LeCroy 9374/M/L & 9374TM

Digital Storage Oscilloscopes

Service Manual

LeCroy

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Version 1.0

June 1996

First printing

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SECTION 1 GENERAL INFORMATION

1.1 Initial Inspection

It is recommended that the shipment be thoroughly inspected immediately upon delivery to the purchaser. All material in the container should be checked against the enclosed Packing List. LeCroy cannot accept responsibility for shortages in comparison with the Packing List unless notified promptly. If the shipment is damaged in any way, please contact the Customer Service Department or local field office immediately.

1.2 Warranty

LeCroy warrants its oscilloscope products to operate within specifications under normal use for a period of three years from date of shipment. Spares, replacement parts and repairs are warranted for 90 days. The instrument's firmware is thoroughly tested and thought to be functional, but is supplied "as is" with no warranty of any kind covering detailed performance. Products not manufactured by LeCroy are covered solely by the warranty of the original equipment manufacturer.
In exercising this warranty, LeCroy will repair or, at its option, replace any product returned to the Customer Service Department or an authorized service facility within the warranty period, provided that the warrantor's examination discloses that the product is defective due to workmanship or materials and that the defect has not been caused by misuse, neglect, accident or abnormal conditions or operation.
LeCroy will return all in-warranty products with transportation prepaid.
This warranty is in lieu of all other warranties, expressed or implied, including but not limited to any implied warranty of merchantability, fitness, or adequacy for any particular purpose or use. LeCroy shall not be liable for any special, incidental, or consequential damages, whether in contract or otherwise.

1.3 Product Assistance

Answers to questions concerning installation, calibration, and use of LeCroy equipment are available from the Customer Service Department, 700 Chestnut Ridge Road, Chestnut Ridge, New York 10977-6499, U.S.A., tel: (914) 578-6060, or 6061, and 2 rue du Pré-de-la-Fontaine, 1217 Meyrin 1, Geneva, Switzerland, tel : (41) 22.719.21.11, or your local field engineering office.

1.4 Addresses

Corporate Headquarters	European Headquarters
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VANHA KAARELANTIE 9
01610 VANTAA
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FAX: 358.0.531.604

HELLENIC SCIENTIFIC REP., LTD
11 VRASSIDA STREET
115 28 ATHENS
GREECE
TEL: 30.1.721.1140 or 721.3154
FAX: 30.1.724.1374

AVANTEC
TVETENVEIEN 6
0661 OSLO NORWAY
TEL: 472.63.05.20
FAX: 472.65.84.14

ABB NERA A/S
KOKSTADVEGEN 23
KOKSTAD BERGEN NORWAY
TEL: 351.2.815.680
FAX: 351.2.815.630

Europe

MEASUREMENT SYSTEMS SCANDINAVIA AB
P.O. BOX 393 FORETAGSALLEN 12, HUS 5 BV
184 24 AKERSBERGA SWEDEN
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FAX: 46.8.540.66536

Eastern Europe

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1120 VIENNA
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2 JACKS ROAD
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AUSTRALIA
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FAX: 61.3579.0971

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55-A/8 & 9 HADAPSPAR
INDUSTRIAL ESTATE
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FAX: 91.212.672205

E.C. GOUGH, LTD
245 ST.ASAPH STREET
P.O. BOX 22073
CHRISTCHURCH NEW ZEALAND

TEL: 64.3.3798.740
FAX: 64.3.3796.776

ELECTRO TECH CORPORATION
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BAHADURSHAH ZAFAR ROAD
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AND ENGINEERING, LTD
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ABEX ENGINEERING PTE. LTD.
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SINGAPORE 1334
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LECOLN TECHNOLOGY CO.,LTD.
4F-1, NO. 214, SEC.1
HO PING E ROAD
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TEL: 886.2.365.0612
FAX: 886.2.367.1792

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2102/31 RAMKAMHANG ROAD
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THAILAND
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SCHMIDT ELECTRONICS LTD
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FAX: 62.21.583.218

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ONTARIO L4Z 1Y2, CANADA
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FAX: 416 890.1959

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SEARCH SA
VIAMONTE 1716 - PISO 7
1055 CAPITAL FEDERAL
ARGENTINA
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ATP-HI-TEK
ALAMEDA AMAZONAS
422 ALPHAVILLE 06454-030
BARUEI, SP BRAZIL
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RANDBURG 2194
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1.5 Maintenance Agreements

LeCroy offers a selection of customer support services. Maintenance agreements provide extended warranty and allow the customer to budget maintenance costs after the initial three years warranty has expired. Other services such as installation, training, enhancements and on-site repair are available through specific Supplemental Support Agreements.

1.6 Documentation Discrepancies

LeCroy is committed to providing state-of-the-art instrumentation and is continually refining and improving the performance of its products. While physical modifications can be implemented quite rapidly, the corrected documentation frequently requires more time to produce. Consequently, this manual may not agree in every detail with the accompanying product. There may be small discrepancies in the values of components for the purposes of pulse shape, timing, offset, etc., and, occasionally, minor logic changes. Where any such inconsistencies exist, please be assured that the unit is correct and incorporates the most up-to-date circuitry. In a similar way the firmware may undergo revision when the instrument is serviced. Should this be the case, manual updates will be made available as necessary.

1.7 Service Procedure

Products requiring maintenance should be returned to the Customer Service Department or authorized service facility. LeCroy will repair or replace any product under warranty at no charge. The purchaser is only responsible for one way transportation charges.

For all LeCroy products in need of repair after the warranty period, the customer must provide a Purchase Order Number before repairs can be initiated. The customer will be billed for parts and labor for the repair, as well as for shipping.

1.8 Return Procedure

To determine your nearest authorized service facility, contact the Customer Service Department or your field office. All products returned for repair should be identified by the model and serial numbers and include a description of the defect or failure, name and phone number of the user, and, in the case of products returned to the factory, a Return Authorization Number (RAN).

The RAN may be obtained by contacting the customer service department in New York, tel: (914)578-6060, or 6061 ; in Geneva, tel: (41)22/719.21.11, or your nearest sales office. Return shipment should be made prepaid. LeCroy will not accept C.O.D. or Collect Return Shipments. Air-freight is generally recommended. The oscilloscope should be packed with the protective cover in place. Wherever possible, the original shipping carton should be used. If a substitute carton is used, it should be rigid and be packed such that the product is surrounded with a minimum of four inches of excelsior or similar shock-absorbing material. In addressing the shipment, it is important that the Return Authorization Number be displayed on the outside of the container to ensure its prompt routing to the proper department within LeCroy.

1.9 Safety Precautions

The following servicing instructions are for use by qualified personnel only. Do not perform any servicing other than contained in service instructions. Refer to procedures prior to performing any service.

Exercise extreme safety when testing high energy power circuits. Always turn the power OFF, disconnect the power cord, discharge the cathode ray tube and all capacitors before disassembling the instrument.

The **W A R N I N G** symbol used in this manual indicates dangers that could result in personal injury.

The **C A U T I O N** symbol used in this manual identify conditions or practices that could damage the instrument.

1.10 Antistatic Precautions

C A U T I O N

Any static charge that builds on your person or clothing may be sufficient to destroy CMOS components, integrated circuits.
In order to avoid possible damage, the usual precautions against static electricity are required.

- Handle the boards in antistatic boxes or containers with foam specially designed to prevent static build-up.

- Ground yourself with a suitable wrist strap.

- Disassembly the instrument at a properly grounded work station equipped with antistatic mat.

- When handling the boards, do not touch the pins.

- Stock the boards in antistatic bags.

SECTION 2 SPECIFICATIONS

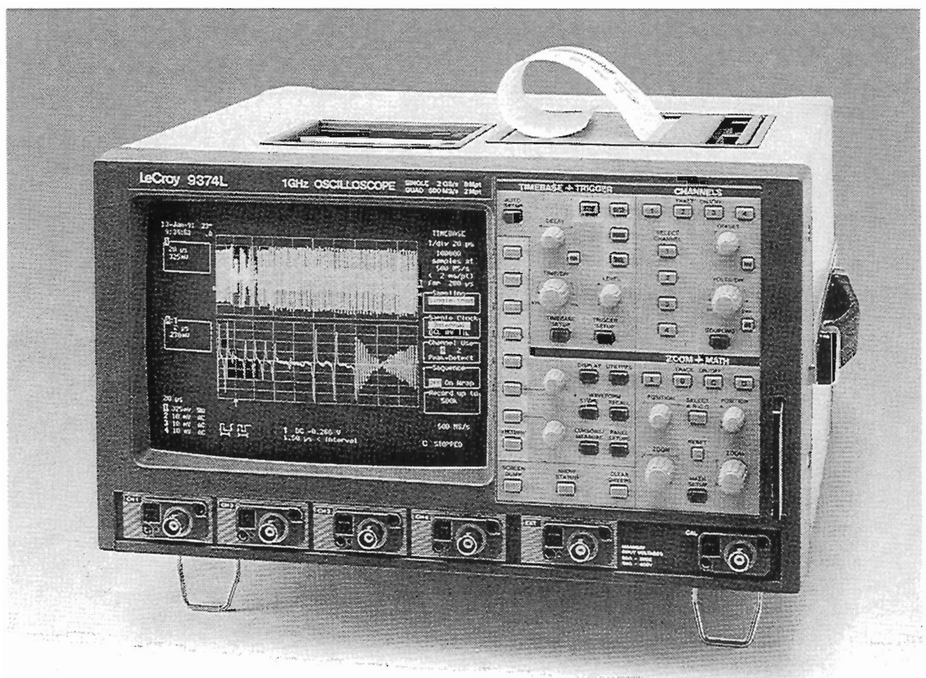
9374/M/L/TM Digital Oscilloscope

LeCroy
Innovators in Instrumentation

9370 Series Digital Oscilloscopes
1 GHz Bandwidth, 2 GS/s

Main Features

- Up to 8M-point record length
- 8-bit vertical resolution, 11-bit with ERES option
- Two- and four-channel versions
- Hard Disk (PCMCIA III), Memory Card and DOS-compatible Floppy Disk options
- Innovative Peak Detect
- Glitch, Pattern, Qualified, Interval, Dropout and TV triggers
- Fully programmable via GPIB and RS-232-C
- Internal graphics printer option
- Automatic PASS/FAIL testing
- Advanced signal processing



1 GHz Bandwidth
The 9370 series digital storage oscilloscope opens up new horizons for engineers and scientists at the leading edge of technological developments. With 1 GHz bandwidth and long acquisition memories, it is now possible to reveal previously hidden waveform details. Narrow glitches are more accurately defined; risetime measurements below 1 nanosecond are more precise; and high-frequency content, filtered out in lower bandwidth systems, is retained, thereby preserving signal amplitudes and overall signal integrity.

2 GS/s Sample Rate
The 2- and 4-channel models of the 9370 series sample simultaneously on all channels at 500 MS/s. Thus, they are ideal for demanding high speed applications. In addition, two channels can be combined to provide a sample rate of 1 GS/s. The 9374 provides 2 GS/s in single channel mode. Finer horizontal resolution and accuracy are guaranteed by high sample rates. This is especially critical in digital design where unpredictable circuit behavior has to be identified and analyzed in detail to be fully understood. Together with this excellent single-shot performance the 9370 series also provides a sample rate equivalent to 10 GS/s for repetitive signals.

8M Point Acquisition Memory
Channel memory lengths of 50k, 250k, 500k and 2M are available on the 9370 series 2- and 4-channel DSOs. The memory power is revealed when the user seeks to sample at the highest speed over many timebase settings. Short memory DSOs may boast a high sample rate for short waveforms, but only a long memory oscilloscope can deliver high sample rates for long waveforms. To exploit this capability to its fullest the LeCroy 9370 series combines its channel acquisition memories to give the user up to 8 million sample points, thereby providing the waveform detail required on long and complex signals.
The combined capabilities of the 9370 series place it in the forefront of DSO capability.

Features and Benefits

WIDE BANDWIDTH
1 GHz bandwidth results in greater accuracy of amplitude measurements for high frequency signals and true representation of high speed digital signals.

HIGH SAMPLE RATES
Sample rates of 500 MS/s, 1 GS/s and 2 GS/s provide greater waveform fidelity, excellent zoom detail, protection against aliasing, better time resolution and wider frequency spectrum.

CHANNEL INTERLEAVING
Memory length is extended by combining the acquisition memories of multiple channels for both continuous or segmented waveform recording. Combining channels yields higher sample rates.

ADVANCED PEAK DETECT SYSTEM
The 9370 series offers an innovative peak detect capture mode. This captures fast glitches or other signal details that might have been missed due to undersampling by running the ADC's at a high sampling rate even on slow time bases. At the same time the scope also stores the underlying data to ensure no loss of time precision - unlike other peak detect systems.

SMART TRIGGER SYSTEM
SMART Trigger functions including Glitch, Pattern, Dropout, State- or Edge Qualified triggers are available.

Pre- and Post-trigger delay are fully variable, Time and Events Holdoff are also included.

The Smart Trigger system allows the scope to trigger on a large variety of signal types, specific signal characteristics and suspect behaviors.

ProBus™ HIGH PERFORMANCE PROBE INTERFACE
The proprietary ProBus interface is supplied as standard on all 93XX family models. It provides a probe interconnection architecture to support the most demanding circuit probing requirements, both now and in the future.

The ProBus interface allows automatic detection of the attached probe as well as complete control, setup and calibration at the probe tip. The probe is no longer an accessory, but an integral part of the measurement solution, with ease of setup and probe-tip measurement accuracy guaranteed.

The ProBus interface supports a rapidly growing range of high-performance and custom probe solutions including high-bandwidth, low-circuit load FET probes.

HIGH RESOLUTION DISPLAY AND EXCELLENT USER INTERFACE
A large high resolution CRT display supports uncluttered presentation of waveform data, information and control menus. Live waveforms can be viewed with up to three expansion regions showing all of the signal details.

The powerful processing capability provides a responsive feel even when extensive processing is being carried out. A proven multi-knob control panel combined with an intuitive menu system provide rapid access to the instrument's powerful capabilities.

PERSISTENCE AND XY DISPLAY MODES
Persistence: Sample points are displayed so that they accumulate on the screen over many acquisitions. "Eye diagrams" and "Constellation displays" can be achieved using this display mode. XY mode plots any two sources against one another.

WAVEFORM PROCESSING AND MEASUREMENT SYSTEM
Pass/Fail Testing and Waveform Limit Testing (Masks) can be performed. Measurements include Pulse Parameters, Statistics and Arithmetic functions. Any failure can cause preprogrammed actions such as Hardcopy, Save, GPIB Service Request, Pulse Out or Beep.

OPTIONAL WAVEFORM MATH PACKAGE - WP01*
Option WP01 provides Summed and Continuous Averaging, Waveform Math Functions, Extrema and Enhanced Resolution Modes.

Functions can be chained together, allowing complex computations. Waveform operations can be performed on live, stored, processed or expanded waveforms. The package is fully programmable over GPIB or RS-232-C. WP01 extends the processing capabilities of the 9370 and reduces the need for external computers and controllers for processing.

OPTIONAL SPECTRAL ANALYSIS PACKAGE - WP02*
Option WP02 provides comprehensive Spectral Analysis capabilities, permitting the system designer to identify characteristics which may not be apparent in the time domain. WP02 provides a wide selection of windowing functions, as well as averaging in the frequency domain.

Spectral analysis can be performed on repetitive and single events. Users can obtain time and frequency values simultaneously and compare phases of the various frequency components with each other.

OPTIONAL STATISTICAL ANALYSIS PACKAGE - WP03
Option WP03 provides extensive statistical analysis capabilities. Detailed analysis can easily be performed on difficult to measure waveform phenomena such as amplitude fluctuation and timing jitter. Live histogram displays represent the statistical distribution of selected waveform parameter measurements. Statistical information can be extracted directly from the histograms using automatic statistical measurements including max, min, average, median, std deviation, etc.

MAGNETIC MEDIA MEASUREMENTS
The DDM/PRML disk drive firmware options provide a unique integrated tool for those developing and testing high-density storage media.

DOS COMPATIBLE MASS STORAGE OPTIONS*
The 9370 series offers 131MB removable hard disk (PCMCIA III), high speed memory card (PCMCIA II) and 3.5" 1.44 MB floppy disk. Traces, setups, screen graphics and Pass/Fail templates can be stored as DOS files and thus read directly by a PC for easy integration into reports.

PRINTING FACILITIES*
An optional internal thermal graphics printer produces full resolution screen dumps in under 10 seconds. The unique 'Strip-Chart' format expands the horizontal axis up to 2 meters per division for viewing fine waveform detail within long memory acquisitions.

A wide range of printer/plotter formats support external hardcopy via the standard GPIB, RS-232-C or optional Centronics interfaces.

REMOTE PROGRAMMING CAPABILITY
Remote programming capability enables DSO control from PC and easy transfer of data for further analysis. The full command set is available via remote control.

9370 Series Specifications

ACQUISITION SYSTEM

Bandwidth (-3 dB):
@ 50 Ω: DC to 1 GHz
10 mV/div and above
@ 1 MΩ DC: DC to 500 MHz typ. at probe tip, with PP005 supplied standard.
1 GHz FET probe optional.
No. of Channels: 4 (9374) or 2 (9370)
No. of Digitizers: 4 (9374) or 2 (9370)
Maximum Sample Rate and Acquisition Memories: See table below.
Sensitivity:
2 mV/div to 1 V/div, 50Ω, fully variable
2 mV/div to 10 V/div, 1MΩ, fully variable.
Scale factors: A wide choice of probe attenuation factors are selectable.
Offset Range:
2.00 - 4.99 mV/div: ±400 mV
5.00 - 99 mV/div: ±1 V
0.1 - 1.0 V/div: ±10 V
1.0 - 10V/div: ± 100 V (1MΩ only)
DC Accuracy: Typically 1%.
Vertical Resolution: 8 bits.
Bandwidth Limiter: 25 MHz, 200 MHz.
Input Coupling: AC, DC, GND.
Input Impedance: 1 MΩ//15 pF or 50 Ω ±1%.
Max Input:
1 MΩ: 400 V (DC+ peak AC ≤10 kHz)
50 Ω: ±5 V DC (500 mW) or 5 V RMS

TIME BASE SYSTEM

Timebases: Main and up to 4 Zoom Traces.
Time/Div Range: 1 ns/div to 1,000 s/div.
Clock Accuracy: ≤10 ppm
Interpolator resolution: 10 ps
Roll Mode: Ranges 500 ms to 1,000 s/div.
For > 50k points: 10 s to 1,000 s/div.
External Clock: ≤100 MHz on EXT input with ECL, TTL or zero crossing levels. Optional 50 MHz to 500 MHz rear panel fixed frequency clock input.
External Reference: Optional 10 MHz rear-panel input.

TRIGGERING SYSTEM

Trigger Modes: Normal, Auto, Single, Stop.
Trigger Sources: CH1, CH2, Line, Ext, Ext/10 (9374: CH3, CH4). Slope, Level and Coupling for each source can be set independently.
Slope: Positive, Negative.
Coupling: AC, DC, HF, LFREJ, HFREJ.
Pre-trigger recording: 0 to 100% of full scale (adjustable in 1% increments).
Post-trigger delay: 0 to 10,000 divisions (adjustable in 0.1 div increments).
Holdoff by time: 10 ns to 20 s.
Holdoff by events: 0 to 99,999,999 events.
Internal Trigger Range: ±5 div.
EXT Trigger Max Input:
1 MΩ//15 pF: 400 V (DC + peak AC ≤10 kHz)
50 Ω ±1%: ±5 V DC (500 mW) or 5 V RMS
EXT Trigger Range: ±0.5 V (±5 V with Ext/10)
Trigger Timing: Trigger Date and Time are listed in the Memory Status Menu.
Trigger Comparator: Optional ECL rear panel output.

SMART TRIGGER TYPES

Pattern: Trigger on the logic AND of 5 inputs - CH1, CH2, CH3, CH4, and EXT Trigger, (9370: 3 inputs - CH1, CH2, EXT) where each source can be defined as High, Low or Don't Care. The Trigger can be defined as the beginning or end of the specified pattern.
Signal or Pattern Width: Trigger on width between two limits selectable from ≤ 2.5ns to 20s. Will typically trigger on glitches 1ns wide.
Signal or Pattern Interval: Trigger on interval between two limits selectable from 10ns to 20s
Dropout: Trigger if the input signal drops out for longer than a time-out from 25ns to 20s.
State/Edge Qualified: Trigger on any source only if a given state (or transition) has occurred on another source. The delay between these events can be defined as a number of events on the trigger channel or as a time interval.
TV: Allows selection of both line (up to 1500) and field number (up to 8) for PAL, SECAM, NTSC or nonstandard video.

Channel Use	Maximum Sample rate	Memory per Channel 9370 9374	9370M 9374M	9374TM	9370L 9374L	Active Channels
All Peak Detect OFF	500 MS/s	50k	250k	500k	2M	All
Paired Peak Detect OFF	1 GS/s	100k	500k	1M	4M	9370: CH1 9374: CH2 & CH3
Paired + PP093 Peak Detect OFF	2 GS/s	200k	1M	2M	8M	One (PP093 input) 9374 models only
All Peak Detect ON	100 MS/s data + 400 MS/s peak	25k data + 25k peaks	100k data + 100k peaks	250k data + 250k peaks	1M data + 1M peaks	All 2.5 ns Peak Detect

ACQUISITION MODES

Random Interleaved Sampling (RIS): For repetitive signals from 1 ns/div to 5 µs/div.
Single shot: For transient and repetitive signals from 10 ns/div (all channels active).
Peak detect: Captures and displays 2.5 ns glitches or other high-speed events.
Sequence: Stores multiple events in segmented acquisition memories.
Number of segments available:
9370-9374 2-200
9370M-9374M 2-500
9370L-9374L-9374TM 2-2,000
Max. Dead Time between segments: 100 µs

DISPLAY

Waveform style: Vectors connect the individual sample points, which are highlighted as dots. Vectors may be switched off.
CRT: 12.5x17.5 cm (9" diagonal) raster.
Resolution: 810 x 696 points.
Modes: Normal, X-Y, Variable or Infinite Persistence.
Real-time Clock: Date, hours, minutes, seconds.
Graticules: Internally generated; separate intensity control for grids and waveforms.
Grids: 1, 2 or 4 grids.
Formats: YT, XY, and both together.
Vertical Zoom: Up to 5x vertical expansion (50x with averaging, up to 40 µV sensitivity, only with WP01).
Maximum Horizontal Zoom Factors:
9370-9374 2,000x
9370M-9374M 10,000x
9370L-9374L-9374TM 100,000x
Waveforms can be expanded to give 2-2.5 points/division. This allows zoom factors up to 400,000x for the 9374L when channels are combined.

INTERNAL MEMORY

Waveform Memory: Up to four 16-bit Memories (M1, M2, M3, M4).
Processing Memory: Up to four 16-bit Waveform Processing Memories (A, B, C, D).
Setup Memory: Four non-volatile memories. Optional Cards or Disks may also be used for high-capacity waveform and setup storage.

CURSOR MEASUREMENTS

Relative Time: Two cursors provide time measurements with resolution of ±0.05% full scale for unexpanded traces; up to 10% of the sampling interval for expanded traces. The corresponding frequency value is displayed.
Relative Voltage: Two horizontal bars measure voltage differences up to ±0.2% of full scale in single-grid mode.
Absolute Time: A cross-hair marker measures time relative to the trigger and voltage with respect to ground.
Absolute Voltage: A reference bar measures voltage with respect to ground.

WAVEFORM PROCESSING

Up to four processing functions may be performed simultaneously. Functions available are: Add, Subtract, Multiply, Divide, Negate, Identity, Summation Averaging and Sine x/x.
Average: Summed averaging of up to 1,000 waveforms in the basic instrument. Up to 10^6 averages are possible with Option WP01.
Extrema*: Roof, Floor, or Envelope values from 1 to 10^6 sweeps.
ERES*: A selection of six Low-Pass digital filters provides up to 11 bits vertical resolution.
Sampled data is always available, even when a trace is turned off. Any of the above modes can be invoked without destroying the data.
FFT*: Spectral Analysis with five windowing functions and FFT averaging.
**Extrema and ERES modes are provided in Math Package WP01. FFT is in WP02.*

AUTOSETUP

Pressing Autosetup sets timebase, trigger and sensitivity to display a wide range of repetitive signals. (Frequency above 50Hz; Duty Cycle greater than 0.1%).
Autosetup Time: Approximately 2 seconds.
Vertical Find: Automatically sets sensitivity and offset.

PROBES

Model: One PP005 (10:1, 10 MΩ // 11 pF) probe supplied per channel. 500 V max input. The 9370 series is fully compatible with LeCroy's range of FET probes, which may be purchased separately.
Probe calibration: Max 1 V into 1 MΩ, 500 mV into 50 Ω, frequency and amplitude programmable, pulse or square wave selectable, rise and fall time 1 ns typical. Alternatively, the calibrator output can provide a trigger output or a PASS/FAIL test output.

INTERFACING

Remote Control: Possible by GPIB and RS-232-C for all front-panel controls, as well as all internal functions.
RS-232-C Port: Asynchronous up to 19200 baud for computer/terminal control or printer/plotter connection.
GPIB Port: (IEEE-488.1) Configurable as talker/listener for computer control and fast data transfer. Command Language complies with requirements of IEEE-488.2.
Centronics Port: Optional hardcopy parallel interface.
Hardcopy: Screen dumps are activated by a front-panel button or via remote control. TIFF and BMP formats are available for importing to Desktop Publishing programs. The following printers and plotters can be used to make hardcopies: HP DeskJet (color or BW), HP ThinkJet, QuietJet, LaserJet, PaintJet and EPSON printers; HP 7470 and 7550 plotters or similar, and HPGL-compatible plotters. An internal high resolution graphics printer is also available.

GENERAL

Auto-calibration ensures specified DC and timing accuracy.
Temperature: 5° to 40° C (41° to 104° F) rated 0° to 50° C (32° to 122° F) operating.
Humidity: <80%.
Shock & Vibration: Meets MIL-STD-810C modified to LeCroy design specifications and MIL-T-28800C.
Safety: Conforms to EN 61010-1.
EMC: Conforms to EN50081-1, EN 50082-1.
Power: 90-250 V AC, 45-66 Hz, 230 W.
Battery Backup: Front-panel settings maintained for two years.
Dimensions: (HWD) 8.5"x14.5"x16.25", 210mm x 370mm x 410mm.
Weight: 13 kg (28.6 lbs) net, 18.5 kg (40.7 lbs) shipping.
Warranty: Three years.
Note: The 9374TM model includes WP01/02, floppy disk and graphics printer.

Ordering Information

☑ **Option included with instrument**
☐ **Optional extra not included**

Oscilloscopes:	
9370/M/L	2 ch. Digital Oscilloscope
9374/M/L	4 ch. Digital Oscilloscope
9374TM	4 ch. , +TP, +GP01
Software Options:	
☐ 93XX-WP01	Waveform Math Package
☐ 93XX-WP02	FFT Processing Package
☐ 93XX-WP03	Statistical Analysis Package
☐ 93XX-DDM	Disk Drive Measurements
☐ 93XX-PRML	Supplementary Disk Drive Measurements
Hardware Options:	
☐ 93XX-MC01/04	Memory Card Reader with 512K Memory Card
☐ 93XX-MC02	128K Memory Card
☐ 93XX-MC04	512K Memory Card
☐ 93XX-HDD	HD01/HD02 combination
☐ 93XX-HD01	Hard Disk Adapter
☐ 93XX-HD02	PCMCIA Hard Disk 131MB
☐ 93XX-DA01-110	PCMCIA type III external desktop adaptor for PC (110V)
☐ 93XX-DA01-220	PCMCIA type III external desktop adaptor for PC (220V)
☐ 93XX-FD01	Internal 3.5" Floppy Drive with Centronics interface
☐ 93XX-GP01	Internal Graphics Printer with Centronics interface
☐ 937X-CKTRIG	500MHz External Clock, 10 MHz Reference Input, Trigger Comparator Output
☐ 930X-64	64MB Processing Memory
☐ 93XX-TP	Total Performance Package WP01/WP02 + FD01
Manuals:	
☑ 937X-OM	Operator's manual
☑ 93XX-RCM	Remote Control manual
☐ 937X-SM	Service manual
☑ 93XX-HG	Hands-On Guide
Warranty & Calibration:	
☐ 93XX-CCMIL	US Military Standard
☐ 93XX-CCOFMET	Swiss OFMET Standard
☐ 93XX-CCNIST	US NIST Standard
☐ 93XX-W5	5 Year Warranty
☐ 93XX-C5	5 year Calibration Contract
☐ 93XX-T5	5 year Warranty and Calibration
Probes & Accessories:	
☐ AP020	1 GHz 10:1 FET Probe
☐ AP021	800 MHz 5:1 FET Probe
☐ AP030	15 MHz Differential Probe
☐ AP082	SDH STM-1E Trigger Pick-Off
☐ AP083	SONET Trigger Pick-Off
☐ AP54701A*	2.5 GHz 0.6pF Active Probe
☐ AP1143A*	Probe Offset and Power Module
☑ PP005	500 MHz 10:1 10 MΩ Passive Probe (1 per channel)
☐ PP012	100:1 Probe
☐ PP062	1 GHz, 10:1, 500 Ω Passive Probe
☐ PP090	ProBus 75 to 50 Ω adapter
☑ PP093	2 GS/s adapter (only 9374/M/L/TM)

* Normally ordered together

USA Direct Sales: 1 (800) 5LE-CROY

LeCroy Worldwide Sales Offices

ASIA/PACIFIC	LeCroy Pty Ltd	61.38.90.7358
BENELUX	LeCroy BV	40.208.9285
FRANCE	LeCroy SARL	(1).69.18.83.20
GERMANY	LeCroy Europe GmbH	06221 82.700
ITALY	LeCroy SRL	06.336.797.00
JAPAN Osaka	LeCroy Japan	0816.330.0961
JAPAN Tokyo	LeCroy Japan	0813.3376.9400
SWITZERLAND	Geneva	022.719.21.11
SWITZERLAND	Lenzburg	062.885.80.50
United Kingdom	LeCroy Ltd	(01235) 533114

LeCroy

Innovators in Instrumentation

9300 Series PCMCIA Portable Hard Disk, Internal Printer, 3.5" Floppy Disk Drive and Ram Card

Main Features

- PCMCIA Type III Portable Hard Disk, DOS Compatible
- High-resolution Printer, ideal for fast, on-the-spot documentation
- 3.5" Floppy disk drive, DOS format - affordable and convenient
- Ultra-fast RAM card, DOS format, ideal for PASS/FAIL testing
- Convenient Hardcopy storage to card/disk

3.5" Floppy

The floppy drive is a convenient storage medium, not only for saving and retrieving waveforms or instrument settings, but also for storing hardcopies that can be printed from a PC when desired. The floppy supports both 720k and 1.44M DOS formats so that it can be read back on any PC with a 3.5" drive, avoiding the need to interface the oscilloscope to your PC. As with the RAM-card option, the floppy system capabilities include automatic storage of data under pre-programmed conditions.

PCMCIA Storage

PCMCIA Interfaces for RAM card and Hard Disk allow the use of fast, removable and compact storage media for saving and retrieving waveforms and instrument settings. They comply fully with the PC industry's PCMCIA and JEIDA standards. With the special Autostore feature, waveforms can be automatically stored after every acquisition and "played back" when desired. When used in combination with the PASS/FAIL feature, failure data can be saved automatically for later analysis.

Printer

The internal printer is an invaluable tool for instant, on-the-spot documentation. It generates a clear, crisp hardcopy of the screen in just a few seconds. The large size of the printout, combined with its high resolution, provide you with an excellent document that matches the screen's superior quality to its finest details. And because it frees you from the trouble of carrying and interfacing a bulky printer, it is the ideal solution for field measurements.

Mass Storage Features and Benefits

LeCroy's mass storage capabilities provide a range of benefits:
- Easy data transfers to PCs
- Waveform logging
- Waveform archiving for future use
- Faster troubleshooting
- Faster, more reproducible testing
- Shared oscilloscope resources

EASY DATA TRANSFER TO PC

Because the 9300 series oscilloscope uses DOS-formatted floppy disks, hard disks and memory cards, transferring waveform data to a PC is simple. The removable storage allows transfers without cables, programming, or any knowledge of GPIB, RS-232, or other interfaces.

In addition, LeCroy provides free of charge, a binary-to-ASCII format conversion program for the PC, accommodating those PC-based analysis packages (such as spreadsheets) that require ASCII format.

WAVEFORM LOGGING

By using Glitch or Dropout triggering in combination with the powerful AUTO-STORE mode, LeCroy oscilloscopes can monitor and log intermittent problems automatically. To store a waveform, the oscilloscope opens and names a DOS-compatible file and then stores the waveform data in the file. This logging feature requires no operator intervention and maintains data and the operational setup through power line failures. Logged waveforms can be selectively played back by trigger time/date or by sequence number, or can be scrolled through sequentially.

WAVEFORM ARCHIVING FOR FUTURE USE

- Recallable proof of performance
- Additional data analysis as needed
- Accurate trend or drift monitoring
- Calibration procedure verification

When storing waveforms, LeCroy DSOs also archive a header of setup information and the acquisition time/date. After recalling an archived waveform, the several hundred byte header ensures correct time and voltage scaling. When recalled into the oscilloscope, the waveform can be zoom expanded, compared, or analyzed just like a live waveform. The time/date offers proof of measurement authenticity and trend sequence.

All LeCroy DSOs store raw waveform data using one byte per sample point. Signal averaged, Enhanced Resolution (ERES) filtered, and other processed data use two bytes per point, to take advantage of the added resolution.

HARDCOPY ARCHIVING

Hardcopies of the screen can also be stored for future use. For instance, a screen saved in TIFF format can be imported into a Word Processor to illustrate a report. Additionally, field-measurement screens can be saved in LaserJet format on the memory card or floppy disk, and then printed from a PC back in the lab.

FASTER FIELD MEASUREMENTS

Recallable reference waveforms and oscilloscope setups for each test point on a Device Under Test (DUT) can make fault troubleshooting faster and more accurate. A dedicated memory card or floppy disk will hold all of the correct test point waveforms and associated DSO setups for a particular DUT.

The technician can recall stored setups quickly and consistently, thereby avoiding incorrect measurement conditions. He can then compare actual waveforms to recalled reference waveforms taken from a known working system. He will therefore spend less time probing a large number of test points and verifying that the correct waveforms exist.

If a problem is found, the aberrant waveform may be saved. It can later be shown to laboratory-based engineers, for example, for problem-solving guidance or for improvement of DUT design.

Memory cards - rugged and pocket-sized - are ideal for this application.

FASTER, MORE REPRODUCIBLE TESTING

LeCroy oscilloscopes will compare measured waveforms against upper and lower waveshape tolerances or against parameter limits, such as risetime, overshoot, or peak voltage, and make PASS/FAIL decisions. This PASS/FAIL testing decreases test times in GPIB-based ATE systems by reducing data transfers. It increases reproducibility and accuracy in manual tests by eliminating human errors.

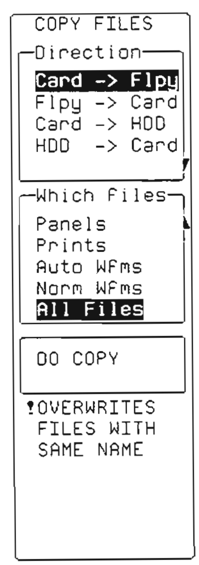
Once defined, these tests may be saved by storing instrument setups which include the specified tolerances and/or reference waveforms. Different test personnel can easily share a common test library via a PC network.

Waveshape test limits can be generated by capturing a "golden" waveform and by then selecting amplitude and timing limits (in fractions of screen graticule divisions). Or a user can create standard waveform limit templates on a computer (e.g. ANSI/CCITT telecommunication templates).

With the LeCroy 9300 series DSOs, specific parameter tolerance test procedures are created by selecting limits for any five out of thirty plus pulse parameters with Boolean AND / OR conditions between them. During testing, FAIL responses can include an audible beep, GPIB SRQ, hardcopy output, or store to memory card.

SHARED OSCILLOSCOPE RESOURCES

By plugging-in your *personal* floppy disk, RAM card or PCMCIA Hard Disk you can restore your setup in seconds. Individual users can keep preferred setups on separate disks or cards or within separate directories.



A selection of files can be copied between the available mass storage devices.

Hardcopy Features and Benefits

The internal printer adds a whole range of benefits to the LeCroy 9300 series:
- Ultra-fast printouts
- High resolution printing
- Easy transportation
- Trouble-free interfacing
- Auto Print on Trigger

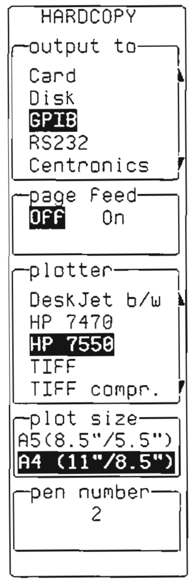
ULTRA-FAST PRINTOUTS
Measurement documentation is made easier and faster since the internal printer produces a hardcopy in less than 10 seconds. In addition the document is date- and time-stamped: a real bonus for archiving test results.

HIGH RESOLUTION PRINTING
With a resolution of 190 dots-per-inch, the internal printer matches the screen's superior quality. And for even higher resolution, the printout can be stretched to a full 70 meter length so you can see those traces down to their finest details.

EASY TRANSPORTATION
A printer that is totally integrated in the instrument makes life much easier for field-measurement applications. Imagine carrying a scope, a printer (and perhaps a floppy drive) in one hand!

TROUBLE-FREE INTERFACING
The internal printer frees your mind from the struggle with cable schematics, baud rates, gender-changers and dip switches, for more productive tasks. Select the internal printer in the scope's utilities menu, hit the SCREEN DUMP button, and you're in business!

AUTO PRINT ON TRIGGER
The Auto Print feature is used to print a screen image on each acquisition.



The 9300 series oscilloscope supports a whole range of popular printers and plotters. Hardcopies can be either sent directly to the peripheral device or to the floppy disk, Ram Card or Hard disk for future use.

OTHER HARDCOPY SOLUTIONS
High quality project reports, presentation materials, technical manuals, and troubleshooting instructions often require integration of text and graphics on the same page.
Advanced PC desktop publishing and word processors such as Word-for-Windows, WordPerfect, or AMI Pro can directly import graphic files, size them, and position them anywhere on the page. Written text can then wrap around or be positioned within the graphics.

LeCroy 9300 oscilloscopes will save screens in TIFF (Tagged Image Format File), or BMP. After transferring the file to a PC, the DTP software can import and manipulate the document like any other graphic object.

The LeCroy 9300 series also offers a wide range of interfacing capabilities with external hardcopy devices:

- Plotters. HPGL, HP 7400 and 7500 compatible
- Printers. HP LaserJet, ThinkJet, Paintjet (including color), DeskJet (including color) and Epson
- Interfacing. RS-232, GPIB, or even Centronics (optional)

Specifications

MASS STORAGE

	Floppy Disk	Ram Card	Hard Disk
Compatibility	3.5" Floppy Drive	PCMCIA I, II JEIDA 3.0, 4.0	PCMCIA III
Supported Formats	DOS Format	Read/Write: SRAM Read: OTP, ROM, Flash DOS Format	DOS Format
Size	720k byte, 1.44M byte	Up to 8M byte	Up to 512M byte *Note 1
Max Transfer Rate	18k byte/sec	500k byte/sec	150k byte/sec
Typical waveform Transfer Speed (Store/Recall)			
1000 point	1.1s / 0.4s	40ms / 30ms	140ms / 120ms
10000 point	1.8s / 1.0s	70ms / 60ms	240ms / 220ms
100000 point	7.5s / 6.5s	300ms / 300ms	1.0s / 0.9s
1M point	57s / 55s	2s / 2s	7.0s / 6.5s

Waveform File size: A channel-trace will use 1 byte per sample plus approximately 360 bytes of waveform descriptor. A processed trace will use 2 bytes per sample.
Template Size: Approximately 21k bytes.
Panel Setup Size: Approximately 3k bytes.

*Note 1: When available

PRINTER
Type: Raster printer, thermal.
Resolution: 190 DPI.
Printout Size: 126 mm x 90 mm
Paper: Thermal printer paper, 30 meter roll, 110 mm width, type Seiko or similar.
Printing speed: 6 seconds approx. for one screen.

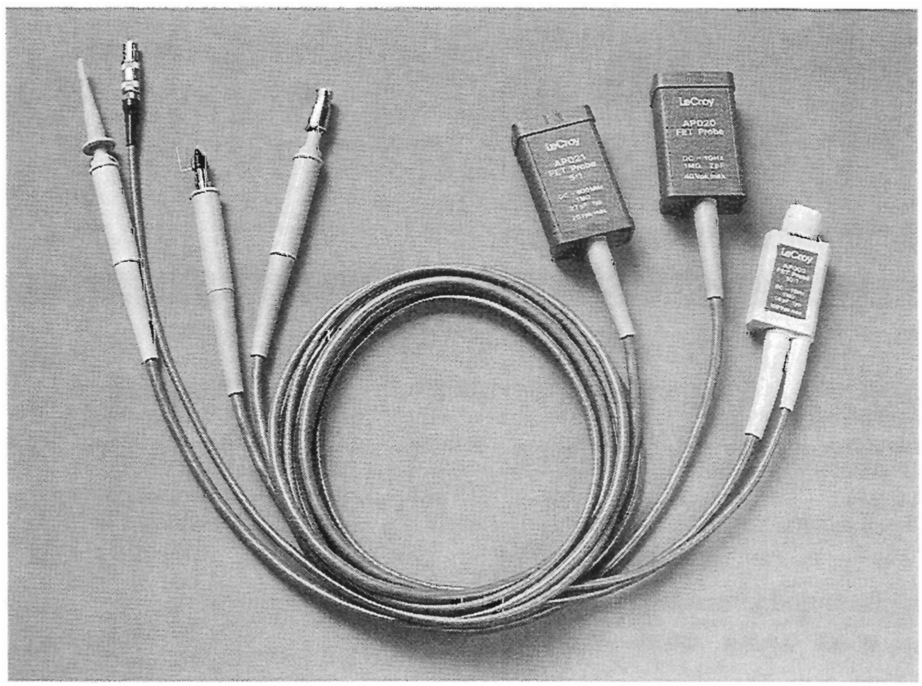
LeCroy

The Digital Scope Specialists

AP003, AP020 and AP021 Active FET Probes

Main Features

- Bandwidths to 1 GHz
- LeCroy ProBus™ interface for the AP020 and the AP021
- 1 MΩ input Impedance
- Low capacitance at probe tip
- Rugged mechanical construction
- Automatic sensing and control on scopes equipped with ProBus™



FET Probes provide the oscilloscope user with a higher level of measurement capability. Compared with passive probes, they offer low circuit loading, low capacitance and high bandwidth. This combination makes them the ideal tools for working on sensititve or high-speed electronics.

This performance is achieved by the integration of a high-impedance Field Effect Transistor (FET) amplifier into the probe tip. The circuit under test sees only the amplifier's input impedance - it is effectively buffered from the scope's input impedance and the probe cable.

LeCroy's AP series of FET probes are mechanically rugged in design, while their miniature construction allows them to be used in hand-held PCB probing applications. Their detachable tips are designed for simple replacement, and they are supplied with a full set of accessories.

Models AP020 and AP021 offer 1 GHz and 800 MHz Bandwidth respectively. AP020 features X10 signal attenuation and is especially recommended for LeCroy's 9320 and 9324 1 GHz oscilloscopes. The AP021 offers X5 attenuation when used with the new 9360.

As an active device, the FET probe requires a stabilized power supply. LeCroy provides an elegant solution to this with the ProBus™ probe interface.

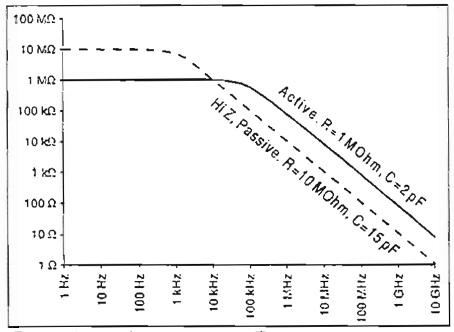
ProBus™ provides probe power and signal connection in one integrated package. It also allows the scope to control other probe functions, such as input coupling and DC offset. The ProBus™ interface is now available on a growing range of LeCroy oscilloscopes and probes. AP003 has an external power connector for use with scopes which are not ProBus™ compatible. All other models use the ProBus™ interface.

Features and Benefits

Connecting a probe to a circuit can significantly distort its signals by adding undesired loading - mostly capacitive and resistive. FET probes offer high resistance and low capacitance therefore they present minimal loading to the circuit under test, and protect from making erroneous measurements.

HIGH RESISTANCE
Low resistance probes have significant DC effects when used in high impedance circuits. They can greatly affect the behaviour of the device under test by changing the swing and the DC offset of the probed signal. A 1 MΩ impedance FET probe will not affect gain or offset in virtually all the cases.

LOW CAPACITANCE
Although not important in DC measurements, capacitive loading is very disruptive at high signal frequencies. The capacitive loading effects can be drastic. When probed with a 10 MΩ, 15



Probe Impedance versus Frequency

pF passive probe, a 100 MHz signal "sees" a 100 Ω load as illustrated on the picture below.

With only 2 pF of capacitance at the probe tip, LeCroy's FET probes reduce circuit loading at high frequencies by a factor of 10. Minimizing tip capacitance can also push the probe's resonant frequency beyond the system bandwidth. Sensitivity to ground lead inductance is also minimized.

PROBUS
The ProBus™ system is a complete measurement solution from probe tip to oscilloscope display. It supplies power to active probes, while automatically sensing probe attenuation. ProBus™ enables direct control of the probe offset and input coupling from the scope's front panel, extending the instrument's accuracy up to the probe tip. In addition, ProBus™ automatically optimizes scope and probe offset adjustments, calibrates the gain at the probe tip and compensates for non-linearities, providing most accurate measurements.

Specifications

MODEL	AP003	AP020	AP021
Bandwidth (MHz)	DC-1000	DC-1000	DC-800
Risetime (psec)	< 350	< 350	< 437
Attenuation	10:1 ±2%	10:1±2%	5:1±2%
Input R (MΩ)	1 ±5%	1±2%	1±2%
Input C (pF)	1.9 ±0.3	1.8 ±0.2	2.7 ±0.2
Max Input Voltage	±100 V	±40 V	±20 V

MODEL	AP003	AP020	AP021
Dynamic Range	±7 V	±5 V	±2.5 V
DC Offset Range	N/A	±20 V	±10 V
Input Coupling	DC	DC/AC	DC/AC
Total length (m)	1.5	1.5	1.5
Power requirement	±12 V	±12 V	±12 V
Interface	N/A	ProBus™	ProBus™

Recommended Matching

LeCroy Model	AP-003	AP-020	AP-021
9304-10-14	XX		
9360-61			X
9320-24		X	
94XX	X		
7200	XX		
7200A	X		
ScopeStation	X		

X: External Power Supply not required
XX: External Power Supply required

Ordering Information

AP003	1 GHz active FET probe
AP020	1 GHz active FET probe
AP021	800 MHz active FET probe with ProBus™ interface. All probes are shipped with the following accessories: 1x Retractable hook 1x Ground Lead 1x BNC Adaptor 1x IC Tip 3x Ground Bayonets 1x Mini pincher with Lead Adaptor
AP501	Power Supply for the AP003

USA Direct Sales: 1 (800) 5LE-CROY

LeCroy Worldwide Sales Offices

ASIA/PACIFIC	LeCroy Pty Ltd	61.38.90.7358
BENELUX	LeCroy BV	04902.8.9285
CANADA	LeCroy Cnd	514.928.4707
FRANCE	LeCroy SARL	(1).69.18.83.20
GERMANY	LeCroy GmbH	06221 83.10.01
ITALY Milano	LeCroy SRL	02.204.70.82
ITALY Rome	LeCroy SRL	06.336.797.00
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JAPAN Tokyo	LeCroy Japan	0813.3376.9400
SWITZERLAND	Geneva	022.719.21.11
SWITZERLAND	Lenzburg	064.51.91.81
United Kingdom	LeCroy Ltd	0235-533114

Other sales and service representatives throughout the world.

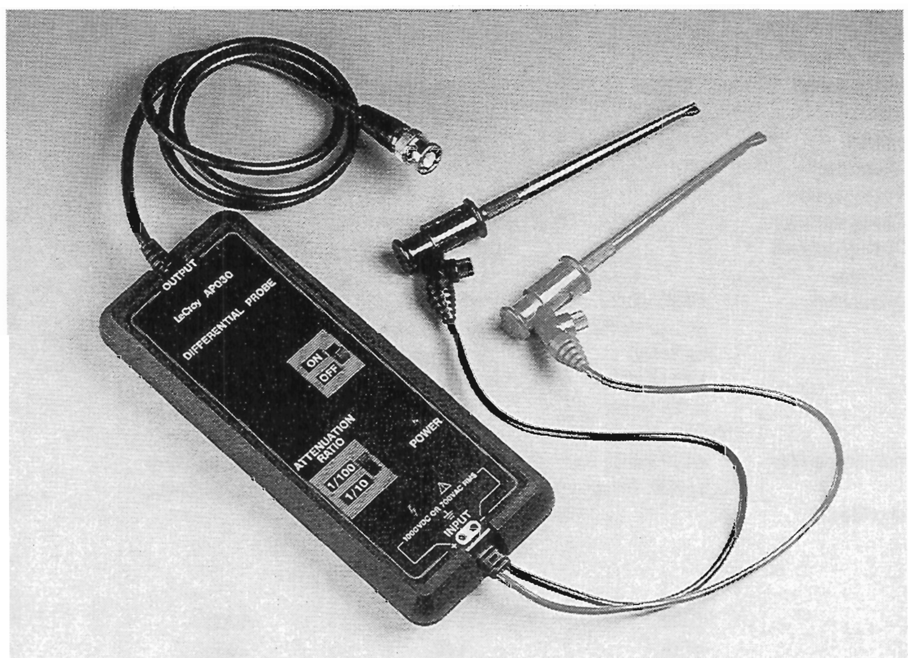
LeCroy

The Digital Scope Specialists

AP030, SI 9000 and SI 9000A Active Differential Probes

Main Features

- Bandwidths to 15 MHz
- Multiple:
  - Attenuations
  - Differential Voltage Ranges
  - Common Mode Voltages
- High Input Impedance
- Rugged and Lightweight Mechanical Construction



The Models AP030, SI 9000 and SI 9000A are fully differential active probes designed for applications where electric signals must be measured relative to a floating voltage, other than ground potential.

These probes are designed specifically for situations where:

- the reference voltage may be several hundreds volts above or below ground;
- measurements require the rejection of common-mode signals, (e.g. to evaluate small amplitude pulses riding on big common-mode signals);
- ground loops and currents produce so much interference that small signals cannot be detected.

With these differential probes the oscilloscope user avoids both the dangerous practice of floating the scope, and the technique of using two scope channels in "Invert and Add" mode, which is limited both in common mode rejection and in dynamic range.

Models AP030, SI 9000 and SI 9000A are lightweight and easy to use. They have the rugged mechanical construction required for laboratory, manufacturing and field service environments, and are battery powered for greater safety and convenience.

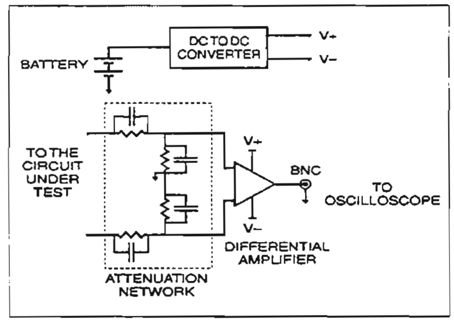
Features and Benefits

FULLY DIFFERENTIAL INPUTS
The probes are fully differential active devices. The differential technique allows measurements to be made between two points in a circuit without reference to ground. The two input signals are processed inside the probe (as illustrated in figure) and the resulting single-ended signal may be measured by any grounded oscilloscope.

HIGH COMMON MODE VOLTAGE
The three probes offer a range of Common Mode Voltages from 40 V to 1000 V.

RUGGED CONSTRUCTION
The probes are designed to be compact and lightweight with power provided by four AA size 1.5 V batteries. A rubber casing enhances the probes' resistance to shocks.

SAFETY
Use of differential probes is safe within the specified voltages. Their use avoids less reliable alternatives, or possible dangerous practices.



Specifications

MODEL	AP030	SI 9000	SI 9000A
Bandwidth (MHz)	15 MHz	15 MHz	15 MHz
Risetime	24 ns	24 ns	24 ns
Attenuation	1:10/1:100	1:20/1:200	1:50/1:500
Atten. Accuracy	2%	2%	2%
Input Resistance	2 MΩ	2 MΩ	2 MΩ
Input Capacitance		12 pF each side to ground	
Input Configuration		Differential	
Input Voltage			
Differential Max	±400 VDC or 280 Vrms for 1:100 ±40 VDC or 28 Vrms for 1:10	±700 VDC or 500 Vms for 1:200 ±70 VDC or 50 Vms for 1:20	±1000 VDC or 700 Vrms for 1:500 100 VDC or 70 Vrms for 1:50
Common Mode Max	±420 VDC or 300 Vrms	±700 VDC or 500 Vrms	±1000 VDC or 700 Vrms
Absolute Max		±1000 VDC or 700 Vrms	
CMRR			
50Hz	-90db	-80db	-80db
1KHz	-80db	-70db	-70db
1MHz	-53 db	-45db	-45db
Output Voltage			
Amplitude Max	±4 V	±3.5 V	±2 V
Offset	<± 5 mV	<±10 mV	<±10 mV
		typical -10° C to +40° C	
Noise		1.5 to 2mV typical	
Source Impedance		1Ω at 1 KHz, 8Ω at 1 MHz typical	
Ambient Temperature			
Operating		-10° C to +40° C	
Storage		-30° C to +70° C	
Power requirement	Four internal 1.5 V AA size batteries or external AC to 6 Vdc adaptor Typical consumption 50 mA		
Dimensions	6.6" (168mm) x 2.4" (62mm) x 0.79" (20mm) excluding casing		
Weight	9.35 oz (265 gr) excluding batteries and casing		

Ordering Information

AP030	15 MHz differential probe 1:10 / 1:100
SI 9000	15 MHz differential probe 1:20 / 1:200
SI 9000A	15 MHz 1:50 / 1:500

All models are delivered with rubber casing.
Batteries not included

USA Direct Sales: 1 (800) 5LE-CROY

LeCroy Worldwide Sales Offices

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SWITZERLAND	Geneva	022.719.21.11
SWITZERLAND	Lenzburg	064.51.91.81
United Kingdom	LeCroy Ltd	(01235) 533114

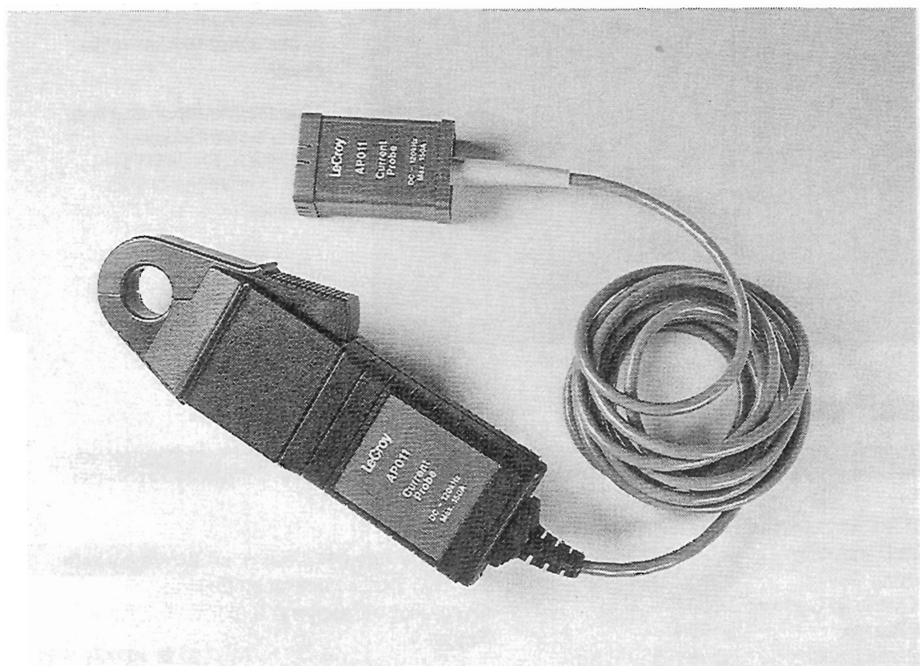
Other sales and service representatives throughout the world.

LeCroy
Innovators in Instrumentation

AP011 Current Probe

Main Features

- DC, AC or impulse currents
- 150A maximum current
- DC - 120 kHz Bandwidth
- Probe Accuracy 1% ± 2mA
- Measurement units in amperes
- ProBus™ compatible, sensed automatically by the 93XX family of oscilloscopes.
- Rugged mechanical design



CURRENT MEASURING

The AP011 allows the oscilloscope to measure current flowing through a conductor. The AP011 is based on a combination of Hall effect and transformer technology which allows measurements to be made on DC, AC and impulse currents. It is rugged in design and uses a split-core transformer to allow the probe head to be clamped around a conductor that remains in circuit.

FULLY INTEGRATED

With the ProBus™ interface, the AP011 probe becomes an integral part of the oscilloscope. The probe is automatically detected with full calibration and control achieved from the on-screen menu system. No external power supplies or amplifiers are required.

Full Remote control is possible over GPIB or RS-232-C interfaces.

SCALED MEASUREMENTS

Waveform scaling factors and unit conversions are automatically applied.

The existing wide range of oscilloscope software analysis functions and parameter measurements are compatible and handle mixed unit conversion.

Features and Benefits

FULLY INTEGRATED SYSTEM

ProBus™ compatibility ensures full integration of the AP011 features into the oscilloscope. The probe is fully operational whenever it is attached to the instrument. There is no need for external amplifiers or power supplies. All controls are menu-driven from the oscilloscope screen, avoiding the need for accessing probe mounted controls which can be particularly difficult and dangerous in some applications.

AUTO-ZERO ADJUSTMENT

Optimal calibration of the probe is achieved by using the Auto-Zero feature. This should be done whenever the probe is first connected, subjected to wide temperature variations, re-oriented with respect to the earth's magnetic field, or subjected to overload conditions. The auto-zero operation on the AP011 is performed automatically by pressing the 'AUTO ZERO' menu button in the associated channel menu (see Figure 1).

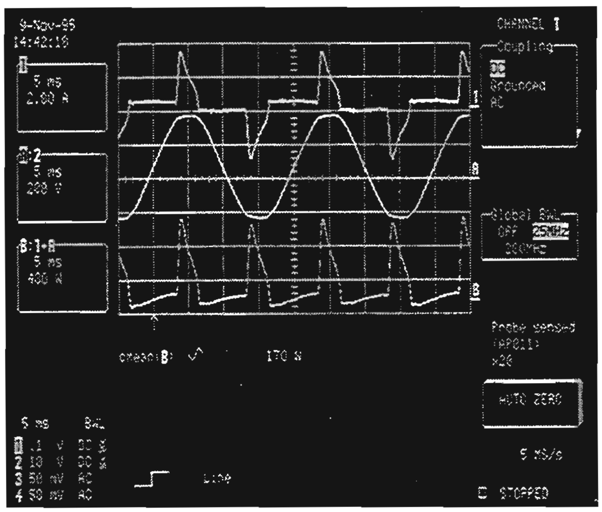


***Figure 1**: This example shows a power supply input current (top trace) vs. voltage (middle trace). These are multiplied to provide the input power waveform (lower trace). A parameter measurement is then made to calculate the mean input power.*

Note that the input coupling menu is automatically configured to control the AP011 attached to that channel.

AUTOMATIC MEASUREMENT UNIT CONVERSION

Automatic unit conversion and calibration ensures correct interpretation of data and avoids the painstaking task of recording and applying conversion and scaling factors.

All waveforms acquired from the AP011 are automatically calibrated and adjusted to be scaled in ampere units. A wide range of functions can be applied to current waveforms. Advanced functions such as FFT's and statistical analysis are available as optional firmware packages.

All functions and measurements recognize ampere vertical scales and adjust the resulting waveform or calculation units, including mixed unit conversions (e.g. current multiplied by voltage as shown in Figure 1).

Specifications

ELECTRICAL CHARACTERISTICS

System Bandwidth:	DC to 120kHz
Measuring Range:	0 to ±150A
Max. Overload Current:	1500A
Offset Range:	±150A
Output sensitivity:	50 mV/A
DC Accuracy (@25°C):	1% of reading ±2mA*
AC Accuracy (@25°C):	1% of reading DC to 2kHz decreasing to 5% @ 120kHz
Delay Time:	< 1µs
di/dt Tracking:	> 35A/µs
Dielectric Strength:	2.3kV, 50Hz, 1min
External field rejection:	500:1 @ DC 100:1 @ 10 kHz

GENERAL CHARACTERISTICS

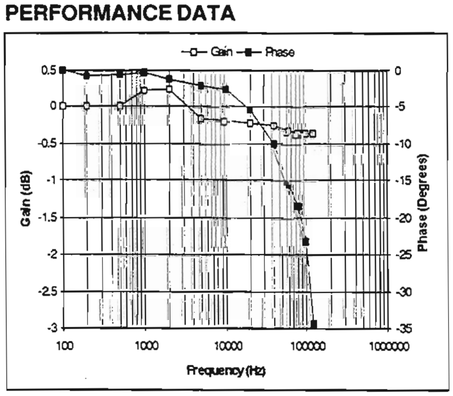
Operating Temperature:	0°C to 50°C
Max Conductor Size:	19mm
Cable Length:	2m
Interface:	ProBus™, 1 MΩ only
Weight:	300g
Usage Environment:	Indoor
Max. Altitude:	2000m.
Max. relative humidity:	80% (max. 31°C)

**** Note: Accuracy is specified for probe operating in fixed orientation with respect to earth's magnetic field following an auto-zero operation***

SAFETY

The probe has been designed to comply with IEC1010-2-032 Installation Category (Overvoltage Category) II, 300V, Pollution Degree 1.

PERFORMANCE DATA



Typical probe amplitude and phase response

Ordering Information

AP011	Current Probe

Software Options:

93XX-WP01	Waveform Math Package
93XX-WP02	FFT Processing Waveform
93XX-WP03	Statistical Analysis Package

USA Direct Sales: 1 (800) 5LE-CROY

LeCroy Worldwide Sales Offices

ASIA/PACIFIC	LeCroy Pty Ltd	61.38.90.7358
BENELUX	LeCroy BV	0490.208.9285
FRANCE	LeCroy SARL	(1).69.18.83.20
GERMANY	LeCroy Europe GmbH	06221.87.200
ITALY	LeCroy SRL	06.336.797.00
JAPAN Osaka	LeCroy Japan	0816.330.0961
JAPAN Tokyo	LeCroy Japan	0813.3376.9400
SWITZERLAND	Geneva	022.719.21.11
SWITZERLAND	Niederlenz	062.885.80.50
United Kingdom	LeCroy Ltd	(01235) 533114

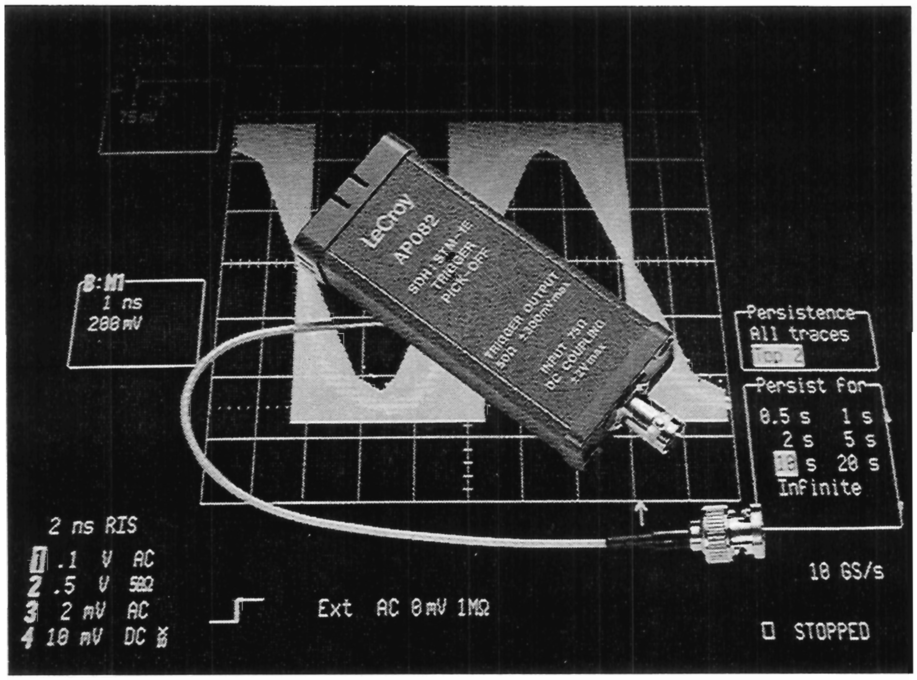
Other sales and service representatives throughout the world.

LeCroy
Innovators in Instrumentation

AP082 / AP083 Trigger Pick-off for SDH: STM-1E and SONET: STS-3

Main Features

- AP082 for SDH,
  AP083 for SONET.
- Ideal for pulse mask-testing (G.703 fig 24 and 25).
- Works with scrambled or live data streams.
- Automatic impedance matching and scaling.
- ProBus™ design, automatically sensed by the 93XX oscilloscopes.
- Includes ready-to-load G.703 masks fig. 24 and 25.



Choose to trigger on "0"s or on "1"s

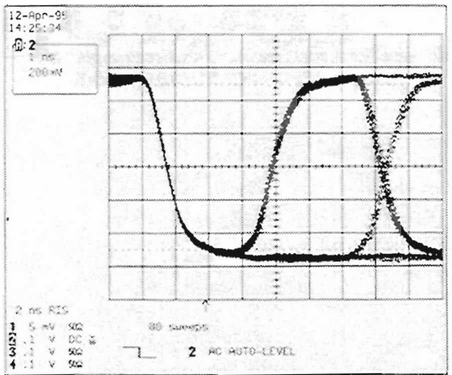
155 Mbps electrical SDH and SONET signals use the CMI encoding. Using an oscilloscope to selectively trigger on the leading edge of a "1" pattern, and reject all the zeros (or vice versa) has been practically impossible until now.
Thanks to its dedicated circuitry, the AP082/083 can easily isolate either "0" or "1" patterns, allowing for further analysis such as jitter characterization or mask testing – G.703 Fig. 24 and 25 masks are supplied with the accessory.

Accurate readings

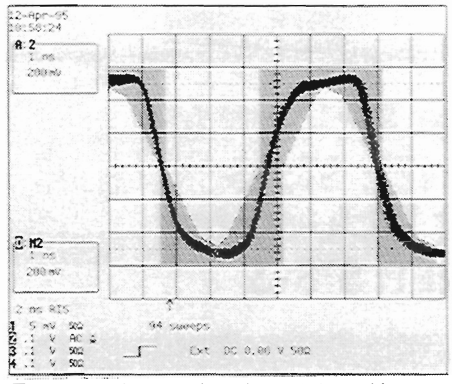
Both the AP082 and the AP083 have been designed to provide the correct impedance matching (50Ω for SONET and 75Ω for SDH) and because the accessory is automatically sensed by the oscilloscope, the amplitude readings are correctly scaled on screen.

High Bandwidth

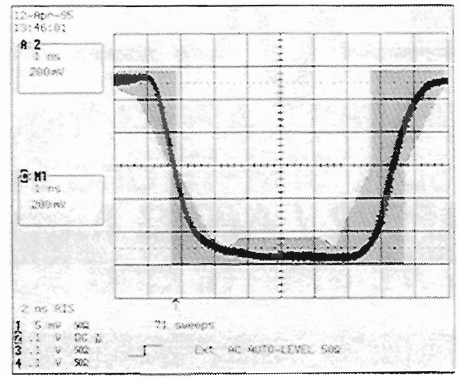
In addition, the accessory's high bandwidth make it suitable for testing with an oscilloscope of 1 GHz or greater, to minimize attenuation and distortion, and to comfortably analyze the signal well beyond its 5th harmonic.



Without the adequate triggering provided by the AP082/083, both "0" and "1" patterns overlap.



The same signal as in column 1, but with AP082/083 trigger set to trigger on a "0" pattern.



The same signal as in column 1, but with AP082/083 trigger set to trigger on a "1" pattern.

Specifications

AP082

Bandwidth (3 dB): 1 GHz

Input range: ±2V
Input coupling: DC
Input impedance: 75Ω

Trigger output impedance: 50Ω
Trigger output range: ±300mV

AP083

Bandwidth (3 dB): 1 GHz

Input range: ±2V
Input coupling: DC
Input impedance: 50Ω

Trigger output impedance: 50Ω
Trigger output range: ±300mV

Ordering Information

AP082	SDH: STM-1E trigger pick-off with SDH masks on 3.5" Floppy disk.
AP083	SONET: STS-3 trigger pick-off with SONET masks on 3.5" Floppy disk.

USA Direct Sales: 1 (800) 5LE-CROY

LeCroy Worldwide Sales Offices

ASIA/PACIFIC	LeCroy Pty Ltd	61.38.90.7358
BENELUX	LeCroy BV	04902.8.9285
FRANCE	LeCroy SARL	(1).69.18.83.20
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ITALY	LeCroy SRL	06.336.797.00
JAPAN Osaka	LeCroy Japan	0816.330.0961
JAPAN Tokyo	LeCroy Japan	0813.3376.9400
SWITZERLAND	Geneva	022.719.21.11
SWITZERLAND	Lenzburg	064.51.91.81
United Kingdom	LeCroy Ltd	(01235) 533114

Other sales and service representatives throughout the world.

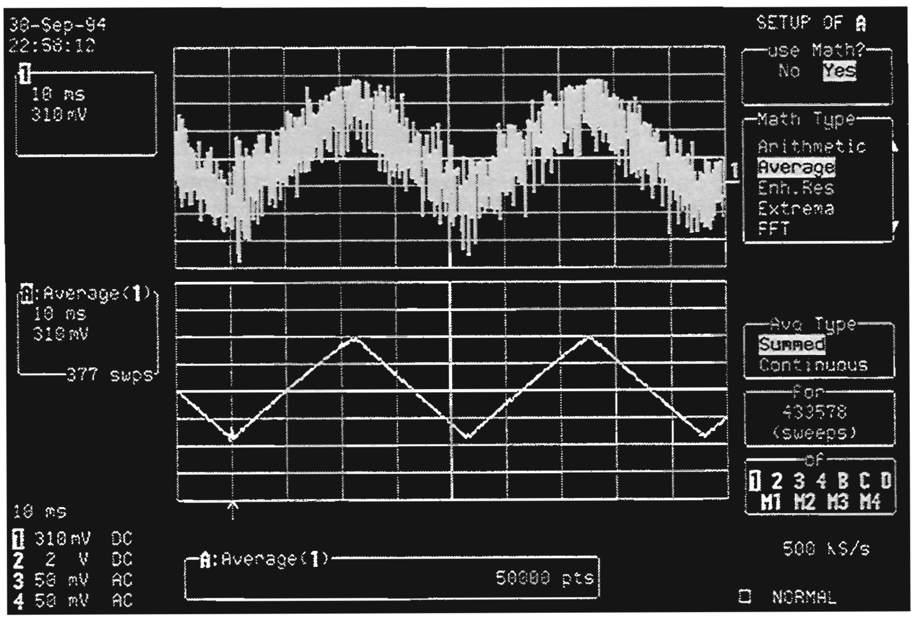
LeCroy
Innovators in Instrumentation

LeCroy
The Digital Scope Specialists

WP01 Waveform Processing Firmware for the 9300 Family of Digital Oscilloscopes

Main Features

- High–precision averaging up to 1 million sweeps
- Extended digital filtering capabilities
- Rescale function, with (ax + b) correction factor
- Envelope mode
- Integration
- Differentiation
- Log(e) and Log(10)
- Exp(e) and Exp(10)
- Absolute, Reciprocal
- Square, Square root
- Powerful function chaining feature



Summed Averaging is applied to the signal in Channel 1, to remove random noise. Trace A shows the result after 377 sweeps: the noise has practically disappeared.

The LeCroy WP01 Waveform Processing package features a powerful toolset that extends the processing power inside the 9300 oscilloscope, well beyond the capabilities of a traditional instrument.

In fact, all the processing is built-in to eliminate the need for external computers and controllers. High-speed microprocessors are used to ensure real-time updates of computed waveforms on the screen.

The package is fully programmable over GPIB or RS-232-C interfaces, and hard copies can be made directly on to a wide range of printers – including the optional internal printer – plotters or graphic formats.

Features and Benefits

EXTENSIVE SIGNAL AVERAGING

WP01 offers two powerful, high-speed averaging modes that can be used to reduce noise and improve the signal-to-noise ratio. Vertical resolution can be extended by several bits to improve dynamic range and increase the overall input sensitivity to as much as 50 µV/div.

Summed averaging, where up to 1,000,000 sweeps are repeatedly summed, with equal weight, in a 32-bit accumulation buffer for improved accuracy. The accumulated result is then divided by the number of sweeps.

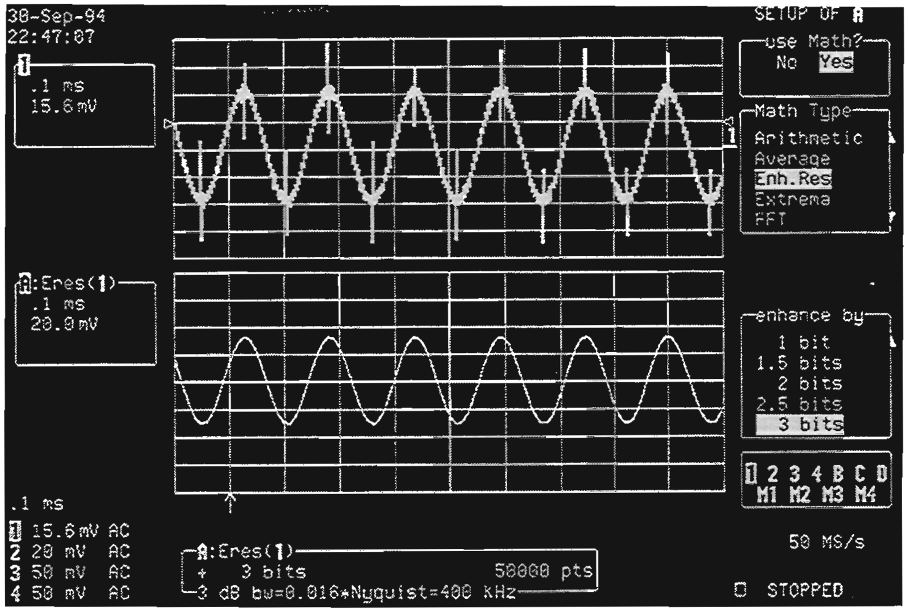
Continuous/exponential averaging where a weighted addition of successive waveforms can be performed with weighting factors from 1:1 to 1:1023. The averaging goes on indefinitely with the contribution of "older" sweeps gradually decreasing. The method is particularly appropriate to reduce noise on signals drifting very slowly in time or amplitude.

ENHANCED RESOLUTION BY DIGITAL FILTERING

Allows low-pass F.I.R. filtering of the digitized signals, with 6 different cut-off frequencies per sampling rate setting. As a result, the vertical resolution of the captured signals – single-shot or repetitive – increases from 8 bits to 11 bits in 0.5-bit steps. This feature is a post-acquisition process which allows the user to capture, save and view the raw data as well as the processed data after applying one or more filters.

RESCALING

Allows an input signal to be rescaled using a (ax + b) correction factor to compensate for gain and offset. This is very useful when dealing with various types of transducers, to read the correct temperature or pressure value directly from the scope's cursor.



High-frequency glitches in Channel 1 have been dramatically reduced in Trace A by using the low-pass filtering properties of the Enhanced Resolution Function.

ENVELOPE MODE

Shows the signal envelope by retaining only the highest and lowest amplitudes for every sampling interval, over a user-definable number of sweeps. Ideal to visualize the time or amplitude jitter in a signal.

POWERFUL MATH TOOLSET

In addition to the basic arithmetic functions found in the standard models (+,–,×,÷), WP01 adds an impressive set of functions such as integration, differentiation, logarithms and exponential – in both bases 10 and e – square, square root, reciprocal and absolute value.

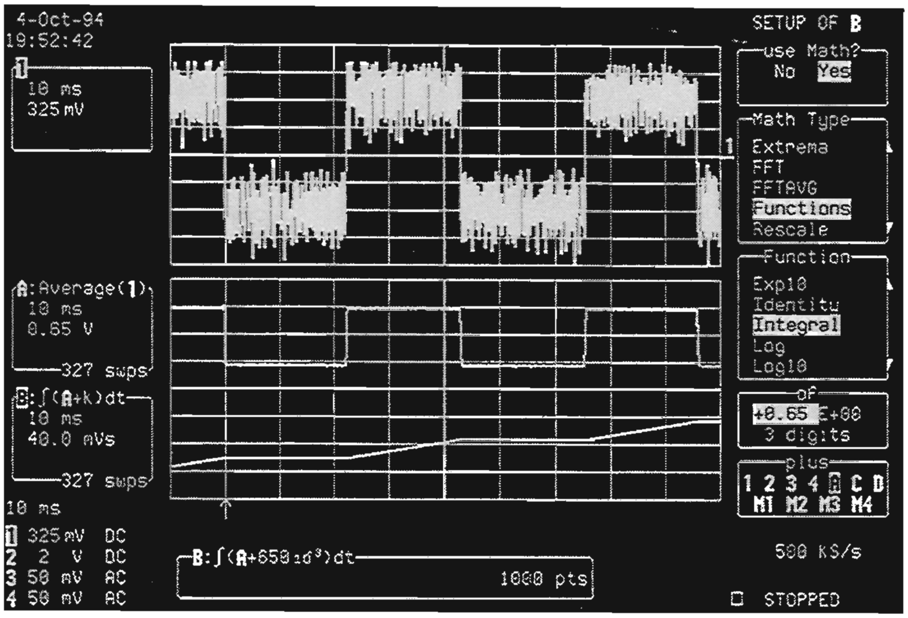
All these functions are updated automatically each time a new waveform is acquired, showing a "live" representation of a computed trace. This would be impossible to achieve on a separate computer.

FUNCTION CHAINING

When more than one math function is needed in the equation, WP01 supports function chaining, and allows the user to multiply, for instance, the "Voltage" and the "Current" channel and to integrate the result to get an instantaneous energy curve.

REMOTE CONTROL

All of the waveform processing can be controlled via GPIB or RS-232-C remote control. And the function traces do not even need to be called up on screen to be updated, an important feature that speeds up the computation.



To illustrate WP01's function chaining ability, the noisy signal in Channel 1 has been averaged in Trace A to remove undesired noise, and the result integrated in trace B.

WP01 Specifications

GENERAL
Max. number data points: only limited by the available amount of system memory (indicated in the "memory used" status menu).
Min. number data points: Data points can be reduced down to 50 in the processing function to improve update rate.
Vertical Zoom: supported, 50× maximum.
Horizontal Zoom: supported, maximum zooming to a point where 20 samples of the source trace occupy the full screen.
Maximum Sensitivity: 50 µV/div after vertical expansion.

SUMMATION AVERAGING
Number of Sweeps: 1 to 1,000,000.
Speed: up to 200,000 points/s.

CONTINUOUS AVERAGING
Possible Weighting Factors: 1:1, 1:3, 1:7, 1:15, 1:31, 1:63, 1:127, 1:255, 1:511 and 1:1023.

ENHANCED RESOLUTION
Choice of six low-pass filters to improve vertical resolution improvement from 8 to 11 bits in 0.5-bit steps.
Resulting bandwidth:

0.5 bit	0.5 × Nyquist BW
1 bit	0.241 × Nyquist BW
1.5 bit	0.058 × Nyquist BW
2 bit	0.029 × Nyquist BW
2.5 bit	0.016 × Nyquist BW

Nyquist BW = 1/2 × sample frequency.

RESCALE
ax + b rescaling with a and b ranging from ±0.00001 E-15 to ±9.99999 E+15

ARITHMETIC
Addition, subtraction, multiplication and ratio on any two waveforms.

FUNCTIONS
Identity, negation, integration (including additive constant), differentiation, square, square root, logarithm and exponential (base e and 10), reciprocal and absolute value of any waveform.

EXTREMA
Shows the signal envelope by retaining only the highest and lowest amplitudes for every sampling interval. Logs all extreme values of a waveform over a programmable number of sweeps. Maxima and minima can be displayed together, or separately by choosing *roof* or *floor* traces.
Number of Sweeps: 1 to 1,000,000.

FUNCTION CHAINING
Up to four functions can be automatically chained using traces A, B, C and D. Using memories M1 to M4 for intermediate results, any number of operations can be chained manually or via remote control.

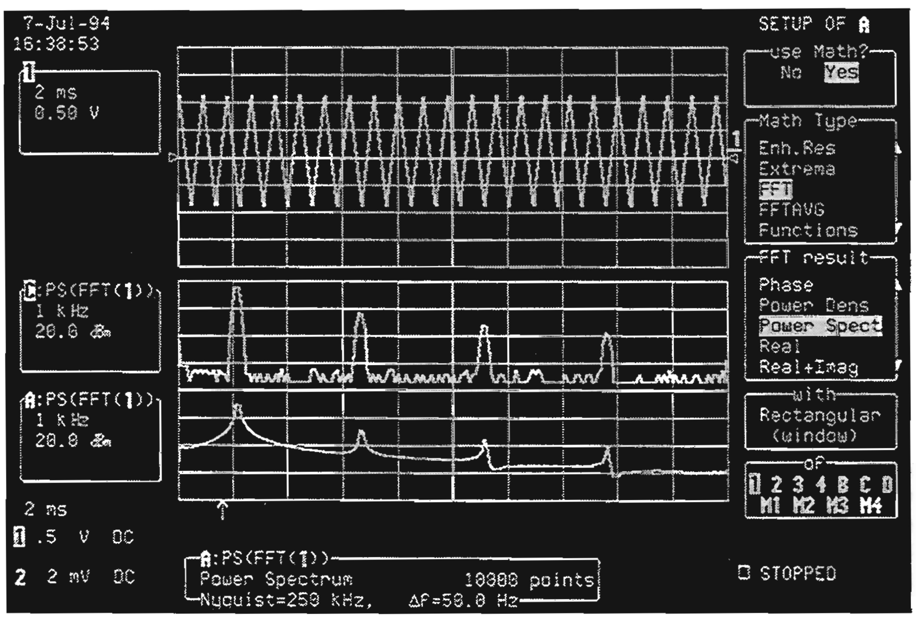
REMOTE CONTROL
All controls and waveform processing functions are fully programmable using simple commands over the oscilloscope's GPIB or RS-232-C interfaces.

The Digital Scope Specialists

WP02 Spectrum Analysis Firmware for the 9300 Family of Digital Oscilloscopes

Main Features

- Frequency range from DC up to the instrument's full bandwitdh
- Simultaneous FFTs on up to four channels
- Frequency resolution down to 100 µHz
- Frequency domain averaging
- Wide selection of scaling formats
- Five window functions
- Up to Five 1000-point FFTs per second
- Full support of cursors and automatic waveform parameters
- Full PASS/FAIL testing support



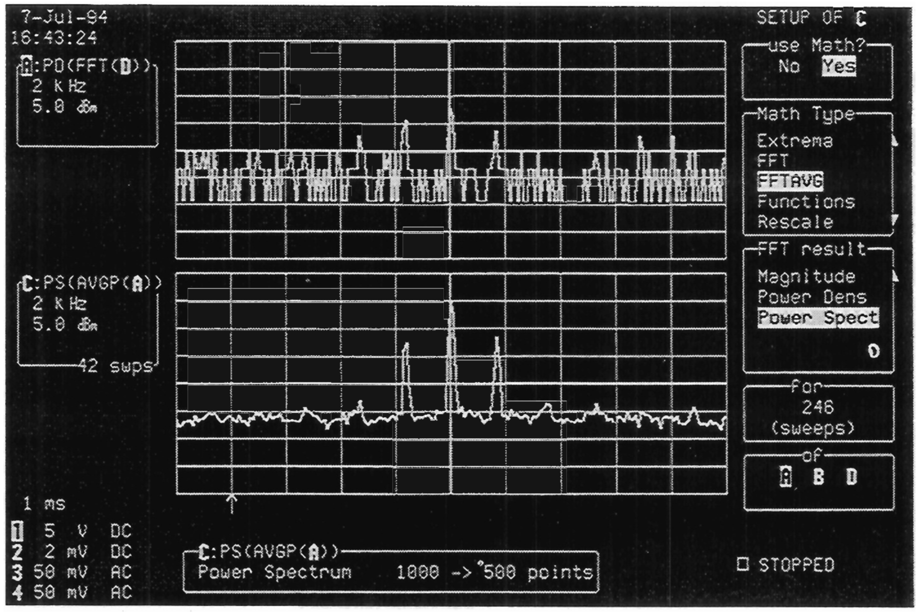
Adding the WP02 Spectrum Analysis Package to the 9300 family of digital oscilloscopes provides a fast and economical solution to frequency domain applications.

The WP02 Spectrum Analysis package provides the 9300 oscilloscope with a powerful frequency-domain toolset that extends its processing capabilities well beyond the realm of a standard instrument. In fact, all the processing is built-in to eliminate the need for external computers and controllers.

High-speed microprocessors are used to ensure real-time update of computed waveforms on the screen. Fast Fourier Transforms (FFTs) rapidly convert time domain waveforms into frequency domain records to reveal valuable spectral information such as phase, magnitude and power.

The package is fully programmable over GPIB and RS-232-C interfaces, and hardcopies can be made directly on to a wide range of printers – including the optional internal printer – plotters or graphic formats.

Features and Benefits



An FFT (top trace) with spectral components buried in noise. By applying the power averaging function (lower trace), all the baseline noise is removed, and the spectral components of an AM signal are clearly visible..

WHY FFT IN A SCOPE?
The FFT package on a LeCroy 9300 has at least four clear advantages over common swept spectrum analyzers:

- It can show the spectrum of a **transient signal**.
- Both **time and frequency** information can be monitored **simultaneously**.
- Phase information is **available**.
- The price is **attractive.**

It has two definite advantages over FFT analyzers:

- It can show higher-frequency components.
- Both **time and frequency** information can be monitored **simultaneously**.
- The price is **attractive**.

BROAD SPECTRUM COVERAGE
The frequency spectrum ranges from DC to the full bandwidth of the oscilloscope for repetitive signals, and to one half of the maximum sampling frequency for transients.

MULTI-CHANNEL ANALYSIS
All input channels can be analyzed simultaneously to look for common frequency-domain characteristics in independent signals.

VERSATILE SCALING FORMATS
Frequency-domain data may be presented as magnitude, phase, real, imaginary, complex, log-power and log-PSD (Power Spectral Density).

STANDARD WINDOW FUNCTIONS
Use rectangular for transient signals; von Hann (Hanning) and Hamming for continuous waveform data; Flattop for accurate amplitude measurements; Blackman-Harris for maximum frequency resolution.

FREQUENCY DOMAIN AVERAGING
Up to 50,000 FFT sweeps may be averaged to reduce base-line noise, enable analysis of phase-incoherent signals or signals which cannot be triggered on.

FREQUENCY CURSORS AND WAVEFORM PARAMETERS
Cursors can be set on the FFT trace to show up to 0.004% frequency resolution (up to 0.002% for 10,000 point memory) and measure power or voltage differences to 0.2% of full scale. Automatic waveform parameters can also be applied to FFT traces.

PASS/FAIL TESTING ON FFT TRACES
PASS/FAIL testing is fully supported on FFT traces. The instrument can be setup to test incoming spectra against tolerance masks. In case the signal "fails", the instrument can be programmed to perform a choice of actions (screen dump, waveform storage, pulse out, etc.)

RESCALING
Allows an input signal to be rescaled using a (ax + b) correction factor to compensate for gain and offset. This is very useful when dealing with various types of transducers, to read the correct temperature or pressure value directly from the scope's cursor.

FUNCTION CHAINING
When more than one math function is needed in the equation, WP02 supports function chaining, and allows the user to subtract a signal from a backgroung reference stored in memory and then perform an FFT after the subtraction.

REMOTE CONTROL
All of the waveform processing can be controlled via GPIB or RS-232-C remote control. And the function traces do not even need to be called up on screen to be updated, an important feature that speeds up the computation.

FOURIER PROCESSING
Fourier processing is a mathematical technique which enables a time-domain waveform to be described in terms of frequency-domain magnitude and phase, or real and imaginary spectra. It is used, for example, in spectral analysis where a waveform is sampled and digitized, then transformed by a Discrete Fourier Transform (DFT). Fast Fourier Transforms (FFT) are a set of algorithms used to reduce the computation time (by better than a factor of 100 for a 1000 point FFT) needed to evaluate a DFT.

WP02 Specifications

GENERAL

Max. number data points: only limited by the available amount of system memory (indicated in the "memory used" status menu).
Min. number data points: Data points can be reduced down to 50 in the processing function to improve update rate.
Vertical Zoom: supported, 50× maximum.
Horizontal Zoom: supported, maximum zooming to a point where 20 samples of the source trace occupy the full screen.
Maximum Sensitivity: 50 µV/div after vertical expansion.
Frequency Range:
Repetitive signals: DC to instrument bandwidth.
Transient signals: DC to 1/2 maximum single-shot sampling frequency
Frequency Scale Factors: 0.05 Hz/div to 0.2 GHz/div in a 1-2-5 sequence.
Frequency Accuracy: 0.01%.

AMPLITUDE AND PHASE

Amplitude Accuracy: Better than 2%. Amplitude accuracy may be modified by the window function (see the window functions table).
Signal Overflow: A warning is provided at the top of the display when the input signal exceeds the ADC range.
Number of Traces: Time domain and frequency domain data can be displayed simultaneously (up to 4 waveforms).
Phase Range: -180° to +180° .
Phase Accuracy: ±5° (for amplitudes > 1.4 div).
Phase Scale Factor: 50° /division.

SPECTRUM SCALING FORMATS

Horizontal Scale: *Linear, in Hz*
Vertical Scales:
Power Spectrum *in dBm (1 mW into 50 Ω).*
Power Spectral Density *(PSD) in dBm.*
Magnitude, Real, Imaginary: *Linear, in V/div*
Phase Display: *Linear, in degrees.*

WINDOW FUNCTIONS

Rectangular, von Hann (Hanning), Hamming, Flattop and Blackman-Harris (see table below).

FFT EXECUTION TIMES*

100 points in less than 0.03 s.
1000 points in less than 0.3 s.
10000 points in less than 3 s.

** Only valid for 9370, 9350, 9360, and 9304/10 with MWP option. Other models, add 50%*

FREQUENCY DOMAIN POWER AVERAGING

Summation averaging of power, PSD or magnitude for up to 50,000 sweeps.

FUNCTION CHAINING

Up to four functions can be automatically chained using traces A, B, C and D. Using memories M1 to M4 for intermediate results, any number of operations can be chained manually or via remote control.

REMOTE CONTROL

All controls and waveform processing functions are fully programmable using simple commands over the oscilloscope's GPIB or RS-232-C interfaces.

FILTER PASS BAND AND RESOLUTION

Window type	Filter bandwidth at -6 dB [freq. bins]	Highest side lobe [dB]	Scallop loss [dB]	Noise bandwidth [freq. bins]
Rectangular	1.21	-13	3.92	1.0
von Hann	2.00	-32	1.42	1.5
Hamming	1.81	-43	1.78	1.36
Flattop	1.78	-44	0.01	2.96
Blackman-Harris	1.81	-67	1.13	1.71

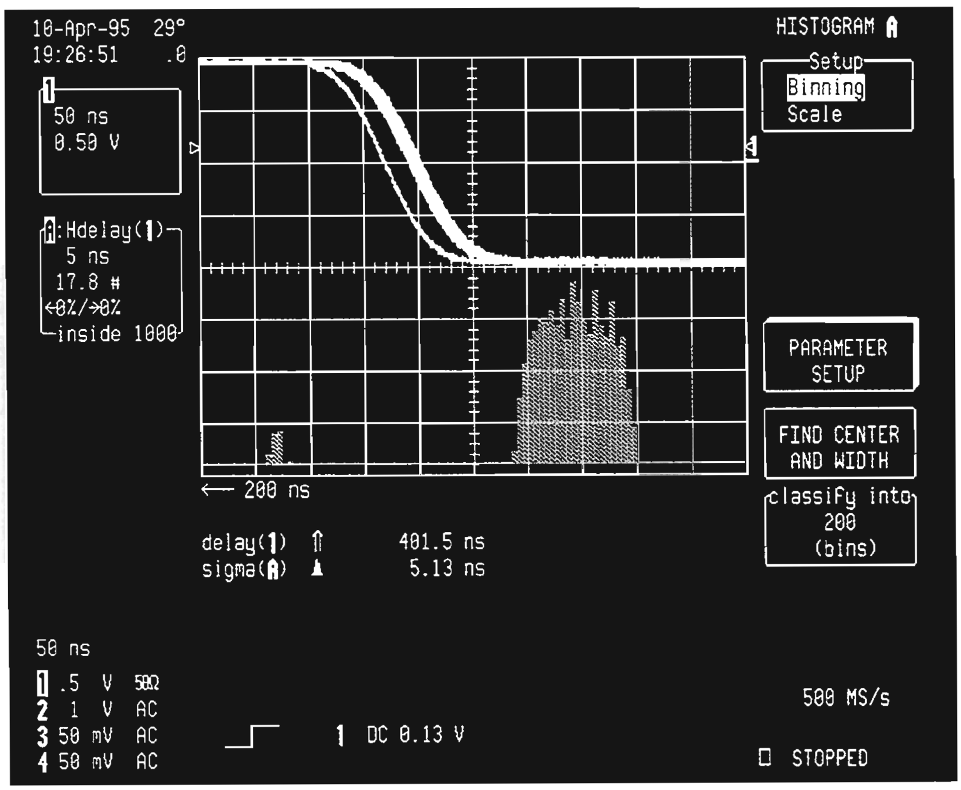
Filter Bandwidth at -6 dB characterizes the frequency resolution of the filter.
Highest Side Lobe indicates the reduction in leakage of signal components into neighboring frequency bins.
Scallop Loss is the loss associated with the picket fence effect.

LeCroy
Innovators in Instrumentation

WP03 Parameter Distribution Analysis Firmware for the 9300 Family of Digital Oscilloscopes

Main Features

- Histogram function of over 40 different parameters
- Up to 2000 bins
- Population of up to 2,000,000,000
- 18 histogram parameters
- Autoscale on Histogram
- Histograms of all or individual segments in sequence waveforms



Parameter Histogram Display shows the statistical distribution of timing jitter.

The LeCroy WP03 Waveform Processing package extends the measurement capability of the 9300 oscilloscope by providing a new processing function – *built into the oscilloscope* – to perform in-depth statistical analysis of waveform parameters – a task that was formerly carried out either manually, with a notepad, or by means of an external computer, in a spreadsheet program.

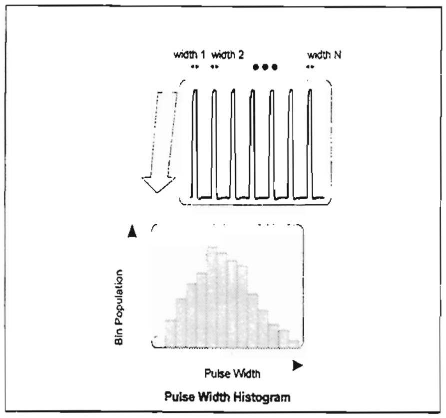
The new function provides **histogramming** of any waveform parameter measurement, and can be conveniently ***autoscaled*** to display the center and width of the distribution. In addition, an already wide range of automated measurements are extended to provide a new category of statistical measurements specifically designed to analyze histogram distributions.

The package is fully programmable over GPIB and RS-232-C interfaces, and hardcopies can be made directly to a wide range of printers (including the optional internal printer), plotters or graphic formats.

WAVEFORM PARAMETER ANALYSIS
WP03 adds a powerful dimension to waveform analysis by recording and analyzing the properties of a series of waveform parameter measurements. This is accomplished by a function that records the parameter values and presents the data in a statistical form – the Histogram.

The Histogram function produces a waveform consisting of one point for each histogram bin, where the value of each point is equal to the number of parameter values which fall into the corresponding bin. Analysis of histogram distributions is supported by a wide range of automated statistical parameters, which provide insight and quantitative analysis into difficult-to-measure phenomena such as jitter and amplitude fluctuation. This function is also invaluable in establishing production test limits.

A DATABASE IN THE OSCILLOSCOPE
The Histogram function performs calculations on a stored ***history database*** of waveform parameter values. This allows detailed analysis to be performed on parameter data without the need to reacquire the source waveforms. Having the parameter database available also allows automatic scaling of histogram and graph displays.

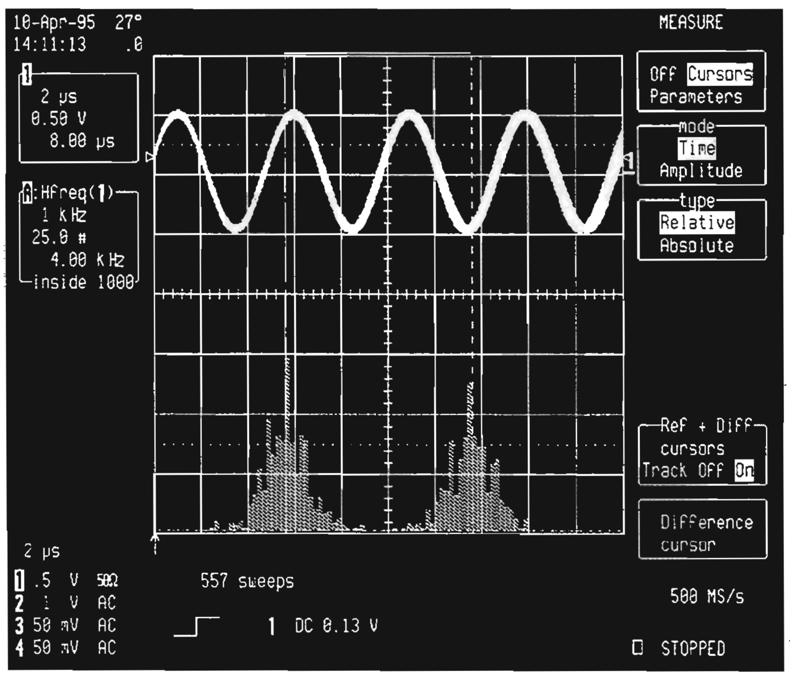


Histogram of a pulse width parameter recorded on a single or sequence acquisition with N occurrences of the parameter

WAVEFORM PARAMETER MEASUREMENTS
The LeCroy 9300 series has the capability to perform a wide range of automated waveform parameter measurements which make interpretation of waveform data easy, accurate and repeatable. The distribution of these parameter measurements can be analyzed by histogramming their values.

Some of the waveform parameters available include:.

amplitude	Δt at level (abs)	overshoot+
area	Δt at level (%)	overshoot -
base	duty cycle	peak to peak
cmean	falltime	period
cmedian	f80-20%	risetime
crms	f@level (abs)	r20-80%
csdev	f@level (%)	r@level (abs)
cycles	frequency	r@level (%)
delay	maximum	RMS
Δdelay	mean	std dev
Δt at level (abs)	median	top
Δt at level (%)	minimum	width



The upper trace shows a persistence display of a signal. A casual observer would assume there is some frequency drift. The histogram of frequencies in the lower display reveals much more detail. There are two dominant frequencies separated by 2 kHz. All scopes can measure frequency (and other parameters). The benefit of LeCroy's WP03 is that it presents the information in a way which will help the observer understand and solve problems faster.

WP03 Specifications

HISTOGRAM FEATURES

Provided below are just some of the histogramming capabilities.

Vertical:
Autoscaling, choice of "Linear", "Log" or "Constant maximum" (linear) scales. Up to 50x expansion.

Horizontal:
20 to 2000 bins in a 1–2–5 sequence.
Autosetup of center and width.

Population:
20 to 2,000,000,000 selectable in a 1–2–5 sequence.

Data Source: Any waveform parameter.

Value:
The number of events binned, as well as the percent of overflow/underflow events are automatically displayed.

Measurements: 18 Statistical parameters operate directly on the histogram.
Cursor measurements can also be made directly on histograms.

Histogram Parameters
The standard 9300 series offers basic parameter statistics (maximum, minimum, average and standard deviation). WP03 adds 18 Parameters for use directly on the histogram displays. These additional measurements allow detailed analysis of the parameter distributions and can be monitored by the pass/fail system to provide go/no-go testing based on parameter statistics.

HISTOGRAM PARAMETERS

Parameter	Abbreviation	Explanation
histogram base	hbase	Horizontal position of left-most statistically significant bin.
histogram top	htop	Horizontal position of right-most statistically significant bin.
histogram amplitude	hampl	Horizontal difference between the htop and hbase values.
histogram rms value	hrms	Root Mean Square value of histogram distribution
sigma	sigma	Standard Deviation of histogram distribution
low	low	Horizontal position of left-most non-zero bin.
high	high	Horizontal position of right-most non-zero bin.
range	range	Horizontal difference between the high and low values.
total population	totp	Total population in the histogram.
maximum population	maxp	Maximum population in any histogram bin (i.e. vertical value at the mode).
peaks	pks	Number of peaks in the distribution.
mode	mode	Horizontal position of the bin with the maximum population.
average	avg	Horizontal mean of the distribution.
median	median	Horizontal median of distribution. The value of the mid-point of the distribution.
full width at half max	fwhm	The width of the distribution around the maximum population bin, including bins which contain at least one half of the maximum population.
full width at x% of max	fwxx	The width of the distribution around the maximum population bin, including bins which are at least x% of the maximum population.
x position at peak	xapk	Horizontal position of the nth largest peak by area.
percentile	pctl	Value in histograms for which % of population is smaller.

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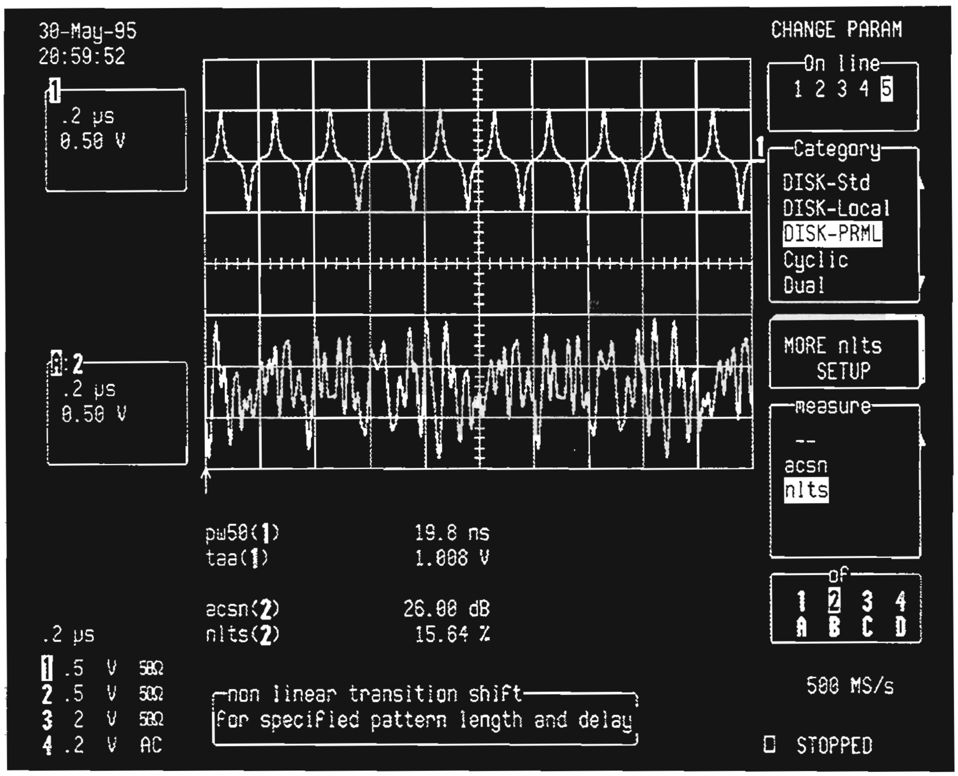
9300 Family Disk Drive Measurement Packages

Main Features

- **IDEMA Test Standards Measurements**
  Pulse Width 50
  Track Average Amplitude
  Resolution
  Overwrite
- **PRML Measurements**
  Non Linear Transition Shift
  Auto Correlation Signal-To-Noise
  Auto Correlation
- **Peak/Trough Pair Measurements**
  Time between peaks
  Time between troughs
  Time over threshold
  And ten others...
- **Histograms for Statistical Analysis**
  Histograms provide bar charts for easy analysis of measurement results over many events.



DISK DRIVE MEASUREMENT PACKAGES

LeCroy's Disk Drive Measurement Packages provide the ability to perform automated drive waveform measurements. The combination of automated measurements, long memory, and waveform display enables previously unavailable drive analysis capabilities.

The Disk Drive Measurement Packages include the DDM package and the PRML package. The DDM package provides IDEMA Test methods measurements and many other measurements for analysis of Lorentzian signals. The PRML package provides parameter measurements specifically for PRML signals including PR4, EPR4 and E^2PR4.

Also provided with the DDM package is a powerful histogram math function capability. The histogram math function allows any drive waveform parameter to be histogrammed and statistically analyzed.

DDM (Disk Drive Measurement) PACKAGE

IDEMA® TEST METHODS PARAMETERS

The DDM package includes processing functions specified in the International Disk Drive Equipment and Materials Association (IDEMA®) test standards document*.

Parameter	Description
PW50*(1)	Pulse Width 50: Provides an average pulse width, measured at 50% peak amplitude, of all peak/trough pairs in the specified waveform.
PW50(+)	Pulse Width 50 (+): Provides an average pulse width, measured at 50% peak amplitude, of all peaks in the specified waveform.
PW50 (-)	Pulse Width 50 (-): Provides an average pulse width, measured at 50% peak amplitude, of all troughs in the specified waveform.
TAA ±*(2)	Track Average Amplitude: Provides an average peak-to-peak amplitude of all Peak/Trough pairs in the specified waveform.
TAA (+)	Track Average Amplitude (+): Provides an average peak amplitude of all peaks in the specified waveform.
TAA (-)	Track Average Amplitude (-): Provides an average peak amplitude of all troughs in the specified waveform.
RESOLUTION*(3)	Specified as (TAA(F1)/TAA(F2)) * 100% Where: F1 = Low Frequency F2 = High Frequency
OW*(4)	Overwrite: Specified as: 10 log (V_r/V_o) Where: V_r is the residual V_{rms} of F1 (low frequency) after F2 (high frequency) write V_o is the V_{rms} of F1 (low frequency) after F1 write.

PEAK/TROUGH PAIR PARAMETERS

Parameters that measure amplitude and timing relationships between positive peaks and negative peaks (troughs) of a waveform are also included in the DDM package. Used in conjunction with the Histogram processing function a statistical description of the waveform can be calculated.

Parameter	Description
lbase	local baseline
lbsep	local baseline separation
lmax	peak maximum voltage
lmin	trough minimum voltage
lnum	number of local peak and trough pairs.
lpp	peak to trough amplitude (lmax - lmin)
ltbe	time between events (either peak to trough or trough to peak)
ltbp	time between peaks
ltbt	time between troughs
ltmn	time at minimum trough voltage
ltmw	time at maximum peak voltage
ltot	width of peak over threshold
ltpt	time between peak and trough
lttp	time between trough and peak
ltut	width of trough under threshold

*As specified in IDEMA Standards, 1994 Revised Edition
(1) Document No. T15-91
(2) Document No. T3-91
(3) Document No. T4-91
(4) Document No. T14-91

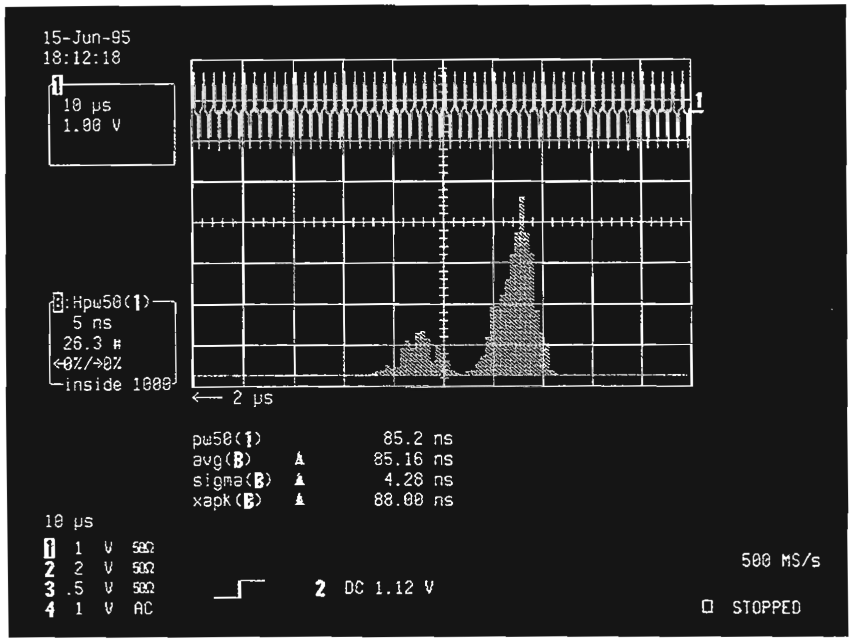
FREQUENCY DOMAIN PARAMETERS

These parameters provide a rapid technique to extract amplitude and phase of single frequencies from complex waveforms. These parameters are more efficient than using an FFT for specific frequencies of interest.

Parameter	Description
nbph	narrow band phase in degrees relative to start of waveform
nbpw	narrow-band power in dBv

Histograms

Any waveform parameter may be histogrammed. The histogram function produces a waveform with the vertical axis in units of 'Events' and the horizontal axis in parameter units (volts, nanoseconds, ...etc.). The histogram shows the statistical variation of the selected parameter and is an extremely valuable analysis tool. Using scope measurement cursors the value and population of any bin can be exactly determined.



Histogram of PW50 for Trace 1 Signal

HISTOGRAM PARAMETERS

Histogram parameters provide the ability to obtain numeric values for statistics or other features of a histogram. When combined with the 9300 family parameter cursors the statistics or other characteristics of a selected section of interest in a histogram can be measured.

Name	Description
Low	Minimum value
High	Maximum value
Range	High - Low
FWHM	Width of largest peak at half amplitude
Maxp	Highest population (vertical value) in the histogram
Average	Mean value
Sigma	Standard deviation
Tpop	Total Population
XAPK	Horizontal position of the selected peak
Pks	Total number of peaks
Median	Horizontal position of the value which divides the histogram into two equal populations
Mode	Horizontal position of the most frequently occurring value
Percentile	Horizontal position separating histogram population to specified % on left such that the population on the left is a specified percentage of the total.

PRML Measurement Package

PRML PARAMETERS

PRML (Partial Response Maximum Likelihood) recording channels provide higher areal densities by allowing magnetic transitions to be written at closer spacing than peak detection channels. The following parameters provide a time domain technique to measure the time shift and S/N ratio created by this magnetic writing process.

Name	Description
NLTS	Non-Linear Transition Shift: NLTS = -200*r Where r = auto correlation coefficient @ time delay
ACSN	Auto Correlation Signal-to-Noise Ratio: ACSN = 10 log (R/1-R Where R = correlation coefficient

AutoCorrelation $R_x\,(u) = \int f_x(t) f_x(t-u)dt$

Ordering Information

93XX-DDM	Disk Drive Measurement Package
93XX-PRML	PRML Measurement Package
93XX-VP1	WP01, WP02 and DDM Package
93XX-VP2	WP01, WP02, DDM and PRML Package
93XX-VP3	DDM and PRML Package

9510/B

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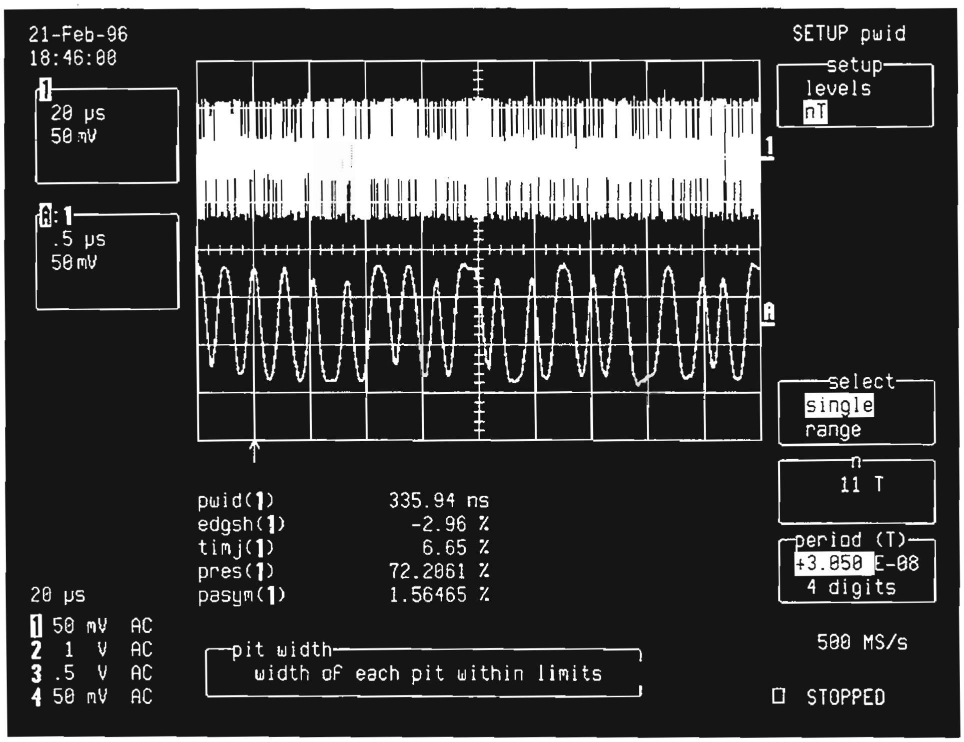
9300 Family Optical-Recording Measurement Package

Main Features

- **Optical Recording Applications**
  - CD-ROM
  - Magnetic-Optical
  - DVD
- **Optical Recording Parameters**
  Sixteen optical-recording specific measurements including pit width, time from pit edge to clock, resolution...
- **List by nT Display Mode**
  Display a list of optical-recording measurement values indexed by each (nT) pulse width.
- **Histograms of Measurements**
  Generate histogram bar charts for analysis of parameter value distributions.
- **Trend Analysis of Measurements**
  Generate trend lines of parameter measurement values to study sector variations, modulation and other time ordered dependencies.



Trace 1 is a captured CD waveform. Trace A is a zoom expansion of Trace 1. Measurements performed on Trace 1 are Pit Width (pwid), Edge Shift (edgsh), Resolution (pres) and Pit Asymmetry (pasym).

Optical Recording Measurement Package

LeCroy's Optical Recording Measurement Package provides the ability to perform automated measurements of optically recorded data waveforms. The combination of automated optical recording measurements, long DSO memory, advanced triggering features and a large screen waveform display provides previously unavailable optical recording analysis capabilities.

Sixteen optical-recording waveform specific parameter measurements are provided.

Up to five different parameter values can be displayed simultaneously with statistics such as average, maximum, minimum and sigma.

Also provided is a unique "List by nT" display mode, which simultaneously provides for each group of 'nT' width pits/spaces, the values of measurements such as edge shift, timing jitter, etc.

Histogram graphs of parameter measurements can be selected to observe statistical anomalies not normally identifiable by calculating, for example, a parameter's average or sigma.

Trend graphs of parameter measurements can also be selected to observe the variation of successive parameter measurements within a sector or even around a track.

OPTICAL RECORDING PARAMETERS

Optical Recording Measurement Package parameters directly support the pit/space width based data encoding mechanism used in optical recording, by pre-screening waveform pits and spaces into width ranges of 1T±.5T, 2T± .5T, ...,jT±.5T where T is the clock period.

User options include the ability to:

- calculate parameter values for pits, spaces or both.
- calculate parameter values for pits and/or spaces of a specific 'nT' value or range of 'nT' values.
- set the voltage threshold level at which to measure pits/spaces widths.

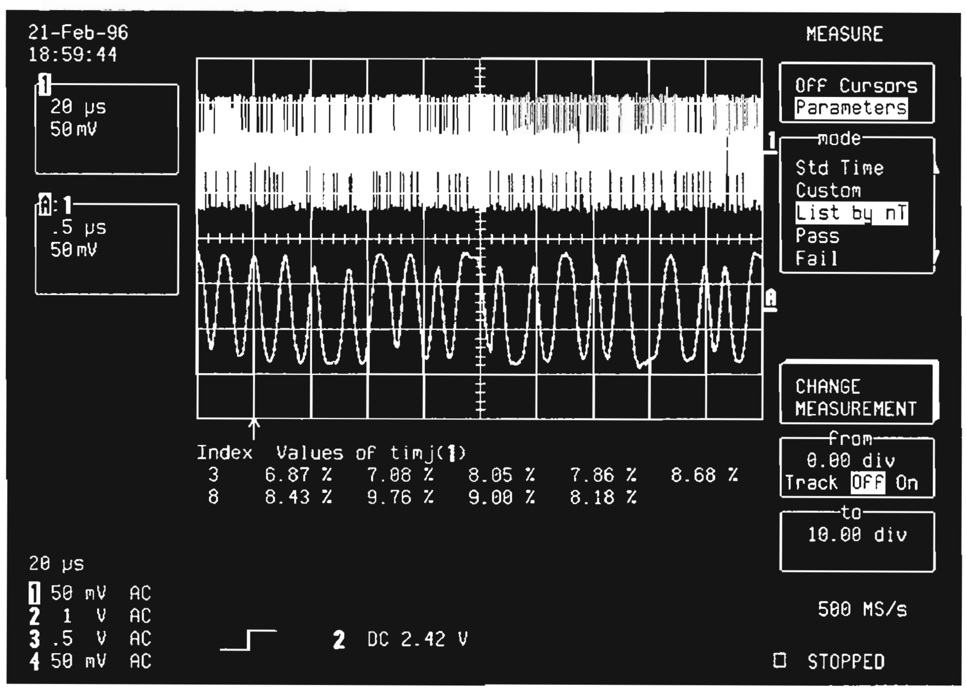
and many more....

Parameter	Description
Δp2cl	Delta Pit to Clock - time between pit or space edges and the next clock edge normalized by the clock period.
Δp2cs	Delta Pit to Clock Sigma - standard deviation of time between pit or space edges and the next clock period, normalized by the clock period.
edgsh	Edge Shift - the mean value of the difference between pits or space widths and their ideal widths.
paa	Pit Average Amplitude - average amplitude of pits.
pasym	Pit Asymmetry - ratio of the difference between the amplitude of the largest 'nT' width pits and the smallest 'nT' width pits to the amplitude of the largest 'nT' width pits.
pbase	Pit Base - the value for the base level of a space.
pmidl	Pit Middle - the midpoint between the top and base of pits.
pmax	Pit Max - the maximum value of a pit.
pmin	Pit Min - the minimum value of a space.
pmoda	Pit Modulation Amplitude - ratio of the amplitude of pits of the smallest 'nT' width to the top of pits of the largest 'nT' width.
pnum	Pit Number - total number of pits and/or spaces in a waveform.
pres	Pit Resolution - ratio of the amplitude of pits of the smallest 'nT' width to pits of the largest 'nT' width.
ptop	Pit Top - the value for the top level of a pit space.
pwid	Pit Width - the width of pits and/or spaces measured at a user defined threshold.
t@pit	Time at Bit - time of occurrence of pits/spaces.
timj	Timing Jitter - the standard deviation of the difference between pit and/or space widths and their ideal widths.

OPTICAL RECORDING 'List by nT' DISPLAY MODE

Often it is desirable to view a measurement value for each 'n' value for all possible 'nT' width ranges simultaneously. The List by nT display is provided to accommodate this need. Up to 25 'nT' values can be displayed simultaneously in this mode. Measurements that can be displayed in the List by nT mode are:

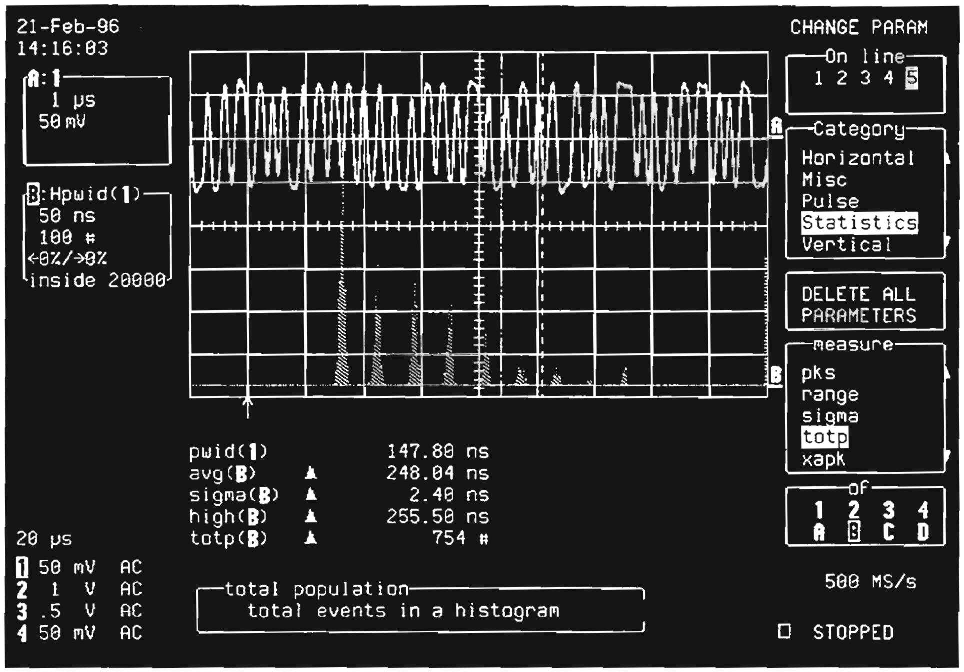
- Time from Pit to Clock
- Sigma of Time from Pit to Clock
- Pit Width
- Edge Shift
- Timing Jitter
- Pit Top
- Pit Base
- Pit Maximum
- Pit Minimum
- Pit Number
- Pit Average Amplitude



List by nT mode display of Timing Jitter (timj) measurement of CD-ROM Data Waveform with separate values displayed for each 'nT' pit/space width (3T-11T)

HISTOGRAM FUNCTION

A histogram of any waveform parameter measurement can be displayed. The histogram function produces a bar graph with the vertical axis in units of 'Events' and the horizontal axis in the unit of the parameter being histogrammed (i.e., volts, nanoseconds, etc.). Histograms graphically represent the distribution of parameter measurements providing insights often not available through standard statistical measurements such as the average and standard deviation.



CD-ROM Data Waveform with Histogram of Pit Width (pwid) parameter. Notice the distinct peaks resulting from pits/spaces all being an integral number of clock periods in width. Statistical analysis of histograms is performed using histogram parameters. For the above figure the histogram peak representing 8T pits and spaces is selected using the vertical cursor lines and the average (avg), sigma, highest value and population of the peak (tpop) are displayed.

HISTOGRAM PARAMETERS

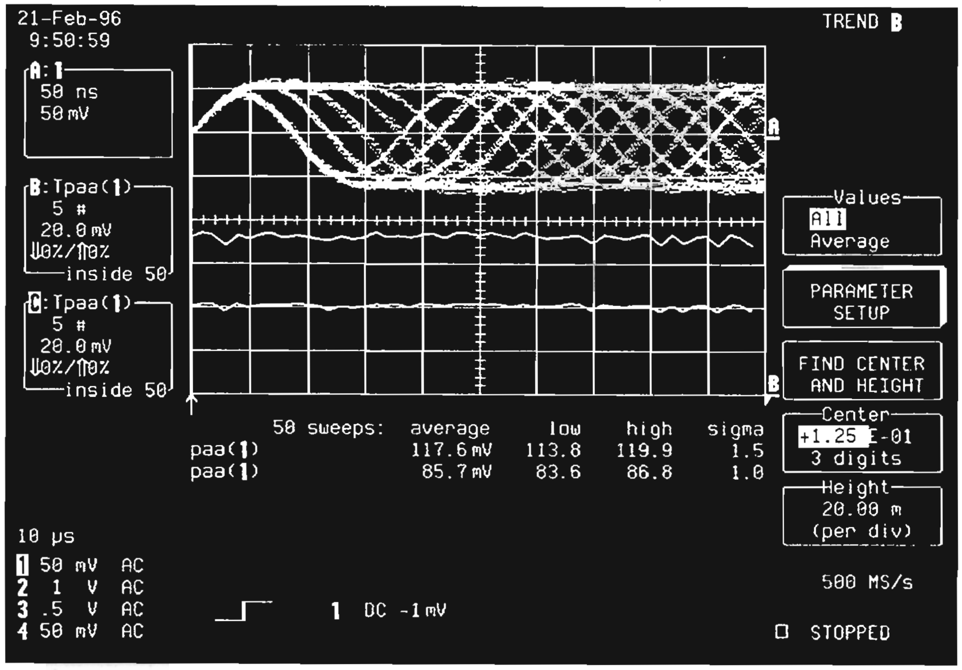
Histogram parameters provide the ability to obtain numeric values for the statistics or other features of a histogram distribution. When combined with the 9300 family parameter cursors the statistics or other characteristics of a selected section of interest in a histogram, such as a specific histogram peak, can be directly measured.

Parameter	Description
Low	Minimum horizontal axis value in a histogram.
High	Maximum horizontal axis value in a histogram.
Range	High - Low.
FWHM	The width of the largest peak in a histogram at half the peak's amplitude.
Maxp	Population of the highest bin in a histogram.
Average	The mean value of a histogram.
Sigma	The standard deviation of the values in a histogram.
Tpop	The total number of parameter measurement values displayed in a histogram.
XAPK	The horizontal axis value of the selected histogram peak.
Pks	The number of distinct peaks (modes) in a histogram.
Median	The horizontal axis value which divides the histogram population into two equal populations.
Mode	The horizontal axis value of the most populated histogram bin.
Percentile	Horizontal position separating a histogram population such that the population on the left is equal to the selected percentile of the total population.

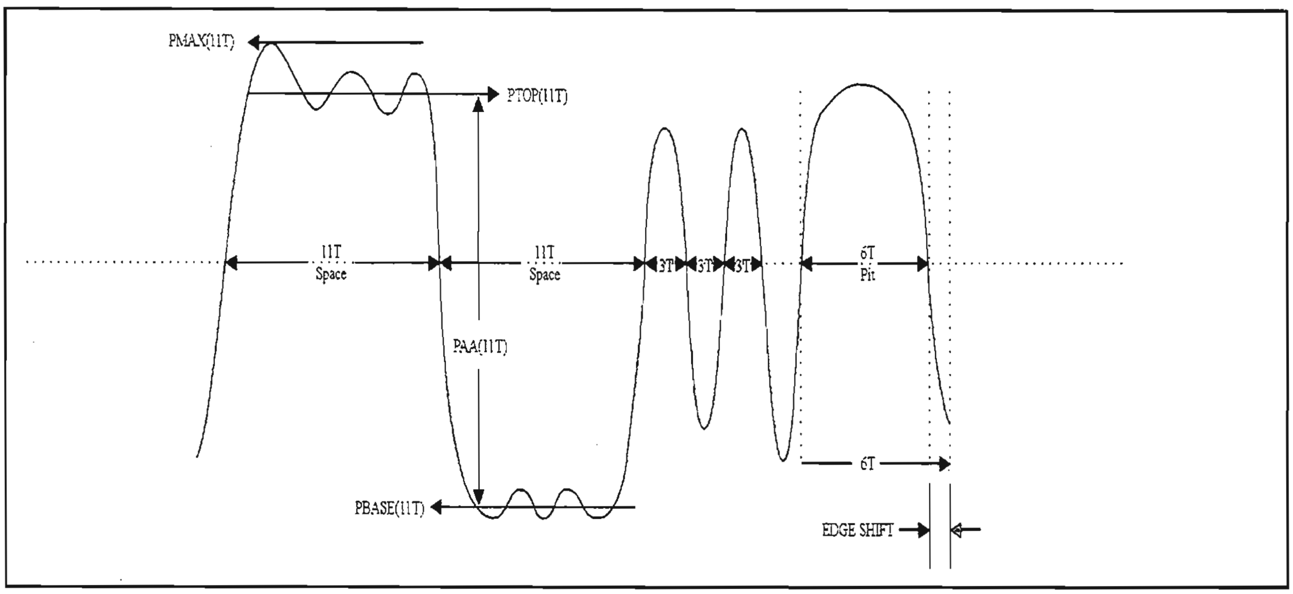
TREND FUNCTION

A graph of successive values of any waveform parameter measurement may be generated through the Trend function. The Trend function produces a line graph with the vertical axis representing the values of parameter measurements and the horizontal axis the rank order number (i.e., first parameter measurement calculated, second parameter...) in which each parameter value displayed was calculated.

The trend function provides instant insight about the variation of a selected waveform attribute for successive parameter measurement calculations. This is particularly useful when trying to determine the modulation of a track or other time or position based variations of interest.



Trace A shows an eye diagram of a CD signal. Trace B is a trend of the Pit Amplitude of 11T pits and Trace C is a trend of the Pit Amplitude of 3T pits. Notice the similarity of the variation in the two trends lines indicating that some of the variation is due to a common source.



Ordering Information

93XX-ORM	Optical Recording Measurement Package
RK-93XXORM	Optical Recording Measurement Package Retrofit Kit

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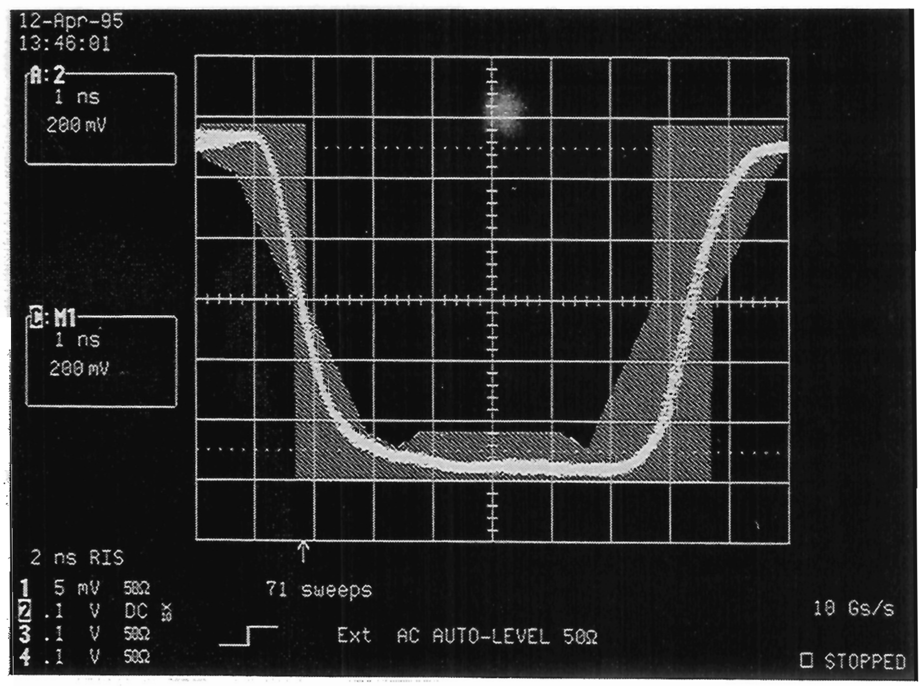
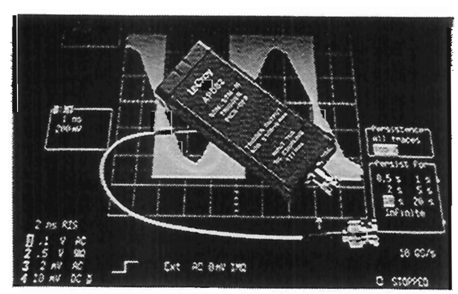
TC1 - CCITT, ANSI and ISDN Telecommunications Test Masks

Main Features

- 25 standard telecom signal masks including SDH and SONET
- Available on 3.5" DOS floppy or PCMCIA memory card
- Up to 4 different pulses can be tested simultaneously
- Allows combination of mask and pulse-parameter testing
- Actions such as Storage, Hardcopy, Beeping, or TTL pulse can be carried out when signal fails



Now you can make telecom pulse-shape measurements to CCITT, ANSI and ISDN standards without using Mylar overlays. LeCroy TC1 automates the mask measurements that are so time-consuming with analog oscilloscopes. In addition the computed Pass/Fail test brings accuracy and repeatability to what used to be simple eyeballing. Human errors can therefore be significantly minimized. And when the test fails, actions such as a TTL pulse output can drive another test device, eliminating the need for developing costly software for production test. The test masks are available on a PCMCIA memory card or a 3.5" DOS floppy disk. That means they can be used on any LeCroy 9300 or 9400 oscilloscope carrying either option, eliminating the need for costly factory retrofits. Just plug in the card or floppy and turn your LeCroy oscilloscope into a Telecom Physical-Layer Tester.



The AP082/83 trigger pick-offs can trigger on scrambled SDH/SONET data streams.

Features and Benefits

WIDE RANGE OF TELECOM MASKS
TC1 provides a total of 25 masks:

- 6 from ANSI T1.102-1987
- 19 from CCITT G.703
- 2 from the ISDN I.403

EASY INSTALLATION
Simply transfer the requested template from the TC1 card or disk to the scope's internal memory and you are ready for testing.

EASY TO USE
Use the built-in Pass/Fail utility to set the oscilloscope to Fail as soon as the acquired signal leaves the mask, then start the acquisition.

CUSTOM TOLERANCES
Masks can be customized by adding extra vertical or horizontal tolerances.

FLEXIBLE TEST ROUTINES
Up to 4 different mask tests can be carried out at the same time. They can also be combined with pulse parameter tests chosen from a list of 32 (rise-time, frequency, amplitude etc.).

FLEXIBLE ACTIONS
If the signal fails, the user can select any of the following procedures:

- Stop the acquisition and show the failed trace.
- Store the signal in internal memory.
- Store the signal on the PCMCIA memory card.
- Store the signal on the 3.5" DOS floppy disk.
- Make a screen dump to a printer or plotter, or to the card/disk for future use in your word processor.
- Generate a "beep".
- Send a TTL pulse from the "CAL OUT" BNC connector.
- Send an SRQ to the GPIB port.

Specifications

STANDARD	DATA RATE	FILE NAME	FILE SIZE
ANSI-DSX-1C	3.152 Mbit/s	DSX1CF5	4402
ANSI-DSX-1 NEW	1.544 Mbit/s	DSX1F1	3600
ANSI-DSX-1 OLD	1.544 Mbit/s	DSX1F2	3601
ANSI-DSX-2	6.312 Mbit/s	DSX2F7	4400
ANSI-DSX-3	44.736 Mbit/s	DSX3F8	4401
ANSI-T1.403	1.544 Mbit/s	DS1F2	3614
CCITT-G.703	1.544 Mbit/s	G703F10	4390
CCITT-G.703	6.312 Mbit/s	G703F11	4389
CCITT-G.703	6.312 Mbit/s	G703F12	4389
CCITT-G.703	32.064 Mbit/s	G703F13	4390
CCITT-G.703	44.736 Mbit/s	G703F14	4390
CCITT-G.703	2.048 Mbit/s	G703F15	4389
CCITT-G.703	8.448 Mbit/s	G703F16	3589
CCITT-G.703	34.368 Mbit/s	G703F17	4390
CCITT-G.703	139.264 Mbit/s	G703F19	3591
CCITT-G.703	139.264 Mbit/s	G703F20	3591
CCITT-G.703	2048 kHz	G703F21C	4421
CCITT-G.703	2048 kHz	G703F21S	4421
CCITT-G.703	97.728 Mbit/s	G703F22	4394
CCITT-G.703	155.520 Mbits	G703F24	4414
CCITT-G.703	155.520 Mbits	G703F25	4414
CCITT-G.703	64 kbit/s	G703F5A	4400
CCITT-G.703	64 kbit/s	G703F5B	3601
CCITT-G.703	64 kbit/s	G703F8	4397
CCITT-G.703	64 kbit/s	G703F9	3599
CCITT-I.430	192 kbit/s	I430F13	3588
CCITT-I.430	192 kbit/s	I430F14	3588

Ordering Information

93XX-MC-TC1	Telecom Templates on a 512K PCMCIA card. Requires the 93XX-MC01/04 card-reader option.
93XX-FD-TC1	Telecom Templates on a 3.5" DOS floppy disk. Requires the 93XX-FD floppy-drive option.
PP 090	75 Ω to 50 Ω ProBus Adaptor
AP082	SDH: STM-1E trigger pick-off with SDH masks on 3.5" Floppy disk.
AP083	SONET: STS-3 trigger pick-off with SONET masks on 3.5" Floppy disk.

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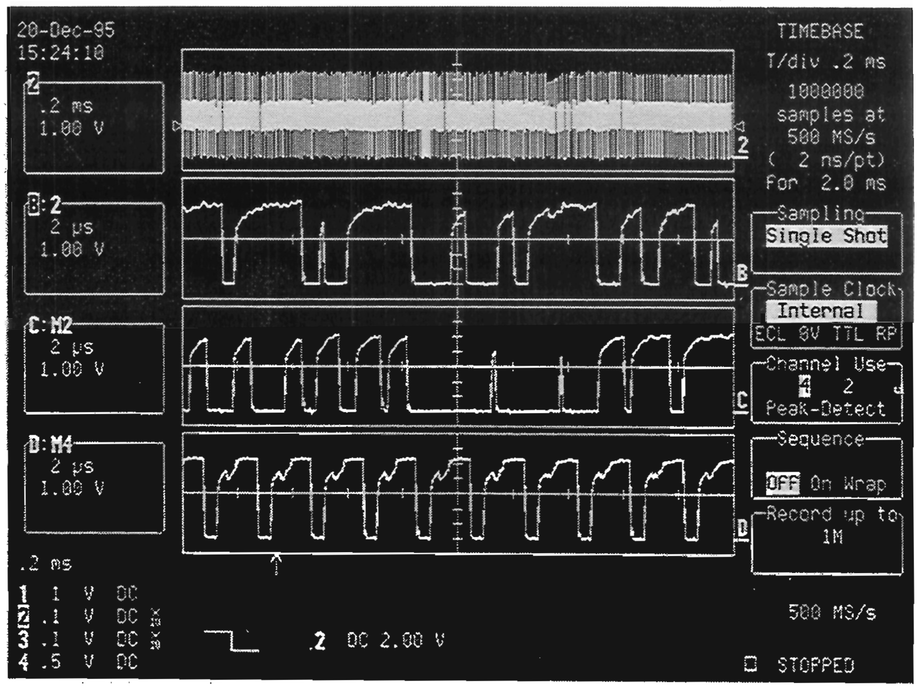
930x-64
64 Mega Bytes Extended Processing Memory

Main Features

- Extended memory capacity for processing long waveforms.
- High-speed signal processing.
- Fast Fourier Transforms on long waveforms.
- Improved trace update rate.



Power and Speed

This option offers 64 Mbytes of processing RAM for the 9300 series of DSOs that have a 68030 processor installed. One benefit of the 64 Mbyte option is its ability to handle longer FFTs, multiple zooms, math function chaining, and storage of very long waveforms. In addition to increased capability for memory intensive applications the extra memory results in higher processing speed for all operations.

Memory Usage

In a typical 9300 series oscilloscope about 1.5 MB of RAM is used by the operating system and the remainder (2.5 MB for standard models, 6.5 MB for 'M' models and 14.5 MB for 'L' models) is available for waveform processing. The amount of memory needed depends on the length of waveforms being processed. For example, performing a simple function on a 1 million point waveform requires 4 Mbytes, performing an FFT on a 1 million point signal requires 8 Mbytes.

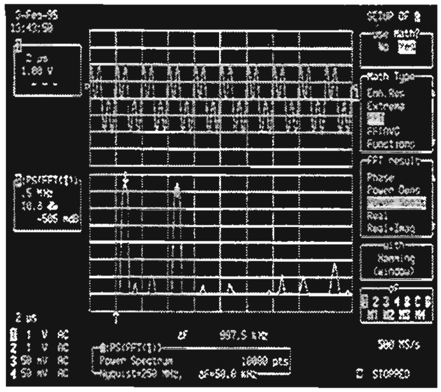
Enough Memory?

Without sufficient processing memory users can run into application problems. Two 2 million point signals may be stored in the RAM of an 'L' model DSO but an additional oscilloscope operation may demand more than the remaining available RAM.The result is memory crunch, and the scope slows down. The 64 Mbyte option gives 'power users' the capability they need to ensure that processing of long waveforms does not cause a problem.

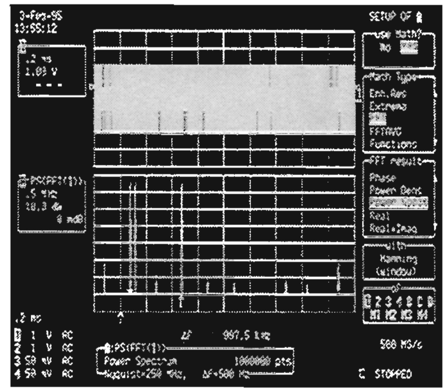
Memory for Analysis

LeCroy high performance DSOs (9350 and 9370 series) can acquire signals of 8 million points and process them with calculations including integration, differentiation, FFT, square-root, log, exponential and six selectable digital filters using the 64 Mbytes of RAM. The benefit to the user is more accurate measurements with better resolution.

An FFT is a complex calculation which requires up to 10 bytes of processing RAM for each point of signal data. One approach to this computational challenge is to reduce the number of points used in the FFT calculation, to use only the first 10 k for example. This compromise can lead to inaccurate analysis and wrong results. With extra RAM FFT calculations can be performed on waveforms of several million points without loss of accuracy.



Displayed above is a waveform and an FFT performed on its first 10,000 points. Its resolution is 50 kHz.



Extended processing memory allows FFTs to be performed quickly on signals of several million points. Above is an FFT of the same signal with 1,000,000 points captured and analyzed. Note that the initial peak of the first screen (left) is resolved into two peaks (above) and that the frequency resolution is now 500 Hz. A DSO with long FFT capability shows more detail and allows more precise measurements in the frequency domain.

Memory Utilization Table

	Record Length Millions of Points			
	1	**2**	**4**	**8**
Store to each of M1 to M4	2	5	10	20
Simple function (e.g. log)	4	10	20	40
Add/sub/mult/div 2 signals	6	15	30	60
Summed Average	8	20	40	80
FFT	8	20	40	80

Memory in Mbytes

This table outlines the memory utilization for computation intensive signal processing. For example, the total processing memory required to perform an FFT on a 4 million point waveform is 40 Mbytes.

Ordering Information

930x-64	Option for: 935X 937X

It is also possible to add the 64 Mbyte option to the 930X and 931X series of DSOs if they have already been upgraded with the MWP option but this would be an unlikely requirement due to the length of the acquisition memory of these oscilloscopes.

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LeCroy

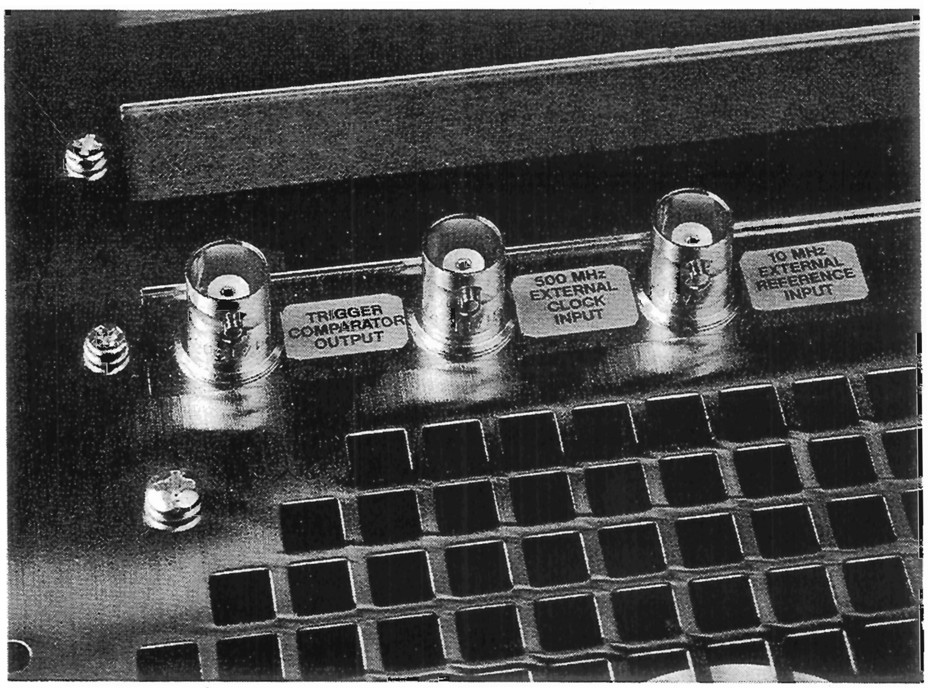
Innovators in Instrumentation

LeCroy
The Digital Scope Specialists

CKTRIG hardware option for the 9350A and 9370 series oscilloscopes

Main Features

- High speed 500 MHz external clock input.
- 10 MHz external clock reference input.
- Edge trigger comparator output.
- BNC, rear-panel mounted connectors.



External clock

This feature allows the 9350A and 9370 series DSOs to be externally clocked at a fixed rate from 50 MS/s to 500 MS/s, enabling full phase control over the acquired signal. The sample rate can be fine-tuned to the exact speed required by the application.

External reference

The external reference allows the scope to be phase-synchronized to an external 10 MHz reference, either to match the stability of the external source or to phase lock the acquired signal. Several DSOs can then be synchronized using a simple source as reference.

Trigger comparator

The trigger comparator signal outputs a pulse for each valid edge-trigger condition on the trigger signal. This is an invaluable feature for event-counting and throughput applications.

Specifications

EXTERNAL CLOCK INPUT
Input signal requirements:

Amplitude:	800 mV p-p
Frequency range:	50 MHz to 500 MHz
Offset:	0 V

Input impedance: 50Ω.
Calibration must be initiated for each external clock change.

The negative pulse width must be <u>less than</u> 5ns.
(2ns recommended)

Swept Clock: Only a fixed frequency external clock is supported. Swept clocks will cause severe offset errors (10% worst-case).

EXTERNAL CLOCK REFERENCE INPUT
Input signal requirements:

Amplitude:	800 mV p-p
Frequency range:	10 MHz ±5%
Offset:	0 V

Input impedance: 50Ω.

TRIGGER COMPARATOR OUTPUT
The comparator operates in a 'time-over-threshold' mode and generates a pulse edge of the same polarity as the polarity of the selected triggering edge each time a valid EDGE TRIGGER condition is met on the trigger signal. The duration of the pulse will be equal to the time the trigger signal is above/below the trigger level.

Note: This does not operate in SMART TRIGGER mode.

Output signal characteristics: ECL, 50Ω, series-terminated.

Ordering Information

935XA-CKTRIG	CKTRIG option for the 9350A oscilloscope family.
935XA-RKCKTRIG	Retrofit kit for the 9350A oscilloscope family.
937X-CKTRIG	CKTRIG option for the 9370 oscilloscope family.
937X-RKCKTRIG	Retrofit kit for the the 9370 oscilloscope family.

For further details, please request the CKTRIG Product Note from ITI Marketing.

USA Direct Sales: 1 (800) 5LE-CROY

LeCroy Worldwide Sales Offices

ASIA/PACIFIC	LeCroy Pty Ltd	61.38.90.7358
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JAPAN Osaka	LeCroy Japan	0816.330.0961
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LeCroy
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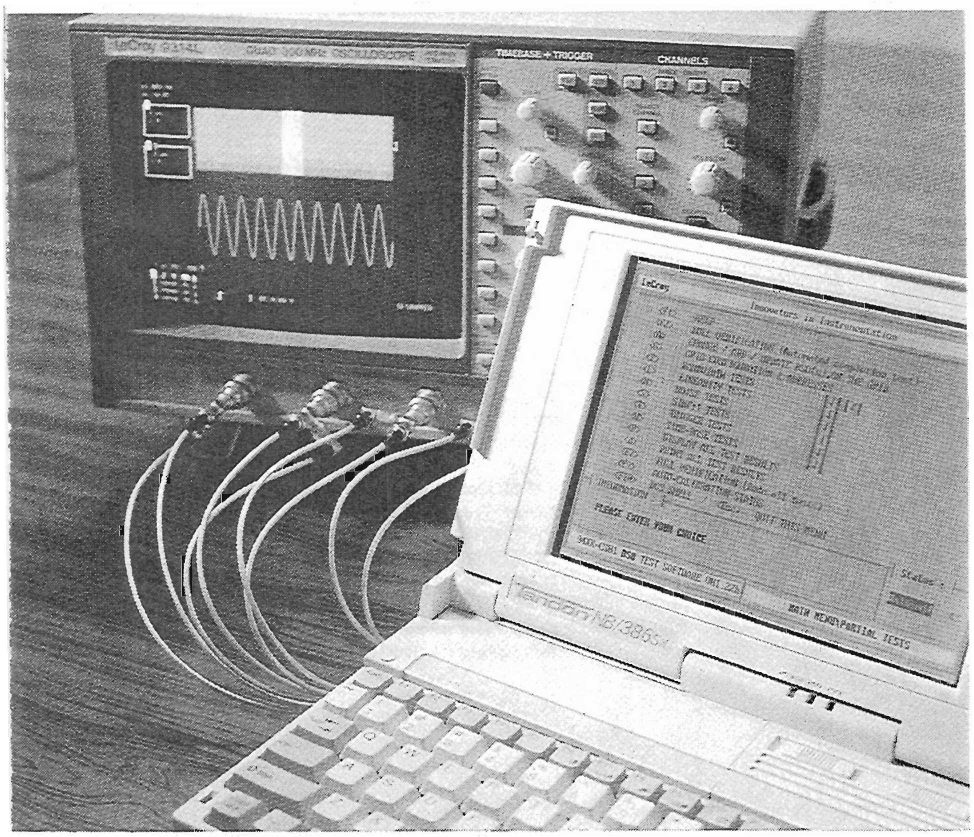
LeCroy

Innovators in Instrumentation

LeCalsoft–Calibration Software for LeCroy Digital Oscilloscopes



The LeCalsoft package enables a fast and thorough verification of all key specifications.

Main Features

- **Traceability to reference standards**
- **Computer check of key specifications**
- **Computer–aided readjustment**
- **Fully automated configurations available**
- **Supports all 93XX and 94XX models**
- **IBM® PC–AT compatible**

General

The LeCroy LeCalsoft (94XXCS05) test and calibration package provides a convenient, unambiguous check of LeCroy oscilloscopes. Designed for users who require traceability to reference standards (NIST, etc.), this package is ideally suited for use in calibration laboratories where the oscilloscopes are checked at fixed intervals.

Results of the calibration check are fully documented on hard copy, or they can be archived on hard disk or diskette.

LeCalsoft works on any PC compatible with the IBM®–AT standard. It controls the oscilloscope and the calibration sources through a National Instruments® GPIB interface.

Features

Calibration Check

All the essential specifications of the Digital Oscilloscope, such as bandwidth, linearity, noise, trigger, timebase and effective–bit count are tested. Deviations from nominal values are calculated and displayed on the screen, printed, or archived on hard disk or diskette.

Comprehensive Documentation of the Test Results

At the end of each calibration check, two types of documentation are available: a long form printout which gives details of the results of all the tests executed, and states whether or not the results are within the specifications, and a short form printout which gives a summary of the test results.

Calibration Traceable to National Standards (NIST, etc.)

By using signal sources traceable to a standard, the calibration will be traceable to the same standard, provided the relevant documentation is maintained.

Manual and Automated Calibration Check

Both manual operation with computer assistance, and automated operation are possible. Automated operation requires programmable multiplexer and signal sources. See the list of supported devices below.

Assisted Adjustment of the Oscilloscope

A computer–aided adjustment procedure is also provided. By following instructions on the screen, the trained technician is guided through the adjustments required to correct the settings of the oscilloscope so that it is within the specifications.

Calibration Certificate

On request, LeCroy will perform calibration traceable to National Standard Organizations. Calibration certificates are provided as part of this service.

Functional Description

Calibration Practice

LeCroy oscilloscopes are auto–calibrating digital oscilloscopes and therefore do not require regular calibration like analog oscilloscopes. However, for users who require traceability to reference standards (such as those provided by the National Institutes of Standards and Technology), and for calibration laboratories which must inspect incoming instruments and perform recalibration at prescribed intervals, the LeCalsoft computer–aided test and calibration packages provide an easy solution.

Under guidance of the LeCalsoft program, some adjustments to the oscilloscope can be made by an electronics technician. However major deviations from specifications usually require repair by a trained service engineer. LeCroy regularly schedules training classes. If no in–house trained person is available, the nearest LeCroy service center can carry out repairs and calibration, and provide traceability to reference standards.

Using the LeCroy LeCalsoft Packages

For calibration checking, digital oscilloscopes have a great advantage over analog oscilloscopes because waveforms can be transferred to a host computer. This simplifies the calibration procedure enormously, makes it potentially faster and allows an extensive range of tests with unambiguous interpretation of the results.

LeCalsoft performs an extensive series of tests which verify the specifications of the oscilloscope. It includes many tests relevant to analog scopes such as Noise and Linearity tests. Although these tests are difficult and time consuming on an analog oscilloscope, they can be computer controlled and are quickly and easily performed on a digital oscilloscope. Tests which are specific to digital oscilloscopes, such as Sinefit tests are also included.

The various test options in LeCalsoft are presented to the operator in the form of a simple menu system. The user has the choice of performing an automated calibration check of the oscilloscope, or individually testing any of the specifications. Some of the tests require the use of high–quality external signal generators. The user receives instructions on the screen when it is necessary to change the cable connections, but apart from this minor intervention, the tests are fully computer controlled when supported GPIB–programmable instruments are used.

Supported Instrumentation

LeCalsoft software works on any AT–compatible equipped with a math coprocessor and a National Instruments GPIB interface. Automated calibration checking is possible using a set of instruments from the following list. (For an automated calibration check, either the LeCroy or Keithley programmable multiplexer is required to feed the calibration signals to the oscilloscope input.)

RF sinewave generators:
- Marconi 2019A, 2022C, 2030, 2031
- Fluke 6060B, 6061A
- Hewlett–Packard 8642A, 8642B
- Rohde & Schwarz SMX

AF sinewave generators:
- Marconi 2019A, 2022C, 2030, 2031
- Hewlett–Packard 8642A, 8642B
- Rohde & Schwarz SMX
- Tektronix FG5010
- LeCroy AFG 9100

DC Precision Power Supply:
- Tektronix PS5004
- Datron 4708 Autocal Multifunction Standard

Fast Pulse Generator:
- Tektronix CG5001/CG551AP

Power Meters:
- Hewlett–Packard HP436A, HP437B

Multiplexers:
- Keithley 199 SYSTEM DMM/ SCANNER with LeCroy interface board.
- LeCroy 4951, 4973–1, 4973–2 Multiplexers.

Frequency standard:
- WWV or HBG1500

Recommended Accessories

A full kit of calibration connectors and interfaces is available from LeCroy. It includes all the necessary cables, adapters, splitters and filters, as well as the Programmable Multiplexer. Also available is a repair package including special tools, board extenders, etc., for computer–aided adjustment.

Use of Other Instruments

It is possible to perform the calibration check with some other unsupported signal sources. However, the user is then required to set up these instruments manually and to perform one measurement at a time. The LeCalsoft package guides the user step by step, and controls the oscilloscope data acquisition and the computation of the results.

LeCalsoft compares the signal measured by the oscilloscope with the signal it would expect to receive from the generator. Warning messages are displayed whenever tolerances are exceeded. Some of the adjustments may be carried out by the user when the test sequence is finished. In this case, the software will guide the user through the correct adjustment procedure. At the end of the calibration check, a printout can be generated to list the results.

Specifications

Computer Required: Any PC compatible with the IBM–AT standard, and equipped with a mathematical coprocessor and a National Instrument Inc. GPIB interface.

Operating System: DOS 3.0 upward

Medium: $3^1/_2$" 1.44 Mb
$5^1/_4$" 1.2 Mb diskette

Major Tests Supported by LeCalsoft

Internal

To ensure proper calibration of the oscilloscope, internal auto–calibration tests are automatically executed during normal operation. This standard sequence of internal auto calibration tests is initiated by the software and the results are transferred to the PC for analysis.

