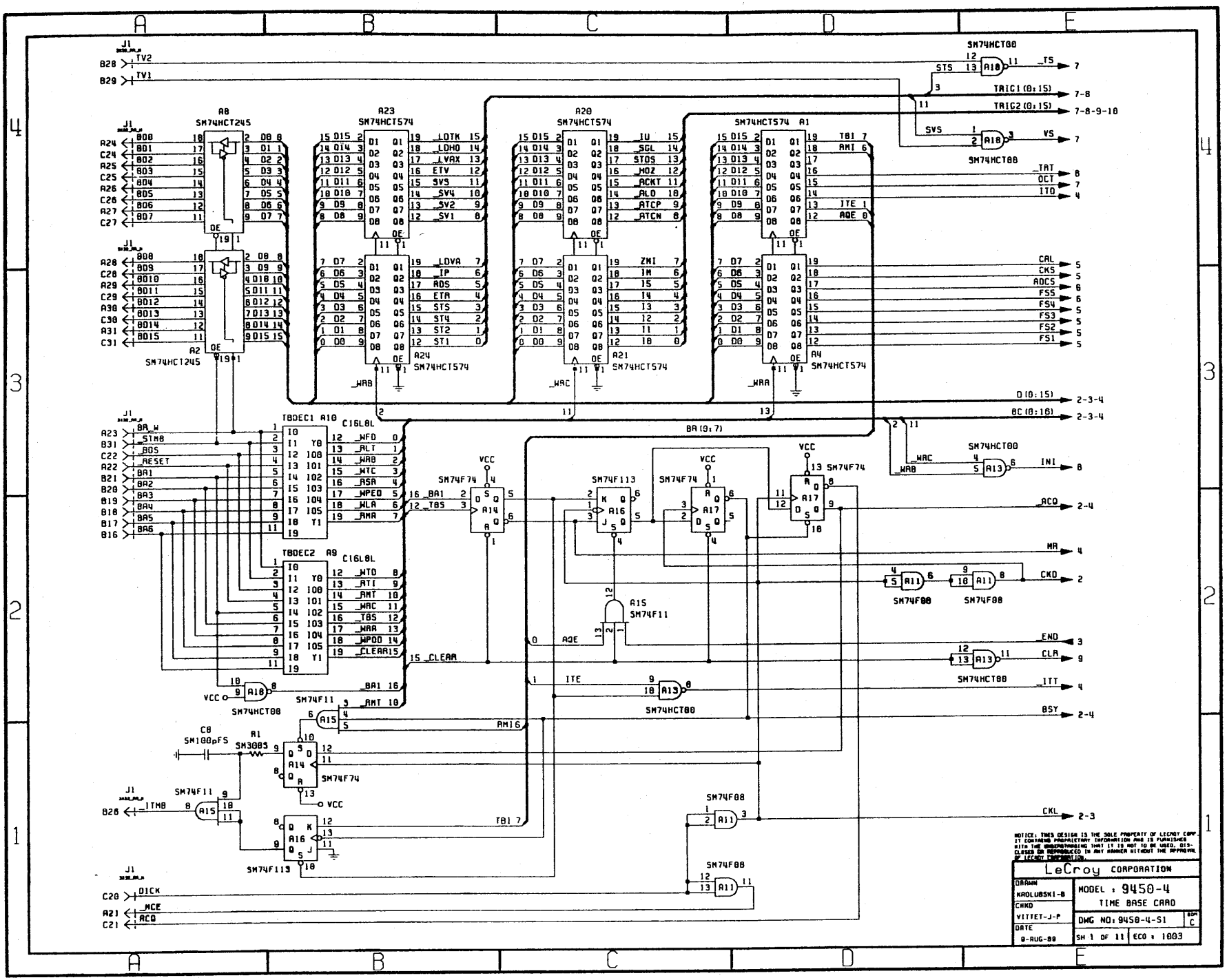
LeCroy CORPORATION		
DRAWN: LEHMANN-J-L	MODEL : 9450_3A	
CHKD: LEHMANN-J-L	ONE CHAN. 400 Ms/s ADC	
DATE: 04-OCT-88	DWG NO: 9450_3A-S1	SIZE: E
	SH 6 OF 6	ECO : 1007

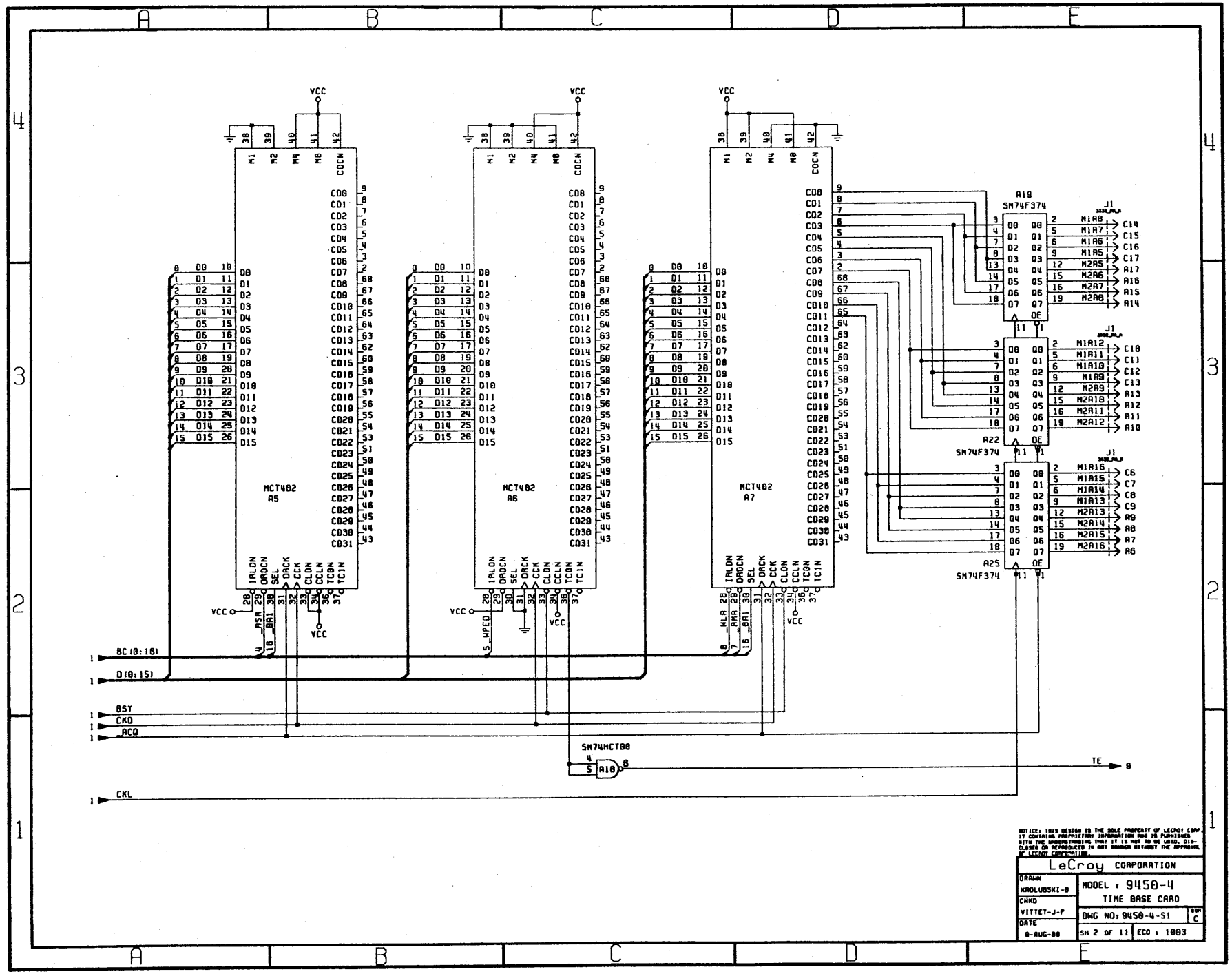

MBUS(0:31)
MDX487
M20
SRAM4Kx4
M21
M22
M23
M24
M25
M26
M27
M28
M1
SM10125
M2
SM10125
RM20
820_6SIPC
RM21
820_6SIPC
CM1
SM.01uFS
CM2
SM.01uFS
CM13
CM42
DI(0:7)
DI3(0:7)
NOCK
OCK
DBE
OS
A0
A1
DME
WE
CE1
CE2
A(5:18)
LeCroy CORPORATION
MODEL : 9450-3A
ONE CHAN. 400 Ms/s ADC
DWG NO. MEMBLK1
SH 1 OF 1
ECO : 1007
DRAWN
JACKY_G
CHKD
LEHMANN_J.J.
DATE
04-OCT-89

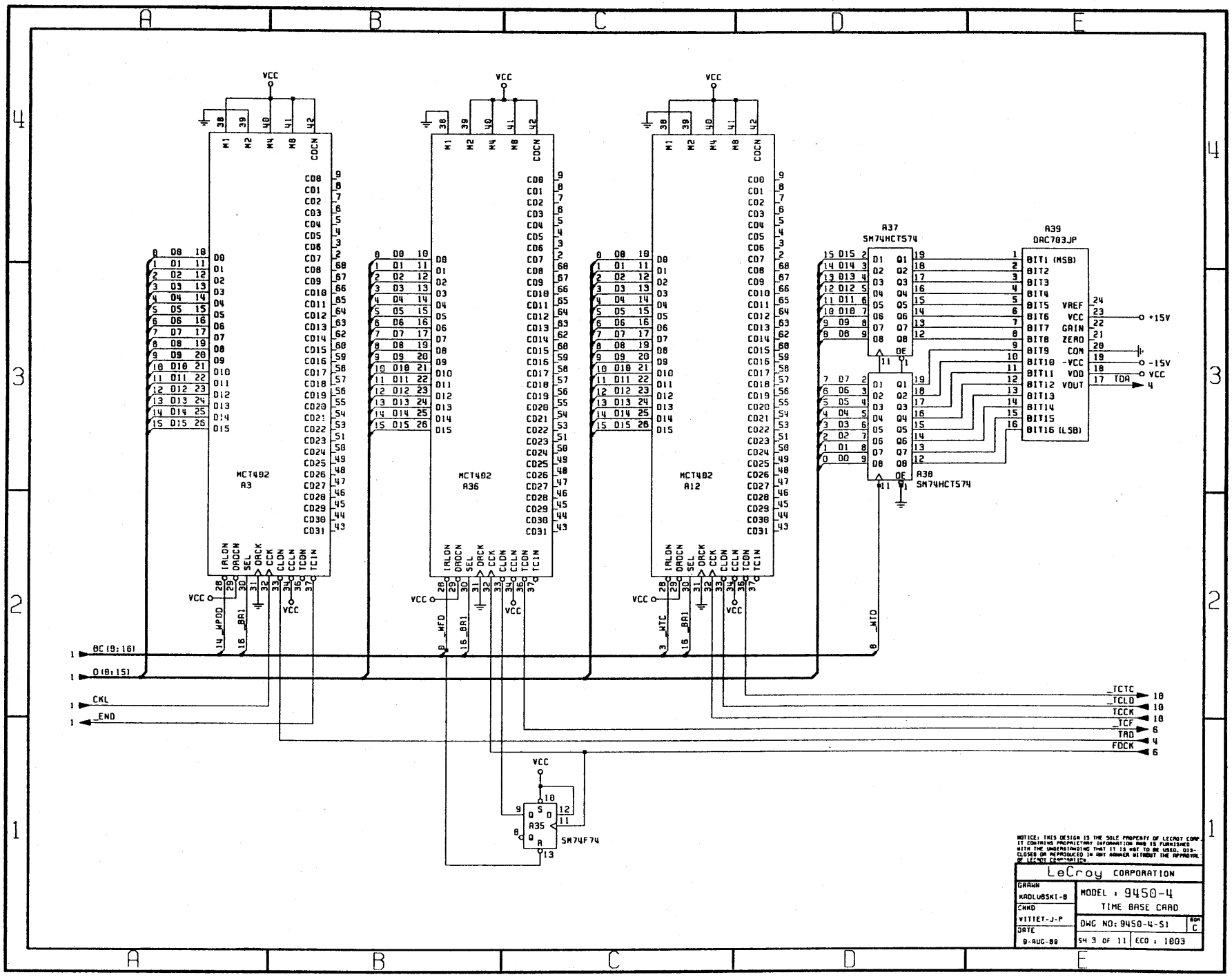

MBUS(0:31)
MDX407
M30
SRAM4Kx4
M31
M32
M33
M34
M35
M36
M37
M38
RM30
820_6SIPC
RM31
820_6SIPC
M3
SM10125
M4
SM10125
CM5
SM.01uFS
CM6
SM.01uFS
VEE
VCC
CK13
CK42
DI(0:7)
DI8(0:7)
NOCK
OCK
DBE
DS
A0
A1
DME
WE
CE1
CE2
A(5:16)
LeCroy CORPORATION
DRAWN
JACKY_G
CHKD
LEHMANN_J_L
DATE
04-OCT-88
MODEL : 9450-3A
ONE CHAN. 400 Ms/s ADC
DWG NO: MEMBLK2
SH 1 OF 1
ECO : 1007


MBUS (0:31)
MDX407
M40
SRAM4Kx4
M41
M42
M43
M44
M45
M46
M47
M48
M5
SM10125
M6
SM10125
RM40
820_8SIPC
RM41
820_8SIPC
VEE
VCC
CM9
SM.01uFS
CM51
SM.01uFS
CK13
CK42
DI (0:7)
DI8 (0:7)
NDCK
DCK
DBE
DS
A0
A1
DME
WE
CE1
CE2
A(5:16)
LeCroy CORPORATION
MODEL : 9450-3A
ONE CHAN. 400 Ms/s ADC
DWG NO: MEMBLK3
SH 1 OF 1
ECO : 1007
DRAWN
JACKY_G
CHKD
LEHMANN_J_L
DATE
04-OCT-88


MBUS(0:31)
MDX407
M10
SRAM4Kx4
M11
M12
M13
M14
M15
M16
M17
M18
M7
M8
SM10125
RM10
RM11
820_6SIPC
CM10
CM11
CM12
CM13
CM14
CM15
CM16
CM17
CM18
CM19
CM50
CM53
CM54
CM56
CM57
CM58
CM59
SM.01UFS
VCC
VEE
CK13
CK42
DI(0:7)
DIB(0:7)
NDCK
DCK
DBE
DS
A0
A1
DME
WE
CE1
CE2
A(5:16)
LeCroy CORPORATION
DRAWN
JACKY_G
CHKD
LEHMANN_J.J.
DATE
04-OCT-88
MODEL : 9450-3A
ONE CHAN. 400 Ma/s ADC
DWG NO: MEMBLK4
REV E
SH 1 OF 1
ECO : 1007


A8
SM74HCT245
A23
SM74HCT574
A20
SM74HCT574
SM74HCT574 A1
A2
SM74HCT245
A24
SM74HCT574
A21
SM74HCT574
A4
SM74HCT574
TBDEC1 A10
C16L8L
TBDEC2 A9
C16L8L
SM74F74
SM74F113
SM74F11
SM74F08
SM74HCT08
C8
SM100pFS
R1
SM300S
TRIG1(0:15)
TRIG2(0:15)
D(0:15)
BC(0:16)
BA(9:7)
LeCroy CORPORATION
MODEL : 9450-4
TIME BASE CARD
DWG NO: 9450-4-S1
SH 1 OF 11
ECO : 1003
DRAWN
KROLUBSKI-B
CHKD
VITTET-J-P
DATE
8-AUG-88


A5
A6
A7
MCT402
A19
A22
A25
SM74F374
SM74HCT08
A18
BC(0:16)
D(0:15)
BSY
CKD
ACQ
CKL
TE
VCC
J1
LeCroy CORPORATION
DRAWN
KADLUBSKI-B
CHKD
VITTET-J-P
DATE
8-AUG-88
MODEL : 9450-4
TIME BASE CARD
DWG NO: 9450-4-S1
SH 2 OF 11
ECO : 1083