The tests are:

- Calibration of the resolution of the time–to–digital converter with respect to the system clock
- Determination of the gain constants of the input amplifiers
- Offset compensation versus gain variation
- Global internal non–linearity
- General functionality check

Bandwidth

To calculate the bandwidth, the amplitudes of sine waves of increasing frequencies are measured. The sine wave generator is first set to 500 kHz with an amplitude 75% of full screen, i.e. ±3 vertical divisions. The frequency is then swept up to the point where an amplitude drop of 3 dB is observed. This indicates the bandwidth.

This test is executed on all channels for 1 MΩ and 50 Ω input impedance and for all vertical sensitivities. It requires a sine wave generator with good flatness.

Generators supported under program control are listed on page 2.

Linearity

15 different known voltages, varying from 5% to 95% of full screen, are applied by the external voltage reference source. For each voltage value, a full waveform is acquired, and the mean value is compared to the known input voltage. The linearity is determined through a linear regression fit to the 15 measurements.The slope, the offset and the chi–square of the fit are computed.

With the linearity test, many other related tests are performed: response time of the overload protection of the 50 Ω input, linearity of the variable gain calibration, range and linearity of the offset setting, and quality of the input coupling.

This procedure is executed on all channels for both 1 MΩ and 50 Ω input impedance. The test requires a DC source with a precision and time stability of 0.1%, a voltage range of 0 V to 20 V adjustable in steps of 5 mV, and an output current capability of 300 mA.

Power supplies supported under program control are listed on page 2.

Noise

The noise tests are executed on all channels for both 1MΩ and 50 Ω input impedance, with AC and DC coupling, five different time–base settings, and open inputs. Full waveforms are acquired with different offset values. The peak–to–peak as well as the RMS values of each measurement are computed, and the maximum values are recorded. The program also indicates the occurrence of any "flyers", i.e. short noise peaks generated by the ADC's.

The noise tests also include:

- checking the linearity of the variable offsets of all channels between 2.5% and 97.5% of full screen.
- checking the stability of the ground line when switching the inputs between GROUND and DC coupling modes.

Rise time/Overshoot

Executed on all channels for both 1MΩ and 50 Ω input impedance, these tests measure the rise time of the oscilloscope response to the input voltage step, as well as the amount of pre–shoot and overshoot. They require a voltage step generator with calibrated fast rise–time amplitude.

The Voltage Step Generator supported under program control is the Tektronix CG5001.

Sinefit

The performance of the analog–to–digital converter is evaluated in terms of the number of effective bits (a measure of the signal–to–noise ratio). It is measured on all channels, at a sensitivity of 50 mV/div., by applying a pure sine wave at varying frequencies and timebase settings

This test is a measurement of dynamic linearity. It shows the effect of such errors as noise, non–linearities and aperture jitter.

Timebase

The timebase test compares the internal clock with a very precise and stable external timebase reference (clock generator) such as the WWV standard or HBG 1500.

Trigger

The trigger capabilities are tested for all possible configurations. These include:

- Internal and external trigger sources
- DC, AC, HF–reject, and LF–reject couplings
- Trigger level settings in all slope modes.

SECTION 3 Block Diagram and Sub-Assemblies

3.1 9374, 9374M & 9374L Sub-Assemblies

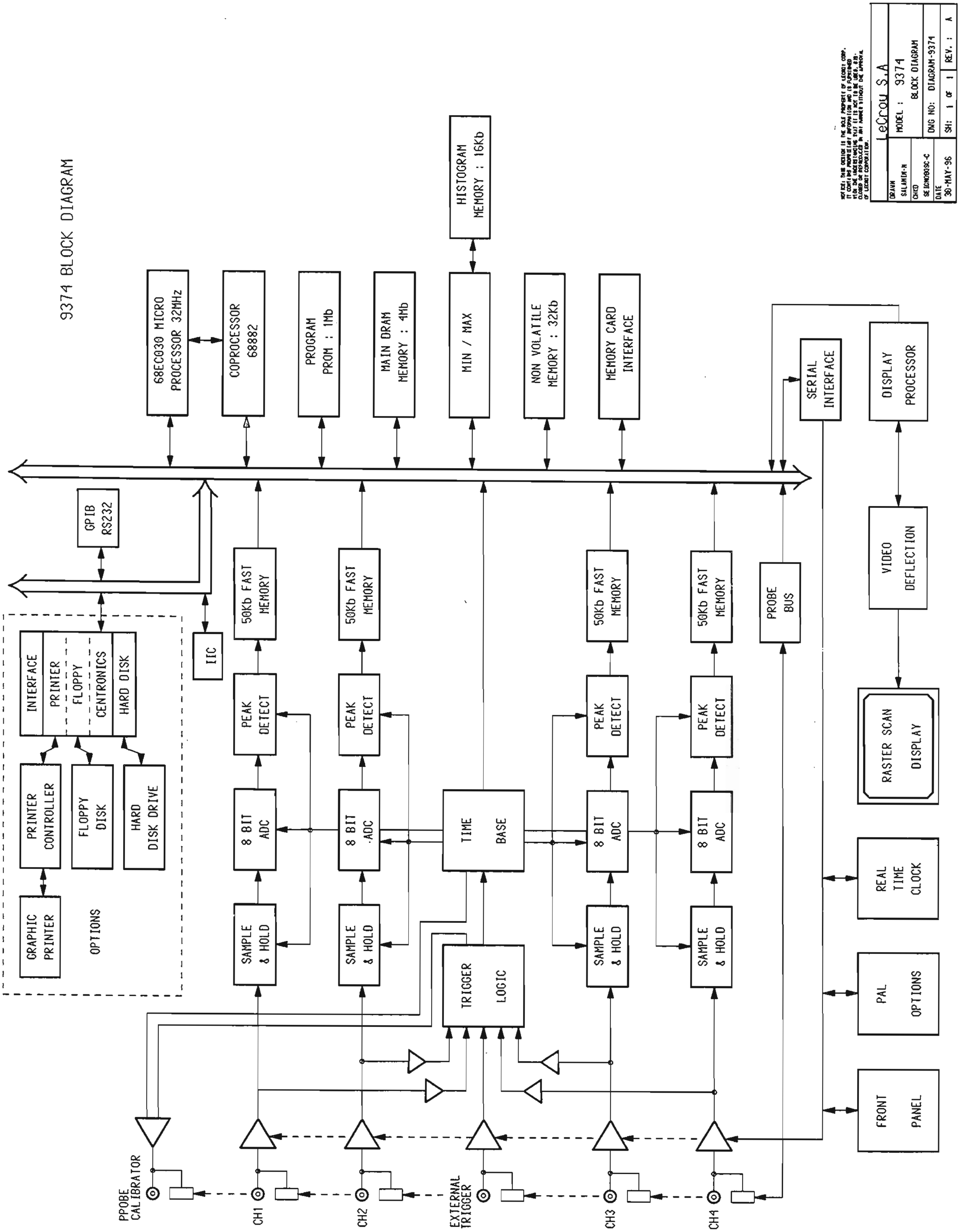
F9302-1-4	Processor, 4 Mbyte RAM for 9374
F9302-1-8	Processor, 8 Mbyte RAM for 9374M
F9302-1-16	Processor, 16 Mbyte RAM for 9374L
F9350-21	Acquisition Memory, 2 X 50 K for 9374
F9350M-21	Acquisition Memory, 2 X 250 K for 9374M
F9350L-2	Acquisition Memory, 2 X 2 MB for 9374L
F9374-3 or -31	Main card, Quad 1 GHz, 500 MS/s, Front end, ADC, Time base
F9300-4	GPIB + RS232 interface
F9354-5	Quad channel front panel
PS9351	Power supply +/- 5V, +/- 15V.
PS9370	Auxiliary Power Supply +/- 5,8 V
93XX-Display	Video, deflection, CRT, yoke
M937X	Mechanical for 9374/M/L series

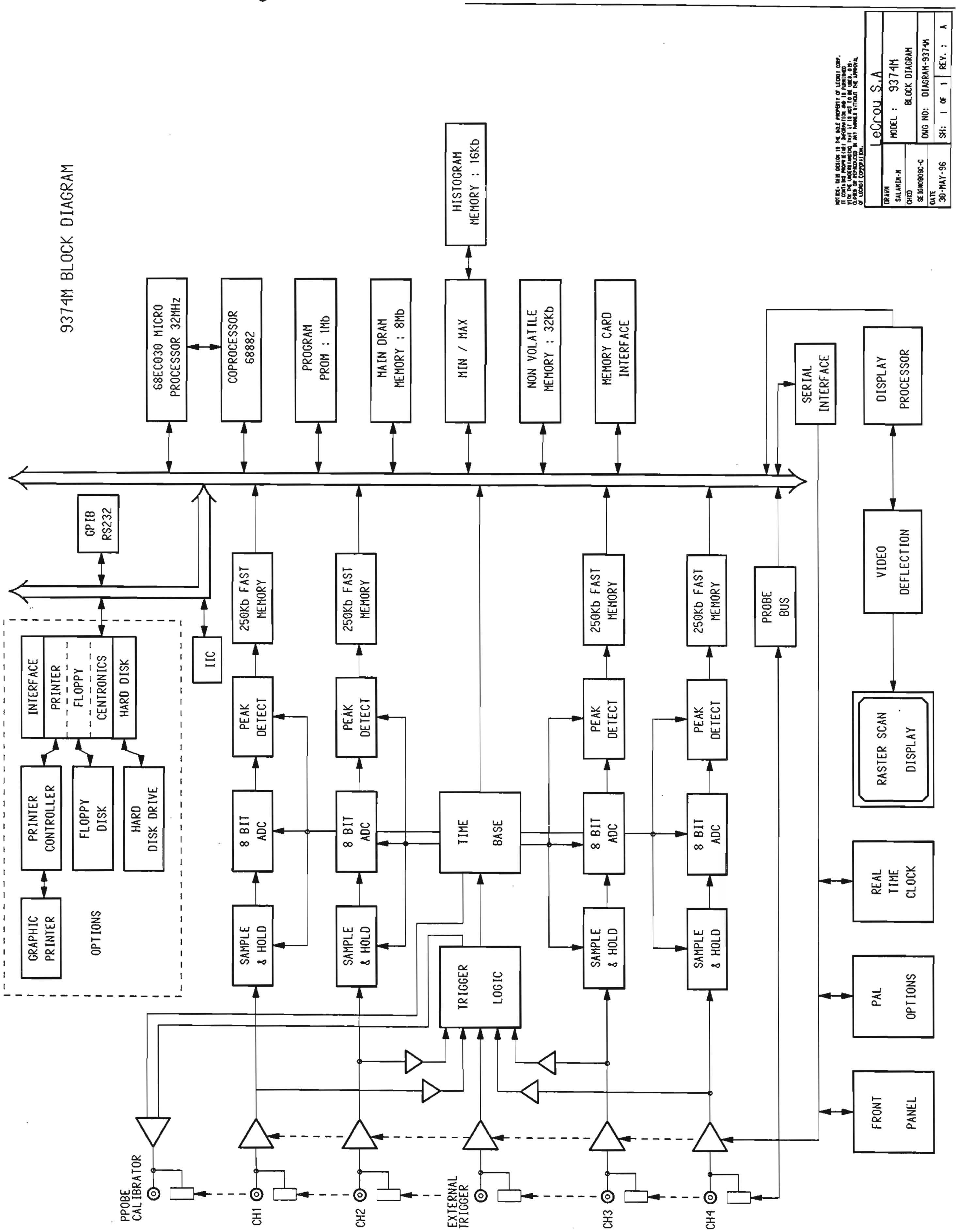
3.2 9374TM Sub-Assemblies

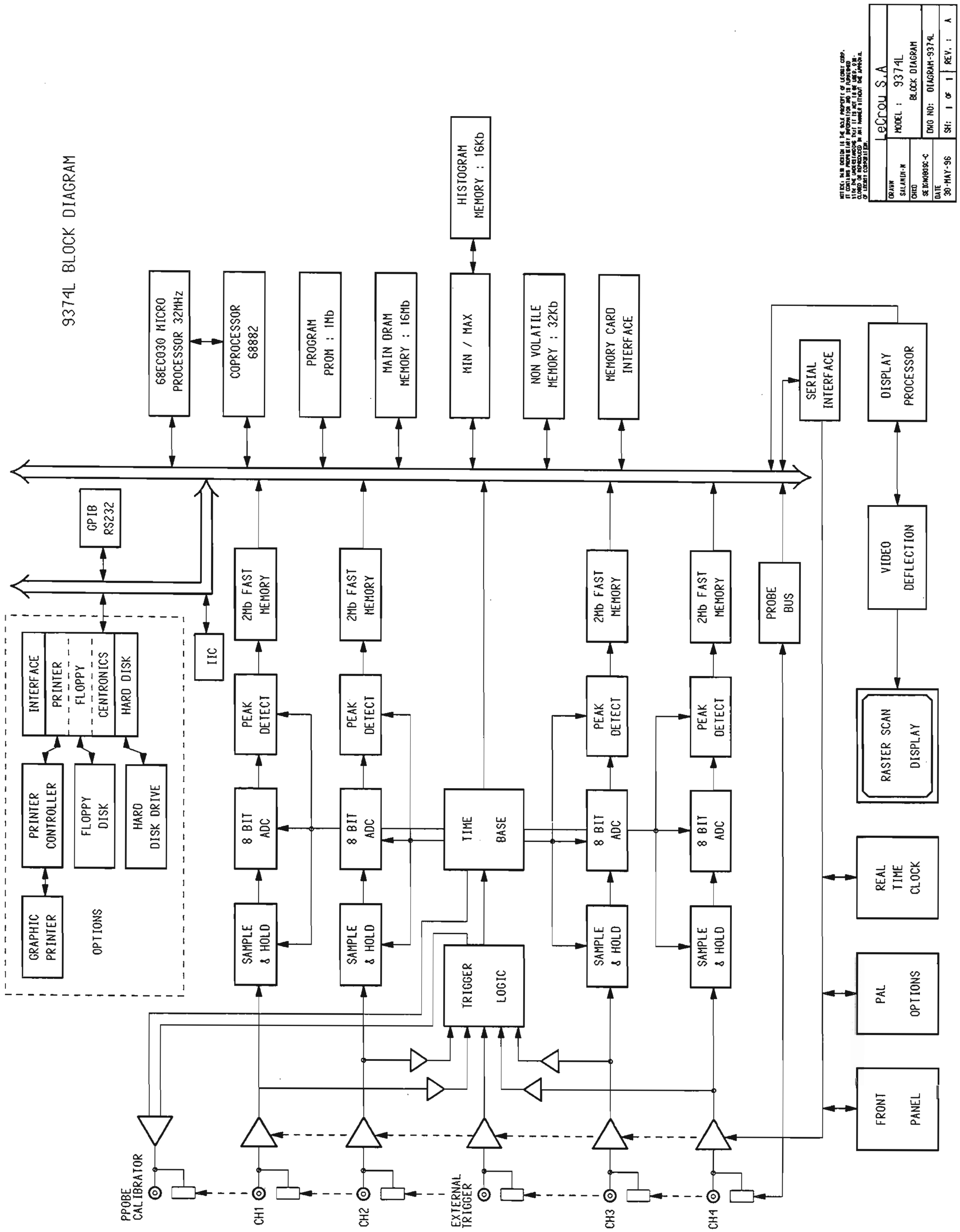
F9302-1-8	Processor, 8 Mbyte RAM for 9374TM
F9350TM-21	Acquisition Memory, 2 X 500 K for 9374TM
F9374-3 or -31	Main card, Quad 1 GHz, 500 MS/s, Front end, ADC, Time base
F9300-4	GPIB + RS232 interface
F9354-5	Quad channel front panel
PS9351	Power supply +/- 5V, +/- 15V.
PS9370	Auxiliary Power Supply +/- 5,8 V
93XX-Display	Video, deflection, CRT, yoke
M937X	Mechanical for 9374/M/L series
9374-FDGP	Graphic Printer & Floppy Disk F9300-6 : Centronics, Floppy, Printer interface F9300-7 : Printer controller
WP01 & WP02	Waveform Processing Firmware & Spectrum Analysis Firmware

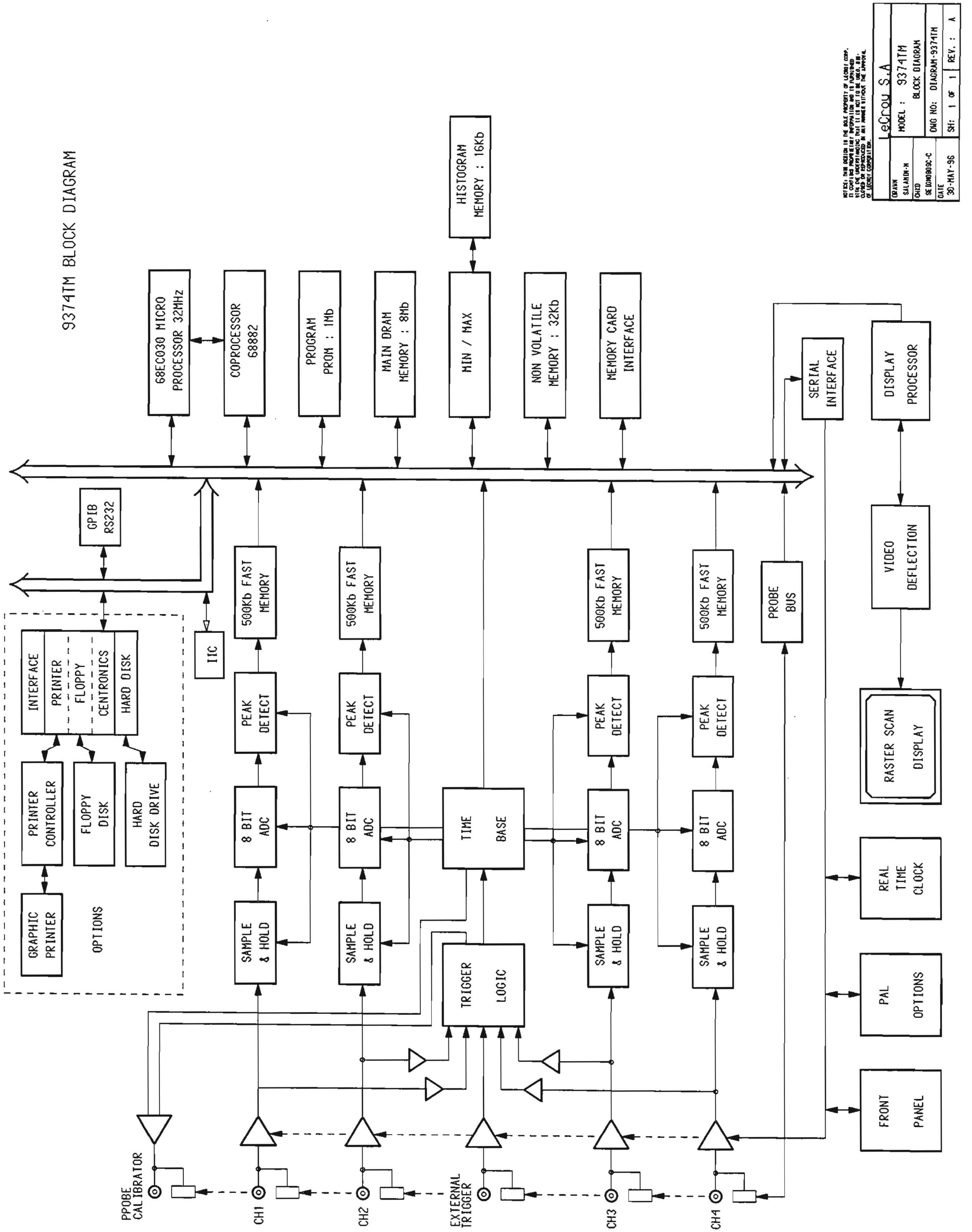
3.3 9374, 9374M, 9374L & 9374TM Hardware Options

9374-FDGP	Graphic Printer & Floppy Disk
	F9300-6 : Centronics, Floppy, Printer interface
	F9300-7 : Printer controller
9374-GP01	Graphic Printer
	F9300-6 : Centronics, Floppy, Printer interface
	F9300-7 : Printer controller
9374-FD01	Floppy Disk
	F9300-6 : Centronics, Floppy, Printer interface
9374-HDD	Hard Disk Drive, 170 MB
	F9300-8 : PCMCIA III, Hard Disk Controller


9374 BLOCK DIAGRAM
LeCroy S.A
MODEL : 9374
BLOCK DIAGRAM
DWG NO: DIAGRAM-9374
SH: 1 OF 1
REV. : A
DRAWN SALAMIN-N
DATE 30-MAY-96
68EC030 MICRO PROCESSOR 32MHz
COPROCESSOR 68882
PROGRAM PROM : 1Mb
MAIN DRAM MEMORY : 4Mb
MIN / MAX
HISTOGRAM MEMORY : 16Kb
NON VOLATILE MEMORY : 32Kb
MEMORY CARD INTERFACE
SERIAL INTERFACE
DISPLAY PROCESSOR
VIDEO DEFLECTION
RASTER SCAN DISPLAY
REAL TIME CLOCK
PAL OPTIONS
FRONT PANEL
GPIB RS232
IIC
INTERFACE
PRINTER
FLOPPY
CENTRONICS
HARD DISK
PRINTER CONTROLLER
FLOPPY DISK
HARD DISK DRIVE
GRAPHIC PRINTER
OPTIONS
50Kb FAST MEMORY
PEAK DETECT
8 BIT ADC
SAMPLE & HOLD
TIME BASE
TRIGGER LOGIC
PROBE BUS
PPOBE CALIBRATOR
CH1
CH2
EXTERNAL TRIGGER
CH3
CH4


9374M BLOCK DIAGRAM
68EC030 MICRO PROCESSOR 32MHz
COPROCESSOR 68882
PROGRAM PROM : 1Mb
MAIN DRAM MEMORY : 8Mb
HISTOGRAM MEMORY : 16Kb
MIN / MAX
NON VOLATILE MEMORY : 32Kb
MEMORY CARD INTERFACE
SERIAL INTERFACE
DISPLAY PROCESSOR
VIDEO DEFLECTION
RASTER SCAN DISPLAY
REAL TIME CLOCK
PAL OPTIONS
FRONT PANEL
GPIB RS232
INTERFACE
PRINTER
FLOPPY
CENTRONICS
HARD DISK
PRINTER CONTROLLER
FLOPPY DISK
HARD DISK DRIVE
GRAPHIC PRINTER
OPTIONS
IIC
250Kb FAST MEMORY
PEAK DETECT
8 BIT ADC
SAMPLE & HOLD
TIME BASE
TRIGGER LOGIC
PROBE BUS
PPOBE CALIBRATOR
CH1
CH2
EXTERNAL TRIGGER
CH3
CH4
LeCroy S.A
MODEL : 9374M
BLOCK DIAGRAM
DWG NO: DIAGRAM-9374M
SH: 1 OF 1
REV. : A
DRAWN SALAMIN-M
DATE 30-MAY-96


9374L BLOCK DIAGRAM
LeCroy S.A
MODEL : 9374L
BLOCK DIAGRAM
DWG NO: DIAGRAM-9374L
SH: 1 OF 1
REV. : A
DATE 30-MAY-96
68EC030 MICRO PROCESSOR 32MHz
COPROCESSOR 68882
PROGRAM PROM : 1Mb
MAIN DRAM MEMORY : 16Mb
HISTOGRAM MEMORY : 16Kb
MIN / MAX
NON VOLATILE MEMORY : 32Kb
MEMORY CARD INTERFACE
SERIAL INTERFACE
DISPLAY PROCESSOR
GPIB RS232
IIC
INTERFACE
PRINTER
FLOPPY
CENTRONICS
HARD DISK
PRINTER CONTROLLER
FLOPPY DISK
HARD DISK DRIVE
GRAPHIC PRINTER
OPTIONS
2Mb FAST MEMORY
PEAK DETECT
8 BIT ADC
SAMPLE & HOLD
TIME BASE
TRIGGER LOGIC
PROBE BUS
VIDEO DEFLECTION
RASTER SCAN DISPLAY
REAL TIME CLOCK
PAL OPTIONS
FRONT PANEL
PROBE CALIBRATOR
CH1
CH2
EXTERNAL TRIGGER
CH3
CH4

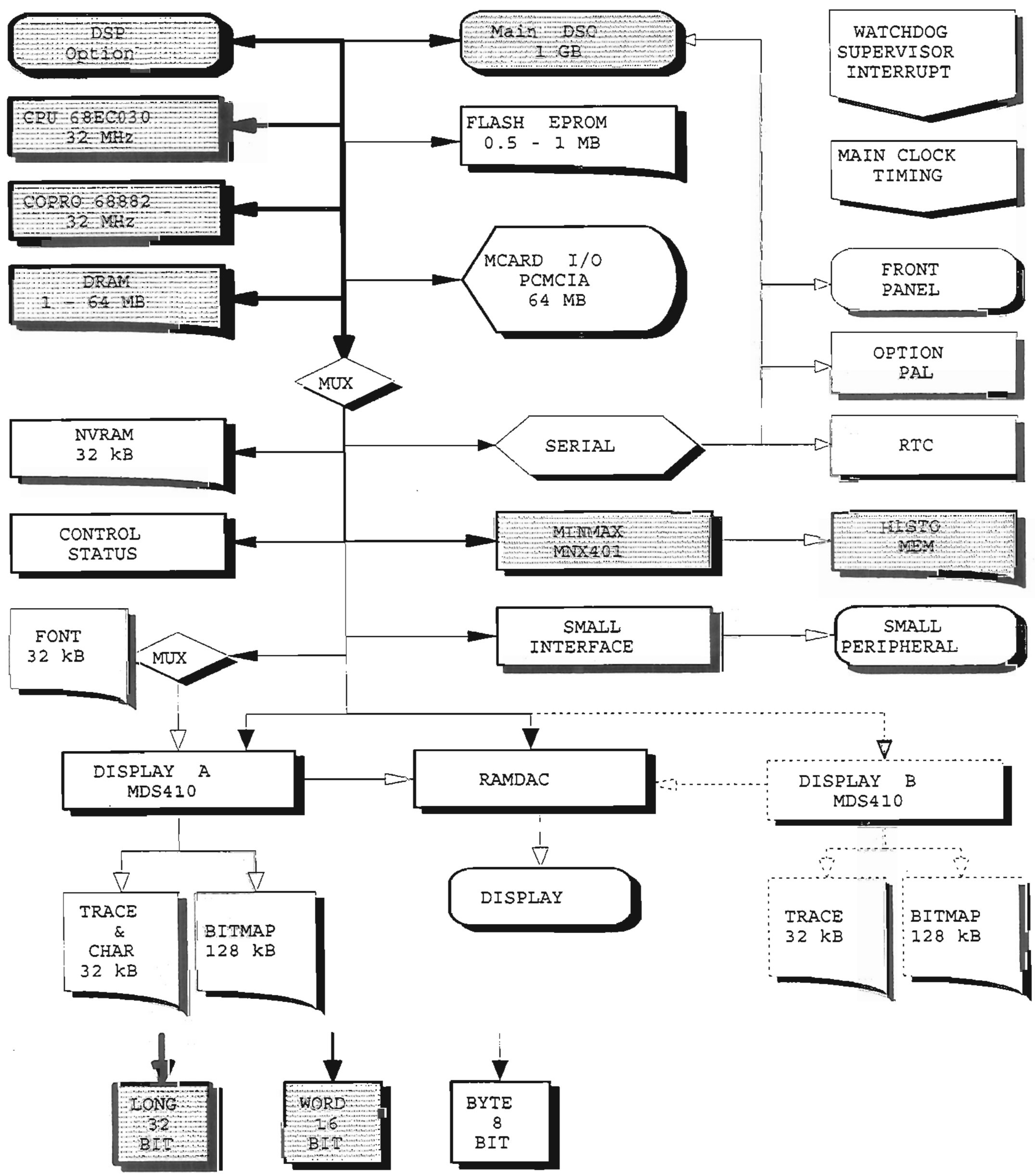

9374TM BLOCK DIAGRAM
68EC030 MICRO PROCESSOR 32MHz
COPROCESSOR 68882
PROGRAM PROM : 1Mb
MAIN DRAM MEMORY : 8Mb
MIN / MAX
HISTOGRAM MEMORY : 16Kb
NON VOLATILE MEMORY : 32Kb
MEMORY CARD INTERFACE
SERIAL INTERFACE
DISPLAY PROCESSOR
VIDEO DEFLECTION
RASTER SCAN DISPLAY
REAL TIME CLOCK
PAL OPTIONS
FRONT PANEL
PROBE BUS
GPIB RS232
IIC
INTERFACE
PRINTER
FLOPPY
CENTRONICS
HARD DISK
PRINTER CONTROLLER
FLOPPY DISK
HARD DISK DRIVE
GRAPHIC PRINTER
OPTIONS
500Kb FAST MEMORY
PEAK DETECT
8 BIT ADC
SAMPLE & HOLD
TIME BASE
TRIGGER LOGIC
PPOBE CALIBRATOR
CH1
CH2
EXTERNAL TRIGGER
CH3
CH4
LeCroy S.A
DRAWN SALAMIN-M
MODEL : 9374TM
BLOCK DIAGRAM
DWG NO: DIAGRAM-9374TM
DATE 30-MAY-96
SH: 1 OF 1
REV. : A

SECTION 4 THEORY of OPERATION

4.1 Processor Board : F9302-1-4 for 9374, F9302-1-8 for 9374M & 9374TM, or F9302-1-16 for 9374L

This processor board is based on to the 68EC030 and 68882 coprocessor, with an internal clock frequency of 32 MHz, and 4 Mbytes or 8 Mbytes or 16 Mbytes memory.
The internal Data Bus is 32 bits wide (DRAM, DSP), the peripheral Data Bus set 8 or 16 bits, and the Address Bus has 32 bits (A0-A30 and A31 for the Min/Max.).

4.1.1 Processor Block Diagram



4.1.2 Parallel Peripherals

DRAM memory : Data bus 32 bits

The DRAM memory of 4 Mbytes or 8 Mbytes or 16 Mbytes (up to 64 Mbytes) is used as the program memory and working memory.
The compacted program of 1MByte stored within the Flash EPROM, IC of 8 Mbit is de-compacted, loaded and executed in the DRAM.

DSP interface : Data bus 32 bits.

An optional Digital Signal Processor is connected to the processor board via a 32 bits address bus.

F9374-31 main board interface : Data bus 16 bits.

The main board is connected to the processor via a 32 bits address bus.
See section 4.3.

Min/Max calculation : Data bus 16 bits.

A gate array MNX401 makes a histogram in its associated 16 Kbytes memory and remembers the minimum and maximum data values it sees.

Flash memory : Data bus 8 bits.

Segmented Flash EPROM of 1 Mbyte (IC of 8 Mbits) contains 16 Kbytes program, executable at power on, and other compacted programs executable in the DRAM.

Memory card : Data bus 8 bits.

An interface is implemented to support an external memory card, PCMCIA / JEIDA 4, type 68 pins, whose size can range from 16 Kbytes to 64 Mbytes, with the extension to support flash memory and I/O cards.

Graphic processor : Data bus 8 bits.

The graphic processor of the raster scan display is a gate array designated MDS410.

Clock frequency	:	48 MHz.
Trace and characters memory	:	32 Kbytes (SRAM).
Bitmap memory	:	128 Kbytes (BMRAM).
Character font	:	32 Kbytes (SRAM).

Non volatile memory : Data bus 8 bits.

A static RAM of 32 Kbytes (IC of 256 Kbits) contains the parameters used at power on to initialize the scope and the stored panels parameters. This memory is battery backed up

DAC command of the display intensity : Data bus 8 bits.

The control of the display intensity is done by a RAMDAC, up to 8 traces.

Status and command registers : Data bus 8 bits.

Status (read) and command (write) registers of 12 bits address, control the memory card and front panel interface during the boot process or after a RESET.

4.1.3 Serial Peripherals

The processor controls the digital and analog section with a dual serial controller.

DAC's registers (read/write)
Front panel registers (68HC05C4)
RTC registers (68HC68T1)
Probe detection
Software options (GAL)
Front end control
Trigger control (MTR408)

Real time clock

Integrated circuit 68HC68T1 (Motorola or RCA).

Resolution	: 1 sec to 99 years.
Clock frequency	: 32.768 KHz.
Non volatile memory	: 32 Kbytes.
Data & Address bus	: 8 bits.
Interrupt level	: 5.

4.1.4 External Interfaces

Serial RS232 interface and Parallel GPIB interface.
See F9300-4 description, section 4.4.

4.1.5 Optional Interfaces

Graphic Printer	: F9300-6 interface and F9300-7 printer controller. Internal graphic printer
Floppy Disk Drive	: F9300-6 interface 1.44 Mbytes floppy
Centronics Printer	: F9300-6 interface
Hard Disk Drive	: F9300-8 PCMCIA III controller, 130 Mbytes hard disk

4.2 F9374-3 or -31 Main Board

4.2.1 Introduction

The board is divided into five sections :

- Front-end
- Microprocessor control.
- Trigger
- Analog to Digital Converter
- Time base

4.2.2 Front End

The front-end system provides the signal conditioning for the ADC system. Except at 1GS/s and 2GS/s, all channel are identical, thus only one channel will be described here.

The main functions of the FE without the amplifier (HFE419) are:

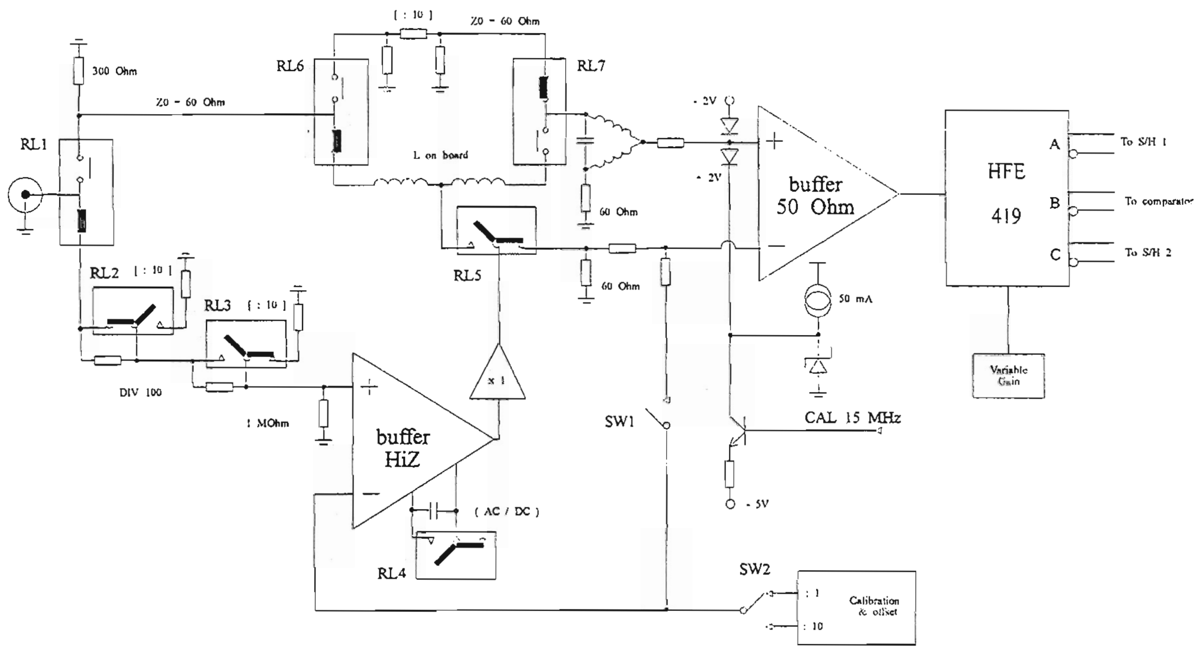
- Four channels operation, calibration with Software control
- Input protection (clamp + thermal detection) and coupling (AC, DC, 1 MΩ, 50 Ω).
- Attenuator by 10 in the 50Ω path and attenuators by 10 & by 100 in 1MΩ path.
- Offset control of ± 1 V and CAL control of ± 1.4 V.

The main functions of HFE419 are:

- Amplitude normalisation for the ADC system : at the BNC the dynamic range is 16 mV to 8V FS at 50Ω and to 80V FS (full scale) at 1 MOhm in a 1-2-5 step sequence and the ADC system input is 500 mV differential.
- Fine gain control to fill in the fixed vertical sensitivities.
- Bandwidth limit filter at 30 MHz and 100 MHz.
- Triggering with standard coupling and TV trigger on four channels and External.

4.2.2.1 Block Diagram

4.2.2.1.a Power off State : 1 MΩ input



- Relay RL1 (_50Ω) selects the input between the HiZ (1 MΩ) and the 50Ω path. A diode circuit senses the temperature of the 300 Ω termination resistor (in parallel with 60 Ohm to have Zin = 50Ω) and sets the _OVL bit low if overheating is detected.

- The 50Ω path is then disconnected by the hardware and the signal will be in the 1 Mohm input.

- Relay RL2 (_:10HZA) selects the input between divide-by-10 or direct for the signal in the **HiZ** path.

- Relay RL3 (_:10HZB) selects the input between divide-by-100 or divide-by-10 for the signal. in the **HiZ** path.

- Relay RL4 (_DC) sets the AC/DC coupling in HiZ.

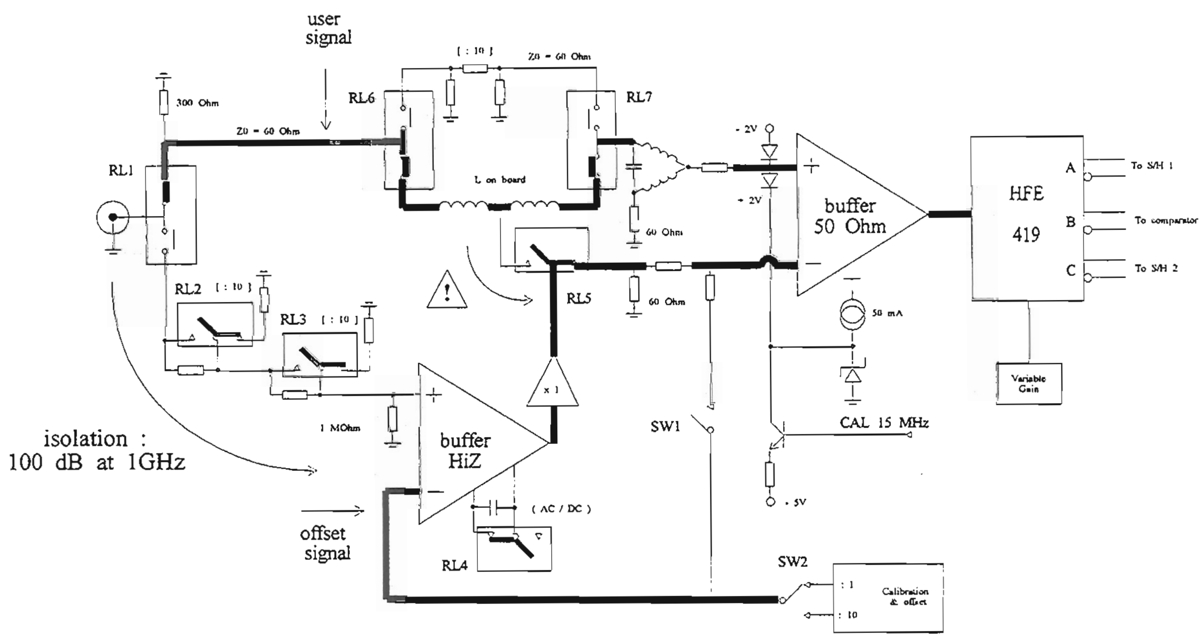
- Relay RL5 (_HZ) enables the **HiZ output** (selection between 1MΩ output & offset for 50Ω buffer).

- Relay RL6(_:10HFA) selects the input between divide-by-10 or direct for the signal. in the **50 Ohm** path.

- Relay RL7 (_:10HFB) selects the ouput between
  :1 in 50 Ohm or HiZ (if RL5 ON)
  :10 in 50 Ohm.

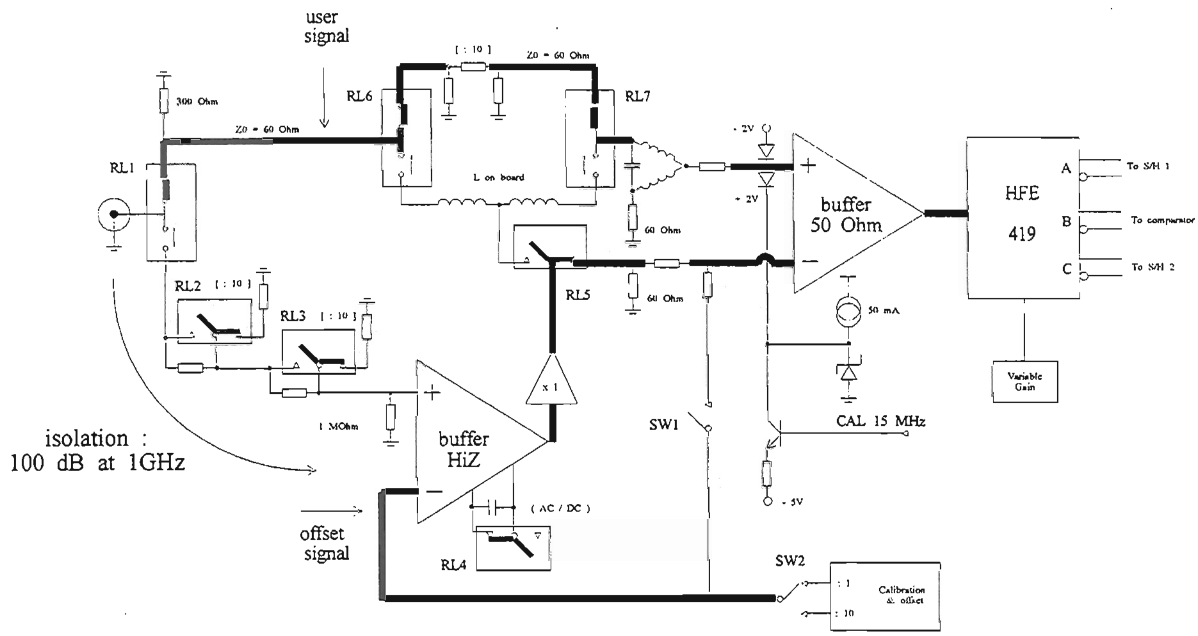
- Switch SW2 (_:1OFF)) sets div1 or div10 for the DC offset .
- CAL signal is equivalent to Offset signal.
- There is no AC/DC coupling in the 50Ω path.
- CAL 15MHz is the calibration clock signal use for 1GS/s.

4.2.2.1.b 50Ω input : Direct Path



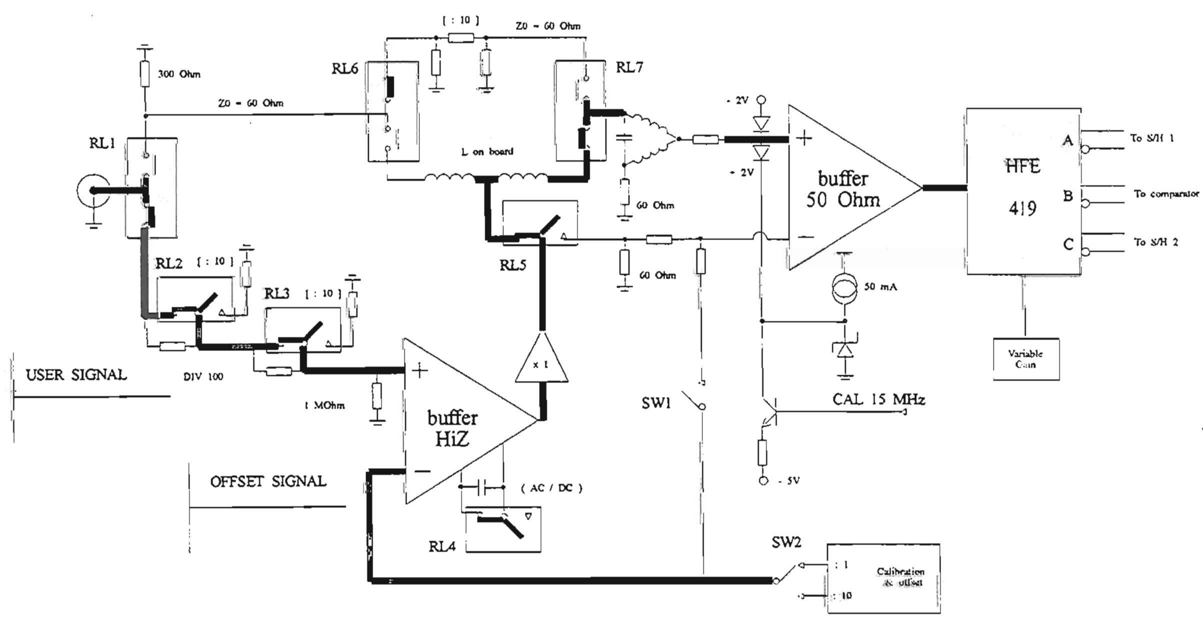
- The first relay RL1 is in a 50Ω characteristic impedance line. The second and third relay (RL6 & RL7) are in a 60Ω line.
- "L on board" is there to compensate for the capacitance of RL5 (Z_0 = 60Ω).
- The 50Ω buffer source impedance is equal to:
  Rs = (clamp resistor, 24Ω) + (50Ω // 300Ω // 60Ω) ≅ 49Ω
- Isolation with : RL5 & filter (between RL5 and the 50Ω buffer).
  The HF signal is filtered and view by the DC amplifier (CA3100) in the 50Ω buffer.

4.2.2.1.c 50Ω input : Divide-by-10 Path



- The divide-by-10 attenuator is a not symetrical Π attenuator:
- The input signal is ten times greater, less 20dB of isolation compensate with RL5.

4.2.2.1.d 1MΩ input : Direct Path



- Buffer HiZ is the AC coupled FET transistor controls in DC with a precision OP amp.
- x1 buffer is a powerful integrated buffer (gain ≅ 1)

4.2.2.2 Front End Analog controls

- One precision DAC with an associate circular memory (μP system) drives and refreshes a multiple sample-and-hold system. The DC calibration control is common to all four channels. Each channel has two analog controls.

The addresses are :

0300 0000 write channel 1 gain control
0300 000c write channel 4gain control
0300 000e write channel 4 offset & CAL control
0300 0002 write channel 1 offset & CAL control
0300 0004 write channel 2 gain control
0300 0006 write channel 2 offset & CAL control
0300 0008 write channel 3 gain control
0300 000a write channel 3 offset & CAL control

4.2.2.3 Front End Digital controls

0141 0z00 - 0141 0zff write channel 1 control register
0141 1z00 - 0141 1zff write channel 2 control register
0141 2z00 - 0141 2zff write channel 3 control register
0141 3z00 - 0141 3zff write channel 4 control register

23							16
—	ENC	ENB	ENA	G1	G0	BWL1	BWL0
15							8
RSH	:1LZ	:10LZ	:100HZ	:10HZ	DC	HZ	LZ
7							0
—	—	—	—	—	—	VOFF3	:1VOFF

where :

Byte 1 controls the HFE419

- ENC 0 = output C OFF, 1 = output C ON.
- ENB 0 = output B OFF, 1 = output B ON.
- ENA 0 = output A OFF, 1 = output A ON.
- (G1, G0) 00 = gain 2.5, 01 = gain 5, 1X = gain 12.5.
- (BWL1, BWL0) 00 = direct, 01 = 200MHz, 1X = 25 MHz.

Byte 2 controls the relays

- RSH 0 = direct to one ADC, 1 = multiplex to two ADCs.
- (:1LZ, :10LZ) 00 = cal 50 Ω, 01 = divide-by-10 50 Ω,
  10 = divide-by-1 50 Ω, 11 = 1 MΩ.
- :100HZ 0 = divide-by-100 path, 1 = divide-by-10 path, 1 MΩ coupling.
- :10HZ 0 = divide-by-1 path, 1 = divide-by-10 path, 1 MΩ coupling.
- DC 0 = AC 1MΩ coupling, 1 = DC 1MΩ coupling
- HZ 0 = 50 Ω coupling, 1 = 1MΩ coupling.
- LZ 0 = 1 MΩ coupling, 1 = 50 Ω coupling.

Byte 3 controls the offset & calibration signal

- VOFF3 — 0 = DC calibration (external BNC is disconnected), 1 = input coupling.
- :1VOFF — 0 = attenuation is ON, 1 = attenuation is OFF.

coupling attenuation	control bit							
	:1LZ	:10LZ	:100HZ	:10HZ	DC	HZ	LZ	VOFF3
power off	0	0	0	0	0	0	0	0
50 Ω, direct	1	0	0	1	0	0	1	0
50 Ω, :10	0	1	0	1	0	0	1	0
50 Ω, cal	1	1	0	1	0	0,1	1	0,1
HiZ, :1, AC	1	0	1	0	0	1	0	0
HiZ, :1, DC	1	0	1	0	1	1	0	0
HiZ, :10	1	0	1	1	0,1	1	0	0
HiZ, :100	1	0	0	1	0,1	1	0	0
HiZ,cal50Ω	0	0	0	1	0	1	0	1

Front-end control with gain range

The name of the control bit describes the state of the relay when the bit is high.

Two serial registers give some information about the front-end state.

0140 4z00 - 0140 4zffread channels overload

7							0
_INTWD	_INTIIC	_OVL_T	_PPOFF	_OVL_D	_OVL_C	_OVL_B	_OVL_A

where :

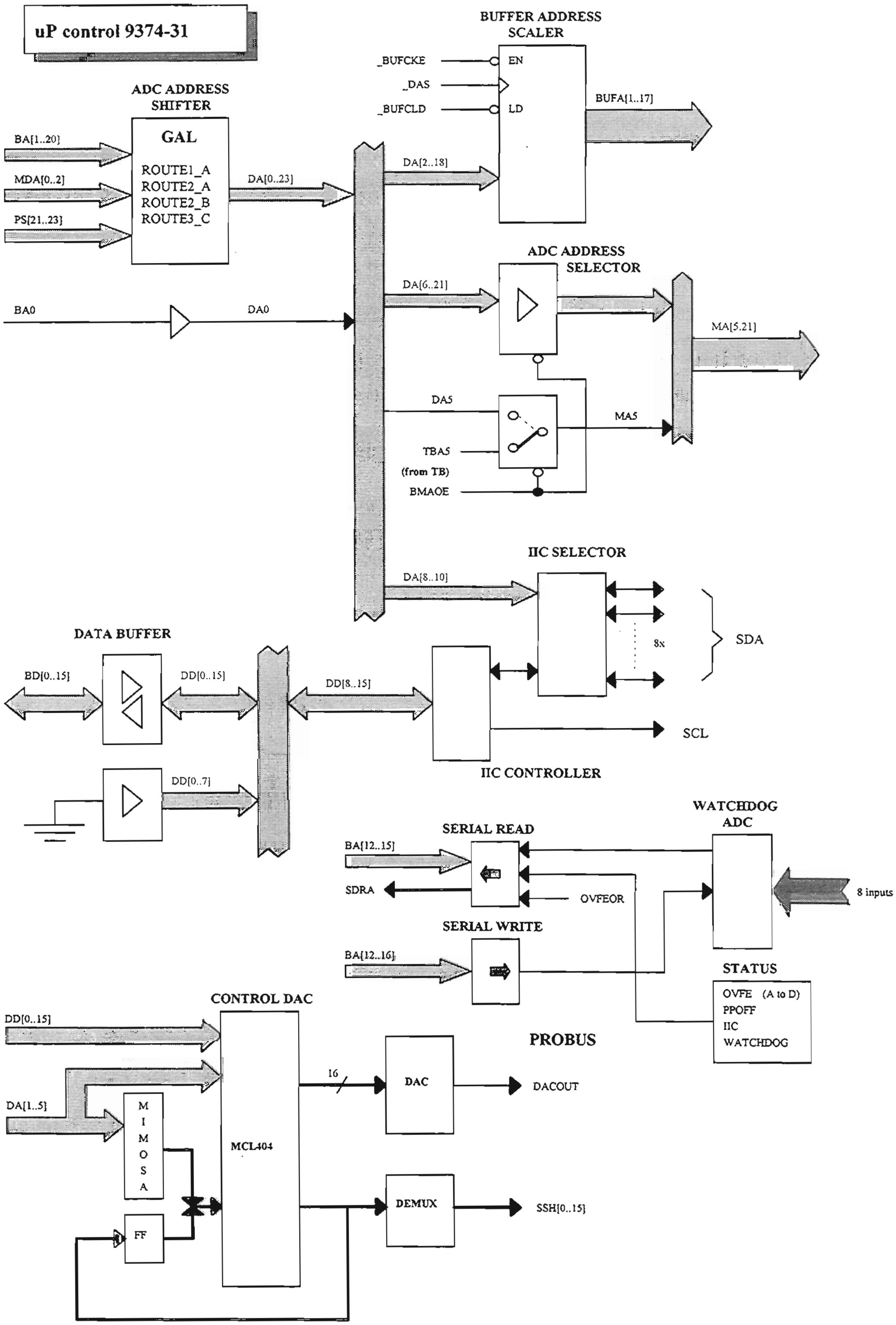
- _INTWD — watchdog ADC interrupt,
- _INTIIC — I²C protocol interrupt,
- _PPOFF — probe power overload interrupt,
- _OVL_n — overload indicator (ch 1, 2, 3, 4, EXT).

A low state indicate that overload or interrupt is detected.

0140 5z00 - 0140 5zffread overload sum

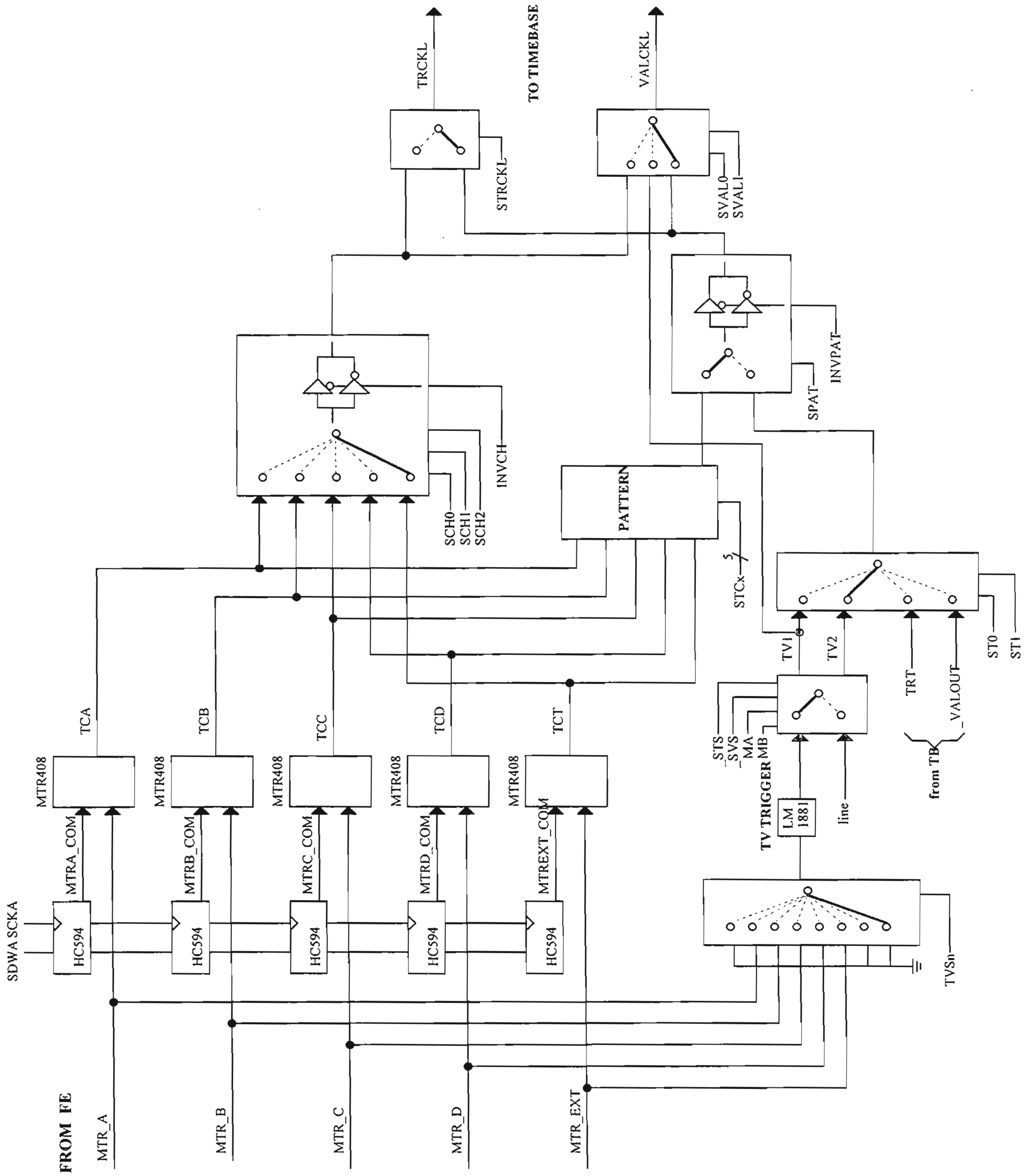
OVLSUM bit 7, Sum of the eight above bits.
0 = OK,
1 = problem occurred (read channels overload)

4.2.3 Microprocessor Control



4.2.4 Trigger

4.2.4.1 Block Diagram



The different trigger couplings are :

- DC
- AC : cut off frequency is almost 10 Hz.
- LF REJ : set a single pole high pass filter with a cut off frequency at 50 kHz.
- HF REJ : set a single pole low pass filter with a cut off frequency at 50 kHz.
- TBWL : single pole low pass filter at 30 MHz.

The amplitude at the input of the MTR408 is 320 mV FS .

4.2.4.2 Digital Controls

The 40 bit shift register, is allocated as follows :

0141 4z00 - 0141 4zffwrite trigger control register

39							32
---	TBWL_A	HFR_A	AC_A	DC_A	---	SNEG_A	SPOS_A
31							24
TEXT50	TBWL_B	HFR_B	AC_B	DC_B	---	SNEG_B	SPOS_B
23							16
---	TBWL_C	HFR_C	AC_C	DC_C	---	SNEG_C	SPOS_C
15							8
---	TBWL_D	HFR_D	AC_D	DC_D	---	SNEG_D	SPOS_D
7							0
_EXT/10	TBWL_EXT	HFR_EXT	AC_EXT	DC_EXT	---	SNEG_EXT	SPOS_EXT

TEXT50 0 = 1 MΩ external input coupling, 1 = 50 Ω external input coupling.
_EXT/10 0 = attenuation is ON, 1 = OFF.

4.2.4.3 Analog Controls

A sample and hold fed by the precision DAC provides the threshold level.

The addresses are :

0300 0010 write EXT threshold control
0300 0018 write channel 1 threshold control
0300 001a write channel 2 threshold control
0300 001c write channel 3 threshold control
0300 001e write channel 4 threshold control

4.2.4.4 TV Trigger

Each channel has a pick-off after the HFE419 or after the high impedance buffer for external trigger. The TV trigger source is selected via bit TVS and drives a times 10 amplifier with complementary outputs. These outputs are selected (_TVINV) depending on the state of the selected HFE419 gain.
The TV trigger uses a commercial chip (LM1881) and provides two outputs,TV1 & TV2. This circuit is able to trigger on different TV line number standards.

▪ **Digital Controls**

The 16 bit shift register, written using the serial protocol, is allocated as follows :

0141 5z00 - 0141 5zffwrite trigger TV and MST412 oscillator control register

15							8
_TVINV	TVS2	TVS1	TVS0	HDTV	875	MB	MA
7							0
_STI	_STW	_SVS	_STS	---	---	---	---

_TVINV 0 = inverting TV trigger (to compensate for inversion in MFE409).
_SVS 0 = enable TV1 source.
_STS 0 = enable TV2 source.
_STI 0 = enable interval width mode for MST412 oscillator control.
_STW 0 = enable pulse width mode for MST412 oscillator control.

TVS2	TVS1	TVS0	TV trigger source	HDTV	875	line setting
0	0	1	channel A	0	0	525-625 TVLO
0	1	0	channel B	0	1	875 (MED)
0	1	1	channel C	1	0	1225 (HIGH)
1	0	0	channel D	1	1	2500 (HDTV)
1	0	1	external trigger			

4.2.5 Analog to Digital Converter

4.2.5.1 Introduction

The analog to digital converter system does the signal conversion to 8 bits.

- Sample and Hold : the HSH423 Hybrid with Analog bandwidth of 1GHz, performs the track and hold before the ADC. It is clocked at three different frequencies : 500 MHz, 400 MHz, and 200 MHz. The offset is calibrated by use of a current mirror controlled by a 8 bit DAC.

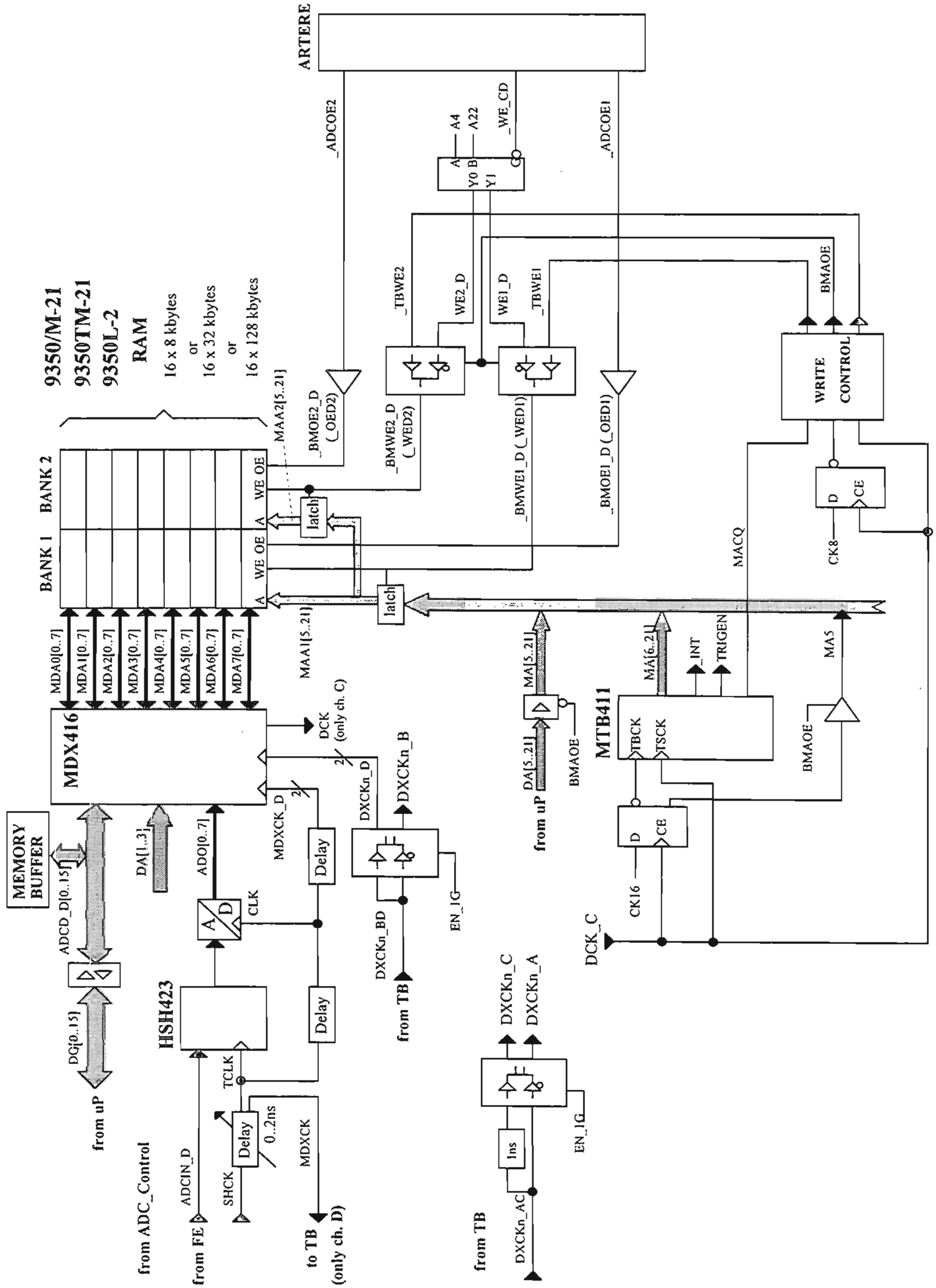
- Flash ADC : the TDA8718 is a folding ADC working at a maximum clock speed of 500 Ms/s. The gain is calibrated by adjusting the internal resistor ladder using a 8 bit DAC. The ADC input level is 240 mV peak to peak on 75 Ω, from the nominal 320 mV front-end output.

- Demultiplexer : the MDX416 monolithic is used to demultiplex the ADC output, and catch the glitch (min/max).

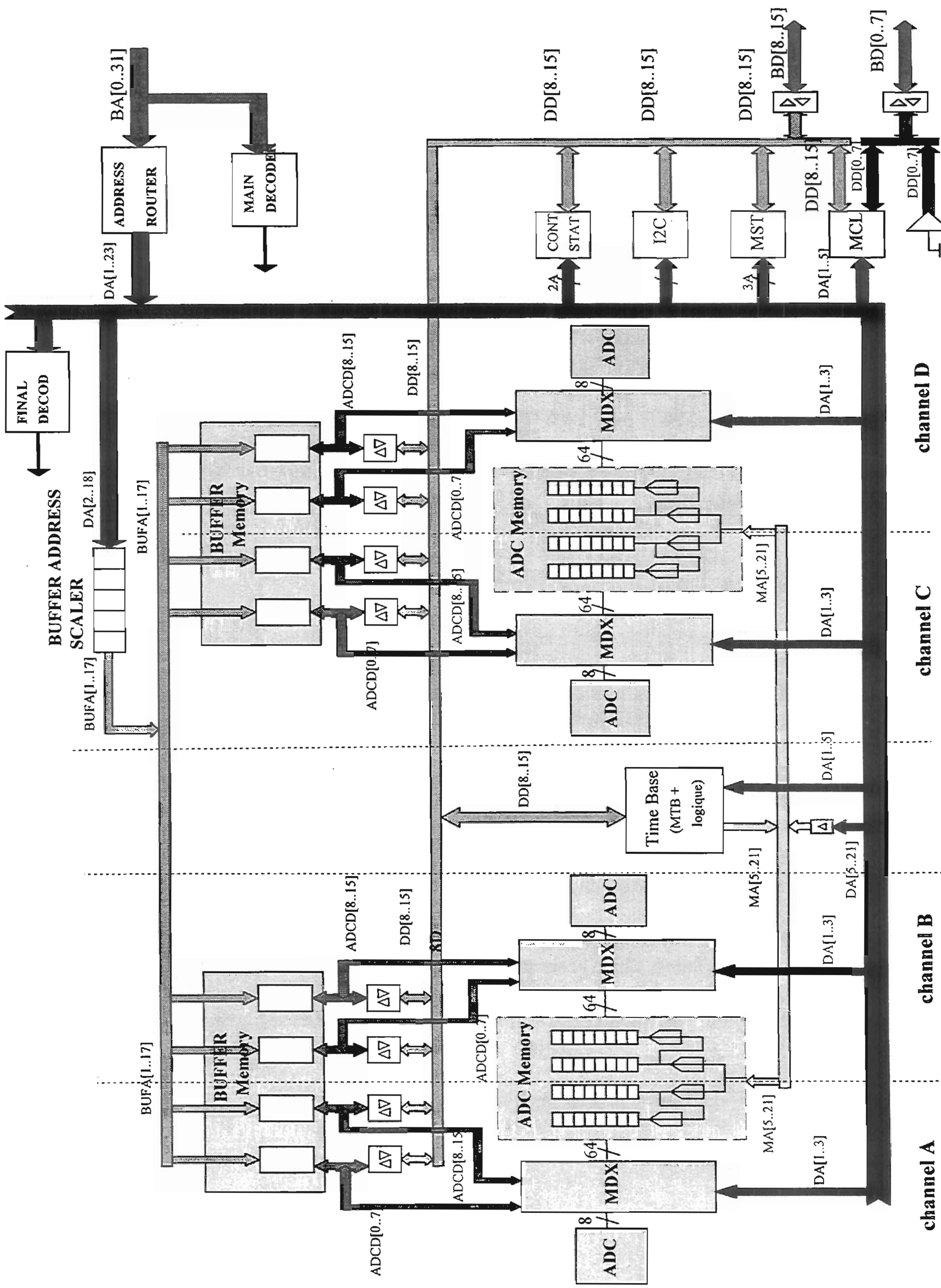
- Buffer Memory : 128K bytes

- ADC Memory : 50K points for 9374, 250K for 9374M, 500 K for 9374TM, 2M points for 9374L. Memory length may be extended by combining the acquisition memories of multiple channels.

4.2.5.2 ADC Block Diagram



4.2.5.3 Memories Block Diagram



4.2.6 Time Base

4.2.6.1 Introduction

The main clock (SHCK) comes from a PLL oscillator with a 10 MHz reference, there is a control bit (SEXTREF) to select an optional external reference with ECL level.

The PLL output frequency is controlled by three bits (SF500, SF400 and _SF200). The main clock is directly used by the sample-and-hold, the analog-to-digital converter and the time-to-digital converter for real time measurement. It is also used for synchronization inside the MDX416 demultiplexer.

The main clock is then feedback to the time base, from the ADC system (MDXCK), to drive a pre-divider controlled by four bits (DIVn). The output of the pre-divider then drives the MTB411 frequency divider (FD). At fastest speed, when the MTB411 frequency divider is not used, the clock to FD (FDCK) can be disabled (DISFD).

The main clock can also be driven from the external trigger BNC, this path is selected by a control bit (SEXTCK). The external clock threshold can be modified by two bits from the time base mode control (EXTCTH1 and EXTCTH2). This external clock frequency range is 0 to 100 MHz.

The PLL oscillator has in fact only two values, 500 and 400 MHz, the 200 MHz is a secondary path coming from a divider by two.

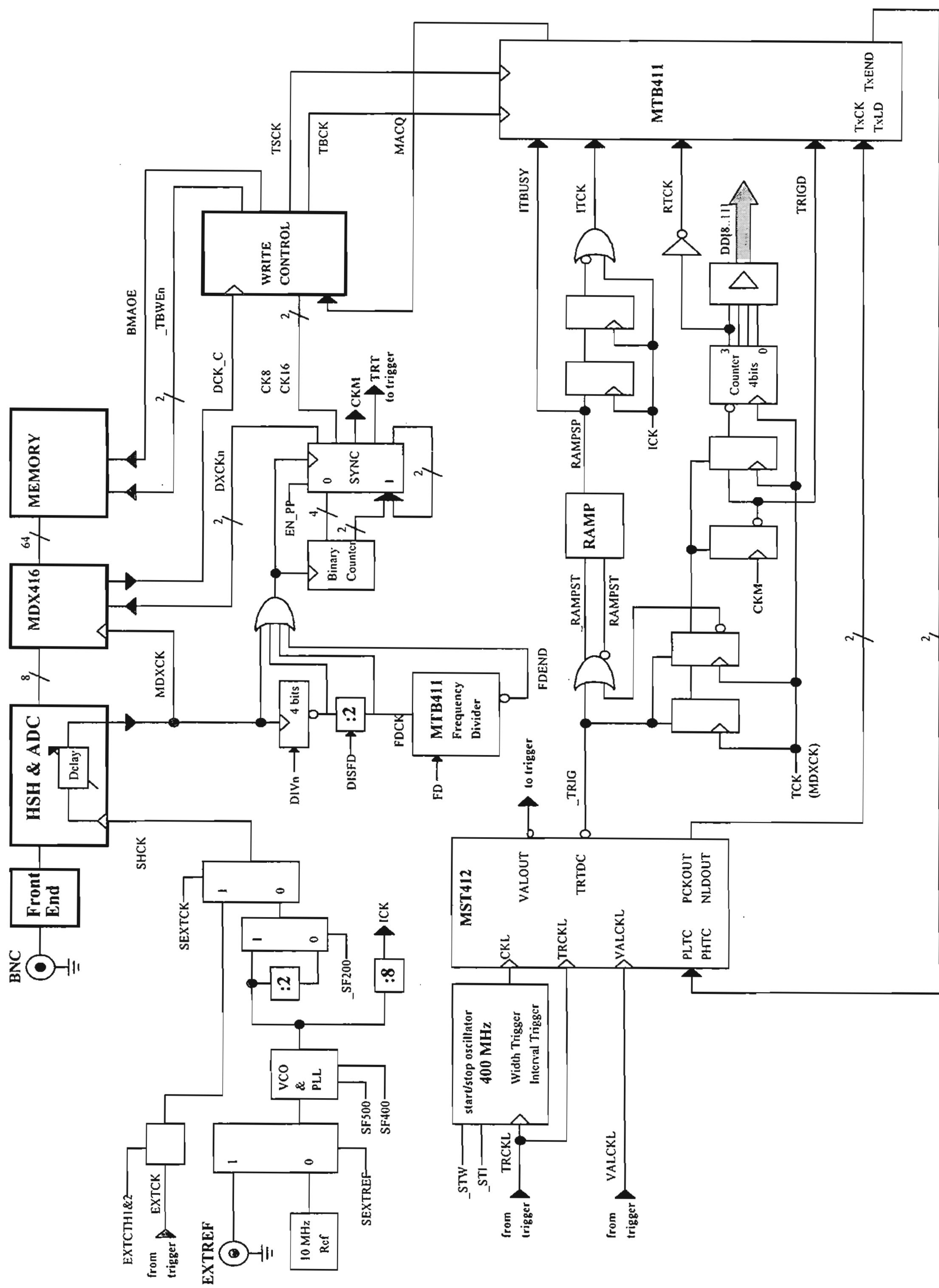
- 500 MHz is used for fast timebase settings, 1 GS/s, 2 GS/s and RIS mode.
- 400 MHz is used as soon as possible when starting to skip samples (skip > 1) in order to be able to do a peak detection (min-max) with the MDX416.
- 200 MHz is used for Roll mode.

There is also another reference clock for the interpolated TDC (ICK) which comes from a divider by eight. Its frequency is then 62.5 or 50 MHz, to be able to directly use the MTB411 counter (general time base control, start/stop, counters, memory address).

The output of the fast frequency divider is combined with the output of the MTB411's FD to drive a synchronous clock generator. The main functions are :

- reference to the MDX416 (DXCKn) and to the memory address generator (CK8 and CK16),
- synchronize the trigger (CKM for TRIGD),
- calibrate the MST412 use for smart trigger (TRT).

4.2.6.2 Time Base Block Diagram



4.2.6.3 Digital Control

0141 8z00 - 0141 8zffwrite Time Base divider register

15							8
---	---	---	---	---	SECK500	EN_1G	SEXTREF
7							0
DISFD	_SF200	SF500	SF400	DIV3	DIV2	DIV1	DIV0

where :

- SECK500 select optional external clock (100 MHz to 500 MHz).
- EN_1G enable 1 GS/s/s acquisition (1 ns delay on MDX416 clock).
- SEXTREF select optional external PLL clock reference (10 MHz ± 5 %).
- DISFD disable FD clock to MTB411.
- _SF200 select oscillator frequency 200 MHz.
- SF500 select oscillator frequency 500 MHz.
- SF400 select oscillator frequency 400 MHz.
- DIVn frequency pre-divider (4 bits).

4.2.6.4 Trigger Selection

Each differential outputs of the five MTR408 from the Front-End (TCx) are selected (bit SCHn) and then inverted (bit INVCH) to drive the TRCKL signal and the VALCKL signal (bit SVAL1).

A logical function of the TCx signals can be selected (bit STCx) for the pattern generator. A few single ended signals can also be selected one at a time (bit STn). These signals are TV1 and TV2 for television trigger, TRT for test and calibration of MST412, _VALOUT for drop-out trigger.

Then there is a selection between the pattern and the single ended sources (bit SPAT). The signal obtained is inverted (bit INVPAT) and used to drive TRCKL (bit STRCKL). There is also a choice between this signal and TV1 to drive VALCKL (bit SVAL0). The pattern trigger logic function is any "AND" combination of TCx input signals, inverted or not. All the control are done through a 16 bit serial register.

4.2.6.5 Smart Trigger

The VALCKL source drives the MST412. The TRCKL source goes through a buffer to drive the MST412 and control the smart trigger 400 MHz start/stop oscillator.

The MST412 oscillator is usually free running, but when using glitch trigger mode the oscillator is enable only during the pulse duration (bit _STW), and when using interval width trigger mode the oscillator is restarted at each edge (bit _STI).
There is also a time base mode control register with roll mode interrupt enable (RMIE), external clock control (SEXTCK, EXTCTH1 and EXTCTH2), buzzer (BUZZ) and calibration front panel output signal selection (PCSn).

4.3 F9300-4 GPIB and RS 232 Interface

This board is connected to the processor through a flat cable.
Data bus is 8 bits, address bus: 12 bits.
Address 0180 000 to 0180 00FF.

4.3.1 RS 232 Serial Interface

Based on the 2661A IC from Signetics or Philips.

- Clock frequency 4.9152 MHz.
- 4 internal registers of 8 bits.
- Interrupt level 2.
- Connector type DB9 with 9 male pins.

4.3.2 GPIB Interface

Based on the circuit 7210 IC from NEC.

- Clock frequency 5 MHz.
- 8 internal registers of 8 bits.
- Tri-state external GPIB drivers. - Low level output.
- Interrupt level 3.

The GPIB address is set by software and stored in non-volatile memory.

4.4 F9354-5 Front Panel

The front panel is connected to the processor board with a flat cable. Power supply and control signals are supplied from the processor. The front panel is divided in two sections:

- One board with Motorola 68HC05C4 processor, coders, and serial data interface.
- One matrix Keyboard with push buttons.

4.5 F9300-6 Centronics, Floppy, Printer interface option

4.5.1 Centronics interface option

This Centronics interface makes direct connection possible to external parallel printer.

- Address 0130 0180 to 0130 01A0
- Interrupt level 2

4.5.2 Floppy Disk drive interface option

Based on the circuit MCS3201 from Motorola.

- Address 0130 01C0 to 0130 01C7
- Interrupt level 4

Address	Read	Write
0130 01C0	Input register	-----
0130 01C2	-----	Digital output register
0130 01C4	Main status register	-----
0130 01C5	Data register	Data register
0130 01C7	Data input register	Disk control register

4.5.3 Printer Interface option

Internal graphic printer : Seiko LPT5446

- Address 0130 0140 to 0130 0160
- Interrupt level 2

4.6 F9300-7 Printer Controller option

Based on the LPT5000 series control chip set from Seiko instrument Inc

- PT501P01 CPU
- PT500GA1 Gate array
- Technical reference 39019-2234-01
- Address 0130 0100

4.7 F9300-8 Hard Disk option, PCMCIA III Controller

- Address 0130 0800 to 0130 0bff
- Interrupt level 5

4.8 93XX-Display

4.8.1 General Description

The raster scan display module is divided into five sections:

- Graphic processor
- Deflection
- Video
- Yoke
- Cathode ray tube

4.8.2 Basic Characteristics

- Nine inches diagonal monochrome, yellowish, orange.
- CRT anti-glare treated
- Non interlaced resolution of (X)810 x (Y)696 pixels at 60 Hz or 50 Hz frequency.

- Landscape vertical raster
- Electromagnetic deflection.
- Intensity control rise and fall time > 12 ns.
- Analog intensity input
- TTL synchronization input.
- Horizontal nominal size: 165 mm for X-on = 15.39 Ms.
- Horizontal size adjustment: > +/- 5 mm.
- Horizontal offset adjustment: +/- 5 mm.
- Vertical nominal size: 120 mm for Y-on = 14.5μs.
- Vertical size adjustment: > +/- 5 mm.
- Vertical offset adjustment: +/- 5 mm.
- X and Y differential non linearity: 10%.

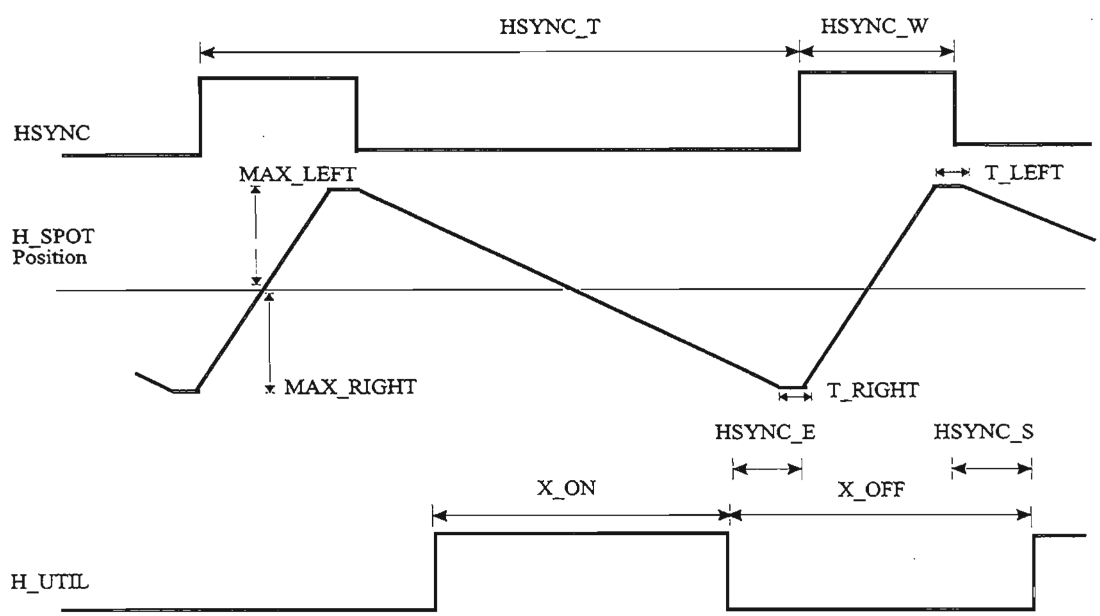
The line deflection is vertical, from bottom to top. The field deflection is horizontal, from left to right and is resynchronized to the power line frequency.

4.8.3 Horizontal Deflection

The horizontal deflection is synchronized to the 50 or 60 Hertz power line frequency. The on time display is the same for both frequencies, therefore the deflection is calculated for 60 Hz. The horizontal deflection is controlled by the HSYNC signal.

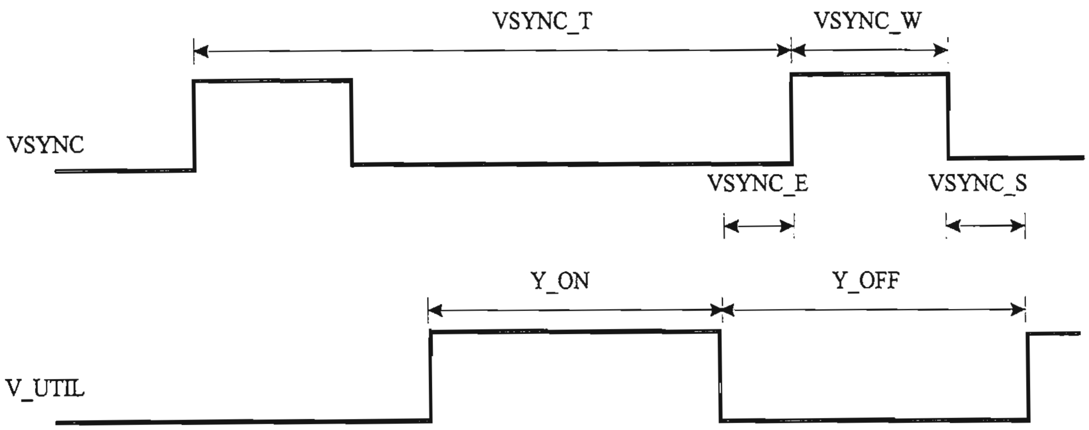
The trailing edge of HSYNC resets the horizontal spot position to a hardware predefined position at the left side of the screen: MAX_left. When ever HSYNC is high, the spot stays at this position.

The falling edge of HSYNC starts the horizontal deflection ramp. The ramp has the same rate for either 50 or 60 Hertz frequency.
When ever HSYNC is low, the horizontal deflection will rise left to right, until HSYNC becomes high, or the system has reached the maximum right position (MAX_RIGHT).



4.8.4 Vertical Synchronization

The timing of both VSYNC and HSYNC is synchronized to the pixel clock (PCLK).



The pixel rate is 48 MHz.

4.8.5 Horizontal Resolution

	# of vertical line	Time in ms
HSYNC_T	842	15.998
HSYNC_W	22	0.418
HSYNC_E	4	0.076
HSYNC_S	6	0.114
X-ON	810	15.390
X-OFF	32	0.608

Values of the horizontal timing for the maximum field refresh frequency.

4.8.6 Vertical Resolution

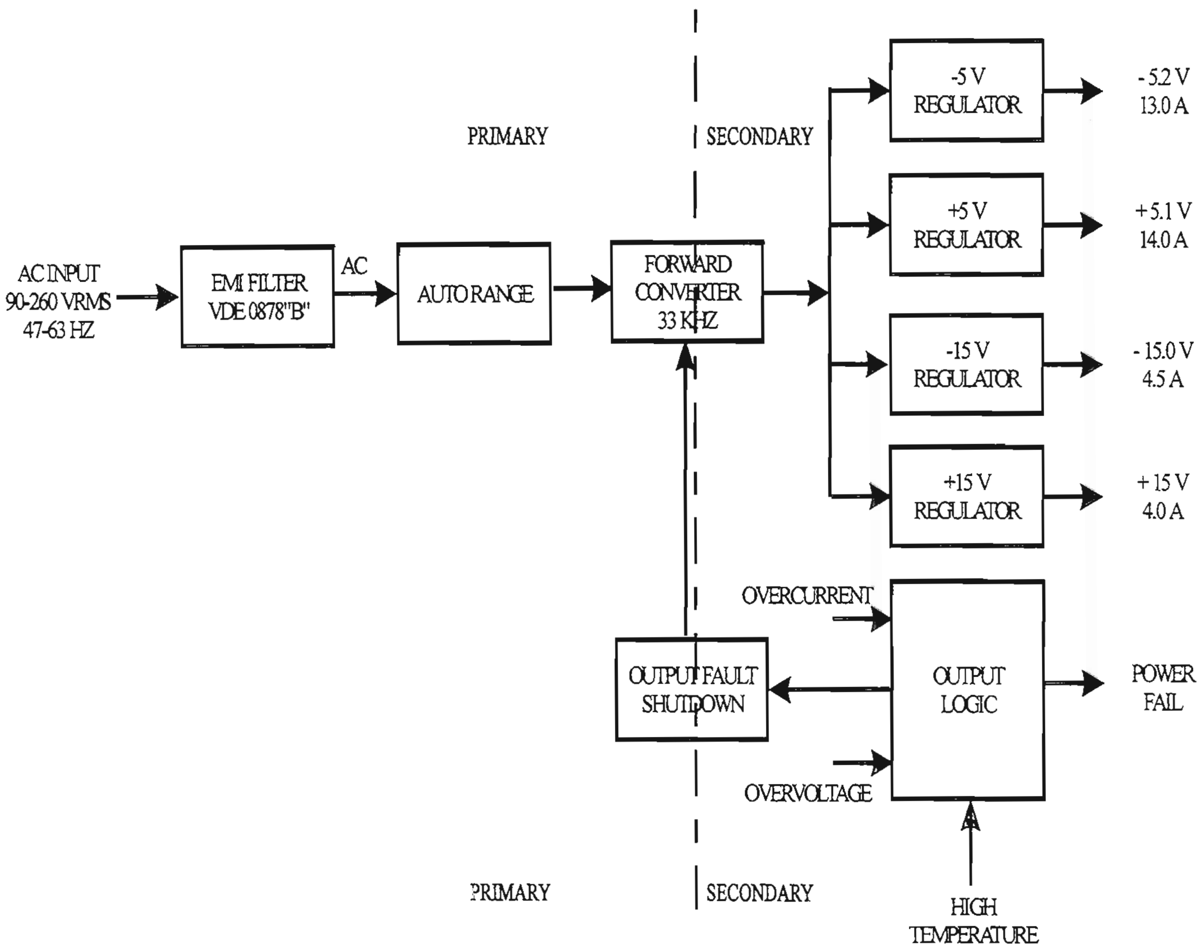
	# of Pixels	Time in µs
VSYNC_T	912	19.000
VSYNC_W	136	2.833
VSYINC_E	0	0.000
VSYNC_S	80	1.666
Y-ON	696	14.500
Y-OFF	216	4.500

4.9 PS9351 Power Supply

4.9.1 Power Supply Specifications

Input voltage	: 90 to 130 V or 180 to 260 V. Auto ranging line voltage.
Input frequency	: 47 Hz to 63 Hz.
Input rush current	: Max. 40 A peak at start up.
Environmental	: Operating temperature range 0 °C to + 50 °C Storage temperature range - 55 °C to + 80 °C Relative humidity from 5% to 95%.
Output voltages	: - 5.2 VDC, 13 amp Max. + 5.2 VDC, 14 amp Max. - 15.1 VDC, 4.5 amp Max + 15.1 VDC, 4 amp Max.
Output adjustment	: +/- 5%.
Regulation	: +/- 1%.
Transient response	: recover to 1% of its final value within 500 µsec.
Ripple and noise	: Peak to peak value < 50 Mv
Hold up time	: 16 msec at full load
Output short circuit protection	: Yes.
Output over voltage protection	: Yes.
Input protection	: 6 amp fuses.
Thermal protection	: Yes.
Safety :	VDE 0806, IEC 380, 435, 950 & UL1012, 478, CSAC22.2#1402C
EMI :	VDE 0871 class A, FCC 20780 class A.

4.9.2 Power Supply Block Diagram



SECTION 5 Performance Verification

5.1 Introduction

This chapter contains procedures suitable for determining if the 9374/M/L/TM Digital Storage Oscilloscope performs as warranted.
They check all the characteristics that are designated as warranted specifications in subsection 5.1.1. A more complete list of specifications is given in section 2.1.

Because they require time and suitable test equipment, you may not need to perform all of these procedures, depending on what you want to accomplish.

In the absence of the computer automated calibration system based on LeCroy Calibration Software (LeCalsoft), this manual performance verification procedure can be followed to establish a traceable calibration.
It is the calibrating entities responsibility to ensure that all laboratory standards used to perform this procedure are operating within their specifications and traceable to required standards if a traceable calibration certificate is to be issued for the 9374/M/L/TM Digital Storage Oscilloscope.

5.1.1 List of Warranted Specifications

The electrical warranted specifications are listed in this subsection.
Warranted specifications are described in terms of quantifiable performance limits which are warranted.

- Input Impedance
- Leakage Current
- Peak to Peak and RMS Average noise level
- Positive and Negative DC linearity
- Positive and Negative Offset
- Bandwidth
- Trigger Level
- Smart Trigger
- Time Base Accuracy
- Overshoot and Rise Time
- Probe Calibrator
- Overload

5.2 Test Equipment Required

These procedures use external, traceable signal generators, DC precision power supply and digital multimeter, to directly check warranted specifications.

Instrument	Specifications	Recommended	Where used
Signal Generator (sine wave)	Frequency : .5 MHz to 2 GHz Frequency Accuracy : 1 PPM Amplitude : 5 V peak to peak	HP8648B or equivalent	5.9.1 5.11 5.12
Fast pulse Generator	Rise time < 70 psec	Picosecond TD1107 B or equivalent	5.13
Sine Wave Generator	Frequency : 5 KHz Amplitude : 6 V peak to peak	LeCroy LW420 or equivalent	5.10
DC precision Power Supply	Amplitude : 10 V, DC Accuracy : < 0.1 %	Tektronix PS5004 or equivalent	5.7, 5.8 5.15
Digital Multimeter	4 digits	Keithley 199 or equivalent	5.4 5.5
10:1 Passive Probe	500 MHz , 10 MΩ	LeCroy PP005	5.9.1.b
Cable	BNC, 50 Ω, length 20 cm, 1ns (7.87 inches)	LeCroy 480232001	5.10.3 5.10.4
Cable	BNC, 50 Ω, length 100 cm, 5 ns (39.37 inches)	LeCroy 480020101	5.XX
Attenuator	50 Ω, 20 dB 1% accuracy	Suhner	5.7
Attenuator	1 MΩ, 20 dB 1% accuracy	Suhner	5.7
Attenuator	50 Ω, 3 dB 1% accuracy	Suhner	5.10
Terminator	50 Ω Feed through, 1% accuracy	Suhner	5.13
BNC T adapter	BNC, 50 Ω, T adapter	LeCroy 402222002	5.10.3 5.10.4

Table 5-1 : Test Equipment

5.3 Turn On

If you are not familiar with operating the 9374/M/L/TM oscilloscope, read the operator's manual.

- Switch on the power using the power switch on the rear panel and verify :
- The display turns on after about 10 seconds and is stable
- The range of intensity and grid intensity is reasonable

- Wait for about 10 minutes for the scope to reach a stable operating temperature.

5.4 Input Impedance

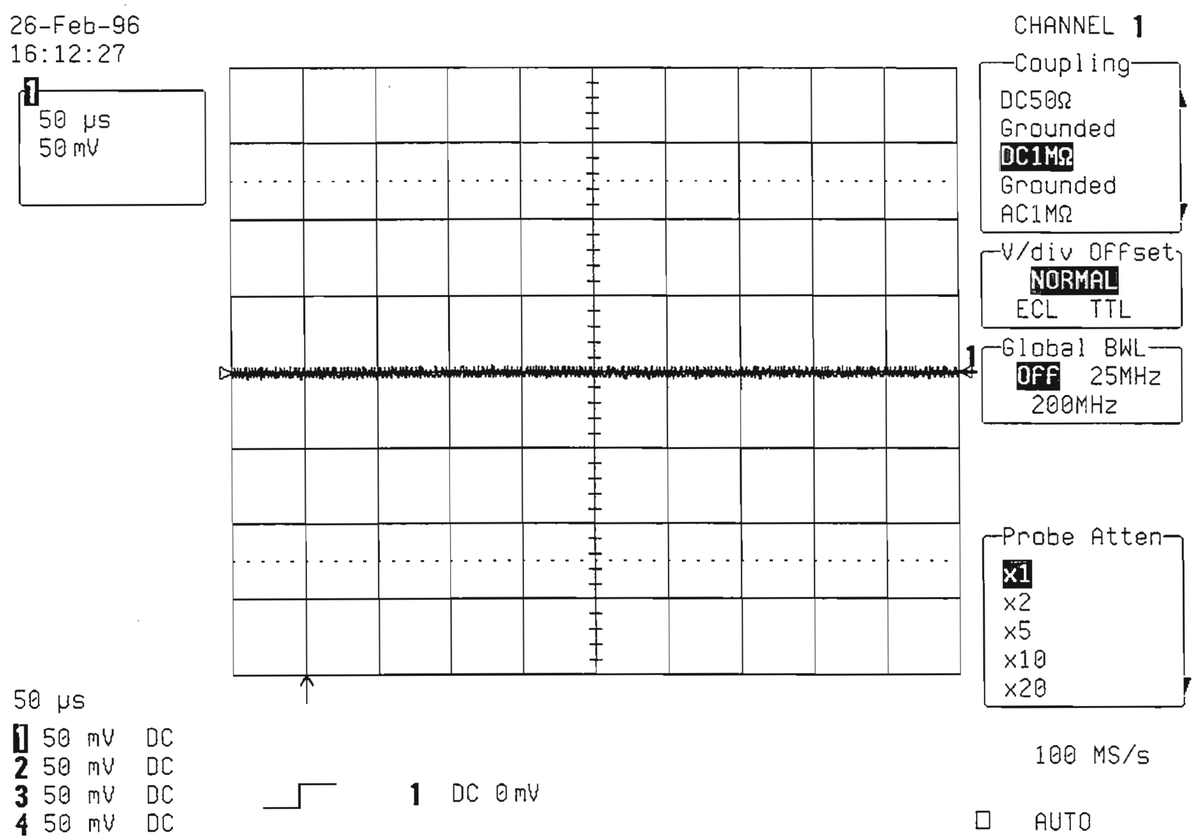
Specifications
DC 1.00 MΩ ± 1%
AC 1.11 MΩ ± 2%
DC 50 Ω ± 1%

5.4.1 Procedure

The impedance values for 50 Ω and 1 MΩ couplings are measured, with a high precision digital multimeter.

5.4.1.a DC 1MΩ

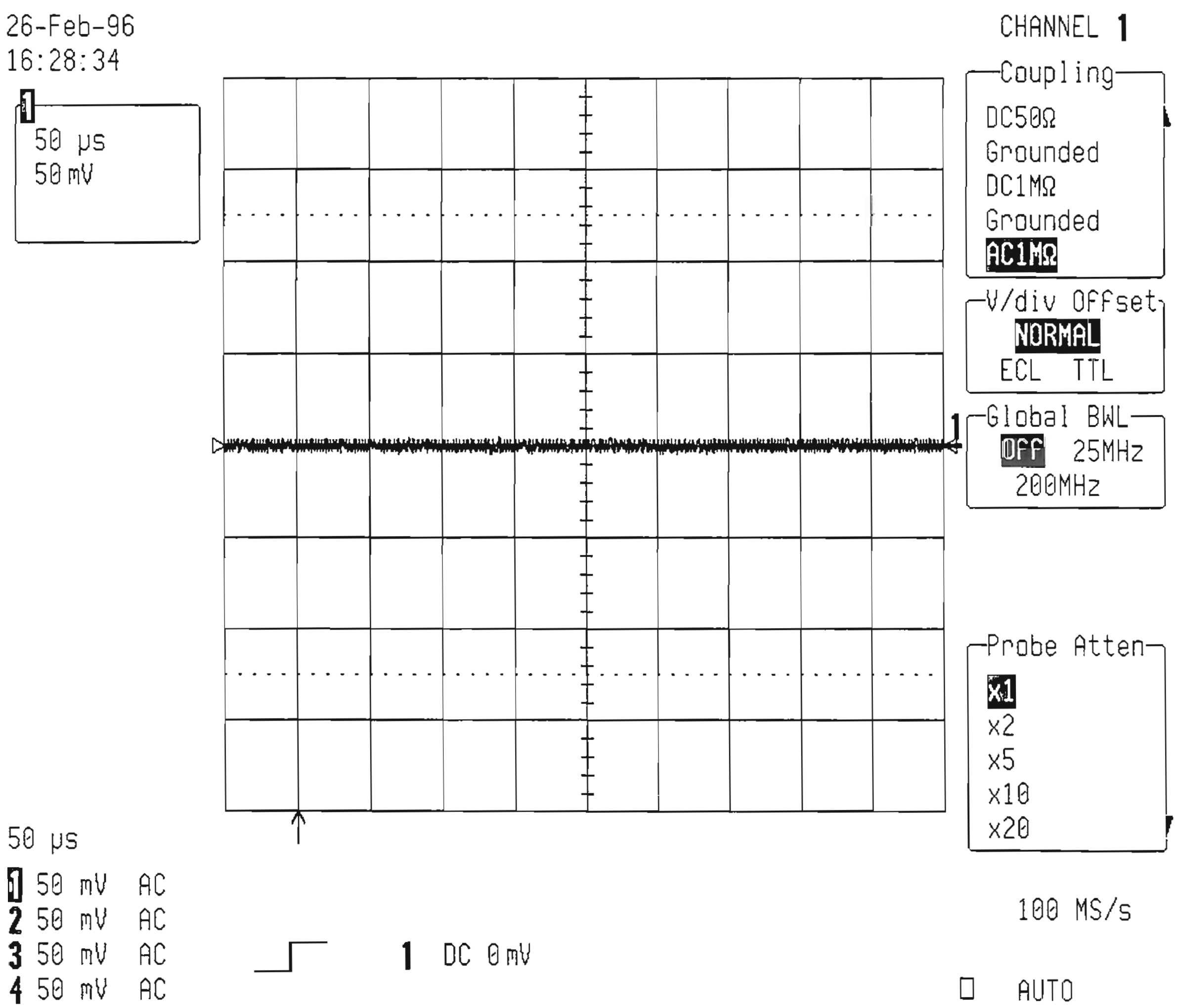
- Set DSO Channel 1 : **On**
- Input Coupling : **DC 1 MΩ**
- Input gain : **50 mV/div.**
- Trigger on : **Channel 1**
- Trigger mode : **Auto**
- Time base : **50 µsec/div.**



- Measure the impedance using a DMM with sense : must be **1.00 MΩ ± 1%**.
- Repeat the above test for input volt/div. of **200 mV**.

5.4.1.b AC 1MΩ

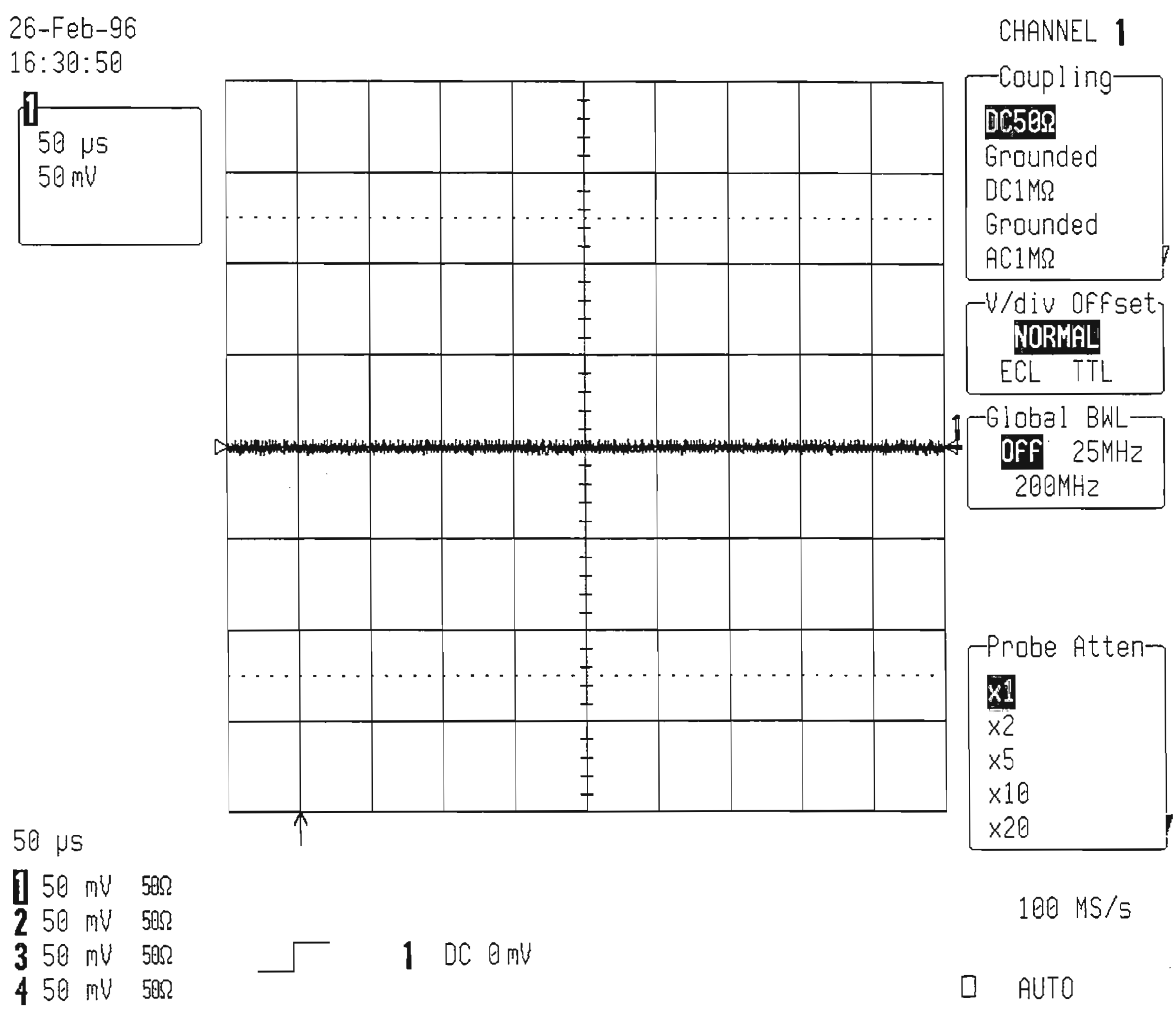
- Set DSO Channel 1 : **On**
- Input Coupling : **AC 1 MΩ**
- Input gain : **50 mV/div.**
- Trigger on : **Channel 1**
- Trigger mode : **Auto**
- Time base : **50 µsec/div.**



- Measure the impedance using a DMM with sense : must be **1.11 MΩ ± 2%.**
- Repeat the test for input volt/div. of **200 mV**, the impedance must be **1.00 MΩ ± 2%.**

5.4.1.c DC 50Ω

- Set DSO Channel 1 : **On**
- Input Coupling : **DC 50Ω**
- Input gain : **50 mV/div.**
- Trigger on : **Channel 1**
- Trigger mode : **Auto**
- Time base : **50 µsec/div.**

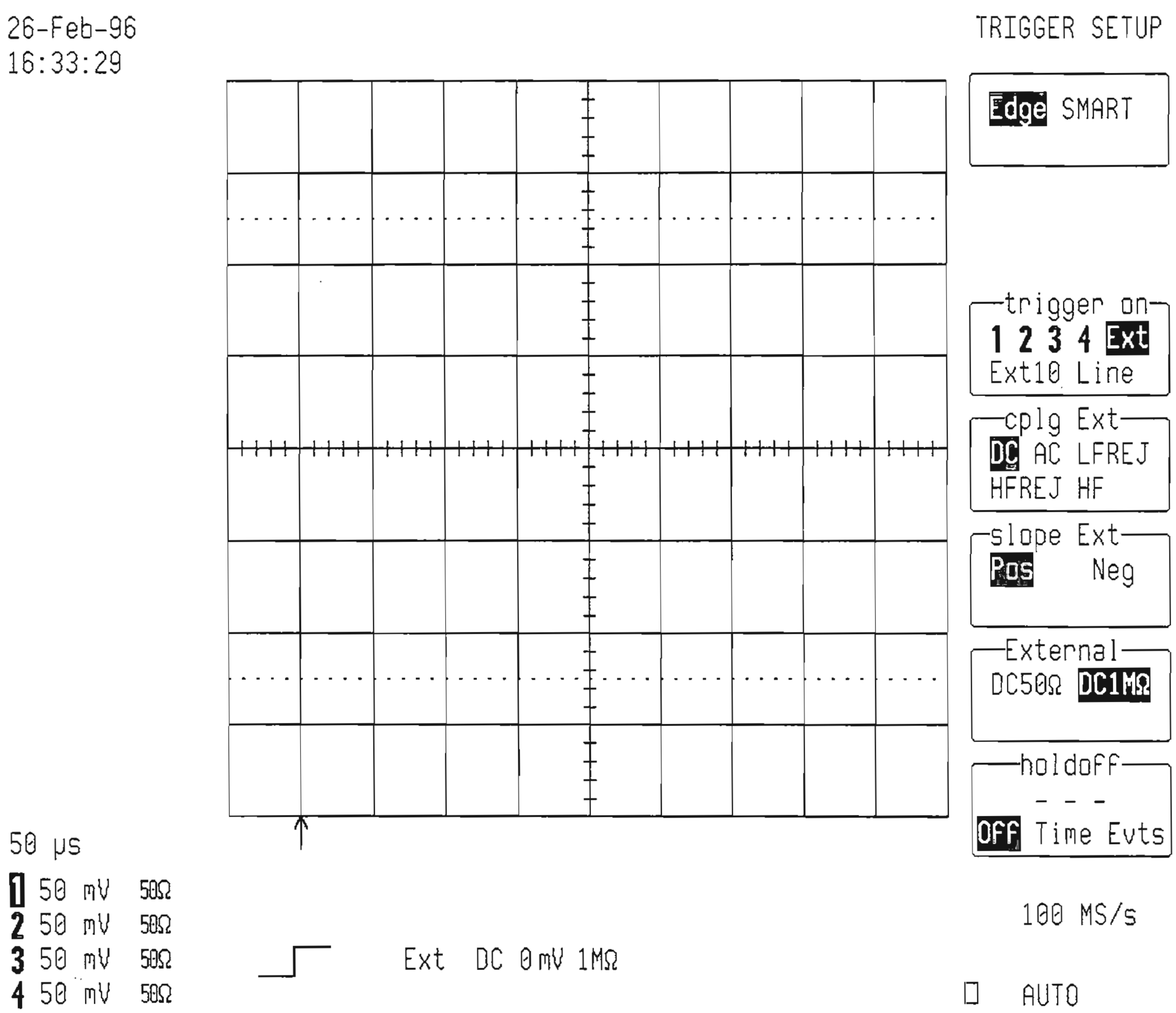


- Measure the impedance using a high precision DMM with sense : must be **50 Ω ± 1%**
- Repeat the above test for input volt/div. of **200 mV**.
- Repeat steps 5.4.1.a, 5.4.1.b and 5.4.1.c for Channel 2, Channel 3 and Channel 4.

5.4.2 External Trigger Input Impedance

5.4.2.a DC 1MΩ

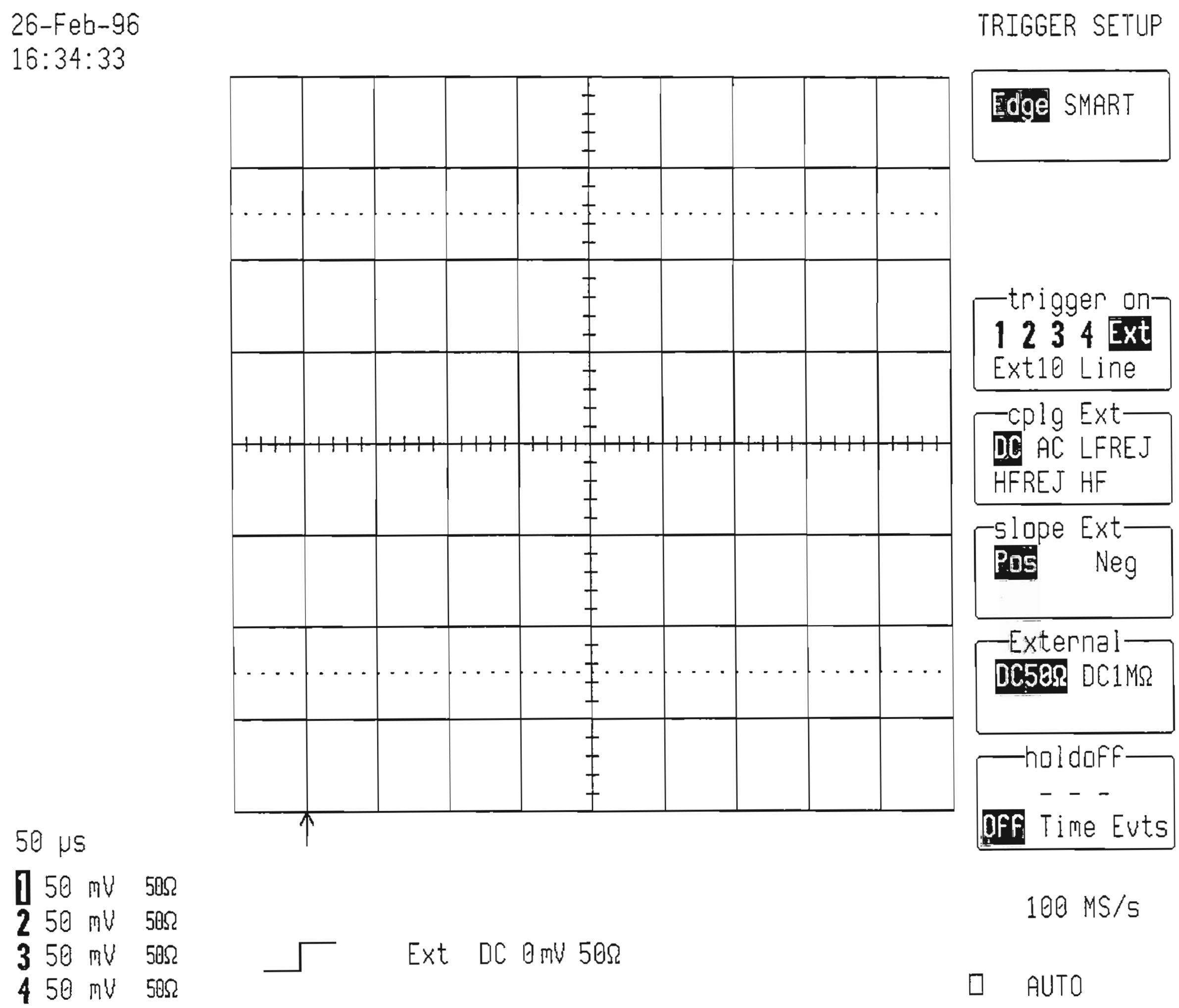
- Set Trigger on : **EXT**
- Trigger mode : **Auto**
- Coupling Ext : **DC**
- External : **DC 1MΩ**
- Time base : **50 µsec/div.**



- Measure the impedance using a high precision DMM : must be **1.00 MΩ ±1%.**

5.4.2.b DC 50Ω

- Set Trigger on : **EXT**
- Trigger mode : **Auto**
- Coupling Ext : **DC**
- External : **DC 50Ω**
- Time base : **50 µsec/div.**

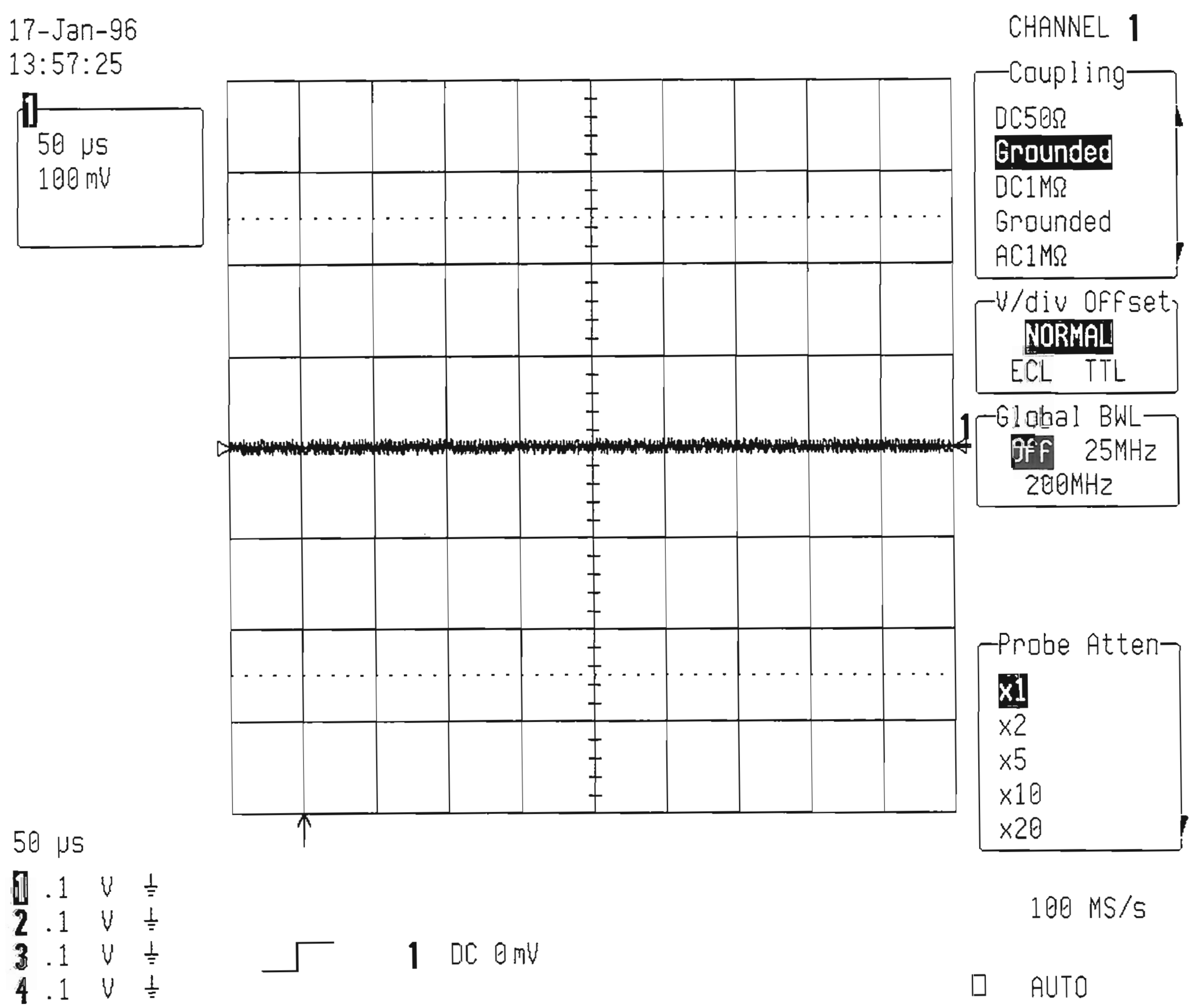


- Measure the impedance using a high precision DMM with sense : must be **50 Ω ± 1%**.
- Repeat steps 5.4.2.a, for Ext/10, and check as above.

5.4.3 Internal Protective Resistor Verification

With any time base and gain, set DSO as follows :

- Input Coupling : **Grounded**
- Check with a high precision DMM : input impedance must be **1 MΩ ± 2%**.



- Repeat the above test for Channel 2, Channel 3 and Channel 4.

5.5 Leakage Current

Specifications

DC 1 MΩ, AC 1 MΩ, DC 50 Ω : ± 1 mV

5.5.1 Procedure

The leakage current is tested by measuring the voltage across the input of each channel.

- Set DSO Ch1 : **On**
- Input Coupling : **DC 50Ω**
- Input gain : **50 mV/div.**
- Trigger on : **Channel 1**
- Trigger mode : **Auto**
- Time base : **10 μsec**

- Connect a high precision DMM to Channel 1, and verify that the reading is not larger than ± **1 mV**.

- Repeat the above test for input volt/div. of **200 mV**.

- Repeat the procedure for **1MΩ DC** and **1MΩ AC**.

- Repeat step 5.5.1 for Channel 2, Channel 3, Channel 4 and External .

5.6 Average Noise Level

Description

The 9374/M/L/TM inputs average noise level is tested at 10 mV/div., with 0 mV offset. This is to verify the proper operation of the main board, front-end and ADC's.
The scope parameters functions are used to measure the RMS and Peak amplitude of the noise.

5.6.1 Peak to Peak Noise

Specifications

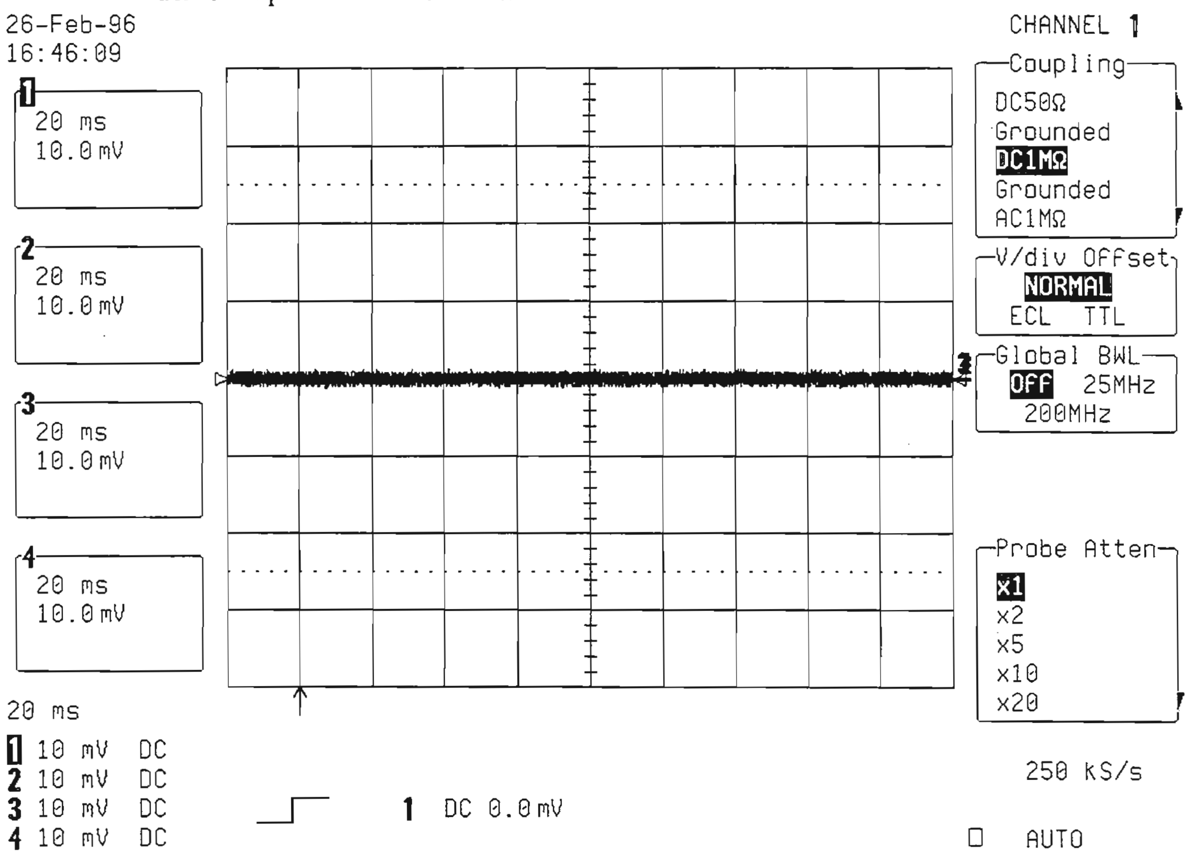
< ± 7.2 mV Peak to Peak at 10 mV/div.

5.6.1.a DC 1MΩ

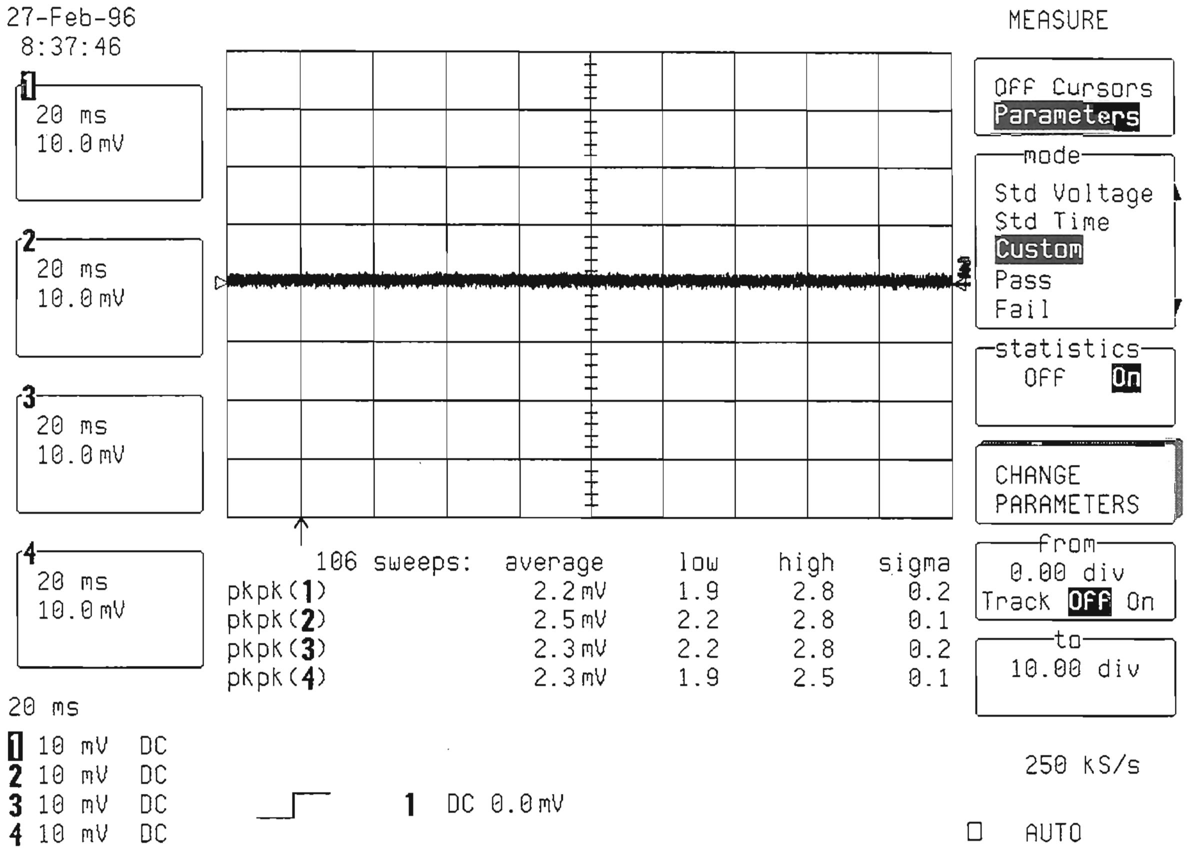
Procedure

- With no signal connected to the inputs, set 9374/M/L/TM DSO settings as follows :
- Turn on traces : **Ch1, Ch2, Ch3, Ch4**
- Display setup : **Standard, Dot Join on, Persistence off, Single grid**

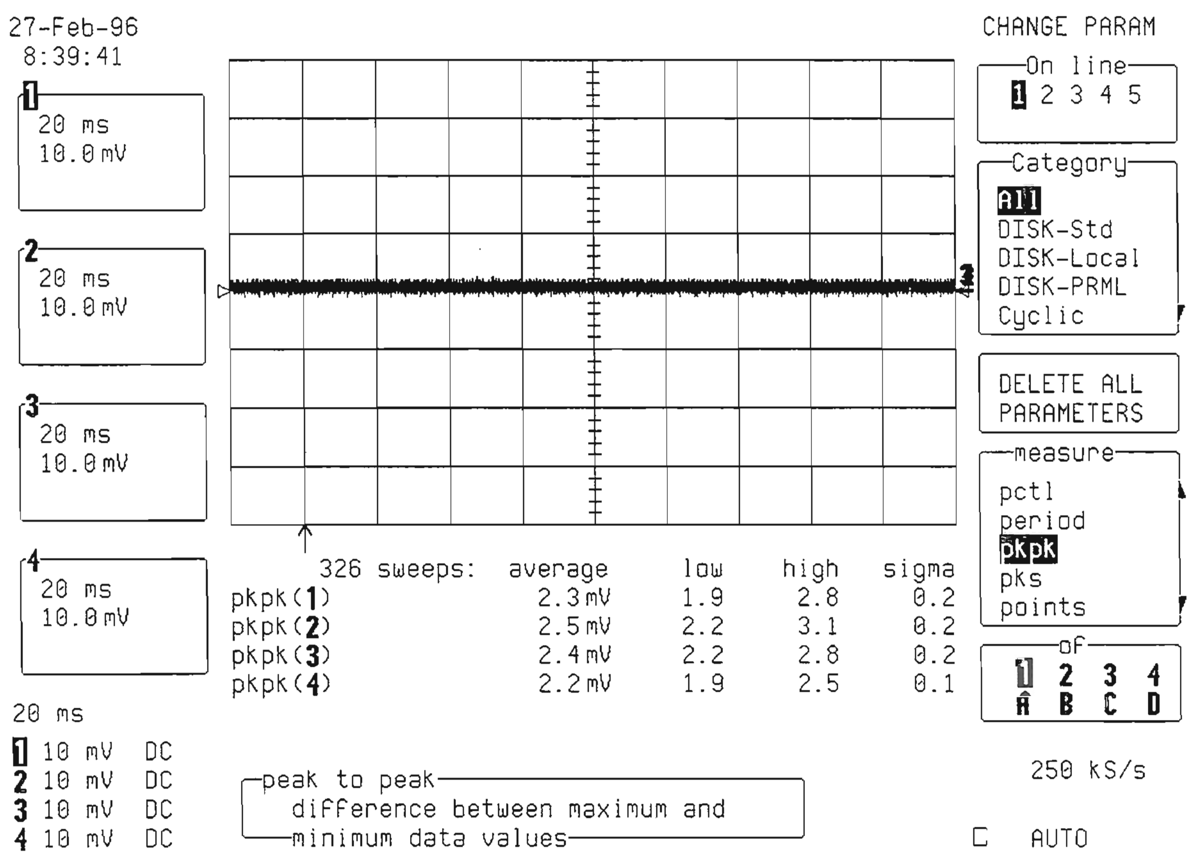
- Input Coupling : **DC 1MΩ**
- V/div. offset : **Normal**
- Probe atten : **X1**
- Global BWL : **Off**
- Input gain : **10 mV/div.**
- Trigger setup : **Edge**
- Trigger on : **1**
- Coupling 1 : **DC**
- Slope 1 : **Pos**
- Holdoff : **Off**
- Trigger Mode : **Auto**
- Timebase : **20 msec/div.**
- Channel use : **4**
- Record up : **50 K**



- Press : **Cursors/Measure**
- Measure : **Parameters**
- Mode : **Custom**
- Statistics : **On**
- Change parameters
- Category : **All**
- On line 1 : **Measure pkpk of Ch1**
- On line 2 : **Measure pkpk of Ch2**
- On line 3 : **Measure pkpk of Ch3**
- On line 4 : **Measure pkpk of Ch4**



27-Feb-96
8:37:46
20 ms
10.0 mV
MEASURE
Off Cursors
Parameters
mode
Std Voltage
Std Time
Custom
Pass
Fail
statistics
Off On
CHANGE PARAMETERS
from
0.00 div
Track Off On
to
10.00 div
106 sweeps: average low high sigma
pkpk(1) 2.2 mV 1.9 2.8 0.2
pkpk(2) 2.5 mV 2.2 2.8 0.1
pkpk(3) 2.3 mV 2.2 2.8 0.2
pkpk(4) 2.3 mV 1.9 2.5 0.1
20 ms
1 10 mV DC
2 10 mV DC
3 10 mV DC
4 10 mV DC
1 DC 0.0 mV
250 kS/s
AUTO



27-Feb-96
8:39:41
20 ms
10.0 mV
CHANGE PARAM
On line
1 2 3 4 5
Category
All
DISK-Std
DISK-Local
DISK-PRML
Cyclic
DELETE ALL PARAMETERS
measure
pctl
period
pkpk
pks
points
of
1 2 3 4
A B C D
326 sweeps: average low high sigma
pkpk(1) 2.3 mV 1.9 2.8 0.2
pkpk(2) 2.5 mV 2.2 3.1 0.2
pkpk(3) 2.4 mV 2.2 2.8 0.2
pkpk(4) 2.2 mV 1.9 2.5 0.1
20 ms
1 10 mV DC
2 10 mV DC
3 10 mV DC
4 10 mV DC
peak to peak
difference between maximum and
minimum data values
250 kS/s
AUTO

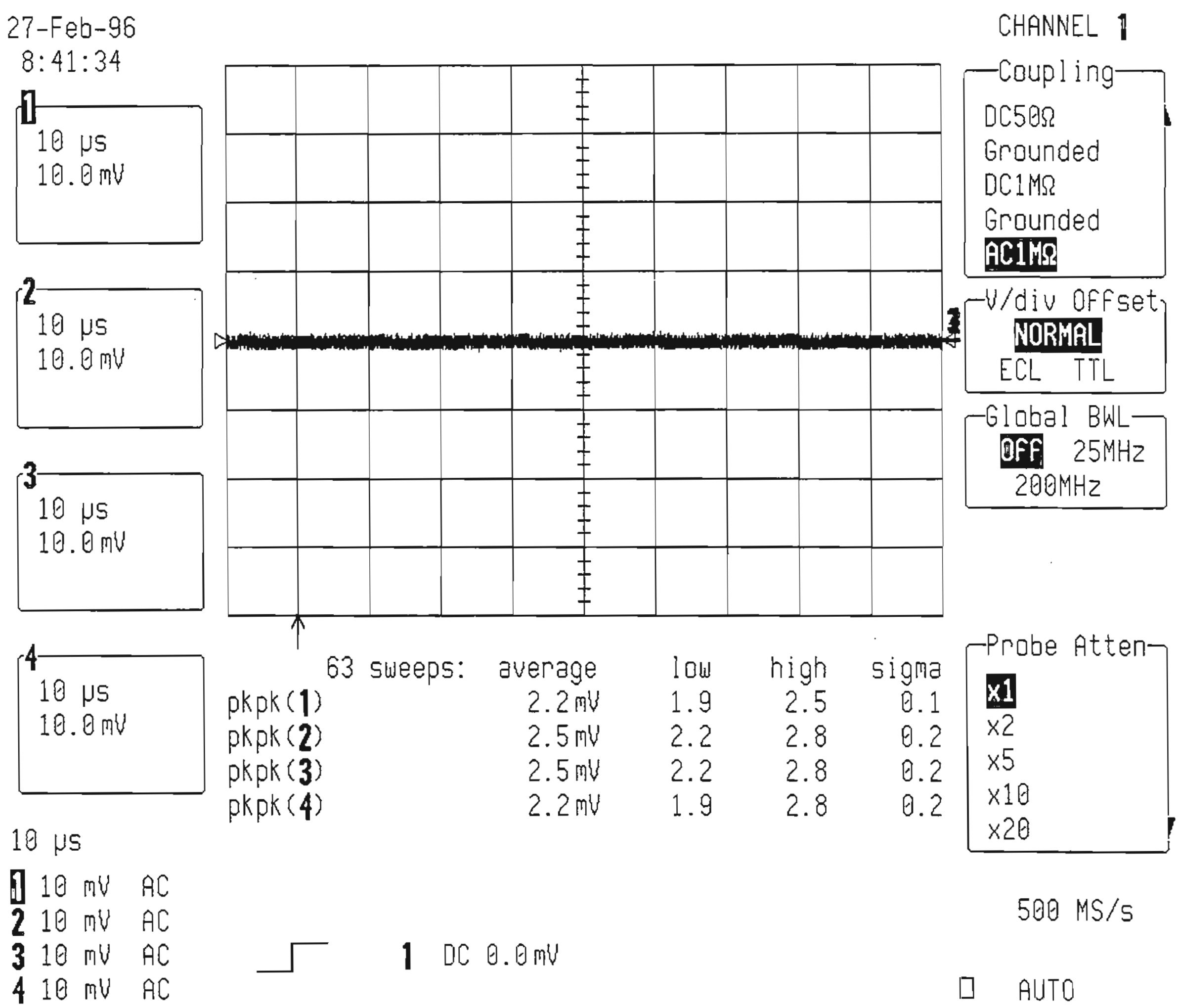
- Check after at least 50 sweeps that : high pkpk readout is less than ± **7.2 mV**, corresponding to **9% of full scale**.

- Repeat the test for Timebase : **1 msec/div**, **50 µsec/div**, and **10 µsec/div.** and check as above.

5.6.1.b AC 1MΩ

- Select Ch1, Ch2, Ch3 & Ch4 : **AC 1MΩ**
- Input gain : **10 mV/div.**
- Timebase : **10 µsec/div.**

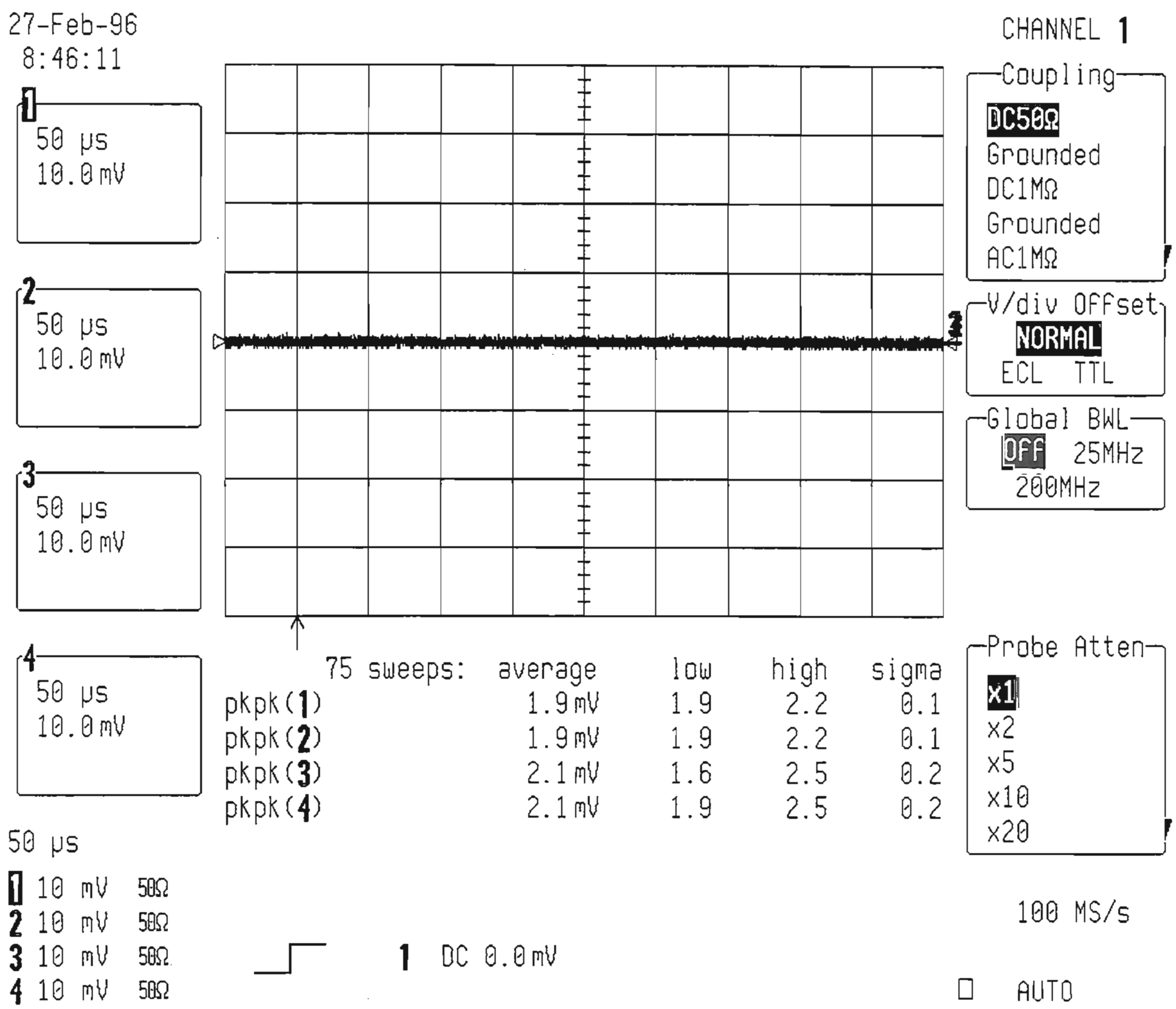
- Check after at least 50 sweeps that the high pkpk readout is less than ± **7.2 mV**, corresponding to **9% of full scale**.



5.6.1.c DC 50Ω

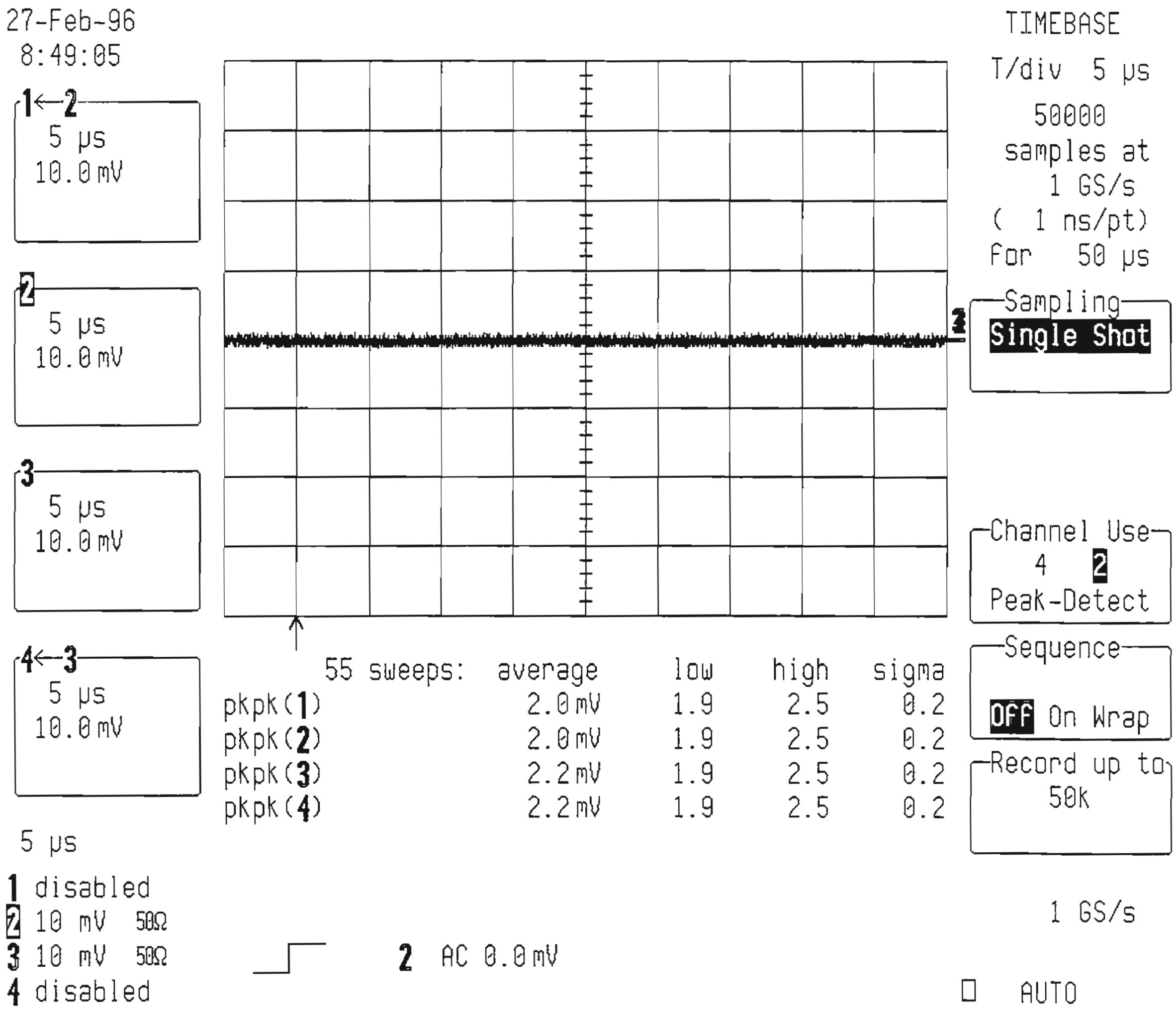
- Select Ch1, Ch2, Ch3 & Ch4 : **DC 50Ω**
- Input gain : **10 mV/div.**
- Set Timebase : **50 µsec/div.**

- Check after at least 50 sweeps that the high pkpk readout is less than ± **7.2 mV**, corresponding to **9% of full scale**.



- Repeat the tests for Timebase : **10 µsec/div** and check as above.

- Select : **Timebase Setup**
- Select Channel use : **2**
- Set Timebase : **5 µsec/div.**



- Check after at least 50 sweeps that the high pkpk readout is less than ± **7.2 mV**, corresponding to **9% of full scale**.

5.6.2 Rms Noise

Specifications

< ± 720 µV at 10 mV/div.

5.6.2.a DC 1MΩ

Procedure

- With no signal connected to the inputs, set 9374/M/L/TM DSO settings as follows :

- Turn on traces : **Ch1, Ch2, Ch3 & Ch4**
- Display setup : **Standard, Dot Join on, Persistence off, Single grid**
- Input Coupling : **DC 1MΩ**
- V/div. offset : **Normal**
- Probe atten : **X1**
- Global BWL : **Off**
- Input gain : **10 mV/div.**
- Trigger setup : **Edge**
- Trigger on : **1**
- Coupling 1 : **DC**
- Slope 1 : **Pos**
- Holdoff : **Off**
- Trigger Mode : **Auto**
- Timebase : **20 msec/div.**
- Channel use : **4**
- Record up : **50 K**

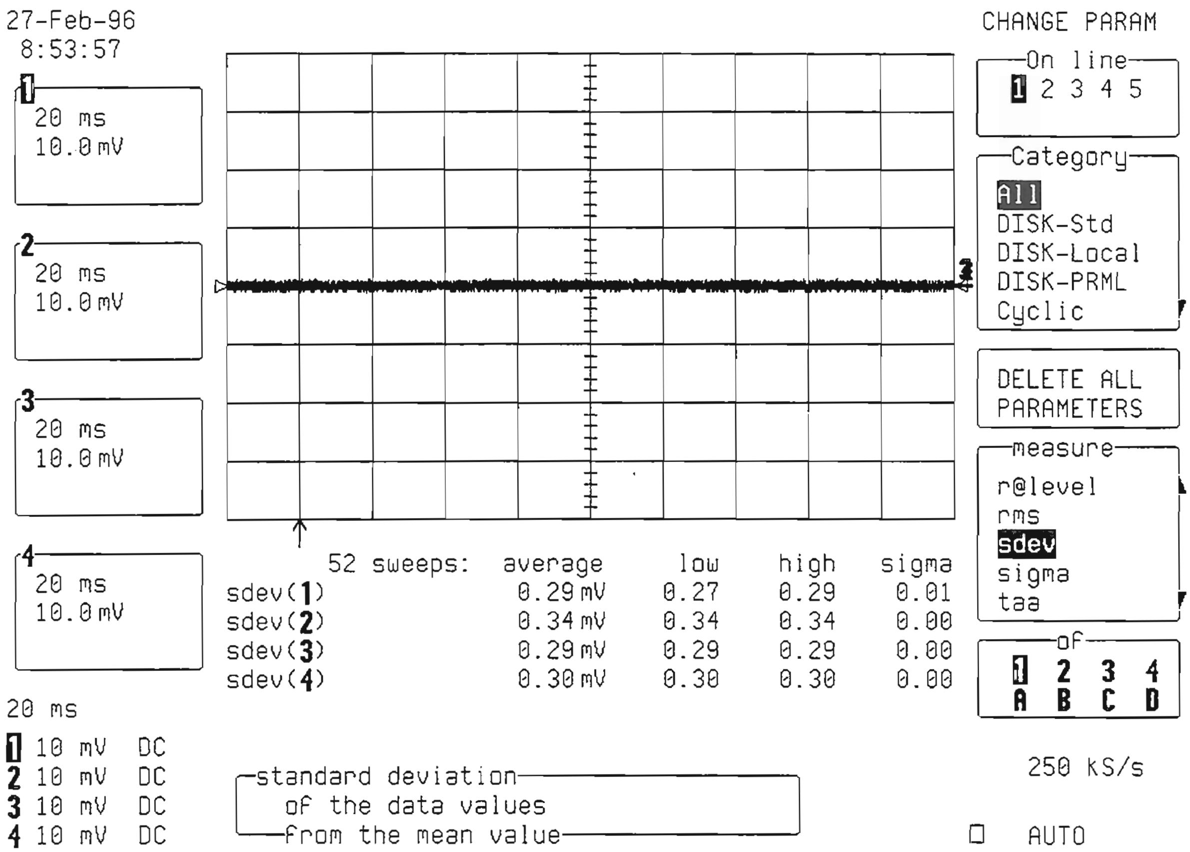
- Press : **Cursors/Measure**
- Measure : **Parameters**
- Mode : **Custom**
- Statistics : **On**

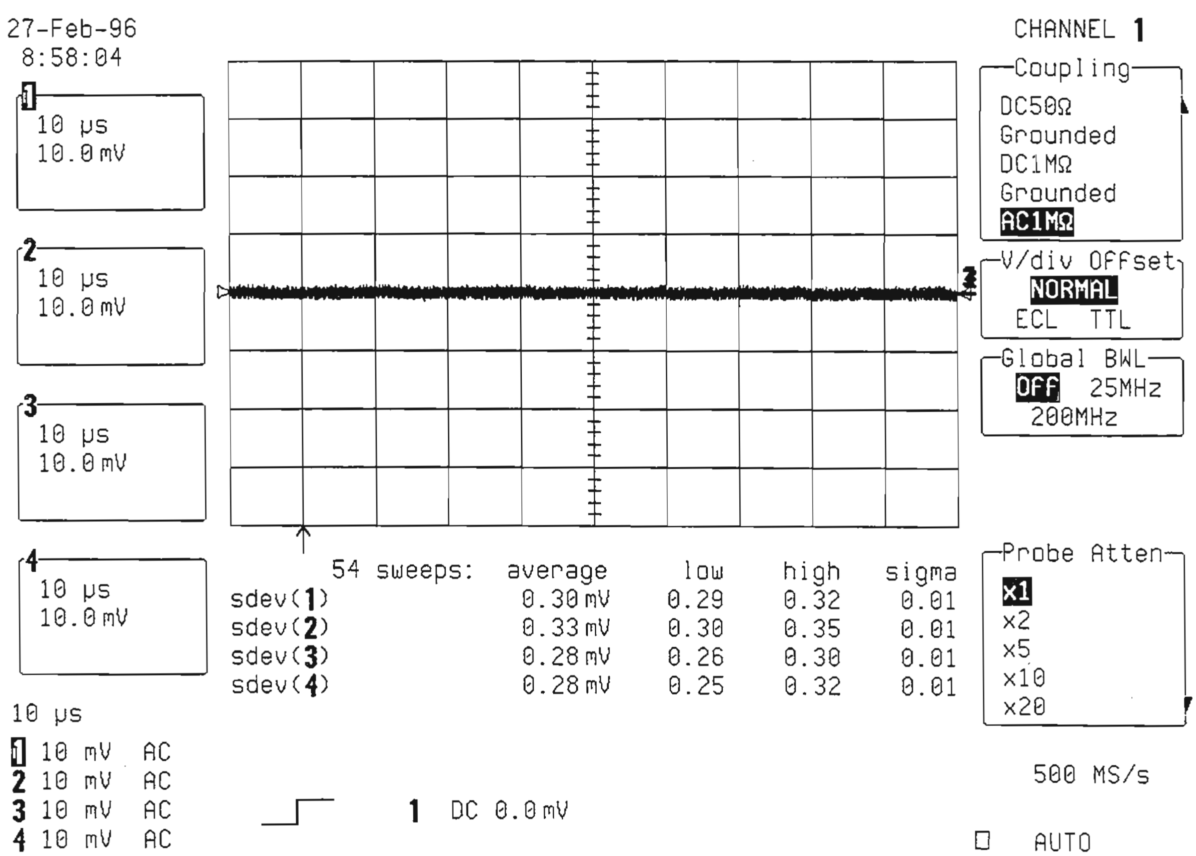
- Change parameters

- On line 1 : **Measure sdev of Ch1**
- On line 2 : **Measure sdev of Ch2**
- On line 3 : **Measure sdev of Ch3**
- On line 4 : **Measure sdev of Ch4**

- Check after at least 50 sweeps that : high sdev readout is less than ± **720** µ**V**, corresponding to **0.9% of full scale**.

- Repeat the test for Timebase : **1 msec/div**, **50** µ**sec/div**, and **10** µ**sec/div.** and check as above.


27-Feb-96
8:53:57
CHANGE PARAM
On line
1 2 3 4 5
Category
All
DISK-Std
DISK-Local
DISK-PRML
Cyclic
DELETE ALL PARAMETERS
measure
r@level
rms
sdev
sigma
taa
of
1 2 3 4
A B C D
1 20 ms 10.0 mV
2 20 ms 10.0 mV
3 20 ms 10.0 mV
4 20 ms 10.0 mV
52 sweeps: average low high sigma
sdev(1) 0.29 mV 0.27 0.29 0.01
sdev(2) 0.34 mV 0.34 0.34 0.00
sdev(3) 0.29 mV 0.29 0.29 0.00
sdev(4) 0.30 mV 0.30 0.30 0.00
20 ms
1 10 mV DC
2 10 mV DC
3 10 mV DC
4 10 mV DC
standard deviation of the data values from the mean value
250 kS/s
AUTO


27-Feb-96
8:58:04
CHANNEL 1
Coupling
DC50Ω
Grounded
DC1MΩ
Grounded
AC1MΩ
V/div Offset
NORMAL
ECL TTL
Global BWL
Off 25MHz
200MHz
1 10 µs 10.0 mV
2 10 µs 10.0 mV
3 10 µs 10.0 mV
4 10 µs 10.0 mV
54 sweeps: average low high sigma
sdev(1) 0.30 mV 0.29 0.32 0.01
sdev(2) 0.33 mV 0.30 0.35 0.01
sdev(3) 0.28 mV 0.26 0.30 0.01
sdev(4) 0.28 mV 0.25 0.32 0.01
Probe Atten
x1
x2
x5
x10
x20
10 µs
1 10 mV AC
2 10 mV AC
3 10 mV AC
4 10 mV AC
1 DC 0.0 mV
500 MS/s
AUTO

5.6.2.b AC 1MΩ

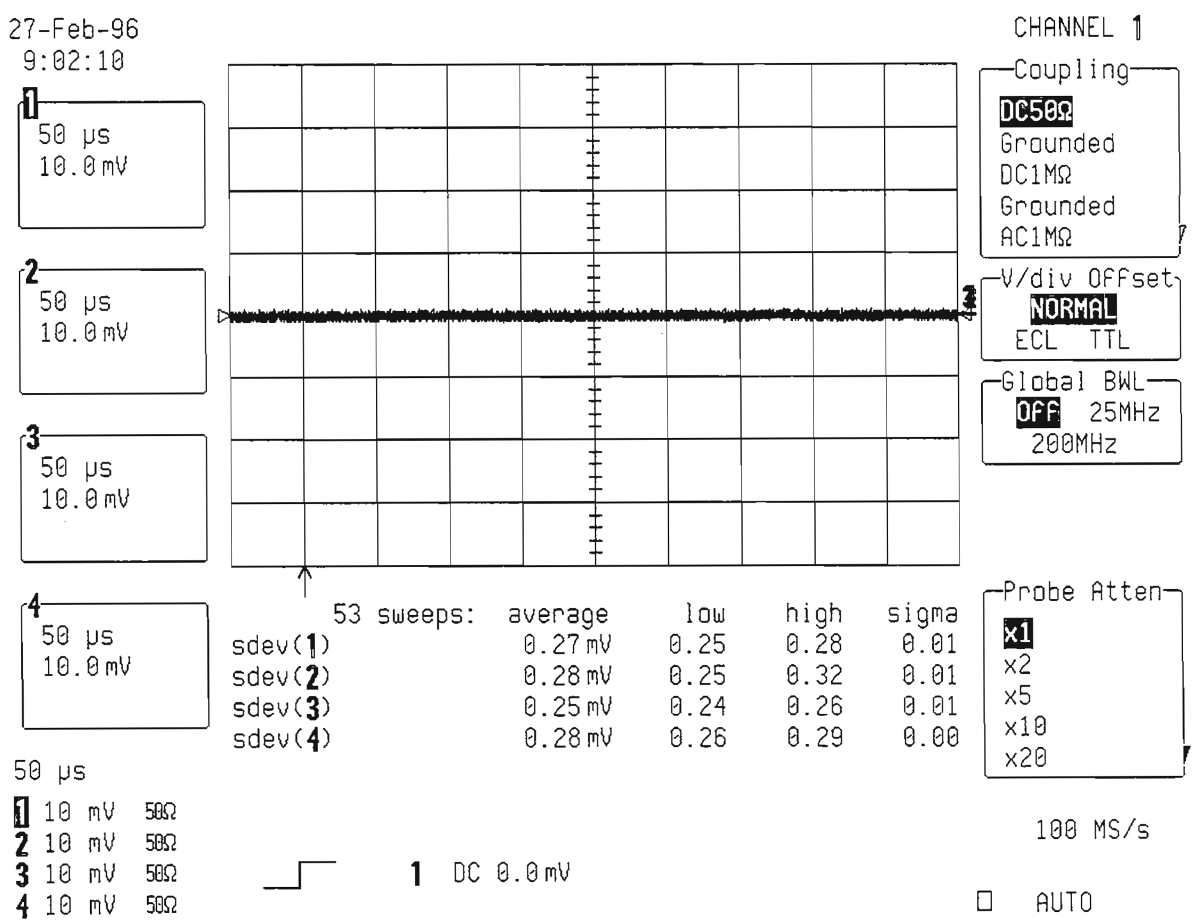
- Select Ch1, Ch2, Ch3 & Ch4 : **AC 1MΩ**
- Input gain : **10 mV/div.**
- Timebase : **10 μsec/div.**

- Check after at least 50 sweeps that the high Sdev readout is less than ± **720 μV**, corresponding to **0.9% of full scale.**

5.6.2.c DC 50Ω

- Select Ch1, Ch2, Ch3 & Ch4 : **DC 50Ω**
- Input gain : **10 mV/div.**
- Set Timebase : **50 μsec/div.**

- Check after at least 50 sweeps that the high Sdev readout is less than ± **720 μV**, corresponding to **0.9% of full scale.**



- Repeat the tests for Timebase : **10 μsec/div** and check as above.

5.6.3 Inputs Grounded

With no cable plugged into scope, set the DSO as follows :

- Turn on trace : **Channel 1, Channel 2, Channel 3 & Channel 4**
- Input Coupling : **DC 50Ω**
- Input gain : **10 mV/div.**
- Offset : **Zero**
- Trigger on : **Channel 1, DC**
- Trigger mode : **Auto**
- Timebase : **10 µsec/div.**
- Channel use : **4**
- Record up : **50 K**
- Turn off trace : **Channel 1, Channel 2, Channel 3 & Channel 4**

- Turn on trace : **A, B, C, D**
- Select Math Setup
- For Math : **Use at most 5000 points**
- Redefine A, B, C, D : **Channel 1, Channel 2, Channel 3 & Channel 4**
- Use Math ? : **Yes**
- Math Type : **Average**
- Avg Type : **Summed**
- For : **1000 sweeps**

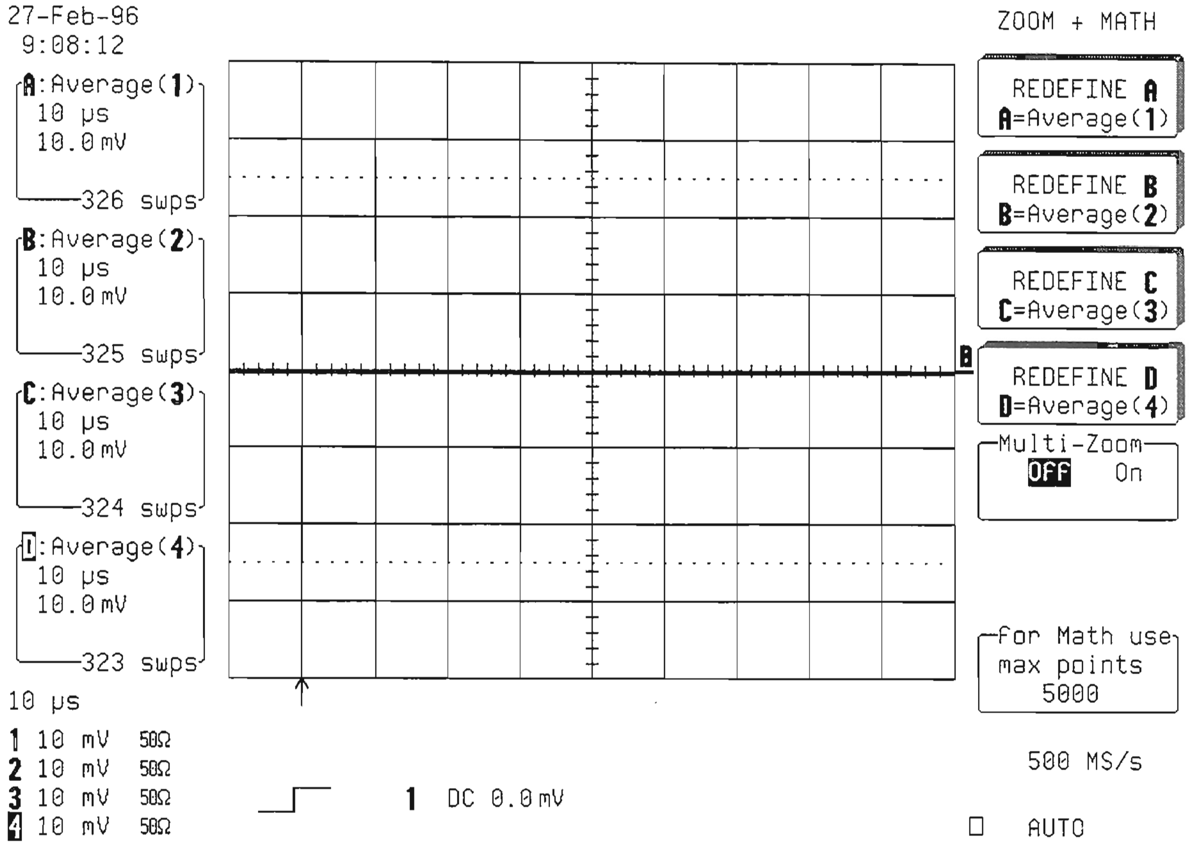
- Cursors/Measure : **Parameters**
- Mode : **Custom**
- Statistics : **off**
- Change parameters
- On line 1 : **Measure mean of A**
- On line 2 : **Measure mean of B**
- On line 3 : **Measure mean of C**
- On line 4 : **Measure mean of D**

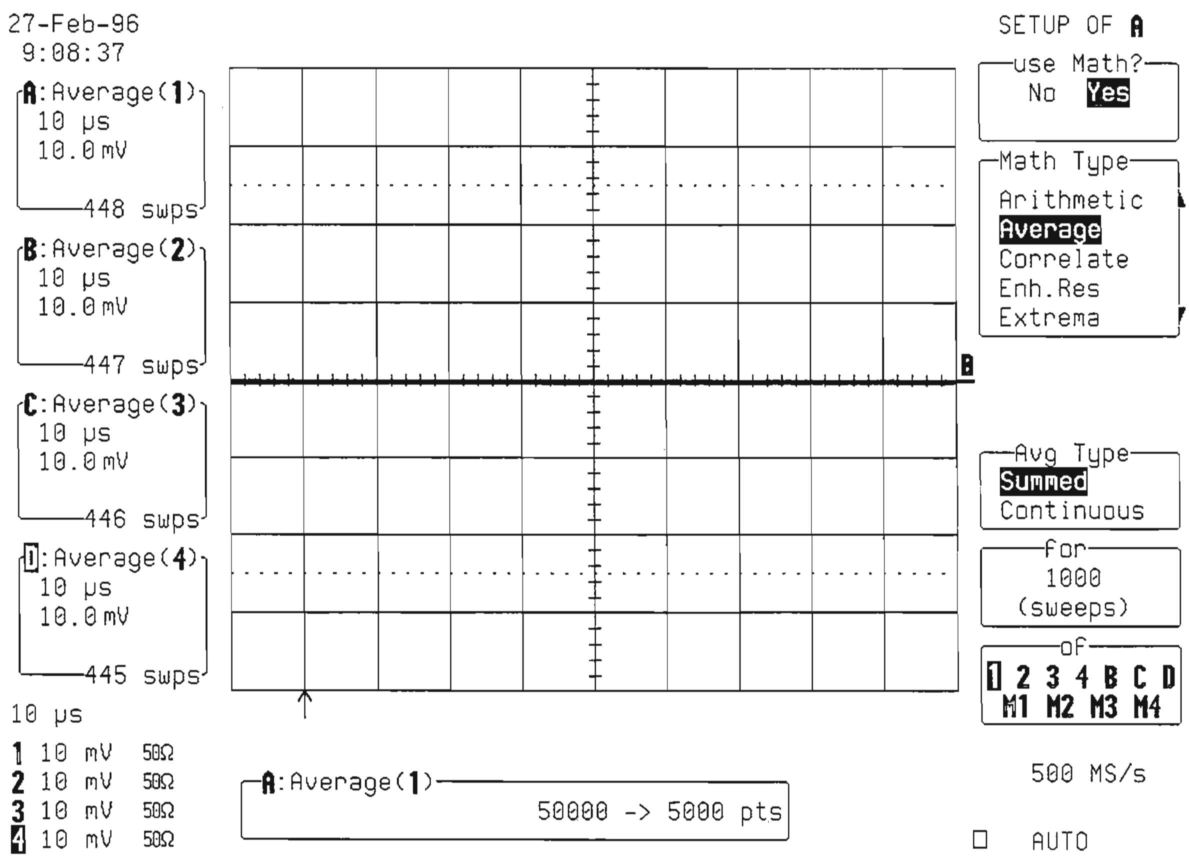
- Check after at least 100 sweeps that the **mean** value of **A, B, C & D** is less than **±1.6 mV,** corresponding to ± 2% of full scale.

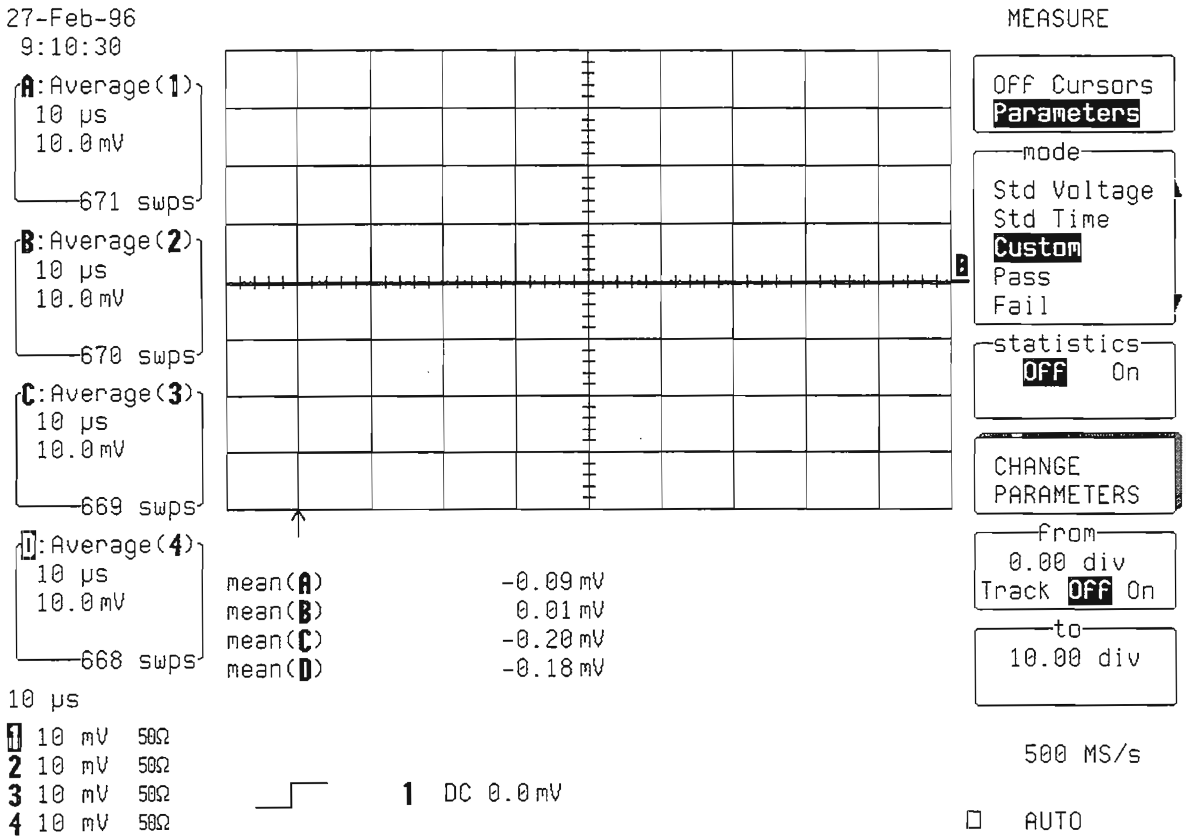
- Switch Channel 1, Channel 2, Channel 3 & Channel 4 between coupling **DC 50Ω** and **Grounded**.
- Check after at least 100 sweeps that the **mean** value of **A, B, C & D** is less than **±1.6 mV,** corresponding to ± 2% of full scale.

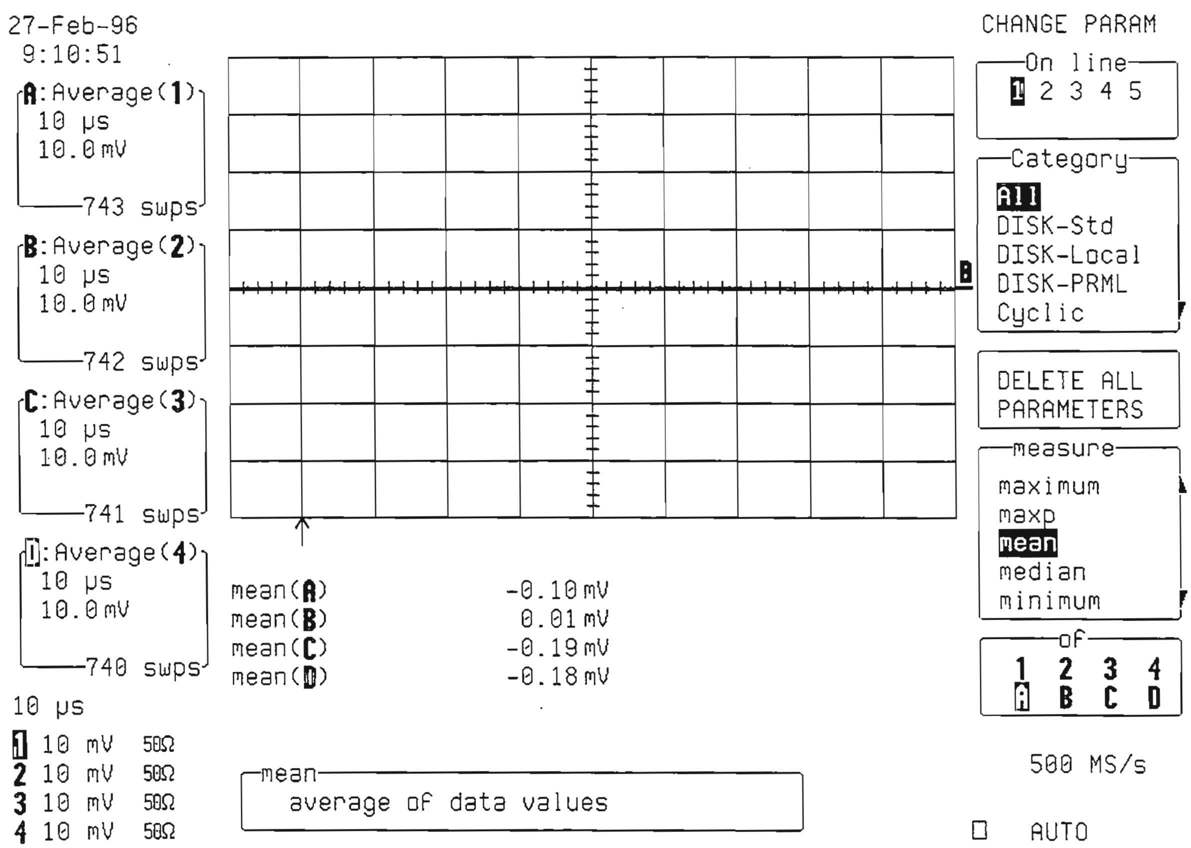
- Set coupling all Channel : **DC 1MΩ**
- Check after at least 100 sweeps that the **mean** value of **A, B, C & D** is less than **±1.6 mV,** corresponding to ± 2% of full scale.

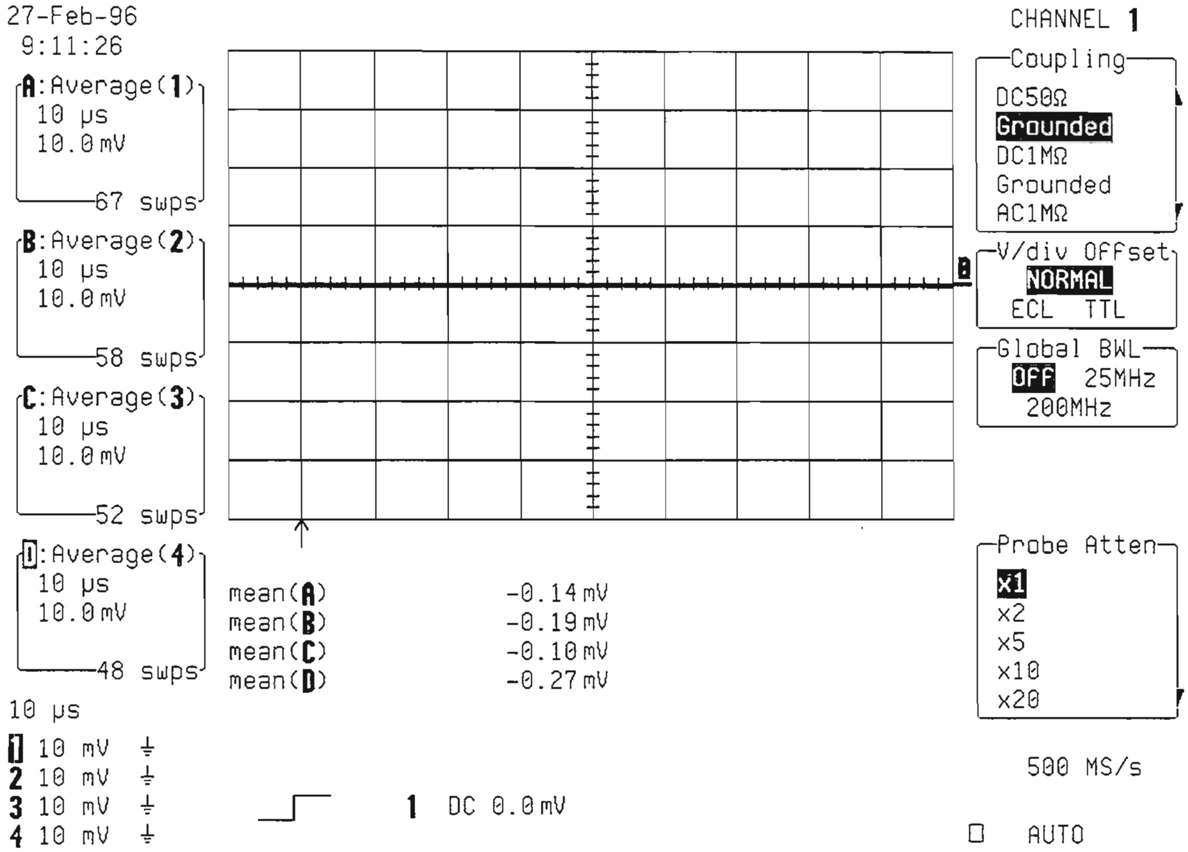
- Switch all Channel between coupling **DC 1MΩ and Grounded**.
- Check after at least 100 sweeps that the **mean** value of **A, B, C & D** is less than **±1.6 mV,** corresponding to ± 2% of full scale.

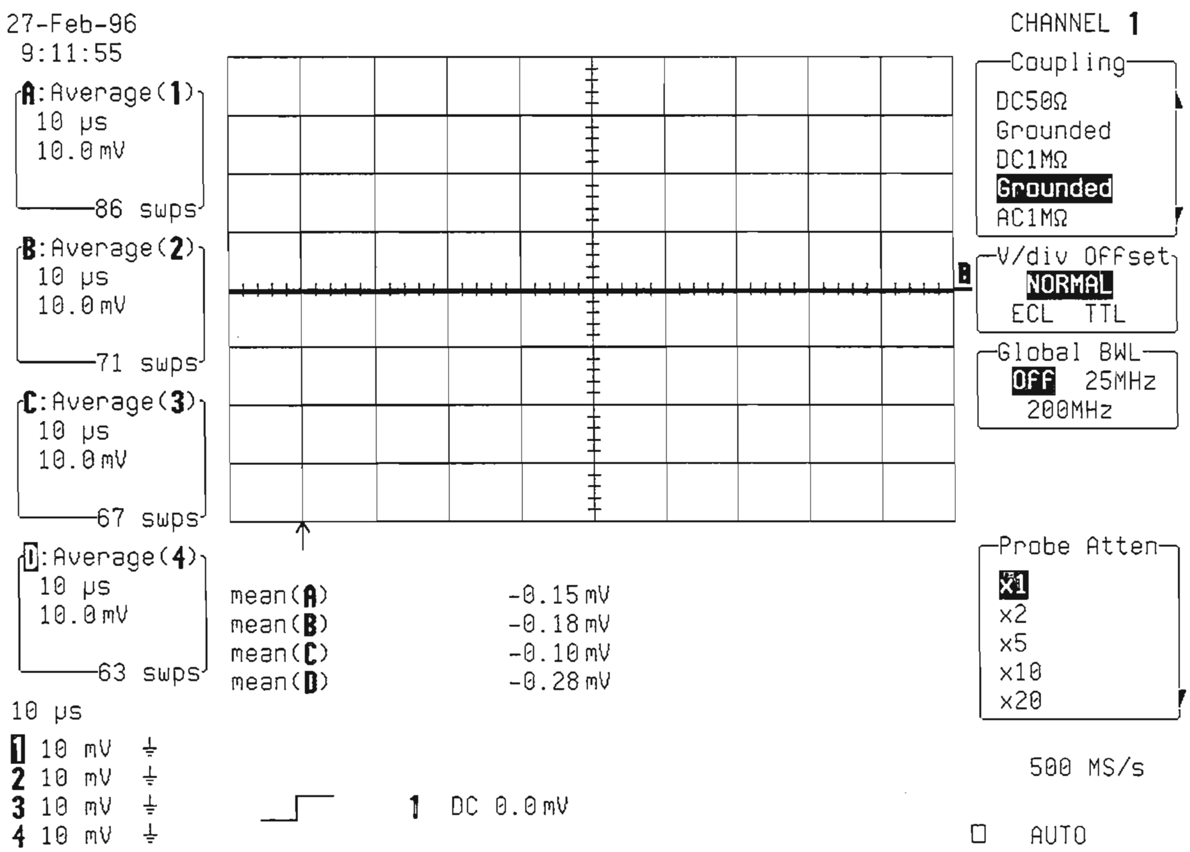

27-Feb-96
9:08:12
A:Average(1)
10 µs
10.0 mV
326 swps
B:Average(2)
10 µs
10.0 mV
325 swps
C:Average(3)
10 µs
10.0 mV
324 swps
D:Average(4)
10 µs
10.0 mV
323 swps
10 µs
1 10 mV 50Ω
2 10 mV 50Ω
3 10 mV 50Ω
4 10 mV 50Ω
1 DC 0.0 mV
ZOOM + MATH
REDEFINE A
A=Average(1)
REDEFINE B
B=Average(2)
REDEFINE C
C=Average(3)
REDEFINE D
D=Average(4)
Multi-Zoom
Off On
for Math use
max points
5000
500 MS/s
AUTO


27-Feb-96
9:08:37
A:Average(1)
10 µs
10.0 mV
448 swps
B:Average(2)
10 µs
10.0 mV
447 swps
C:Average(3)
10 µs
10.0 mV
446 swps
D:Average(4)
10 µs
10.0 mV
445 swps
10 µs
1 10 mV 50Ω
2 10 mV 50Ω
3 10 mV 50Ω
4 10 mV 50Ω
A:Average(1)
50000 -> 5000 pts
SETUP OF A
use Math?
No Yes
Math Type
Arithmetic
Average
Correlate
Enh.Res
Extrema
Avg Type
Summed
Continuous
for
1000
(sweeps)
of
1 2 3 4 B C D
M1 M2 M3 M4
500 MS/s
AUTO


27-Feb-96
9:10:30
A:Average(1)
10 µs
10.0 mV
671 swps
B:Average(2)
10 µs
10.0 mV
670 swps
C:Average(3)
10 µs
10.0 mV
669 swps
D:Average(4)
10 µs
10.0 mV
668 swps
10 µs
1 10 mV 50Ω
2 10 mV 50Ω
3 10 mV 50Ω
4 10 mV 50Ω
mean(A) -0.09 mV
mean(B) 0.01 mV
mean(C) -0.20 mV
mean(D) -0.18 mV
1 DC 0.0 mV
MEASURE
Off Cursors
Parameters
mode
Std Voltage
Std Time
Custom
Pass
Fail
statistics
Off On
CHANGE PARAMETERS
from
0.00 div
Track Off On
to
10.00 div
500 MS/s
AUTO


27-Feb-96
9:10:51
A:Average(1)
10 µs
10.0 mV
743 swps
B:Average(2)
10 µs
10.0 mV
742 swps
C:Average(3)
10 µs
10.0 mV
741 swps
D:Average(4)
10 µs
10.0 mV
740 swps
10 µs
1 10 mV 50Ω
2 10 mV 50Ω
3 10 mV 50Ω
4 10 mV 50Ω
mean(A) -0.10 mV
mean(B) 0.01 mV
mean(C) -0.19 mV
mean(D) -0.18 mV
mean
average of data values
CHANGE PARAM
On line
1 2 3 4 5
Category
All
DISK-Std
DISK-Local
DISK-PRML
Cyclic
DELETE ALL PARAMETERS
measure
maximum
maxp
mean
median
minimum
of
1 2 3 4
A B C D
500 MS/s
AUTO


27-Feb-96
9:11:26
A: Average(1)
10 µs
10.0 mV
67 swps
B: Average(2)
10 µs
10.0 mV
58 swps
C: Average(3)
10 µs
10.0 mV
52 swps
D: Average(4)
10 µs
10.0 mV
48 swps
10 µs
1 10 mV
2 10 mV
3 10 mV
4 10 mV
mean(A) -0.14 mV
mean(B) -0.19 mV
mean(C) -0.10 mV
mean(D) -0.27 mV
1 DC 0.0 mV
CHANNEL 1
Coupling
DC50Ω
Grounded
DC1MΩ
Grounded
AC1MΩ
V/div Offset
NORMAL
ECL TTL
Global BWL
Off 25MHz
200MHz
Probe Atten
x1
x2
x5
x10
x20
500 MS/s
AUTO


27-Feb-96
9:11:55
A: Average(1)
10 µs
10.0 mV
86 swps
B: Average(2)
10 µs
10.0 mV
71 swps
C: Average(3)
10 µs
10.0 mV
67 swps
D: Average(4)
10 µs
10.0 mV
63 swps
10 µs
1 10 mV
2 10 mV
3 10 mV
4 10 mV
mean(A) -0.15 mV
mean(B) -0.18 mV
mean(C) -0.10 mV
mean(D) -0.28 mV
1 DC 0.0 mV
CHANNEL 1
Coupling
DC50Ω
Grounded
DC1MΩ
Grounded
AC1MΩ
V/div Offset
NORMAL
ECL TTL
Global BWL
Off 25MHz
200MHz
Probe Atten
x1
x2
x5
x10
x20
500 MS/s
AUTO

5.7 DC Linearity

Specification

≤ ± 5 % of full scale at 2mV/div, with 0 mV offset.
≤ ± 3 % of full scale at 5mV/div, with 0 mV offset.
≤ ± 2 % of full scale at 10mV/div and above.

5.7.1 Description

This test measures the DC Accuracy within the gain range specified.
The parameters Std voltage are used to measure the amplitude of the DC input signal.

5.7.1.a DC 50Ω

Procedure

- Turn on trace : **Ch1**
- Display setup : **Standard, Persistence off, Dot join on, Single grid**
- Input Coupling : **DC 50 Ω**
- V/div. offset : **Normal**
- Global BWL : **Off**
- Probe atten : **X1**
- Input offset : **0.0 mV**
- Input gain : **from 2mV/div to 5 V/div.** (see table 5-2 and 5-3)

- Trigger setup : **Edge**
- Trigger on : **1**
- Coupling 1 : **DC**
- Slope 1 : **Pos**
- Mode : **Auto**
- Holdoff : **Off**

- Timebase : **2 msec/div.**
- Channel use : **4**
- Record up : **50 K**

- Turn on trace : **A**
- Select Math Setup
- For Math : **Use at most 5000 points**
- Redefine A
- Use Math ? : **Yes**
- Math Type : **Average**
- Avg Type : **Summed**
- For : **1000 sweeps**
- Of : **Channel 1**

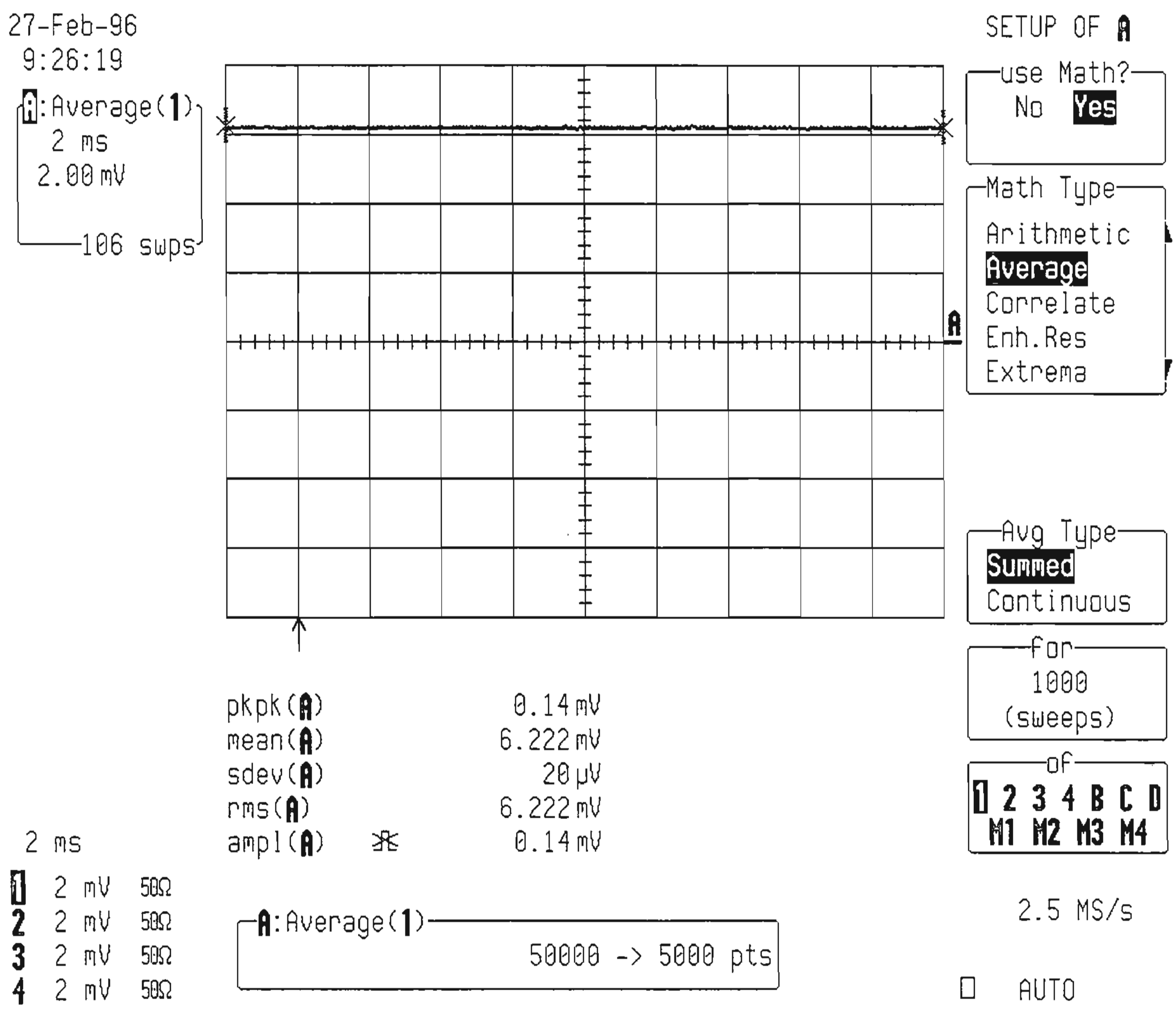
- Turn off trace : **Channel 1**

- Cursors/Measure : **Parameters**
- Mode : **Std Voltage**
- Statistics : **off**
- on displayed trace : **A**

5.7.1.a.1 Positive DC Linearity

- For the ranges **2 mV/div. to 1 V/div.**, from the high precision voltage source, apply to Channel 1 : **+ 3 major screen divisions**.

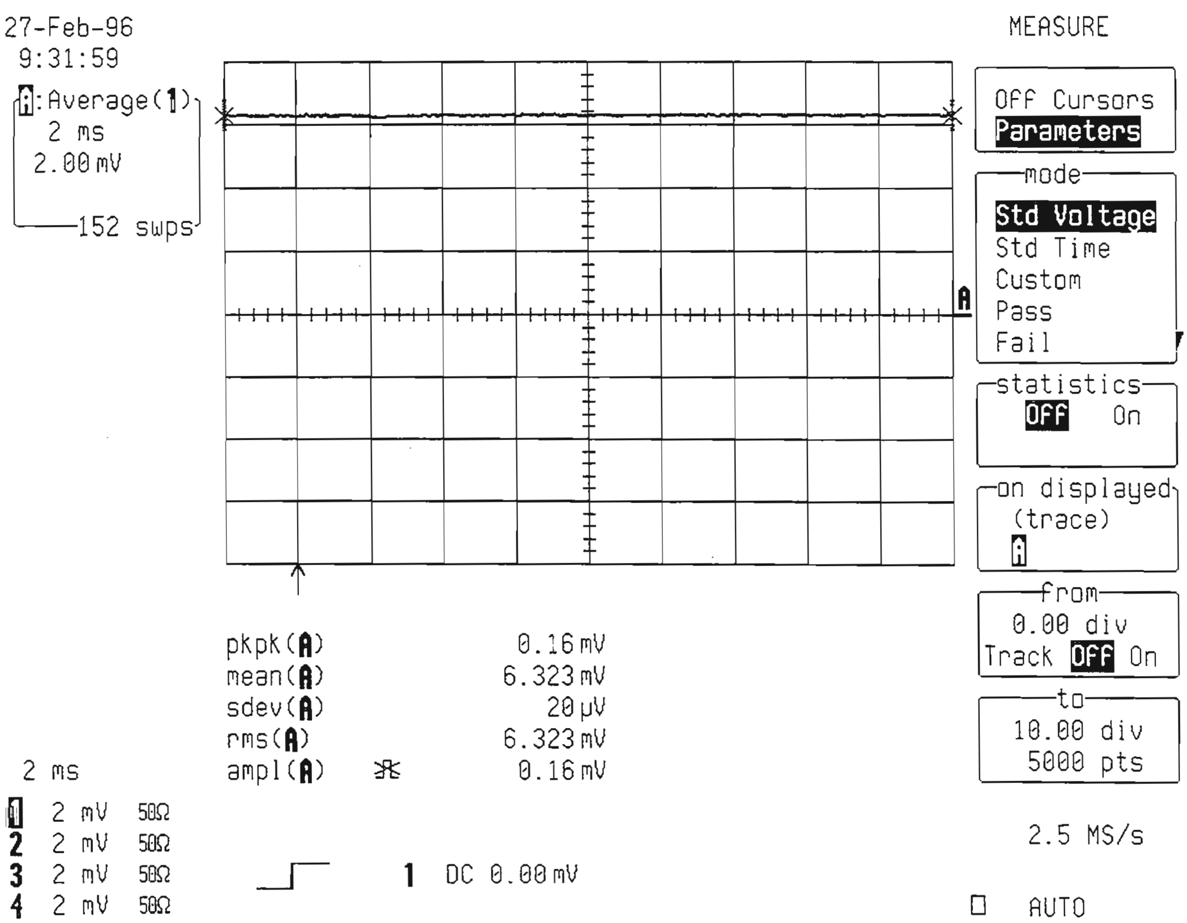
- For the low sensitivities : **2 mV, 5 mV, 10 mV, 20 mV** and **50 mV/div.**, use a **50 Ohm 20 dB** attenuator.

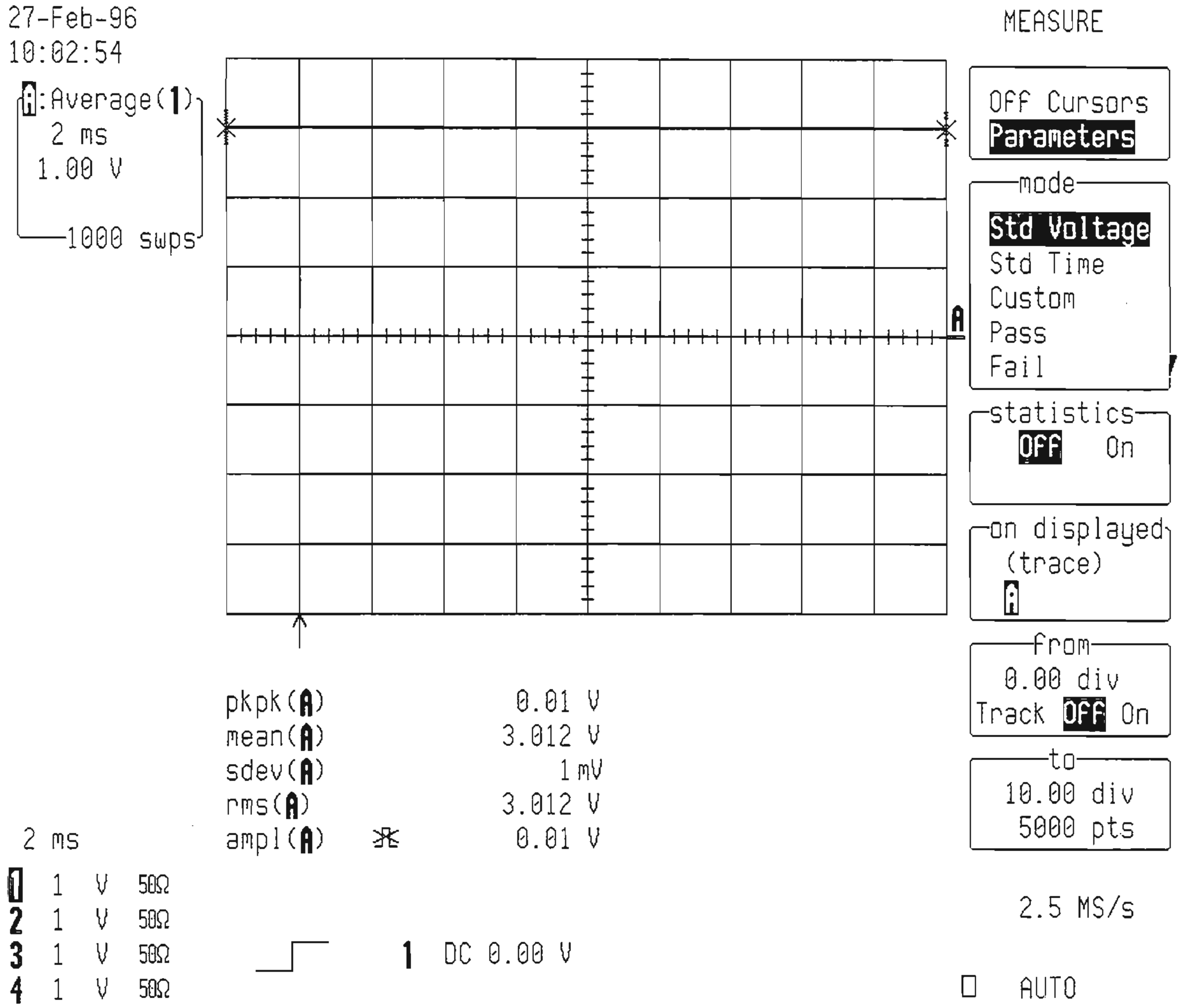


Range	Attenuator	Conditions of Test			Average Mean Parameter Reading		
Volts/div Control	20 dB	PS Output	9374/M/L/TM Input	9374/M/L/TM Full scale	Min Value -X % of FS	Max. Value +X% of FS	X%
2 mV	Yes	+ 60 mV	+ 6 mV	16 mV	+ 5.2 mV	+ 6.8 mV	5%
5 mV	Yes	+ 150 mV	+ 15 mV	40 mV	+ 13.8 mV	+ 16.2 mV	3%
10 mV	Yes	+ 300 mV	+ 30 mV	80 mV	+ 28.4 mV	+ 31.6 mV	2%
20 mV	Yes	+ 600 mV	+ 60 mV	160 mV	+ 56.8 mV	+ 63.2 mV	2%
50 mV	Yes	+ 1.5 V	+150 mV	400 mV	+ 142 mV	+ 158 mV	2%
.1 V	No	+ 300 mV	+ 300 mV	800 mV	+ 284 mV	+ 316 mV	2%
.2 V	No	+ 600 mV	+ 600 mV	1.6 v	+ 568 mV	+ 632 mV	2%
.5 V	No	+ 1.5 V	+ 1.5 V	4 V	+ 1.42 V	+ 1.58 V	2%
1 V	No	+ 3 V	+ 3 V	8 V	+ 2.84 V	+ 3.16 V	2%

Table 5-2 : Positive DC Linearity Readout Accuracy

- For each point, read off the **Mean** parameter voltage, and compare it to the digital readout of the voltage reference
- The **Mean** parameter reading should be within the limits shown in table 5-2.





5.7.1.a.2 Negative DC Linearity

- For the ranges **2 mV/div. to 1 V/div.**, from the high precision voltage source, apply to Channel 1 : **- 3 major screen divisions**.

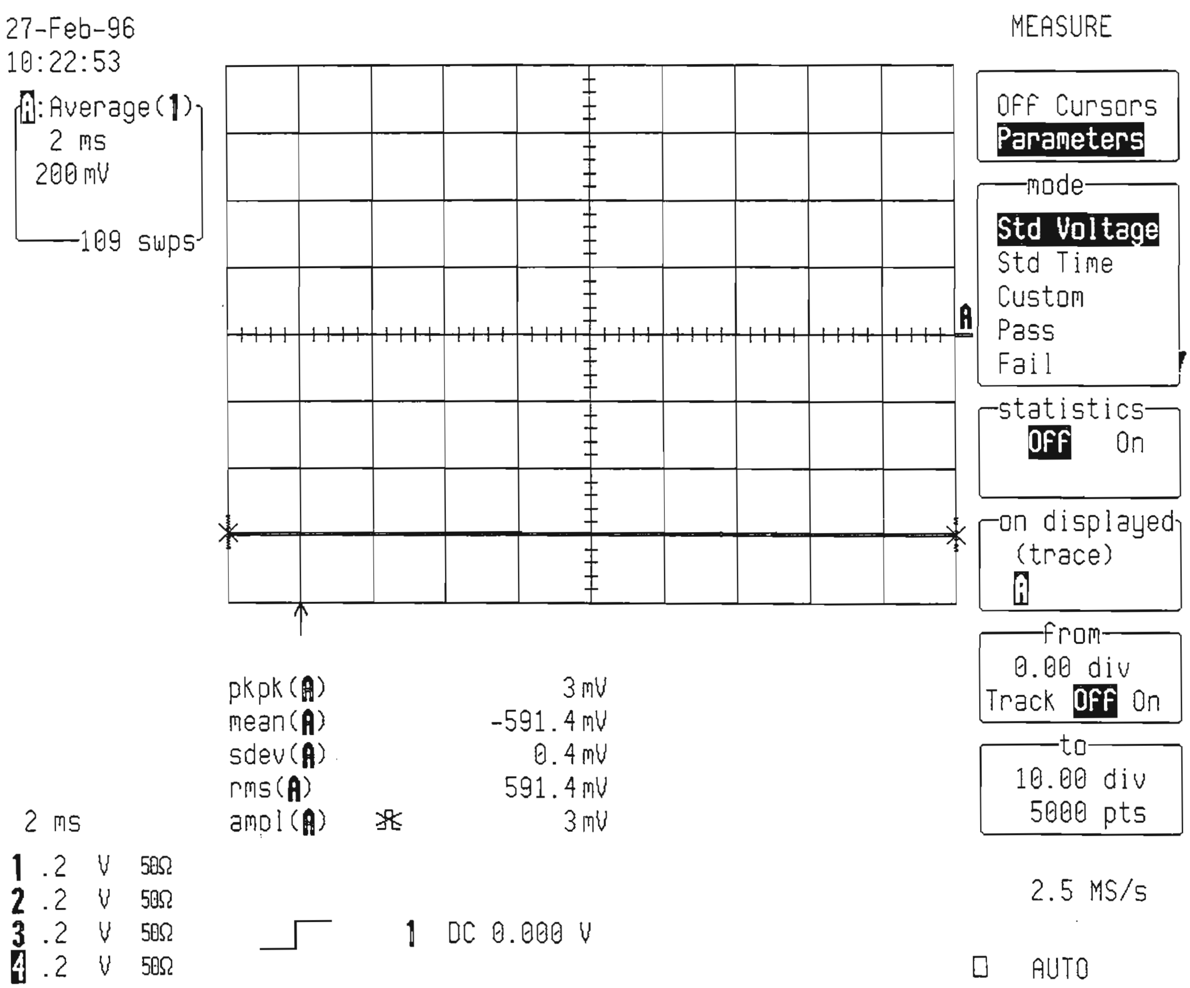
- For the low sensitivities : **2 mV, 5 mV, 10 mV, 20 mV** and **50 mV/div.**, use a **50Ω 20 dB** attenuator.

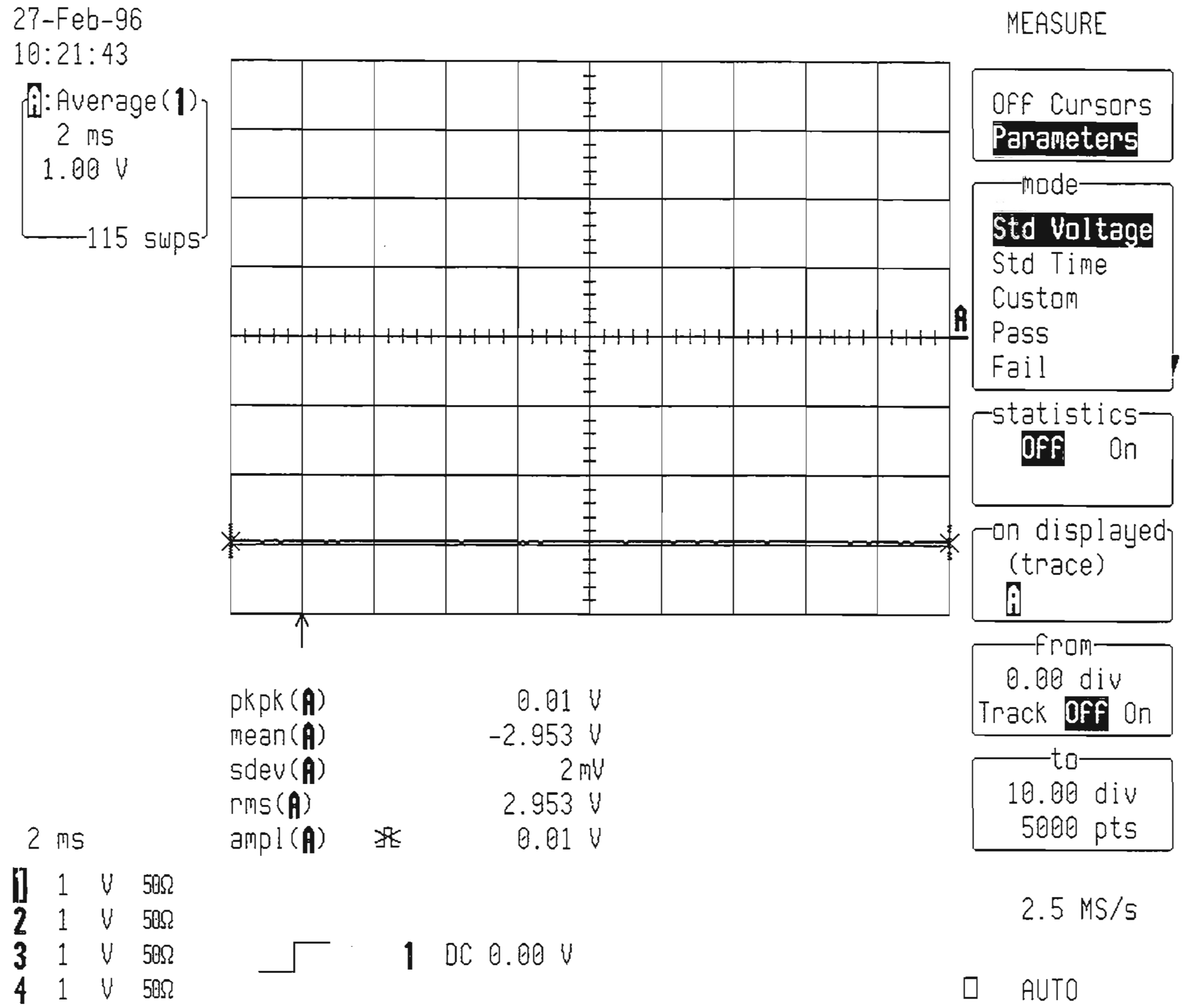
- For each point, read off the **Mean** parameter voltage, and compare it to the digital readout of the voltage reference.

- The **mean** parameter reading should be within the limits shown in table 5-3.

Range	**Attenuator**	**Conditions of Test**			**Average Mean Parameter Reading**		
Volts/div Control	20 dB	PS Output	9374/M/L/TM Input	9374/M/L/TM Full scale	Min Value -X % of FS	Max. Value +X% of FS	X%
2 mV	Yes	- 60 mV	- 6 mV	16 mV	- 5.2 mV	- 6.8 mV	5%
5 mV	Yes	- 150 mV	- 15 mV	40 mV	- 13.8 mV	- 16.2 mV	3%
10 mV	Yes	- 300 mV	- 30 mV	80 mV	- 28.4 mV	- 31.6 mV	2%
20 mV	Yes	- 600 mV	- 60 mV	160 mV	- 56.8 mV	- 63.2 mV	2%
50 mV	Yes	- 1.5 V	-150 mV	400 mV	- 142 mV	- 158 mV	2%
.1 V	No	- 300 mV	- 300 mV	800 mV	- 284 mV	- 316 mV	2%
.2 V	No	- 600 mV	- 600 mV	1.6 v	- 568 mV	- 632 mV	2%
.5 V	No	- 1.5 V	- 1.5 V	4 V	- 1.42 V	- 1.58 V	2%
1 V	No	- 3 V	- 3 V	8 V	- 2.84 V	- 3.16 V	2%

Table 5-3 : Negative DC Linearity Readout Accuracy





5.7.1.b DC 1MΩ

Set the DSO as follows :

- Input Coupling : **DC 1MΩ**
- Input offset : **0.0 mV**
- Input gain : **from 2mV/div. to 5 V/div.**

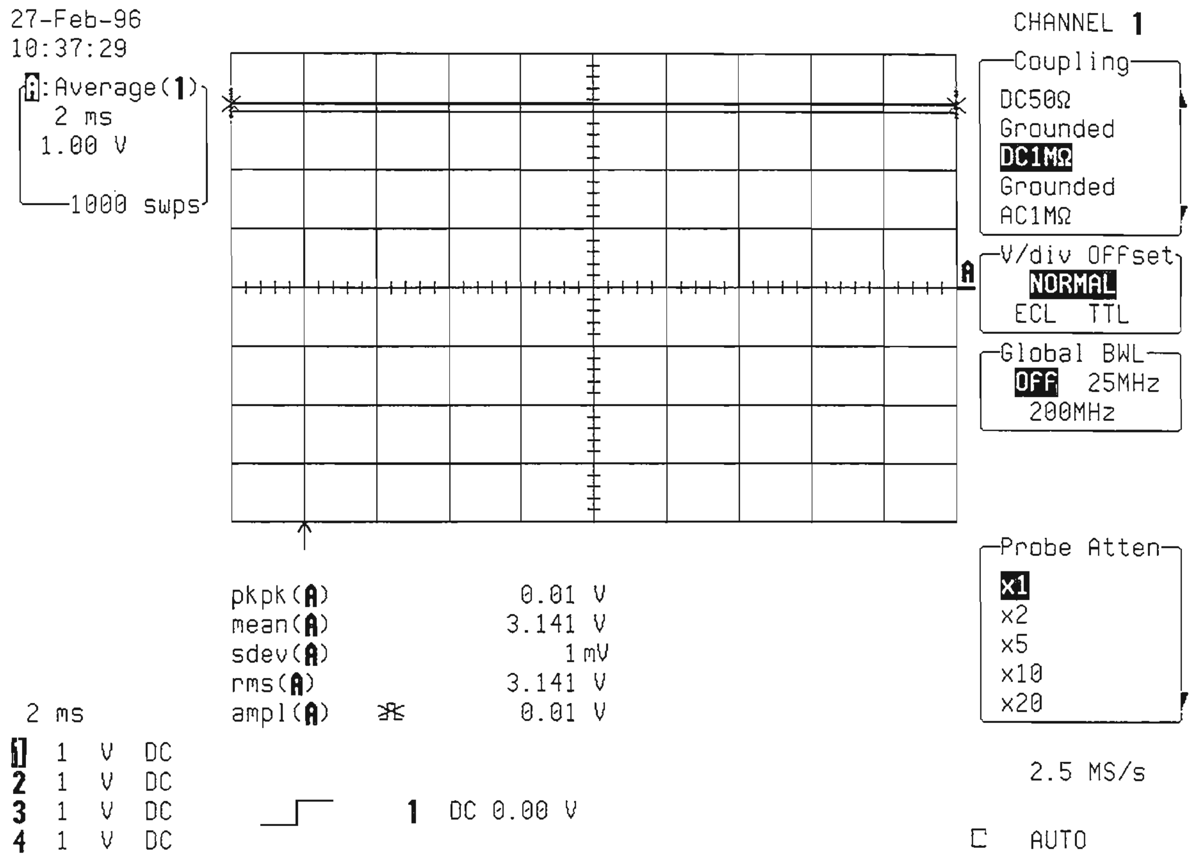
- For the ranges **2 mV/div. to 5 V/div.**, from the high precision voltage source, apply to Channel 1 the following 2 voltages values, one after another : + **3 major** screen divisions, **- 3 major** screen divisions.

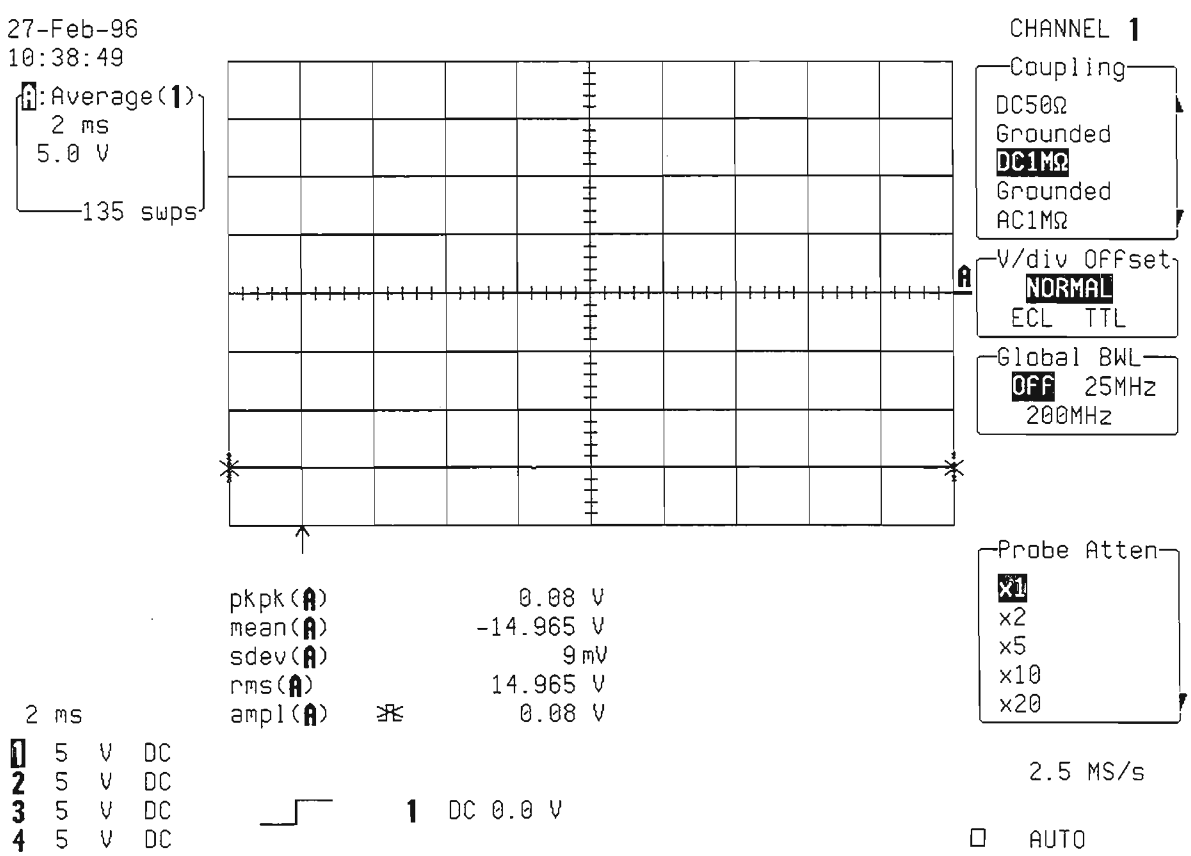
- For the low sensitivities : **2, 5, 10, 20** and **50 mV/div.**, use a **1MΩ 20 dB** attenuator (1/10), see table 5-4.

Range	Attenuator	Conditions of Test			Average Mean Parameter Reading		
Volts/div Control	20 dB	PS Output	9374/M/L/TM Input	9374/M/L/TM Full scale	Min Value ±X% of FS	Max. Value ±X% of FS	± X%
2 mV	Yes	± 60 mV	± 6 mV	16 mV	± 5.2 mV	± 6.8 mV	5%
5 mV	Yes	± 150 mV	± 15 mV	40 mV	± 13.8 mV	± 16.2 mV	3%
10 mV	Yes	± 300 mV	± 30 mV	80 mV	± 28.4 mV	± 31.6 mV	2%
20 mV	Yes	± 600 mV	± 60 mV	160 mV	± 56.8 mV	± 63.2 mV	2%
50 mV	Yes	± 1.5 V	±150 mV	400 mV	± 142 mV	± 158 mV	2%
.1 V	No	± 300 mV	± 300 mV	800 mV	± 284 mV	± 316 mV	2%
.2 V	No	± 600 mV	± 600 mV	1.6 v	± 568 mV	± 632 mV	2%
.5 V	No	± 1.5 V	± 1.5 V	4 V	± 1.42 V	± 1.58 V	2%
1 V	No	± 3 V	± 3 V	8 V	± 2.84 V	± 3.16 V	2%
2 V	No	± 6 V	± 6 V	16 V	± 5.68 V	± 6.32 V	2%
5 V	No	± 15 V	± 15 V	40 V	± 14.2 V	± 15.8 V	2%

Table 5-4 : 1MΩ DC Linearity Readout Accuracy

- For each point, read off the **Mean** parameter voltage, and compare it to the digital readout of the voltage reference.
- The **mean** parameter reading should be within the limits shown in table 5-4.
- Repeat steps 5.7.1.a and 5.7.1.b for Channel 2, Channel 3 and Channel 4 substituting channel controls and input connector.


27-Feb-96
10:37:29
A: Average(1)
2 ms
1.00 V
1000 swps
CHANNEL 1
Coupling
DC50Ω
Grounded
DC1MΩ
Grounded
AC1MΩ
V/div Offset
NORMAL
ECL TTL
Global BWL
Off 25MHz
200MHz
Probe Atten
x1
x2
x5
x10
x20
pkpk(A) 0.01 V
mean(A) 3.141 V
sdev(A) 1 mV
rms(A) 3.141 V
ampl(A) 0.01 V
2 ms
1 1 V DC
2 1 V DC
3 1 V DC
4 1 V DC
1 DC 0.00 V
2.5 MS/s
AUTO


27-Feb-96
10:38:49
A: Average(1)
2 ms
5.0 V
135 swps
CHANNEL 1
Coupling
DC50Ω
Grounded
DC1MΩ
Grounded
AC1MΩ
V/div Offset
NORMAL
ECL TTL
Global BWL
Off 25MHz
200MHz
Probe Atten
x1
x2
x5
x10
x20
pkpk(A) 0.08 V
mean(A) -14.965 V
sdev(A) 9 mV
rms(A) 14.965 V
ampl(A) 0.08 V
2 ms
1 5 V DC
2 5 V DC
3 5 V DC
4 5 V DC
1 DC 0.0 V
2.5 MS/s
AUTO

5.8 Offset

5.8.1 Description

The maximum allowed offsets depend on the sensitivity as described in the specifications, and is tested at 2 mV and 5 mV range.

Specifications

± 400 mV : for the range 2mV/div.
± 1 V : for 5 mV/div., 10 mV/div., 20 mV/div., 50 mV/div.,
± 10 V : for 100 mV/div., 200 mV/div., 500 mV/div., 1 V/div (50 Ω)
± 100 V : for (1 MΩ), 1 V/div., 2 V/div., 5 V/div., 10 V/div.

5.8.1.a Negative Offset Control Procedure

Set the DSO as follows :

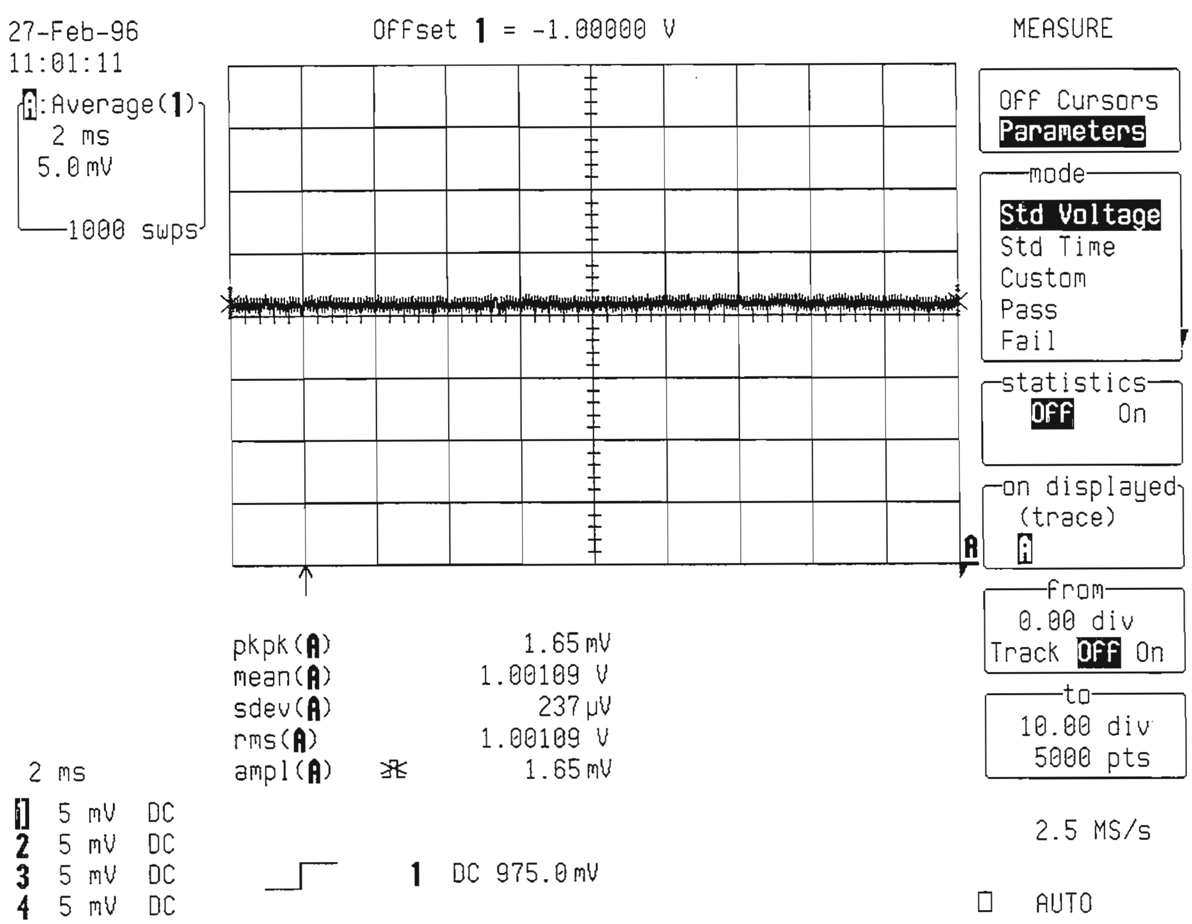
- Turn on trace : **Channel 1**
- Display setup : **Standard, Persistence off, Dot join on, Single grid**
- Input Coupling : **DC 1MΩ**
- V/div. offset : **Normal**
- Global BWL : **Off**
- Probe atten : **X1**
- Input gain : **5 mV**
- Trigger setup : **Edge**
- Trigger on : **1**
- Coupling 1 : **DC**
- Slope 1 : **Pos**
- Mode : **Auto**
- Holdoff : **Off**
- Timebase : **2 msec/div.**
- Channel use : **4**
- Record up : **50 K**
- Turn on trace : **A**
- Select Math Setup
- For Math : **Use at most 5000 points**
- Redefine A
- Use Math ? : **Yes**
- Math Type : **Average**
- Avg Type : **Summed**
- For : **1000 sweeps**
- Of : **Channel 1**

- Turn off trace : **Channel 1**
- Cursors/Measure : **Parameters**
- Mode : **Std Voltage**
- Statistics : **off**
- On displayed trace : **A**

- From the high precision voltage source PS5004, apply to Channel 1 + **1 V** .
- Using the offset control, move Channel 1 trace through the entire range until the maximum offset value is reached : - **1 V**.
- Verify that the displayed trace A : Average (1) is in the screen, near to the center horizontal graticule line.
- Press clear sweeps.
- Check after at least 100 sweeps that the mean (A) parameter readout is : minimum + **.985 V**, maximum + **1.015 V.** (see table 5-5).

Range	Conditions of Test		Offset Control	Mean Parameter Reading	
Volts/div Control	PS Output	9374/M/L/TM Input	9374/M/L/TM Offset	Minimum Value,	Maximum Value,
5 mV	+ 1 V	+ 1 V	- 1 V	+ .985 V	+ 1.015 V
2 mV	+ 400 mV	+ 400 mV	- 400 mV	+ 392 mV	+ 408 mV

Table 5-5 : Negative offset control



- Select Input Coupling : **DC 50Ω**
- Input gain : **5 mV**

- Press clear sweeps

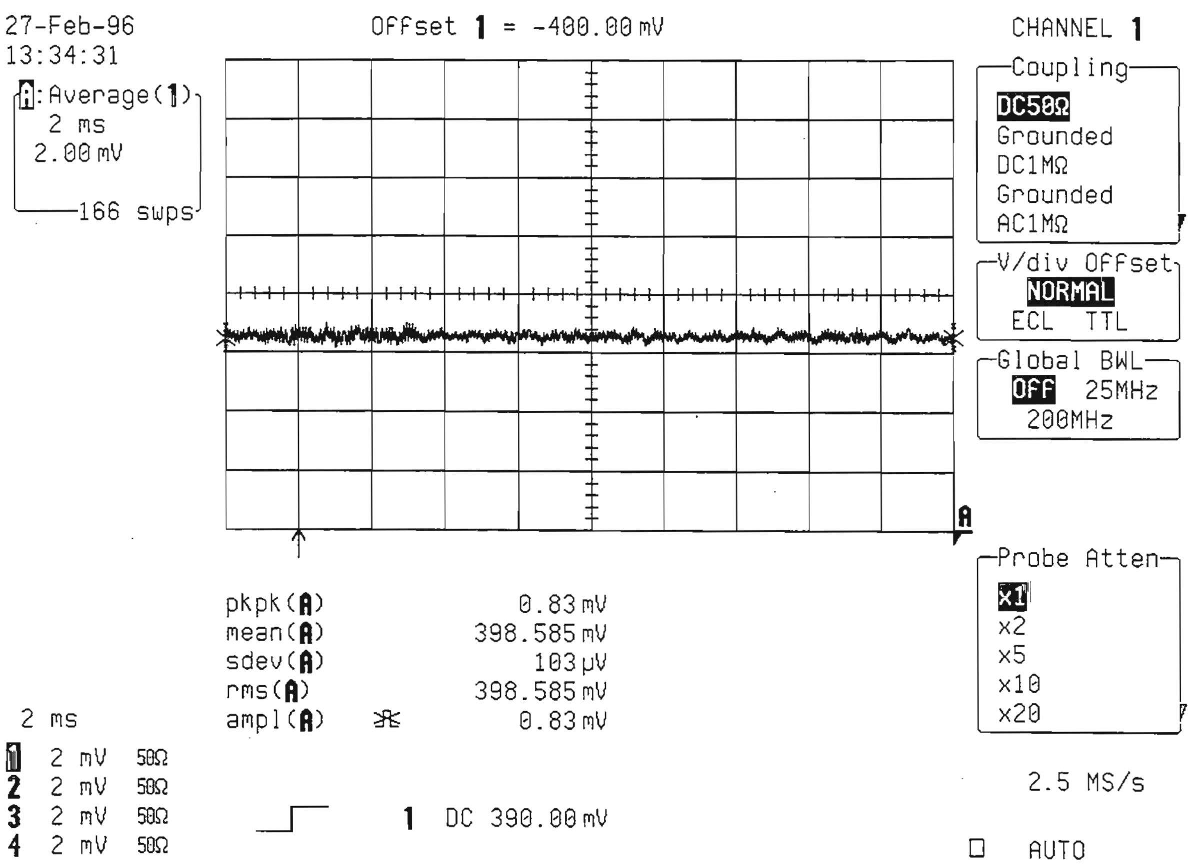
- Check after at least 100 sweeps that the mean (A) parameter readout is : minimum + **.985 V** , maximum + **1.015 V.**

- Set input gain to **2 mV/div** from the high precision voltage source, apply to Channel 1 the following voltage value : + **400 mV**.

- Using the offset control, move the Ch1 trace through the entire range until the following offset value is reached : **- 400 mV**.

- Press clear sweeps

- Check after at least 100 sweeps that the mean (A) parameter readout is : minimum + **392 mV**, maximum + **408 mV** (see table 5-5).



- Repeat step 5.8.1.a for Channel 2, Channel 3 and Channel 4 substituting channel controls and input connector.

5.8.1.b Positive Offset Control Procedure

Set the DSO as in 5.8.1.a:

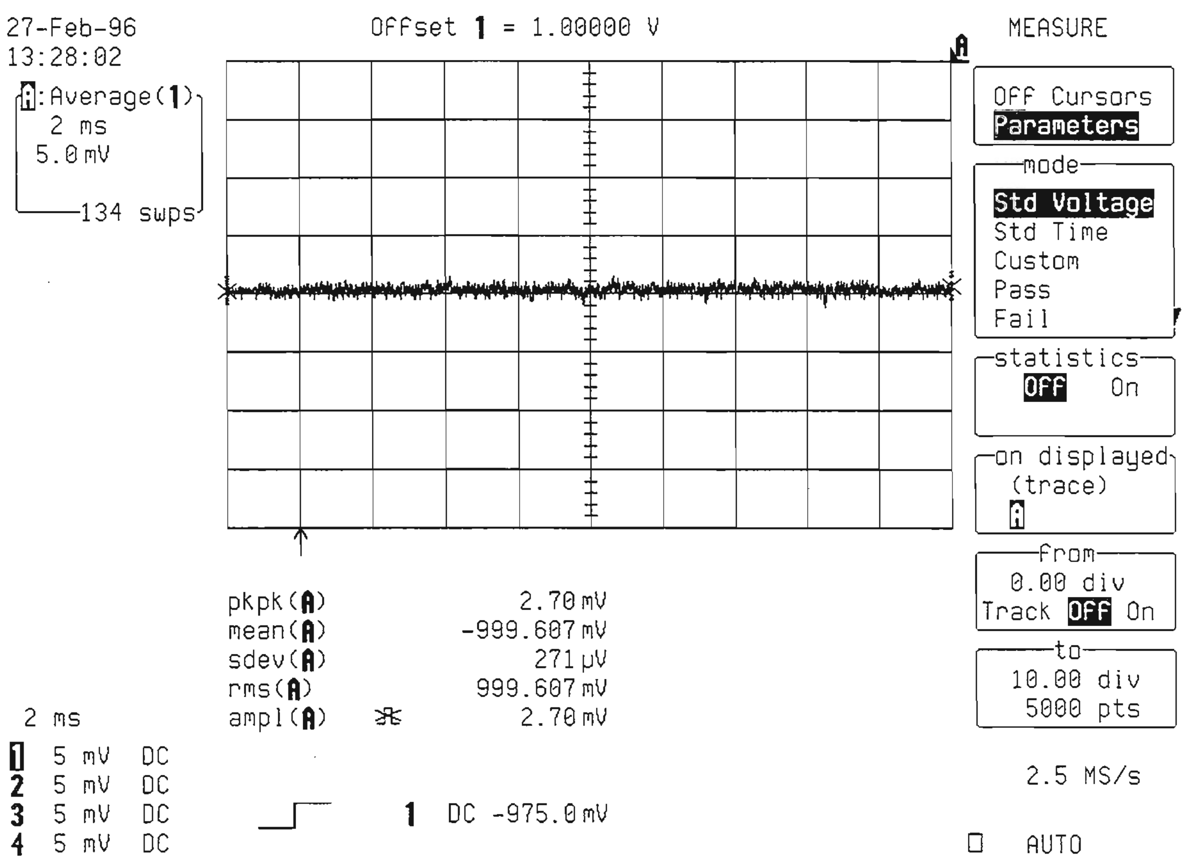
- Input Coupling : **DC 1MΩ**
- Channel 1 input gain : **5 mV**

- From the high precision voltage source PS5004, apply to Channel 1 **- 1 V** .
- Using the offset control, move Channel 1 trace through the entire range until the maximum offset value is reached : **+ 1 V**.
- Verify that the displayed trace A : Average (1) is in the screen, near to the center horizontal graticule line.

- Check after at least 100 sweeps that the mean (A) parameter readout is : minimum **- .985 V**, maximum **- 1.015 V.** (see table 5-6).

Range	Conditions of Test		Offset Control	Mean Parameter Reading	
Volts/div Control	PS Output	9374/M/L/TM Input	9374/M/L/TM Offset	Minimum Value,	Maximum Value,
5 mV	- 1 V	- 1 V	+ 1 V	- .985 V	- 1.015 V
2 mV	- 400 mV	- 400 mV	+ 400 mV	- 392 mV	- 408 mV

Table 5-6 : Positive offset control



- Select Input Coupling : **DC 50Ω**
- Input gain : **5 mV**

- Press clear sweeps

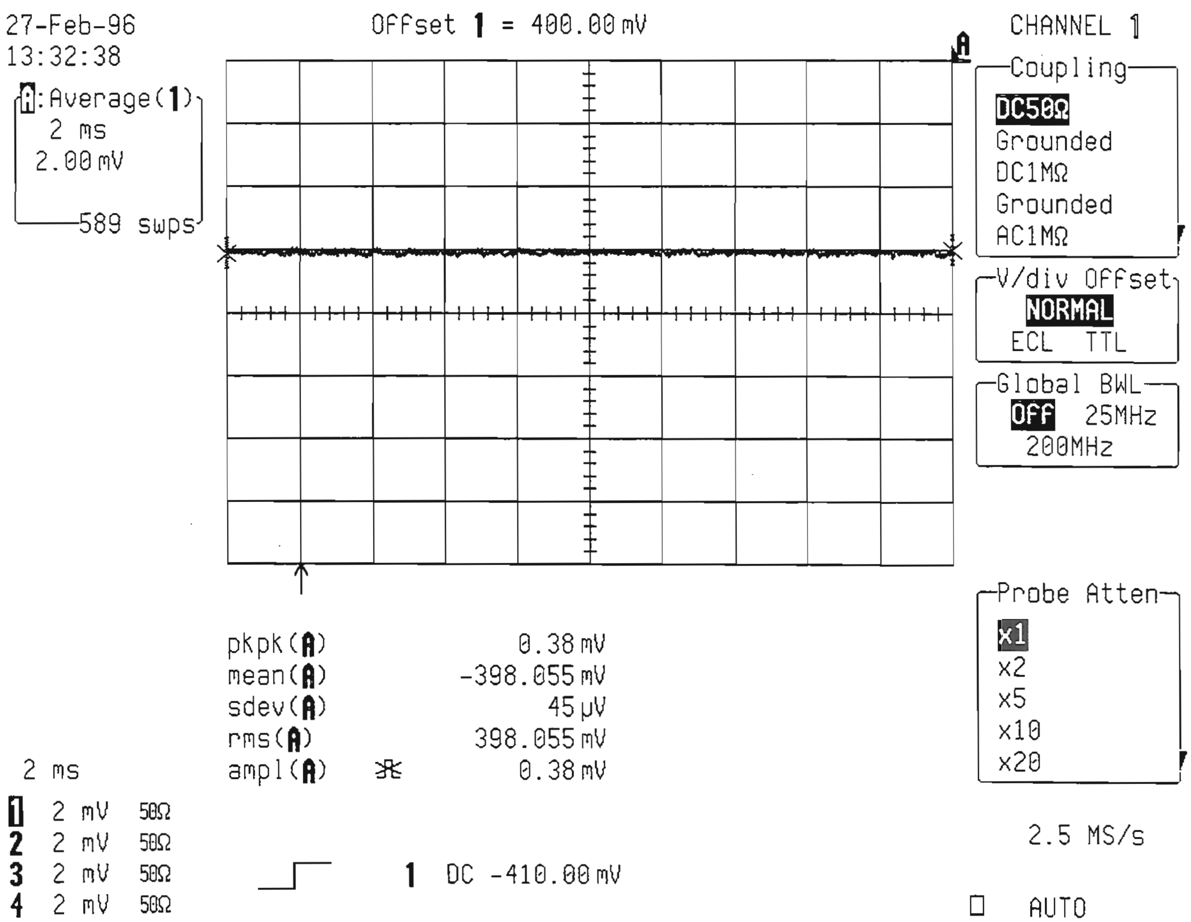
- Check after at least 100 sweeps that the mean (A) parameter readout is : minimum - **.985 V** , maximum - **1.015 V.**

- Set input gain to **2 mV/div** from the high precision voltage source, apply to Channel 1 the following voltage value : **- 400 mV**.

- Using the offset control, move the Ch1 trace through the entire range until the following offset value is reached : + **400 mV**.

- Press clear sweeps

- Check after at least 100 sweeps that the mean (A) parameter readout is : minimum - **392 mV**, maximum - **408 mV** (see table 5-6).



- Repeat step 5.8.1.b for Channel 2, Channel 3 and Channel 4 substituting channel controls and input connector.

5.9 Bandwidth

5.9.1 Description

The purpose of this test is to ensure that the entire system has a bandwidth of at least 1 GHz . An external source is used as the reference to provide a signal where amplitude and frequency are well controlled. A serious measurement of the bandwidth requires the use of a source whose amplitude does not change with frequency.
The LeCroy calibration software corrects for the measured amplitude variation of the generator used. Generators can have errors of - 1 dB above 500 MHz. The non flatness of the generator should be taken into consideration.

Specifications

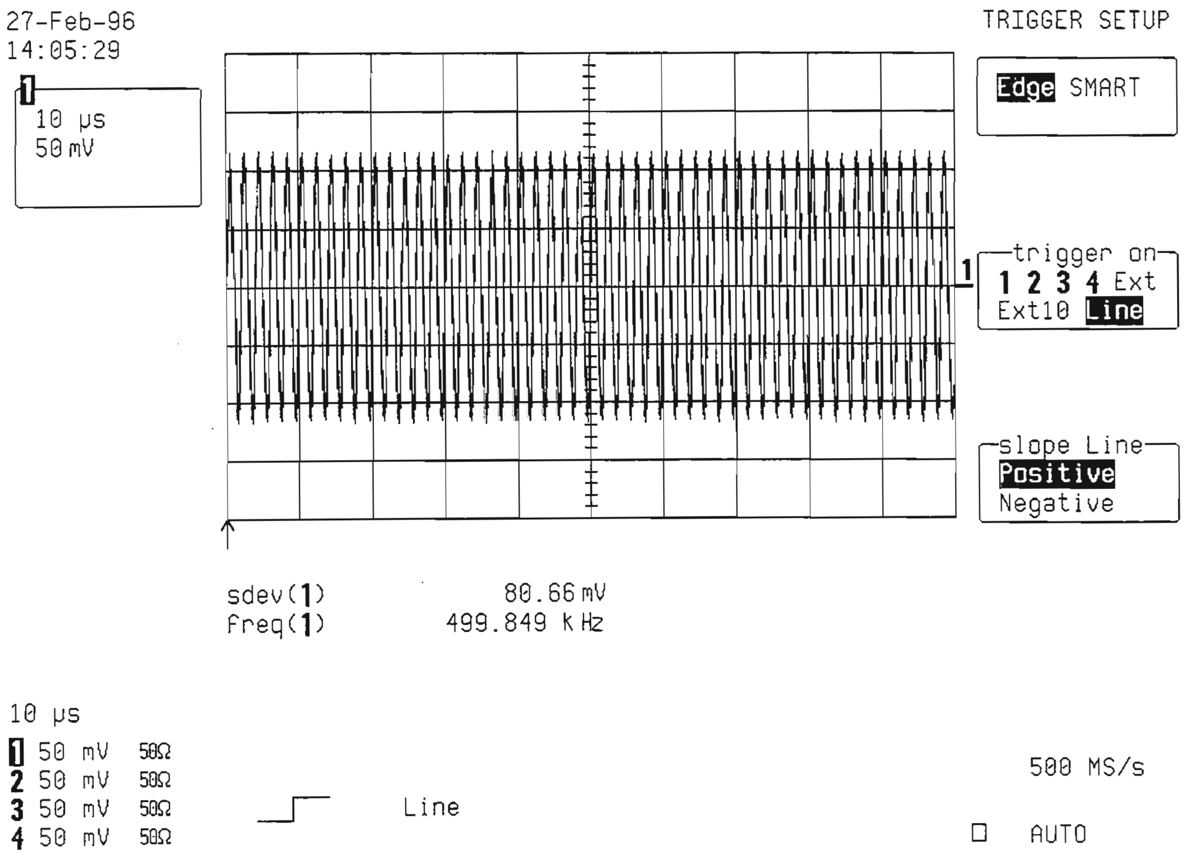
DC to at least 1 GHz (- 3 dB) at 10 mV/div. and above.
DC to at least 400 MHz at 5 mV/div.
DC to at least 150 MHz at 2 mV/div.

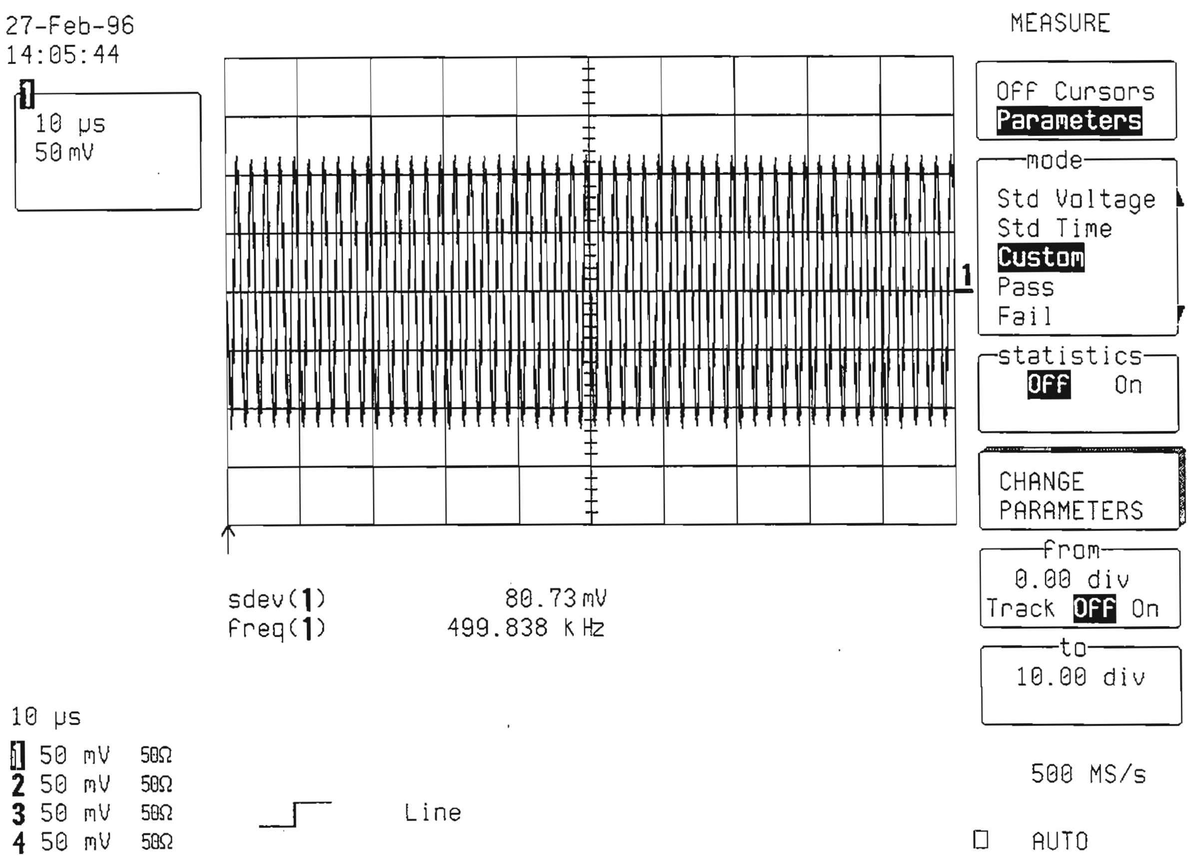
5.9.1.a DC 50 Ω

Procedure

- Turn on trace : **Ch1**
- Display setup : **Standard, Persistence off, Dot join on, Single grid**
- Input Coupling : **DC 50 Ω**
- V/div. offset : **Normal**
- Global BWL : **Off**
- Probe atten : **X1**
- Input gain : **50 mV/div.**
- Offset : **0 mV**
- Trigger setup : **Edge**
- Trigger on : **Line**
- Slope Line : **Pos**
- Mode : **Norm or Auto**
- Timebase : **10 µsec/div.**
- Channel use : **4**
- Record up : **50 K**
- Press Cursors/Measure: **Parameters**
- Mode : **Custom**
- Statistics : **off**
- Change parameters : **Measure**
- On line 1 : **sdev of 1**
- On line 2 : **freq of 1**

- Connect a HP8648B sine wave generator to Channel 1, set the frequency to **500 KHz**, adjust the generator output amplitude to get on DSO : **sdev(1) = 80 mV**.

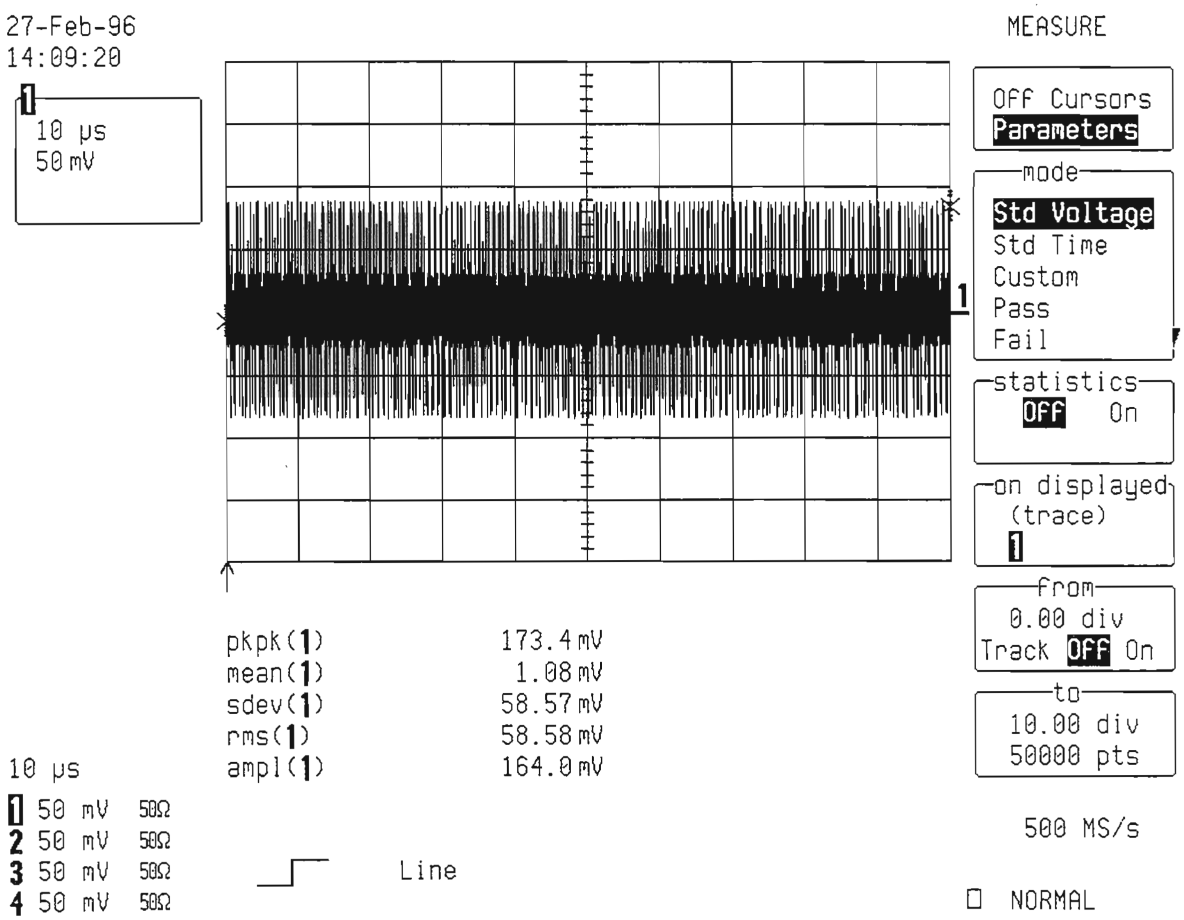

27-Feb-96
14:05:29
1
10 µs
50 mV
TRIGGER SETUP
Edge SMART
trigger on
1 2 3 4 Ext
Ext10 Line
slope Line
Positive
Negative
sdev(1) 80.66 mV
freq(1) 499.849 kHz
10 µs
1 50 mV 50Ω
2 50 mV 50Ω
3 50 mV 50Ω
4 50 mV 50Ω
Line
500 MS/s
AUTO


27-Feb-96
14:05:44
1
10 µs
50 mV
MEASURE
Off Cursors
Parameters
mode
Std Voltage
Std Time
Custom
Pass
Fail
statistics
Off On
CHANGE
PARAMETERS
from
0.00 div
Track Off On
to
10.00 div
sdev(1) 80.73 mV
freq(1) 499.838 kHz
10 µs
1 50 mV 50Ω
2 50 mV 50Ω
3 50 mV 50Ω
4 50 mV 50Ω
Line
500 MS/s
AUTO

- Increase the generator frequency in multi **50 MHz** steps until the sine wave amplitude is 70% of the initial amplitude at 500 KHz .

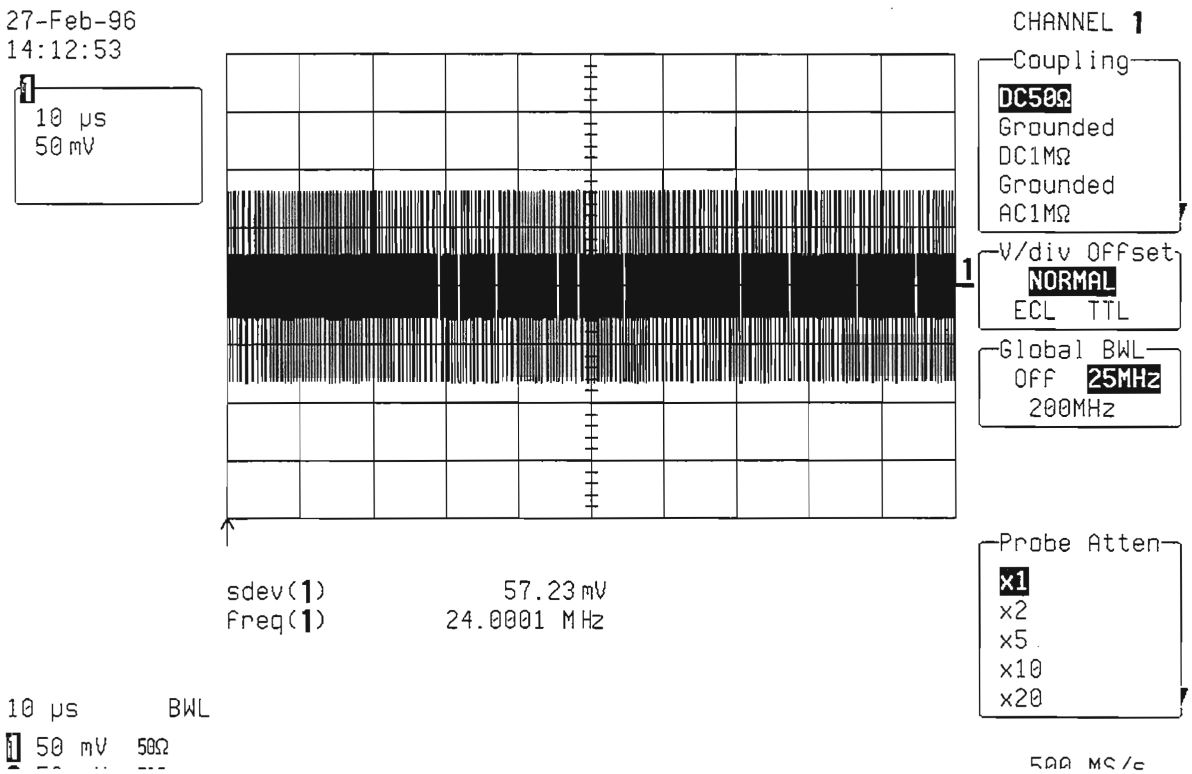
- At each 50 MHz step, check that **sdev(1) > 56 mV**

- When **sdev(1) = 56 mV (3 dB point)** the frequency of the generator must be at least **1 GHz**.

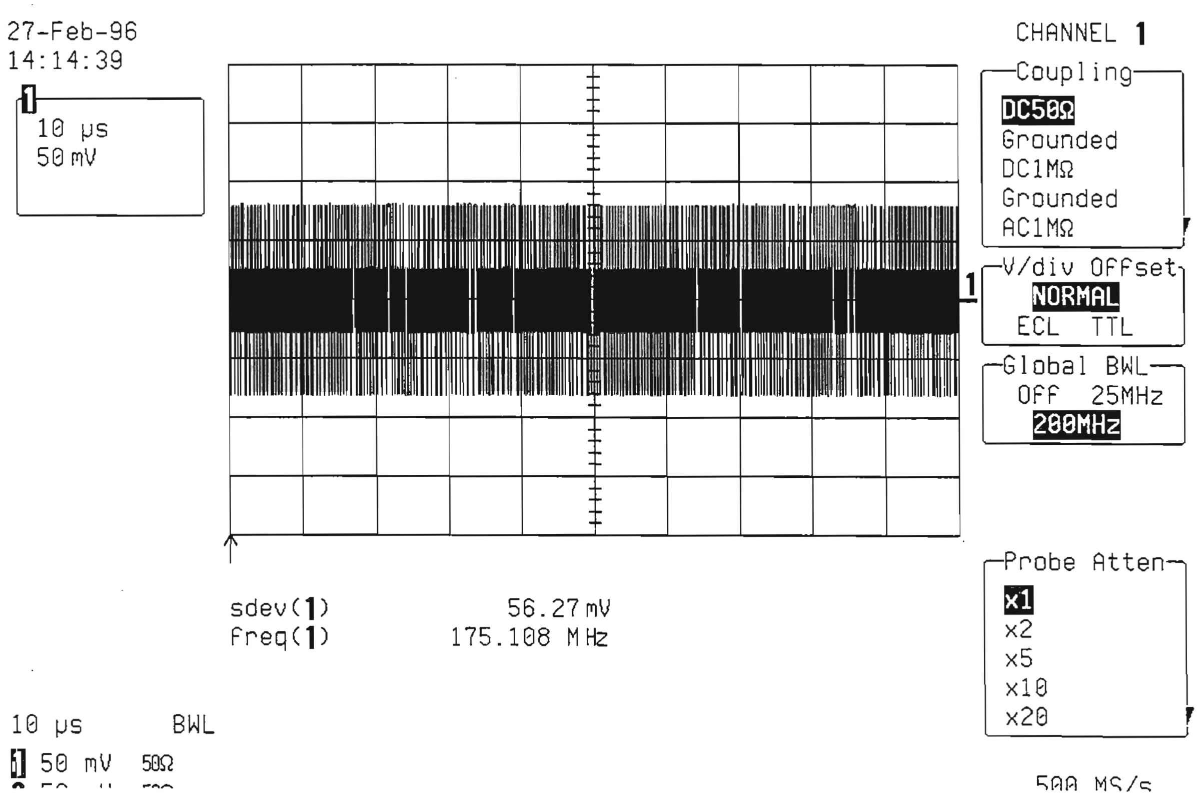


- Select Coupling and **Global BWL : 25 MHz** (bandwidth limiter on)

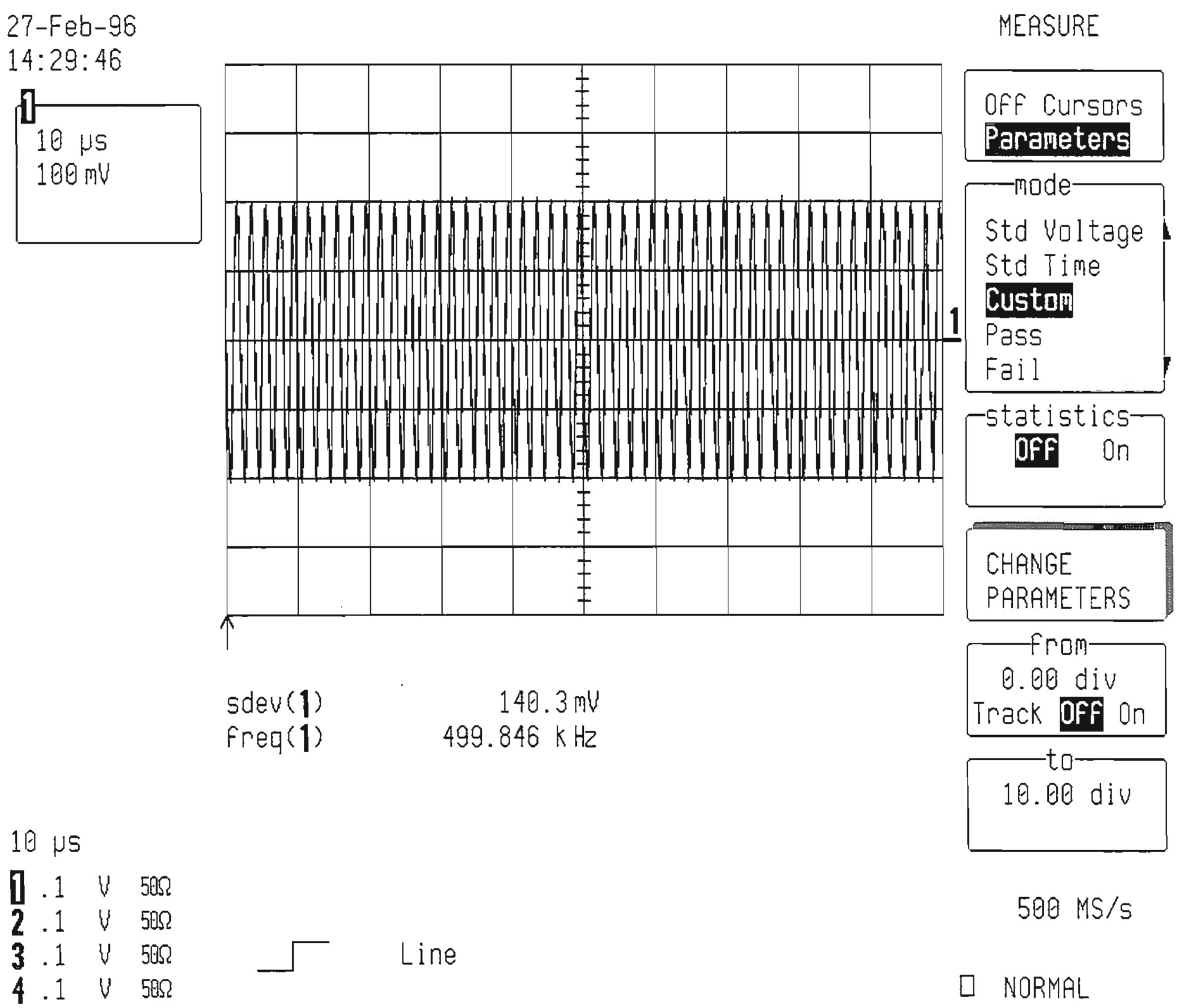
- Check that the frequency at the 3 dB point (**sdev(1) = 56 mV**) is typically **25 MHz** . (between 10 MHz and 37 MHz).

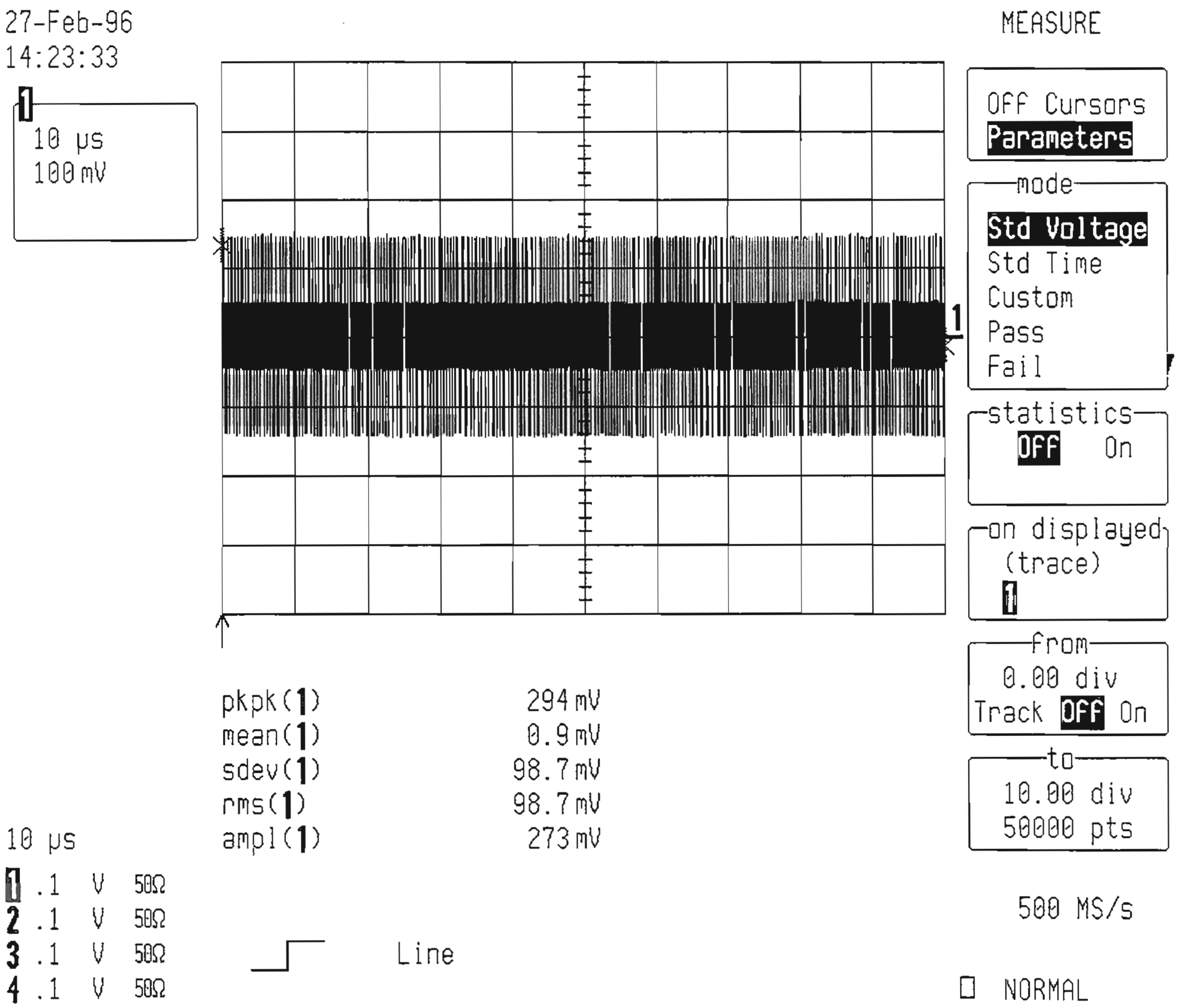


- Select Coupling and **Global BWL : 200 MHz** (bandwidth limiter on)
- Check that the frequency at the 3 dB point (**sdev(1) = 56 mV**) is typically **200 MHz** . (between 110 MHz and 290 MHz).



- Set DSO Input gain : **100 mV/div.**
- Select Coupling and **Global BWL : Off** (bandwidth limiter off)
- Set sine wave generator frequency to **500 KHz**, adjust the generator output amplitude to get on DSO : **sdev(1) = 140 mV**.
- Increase the generator frequency in multi **50 MHz** steps until the sine wave amplitude is 70% of the initial amplitude at 500 KHz .
- At each 50 MHz step, check that **sdev(1) > 98 mV**
- When **sdev(1) = 98 mV (3 dB point)** the frequency of the generator must be at least **1 GHz**.



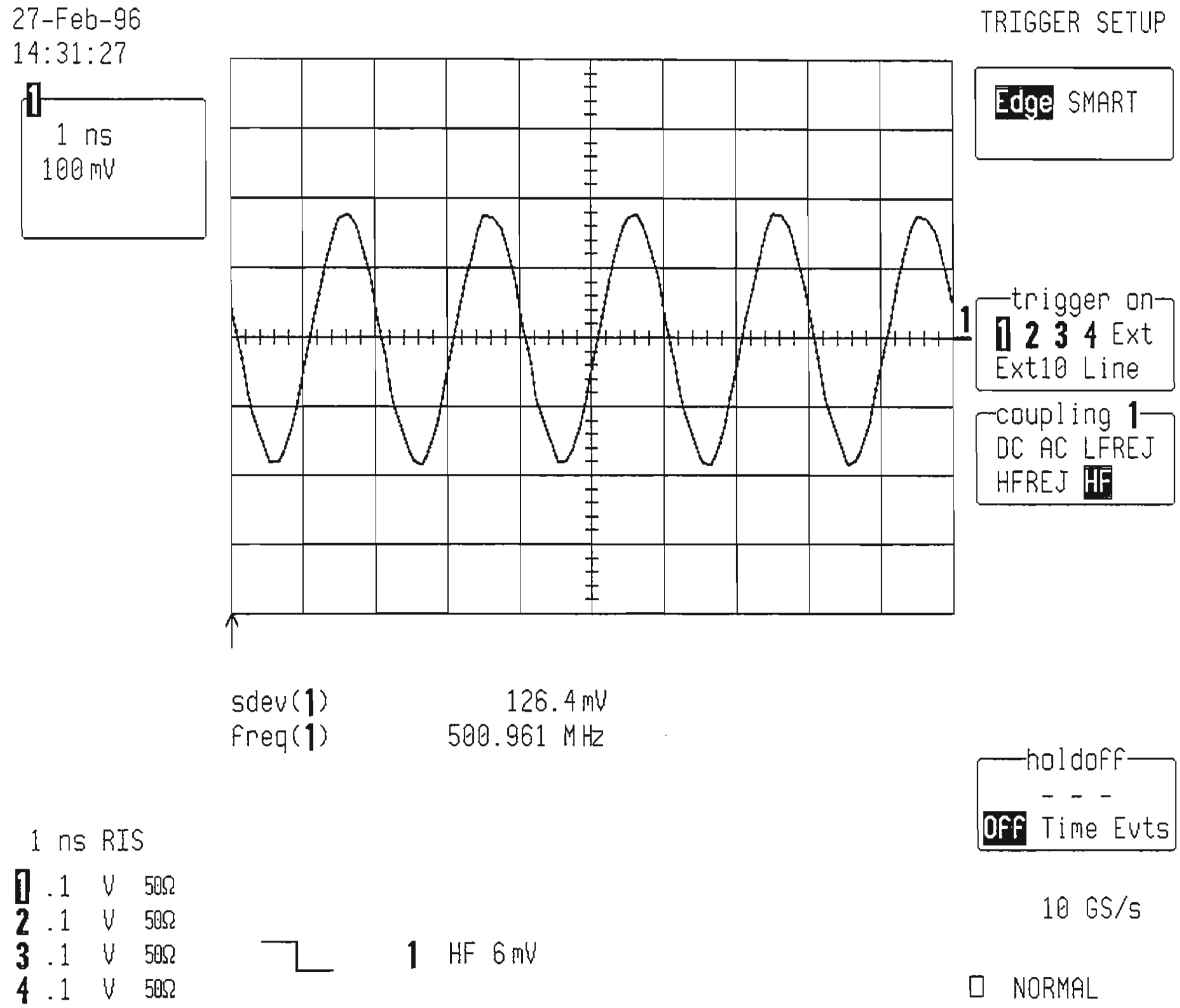


5.9.1.a.1 Trigger Bandwidth

- Set DSO Input gain : **100 mV/div.**
- Set Trigger on : **1**
- Coupling 1 : **HF**
- Mode : **Norm**
- Timebase : **1 nsec/div.**

- Set sine wave generator frequency to **501 MHz**

- Change Trigger level, until the scope triggers on Channel 1.



- Check : The scope must keep triggering in a stable way, a smooth 501 MHz sine wave must be visible on the screen.
- Repeat step 5.9.1.a and 5.9.1.a.1 for Channel 2, Channel 3 and Channel 4 substituting channel controls and input connector.

5.9.1.b 1 MΩ

The purpose of this test is to ensure that the entire 9374/M/L/TM system has a bandwidth of at least **450 MHz at probe tip**.

Set up a HP8648B sine wave generator or equivalent.

- Terminate the output of the HP8648B via a **50Ω feed through** and connect it to the channel 1 input through a LeCroy **PP005 10X-probe** using a probe tip BNC Jack adapter.
  Make sure the probe compensation is perfectly adjusted at low frequency.

- Turn on trace : **Ch1**
- Display setup : **Standard, Persistence off, Dot join on, Single grid**
- Input Coupling : **AC 1MΩ**
- V/div. offset : **Normal**
- Global BWL : **Off**
- Input gain : **1 V/div.**
- Offset : **0 mV**
- Trigger setup : **Edge**
- Trigger on : **Line**
- Slope Line : **Pos**
- Mode : **Norm**
- Timebase : **10 µsec/div.**
- Channel use : **4**
- Record up : **50 K**
- Press Cursors/Measure: **Parameters**
- Mode : **Custom**
- Statistics : **off**
- Change parameters : **Measure**
- On line 1 : **sdev of 1**
- On line 2 : **freq of 1**

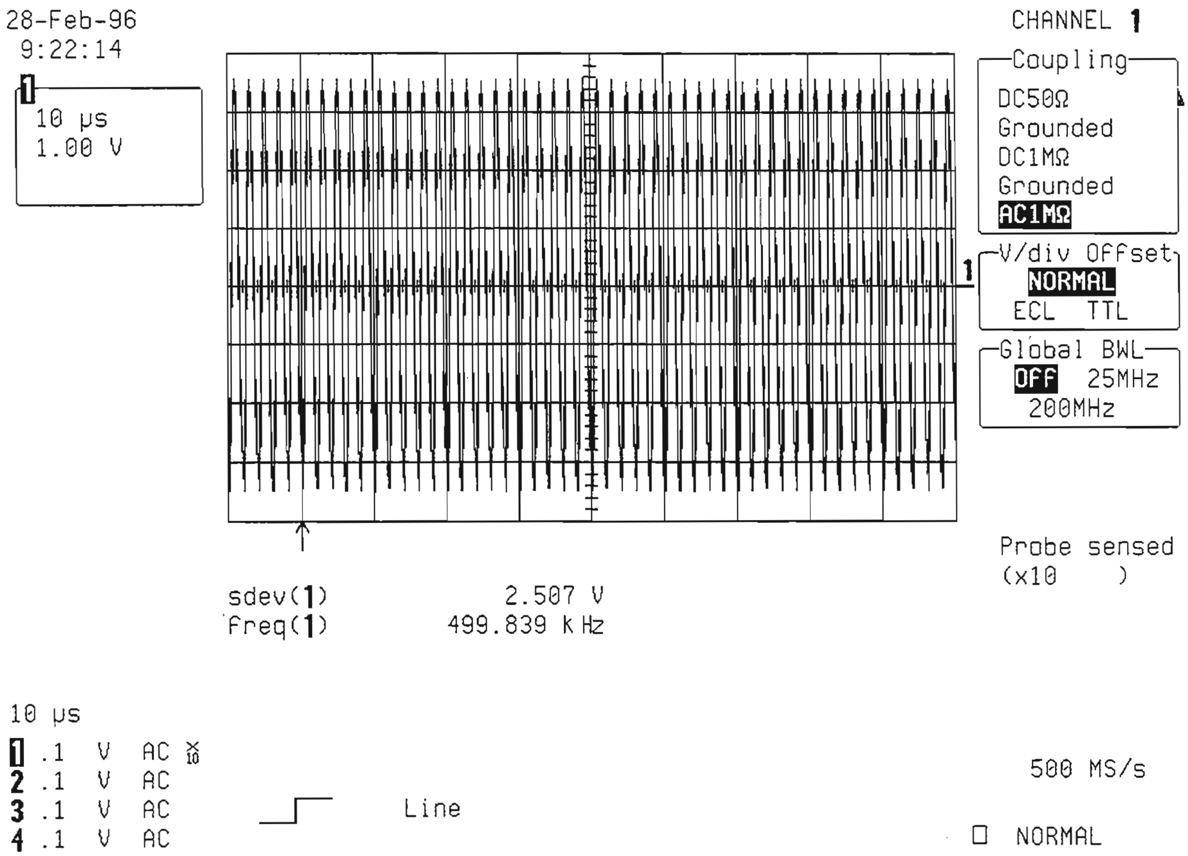
- Set sine wave generator frequency to **500 KHz**, adjust the generator output amplitude to get on DSO : **sdev(1) = 2.5 V**.

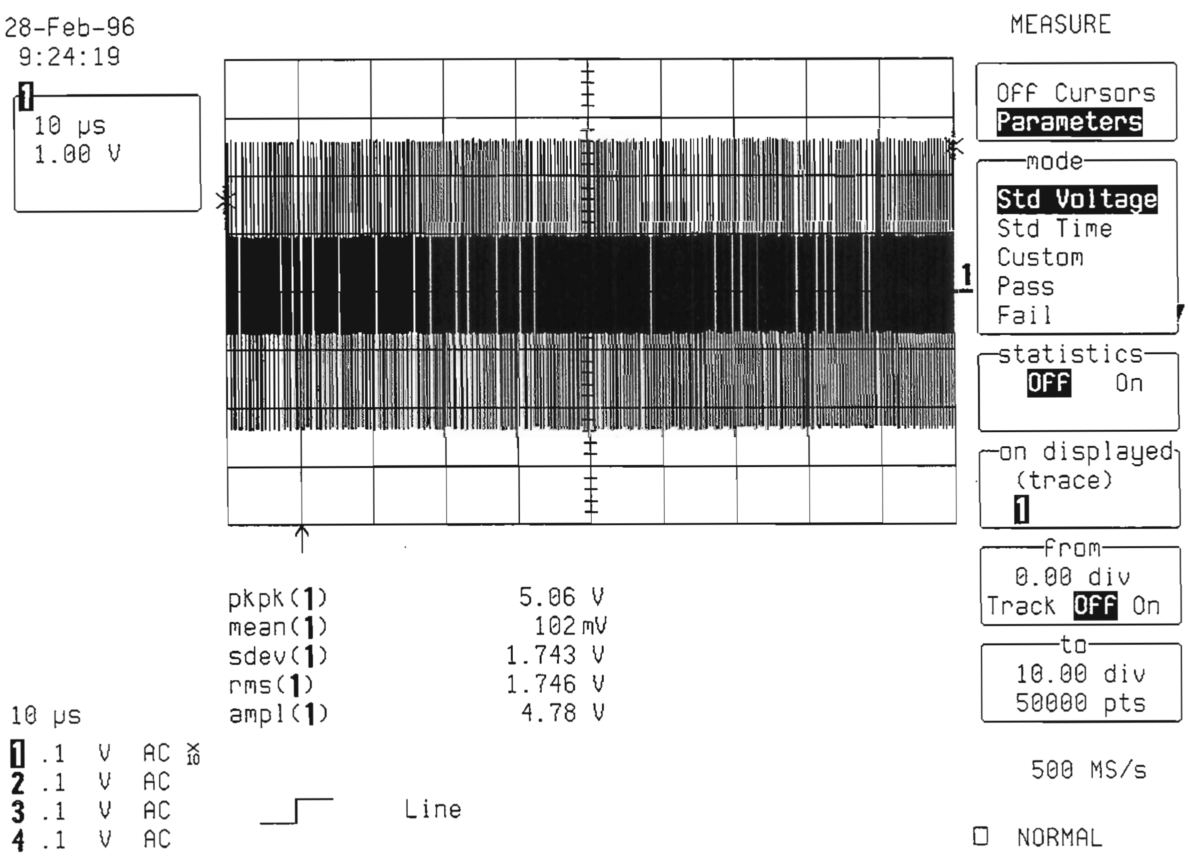
- Increase the generator frequency in multi **50 MHz** steps until the sine wave amplitude is 70% of the initial amplitude at 500 KHz .

- At each frequency step, check that **sdev(1)** > **1.75 V**

- When **sdev(1) = 1.75 V (3 dB point**) the frequency of the generator must be at least **450 MHz.**

- Repeat step 5.9.1.b for Channel 2, Channel 3 and Channel 4 substituting channel control and input connector.


28-Feb-96
9:22:14
1
10 µs
1.00 V
CHANNEL 1
Coupling
DC50Ω
Grounded
DC1MΩ
Grounded
AC1MΩ
V/div Offset
NORMAL
ECL TTL
Global BWL
Off 25MHz
200MHz
Probe sensed
(x10)
sdev(1) 2.507 V
freq(1) 499.839 kHz
10 µs
1 .1 V AC x10
2 .1 V AC
3 .1 V AC
4 .1 V AC
Line
500 MS/s
NORMAL


28-Feb-96
9:24:19
1
10 µs
1.00 V
MEASURE
Off Cursors
Parameters
mode
Std Voltage
Std Time
Custom
Pass
Fail
statistics
Off On
on displayed
(trace)
1
from
0.00 div
Track Off On
to
10.00 div
50000 pts
pkpk(1) 5.06 V
mean(1) 102 mV
sdev(1) 1.743 V
rms(1) 1.746 V
ampl(1) 4.78 V
10 µs
1 .1 V AC x10
2 .1 V AC
3 .1 V AC
4 .1 V AC
Line
500 MS/s
NORMAL

5.10 Trigger Level

5.10.1 Description

The trigger capabilities are tested for several cases of the standard edge trigger :

- Channel (internal), and External Trigger sources
- Three DC levels : -3, 0, +3 major screen divisions
- DC coupling
- Positive and negative slopes

5.10.2 Channel (internal)

The horizontal and vertical errors for a trigger at 0 v threshold are determined by comparing the crossing point of the same sine wave at two different amplitudes.

- Setup any sine wave generator capable of generating sine waves of **1 KHz**, **4V pkpk**.
- Connect the generator output to Channel 1

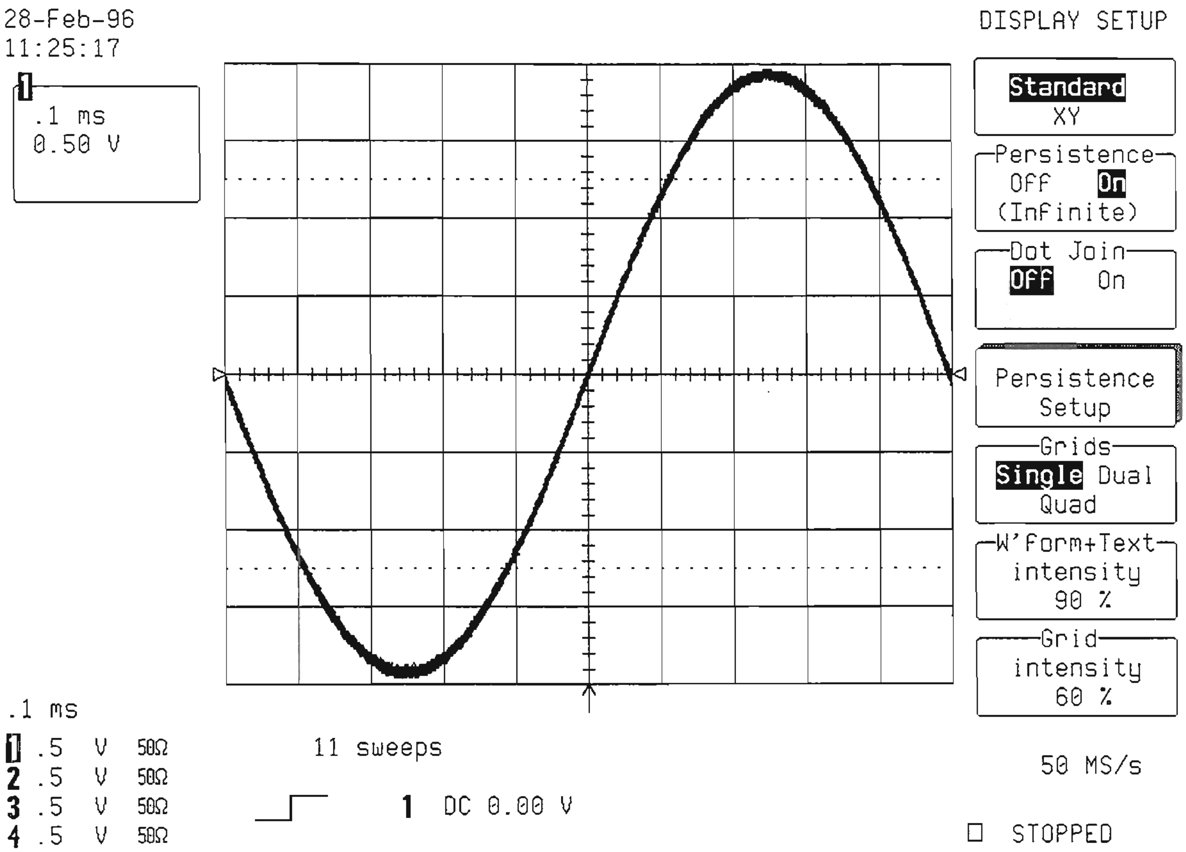
- Turn on trace : **Ch1**
- Input Coupling Ch 1 : **DC 50 Ω**
- V/div. offset : **Normal**
- Input gain : **.5 V/div.**
- Input offset : **0 mV**
- Trigger setup : **Edge**
- Trigger on : **1**
- Coupling 1 : **DC**
- Slope 1 : **Pos**
- Set Trigger level : **DC 0.0 mV**
- Mode : **Single**
- Pre-Trigger Delay : **50 %**
- Timebase : **.1 msec/div.**
- Channel Use : **4**
- Record up to : **50 K samples**

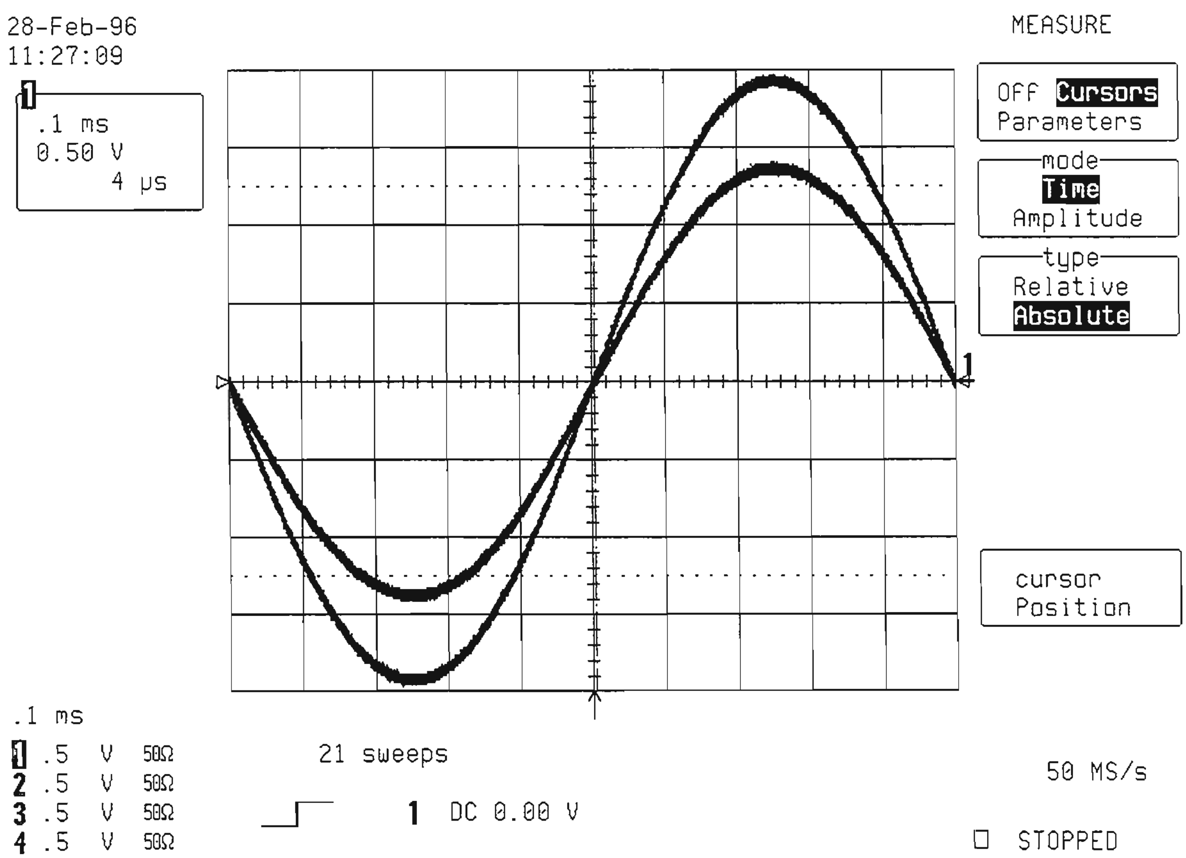
- Adjust the sine wave generator's output amplitude to get **8 divisions peak to peak**, corresponding to a **4 V** amplitude.
- It is important that the offset of the input is set to **zero mV**, use show status and acquisition status to verify.

- Display setup : **Dot join Off**
- Set **Persistence On,** and acquire few sweeps in Single Trigger mode.
- Connect a **3 dB attenuator**, and acquire few more sweeps in Single mode.

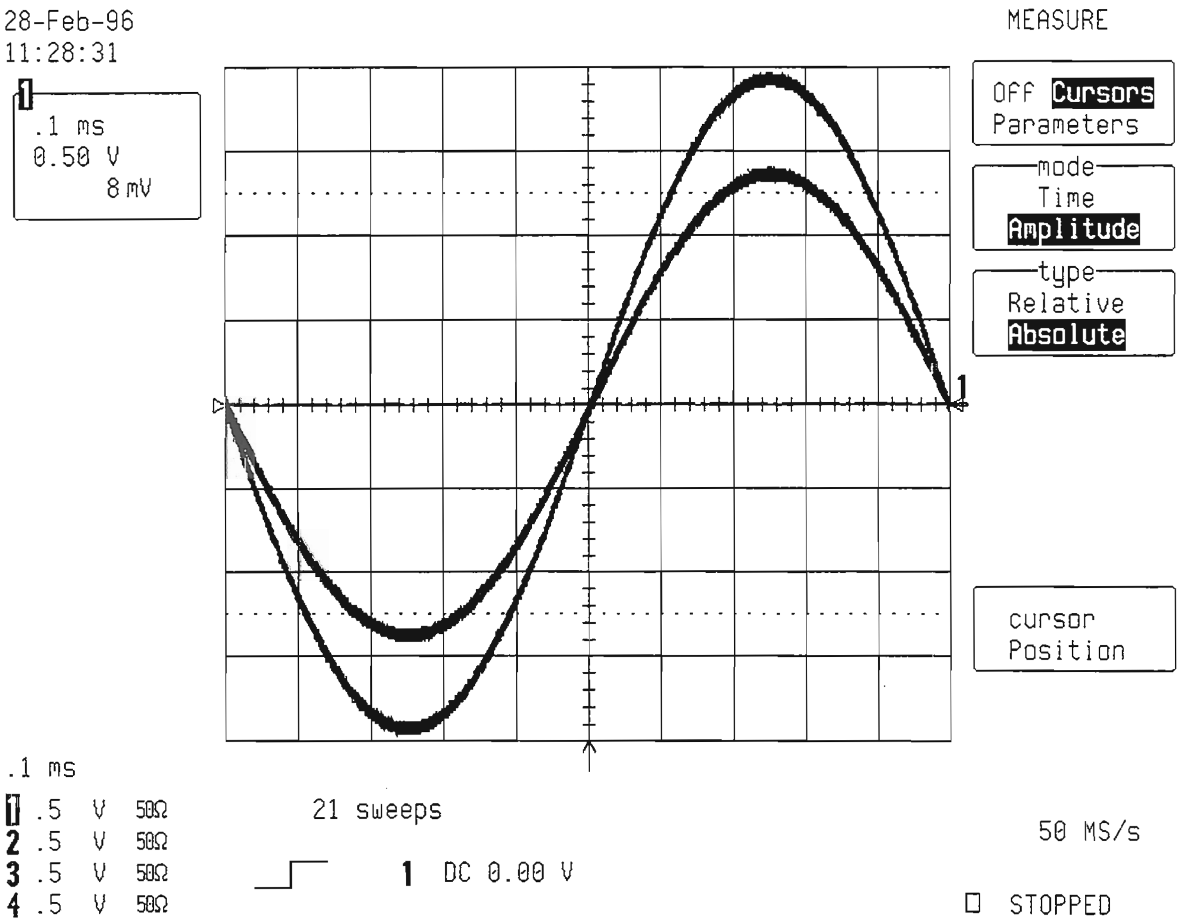
- Select Cursors/Measure : **Cursors, Time, Absolute**
- Use the " cursor position " knob, to move the marker at the **horizontal crossing point** of the two sine waves.

- Check that the **time** difference obtained between the marker and the trigger is within ± **20 μ sec.** The time readout is below 0.50 V in the icon **1,** at top left.


28-Feb-96
11:25:17
1
.1 ms
0.50 V
DISPLAY SETUP
Standard
XY
Persistence
Off On
(Infinite)
Dot Join
Off On
Persistence
Setup
Grids
Single Dual
Quad
W'form+Text
intensity
90 %
Grid
intensity
60 %
.1 ms
1 .5 V 50Ω
2 .5 V 50Ω
3 .5 V 50Ω
4 .5 V 50Ω
11 sweeps
1 DC 0.00 V
50 MS/s
STOPPED


28-Feb-96
11:27:09
1
.1 ms
0.50 V
4 µs
MEASURE
Off Cursors
Parameters
mode
Time
Amplitude
type
Relative
Absolute
cursor
Position
.1 ms
1 .5 V 50Ω
2 .5 V 50Ω
3 .5 V 50Ω
4 .5 V 50Ω
21 sweeps
1 DC 0.00 V
50 MS/s
STOPPED

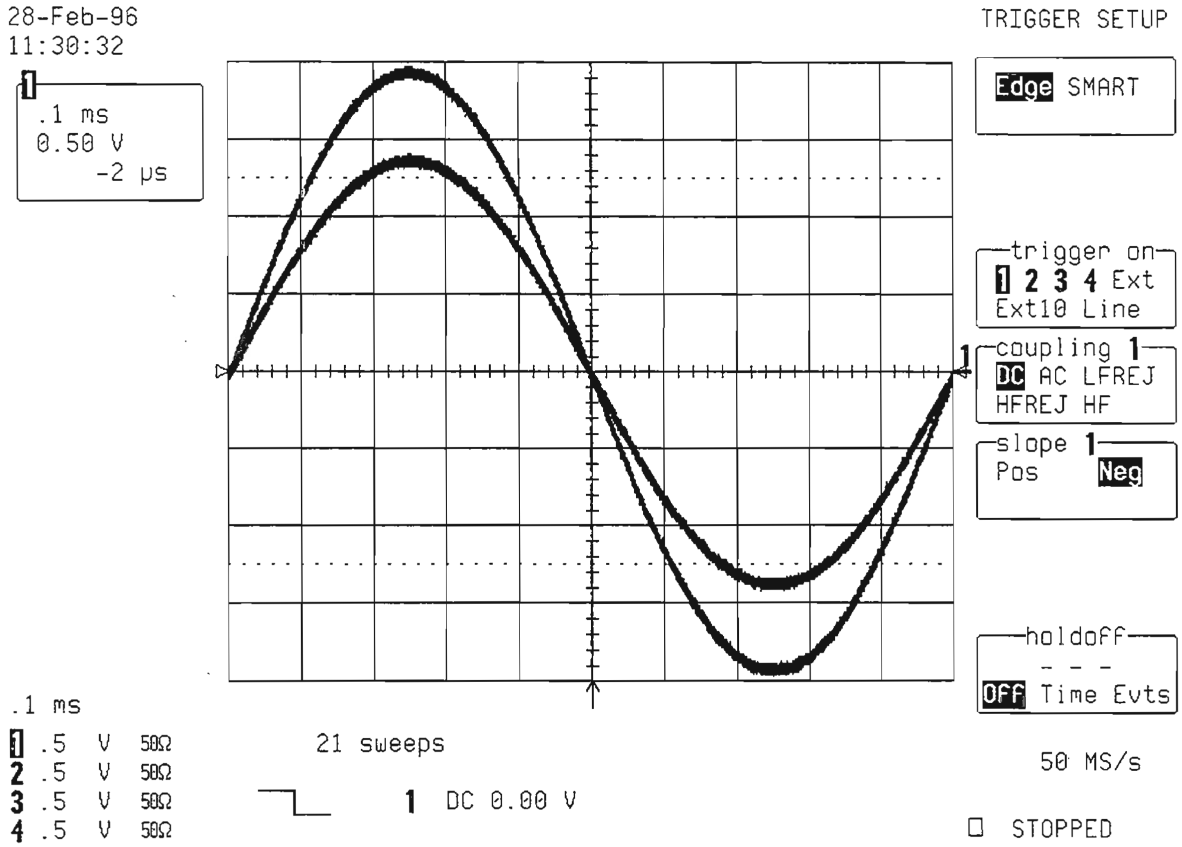
- Select Cursors mode : **Amplitude, Absolute**
- Use the " cursor position " knob, to move the marker at the **vertical crossing point** of the two sine waves.
- Check that the **voltage** difference obtained between the marker and the trigger level is within ± **200 mV.** The level readout is below 0.50 V in the icon **1,** at top left.

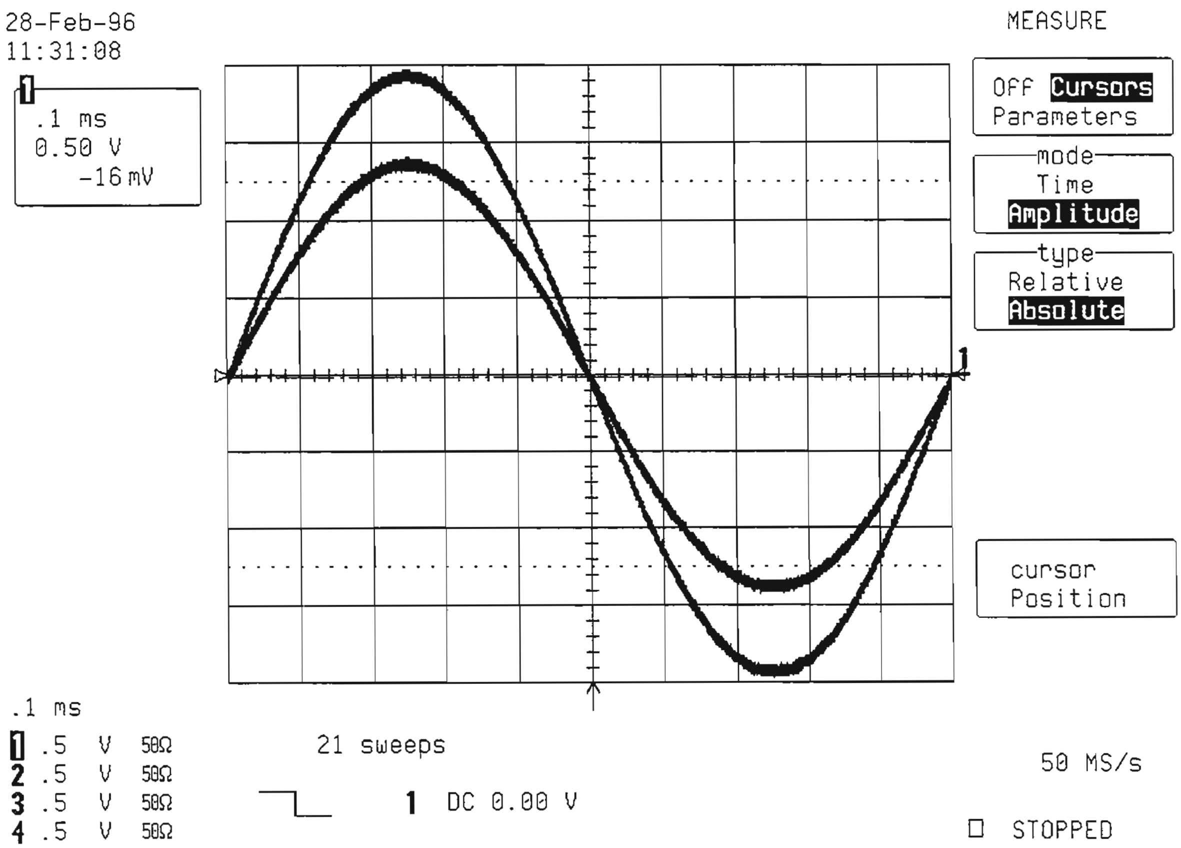


- Set Trigger Slope 1 : **Neg**

- Disconnect the **3 dB attenuator** from the BNC input
- Acquire few sweeps in Single Trigger mode.
- Connect the **3 dB attenuator**, and acquire few more sweeps in Single mode.
- Select Cursors/Measure : **Cursors, Time, Absolute**
- Use the " cursor position " knob, to move the marker at the **horizontal crossing point** of the two sine waves.
- Check that the **time** difference obtained between the marker and the trigger is within ± **20 µ sec.** The time readout is below 0.50 V in the icon **1,** at top left.

- Select Cursors mode : **Amplitude, Absolute**
- Use the " cursor position " knob, to move the marker at the **vertical crossing point** of the two sine waves.
- Check that the **voltage** difference obtained between the marker and the trigger level is within ± **200 mV.** The level readout is below 0.50 V in the icon **1,** at top left.


28-Feb-96
11:30:32
1
.1 ms
0.50 V
-2 µs
TRIGGER SETUP
Edge SMART
trigger on
1 2 3 4 Ext
Ext10 Line
coupling 1
DC AC LFREJ
HFREJ HF
slope 1
Pos Neg
holdoff
- - -
Off Time Evts
.1 ms
1 .5 V 50Ω
2 .5 V 50Ω
3 .5 V 50Ω
4 .5 V 50Ω
21 sweeps
1 DC 0.00 V
50 MS/s
STOPPED


28-Feb-96
11:31:08
1
.1 ms
0.50 V
-16 mV
MEASURE
Off Cursors
Parameters
mode
Time
Amplitude
type
Relative
Absolute
cursor
Position
.1 ms
1 .5 V 50Ω
2 .5 V 50Ω
3 .5 V 50Ω
4 .5 V 50Ω
21 sweeps
1 DC 0.00 V
50 MS/s
STOPPED

- Set Trigger level : **DC + 1.5 V**
- Disconnect the **3 dB attenuator** from the BNC input
- Set Trigger Slope 1 : **Pos**

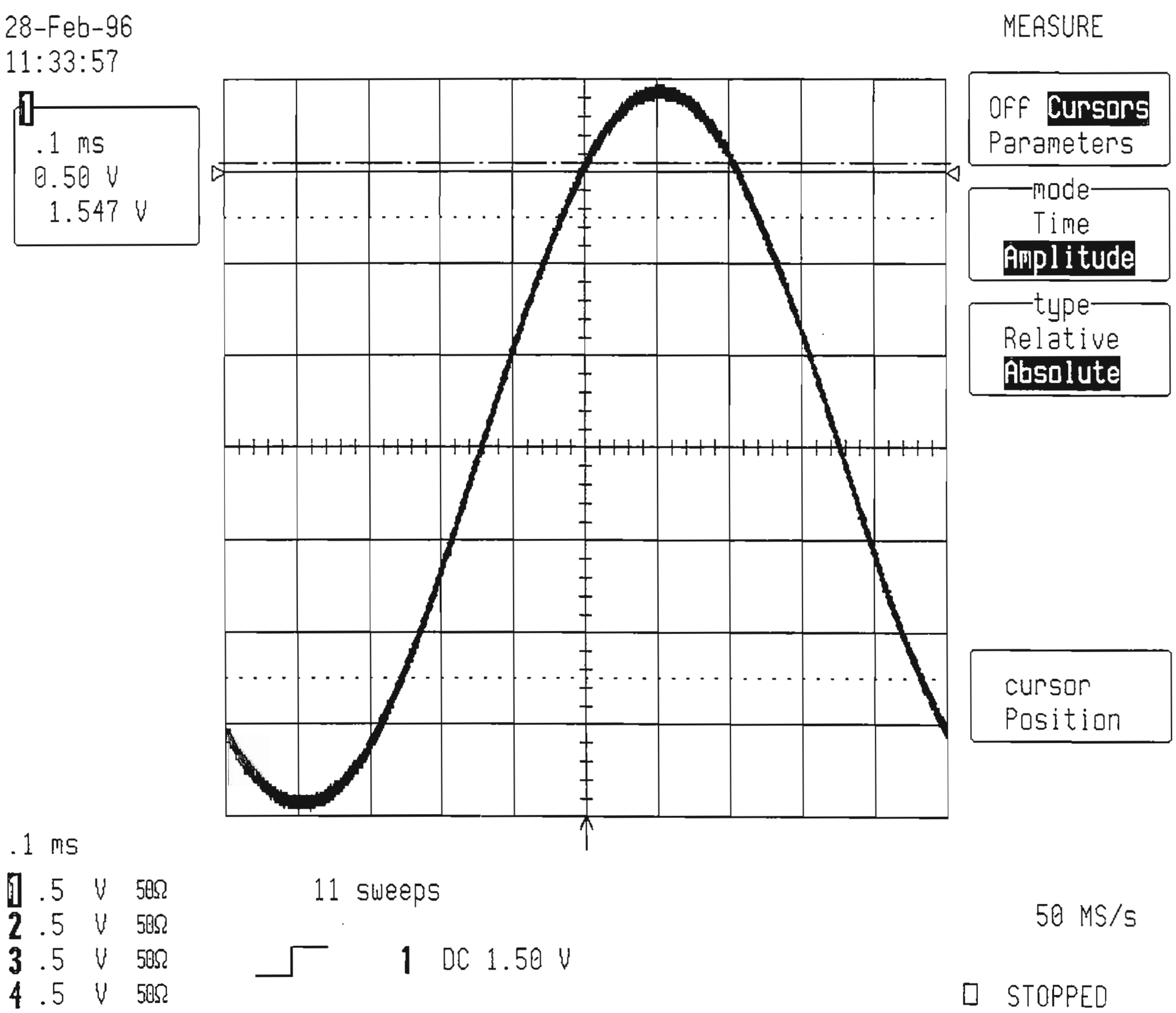
- Acquire few sweeps in Single Trigger mode.

- The sine wave must pass through the **horizontal center** of the screen at the **vertical** + **3 divisions**.

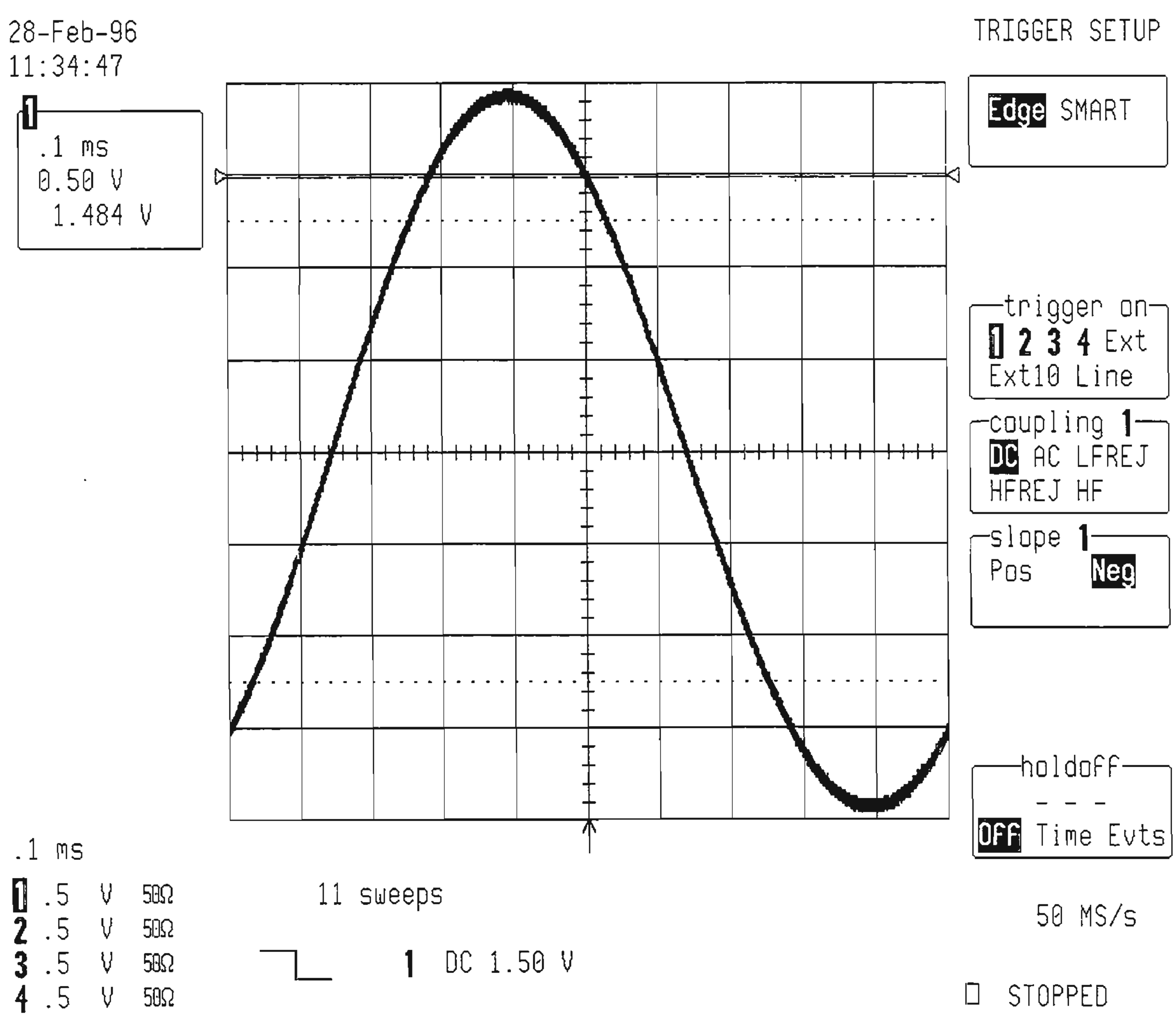
- Select Cursors/Measure : **Cursors, Amplitude, Absolute**

- Use the " cursor position " knob, to move the marker, at the **crossing point** of the **sine wave** and the **horizontal center of the screen** (50% pre-trigger line).

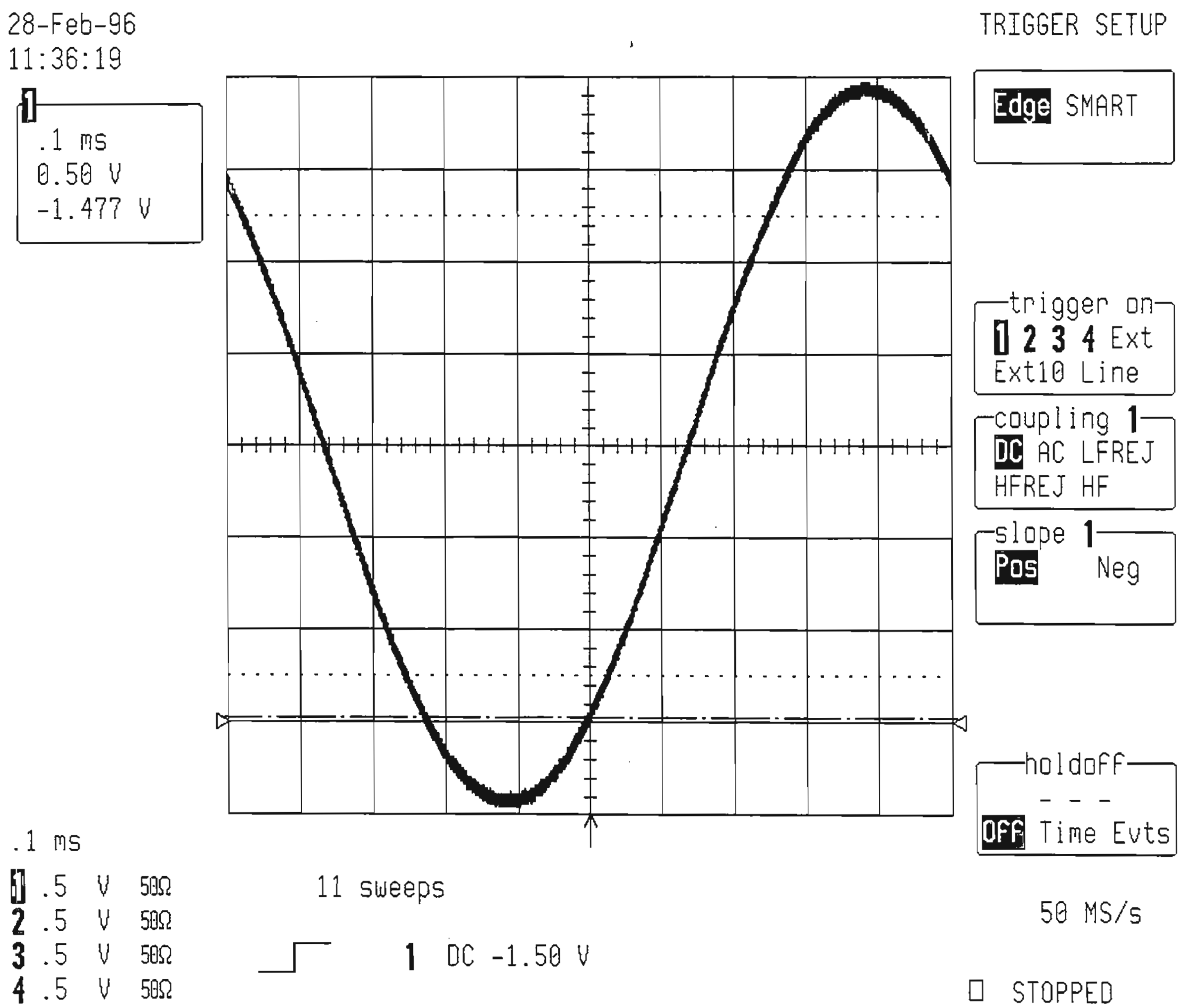
- Check that the **vertical crossing point level is + 1.5 V ± .2 V.** See icon **1** at top left.



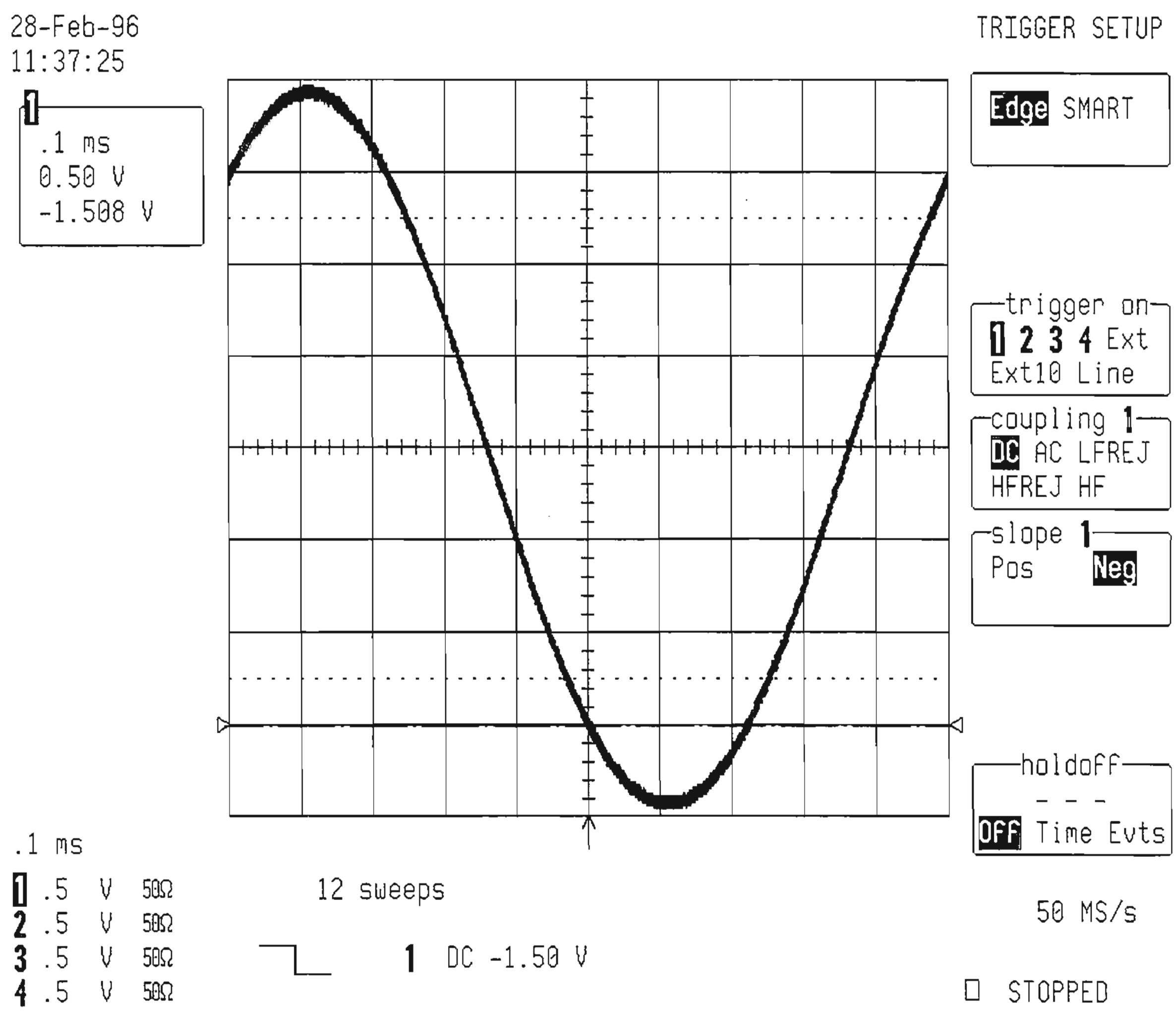
- Set Trigger Slope 1 : **Neg**
- Acquire few sweeps in Single Trigger mode.
- The sine wave must pass through the **horizontal center** of the screen at the **vertical + 3 divisions**.
- Select Cursors/Measure : **Cursors, Amplitude, Absolute**
- Use the " cursor position " knob, to move the marker, at the **crossing point** of the **sine wave** and the **horizontal center of the screen** (50% pre-trigger line).
- Check that the **vertical crossing point level is + 1.5 V ± .2 V.** See icon at top left.



- Set Trigger level : **DC - 1.5 V**
- Set Trigger Slope 1 : **Pos**
- Acquire few sweeps in Single Trigger mode.
- The sine wave must pass through the **horizontal center** of the screen at the **vertical - 3 divisions**.
- Select Cursors/Measure : **Cursors, Amplitude, Absolute**
- Use the " cursor position " knob, to move the marker, at the **crossing point** of the **sine wave** and the **horizontal center of the screen** (50% pre-trigger line).
- Check that the **vertical crossing point level is - 1.5 V ± .2 V.** See icon **1** at top left.



- Set Trigger Slope 1 : **Neg**
- Acquire few sweeps in Single Trigger mode.
- The sine wave must pass through the **horizontal center** of the screen at the **vertical - 3 divisions**.
- Select Cursors/Measure : **Cursors, Amplitude, Absolute**
- Use the " cursor position " knob, to move the marker, at the **crossing point** of the **sine wave** and the **horizontal center of the screen** (50% pre-trigger line).
- Check that the **vertical crossing point level is - 1.5 V ± .2 V.** See icon 1 at top left.



- Repeat step 5.10.2 for Channel 2, Channel 3 and Channel 4, substituting channel controls and input connector.