A
B
C
D
E
4
3
2
1
VCC
M1
M2
M4
M8
CDCN
CD00
CD01
CD02
CD03
CD04
CD05
CD06
CD07
CD08
CD09
CD10
CD11
CD12
CD13
CD14
CD15
CD16
CD17
CD18
CD19
CD20
CD21
CD22
CD23
CD24
CD25
CD26
CD27
CD28
CD29
CD30
CD31
D00
D01
D02
D03
D04
D05
D06
D07
D08
D09
D10
D11
D12
D13
D14
D15
IRLDN
DRDCN
SEL
DRCK
CCK
CLDN
CCLN
TCDN
TC1N
MCT402
A3
A36
A12
_WPOD
_WFD
_WTC
_BA1
_WTD
A37
SM74HCT574
A38
SM74HCT574
A39
DAC703JP
BIT1 (MSB)
BIT2
BIT3
BIT4
BIT5
BIT6
BIT7
BIT8
BIT9
BIT10
BIT11
BIT12
BIT13
BIT14
BIT15
BIT16 (LSB)
VREF
VCC
GAIN
ZERO
CON
-VCC
VDD
VOUT
+15V
-15V
VCC
TDA
BC(9:16)
D(0:15)
CKL
_END
_TCTC
_TCLD
TCCK
_TCF
TAD
FOCK
A35
SM74F74
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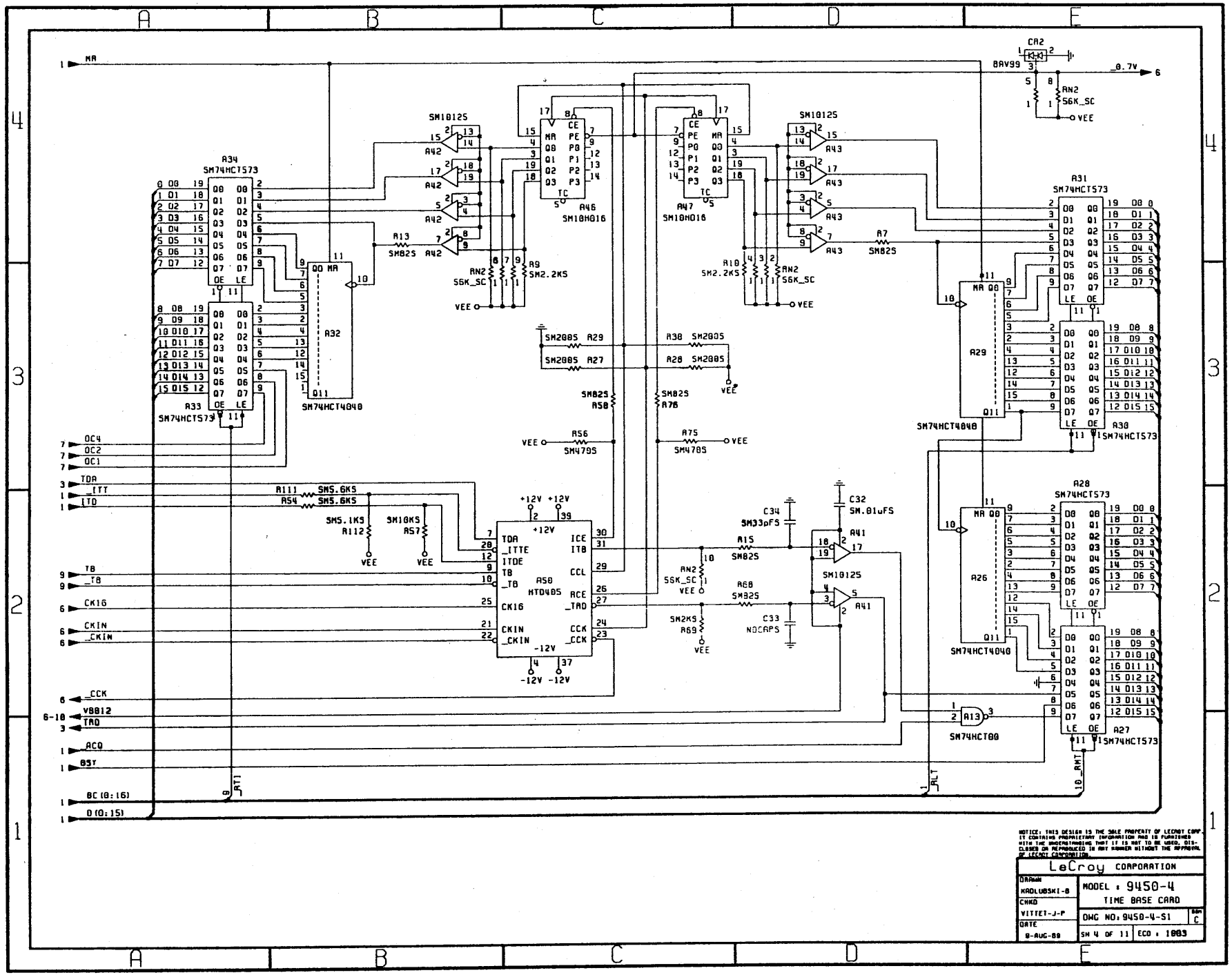
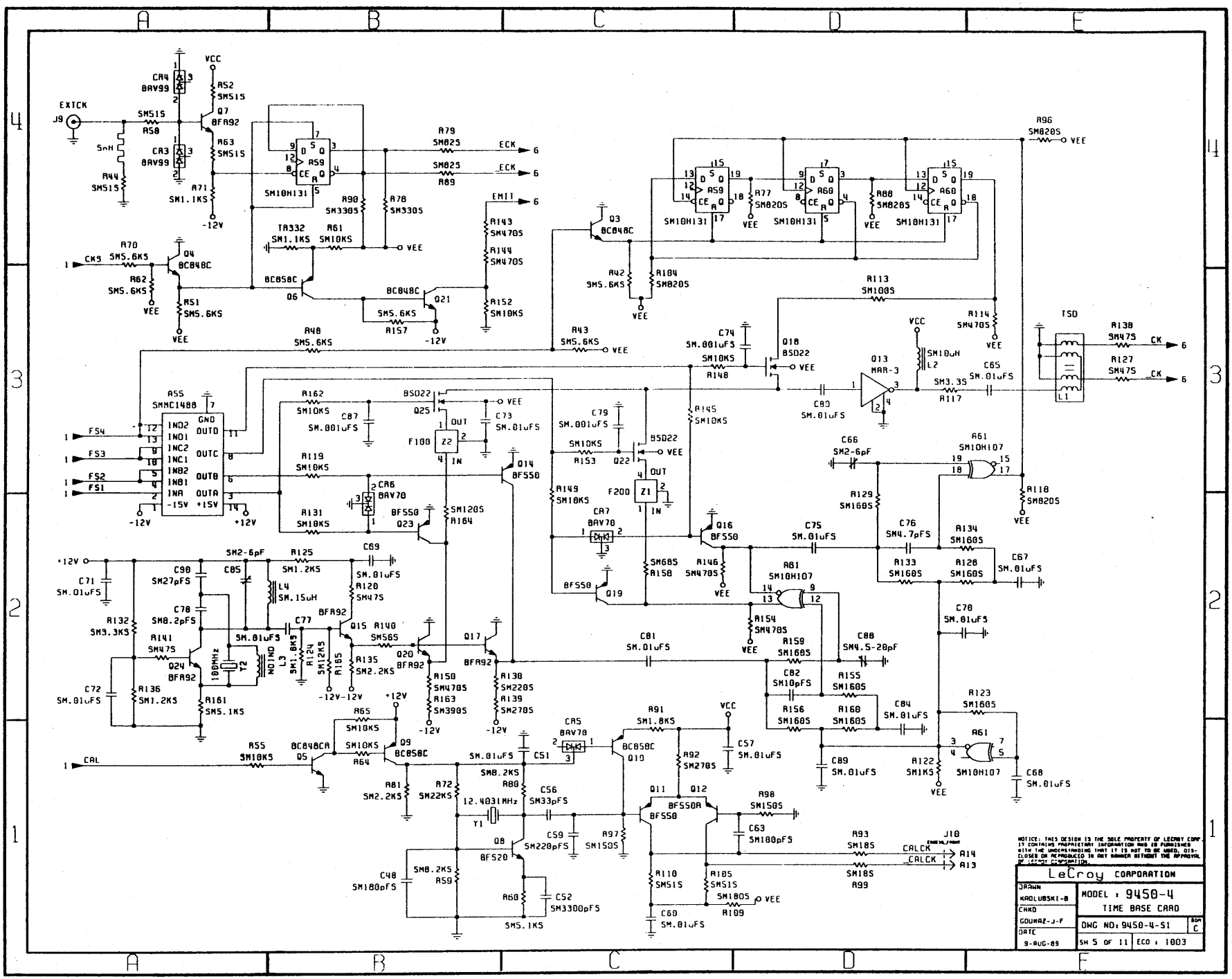
LeCroy CORPORATION
DRAWN
KADLUBSKI-B
CHKD
VITTET-J-P
DATE
9-AUG-88
MODEL : 9450-4
TIME BASE CARD
DWG NO: 9450-4-S1
REV C
SH 3 OF 11
ECO : 1003



LeCroy CORPORATION

DRAWN KADLUBSKI-B	MODEL : 9450-4 TIME BASE CARD
CHKD VITTET-J-P	DWG NO: 9450-4-S1 SIZE C
DATE 8-AUG-88	SH 4 OF 11 ECO : 1883


EXTCK
J9
VCC
-12V
VEE
+12V
+15V
-15V
ECK
EMIT
CK
CAL
CALCK
_CALCK
A14
A13
TSD
L1
L2
L3
L4
Y1
Y2
12.4031MHz
100MHz
LeCroy CORPORATION
DRAWN
KADLUBSKI-B
CHKD
GOUMAZ-J-F
DATE
9-AUG-89
MODEL : 9450-4
TIME BASE CARD
DWG NO: 9450-4-S1
BOM C
SH 5 OF 11
ECO : 1003
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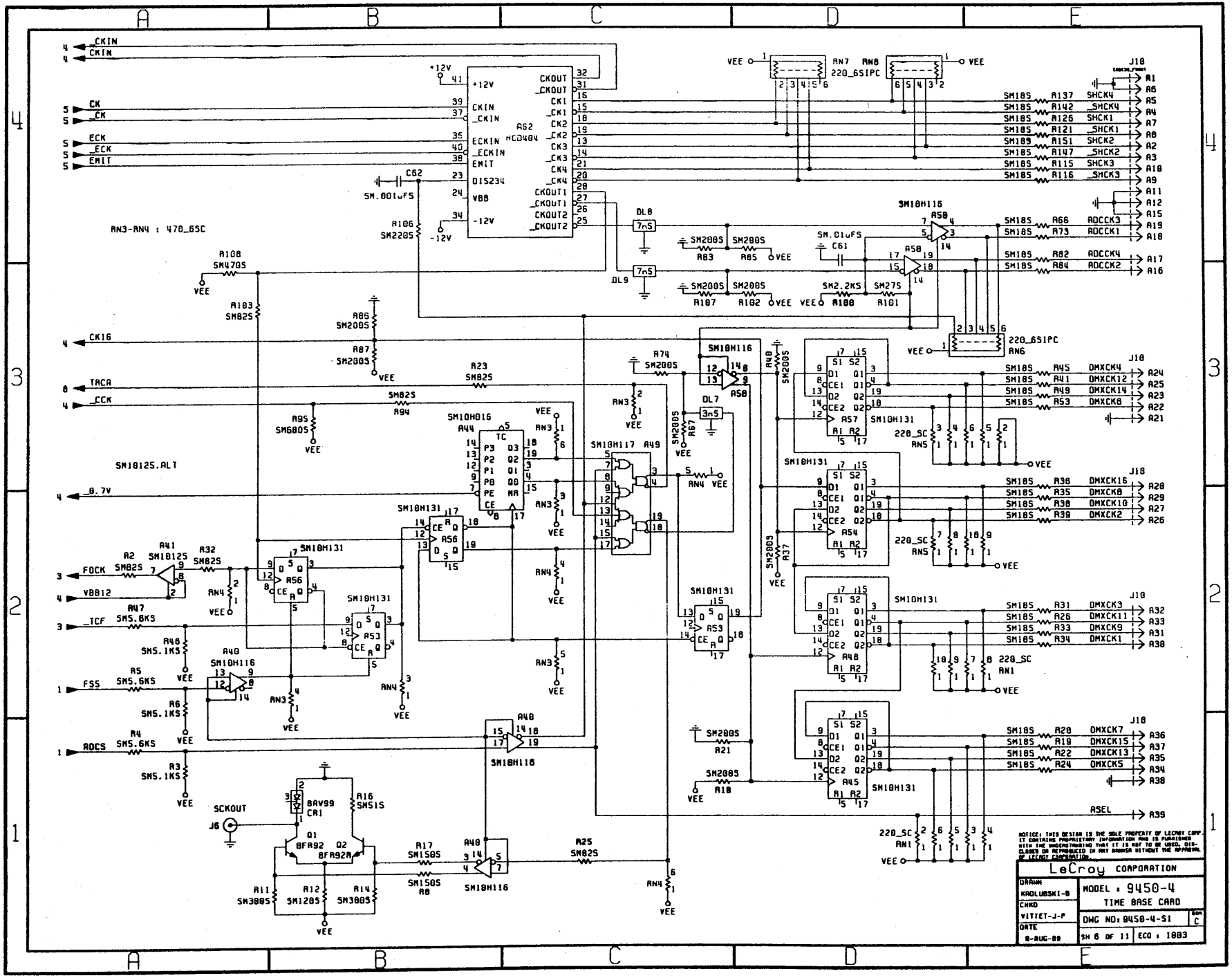
AS2 MC10404
+12V
-12V
CKOUT
_CKOUT
CK1
_CK1
CK2
_CK2
CK3
_CK3
CK4
_CK4
CKOUT1
_CKOUT1
CKOUT2
_CKOUT2
CKIN
_CKIN
ECKIN
_ECKIN
EMIT
DIS234
VBB
AN3-AN4 : 470_6SC
SM10125.ALT
SM10H116
SM10H131
SM10H117
SM10H016
220_6SIPC
220_SC
SCKOUT
J6
J10
LeCroy CORPORATION
MODEL : 9450-4
TIME BASE CARD
DWG NO: 9450-4-S1
SH 6 OF 11
ECO : 1003
DRAWN KAOLUBSKI-B
CHKD VITTET-J-P
DATE 8-AUG-89
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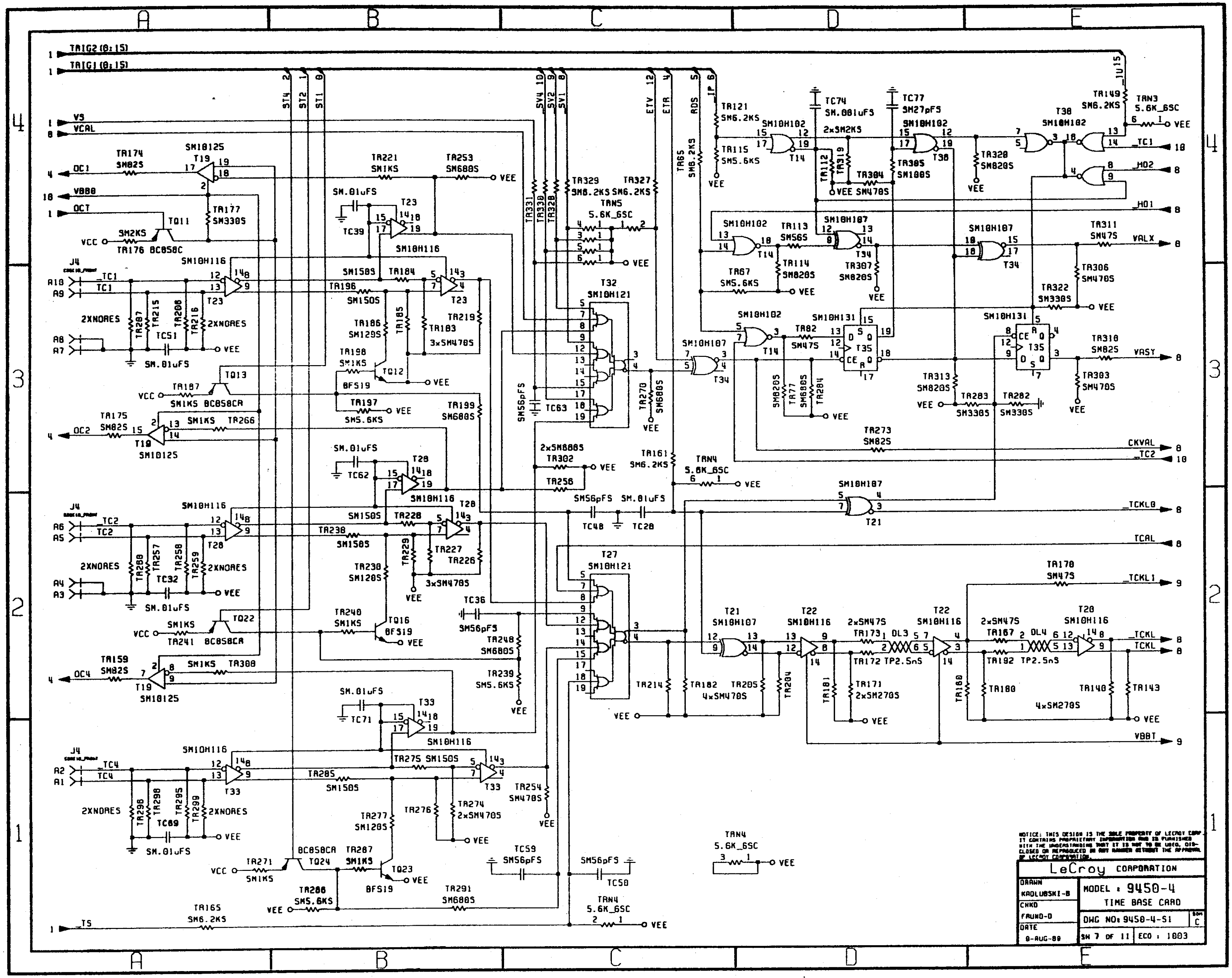
TRIG2(0:15)
TRIG1(0:15)
VS
VCAL
OC1
VBB0
OCT
OC2
OC4
_TS
_TC1
_H02
_H01
VALX
VASY
CKVAL
_TC2
_TCKL0
TCAL
_TCKL1
_TCKL
TCKL
VBBT
VEE
VCC
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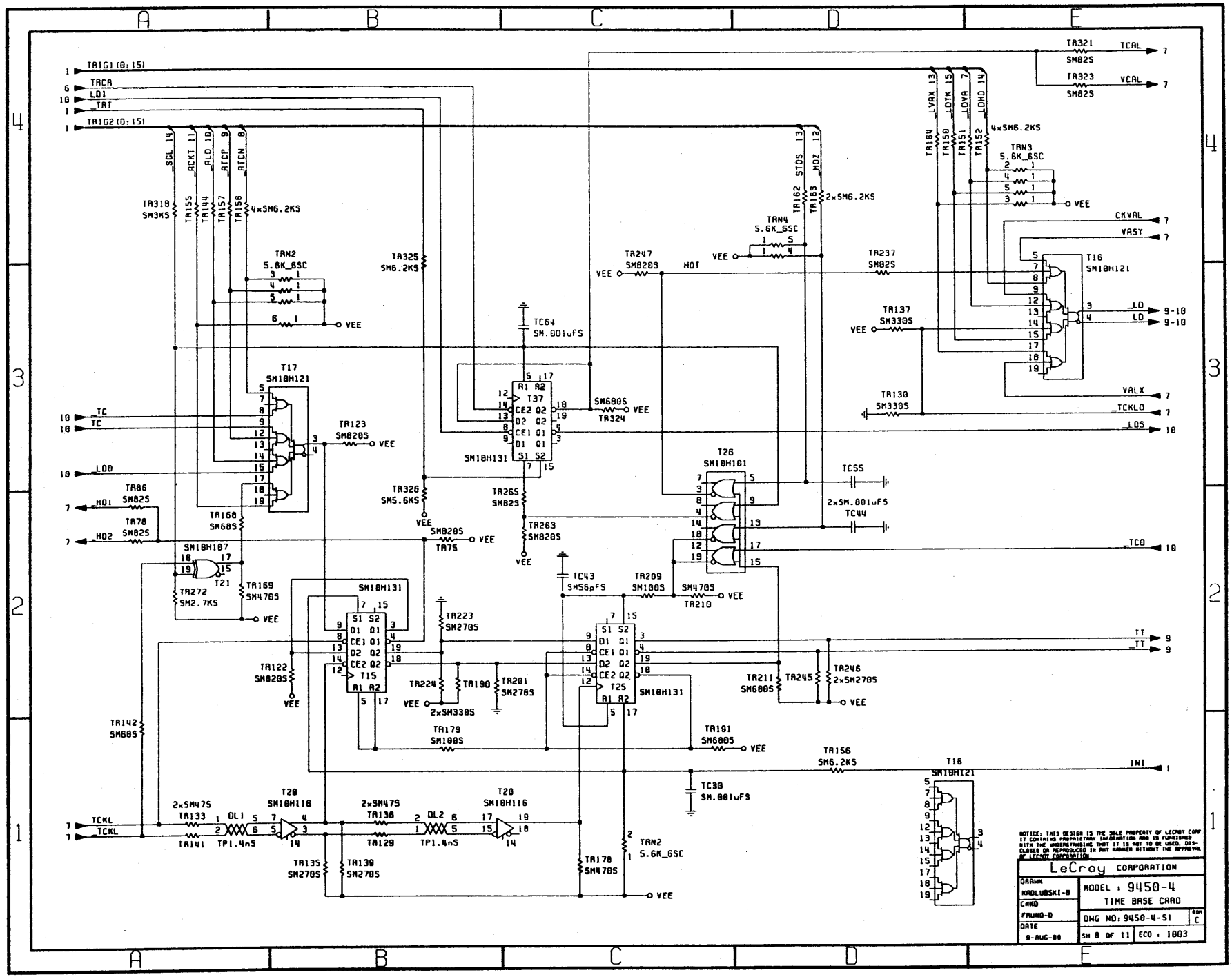
LeCroy CORPORATION
DRAWN KADLUBSKI-B
CHKD FRUND-D
DATE 8-AUG-89
MODEL : 9450-4
TIME BASE CARD
DWG NO: 9450-4-S1
REV C
SH 7 OF 11
ECO : 1003