5.10.3 External Trigger

Specifications

External trigger range : DC ± .5 V

Procedure

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

- Set frequency : **1 KHz**
- Turn on trace : **Ch2**
- Input Coupling Ch 2 : **DC 50 Ω**
- V/div. offset : **Normal**
- Input gain : **100 mV/div.**
- Input offset : **0 mV**
- Trigger setup : **Edge**
- Trigger on : **Ext**
- Coupling Ext : **DC**
- Slope Ext : **Pos**
- External : **DC 1MΩ**
- Set Ext Trigger level : **DC 0.0 mV**
- Mode : **Single**
- Pre-Trigger Delay : **50 %**
- Timebase : **.1 msec/div.**
- Channel use : **4**
- Record up to : **50 K samples**

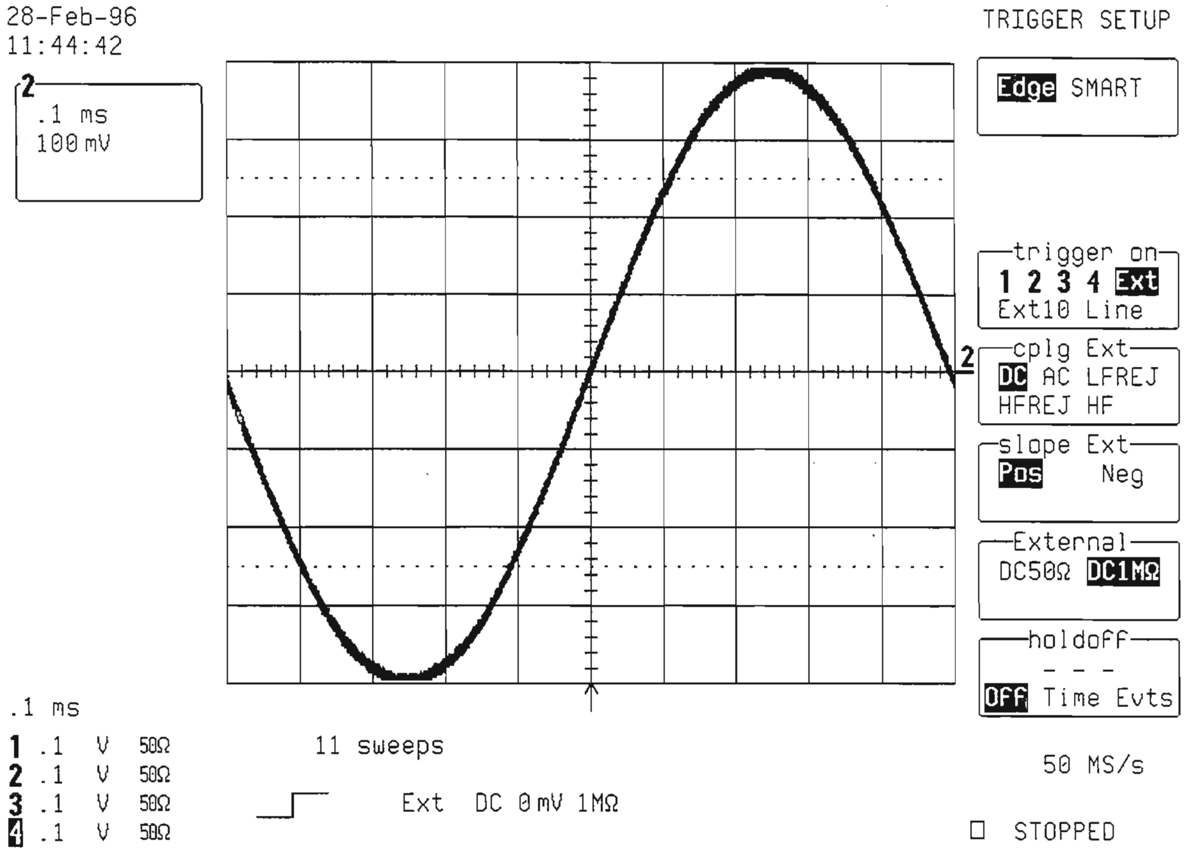
- Adjust the sine wave generator's output amplitude to get **8 divisions peak to peak**, corresponding to a **.8 V** amplitude.
- It is important that the offset of the input is set to **zero mV**, use show status and acquisition status to verify.

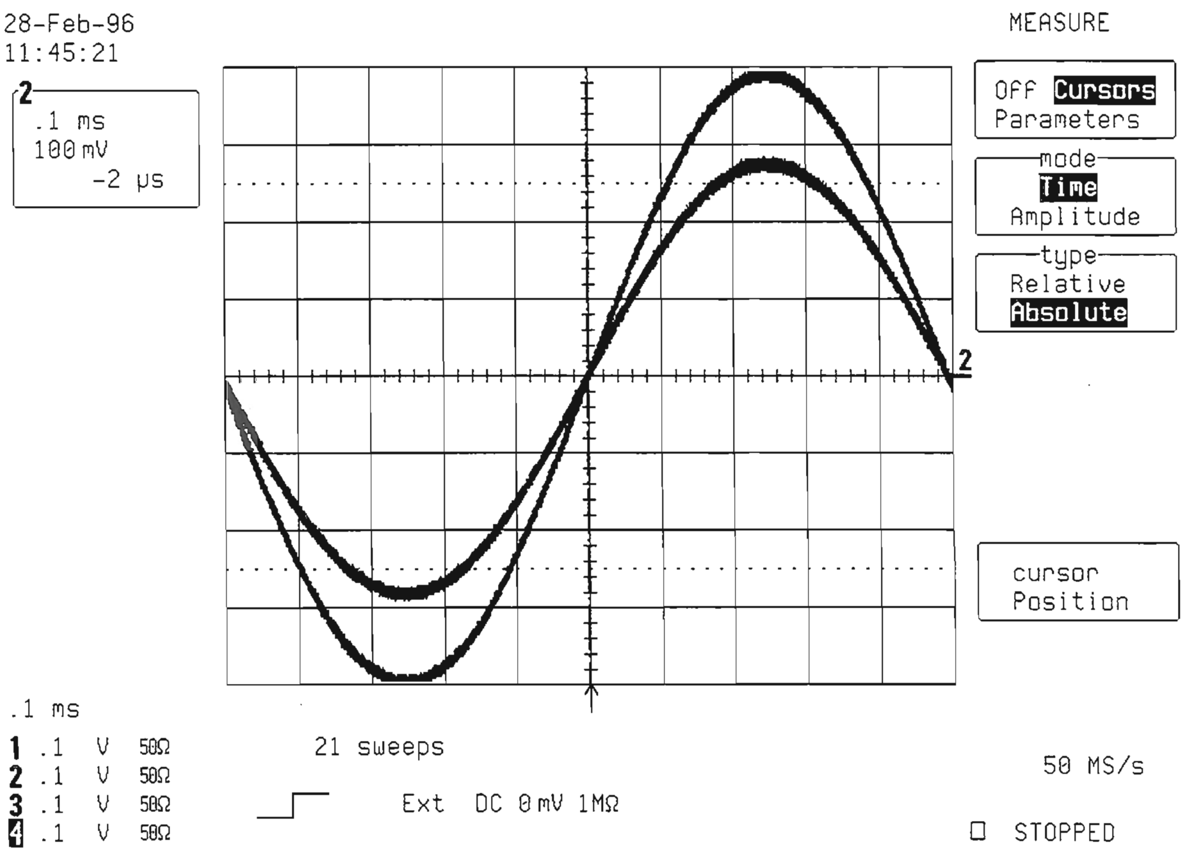
- Display setup : **Dot join Off**
- Set **Persistence On,** and acquire few sweeps in Single Trigger mode.

- Connect a **3 dB attenuator**, and acquire few more sweeps in Single mode.

- Select Cursors/Measure : **Cursors, Time, Absolute**
- Use the " cursor position " knob, to move the marker at the **horizontal crossing point** of the two sine waves.

- Check that the **time** difference obtained between the marker and the trigger is within **± 20 µsec.** The time readout is below 100 mV in the icon **2,** at top left.

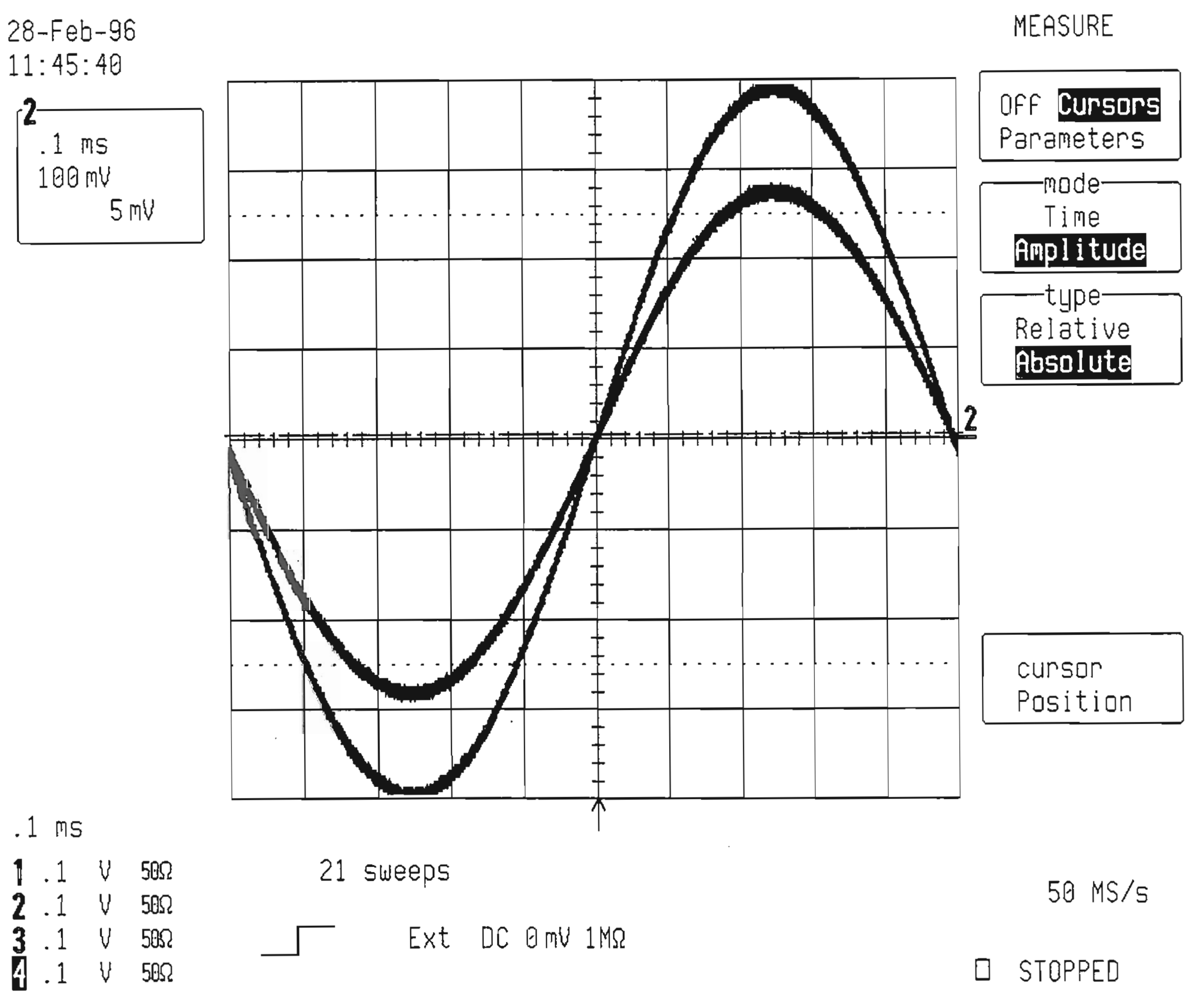

28-Feb-96
11:44:42
2
.1 ms
100 mV
TRIGGER SETUP
Edge SMART
trigger on
1 2 3 4 Ext
Ext10 Line
cplg Ext
DC AC LFREJ
HFREJ HF
slope Ext
Pos Neg
External
DC50Ω DC1MΩ
holdoff
- - -
Off Time Evts
.1 ms
1 .1 V 50Ω
2 .1 V 50Ω
3 .1 V 50Ω
4 .1 V 50Ω
11 sweeps
Ext DC 0 mV 1MΩ
50 MS/s
STOPPED


28-Feb-96
11:45:21
2
.1 ms
100 mV
-2 μs
MEASURE
Off Cursors
Parameters
mode
Time
Amplitude
type
Relative
Absolute
cursor
Position
.1 ms
1 .1 V 50Ω
2 .1 V 50Ω
3 .1 V 50Ω
4 .1 V 50Ω
21 sweeps
Ext DC 0 mV 1MΩ
50 MS/s
STOPPED

- Select Cursors mode : **Amplitude, Absolute**

- Use the " cursor position " knob, to move the marker at the vertical crossing point of the two sine waves.

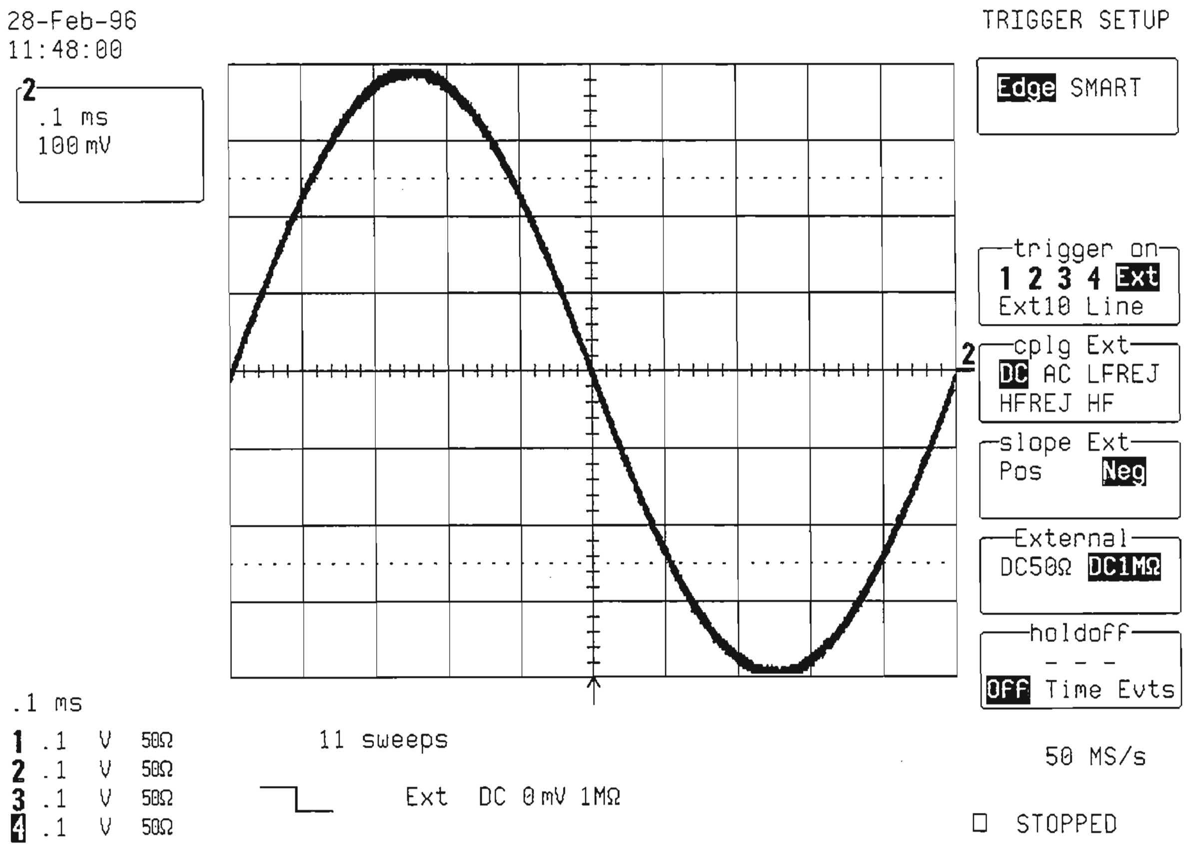
- Check that the **vertical crossing point level is within** ± **40 mV.** See icon 2 at top left.

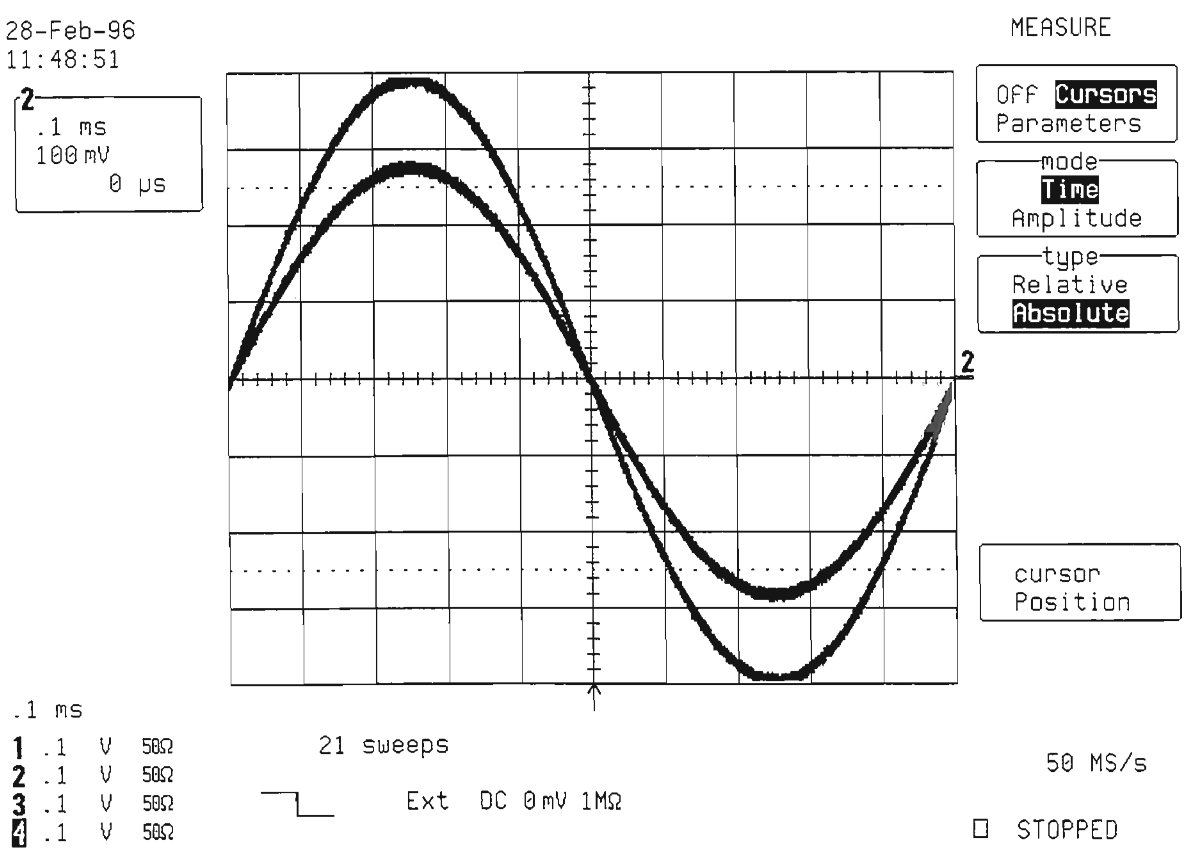


- Set Slope Ext : **Neg**

- Disconnect the **3 dB attenuator** from the BNC input
- Acquire few sweeps in Single Trigger mode.
- Connect the **3 dB attenuator**, and acquire few more sweeps in Single mode.
- Select Cursors/Measure : **Cursors, Time, Absolute**
- Use the " cursor position " knob, to move the marker at the **horizontal crossing point** of the two sine waves.

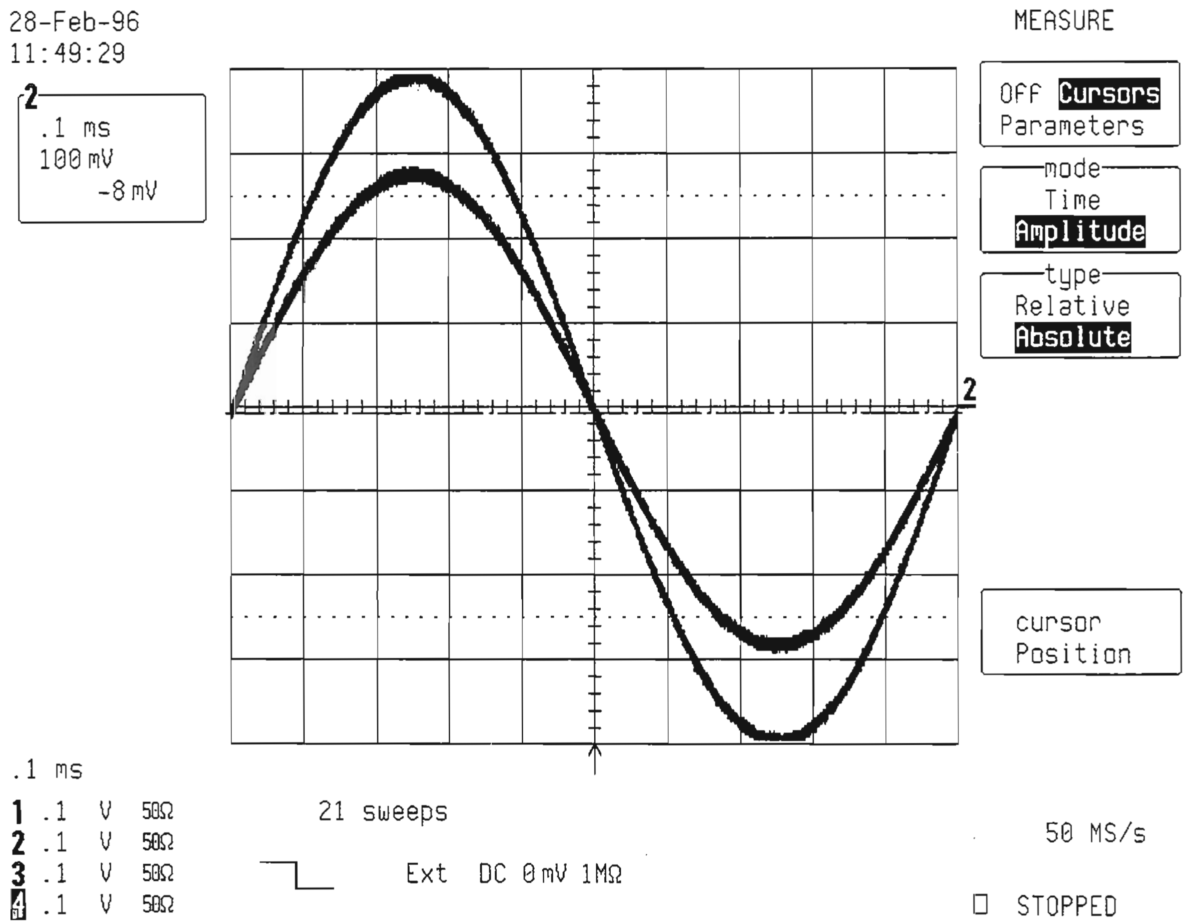
- Check that the **time** difference obtained between the marker and the trigger is within ± **20 μ sec.** The time readout is below 100 mV in the icon **2,** at top left.


28-Feb-96
11:48:00
2
.1 ms
100 mV
TRIGGER SETUP
Edge SMART
trigger on
1 2 3 4 Ext
Ext10 Line
cplg Ext
DC AC LFREJ
HFREJ HF
slope Ext
Pos Neg
External
DC50Ω DC1MΩ
holdoff
- - -
Off Time Evts
.1 ms
1 .1 V 50Ω
2 .1 V 50Ω
3 .1 V 50Ω
4 .1 V 50Ω
11 sweeps
Ext DC 0 mV 1MΩ
50 MS/s
STOPPED


28-Feb-96
11:48:51
2
.1 ms
100 mV
0 μs
MEASURE
Off Cursors
Parameters
mode
Time
Amplitude
type
Relative
Absolute
cursor
Position
.1 ms
1 .1 V 50Ω
2 .1 V 50Ω
3 .1 V 50Ω
4 .1 V 50Ω
21 sweeps
Ext DC 0 mV 1MΩ
50 MS/s
STOPPED

- Select Cursors mode : **Amplitude, Absolute**
- Use the " cursor position " knob, to move the marker at the **vertical crossing point** of the two sine waves.

- Check that the **voltage** difference obtained between the marker and the trigger level is within ± **40 mV.** The level readout is below 100 mV in the icon **2,** at top left.

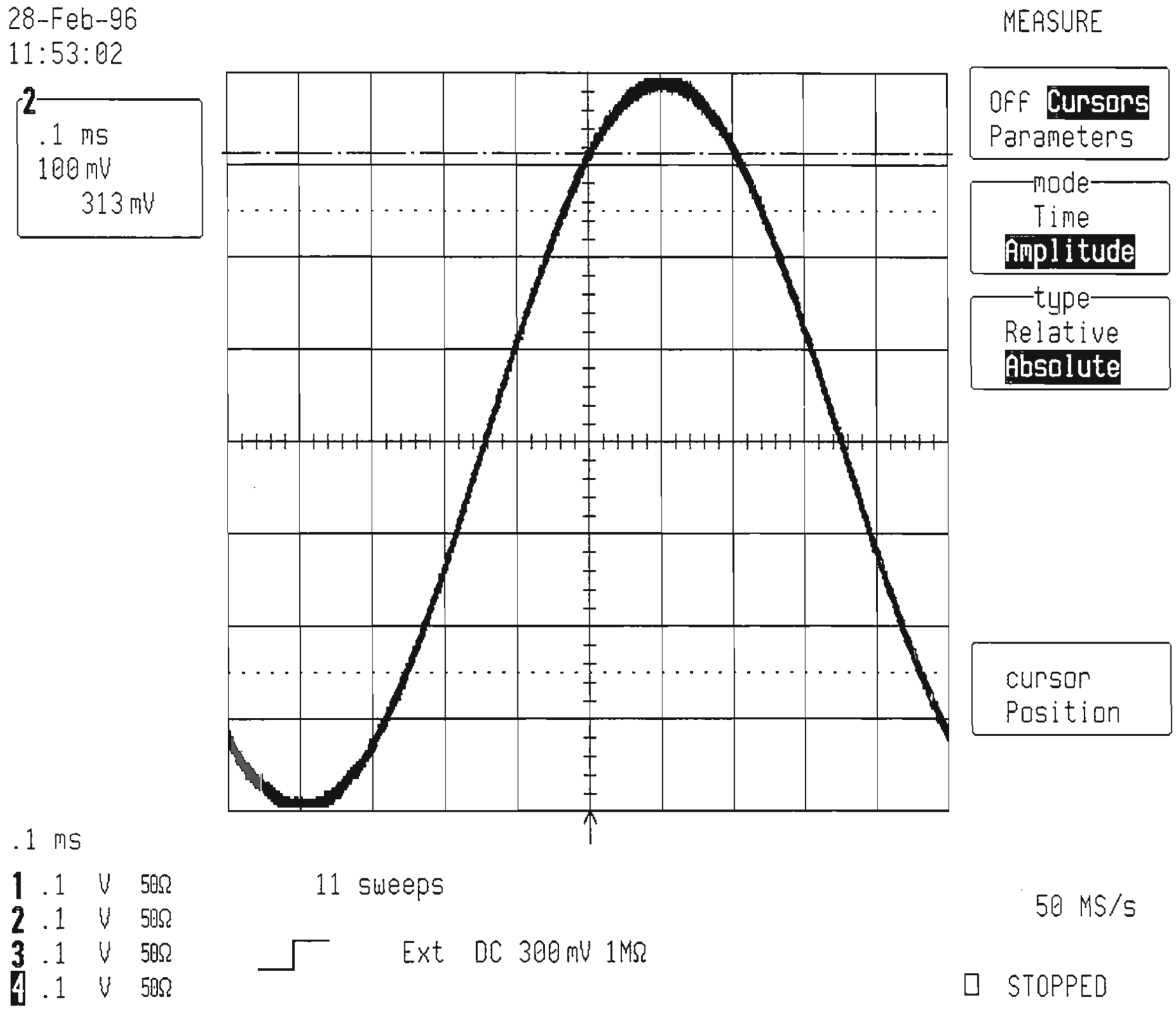


- Set Trigger level : **DC + 300 mV**

- Disconnect the **3 dB attenuator** from the BNC input
- Set Trigger Slope Ext : **Pos**
- Acquire few sweeps in Single Trigger mode.
- The sine wave must pass through the **horizontal center** of the screen at the **vertical + 3 divisions**.

- Select Cursors/Measure : **Cursors, Amplitude, Absolute**
- Use the " cursor position " knob, to move the marker, at the **crossing point** of the **sine wave** and the **horizontal center of the screen** (50% pre-trigger line).

- Check that the **vertical crossing point level is + 300 mV** ± **40 mV.** See icon **2** at top.

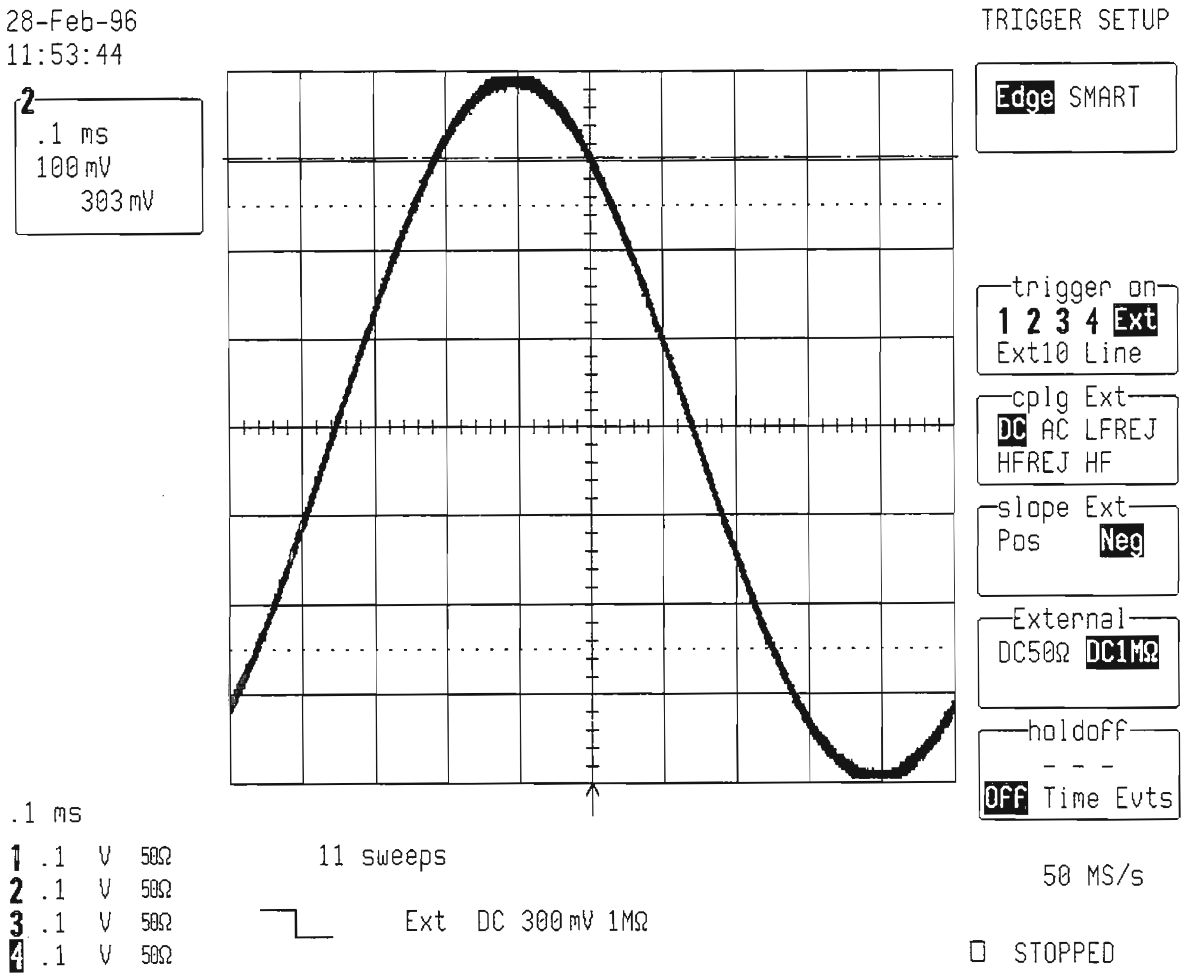


- Set Trigger Slope Ext : **Neg**

- Acquire few sweeps in Single Trigger mode.
- The sine wave must pass through the **horizontal center** of the screen at the **vertical + 3 divisions**.

- Select Cursors/Measure : **Cursors, Amplitude, Absolute**
- Use the " cursor position " knob, to move the marker, at the **crossing point** of the **sine wave** and the **horizontal center of the screen** (50% pre-trigger line).

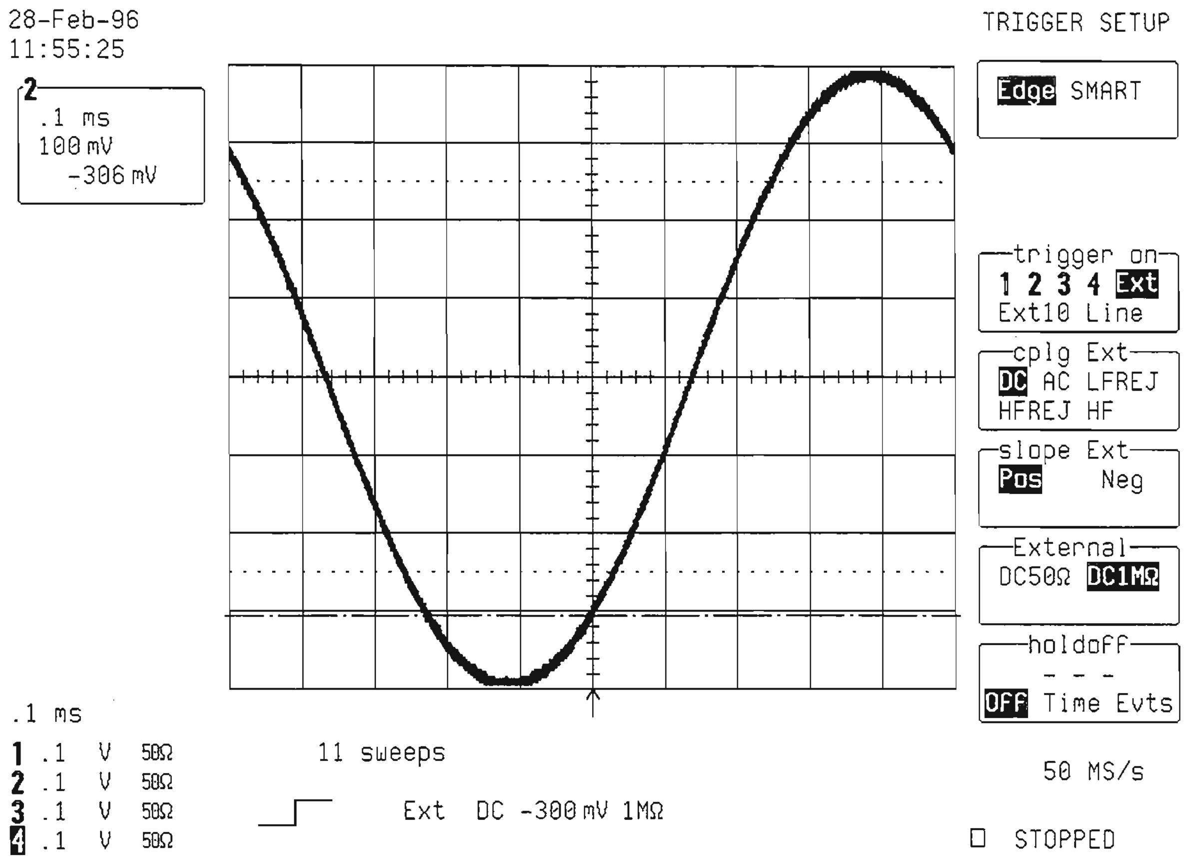
- Check that the **vertical crossing point level is + 300 mV ± 40 mV.** See icon 2 at top .

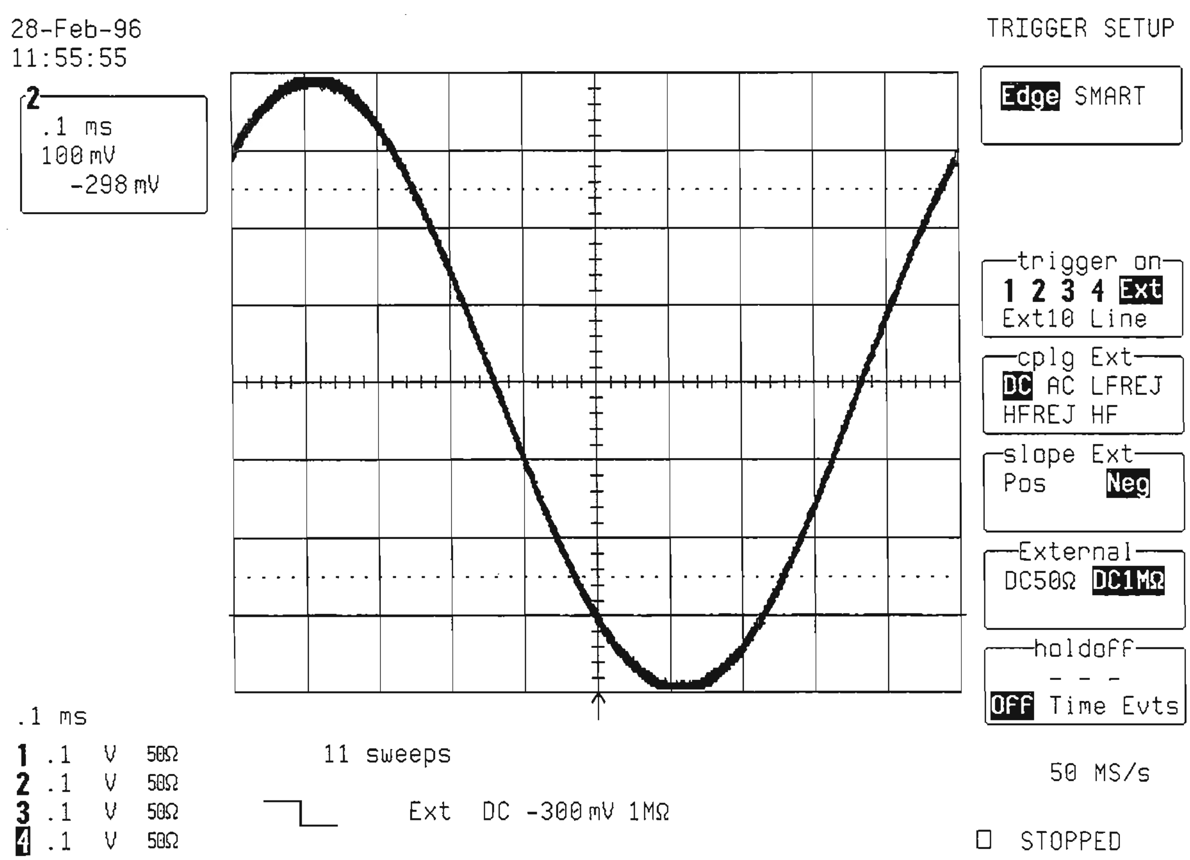


- Set Trigger level : **DC - 300 mV**

- Set Trigger Slope Ext : **Pos**
- Acquire few sweeps in Single Trigger mode.
- The sine wave must pass through the **horizontal center** of the screen at the **vertical - 3 divisions.**
- Select Cursors/Measure : **Cursors, Amplitude, Absolute**
- Use the " cursor position " knob, to move the marker, at the **crossing point** of the **sine wave** and the **horizontal center of the screen** (50% pre-trigger line).
- Check that the **vertical crossing point level is - 300 mV ± 40 mV.** See icon **2** at top.

- Set Trigger Slope Ext : **Neg**
- Acquire few sweeps in Single Trigger mode.
- The sine wave must pass through the **horizontal center** of the screen at the **vertical - 3 divisions.**
- Select Cursors/Measure : **Cursors, Amplitude, Absolute**
- Use the " cursor position " knob, to move the marker, at the **crossing point** of the **sine wave** and the **horizontal center of the screen** (50% pre-trigger line).
- Check that the **vertical crossing point level is - 300 mV ± 40 mV.** See icon 2 at top.


28-Feb-96
11:55:25
2
.1 ms
100 mV
-306 mV
TRIGGER SETUP
Edge SMART
trigger on
1 2 3 4 Ext
Ext10 Line
cplg Ext
DC AC LFREJ
HFREJ HF
slope Ext
Pos Neg
External
DC50Ω DC1MΩ
holdoff
- - -
Off Time Evts
.1 ms
1 .1 V 50Ω
2 .1 V 50Ω
3 .1 V 50Ω
4 .1 V 50Ω
11 sweeps
Ext DC -300 mV 1MΩ
50 MS/s
STOPPED


28-Feb-96
11:55:55
2
.1 ms
100 mV
-298 mV
TRIGGER SETUP
Edge SMART
trigger on
1 2 3 4 Ext
Ext10 Line
cplg Ext
DC AC LFREJ
HFREJ HF
slope Ext
Pos Neg
External
DC50Ω DC1MΩ
holdoff
- - -
Off Time Evts
.1 ms
1 .1 V 50Ω
2 .1 V 50Ω
3 .1 V 50Ω
4 .1 V 50Ω
11 sweeps
Ext DC -300 mV 1MΩ
50 MS/s
STOPPED

5.10.4 External /10 Trigger

Specifications

External trigger range : DC ± 5 V

Procedure

- Connect the output of the generator to External input and to Channel 2 via a coaxial T-connector. The cable length from External to Channel 2 must be short, at most 2 nsec.
- Set frequency : **1 KHz**

- Turn on trace : **Ch2**
- Input Coupling Ch 2 : **DC 50 Ω**
- V/div. offset : **Normal**
- Input gain : **1 V/div.**
- Input offset : **0 mV**
- Trigger setup : **Edge**
- Trigger on : **Ext10**
- Coupling Ext10 : **DC**
- Slope Ext10 : **Pos**
- External : **DC 1MΩ**
- Set Ext Trigger level : **DC 0.0 mV**
- Mode : **Single**
- Pre-Trigger Delay : **50 %**
- Timebase : **.1 msec/div.**
- Channel use : **4**
- Record up to : **50 K samples**

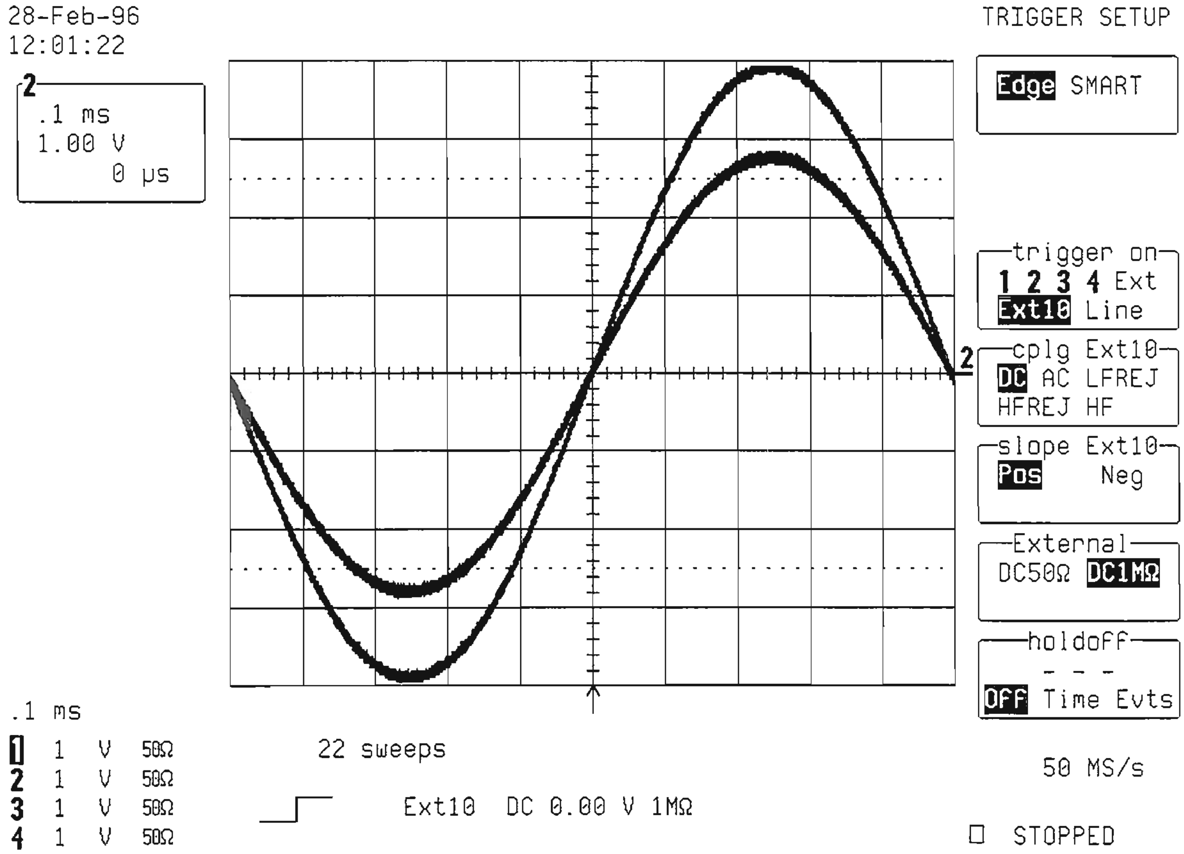
- Adjust the sine wave generator's output amplitude to get **8 divisions peak to peak**, corresponding to a **8 V** amplitude.
- It is important that the offset of the input is set to **zero mV**, use show status and acquisition status to verify.

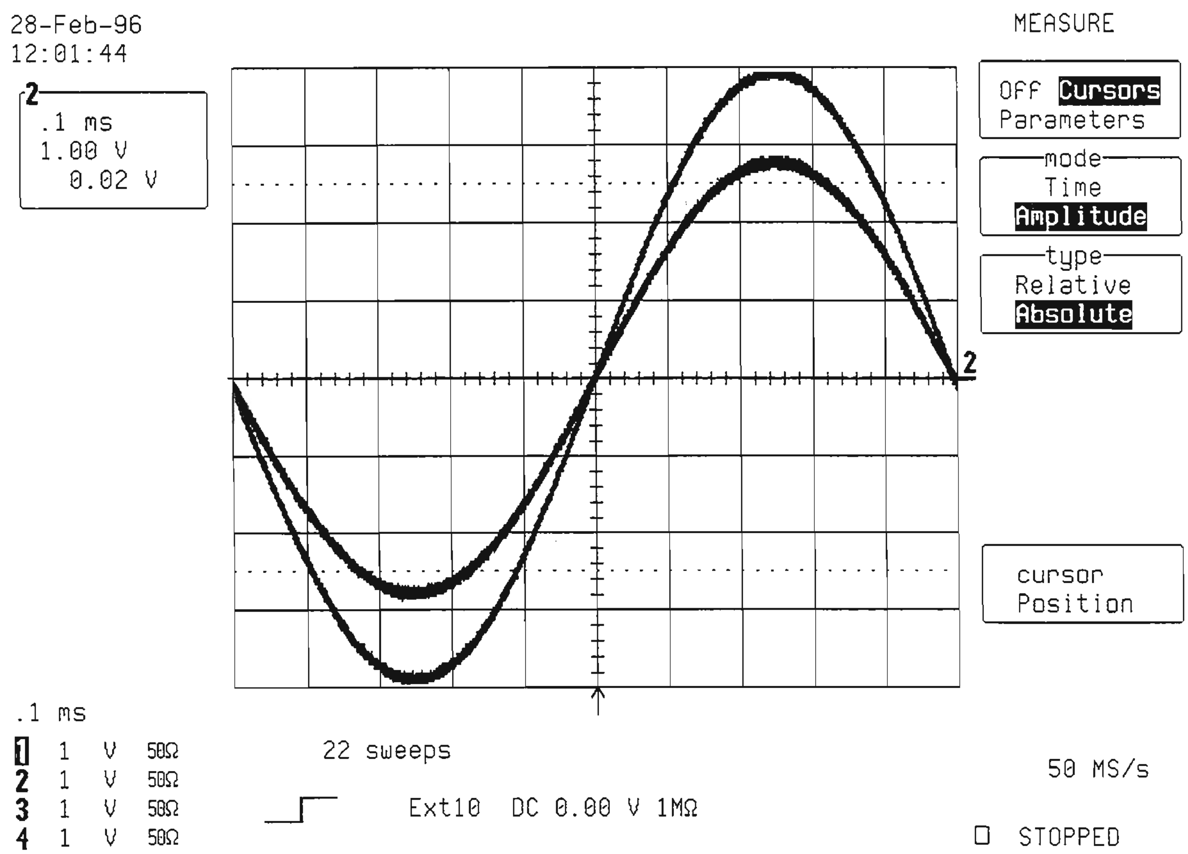
- Display setup : **Dot join Off**
- Set **Persistence On,** and acquire few sweeps in Single Trigger mode.

- Connect a **3 dB attenuator**, and acquire few more sweeps in Single mode.

- Select Cursors/Measure : **Cursors, Time, Absolute**
- Use the " cursor position " knob, to move the marker at the **horizontal crossing point** of the two sine waves.

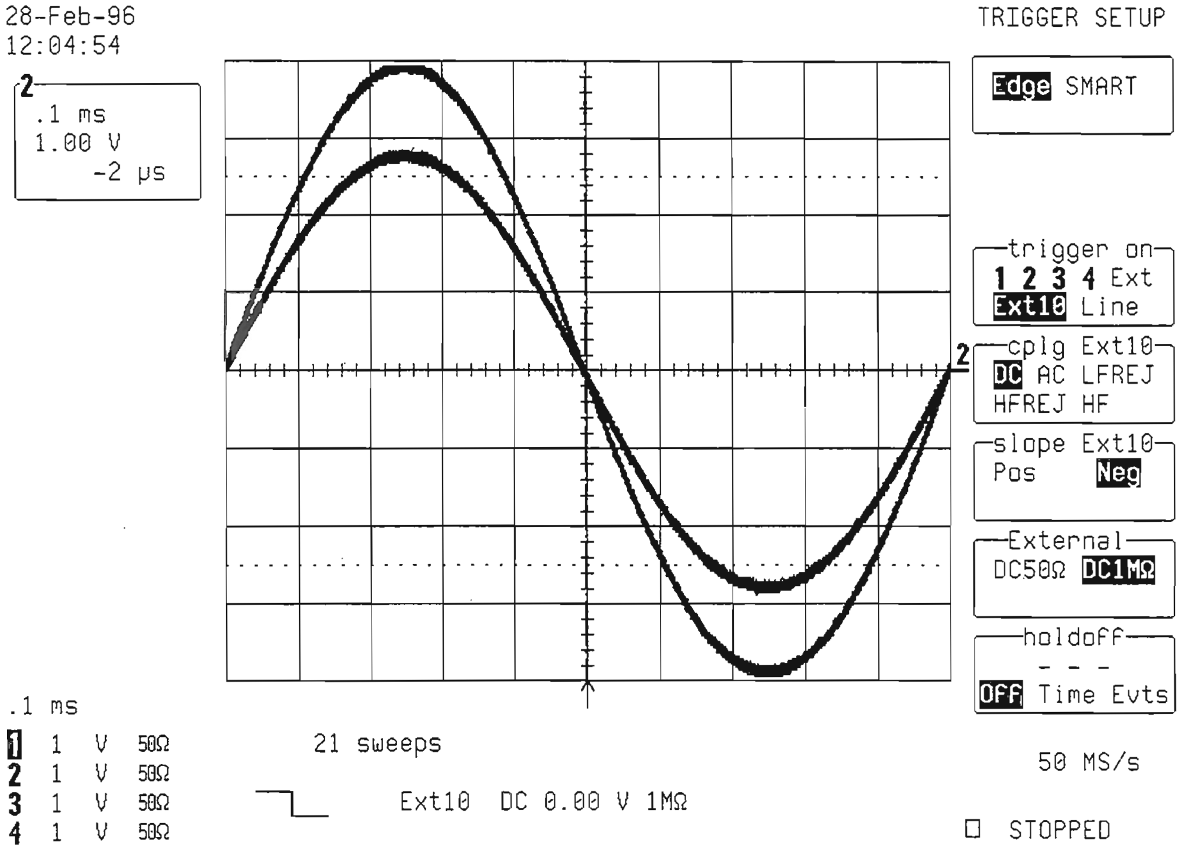
- Check that the **time** difference obtained between the marker and the trigger is within ± **20 µsec.** The time readout is below 1 V in the icon **2,** at top left.

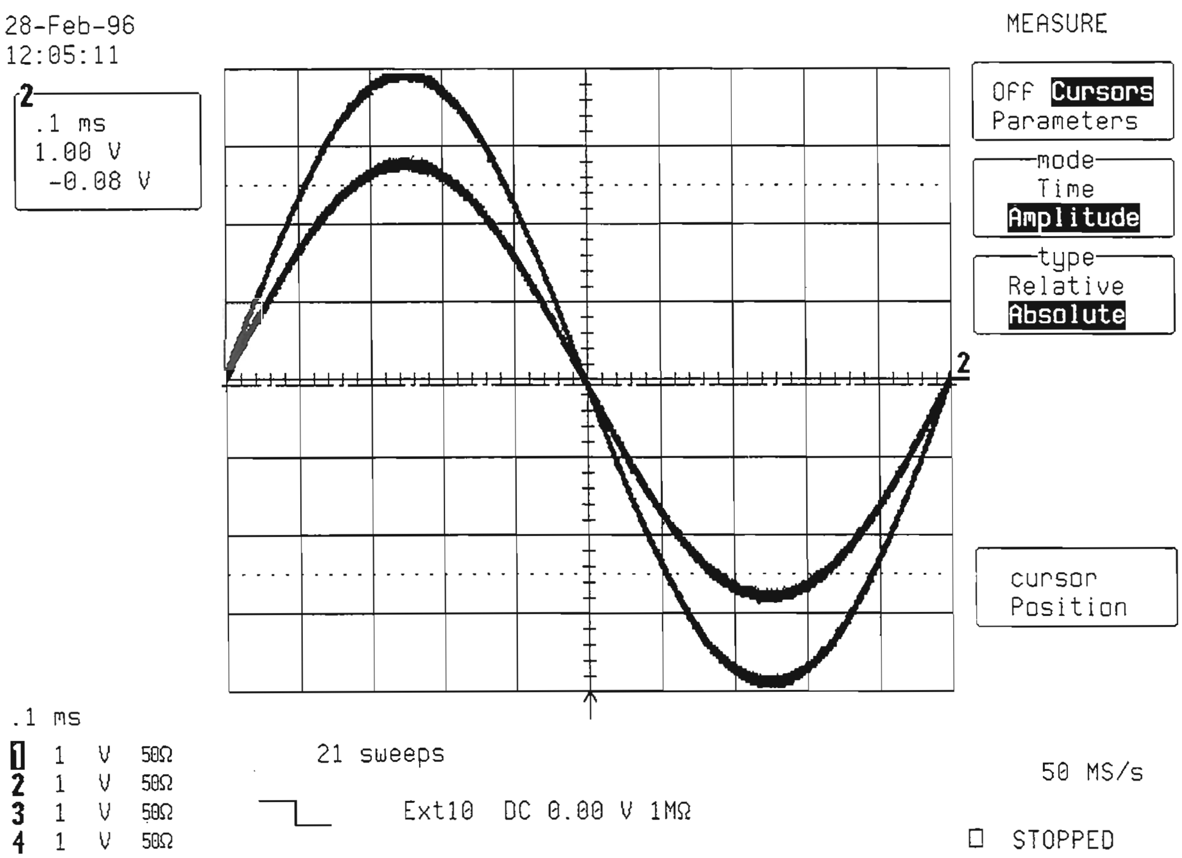

28-Feb-96
12:01:22
TRIGGER SETUP
2
.1 ms
1.00 V
0 µs
Edge SMART
trigger on
1 2 3 4 Ext
Ext10 Line
2
cplg Ext10
DC AC LFREJ
HFREJ HF
slope Ext10
Pos Neg
External
DC50Ω DC1MΩ
holdoff
- - -
Off Time Evts
.1 ms
1 1 V 50Ω
2 1 V 50Ω
3 1 V 50Ω
4 1 V 50Ω
22 sweeps
Ext10 DC 0.00 V 1MΩ
50 MS/s
STOPPED


28-Feb-96
12:01:44
MEASURE
2
.1 ms
1.00 V
0.02 V
Off Cursors
Parameters
mode
Time
Amplitude
type
Relative
Absolute
2
cursor
Position
.1 ms
1 1 V 50Ω
2 1 V 50Ω
3 1 V 50Ω
4 1 V 50Ω
22 sweeps
Ext10 DC 0.00 V 1MΩ
50 MS/s
STOPPED

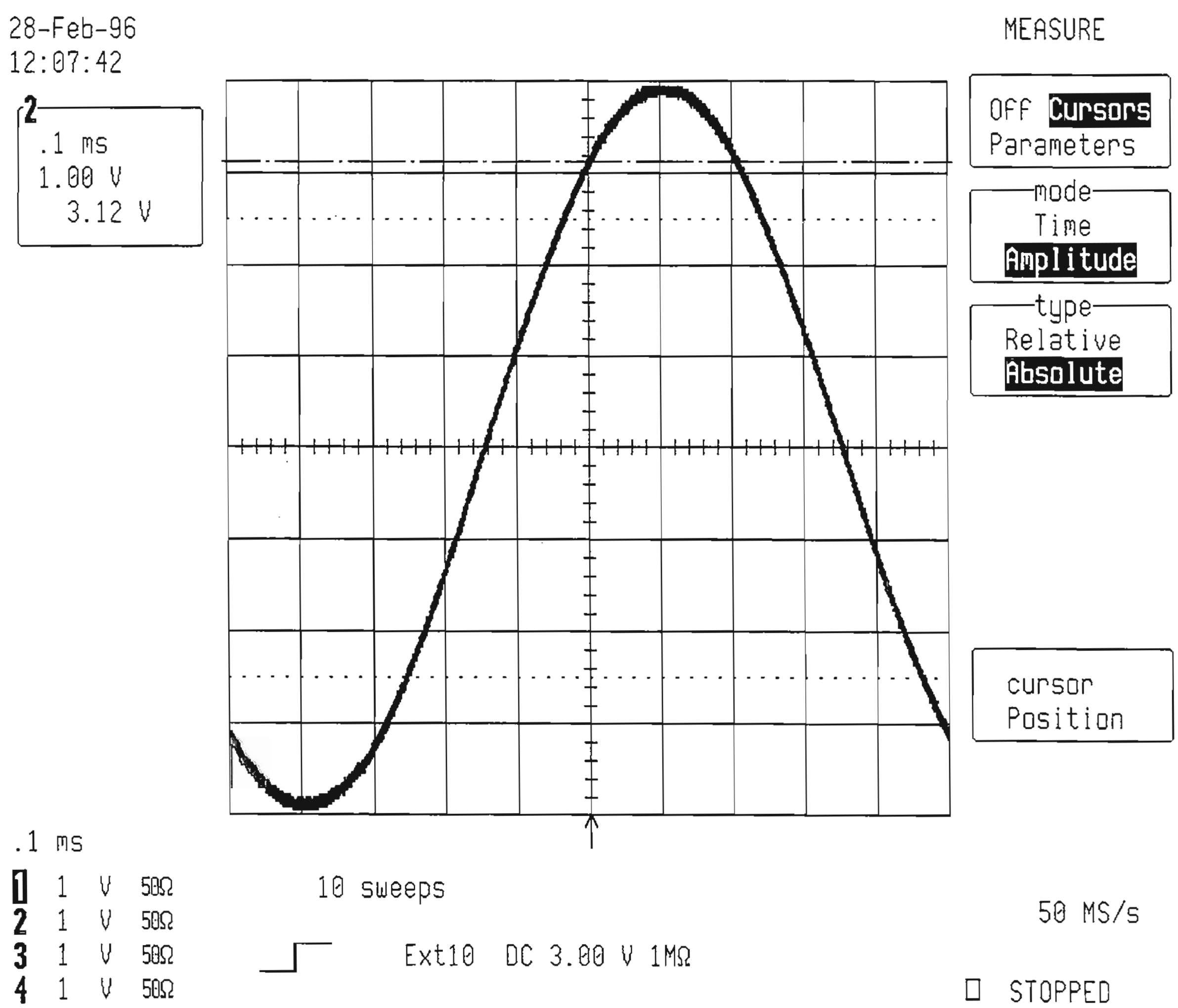
- Select Cursors mode : **Amplitude, Absolute**
- Use the " cursor position " knob, to move the marker at the **vertical crossing point** of the two sine waves.
- Check that the **voltage** difference obtained between the marker and the trigger level is within ± **400 mV.** The level readout is below 1 V in the icon **2,** at top left.

- Set Trigger Slope Ext10 : **Neg**
- Disconnect the **3 dB attenuator** from the BNC input
- Acquire few sweeps in Single Trigger mode.
- Connect the **3 dB attenuator**, and acquire few more sweeps in Single mode.
- Select Cursors/Measure : **Cursors, Time, Absolute**
- Use the " cursor position " knob, to move the marker at the **horizontal crossing point** of the two sine waves.
- Check that the **time** difference obtained between the marker and the trigger is within ± **20 µ sec.** The time readout is below 1 V in the icon **2,** at top left.
- Select Cursors mode : **Amplitude, Absolute**
- Use the " cursor position " knob, to move the marker at the **vertical crossing point** of the two sine waves.
- Check that the **vertical crossing point level is within** ± **400 mV.** See icon **2** at left.

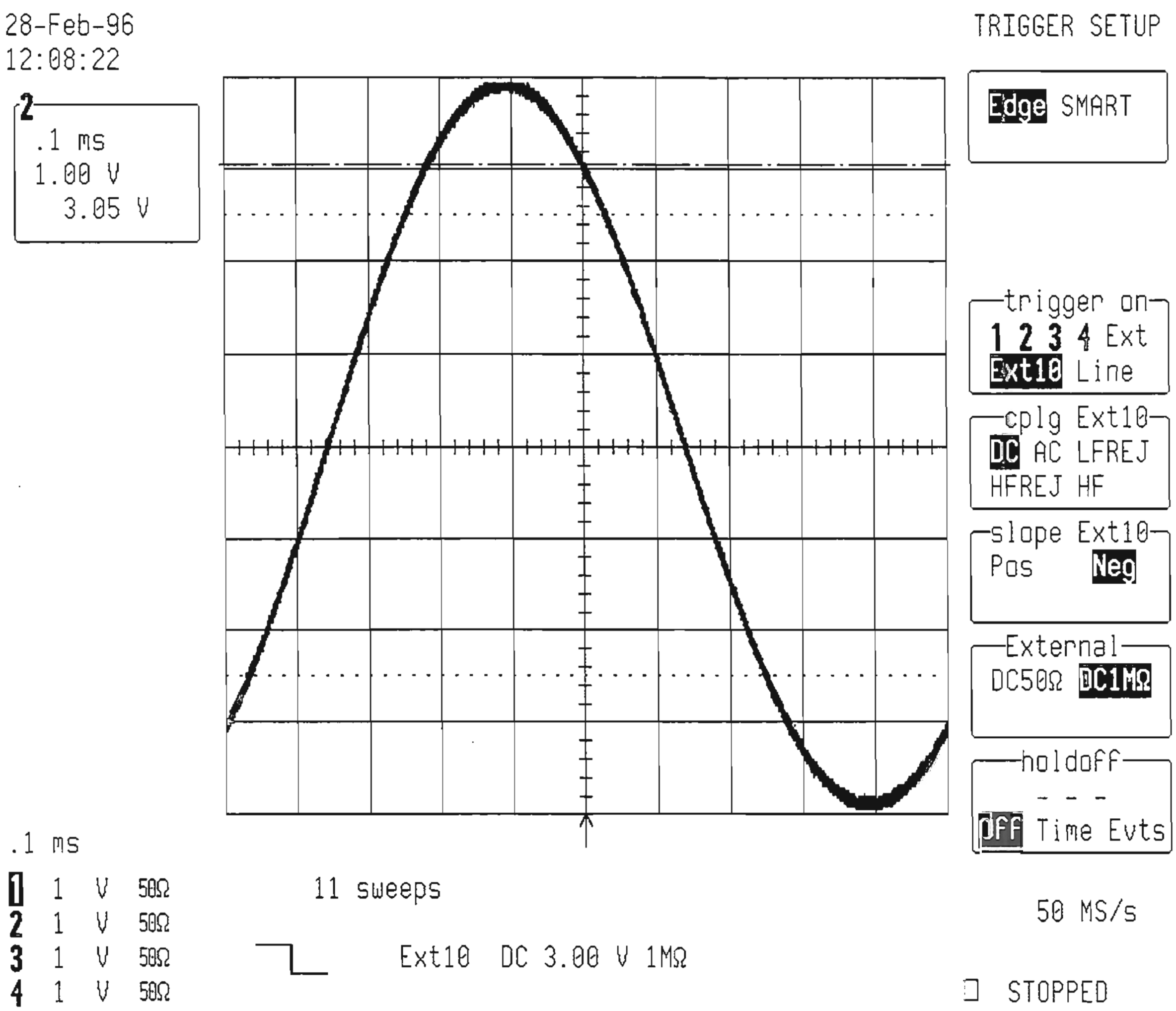

28-Feb-96
12:04:54
2
.1 ms
1.00 V
-2 µs
TRIGGER SETUP
Edge SMART
trigger on
1 2 3 4 Ext
Ext10 Line
cplg Ext10
DC AC LFREJ
HFREJ HF
slope Ext10
Pos Neg
External
DC50Ω DC1MΩ
holdoff
- - -
Off Time Evts
.1 ms
1 1 V 50Ω
2 1 V 50Ω
3 1 V 50Ω
4 1 V 50Ω
21 sweeps
Ext10 DC 0.00 V 1MΩ
50 MS/s
STOPPED


28-Feb-96
12:05:11
2
.1 ms
1.00 V
-0.08 V
MEASURE
Off Cursors
Parameters
mode
Time
Amplitude
type
Relative
Absolute
cursor
Position
.1 ms
1 1 V 50Ω
2 1 V 50Ω
3 1 V 50Ω
4 1 V 50Ω
21 sweeps
Ext10 DC 0.00 V 1MΩ
50 MS/s
STOPPED

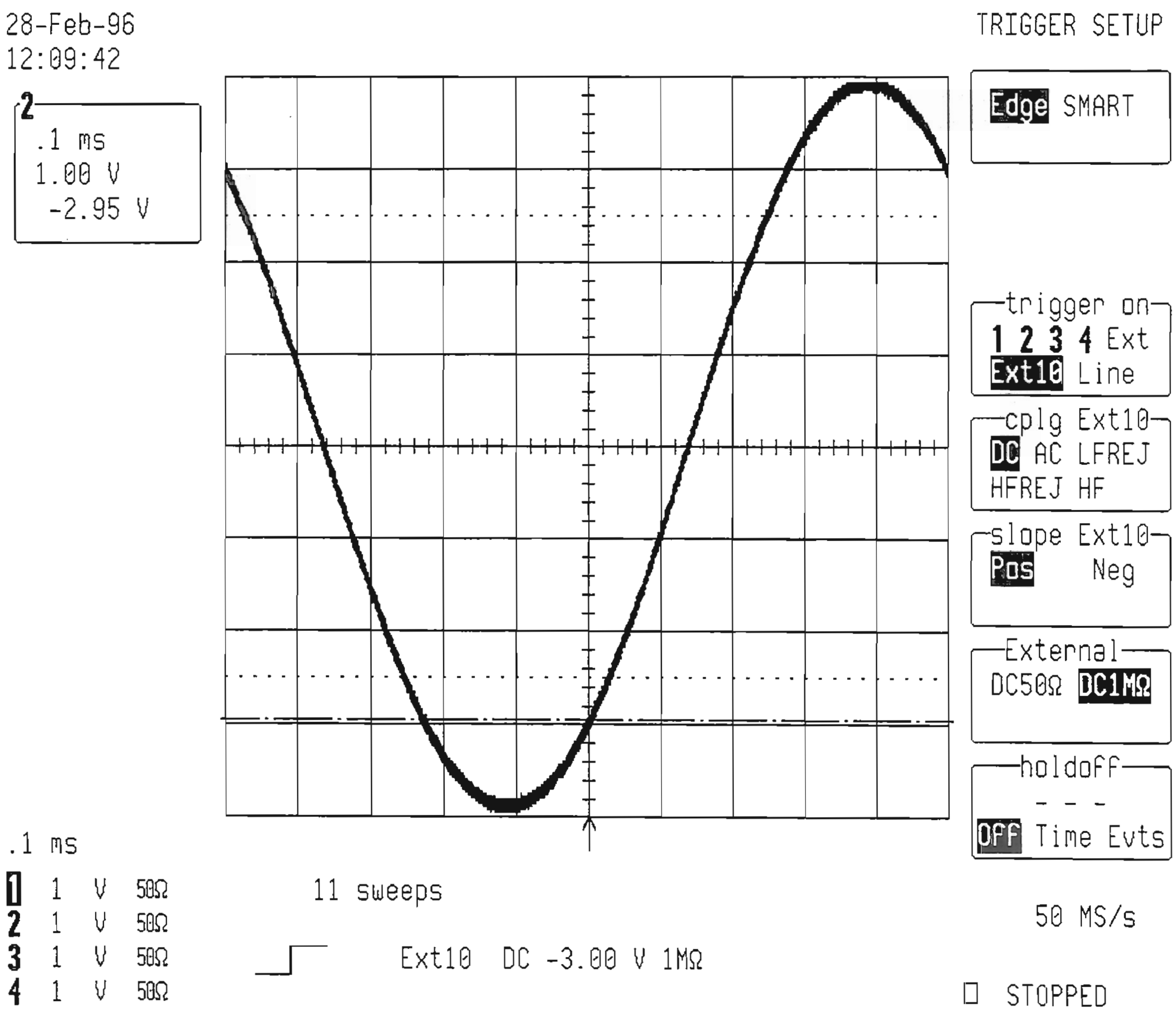
- Set Trigger level : **DC + 3 V**
- Set Trigger Slope Ext10 : **Pos**
- Disconnect the **3 dB attenuator** from the BNC input
- Acquire few sweeps in Single Trigger mode.
- The sine wave must pass through the **horizontal center** of the screen at the **vertical + 3 divisions**.
- Select Cursors/Measure : **Cursors, Amplitude, Absolute**
- Use the " cursor position " knob, to move the marker, at the **crossing point** of the **sine wave** and the **horizontal center of the screen** (50% pre-trigger line).
- Check that the **vertical crossing point level is + 3 V ± 400 mV.** See icon **2** at top.



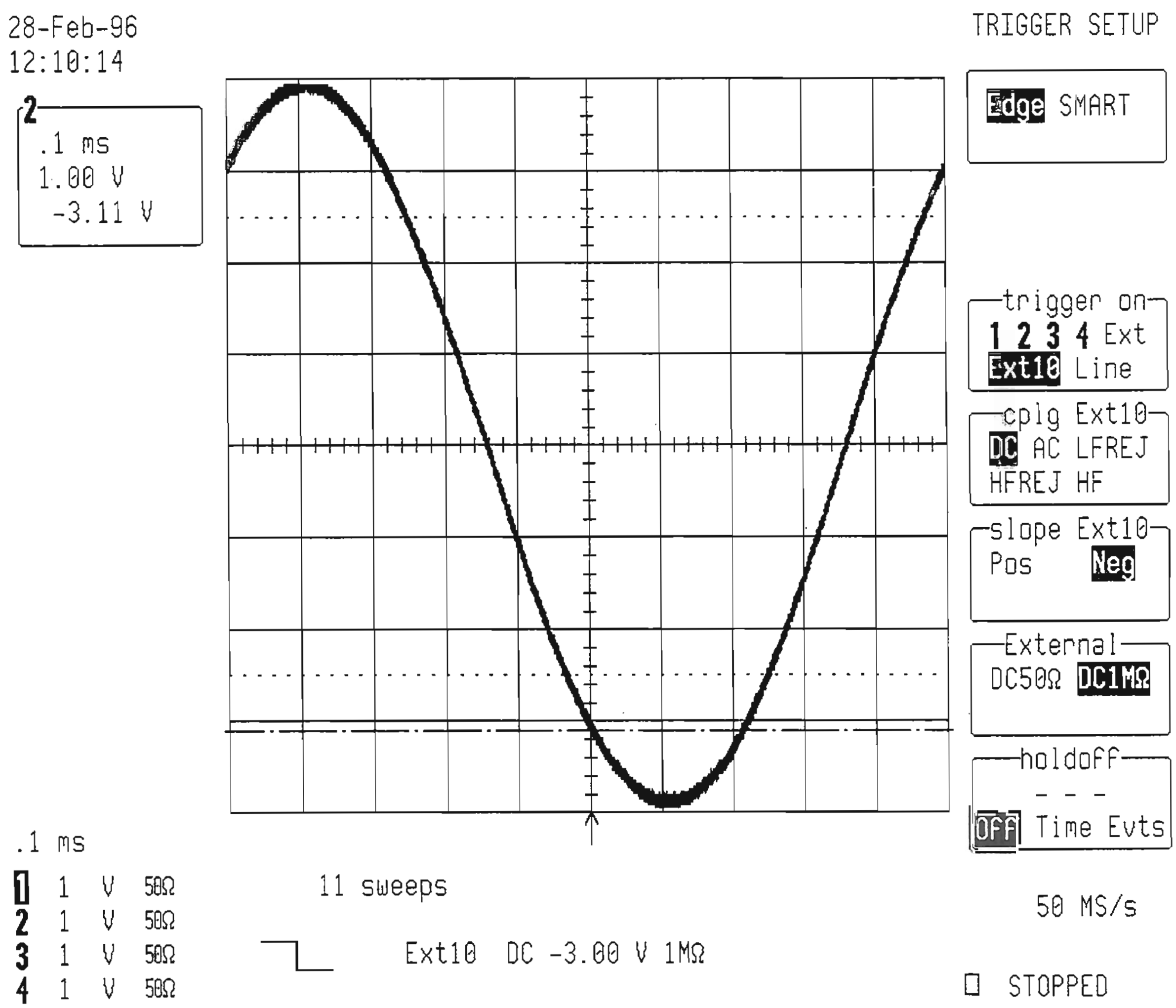
- Set Trigger Slope Ext10 : **Neg**
- Acquire few sweeps in Single Trigger mode.
- The sine wave must pass through the **horizontal center** of the screen at the **vertical + 3 divisions.**
- Select Cursors/Measure : **Cursors, Amplitude, Absolute**
- Use the " cursor position " knob, to move the marker, at the **crossing point** of the **sine wave** and the **horizontal center of the screen** (50% pre-trigger line).
- Check that the **vertical crossing point level is + 3 V ± 400 mV.** See icon **2** at top .



- Set Trigger level : **DC - 3 V**
- Trigger Slope Ext10 : **Pos**
- Acquire few sweeps in Single Trigger mode.
- The sine wave must pass through the **horizontal center** of the screen at the **vertical - 3 divisions**.
- Select Cursors/Measure : **Cursors, Amplitude, Absolute**
- Use the " cursor position " knob, to move the marker, at the **crossing point** of the **sine wave** and the **horizontal center of the screen** (50% pre-trigger line).
- Check that the **vertical crossing point level is - 3 V ± 400 mV.** See icon **2** at top.



- Trigger Slope Ext10 : **Neg**
- Acquire few sweeps in Single Trigger mode.
- The sine wave must pass through the **horizontal center** of the screen at the **vertical - 3 divisions**.
- Select Cursors/Measure : **Cursors, Amplitude, Absolute**
- Use the " cursor position " knob, to move the marker, at the **crossing point** of the **sine wave** and the **horizontal center of the screen** (50% pre-trigger line).
- Check that the **vertical crossing point level is - 3 V ± 400 mV.** See icon 2 at top.



5.11 Smart Trigger

Specifications

Pulse width < or > 2.5 nsec to 20 sec.

5.11.1 Trigger on Pulse Width < 10 nsec

Procedure

- Connect a sine wave generator to Channel 1

- Frequency : **100 MHz**
- Turn on trace : **Ch1**
- Display setup : **Standard, Persistence off, Dot join on, Single grid**
- Input Coupling : **DC 50 Ω**
- V/div. offset : **Normal**
- Global BWL : **Off**
- Probe atten : **X1**
- Input gain : **.5 V/div.**
- Trigger setup : **Smart**
- Setup Smart Trigger : **Glitch**
- Trigger on : **1**
- Coupling 1 : **DC**
- At end of : **Neg**
- Width : **< 10 nsec**
- Mode : **Norm**
- Timebase : **5 nsec/div.**

- Adjust the generator output amplitude to get a five division amplitude sine wave.

- Check that the scope triggers

- Switch to Width : **> 10 nsec**

- Check that the scope **doesn't trigger** : slow trigger and no flashes in box next to normal.

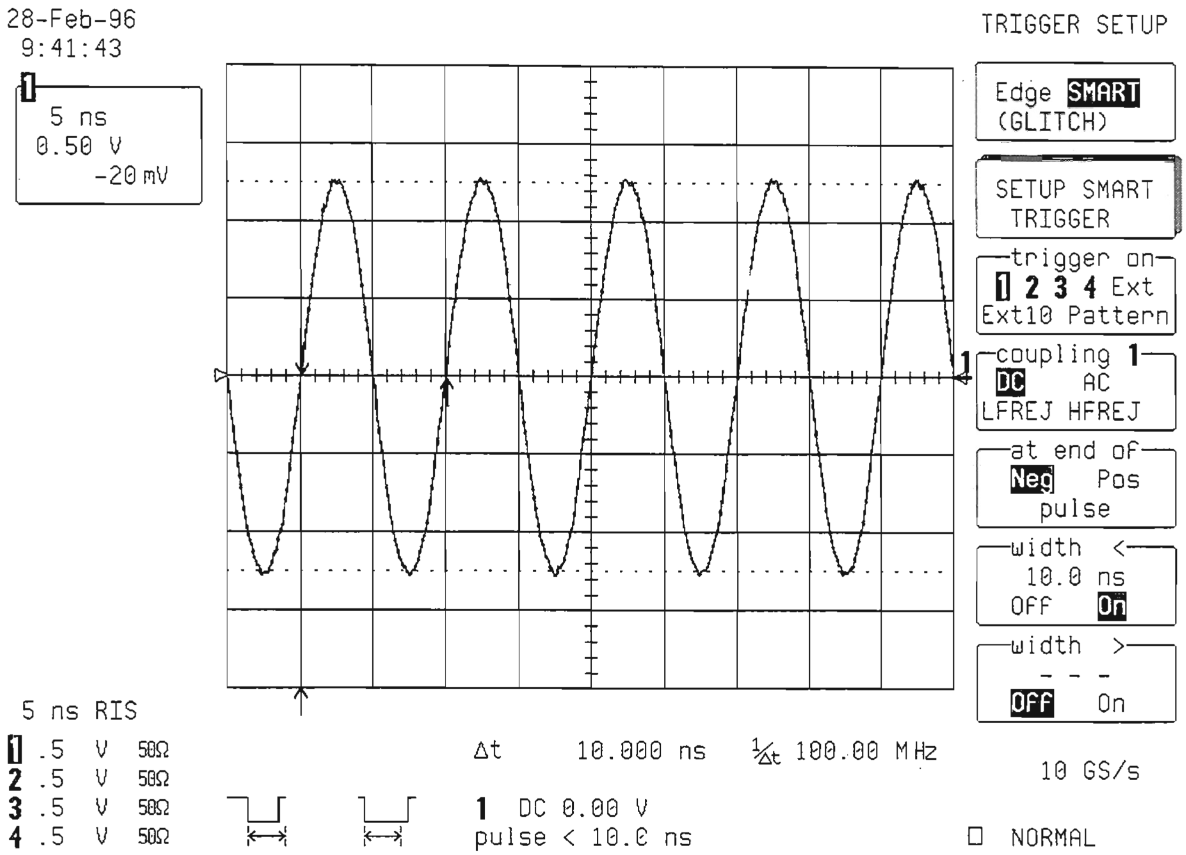
5.11.2 Trigger on Pulse Width > 10 nsec

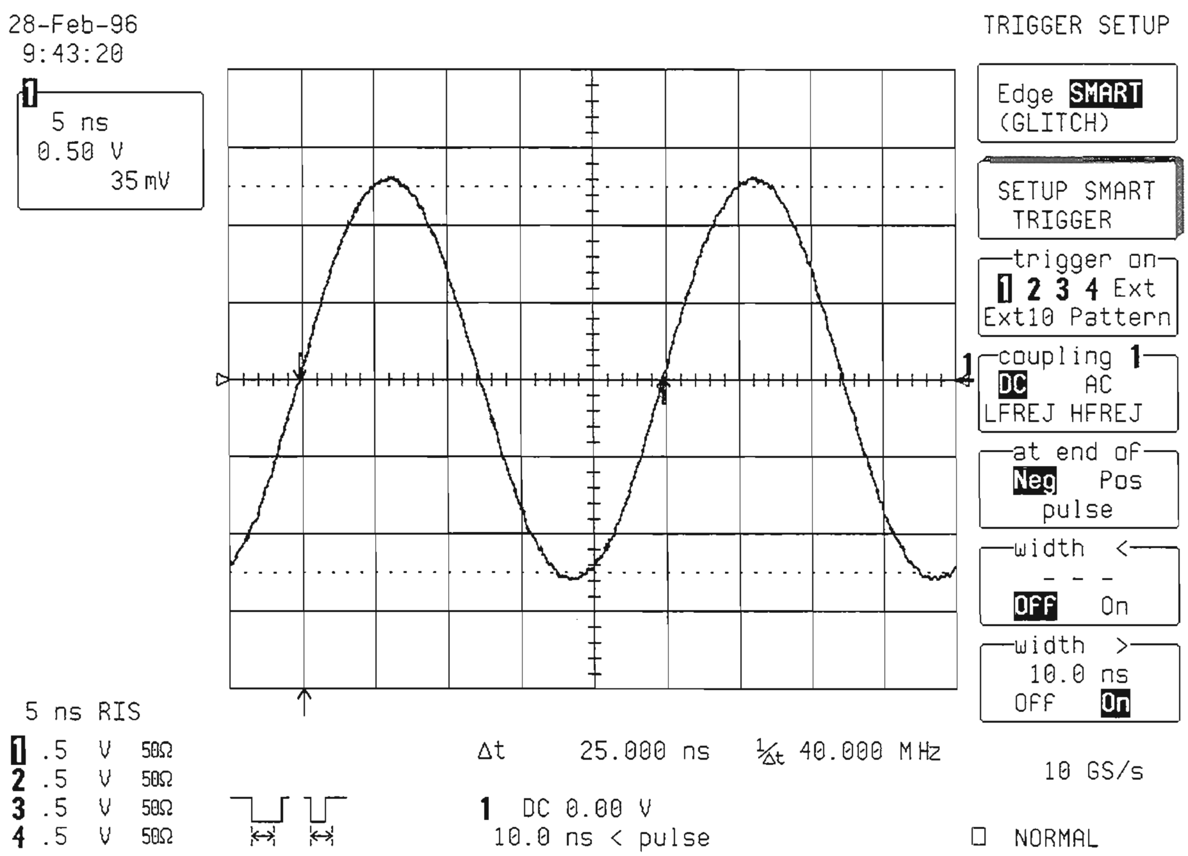
- Adjust the generator frequency to **40 MHz**

- Check that the scope triggers

- Switch to Width : **< 10 nsec**

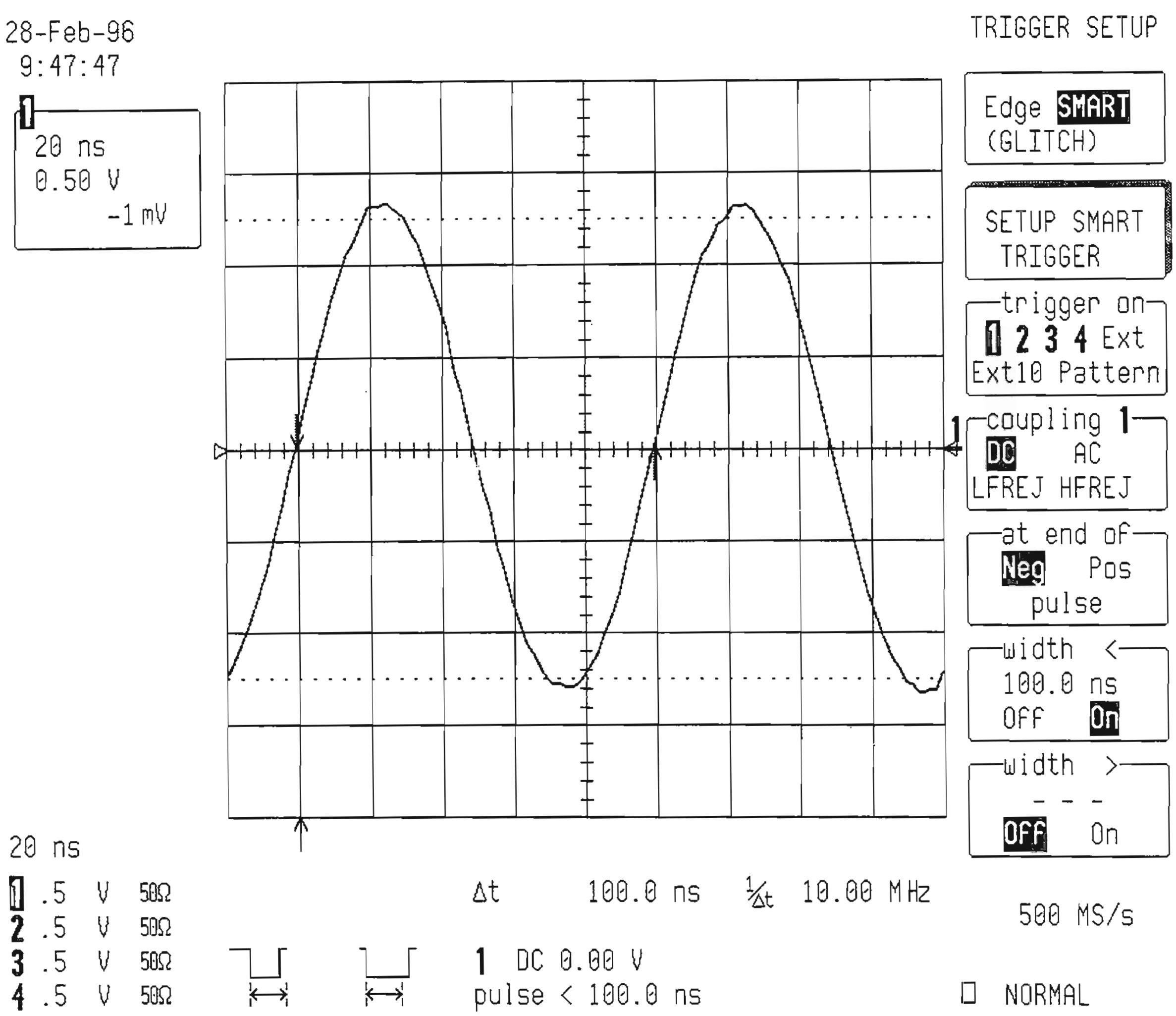
- Check that the scope **doesn't trigger** : slow trigger and no flashes in box next to normal.


28-Feb-96
9:41:43
5 ns
0.50 V
-20 mV
TRIGGER SETUP
Edge SMART (GLITCH)
SETUP SMART TRIGGER
trigger on 1 2 3 4 Ext Ext10 Pattern
coupling 1 DC AC LFREJ HFREJ
at end of Neg Pos pulse
width < 10.0 ns Off On
width > - - - Off On
5 ns RIS
1 .5 V 50Ω
2 .5 V 50Ω
3 .5 V 50Ω
4 .5 V 50Ω
Δt 10.000 ns 1/Δt 100.00 MHz
10 GS/s
1 DC 0.00 V
pulse < 10.0 ns
NORMAL


28-Feb-96
9:43:20
5 ns
0.50 V
35 mV
TRIGGER SETUP
Edge SMART (GLITCH)
SETUP SMART TRIGGER
trigger on 1 2 3 4 Ext Ext10 Pattern
coupling 1 DC AC LFREJ HFREJ
at end of Neg Pos pulse
width < - - - Off On
width > 10.0 ns Off On
5 ns RIS
1 .5 V 50Ω
2 .5 V 50Ω
3 .5 V 50Ω
4 .5 V 50Ω
Δt 25.000 ns 1/Δt 40.000 MHz
10 GS/s
1 DC 0.00 V
10.0 ns < pulse
NORMAL

5.11.3 Trigger on Pulse Width < 100 nsec

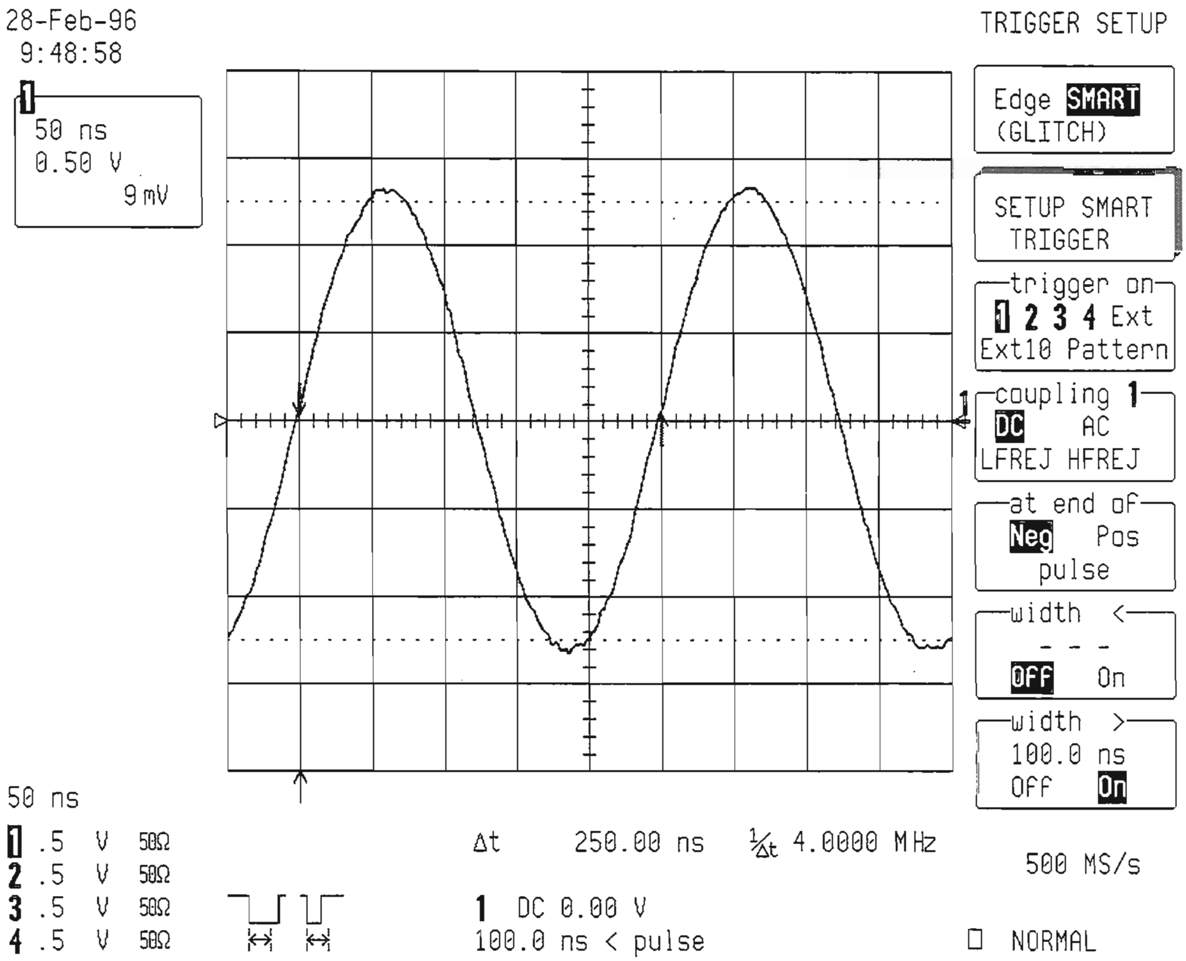
- Set the generator frequency to **10 MHz**
- Pulse width : **< 100 nsec**
- Timebase : **20 nsec/div.**
- Check that the scope triggers.



- Switch to Width : **> 100 nsec**
- Check that the scope **doesn't trigger** : slow trigger and no flashes in box next to normal.

5.11.4 Trigger on Pulse Width > 100 nsec

- Adjust the generator frequency to **4 MHz**
- Pulse width : **> 100 nsec**
- Set Timebase : **50 nsec/div.**
- Check that the scope triggers.



- Switch to Width : **< 100 nsec**
- Check that the scope **doesn't trigger** : slow trigger and no flashes in box next to normal.
- Repeat all the above tests for Channel 2, Channel 3 and Channel 4 substituting channel controls and input connector, and check as above.

5.12 Time Base Accuracy

5.12.1 Description

An external sine wave generator of **1 MHz** with a frequency accuracy better than 1 PPM is used.

Specifications

500 MHz clock : accuracy : $\leq \pm$ **0.001 % or $\leq \pm$ 10 PPM**

5.12.2 500 MHz Clock Manual Verification Procedure

Setup a sine wave generator.

- Frequency : **1 MHz**

- Connect the generator output to Channel 1

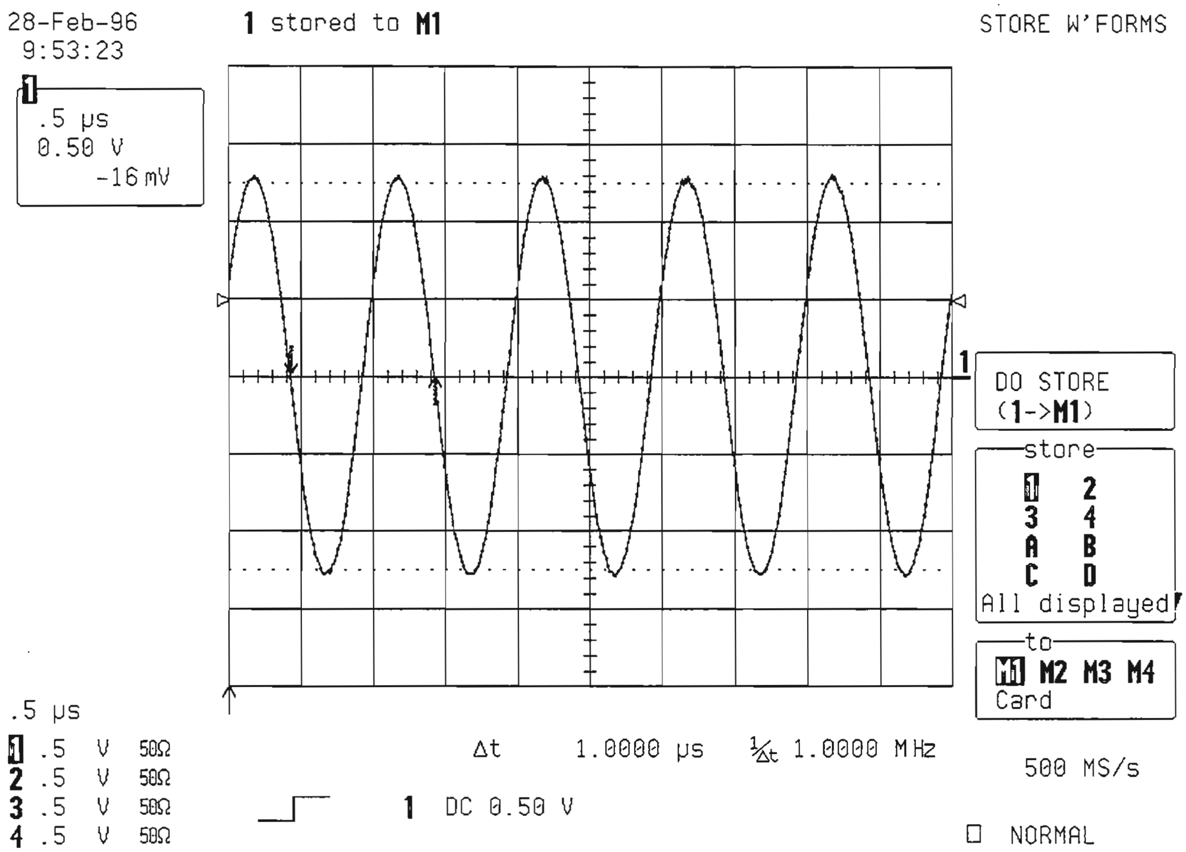
- Turn on trace : **Ch1**
- Display setup : **Standard, Persistence off, Dot join on, Single grid**
- Input Coupling : **DC 50 Ω**
- V/div. offset : **Normal**
- Probe atten : **X1**
- Input gain : **.5 V/div.**
- Trigger setup : **Edge**
- Trigger on : **1**
- Coupling 1 : **DC**
- Slope 1 : **Pos**
- Level 1 : **0.5 V**
- Mode : **Norm**
- Holdoff : **Off**
- Delay : **0 %**
- Timebase : **.5 µsec/div.**
- Channel use : **4**
- Record up to : **50 K**

- Adjust the generator output amplitude and Ch1 offset to get a five divisions peak to peak amplitude sine wave.

- Store Channel 1 in Memory 1

- Set Post-trigger delay to **5.00 msec**

This allows the accuracy of the time base clock to be checked **5000 periods** after the trigger point.



28-Feb-96
9:54:18

STATUS

ACQUISITION STATUS

- **Acquisition**
- System
- Text & Times
- Waveform
- Memory Used

	1	2	3	4
Vertical				
V/div	.5 V	.5 V	.5 V	.5 V
Probe	x1	x1	x1	x1
Offset	0 mV	0 mV	0 mV	0 mV
Coupling	DC50Ω	DC50Ω	DC50Ω	DC50Ω

Bandwidth Limit Off

Time base
Time/div .5 µs Time/pnt 2 ns (500 MS/s)
RIS OFF
Sequence Off Pts/div 250

Trigger Edge Mode NORMAL
External Attenuation x1

1 DC 0.50 V

Post-trigger Delay 5.00000 ms

The currently preselected Smart Trigger type is
GLITCH

500 MS/s

☐ NORMAL

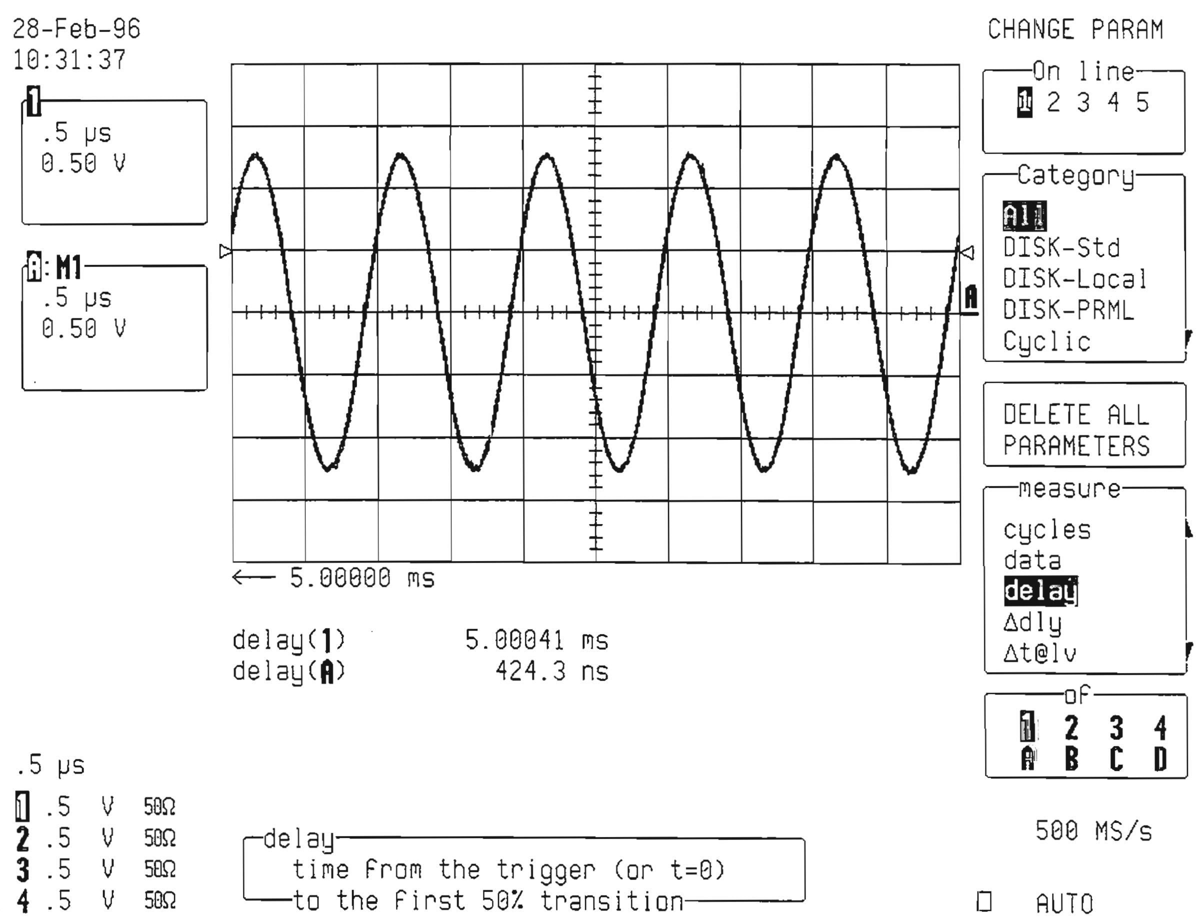
- Recall Memory **1 to A**
- Turn on trace **A**
- Check that the displayed Channel 1 trace is **aligned** with the sine wave from memory 1.

▪ Press	:	**Cursors/Measure**
▫ Measure	:	**Parameters**
▪ Mode	:	**Custom**
▪ Statistics	:	**Off**

- Change parameters

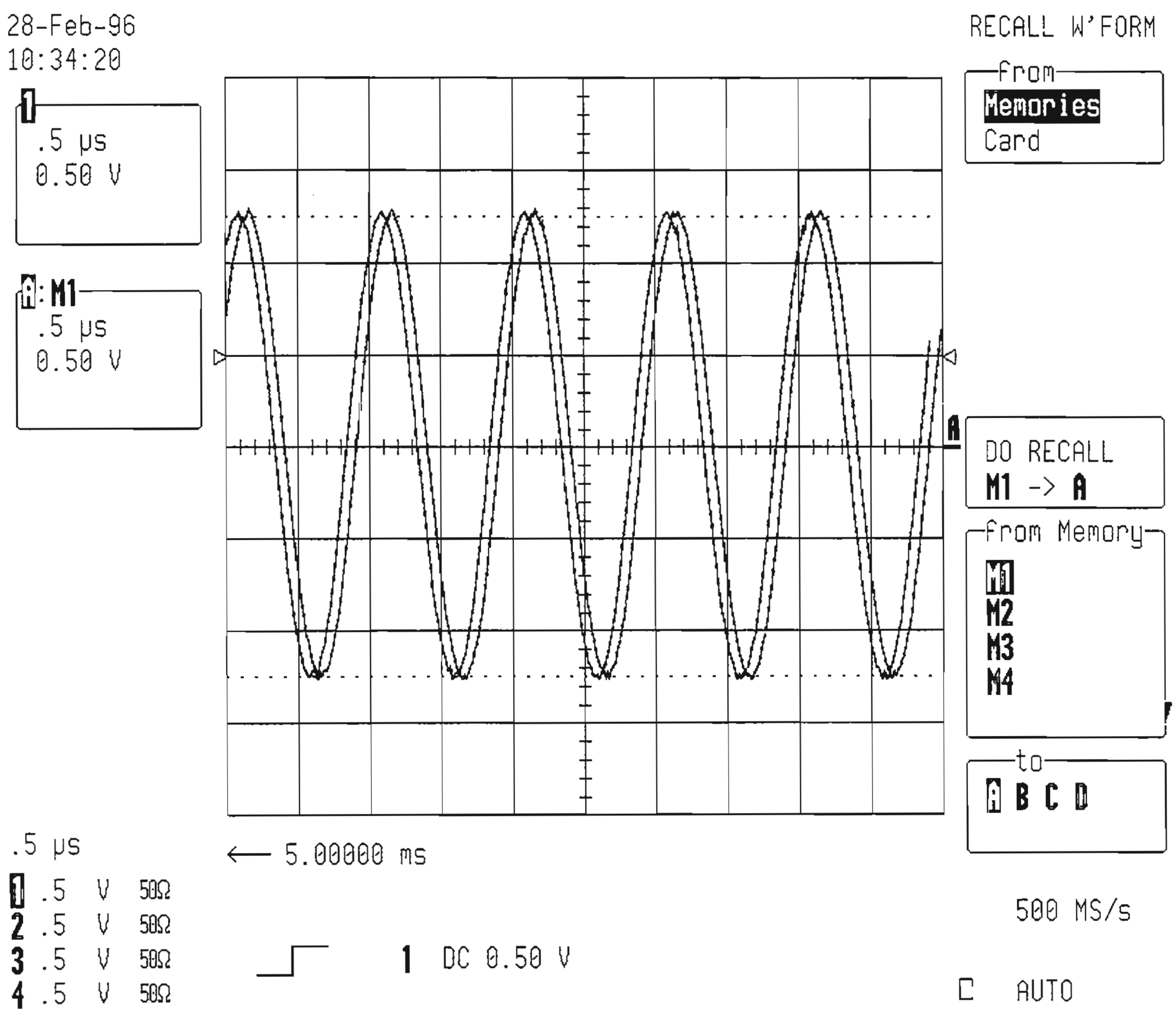
▪ On line 1	:	**Delay of 1**
▪ On line 2	:	**Delay of A**

- Check that (**delay(A) - delay(1) + 5 msec**) ≤ ± **0.00005** msec corresponding to **10 PPM.**



A difference of ± **0.05 µsec** corresponds to ± **10 PPM**.

See screen dump below :



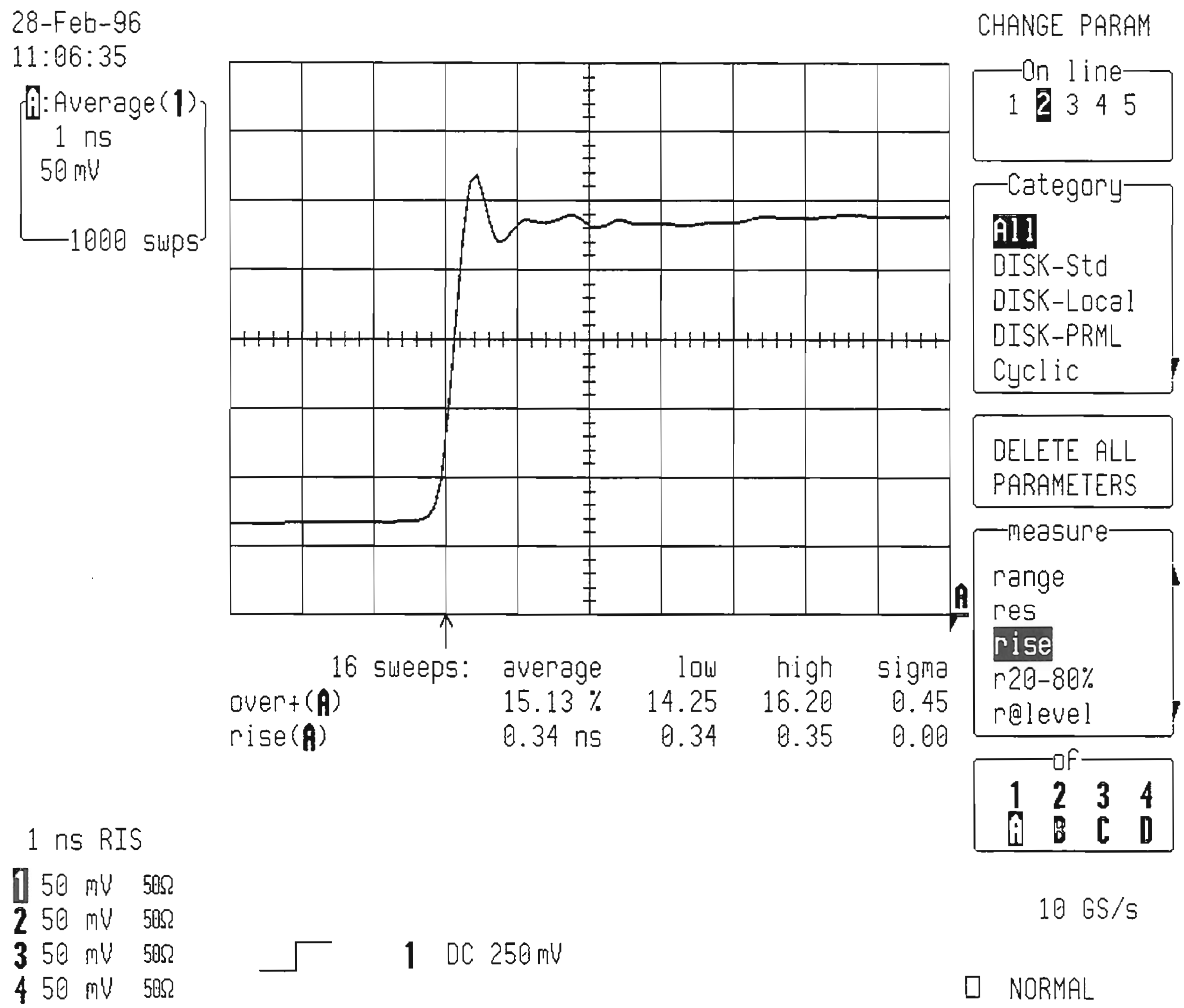
5.13 Overshoot and Rise time (10%-90%)

Specifications

DC 50 Ω, 50 mV/div., : overshoot < 20 %, rise time < 0.5 ns
DC 1 MΩ, 100 mV/div., : rise time < 1.5 ns

Procedure

- Apply the fast pulse generator TD-1107B (< 70 psec) or equivalent, to Channel 1
- Set the DSO as follows :
- Turn on trace : **Ch1**
- Display setup : **Standard, Persistence off, Dot join on, Single grid**
- Coupling Channel 1 : **DC 50 Ω**
- V/div. offset : **Normal**
- Global BWL : **Off**
- Probe atten : **X1**
- Input offset : **- 250 mV**
- Input gain : **50 mV/div**
- Trigger setup : **Edge**
- Trigger on : **1**
- Trigger level : **DC 250 mV**
- Coupling 1 : **DC**
- Slope 1 : **Pos**
- Mode : **Normal**
- Holdoff : **Off**
- Timebase : **1 nsec/div**
- Record up to : **50K samples**
- Delay : **30 % Pre-Trigger**
- Turn on trace : **A**
- Select Math Setup
- For Math : **Use at most 1000 points**
- Use Math ? : **Yes**
- Math Type : **Average**
- Avg Type : **Summed**
- Of : **Channel 1**
- Turn off trace : **Channel 1**
- Cursors/Measure : **Parameters**
- Mode : **Custom**
- Statistics : **On**
- Change Parameters :
- on displayed trace : **A**
- On line 1 :
- Measure : **Over + of A**
- On line 2 :
- Measure : **Rise of A**



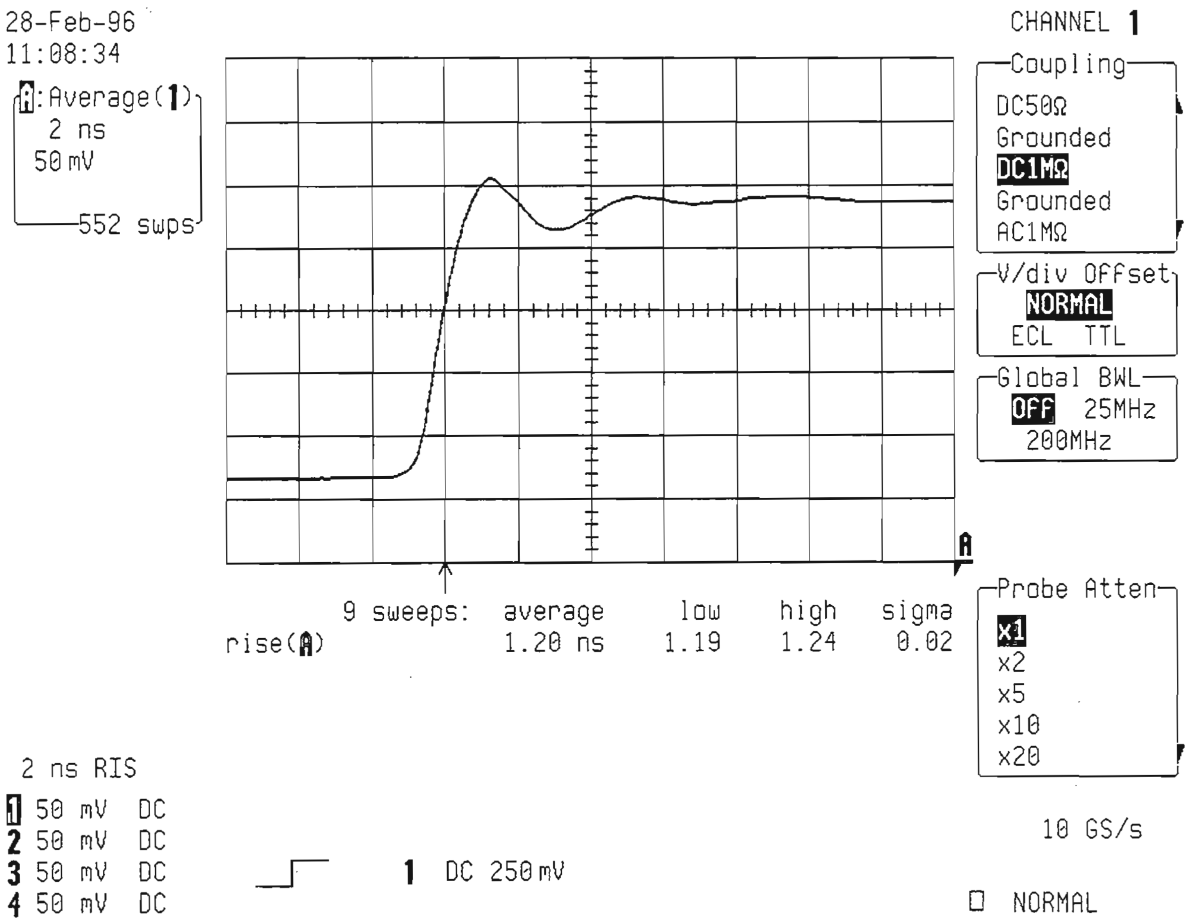
- Check that the average overshoot is < **20 %** and rise time is < **0.5 ns** (measured in scope and not corrected for the effect of the step generator).

- Set Input Coupling : **DC 1 MΩ**

- Timebase : **2 nsec/div**

- Terminate the output of the **TD-1107B** pulser with a **50Ω** feed through and connect it to Ch1

- Check that the Average rise time is < **1.5** ns (measured in scope and not corrected for the effect of the step generator).



- Repeat the above tests for Channel 2, Channel 3 and Channel 4 substituting channel controls and input connector, and check as above.

5.14 Probe Calibrator Verification

Specifications

Amplitude : 50 mV to 500 mV ± **2 %** into 50Ω
: 50 mV to 1 V ± **2 %** into 1 MΩ

Frequency : 500 Hz to 2 MHz ± 1 ‰

Probe Calibrator Verification Procedure

- Connect the Probe Calibrator output to Channel 1, using a 5 nsec BNC cable
- Select : **Utilities**
- Press : **Cal BNC Setup**
- Mode : **Cal signal**
- Set Frequency : **500 Hz**
- Amplitude : **1 V (500 mV into 50 Ω)**

- Turn on trace : **Ch1**
- Display setup : **Standard, Persistence off, Dot join on, Single grid**
- Input Coupling : **DC 50 Ω**
- V/div. offset : **Normal**
- Probe atten : **X1**
- Input offset : **- 250 mV**
- Input gain : **100 mV/div.**

- Trigger setup : **Edge**
- Trigger on : **1**
- Trigger level : **DC 250 mV**
- Coupling 1 : **DC**
- Slope 1 : **Pos**
- Mode : **Normal**
- Holdoff : **Off**

- Timebase : **.5 msec/div.**
- Delay : **10 % Pre-Trigger**

- Cursors/Measure : **Parameters**
- Mode : **Custom**
- Change parameters :
- On line 1 : **Measure ampl of 1**
- On line 2 : **Measure freq of 1**

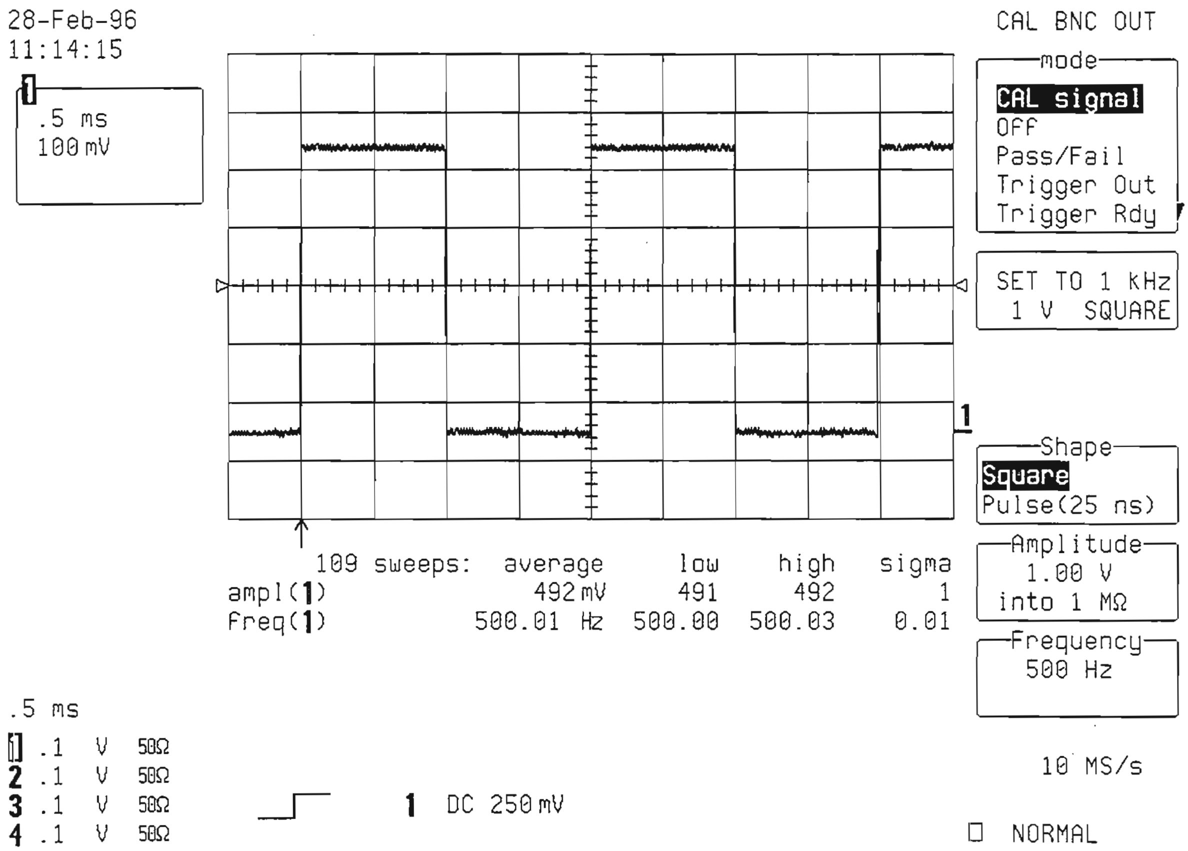
- Check parameters readout : freq (1) = **500 Hz** ± 1 ‰ , and ampl (1) = **500 mV** ± **6 %** (± **2 %** plus ± 4 % due to the non linearity of the scope)

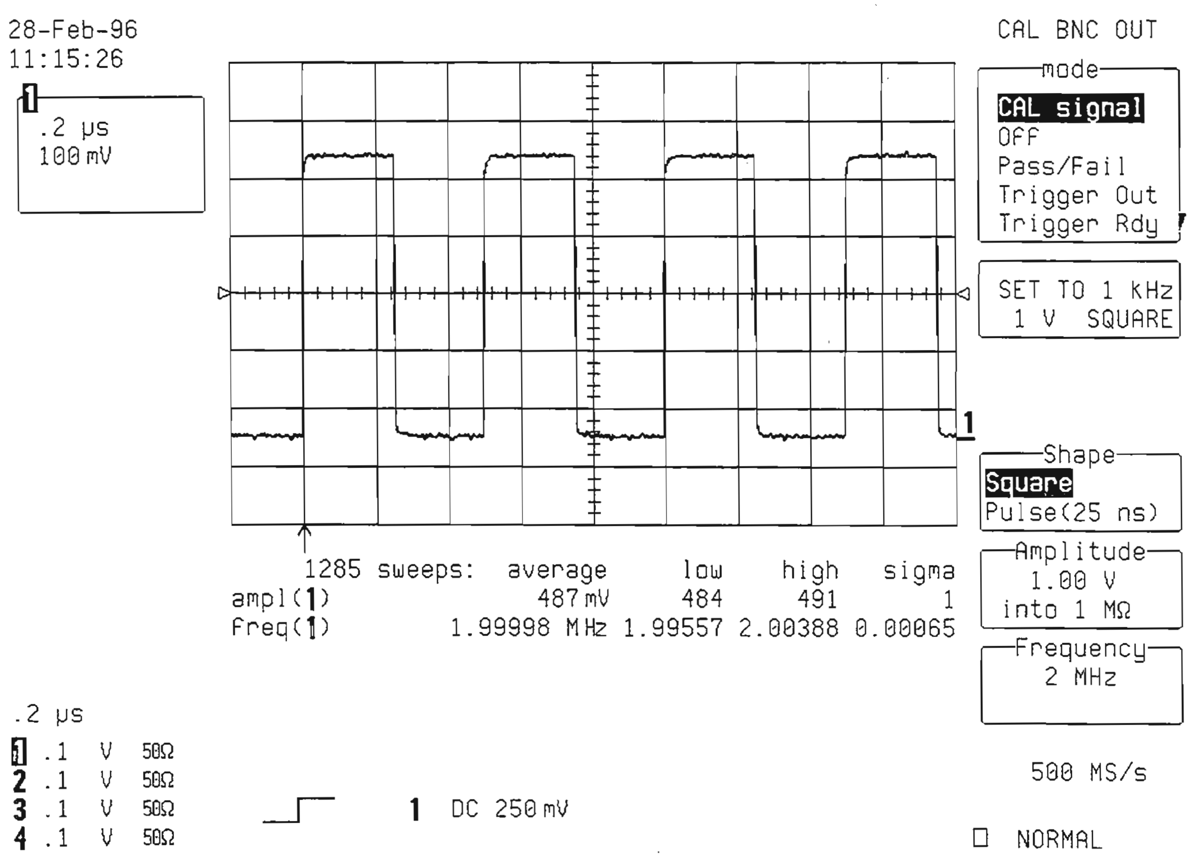
- Set Cal frequency : **2 MHz**
- Timebase : **.2 µs**
- Check that freq (1) is **2 MHz** ± 1 ‰

- Repeat test for amplitude of **0.05 V** (25 mV into 50 Ω)

- Set Cal amplitude : **50 mV** (25 mV into 50 Ω)
- DSO Input gain : **5 mV/div.**

- Check parameters readout ampl (1) = **25 mV** ± **6 %**

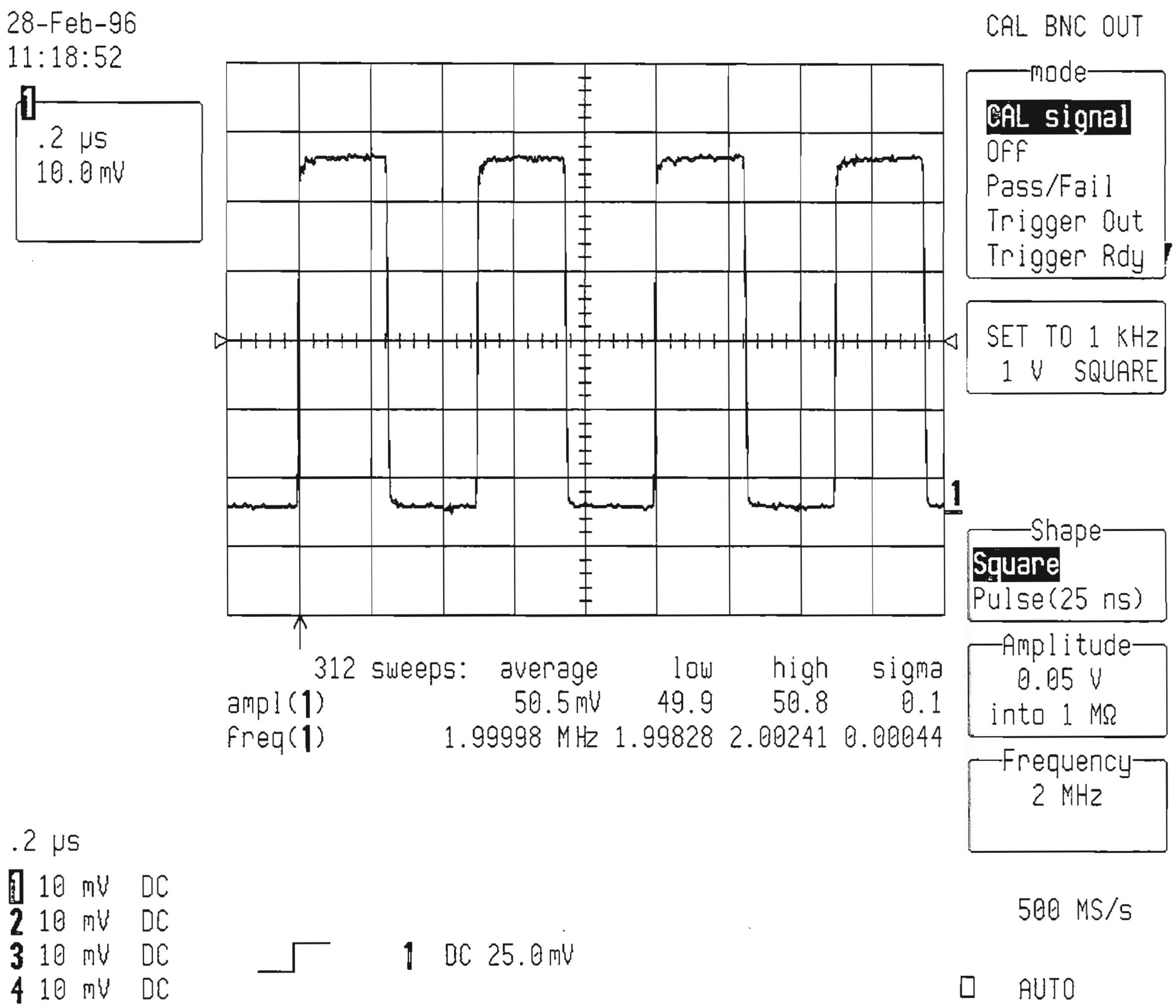

28-Feb-96
11:14:15
.5 ms
100 mV
CAL BNC OUT
mode
CAL signal
Off
Pass/Fail
Trigger Out
Trigger Rdy
SET TO 1 kHz
1 V SQUARE
Shape
Square
Pulse(25 ns)
Amplitude
1.00 V
into 1 MΩ
Frequency
500 Hz
109 sweeps: average low high sigma
ampl(1) 492 mV 491 492 1
freq(1) 500.01 Hz 500.00 500.03 0.01
.5 ms
1 .1 V 50Ω
2 .1 V 50Ω
3 .1 V 50Ω
4 .1 V 50Ω
1 DC 250 mV
10 MS/s
NORMAL


28-Feb-96
11:15:26
.2 µs
100 mV
CAL BNC OUT
mode
CAL signal
Off
Pass/Fail
Trigger Out
Trigger Rdy
SET TO 1 kHz
1 V SQUARE
Shape
Square
Pulse(25 ns)
Amplitude
1.00 V
into 1 MΩ
Frequency
2 MHz
1285 sweeps: average low high sigma
ampl(1) 487 mV 484 491 1
freq(1) 1.99998 MHz 1.99557 2.00388 0.00065
.2 µs
1 .1 V 50Ω
2 .1 V 50Ω
3 .1 V 50Ω
4 .1 V 50Ω
1 DC 250 mV
500 MS/s
NORMAL

- Repeat the tests for the amplitude of 0.05 V and 1 V into 1 MΩ

- Cal amplitude : **50 mV**
- Set Input Coupling : **DC 1M Ω**
- DSO Input gain : **10 mV/div.**

- Check parameters readout ampl (1) = **50 mV ± 6 %**



- Set Cal amplitude : **1 V**
- DSO Input gain : **200 mV/div.**

- Check parameters readout ampl (1) = **1 V ± 6 %**

5.15 Overload

Specifications

1 Watt into 50 Ω : Overload < 17 seconds

Procedure

- Set the DSO as follows :

- Display setup : **Standard, Persistence off, Dot join on, Single grid**
- Input Coupling : **DC 50 Ω**
- V/div. offset : **Normal**
- Global BWL : **Off**
- Probe atten : **X1**
- Input offset : **- 3.5 V**
- Input gain : **1 V/div.**
- Trigger setup : **Edge**
- Trigger on : **1**
- Trigger level : **DC - 0.04 V**
- Delay : **zero**
- Coupling 1 : **DC**
- Slope 1 : **Pos**
- Mode : **Norm**
- Holdoff : **Off**
- Timebase : **2 sec/div.**
- Channel Use : **4**
- Record up to : **1000 samples**

- From Tektronix power supply PS5004, apply **7.07 V** (1 Watt) to Channel 1.

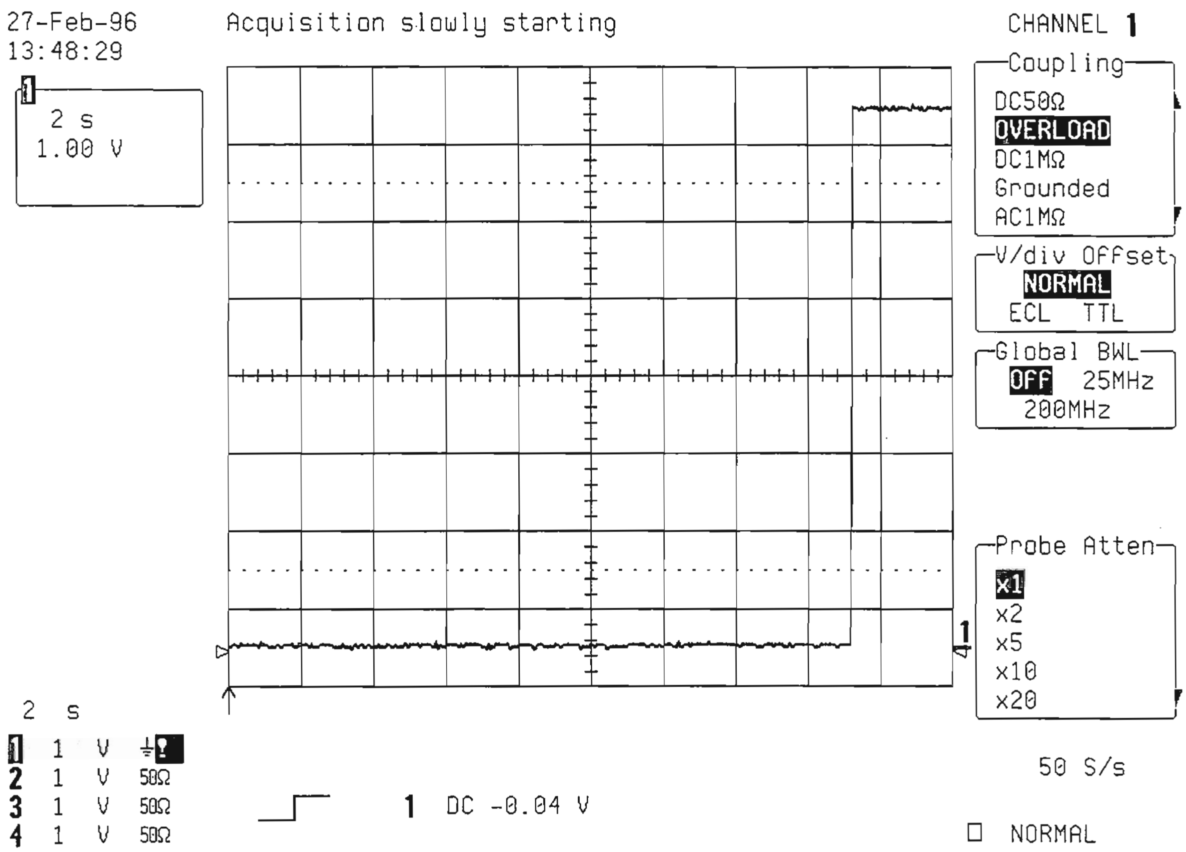
- Check that the overload trips, within **17** seconds.

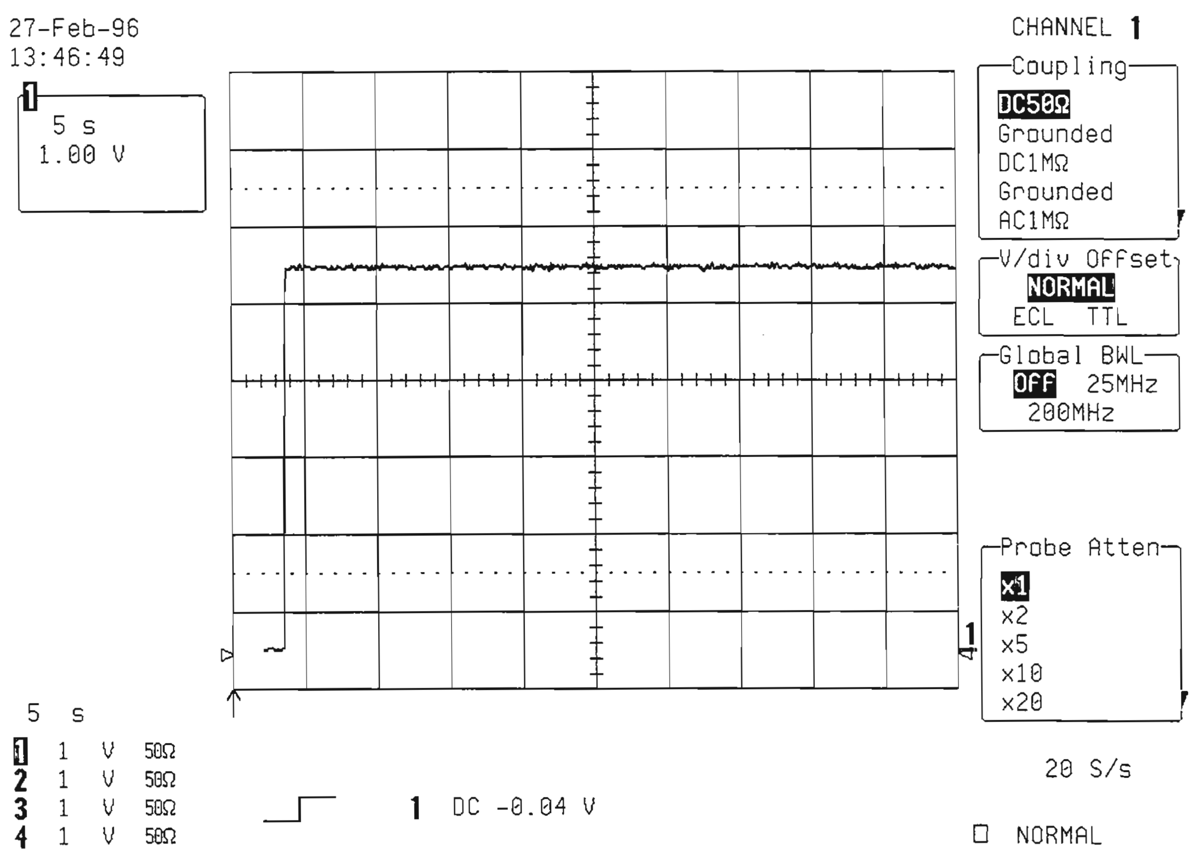
- Set Timebase : **5 sec/div.**

- From Tektronix power supply PS5004, apply **5 V** (.5 Watt) to Channel 1

- Check that the overload doesn't trip for at least **30** seconds.

- Repeat the above tests for Channel 2, Channel 3 and Channel 4 substituting channel controls and input connector, and check as above.


27-Feb-96
13:48:29
Acquisition slowly starting
CHANNEL 1
2 s
1.00 V
Coupling
DC50Ω
OVERLOAD
DC1MΩ
Grounded
AC1MΩ
V/div Offset
NORMAL
ECL TTL
Global BWL
Off 25MHz
200MHz
Probe Atten
x1
x2
x5
x10
x20
2 s
1 1 V
2 1 V 50Ω
3 1 V 50Ω
4 1 V 50Ω
50 S/s
1 DC -0.04 V
NORMAL


27-Feb-96
13:46:49
CHANNEL 1
5 s
1.00 V
Coupling
DC50Ω
Grounded
DC1MΩ
Grounded
AC1MΩ
V/div Offset
NORMAL
ECL TTL
Global BWL
Off 25MHz
200MHz
Probe Atten
x1
x2
x5
x10
x20
5 s
1 1 V 50Ω
2 1 V 50Ω
3 1 V 50Ω
4 1 V 50Ω
20 S/s
1 DC -0.04 V
NORMAL

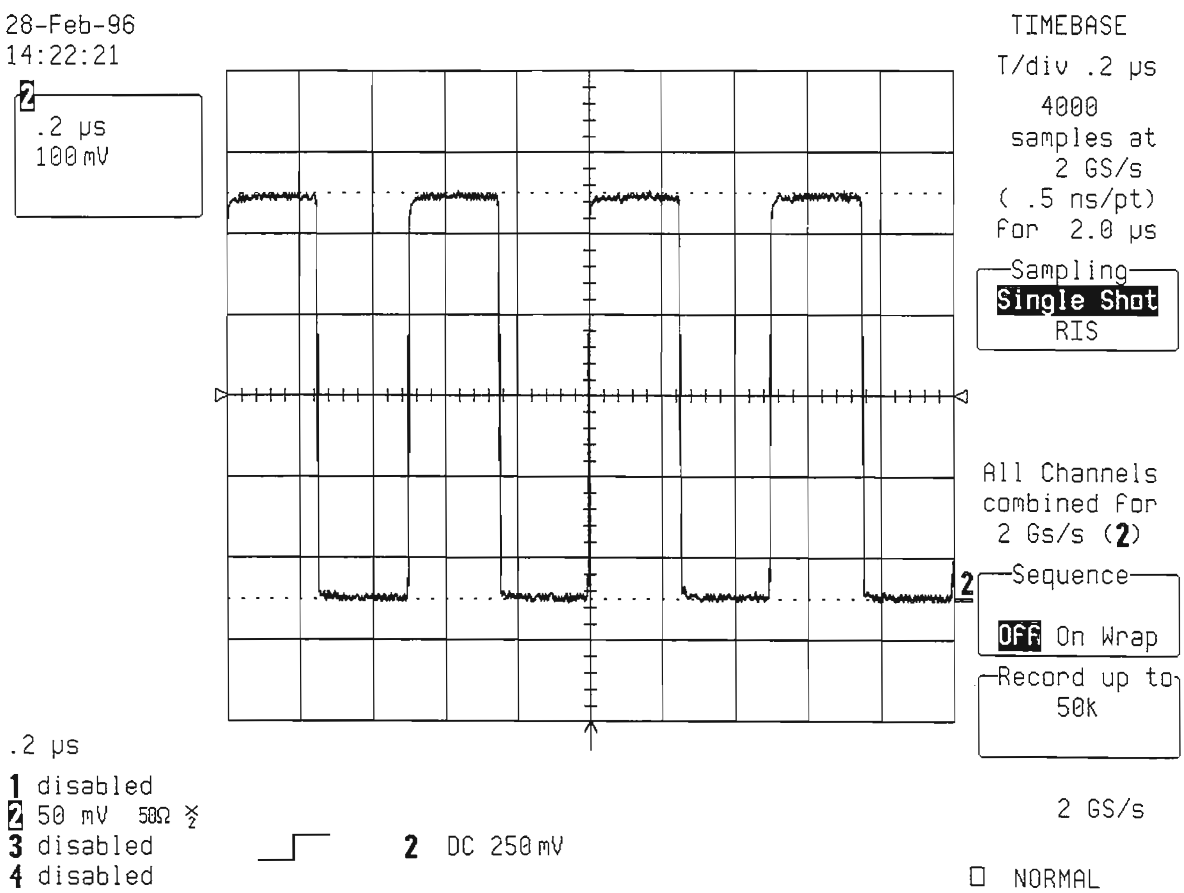
5.16 Combining Channels

Channels can be combined to achieve more memory and more sampling rate by interleaving the ADC's in time. It is possible to achieve 2 GS/s and up to 8M record length (9374L) by means of a special adaptor call PP093.

- Set DSO Timebase : **.2 µsec/div.**

- Connect the **PP093** adaptor to Channel 2 and Channel 3 and check that :
- The PP093 is identified on **Channel 2**
- Channel 1, Channel 3 and Channel 4 are **disabled**
- Channel 2 is set to **DC 50 Ω, X2**
- Sampling rate is **2 GS/s**

- Connect the **Probe calibrator** output to **PP093** input using a 5 nsec BNC cable.
- Set Cal frequency to **2 MHz** and Amplitude to **1 V** into **1 MΩ**
- Turn on **trace 2** and check that :
- A Square wave of 500 mV is displayed on Channel 2



- Turn on trace **1**, **3**, **4** and check that :
- A Square wave of 500 mV is displayed on Channel 1, Channel 3, and Channel 4.

SECTION 6 MAINTENANCE

6.1 Introduction

This section contains information necessary to disassemble, assemble, maintain, calibrate and troubleshoot the LeCroy 9374, 9374M, 9374L and 9374TM digital oscilloscope.

6.2 Disassembly and Assembly Procedure

The disassembly and assembly procedures detailed below refer to the assembly and disassembly diagram 6.2.3, and the view of figures 6.1, 6.2, 6.3, 6.4, 6.5, 6.6 & 6.7. Please study the diagram and figures before attempting disassembly.

WARNING

Before removing any parts from the LeCroy 9374, be sure to read carefully the instructions referring to those parts, noting any precautions needed to avoid problems caused by mechanical behaviour, high voltage supplies, etc.

CAUTION

The usual precautions against static electricity are required (see 1.10)

6.2.1 Removal of the Upper Cover (5.14)

The top cover (5.14) is secured by two M4x5 screws (5.16) on both sides of the front panel assembly (2), and by two M4x8 screws (5.15) on the rear panel (3). Remove the screws and carefully slide the cover off the unit to the rear. Removal of the top cover gives access to the boards and parts listed in section 6.2.3.

6.2.2 Removal of the PS9351 Power Supply (4) and PS9370 Auxiliary Power Supply (5.12)

WARNING

Ensure the line cord is disconnected. Remove the following:

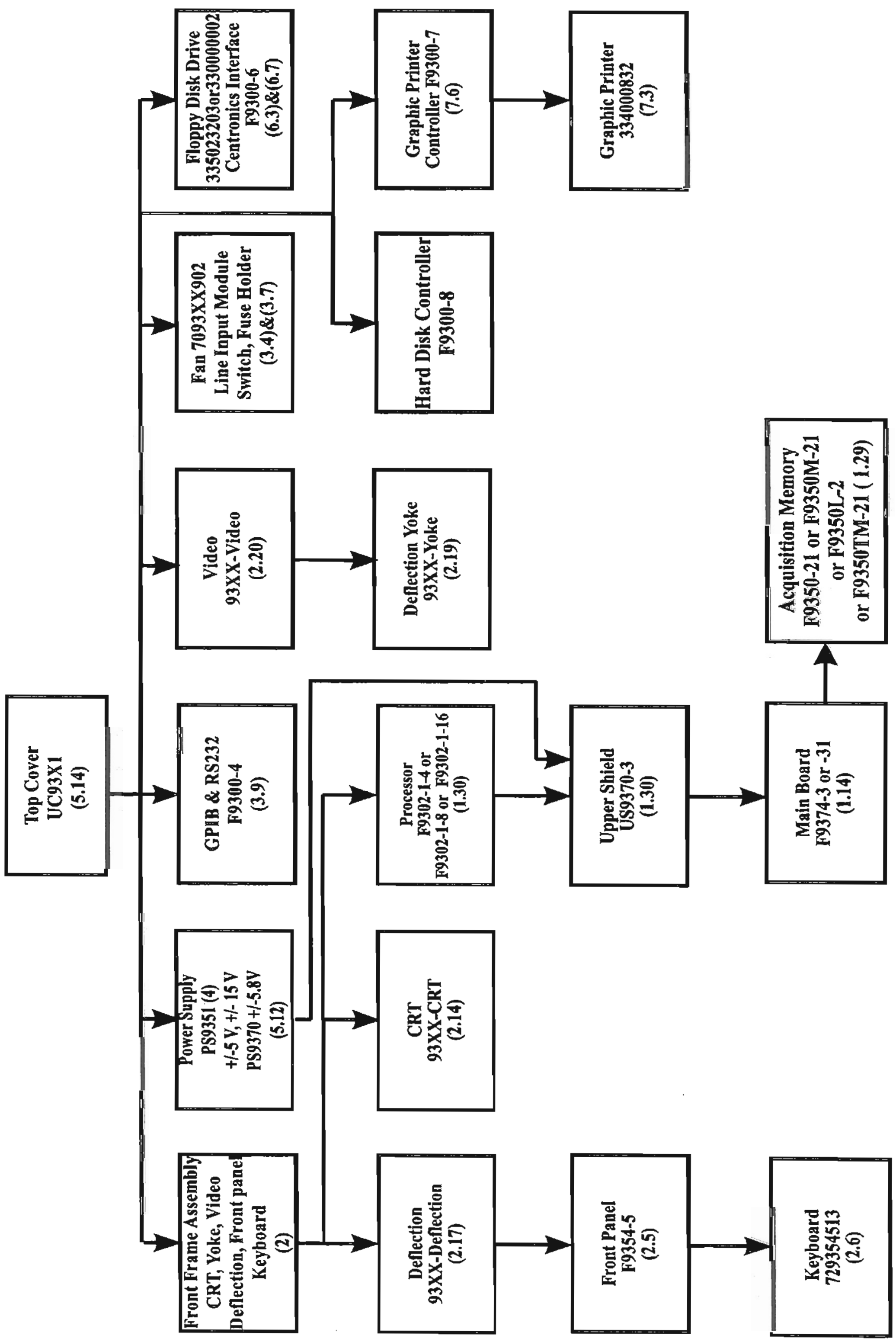
- Top cover (6.2.1).
- One M4X8 screw (5.9) from left side of the bottom cover (1.1).
- Two M4X8 screws (5.1) from left side of the rear panel (3).

Disconnect the following:
- Base card power cable connector J1 & J6 from PS9370 connector J2(see figure 6.8).
- PS9351 line input cable (AC line, neutral, ground) from line input module (3.7) .
- Auxiliary power cable from optional internal graphic printer connector J4 (see figure 6.8).

The PS9351 power supply can now be removed vertically from the oscilloscope.
The PS9370 auxiliary power supply can be removed vertically from the main board connector J1/J2.

6.2.3 Disassembly and Assembly Diagram

Disassembly : If it becomes necessary to replace a board or a part, use the disassembly diagram to disassemble the unit. Any board can be removed if items higher in the diagram and connected by a line are already out.



Assembly : Reassemble the unit in the reverse order.

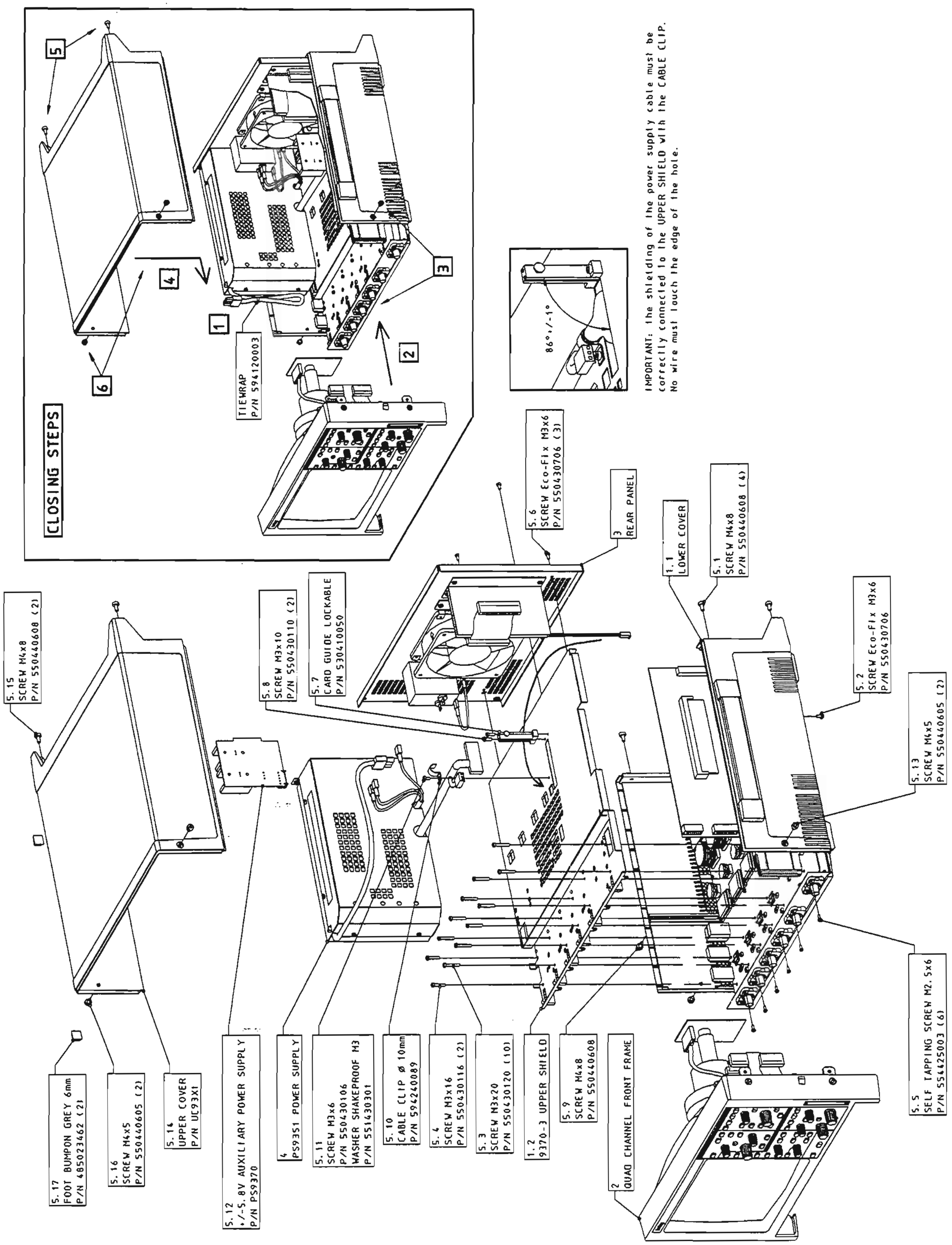


Figure 6.1 : 9374/M/L/TM Assembly

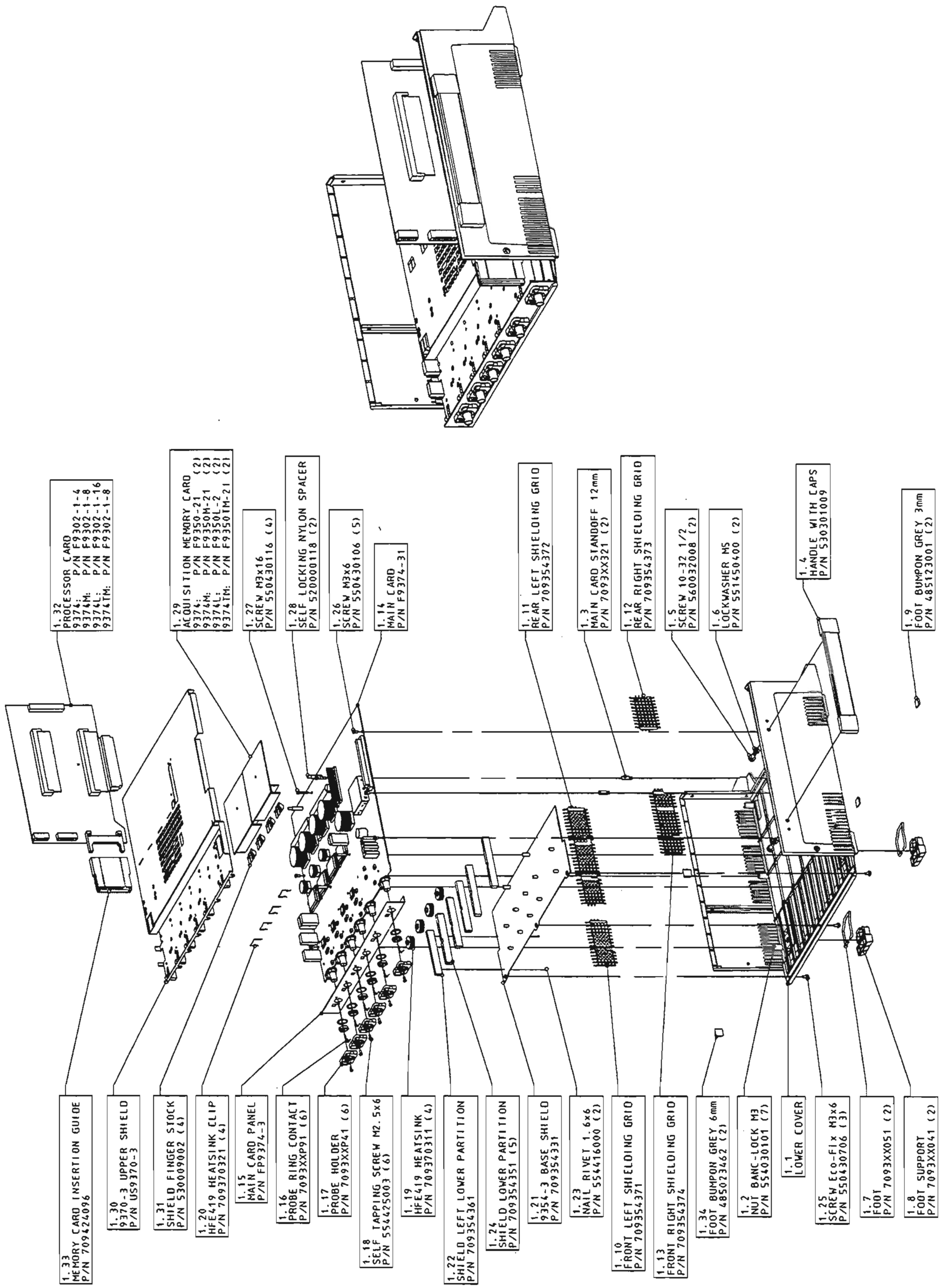


Figure 6.2 : 9374/M/L/TM Lower Cover Assembly

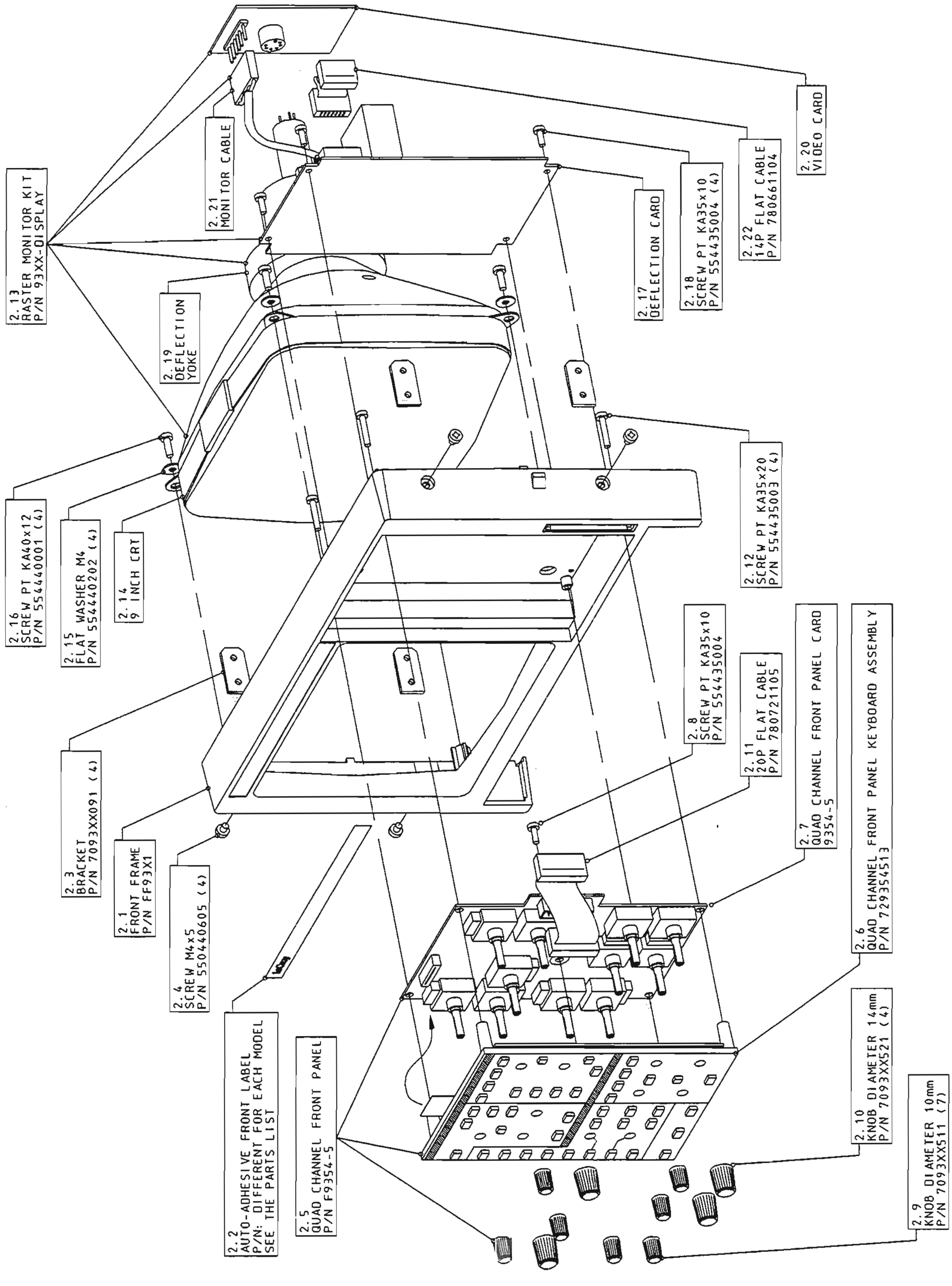


Figure 6.3 : 9374/M/L/TM Front Frame Assembly

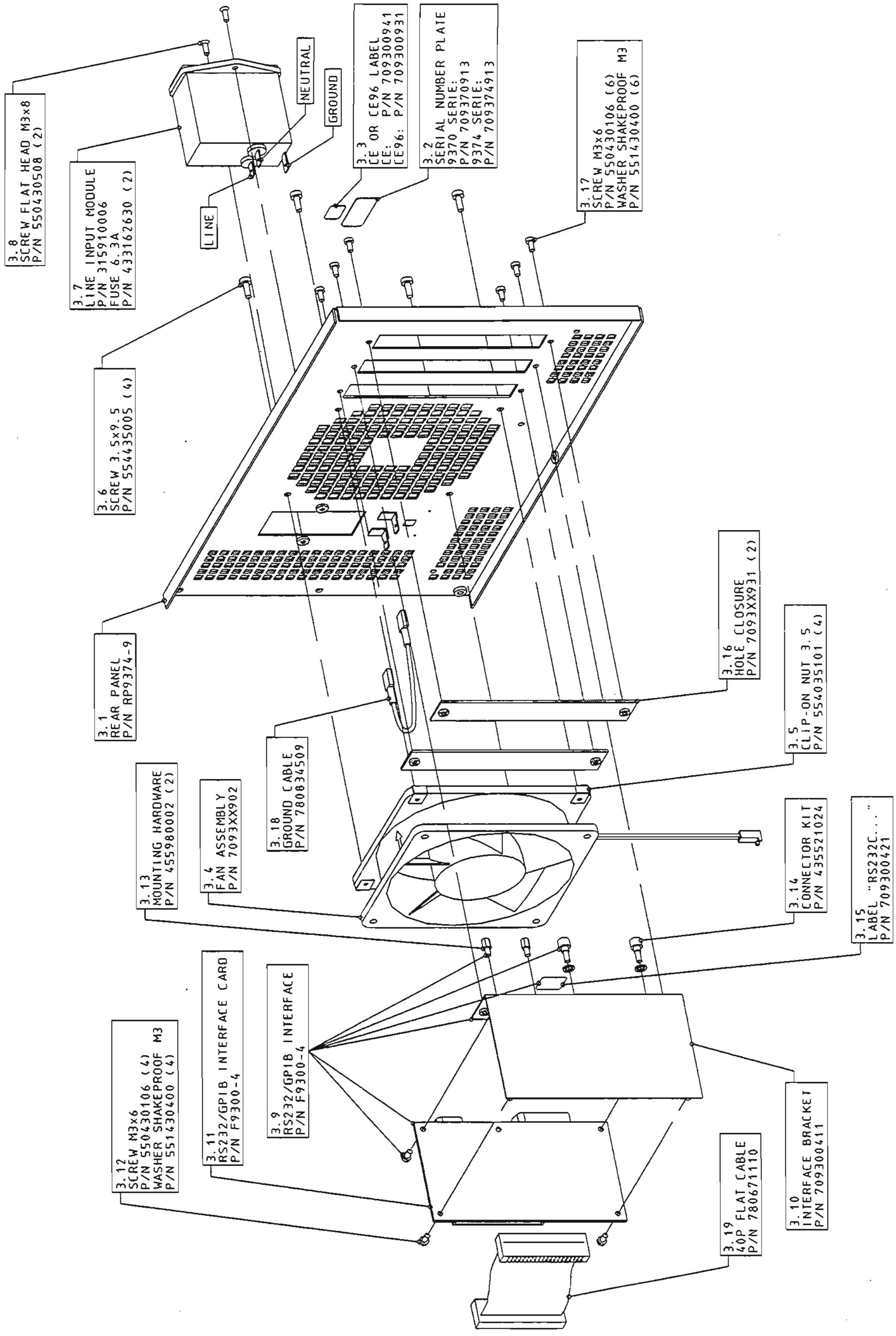


Figure 6.4 : 9374/M/L/TM Rear Panel Assembly

6.2.4 Removal of the F9300-4 GPIB/RS232 Interface (3.9)

The GPIB/RS232 interface (3.9) is vertically mounted on the rear panel (3.1).