TRIG1(0:15)
TACA
LO1
_TRT
TRIG2(0:15)
TA321 SM82S TCAL
TA323 SM82S VCAL
4xSM6.2KS
TAN3 5.6K_6SC
CKVAL
VASY
T16 SM10H121
TA237 SM82S
TA247 SM82S HOT
TAN4 5.6K_6SC
TA318 SM3KS
TAN2 5.6K_6SC
TA325 SM6.2KS
TC64 SM.001uFS
T17 SM10H121
TA123 SM82S
TA137 SM330S
TA130 SM330S
VALX
_TCKLO
_LOS
_LD 9-10
LD 9-10
TC
_LOD
TA86 SM82S _HO1
TA78 SM82S _HO2
TA168 SM68S
SM10H107 T21
TA272 SM2.7KS
TA169 SM470S
T37 SM10H131
TA324 SM680S
TA326 SM5.6KS
TA265 SM82S
TA263 SM820S
TA75 SM820S
T26 SM10H101
TC55 2xSM.001uFS
TC44
_TC0
TC43 SM56pFS
TA209 SM100S
TA210 SM470S
T15 T25 SM10H131
TA223 SM270S
TA224 TA190 TA201 SM270S
2xSM330S
TA122 SM820S
TA211 SM680S
TA245 TA246 2xSM270S
TT
_TT
TA142 SM68S
TA179 SM100S
TA181 SM680S
TA156 SM6.2KS
INI
TC30 SM.001uFS
T16 SM10H121
TCKL
_TCKL
2xSM47S TA133 TA141 DL1 TP1.4nS
T28 SM10H116
2xSM47S TA136 TA129 DL2 TP1.4nS
T28 SM10H116
TA135 SM270S
TA139 SM270S
TA178 SM470S
TAN2 5.6K_6SC
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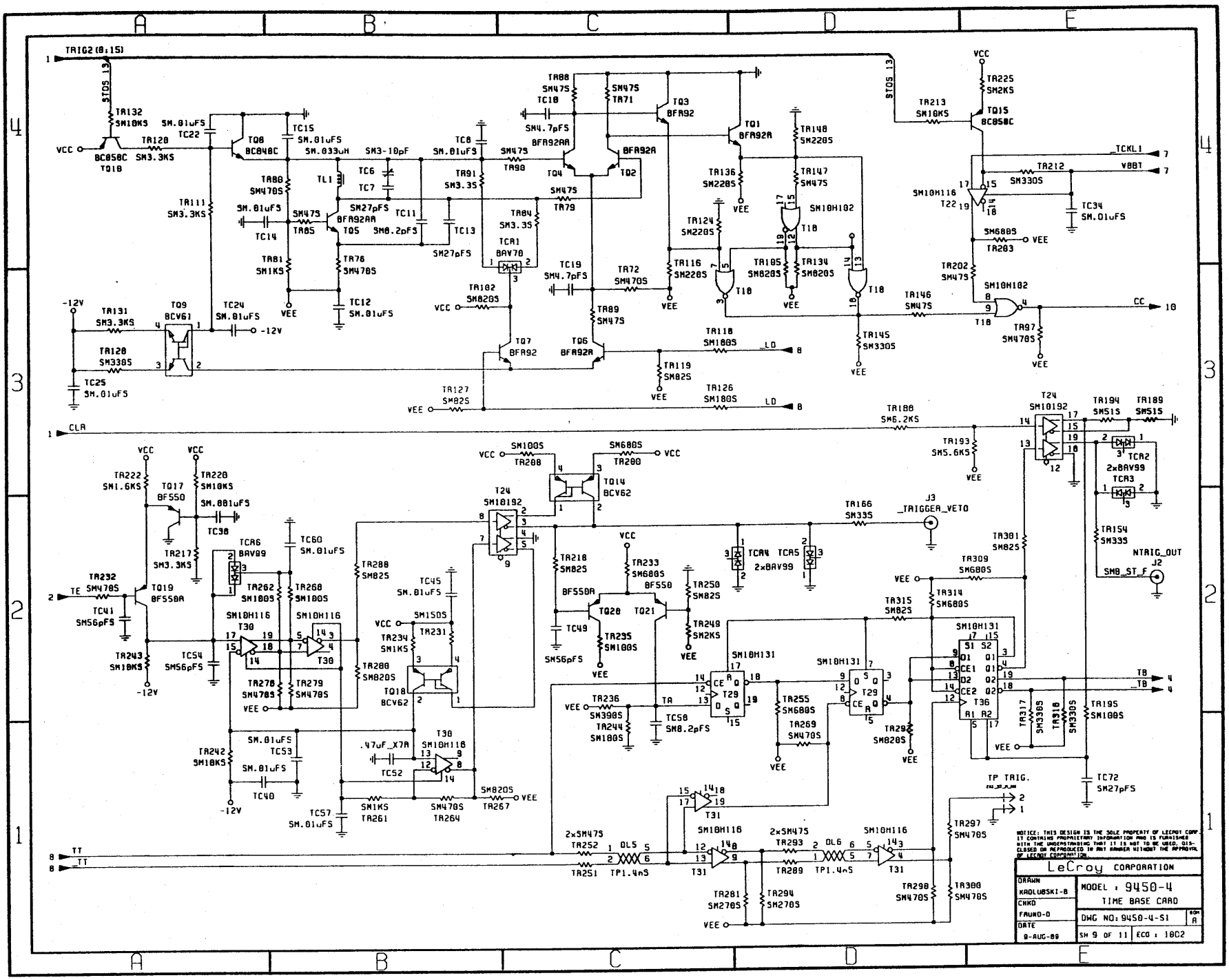
LeCroy CORPORATION
DRAWN KADLUBSKI-B
CHKD FRUND-D
DATE 8-AUG-88
MODEL : 9450-4
TIME BASE CARD
DWG NO: 9450-4-S1
RDM C
SH 8 OF 11
ECO : 1003


TRIG2(0:15)
STOS 13
TA132 SM10KS
TC22 SM.01uFS
TC15 SM.01uFS
TA128 SM3.3KS
TQ8 BC848C
BC858C TQ18
VCC
TL1
TC6
TC7
SM3-10pF
TC8 SM.01uFS
TA88 SM47S
TC18 SM4.7pFS
TA71 SM47S
TQ3 BFR92
TQ1 BFR92A
BFR92AA TQ4
BFR92A TQ2
TA91 SM3.3S
TA90 SM47S
TA79 SM47S
TA148 SM220S
TA136 SM220S
TA147 SM47S
TA124 SM220S
SM10H102 T18
TA111 SM3.3KS
SM.01uFS TC14
TA80 SM470S
TA85 SM47S
SM27pFS BFR92AA TQ5
TC11 SM8.2pFS
TC13 SM27pFS
TA84 SM3.3S
TCA1 BAV70
TA81 SM1KS
TA76 SM470S
TC19 SM4.7pFS
TA72 SM470S
TA116 SM220S
TA105 SM820S
TA134 SM820S
TA102 SM820S
TA89 SM47S
TA118 SM100S
_LD 8
TQ7 BFR92
TQ6 BFR92A
TA119 SM82S
TA127 SM82S
TA126 SM100S
TA145 SM330S
TA146 SM47S
TA97 SM470S
CC 10
-12V
TA131 SM3.3KS
TQ9 BCV61
TC24 SM.01uFS
TA120 SM330S
TC25 SM.01uFS
VEE
TA213 SM10KS
TA225 SM2KS
TQ15 BC858C
_TCKL1 7
TA212 SM330S
VBBT 7
SM10H116 T22
TC34 SM.01uFS
SM680S TA203
TA202 SM47S
SM10H102
CLR
TA186 SM6.2KS
TA193 SM5.6KS
T24 SM10192
TA194 SM51S
TA189 SM51S
TCA2 2x8AV99
TCA3
TA222 SM1.6KS
TQ17 BF550
TA220 SM10KS
SM.001uFS TC38
TA217 SM3.3KS
TCA6 BAV99
TC60 SM.01uFS
TA232 TE SM470S
TQ19 BF550A
TC41 SM56pFS
TA243 SM10KS
-12V
TA262 SM100S
TA268 SM100S
SM10H116 T30
TC54 SM56pFS
TA270 SM470S
TA279 SM470S
VEE
TA288 SM82S
TC45 SM.01uFS
SM150S
TA234 SM1KS
TA231
TA280 SM820S
TQ18 BCV62
SM100S TA208
SM680S TA200
VCC
TQ14 BCV62
TA218 SM82S
TA233 SM680S
BF550A TQ20 TQ21
TA250 SM82S
TA249 SM2KS
TC49 SM56pFS
TA235 SM100S
TA166 SM33S
J3 _TRIGGER_VETO
TCA4 TCA5 2x8AV99
TA309 SM680S
TA314 SM680S
TA315 SM82S
TA301 SM82S
TA154 SM33S
NTRIG_OUT
SMB_ST_F J2
SM10H131
TA236 SM390S
TA244 SM100S
TC58 SM8.2pFS
TA255 SM680S
TA269 SM470S
TA295 SM820S
TA317 SM330S
TA318 SM330S
TA195 SM100S
TB 4
TC72 SM27pFS
TP TRIG.
TA242 SM10KS
TC53 SM.01uFS
TC40 SM.01uFS
TC57 SM.01uFS
.47uF_X7R TC52
SM1KS TA261
SM470S TA264
SM820S TA267
TT 8
_TT 8
2xSM47S TA252
DL5 TP1.4nS
TA251
T31
TA297 SM470S
TA293 TA289
TA281 SM270S
TA294 SM270S
TA298 SM470S
TA300 SM470S
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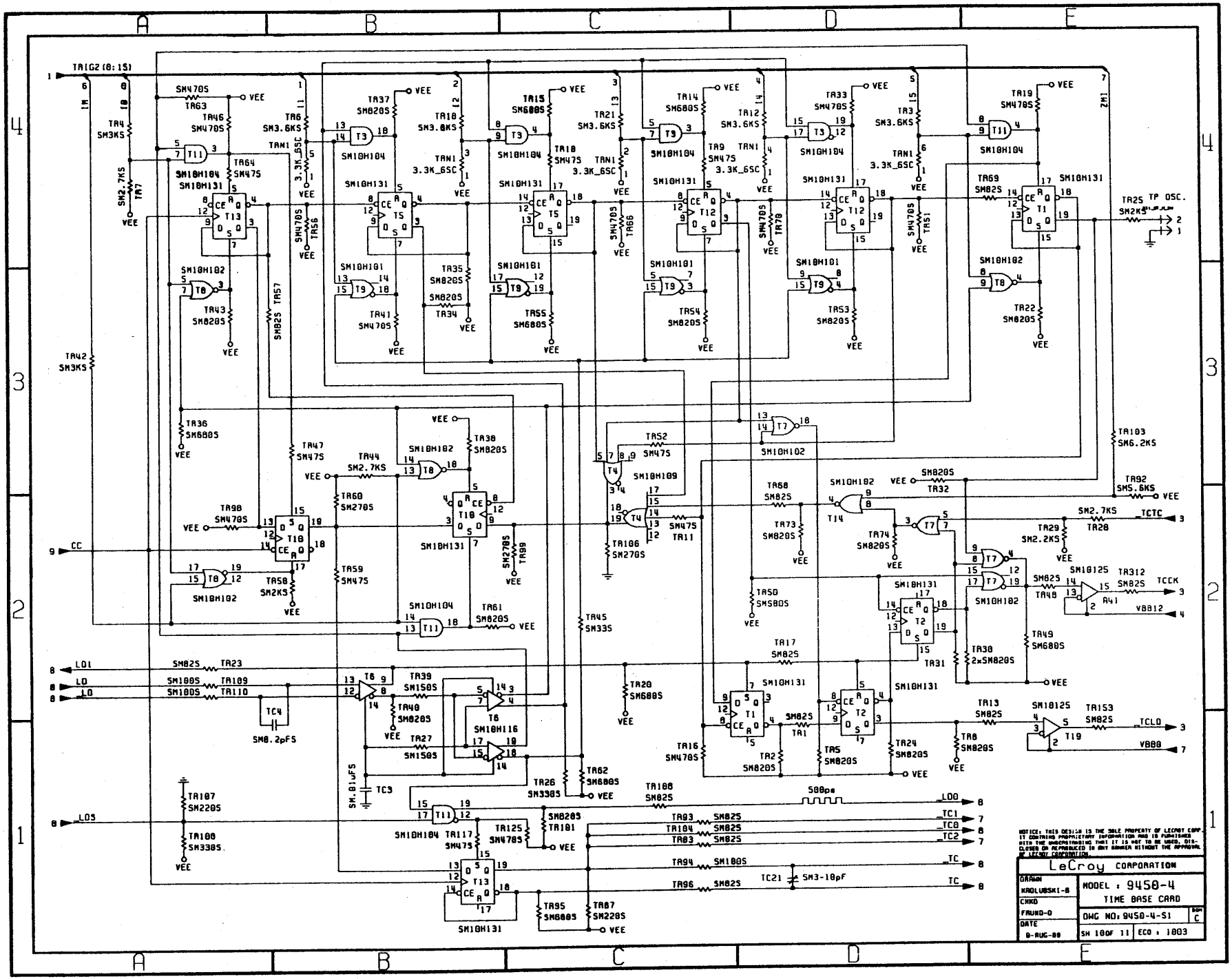
LeCroy CORPORATION
DRAWN KADLUBSKI-B
CHKD
FAUND-D
DATE 9-AUG-89
MODEL : 9450-4
TIME BASE CARD
DWG NO: 9450-4-S1
SH 9 OF 11
ECO : 1002


LeCroy CORPORATION
MODEL : 9450-4
TIME BASE CARD
DWG NO: 9450-4-S1
SH 1OF 11
ECO : 1003
DRAWN KROLUBSKI-B
CHKD
FRUND-D
DATE 9-AUG-89
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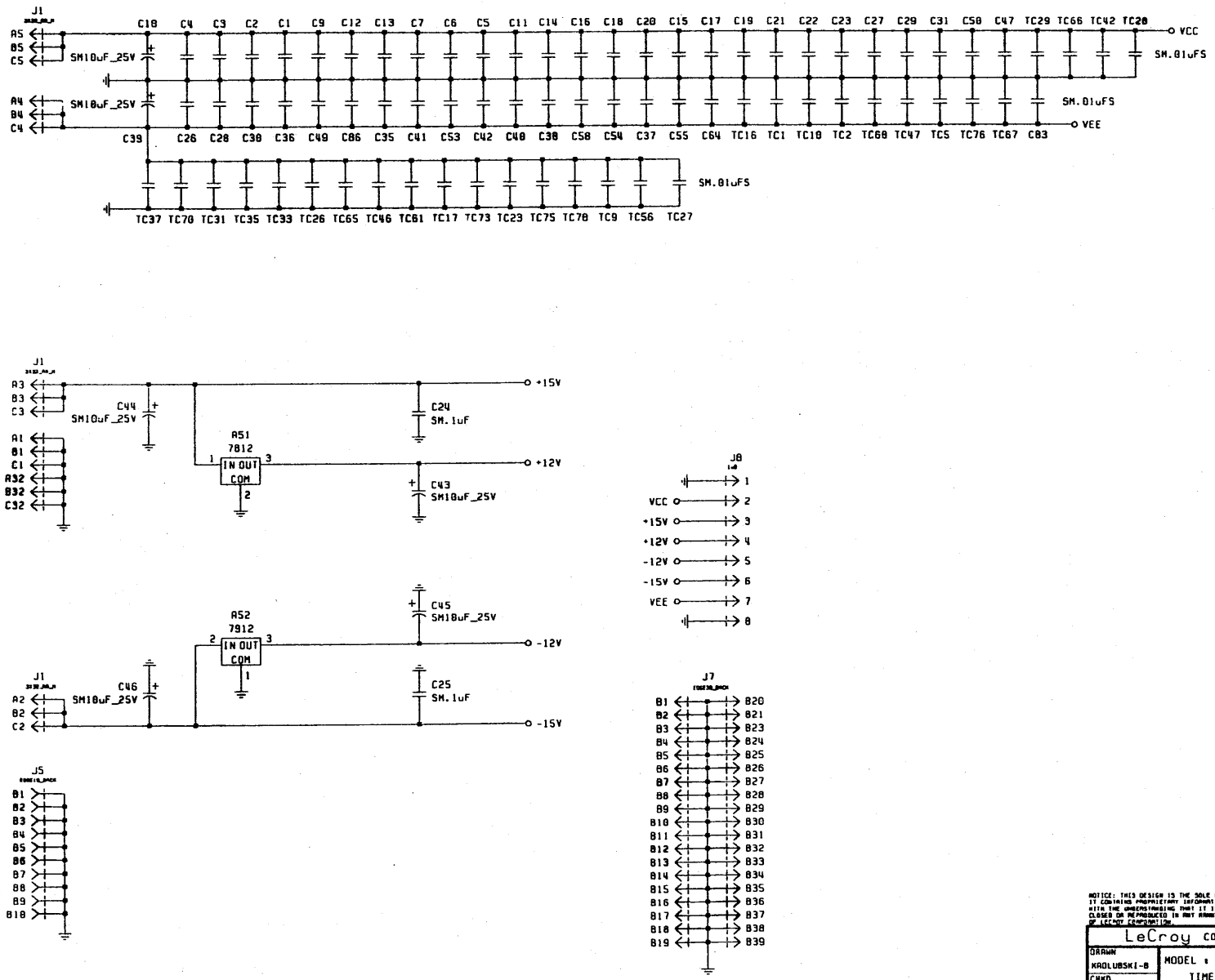
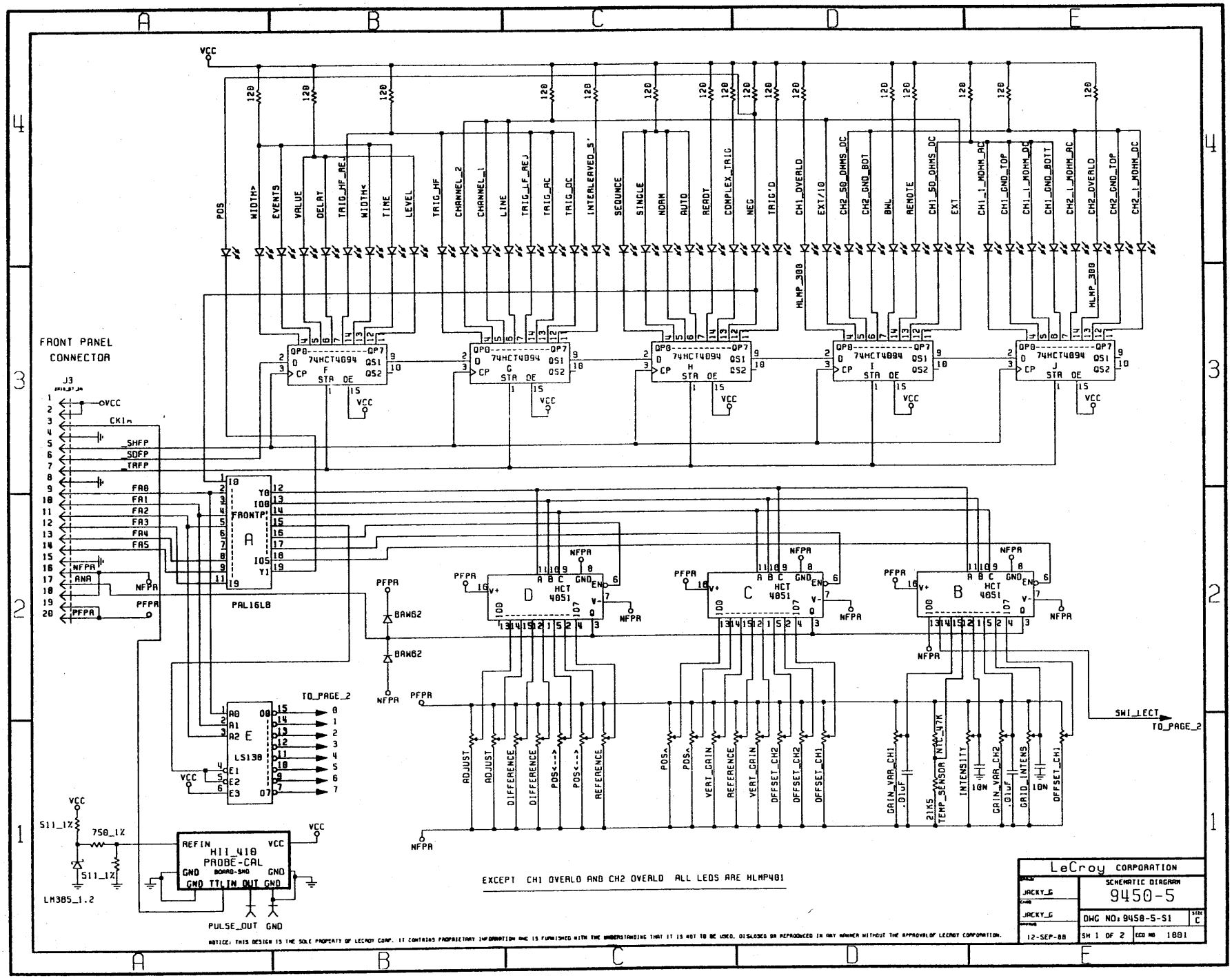
TRIG2(8:1S)
CC
LOI
LO
LO
LOS
TP OSC.
TCTC
TCCK
TCLD
VB812
VB88
500ps
_LOO
_TC1
_TCO
_TC2
_TC
_TC
TC4
SM8.2pFS
TC3
SM.01uFS
TC21
SM3-18pF



LeCroy CORPORATION

DRAWN KADLUBSKI-B	MODEL # 9450-4 TIME BASE CARD
CHKD VITTET-J-P	DWG NO: 9458-4-S1 SGN C
DATE 9-AUG-89	SH 11OF 11 ECO # 1803


FRONT PANEL CONNECTOR
J3
PAL16L8
LS138
HII_410 PROBE-CAL
LM385_1.2
74HCT4094
HCT 4051
BAW62
TO_PAGE_2
SWI_LECT
EXCEPT CH1 OVERLD AND CH2 OVERLD ALL LEDS ARE HLMP481
LeCroy CORPORATION
SCHEMATIC DIAGRAM
9450-5
DWG NO: 9450-5-S1
SH 1 OF 2
ECO NO 1881
12-SEP-88
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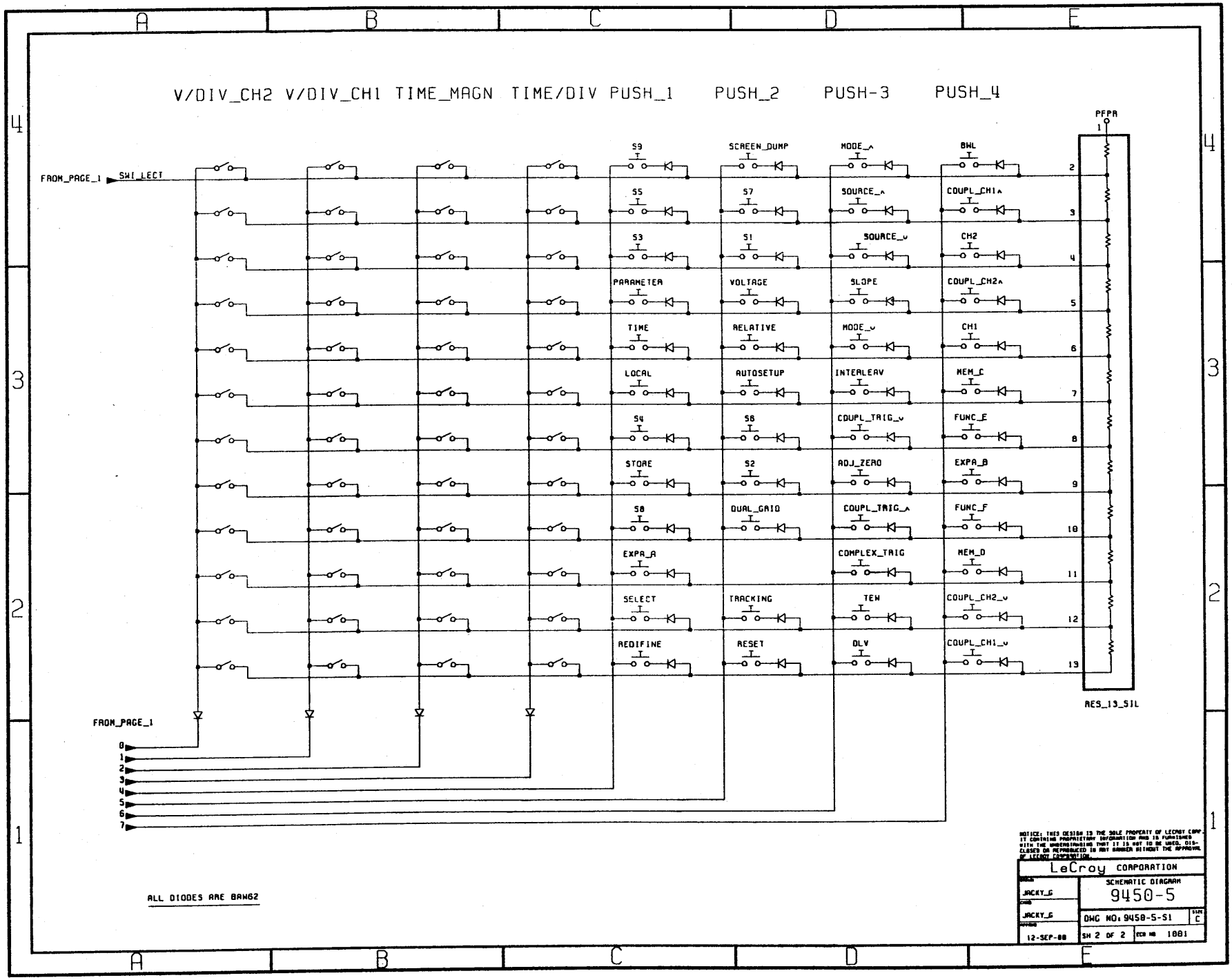
V/DIV_CH2 V/DIV_CH1 TIME_MAGN TIME/DIV PUSH_1 PUSH_2 PUSH-3 PUSH_4
FROM_PAGE_1
SWI_LECT
S9
SCREEN_DUMP
MODE_^
BWL
S5
S7
SOURCE_^
COUPL_CH1^
S3
S1
SOURCE_v
CH2
PARAMETER
VOLTAGE
SLOPE
COUPL_CH2^
TIME
RELATIVE
MODE_v
CH1
LOCAL
AUTOSETUP
INTERLEAV
MEM_C
S4
S6
COUPL_TRIG_v
FUNC_E
STORE
S2
ADJ_ZERO
EXPA_B
S0
QUAL_GAIO
COUPL_TRIG_^
FUNC_F
EXPA_A
COMPLEX_TRIG
MEM_D
SELECT
TRACKING
TEW
COUPL_CH2_v
REDIFINE
RESET
DLV
COUPL_CH1_v
PFPR
RES_13_SIL
FROM_PAGE_1
0
1
2
3
4
5
6
7
ALL DIODES ARE BAW62
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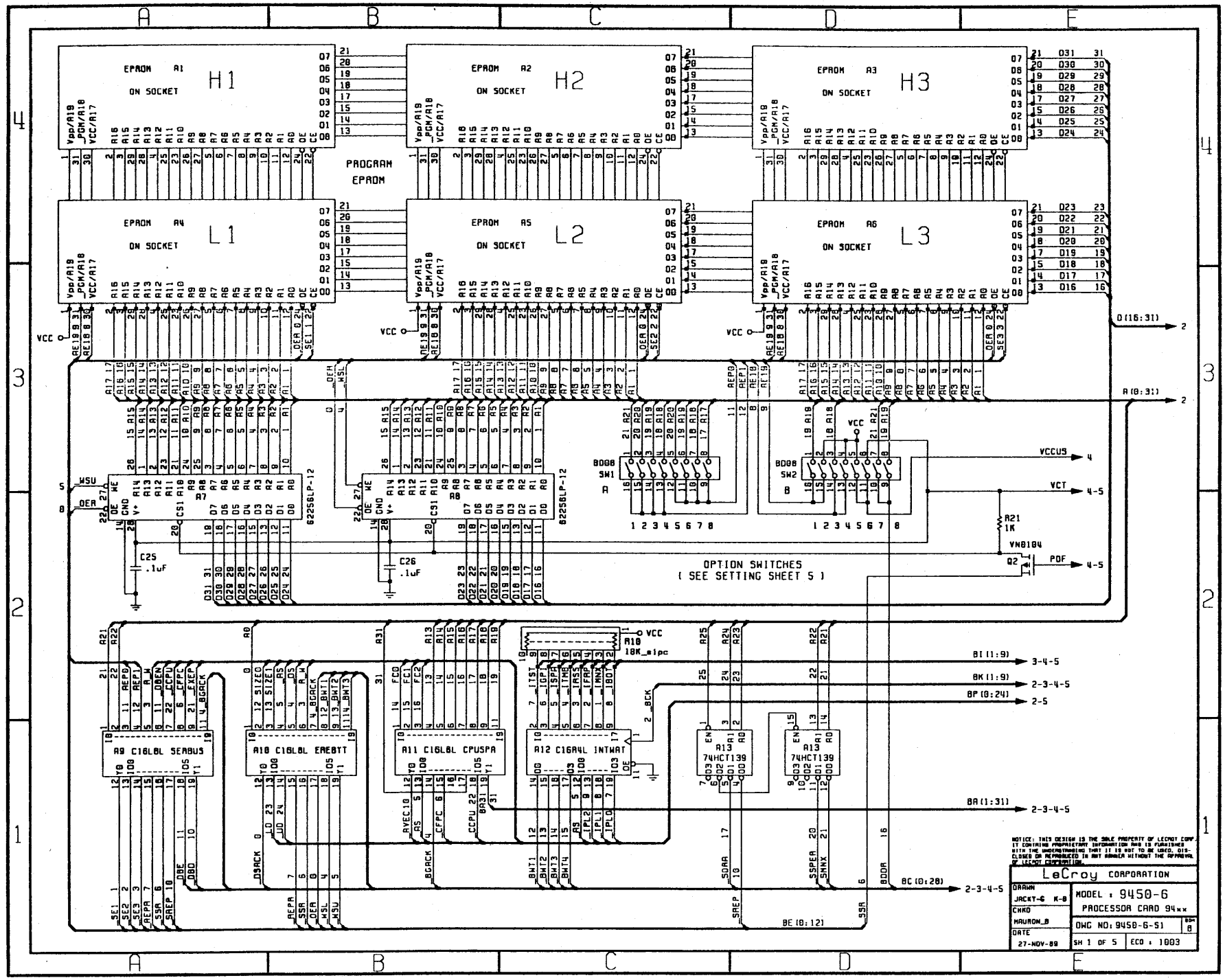
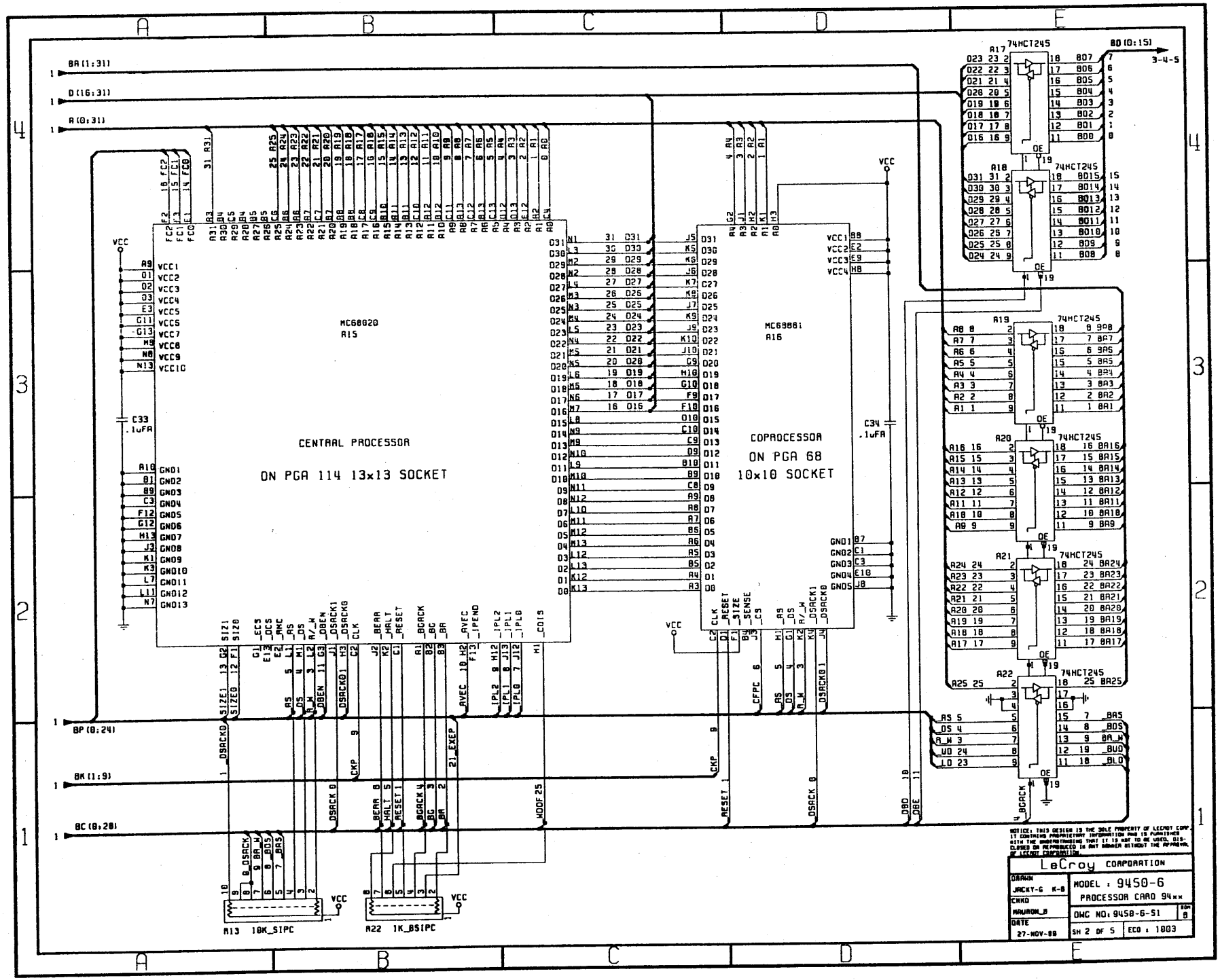
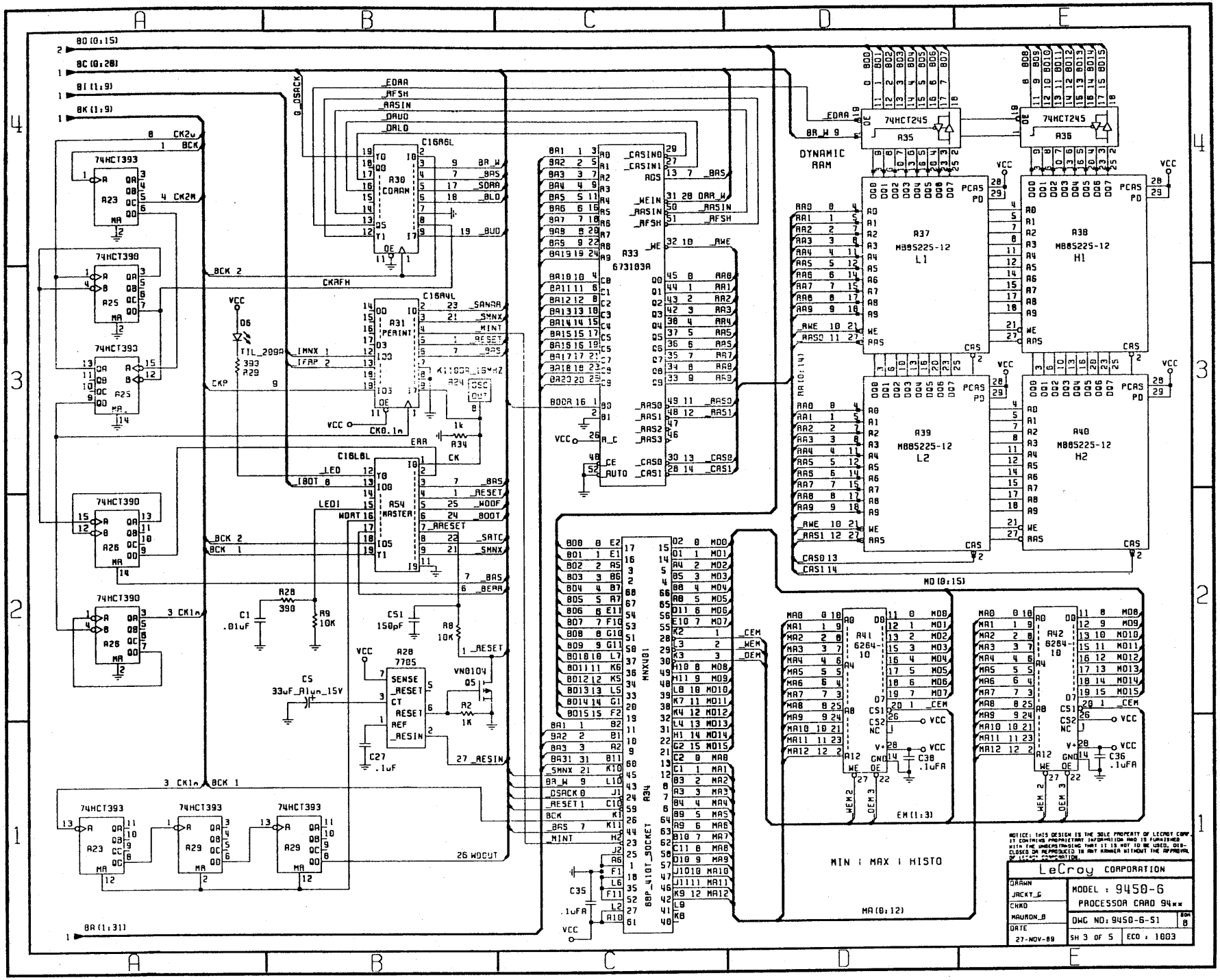
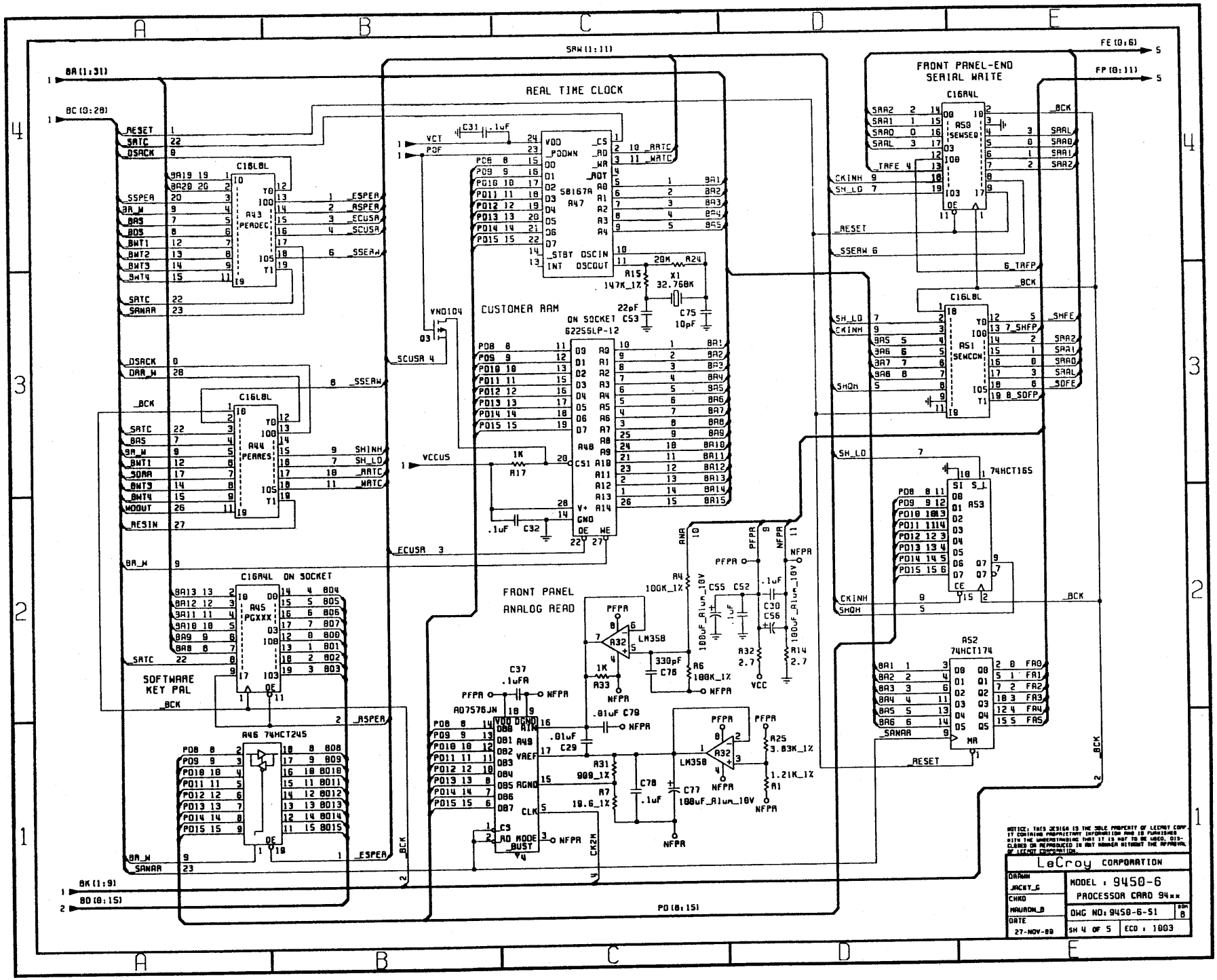
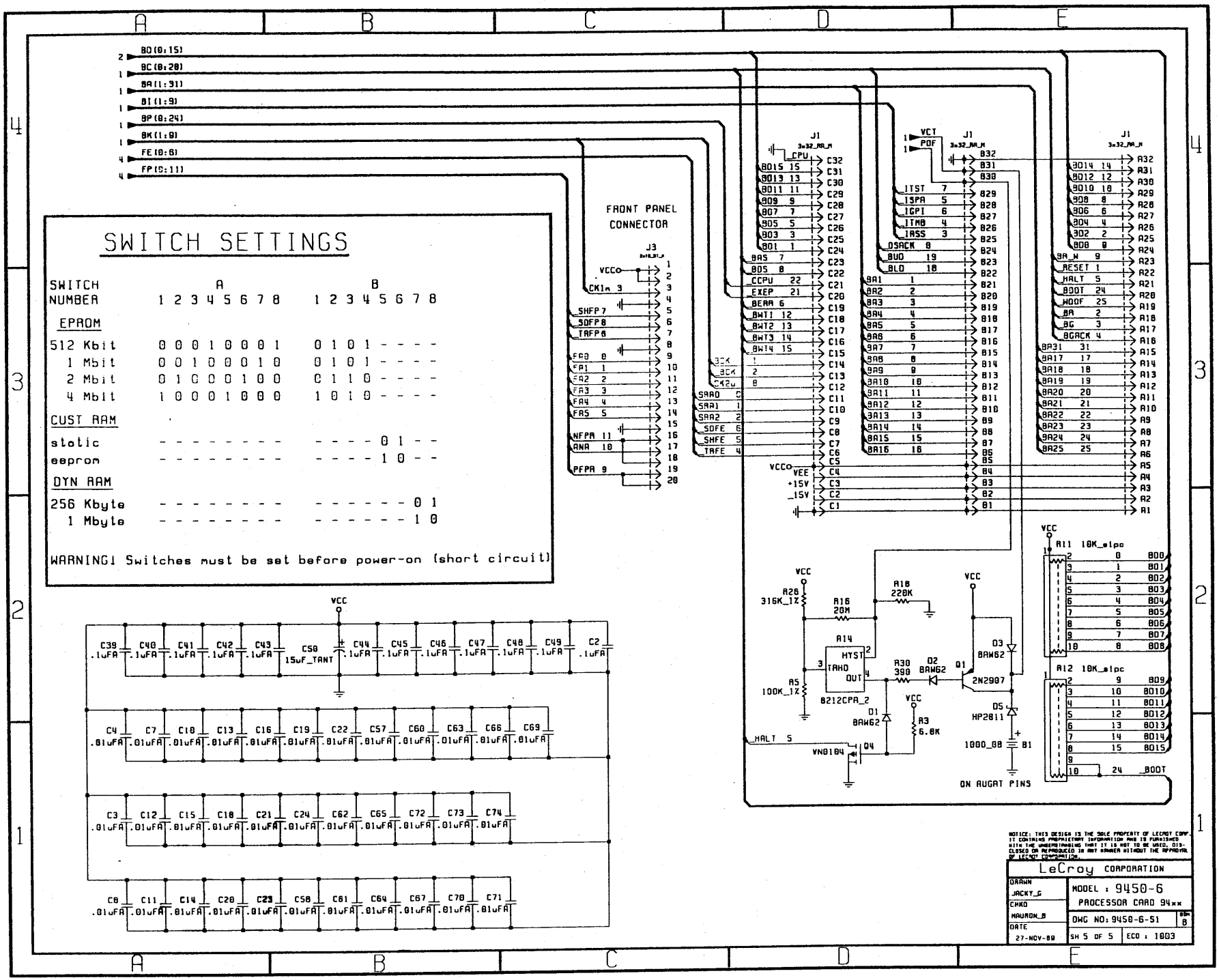
LeCroy CORPORATION
SCHEMATIC DIAGRAM
9450-5
JACKY_G
JACKY_G
12-SEP-88
DWG NO: 9450-5-S1
SIZE C
SH 2 OF 2
ECN NO 1081