Remove the following:

- Top cover (6.2.1).
- Two M3x6 screws (3.17) and washers from the rear panel (3.1).
- Disconnect the flat cable (3.19) from the processor board (1.32) connector J5.

The GPIB/RS232 board can be removed forward from the rear panel.

6.2.5 Removal of the Fan (3.4)

Remove the following:

- Top cover (6.2.1)
- Four screws (3.6) from the rear panel (3.1).
- Disconnect the fan power cable from the main card F9374-31 connector J3.

The fan (3.4) part number : 7093XX902 can be removed from the unit.

CAUTION

Note the air flow, the fan extracts air from the unit and expels it.

6.2.6 Removal of the Line Input module (3.7)

WARNING

Disconnect the power cord.
Remove the following:

- Top cover (6.2.1).
- Two screws (3.8) from the rear panel.
- Disconnect the power cable from the power supply connector.
- Disconnect the earth cable (3.18).

The fuse holder assembly (3.7) can be removed from the rear panel (3.1).

6.2.7 Removal of the 93XX-Video (2.20)

- Remove the top cover (6.2.1).
- Disconnect the ground cable from CRT (black wire)
- Disconnect the monitor cable (2.21) from the deflection board, connector W301 & W302

Ease the video board (2.20) carefully toward the back of the DSO, until it is free.

6.2.8 Removal of the 93XX-Yoke (2.19)

- Remove the top cover (6.2.1).
- Remove the 93XX-video board (6.2.7).
- Disconnect the cable from the deflection board connector W201.
- Loose the screw on the yoke ring holder.

The deflection yoke (2.19) can be removed from the cathode ray tube (2.14).

6.2.9 Removal of the front frame Assembly (2)

Remove the following:

- Top cover (6.2.1)
- Two screws (5.13) that secure the front frame assembly (2) to the lower cover (1.1).
- Disconnect the front panel flat cable (2.11) from the processor (1.32) connector J4.
- Disconnect the deflection flat cable (2.22) from the processor board (1.32) connector J6.

The front frame assembly (2) with the CRT (2.14), yoke (2.19), video (2.20), deflection (2.17), front panel (2.7) and keyboard (2.6) can with care be removed forward from the unit.

CAUTION

Hold the CRT very carefully, or place soft padding under it.

6.2.10 Removal of the 93XX-Deflection (2.17)

The deflection board (2.17) is situated to the back of the front panel (2.5).

Remove the following

- Top cover (6.2.1).
- Front frame assembly (6.2.9).
- Disconnect the monitor cable (2.21) which lead to the video board (2.20), connector W301 and W302.
- Disconnect the cable from the deflection yoke, connector W201.
- Disconnect the EHT plug from the receptacle at the right side of the CRT (2.14).

WARNING

Touch the free end of the EHT cable to the ground, this ensures that no significant charge remains. The CRT must be discharged similarly, using a tool or a long screw driver which is first placed to the ground and on the CRT receptacle.

Remove the four M35x10 screws (2.18) that secure the deflection board to the plastic front frame.

The board (2.17) can now be removed from the unit.

6.2.11 Removal of the 93XX-CRT (2.14)

It is necessary to remove the front frame assembly (6.2.9). The CRT is secured to the plastic front frame by four screws (2.16).

- Remove the 93XX-video (6.2.7).
- Remove the 93XX-yoke (6.2.8).
- Disconnect the EHT cable from the deflection board. - Discharge the tube.
- Remove the four screws.

The CRT can now be removed from the front frame.

WARNING

Use care when handling the CRT. Avoid striking it on any object which may cause the tube to implode. Store the cathode ray tube face down on a soft surface.
To avoid electrical shock the CRT should be discharged after the 9374/M/L/T oscilloscope is powered OFF. After disconnecting the EHT plug, ground the CRT anode lead to the metallic display support, repeat the operation to fully dissipate the charge.

6.2.12 Removal of the F9354-5 Front Panel (2.5)

Remove the following:

- Upper cover (6.2.1).
- Front frame assembly (6.2.9).
- 93XX-deflection board (6.2.10).
- Four screws (2.12) that secure the front panel.

The front panel (2.5) with the keyboard (2.6) can be removed forward from the unit.

6.2.13 Removal of the Front Panel Keyboard (2.6)

Remove the following:

- Upper cover (6.2.1).
- Front frame assembly (6.2.9).
- 93XX-deflection board (6.2.10).
- F9354-5 front panel (6.2.12).
- The 11 rotary knobs (2.9 and 2.10).Take great care of the soft plastic
- One screw (2.8) that secures the keyboard to the front panel.
- Disconnect the flat ribbon cable from the front panel connector J2, and remove the keyboard P/N : 729354513.

CAUTION

When removing or installing the keyboard or the front panel, be careful of the fragile flat ribbon cable and connector.

6.2.14 Removal of the Processor (1.32)

The processor F9302-1-4 or F9302-1-8 or F9302-1-16 board is located along the right side of the instrument.

Remove the following:

- Top cover (6.2.1).
- Front frame assembly (6.2.9).
- Disconnect the flat cable (3.19) from the F9300-4 GPIB interface connector J5

The processor can be removed vertically from the main card (1.14) F9374-3 or -31 connector J1

CAUTION

Static electricity can damage components (RAM, Eproms, microprocessor...). Antistatic precautions are required.

6.2.15 Removal of the F9374-3 or -31 Main Card (1.14)

Remove the following:

- Top cover (6.2.1).
- Front frame assembly (6.2.9).
- Power supply (6.2.2), and PS9370 auxiliary power supply (5.12)
- Processor (6.2.14).

The main board with the upper shield (1.2) is horizontally mounted to the lower case cover (1.1).

- Remove the ten M3x20 screws (5.3), two M3x16 (5.4) and six M2.5x6 (5.5) that secure the upper shield (1.2) to the main board and front panel.
- Remove the two M4x8 (5.1) and one M3x6 (5.2) that secure the rear panel assembly (3) to the lower cover (1.1)
- Disconnect the fan cable from connector J3.

The upper shield (1.2) attached to the rear panel (3) can be removed forward from the board.

- Remove the five M3x6 screws (1.26), four M3x16 (1.27) and three M3x6 flat head screws (1.25) that secure the board to the lower cover (1.1).

The main board F9374-3 or -31 (1.14) with acquisition memory card (1.29), base shield (1.21) and card panel (1.15) can be removed from the scope.

CAUTION

Antistatic precautions are required.

6.2.16 Removal of the Handle (1.4)

The handle with two black end caps is secured to the right side of the lower cover (1.1) by two screws (1.5) and washers (1.6).

- Remove the upper cover (6.2.1), and processor board (6.2.14).

The handle can be removed from the lower case.

6.2.17 Removal of the Foot Support (1.8)

The two foot supports are clipped on the lower cover (1.1).

- Remove the foot (1.7) or the support (1.8) by inserting a small flat screwdriver under the support

6.2.18 Removal of the 93XX-FD01 Floppy Disk Drive Option

- Remove the upper cover (6.2.1).
- Disconnect the flat ribbon cable from the F9300-6 interface (see figure 6.5 & 6.6).
- Remove the two M3x6 screws that secure the floppy drive support to the upper cover.
- Remove the support 70FD01021 (See figure 6.5) or 70FD01091 (See figure 6.6)
- Remove the frame 70FD01031 (See figure 6.5 & 6.6) from the cover.
- Remove the four M2.5x4 screws that secure the floppy to the support

The floppy disk drive (6.3) can be removed from the frame.

6.2.19 Removal of the 93XX-GP01 Graphic Printer and F9300-7 Controller Option

- Remove the upper cover (6.2.1).
- Disconnect the power cable from the PS9351 power supply (see figure 6.7).
- Disconnect the flat ribbon cable (780791604) from the F9300-7 controller (see figure 6.7).
- Disconnect the flat ribbon cable (780721022) between the F9300-6 interface and F9300-7 controller.
- Remove the four M3x6 screws that secure the F9300-7 controller to frame (70GP01031).
- Remove the F9300-7 controller
- Remove the two M3x6 screws that secure the printer to the frame

The graphic printer (7.3) can now be removed from the upper cover.

6.2.20 Removal of the F9300-6 Centronics Interface Option

- Remove the upper cover (6.2.1).
- Remove the two M3x6 screws from the rear panel
- Disconnect the flat cable P/N : 780801015 from the F9300-4 GPIB/RS232 board (see figure 6.6 or 6.7).

The Centronics interface board can be removed forward from the rear panel.

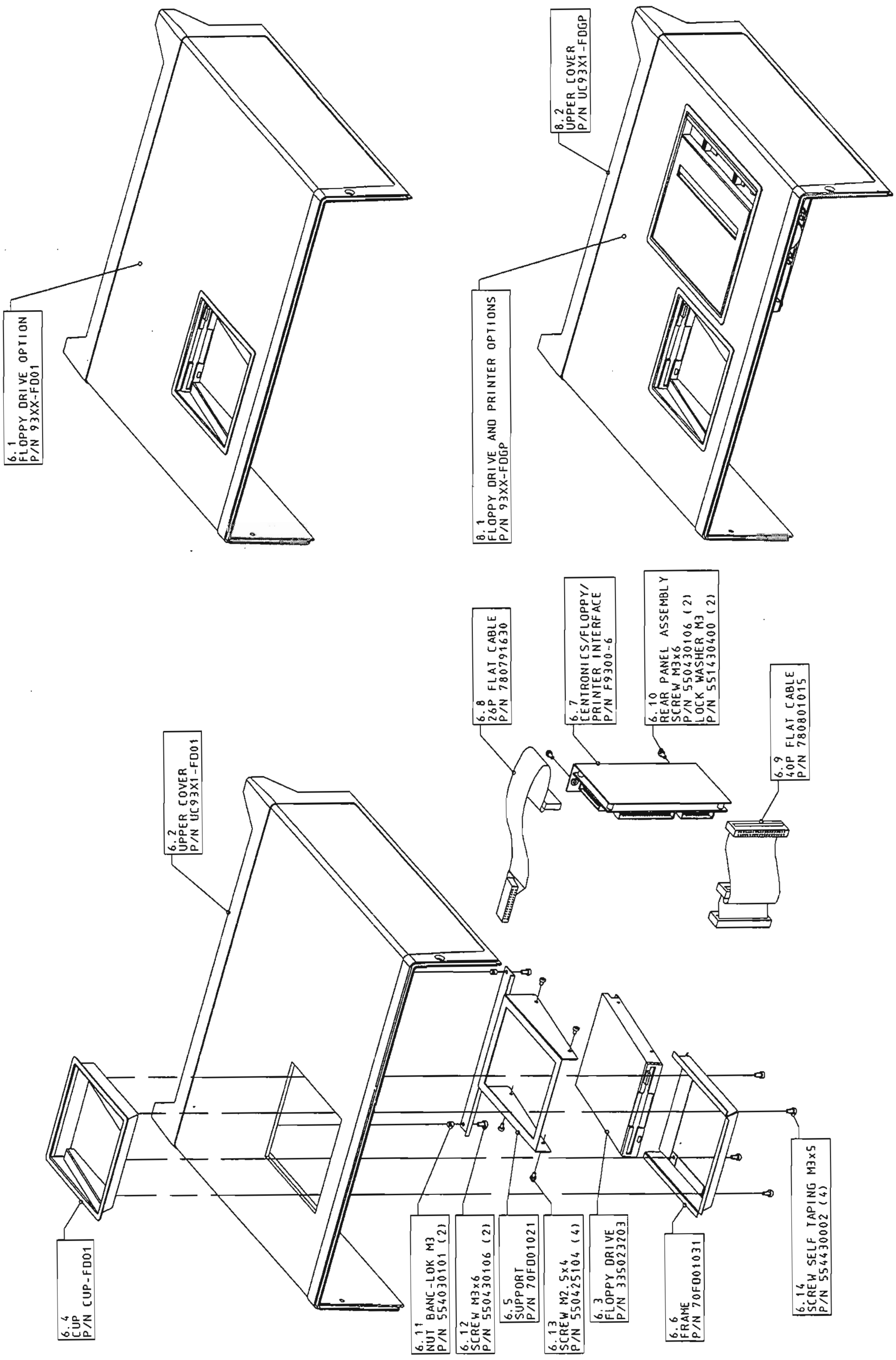


Figure 6.5 : Floppy Drive Assembly P/N: 335023203

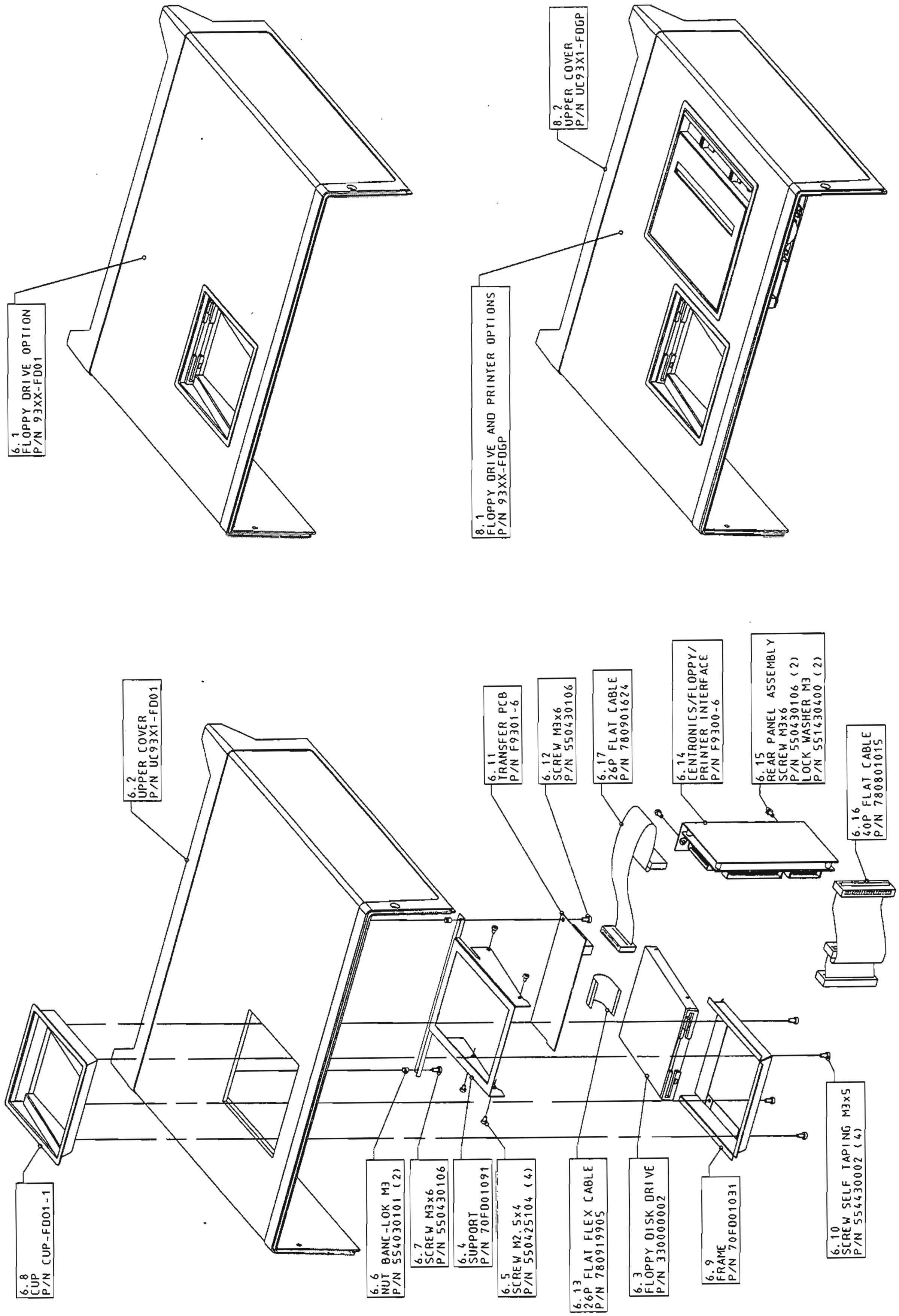


Figure 6.6 : Floppy Drive Assembly P/N: 330000002

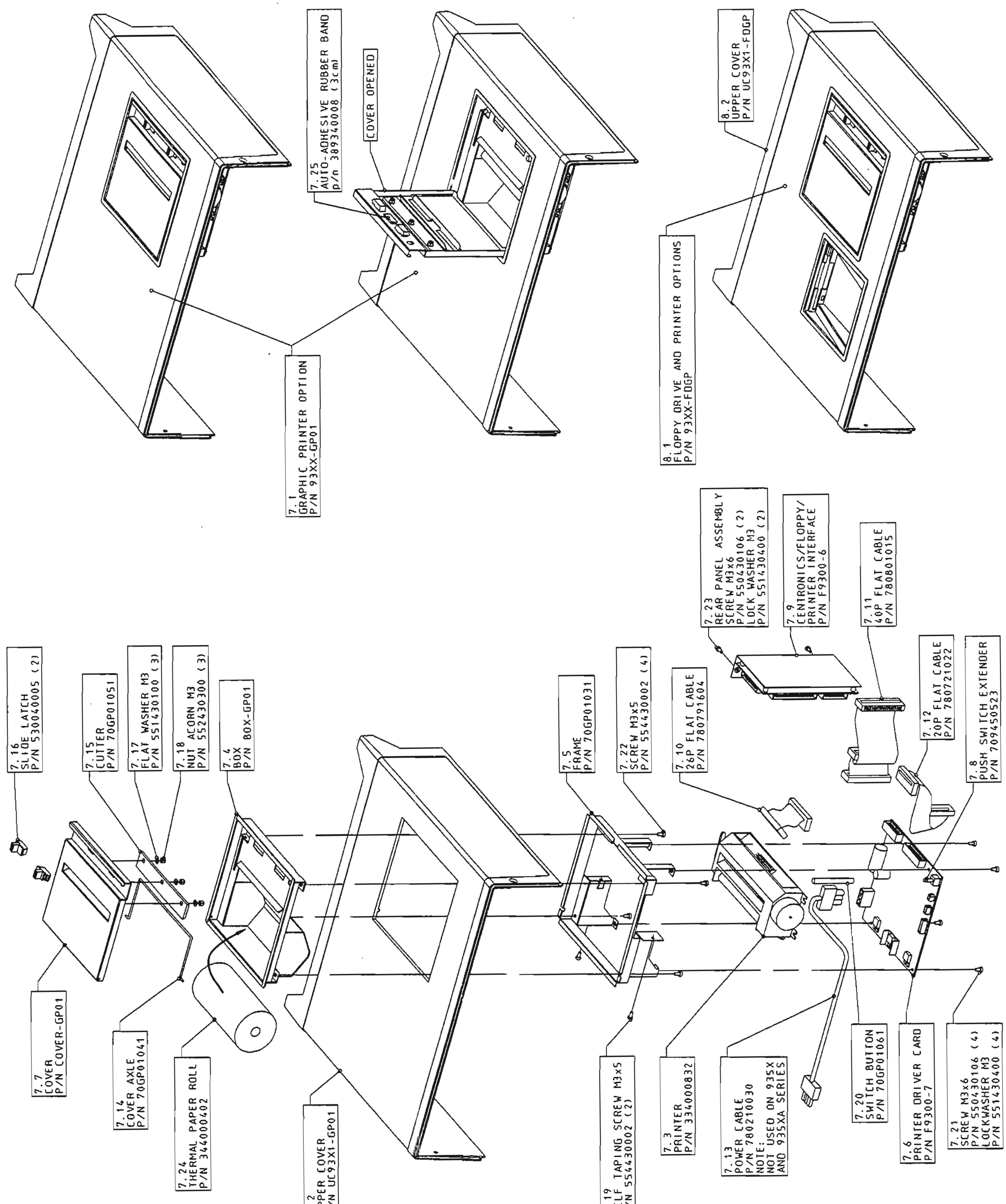


Figure 6.7 : Graphic Printer Assembly

6.3 Software Upgrade Procedure

F9302-1-X processor board has one 8MB Flash Prom which contains the program memory and the character font used by the graphic processor of the raster scan display.

After any software change, a general instrument reset is mandatory. Simultaneously press the autosetup button, the top menu button and the return button.

6.3.1 Upgrading Firmware

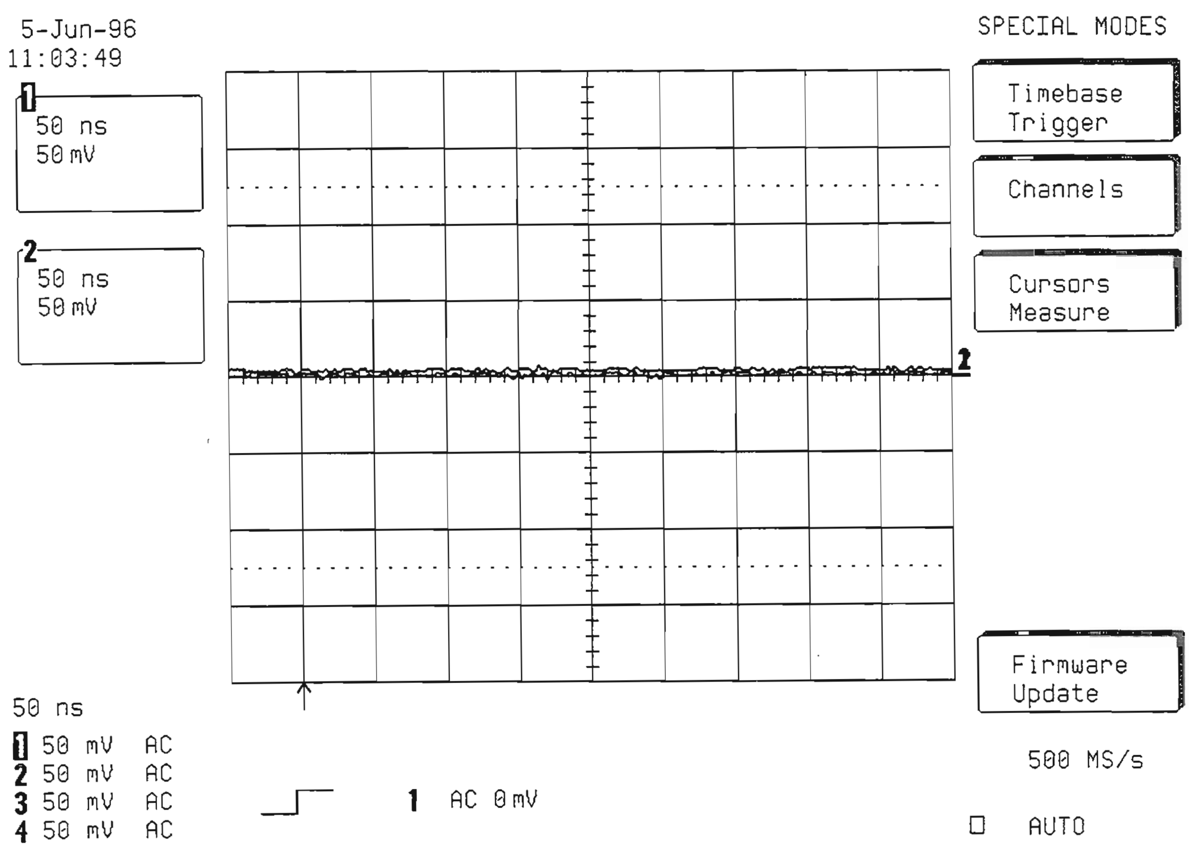
LeCroy Corporation has a policy of continually improving and upgrading its products.

The 9374/M/L/T instrument is equipped with Flash Prom on processor board, the Software is upgraded to the latest version using either the Memory Card interface or the Floppy disk drive.

6.3.1.1 Upgrading Firmware from Memory Card

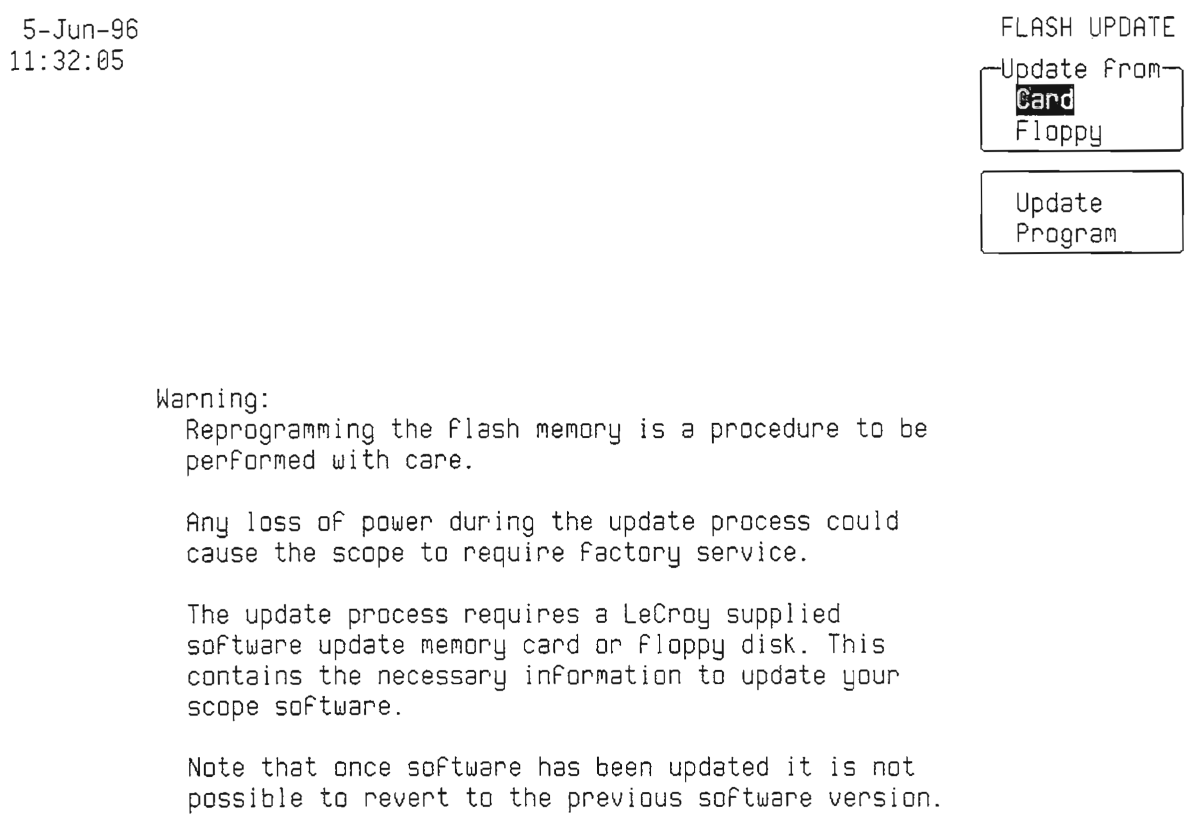
A single memory card containing the 93XX36XX.bin file in the Lecroy_P directory is required.

- Insert the card and cycle power to the scope. Once re-booted enter the **Utilities, Special Modes, Firmware Update** menu.



- Change the **Update From** control to **Card**
- Press **Update Program**.

The Software is then downloaded to the Flash Prom on the processor board.



6.3.1.2 Upgrading Firmware from Floppy

In order to update the scope firmware from floppy, two disks are required.

The first contains a **93XX36XX.bin** file in the Lecroy_P directory.

The second contains a **93XX36XX.fla** file in the Lecroy_P directory

- Insert the first disk and cycle power to the scope. Once re-booted enter the **Utilities, Special Modes, Firmware Update** menu.
- Change the **Update From** control to **Floppy**
- Insert the second floppy disk and press **Update Program**.

The Software is then downloaded to the Flash Prom.

5-Jun-96
11:36:15

Press Button again to confirm

FLASH UPDATE

Update From
Card
Floppy

Update
Program

Warning:
- Reprogramming the flash memory is a procedure to be performed with care.

Any loss of power during the update process could cause the scope to require factory service.

The update process requires a LeCroy supplied software update memory card or floppy disk. This contains the necessary information to update your scope software.

Note that once software has been updated it is not possible to revert to the previous software version.

6.3.2 Changing Software Options

The software option selection GAL is located on the processor board at location A49.
Insert or replace the GAL to select new options.
Make sure that the orientation notch is correctly aligned with the PCB.

6.3.3 Software Option Selection GAL

The following software options are available : (see section 2)

WP01	Advanced Math Firmware
WP02	Basic FFT Firmware
WP03	Parameter Distribution Analysis Firmware
CARD	Memory card
DDM	Disk Drive Measurements
PRML	Partial Response Maximum Likelihood
ORM	Optical Recording Measurement
MC01	PCMCIA Memory Card

MC01 200	ORM 040	PRML 020	DDM 008	WP03 004	WP02 002	WP01 001	CLE XXX-R XXX = Software option, R = Release Code
no	no	no	no	no	no	no	GAL Not Necessary
no	no	no	no	no	no	**yes**	**CLE 001-A**
no	no	no	no	no	**yes**	no	**CLE 002-A**
no	no	no	no	no	yes	yes	CLE 003-A
no	no	no	no	**yes**	no	no	**CLE 004-A**
no	no	no	no	yes	no	yes	CLE 005-A
no	no	no	no	yes	yes	no	CLE 006-A
no	no	no	no	yes	yes	yes	CLE 007-A
no	no	no	**yes**	no	no	no	**CLE 008-A**
no	no	no	yes	no	no	yes	CLE 009-A
no	no	no	yes	no	yes	no	CLE 00A-A
no	no	no	yes	no	yes	yes	CLE 00B-A
no	no	no	yes	yes	no	no	CLE 00C-A
no	no	no	yes	yes	no	yes	CLE 00D-A
no	no	no	yes	yes	yes	no	CLE 00E-A
no	no	no	yes	yes	yes	yes	CLE 00F-A
no	no	**yes**	no	no	no	no	**CLE 020-A**
no	no	yes	no	no	no	yes	CLE 021-A
no	no	yes	no	no	yes	no	CLE 022-A
no	no	yes	no	no	yes	yes	CLE 023-A
no	no	yes	no	yes	no	no	CLE 024-A
no	no	yes	no	yes	no	yes	CLE 025-A
no	no	yes	no	yes	yes	no	CLE 026-A
no	no	yes	no	yes	yes	yes	CLE 027-A
no	no	yes	yes	no	no	no	CLE 028-A
no	no	yes	yes	no	no	yes	CLE 029-A
no	no	yes	yes	no	yes	no	CLE 02A-A
no	no	yes	yes	no	yes	yes	CLE 02B-A
no	no	yes	yes	yes	no	no	CLE 02C-A
no	no	yes	yes	yes	no	yes	CLE 02D-A
no	no	yes	yes	yes	yes	no	CLE 02E-A
no	no	yes	yes	yes	yes	yes	CLE 02F-A
no	**yes**	no	no	no	no	no	**CLE 040-A**
no	yes	no	no	no	no	yes	CLE 041-A
no	yes	no	no	no	yes	no	CLE 042-A
no	yes	no	no	no	yes	yes	CLE 043-A
..........✂..........	....✂....	....✂....	....✂....	....✂....	....✂....	....✂....	..................✂................
yes	no	no	no	no	no	no	**CLE 200-A**
yes	no	no	no	no	no	yes	CLE 201-A
yes	no	no	no	no	yes	no	CLE 202-A
yes	no	no	no	no	yes	yes	CLE 203-A
yes	no	no	no	yes	no	no	CLE 204-A
yes	no	no	no	yes	no	yes	CLE 205-A
yes	no	no	no	yes	yes	no	CLE 206-A
yes	no	no	no	yes	yes	yes	CLE 207-A
yes	no	no	yes	no	no	no	CLE 208-A
..........✂..........	....✂....	....✂....	....✂....	....✂....	....✂....	....✂....	..................✂................
yes	yes	yes	yes	yes	yes	yes	CLE 26F-A

6.3.4 Processor Board Exchange Procedure

The replacement board is supplied without any options. Therefore the existing GAL (Loc A49) must be transferred from the faulty board to the new board. After upgrading firmware or changing the software option, check that the scope boots correctly. Then check in the system summary, by using the show status button on the front panel, the software version, software options and serial number.

The serial number of the 9374/M/L/TM oscilloscope is loaded in the real time clock memory which is battery backed up. If it becomes necessary to replace the processor board, the serial number must be loaded in the memory of the new board by using LeCroy program " LeCalsoft " under GPIB remote control.

To run " LeCalsoft " type SKP.exe, in the main menu type S, and follow the instructions, use five digits to enter the serial number (i.e. 01490).

```
 5-Jun-96                                                      STATUS
14:25:57
                                                              Acquisition
                                                              System
Serial Number  937401490                                      Text & Times
                                                              Waveform
Soft Version   9374L  06.7.1                                  Memory Used
    Friday, May 03, 1996 6:37 PM
    (build 27)

Soft Options
    WP01   WP02   WP03   DDM   CKIO   PRML   MC01


Hard Options                                                  MORE VERSION
    GPIB   R232   CLBZ   FD01   CENT   CKTR   CPU3   I2C      INFORMATION


Main RAM size  16 Mbytes



                                                                 500 MS/s

                                                              □  AUTO
```

6.4 Equipment and Spare Parts Recommended for Service

6.4.1 Equipment

The following equipment is needed to provide the technician access to the 9374/M/L/TM subassemblies during repair and calibration (see Performance Verification section 5).

Instrument	Specifications	Recommended	Where used
Signal Generator (sine wave)	Frequency : .5 MHz to 2 GHz Frequency Accuracy : 1 PPM Amplitude : 5 V peak to peak	HP8648B or equivalent	5.9.1 5.11 5.12
Fast pulse Generator	Rise time < 70 psec	Picosecond TD1107 B or equivalent	5.13
Sine Wave Generator	Frequency : 5 KHz Amplitude : 6 V peak to peak	LeCroy LW420 or equivalent	5.10
DC precision Power Supply	Amplitude : 10 V, DC Accuracy : < 0.1 %	Tektronix PS5004 or equivalent	5.7, 5.8 5.15
Digital Multimeter	4 digits	Keithley 199 or equivalent	5.4 5.5
10:1 Passive Probe	500 MHz , 10 MΩ	LeCroy PP005	5.9.1.b
Cable	BNC, 50 Ω, length 20 cm, 1ns (7.87 inches)	LeCroy 480232001	5.10.3 5.10.4
Cable	BNC, 50 Ω, length 100 cm, 5 ns (39.37 inches)	LeCroy 480020101	5.XX
Attenuator	50 Ω, 20 dB 1% accuracy	Suhner	5.7
Attenuator	1 MΩ, 20 dB 1% accuracy	Suhner	5.7
Attenuator	50 Ω, 3 dB 1% accuracy	Suhner	5.10
Feed through	50 Ω, 1% accuracy	Suhner	5.13
BNC T adapter	BNC, 50 Ω, T adapter	LeCroy 402222002	5.10.3 5.10.4

6.4.2 Spare Parts

In order to make the repair of 9374/M/L/TM DSO's series at board level, a minimum stock of boards is at least one each:

- F9302-1-4 : Processor board for 9374
- F9302-1-8 : Processor board for 9374M and 9374TM
- F9302-1-16 : Processor board for 9374L

- F9350-21 : Acquisition memory for 9374
- F9350M-21 : Acquisition memory for 9374M
- F9350TM-21 : Acquisition memory for 9374TM
- F9350L-2 : Acquisition memory for 9374L

- F9374-3 or 31 : Main board for 9374, 9374M, 9374L, & 9474TM

- F9300-4 : GPIB/RS232 interface
- F9354-5 : Front panel with keyboard

- 93XX-Display : Raster monitor kit
- PS9351 : Power supply
- PS9350 : Auxiliary Power Supply

If the unit is equipped with the 93XX-FD01 option :
- F9300-6 : Floppy, Graphic printer, Centronics Interface
- 335023203 : Floppy disk drive

or 330000002 : Floppy disk drive

If the unit is equipped with the 93XX-GP01 option :
- F9300-6 : Graphic printer, Floppy, Centronics Interface
- F9300-7 : Graphic printer controller
- 334000832 : LPT5446 Seiko Graphic printer

If the unit is equipped with the 93XX-HD01 option :
- F9300-8 : Hard disk Interface
- HDD02 : Hard disk drive

The other parts (fan, fuse holder, scope handle, covers, rear panel...) are not on the above list because they are very reliable parts and the probability of failure is very low.

6.5 Troubleshooting and Flow Charts

6.5.1 Introduction

The troubleshooting information contained in this section is intended for use by qualified personnel having a basic understanding of electronics (analog and digital). In order to simplify servicing and minimize downtime, the following list of possible symptoms, likely causes, and troubleshooting steps have been prepared.
The first step in troubleshooting is to check for obvious items like blown fuses.
The power supply is the next item to check before proceeding to more detailed troubleshooting, since noise or low power supply voltages can cause a variety of digital and analog problems.

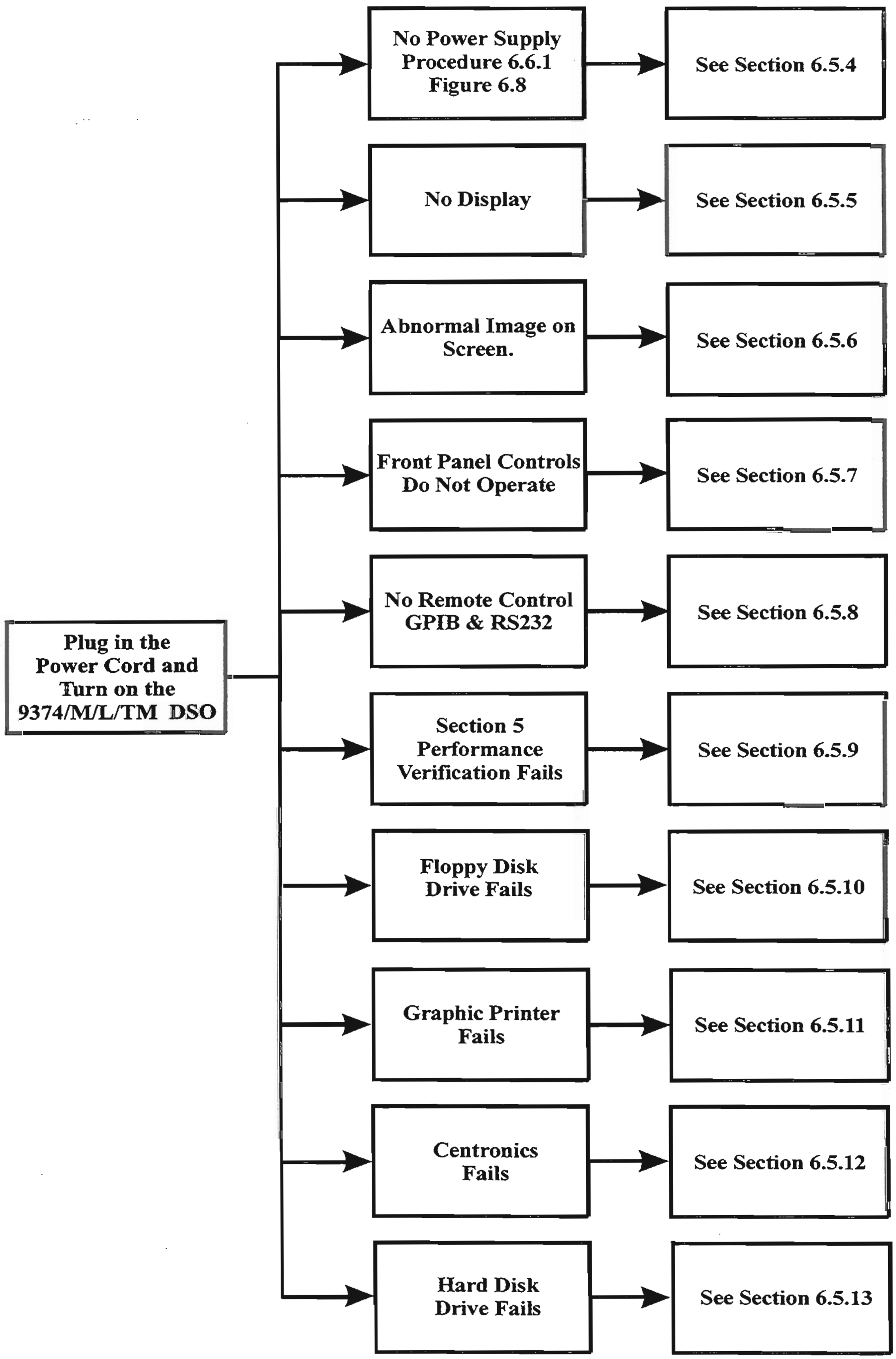
6.5.2 Line Voltage Autoranging

The 9374/M/L/TM oscilloscope operates from a 115 V (90 to 130 V) or 220 V (180 to 260 V) normal power source at 47 Hz to 63Hz.
No voltage selection is required since the instrument automatically adapts to the line voltage which is present. The instrument operates at line frequencies up to 440 Hz.

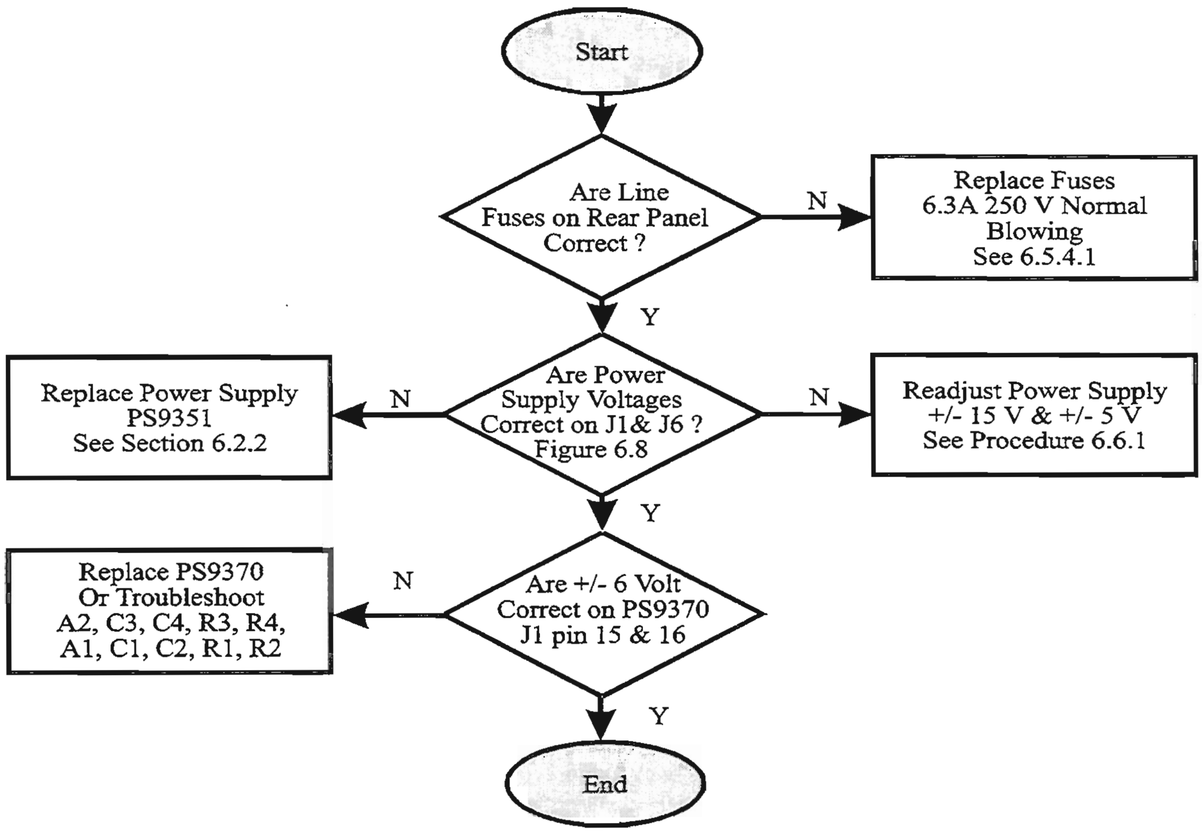
6.5.3 Initial Troubleshooting Chart

Most procedures in this section will allow troubleshooting down to the **BOARD LEVEL.**

Defective circuit boards will be repaired or exchanged by the regional LeCroy service office or the local representative (see section 1.4).


Plug in the Power Cord and Turn on the 9374/M/L/TM DSO
No Power Supply Procedure 6.6.1 Figure 6.8
See Section 6.5.4
No Display
See Section 6.5.5
Abnormal Image on Screen.
See Section 6.5.6
Front Panel Controls Do Not Operate
See Section 6.5.7
No Remote Control GPIB & RS232
See Section 6.5.8
Section 5 Performance Verification Fails
See Section 6.5.9
Floppy Disk Drive Fails
See Section 6.5.10
Graphic Printer Fails
See Section 6.5.11
Centronics Fails
See Section 6.5.12
Hard Disk Drive Fails
See Section 6.5.13

6.5.4 No Power Supply



6.5.4.1 Line Fuses Replacement

The power supply of the oscilloscope is protected against short circuits and overload by means of two 6.3A / 250 V fuses located above the main plugs.

WARNING

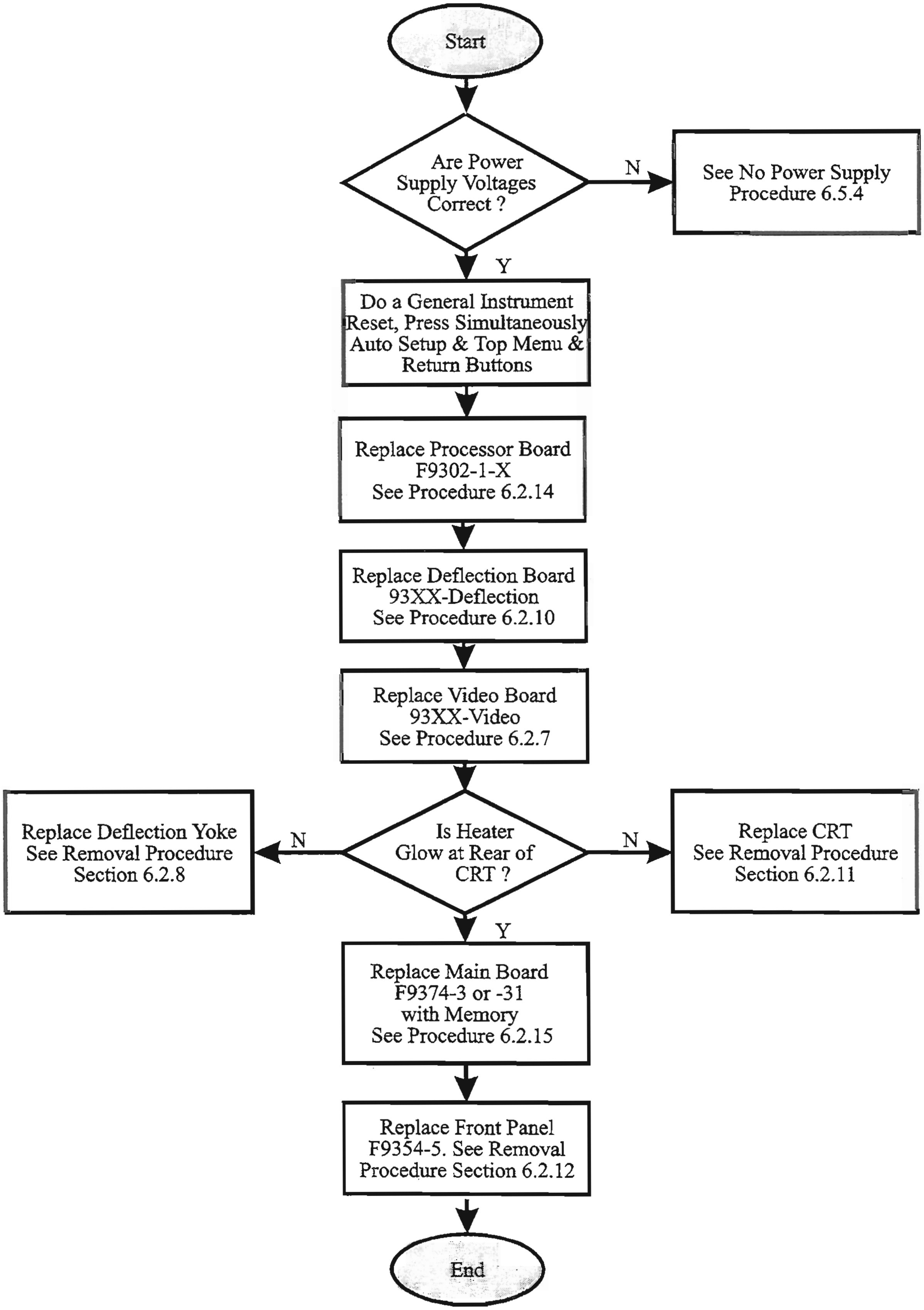
Disconnect the instrument from the power line and from other equipment before replacing fuses.

To replace line fuses, proceed as follow :

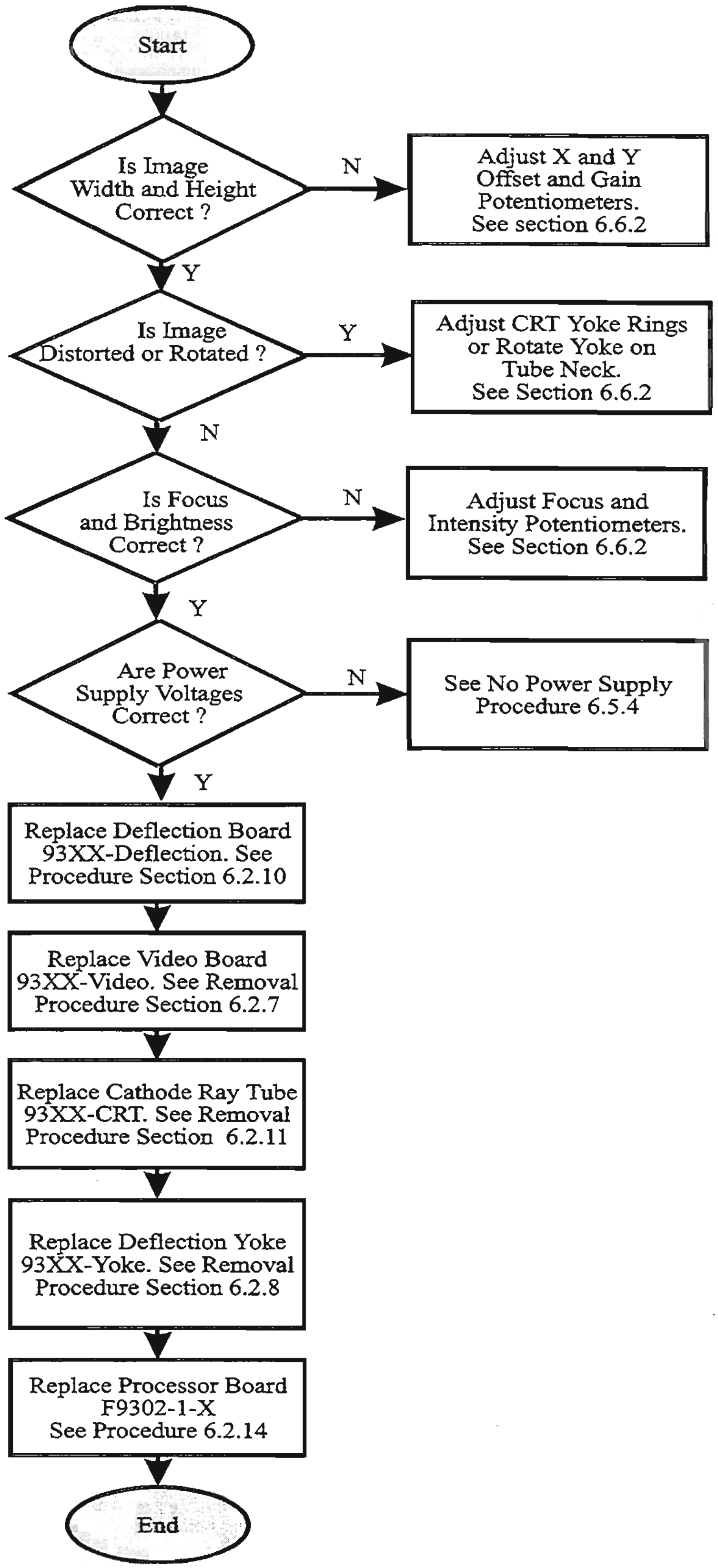
- Turn off the power and disconnect the line cord from the instrument
- Open the fuse box by inserting a small flat screwdriver under the plastic cover and remove the fuse carrier from the holder
- Remove the 6.3 amp fuse and replace it with the proper type:

6.3 amp/250 V, normal blowing.
LeCroy part number: 433 162 630

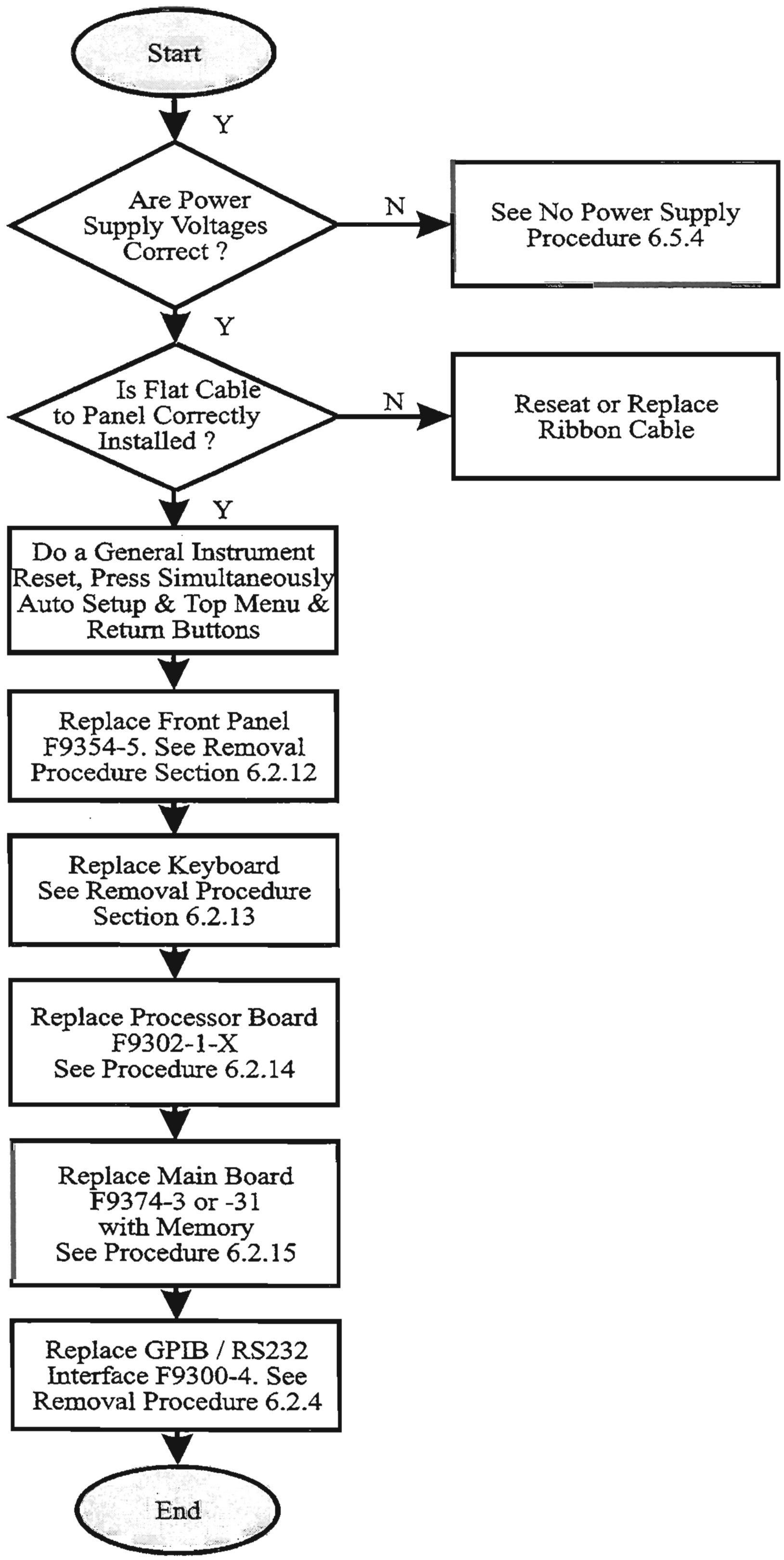
6.5.5 No Display



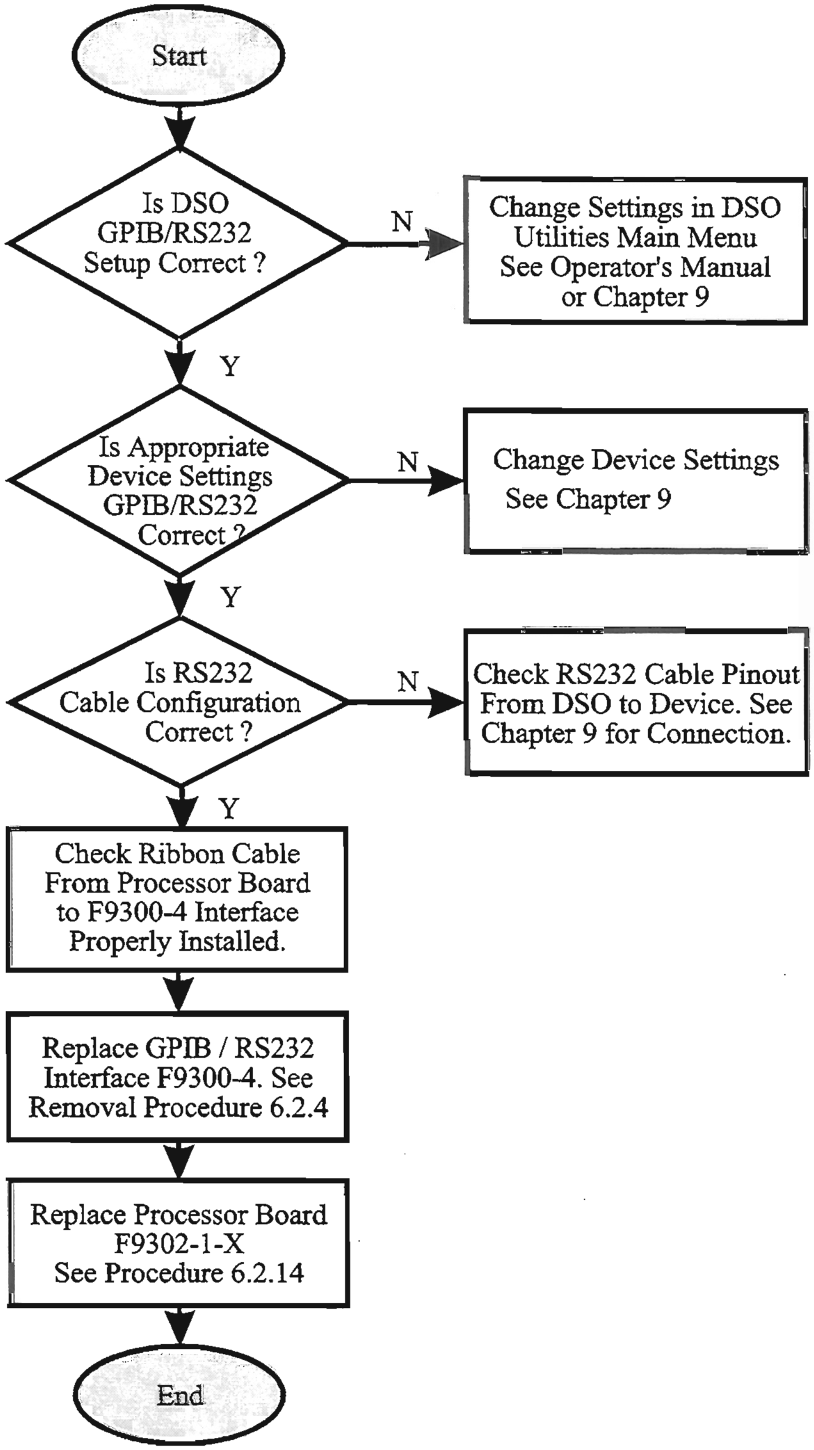
6.5.6 Abnormal Image On Screen



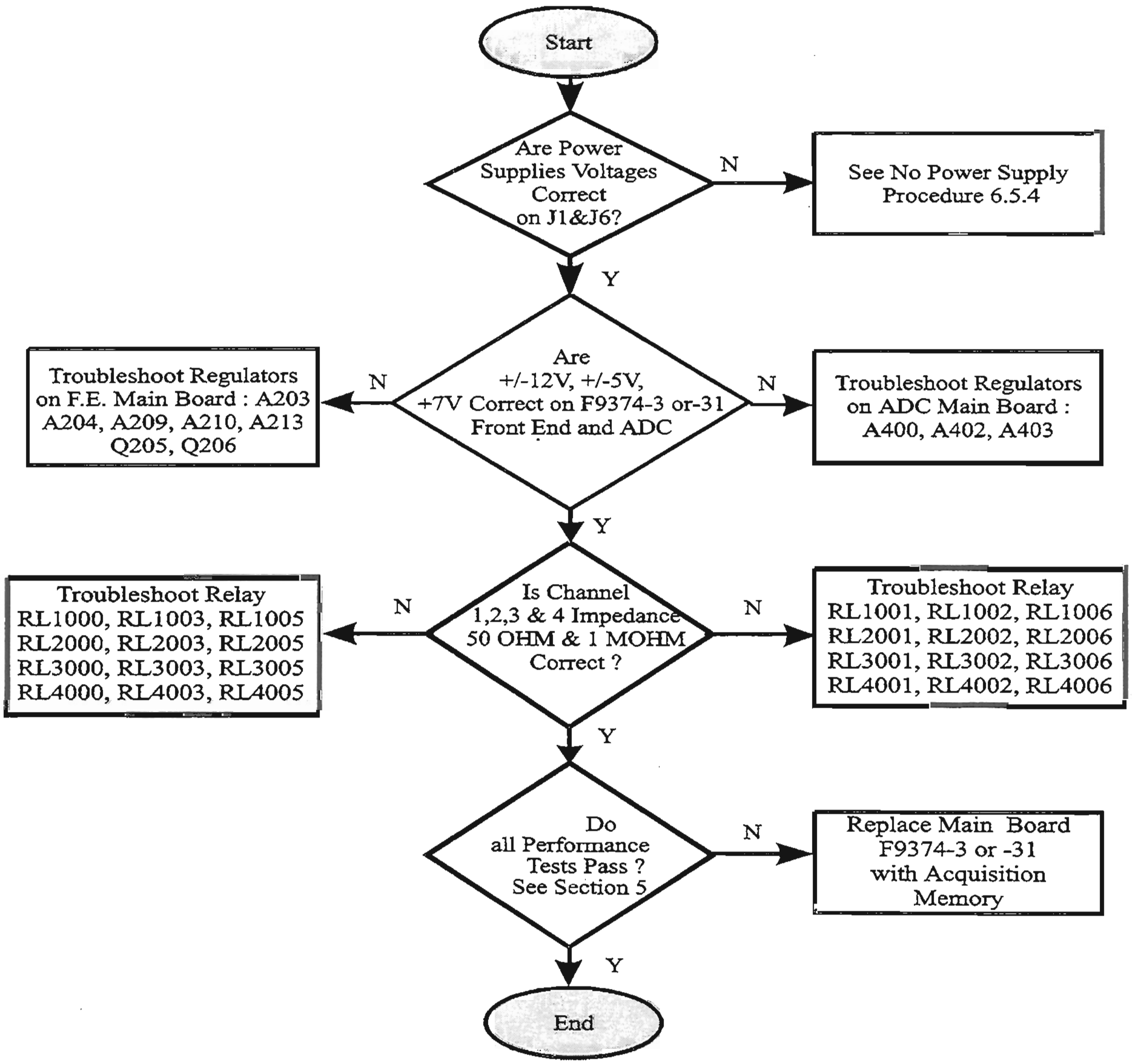
6.5.7 Front Panel Controls Do Not Operate



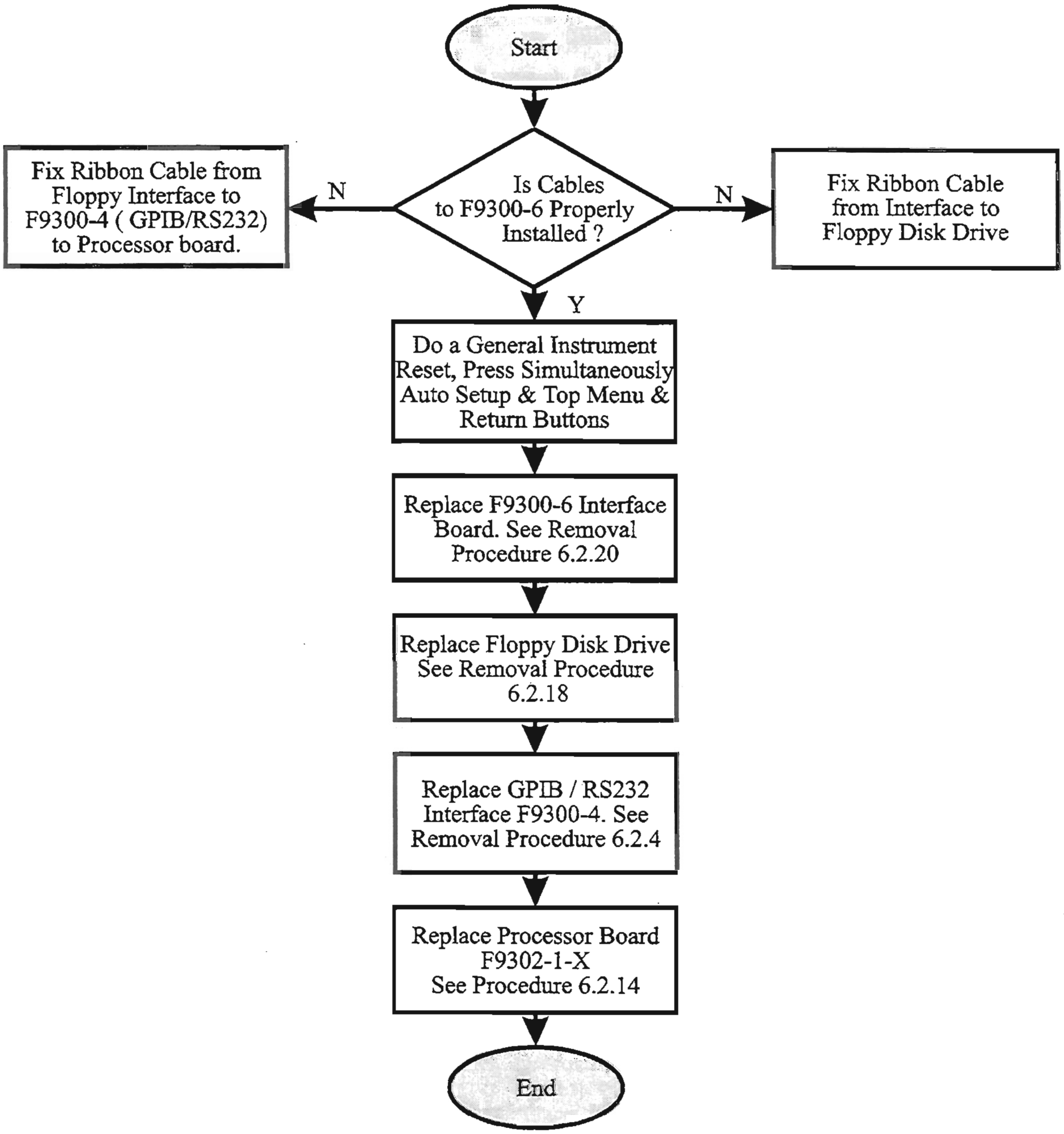
6.5.8 No Remote Control GPIB and RS232



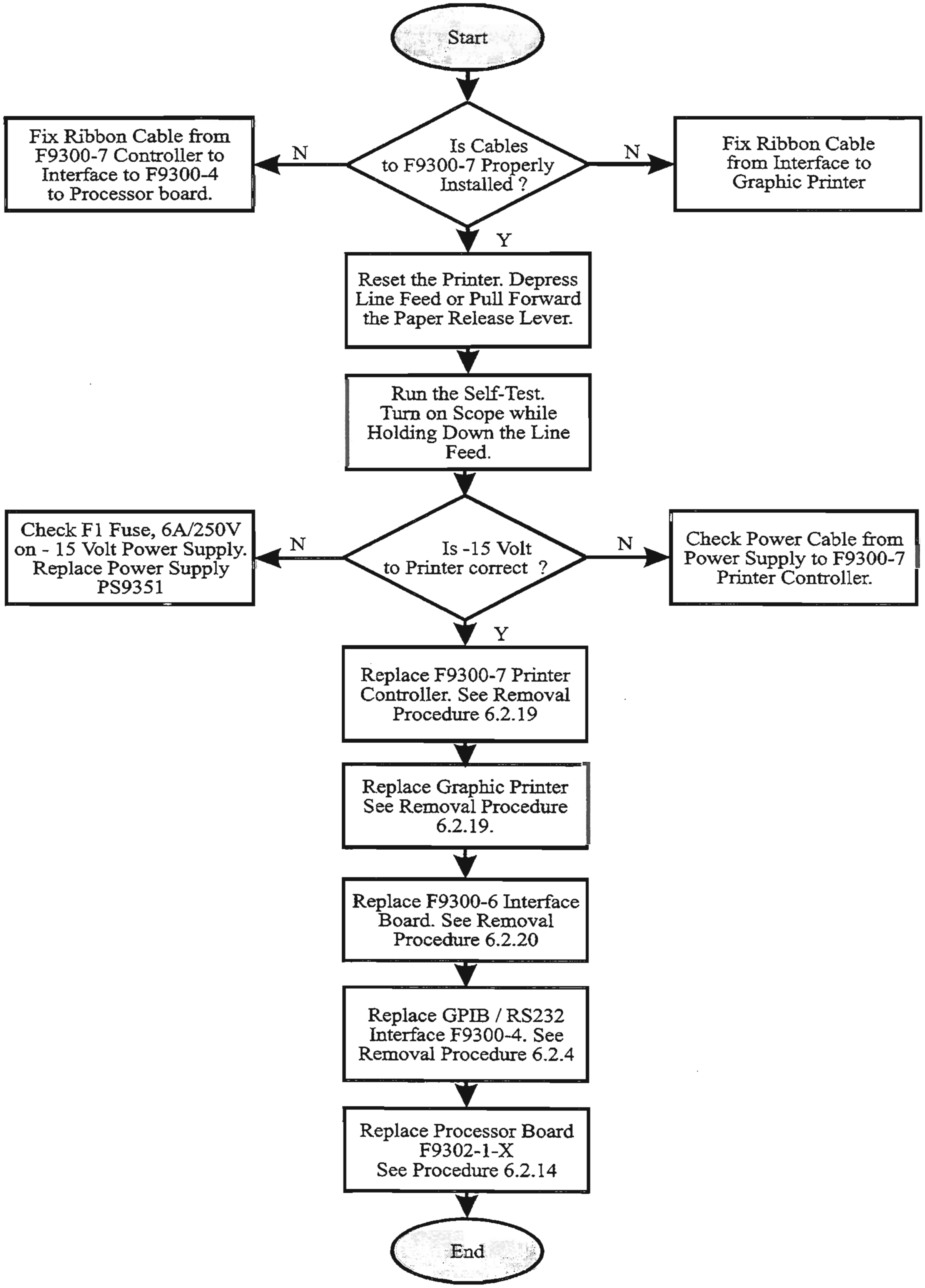
6.5.9 Performance Verification Fails



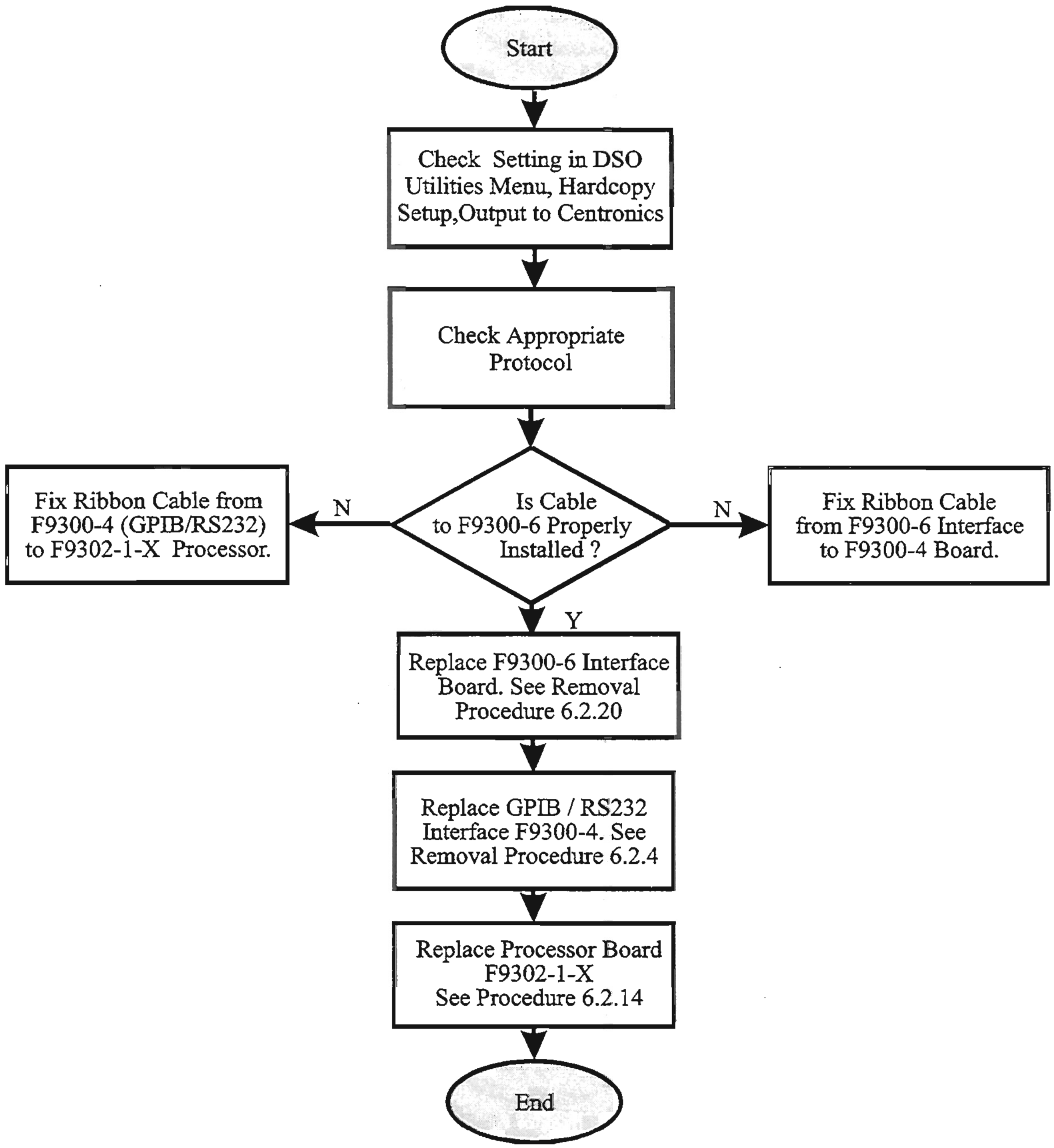
6.5.10 Floppy Disk Drive Fails



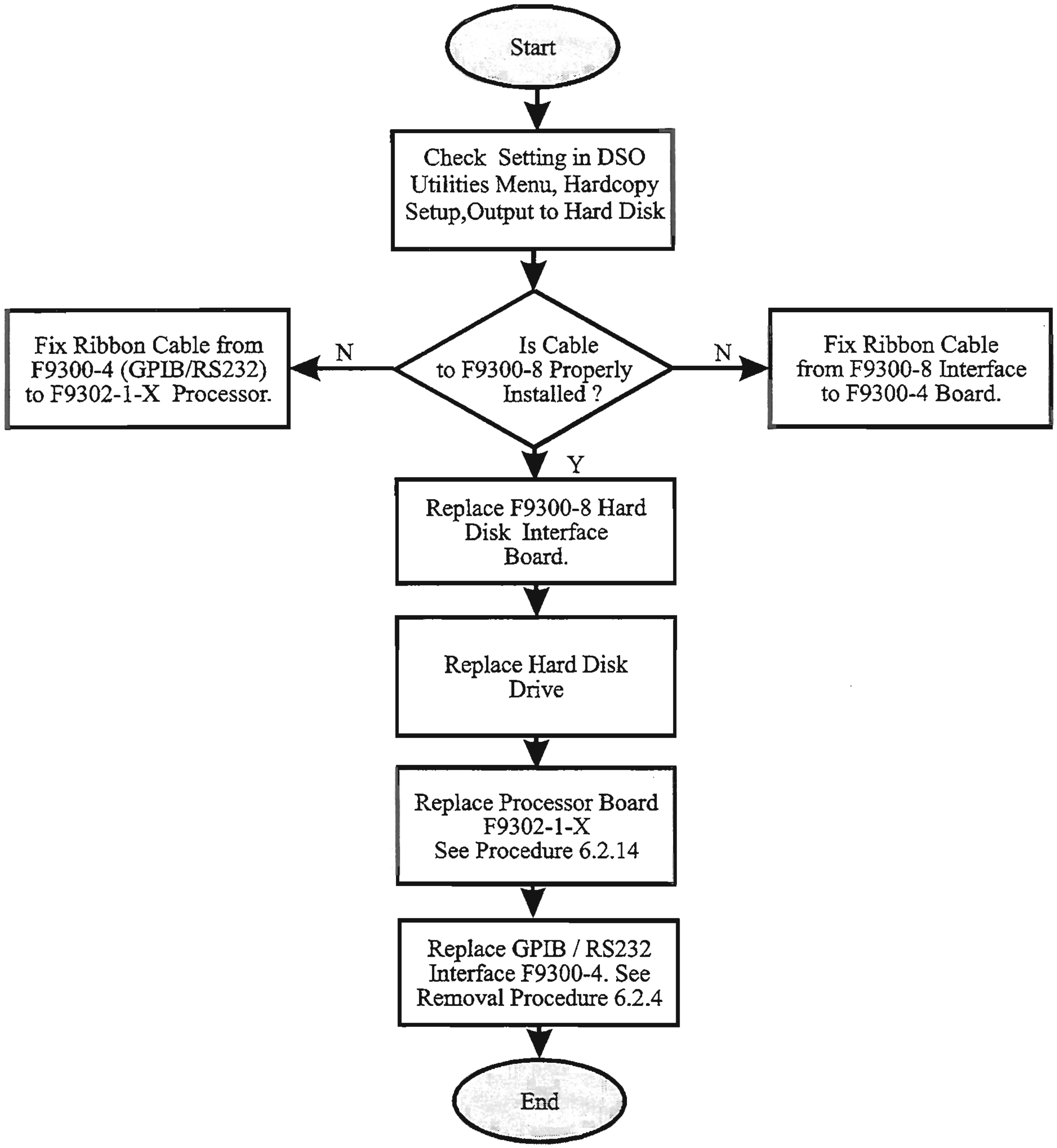
6.5.11 Graphic Printer Fails



6.5.12 Centronics Fails



6.5.13 Hard Disk Fails



6.6 Calibration Procedures

The following section includes the adjustments required for the power supply, front end and display. It is recommended that they be verified at one year intervals.

6.6.1 PS9351 Power Supply Calibration

The four voltages are adjustable by ± 5% of the nominal value.

The reference for the measurements are the pins on top of connector J1 connected to the main board F9374-3 or -31.

For the power supply calibration proceed as follow:

- Turn off the power
- Remove the top cover (6.2.1)
- Remove the front frame assembly (6.2.9) and put it to the right of the unit.

- By using two extension cables, reconnect the processor board to the front panel (J4) and to the deflection board (J6).

- Once the top cover is removed and the front panel is disassembled from the scope, extra cooling of the main board is required. It's mandatory to disconnect the existing Fan from connector J3, located on F9374-3 or -31card, and to use a Fan with the air flow oriented to the front end section of the board.

- The front frame assembly is now reconnected to the processor through the extension cables.

- Turn on the power, set the scope to Auto Trigger, and perform the adjustments to get on J1 & J6 (see figure 6. 8).

J1 Pin 4, 5, 6	:	**+ 5.12 V** (Min = + 5.05 V, Max = + 5.15 V)
J1 Pin 9, 10, 11	:	**- 5.2 V** (Min = - 5.15 V, Max = - 5.25 V)
J6 Pin 1	:	**+15 V** (Min = +14.9 V, Max = +15.1 V)
J6 Pin 3	:	**- 15 V** (Min = -14.9 V, Max = -15.1 V)
J1 Pin 3, 7, 8	:	**Ground**
J6 Pin 2	:	**Ground**

The four potentiometers are accessible from the right side through holes in the PS9351 power supply chassis.

- Turn the potentiometer clockwise to increase the tension or counterclockwise to decrease the voltage. When the adjustment is done, stop the acquisition by depressing the stop trigger push button, and verify that there is no large difference on the + 5.12 V, typically less than 80 mV.

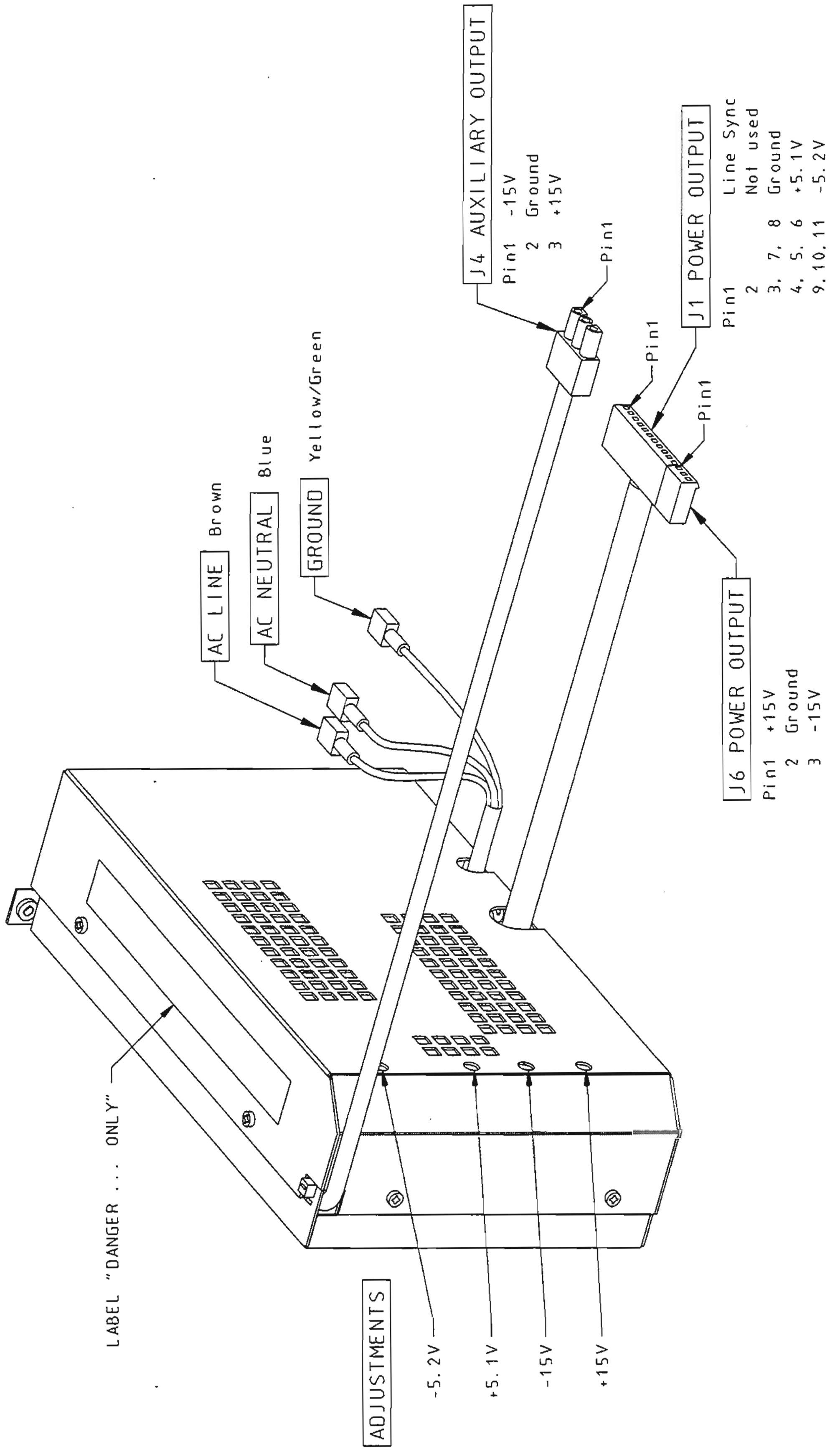


Figure 6.8 : PS9351 Power Supply

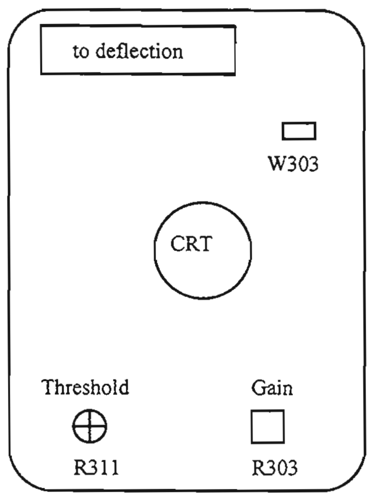
6.6.2 93XX-Display Adjustment Procedure

6.6.2.1 Introduction

There is a total of 12 potentiometers or variable coils to adjust the deflection and video board.

Video: (2 adjustments)

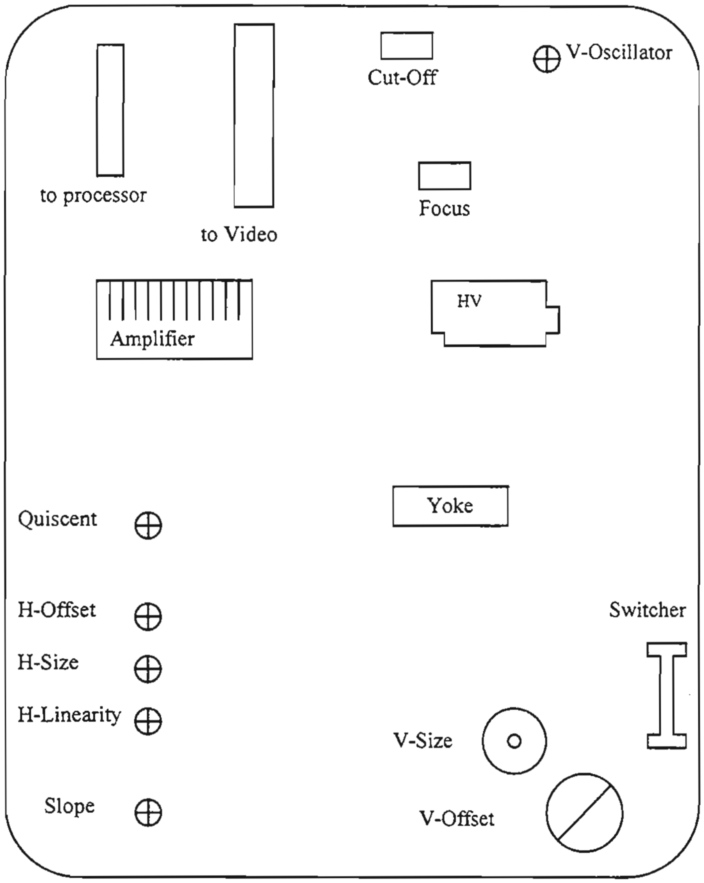
- Threshold : **Level of the video board.**
- Gain : **Intensity of the screen.**



Video board component side

Deflection : (10 adjustments)

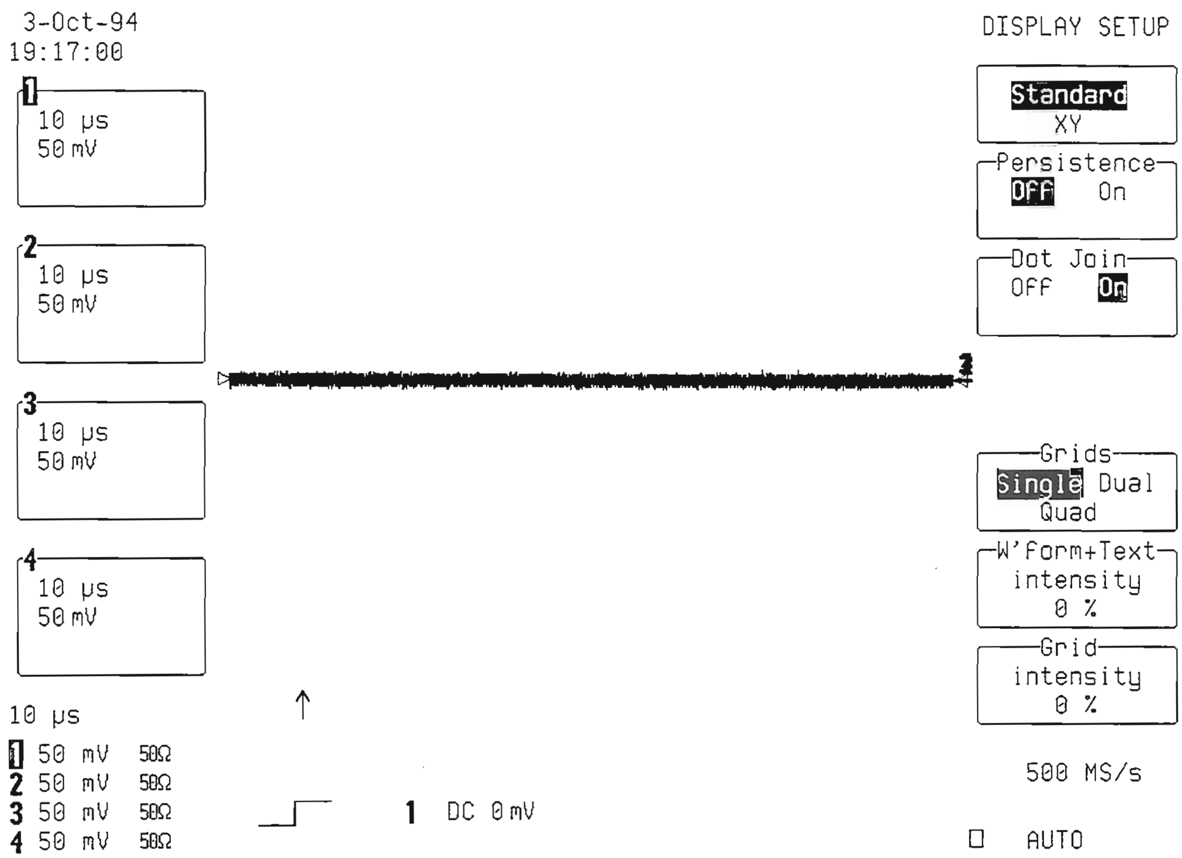
- Vosc : **Frequency of the vertical oscillator.**
- Slope : **Speed of the horizontal ramp.**
- Focus : **Focus of the screen.**
- Cut off : **Cathode ray tube cut off.**
- Quiescent : **Standby current of the horizontal deflection amplifier.**
- H Linearity : **Horizontal linearity.**
- H Size : **Horizontal size** (Max 165mm).
- H Offset : **Horizontal position.**
- V Size : **Vertical size** (Max 120mm).
- V Offset : **Vertical position.**



Deflection board component side

6.6.2.2 Coarse Adjustment

- Depress display button.
- Set W'form + text intensity to 0%.
- Set grid intensity to 0%
- Turn fully clockwise the intensity potentiometer on the video board.
- On the video board connect a digital multimeter on test point : W303
- Adjust threshold potentiometer to get 2 V ± 0.1 V on W303.



- Set W'form intensity to 100%.
- Set grid intensity to 60%.

- Adjust H-size, H-offset, V-size, V-offset to center the image in the screen.
  The vertical position should be adjusted to get the push buttons of the front panel in front of the software menus, use the utilities set up.
  The small magnets mounted on the deflection yoke influence the vertical position.

- Turn the quiescent potentiometer clockwise until the default of the horizontal lines just disappears from the vertical center of the screen.

- Increase the cut off until a vertical line appears on the right side of the screen.

- Adjust the slope potentiometer to get 5mm gap between the highlighted vertical line and the right border of the selection menus.

- Adjust H-linearity to get the best linearity.

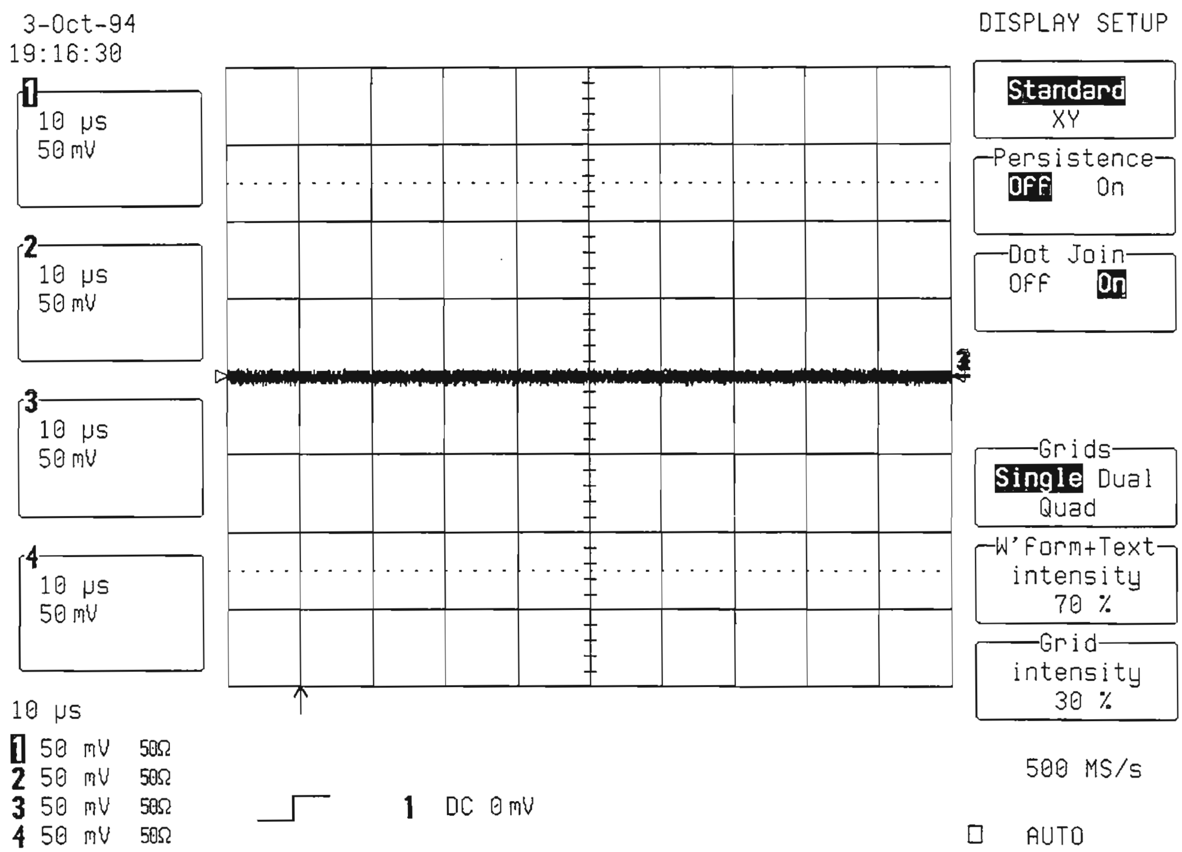
6.6.2.3 Fine Adjustment

The final adjustment of the intensity, cut off, and focus must be made in a dark room.

- Set W'form intensity to 30%.
- Set grid intensity to 0%.
- Adjust the cut off potentiometer until the highlighted vertical line disappears from the right side of the screen.

- Set W'form intensity to 20%.
- Display four traces.
- On the video board adjust the gain potentiometer (intensity) in order to get the text just readable.

- Set W'form + text intensity to 70%.
- Set grid intensity to 30%



- Adjust the focus (usually fully clockwise) for most uniform focus over the entire screen.

- In a standard luminosity environment set W'form + text to 90%, and grid intensity to 60%.

- Verify the intensity, focus, and contrast adjustment, for best definition of the displayed text.

CAUTION

Never change the Vosc calibration.

SECTION 7 SCHEMATICS, LAYOUTS, PARTS LIST

9374, 9374M, 9374L & 9374TM

Digital Storage Oscilloscope

PART : 9374 DESC : 500 MHz, QUAD CHANNEL 500 MS/s, 1GHZ DSO, 50 KB

COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
205750000	IC AND-OR GATE ARRAY 16V8	1
709374016	FRONT LABEL 9374	1
709374913	SERIAL NUMBER PLATE 9374	1
F9302-1-4	PROCESSOR CARD WITH 4Mb DRAM	1
F9350-21	ACQUISITION MEMORY 2 X 50 K	2
F9374-3 or -31	MAIN CARD (FRONT END, ADC, TDC)	1
F9300-4	GPIB + RS232 INTERFACE CARD	1
F9354-5	QUAD CHANNEL FRONT PANEL	1
M937X	MECHANICAL FOR 9374	1
937X-SOFT	SOFTWARE	1
ACCESSORIES-9374	ACCESSORIES FOR 9374	1

PART : 9374M DESC : 500 MHz, QUAD CHANNEL 500 MS/s, 1 GHZ DSO, 250 KB

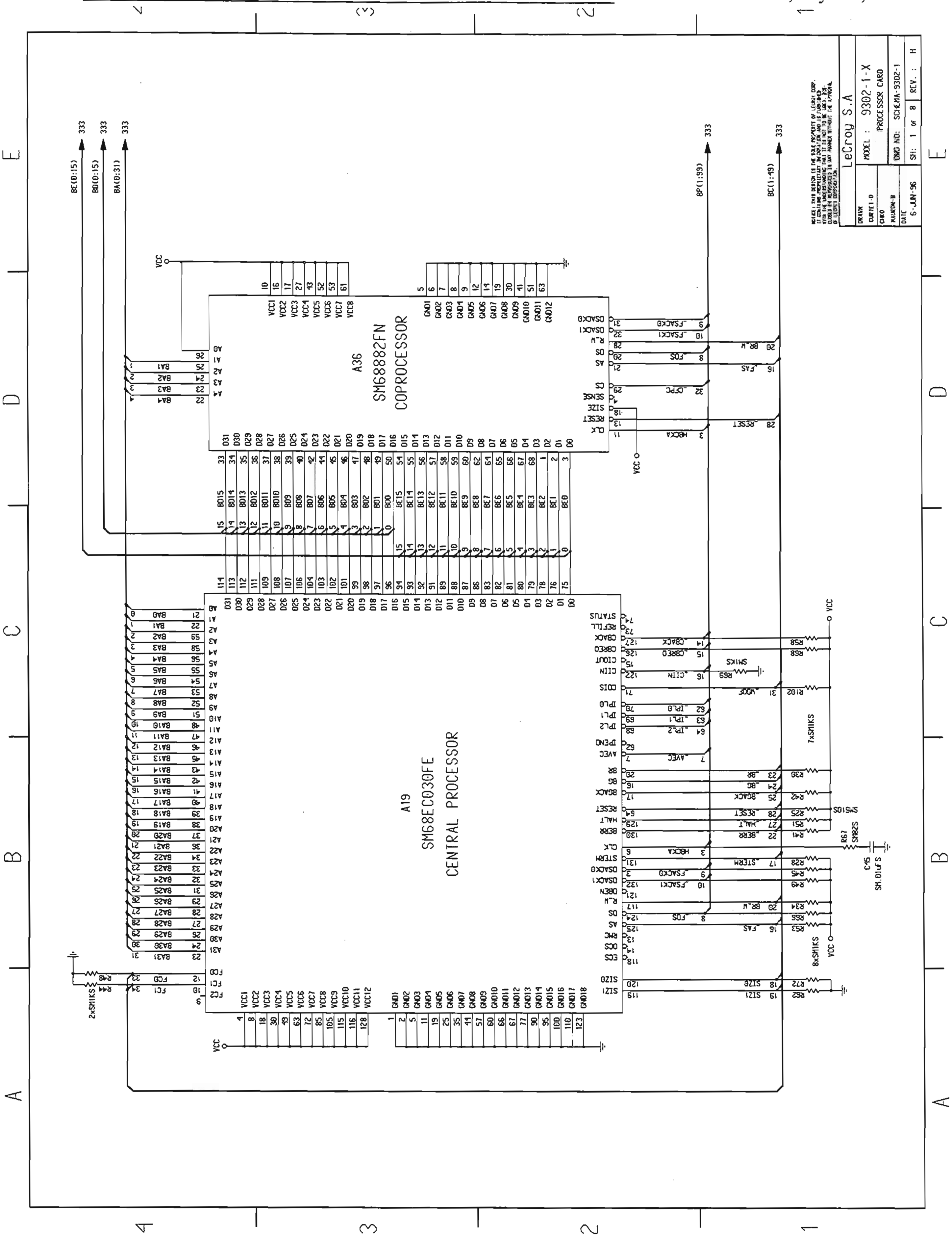
709374M16	FRONT LABEL 9374M	1
F9302-1-8	PROCESSOR CARD WITH 8Mb DRAM	1
F9350M-21	ACQUISITION MEMORY 2 X 250 K	2

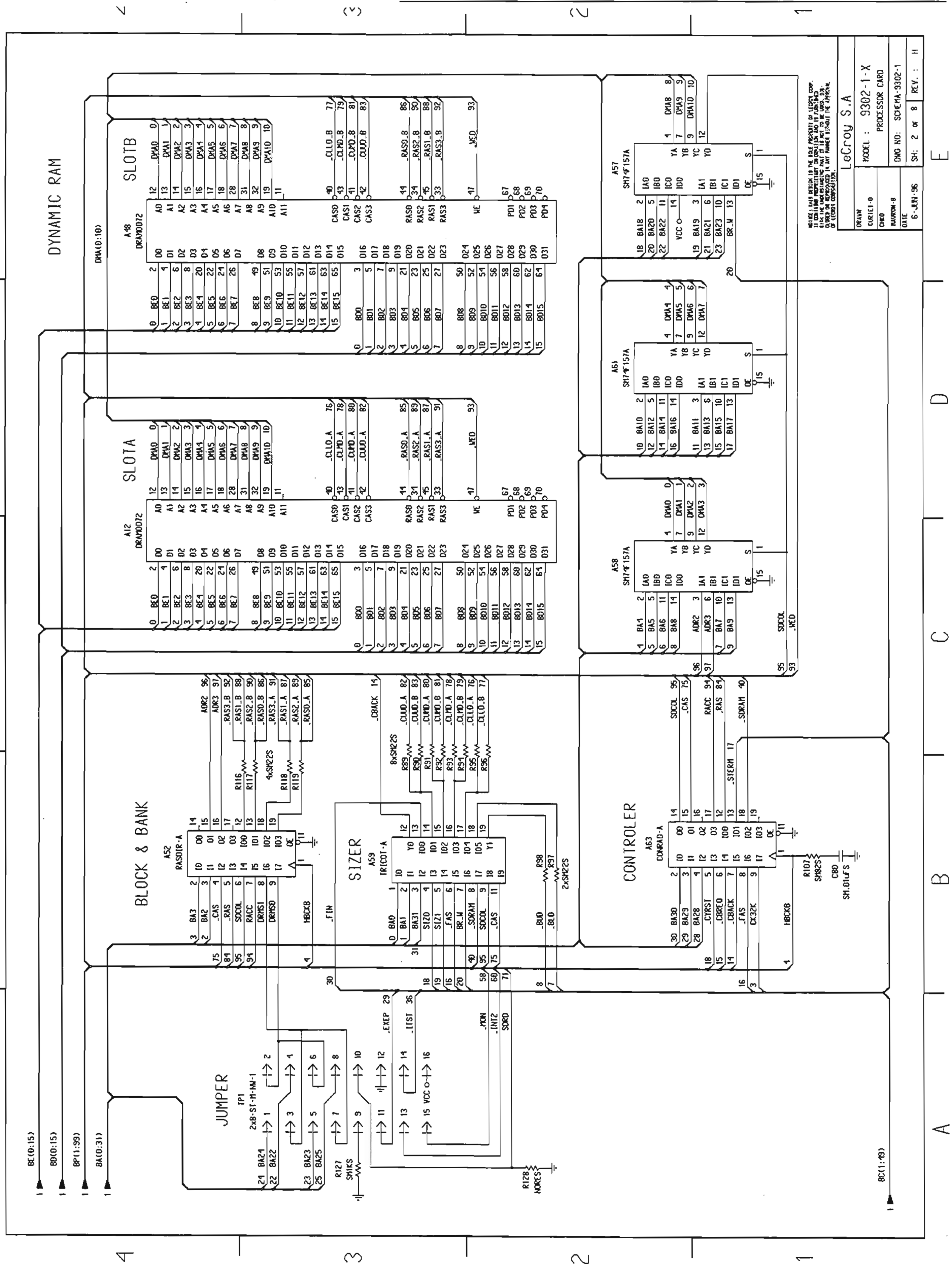
PART : 9374L DESC : 500 MHz, QUAD CHANNEL 500 MS/s, 1GHZ DSO, 2 MB

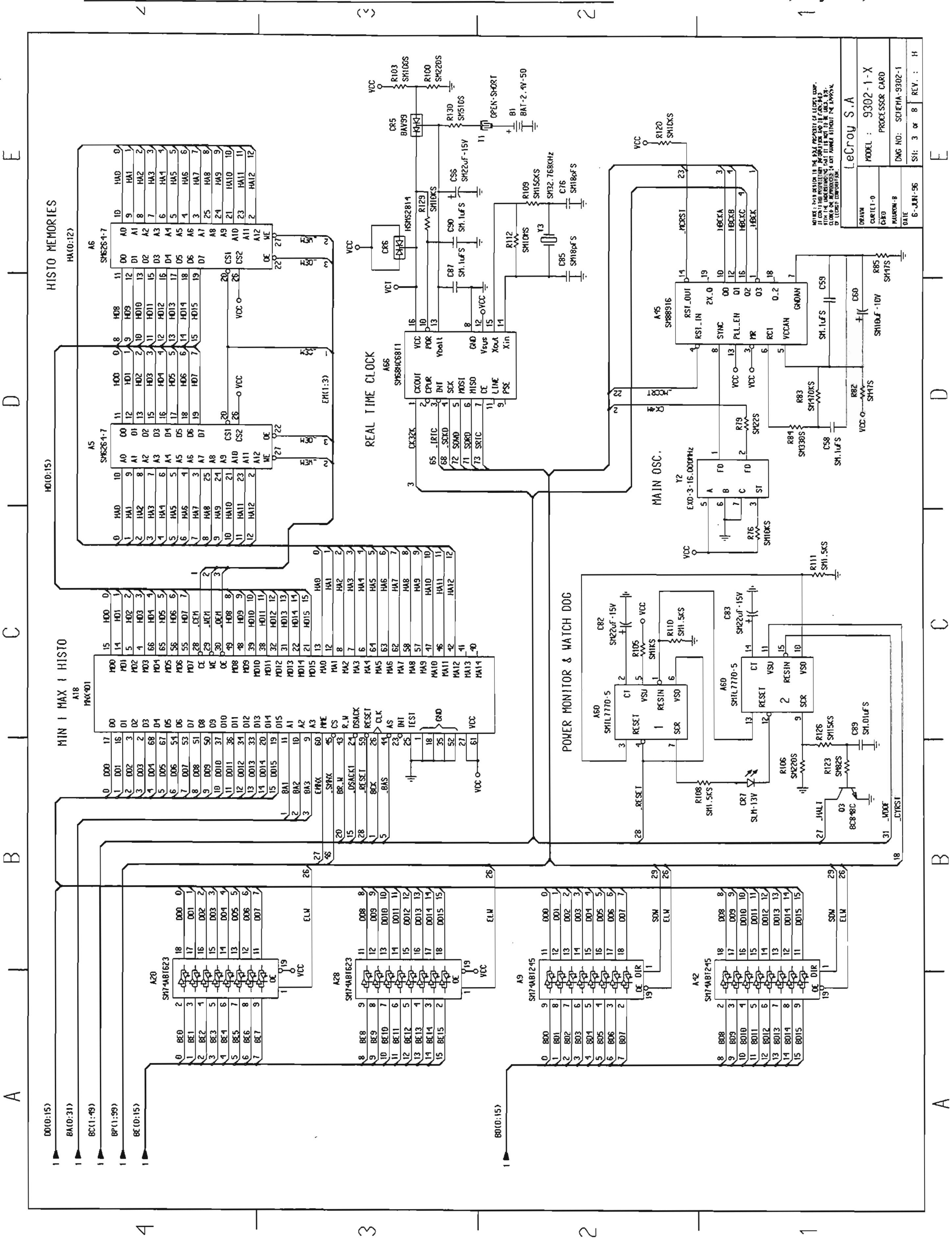
709374L16	FRONT LABEL 9374L	1
F9302-1-16	PROCESSOR CARD WITH 16Mb DRAM	1
F9350L-2	ACQUISITION MEMORY 2 X 2 MB	2

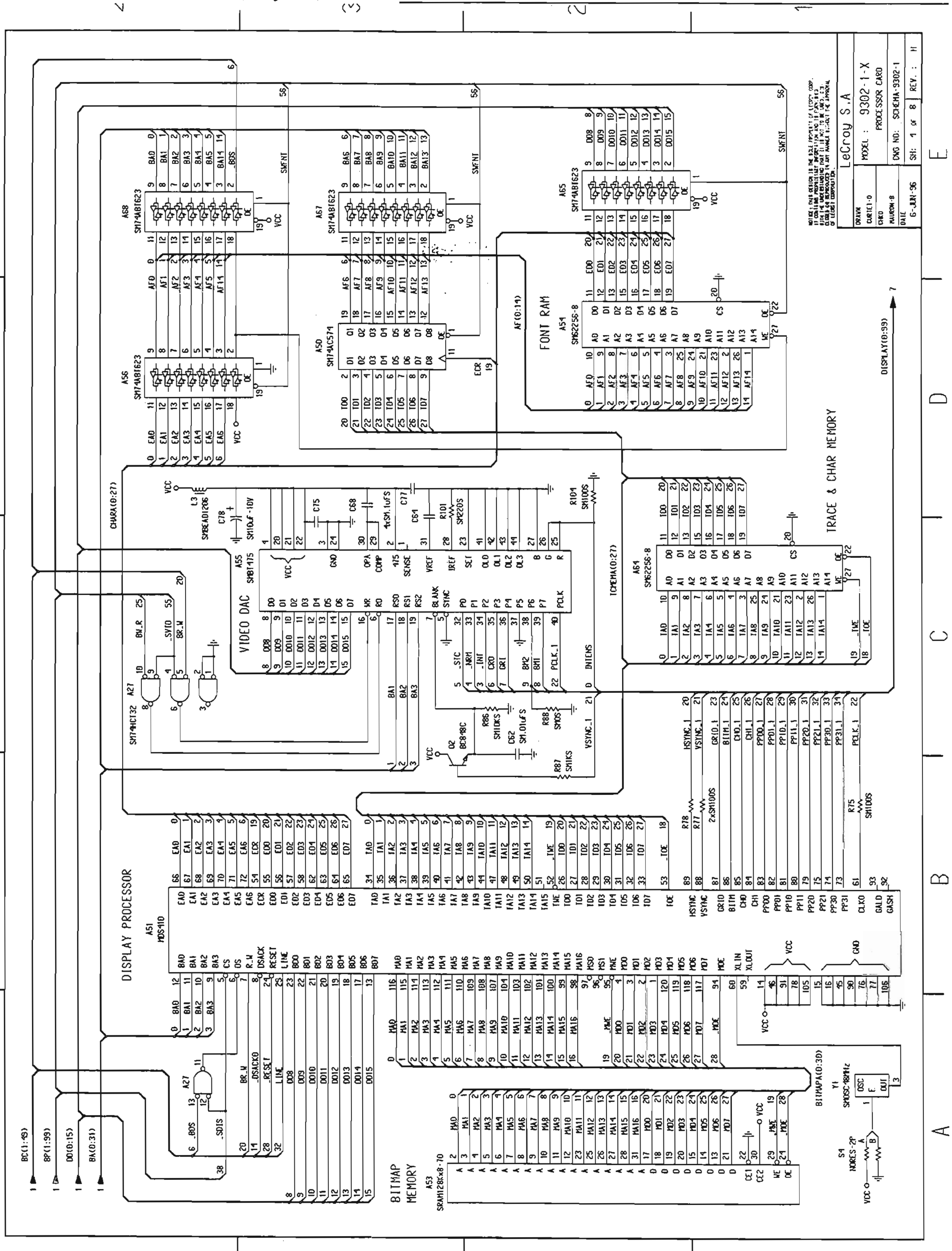
PART : 9374TM DESC : 500 MHz, QUAD CHANNEL 500 MS/s, 1 GHZ DSO, 500 KB

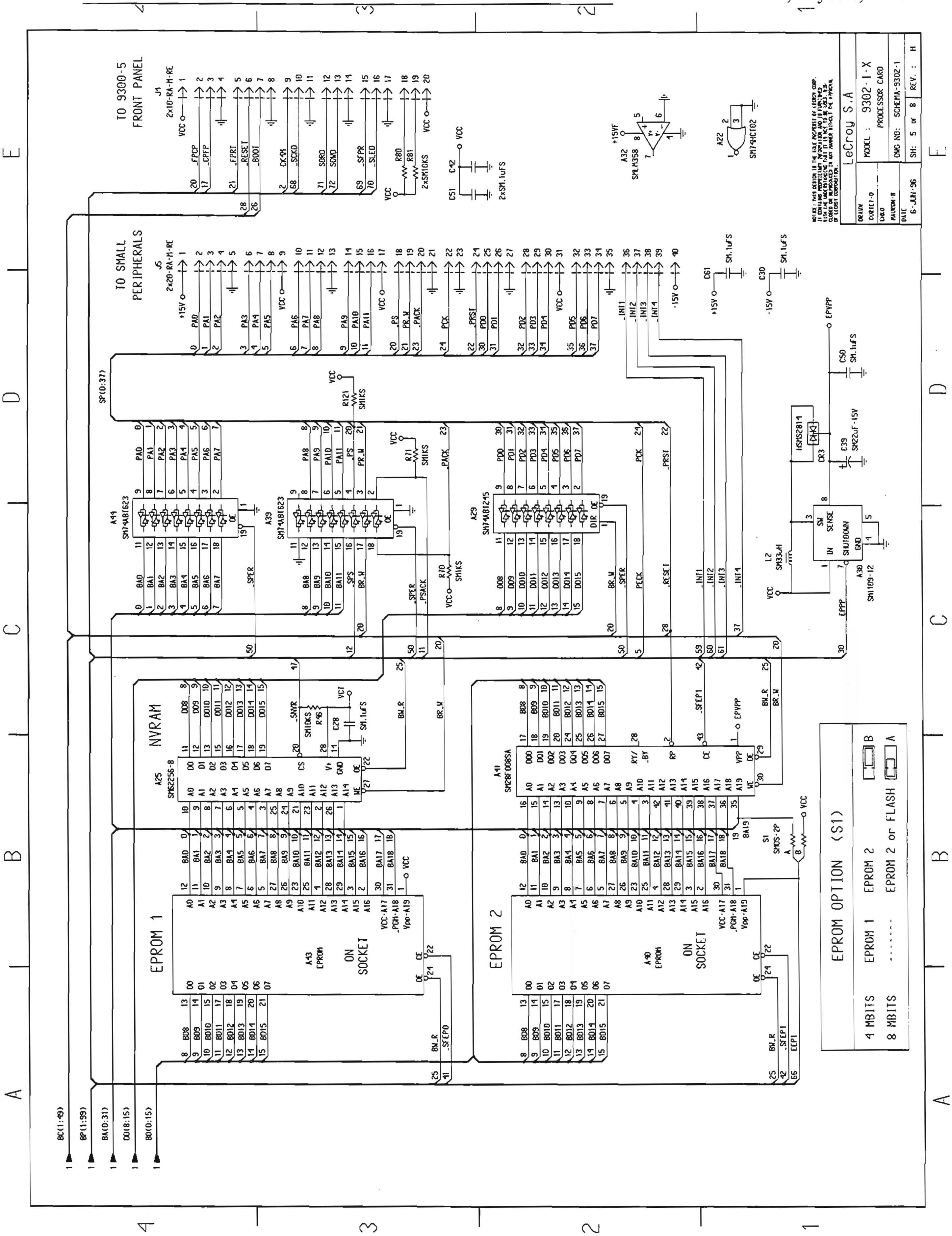
709374TM16	FRONT LABEL 9374TM	1
F9302-1-8	PROCESSOR CARD WITH 8Mb DRAM	1
F9350TM-21	ACQUISITION MEMORY 2 X 500 KB	2

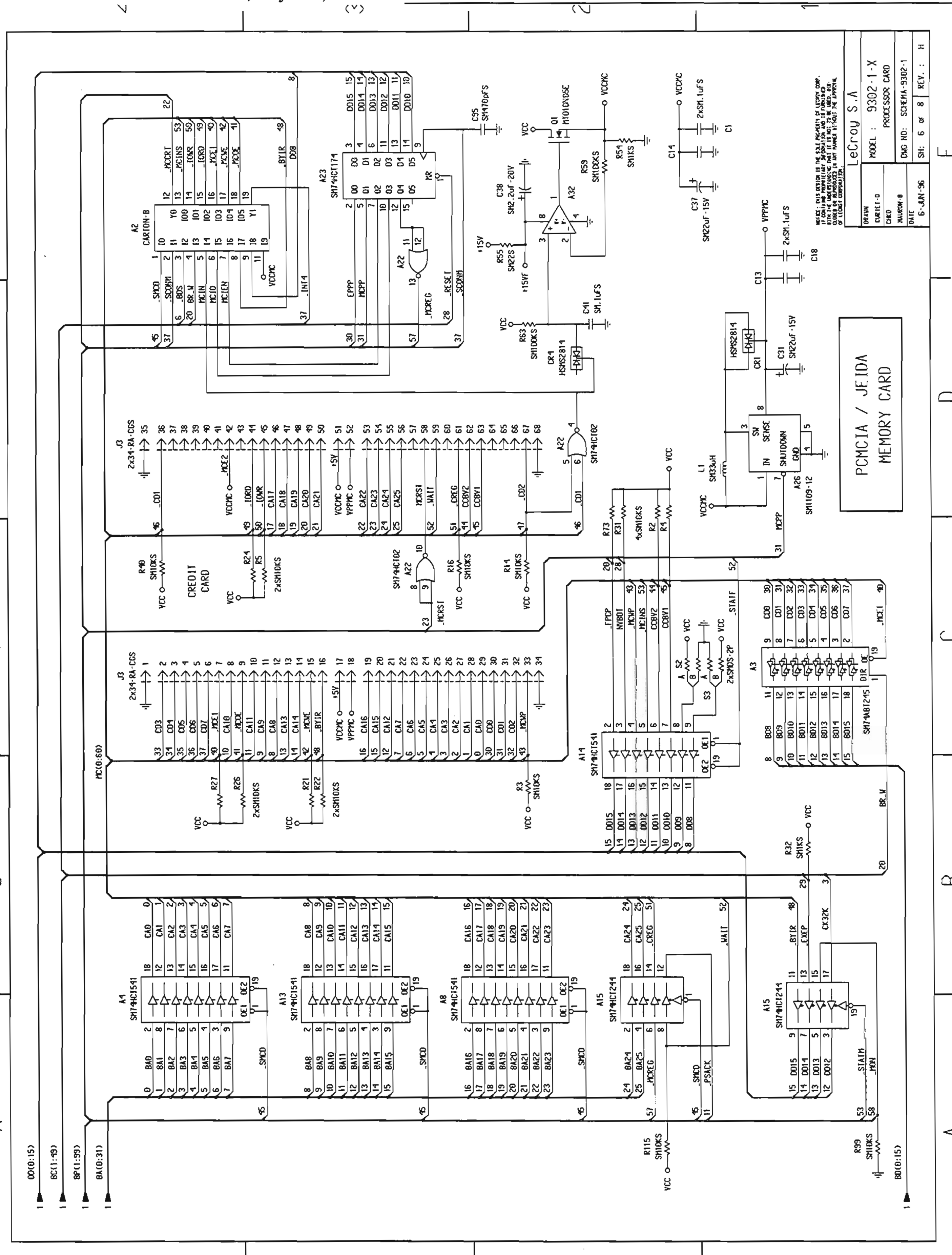

LeCroy S.A
MODEL : 9302-1-X
PROCESSOR CARD
DWG NO: SCHEMA-9302-1
SH: 1 of 8
REV. : H
6-JUN-96
A36
SM68882FN
COPROCESSOR
A19
SM68EC030FE
CENTRAL PROCESSOR

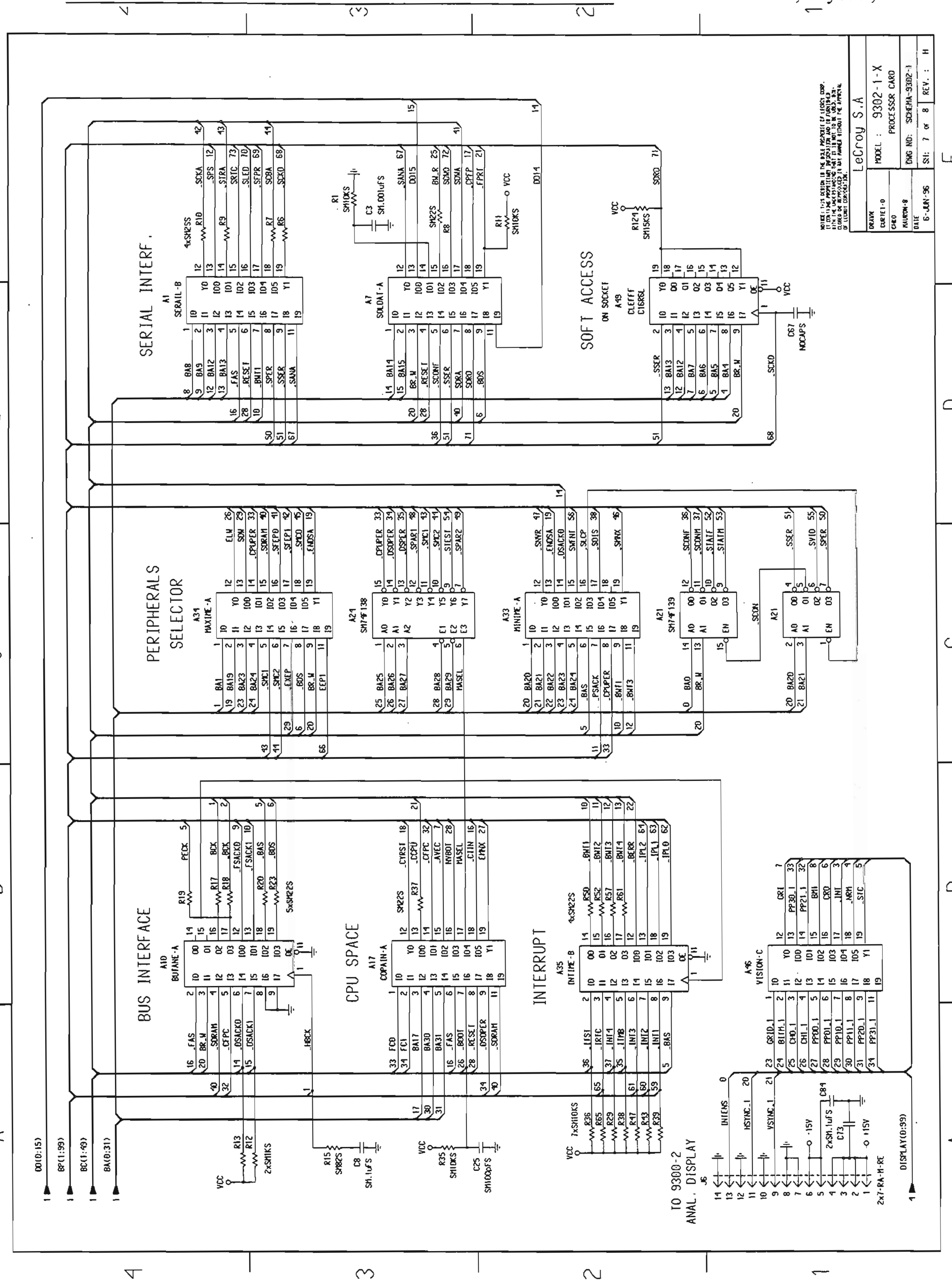

DYNAMIC RAM
SLOTB
SLOTA
BLOCK & BANK
SIZER
CONTROLER
JUMPER
LeCroy S.A
MODEL : 9302-1-X
PROCESSOR CARD
DWG NO: SCHEMA-9302-1
SH: 2 OF 8
REV. : H
6-JUN-96

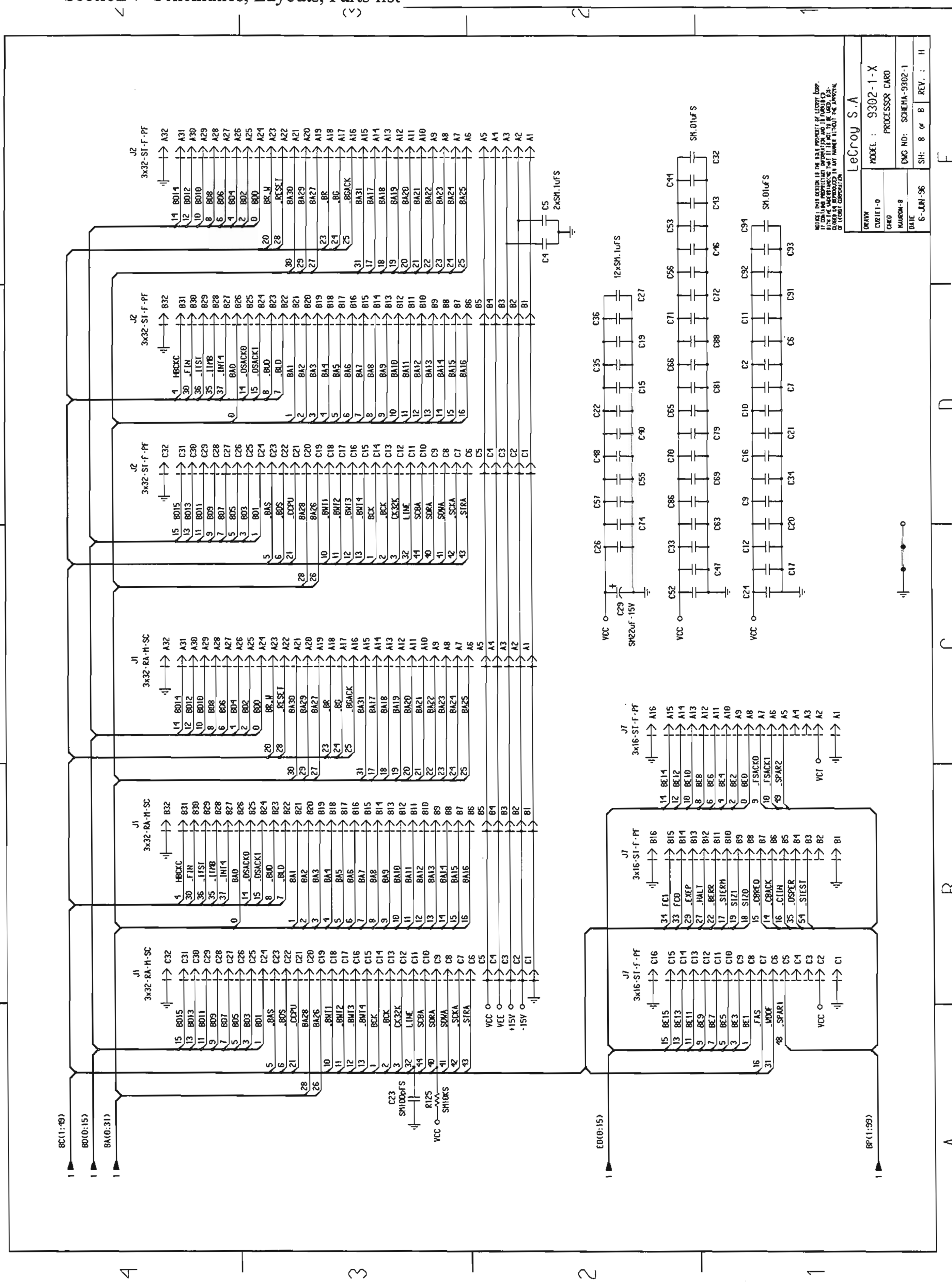

HISTO MEMORIES
REAL TIME CLOCK
MAIN OSC.
POWER MONITOR & WATCH DOG
MIN I MAX I HISTO
LeCroy S.A
9302-1-X
PROCESSOR CARD
SCHEMA-9302-1

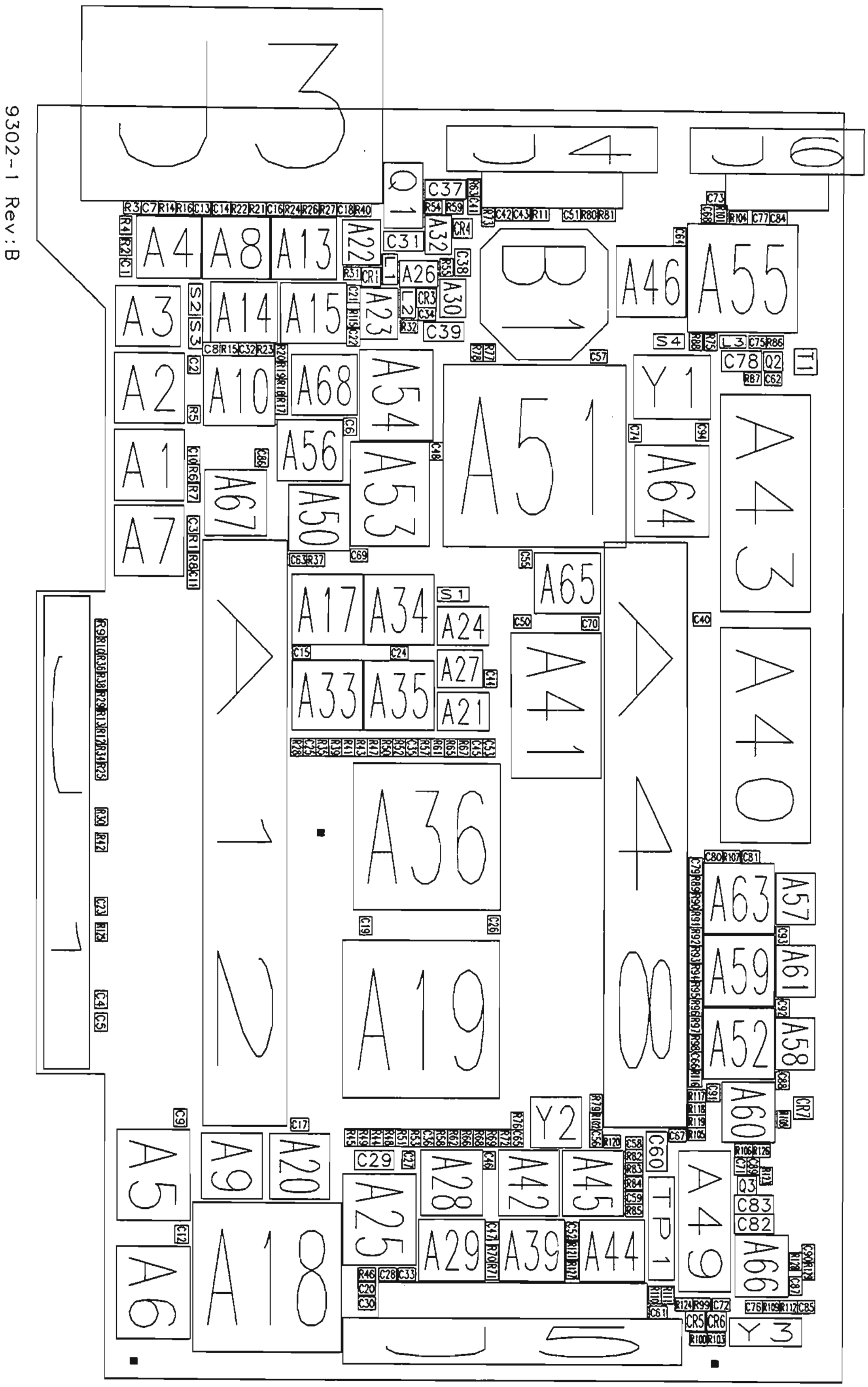

DISPLAY PROCESSOR
VIDEO DAC
FONT RAM
TRACE & CHAR MEMORY
BITMAP MEMORY
LeCroy S.A
MODEL : 9302-1-X
PROCESSOR CARD
DWG NO: SCHEMA-9302-1
SH: 1 of 8
6-JUN-96

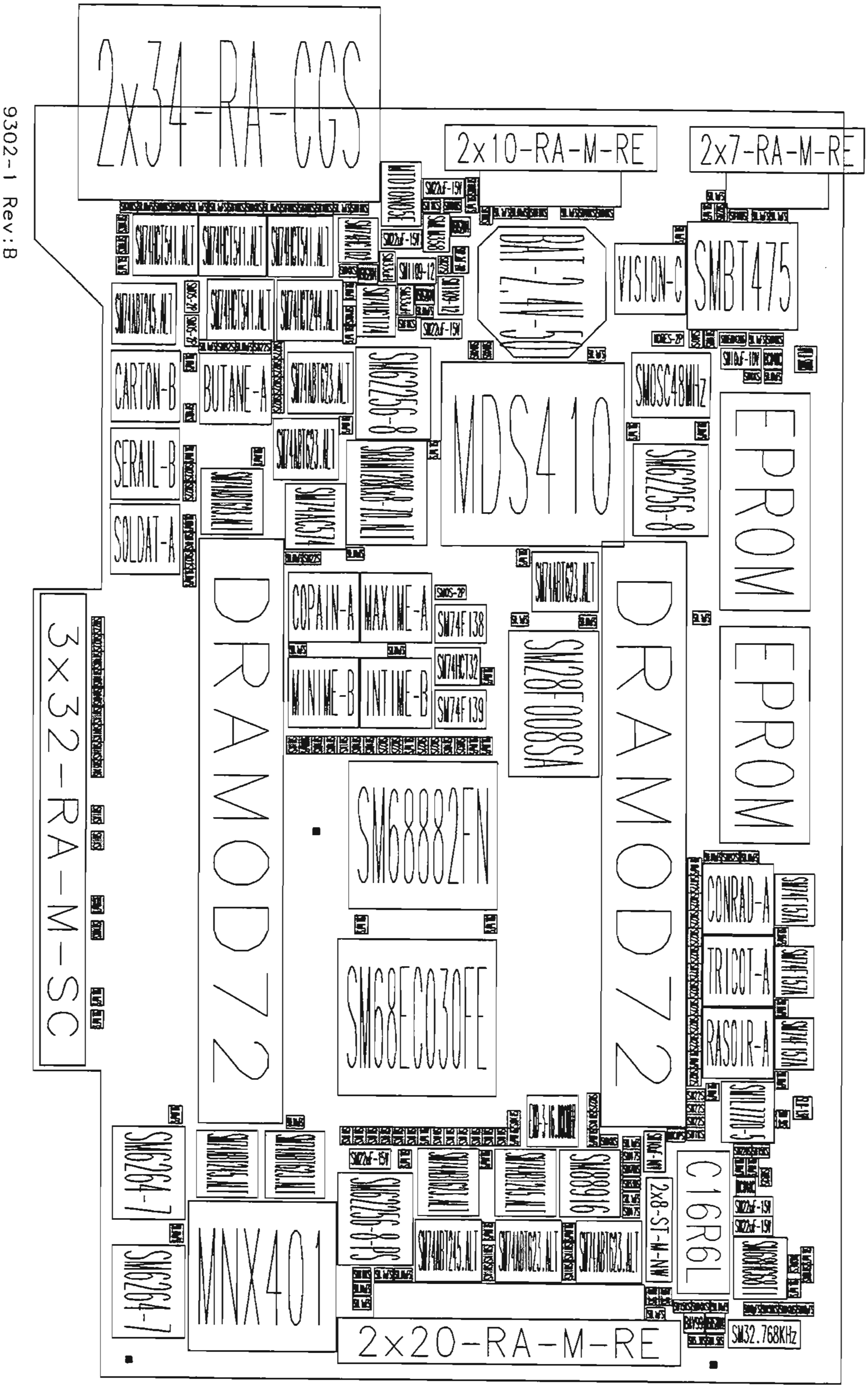

TO 9300-5 FRONT PANEL
TO SMALL PERIPHERALS
NVRAM
EPROM 1
EPROM 2
EPROM OPTION (S1)
4 MBITS EPROM 1 EPROM 2 B
8 MBITS ------- EPROM 2 or FLASH A
LeCroy S.A
MODEL : 9302-1-X
PROCESSOR CARD
DWG NO: SCHEMA-9302-1
SH: 5 of 8
REV. : H
6-JUN-96

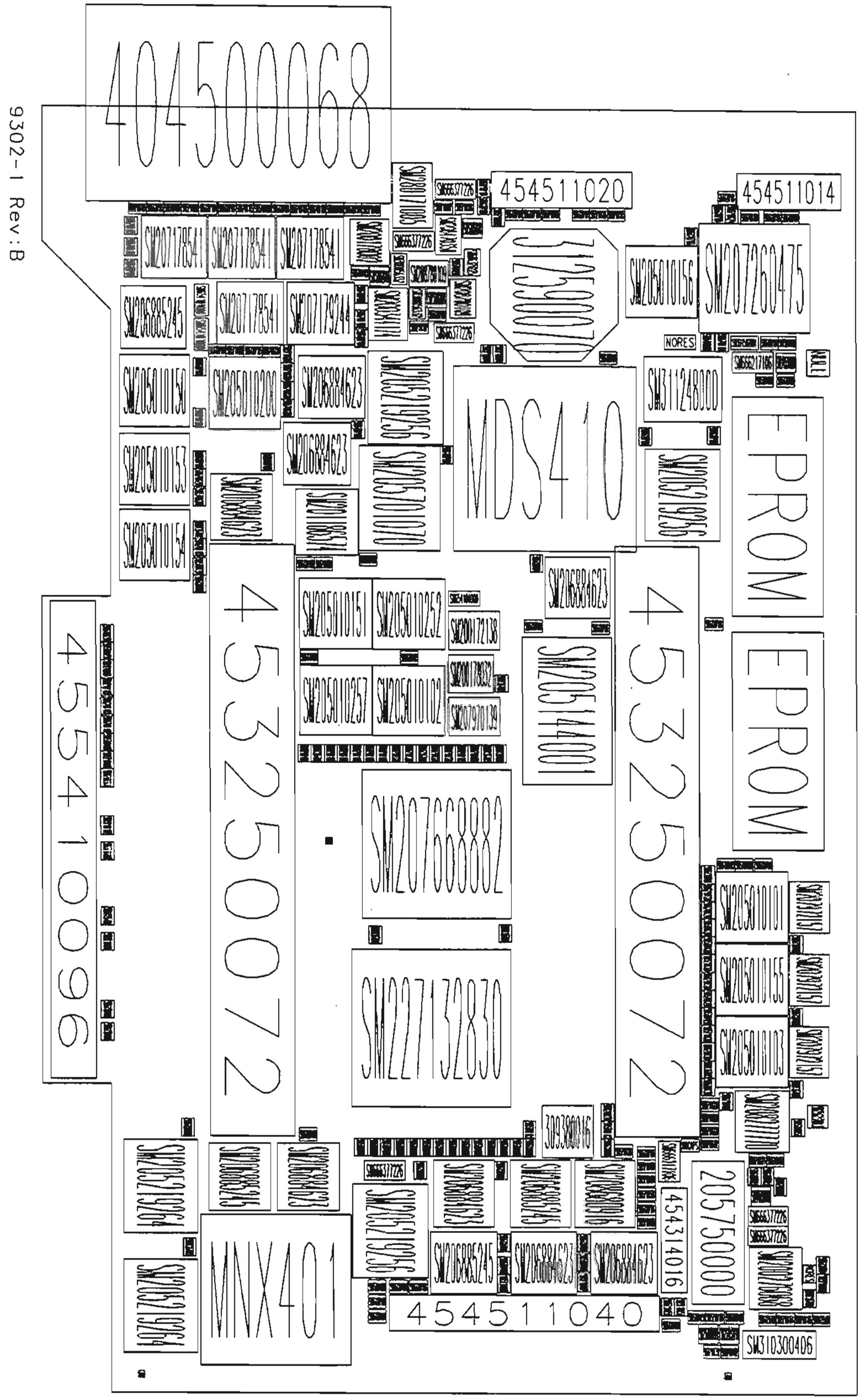

LeCroy S.A
MODEL : 9302-1-X
PROCESSOR CARD
DWG NO: SCHEMA-9302-1
SH: 6 OF 8
REV. : H
6-JUN-96
PCMCIA / JEIDA
MEMORY CARD
CREDIT CARD

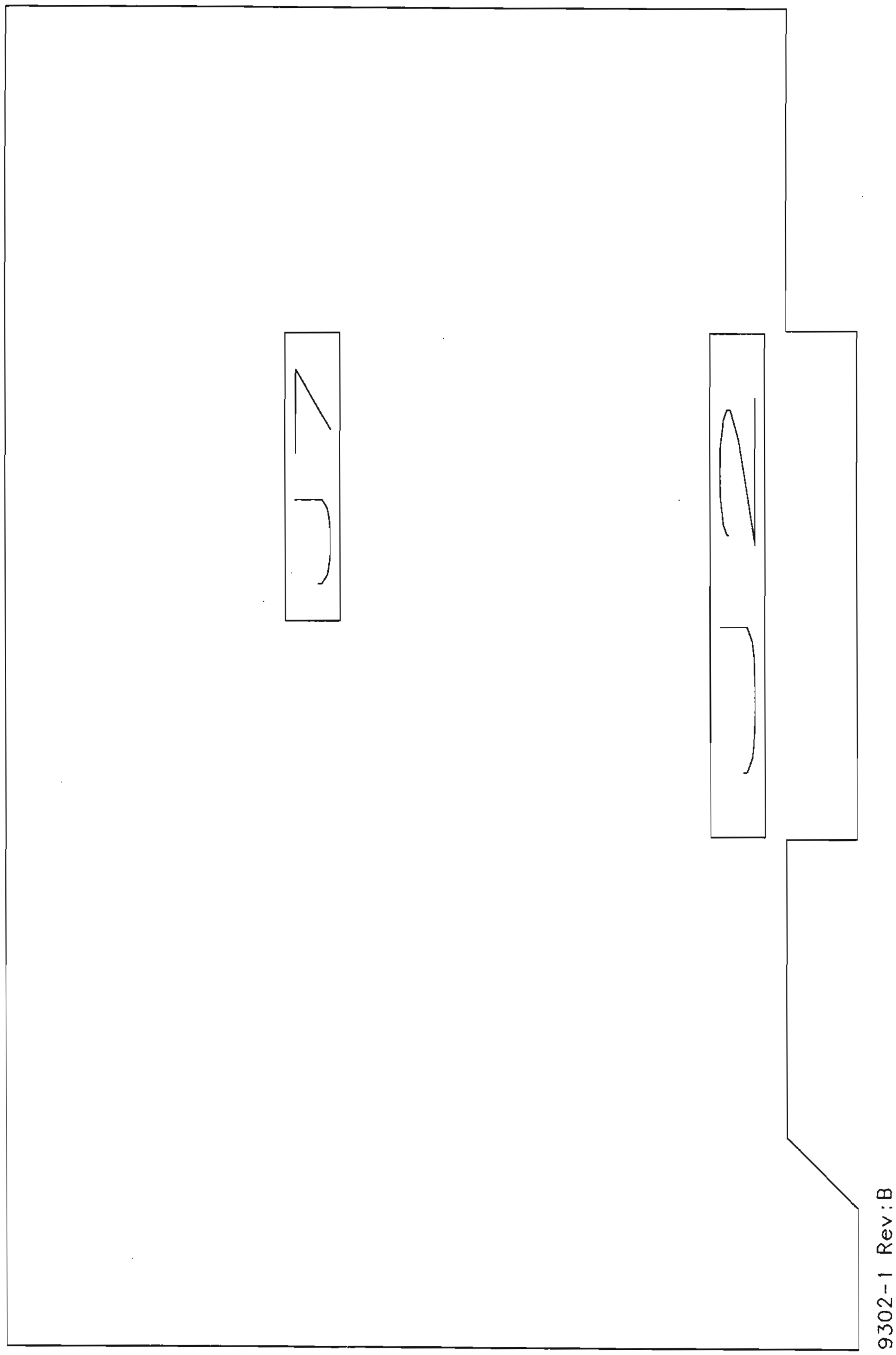

SERIAL INTERF.
SOFT ACCESS
PERIPHERALS SELECTOR
BUS INTERFACE
CPU SPACE
INTERRUPT
TO 9300-2 ANAL. DISPLAY
LeCroy S.A
MODEL : 9302-1-X
PROCESSOR CARD
DWG NO: SCHEMA-9302-1
REV. : H
6-JUN-96

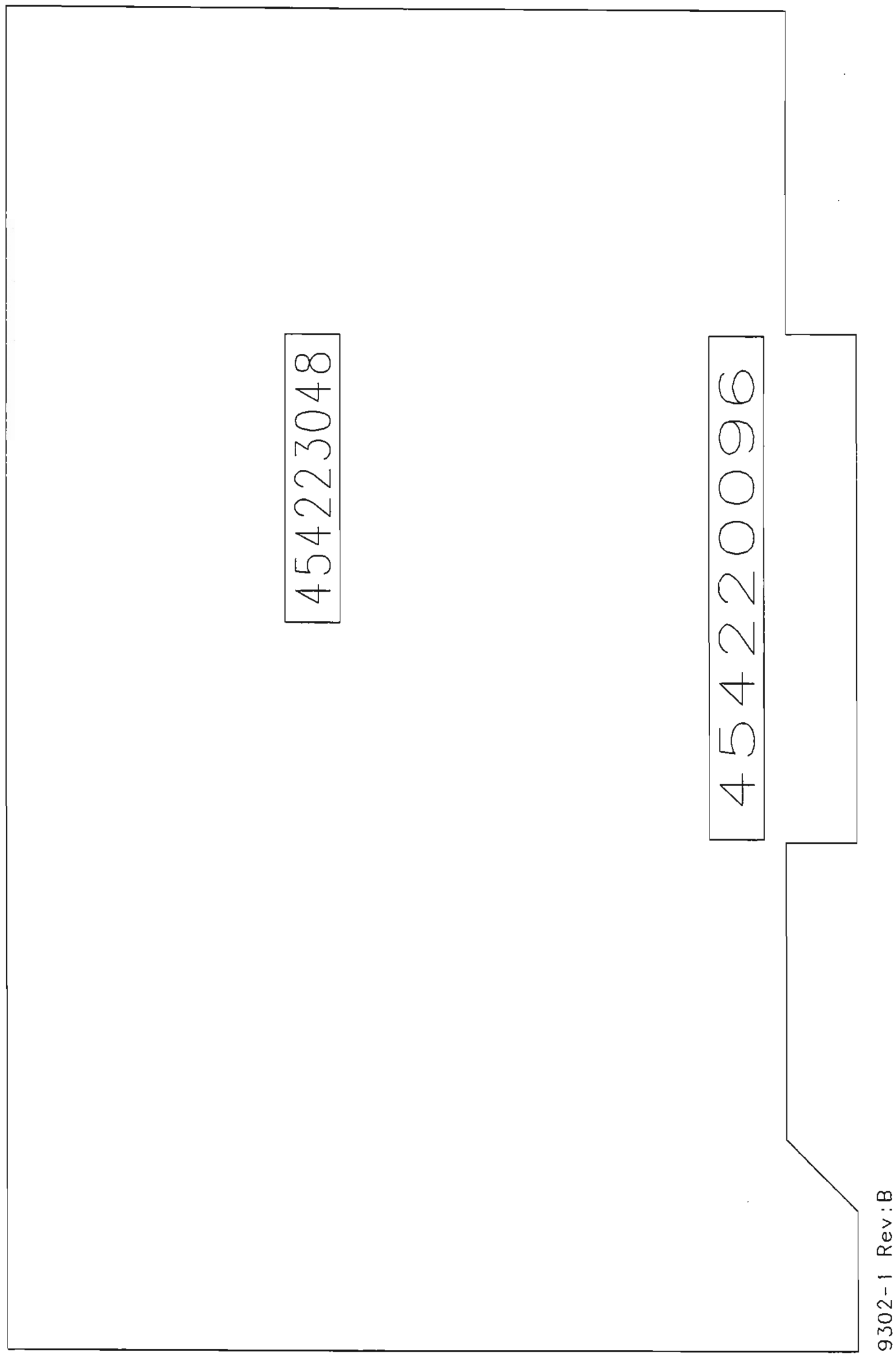

LeCroy S.A
MODEL : 9302-1-X
PROCESSOR CARD
DWG NO: SCHEMA-9302-1
SH: 8 of 8
REV. : H
6-JUN-96

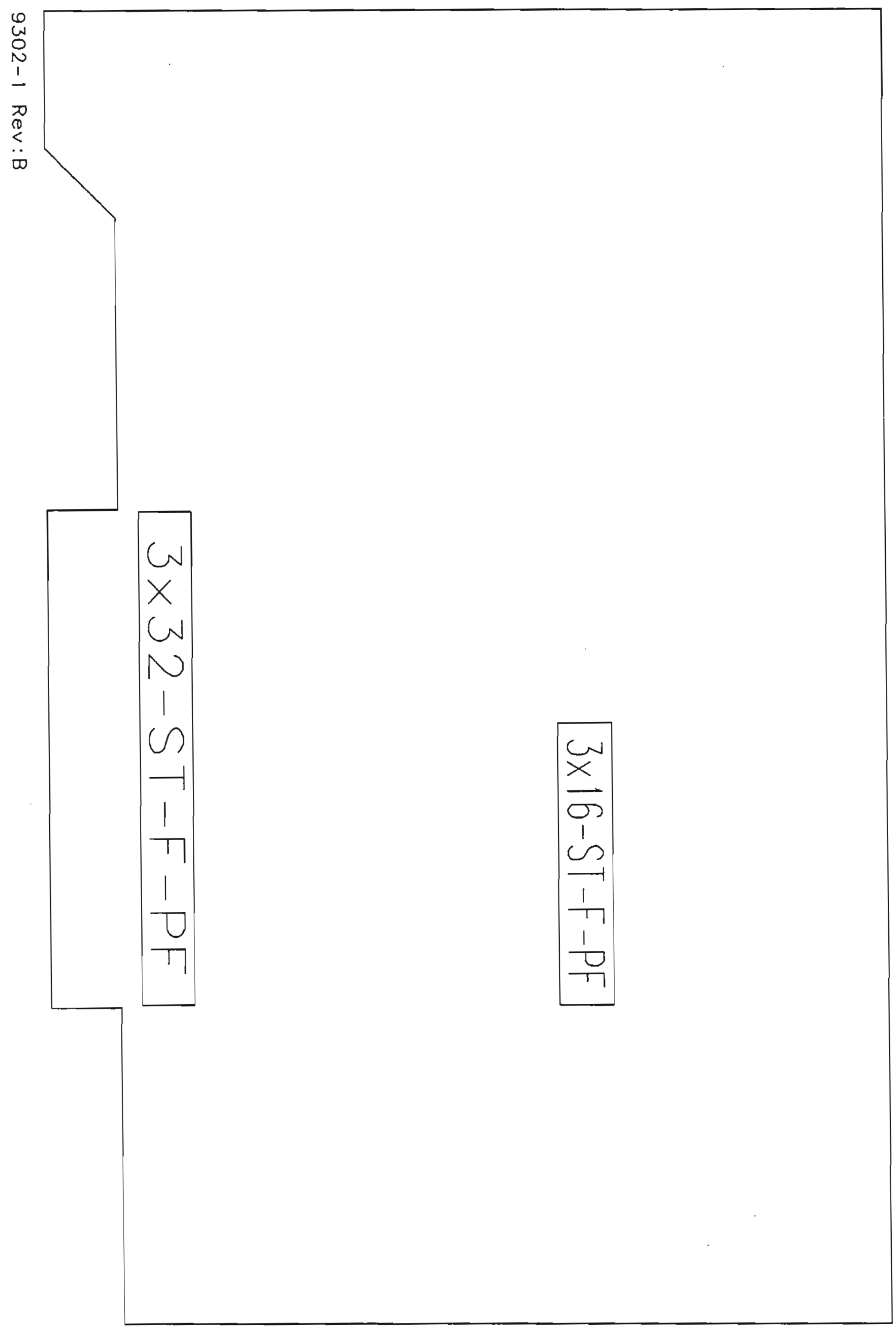

9302-1 Rev:B
J3
J4
J6
J5
J1
A51
A36
A19


9302-1 Rev:B
2x34-RA-CGS
2x10-RA-M-RE
2x7-RA-M-RE
SMBT475
VISION-C
MDS410
EPROM
EPROM
CARTON-B
BUTANE-A
SERAIL-B
SOLDAT-A
COPAIN-A
MAXIME-A
MINIME-B
INTIME-B
SM74F138
SM74F139
3x32-RA-M-SC
DRAMOD72
DRAMOD72
SM68882FN
SM68EC030FE
CONRAD-A
TRICOT-A
RASOIR-A
C16R6L
MNX401
SM6264-7
SM6264-7
2x20-RA-M-RE
SM32.768KHz