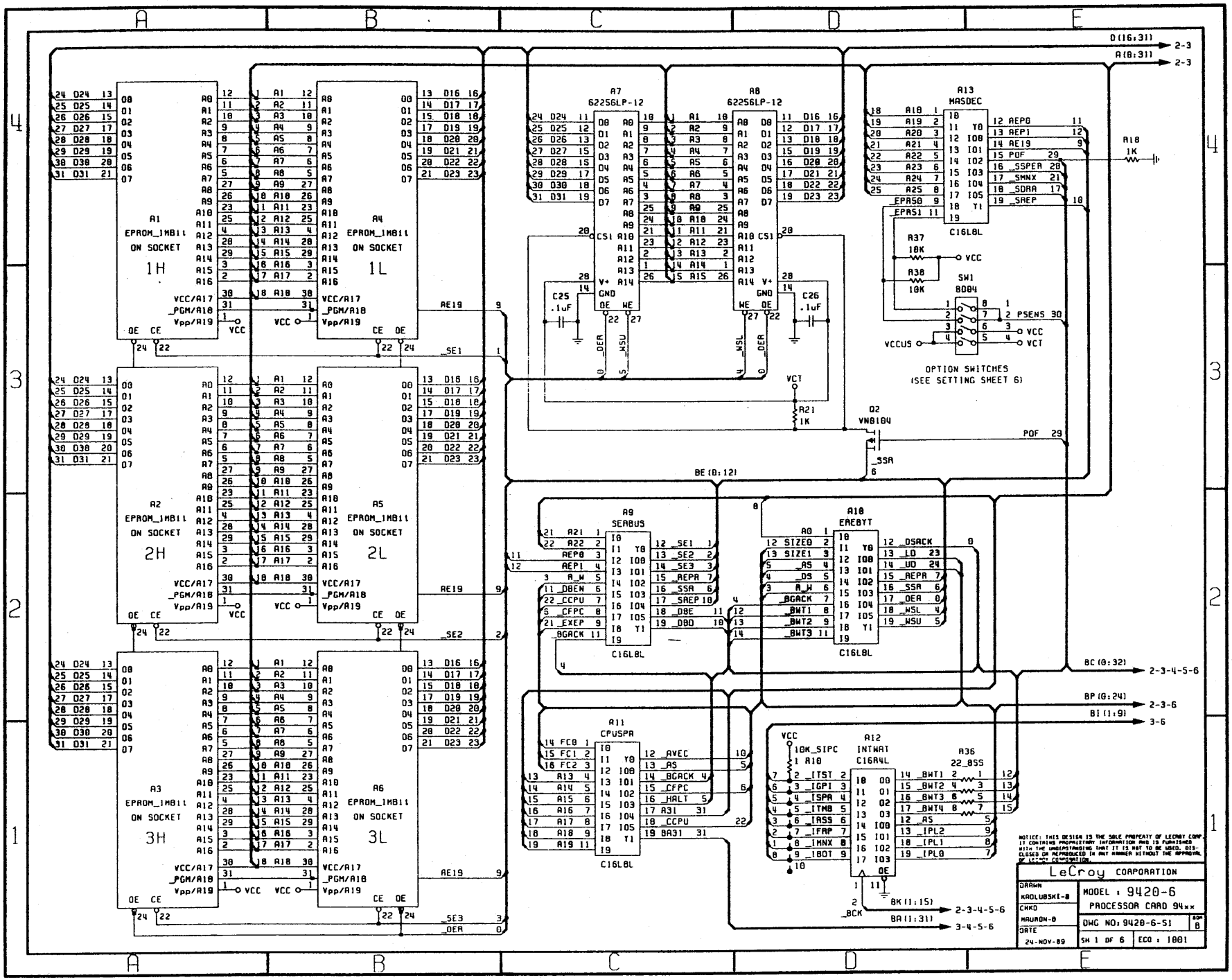

EPROM A1
ON SOCKET
H1
EPROM A2
ON SOCKET
H2
EPROM A3
ON SOCKET
H3
PROGRAM EPROM
EPROM A4
ON SOCKET
L1
EPROM A5
ON SOCKET
L2
EPROM A6
ON SOCKET
L3
D(16:31)
A(0:31)
VCC5
VCT
POF
OPTION SWITCHES
(SEE SETTING SHEET 5)
BI(1:9)
BK(1:9)
BP(0:24)
BA(1:31)
BC(0:28)
BE(0:12)
A9 C16L8L SEABUS
A10 C16L8L EREBTT
A11 C16L8L CPUSPA
A12 C16A4L INTWAT
A13 74HCT139
LeCroy CORPORATION
MODEL : 9450-6
PROCESSOR CARD 94xx
DWG NO: 9450-6-S1
SH 1 OF 5
ECO : 1003
27-NOV-89

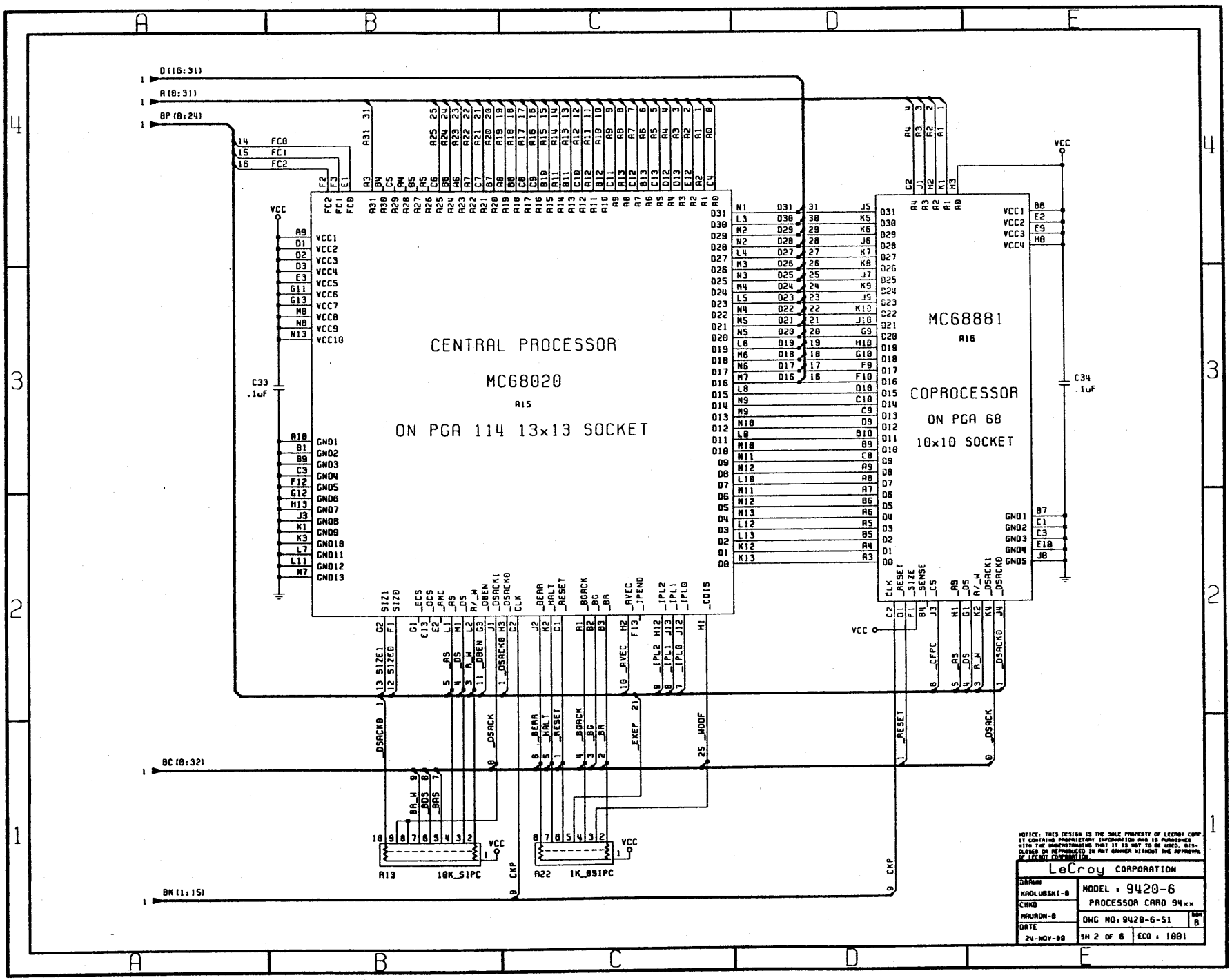

BA(1:31)
D(16:31)
A(0:31)
BD(0:15)
3-4-5
MC68020
A15
CENTRAL PROCESSOR
ON PGA 114 13x13 SOCKET
MC68881
A16
COPROCESSOR
ON PGA 68
10x10 SOCKET
74HCT245
A17
A18
A19
A20
A21
A22
C33
.1uFA
C34
.1uFA
BP(0:24)
BK(1:9)
BC(0:28)
A13 10K_SIPC
A22 1K_8SIPC
LeCroy CORPORATION
MODEL : 9450-6
PROCESSOR CARD 94xx
DWG NO: 9450-6-S1
SH 2 OF 5
ECO : 1803
DRAWN JACKY-G K-B
CHKD MAHARAM_B
DATE 27-NOV-88

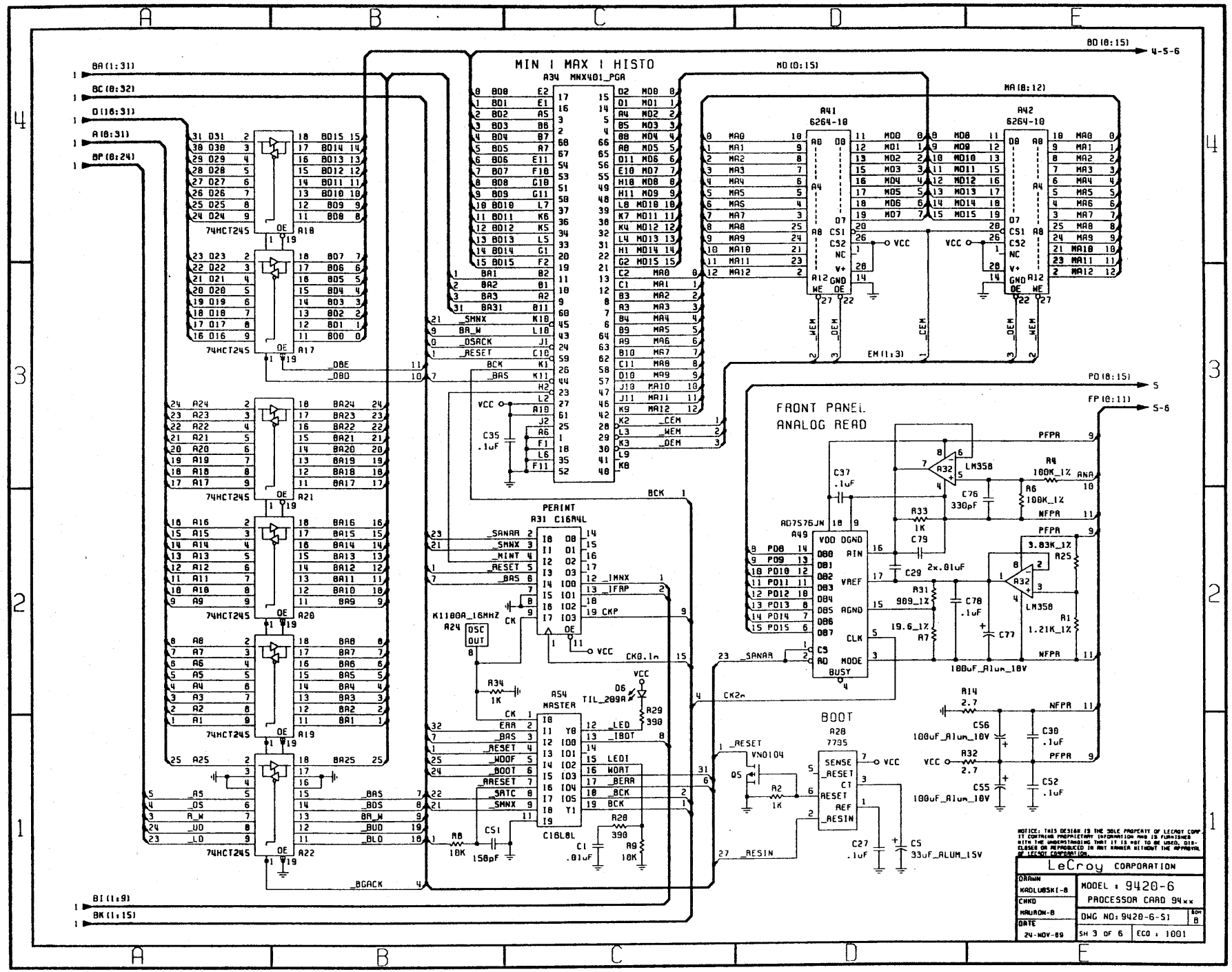

DYNAMIC RAM
MIN : MAX : HISTO
LeCroy CORPORATION
MODEL : 9450-6
PROCESSOR CARD 94xx
DWG NO: 9450-6-S1
SH 3 OF 5
ECO : 1803
DRAWN JACKT_G
CHKD MAURON_B
DATE 27-NOV-89

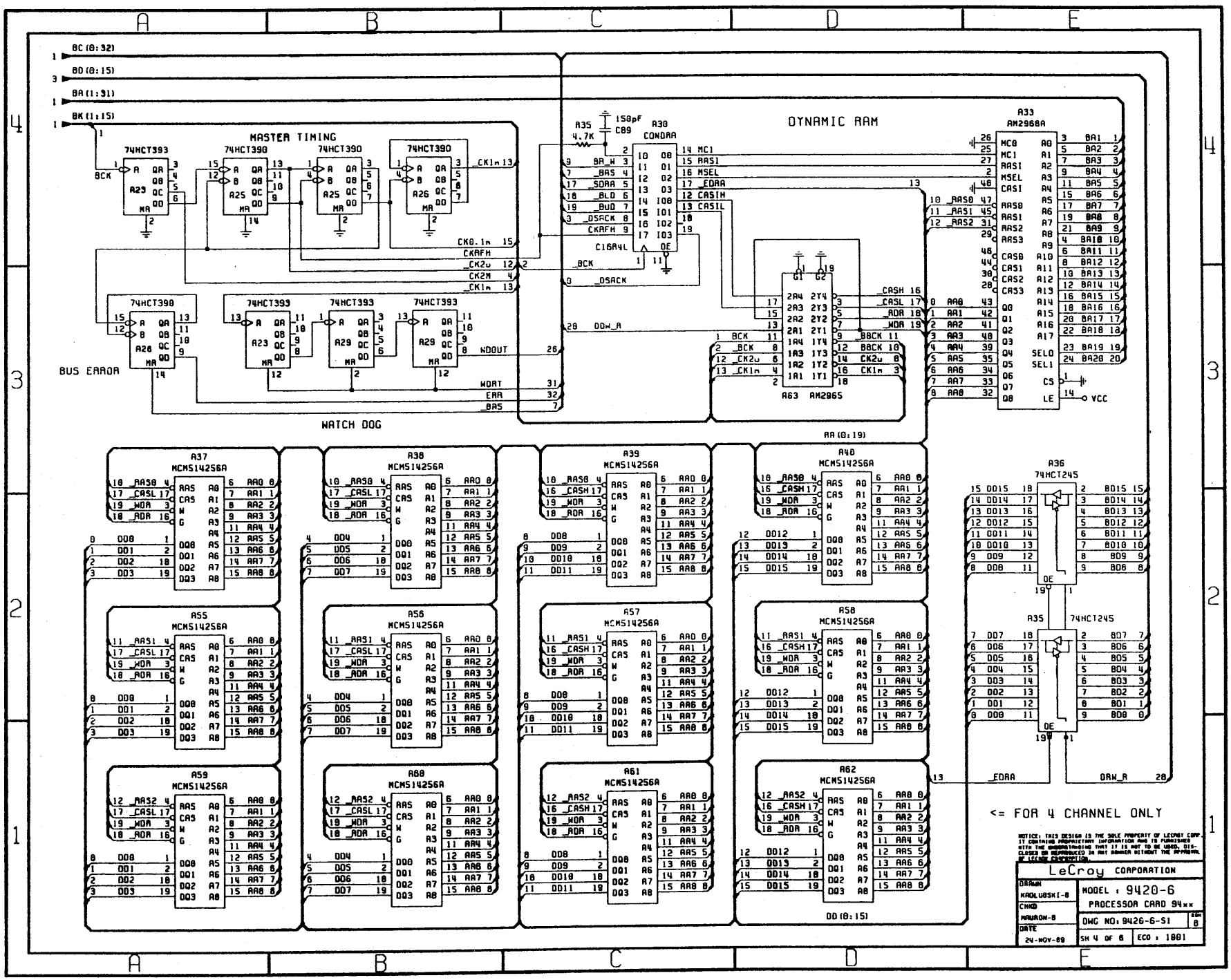

REAL TIME CLOCK
CUSTOMER RAM
ON SOCKET CS3
6225SLP-12
FRONT PANEL
ANALOG READ
SOFTWARE
KEY PAL
FRONT PANEL-END
SERIAL WRITE
C16A4L ON SOCKET
A46 74HCT245
A52
74HCT174
74HCT165
LM358
AD7576JN
58167A
32.768K
LeCroy CORPORATION
MODEL : 9450-6
PROCESSOR CARD 94xx
DWG NO: 9450-6-S1
SH 4 OF 5
ECO : 1003
DRAWN
JACKY_G
CHKD
MAURON_B
DATE
27-NOV-89

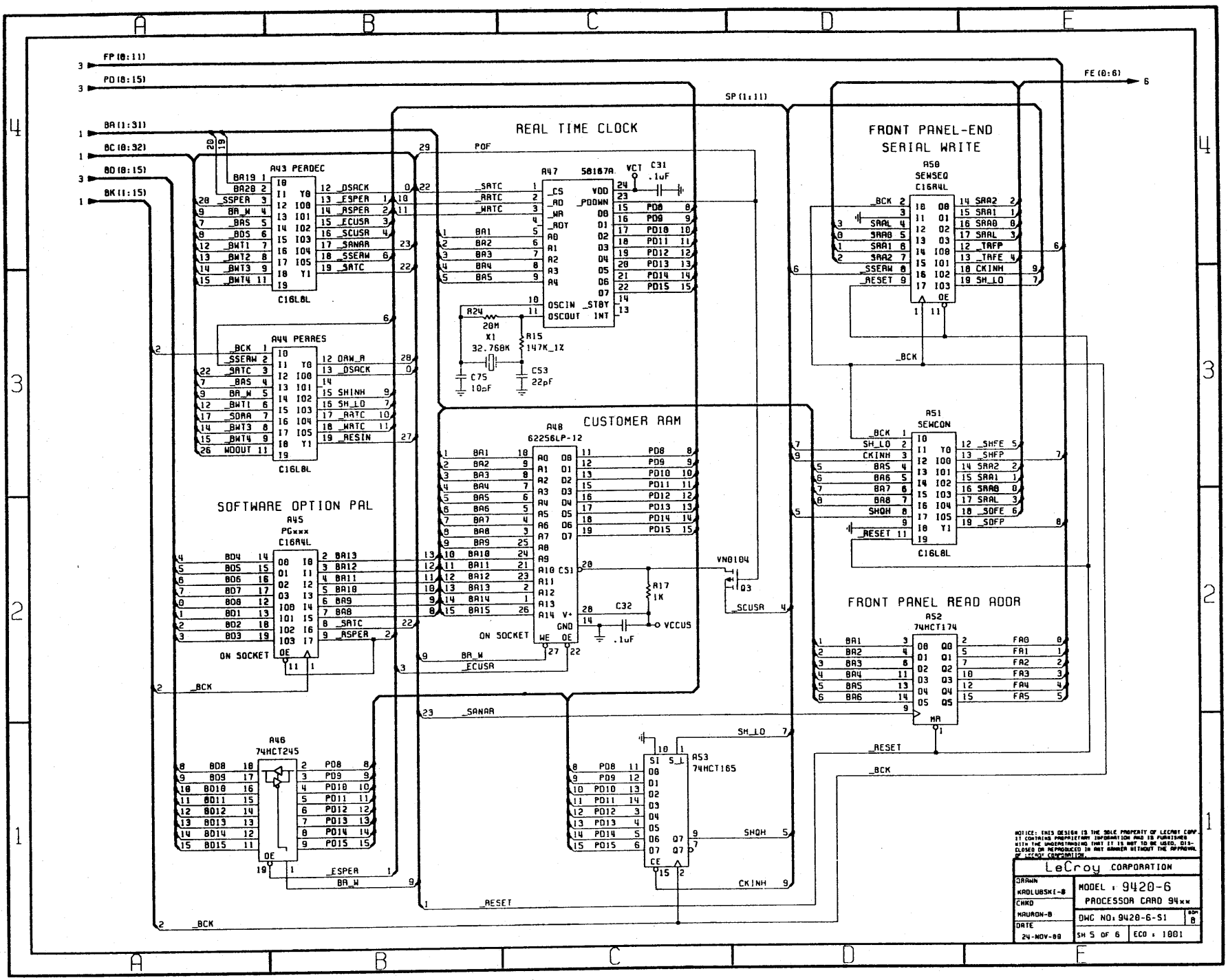

SWITCH SETTINGS
SWITCH NUMBER
A 1 2 3 4 5 6 7 8
B 1 2 3 4 5 6 7 8
EPROM
512 Kbit 0 0 0 1 0 0 0 1 0 1 0 1 - - - -
1 Mbit 0 0 1 0 0 0 1 0 0 1 0 1 - - - -
2 Mbit 0 1 0 0 0 1 0 0 0 1 1 0 - - - -
4 Mbit 1 0 0 0 1 0 0 0 1 0 1 0 - - - -
CUST RAM
static - - - - - - - - - - - - 0 1 - -
eeprom - - - - - - - - - - - - 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
J3
J1
CPU
VCT
POF
ON AUGAT PINS
LeCroy CORPORATION
DRAWN JACKY_G
CHKD MAURON_B
DATE 27-NOV-89
MODEL : 9450-6
PROCESSOR CARD 94xx
DWG NO: 9450-6-51
SH 5 OF 5
ECO : 1803

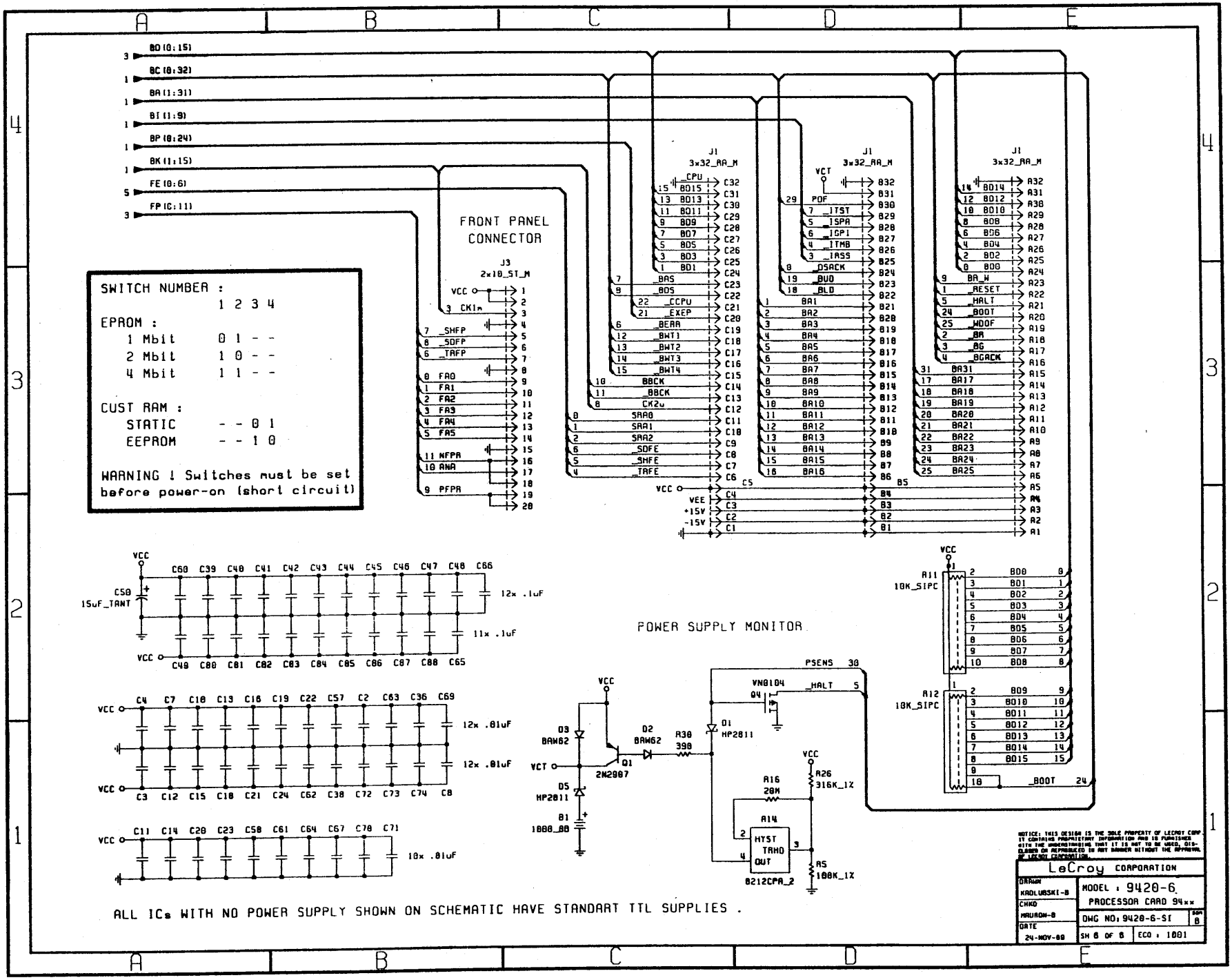

A1 EPROM_1MBit ON SOCKET 1H
A4 EPROM_1MBit ON SOCKET 1L
A2 EPROM_1MBit ON SOCKET 2H
A5 EPROM_1MBit ON SOCKET 2L
A3 EPROM_1MBit ON SOCKET 3H
A6 EPROM_1MBit ON SOCKET 3L
A7 62256LP-12
A8 62256LP-12
A13 MASDEC
A9 SERBUS
A10 EREBYT
A11 CPUSPA
A12 INTWAT
C16L8L
C25 .1uF
C26 .1uF
R18 1K
R21 1K
R37 10K
R38 10K
SW1 8004
Q2 VN0104
OPTION SWITCHES (SEE SETTING SHEET 6)
D(16:31) 2-3
A(8:31) 2-3
BE(0:12)
BC(0:32) 2-3-4-5-6
BP(0:24) 2-3-6
BI(1:9) 3-6
BK(1:15) 2-3-4-5-6
BA(1:31) 3-4-5-6
LeCroy CORPORATION
MODEL : 9420-6
PROCESSOR CARD 94xx
DWG NO: 9420-6-S1
SH 1 OF 6
ECO : 1001

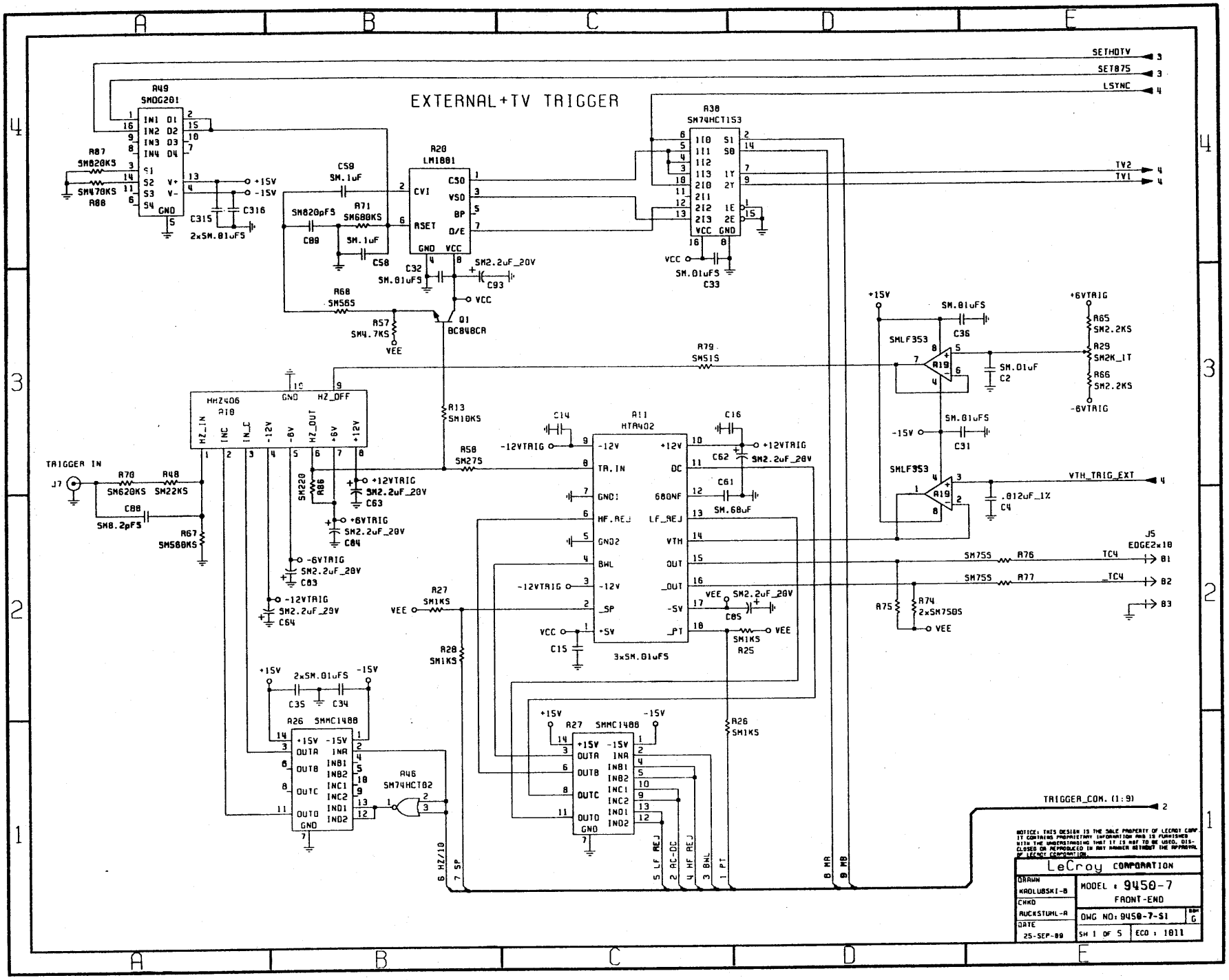

CENTRAL PROCESSOR
MC68020
R15
ON PGA 114 13x13 SOCKET
COPROCESSOR
MC68881
R16
ON PGA 68
10x10 SOCKET
VCC
C33
.1uF
C34
.1uF
A13
10K_SIPC
A22
1K_8SIPC
D(16:31)
A(0:31)
BP(0:24)
BC(0:32)
BK(1:15)
LeCroy CORPORATION
MODEL : 9420-6
PROCESSOR CARD 94xx
DWG NO: 9420-6-S1
SH 2 OF 6
ECO : 1001
DRAWN KAOLUBSKI-B
CHKD MAURON-B
DATE 24-NOV-88

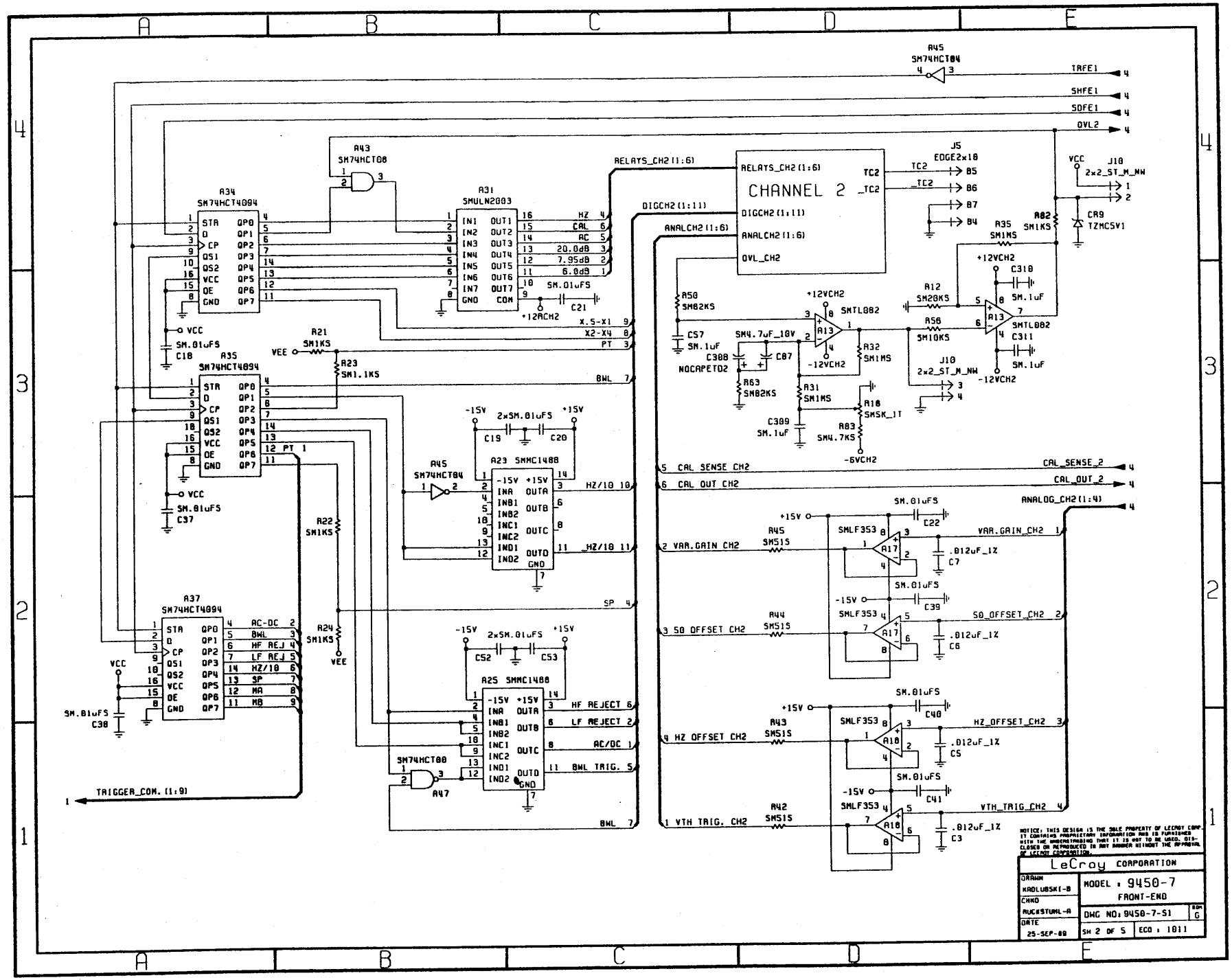

MIN / MAX / HISTO
A34 MMX401_PGA
PERINT
A31 C16R4L
FRONT PANEL
ANALOG READ
BOOT
A28
7705
A49
AD7576JN
A24
K1100A_16MHZ
A54
MASTER
C16L8L
A41
6264-10
A42
6264-10
74HCT245
A17
A18
A19
A20
A21
A22
A23
LM358
VNDI04
TIL_209A
BD(8:15)
MD(0:15)
MA(8:12)
PD(8:15)
FP(0:11)
BA(1:31)
BC(8:32)
D(16:31)
A(8:31)
BP(8:24)
BI(1:9)
BK(1:15)
_BGACK
CK2m
_RESIN
LeCroy CORPORATION
DRAWN KADLUBSKI-B
CHKD MAURON-B
DATE 24-NOV-89
MODEL : 9420-6
PROCESSOR CARD 94xx
DWG NO: 9420-6-S1
SH 3 OF 6
ECO : 1001