9302-1 Rev:B
40450068
454511020
454511014
MDS410
EPROM
EPROM
453250072
453250072
455410096
MNX401
454511040
454314016
205750000
SM207668882
SM227132830


9302-1 Rev:B


454223048
454220096
9302-1 Rev:B


9302-1 Rev:B
3x32-ST-F-PF
3x16-ST-F-PF

PART: F9302-1-X **DESC : PROCESSOR with 4 Mb or 8Mb or 16Mb RAM**

Location	Part Number	Description	Location	Part Number	Description
A1	SM205010153	SERAIL-B	A55	SM207260475	SMBT475
A10	SM205010200	BUTANE-A	A56	SM206884623	SM74ABT623
A12	453250072	DRAMOD72	A57	SM207972157	SM74F157A
A13	SM207178541	SM74HCT541	A58	SM207972157	SM74F157A
A14	SM207178541	SM74HCT541	A59	SM205010155	TRICOT-A
A15	SM207179244	SM74HCT244	A6	SM205219264	SM6264-7
A17	SM205010151	COPAIN-A	A60	SM208277770	SMTL7770-5
A18	MNX401	MNX401	A61	SM207972157	SM74F157A
A19	SM227132830	SM68EC030FE	A63	SM205010101	CONRAD-A
A2	SM205010150	CARTON-B	A64	SM205219256	SM62256-8
A20	SM206884623	SM74ABT623	A65	SM206884623	SM74ABT623
A21	SM207970139	SM74F139	A66	SM200276068	SM68HC68T1
A22	SM200178002	SM74HCT02	A67	SM206884623	SM74ABT623
A23	SM200344174	SM74HCT174	A68	SM206884623	SM74ABT623
A24	SM200172138	SM74F138	A7	SM205010154	SOLDAT-A
A25	SM205219256	SM62256-8-PS	A8	SM207178541	SM74HCT541
A26	SM208780109	SM1109-12	A9	SM206885245	SM74ABT245
A27	SM200178032	SM74HCT32	B1	312590070	BAT-2.4V-50
A28	SM206884623	SM74ABT623	C1	SM661207104	SM.1μF
A29	SM206885245	SM74ABT245	C10	SM661207103	SM.01μF
A3	SM206885245	SM74ABT245	C11	SM661207103	SM.01μF
A30	SM208780109	SM1109-12	C12	SM661207103	SM.01μF
A32	SM208470358	SMLM358	C13	SM661207104	SM.1μF
A33	SM205010257	MINIME-A	C14	SM661207104	SM.1μF
A34	SM205010252	MAXIME-A	C15	SM661207104	SM.1μF
A35	SM205010102	INTIME-B	C16	SM661207103	SM.01μF
A36	SM207668882	SM68882FN	C17	SM661207103	SM.01μF
A39	SM206884623	SM74ABT623	C18	SM661207104	SM.1μF
A4	SM207178541	SM74HCT541	C19	SM661207104	SM.1μF
A40	EPROM	EPROM	C2	SM661207103	SM.01μF
A41	SM205144001	SM28F008SA	C20	SM661207103	SM.01μF
A42	SM206885245	SM74ABT245	C21	SM661207103	SM.01μF
A43	EPROM	EPROM	C22	SM661207104	SM.1μF
A44	SM206884623	SM74ABT623	C23	SM661255101	SM100pF
A45	SM208680916	SM88916	C24	SM661207103	SM.01μF
A46	SM205010156	VISION-C	C25	SM661255101	SM100pF
A48	453250072	DRAMOD72	C26	SM661207104	SM.1μF
A49	205750000	C16R6L	C27	SM661207104	SM.1μF
A5	SM205219264	SM6264-7	C28	SM661207104	SM.1μF
A50	SM201186574	SM74AC574	C29	SM666377226	SM22μF-15V
A51	MDS410	MDS410	C3	SM661207102	SM.001μF
A52	SM205010103	RASOIR-A	C30	SM661207104	SM.1μF
A53	SM205701070	SRAM128Kx8-7	C31	SM666377226	SM22μF-15V
A54	SM205219256	SM62256-8	C32	SM661207103	SM.01μF

PART: F9302-1-X **DESC : PROCESSOR with 4 Mb or 8Mb or 16Mb RAM**

Location	Part Number	Description	Location	Part Number	Description
C33	SM661207103	SM.01μF	C77	SM661207104	SM.1μF
C34	SM661207103	SM.01μF	C78	SM666217106	SM10μF-10V
C35	SM661207104	SM.1μF	C79	SM661207103	SM.01μF
C36	SM661207104	SM.1μF	C8	SM661207104	SM.1μF
C37	SM666377226	SM22μF-15V	C80	SM661207103	SM.01μF
C38	SM666327225	SM2.2μF-20V	C81	SM661207103	SM.01μF
C39	SM666377226	SM22μF-15V	C82	SM666377226	SM22μF-15V
C4	SM661207104	SM.1μF	C83	SM666377226	SM22μF-15V
C40	SM661207104	SM.1μF	C84	SM661207104	SM.1μF
C41	SM661207104	SM.1μF	C85	SM661255180	SM18pF
C42	SM661207104	SM.1μF	C86	SM661207103	SM.01μF
C43	SM661207103	SM.01μF	C87	SM661207104	SM.1μF
C44	SM661207103	SM.01μF	C88	SM661207103	SM.01μF
C45	SM661207103	SM.01μF	C89	SM661207103	SM.01μF
C46	SM661207103	SM.01μF	C9	SM661207103	SM.01μF
C47	SM661207103	SM.01μF	C90	SM661207104	SM.1μF
C48	SM661207104	SM.1μF	C91	SM661207103	SM.01μF
C5	SM661207104	SM.1μF	C92	SM661207103	SM.01μF
C50	SM661207104	SM.1μF	C93	SM661207103	SM.01μF
C51	SM661207104	SM.1μF	C94	SM661207103	SM.01μF
C52	SM661207103	SM.01μF	C95	SM661255471	SM470pF
C53	SM661207103	SM.01μF	C96	SM666377226	SM22μF-15V
C55	SM661207104	SM.1μF	CR1	SM232032814	HSMS2814
C56	SM661207103	SM.01μF	CR3	SM232032814	HSMS2814
C57	SM661207104	SM.1μF	CR4	SM232032814	HSMS2814
C58	SM661207104	SM.1μF	CR5	SM236030099	BAV99
C59	SM661207104	SM.1μF	CR6	SM232032814	HSMS2814
C6	SM661207103	SM.01μF	CR7	SM256232013	SLM-13V
C60	SM666217106	SM10μF-10V	J1	455410096	3x32-RA-M-SC
C61	SM661207104	SM.1μF	J2	454220096	3x32-ST-F-PF
C62	SM661207103	SM.01μF	J3	404500068	2x34-RA-CGS
C63	SM661207103	SM.01μF	J4	454511020	2x10-RA-M-RE
C64	SM661207104	SM.1μF	J5	454511040	2x20-RA-M-RE
C65	SM661207103	SM.01μF	J6	454511014	2x7-RA-M-RE
C66	SM661207103	SM.01μF	J7	454223048	3x16-ST-F-PF
C68	SM661207104	SM.1μF	L1	SM300056332	SM33μH
C69	SM661207103	SM.01μF	L2	SM300056332	SM33μH
C7	SM661207103	SM.01μF	L3	SM301502001	SMBD1206
C70	SM661207103	SM.01μF	Q1	SM280171005	MTD10N05E
C71	SM661207103	SM.01μF	Q2	SM270330848	BC848C
C72	SM661207103	SM.01μF	Q3	SM270330848	BC848C
C73	SM661207104	SM.1μF	R1	SM652101103	SM10KΩ
C74	SM661207104	SM.1μF	R10	SM652101220	SM22Ω
C75	SM661207104	SM.1μF	R100	SM652101221	SM220Ω
C76	SM661255180	SM18pF	R101	SM652101221	SM220Ω

PART: F9302-1-X **DESC : PROCESSOR with 4 Mb or 8Mb or 16Mb RAM**

Location	Part Number	Description	Location	Part Number	Description
R102	SM652101102	SM1KΩ	R3	SM652101103	SM10KΩ
R103	SM652101101	SM100Ω	R30	SM652101102	SM1KΩ
R104	SM652101101	SM100Ω	R31	SM652101103	SM10KΩ
R105	SM652101102	SM1KΩ	R32	SM652101102	SM1KΩ
R106	SM652101221	SM220Ω	R34	SM652101102	SM1KΩ
R107	SM652101820	SM82Ω	R35	SM652101103	SM10KΩ
R108	SM652101152	SM1.5KΩ	R36	SM652101103	SM10KΩ
R109	SM652101154	SM150KΩ	R37	SM652101220	SM22Ω
R11	SM652101103	SM10KΩ	R38	SM652101103	SM10KΩ
R110	SM652101152	SM1.5KΩ	R39	SM652101103	SM10KΩ
R111	SM652101152	SM1.5KΩ	R4	SM652101103	SM10KΩ
R112	SM652101106	SM10MΩ	R40	SM652101103	SM10KΩ
R115	SM652101103	SM10KΩ	R41	SM652101102	SM1KΩ
R116	SM652101220	SM22Ω	R42	SM652101102	SM1KΩ
R117	SM652101220	SM22Ω	R43	SM652101103	SM10KΩ
R118	SM652101220	SM22Ω	R44	SM652101102	SM1KΩ
R119	SM652101220	SM22Ω	R45	SM652101102	SM1KΩ
R12	SM652101102	SM1KΩ	R46	SM652101103	SM10KΩ
R120	SM652101103	SM10KΩ	R47	SM652101103	SM10KΩ
R121	SM652101102	SM1KΩ	R48	SM652101102	SM1KΩ
R123	SM652101820	SM82Ω	R49	SM652101102	SM1KΩ
R124	SM652101153	SM15KΩ	R5	SM652101103	SM10KΩ
R125	SM652101103	SM10KΩ	R50	SM652101220	SM22Ω
R126	SM652101153	SM15KΩ	R51	SM652101102	SM1KΩ
R127	SM652101102	SM1KΩ	R52	SM652101220	SM22Ω
R129	SM652101103	SM10KΩ	R53	SM652101102	SM1KΩ
R13	SM652101102	SM1KΩ	R54	SM652101102	SM1KΩ
R130	SM652101511	SM510Ω	R55	SM652101220	SM22Ω
R14	SM652101103	SM10KΩ	R57	SM652101220	SM22V
R15	SM652101820	SM82Ω	R58	SM652101102	SM1KΩ
R16	SM652101103	SM10KΩ	R59	SM652101104	SM100KΩ
R17	SM652101220	SM22Ω	R6	SM652101220	SM22Ω
R18	SM652101220	SM22Ω	R61	SM652101220	SM22Ω
R19	SM652101220	SM22Ω	R62	SM652101102	SM1KΩ
R2	SM652101103	SM10KΩ	R63	SM652101104	SM100KΩ
R20	SM652101220	SM22Ω	R65	SM652101103	SM10KΩ
R21	SM652101103	SM10KΩ	R66	SM652101102	SM1KΩ
R22	SM652101103	SM10KΩ	R67	SM652101820	SM82Ω
R23	SM652101220	SM22Ω	R68	SM652101102	SM1KΩ
R24	SM652101103	SM10KΩ	R69	SM652101102	SM1KΩ
R25	SM652101511	SM510Ω	R7	SM652101220	SM22Ω
R26	SM652101103	SM10KΩ	R70	SM652101102	SM1KΩ
R27	SM652101103	SM10KΩ	R71	SM652101102	SM1KΩ
R28	SM652101102	SM1KΩ	R72	SM652101102	SM1KΩ
R29	SM652101103	SM10KΩ	R73	SM652101103	SM10KΩ

PART: F9302-1-X **DESC : PROCESSOR with 4 Mb or 8Mb or 16Mb RAM**

Location	Part Number	Description	Location	Part Number	Description
R75	SM652101101	SM100Ω	R90	SM652101220	SM22Ω
R76	SM652101103	SM10KΩ	R91	SM652101220	SM22Ω
R77	SM652101101	SM100Ω	R92	SM652101220	SM22Ω
R78	SM652101101	SM100Ω	R93	SM652101220	SM22Ω
R79	SM652101220	SM22Ω	R94	SM652101220	SM22Ω
R8	SM652101220	SM22Ω	R95	SM652101220	SM22Ω
R80	SM652101103	SM10KΩ	R96	SM652101220	SM22Ω
R81	SM652101103	SM10KΩ	R97	SM652101220	SM22Ω
R82	SM652101470	SM47Ω	R98	SM652101220	SM22Ω
R83	SM652101474	SM470KΩ	R99	SM652101103	SM10KΩ
R84	SM652101331	SM330Ω	S1	SM654101000	SM0Ω-2P
R85	SM652101470	SM47Ω	S2	SM654101000	SM0Ω-2P
R86	SM652101103	SM10KΩ	S3	SM654101000	SM0Ω-2P
R87	SM652101102	SM1KΩ	Y1	SM311248000	SMOSC48MHz
R88	SM654101000	SM0Ω	Y2	309380016	16.000MHZ
R89	SM652101220	SM22Ω	Y3	SM310300406	SM32.768KHz
R9	SM652101220	SM22Ω	TP1	454314016	2x8-ST-M-NW

PART: F9302-1-4 **DESC: PROCESSOR CARD with 4MB DRAM for 9374**

COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
205800130	MODULE DRAM 1MX32 BIT	1
454370002	SHUNT 2 POS	2
S9302-1	PROCESSOR CARD WHOUT DRAM	1

PART: F9302-1-8 **DESC: PROCESSOR CARD with 8MB DRAM for 9374M & 9374TM**

COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
205800230	MODULE DRAM 2MX32 BIT	1
454370002	SHUNT 2 POS	2
S9302-1	PROCESSOR CARD WHOUT DRAM	1

PART: F9302-1-16 **DESC: PROCESSOR CARD with 16MB DRAM for 9374L**

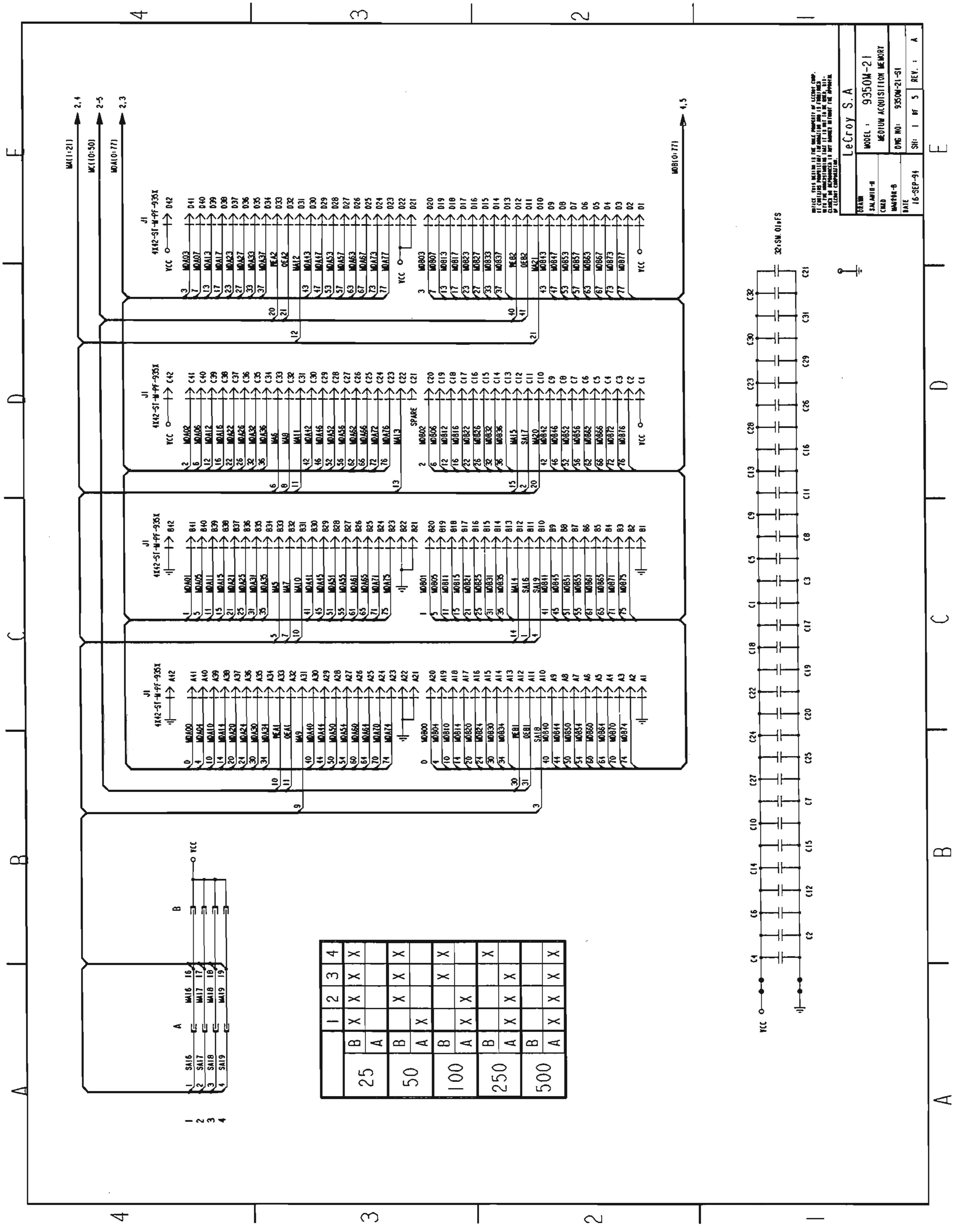
COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
205800230	MODULE DRAM 2MX32	2
454370002	SHUNT 2 POS	2
S9302-1	PROCESSOR CARD WHOUT DRAM	1

PART: S9302-1 **DESC: PROCESSOR CARD without DRAM**

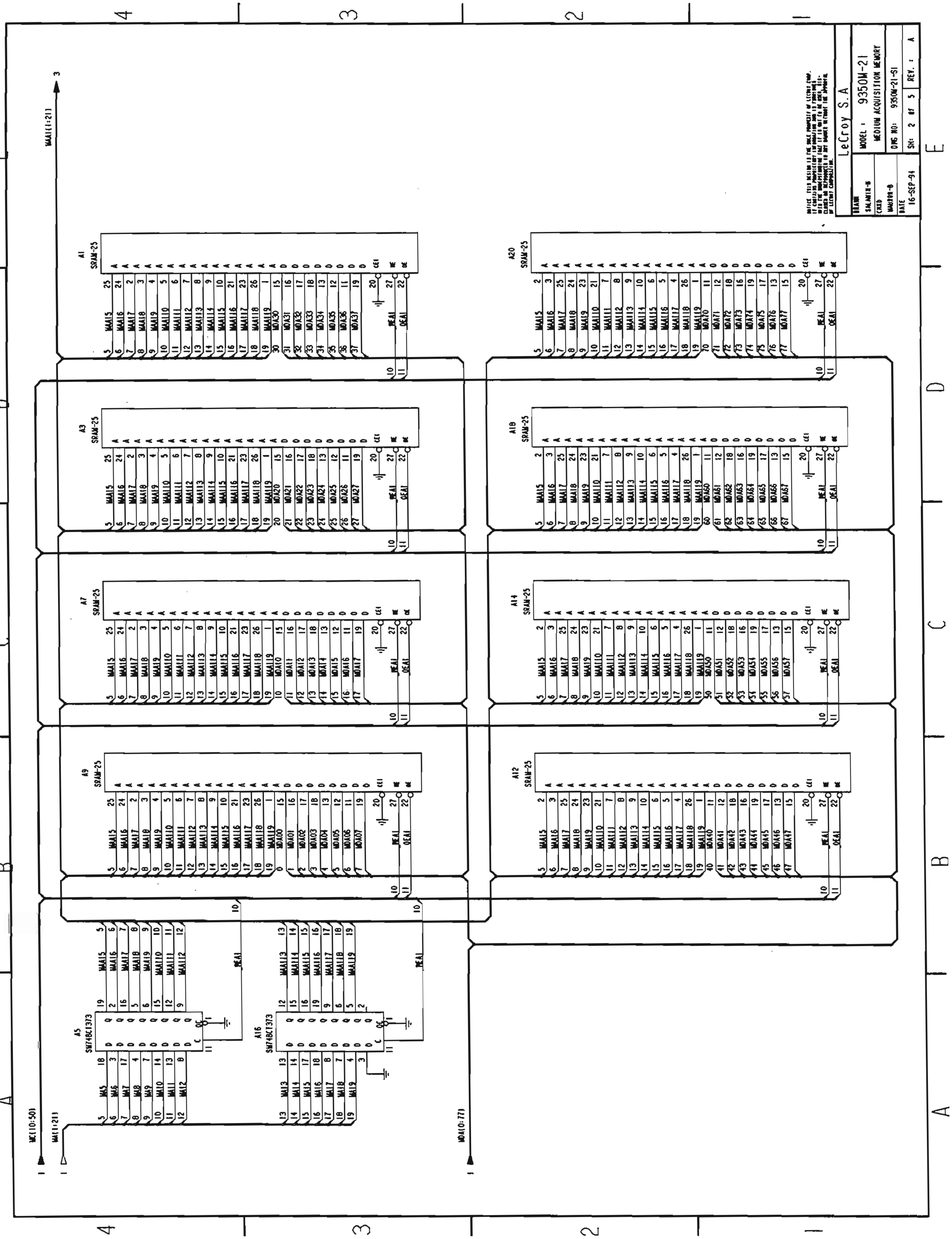
COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
309380016	CRYSTAL OSC (PROGR) 16 MHZ	1
312590070	BATTERY LITHIUM 3V 70MAH	1
400331020	SOCKET IC ST DIP-20	1
404500068	CONN BD TO BD 68 POS	1
453250072	CONN PC EDGE/SOLD TAIL 72	2
454314016	HDR DIP SOLD TO MALE 16	1
454511014	HDR SOLD TAIL/MALE/14/RT	1
454511020	HDR SOLD TAIL/MALE 20	1
454511040	HDR SOLD TAIL/MALE/40/RT	1
455410096	CONN RT ANGLE MALE 96 S-CLIP	1
550130108	SCREW CYL HD M3X8	2
552130101	NUT HEX M3	2
719302103	PC BD PRSS'Y 9302-1	1
MDS410	IC RSDP GATE ARRAY MDS410	1
MNX401	ICMIN MAX GATRR. MNX401	1
SM200172138	IC 3-8 DECODER 74F138	1
SM200178002	IC 2-INPUT NOR HCT02	1
SM200178032	IC 2-IN OR HCT32	1
SM200276068	IC RTC SERIAL 68HC68T1	1
SM200344174	IC HEX D-FLOP HCT174	1
SM201186574	IC OCTAL D-TYP FLOP 74AC574	1
SM205010101	PROGRAMMED GAL CONRAD-A	1
SM205010102	PROGRAMMED GAL INTIME-B	1
SM205010103	PROGRAMMED GAL RASOIR-A	1
SM205010150	PROGRAMMED GAL CARTON-B	1
SM205010151	PROGRAMMED GAL COPAIN-A	1
SM205010153	PROGRAMMED GAL SERAIL-C	1
SM205010154	PROGRAMMED GAL SOLDAT-A	1
SM205010155	PROGRAMMED GAL TRICOT-A	1
SM205010156	PROGRAMMED GAL VISION-C	1
SM205010200	PROGRAMMED GAL BUTANE-A	1
SM205010252	PROGRAMMED GAL MAXIME-A	1
SM205010257	PROGRAMMED GAL MINIME-A	1
SM205144001	8-MBIT FLASH MEM 28F008SA	1
SM205219256	IC 32K X 8 SRAM MS62256	3
SM205219264	IC 8K X 8 SRAM 70 NSEC 6264	2
SM205701070	IC 128KX8 STAT RAM 70 NS	1
SM206884623	IC OCTAL BUS TRANSCVR ABT623	8
SM206885245	IC BUS TRANSCVR ABT245	4
SM207178541	IC BµF FER/LINE DR HCT541	4
SM207179244	IC BµF /LINE DRIV HCT244	1
SM207260475	IC RAMDAC 256W 50MHZ BT475	1
SM207668882	IC CO PROCESSOR 68882	1
SM207970139	IC DECODER/DEMUX 74F139	1

PART: S9302-1 **DESC: PROCESSOR CARD without DRAM**

COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
SM207972157	IC DATA SEL/MUX 74F157A	3
SM208277770	IC DUAL PWR SUPPLY SUP 7770-5	1
SM208470358	IC DUAL OP AMP 358D	1
SM208680916	IC LOW SKEW CLOCK DRIVER 88916	1
SM208780109	IC MICROPOWER DC-DC CONV.	2
SM227132830	IC 32-BIT U PROC 68EC030	1
SM232032814	DIODE 2814	4
SM236030099	DIODE SO-PKG BAV99	1
SM256232013	DIODE LIGHT EMITTING RED	1
SM270330848	TRANSISTOR NPN BC848C	2
SM280171005	TRANS POWER MOSFET MTD10N05E	1
SM300056332	INDUCTOR WOUND 33 UH	2
SM301502001	BD (FERRITE CHIP)	1
SM310300406	CRYSTAL 32768HZ	1
SM311248000	CRYSTAL OSCILLATOR 48MHZ	1
SM652101101	RES CHIP (E24) 1% 100 Ω	5
SM652101102	RES CHIP (E24) 1% 1 KΩ	28
SM652101103	RES CHIP (E24) 1% 10 KΩ	34
SM652101104	RES CHIP (E24) 1% 100 KΩ	2
SM652101106	RES CHIP (E24) 1% 10 MEGΩ	1
SM652101152	RES CHIP (E24) 1% 1.5 KΩ	3
SM652101153	RES CHIP (E24) 1% 15 KΩ	2
SM652101154	RES CHIP (E24) 1% 150 KΩ	1
SM652101220	RES CHIP (E24) 1% 22 Ω	31
SM652101221	RES CHIP (E24) 1% 220 Ω	3
SM652101331	RES CHIP (E24) 1% 330 Ω	1
SM652101470	RES CHIP (E24) 47 Ω	2
SM652101474	RES CHIP (E24) 1% 470 KΩ	1
SM652101511	RES CHIP (E24) 1% 510 Ω	2
SM652101820	RES CHIP (E24) 1% 82 Ω	4
SM654101000	CHIP JUMPER ZERO Ω	4
SM661207102	CAP CERA CHIP 10% .001µF	1
SM661207103	CAP CERA CHIP 20% .01µF (0805)	41
SM661207104	CAP CERA CHIP 20% .1 µF	36
SM661255101	CAP CERA CHIP 5% 100 PF	2
SM661255180	CAP CERA CHIP 5% 18PF	2
SM666217106	CAP MOLD TANT CHIP 10 µF	2
SM666327225	CAP MOLD TANT CHIP 2.2 µF	1
SM666377226	CAP MOLD TANT CHIP 22 µF	6



LeCroy S.A
9350M-21
MEDIUM ACQUISITION MEMORY
9350M-21-S1
16-SEP-94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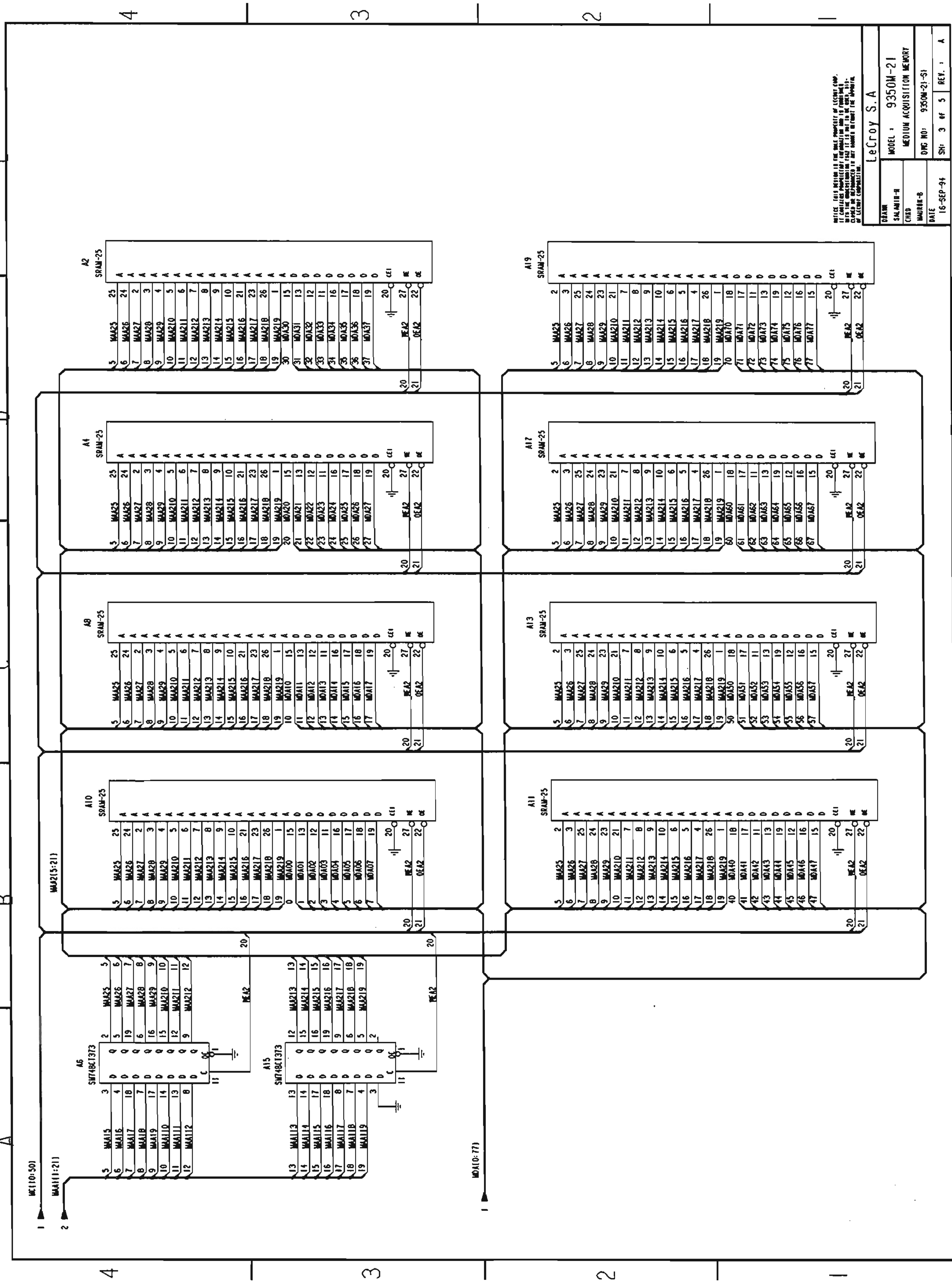
MODEL : 9350M-21
MEDIUM ACQUISITION MEMORY
DWG NO: 9350M-21-S1
SH: 2 OF 5
REV. : A
16-SEP-94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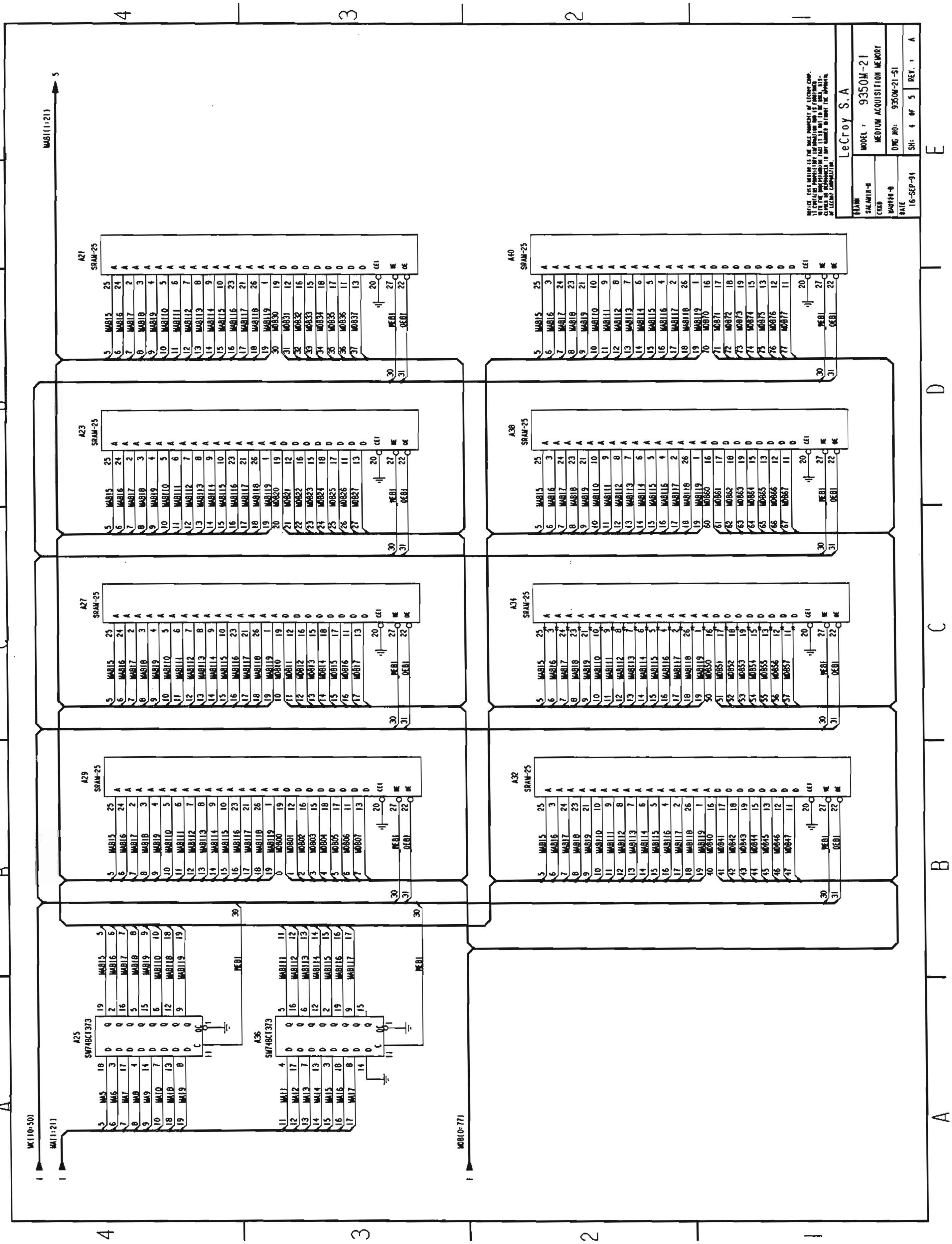
MEDIUM ACQUISITION MEMORY
DWG NO: 9350M-21-S3
SH: 3 of 5
REV. : A
DATE 16-SEP-94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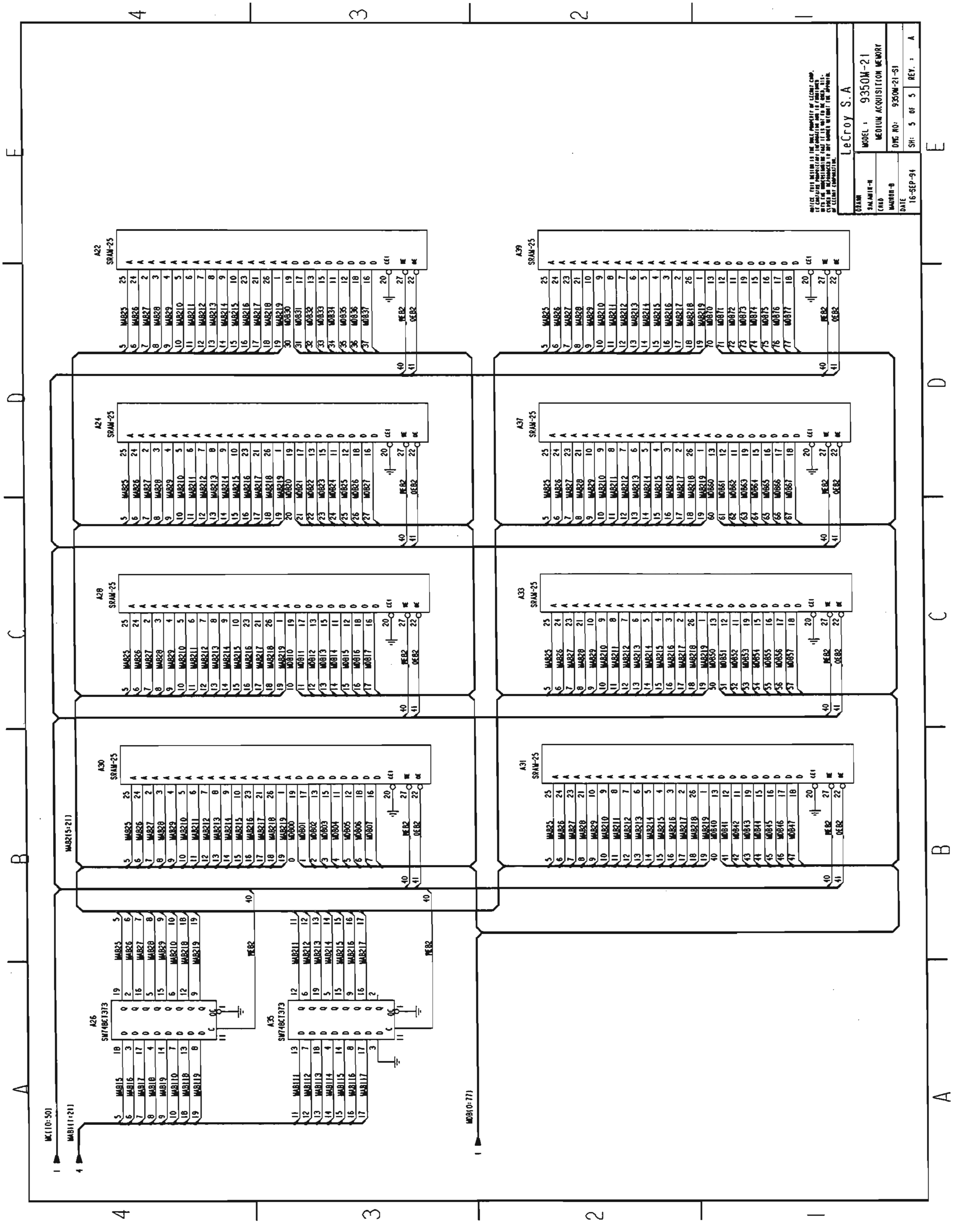
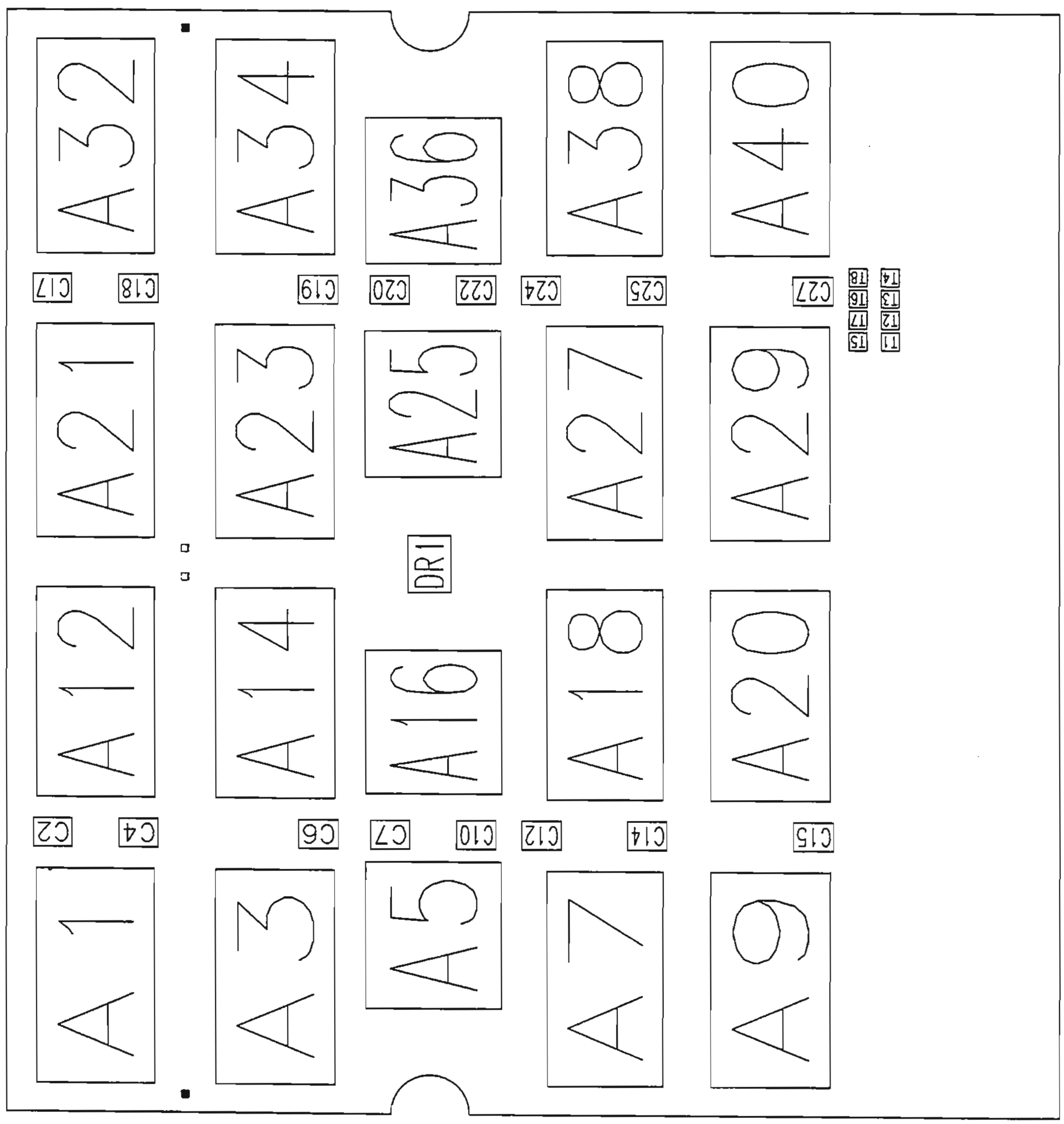
MODEL : 9350M-21
MEDIUM ACQUISITION MEMORY
DWG NO: 9350M-21-S1
16-SEP-94

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C27
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T6
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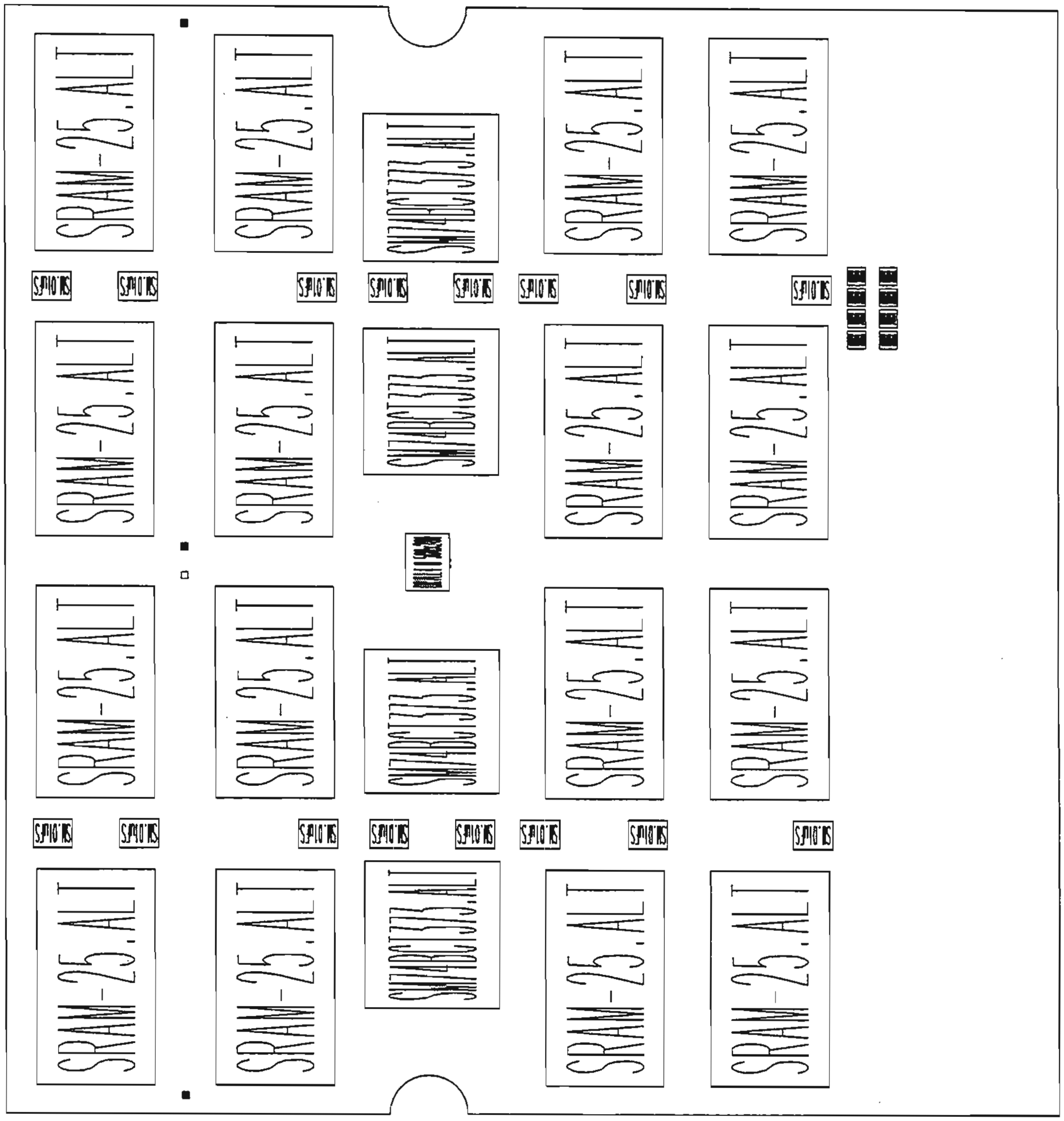
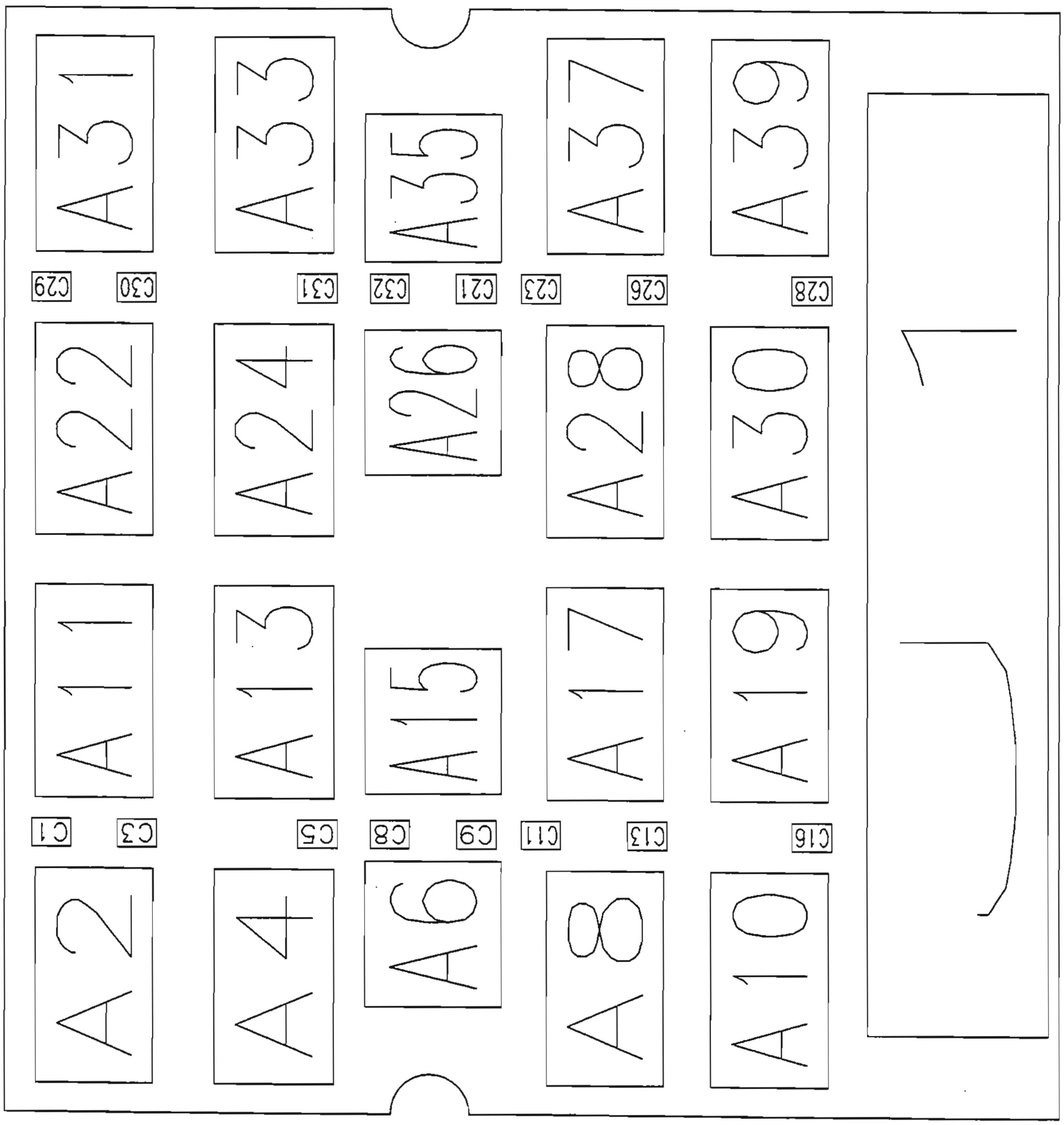
T5
T4
T3
T2
T1
A21
A23
A25
A27
A29
DR1
A12
A14
A16
A18
A20
C2
C4
C6
C7
C10
C12
C14
C15
A1
A3
A5
A7
A9




A31
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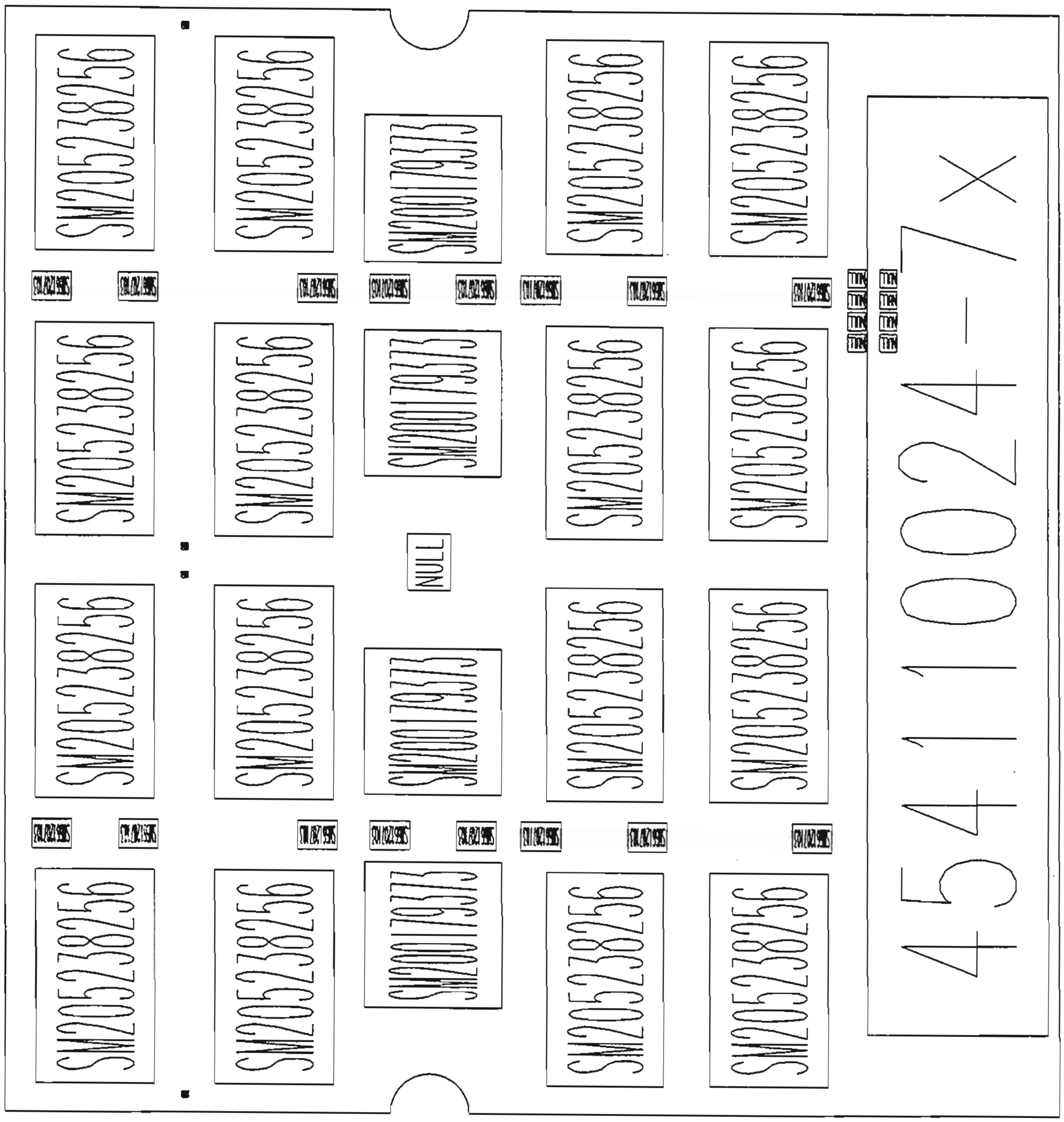
A10



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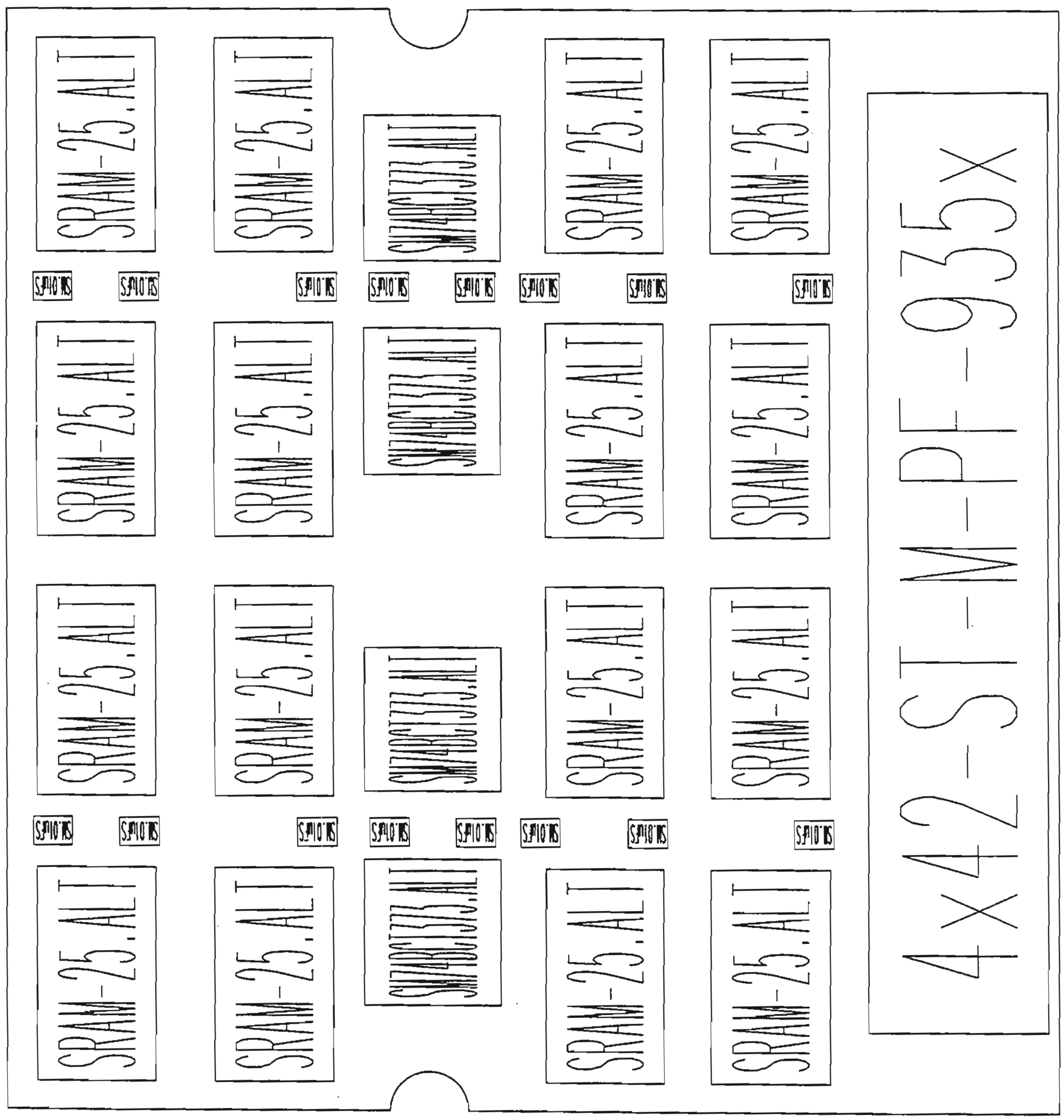

SRAM-25.ALT
4x42-ST-M-PF-935x

PART: F9350-21 DESC: ACQUISITION MEMORY CARD 2x50K for 9374

Location	Part Number	Description	Location	Part Number	Description
A1	SM205228863	SRAM8Kx8-25	A37	SM205228863	SRAM8Kx8-25
A2	SM205228863	SRAM8Kx8-25	A38	SM205228863	SRAM8Kx8-25
A3	SM205228863	SRAM8Kx8-25	A39	SM205228863	SRAM8Kx8-25
A4	SM205228863	SRAM8Kx8-25	A40	SM205228863	SRAM8Kx8-25
A5	SM200179373	SM74BCT373	C1	SM661207103	SM.01µF S
A6	SM200179373	SM74BCT373	C2	SM661207103	SM.01µF S
A7	SM205228863	SRAM8Kx8-25	C3	SM661207103	SM.01µF S
A8	SM205228863	SRAM8Kx8-25	C4	SM661207103	SM.01µF S
A9	SM205228863	SRAM8Kx8-25	C5	SM661207103	SM.01µF S
A10	SM205228863	SRAM8Kx8-25	C6	SM661207103	SM.01µF S
A11	SM205228863	SRAM8Kx8-25	C7	SM661207103	SM.01µF S
A12	SM205228863	SRAM8Kx8-25	C8	SM661207103	SM.01µF S
A13	SM205228863	SRAM8Kx8-25	C9	SM661207103	SM.01µF S
A14	SM205228863	SRAM8Kx8-25	C10	SM661207103	SM.01µF S
A15	SM200179373	SM74BCT373	C11	SM661207103	SM.01µF S
A16	SM200179373	SM74BCT373	C12	SM661207103	SM.01µF S
A17	SM205228863	SRAM8Kx8-25	C13	SM661207103	SM.01µF S
A18	SM205228863	SRAM8Kx8-25	C14	SM661207103	SM.01µF S
A19	SM205228863	SRAM8Kx8-25	C15	SM661207103	SM.01µF S
A20	SM205228863	SRAM8Kx8-25	C16	SM661207103	SM.01µF S
A21	SM205228863	SRAM8Kx8-25	C17	SM661207103	SM.01µF S
A22	SM205228863	SRAM8Kx8-25	C18	SM661207103	SM.01µF S
A23	SM205228863	SRAM8Kx8-25	C19	SM661207103	SM.01µF S
A24	SM205228863	SRAM8Kx8-25	C20	SM661207103	SM.01µF S
A25	SM200179373	SM74BCT373	C21	SM661207103	SM.01µF S
A26	SM200179373	SM74BCT373	C22	SM661207103	SM.01µF S
A27	SM205228863	SRAM8Kx8-25	C23	SM661207103	SM.01µF S
A28	SM205228863	SRAM8Kx8-25	C24	SM661207103	SM.01µF S
A29	SM205228863	SRAM8Kx8-25	C25	SM661207103	SM.01µF S
A30	SM205228863	SRAM8Kx8-25	C26	SM661207103	SM.01µF S
A31	SM205228863	SRAM8Kx8-25	C27	SM661207103	SM.01µF S
A32	SM205228863	SRAM8Kx8-25	C28	SM661207103	SM.01µF S
A33	SM205228863	SRAM8Kx8-25	C29	SM661207103	SM.01µF S
A34	SM205228863	SRAM8Kx8-25	C30	SM661207103	SM.01µF S
A35	SM200179373	SM74BCT373	C31	SM661207103	SM.01µF S
A36	SM200179373	SM74BCT373	C32	SM661207103	SM.01µF S
			J1	454110024	7x 4x42

PART: S9350-21 DESC: ACQUISITION MEMORY CARD 2x50K for 9374

COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
145344109	CAP ALU COMPACT AXIAL 10000µF	2
454110024	HDR 2MM PRESSFIT TO MALE 24	7
719350M21	PC BD PRSS'Y 9350M-21	1
SM200179373	IC OCTAL LATCH 74BCT373	8
SM205228863	IC 8K X 8 STATIC RAM 25NS	32
SM661207103	CAP CERA CHIP 20% .01µF (0805)	32

PART: S9350M-21 DESC: ACQUISITION MEMORY CARD 2x250K for 9374M & 2x500K for 9374M

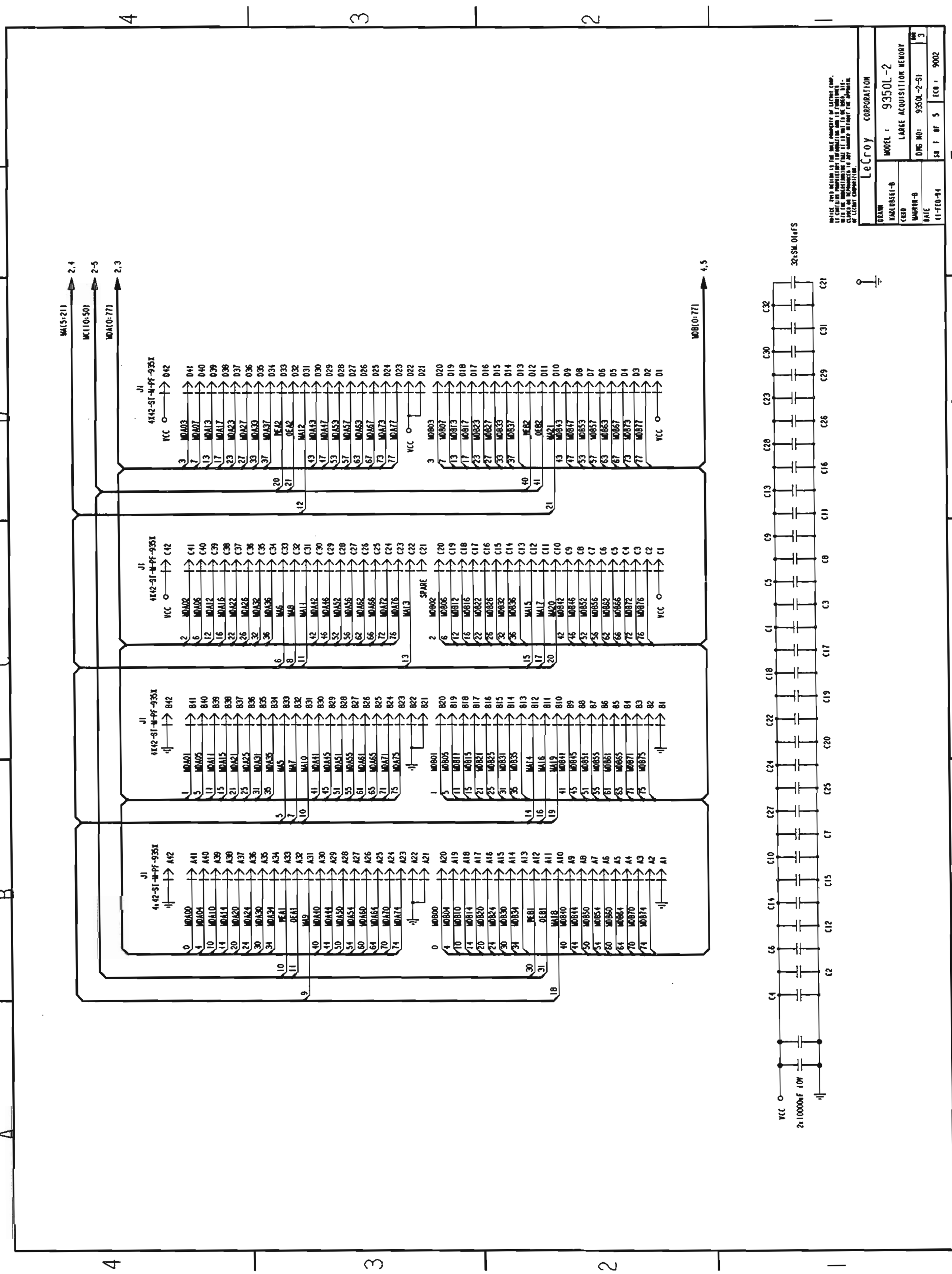
COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
145344109	CAP ALU COMPACT AXIAL 10000µF	2
454110024	HDR 2MM PRESSFIT TO MALE 24	7
719350M21	PC BD PRSS'Y 9350M-21	1
SM200179373	IC OCTAL LATCH 74BCT373	8
SM205238256	IC 32K X 8 SRAM 25NS	32
SM661207103	CAP CERA CHIP 20% .01µF (0805)	32

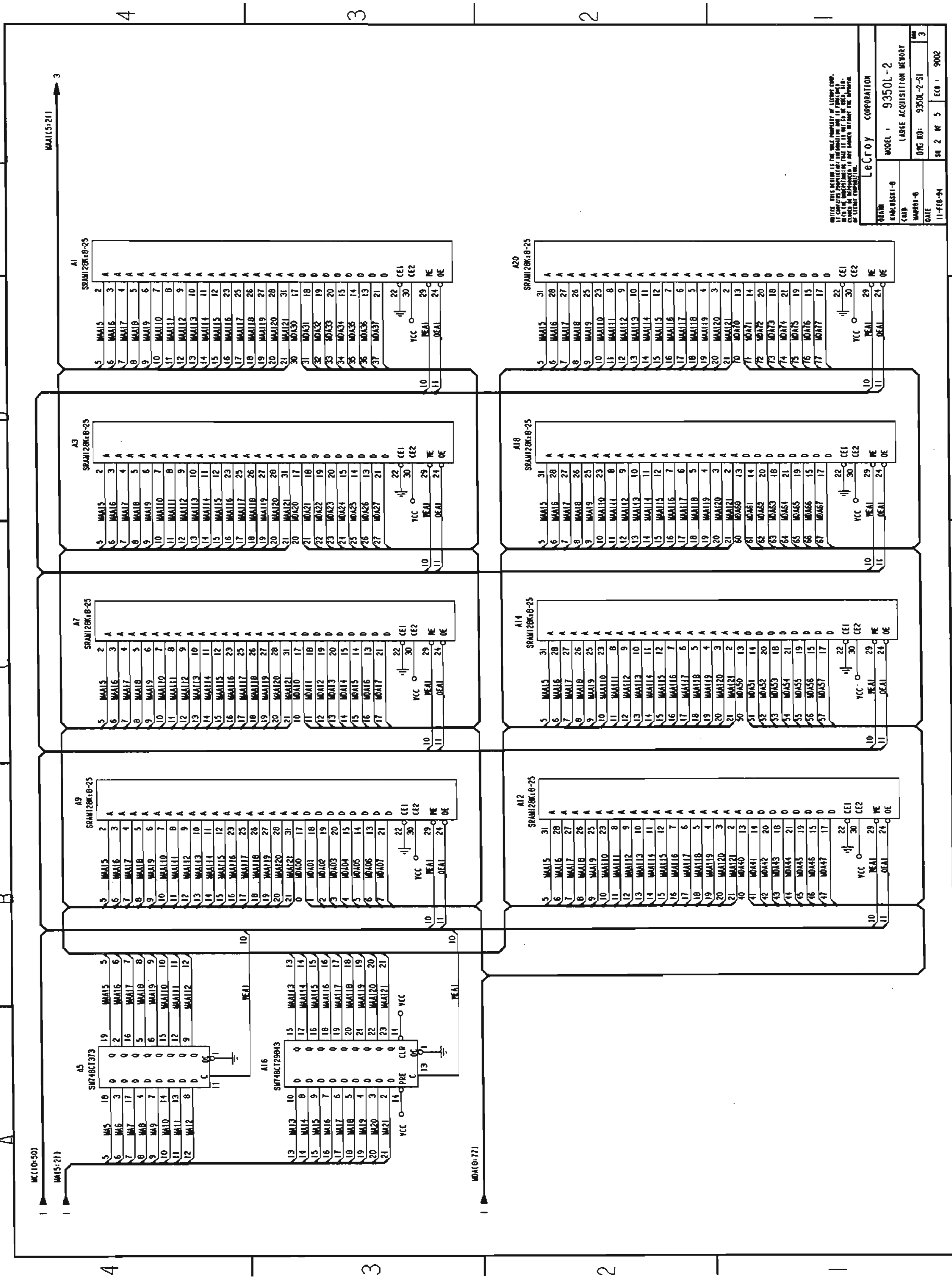
PART: F9350L-2 DESC: ACQUISITION MEMORY CARD 2 x 2 M for 9374L

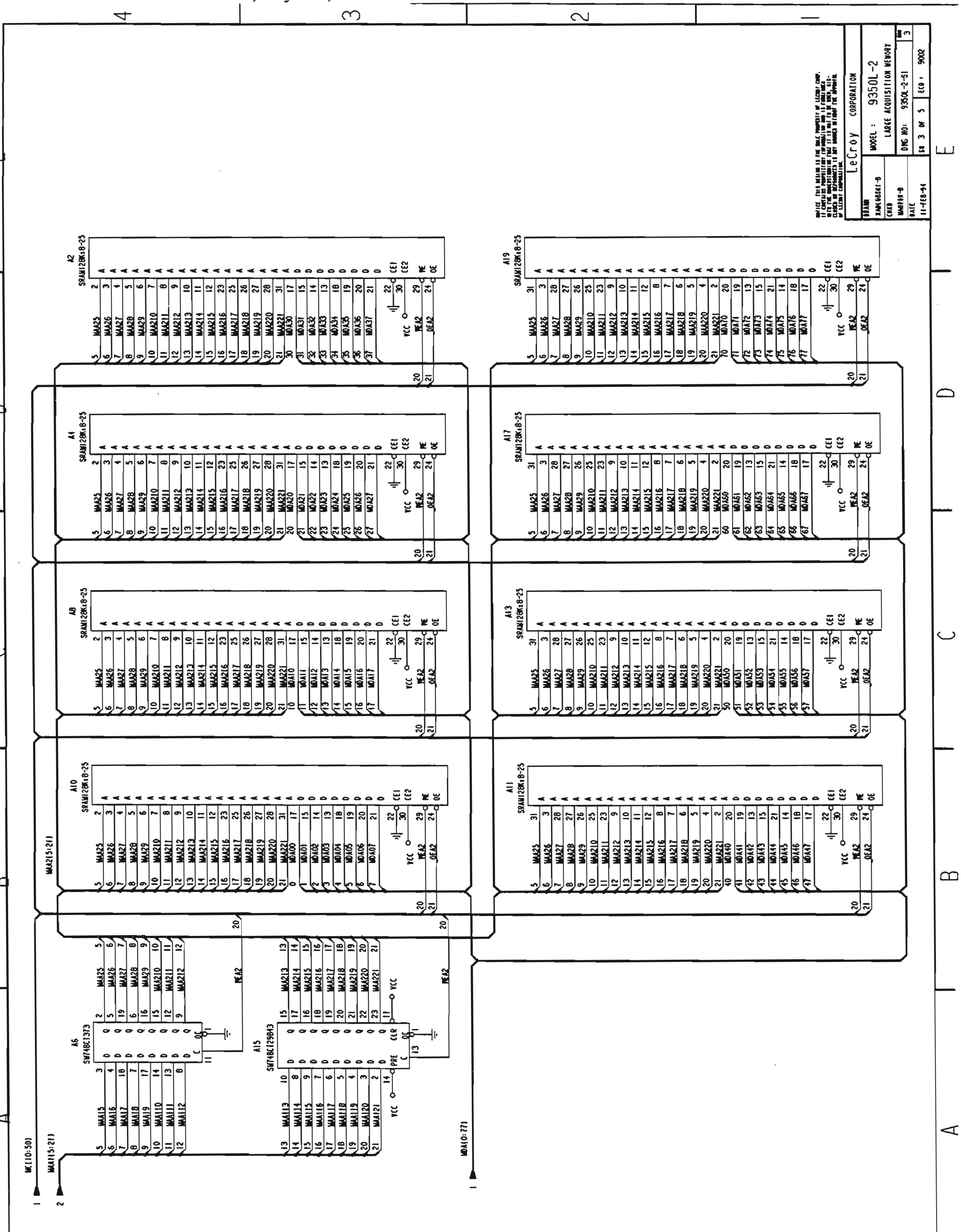
COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
145344109	CAP ALU COMPACT AXIAL 10000µF	2
454110024	HDR 2MM PRESSFIT TO MALE 24	7
719350L23	PC BD PRSS'Y 9350L-2	1
SM200179373	IC OCTAL LATCH 74BCT373	4
SM205232226	IC 128KX8 SRAM 25 6226AWJ25	32
SM207480843	IC 9-BIT BUS INT LA 74BCT29843	4
SM661207103	CAP CERA CHIP 20% .01µF (0805)	32

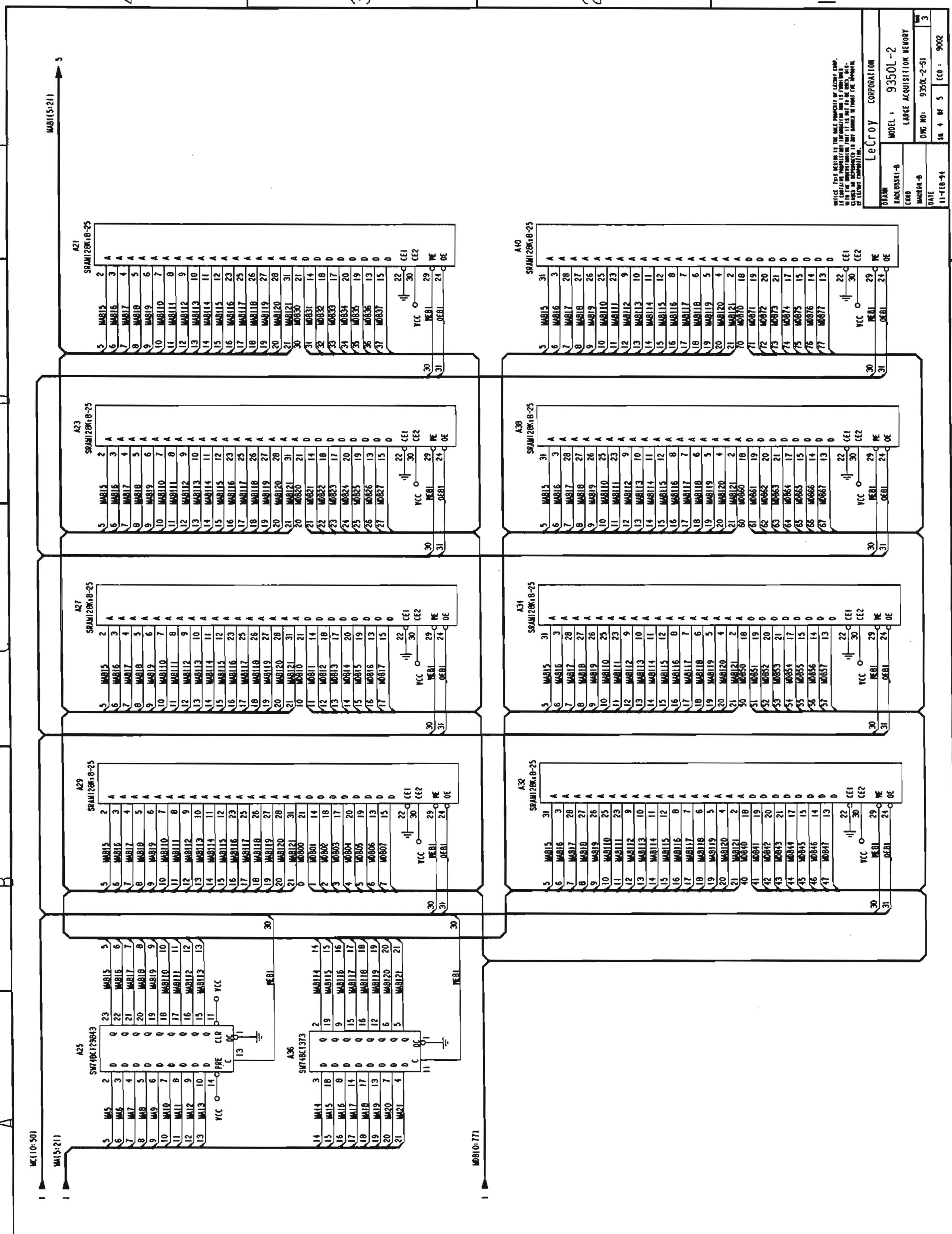
PART: F9350M-21 & F9350TM21 DESC: ACQUISITION MEMORY CARD for 9374M & 9374TM

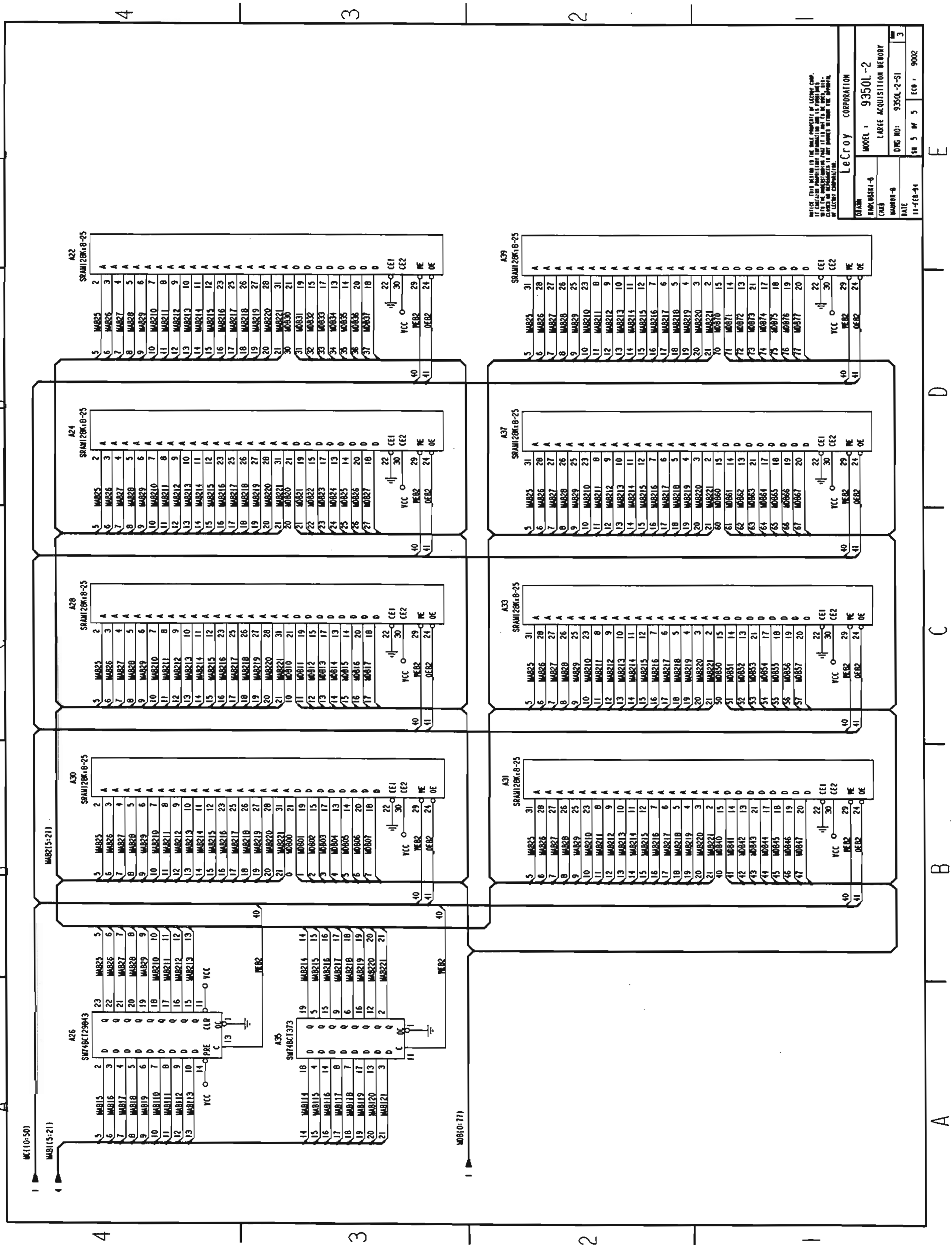
Location	Part Number	Description	Location	Part Number	Description
A1	SM205238256	SRAM-25	A38	SM205238256	SRAM-25
A2	SM205238256	SRAM-25	A39	SM205238256	SRAM-25
A3	SM205238256	SRAM-25	A40	SM205238256	SRAM-25
A4	SM205238256	SRAM-25	C1	SM661207103	SM.01μF S
A5	SM200179373	SM74BCT373	C2	SM661207103	SM.01μF S
A6	SM200179373	SM74BCT373	C3	SM661207103	SM.01μF S
A7	SM205238256	SRAM-25	C4	SM661207103	SM.01μF S
A8	SM205238256	SRAM-25	C5	SM661207103	SM.01μF S
A9	SM205238256	SRAM-25	C6	SM661207103	SM.01μF S
A10	SM205238256	SRAM-25	C7	SM661207103	SM.01μF S
A11	SM205238256	SRAM-25	C8	SM661207103	SM.01μF S
A12	SM205238256	SRAM-25	C9	SM661207103	SM.01μF S
A13	SM205238256	SRAM-25	C10	SM661207103	SM.01μF S
A14	SM205238256	SRAM-25	C11	SM661207103	SM.01μF S
A15	SM200179373	SM74BCT373	C12	SM661207103	SM.01μF S
A16	SM200179373	SM74BCT373	C13	SM661207103	SM.01μF S
A17	SM205238256	SRAM-25	C14	SM661207103	SM.01μF S
A18	SM205238256	SRAM-25	C15	SM661207103	SM.01μF S
A19	SM205238256	SRAM-25	C16	SM661207103	SM.01μF S
A20	SM205238256	SRAM-25	C17	SM661207103	SM.01μF S
A21	SM205238256	SRAM-25	C18	SM661207103	SM.01μF S
A22	SM205238256	SRAM-25	C19	SM661207103	SM.01μF S
A23	SM205238256	SRAM-25	C20	SM661207103	SM.01μF S
A24	SM205238256	SRAM-25	C21	SM661207103	SM.01μF S
A25	SM200179373	SM74BCT373	C22	SM661207103	SM.01μF S
A26	SM200179373	SM74BCT373	C23	SM661207103	SM.01μF S
A27	SM205238256	SRAM-25	C24	SM661207103	SM.01μF S
A28	SM205238256	SRAM-25	C25	SM661207103	SM.01μF S
A29	SM205238256	SRAM-25	C26	SM661207103	SM.01μF S
A30	SM205238256	SRAM-25	C27	SM661207103	SM.01μF S
A31	SM205238256	SRAM-25	C28	SM661207103	SM.01μF S
A32	SM205238256	SRAM-25	C29	SM661207103	SM.01μF S
A33	SM205238256	SRAM-25	C30	SM661207103	SM.01μF S
A34	SM205238256	SRAM-25	C31	SM661207103	SM.01μF S
A35	SM200179373	SM74BCT373	C32	SM661207103	SM.01μF S
A36	SM200179373	SM74BCT373	J1	454110024	7x 4x42-ST-M
A37	SM205238256	SRAM-25			


LeCroy CORPORATION
MODEL : 9350L-2
LARGE ACQUISITION MEMORY

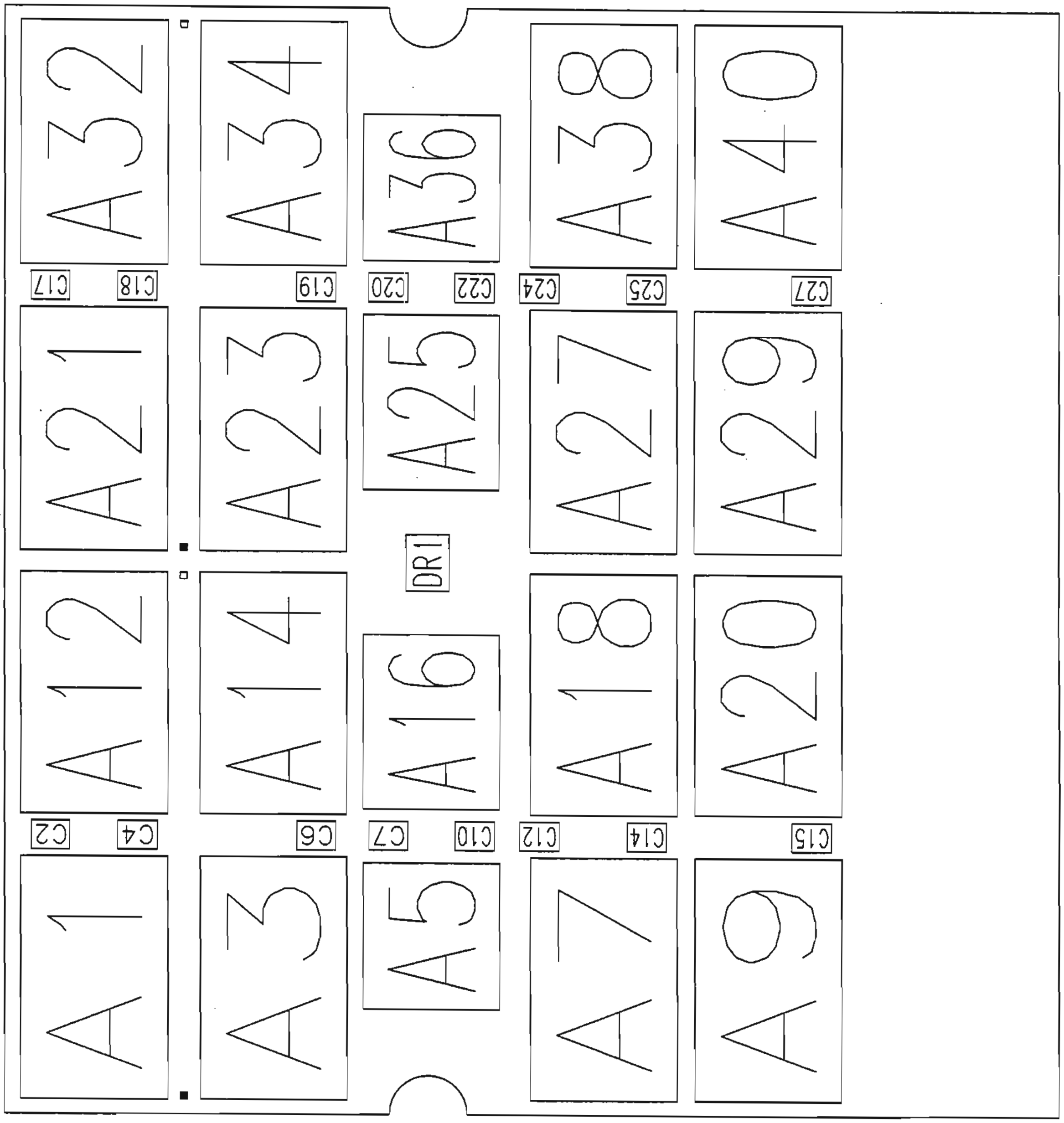

LeCroy CORPORATION
MODEL: 9350L-2
LARGE ACQUISITION MEMORY
DWG NO: 9350L-2-S1
SH 2 OF 5
ECO: 9002
DATE 11-FEB-94
SRAM128Kx8-25
SN74BCT373
SN74BCT29843

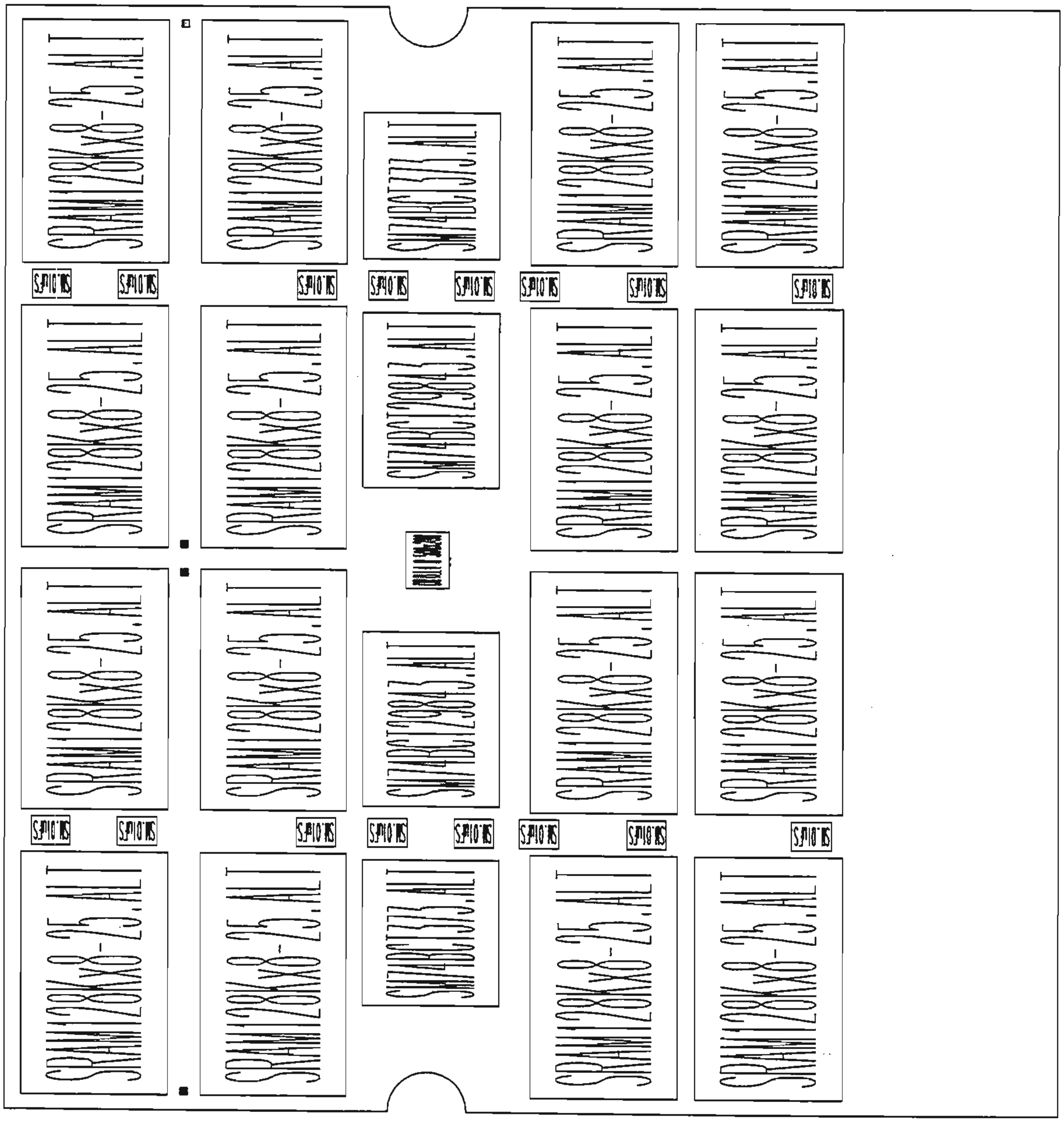

LeCroy CORPORATION
MODEL : 9350L-2
LARGE ACQUISITION MEMORY

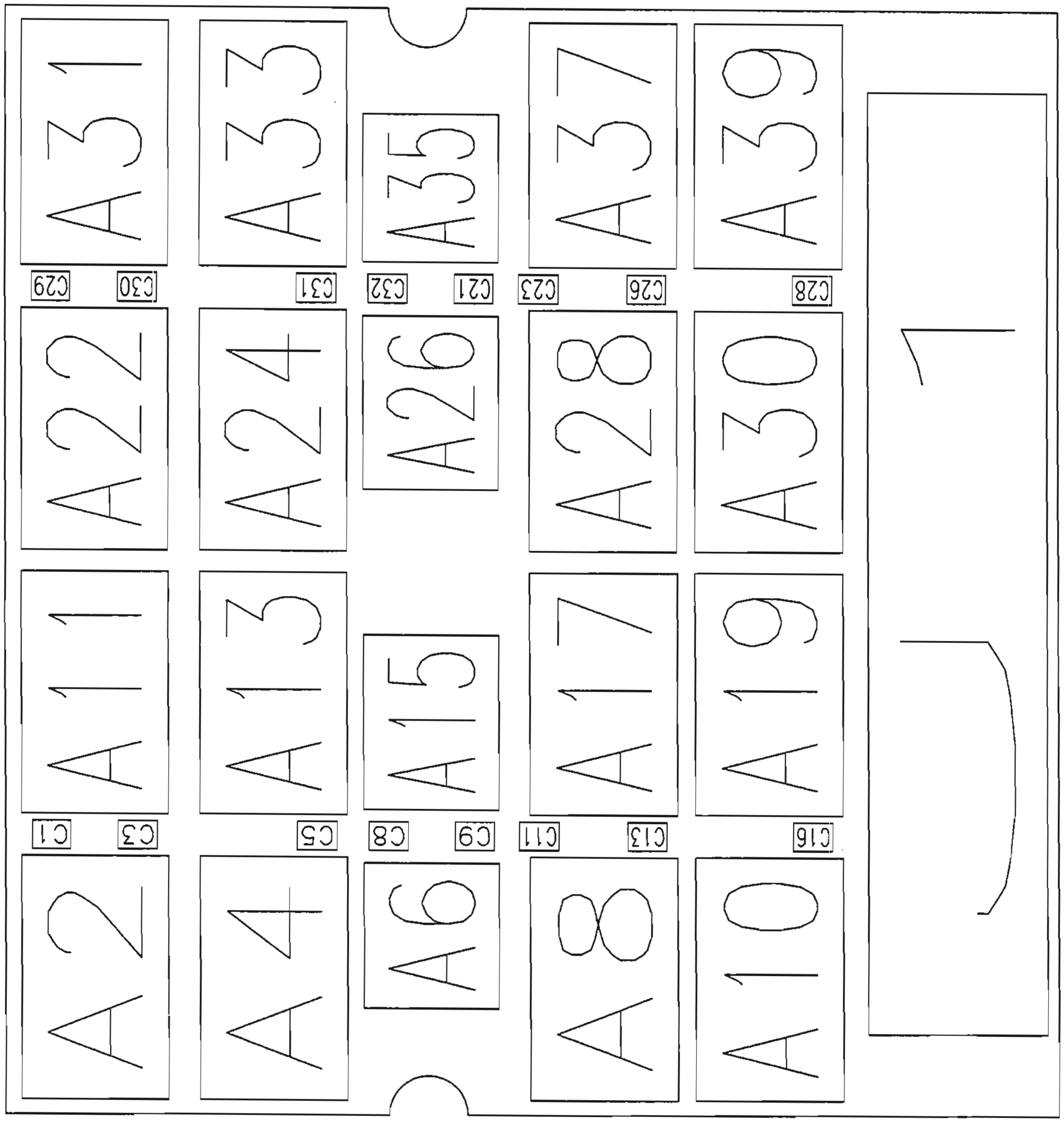

LeCroy CORPORATION
MODEL: 9350L-2
LARGE ACQUISITION MEMORY

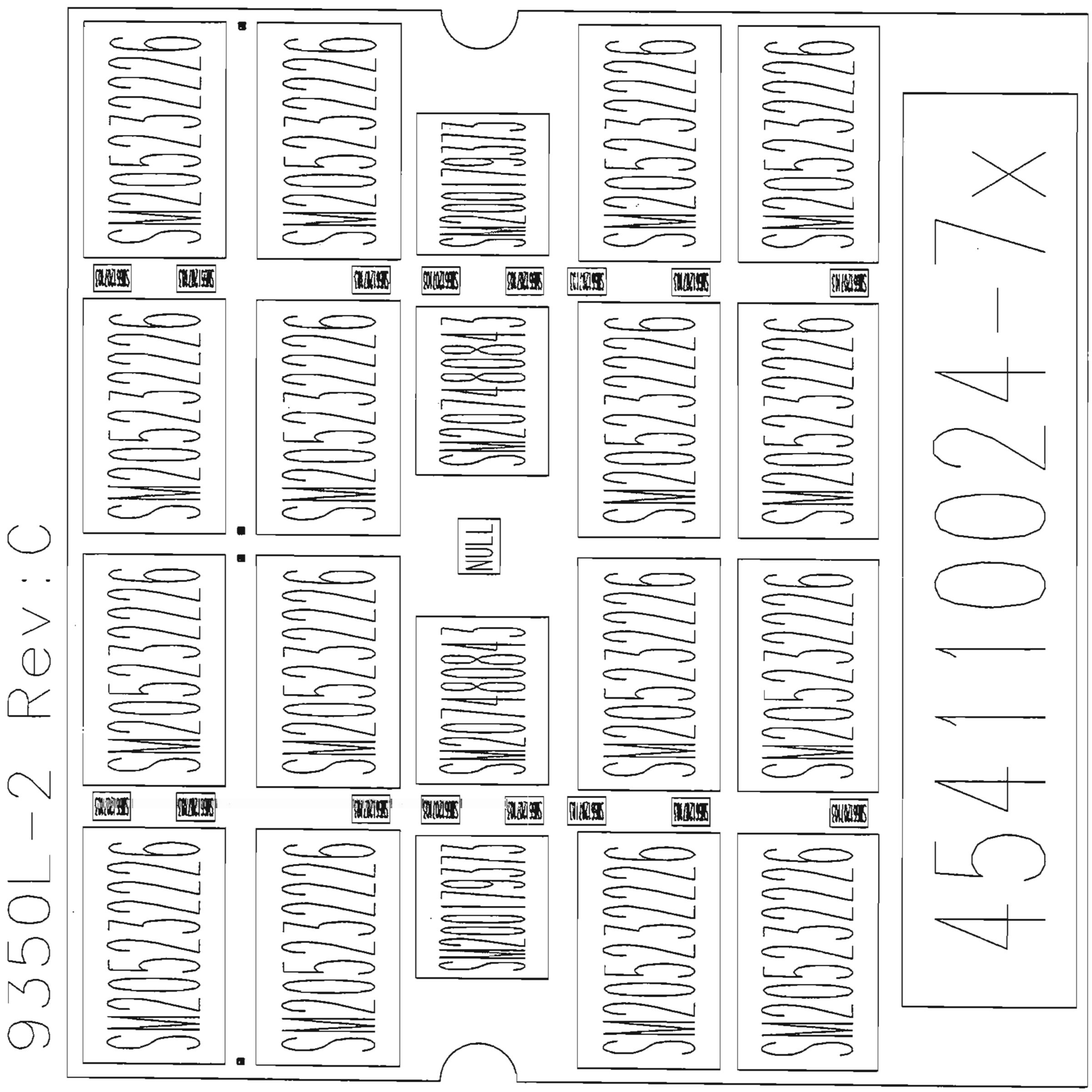


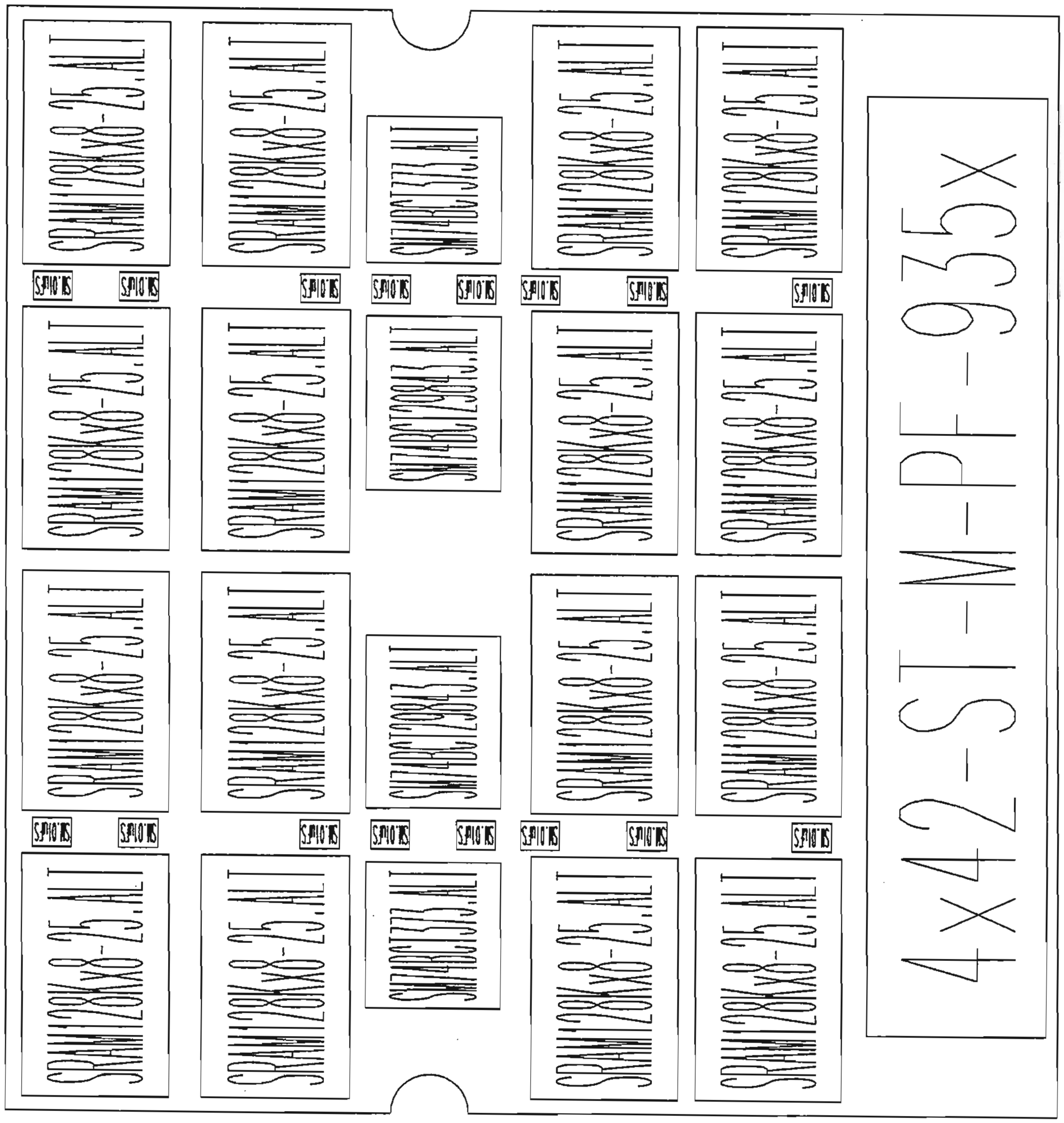
LeCroy CORPORATION
MODEL : 9350L-2
LARGE ACQUISITION MEMORY
DWG NO: 9350L-2-S1
SH 5 OF 5
ECO : 9002
DATE 11-FEB-94
A22 SRAM128Kx8-25
A24 SRAM128Kx8-25
A28 SRAM128Kx8-25
A30 SRAM128Kx8-25
A39 SRAM128Kx8-25
A37 SRAM128Kx8-25
A33 SRAM128Kx8-25
A31 SRAM128Kx8-25
A26 SN74BCT29843
A35 SN74BCT373
MDB(0:77)
MAB1(5:21)
MAB2(5:21)


A32
A34
A36
A38
A40
C17
C18
C19
C20
C22
C24
C25
C27
A21
A23
A25
A27
A29
DR1
A12
A14
A16
A18
A20
C2
C4
C6
C7
C10
C12
C14
C15
A1
A3
A5
A7
A9



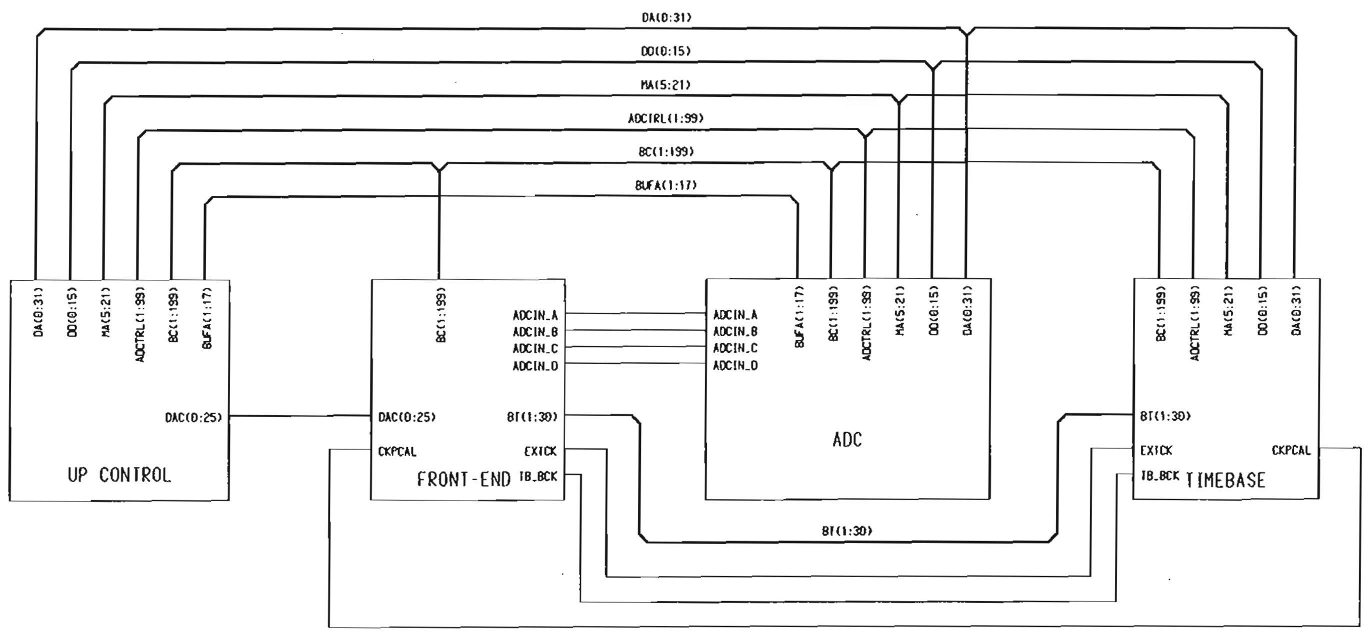

A31
A33
A35
A37
A39
C29
C30
C31
C32
C21
C23
C26
C28
A22
A24
A26
A28
A30
A11
A13
A15
A17
A19
C1
C3
C5
C8
C9
C11
C13
C16
A2
A4
A6
A8
A10


9350L-2 Rev:C
454110024-7x
NULL


4x42-ST-M-PF-935x

PART: F9350L-2 DESC: ACQUISITION MEMORY CARD 2x2 M for 9374L

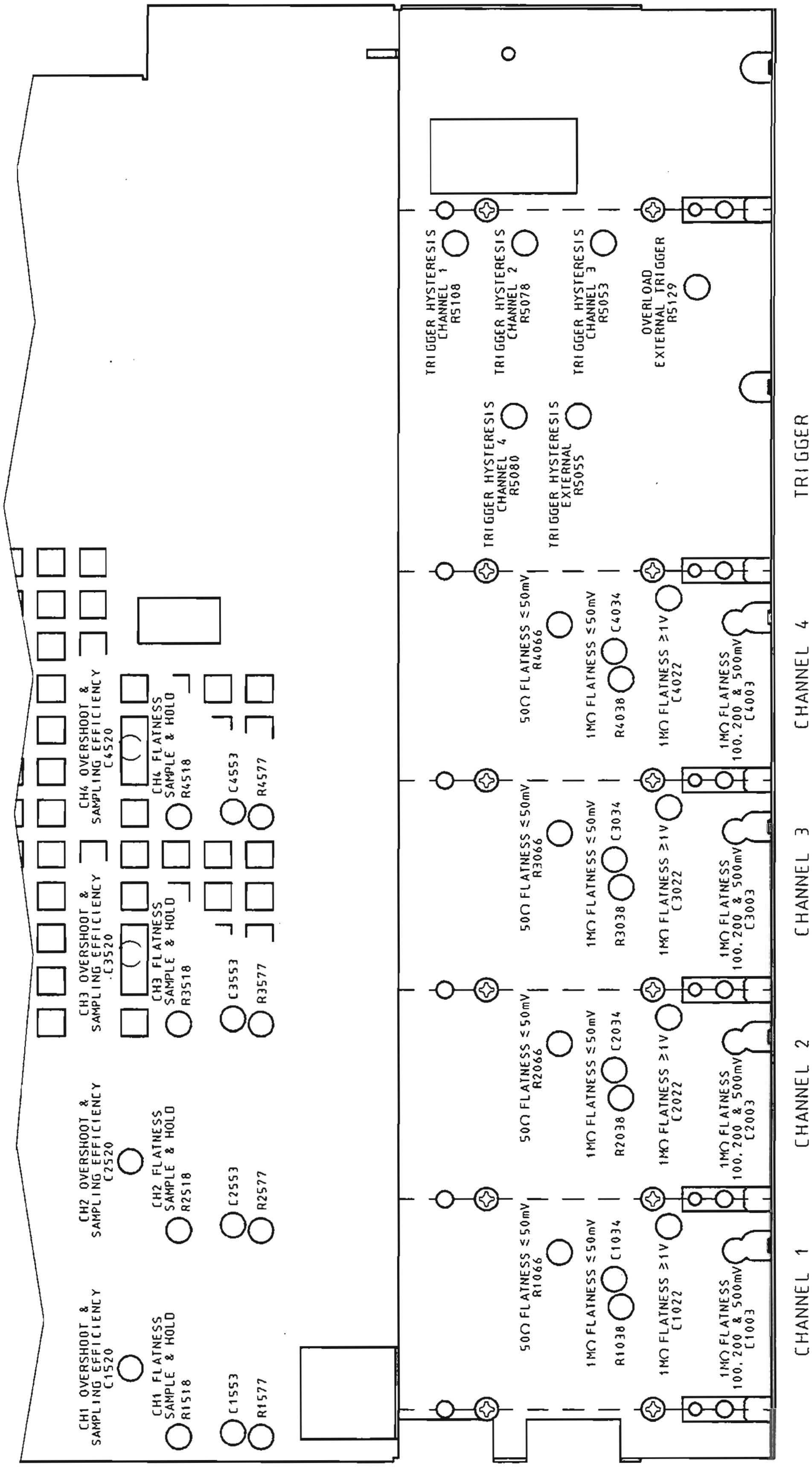
Location	Part Number	Description
A1	SM205232226	SRAM128Kx8-25
A2	SM205232226	SRAM128Kx8-25
A3	SM205232226	SRAM128Kx8-25
A4	SM205232226	SRAM128Kx8-25
A5	SM200179373	SM74BCT373
A6	SM200179373	SM74BCT373
A7	SM205232226	SRAM128Kx8-25
A8	SM205232226	SRAM128Kx8-25
A9	SM205232226	SRAM128Kx8-25
A10	SM205232226	SRAM128Kx8-25
A11	SM205232226	SRAM128Kx8-25
A12	SM205232226	SRAM128Kx8-25
A13	SM205232226	SRAM128Kx8-25
A14	SM205232226	SRAM128Kx8-25
A15	SM207480843	SM74BCT29843
A16	SM207480843	SM74BCT29843
A17	SM205232226	SRAM128Kx8-25
A18	SM205232226	SRAM128Kx8-25
A19	SM205232226	SRAM128Kx8-25
A20	SM205232226	SRAM128Kx8-25
A21	SM205232226	SRAM128Kx8-25
A22	SM205232226	SRAM128Kx8-25
A23	SM205232226	SRAM128Kx8-25
A24	SM205232226	SRAM128Kx8-25
A25	SM207480843	SM74BCT29843
A26	SM207480843	SM74BCT29843
A27	SM205232226	SRAM128Kx8-25
A28	SM205232226	SRAM128Kx8-25
A29	SM205232226	SRAM128Kx8-25
A30	SM205232226	SRAM128Kx8-25
A31	SM205232226	SRAM128Kx8-25
A32	SM205232226	SRAM128Kx8-25
A33	SM205232226	SRAM128Kx8-25
A34	SM205232226	SRAM128Kx8-25
A35	SM200179373	SM74BCT373
A36	SM200179373	SM74BCT373
A37	SM205232226	SRAM128Kx8-25
A38	SM205232226	SRAM128Kx8-25
A39	SM205232226	SRAM128Kx8-25
A40	SM205232226	SRAM128Kx8-25
C1	SM661207103	SM.01µF
C2	SM661207103	SM.01µF
C3	SM661207103	SM.01µF
C4	SM661207103	SM.01µF
C5	SM661207103	SM.01µF
C6	SM661207103	SM.01µF
C7	SM661207103	SM.01µF
C8	SM661207103	SM.01µF
C9	SM661207103	SM.01µF
C10	SM661207103	SM.01µF
C11	SM661207103	SM.01µF
C12	SM661207103	SM.01µF
C13	SM661207103	SM.01µF
C14	SM661207103	SM.01µF
C15	SM661207103	SM.01µF
C16	SM661207103	SM.01µF
C17	SM661207103	SM.01µF
C18	SM661207103	SM.01µF
C19	SM661207103	SM.01µF
C20	SM661207103	SM.01µF
C21	SM661207103	SM.01µF
C22	SM661207103	SM.01µF
C23	SM661207103	SM.01µF
C24	SM661207103	SM.01µF
C25	SM661207103	SM.01µF
C26	SM661207103	SM.01µF
C27	SM661207103	SM.01µF
C28	SM661207103	SM.01µF
C29	SM661207103	SM.01µF
C30	SM661207103	SM.01µF
C31	SM661207103	SM.01µF
C32	SM661207103	SM.01µF
J1	454110024	7x 4x42-ST-M-



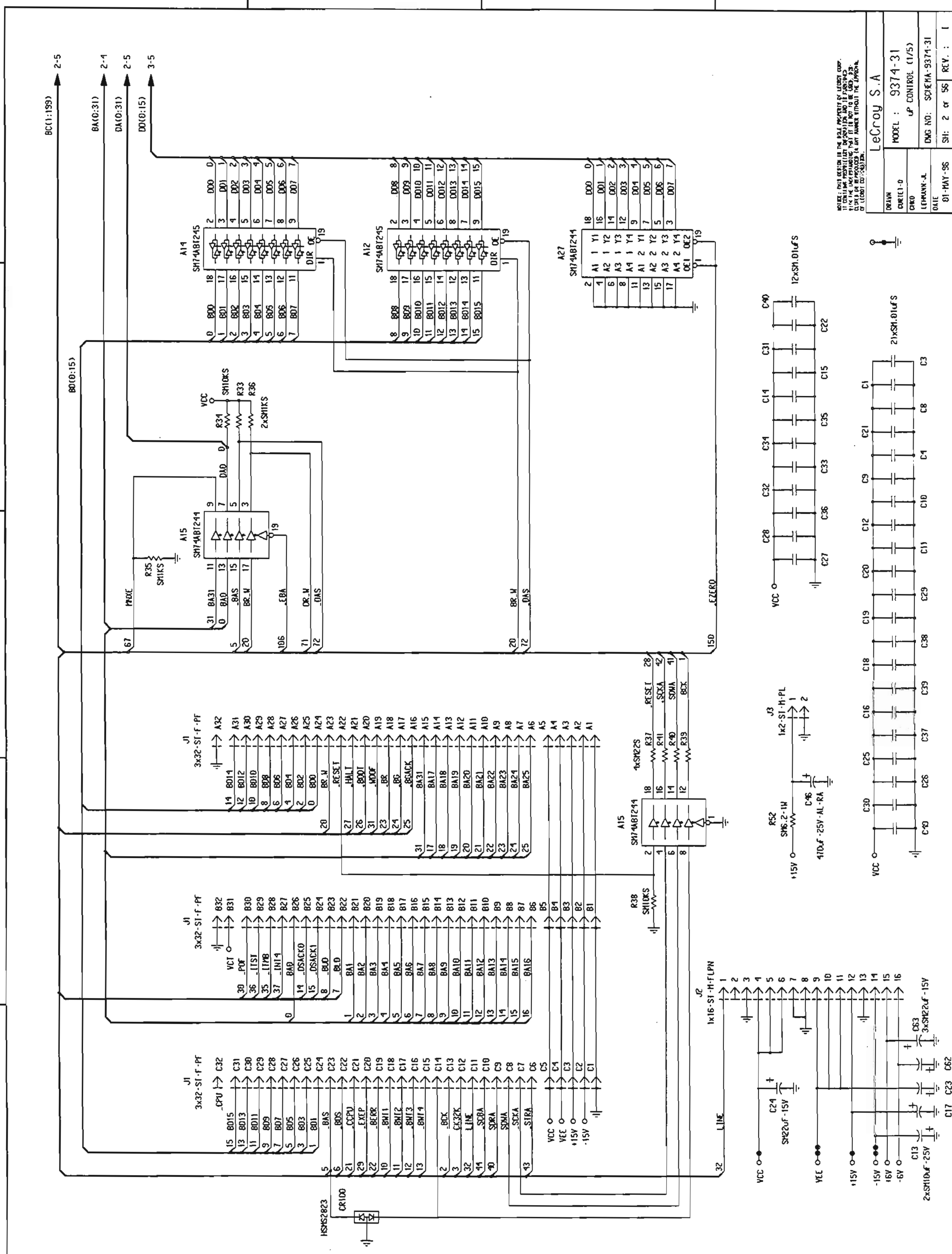
UNMOUNTED COMPONENT FOR 9370-3:

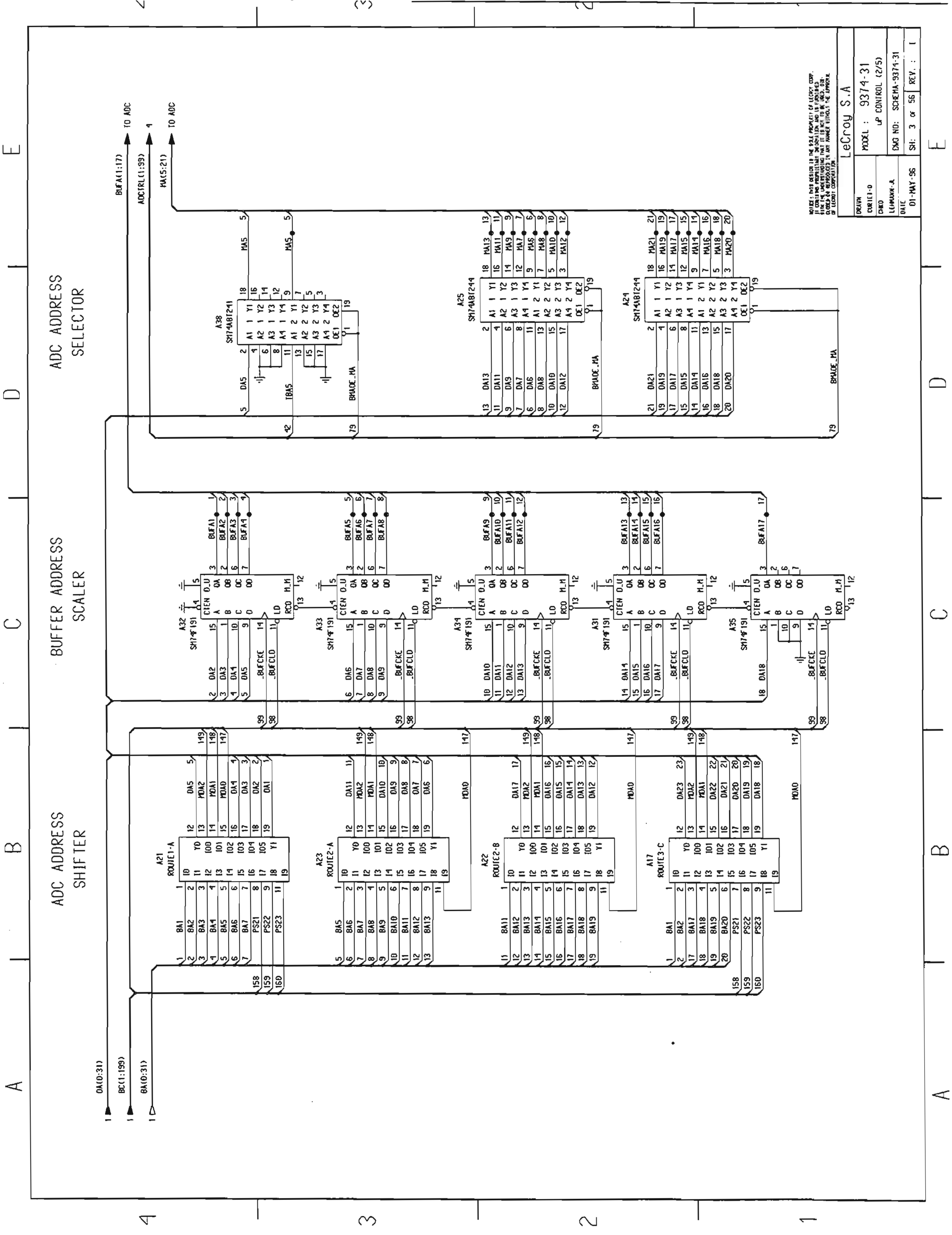
FRONT-END (SHEET7):	- FRONT-END CHANNEL A & B - A214, A215, C232, C233, C237, - C238, R225, R226, R227, R231, - R233, R234, RL200, RL201, R247 - R248, R249, R255, R256, CR203 - CR204, Q200, Q201
FRONT-END TRIGGER (SHEET27): (R5xxx) = NORES	- A5014, A5017, C5051, C5052, - C5057, C5059, C5064, C5065, - C5067, C5068, C5071, C5076, - C5077, C5079, C5084, C5085, - C5087, C5091, C5093, C5094, - CR5006, CR5009, R5071, R5073, - R5075, R5077, R5078, R5081, - R5082, (R5083), R5084, (R5085), - R5086, R5087, R5095, R5097, - R5099, R5103, R5107, R5108, - R5112, R5113, (R5114), R5115, - R5143, R145, C5112, C5114 - (R5116), R5117
ADC (SHEET31):	- ADC CONTROL CHANNEL A & B - ADC CONNECTOR CHANNEL A & B

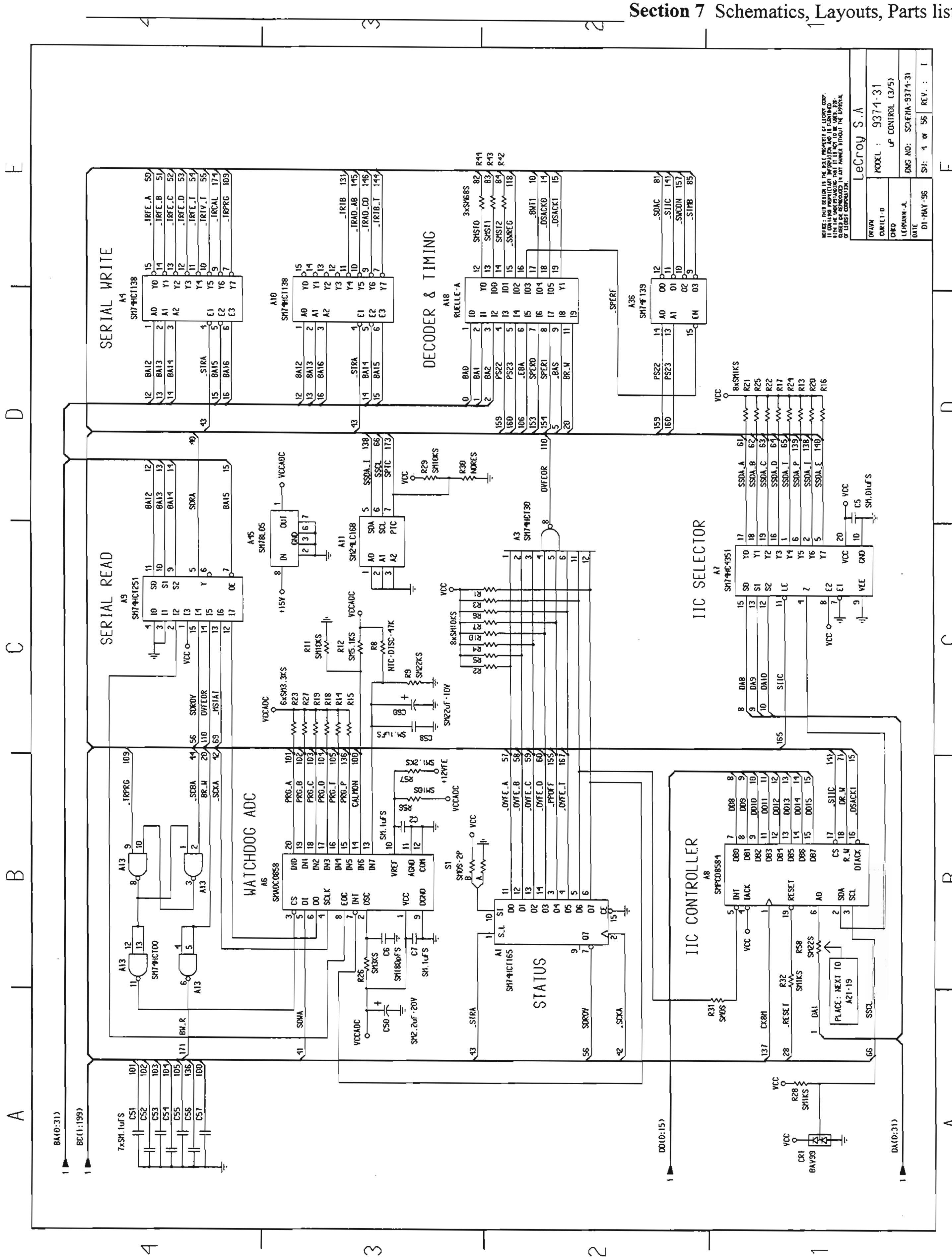
LeCroy S.A		
DRAWN CURTET-D	MODEL : 9374-31 TOP LEVEL (1/1)	
CHKD LEHMANN-JL	DWG NO: SCHEMA-9374-31	
DATE 01-MAY-95	SH: 1 of 55	REV. : 1

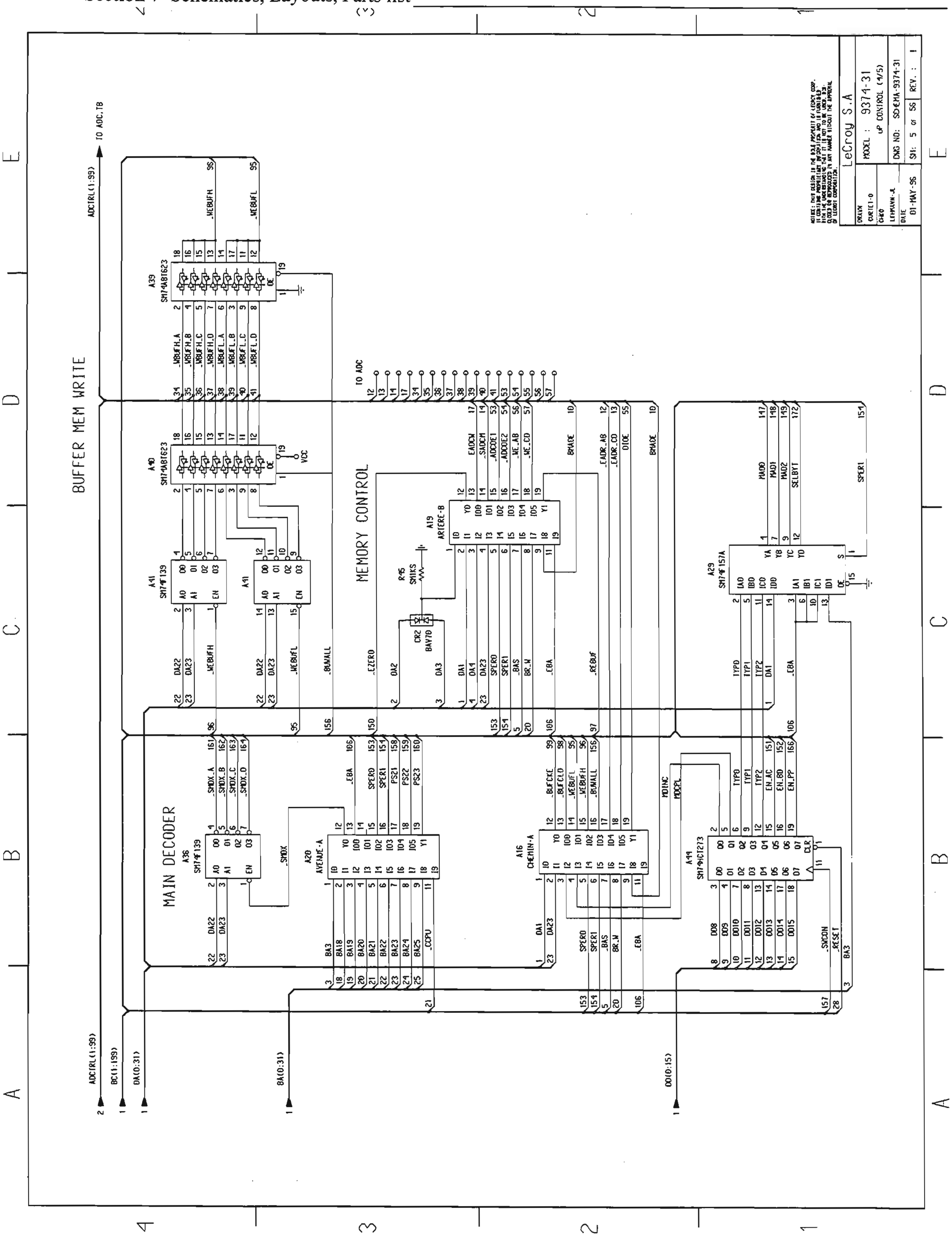


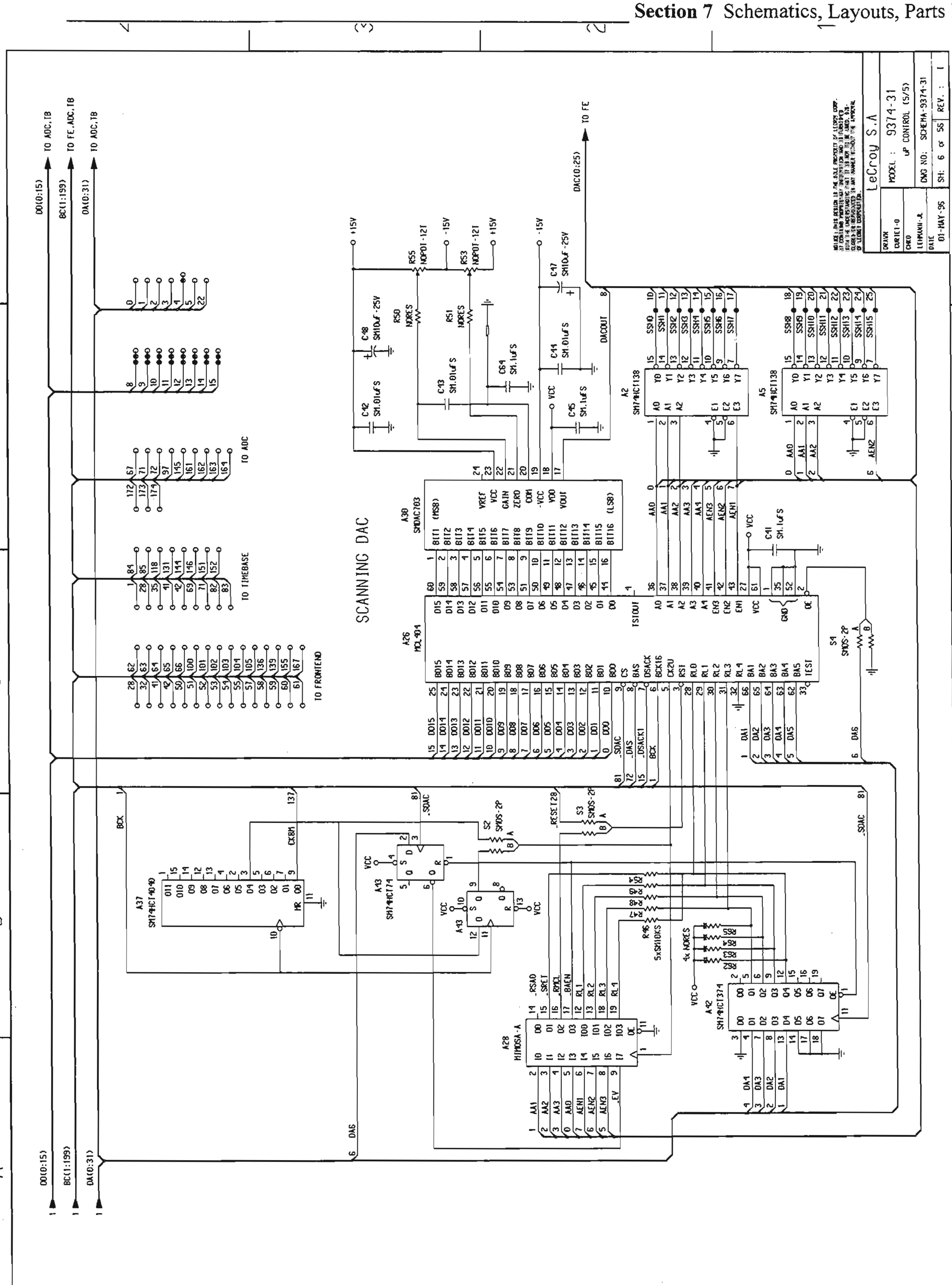
CH1 OVERSHOOT & SAMPLING EFFICIENCY C1520
CH1 FLATNESS SAMPLE & HOLD R1518
C1553
R1577
CH2 OVERSHOOT & SAMPLING EFFICIENCY C2520
CH2 FLATNESS SAMPLE & HOLD R2518
C2553
R2577
CH3 OVERSHOOT & SAMPLING EFFICIENCY C3520
CH3 FLATNESS SAMPLE & HOLD R3518
C3553
R3577
CH4 OVERSHOOT & SAMPLING EFFICIENCY C4520
CH4 FLATNESS SAMPLE & HOLD R4518
C4553
R4577
TRIGGER HYSTERESIS CHANNEL 1 R5108
TRIGGER HYSTERESIS CHANNEL 2 R5078
TRIGGER HYSTERESIS CHANNEL 3 R5053
OVERLOAD EXTERNAL TRIGGER R5129
TRIGGER HYSTERESIS CHANNEL 4 R5080
TRIGGER HYSTERESIS EXTERNAL R5055
50Ω FLATNESS ≤50mV R4066
1MΩ FLATNESS ≤50mV C4034
R4038
1MΩ FLATNESS ≥1V C4022
1MΩ FLATNESS 100, 200 & 500mV C4003
50Ω FLATNESS ≤50mV R3066
1MΩ FLATNESS ≤50mV C3034
R3038
1MΩ FLATNESS ≥1V C3022
1MΩ FLATNESS 100, 200 & 500mV C3003
50Ω FLATNESS ≤50mV R2066
1MΩ FLATNESS ≤50mV C2034
R2038
1MΩ FLATNESS ≥1V C2022
1MΩ FLATNESS 100, 200 & 500mV C2003
50Ω FLATNESS ≤50mV R1066
1MΩ FLATNESS ≤50mV C1034
R1038
1MΩ FLATNESS ≥1V C1022
1MΩ FLATNESS 100, 200 & 500mV C1003
TRIGGER
CHANNEL 4
CHANNEL 3
CHANNEL 2
CHANNEL 1

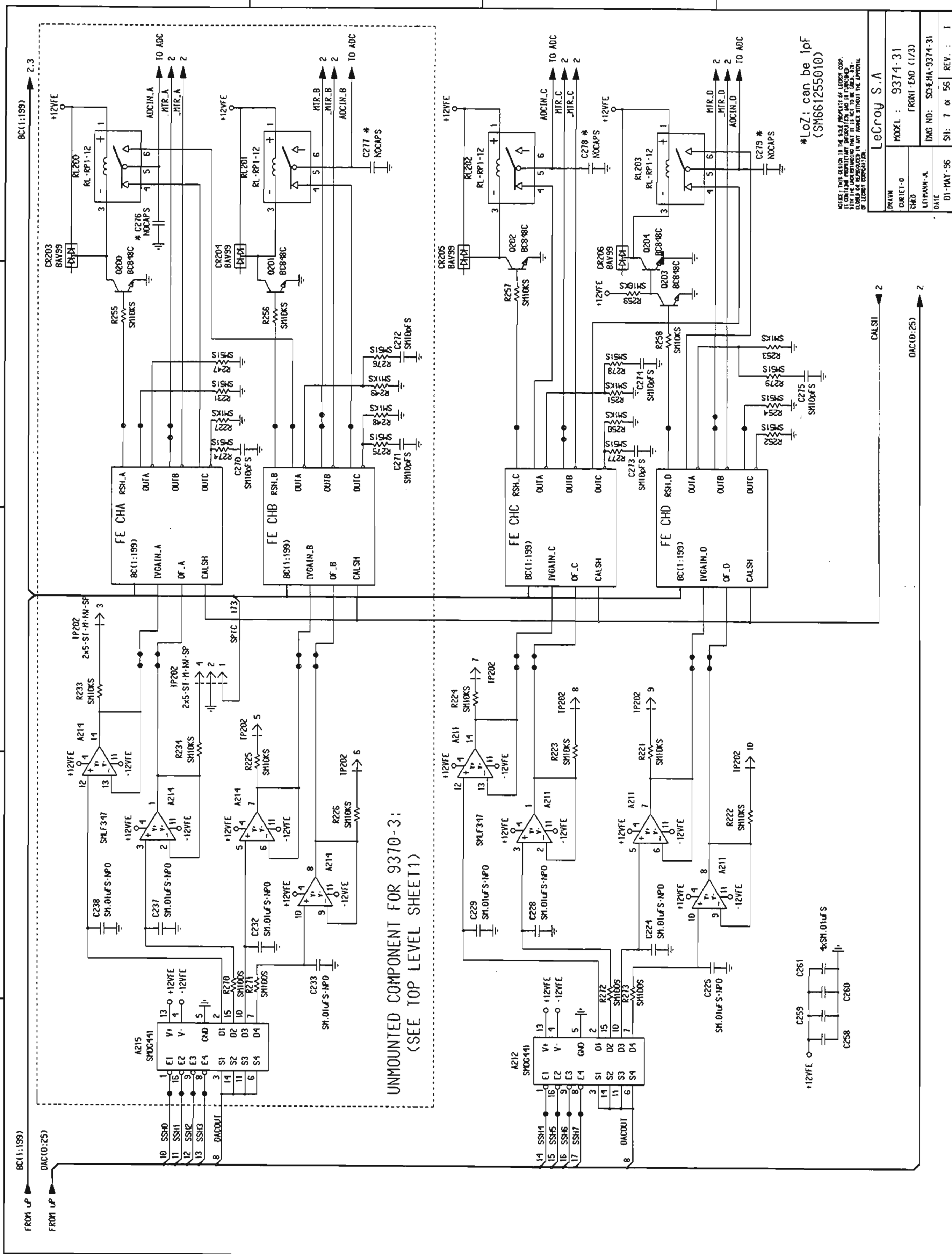

LeCroy S.A
MODEL : 9374-31
µP CONTROL (1/5)
DWG NO: SCHEMA-9374-31
SH: 2 OF 56
REV. : 1
01-MAY-96

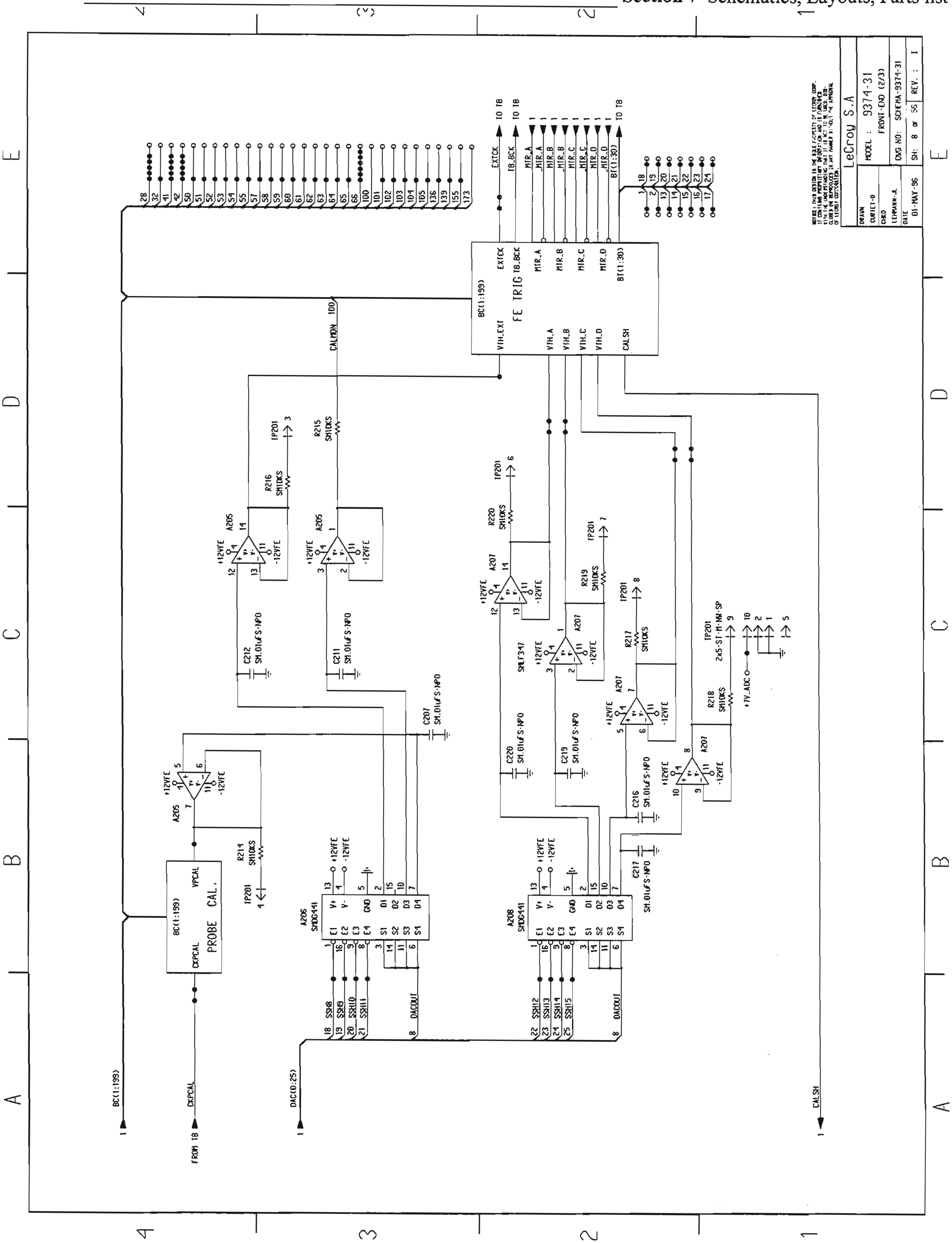

ADC ADDRESS SELECTOR
BUFFER ADDRESS SCALER
ADC ADDRESS SHIFTER
LeCroy S.A
MODEL : 9374-31
uP CONTROL (2/5)
DWG NO: SCHEMA-9374-31
SH: 3 of 56
REV. : 1
01-MAY-96
TO ADC
BUFA(1:17)
ADCTRL(1:99)
MA(5:21)
DA(0:31)
BC(1:199)
BA(0:31)

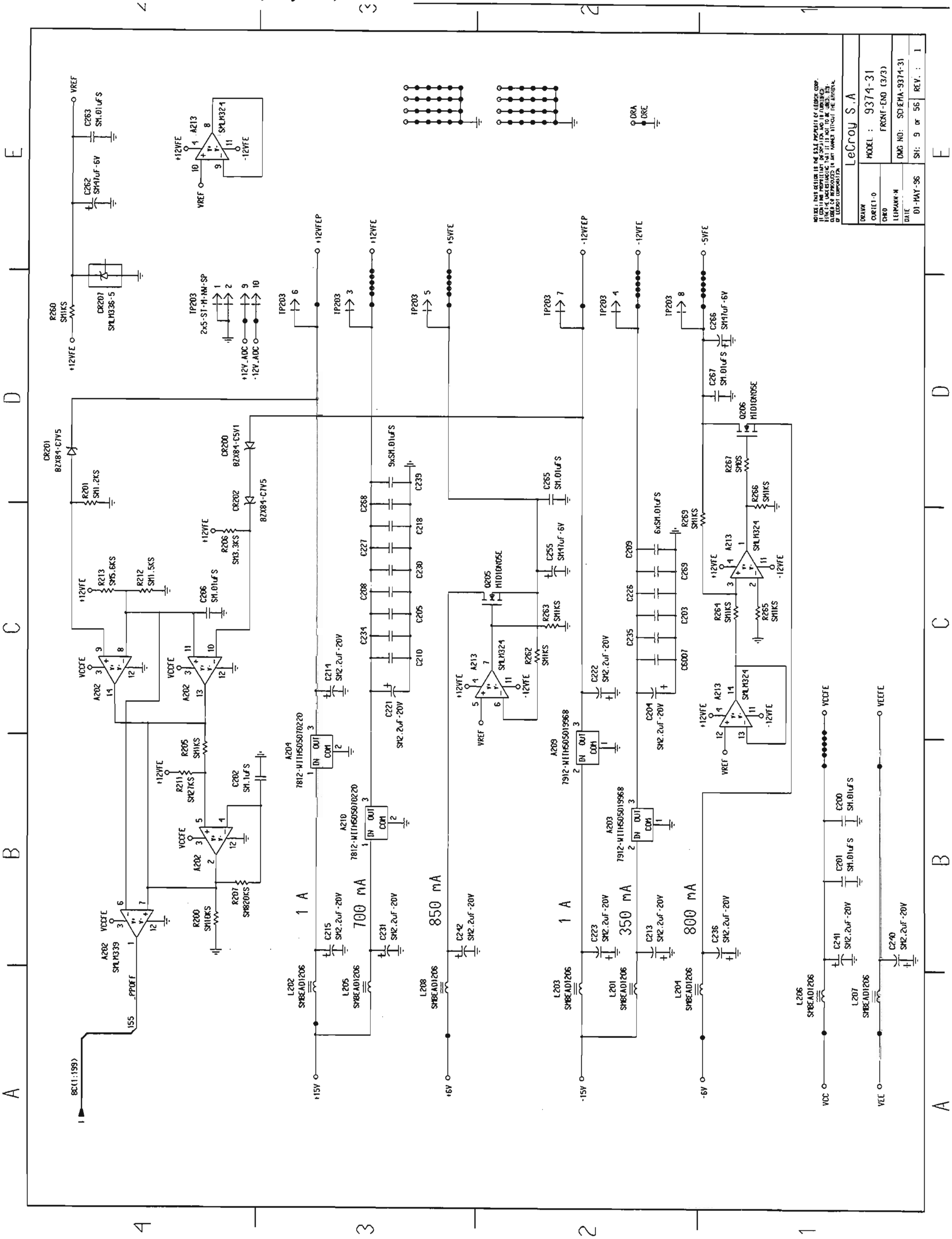

SERIAL WRITE
SERIAL READ
DECODER & TIMING
WATCHDOG ADC
STATUS
IIC SELECTOR
IIC CONTROLLER
LeCroy S.A
MODEL : 9374-31
µP CONTROL (3/5)
DWG NO: SCHEMA-9374-31
SH: 4 OF 56
REV. : 1
DATE 01-MAY-96

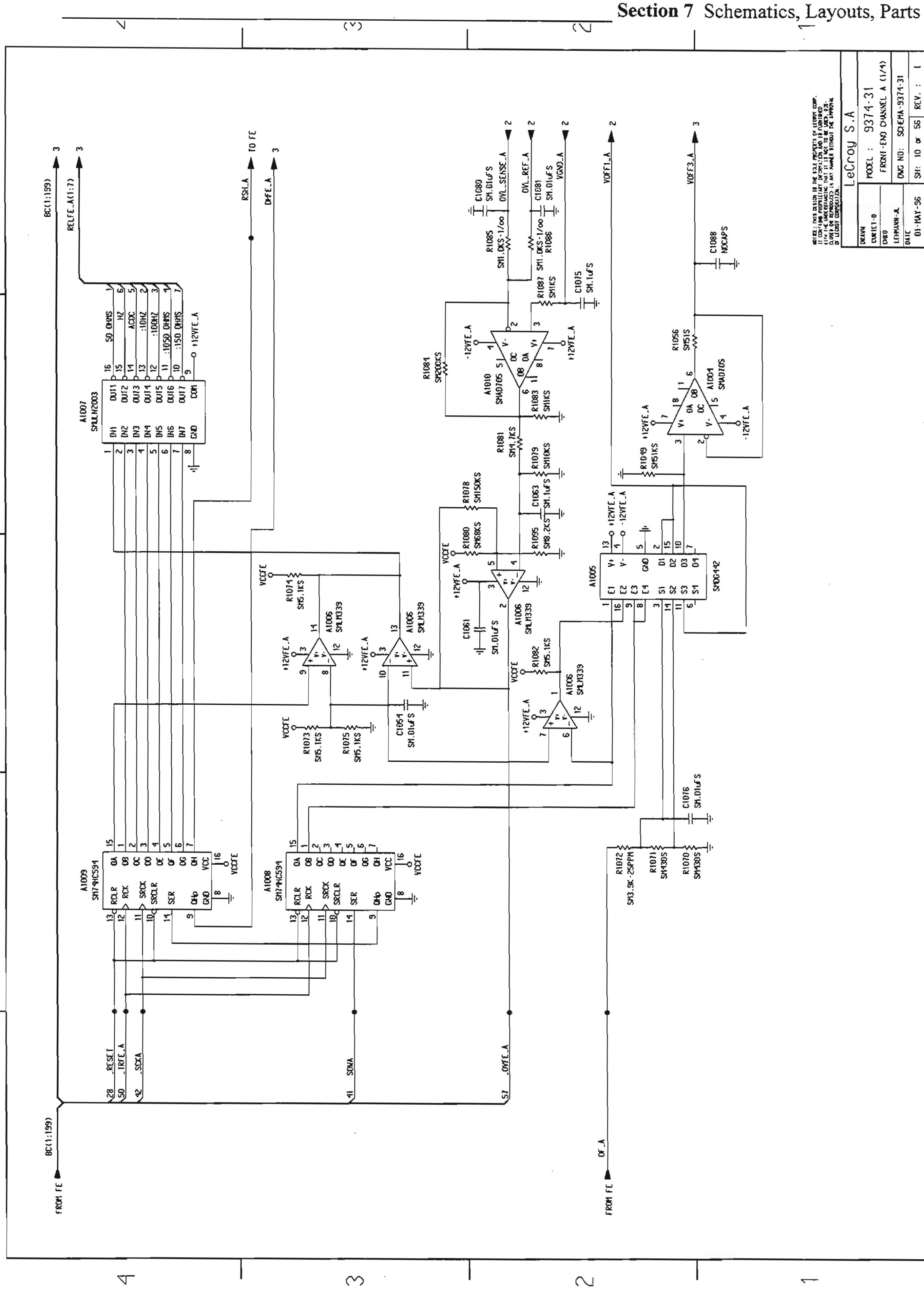

BUFFER MEM WRITE
MEMORY CONTROL
MAIN DECODER
LeCroy S.A
MODEL : 9374-31
uP CONTROL (4/5)

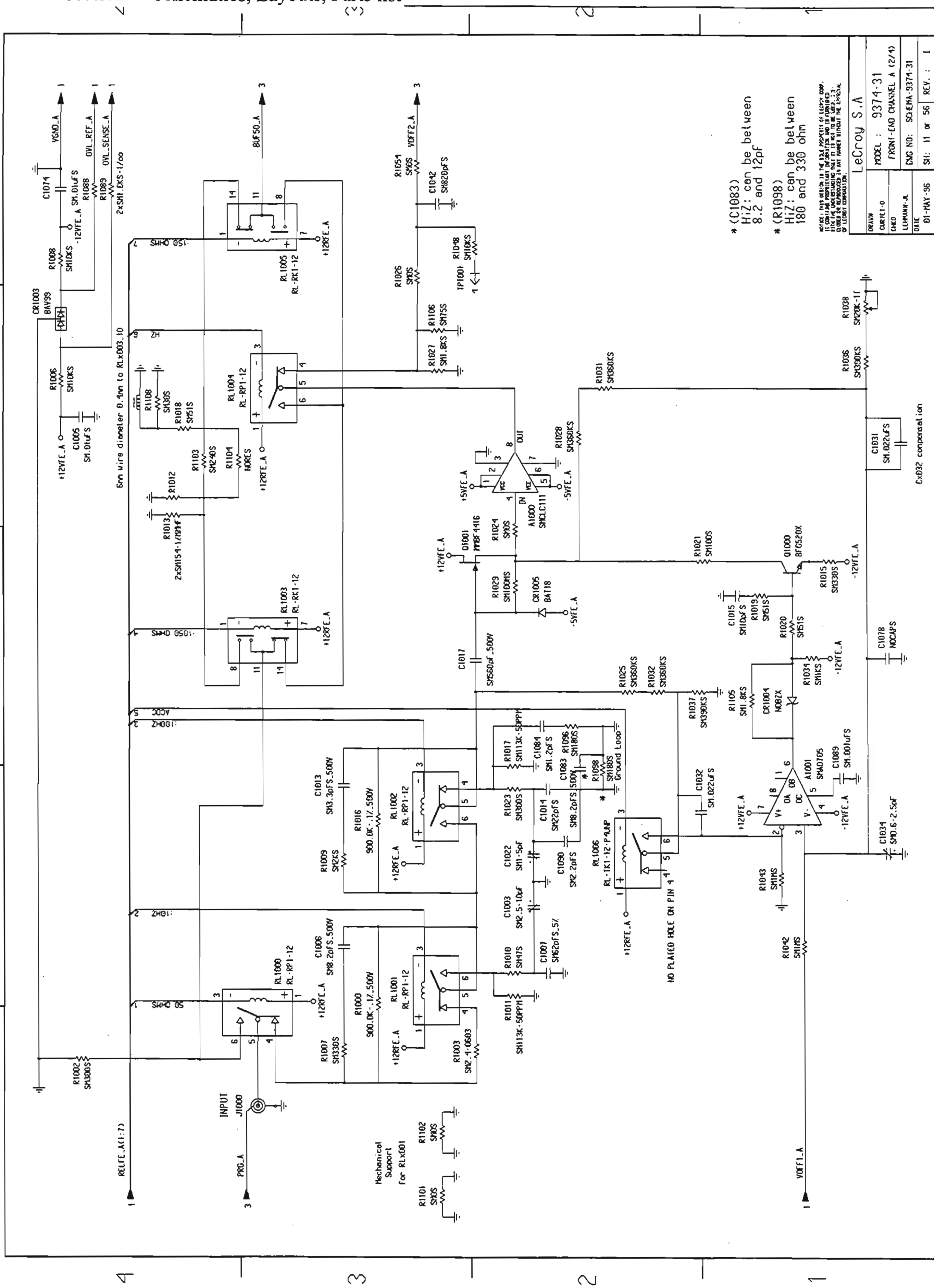

SCANNING DAC
LeCroy S.A
MODEL : 9374-31
uP CONTROL (5/5)
DWG NO: SCHEMA-9374-31
SH: 6 OF 55
REV. : 1
01-MAY-95
TO FRONTEND
TO TIMEBASE
TO ADC
TO FE
DO(0:15)
BC(1:199)
DA(0:31)
DAC(0:25)

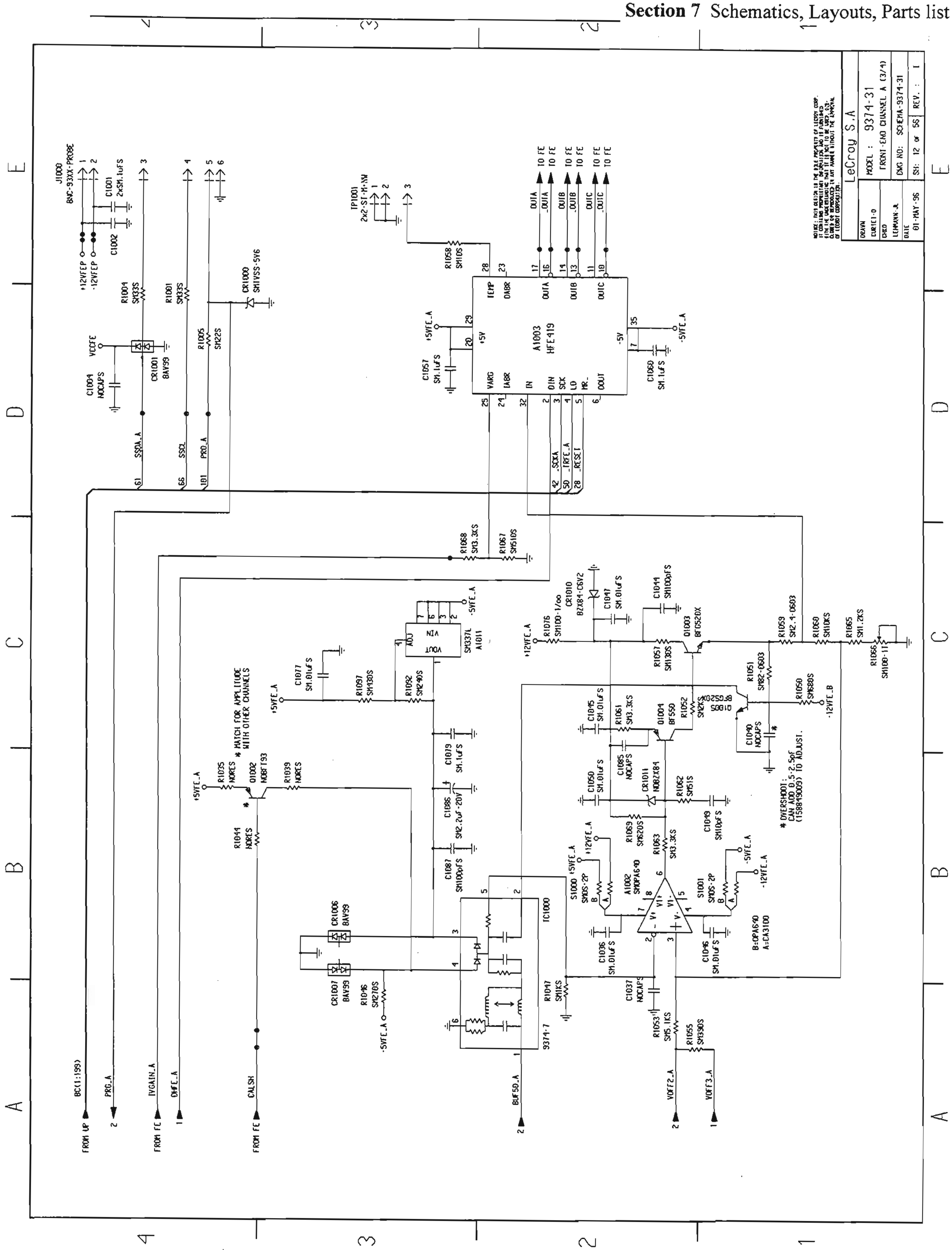

UNMOUNTED COMPONENT FOR 9370-3;
(SEE TOP LEVEL SHEET1)
*LoZ: can be 1pF
(SM661255010)
LeCroy S.A
MODEL : 9374-31
FRONT-END (1/3)
FE CHA
FE CHB
FE CHC
FE CHD
TO ADC
FROM uP

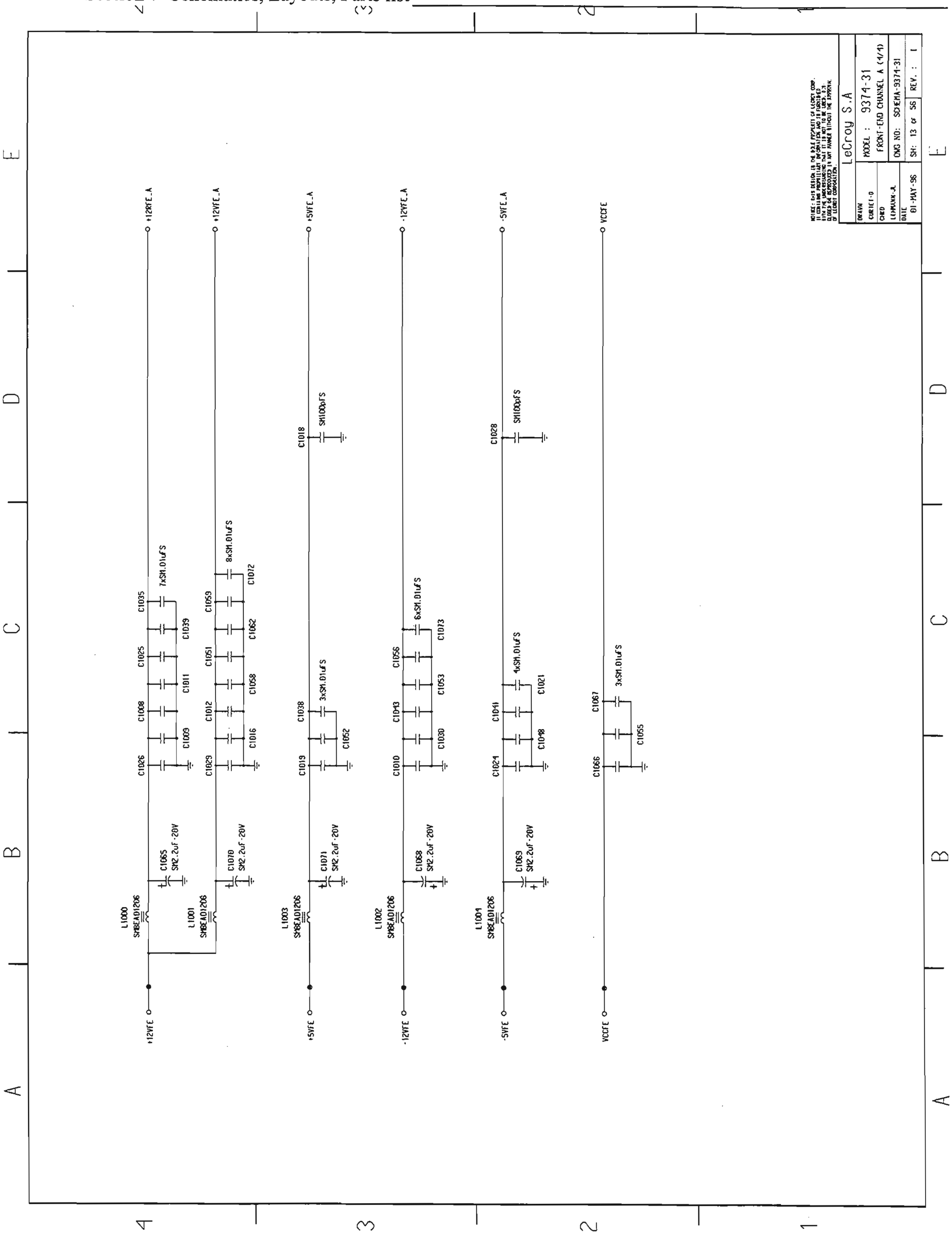

LeCroy S.A
MODEL : 9374-31
FRONT-END (2/3)
DWG NO: SCHEMA-9374-31
SH: 8 OF 56
REV. : I
01-MAY-96
FE TRIG
PROBE CAL.
BC(1:199)
DAC(0:25)
CKPCAL
FROM TB
CALSH
EXTCK
TB_BCK
TO TB
A205
A206
A207
A208
SMD0441


LeCroy S.A
MODEL : 9374-31
FRONT-END (3/3)
DWG NO: SCHEMA-9374-31
SH: 9 OF 56
REV. : 1
01-MAY-96
1 A
700 mA
850 mA
1 A
350 mA
800 mA
+15V
+6V
-15V
-6V
VCC
VEE
+12VFEP
+12VFE
+5VFE
-12VFEP
-12VFE
-5VFE
VREF

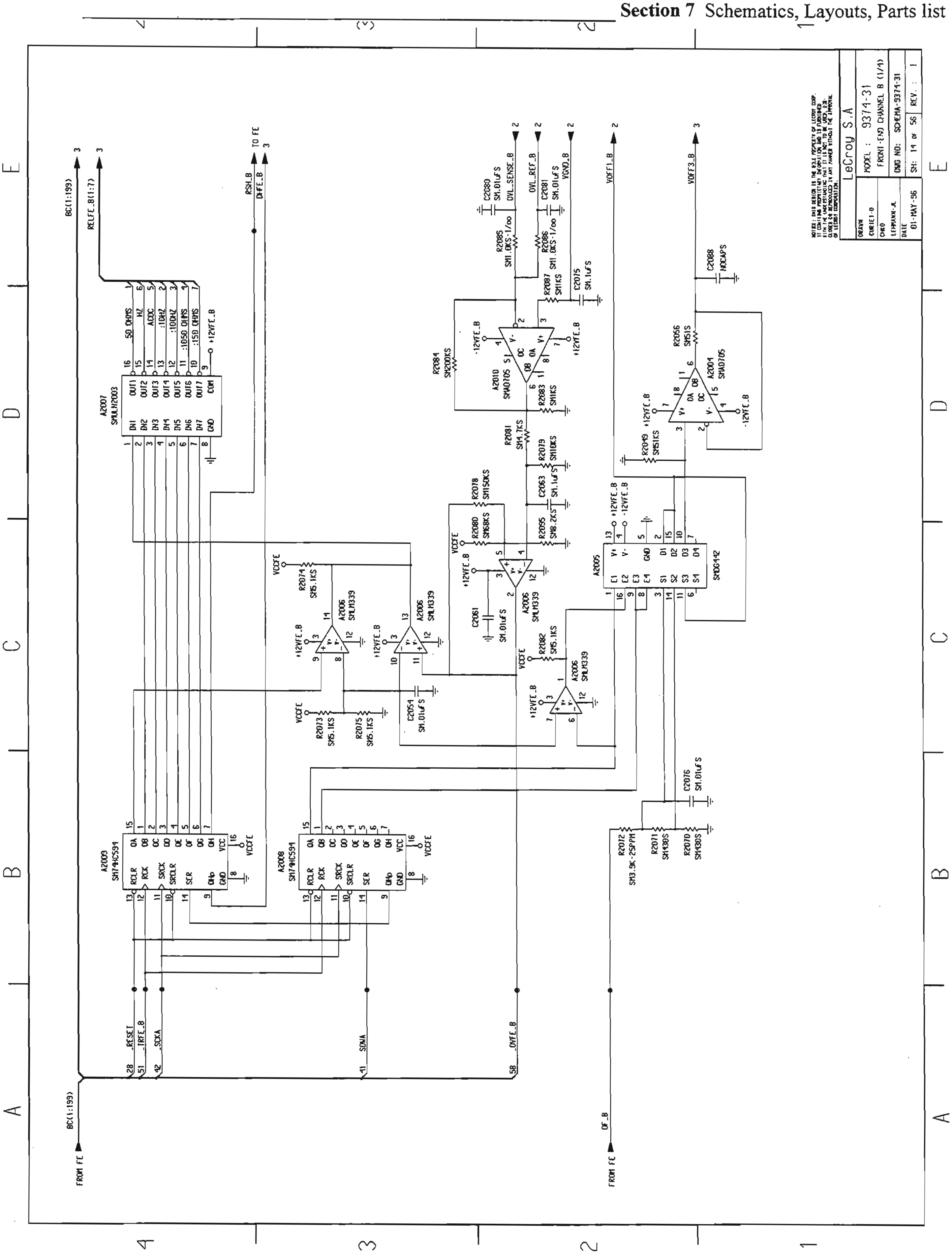

LeCroy S.A
MODEL : 9374-31
FRONT-END CHANNEL A (1/4)
DWG NO: SCHEMA-9374-31
SH: 10 OF 56
REV. : 1
01-MAY-96
A1007
SMULN2003
A1009
SM74HC594
A1008
SM74HC594
A1005
SMDG442
A1006
SMLM339
A1010
SMAD705
A1004
SMAD705
BC(1:199)
RELFE_A(1:7)
RSH_A
DAFE_A
OVL_SENSE_A
OVL_REF_A
VGND_A
VOFF1_A
VOFF3_A
OF_A
FROM FE
TO FE
_RESET
_IRFE_A
_SCKA
SDNA
_OVFE_A
VCCFE
+12VFE_A
-12VFE_A

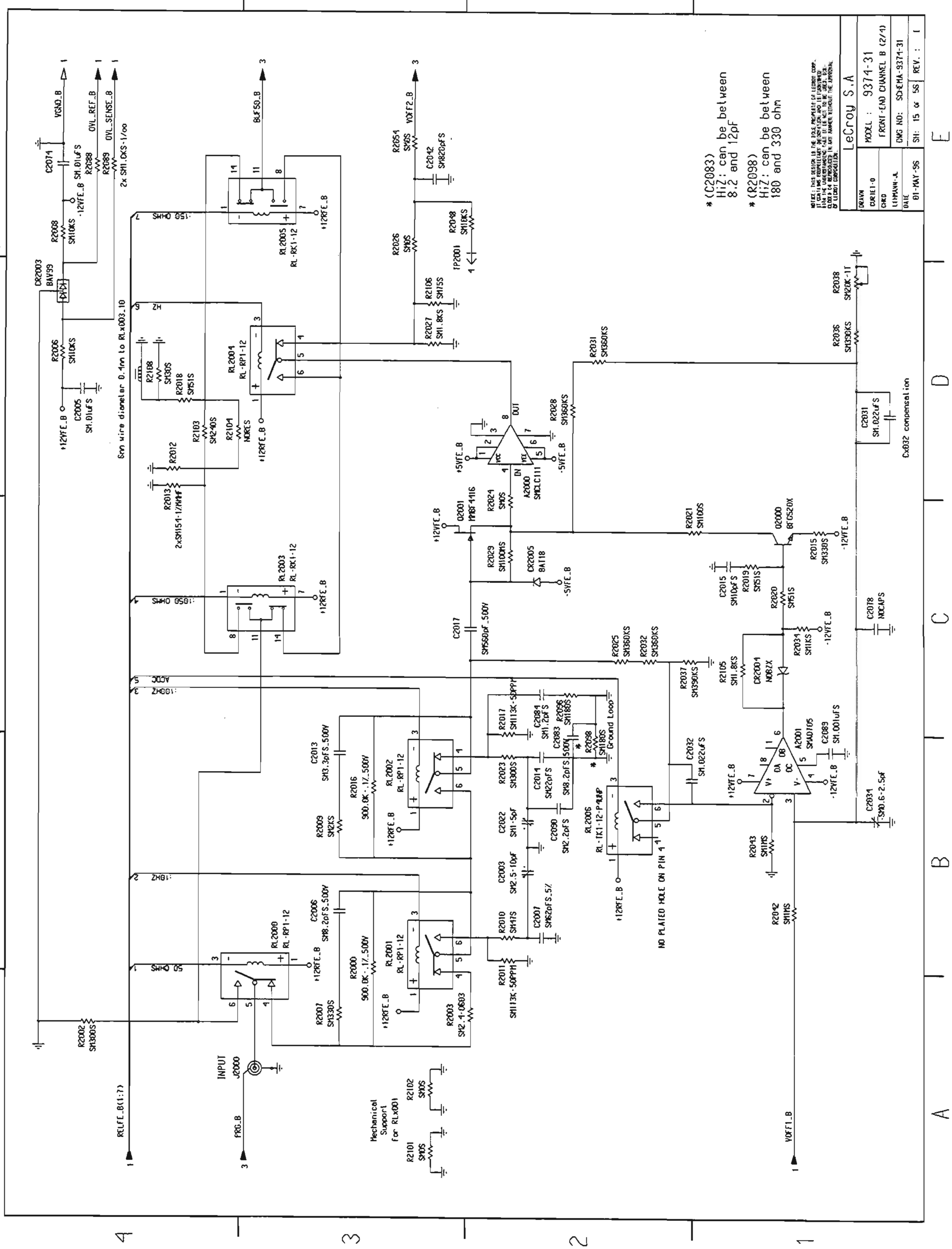

* (C1083)
HiZ: can be between
8.2 and 12pF
* (R1098)
HiZ: can be between
180 and 330 ohm
LeCroy S.A
MODEL : 9374-31
FRONT-END CHANNEL A (2/4)
DWG NO: SCHEMA-9374-31
SH: 11 OF 56
REV. : I
01-MAY-96
INPUT
J1000
Mechanical
Support
for RLX001


LeCroy S.A
MODEL : 9374-31
FRONT-END CHANNEL A (3/4)
DWG NO: SCHEMA-9374-31
01-MAY-96

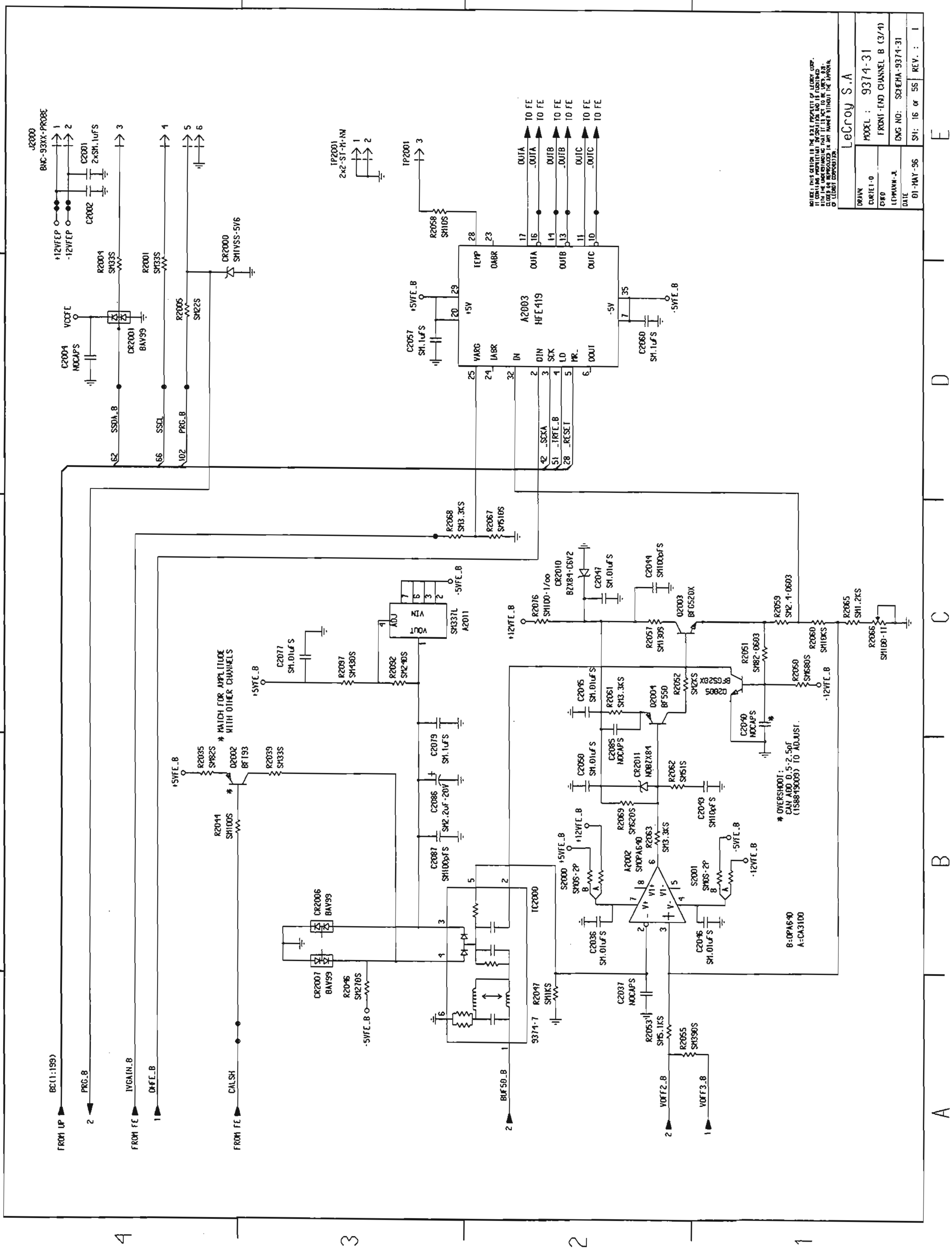


+12VFE_A
+12VFE_A
+5VFE_A
-12VFE_A
-5VFE_A
VCCFE
+12VFE
+5VFE
-12VFE
-5VFE
VCCFE
L1000 SMBEAD1206
L1001 SMBEAD1206
L1003 SMBEAD1206
L1002 SMBEAD1206
L1004 SMBEAD1206
7xSM.01uFS
8xSM.01uFS
3xSM.01uFS
6xSM.01uFS
4xSM.01uFS
3xSM.01uFS
SM100pFS
SM100pFS
SM2.2uF-20V
LeCroy S.A
MODEL : 9374-31
FRONT-END CHANNEL A (4/4)

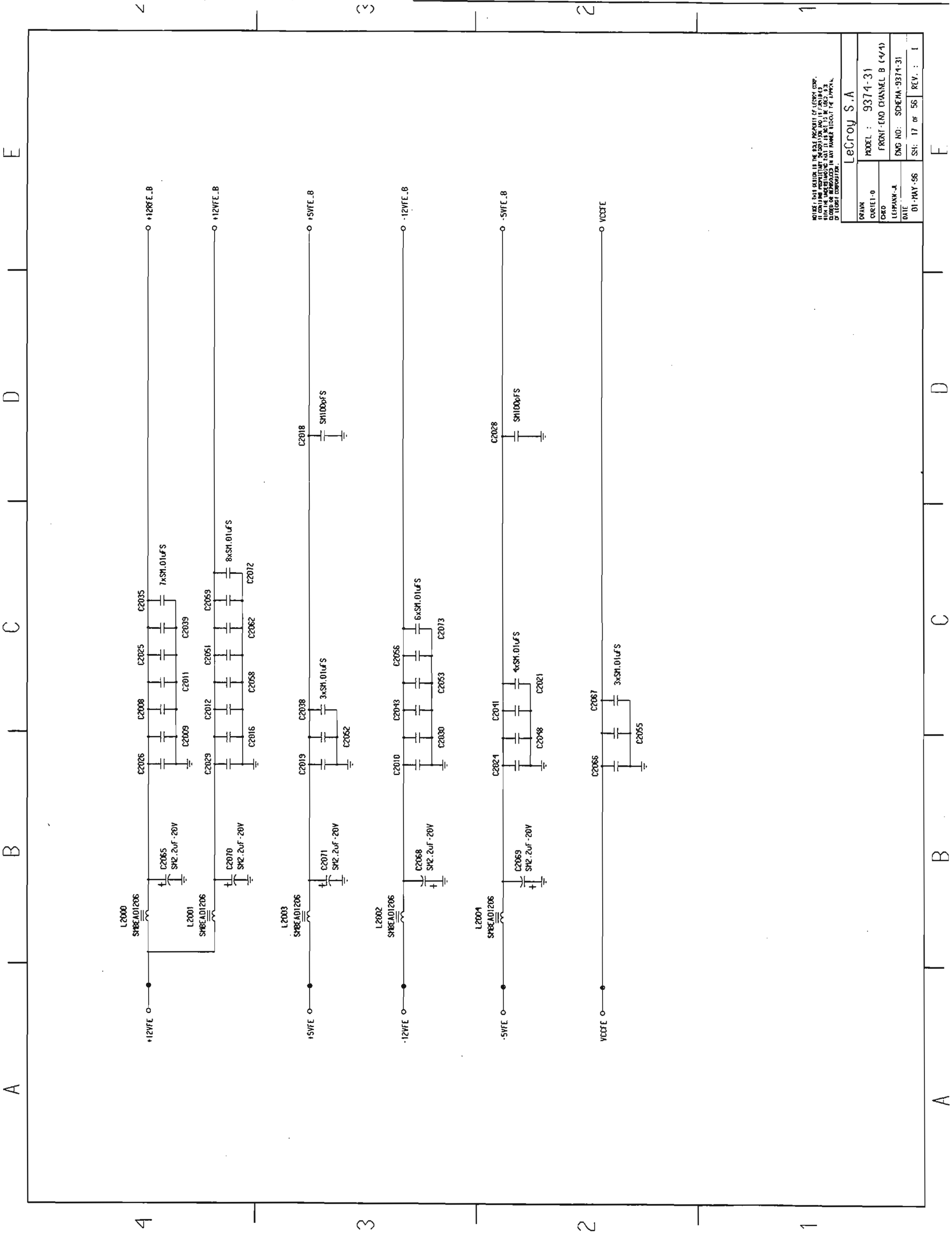

LeCroy S.A
MODEL : 9374-31
FRONT-END CHANNEL B (1/1)
DWG NO: SCHEMA-9374-31
SH: 14 OF 56
REV. : 1
01-MAY-96

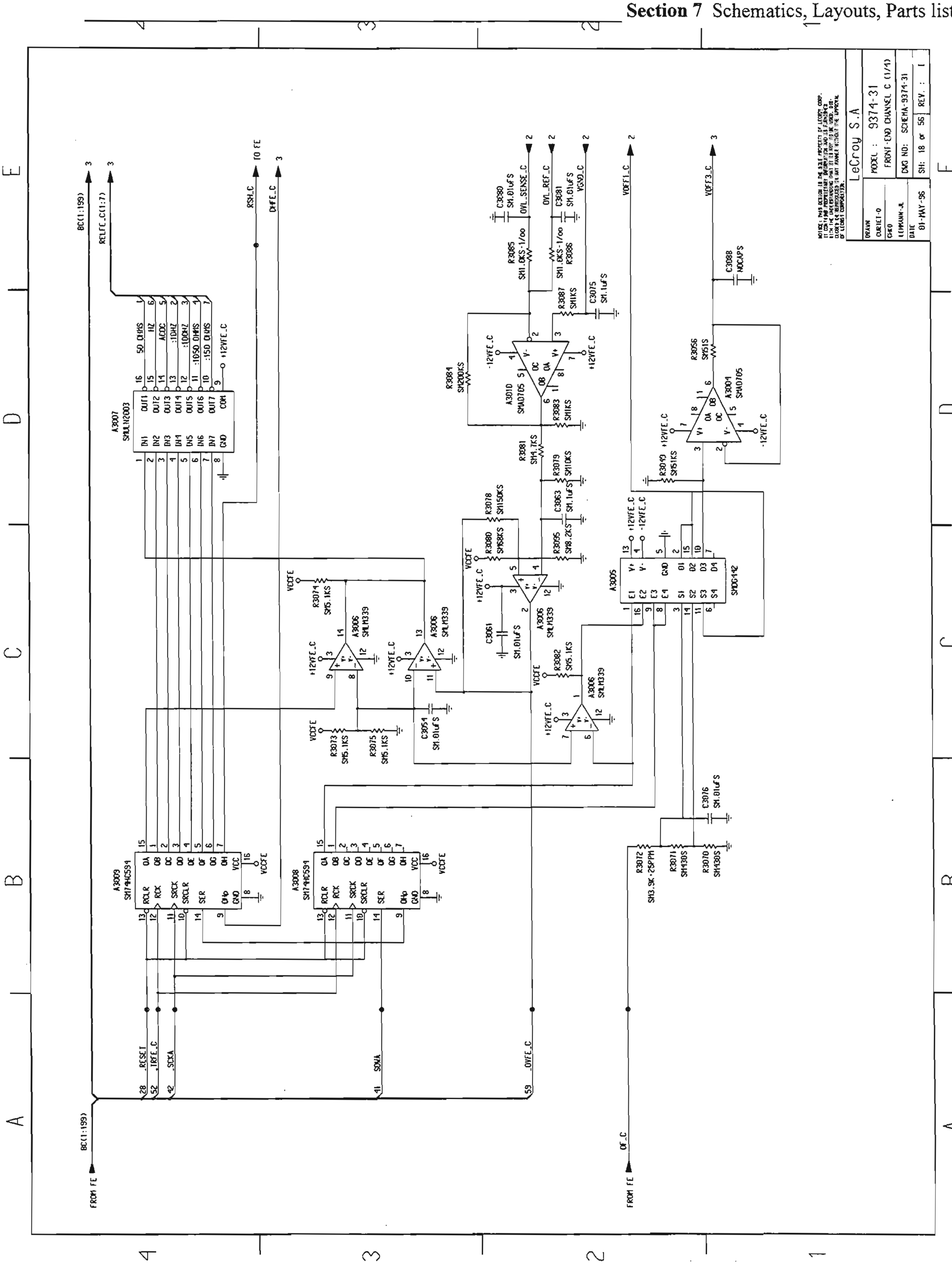


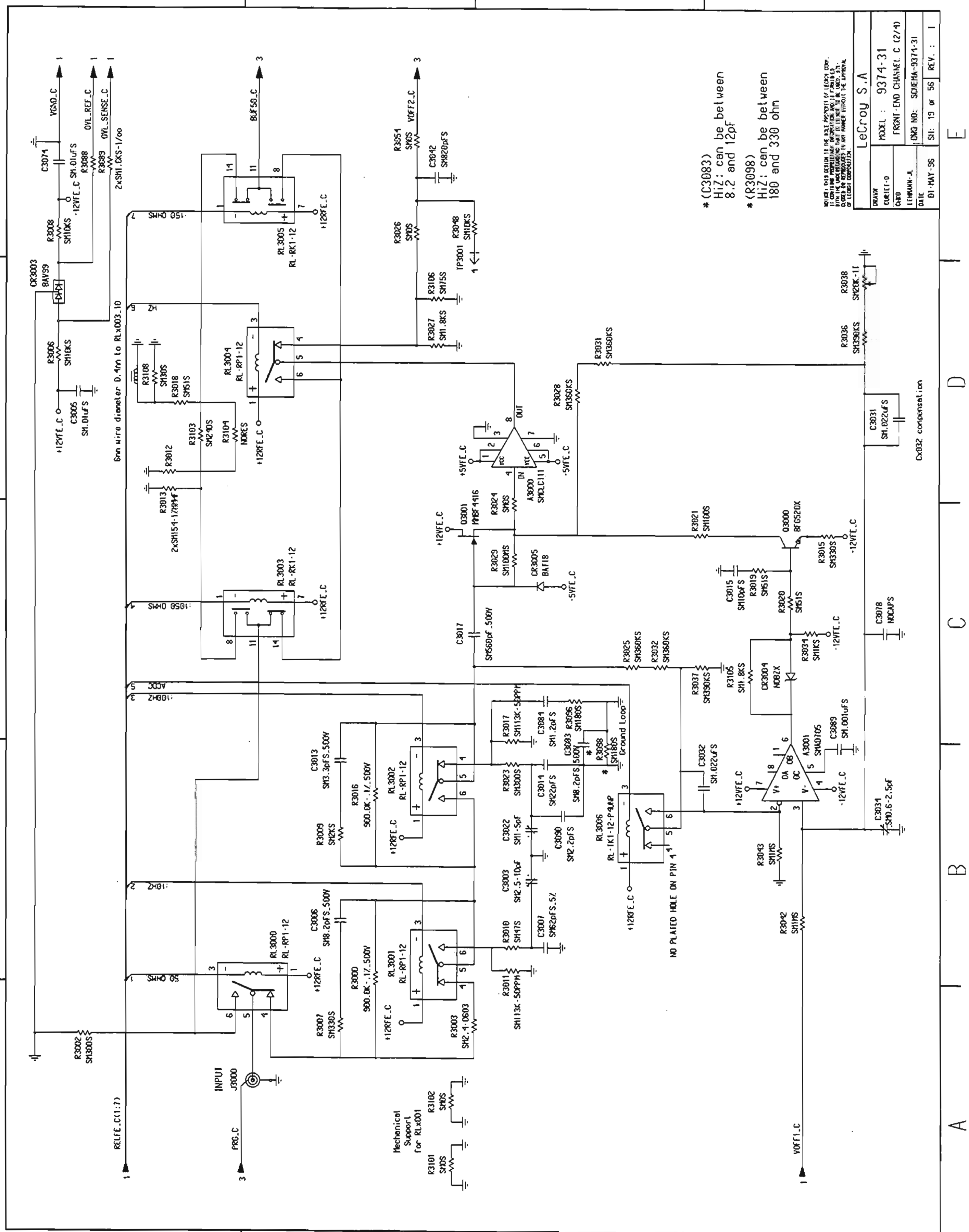
*(C2083)
HiZ: can be between
8.2 and 12pF
*(R2098)
HiZ: can be between
180 and 330 ohm
LeCroy S.A
MODEL : 9374-31
FRONT-END CHANNEL B (2/4)
DWG NO: SCHEMA-9374-31
SH: 15 of 55
REV. : 1
01-MAY-95
INPUT
J2000
NO PLATED HOLE ON PIN 4



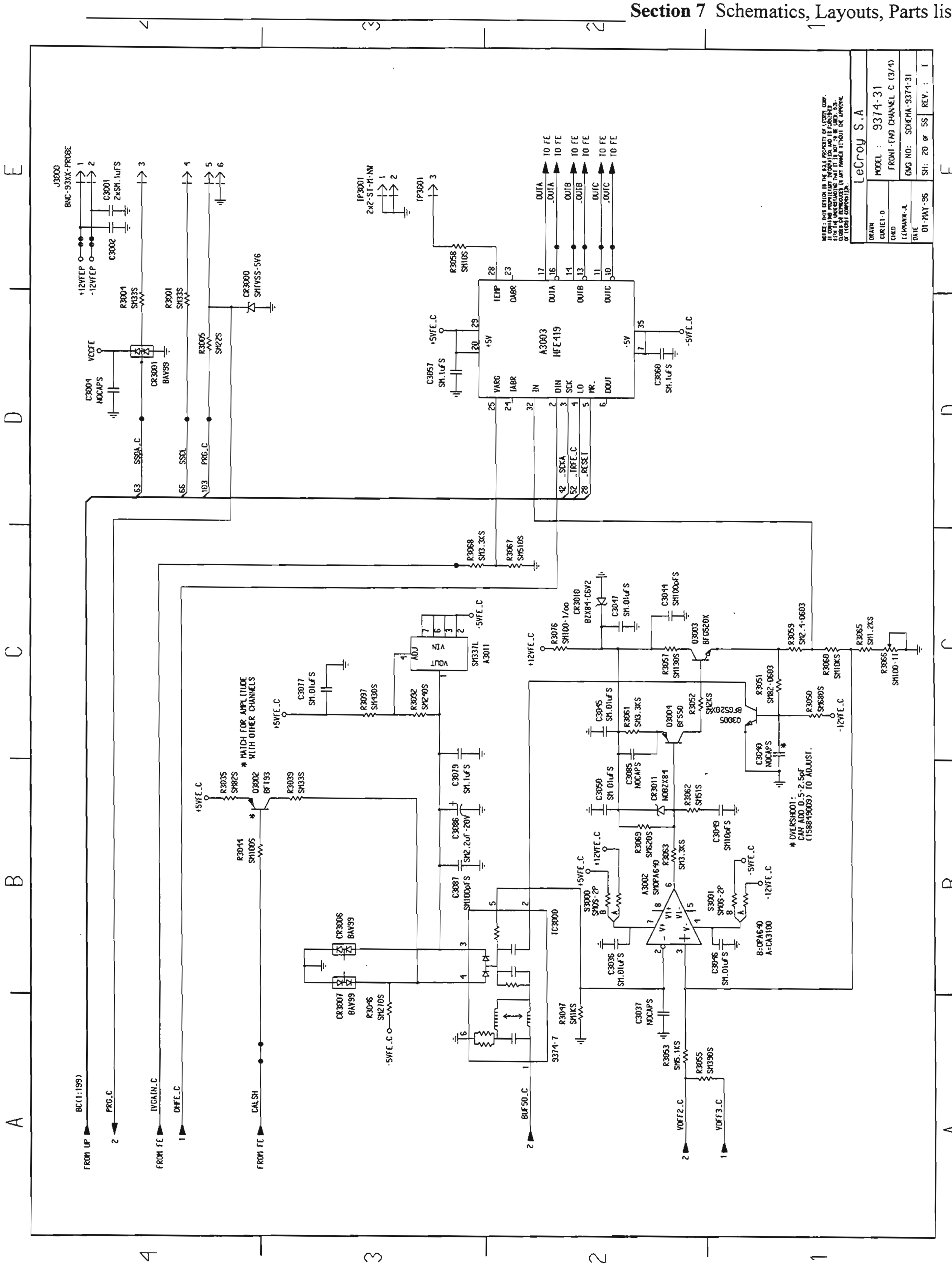
LeCroy S.A
MODEL : 9374-31
FRONT-END CHANNEL B (3/4)
DWG NO: SCHEMA-9374-31
SH: 16 of 56
REV. : 1
DATE 01-MAY-96
A2003
HFE419
A2011
SM337L
A2002
* MATCH FOR AMPLITUDE WITH OTHER CHANNELS
* OVERSHOOT: CAN ADD 0.5-2.5pF (1588490O9) TO ADJUST.
B:OPA640
A:CA3100
FROM UP
FROM FE

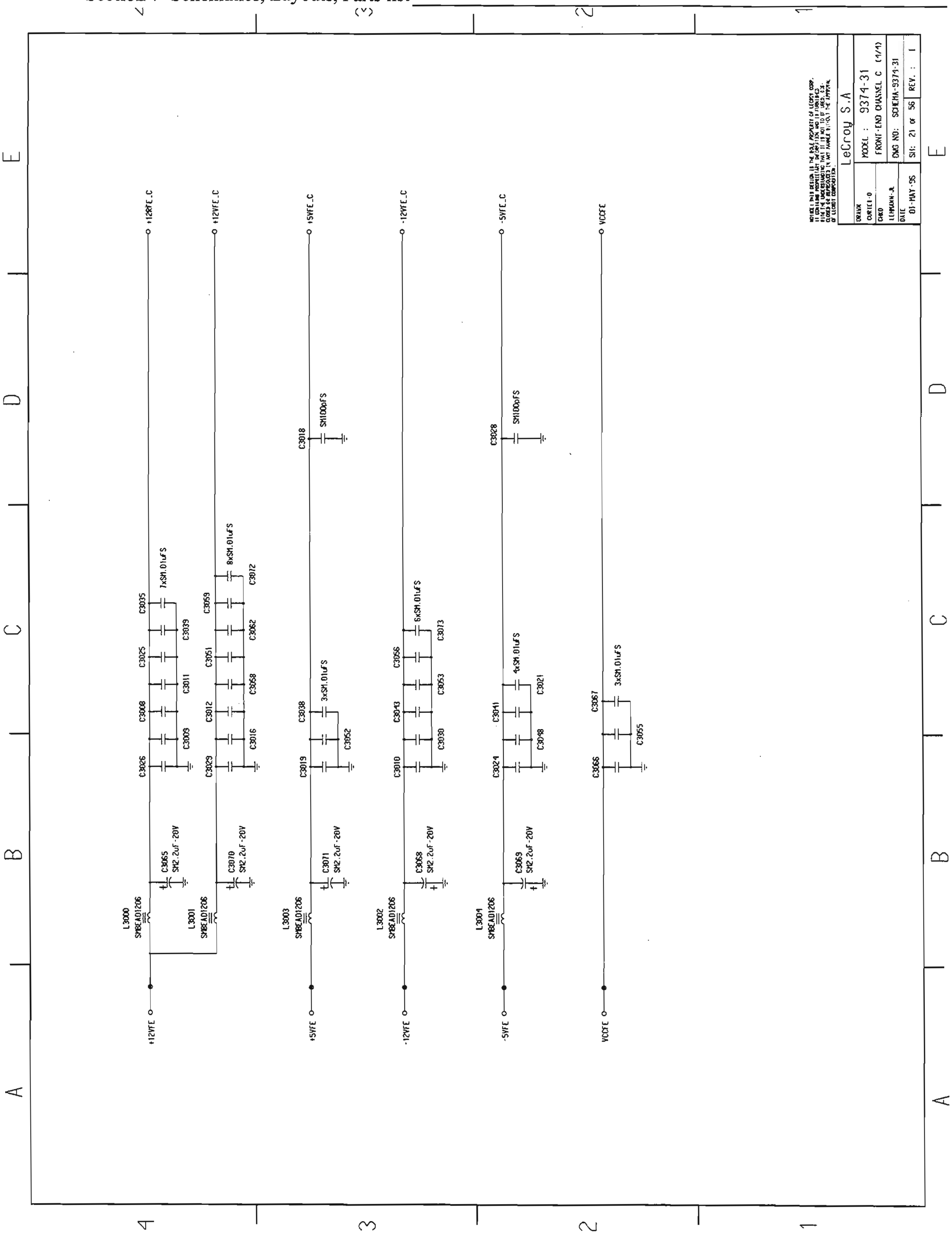

LeCroy S.A
MODEL : 9374-31
FRONT-END CHANNEL B (4/4)
DWG NO: SCHEMA-9374-31
SH: 17 of 56
REV. : 1
01-MAY-96
+12RFE_B
+12VFE_B
+5VFE_B
-12VFE_B
-5VFE_B
VCCFE
+12VFE
+5VFE
-12VFE
-5VFE
L2000
L2001
L2002
L2003
L2004
SMBEAD1206
SM2.2uF-20V
SM100pFS
7xSM.01uFS
8xSM.01uFS
6xSM.01uFS
4xSM.01uFS
3xSM.01uFS

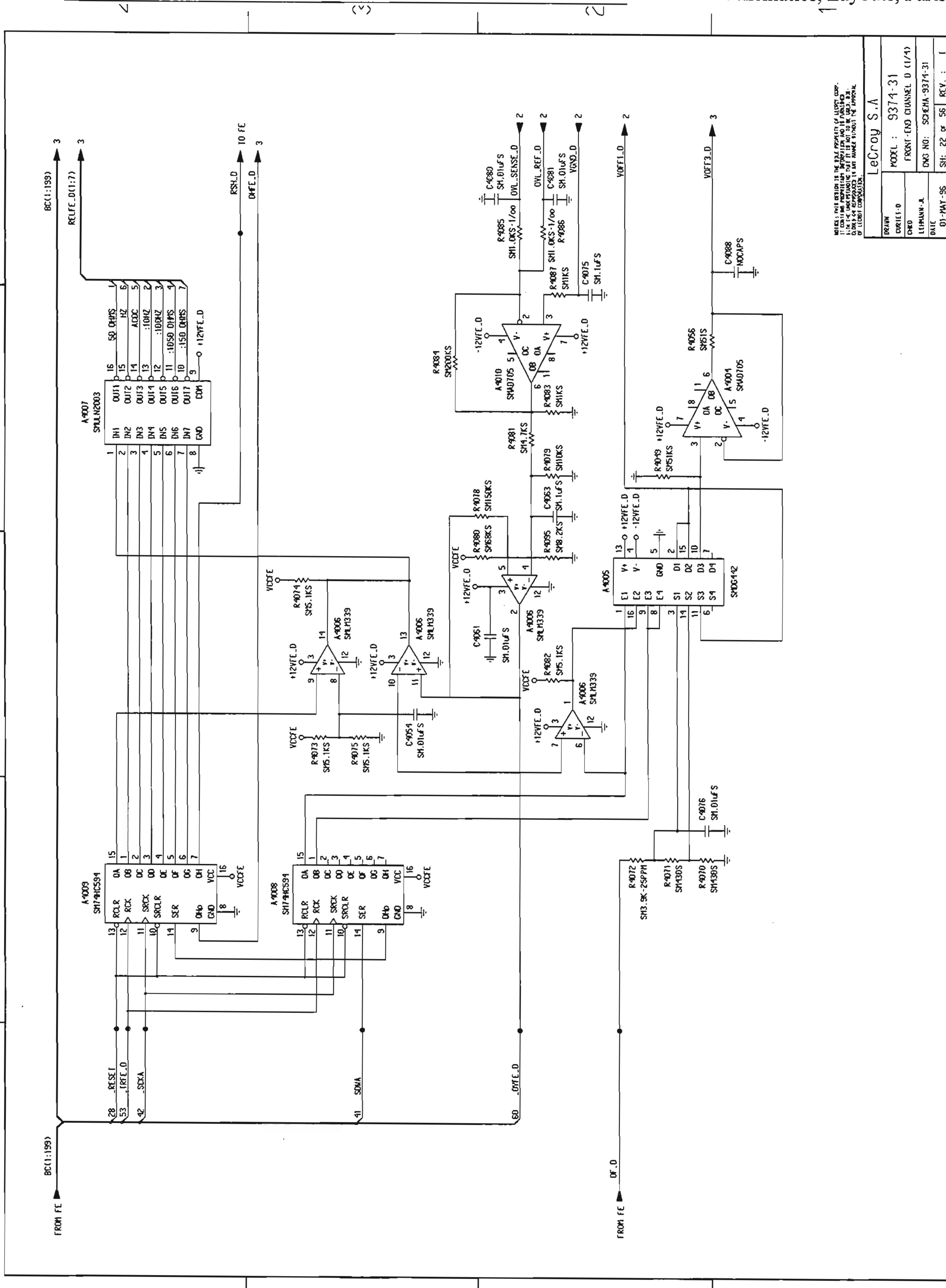

LeCroy S.A
MODEL : 9374-31
FRONT-END CHANNEL C (1/4)
DWG NO: SCHEMA-9374-31
SH: 18 OF 56
REV. : 1
DATE 01-MAY-96
FROM FE
BC(1:199)
RELFE_C(1:7)
RSH_C
DVFE_C
TO FE
OVL_SENSE_C
OVL_REF_C
VGND_C
VOFF1_C
VOFF3_C
OF_C
_RESET
_IRFE_C
_SCKA
SDNA
_OVFE_C

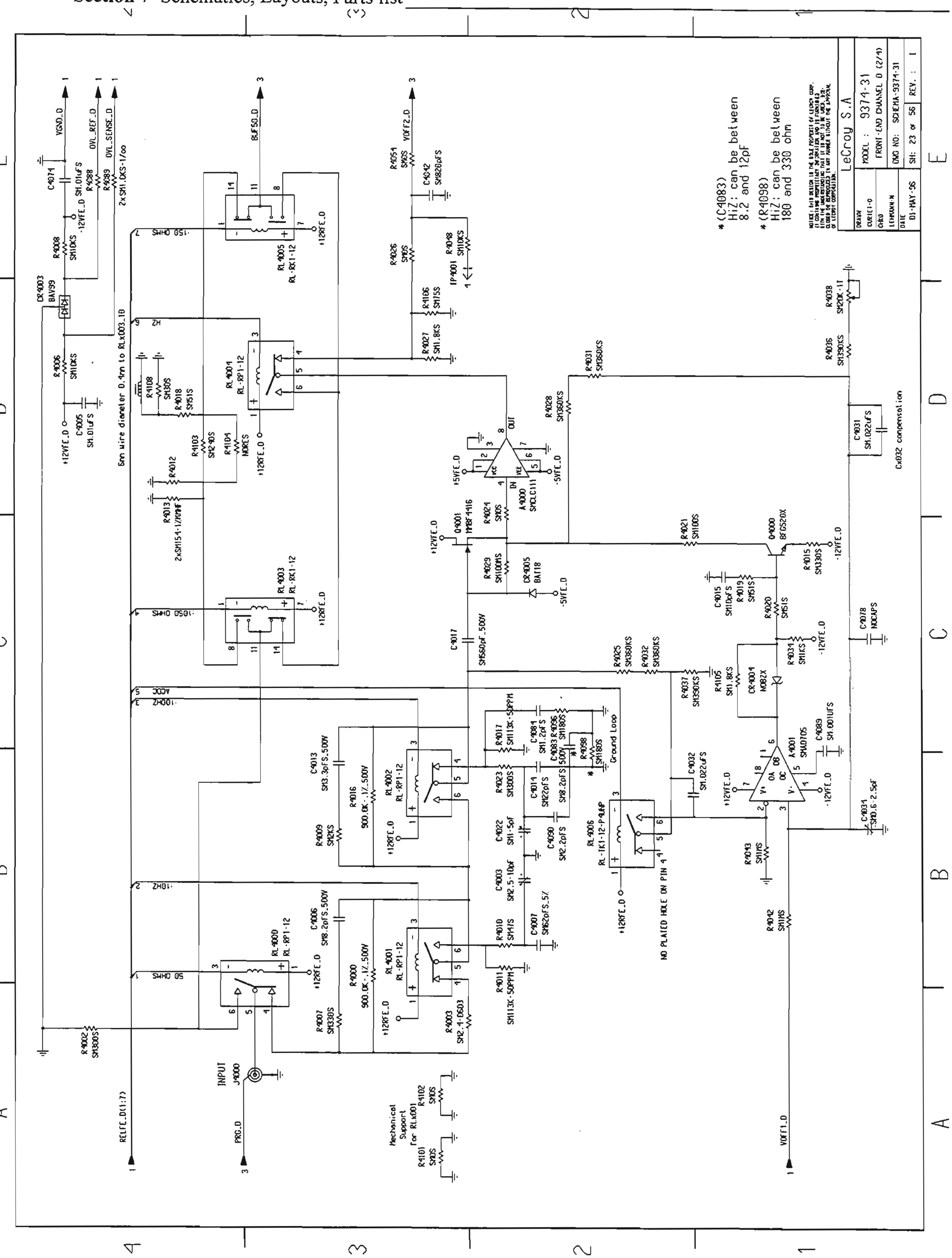


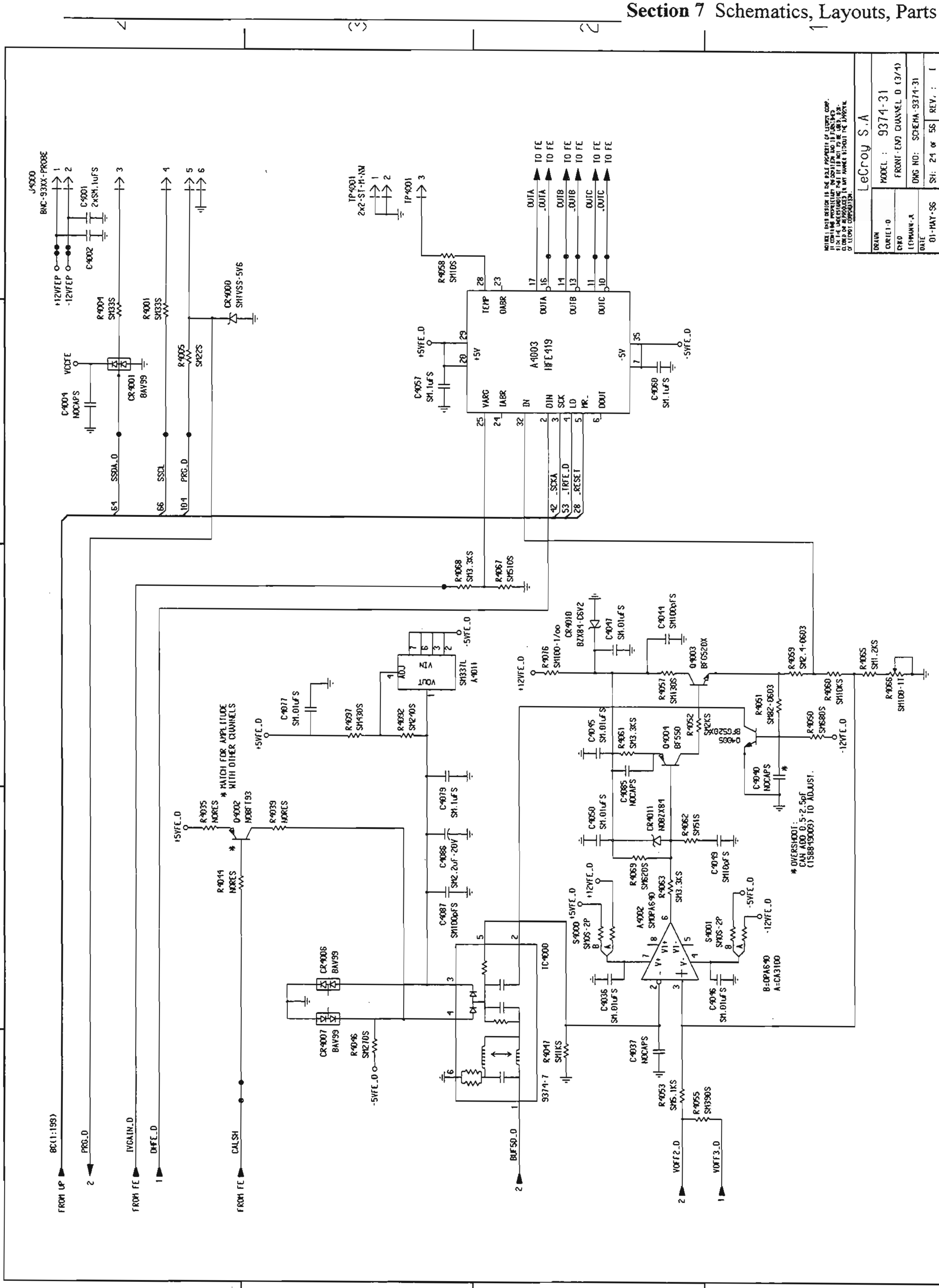
LeCroy S.A
MODEL : 9374-31
FRONT-END CHANNEL C (2/4)
SCHEMA-9374-31
SH: 19 of 56
REV. : 1
01-MAY-96
*(C3083) HiZ: can be between 8.2 and 12pF
*(R3098) HiZ: can be between 180 and 330 ohm
INPUT J3000
NO PLATED HOLE ON PIN 4
Mechanical Support for RLx001
Cx032 compensation

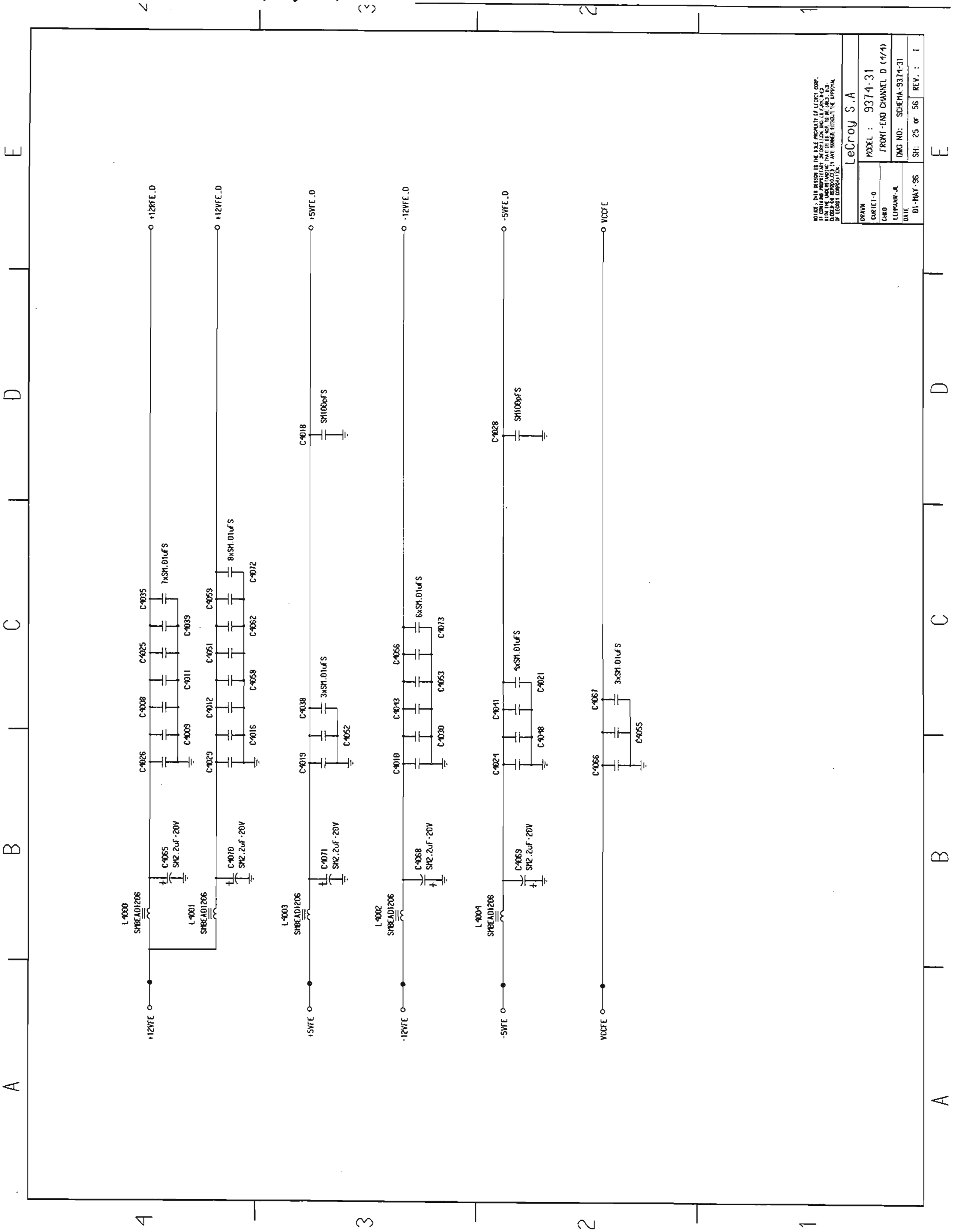

LeCroy S.A
9374-31
FRONT-END CHANNEL C (3/4)
SCHEMA-9374-31

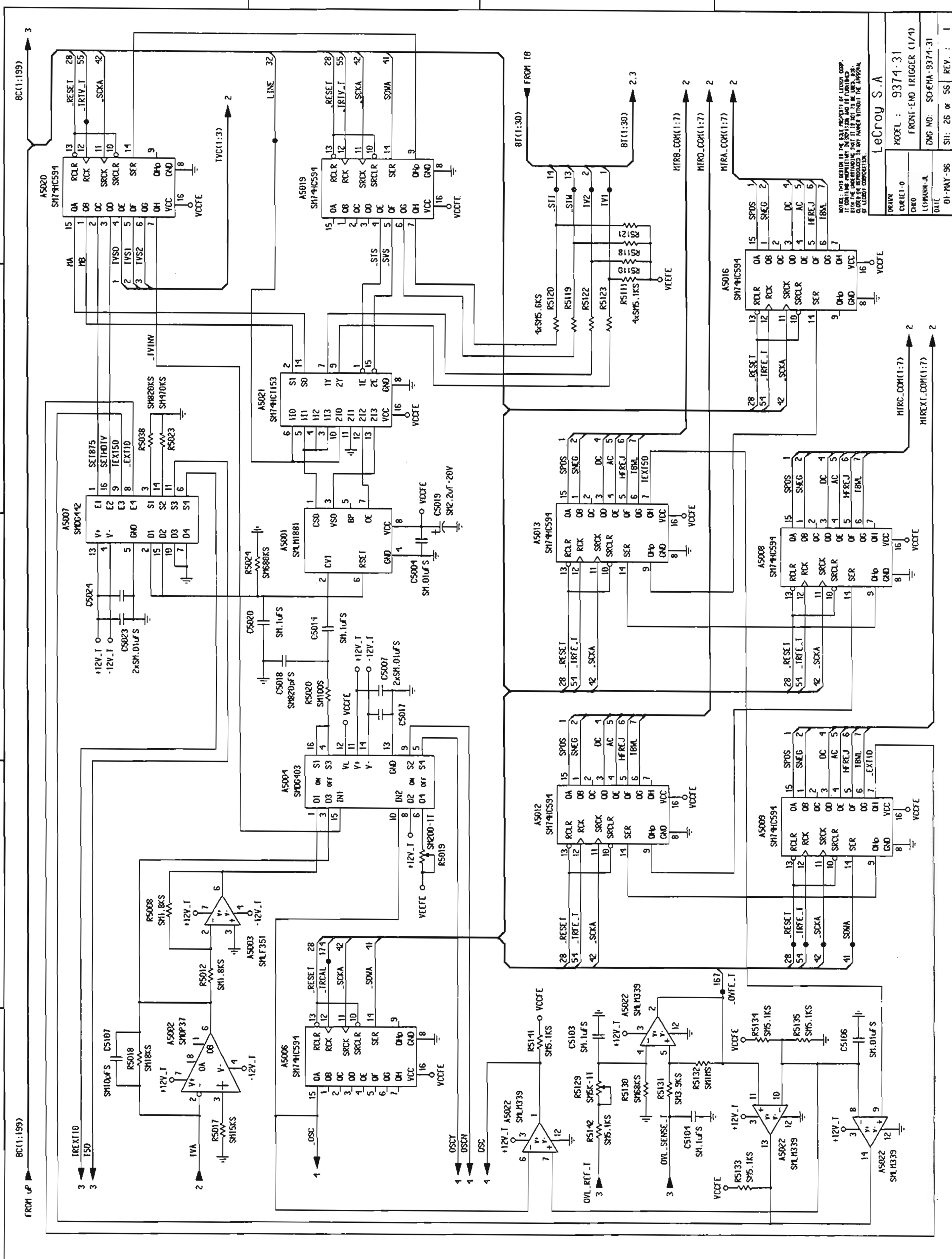

LeCroy S.A
MODEL : 9374-31
FRONT-END CHANNEL C (1/4)
DWG NO: SCHEMA-9374-31
SH: 21 of 56
REV. : 1
01-MAY-95
+12RFE_C
+12VFE_C
+5VFE_C
-12VFE_C
-5VFE_C
VCCFE
+12VFE
+5VFE
-12VFE
-5VFE
L3000
L3001
L3003
L3002
L3004
SMBEAD1206
SM2.2uF-20V
7xSM.01uFS
8xSM.01uFS
3xSM.01uFS
6xSM.01uFS
4xSM.01uFS
SM100pFS

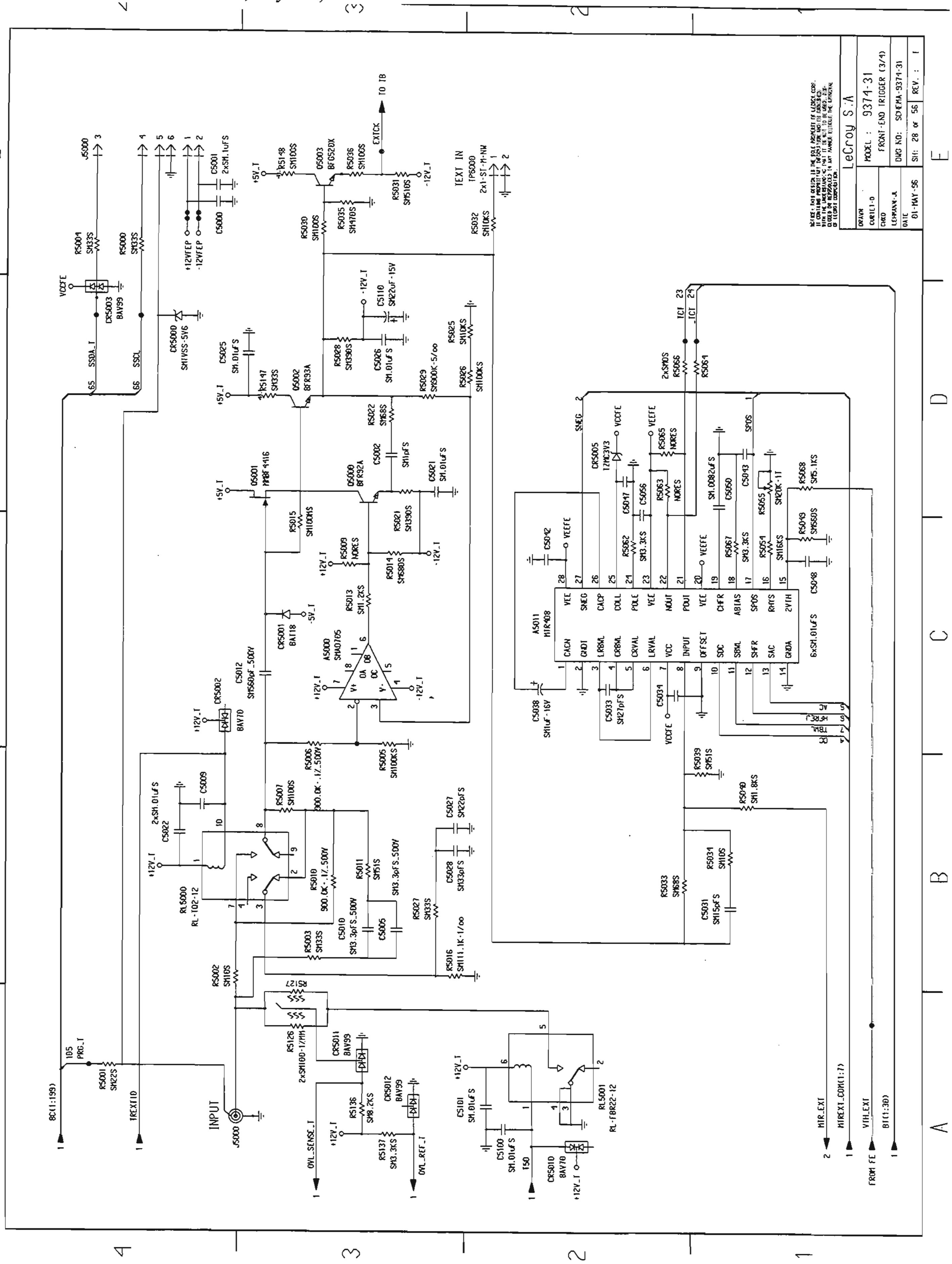

LeCroy S.A
MODEL : 9374-31
FRONT-END CHANNEL D (1/4)
DWG NO: SCHEMA-9374-31
SH: 22 OF 56
01-MAY-96
A4007 SMULN2003
A4009 SM74HC594
A4008 SM74HC594
A4005 SMDG442
A4010 SMAD705
A4001 SMAD705
A4006 SMLM339
FROM FE
BC(1:199)
RCLFE_D(1:7)
RSH_D
TO FE
OVL_SENSE_D
OVL_REF_D
VGND_D
VOFF1_D
VOFF3_D
OF_D

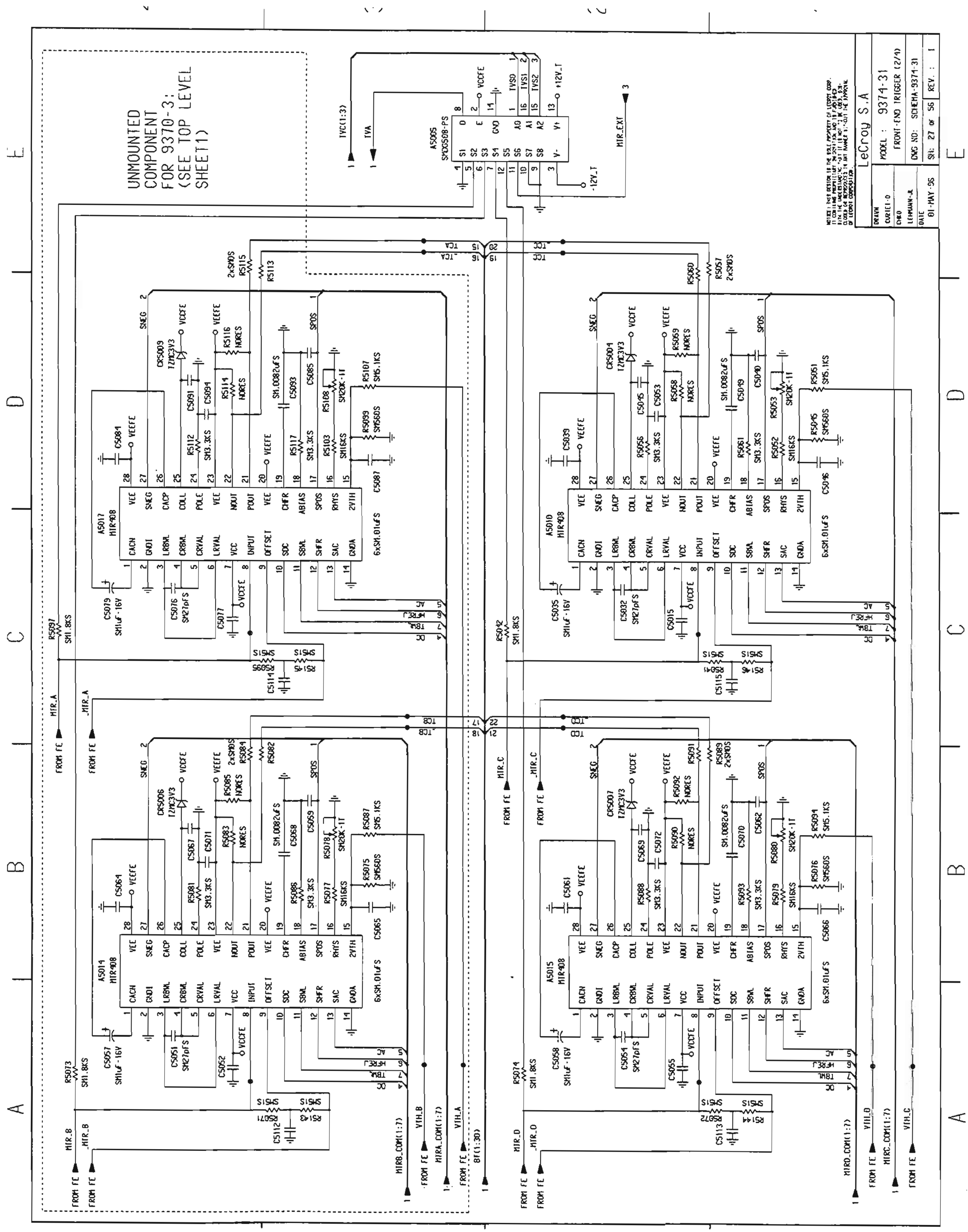

*(C4083)
HiZ: can be between
8.2 and 12pF
*(R4098)
HiZ: can be between
180 and 330 ohm
LeCroy S.A
MODEL : 9374-31
FRONT-END CHANNEL D (2/4)
SCHEMA-9374-31
INPUT
Ground Loop
NO PLATED HOLE ON PIN 4
Cx032 compensation

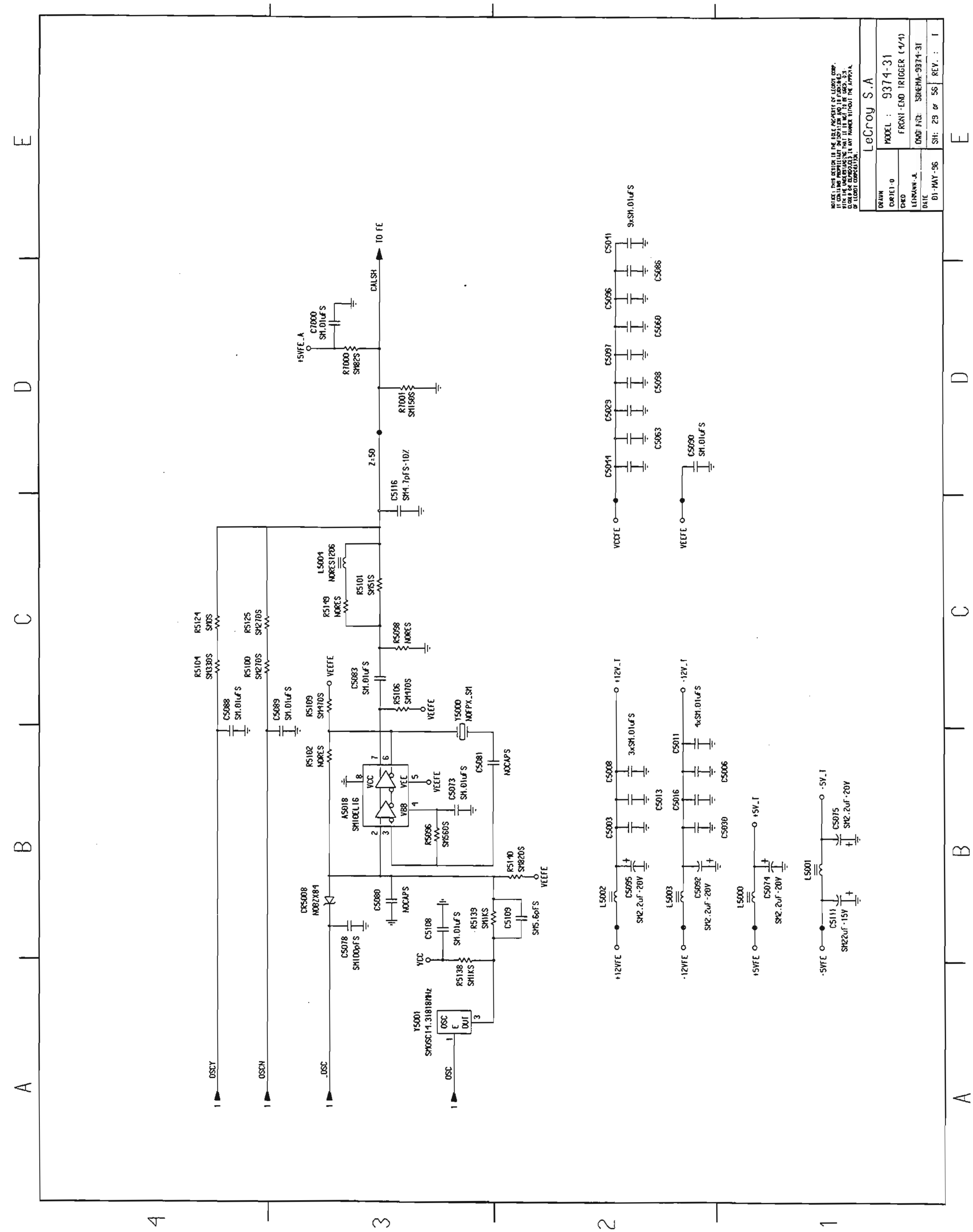

LeCroy S.A
MODEL : 9374-31
FRONT-END CHANNEL D (3/4)
DWG NO: SCHEMA-9374-31
SH: 24 of 56
REV. : I
01-MAY-96

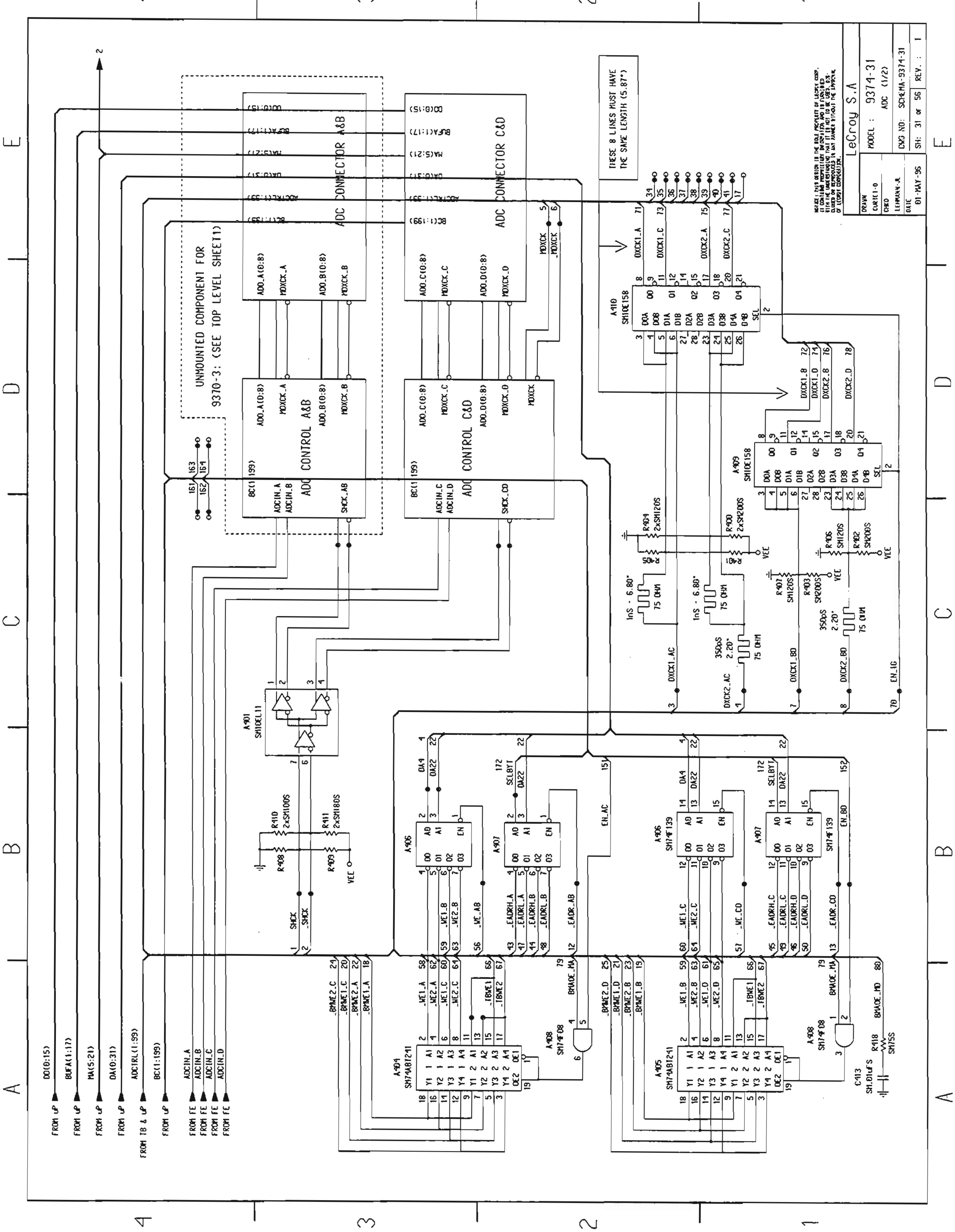

LeCroy S.A
MODEL : 9374-31
FRONT-END CHANNEL D (4/4)
DWG NO: SCHEMA-9374-31
SH: 25 of 56
REV. : 1
DATE 01-MAY-95
+12RFE_D
+12VFE_D
+5VFE_D
-12VFE_D
-5VFE_D
VCCFE
+12VFE
+5VFE
-12VFE
-5VFE
SMBEAD1206
SM2.2uF-20V
7xSM.01uFS
8xSM.01uFS
3xSM.01uFS
6xSM.01uFS
4xSM.01uFS
SM100pFS

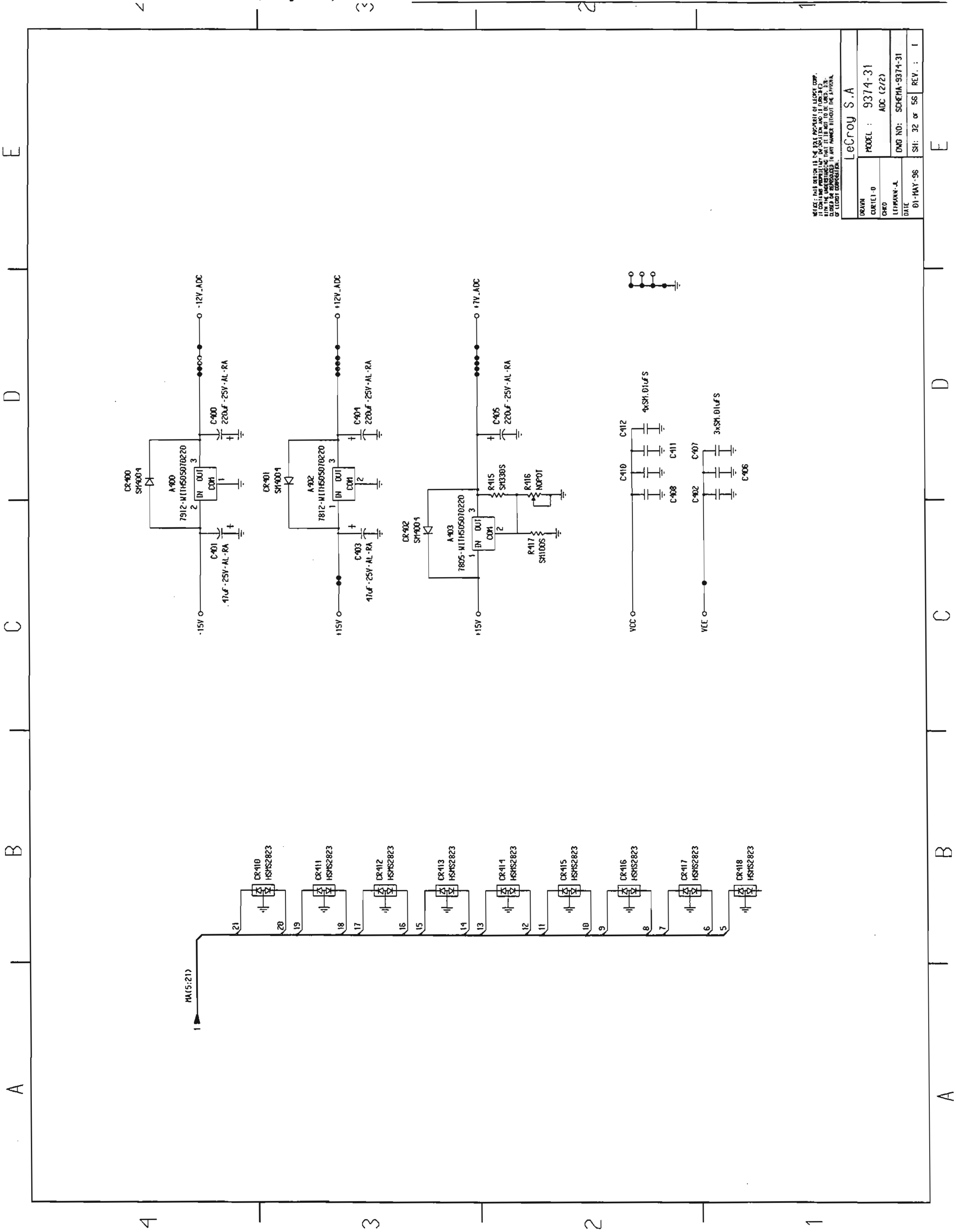

LeCroy S.A
MODEL : 9374-31
FRONT-END TRIGGER (1/4)
DWG NO: SCHEMA-9374-31
SH: 26 of 55
REV. : 1
01-MAY-96

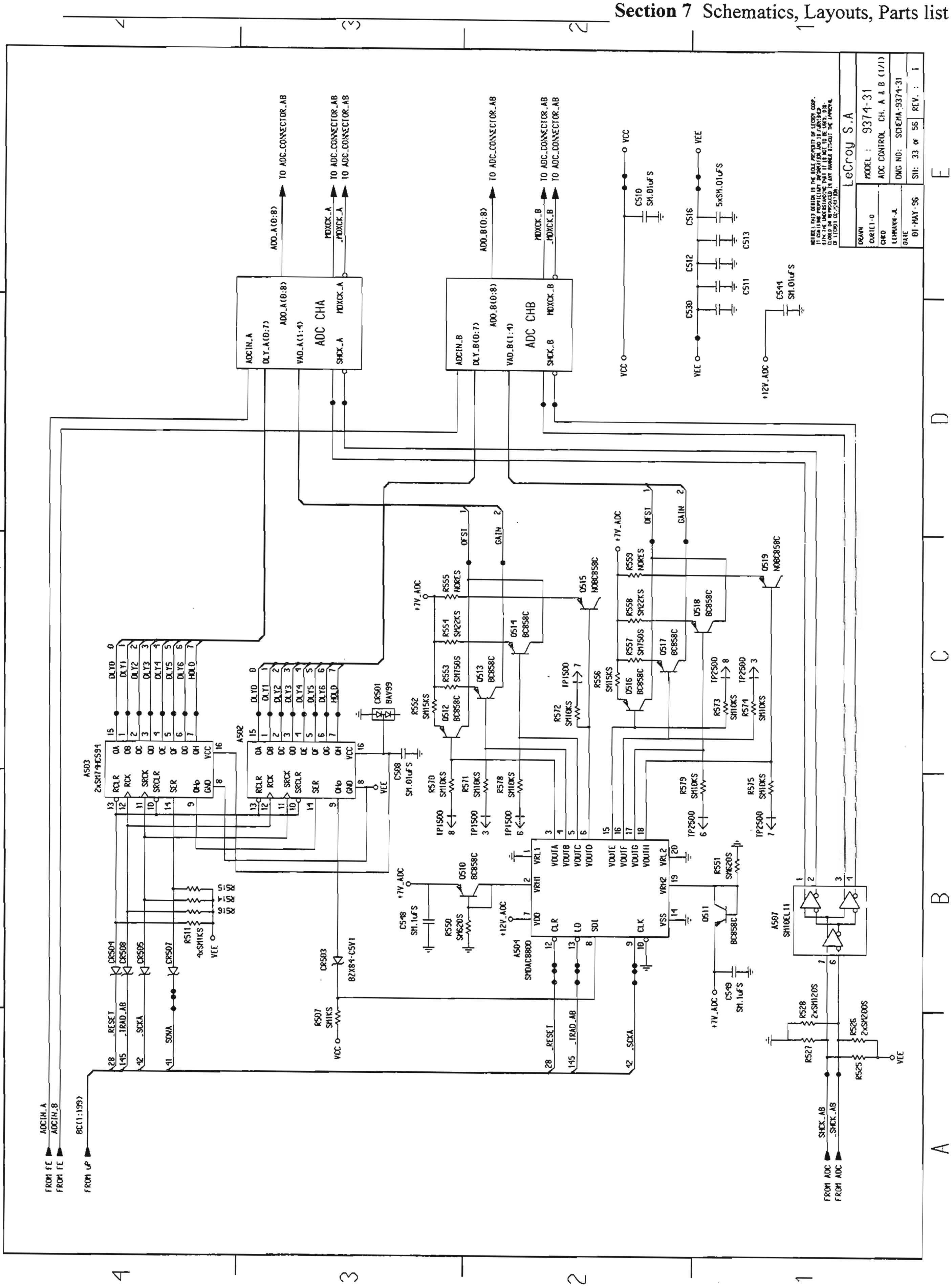

LeCroy S.A
MODEL : 9374-31
FRONT-END TRIGGER (3/4)
DWG NO: SCHEMA-9374-31
SH: 28 of 56
REV. : I

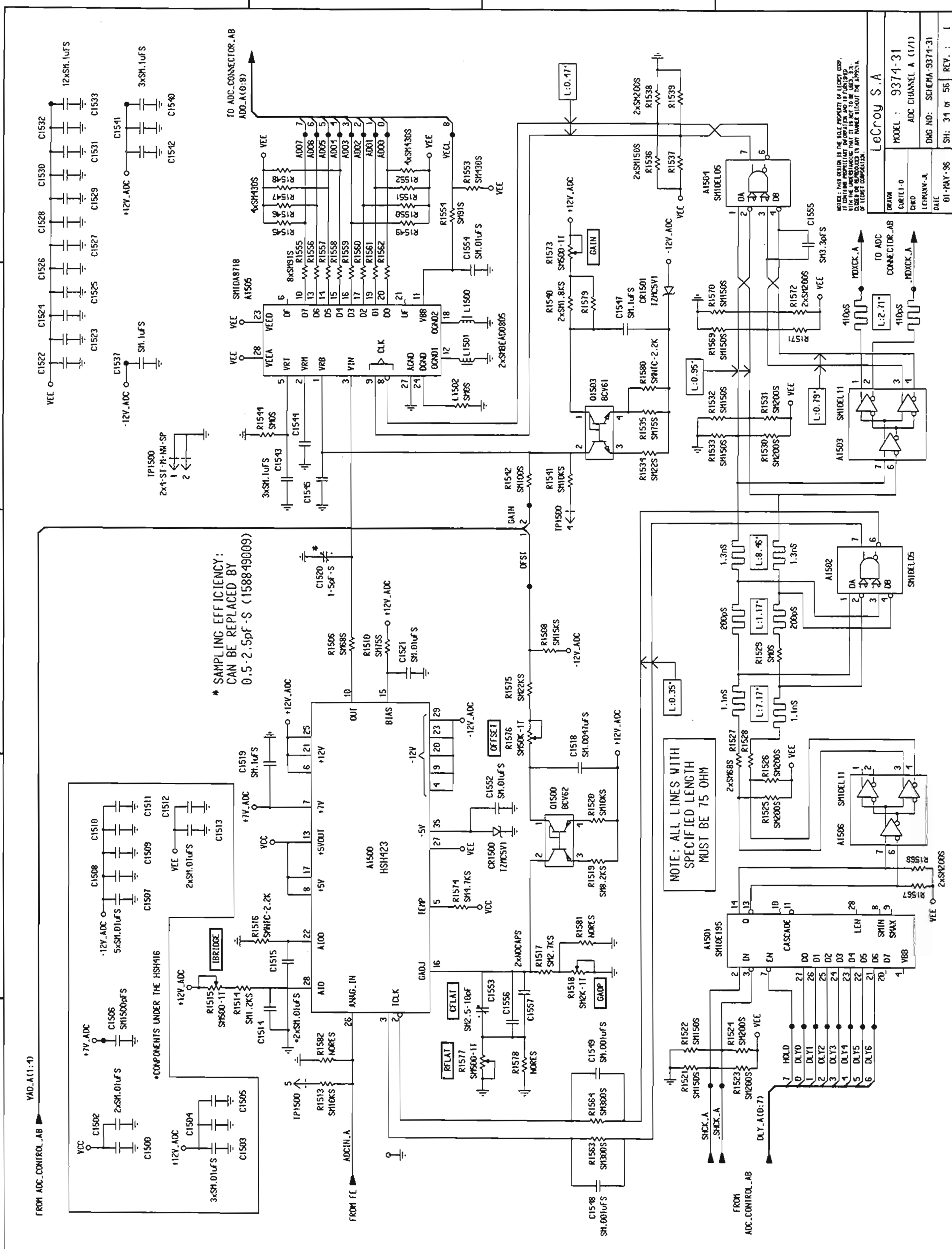

UNMOUNTED COMPONENT FOR 9370-3: (SEE TOP LEVEL SHEET1)
LeCroy S.A
MODEL : 9374-31
FRONT-END TRIGGER (2/4)
DWG NO: SCHEMA-9374-31
SH: 27 of 56
REV. : 1
01-MAY-95

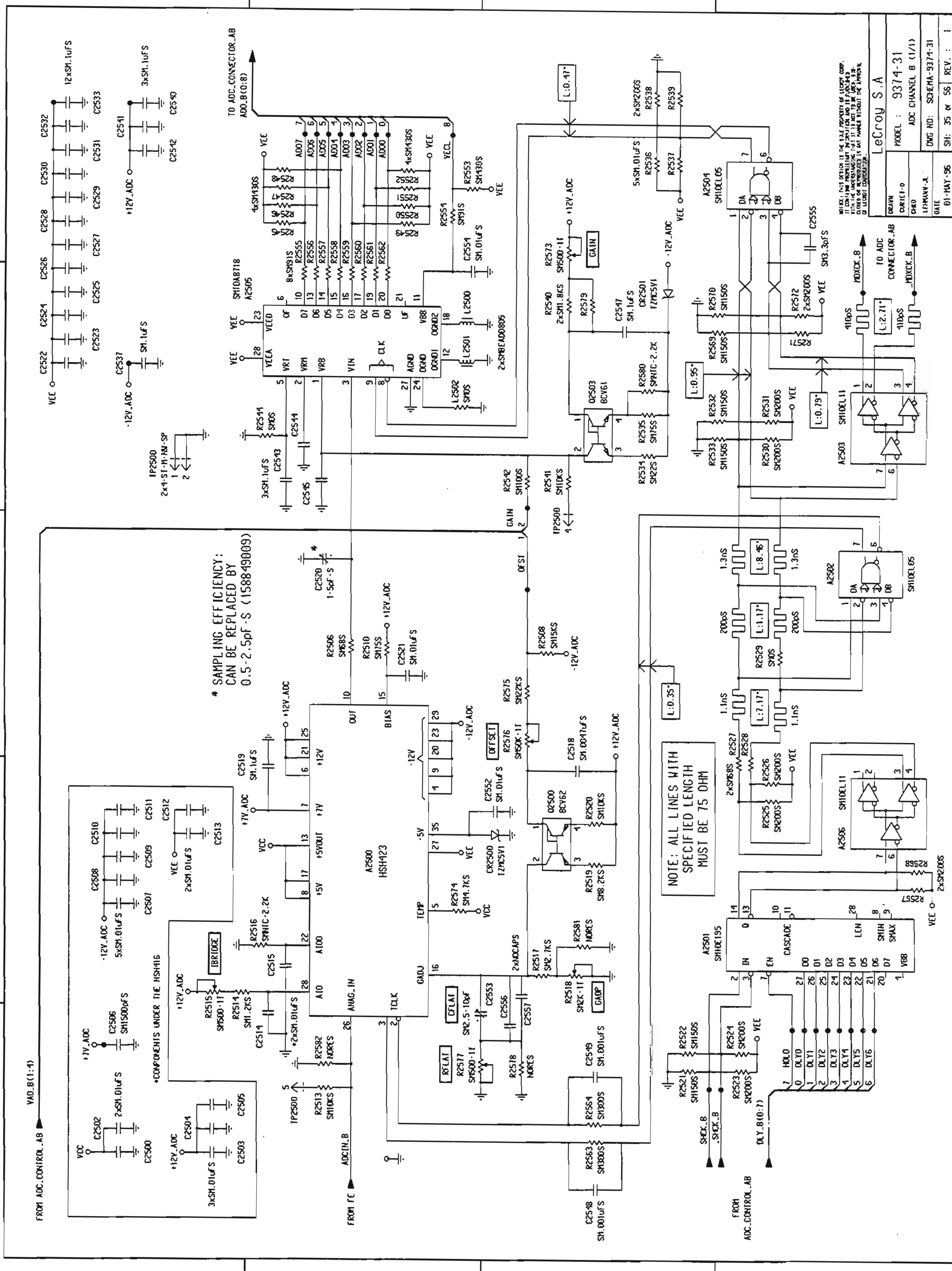

LeCroy S.A
MODEL : 9374-31
FRONT-END TRIGGER (4/1)
SCHEMA-9374-31
SH: 29 of 56
REV. : 1
01-MAY-96

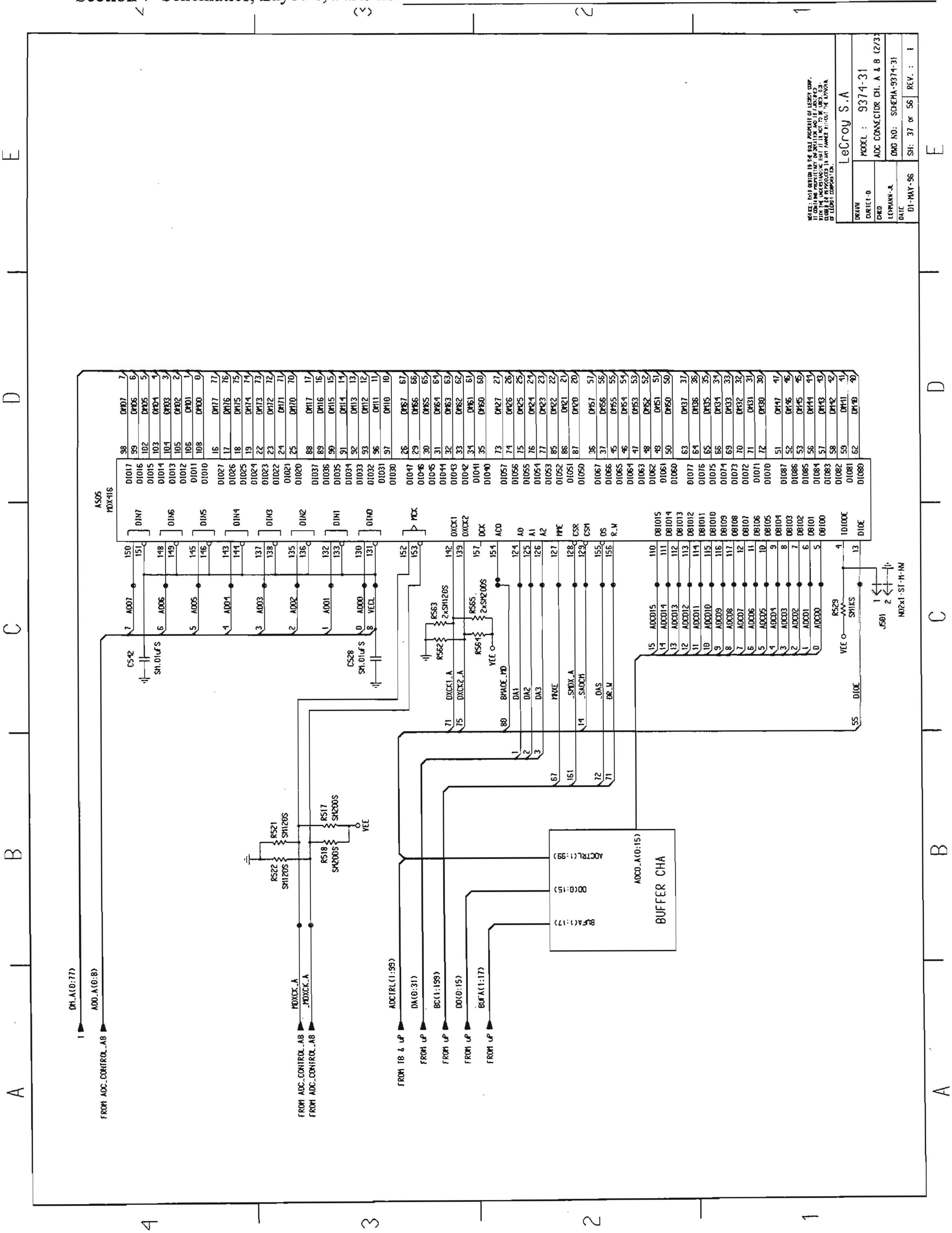

UNMOUNTED COMPONENT FOR
9370-3: (SEE TOP LEVEL SHEET1)
ADC CONNECTOR A&B
ADC CONNECTOR C&D
ADC CONTROL A&B
ADC CONTROL C&D
THESE 8 LINES MUST HAVE
THE SAME LENGTH (5.87")
LeCroy S.A
MODEL : 9374-31
ADC (1/2)
DWG NO: SCHEMA-9374-31
SH: 31 of 56
REV. : 1
DATE 01-MAY-96

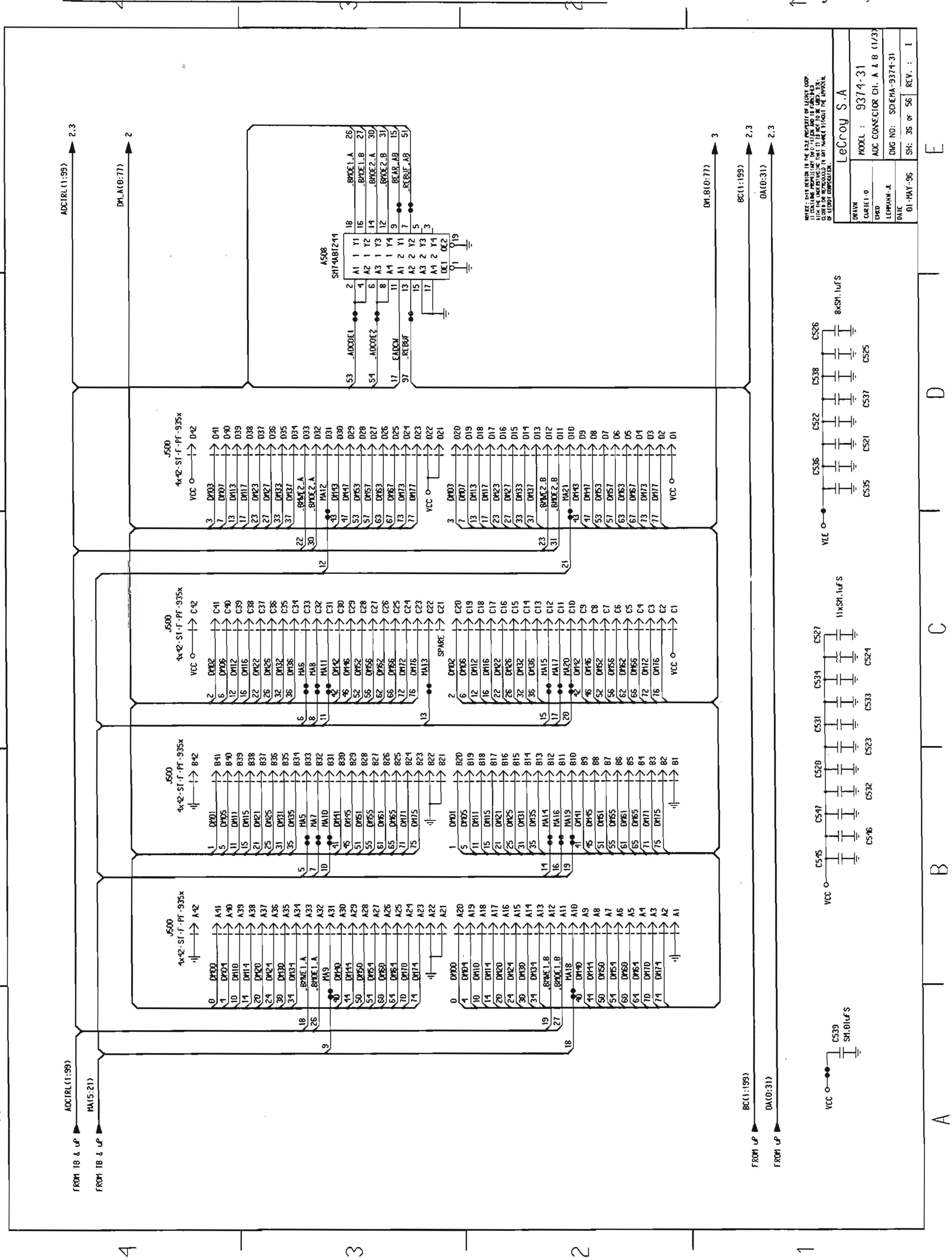

LeCroy S.A
MODEL : 9374-31
ADC (2/2)
DWG NO: SCHEMA-9374-31
SH: 32 of 55
REV. : I
DATE 01-MAY-96
-12V_ADC
+12V_ADC
+7V_ADC
-15V
+15V
VCC
VEE
MA(5:21)

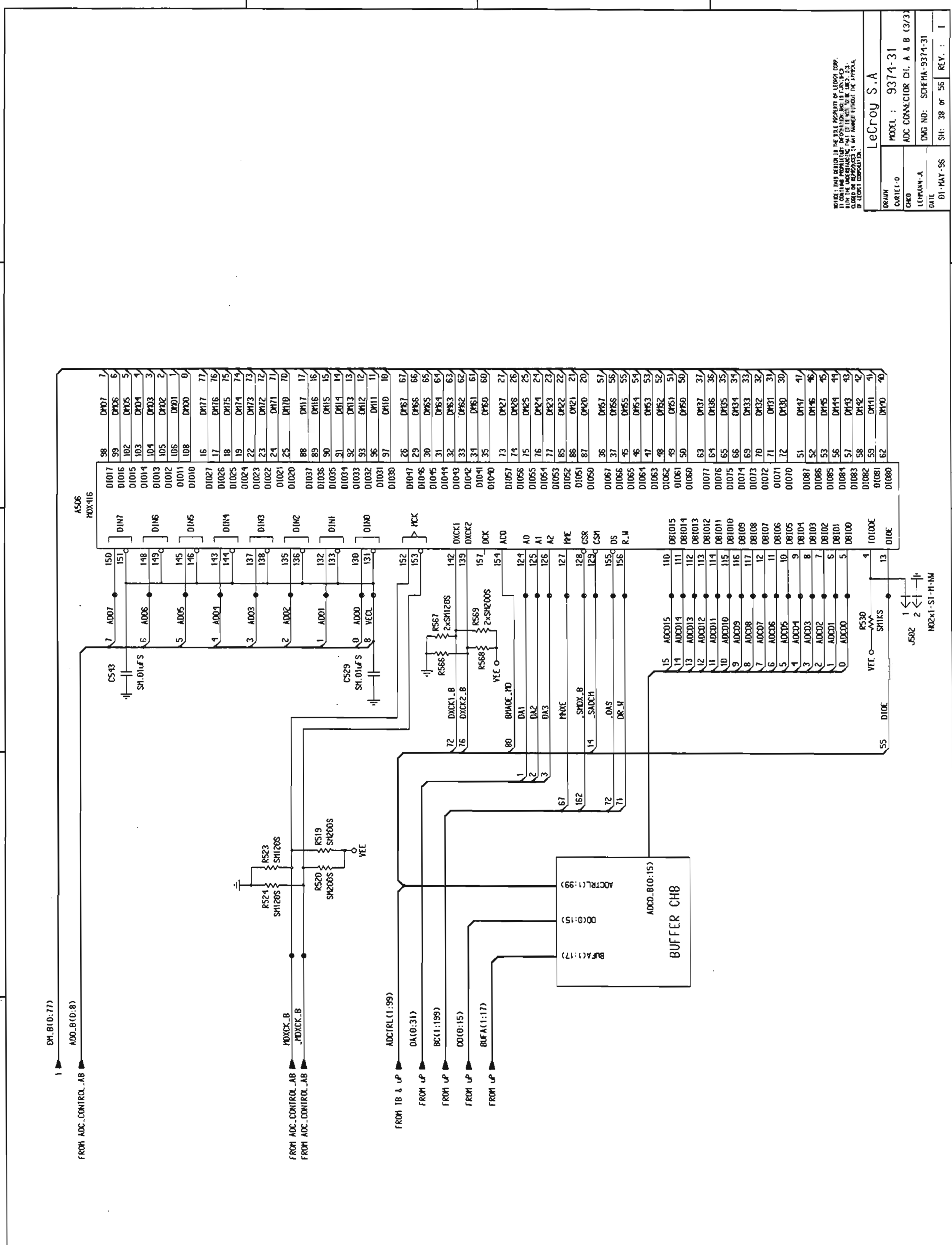

LeCroy S.A
MODEL : 9374-31
ADC CONTROL CH. A & B (1/1)
DWG NO: SCHEMA-9374-31
SH: 33 of 56
REV. : 1
01-MAY-96
ADC CHA
ADC CHB

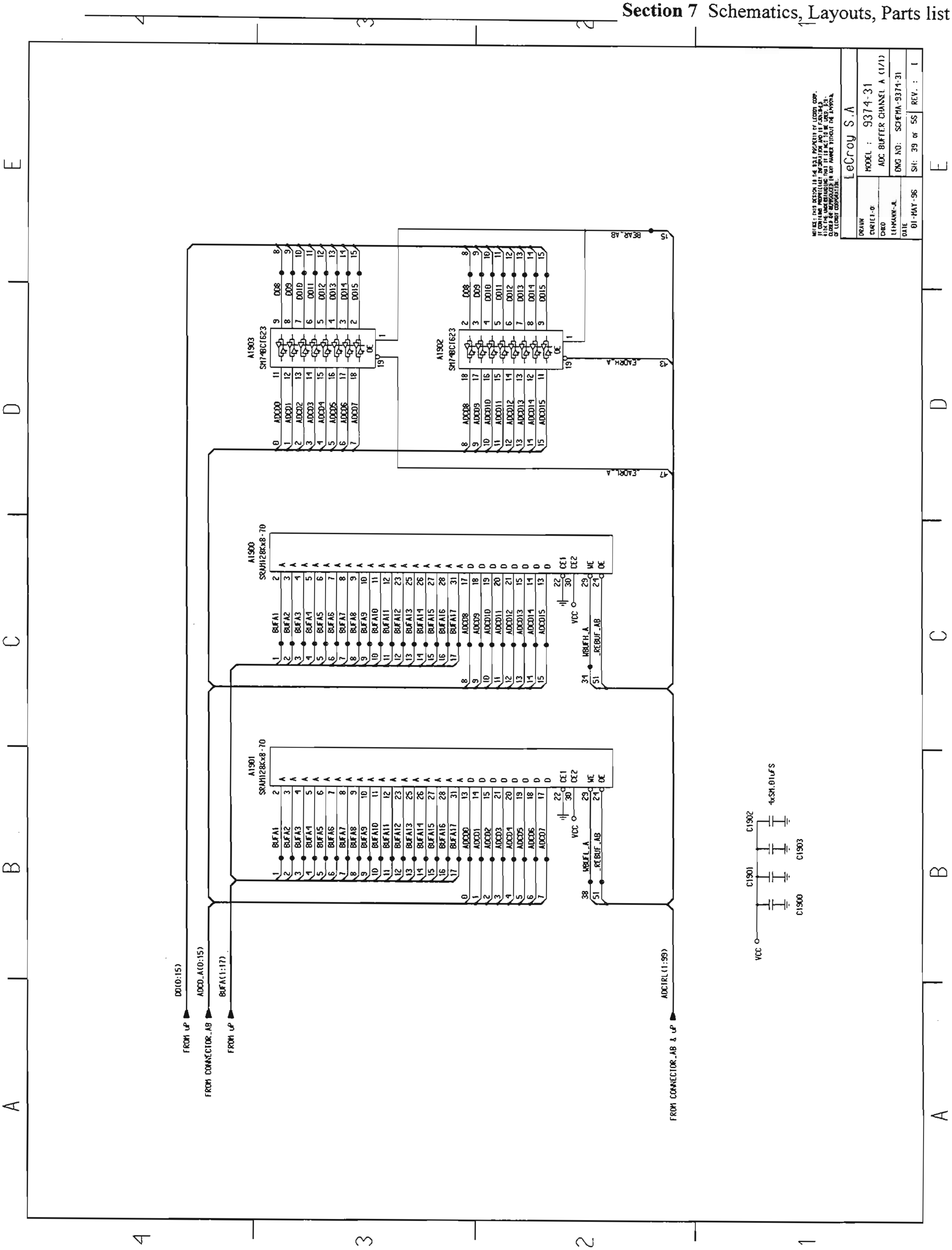

LeCroy S.A
MODEL : 9374-31
ADC CHANNEL A (1/1)
DWG NO: SCHEMA-9374-31
SH: 31 OF 56
REV. : I
01-MAY-96
NOTE: ALL LINES WITH SPECIFIED LENGTH MUST BE 75 OHM
* SAMPLING EFFICIENCY: CAN BE REPLACED BY 0.5-2.5pF-S (158849009)
A1500 HSH423
A1501 SM10E195
A1502 SM10EL05
A1503 SM10EL11
A1504 SM10EL05
A1505 SMTDA8718
A1506 SM10EL11
FROM ADC_CONTROL_AB
FROM FE
TO ADC_CONNECTOR_AB
*COMPONENTS UNDER THE HSM416

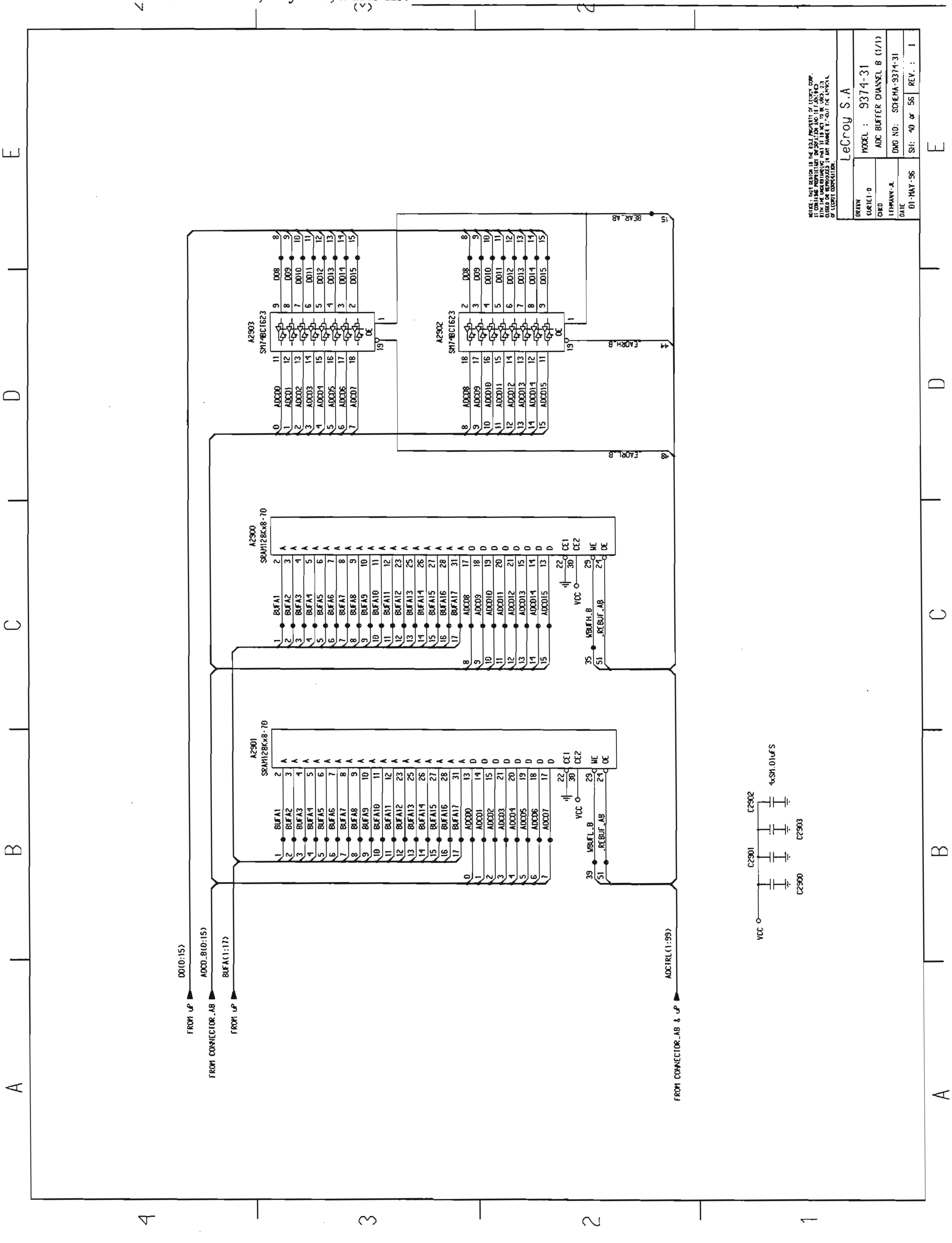

LeCroy S.A
MODEL : 9374-31
ADC CHANNEL B (1/1)
DWG NO: SCHEMA-9374-31
SH: 35 of 58
REV. : 1
01-MAY-96
NOTE: ALL LINES WITH SPECIFIED LENGTH MUST BE 75 OHM
* SAMPLING EFFICIENCY: CAN BE REPLACED BY 0.5-2.5pF-S (158849009)
A2500 HSH423
FROM ADC_CONTROL_AB
TO ADC_CONNECTOR_AB
FROM FE

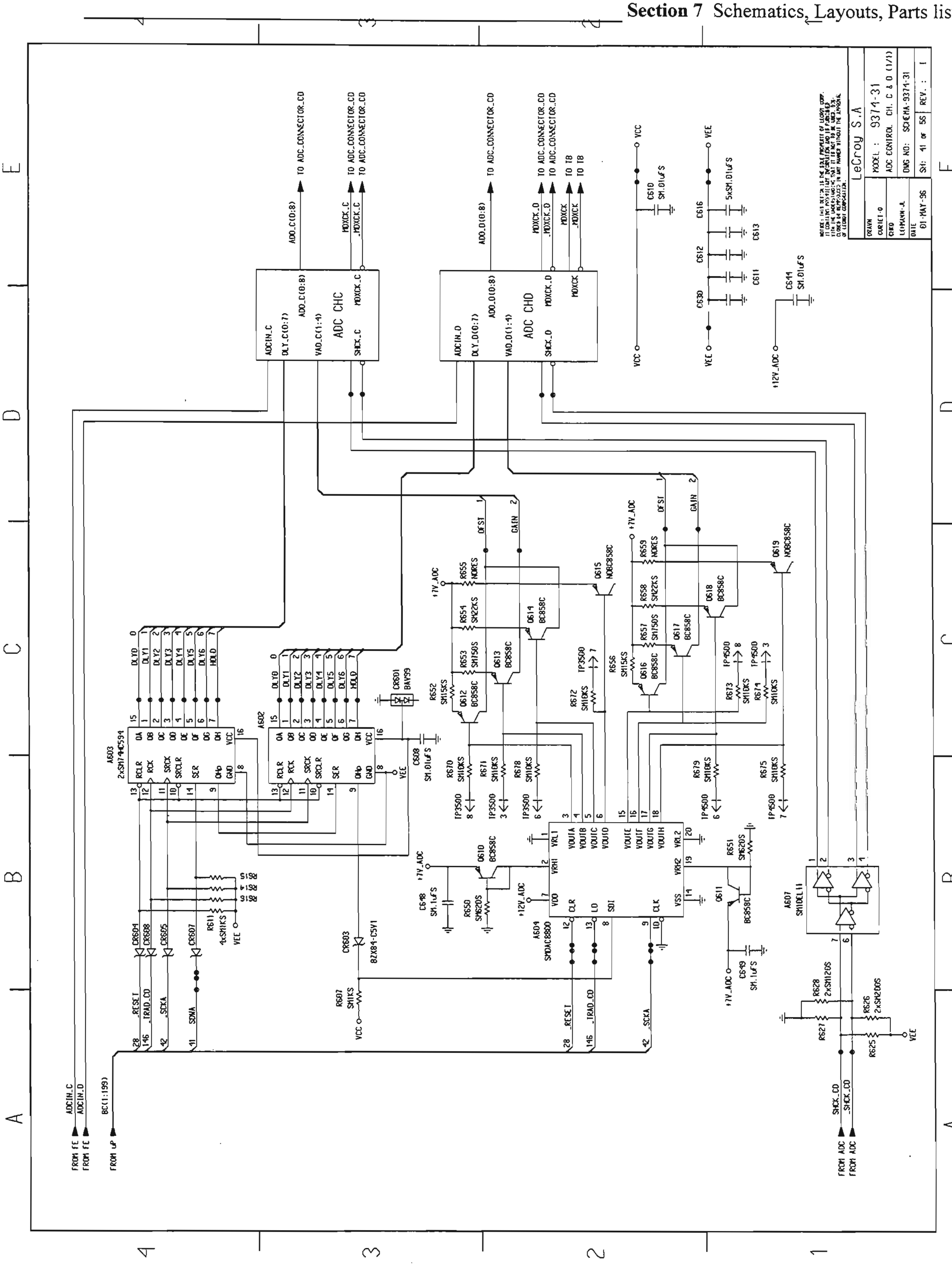

LeCroy S.A
MODEL : 9374-31
ADC CONNECTOR CH. A & B (2/3)
SCHEMA-9374-31
SH: 37 OF 56
01-MAY-96
BUFFER CHA
FROM ADC_CONTROL_AB
FROM TB & uP
FROM uP


LeCroy S.A
MODEL : 9374-31
ADC CONNECTOR CH. A & B (1/3)
DWG NO: SCHEMA-9374-31
SH: 35 of 56
REV. : 1
01-MAY-95

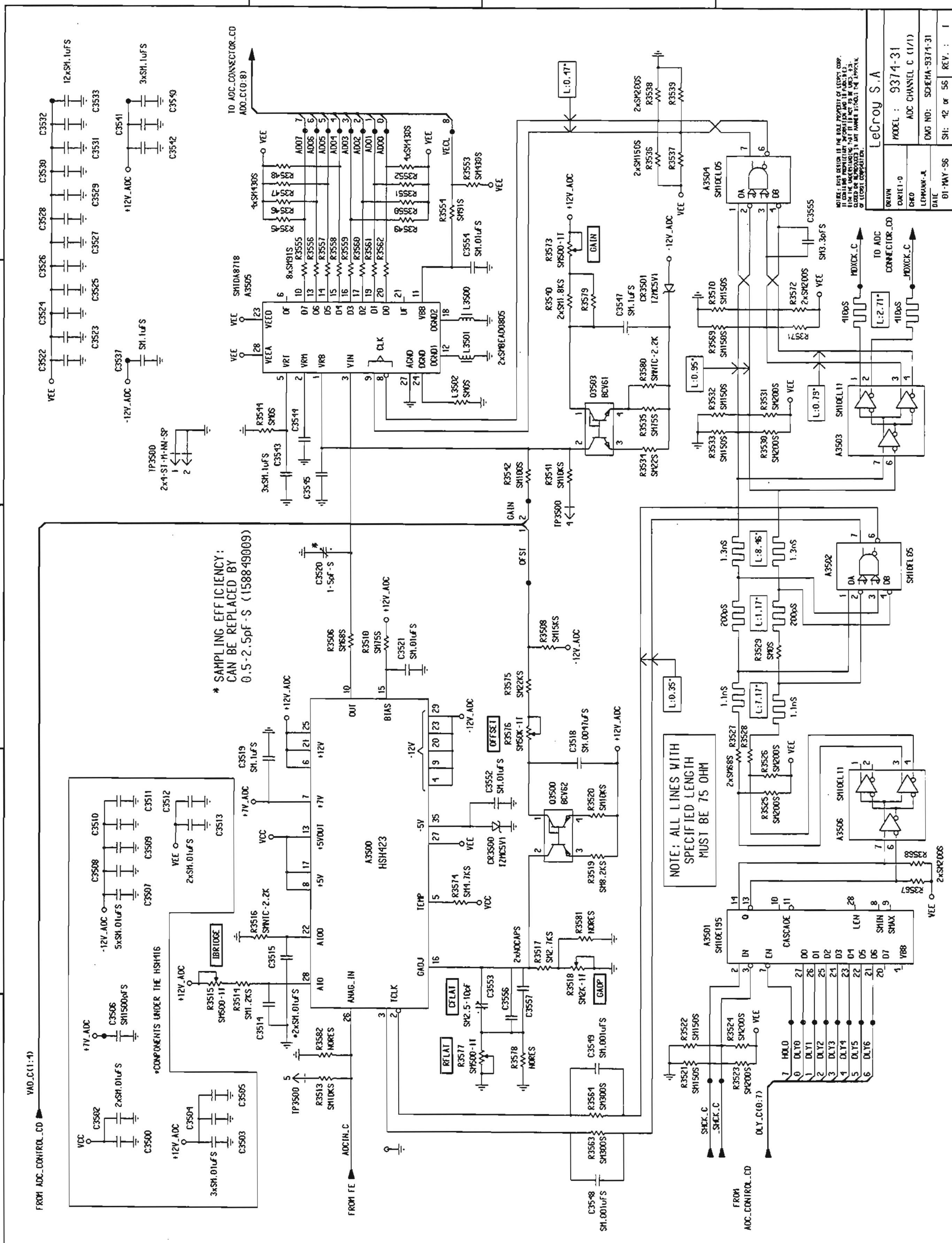


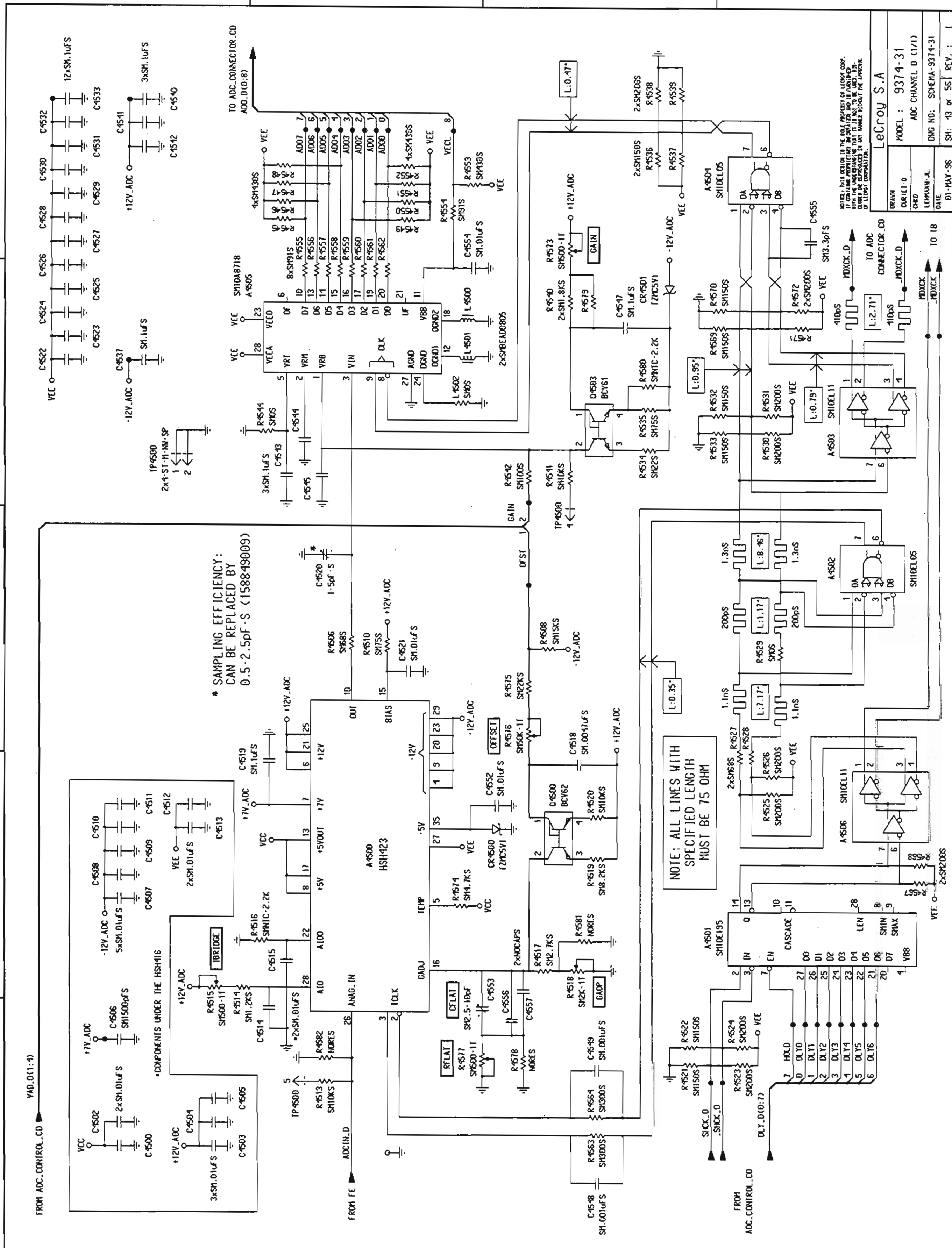

LeCroy S.A
MODEL : 9374-31
ADC BUFFER CHANNEL A (1/1)
DWG NO: SCHEMA-9374-31
SH: 39 OF 55
REV. : 1
01-MAY-96
A1903
SN74BCT623
A1902
SN74BCT623
A1900
SRAM128Kx8-70
A1901
SRAM128Kx8-70
FROM uP
FROM CONNECTOR_AB
FROM CONNECTOR_AB & uP
DO(0:15)
ADCO_A(0:15)
BUFA(1:17)
ADCTRL(1:99)
4xSM.01uFS
C1900
C1901
C1902
C1903
VCC

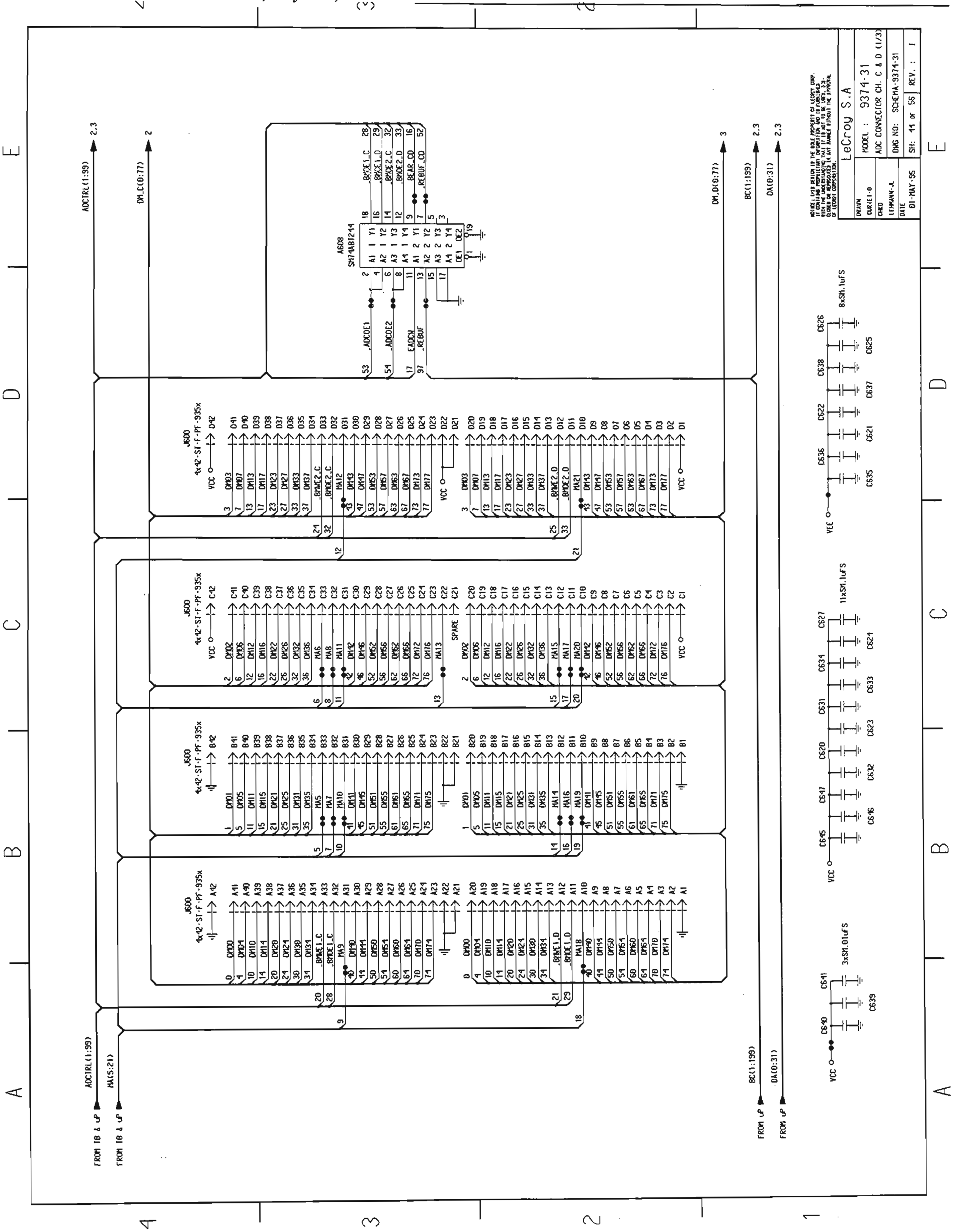

LeCroy S.A
MODEL : 9374-31
ADC BUFFER CHANNEL B (1/1)
DWG NO: SCHEMA-9374-31
SH: 40 of 56
REV. : I
DRAWN CURIET-O
CHKD LEHMANN-JL
DATE 01-MAY-96
A2903 SN74BC1623
A2902 SN74BC1623
A2900 SRAM128Kx8-70
A2901 SRAM128Kx8-70
D0(0:15) FROM uP
ADC0_B(0:15) FROM CONNECTOR_AB
BUFA(1:17) FROM uP
ADCTRL(1:99) FROM CONNECTOR_AB & uP
BEAR_AB
EADRH_B
EADRL_B
WBUFH_B
WBUFL_B
REBUF_AB
VCC
C2900 C2901 C2902 C2903
4xSM.01uFS

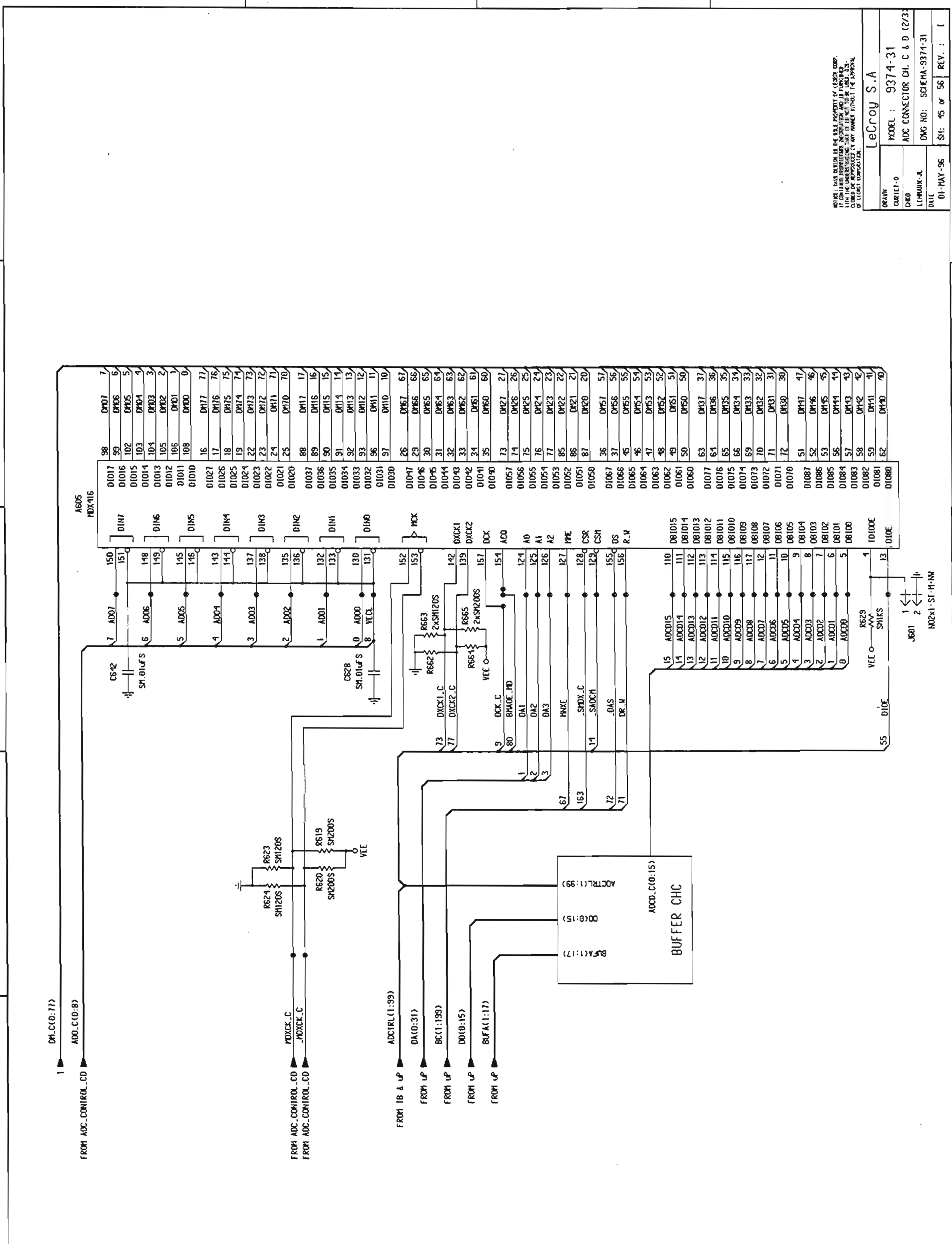


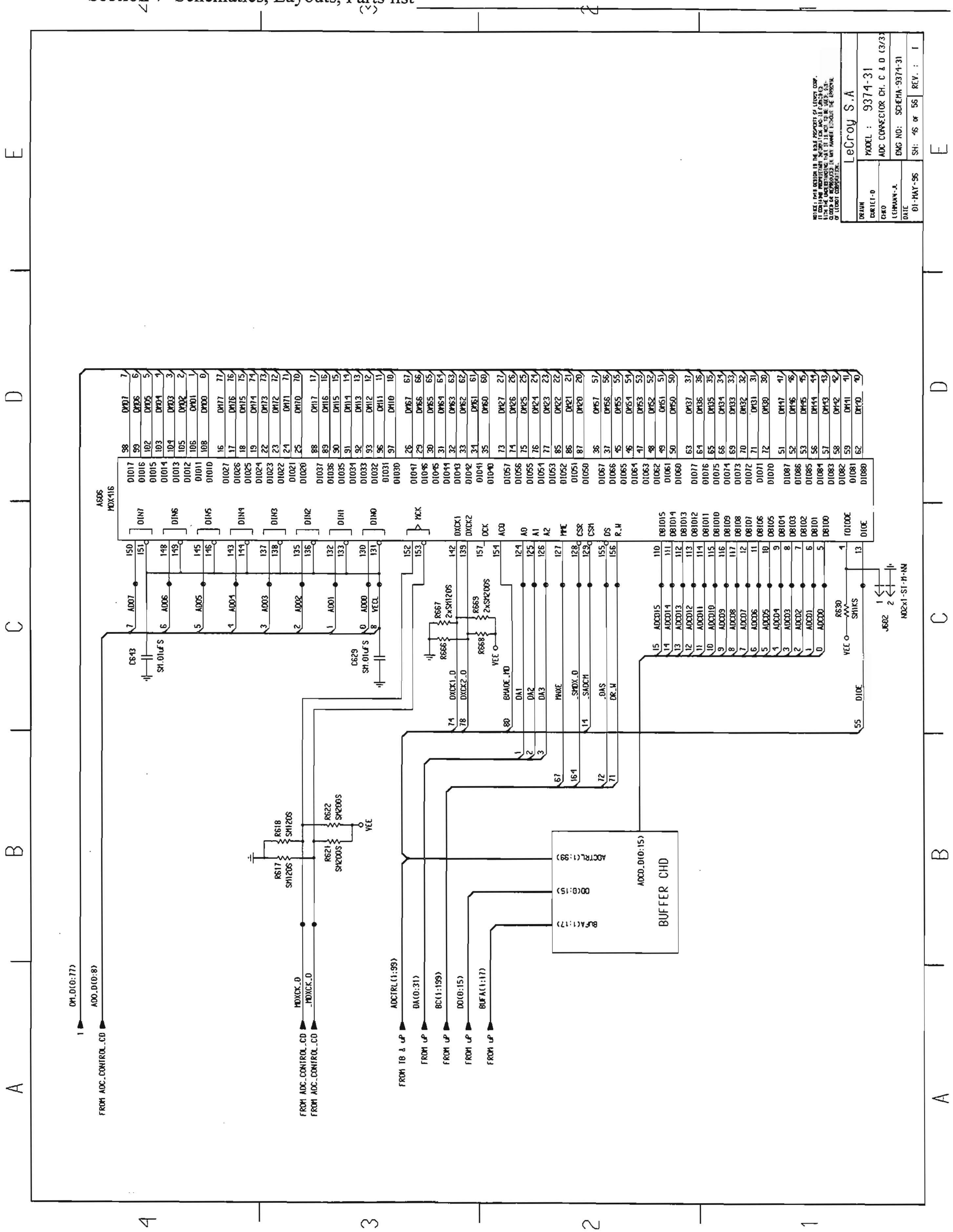
ADC CHC
ADC CHD
TO ADC_CONNECTOR.CO
TO T8
FROM FE
FROM uP
FROM ADC
LeCroy S.A
MODEL : 9374-31
ADC CONTROL CH. C & D (1/1)
DWG NO: SCHEMA-9374-31
SH: 41 of 56
REV. : 1
01-MAY-96

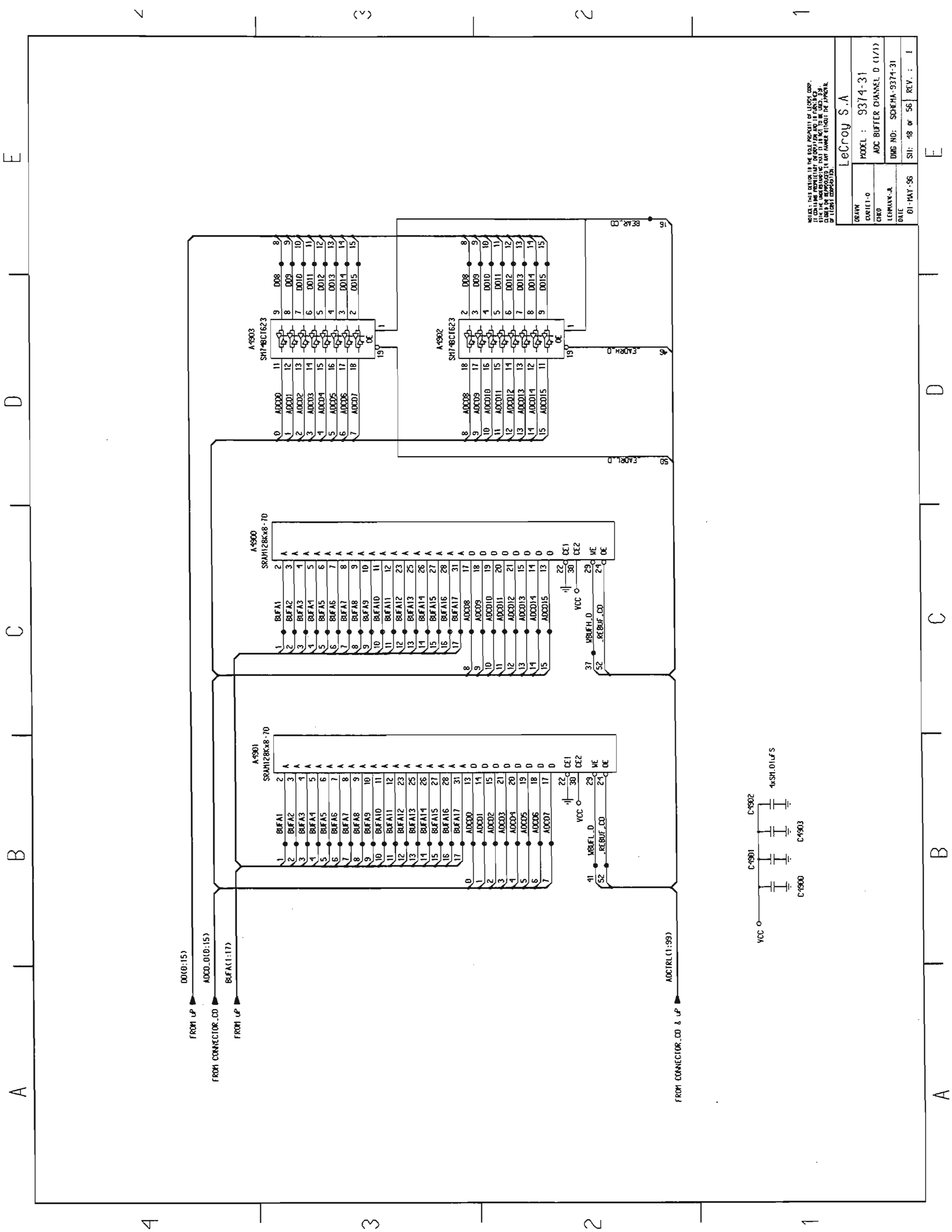

LeCroy S.A
MODEL : 9374-31
ADC CHANNEL C (1/1)
DWG NO: SCHEMA-9374-31
SH: 42 of 56
REV. : 1
DATE 01-MAY-96
NOTE; ALL LINES WITH SPECIFIED LENGTH MUST BE 75 OHM
* SAMPLING EFFICIENCY: CAN BE REPLACED BY 0.5-2.5pF-S (158849009)
A3500 HSH423
A3505 SMIDA8718
A3501 SM10E195
FROM ADC_CONTROL_CD
FROM FE
TO ADC_CONNECTOR_CD

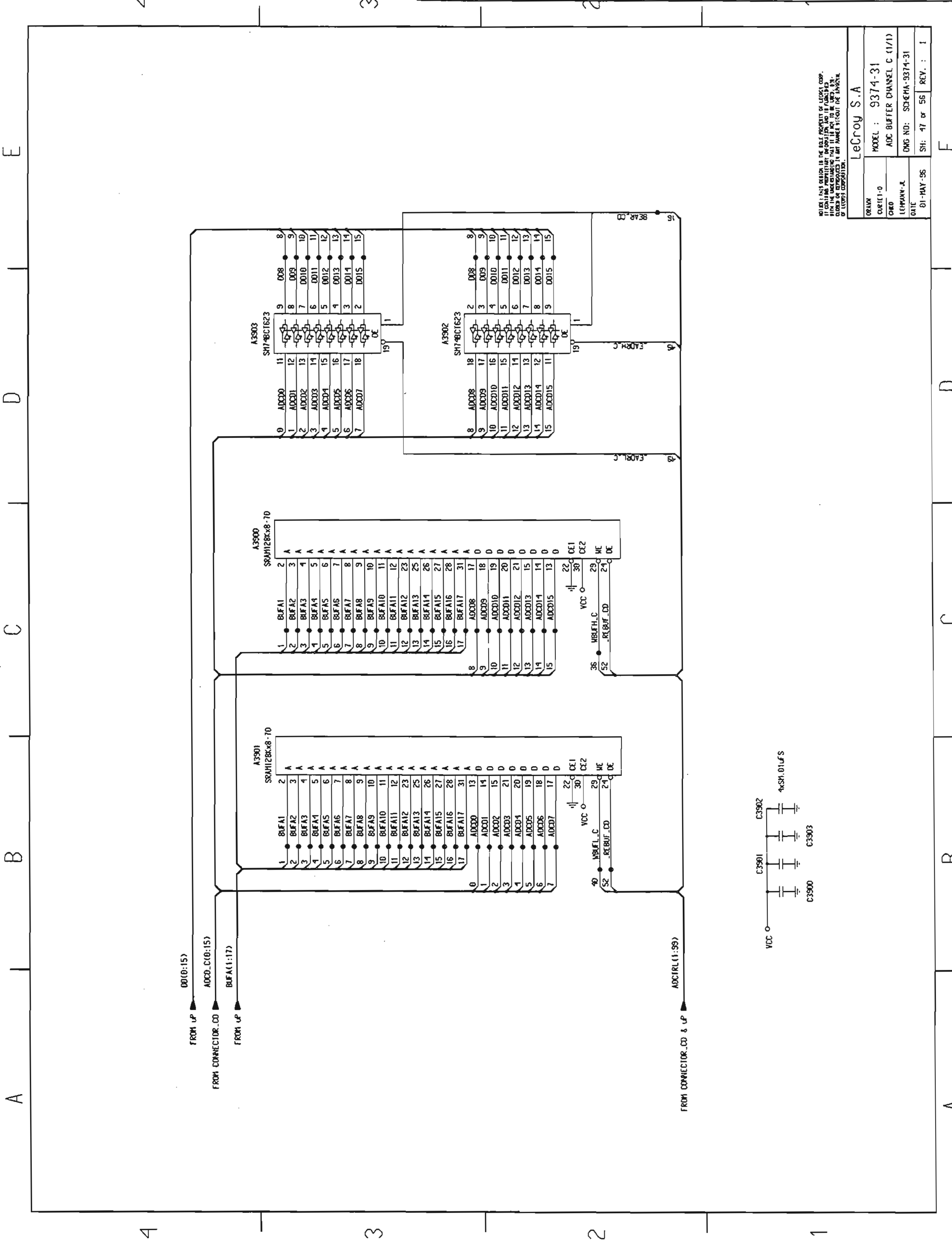

LeCroy S.A
MODEL : 9374-31
ADC CHANNEL D (1/1)
DWG NO: SCHEMA-9374-31
SH: 13 of 56
REV. : 1
DATE 01-MAY-96
NOTE: ALL LINES WITH SPECIFIED LENGTH MUST BE 75 OHM
* SAMPLING EFFICIENCY: CAN BE REPLACED BY 0.5-2.5pF-S (158849009)
A4500 HSH423
A4505 SM10A8718
TO ADC CONNECTOR_CD
FROM ADC_CONTROL_CD
FROM FE

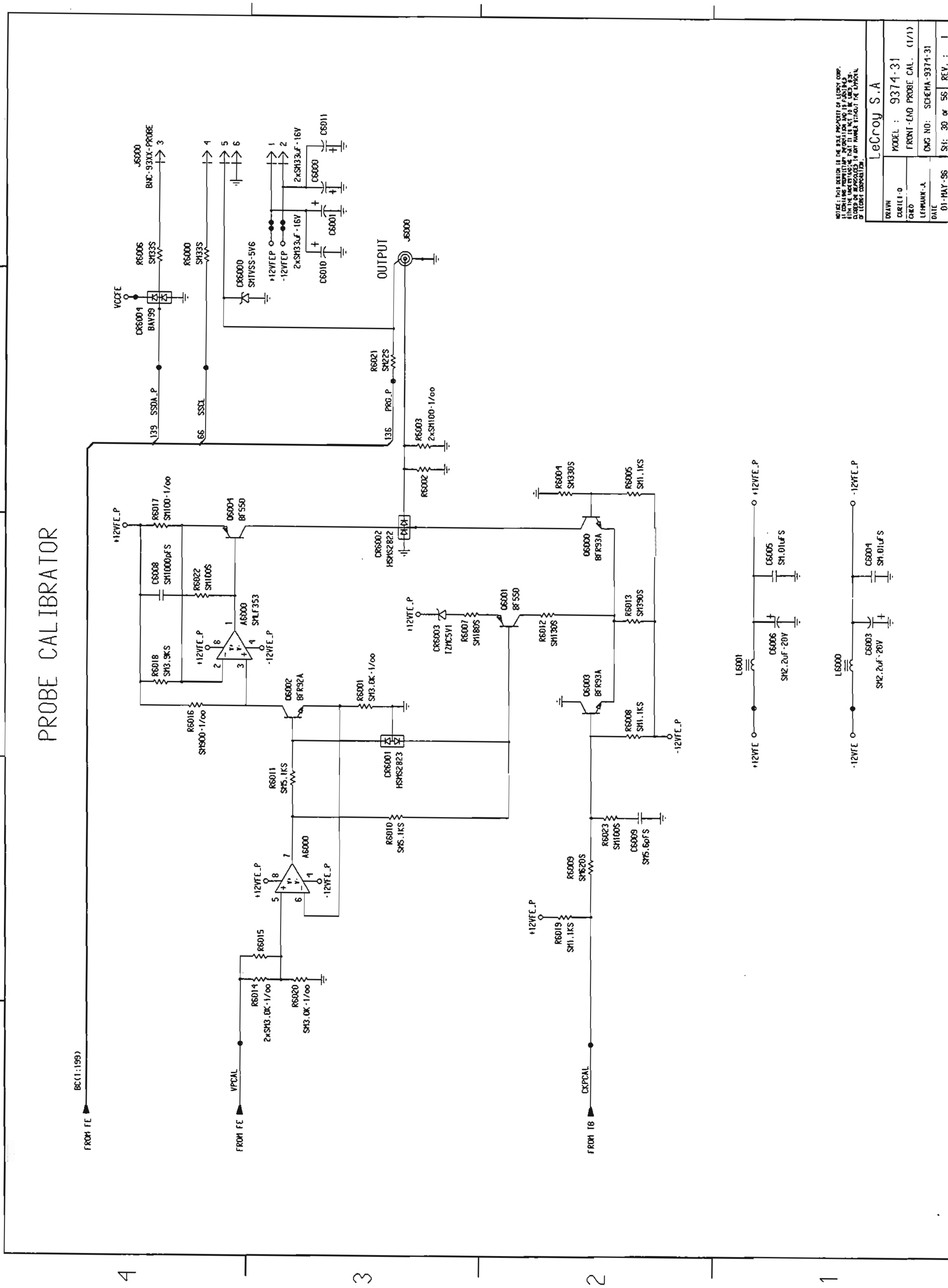

LeCroy S.A
MODEL : 9374-31
ADC CONNECTOR CH. C & D (1/3)
DWG NO: SCHEMA-9374-31
SH: 44 OF 55
REV. : I
01-MAY-95
A608
SN74ABT244
J600
4x42-SI-F-PF-935x
ADCTRL(1:99)
MA(5:21)
FROM IB & uP
BC(1:199)
DA(0:31)
FROM uP
DM_C(0:77)
DM_D(0:77)
8xSM.1uFS
11xSM.1uFS
3xSM.01uFS