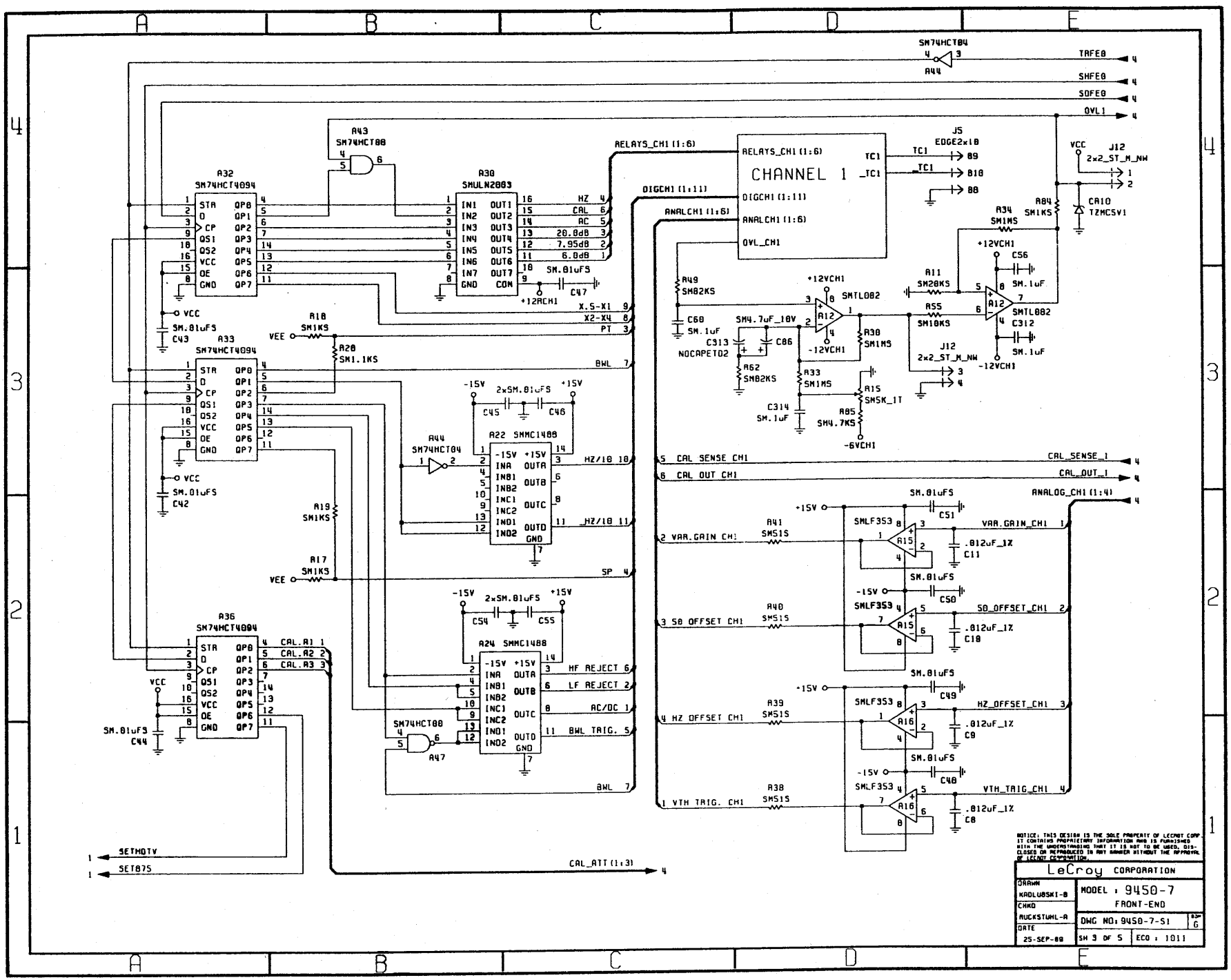

BC(0:32)
BD(0:15)
BA(1:31)
BK(1:15)
MASTER TIMING
74HCT393
74HCT390
BCK
CK0.1M
CKAFH
CK2U
CK2M
CK1M
BUS ERROR
WATCH DOG
WDOUT
WDRT
ERR
BAS
DSACK
DDW_R
DYNAMIC RAM
A35 150pF 4.7K
C89
A30 CONDRA
C16R4L
A33 AM2968A
A63 AM2865
RA(0:19)
A37 MCM514256A
A38 MCM514256A
A39 MCM514256A
A40 MCM514256A
A55 MCM514256A
A56 MCM514256A
A57 MCM514256A
A58 MCM514256A
A59 MCM514256A
A60 MCM514256A
A61 MCM514256A
A62 MCM514256A
A36 74HCT245
A35 74HCT245
DD(0:15)
EDRA
DRW_R
<= FOR 4 CHANNEL ONLY
LeCroy CORPORATION
MODEL : 9420-6
PROCESSOR CARD 94xx
DWG NO: 9426-6-S1
SH 4 OF 8
ECO : 1801
DRAWN KADLUBSKI-B
CHKD MAHAON-B
DATE 24-NOV-89

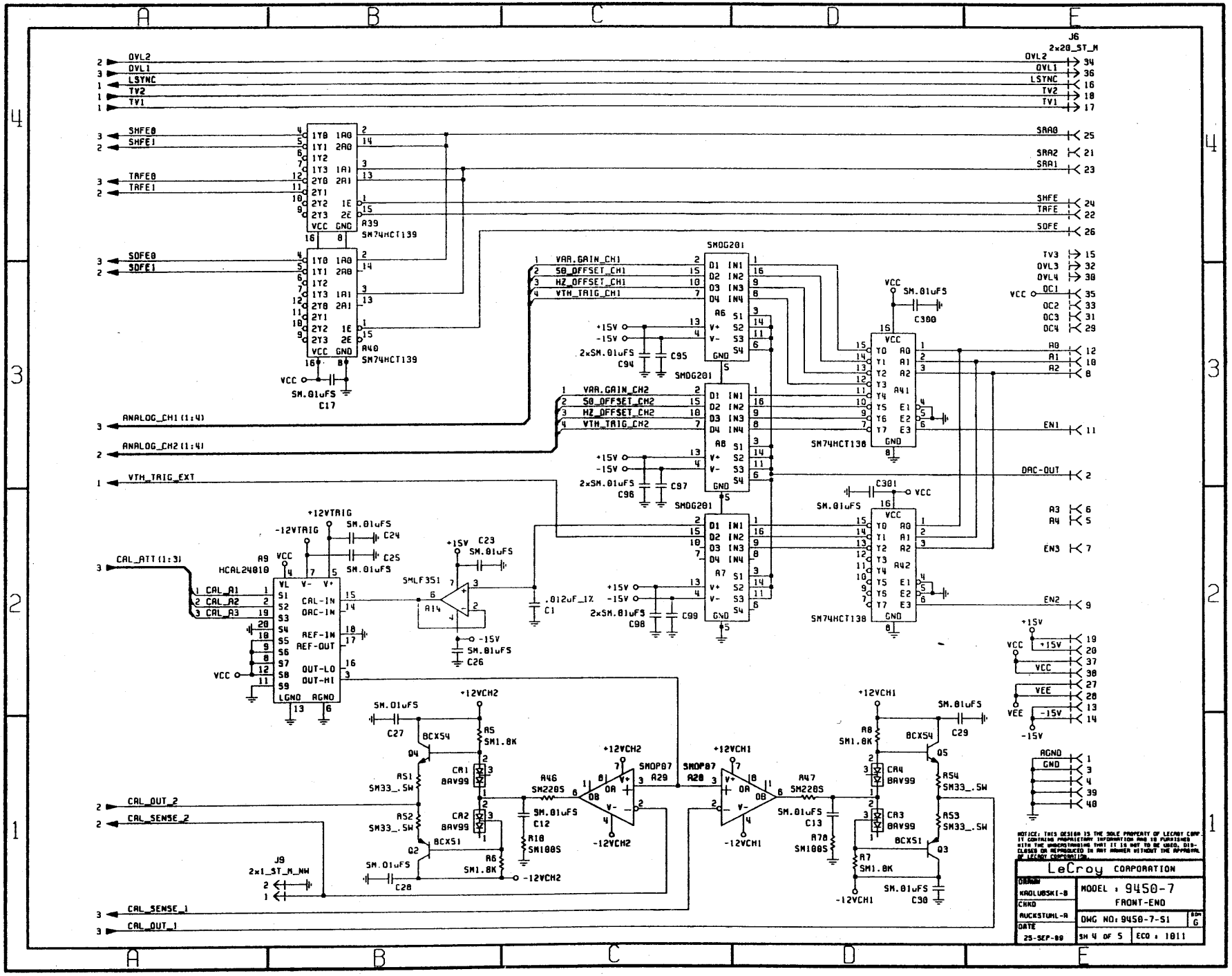

REAL TIME CLOCK
FRONT PANEL-END SERIAL WRITE
CUSTOMER RAM
SOFTWARE OPTION PAL
FRONT PANEL READ ADDR
A43 PERDEC
C16L8L
A44 PERRES
A45 PGxxx C16R4L
A46 74HCT245
A47 58167A
A48 62256LP-12
A50 SEWSEQ C16R4L
A51 SEWCON
A52 74HCT174
A53 74HCT165
FP(8:11)
PD(8:15)
BA(1:31)
BC(8:32)
BD(8:15)
BK(1:15)
FE(0:6)
SP(1:11)
POF
VCT
C31 .1uF
R24 20M
X1 32.768K
R15 147K_1%
C75 10pF
C53 22pF
R17 1K
C32 .1uF
VCCUS
VN0104
Q3
ON SOCKET
_BCK
_RESET
_SCUSA
_ECUSA
_SANAR
_ESPER
BA_W
SH_LO
SHQH
CKINH
LeCroy CORPORATION
DRAWN KADLUBSKI-B
CHKD MAURAN-B
DATE 24-NOV-88
MODEL : 9420-6
PROCESSOR CARD 94xx
DWG NO: 9420-6-S1
SH 5 OF 6
ECO : 1001

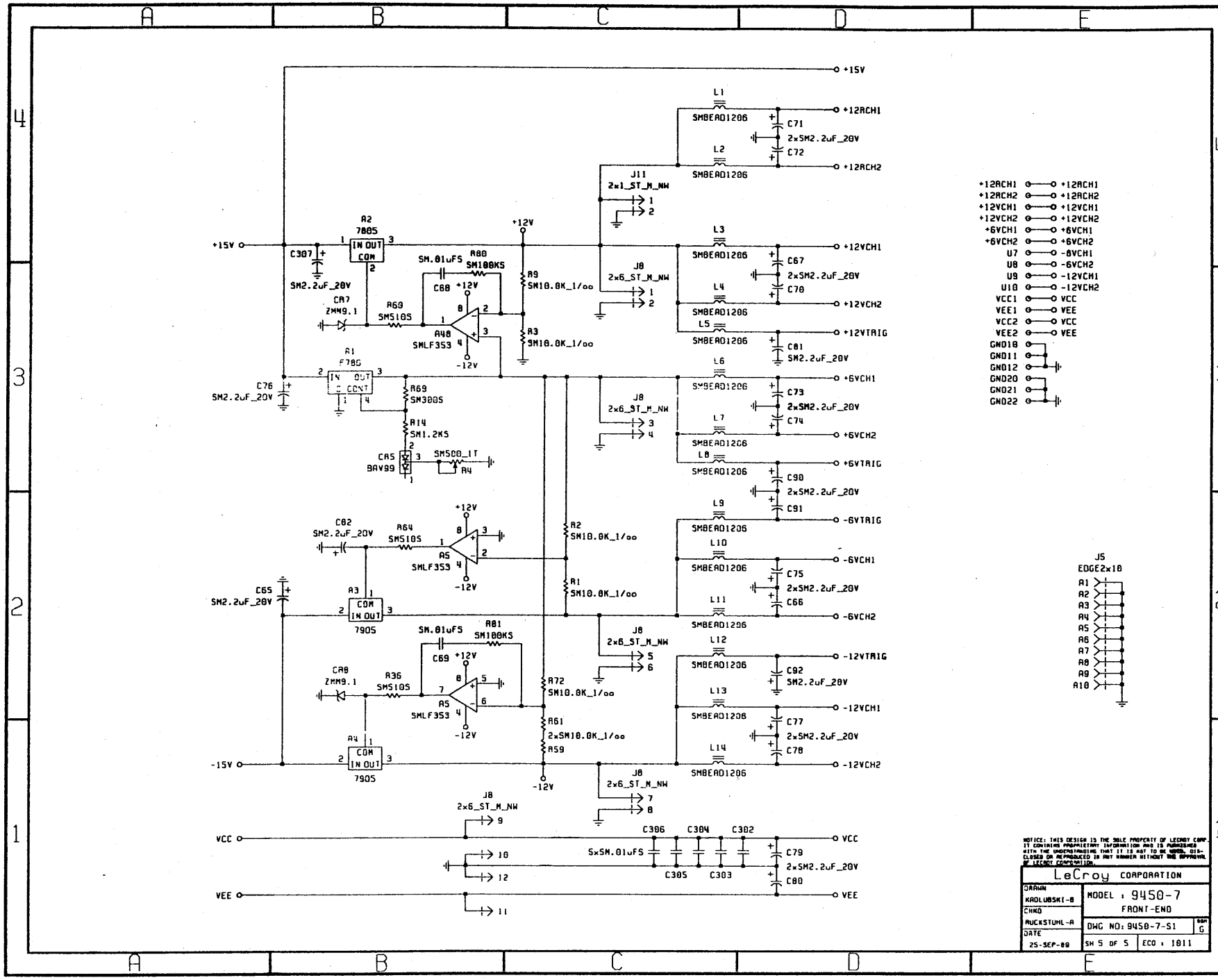

BD[0:15]
BC[0:32]
BA[1:31]
BI[1:9]
BP[0:24]
BK[1:15]
FE[0:6]
FP[C:11]
FRONT PANEL CONNECTOR
J3
2x10_ST_M
J1
3x32_RA_M
SWITCH NUMBER :
1 2 3 4
EPROM :
1 Mbit 0 1 - -
2 Mbit 1 0 - -
4 Mbit 1 1 - -
CUST RAM :
STATIC - - 0 1
EEPROM - - 1 0
WARNING ! Switches must be set before power-on (short circuit)
POWER SUPPLY MONITOR
ALL ICs WITH NO POWER SUPPLY SHOWN ON SCHEMATIC HAVE STANDART TTL SUPPLIES .
LeCroy CORPORATION
MODEL : 9420-6
PROCESSOR CARD 94xx
DWG NO: 9420-6-SI
SH 6 OF 6
ECO : 1001
DRAWN KADLUBSKI-B
CHKD MAURON-B
DATE 24-NOV-89

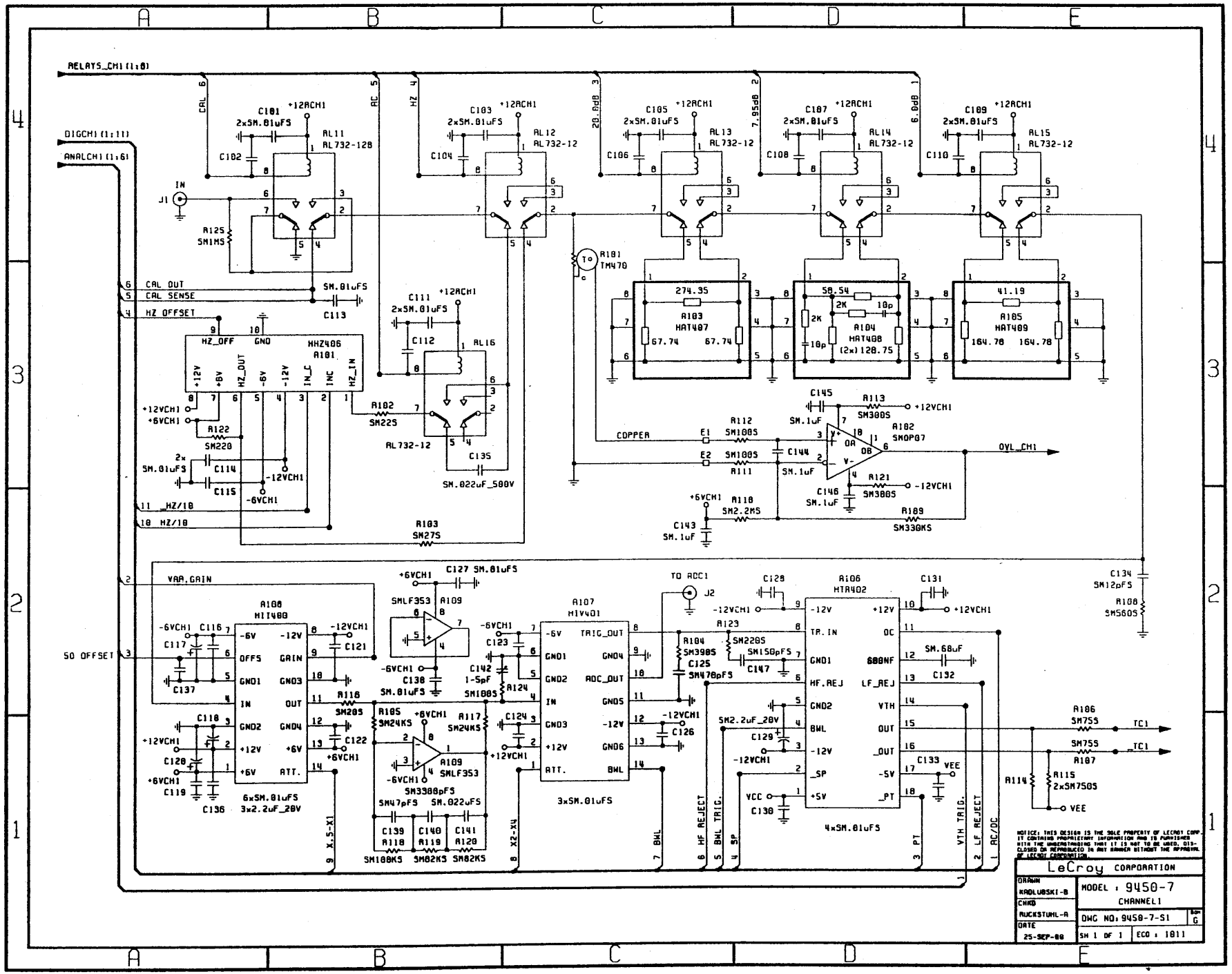

EXTERNAL+TV TRIGGER
SETHDTV
SET875
LSYNC
TV2
TV1
A49 SMDG201
A87 SM820KS
SM470KS A88
C315 2xSM.01uFS
C316
+15V
-15V
C59 SM.1uF
SM820pFS C89
A71 SM680KS
SM.1uF C58
A20 LM1881
C32 SM.01uFS
SM2.2uF_20V C93
R68 SM5KS
R57 SM4.7KS
VEE
Q1 BC848CR
A38 SM74HCT153
VCC
SM.01uFS C33
R79 SM51S
A18 HHZ406
TRIGGER IN
J7
R70 SM620KS
R48 SM22KS
C88 SM8.2pFS
R67 SM560KS
R13 SM10KS
R58 SM27S
SM220 R86
+12VTRIG
SM2.2uF_20V C63
+6VTRIG
C84
-6VTRIG
C83
-12VTRIG
C64
A11 HTA402
C14
C16
C62
C61
SM.68uF
680NF
C15
3xSM.01uFS
R27 SM1KS
R28 SM1KS
R25
R26 SM1KS
A26 SMMC1488
C35
C34
2xSM.01uFS
A27 SMMC1488
A46 SM74HCT02
+15V SM.01uFS C36
SMLF353 A19
SM.01uF C2
+6VTRIG
A65 SM2.2KS
A29 SM2K_1T
A66 SM2.2KS
-6VTRIG
-15V SM.01uFS C31
SMLF953 A19
VTH_TRIG_EXT
.012uF_1% C4
J5 EDGE2x10
SM75S R76
SM75S R77
TC4
B1
B2
B3
A75
A74 2xSM75OS
TRIGGER_COM. (1:9)
6 HZ/10
7 SP
5 LF REJ
2 AC-DC
4 HF REJ
3 BAL
1 PT
8 MA
9 MB
LeCroy CORPORATION
DRAWN KROLUBSKI-B
CHKD AUCKSTUHL-A
DATE 25-SEP-89
MODEL # 9450-7
FRONT-END
DWG NO: 9450-7-S1
SH 1 OF 5
ECO # 1811


A45 SM74HCT04
TRFE1
SHFE1
SDFE1
OVL2
A43 SM74HCT08
A34 SM74HCT4094
A31 SMULN2003
RELAYS_CH2(1:6)
DIGCH2(1:11)
ANALCH2(1:6)
OVL_CH2
CHANNEL 2
J5 EDGE2x18
J10 2x2_ST_M_NW
CR9 TZMC5V1
A82 SM1KS
A35 SM74HCT4094
A21 SM1KS
A23 SMMC1488
A25 SMMC1488
A37 SM74HCT4094
A47 SM74HCT00
A50 SM82KS
A12 SM20KS
A56 SM10KS
A35 SM1MS
A32 SM1MS
A31 SM1MS
A18 SM5K_1T
A83 SM4.7K5
A13 SMTL082
C310 SM.1uF
C311 SM.1uF
C309 SM.1uF
C307 SM4.7uF_10V
C308 NOCAPETD2
CS7 SM.1uF
A63 SM82KS
A45 SM51S
A44 SM51S
A43 SM51S
A42 SM51S
A17 SMLF353
A16 SMLF353
C22 SM.01uFS
C39 SM.01uFS
C40 SM.01uFS
C41 SM.01uFS
C7 .012uF_1%
C6 .012uF_1%
C5 .012uF_1%
C3 .012uF_1%
C18 SM.01uFS
C37 SM.01uFS
C38 SM.01uFS
C19 2xSM.01uFS
C20
C52 2xSM.01uFS
C53
R23 SM1.1K5
R22 SM1K5
R24 SM1K5
R21 SM1K5
-15V
+15V
VCC
VEE
+12VCH2
-12VCH2
-6VCH2
TRIGGER_COM.(1:9)
CAL_SENSE_2
CAL_OUT_2
ANALOG_CH2(1:4)
VAR.GAIN_CH2
SO_OFFSET_CH2
HZ_OFFSET_CH2
VTH_TRIG_CH2
HZ/10
_HZ/10
SP
BWL
PT
X.5-X1
X2-X4
HF REJECT
LF REJECT
AC/DC
BWL TRIG.
NOTICE: THIS DESIGN IS THE SOLE PROPERTY OF LECROY CORP. IT CONTAINS PROPRIETARY INFORMATION AND IS FURNISHED WITH THE UNDERSTANDING THAT IT IS NOT TO BE USED, DISCLOSED OR REPRODUCED IN ANY MANNER WITHOUT THE APPROVAL OF LECROY CORPORATION.
LeCroy CORPORATION
DRAWN KROLUBSKI-B
CHKD RUC&STUML-A
DATE 25-SEP-89
MODEL : 9450-7
FRONT-END
DWG NO: 9450-7-S1
SH 2 OF 5
ECO : 1011


A43 SM74HCT08
A32 SM74HCT4094
A30 SMULN2003
RELAYS_CH1 (1:6)
DIGCH1 (1:11)
ANALCH1 (1:6)
OVL_CH1
CHANNEL 1
J5 EDGE2x18
J12 2x2_ST_M_NW
CA10 TZMC5V1
A33 SM74HCT4094
A36 SM74HCT4094
A44 SM74HCT04
A22 SMMC1488
A24 SMMC1488
A47 SM74HCT08
A12 SMTL082
A15 SMLF353
A16 SMLF353
A41 SM51S
A40 SM51S
A39 SM51S
A38 SM51S
SM.01uFS
SM4.7uF_10V
NOCAPETD2
+15V
-15V
-12VCH1
+12VCH1
-6VCH1
VCC
VEE
HZ
CAL
AC
20.0dB
7.95dB
6.0dB
X.S-X1
X2-X4
PT
BWL
SP
HZ/10
HF REJECT
LF REJECT
AC/DC
BWL TRIG.
CAL.A1
CAL.A2
CAL.A3
SETHOTV
SET875
CAL_ATT (1:3)
TAFE0
SHFE0
SDFE0
OVL1
CAL_SENSE_1
CAL_OUT_1
ANALOG_CH1 (1:4)
VAR.GAIN_CH1
SO_OFFSET_CH1
HZ_OFFSET_CH1
VTH_TRIG_CH1
.012uF_1%
LeCroy CORPORATION
MODEL : 9450-7
FRONT-END
DWG NO: 9450-7-S1
SH 3 OF 5
ECO : 1011
DRAWN KADLUBSKI-B
CHKD RUCKSTUHL-A
DATE 25-SEP-89


OVL2
OVL1
LSYNC
TV2
TV1
SHFE0
SHFE1
TAFE0
TAFE1
SOFE0
SOFE1
A39
SM74HCT139
A40
SM74HCT139
C17
SM.01uFS
ANALOG_CH1 (1:4)
ANALOG_CH2 (1:4)
VTH_TRIG_EXT
SMDG201
VAR.GAIN_CH1
SO_OFFSET_CH1
HZ_OFFSET_CH1
VTH_TRIG_CH1
VAR.GAIN_CH2
SO_OFFSET_CH2
HZ_OFFSET_CH2
VTH_TRIG_CH2
+15V
-15V
2xSM.01uFS
C94
C95
C96
C97
C98
C99
SM74HCT138
C300
C301
DAC-OUT
EN1
EN2
EN3
+12VTRIG
-12VTRIG
C24
C25
CAL_ATT(1:3)
CAL_A1
CAL_A2
CAL_A3
A9
HCAL24818
CAL-IN
DAC-IN
REF-IN
REF-OUT
OUT-LO
OUT-HI
SMLF351
A14
C23
C26
C1
.012uF_1%
+12VCH2
-12VCH2
+12VCH1
-12VCH1
C27
C28
C29
C30
BCX54
BCX51
Q4
Q2
Q5
Q3
A5
SM1.8K
A6
A7
A8
A51
SM33_.5W
A52
A53
A54
CR1
CR2
CR3
CR4
BAV99
A46
SM220S
A47
A10
SM100S
A70
C12
C13
SMOP07
A29
A28
J9
2x1_ST_M_NW
CAL_OUT_2
CAL_SENSE_2
CAL_SENSE_1
CAL_OUT_1
J6
2x20_ST_M
SAA0
SAA2
SAA1
SHFE
TAFE
SOFE
TV3
OVL3
OVL4
DC1
DC2
DC3
DC4
A0
A1
A2
A3
A4
+15V
VCC
VEE
-15V
AGND
GND
NOTICE: THIS DRAWING IS THE SOLE PROPERTY OF LECROY CORP. IT CONTAINS PROPRIETARY INFORMATION AND IS FURNISHED WITH THE UNDERSTANDING THAT IT IS NOT TO BE USED, DISCLOSED OR REPRODUCED IN ANY MANNER WITHOUT THE APPROVAL OF LECROY CORPORATION.
LeCroy CORPORATION
DRAWN
KADLUBSKI-B
CHKD
AUCKSTUHL-A
DATE
25-SEP-89
MODEL : 9450-7
FRONT-END
DWG NO: 9450-7-S1
SH 4 OF 5
ECO : 1811


+15V
+12RCH1
+12RCH2
+12VCH1
+12VCH2
+6VCH1
+6VCH2
-6VCH1
-6VCH2
-12VCH1
-12VCH2
+12VTRIG
+6VTRIG
-6VTRIG
-12VTRIG
VCC
VEE
-15V
+12V
-12V
A2 7805
A1 7805
A3 7905
A4 7905
J11 2x1_ST_M_NW
J8 2x6_ST_M_NW
J5 EDGE2x18
SMBEAD1206
2xSM2.2uF_20V
SM2.2uF_20V
SM.01uFS
SM100KS
SM10.0K_1/oo
SM510S
SM1.2KS
SM300S
SM500_1T
SMLF353
ZMM9.1
BAV99
5xSM.01uFS
NOTICE: THIS DESIGN IS THE SOLE PROPERTY OF LECROY CORP. IT CONTAINS PROPRIETARY INFORMATION AND IS FURNISHED WITH THE UNDERSTANDING THAT IT IS NOT TO BE USED, DISCLOSED OR REPRODUCED IN ANY MANNER WITHOUT THE APPROVAL OF LECROY CORPORATION.
LeCroy CORPORATION
DRAWN KAOLUBSKI-B
CHKD RUCKSTUHL-A
DATE 25-SEP-89
MODEL : 9450-7
FRONT-END
DWG NO: 9450-7-S1
REV G
SH 5 OF 5
ECO : 1011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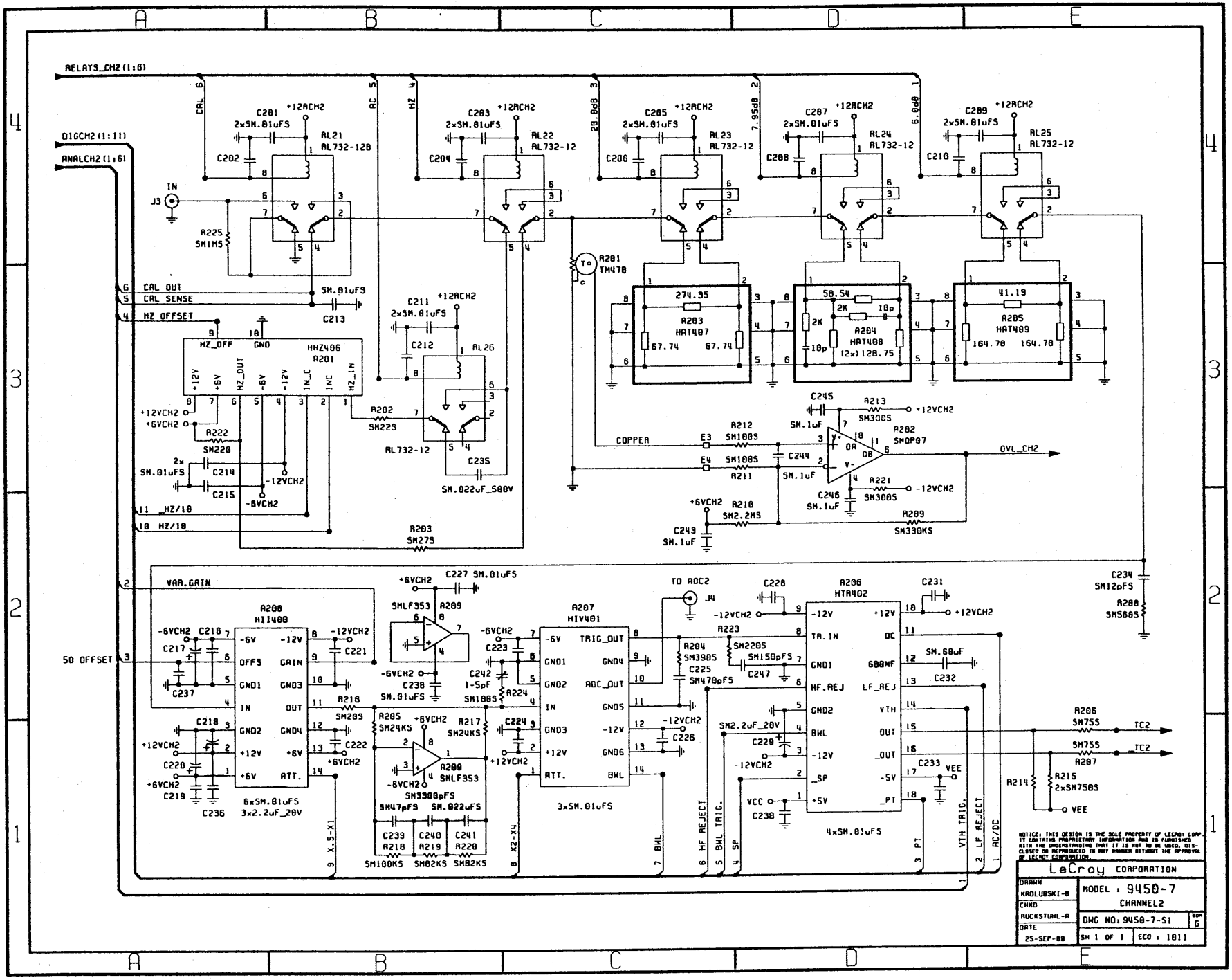
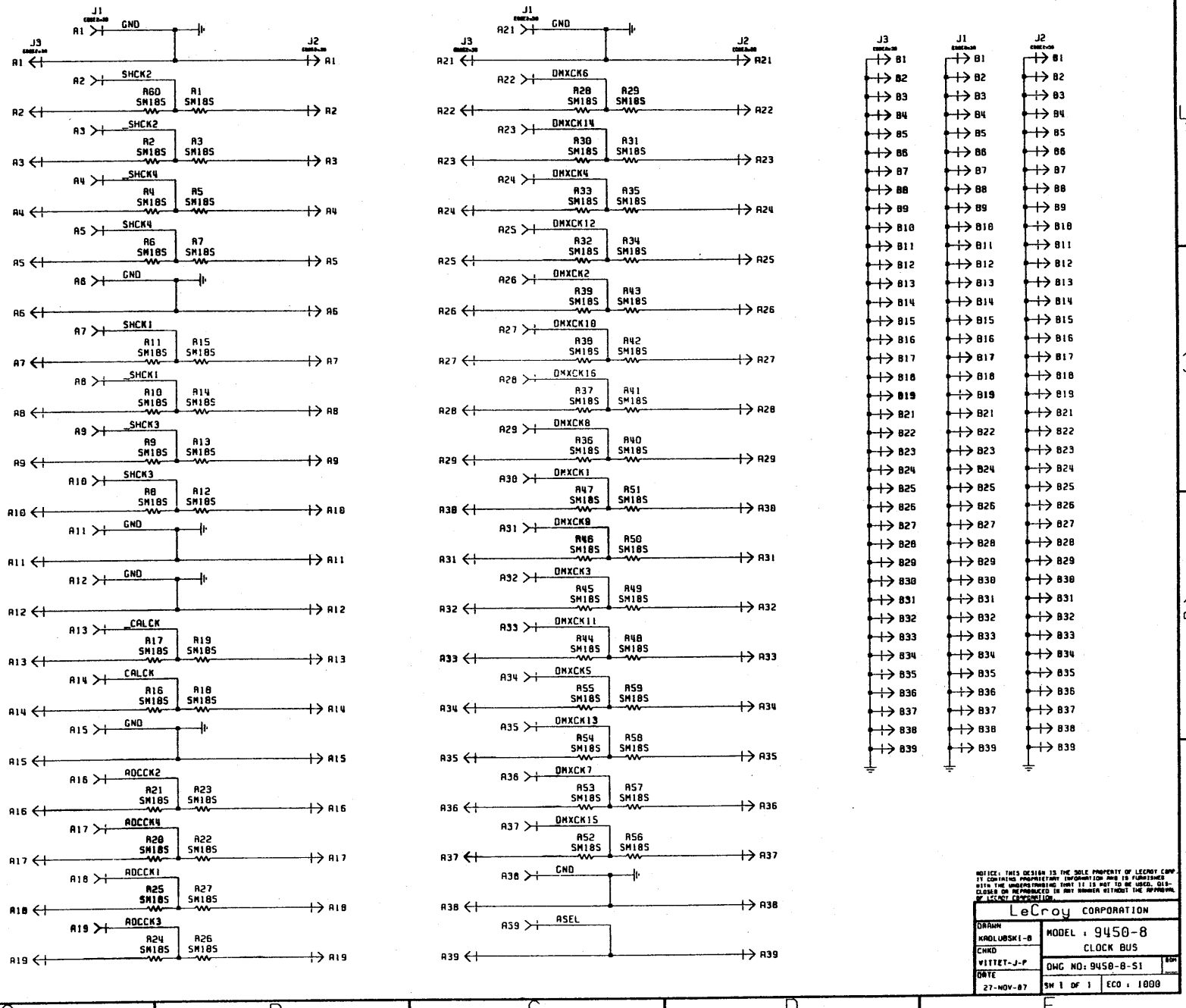
DIGCH1 (1:11)
ANALCH1 (1:6)
CAL OUT
CAL SENSE
HZ OFFSET
HZ/10
VAR.GAIN
50 OFFSET
COPPER
OVL_CH1
TO ADC1
TC1
VEE
+12VCH1
-12VCH1
+6VCH1
-6VCH1
HHZ406
HI1480
HI1402
HI1401
SMLF353
HAT407
HAT408
HAT409
SMOP07
6xSM.01uFS
3x2.2uF_28V
3xSM.01uFS
4xSM.01uFS
SM.022uF_500V
LeCroy CORPORATION
MODEL : 9450-7
CHANNEL1
DWG NO: 9450-7-S1
SH 1 OF 1
ECO : 1011
DRAWN KADLUBSKI-B
CHKD RUCKSTUHL-A
DATE 25-SEP-89

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J3
J2
GND
SHCK2
SHCK4
SHCK1
SHCK3
CALCK
ADCCK2
ADCCK4
ADCCK1
ADCCK3
DMXCK6
DMXCK14
DMXCK4
DMXCK12
DMXCK2
DMXCK10
DMXCK16
DMXCK8
DMXCK1
DMXCK9
DMXCK3
DMXCK11
DMXCK5
DMXCK13
DMXCK7
DMXCK15
ASEL
SM18S
NOTICE: THIS DESIGN IS THE SOLE PROPERTY OF LECROY CORP. IT CONTAINS PROPRIETARY INFORMATION AND IS FURNISHED WITH THE UNDERSTANDING THAT IT IS NOT TO BE USED, DISCLOSED OR REPRODUCED IN ANY MANNER WITHOUT THE APPROVAL OF LECROY CORPORATION.
LeCroy CORPORATION
DRAWN
KADLUBSKI-B
CHKD
WITTET-J-P
DATE
27-NOV-87
MODEL : 9450-8
CLOCK BUS
DWG NO: 9450-8-S1
SH 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	R	QTY IN TOP ASSEMB
123456789----------	----------	-	-------
F9450-1	COMPLETED BOARD F9450-1	A	1.00
102484471	CAP CERA DISC 100V 470 PF		1.00
103307103	CAP CERA MONO 50V .01 UF		28.00
103427104	CAP CERA MONO 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 INTERF CONTR 7210		1.00
207280703	IC 16-BIT DAC 703		1.00
207440232	IC XMTR/RCVR MAX 232		1.00
207470160	IC OCTAL BUS XCVR 75160A		1.00
207470161	IC OCTL 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 UOM: EA SC: M REV: B

COMPONENT PART NUMBER	DESCRIPTION	R	QTY IN TOP 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 UOM: EA SC: M REV: B

COMPONENT PART NUMBER	DESCRIPTION	R	QTY IN TOP 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	R	QTY IN TOP 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 TRANSCVR HCT245		2.00
208011005	IC VOLT FOLLOWER LM310N		2.00
208031010	IC QUAD DIFF COMP LM339N		1.00
208041001	IC 8-BIT DAC MONODAC-08EQ		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 PICOAMPERE 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	R	QTY IN TOP 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 6168SO-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	R	QTY IN TOP 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 PROC 320C25		2.00
SM232022822	DIODE ARRAY SCHTTKY 2822		2.00
SM236030099	DIODE 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 PC 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	R	QTY IN TOP 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 MONO 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 OR/NOR 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 UOM: EA SC: M REV: B

COMPONENT PART NUMBER	DESCRIPTION	R	QTY IN TOP ASSEMB
123456789----------	----------	-	-------
SM200167104	IC 2-IN AND GATE 10H104		2.00
SM200167107	IC 2-IN EXCL OR/NOR10H107		3.00
SM200167109	IC 4-5 IN OR/NOR 10H109		1.00
SM200167117	IC OR-AND/O-A-INV 10H117		1.00
SM200167121	IC OR-AND/O-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 SO-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

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PART: 9450
DESC: FINAL ASSEMBLY 9450 UOM: EA SC: M REV: B

COMPONENT PART NUMBER	DESCRIPTION	R	QTY IN TOP 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 UOM: EA SC: M REV: B

COMPONENT PART NUMBER	DESCRIPTION	R	QTY IN TOP 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 MONO 50V .01 UF		4.00
103427104	CAP CERA MONO 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	R	QTY IN TOP 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 SOLD 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 MONO 50V .01 UF		37.00
103427104	CAP CERA MONO 100V .1 UF		31.00
161225027	RES COMP 1/8W 5% 2.7 OHMS		2.00

CLASS CODE: 1
FINISHED GOODS-MANUFACTURED
PART: 9450
DESC: FINAL ASSEMBLY 9450 UOM: EA SC: M REV: B

COMPONENT PART NUMBER	DESCRIPTION	R	QTY IN TOP ASSEMB
123456789----------	----------	-	-------
102412100	CAP CERA DISC 100V 10 PF		1.00
103625151	CAP CERA MONO 100V 150 PF		2.00
102412220	CAP CERA DISC 100V 22 PF		1.00
103506331	CAP CERA MONO 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 TRANSCVR 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

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PART: 9450
DESC: FINAL ASSEMBLY 9450 UOM: EA SC: M REV: B

COMPONENT PART NUMBER	DESCRIPTION	R	QTY IN TOP 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
MNX401	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 NOR 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 SO-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	R	QTY IN TOP 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
SM653305330	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	DIODE 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 UOM: EA SC: M REV: B

COMPONENT PART NUMBER	DESCRIPTION	R	QTY IN TOP 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 SOLD 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	R	QTY IN TOP 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 UOM: 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-BLO 250V 2AMP		2.00
433162400	FUSE SLO-BLO 250V 4 AMP		2.00

9450 DIGITAL OSCILLOSCOPE

SERVICE MANUAL

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Version 0.5

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