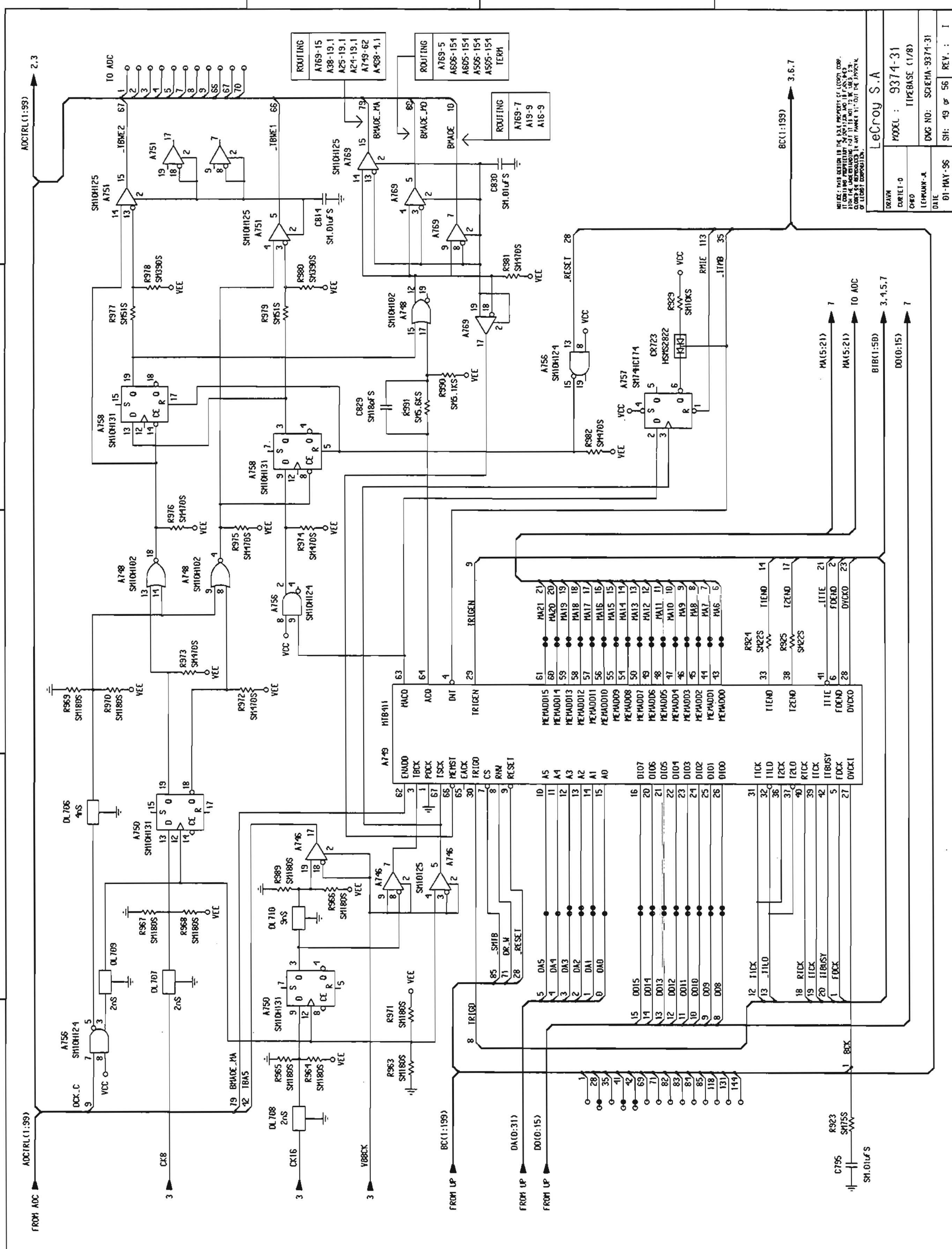

LeCroy S.A
MODEL : 9374-31
ADC CONNECTOR CH. C & D (2/3)
DWG NO: SCHEMA-9374-31
A605
MDX416
BUFFER CHC

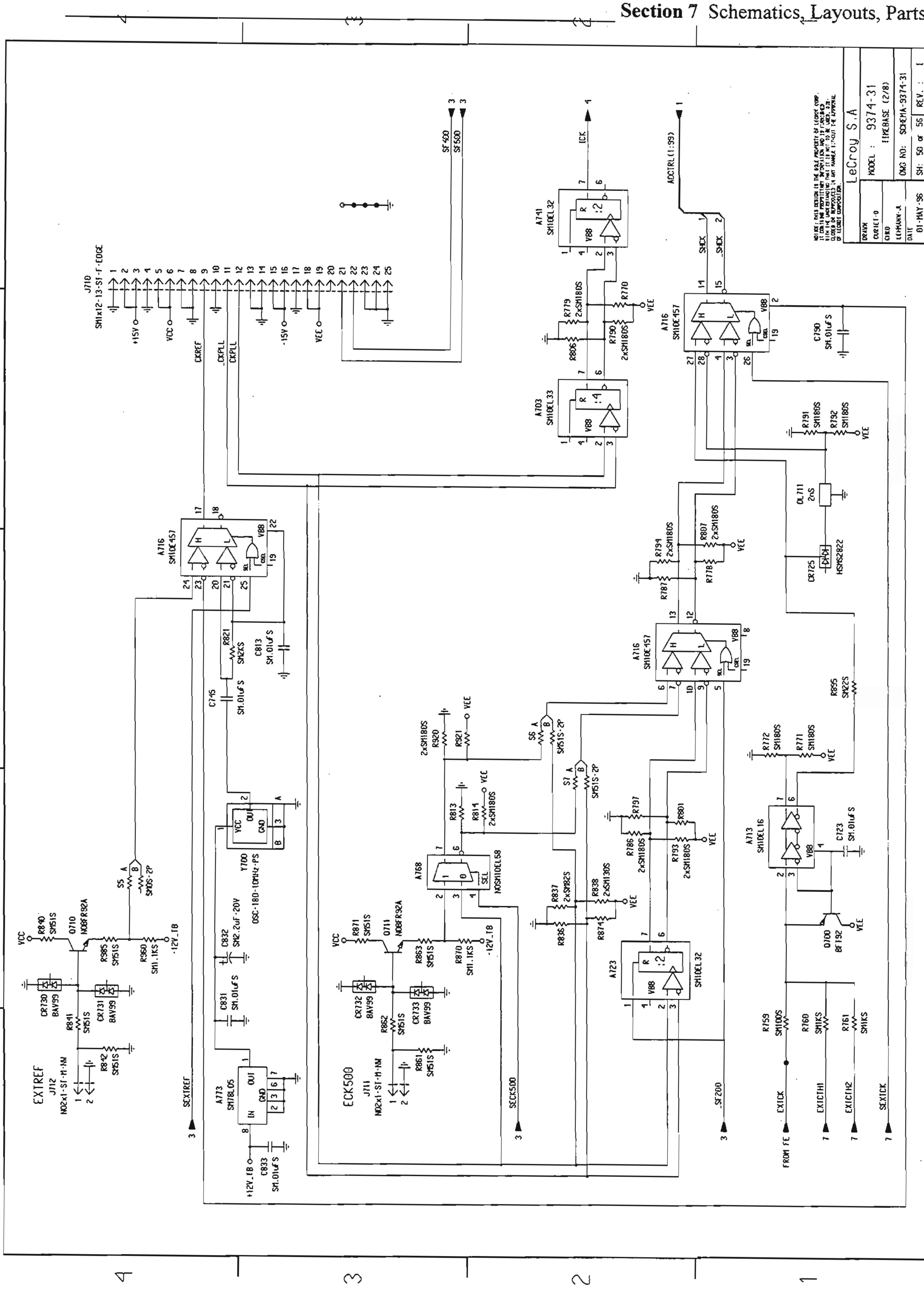

LeCroy S.A
MODEL : 9374-31
ADC CONNECTOR CH. C & D (3/3)
DWG NO: SCHEMA-9374-31
SH: 46 of 56
REV. : 1
DATE 01-MAY-96
A606
MDX416
BUFFER CHD
FROM ADC_CONTROL_CD
FROM TB & uP
FROM uP

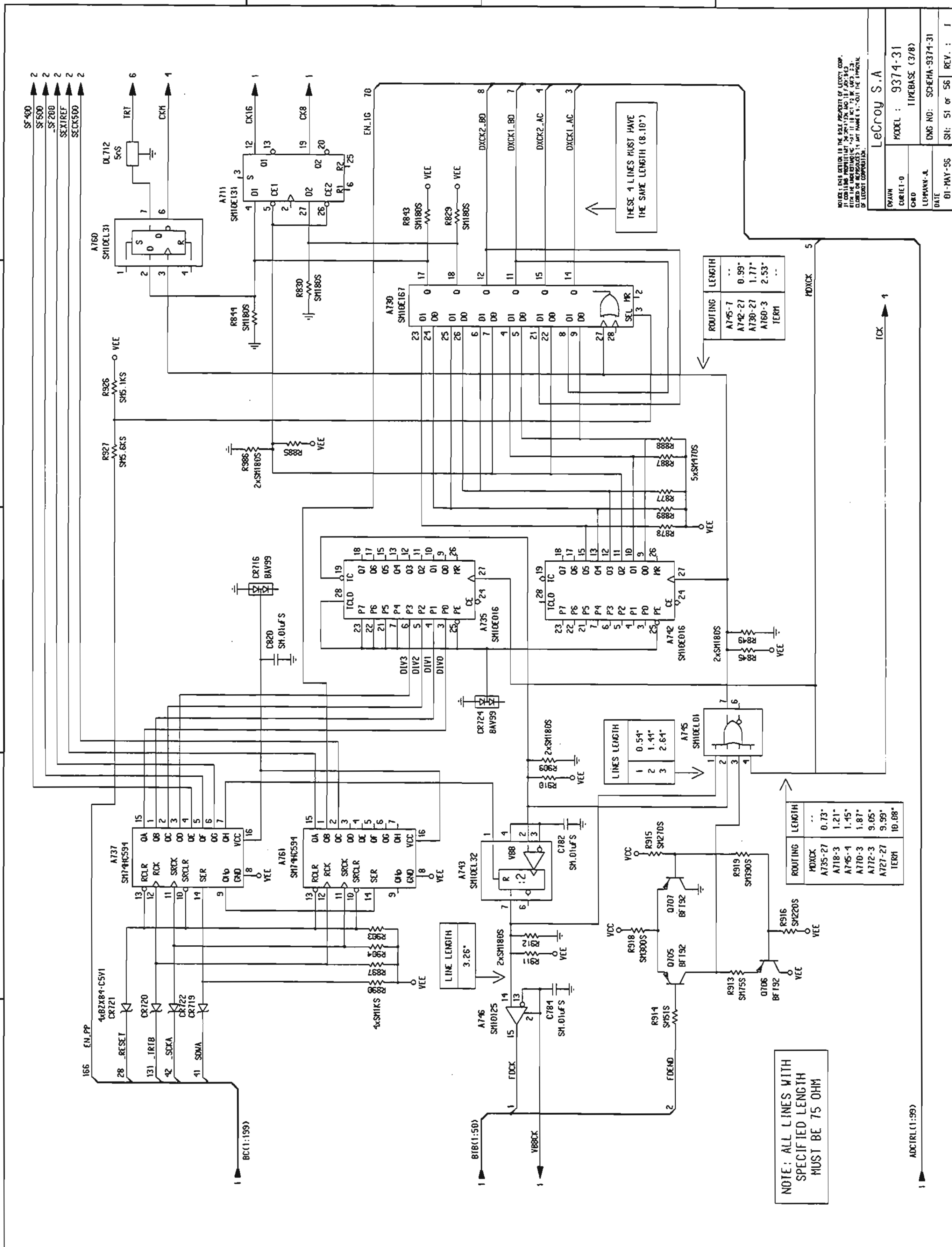

LeCroy S.A
MODEL : 9374-31
ADC BUFFER CHANNEL D (1/1)
DWG NO: SCHEMA-9374-31
SH: 48 of 56
REV. : 1
DATE 01-MAY-96
A4903 SN74BCT623
A4902 SN74BCT623
A4900 SRAM128Kx8-70
A4901 SRAM128Kx8-70
DO(0:15)
ADCD_D(0:15)
BUFA(1:17)
ADCTRL(1:99)
FROM uP
FROM CONNECTOR_CD
FROM CONNECTOR_CD & uP

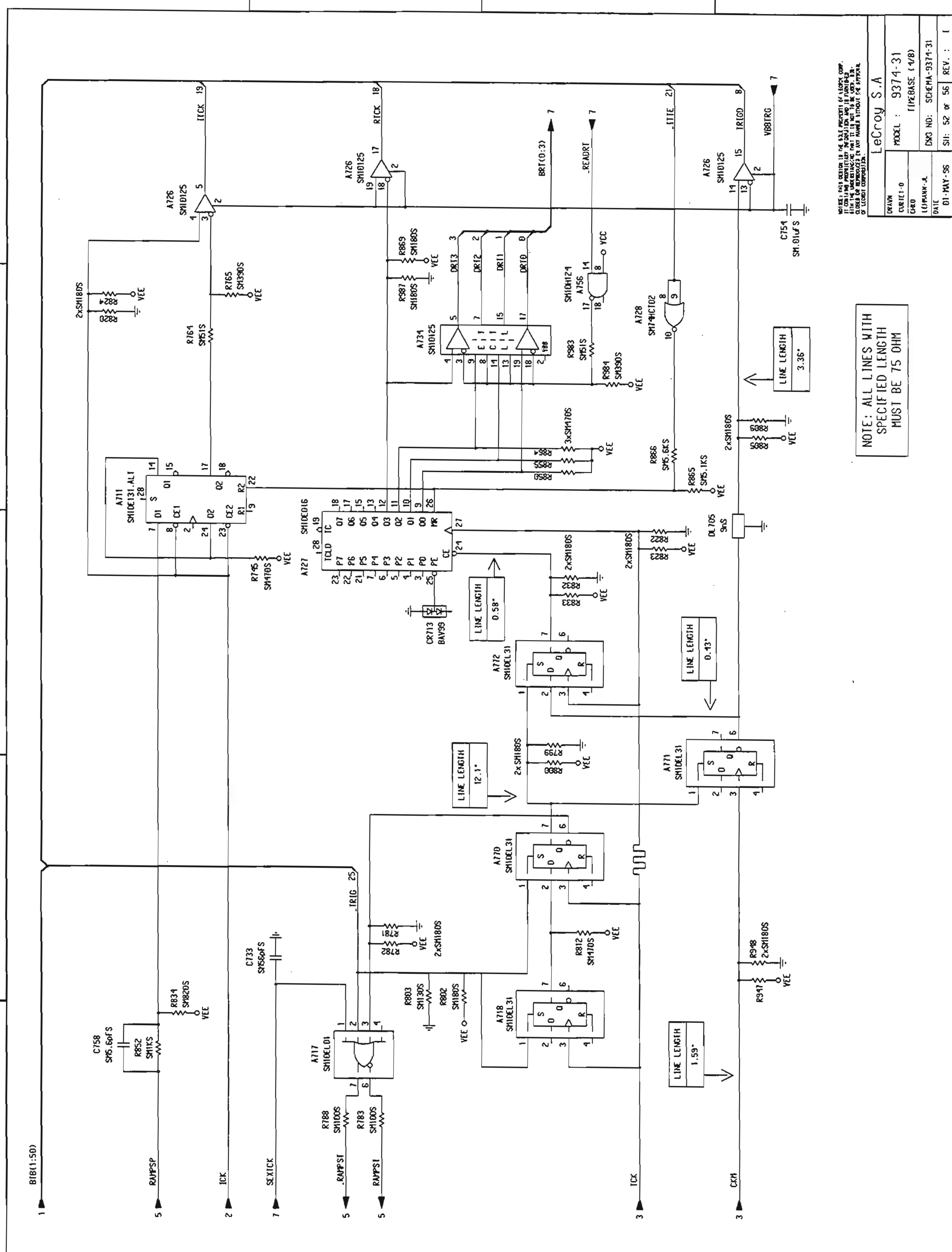

LeCroy S.A
MODEL : 9374-31
ADC BUFFER CHANNEL C (1/1)
DWG NO: SCHEMA-9374-31
SH: 47 of 56
REV. : 1
DATE 01-MAY-95
A3903 SN74BCT623
A3902 SN74BCT623
A3900 SRAM128Kx8-70
A3901 SRAM128Kx8-70
DD(0:15)
ADCD_C(0:15)
BUFA(1:17)
ADCIRL(1:39)
FROM uP
FROM CONNECTOR_CD
FROM CONNECTOR_CD & uP
C3900
C3901
C3902
C3903
VCC

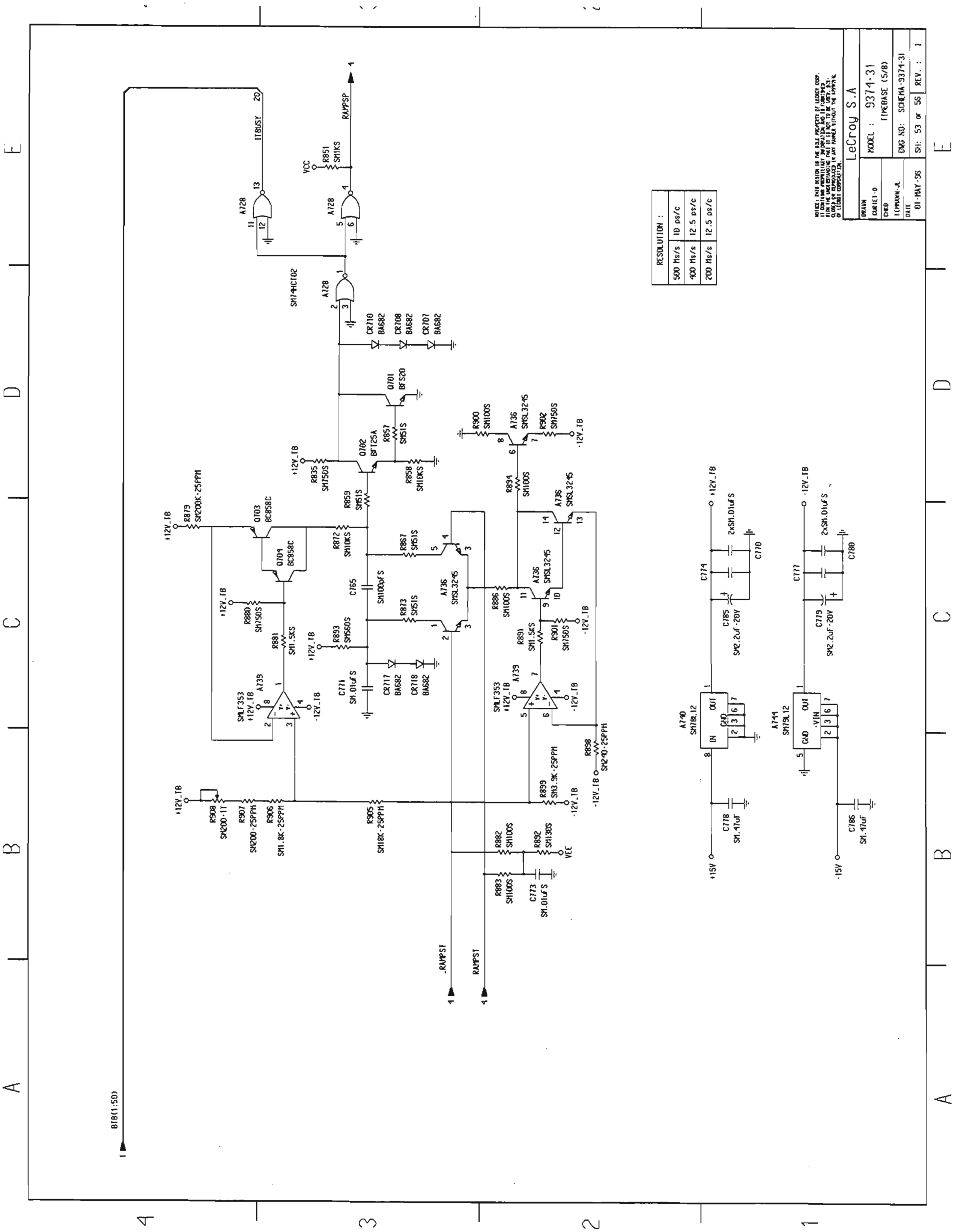

PROBE CALIBRATOR
LeCroy S.A
MODEL : 9374-31
FRONT-END PROBE CAL. (1/1)
OUTPUT
FROM FE
FROM TB
BC(1:199)
VPCAL
CKPCAL

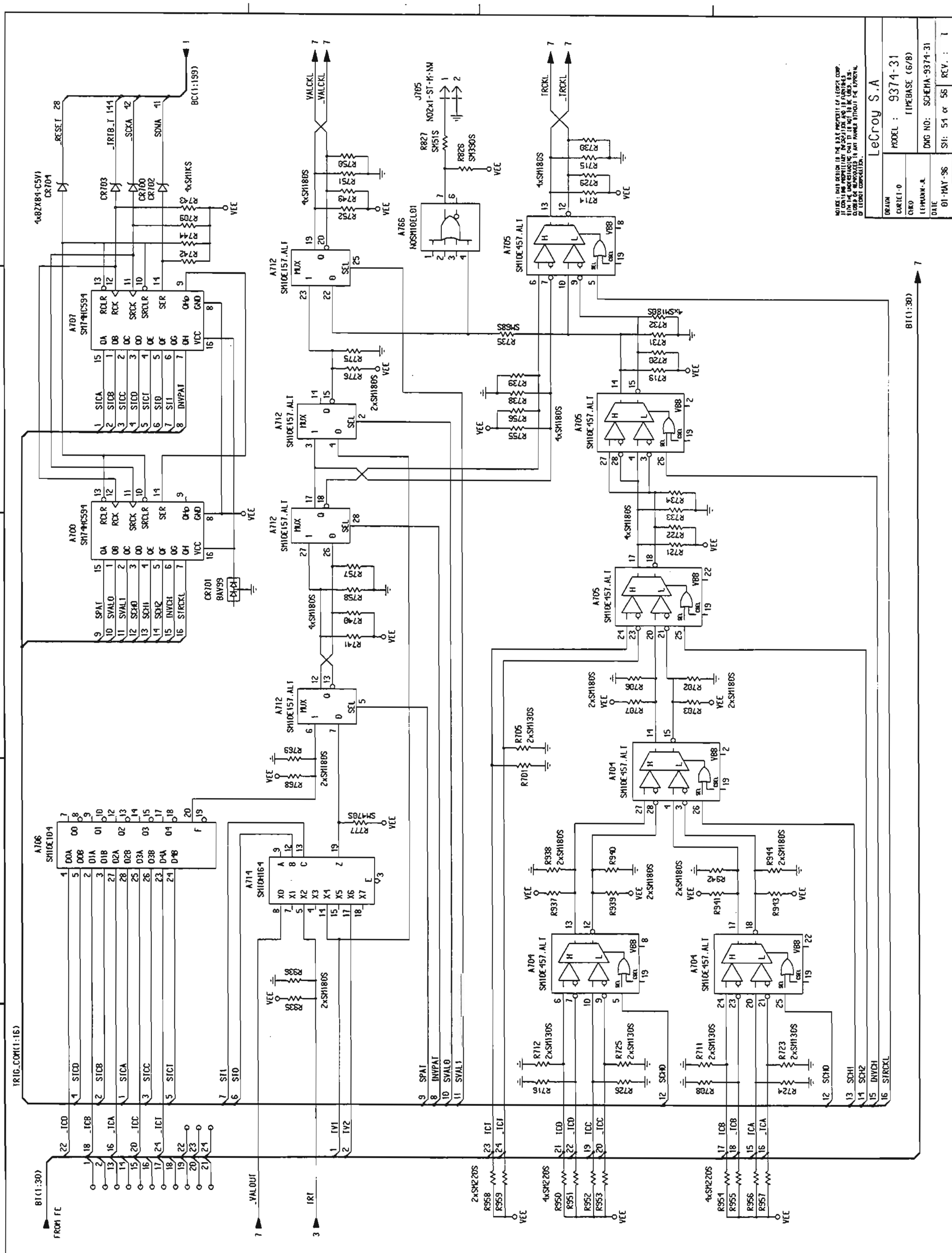

LeCroy S.A
MODEL : 9374-31
TIMEBASE (1/8)
DWG NO: SCHEMA-9374-31
SH: 49 of 56
01-MAY-96
FROM ADC
FROM UP
TO ADC

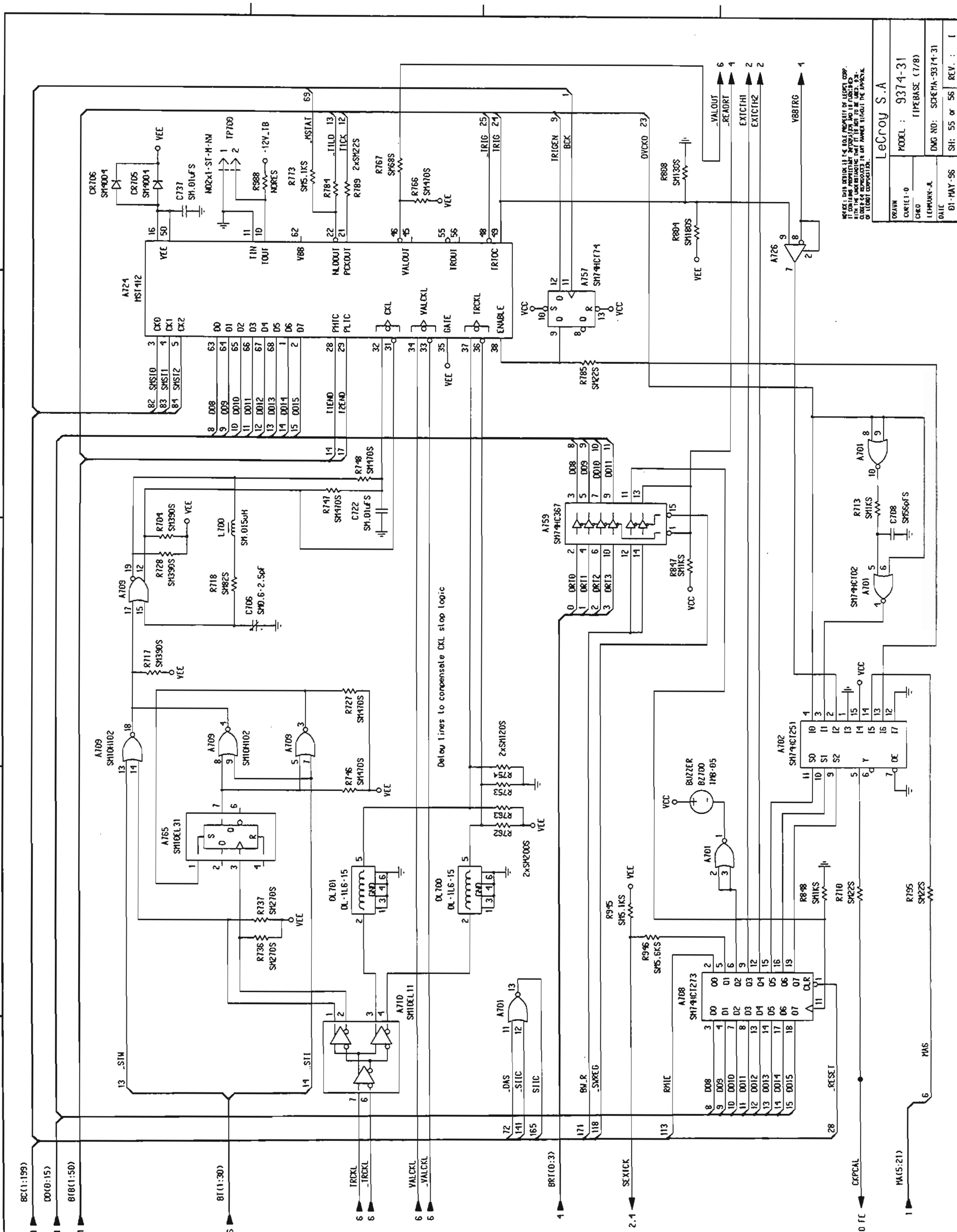

LeCroy S.A
MODEL : 9374-31
TIMEBASE (2/8)
DWG NO: SCHEMA-9374-31
SH: 50 of 56
REV. : 1
01-MAY-96

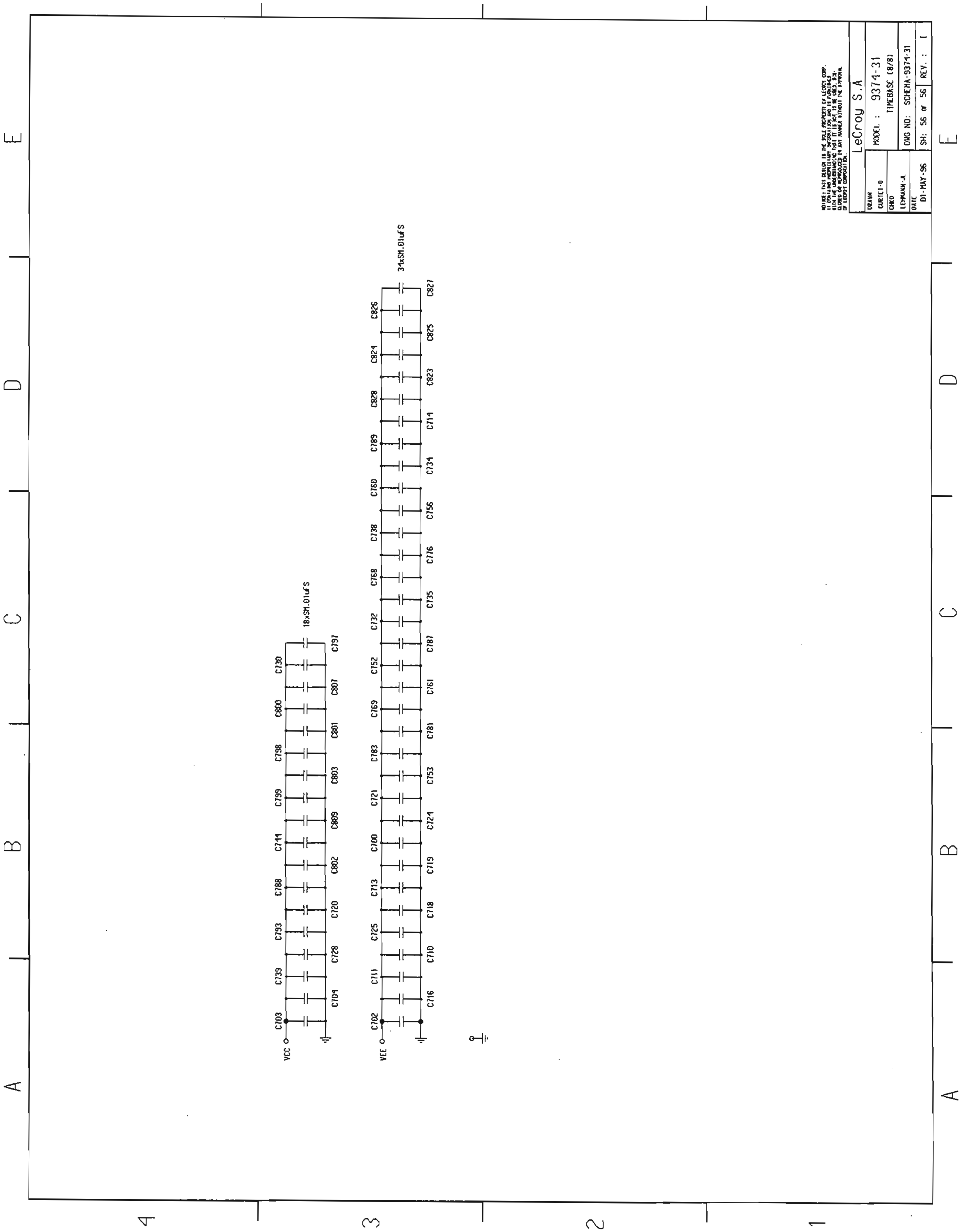

LeCroy S.A
MODEL : 9374-31
TIMEBASE (3/8)
DWG NO: SCHEMA-9374-31
SH: 51 OF 56
REV. : I
DATE 01-MAY-96
THESE 4 LINES MUST HAVE THE SAME LENGTH (8.10")
NOTE: ALL LINES WITH SPECIFIED LENGTH MUST BE 75 OHM

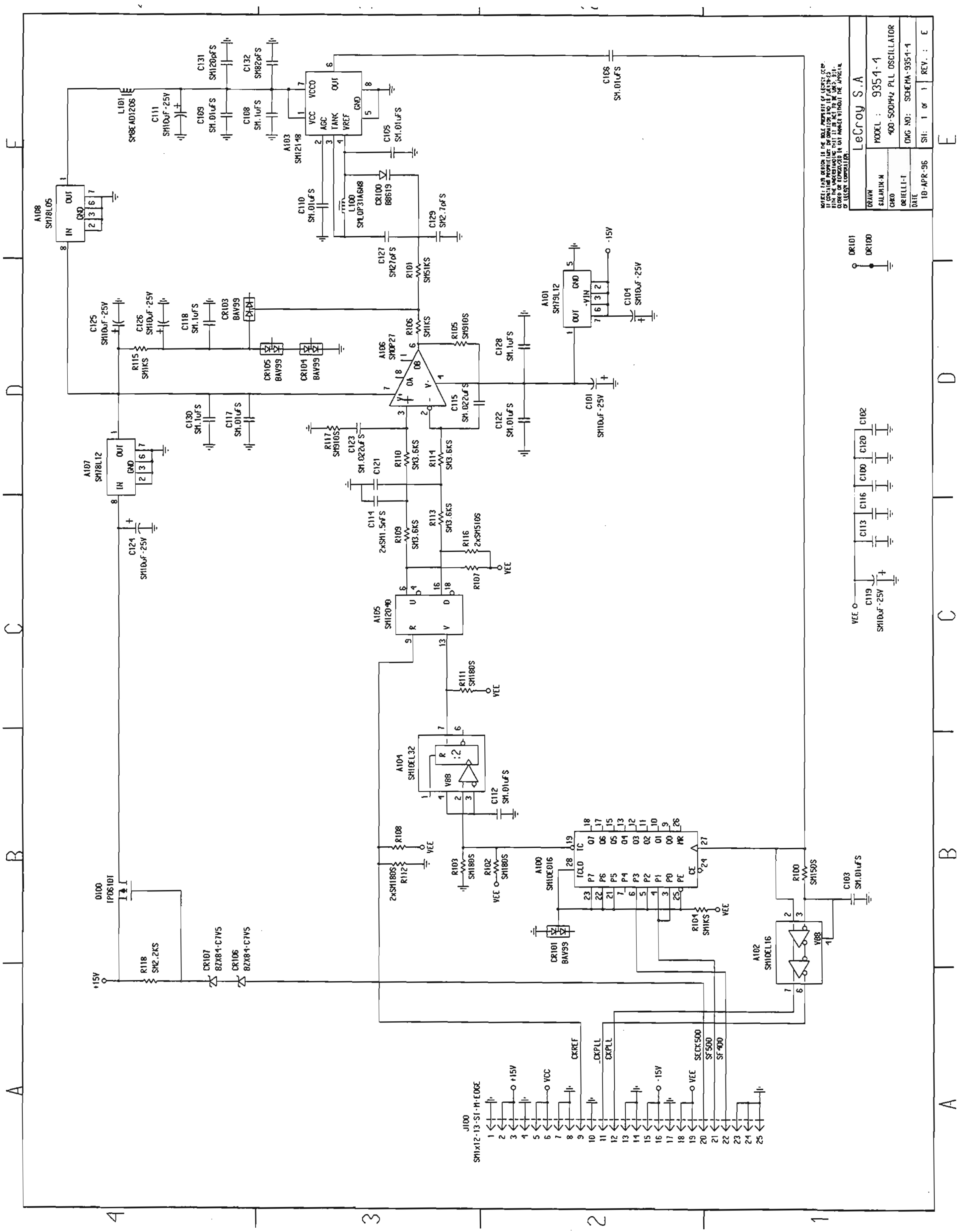

NOTE: ALL LINES WITH SPECIFIED LENGTH MUST BE 75 OHM
LeCroy S.A
MODEL : 9374-31
TIMEBASE (4/8)
SCHEMA-9374-31
SH: 52 of 56
REV. : 1
01-MAY-96

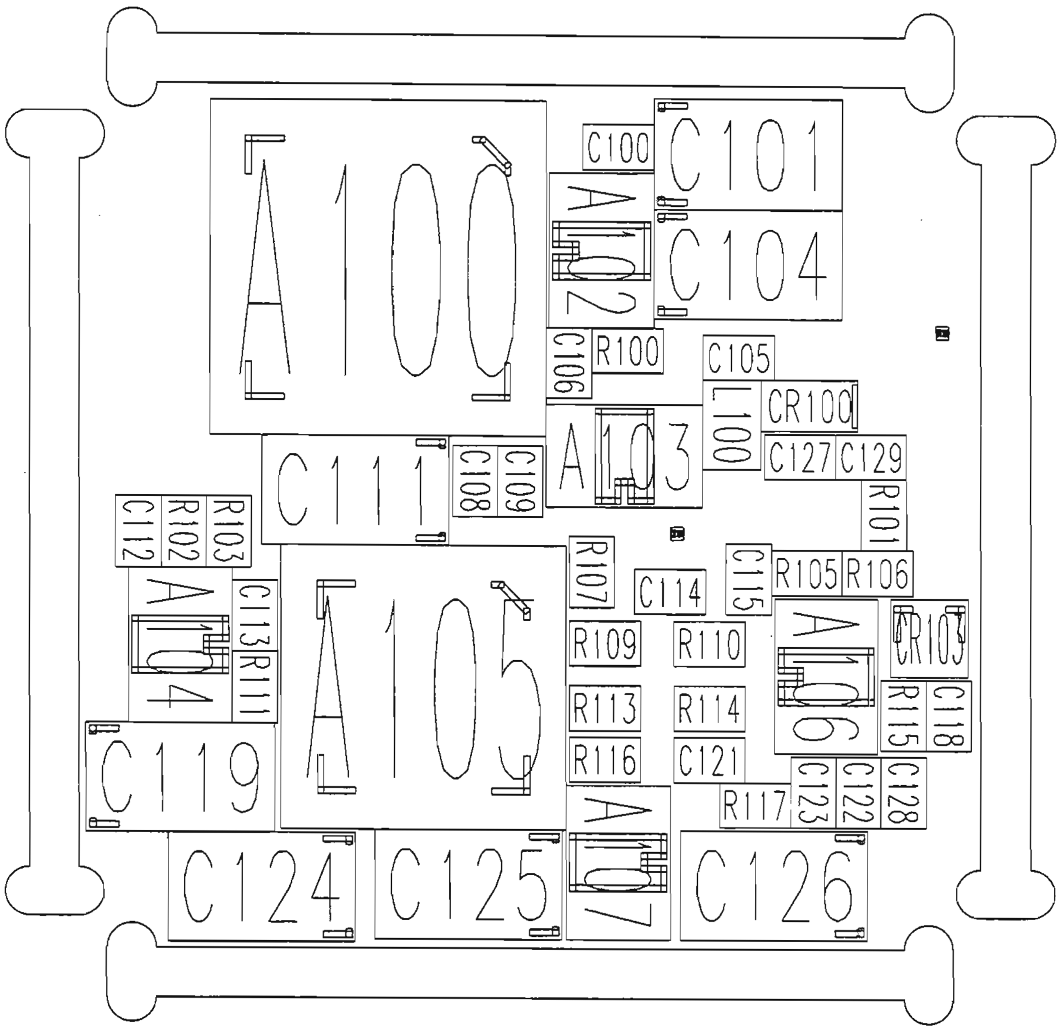

LeCroy S.A
MODEL : 9374-31
TIMEBASE (5/8)
DWG NO: SCHEMA-9374-31
SH: 53 of 55
REV. : 1
DATE 01-MAY-95
RESOLUTION :
500 Ms/s 10 ps/c
400 Ms/s 12.5 ps/c
200 Ms/s 12.5 ps/c

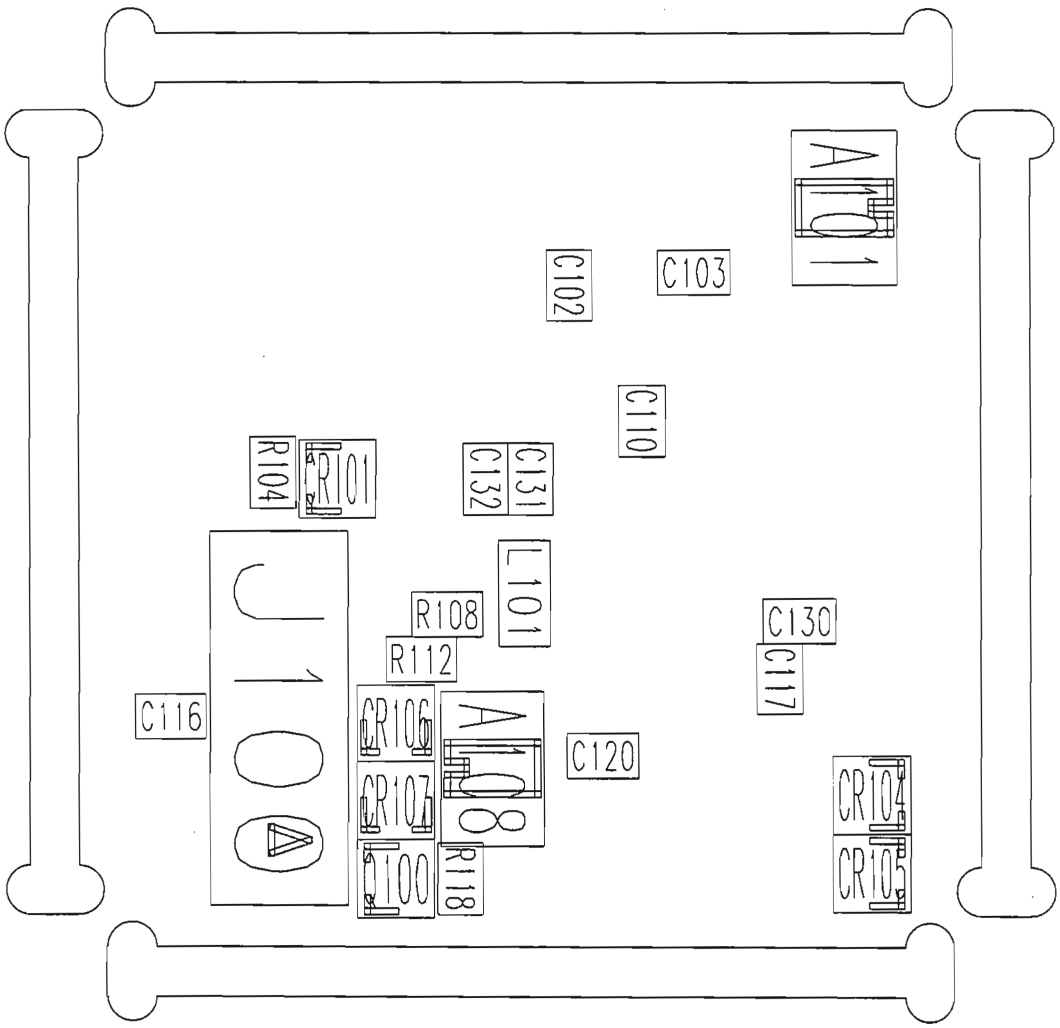

LeCroy S.A
MODEL : 9374-31
TIMEBASE (6/8)
DWG NO: SCHEMA-9374-31
SH: 54 of 56
REV.: 1
DATE 01-MAY-96
E
D
C
B
A
4
3
2
1

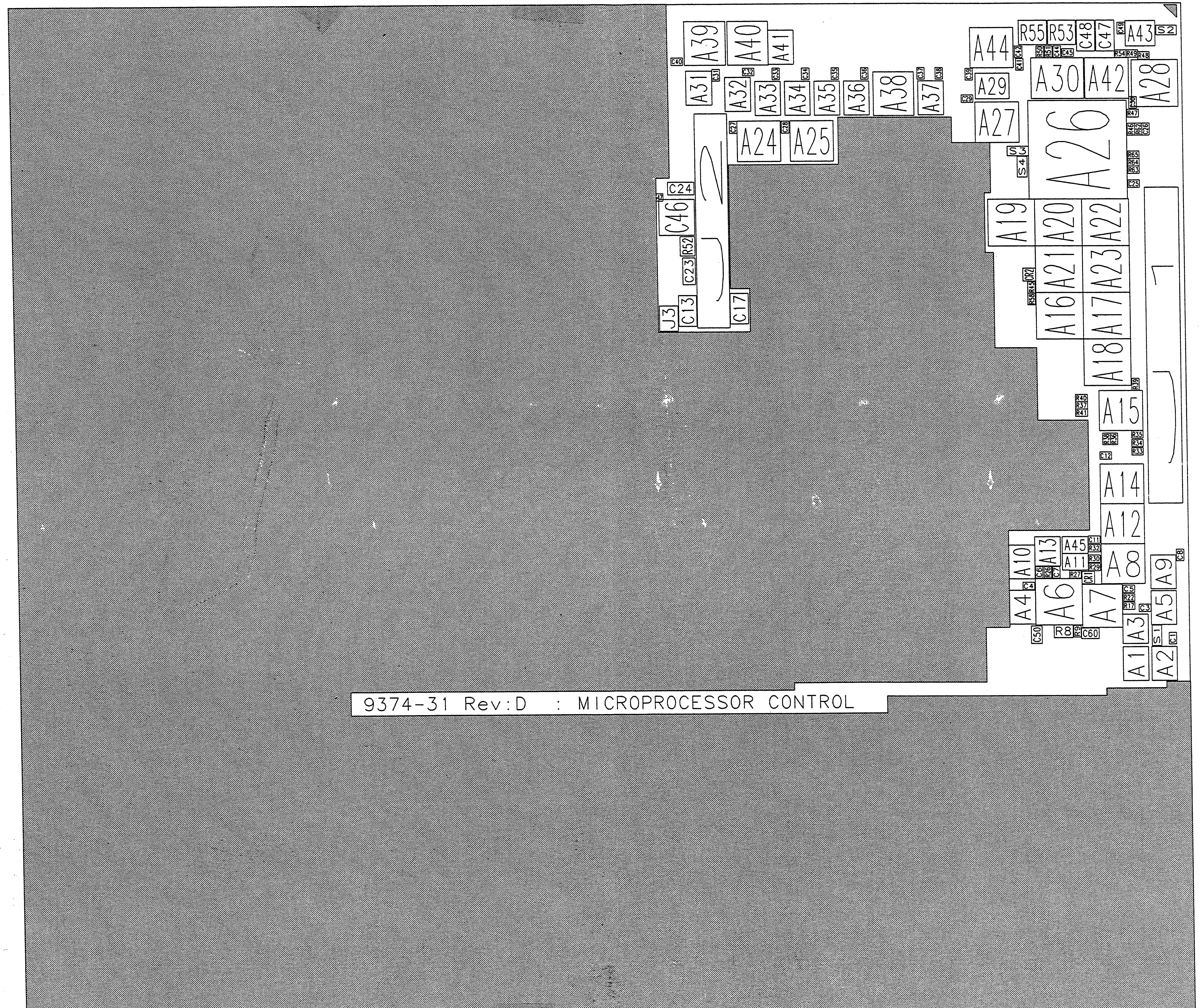

LeCroy S.A
MODEL : 9374-31
TIMEBASE (7/8)
Delay lines to compensate CKL stop logic

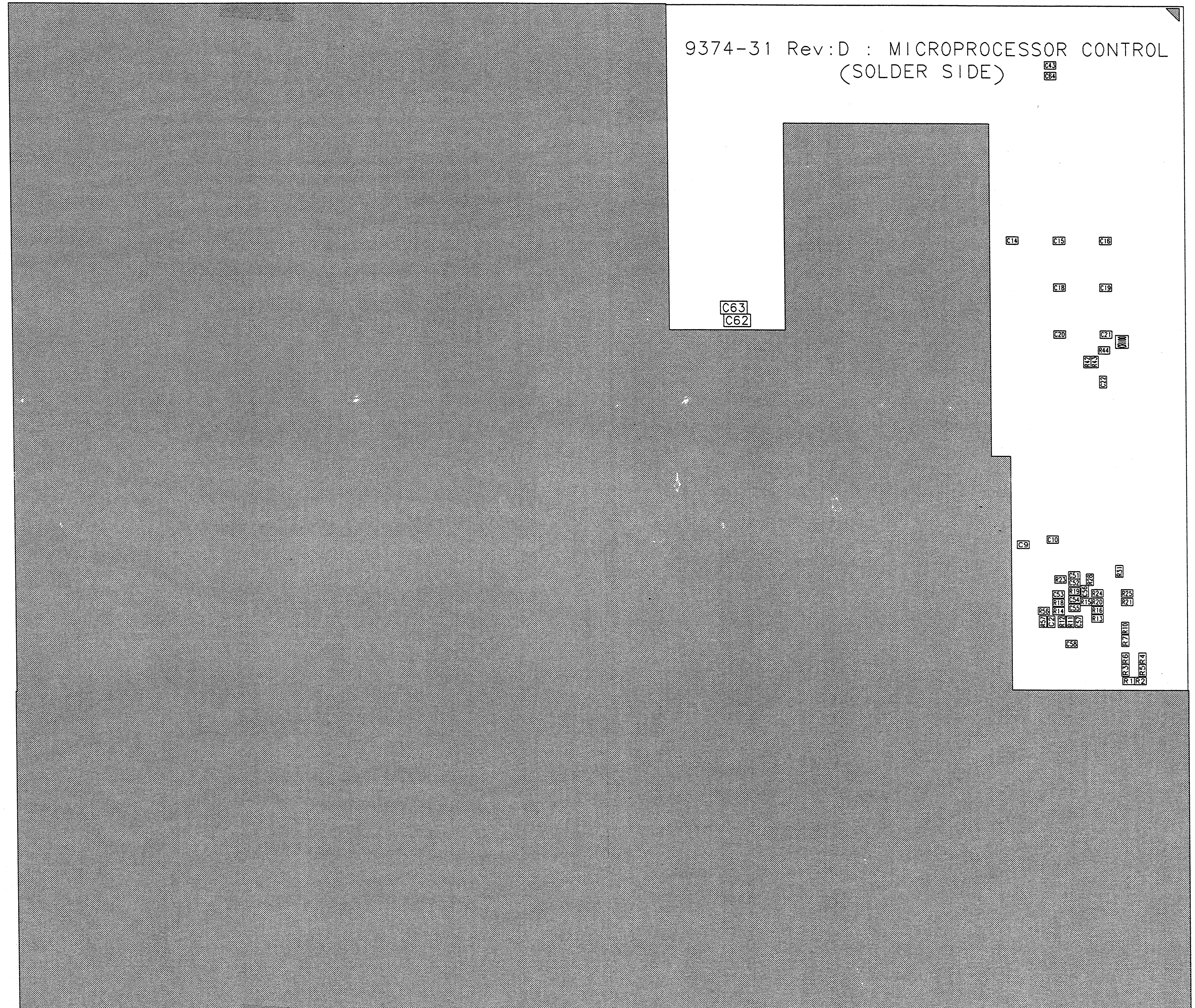

LeCroy S.A
MODEL : 9374-31
TIMEBASE (8/8)
DRAWN
CURTET-O
CHKD
LEHMANN-A.
DATE
01-MAY-96
DWG NO: SCHEMA-9374-31
SH: 55 of 56
REV. : I
18xSM.01uFS
34xSM.01uFS
VCC
VEE
C703 C739 C793 C788 C744 C799 C798 C800 C730
C704 C728 C720 C802 C809 C803 C801 C807 C797
C702 C711 C725 C713 C700 C721 C783 C769 C752 C732 C768 C738 C760 C789 C828 C824 C826
C716 C710 C718 C719 C724 C753 C781 C761 C787 C735 C776 C756 C734 C714 C823 C825 C827
A B C D E
1 2 3 4

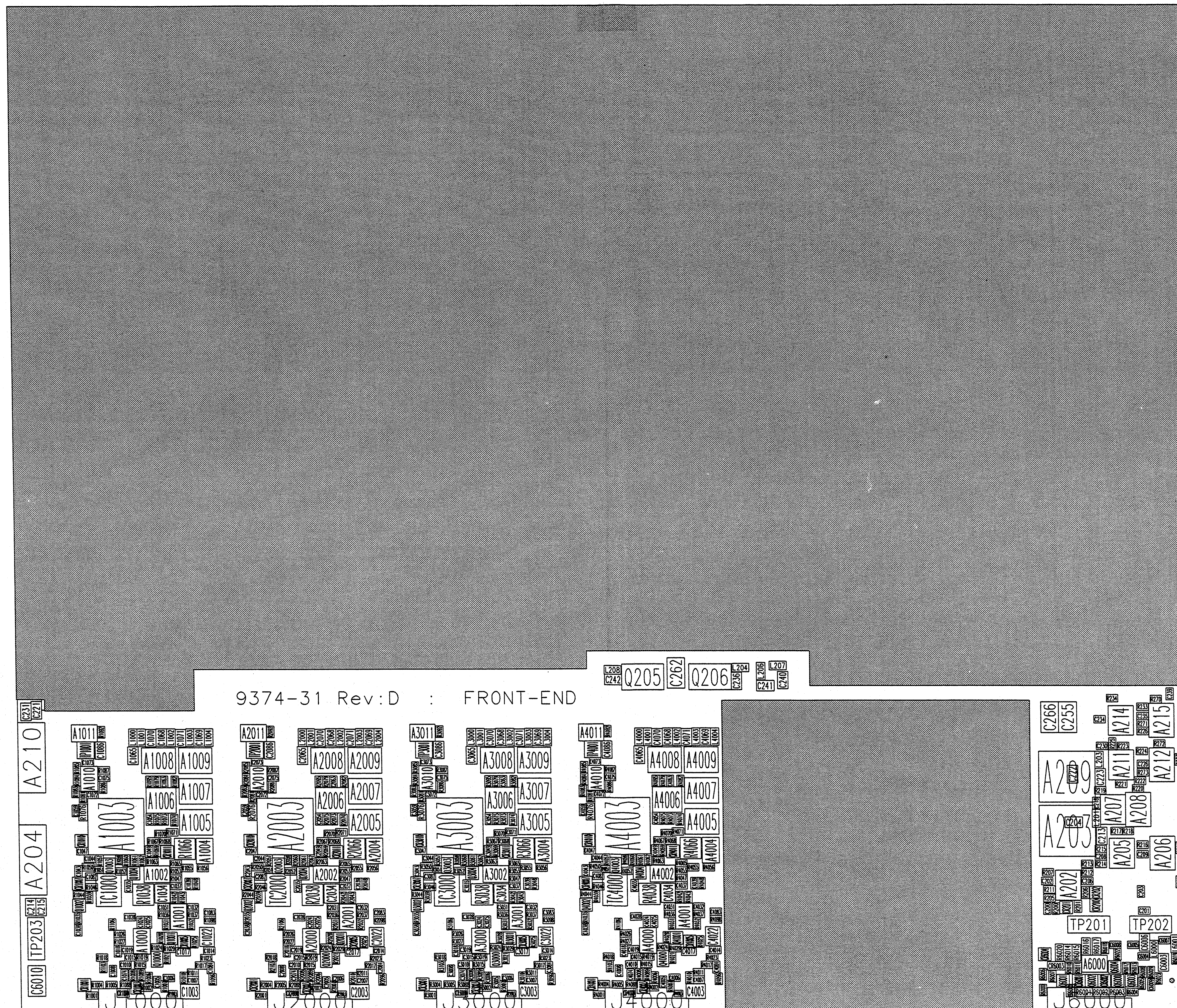

LeCroy S.A
MODEL : 9354-1
400-500MHz PLL OSCILLATOR
DWG NO: SCHEMA-9354-1
10-APR-96
REV. : E

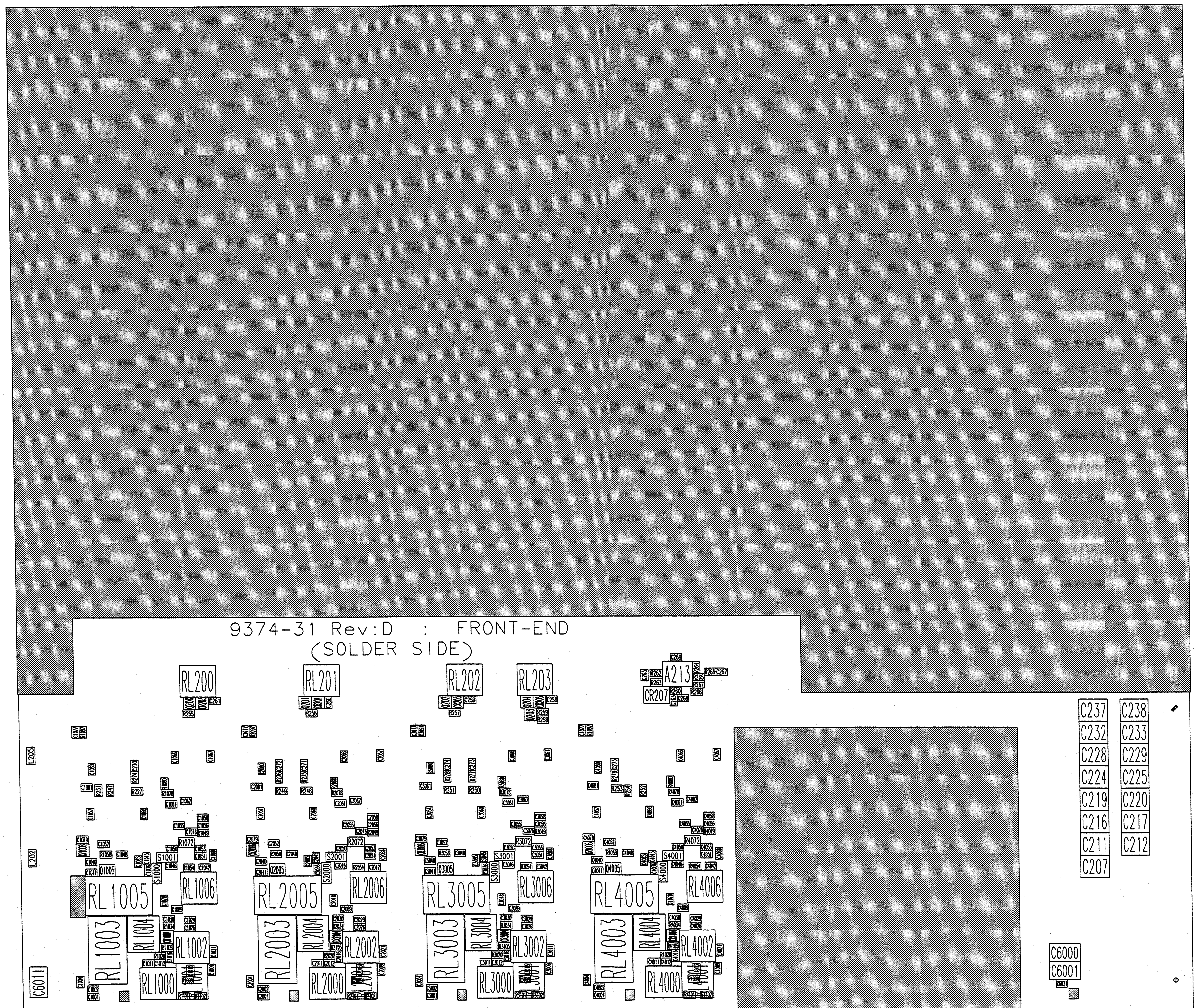

A100
C100
C101
A102
C104
C106
R100
C105
CR100
L100
A103
C111
C108
C109
C127
C129
R101
R112
R102
R103
C112
R107
C114
C115
R105
R106
A104
C113
R111
A105
R109
R110
A106
CR103
R113
R114
R115
C118
C119
R116
C121
R117
C123
C122
C128
A107
C124
C125
C126

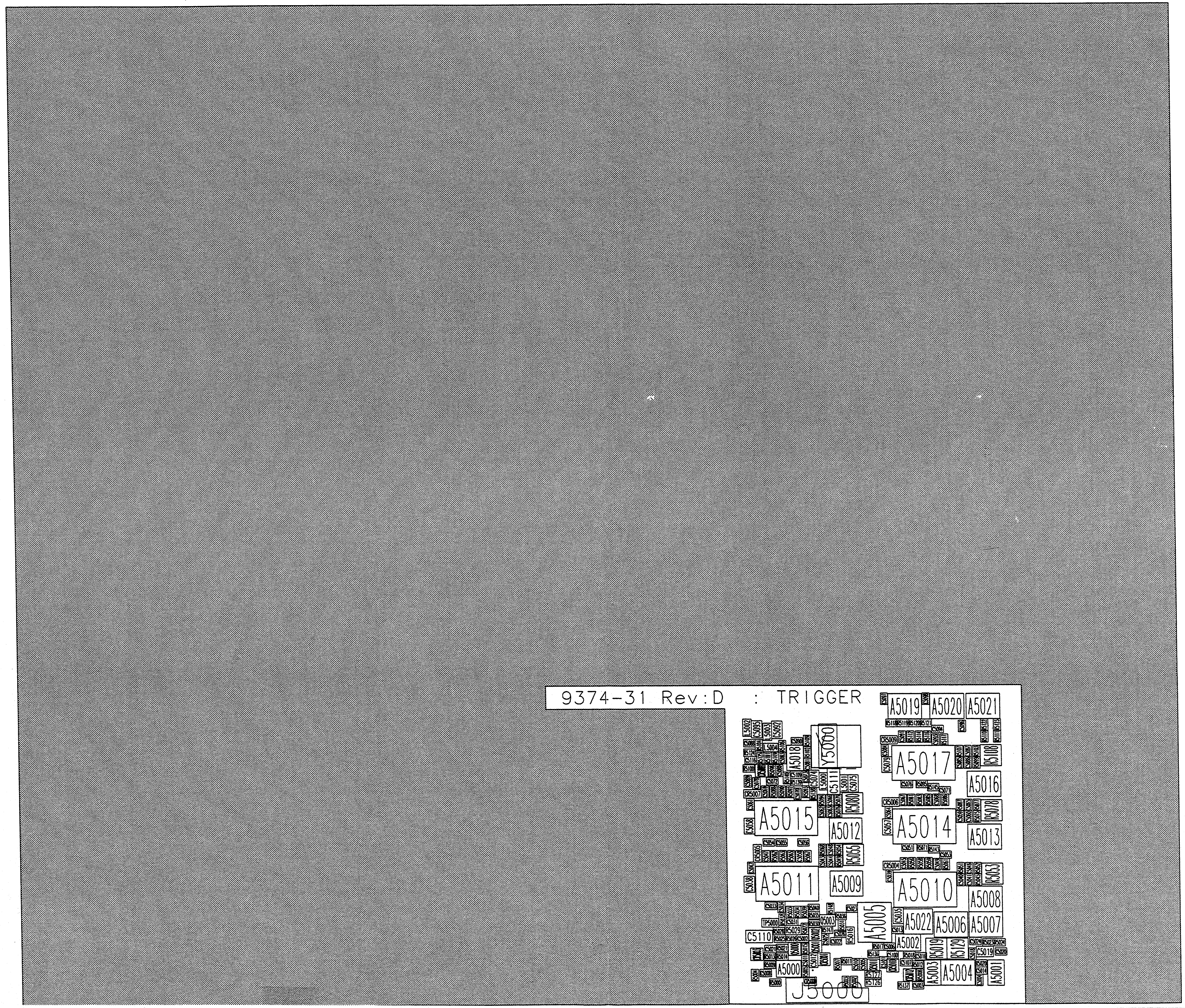

A101
C103
C102
C110
R104
CR101
C132
C131
L101
R108
R112
C130
C117
C116
J100
CR106
A108
C120
CR107
CR104
Q100
R118
CR105

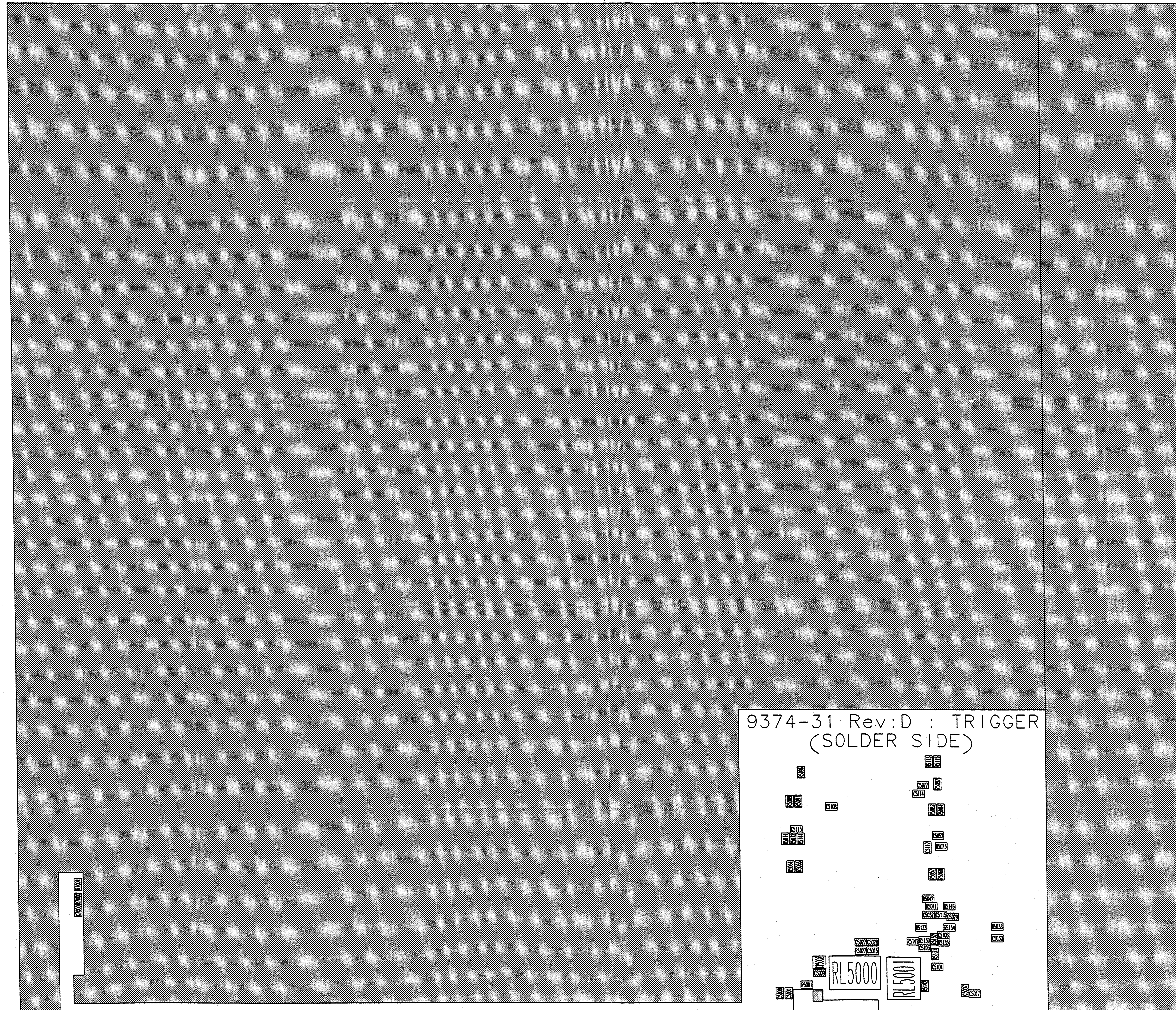

9374-31 Rev:D : MICROPROCESSOR CONTROL

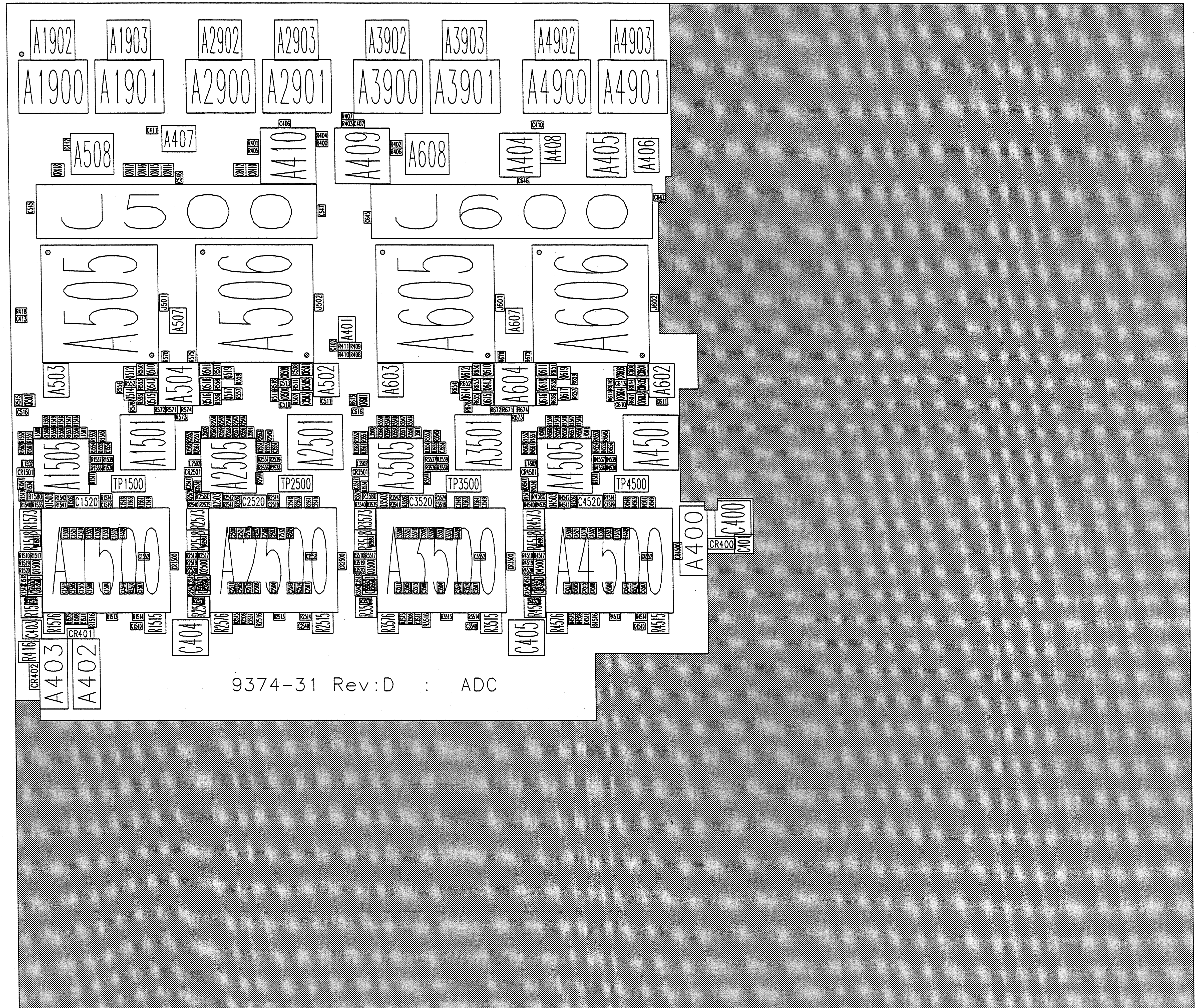

9374-31 Rev:D : MICROPROCESSOR CONTROL
(SOLDER SIDE)
C43
C64
C14
C15
C16
C18
C19
C20
C21
R44
C63
C62
C9
C10
C58

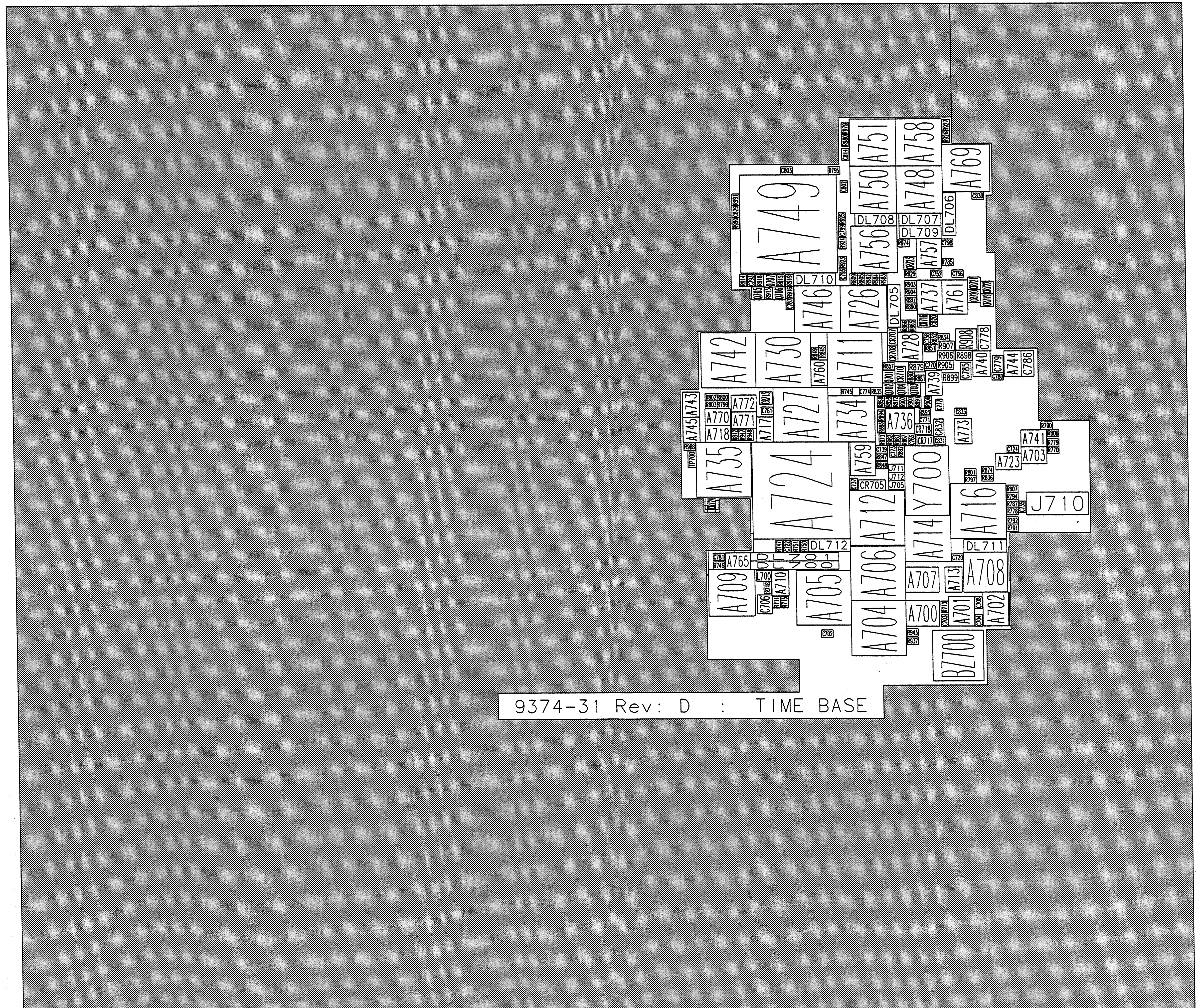

9374-31 Rev:D : FRONT-END
Q205
C262
Q206
A210
A204
TP203
C6010
J1000
J2000
J3000
J4000
J6000
A1003
A2003
A3003
A4003
C266
C255
A214
A215
A212
A211
A209
A203
A207
A208
A205
A206
A202
TP201
TP202
A6000

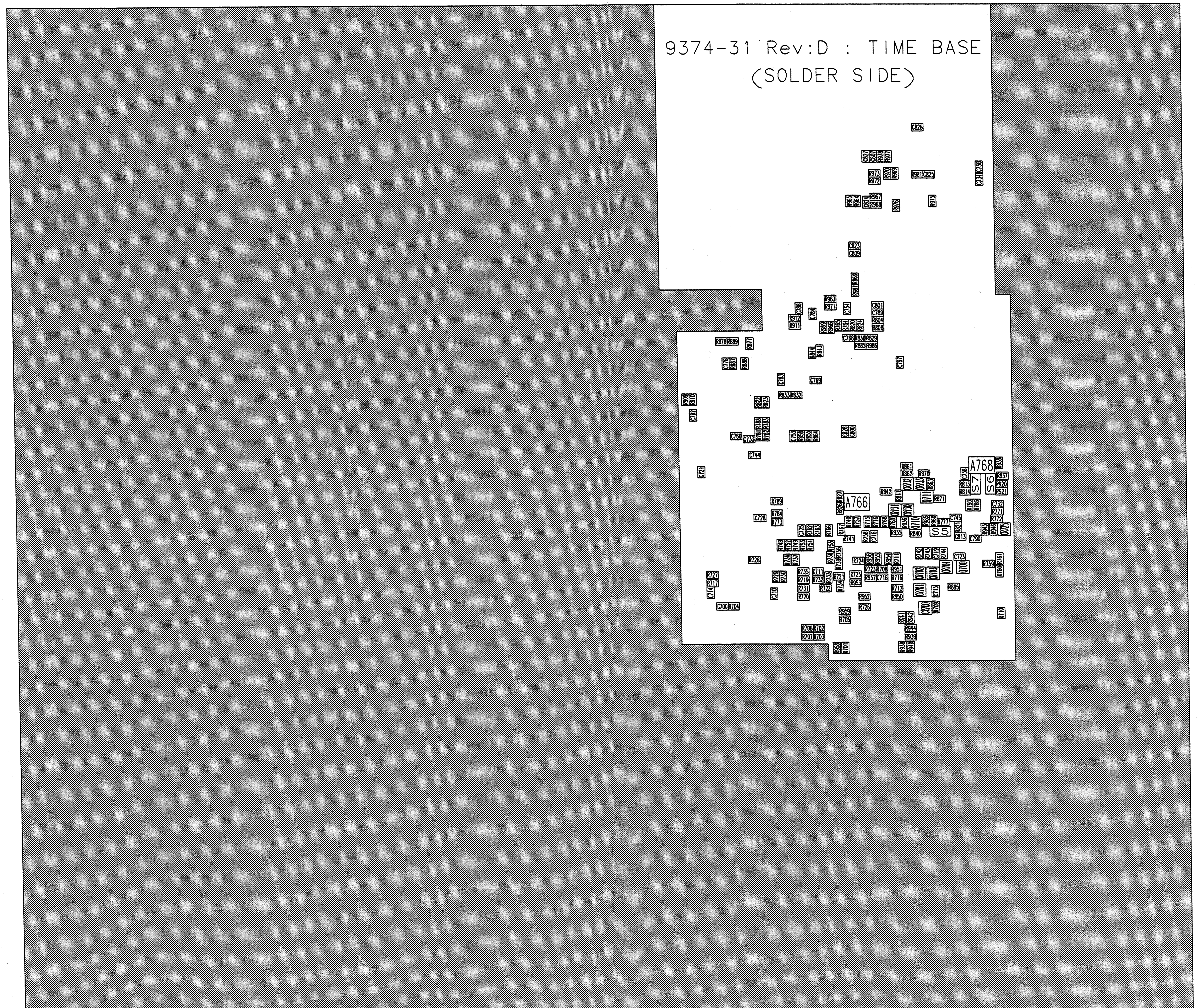

9374-31 Rev:D : FRONT-END
(SOLDER SIDE)


9374-31 Rev:D : TRIGGER
A5019
A5020
A5021
A5018
Y5000
C5111
A5017
R5108
A5016
A5015
A5014
R5078
A5013
A5012
A5011
A5009
A5010
R5053
A5008
A5005
A5022
A5006
A5007
C5110
A5002
R5019
R5129
C5019
A5000
A5003
A5004
A5001
J5000


9374-31 Rev:D : TRIGGER
(SOLDER SIDE)
RL5000
RL5001


A1902
A1903
A2902
A2903
A3902
A3903
A4902
A4903
A1900
A1901
A2900
A2901
A3900
A3901
A4900
A4901
A508
A407
A410
A409
A608
A404
A408
A405
A406
J500
J600
A505
A506
A605
A606
A507
A401
A607
A503
A504
A502
A603
A604
A602
A1505
A1501
A2505
A2501
A3505
A3501
A4505
A4501
TP1500
TP2500
TP3500
TP4500
C1520
C2520
C3520
C4520
A1500
A2500
A3500
A4500
A400
C400
CR400
C404
C405
CR401
A403
A402
9374-31 Rev:D : ADC


9374-31 Rev: D : TIME BASE


9374-31 Rev:D : TIME BASE
(SOLDER SIDE)
A768
A766
S5
S6
S7

PART: F9374-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9374/M/L/TM

Location	Part Number	Description
A1	SM205618165	SM74HCT165
A10	SM200178138	SM74HCT138
A1000	SM208470111	SMCLC111
A1001	SM208470705	SMAD705
A1002	SM208480640	SMOPA640
A1003	HFE419	HFE419
A1004	SM208470705	SMAD705
A1005	SM207770442	SMDG442-PS
A1006	SM208870339	SMLM339
A1007	SM289772003	SMULN2003
A1008	SM205618594	SM74HC594-PS
A1009	SM205618594	SM74HC594-PS
A1010	SM208470705	SMAD705
A1011	SM208880337	SM337L
A11	SM205108016	SM24LC16B
A12	SM206885245	SM74ABT245
A13	SM200178000	SM74HCT00
A14	SM206885245	SM74ABT245
A15	SM207171244	SM74ABT244
A1500	HSH423	HSH423
A1501	SM201166195	SM10E195
A1502	SM201174005	SM10EL05
A1503	SM201174011	SM10EL11
A1504	SM201174005	SM10EL05
A1505	SM207260718	SMTDA8718
A1506	SM201174011	SM10EL11
A16	SM205045357	CHEMIN-A
A17	SM205045358	ROUTE3-C
A18	SM205045355	RUELLE-A
A19	SM205045359	ARTERE-B
A1900	SM205701070	SRAM128Kx8-70
A1901	SM205701070	SRAM128Kx8-70
A1902	SM206884623	SM74ABT623
A1903	SM206884623	SM74ABT623
A2	SM200178138	SM74HCT138
A20	SM205045354	AVENUE-A
A2000	SM208470111	SMCLC111
A2001	SM208470705	SMAD705
A2002	SM208480640	SMOPA640
A2003	HFE419	HFE419
A2004	SM208470705	SMAD705
A2005	SM207770442	SMDG442-PS
A2006	SM208870339	SMLM339
A2007	SM289772003	SMULN2003
A2008	SM205618594	SM74HC594-PS
A2009	SM205618594	SM74HC594-PS
A2010	SM208470705	SMAD705
A2011	SM208880337	SM337L
A202	SM208870339	SMLM339
A203	208124003	7912+505019968
A204	208123002	7812+505070220
A205	SM208470347	SMLF347
A206	SM207770201	SMDG441-PS
A207	SM208470347	SMLF347
A208	SM207770201	SMDG441-PS
A209	208124003	7912+505019968
A21	SM205045350	ROUTE1-A
A210	208123002	7812+505070220
A211	SM208470347	SMLF347
A212	SM207770201	SMDG441-PS
A213	SM208470324	SMLM324
A214	SM208470347	SMLF347
A215	SM207770201	SMDG441-PS
A22	SM205045352	ROUTE2-B
A23	SM205045351	ROUTE2-A
A24	SM207171244	SM74ABT244
A25	SM207171244	SM74ABT244
A2500	HSH423	HSH423
A2501	SM201166195	SM10E195
A2502	SM201174005	SM10EL05
A2503	SM201174011	SM10EL11
A2504	SM201174005	SM10EL05
A2505	SM207260718	SMTDA8718
A2506	SM201174011	SM10EL11
A26	MCL404	MCL404
A27	SM207171244	SM74ABT244
A28	SM205045300	MIMOSA-A
A29	SM207972157	SM74F157A
A2900	SM205701070	SRAM128Kx8-70
A2901	SM205701070S	RAM128Kx8-70
A2902	SM206884623	SM74ABT623
A2903	SM206884623	SM74ABT623
A3	SM200178030	SM74HCT30
A30	SM207280703	SMDAC703
A3000	SM208470111	SMCLC111
A3001	SM208470705	SMAD705
A3002	SM208480640	SMOPA640
A3003	HFE419	HFE419
A3004	SM208470705	SMAD705
A3005	SM207770442	SMDG442-PS

PART: F9374-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9374/M/L/TM

Location	Part Number	Description	Location	Part Number	Description
A3006	SM208870339	SMLM339	A405	SM207172241	SM74ABT241
A3007	SM289772003	SMULN2003	A406	SM207970139	SM74F139
A3008	SM205618594	SM74HC594-PS	A407	SM207970139	SM74F139
A3009	SM205618594	SM74HC594-PS	A408	SM200172008	SM74F08
A3010	SM208470705	SMAD705	A409	SM207961158	SM10E158
A3011	SM208880337	SM337L	A41	SM207970139	SM74F139
A31	SM200169191	SM74F191	A410	SM207961158	SM10E158
A32	SM200169191	SM74F191	A42	SM200178374	SM74HCT374
A33	SM200169191	SM74F191	A43	SM200178074	SM74HCT74
A34	SM200169191	SM74F191	A44	SM200178273	SM74HCT273
A35	SM200169191	SM74F191	A45	SM208570805	SM78L05
A3500	HSH423	HSH423	A4500	HSH423	HSH423
A3501	SM201166195	SM10E195	A4501	SM201166195	SM10E195
A3502	SM201174005	SM10EL05	A4502	SM201174005	SM10EL05
A3503	SM201174011	SM10EL11	A4503	SM201174011	SM10EL11
A3504	SM201174005	SM10EL05	A4504	SM201174005	SM10EL05
A3505	SM207260718	SMTDA8718	A4505	SM207260718	SMTDA8718
A3506	SM201174011	SM10EL11	A4506	SM201174011	SM10EL11
A36	SM207970139	SM74F139	A4900	SM205701070	SRAM128Kx8
A37	SM200278040	SM74HCT4040	A4901	SM205701070	SRAM128Kx8
A38	SM207172241	SM74ABT241	A4902	SM206884623	SM74ABT623
A39	SM206884623	SM74ABT623	A4903	SM206884623	SM74ABT623
A3900	SM205701070	SRAM128Kx8	A5	SM200178138	SM74HCT138
A3901	SM205701070	SRAM128Kx8	A5000	SM208470705	SMAD705
A3902	SM206884623	SM74ABT623	A5001	SM208971881	SMLM1881
A3903	SM206884623	SM74ABT623	A5002	SM208470037	SMOP37
A4	SM200178138	SM74HCT138	A5003	SM208470351	SMLF351
A40	SM206884623	SM74ABT623	A5004	SM207770403	SMDG403-PS
A400	208124003	7912+505070220	A5005	SM207970508	SMDG508-PS
A4000	SM208470111	SMCLC111	A5006	SM205618594	SM74HC594-PS
A4001	SM208470705	SMAD705	A5007	SM207770442	SMDG442-PS
A4002	SM208480640	SMOPA640	A5008	SM205618594	SM74HC594-PS
A4003	HFE419	HFE419	A5009	SM205618594	SM74HC594-PS
A4004	SM208470705	SMAD705	A5010	MTR408	MTR408
A4005	SM207770442	SMDG442-PS	A5011	MTR408	MTR408
A4006	SM208870339	SMLM339	A5012	SM205618594	SM74HC594-PS
A4007	SM289772003	SMULN2003	A5013	SM205618594	SM74HC594-PS
A4008	SM205618594	SM74HC594-PS	A5014	MTR408	MTR408
A4009	SM205618594	SM74HC594-PS	A5015	MTR408	MTR408
A401	SM201174011	SM10EL11	A5016	SM205618594	SM74HC594-PS
A4010	SM208470705	SMAD705	A5017	MTR408	MTR408
A4011	SM208880337	SM337L	A5018	SM201570016	SM10EL16-PS
A402	208123002	7812+505070220	A5019	SM205618594	SM74HC594-PS
A403	208122002	7805+505070220	A502	SM205618594	SM74HC594-PS
A404	SM207172241	SM74ABT241	A5020	SM205618594	SM74HC594-PS

PART: F9374-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9374/M/L/TM

Location	Part Number	Description
A5021	SM207978153	SM74HCT153
A5022	SM208870339	SMLM339
A503	SM205618594	SM74HC594-PS
A504	SM207288800	SMDAC8800
A505	MDX416	MDX416
A506	MDX416	MDX416
A507	SM201174011	SM10EL11
A508	SM207171244	SM74ABT244
A6	SM206260858	SMADC0858
A6000	SM208470353	MLF353
A602	SM205618594	SM74HC594-PS
A603	SM205618594	SM74HC594-PS
A604	SM207288800	SMDAC8800
A605	MDX416	MDX416
A606	MDX416	MDX416
A607	SM201174011	SM10EL11
A608	SM207171244	SM74ABT244
A7	SM207970351	SM74HC4351
A700	SM205618594	SM74HC594-PS
A701	SM200178002	SM74HCT02
A702	SM207978251	SM74HCT251
A703	SM201274033	SM10EL33
A704	SM206970457	SM10E457
A705	SM206970457	SM10E457
A706	SM201164104	SM10E104
A707	SM205618594	SM74HC594-PS
A708	SM200178273	SM74HCT273
A709	SM200167102	SM10H102
A710	SM201174011	SM10EL11
A711	SM201164131	SM10E131
A712	SM207960157	SM10E157
A713	SM201570016	SM10EL16
A714	SM200167164	SM10H164
A716	SM206970457	SM10E457
A717	SM201174001	SM10EL01
A718	SM201174031	SM10EL31
A723	SM201274032	SM10EL32
A724	MST412	MST412
A726	SM207360125	SM10125
A727	SM200169016	SM10E016
A728	SM200178002	SM74HCT02
A730	SM201164167	SM10E167
A734	SM207360125	SM10125
A735	SM200169016	SM10E016
A736	SM208030245	SMSL3245
A737	SM205618594	SM74HC594-PS
A739	SM208470353	SMLF353
A740	SM208570078	SM78L12
A741	SM201274032	SM10EL32
A742	SM200169016	SM10E016
A743	SM201274032	SM10EL32
A744	SM208880079	SM79L12
A745	SM201174001	SM10EL01
A746	SM207360125	SM10125
A748	SM200167102	SM10H102
A749	MTB411	MTB411
A750	SM200167131	SM10H131
A751	SM207367125	SM10H125
A756	SM207367124	SM10H124
A757	SM200178074	SM74HCT74
A758	SM200167131	SM10H131
A759	SM207170367	SM74HC367
A760	SM201174031	SM10EL31
A761	SM205618594	SM74HC594-PS
A765	SM201174031	SM10EL31
A769	SM207367125	SM10H125
A770	SM201174031	SM10EL31
A771	SM201174031	SM10EL31
A772	SM201174031	SM10EL31
A773	SM208570805	SM78L05
A8	SM206070584	SMPCD8584
A9	SM207978251	SM74HCT251
BZ700	530040007	TMB-05
C1	SM661207103	SM.01µF
C10	SM661207103	SM.01µF
C1001	SM661207104	SM.1µF
C1002	SM661207104	SM.1µF
C1003	SM158240202	SM2.5-10pF
C1005	SM661207103	SM.01µF
C1006	SM661540082	SM8.2pF_500V
C1007	SM661535620	SM62pF
C1008	SM661207103	SM.01µF
C1009	SM661207103	SM.01µF
C1010	SM661207103	SM.01µF
C1011	SM661207103	SM.01µF
C1012	SM661207103	SM.01µF
C1013	SM661540033	SM3.3pF_500V
C1014	SM661255220	SM22pF
C1015	SM661255100	SM10pF
C1016	SM661207103	SM.01µF

PART: F9374-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9374/M/L/TM

Location	Part Number	Description	Location	Part Number	Description
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C1017	SM661526561	SM560pF_500V	C1069	SM666327225	SM2.2μF-20V
C1018	SM661255101	SM100pF	C1070	SM666327225	SM2.2μF-20V
C1019	SM661207103	SM.01μF	C1071	SM666327225	SM2.2μF-20V
C1021	SM661207103	SM.01μF	C1072	SM661207103	SM.01μF
C1022	SM158240201	SM1-5pF	C1073	SM661207103	SM.01μF
C1024	SM661207103	SM.01μF	C1074	SM661207103	SM.01μF
C1025	SM661207103	SM.01μF	C1075	SM661207104	SM.1μF
C1026	SM661207103	SM.01μF	C1076	SM661207103	SM.01μF
C1028	SM661255101	SM100pF	C1077	SM661207103	SM.01μF
C1029	SM661207103	SM.01μF	C1079	SM661207104	SM.1μF
C1030	SM661207103	SM.01μF	C1080	SM661207103	SM.01μF
C1031	SM661207223	SM.022μF	C1081	SM661207103	SM.01μF
C1032	SM661207223	M.022μF	C1083	SM661540082	SM8.2pF_500V
C1034	SM158240200	SM0.6-2.5pF	C1084	SM661255012	SM1.2pF
C1035	SM661207103	SM.01μF	C1086	SM666327225	SM2.2μF-20V
C1036	SM661207103	SM.01μF	C1087	SM661255101	SM100pF
C1038	SM661207103	SM.01μF	C1089	SM661207102	SM.001μF
C1039	SM661207103	SM.01μF	C1090	SM661255022	SM2.2pF
C1041	SM661207103	SM.01μF	C11	SM661207103	SM.01μF
C1042	SM661255821	SM820pF	C12	SM661207103	SM.01μF
C1043	SM661207103	SM.01μF	C13	SM666247106	SM10μF-25V
C1044	SM661255101	SM100pF	C14	SM661207103	SM.01μF
C1045	SM661207103	SM.01μF	C15	SM661207103	SM.01μF
C1046	SM661207103	SM.01μF	C1500	SM661207103	SM.01μF
C1047	SM661207103	SM.01μF	C1502	SM661207103	SM.01μF
C1048	SM661207103	SM.01μF	C1503	SM661207103	SM.01μF
C1049	SM661255100	SM10pF	C1504	SM661207103	SM.01μF
C1050	SM661207103	SM.01μF	C1505	SM661207103	SM.01μF
C1051	SM661207103	SM.01μF	C1506	SM661255152	SM1500pF
C1052	SM661207103	SM.01μF	C1507	SM661207103	SM.01μF
C1053	SM661207103	SM.01μF	C1508	SM661207103	SM.01μF
C1054	SM661207103	SM.01μF	C1509	SM661207103	SM.01μF
C1055	SM661207103	SM.01μF	C1510	SM661207103	SM.01μF
C1056	SM661207103	SM.01μF	C1511	SM661207103	SM.01μF
C1057	SM661207104	SM.1μF	C1512	SM661207103	SM.01μF
C1058	SM661207103	SM.01μF	C1513	SM661207103	SM.01μF
C1059	SM661207103	SM.01μF	C1514	SM661207103	SM.01μF
C1060	SM661207104	SM.1μF	C1515	SM661207103	SM.01μF
C1061	SM661207103	SM.01μF	C1518	SM661205472	SM.0047μF
C1062	SM661207103	SM.01μF.	C1519	SM661207104	SM.1μF
C1063	SM661207104	SM.1μF	C1520	158849010	1-5pF
C1065	SM666327225	SM2.2μF-20V	C1521	SM661207103	SM.01μF
C1066	SM661207103	SM.01μF	C1522	SM661207104	SM.1μF
C1067	SM661207103	SM.01μF	C1523	SM661207104	SM.1μF
C1068	SM666327225	SM2.2μF-20V	C1524	SM661207104	SM.1μF

PART: F9374-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9374/M/L/TM

Location	Part Number	Description
C1525	SM661207104	SM.1μF
C1526	SM661207104	SM.1μF
C1527	SM661207104	SM.1μF
C1528	SM661207104	SM.1μF
C1529	SM661207104	SM.1μF
C1530	SM661207104	SM.1μF
C1531	SM661207104	SM.1μF
C1532	SM661207104	SM.1μF
C1533	SM661207104	SM.1μF
C1537	SM661207104	SM.1μF
C1540	SM661207104	SM.1μF
C1541	SM661207104	SM.1μF
C1542	SM661207104	SM.1μF
C1543	SM661207104	SM.1μF
C1544	SM661207104	SM.1μF
C1545	SM661207104	SM.1μF
C1547	SM661207104	SM.1μF
C1548	SM661207102	SM.001μF
C1549	SM661207102	SM.001μF
C1552	SM661207103	SM.01μF
C1553	SM158240202	SM2.5-10pF
C1554	SM661207103	SM.01μF
C1555	SM661255033	SM3.3pF
C16	SM661207103	SM.01μF
C17	SM666247106	SM10μF-25V
C18	SM661207103	SM.01μF
C19	SM661207103	SM.01μF
C1900	SM661207103	SM.01μF
C1901	SM661207103	SM.01μF
C1902	SM661207103	SM.01μF
C1903	SM661207103	SM.01μF
C2	SM661207104	SM.1μF
C20	SM661207103	SM.01μF
C200	SM661207103	SM.01μF
C2001	SM661207104	SM.1μF
C2002	SM661207104	SM.1μF
C2003	SM158240202	SM2.5-10pF
C2005	SM661207103	SM.01μF
C2006	SM661540082	SM8.2pF_500V
C2007	SM661535620	SM62pF
C2008	SM661207103	SM.01μF
C2009	SM661207103	SM.01μF
C201	SM661207103	SM.01μF
C2010	SM661207103	SM.01μF
C2011	SM661207103	SM.01μF
C2012	SM661207103	SM.01μF
C2013	SM661540033	SM3.3pF_500V
C2014	SM661255220	SM22pF
C2015	SM661255100	SM10pF
C2016	SM661207103	SM.01μF
C2017	SM661526561	SM560pF_500V
C2018	SM661255101	SM100pF
C2019	SM661207103	SM.01μF
C202	SM661207104	SM.1μF
C2021	SM661207103	SM.01μF
C2022	SM158240201	SM1-5pF
C2024	SM661207103	SM.01μF
C2025	SM661207103	SM.01μF
C2026	SM661207103	SM.01μF
C2028	SM661255101	SM100pF
C2029	SM661207103	SM.01μF
C203	SM661207103	SM.01μF
C2030	SM661207103	SM.01μF
C2031	SM661207223	SM.022μF
C2032	SM661207223	SM.022μF
C2034	SM158240200	SM0.6-2.5pF
C2035	SM661207103	SM.01μF
C2036	SM661207103	SM.01μF
C2038	SM661207103	SM.01μF
C2039	SM661207103	SM.01μF
C204	SM666327225	SM2.2μF-20V
C2041	SM661207103	SM.01μF
C2042	SM661255821	SM820pF
C2043	SM661207103	SM.01μF
C2044	SM661255101	SM100pF
C2045	SM661207103	SM.01μF
C2046	SM661207103	SM.01μF
C2047	SM661207103	SM.01μF
C2048	SM661207103	SM.01μF
C2049	SM661255100	SM10pF
C205	SM661207103	SM.01μF
C2050	SM661207103	SM.01μF
C2051	SM661207103	SM.01μF
C2052	SM661207103	SM.01μF
C2053	SM661207103	SM.01μF
C2054	SM661207103	SM.01μF
C2055	SM661207103	SM.01μF
C2056	SM661207103	SM.01μF
C2057	SM661207104	SM.1μF
C2058	SM661207103	SM.01μF

PART: F9374-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9374/M/L/TM

Location	Part Number	Description
C2059	SM661207103	SM.01μF
C206	SM661207103	SM.01μF
C2060	SM661207104	SM.1μF
C2061	SM661207103	SM.01μF
C2062	SM661207103	SM.01μF
C2063	SM661207104	SM.1μF
C2065	SM666327225	SM2.2μF-20V
C2066	SM661207103	SM.01μF
C2067	SM661207103	SM.01μF
C2068	SM666327225	SM2.2μF-20V
C2069	SM666327225	SM2.2μF-20V
C207	SM661555103	SM.01μF-NPO
C2070	SM666327225	SM2.2μF-20V
C2071	SM666327225	SM2.2μF-20V
C2072	SM661207103	SM.01μF
C2073	SM661207103	SM.01μF
C2074	SM661207103	SM.01μF
C2075	SM661207104	SM.1μF
C2076	SM661207103	SM.01μF
C2077	SM661207103	SM.01μF
C2079	SM661207104	SM.1μF
C208	SM661207103	SM.01μF
C2080	SM661207103	SM.01μF
C2081	SM661207103	SM.01μF
C2083	SM661540082	SM8.2pF_500V
C2084	SM661255012	SM1.2pF
C2086	SM666327225	SM2.2μF-20V
C2087	SM661255101	SM100pF
C2089	SM661207102	SM.001μF
C209	SM661207103	SM.01μF
C2090	SM661255022	SM2.2pF
C21	SM661207103	SM.01μF
C210	SM661207103	SM.01μF
C211	SM661555103	SM.01μF-NPO
C212	SM661555103	SM.01μF-NPO
C213	SM666327225	SM2.2μF-20V
C214	SM666327225	SM2.2μF-20V
C215	SM666327225	SM2.2μF-20V
C216	SM661555103	SM.01μF-NPO
C217	SM661555103	SM.01μF-NPO
C218	SM661207103	SM.01μF
C219	SM661555103	SM.01μF-NPO
C22	SM661207103	SM.01μF
C220	SM661555103	SM.01μF-NPO
C221	SM666327225	SM2.2μF-20V
C222	SM666327225	SM2.2μF-20V
C223	SM666327225	SM2.2μF-20V
C224	SM661555103	SM.01μF-NPO
C225	SM661555103	SM.01μF-NPO
C226	SM661207103	SM.01μF
C227	SM661207103	SM.01μF
C228	SM661555103	SM.01μF-NPO
C229	SM661555103	SM.01μF-NPO
C23	SM666377226	SM22μF-15V
C230	SM661207103	SM.01μF
C231	SM666327225	SM2.2μF-20V
C232	SM661555103	SM.01μF-NPO
C233	SM661555103	SM.01μF-NPO
C234	SM661207103	SM.01μF
C235	SM661207103	SM.01μF
C236	SM666327225	SM2.2μF-20V
C237	SM661555103	SM.01μF-NPO
C238	SM661555103	SM.01μF-NPO
C239	SM661207103	SM.01μF
C24	SM666377226	SM22μF-15V
C240	SM666327225	SM2.2μF-20V
C241	SM666327225	SM2.2μF-20V
C242	SM666327225	SM2.2μF-20V
C25	SM661207103	SM.01μF
C2500	SM661207103	SM.01μF
C2502	SM661207103	SM.01μF
C2503	SM661207103	SM.01μF
C2504	SM661207103	SM.01μF
C2505	SM661207103	SM.01μF
C2506	SM661255152	SM1500pF
C2507	SM661207103	SM.01μF
C2508	SM661207103	SM.01μF
C2509	SM661207103	SM.01μF
C2510	SM661207103	SM.01μF
C2511	SM661207103	SM.01μF
C2512	SM661207103	SM.01μF
C2513	SM661207103	SM.01μF
C2514	SM661207103	SM.01μF
C2515	SM661207103	SM.01μF
C2518	SM661205472	SM.0047μF
C2519	SM661207104	SM.1μF
C2520	158849010	1-5pF
C2521	SM661207103	SM.01μF
C2522	SM661207104	SM.1μF
C2523	SM661207104	SM.1μF

PART: F9374-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9374/M/L/TM

Location	Part Number	Description
C2524	SM661207104	SM.1µF
C2525	SM661207104	SM.1µF
C2526	SM661207104	SM.1µF
C2527	SM661207104	SM.1µF
C2528	SM661207104	SM.1µF
C2529	SM661207104	SM.1µF
C2530	SM661207104	SM.1µF
C2531	SM661207104	SM.1µF
C2532	SM661207104	SM.1µF
C2533	SM661207104	SM.1µF
C2537	SM661207104	SM.1µF
C2540	SM661207104	SM.1µF
C2541	SM661207104	SM.1µF
C2542	SM661207104	SM.1µF
C2543	SM661207104	SM.1µF
C2544	SM661207104	SM.1µF
C2545	SM661207104	SM.1µF
C2547	SM661207104	SM.1µF
C2548	SM661207102	SM.001µF
C2549	SM661207102	SM.001µF
C255	SM666237476	SM47µF-6V
C2552	SM661207103	SM.01µF
C2553	SM158240202	SM2.5-10pF
C2554	SM661207103	SM.01µF
C2555	SM661255033	SM3.3pF
C258	SM661207103	SM.01µF
C259	SM661207103	SM.01µF
C26	SM661207103	SM.01µF
C260	SM661207103	SM.01µF
C261	SM661207103	SM.01µF
C262	SM666237476	SM47µF-6V
C263	SM661207103	SM.01µF
C265	SM661207103	SM.01µF
C266	SM666237476	SM47µF-6V
C267	SM661207103	SM.01µF
C268	SM661207103	SM.01µF
C269	SM661207103	SM.01µF
C27	SM661207103	SM.01µF
C270	SM661255100	SM10pF
C271	SM661255100	SM10pF
C272	SM661255100	SM10pF
C273	SM661255100	SM10pF
C274	SM661255100	SM10pF
C275	SM661255100	SM10pF
C28	SM661207103	SM.01µF

Location	Part Number	Description
C29	SM661207103	SM.01µF
C2900	SM661207103	SM.01µF
C2901	SM661207103	SM.01µF
C2902	SM661207103	SM.01µF
C2903	SM661207103	SM.01µF
C3	SM661207103	SM.01µF
C30	SM661207103	SM.01µF
C3001	SM661207104	SM.1µF
C3002	SM661207104	SM.1µF
C3003	SM158240202	SM2.5-10pF
C3005	SM661207103	SM.01µF
C3006	SM661540082	SM8.2pF_500V
C3007	SM661535620	SM62pF
C3008	SM661207103	SM.01µF
C3009	SM661207103	SM.01µF
C3010	SM661207103	SM.01µF
C3011	SM661207103	SM.01µF
C3012	SM661207103	SM.01µF
C3013	SM661540033	SM3.3pF_500V
C3014	SM661255220	SM22pF
C3015	SM661255100	SM10pF
C3016	SM661207103	SM.01µF
C3017	SM661526561	SM560pF_500V
C3018	SM661255101	SM100pF
C3019	SM661207103	SM.01µF
C3021	SM661207103	SM.01µF
C3022	SM158240201	SM1-5pF
C3024	SM661207103	SM.01µF
C3025	SM661207103	SM.01µF
C3026	SM661207103	SM.01µF
C3028	SM661255101	SM100pF
C3029	SM661207103	SM.01µF
C3030	SM661207103	SM.01µF
C3031	SM661207223	SM.022µF
C3032	SM661207223	SM.022µF
C3034	SM158240200	SM0.6-2.5pF
C3035	SM661207103	SM.01µF
C3036	SM661207103	SM.01µF
C3038	SM661207103	SM.01µF
C3039	SM661207103	SM.01µF
C3041	SM661207103	SM.01µF
C3042	SM661255821	SM820pF
C3043	SM661207103	SM.01µF
C3044	SM661255101	SM100pF
C3045	SM661207103	SM.01µF

PART: F9374-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9374/M/L/TM

Location	Part Number	Description	Location	Part Number	Description
C3046	SM661207103	SM.01µF	C3500	SM661207103	SM.01µF
C3047	SM661207103	SM.01µF	C3502	SM661207103	SM.01µF
C3048	SM661207103	SM.01µF	C3503	SM661207103	SM.01µF
C3049	SM661255100	SM10pF	C3504	SM661207103	SM.01µF
C3050	SM661207103	SM.01µF	C3505	SM661207103	SM.01µF
C3051	SM661207103	SM.01µF	C3506	SM661255152	SM1500pF
C3052	SM661207103	SM.01µF	C3507	SM661207103	SM.01µF
C3053	SM661207103	SM.01µF	C3508	SM661207103	SM.01µF
C3054	SM661207103	SM.01µF	C3509	SM661207103	SM.01µF
C3055	SM661207103	SM.01µF	C3510	SM661207103	SM.01µF
C3056	SM661207103	SM.01µF	C3511	SM661207103	SM.01µF
C3057	SM661207104	SM.1µF	C3512	SM661207103	SM.01µF
C3058	SM661207103	SM.01µF	C3513	SM661207103	SM.01µF
C3059	SM661207103	SM.01µF	C3514	SM661207103	SM.01µF
C3060	SM661207104	SM.1µF	C3515	SM661207103	SM.01µF
C3061	SM661207103	SM.01µF	C3518	SM661205472	SM.0047µF
C3062	SM661207103	SM.01µF	C3519	SM661207104	SM.1µF
C3063	SM661207104	SM.1µF	C3520	158849010	1-5pF
C3065	SM666327225	SM2.2µF-20V	C3521	SM661207103	SM.01µF
C3066	SM661207103	SM.01µF	C3522	SM661207104	SM.1µF
C3067	SM661207103	SM.01µF	C3523	SM661207104	SM.1µF
C3068	SM666327225	SM2.2µF-20V	C3524	SM661207104	SM.1µF
C3069	SM666327225	SM2.2µF-20V	C3525	SM661207104	SM.1µF
C3070	SM666327225	SM2.2µF-20V	C3526	SM661207104	SM.1µF
C3071	SM666327225	SM2.2µF-20V	C3527	SM661207104	SM.1µF
C3072	SM661207103	SM.01µF	C3528	SM661207104	SM.1µF
C3073	SM661207103	SM.01µF	C3529	SM661207104	SM.1µF
C3074	SM661207103	SM.01µF	C3530	SM661207104	SM.1µF
C3075	SM661207104	SM.1µF	C3531	SM661207104	SM.1µF
C3076	SM661207103	SM.01µF	C3532	SM661207104	SM.1µF
C3077	SM661207103	SM.01µF	C3533	SM661207104	SM.1µF
C3079	SM661207104	SM.1µF	C3537	SM661207104	SM.1µF
C3080	SM661207103	SM.01µF	C3540	SM661207104	SM.1µF
C3081	SM661207103	SM.01µF	C3541	SM661207104	SM.1µF
C3083	SM661540082	SM8.2pF_500V	C3542	SM661207104	SM.1µF
C3084	SM661255012	SM1.2pF	C3543	SM661207104	SM.1µF
C3086	SM666327225	SM2.2µF-20V	C3544	SM661207104	SM.1µF
C3087	SM661255101	SM100pF	C3545	SM661207104	SM.1µF
C3089	SM661207102	SM.001µF	C3547	SM661207104	SM.1µF
C3090	SM661255022	SM2.2pF	C3548	SM661207102	SM.001µF
C31	SM661207103	SM.01µF	C3549	SM661207102	SM.001µF
C32	SM661207103	SM.01µF	C3552	SM661207103	SM.01µF
C33	SM661207103	SM.01µF	C3553	SM158240202	SM2.5-10pF
C34	SM661207103	SM.01µF	C3554	SM661207103	SM.01µF
C35	SM661207103	SM.01µF	C3555	SM661255033	SM3.3pF

PART: F9374-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9374/M/L/TM

Location	Part Number	Description
C36	SM661207103	SM.01µF
C37	SM661207103	SM.01µF
C38	SM661207103	SM.01µF
C39	SM661207103	SM.01µF
C3900	SM661207103	SM.01µF
C3901	SM661207103	SM.01µF
C3902	SM661207103	SM.01µF
C3903	SM661207103	SM.01µF
C4	SM661207103	SM.01µF
C40	SM661207103	SM.01µF
C400	146574227	220µF -25V
C4001	SM661207104	SM.1µF
C4002	SM661207104	SM.1µF
C4003	SM158240202	SM2.5-10pF
C4005	SM661207103	SM.01µF
C4006	SM661540082	SM8.2pF_500V
C4007	SM661535620	SM62pF_5
C4008	SM661207103	SM.01µF
C4009	SM661207103	SM.01µF
C401	146554476	47µF -25V
C4010	SM661207103	SM.01µF
C4011	SM661207103	SM.01µF
C4012	SM661207103	SM.01µF
C4013	SM661540033	SM3.3pF_500V
C4014	SM661255220	SM22pF
C4015	SM661255100	SM10pF
C4016	SM661207103	SM.01µF
C4017	SM661526561	SM560pF_500V
C4018	SM661255101	SM100pF
C4019	SM661207103	SM.01µF
C402	SM661207103	SM.01µF
C4021	SM661207103	SM.01µF
C4022	SM158240201	SM1-5pF
C4024	SM661207103	SM.01µF
C4025	SM661207103	SM.01µF
C4026	SM661207103	SM.01µF
C4028	SM661255101	SM100pF
C4029	SM661207103	SM.01µF
C403	146554476	47µF-25V
C4030	SM661207103	SM.01µF
C4031	SM661207223	SM.022µF
C4032	SM661207223	SM.022µF
C4034	SM158240200	SM0.6-2.5pF
C4035	SM661207103	SM.01µF
C4036	SM661207103	SM.01µF
C4038	SM661207103	SM.01µF
C4039	SM661207103	SM.01µF
C404	146574227	220µF-25V
C4041	SM661207103	SM.01µF
C4042	SM661255821	SM820pF
C4043	SM661207103	SM.01µF
C4044	SM661255101	SM100pF
C4045	SM661207103	SM.01µF
C4046	SM661207103	SM.01µF
C4047	SM661207103	SM.01µF
C4048	SM661207103	SM.01µF
C4049	SM661255100	SM10pF
C405	146574227	220µF -25V
C4050	SM661207103	SM.01µF
C4051	SM661207103	SM.01µF
C4052	SM661207103	SM.01µF
C4053	SM661207103	SM.01µF
C4054	SM661207103	SM.01µF
C4055	SM661207103	SM.01µF
C4056	SM661207103	SM.01µF
C4057	SM661207104	SM.1µF
C4058	SM661207103	SM.01µF
C4059	SM661207103	SM.01µF
C406	SM661207103	SM.01µF
C4060	SM661207104	SM.1µF
C4061	SM661207103	SM.01µF
C4062	SM661207103	SM.01µF
C4063	SM661207104	SM.1µF
C4065	SM666327225	SM2.2µF-20V
C4066	SM661207103	SM.01µF
C4067	SM661207103	SM.01µF
C4068	SM666327225	SM2.2µF-20V
C4069	SM666327225	SM2.2µF-20V
C407	SM661207103	SM.01µF
C4070	SM666327225	SM2.2µF-20V
C4071	SM666327225	SM2.2µF-20V
C4072	SM661207103	SM.01µF
C4073	SM661207103	SM.01µF
C4074	SM661207103	SM.01µF
C4075	SM661207104	SM.1µF
C4076	SM661207103	SM.01µF
C4077	SM661207103	SM.01µF
C4079	SM661207104	SM.1µF
C408	SM661207103	SM.01µF
C4080	SM661207103	SM.01µF

PART: F9374-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9374/M/L/TM

Location	Part Number	Description
C4081	SM661207103	SM.01µF
C4083	SM661540082	SM8.2pF_500V
C4084	SM661255012	SM1.2pF
C4086	SM666327225	SM2.2µF-20V
C4087	SM661255101	SM100pF
C4089	SM661207102	SM.001µF
C4090	SM661255022	SM2.2pF
C41	SM661207104	SM.1µF
C410	SM661207103	SM.01µF
C411	SM661207103	SM.01µF
C412	SM661207103	SM.01µF
C413	SM661207103	SM.01µF
C42	SM661207103	SM.01µF
C43	SM661207103	SM.01µF
C44	SM661207103	SM.01µF
C45	SM661207104	SM.1µF
C4500	SM661207103	SM.01µF
C4502	SM661207103	SM.01µF
C4503	SM661207103	SM.01µF
C4504	SM661207103	SM.01µF
C4505	SM661207103	SM.01µF
C4506	SM661255152	SM1500pF
C4507	SM661207103	SM.01µF
C4508	SM661207103	SM.01µF
C4509	SM661207103	SM.01µF
C4510	SM661207103	SM.01µF
C4511	SM661207103	SM.01µF
C4512	SM661207103	SM.01µF
C4513	SM661207103	SM.01µF
C4514	SM661207103	SM.01µF
C4515	SM661207103	SM.01µF
C4518	SM661205472	SM.0047µF
C4519	SM661207104	SM.1µF
C4520	158849010	1-5pF
C4521	SM661207103	SM.01µF
C4522	SM661207104	SM.1µF
C4523	SM661207104	SM.1µF
C4524	SM661207104	SM.1µF
C4525	SM661207104	SM.1µF
C4526	SM661207104	SM.1µF
C4527	SM661207104	SM.1µF
C4528	SM661207104	SM.1µF
C4529	SM661207104	SM.1µF
C4530	SM661207104	SM.1µF
C4531	SM661207104	SM.1µF

Location	Part Number	Description
C4532	SM661207104	SM.1µF
C4533	SM661207104	SM.1µF
C4537	SM661207104	SM.1µF
C4540	SM661207104	SM.1µF
C4541	SM661207104	SM.1µF
C4542	SM661207104	SM.1µF
C4543	SM661207104	SM.1µF
C4544	SM661207104	SM.1µF
C4545	SM661207104	SM.1µF
C4547	SM661207104	SM.1µF
C4548	SM661207102	SM.001µF
C4549	SM661207102	SM.001µF
C4552	SM661207103	SM.01µF
C4553	SM158240202	SM2.5-10pF
C4554	SM661207103	SM.01µF
C4555	SM661255033	SM3.3pF
C46	146544471	470µF-25V
C47	SM666247106	SM10µF-25V
C48	SM666247106	SM10µF-25V
C49	SM661207103	SM.01µF
C4900	SM661207103	SM.01µF
C4901	SM661207103	SM.01µF
C4902	SM661207103	SM.01µF
C4903	SM661207103	SM.01µF
C5	SM661207103	SM.01µF
C50	SM666327225	SM2.2µF-20V
C5000	SM661207104	SM.1µF
C5001	SM661207104	SM.1µF
C5002	SM661255010	SM1pF
C5003	SM661207103	SM.01µF
C5004	SM661207103	SM.01µF
C5005	SM661540033	SM3.3pF-500V
C5006	SM661207103	SM.01µF
C5007	SM661207103	SM.01µF
C5008	SM661207103	SM.01µF
C5009	SM661207103	SM.01µF
C5010	SM661540033	SM3.3pF-500V
C5011	SM661207103	SM.01µF
C5012	SM661526561	SM560pF-500V
C5013	SM661207103	SM.01µF
C5014	SM661207104	SM.1µF
C5015	SM661207103	SM.01µF
C5016	SM661207103	SM.01µF
C5017	SM661207103	SM.01µF
C5018	SM661255821	SM820pF

PART: F9374-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9374/M/L/TM

Location	Part Number	Description	Location	Part Number	Description
C5019	SM666327225	SM2.2µF-20V	C5066	SM661207103	SM.01µF
C5020	SM661207104	SM.1µF	C5067	SM661207103	SM.01µF
C5021	SM661207103	SM.01µF	C5068SM661205822		SM.0082µF
C5022	SM661207103	SM.01µF	C5069	SM661207103	SM.01µF
C5023	SM661207103	SM.01µF	C5070	SM661205822	SM.0082µF
C5024	SM661207103	SM.01µF	C5071	SM661207103	SM.01µF
C5025	SM661207103	SM.01µF	C5072	SM661207103	SM.01µF
C5026	SM661207103	SM.01µF	C5073	SM661207103	SM.01µF
C5027	SM661255220	SM22pF	C5074	SM666327225	SM2.2µF-20V
C5028	SM661255330	SM33pF	C5075	SM666327225	SM2.2µF-20V
C5029	SM661207103	SM.01µF	C5076	SM661255270	SM27pF
C5030	SM661207103	SM.01µF	C5077	SM661207103	SM.01µF
C5031	SM661255150	SM15pF	C5078	SM661255101	SM100pF
C5032	SM661255270	SM27pF	C5079	SM666427105	SM1µF-16V
C5033	SM661255270	SM27pF	C508	SM661207103	SM.01µF
C5034	SM661207103	SM.01µF	C5083	SM661207103	SM.01µF
C5035	SM666427105	SM1µF-16V	C5084	SM661207103	SM.01µF
C5038	SM666427105	SM1µF-16V	C5085	SM661207103	SM.01µF
C5039	SM661207103	SM.01µF	C5086	SM661207103	SM.01µF
C5040	SM661207103	SM.01µF	C5087	SM661207103	SM.01µF
C5041	SM661207103	SM.01µF	C5088	SM661207103	SM.01µF
C5042	SM661207103	SM.01µF	C5089	SM661207103	SM.01µF
C5043	SM661207103	SM.01µF	C5090	SM661207103	SM.01µF
C5044	SM661207103	SM.01µF	C5091	SM661207103	SM.01µF
C5045	SM661207103	SM.01µF	C5092	SM666327225	SM2.2µF-20V
C5046	SM661207103	SM.01µF	C5093	SM661205822	SM.0082µF
C5047	SM661207103	SM.01µF	C5094	SM661207103	SM.01µF
C5048	SM661207103	SM.01µF	C5095	SM666327225	SM2.2µF-20V
C5049	SM661205822	SM.0082µF	C5096	SM661207103	SM.01µF
C5050	SM661205822	SM.0082µF	C5097	SM661207103	SM.01µF
C5051	SM661255270	SM27pF	C5098	SM661207103	SM.01µF
C5052	SM661207103	SM.01µF	C51	SM661207104	SM.1µF
C5053	SM661207103	SM.01µF	C510	SM661207103	SM.01µF
C5054	SM661255270	SM27pF	C5100	SM661207103	SM.01µF
C5055	SM661207103	SM.01µF	C5101	SM661207103	SM.01µF
C5056	SM661207103	SM.01µF	C5103	SM661207104	SM.1µF
C5057	SM666427105	SM1µF-16V	C5104	SM661207104	SM.1µF
C5058	SM666427105	SM1µF-16V	C5106	SM661207103	SM.01µF
C5059	SM661207103	SM.01µF	C5107	SM661255100	SM10pF
C5060	SM661207103	SM.01µF	C5108	SM661207103	SM.01µF
C5061	SM661207103	SM.01µF	C5109	SM661255056	SM5.6pF
C5062	SM661207103	SM.01µF	C511	SM661207103	SM.01µF
C5063	SM661207103	SM.01µF	C5110	SM666377226	SM22µ-15V
C5064	SM661207103	SM.01µF	C5111	SM666377226	SM22µF-15V
C5065	SM661207103	SM.01µF	C5112	SM661207103	SM.01µF

PART: F9374-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9374/M/L/TM

Location	Part Number	Description	Location	Part Number	Description
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C5113	SM661207103	SM.01μF	C6001	SM666257336	SM33μF-16V
C5114	SM661207103	SM.01μF	C6003	SM666327225	SM2.2μF-20V
C5115	SM661207103	SM.01μF	C6004	SM661207103	SM.01μF
C5116	SM661255047	SM4.7pF-10	C6005	SM661207103	SM.01μF
C512	SM661207103	SM.01μF	C6006	SM666327225	SM2.2μF-20V
C513	SM661207103	SM.01μF	C6007	SM661207103	SM.01μF
C516	SM661207103	SM.01μF	C6008	SM661255102	SM1000pF
C52	SM661207104	SM.1μF	C6009	SM661255056	SM5.6pF
C520	SM661207104	SM.1μF	C6010	SM666257336	SM33μF-16V
C521	SM661207104	SM.1μF	C6011	SM666257336	SM33μF-16V
C522	SM661207104	SM.1μF	C608S	M661207103	SM.01μF
C523	SM661207104	SM.1μF	C610	SM661207103	SM.01μF
C524	SM661207104	SM.1μF	C611	SM661207103	SM.01μF
C525	SM661207104	SM.1μF	C612	SM661207103	SM.01μF
C526	SM661207104	SM.1μF	C613	SM661207103	SM.01μF
C527	SM661207104	SM.1μF	C616	SM661207103	SM.01μF
C528	SM661207103	SM.01μF	C62	SM666377226	SM22μF-15V
C529	SM661207103	SM.01μF	C620	SM661207104	SM.1μF
C53	SM661207104	SM.1μF	C621	SM661207104	SM.1μF
C530	SM661207103	SM.01μF	C622	SM661207104	SM.1μF
C531	SM661207104	SM.1μF	C623	SM661207104	SM.1μF
C532	SM661207104	SM.1μF	C624	SM661207104	SM.1μF
C533	SM661207104	SM.1μF	C625	SM661207104	SM.1μF
C534	SM661207104	SM.1μF	C626	SM661207104	SM.1μF
C535	SM661207104	SM.1μF	C627	SM661207104	SM.1μF
C536	SM661207104	SM.1μF	C628	SM661207103	SM.01μF
C537	SM661207104	SM.1μF	C629	SM661207103	SM.01μF
C538	SM661207104	SM.1μF	C63	SM666377226	SM22μF-15V
C539	SM661207103	SM.01μF	C630	SM661207103	SM.01μF
C54	SM661207104	M.1μF	C631	SM661207104	SM.1μF
C542	SM661207103	SM.01μF	C632	SM661207104	SM.1μF
C543	SM661207103	SM.01μF	C633	SM661207104	SM.1μF
C544	SM661207103	SM.01μF	C634	SM661207104	SM.1μF
C545	SM661207104	SM.1μF	C635	SM661207104	SM.1μF
C546	SM661207104	SM.1μF	C636	SM661207104	SM.1μF
C547	SM661207104	SM.1μF	C637	SM661207104	SM.1μF
C548	SM661207104	SM.1μF	C638	SM661207104	SM.1μF
C549	SM661207104	SM.1μF	C639	SM661207103	SM.01μF
C55	SM661207104	SM.1μF	C64	SM661207104	SM.1μF
C56	SM661207104	SM.1μF	C640	SM661207103	SM.01μF
C57	SM661207104	SM.1μF	C641	SM661207103	SM.01μF
C58	SM661207104	SM.1μF	C642	SM661207103	SM.01μF
C6	SM661255181	SM180pF	C643	SM661207103	SM.01μF
C60	SM666086226	SM22μF-10V	C644	SM661207103	SM.01μF
C6000	SM666257336	SM33μF-16V	C645	SM661207104	SM.1μF

PART: F9374-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9374/M/L/TM

Location	Part Number	Description	Location	Part Number	Description
C646	SM661207104	SM.1μF	C769	SM661207103	SM.01μF
C647	SM661207104	SM.1μF	C770	SM661207103	SM.01μF
C648	SM661207104	SM.1μF	C771	SM661207103	SM.01μF
C649	SM661207104	SM.1μF	C773	SM661207103	SM.01μF
C7	SM661207104	SM.1μF	C774	SM661207103	SM.01μF
C700	SM661207103	SM.01μF	C776	SM661207103	SM.01μF
C7000	SM661207103	SM.01μF	C777	SM661207103	SM.01μF
C702	SM661207103	SM.01μF	C778	SM661446474	SM.47μF
C703	SM661207103	SM.01μF	C779	SM666327225	SM2.2μF-20V
C704	SM661207103	SM.01μF	C780	SM661207103	SM.01μF
C706	SM158240200	SM0.6-2.5pF	C781	SM661207103	SM.01μF
C708	SM661255560	SM56pF	C782	SM661207103	SM.01μF
C710	SM661207103	SM.01μF	C783	SM661207103	SM.01μF
C711	SM661207103	SM.01μF	C784	SM661207103	SM.01μF
C713	SM661207103	SM.01μF	C785	SM666327225	SM2.2μF-20V
C714	SM661207103	SM.01μF	C786	SM661446474	SM.47μF
C716	SM661207103	SM.01μF	C787	SM661207103	SM.01μF
C718	SM661207103	SM.01μF	C788	SM661207103	SM.01μF
C719	SM661207103	SM.01μF	C789	SM661207103	SM.01μF
C720	SM661207103	SM.01μF	C790	SM661207103	SM.01μF
C721	SM661207103	SM.01μF	C793	SM661207103	SM.01μF
C722	SM661207103	SM.01μF	C795	SM661207103	SM.01μF
C723	SM661207103	SM.01μF	C797	SM661207103	SM.01μF
C724	SM661207103	SM.01μF	C798	SM661207103	SM.01μF
C725	SM661207103	SM.01μF	C799	SM661207103	SM.01μF
C728	SM661207103	SM.01μF	C8	SM661207103	SM.01μF
C730	SM661207103	SM.01μF	C800	SM661207103	SM.01μF
C732	SM661207103	SM.01μF	C801	SM661207103	SM.01μF
C733	SM661255560	SM56pF	C802	SM661207103	SM.01μF
C734	SM661207103	SM.01μF	C803	SM661207103	SM.01μF
C735	SM661207103	SM.01μF	C807	SM661207103	SM.01μF
C737	SM661207103	SM.01μF	C809	SM661207103	SM.01μF
C738	SM661207103	SM.01μF	C813	SM661207103	SM.01μF
C739	SM661207103	SM.01μF	C814	SM661207103	SM.01μF
C744	SM661207103	SM.01μF	C820	SM661207103	SM.01μF
C745	SM661207103	SM.01μF	C823	SM661207103	SM.01μF
C752	SM661207103	SM.01μF	C824	SM661207103	SM.01μF
C753	SM661207103	SM.01μF	C825	SM661207103	SM.01μF
C754	SM661207103	SM.01μF	C826	SM661207103	SM.01μF
C756	SM661207103	SM.01μF	C827	SM661207103	SM.01μF
C758	SM661255056	SM5.6pF	C828	SM661207103	SM.01μF
C760	SM661207103	SM.01μF	C829	SM661255180	SM18pF
C761	SM661207103	SM.01μF	C830	SM661207103	SM.01μF
C765	SM661255101	SM100pF	C831	SM661207103	SM.01μF
C768	SM661207103	SM.01μF	C832	SM666327225	SM2.2μF-20V

PART: F9374-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9374/M/L/TM

Location	Part Number	Description
C833	SM661207103	SM.01µF
C9	SM661207103	SM.01µF
CR1	SM236030099	BAV99
CR100	SM253032823	HSMS2823
CR1000	SM229020150	SMTVSS-5V6
CR1001	SM236030099	BAV99
CR1003	SM236030099	BAV99
CR1005	SM252023018	BAT18
CR1006	SM236030099	BAV99
CR1007	SM236030099	BAV99
CR1010	SM240218462	BZX84-C6V2
CR1500	SM240050051	TZMC5V1
CR1501	SM240050051	TZMC5V1
CR2	SM232120070	BAV70
CR200	SM240218451	BZX84-C5V1
CR2000	SM229020150	SMTVSS-5V6
CR2001	SM236030099	BAV99
CR2003	SM236030099	BAV99
CR2005	SM252023018	BAT18
CR2006	SM236030099	BAV99
CR2007	SM236030099	BAV99
CR201	SM240218475	BZX84-C7V5
CR2010	SM240218462	BZX84-C6V2
CR202	SM240218475	BZX84-C7V5
CR203	SM236030099	BAV99
CR204	SM236030099	BAV99
CR205	SM236030099	BAV99
CR206	SM236030099	BAV99
CR207	SM208591336	SMLM336-5
CR2500	SM240050051	TZMC5V1
CR2501	SM240050051	TZMC5V1
CR3000	SM229020150	SMTVSS-5V6
CR3001	SM236030099	BAV99
CR3003	SM236030099	BAV99
CR3005	SM252023018	BAT18
CR3006	SM236030099	BAV99
CR3007	SM236030099	BAV99
CR3010	SM240218462	BZX84-C6V2
CR3500	SM240050051	TZMC5V1
CR3501	SM240050051	TZMC5V1
CR400	SM236654004	SM4004
CR4000	SM229020150	SMTVSS-5V6
CR4001	SM236030099	BAV99
CR4003	SM236030099	BAV99
CR4005	SM252023018	BAT18
CR4006	SM236030099	BAV99
CR4007	SM236030099	BAV99
CR401	SM236654004	SM4004
CR4010	SM240218462	BZX84-C6V2
CR402	SM236654004	SM4004
CR410	SM253032823	HSMS2823
CR411	SM253032823	HSMS2823
CR412	SM253032823	HSMS2823
CR413	SM253032823	HSMS2823
CR414	SM253032823	HSMS2823
CR415	SM253032823	HSMS2823
CR416	SM253032823	HSMS2823
CR417	SM253032823	HSMS2823
CR418	SM253032823	HSMS2823
CR4500	SM240050051	TZMC5V1
CR4501	SM240050051	TZMC5V1
CR5000	SM229020150	SMTVSS-5V6
CR5001	SM252023018	BAT18
CR5002	SM232120070	BAV70
CR5003	SM236030099	BAV99
CR5004	SM240050033	TZMC3V3
CR5005	SM240050033	TZMC3V3
CR5006	SM240050033	TZMC3V3
CR5007	SM240050033	TZMC3V3
CR5009	SM240050033	TZMC3V3
CR501	SM236030099	BAV99
CR5010	SM232120070	BAV70
CR5011	SM236030099	BAV99
CR5012	SM236030099	BAV99
CR503	SM240218451	BZX84-C5V1
CR504	SM240218451	BZX84-C5V1
CR505	SM240218451	BZX84-C5V1
CR507	SM240218451	BZX84-C5V1
CR508	SM240218451	BZX84-C5V1
CR6000	SM229020150	SMTVSS-5V6
CR6001	SM253032823	HSMS2823
CR6002	SM232022822	HSMS2822
CR6003	SM240050051	TZMC5V1
CR6004	SM236030099	BAV99
CR601	SM236030099	BAV99
CR603	SM240218451	BZX84-C5V1
CR604	SM240218451	BZX84-C5V1
CR605	SM240218451	BZX84-C5V1
CR607	SM240218451	BZX84-C5V1
CR608	SM240218451	BZX84-C5V1

PART: F9374-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9374/M/L/TM

Location	Part Number	Description
CR700	SM240218451	BZX84-C5V1
CR701	SM236030099	BAV99
CR702	SM240218451	BZX84-C5V1
CR703	SM240218451	BZX84-C5V1
CR704	SM240218451	BZX84-C5V1
CR705	SM236654004	SM4004
CR706	SM236654004	SM4004
CR707	SM252080682	BA682
CR708	SM252080682	BA682
CR710	SM252080682	BA682
CR713	SM236030099	BAV99
CR716	SM236030099	BAV99
CR717	SM252080682	BA682
CR718	SM252080682	BA682
CR719	SM240218451	BZX84-C5V1
CR720	SM240218451	BZX84-C5V1
CR721	SM240218451	BZX84-C5V1
CR722	SM240218451	BZX84-C5V1
CR723	SM232022822	HSMS2822
CR724	SM236030099	BAV99
CR725	SM232022822	HSMS2822
CR730	SM236030099	BAV99
CR731	SM236030099	BAV99
CR732	SM236030099	BAV99
CR733	SM236030099	BAV99
DL700	290199015	DL-1L6-15
DL701	290199015	DL-1L6-15
DL705	290120009	9nS
DL706	290120004	4nS
DL707	290120002	2nS
DL708	290120002	2nS
DL709	290120002	2nS
DL710	290120009	9nS
DL711	290120002	2nS
DL712	290120005	5nS
J1	454220096	3x32-ST-F-PF
J1000	7093XXP01-	P21 BNC PROBE
J2	454115016	1x16-ST-MFLPN
J2000	7093XXP01-P21	BNC-PROBE
J3	454390002	1x2-ST-M-PL
J3000	7093XXP01-P21	BNC-PROBE
J4000	7093XXP01-P21	BNC-PROBE
J500	454111024-7x	4x42-ST-F-
J5000	7093XXP01-P21	BNC-PROBE
J600	454111024-7x	4x42-ST-F

Location	Part Number	Description
J6000	7093XXP01-P21	BNC-PROBE
J710	SM454120025	SM1x12-13-STF
L1000	SM301502001	SMBD1206
L1001	SM301502001	SMBD1206
L1002	SM301502001	SMBD1206
L1003	SM301502001	SMBD1206
L1004	SM301502001	SMBD1206
L1500	SM669080181	SMBD0805
L1501	SM669080181	SMBD0805
L1502	SM654101000	SM0S
L2000	SM301502001	SMBD1206
L2001	SM301502001	SMBD1206
L2002	SM301502001	SMBD1206
L2003	SM301502001	SMBD1206
L2004	SM301502001	SMBD1206
L201	SM301502001	SMBD1206
L202	SM301502001	SMBD1206
L203	SM301502001	SMBD1206
L204	SM301502001	SMBD1206
L205	SM301502001	SMBD1206
L206	SM301502001	SMBD1206
L207	SM301502001	SMBD1206
L208	SM301502001	SMBD1206
L2500	SM669080181	SMBD0805
L2501	SM669080181	SMBD0805
L2502	SM654101000	SM0S
L3000	SM301502001	SMBD1206
L3001	SM301502001	SMBD1206
L3002	SM301502001	SMBD1206
L3003	SM301502001	SMBD1206
L3004	SM301502001	SMBD1206
L3500	SM669080181	SMBD0805
L3501	SM669080181	SMBD0805
L3502	SM654101000	SM0S
L4000	SM301502001	SMBD1206
L4001	SM301502001	SMBD1206
L4002	SM301502001	SMBD1206
L4003	SM301502001	SMBD1206
L4004	SM301502001	SMBD1206
L4500	SM669080181	SMBD0805
L4501	SM669080181	SMBD0805
L4502	SM654101000	SM0S
L5000	SM301502001	SMBD1206
L5001	SM301502001	SMBD1206
L5002	SM301502001	SMBD1206

PART: F9374-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9374/M/L/TM

Location	Part Number	Description
L5003	SM301502001	SMBD1206
L6000	SM301502001	SMBD1206
L6001	SM301502001	SMBD1206
L700	SM300446150	SM.015uH
Q1000	SM270160520	BFG520X
Q1001	SM280120416	MMBF4416
Q1003	SM270160520	BFG520X
Q1004	SM275030550	BF550
Q1005	SM270160520	BFG520X
Q1500	SM289240062	BCV62
Q1503	SM289240061	BCV61
Q200	SM270330848	BC848C
Q2000	SM270160520	BFG520X
Q2001	SM280120416	MMBF4416
Q2002	SM275030093	BFT93
Q2003	SM270160520	BFG520X
Q2004	SM275030550	BF550
Q2005	SM270160520	BFG520X
Q201	SM270330848	BC848C
Q202	SM270330848	BC848C
Q203	SM270330848	BC848C
Q204	SM270330848	BC848C
Q205	SM280171005	MTD10N05E
Q206	SM280171005	MTD10N05E
Q2500	SM289240062	BCV62
Q2503	SM289240061	BCV61
Q3000	SM270160520	BFG520X
Q3001	SM280120416	MMBF4416
Q3002	SM275030093	BFT93
Q3003	SM270160520	BFG520X
Q3004	SM275030550	BF550
Q3005	SM270160520	BFG520X
Q3500	SM289240062	BCV62
Q3503	SM289240061	BCV61
Q4000	SM270160520	BFG520X
Q4001	SM280120416	MMBF4416
Q4003	SM270160520	BFG520X
Q4004	SM275030550	BF550
Q4005	SM270160520	BFG520X
Q4500	SM289240062	BCV62
Q4503	SM289240061	BCV61
Q5000	SM270130092	BFR92A
Q5001	SM280120416	MMBF4416
Q5002	SM270130093	BFR93A
Q5003	SM270160520	BFG520X
Q510	SM275330858	BC858C
Q511	SM275330858	BC858C
Q512	SM275330858	BC858C
Q513	SM275330858	BC858C
Q514	SM275330858	BC858C
Q516	SM275330858	BC858C
Q517	SM275330858	BC858C
Q518	SM275330858	BC858C
Q6000	SM270130093	BFR93A
Q6001	SM275030550	BF550
Q6002	SM270130092	BFR92A
Q6003	SM270130093	BFR93A
Q6004	SM275030550	BF550
Q610	SM275330858	BC858C
Q611	SM275330858	BC858C
Q612	SM275330858	BC858C
Q613	SM275330858	BC858C
Q614	SM275330858	BC858C
Q616	SM275330858	BC858C
Q617	SM275330858	BC858C
Q618	SM275330858	BC858C
Q700	SM275030092	BFT92
Q701	SM270030020	BFS20
Q702	SM207130025	BFT25A
Q703	SM275330858	BC858C
Q704	SM275330858	BC858C
Q705	SM275030092	BFT92
Q706	SM275030092	BFT92
Q707	SM275030092	BFT92
R1	SM652101103	SM10KΩ
R10	SM652101103	SM10KΩ
R1000	168909001	900.0KΩ-500V
R1001	SM652101330	SM33Ω
R1002	SM652101301	SM300Ω
R1003	SM652061024	SM2.4Ω-0603
R1004	SM652101330	SM33Ω
R1005	SM652101220	SM22Ω
R1006	SM652101103	SM10KΩ
R1007	SM652101331	SM330Ω
R1008	SM652101103	SM10KΩ
R1009	SM652101202	SM2KΩ
R1010	SM652101470	SM47Ω
R1011	SM652181590	SM113KΩ50PPM
R1012	SM168651315	SM154Ω1MMHF
R1013	SM168651315	SM154Ω1MMHF

PART: F9374-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9374/M/L/TM

Location	Part Number	Description	Location	Part Number	Description
R1015	SM652101331	SM330Ω	R1070	SM652101431	SM430Ω
R1016	168909001	900KΩ-500V	R1071	SM652101431	SM430Ω
R1017	SM652181590	SM113KΩ50PPM	R1072	SM651104392	SM3.9KΩ25PPM
R1018	SM652101510	SM51Ω	R1073	SM652101512	SM5.1KΩ
R1019	SM652101510	SM51Ω	R1074	SM652101512	SM5.1KΩ
R1020	SM652101510	SM51Ω	R1075	SM652101512	SM5.1KΩ
R1021	SM652101101	SM100Ω	R1076	SM168659297	SM100Ω-1/oo
R1023	SM652101301	SM300Ω	R1078	SM652101154	SM150KΩ
R1024	SM654101000	SM0Ω	R1079	SM652101103	SM10KΩ
R1025	SM652101364	SM360KΩ	R1080	SM652101683	SM68KΩ
R1026	SM654101000	SM0Ω	R1081	SM652101472	SM4.7KΩ
R1027	SM652101182	SM1.8KΩ	R1082	SM652101512	SM5.1KΩ
R1028	SM652101364	SM360KΩ	R1083	SM652101102	SM1KΩ
R1029	SM653185107	SM100MΩ	R1084	SM652101204	SM200KΩ
R1031	SM652101364	SM360KΩ	R1085	SM651081102	SM1.0KΩ-1/oo
R1032	SM652101364	SM360KΩ	R1086	SM651081102	SM1.0KΩ-1/oo
R1034	SM652101102	SM1KΩ	R1087	SM652101102	SM1KΩ
R1036	SM652101394	SM390KΩ	R1088	SM651081102	SM1.0KΩ-1/oo
R1037	SM652101394	SM390KΩ	R1089	SM651081102	SM1.0KΩ-1/oo
R1038	SM185457203	SM20KΩ-1T	R1092	SM652101241	SM240Ω
R1042	SM652101105	SM1MΩ	R1095	SM652101822	SM8.2KΩ
R1043	SM652101105	SM1MΩ	R1096	SM652101181	SM180Ω
R1046	SM652101271	SM270Ω	R1097	SM652101431	SM430Ω
R1047	SM652101102	SM1KΩ	R1098	SM652101181	SM180Ω
R1048	SM652101103	SM10KΩ	R11	SM652101103	SM10KΩ
R1049	SM652101513	SM51KΩ	R1101	SM654101000	SM0Ω
R1050	SM652101681	SM680Ω	R1102	SM654101000	SM0Ω
R1051	SM652061820	SM82Ω-0603	R1103	SM652101241	SM240Ω
R1052	SM652101202	SM2KΩ	R1105	SM652101182	SM1.8KΩ
R1053	SM652101512	SM5.1KΩ	R1106	SM652101750	SM75Ω
R1054	SM654101000	SM0Ω	R1108	SM652101300	SM30Ω
R1055	SM652101391	SM390Ω	R12	SM652101512	SM5.1KΩ
R1056	SM652101510	SM51Ω	R13	SM652101102	SM1KΩ
R1057	SM652101131	SM130Ω	R14	SM652101332	SM3.3KΩ
R1058	SM652101100	SM10Ω	R15	SM652101332	SM3.3KΩ
R1059	SM652061024	SM2.4Ω-0603	R1506	SM652101680	SM68Ω
R1060	SM652101103	SM10KΩ	R1508	SM652101153	SM15KΩ
R1061	SM652101332	SM3.3KΩ	R1510	SM652101750	SM75Ω
R1062	SM652101510	SM51Ω	R1513	SM652101103	SM10KΩ
R1063	SM652101332	SM3.3KΩ	R1514	SM652101122	SM1.2KΩ
R1065	SM652101122	SM1.2KΩ	R1515	SM185457501	SM500Ω-1T
R1066	SM185457101	SM100Ω-1T	R1516	SM653206222	SMNTC-2.2KΩ
R1067	SM652101511	SM510Ω	R1517	SM652101272	SM2.7KΩ
R1068	SM652101332	SM3.3KΩ	R1518	SM185457202	SM2KΩ-1T
R1069	SM652101621	SM620Ω	R1519	SM652101822	SM8.2KΩ

PART: F9374-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9374/M/L/TM

Location	Part Number	Description
R1520	SM652101103	SM10KΩ
R1521	SM652101151	SM150Ω
R1522	SM652101151	SM150Ω
R1523	SM652101201	SM200Ω
R1524	SM652101201	SM200Ω
R1525	SM652101201	SM200Ω
R1526	SM652101201	SM200Ω
R1527	SM652101680	SM68Ω
R1528	SM652101680	SM68Ω
R1529	SM654101000	SM0Ω
R1530	SM652101201	SM200Ω
R1531	SM652101201	SM200Ω
R1532	SM652101151	SM150Ω
R1533	SM652101151	SM150Ω
R1534	SM652101220	SM22Ω
R1535	SM652101750	SM75Ω
R1536	SM652101151	SM150Ω
R1537	SM652101151	SM150Ω
R1538	SM652101201	SM200Ω
R1539	SM652101201	SM200Ω
R1540	SM652101182	SM1.8KΩ
R1541	SM652101103	SM10KΩ
R1542	SM652101101	SM100Ω
R1544	SM654101000	SM0Ω
R1545	SM652101431	SM430Ω
R1546	SM652101431	SM430Ω
R1547	SM652101431	SM430Ω
R1548	SM652101431	SM430Ω
R1549	SM652101431	SM430Ω
R1550	SM652101431	SM430Ω
R1551	SM652101431	SM430Ω
R1552	SM652101431	SM430Ω
R1553	SM652101431	SM430Ω
R1554	SM652101910	SM91Ω
R1555	SM652101910	SM91Ω
R1556	SM652101910	SM91Ω
R1557	SM652101910	SM91Ω
R1558	SM652101910	SM91Ω
R1559	SM652101910	SM91Ω
R1560	SM652101910	SM91Ω
R1561	SM652101910	SM91Ω
R1562	SM652101910	SM91Ω
R1563	SM652101301	SM300Ω
R1564	SM652101301	SM300Ω
R1567	SM652101201	SM200Ω
R1568	SM652101201	SM200Ω
R1569	SM652101151	SM150Ω
R1570	SM652101151	SM150Ω
R1571	SM652101201	SM200Ω
R1572	SM652101201	SM200Ω
R1573	SM185457501	SM500Ω-1T
R1574	SM652101472	SM4.7KΩ
R1575	SM652101223	SM22KΩ
R1576	SM185457503	SM50KΩ-1T
R1577	SM185457501	SM500Ω-1T
R1579	SM652101182	SM1.8KΩ
R1580	SM653206222	SMNTC-2.2KΩ
R16	SM652101102	SM1KΩ
R17	SM652101102	SM1KΩ
R18	SM652101332	SM3.3KΩ
R19	SM652101332	SM3.3KΩ
R2	SM652101103	SM10KΩ
R20	SM652101102	SM1KΩ
R200	SM652101103	SM10KΩ
R2000	168909001	900KΩ-500V
R2001	SM652101330	SM33Ω
R2002	SM652101301	SM300Ω
R2003	SM652061024	SM2.4Ω-0603
R2004	SM652101330	SM33Ω
R2005	SM652101220	SM22Ω
R2006	SM652101103	SM10KΩ
R2007	SM652101331	SM330Ω
R2008	SM652101103	SM10KΩ
R2009	SM652101202	SM2KΩ
R201	SM652101122	SM1.2KΩ
R2010	SM652101470	SM47Ω
R2011	SM652181590	SM113KΩ50PPM
R2012	SM168651315	SM154Ω1MMHF
R2013	SM168651315	SM154Ω1MMHF
R2015	SM652101331	SM330Ω
R2016	168909001	900KΩ-500V
R2017	SM652181590	SM113KΩ50PPM
R2018	SM652101510	SM51Ω
R2019	SM652101510	SM51Ω
R2020	SM652101510	SM51Ω
R2021	SM652101101	SM100Ω
R2023	SM652101301	SM300Ω
R2024	SM654101000	SM0Ω
R2025	SM652101364	SM360KΩ
R2026	SM654101000	SM0Ω

PART: F9374-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9374/M/L/TM

Location	Part Number	Description
R2027	SM652101182	SM1.8KΩ
R2028	SM652101364	SM360KΩ
R2029	SM653185107	SM100MΩ
R2031	SM652101364	SM360KΩ
R2032	SM652101364	SM360KΩ
R2034	SM652101102	SM1KΩ
R2035	SM652101820	SM82Ω
R2036	SM652101394	SM390KΩ
R2037	SM652101394	SM390KΩ
R2038	SM185457203	SM20KΩ-1T
R2039	SM652101330	SM33Ω
R2042	SM652101105	SM1MΩ
R2043	SM652101105	SM1MΩ
R2044	SM652101101	SM100Ω
R2046	SM652101271	SM270Ω
R2047	SM652101102	SM1KΩ
R2048	SM652101103	SM10KΩ
R2049	SM652101513	SM51KΩ
R205	SM652101102	SM1KΩ
R2050	SM652101681	SM680Ω
R2051	SM652061820	SM82Ω-0603
R2052	SM652101202	SM2KΩ
R2053	SM652101512	SM5.1KΩ
R2054	SM654101000	SM0Ω
R2055	SM652101391	SM390Ω
R2056	SM652101510	SM51Ω
R2057	SM652101131	SM130Ω
R2058	SM652101100	SM10Ω
R2059	SM652061024	SM2.4Ω-0603
R206	SM652101332	SM3.3KΩ
R2060	SM652101103	SM10KΩ
R2061	SM652101332	SM3.3KΩ
R2062	SM652101510	SM51Ω
R2063	SM652101332	SM3.3KΩ
R2065	SM652101122	SM1.2KΩ
R2066	SM185457101	SM100Ω-1T
R2067	SM652101511	SM510Ω
R2068	SM652101332	SM3.3KΩ
R2069	SM652101621	SM620Ω
R207	SM652101824	SM820KΩ
R2070	SM652101431	SM430Ω
R2071	SM652101431	SM430Ω
R2072	SM651104392	SM3.9KΩ25PPM
R2073	SM652101512	SM5.1KΩ
R2074	SM652101512	SM5.1KΩ
R2075	SM652101512	SM5.1KΩ
R2076	SM168659297	SM100Ω-1/oo
R2078	SM652101154	SM150KΩ
R2079	SM652101103	SM10KΩ
R2080	SM652101683	SM68KΩ
R2081	SM652101472	SM4.7KΩ
R2082	SM652101512	SM5.1KΩ
R2083	SM652101102	SM1KΩ
R2084	SM652101204	SM200KΩ
R2085	SM651081102	SM1.0KΩ-1/oo
R2086	SM651081102	SM1.0KΩ-1/oo
R2087	SM652101102	SM1KΩ
R2088	SM651081102	SM1.0KΩ-1/oo
R2089	SM651081102	SM1.0KΩ-1/oo
R2092	SM652101241	SM240Ω
R2095	SM652101822	SM8.2KΩ
R2096	SM652101181	SM180Ω
R2097	SM652101431	SM430Ω
R2098	SM652101181	SM180Ω
R21	SM652101102	SM1KΩ
R2101	SM654101000	SM0Ω
R2102	SM654101000	SM0Ω
R2103	SM652101241	SM240Ω
R2105	SM652101182	SM1.8KΩ
R2106	SM652101750	SM75Ω
R2108	SM652101300	SM30Ω
R211	SM652101273	SM27KΩ
R212	SM652101152	SM1.5KΩ
R213	SM652101562	SM5.6KΩ
R214	SM652101103	SM10KΩ
R215	SM652101103	SM10KΩ
R216	SM652101103	SM10KΩ
R217	SM652101103	SM10KΩ
R218	SM652101103	SM10KΩ
R219	SM652101103	SM10KΩ
R22	SM652101102	SM1KΩ
R220	SM652101103	SM10KΩ
R221	SM652101103	SM10KΩ
R222	SM652101103	SM10KΩ
R223	SM652101103	SM10KΩ
R224	SM652101103	SM10KΩ
R225	SM652101103	SM10KΩ
R226	SM652101103	SM10KΩ
R227	SM652101102	SM1KΩ
R23	SM652101332	SM3.3KΩ

PART: F9374-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9374/M/L/TM

Location	Part Number	Description
R231	SM652101510	SM51Ω
R233	SM652101103	SM10KΩ
R234	SM652101103	SM10KΩ
R24	SM652101102	SM1KΩ
R247	SM652101510	SM51Ω
R248	SM652101102	SM1KΩ
R249	SM652101102	SM1KΩ
R25	SM652101102	SM1KΩ
R250	SM652101102	SM1KΩ
R2506	SM652101680	SM68Ω
R2508	SM652101153	SM15KΩ
R251	SM652101102	SM1KΩ
R2510	SM652101750	SM75Ω
R2513	SM652101103	SM10KΩ
R2514	SM652101122	SM1.2KΩ
R2515	SM185457501	SM500Ω-1T
R2516	SM653206222	SMNTC-2.2KΩ
R2517	SM652101272	SM2.7KΩ
R2518	SM185457202	SM2KΩ-1T
R2519	SM652101822	SM8.2KΩ
R252	SM652101510	SM51Ω
R2520	SM652101103	SM10KΩ
R2521	SM652101151	SM150Ω
R2522	SM652101151	SM150Ω
R2523	SM652101201	SM200Ω
R2524	SM652101201	SM200Ω
R2525	SM652101201	SM200Ω
R2526	SM652101201	SM200Ω
R2527	SM652101680	SM68Ω
R2528	SM652101680	SM68Ω
R2529	SM654101000	SM0Ω
R253	SM652101102	SM1KΩ
R2530	SM652101201	SM200Ω
R2531	SM652101201	SM200Ω
R2532	SM652101151	SM150Ω
R2533	SM652101151	SM150Ω
R2534	SM652101220	SM22Ω
R2535	SM652101750	SM75Ω
R2536	SM652101151	SM150Ω
R2537	SM652101151	SM150Ω
R2538	SM652101201	SM200Ω
R2539	SM652101201	SM200Ω
R254	SM652101510	SM51Ω
R2540	SM652101182	SM1.8KΩ
R2541	SM652101103	SM10KΩ
R2542	SM652101101	SM100Ω
R2544	SM654101000	SM0Ω
R2545	SM652101431	SM430Ω
R2546	SM652101431	SM430Ω
R2547	SM652101431	SM430Ω
R2548	SM652101431	SM430Ω
R2549	SM652101431	SM430Ω
R255	SM652101103	SM10KΩ
R2550	SM652101431	SM430Ω
R2551	SM652101431	SM430Ω
R2552	SM652101431	SM430Ω
R2553	SM652101431	SM430Ω
R2554	SM652101910	SM91Ω
R2555	SM652101910	SM91Ω
R2556	SM652101910	SM91Ω
R2557	SM652101910	SM91Ω
R2558	SM652101910	SM91Ω
R2559	SM652101910	SM91Ω
R256	SM652101103	SM10KΩ
R2560	SM652101910	SM91Ω
R2561	SM652101910	SM91Ω
R2562	SM652101910	SM91Ω
R2563	SM652101301	SM300Ω
R2564	SM652101301	SM300Ω
R2567	SM652101201	SM200Ω
R2568	SM652101201	SM200Ω
R2569	SM652101151	SM150Ω
R257	SM652101103	SM10KΩ
R2570	SM652101151	SM150Ω
R2571	SM652101201	SM200Ω
R2572	SM652101201	SM200Ω
R2573	SM185457501	SM500Ω-1T
R2574	SM652101472	SM4.7KΩ
R2575	SM652101223	SM22KΩ
R2576	SM185457503	SM50KΩ-1T
R2577	SM185457501	SM500Ω-1T
R2579	SM652101182	SM1.8KΩ
R258	SM652101103	SM10KΩ
R2580	SM653206222	SMNTC-2.2KΩ
R259	SM652101103	SM10KΩ
R26	SM652101302	SM3KΩ
R260	SM652101102	SM1KΩ
R262	SM652101102	SM1KΩ
R263	SM652101102	SM1KΩ
R264	SM652101102	SM1KΩ

PART: F9374-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9374/M/L/TM

Location	Part Number	Description
R265	SM652101102	SM1KΩ
R266	SM652101102	SM1KΩ
R267	SM654101000	SM0Ω
R269	SM652101102	SM1KΩ
R27	SM652101332	SM3.3KΩ
R270	SM652101101	SM100Ω
R271	SM652101101	SM100Ω
R272	SM652101101	SM100Ω
R273	SM652101101	SM100Ω
R274	SM652101510	SM51Ω
R275	SM652101510	SM51Ω
R276	SM652101510	SM51Ω
R277	SM652101510	SM51Ω
R278	SM652101510	SM51Ω
R279	SM652101510	SM51Ω
R28	SM652101102	SM1KΩ
R29	SM652101103	SM10KΩ
R3	SM652101103	SM10KΩ
R3000	168909001	900KΩ-500V
R3001	SM652101330	SM33Ω
R3002	SM652101301	SM300Ω
R3003	SM652061024	SM2.4Ω-0603
R3004	SM652101330	SM33Ω
R3005	SM652101220	SM22Ω
R3006	SM652101103	SM10KΩ
R3007	SM652101331	SM330Ω
R3008	SM652101103	SM10KΩ
R3009	SM652101202	SM2KΩ
R3010	SM652101470	SM47Ω
R3011	SM652181590	SM113KΩ50PPM
R3012	SM168651315	SM154Ω1MMHF
R3013	SM168651315	SM154Ω1MMHF
R3015	SM652101331	SM330Ω
R3016	168909001	900KΩ-500V
R3017	SM652181590	SM113KΩ50PPM
R3018	SM652101510	SM51Ω
R3019	SM652101510	SM51Ω
R3020	SM652101510	SM51Ω
R3021	SM652101101	SM100Ω
R3023	SM652101301	SM300Ω
R3024	SM654101000	SM0Ω
R3025	SM652101364	SM360KΩ
R3026	SM654101000	SM0Ω
R3027	SM652101182	SM1.8KΩ
R3028	SM652101364	SM360KΩ

Location	Part Number	Description
R3029	SM653185107	SM100MΩ
R3031	SM652101364	SM360KΩ
R3032	SM652101364	SM360KΩ
R3034	SM652101102	SM1KΩ
R3035	SM652101820	SM82Ω
R3036	SM652101394	SM390KΩ
R3037	SM652101394	SM390KΩ
R3038	SM185457203	SM20KΩ-1T
R3039	SM652101330	SM33Ω
R3042	SM652101105	SM1MΩ
R3043	SM652101105	SM1MΩ
R3044	SM652101101	SM100Ω
R3046	SM652101271	SM270Ω
R3047	SM652101102	SM1KΩ
R3048	SM652101103	SM10KΩ
R3049	SM652101513	SM51KΩ
R3050	SM652101681	SM680Ω
R3051	SM652061820	SM82Ω-0603
R3052	SM652101202	SM2KΩ
R3053	SM652101512	SM5.1KΩ
R3054	SM654101000	SM0Ω
R3055	SM652101391	SM390Ω
R3056	SM652101510	SM51Ω
R3057	SM652101131	SM130Ω
R3058	SM652101100	SM10Ω
R3059	SM652061024	SM2.4Ω-0603
R3060	SM652101103	SM10KΩ
R3061	SM652101332	SM3.3KΩ
R3062	SM652101510	SM51Ω
R3063	SM652101332	SM3.3KΩ
R3065	SM652101122	SM1.2KΩ
R3066	SM185457101	SM100Ω-1T
R3067	SM652101511	SM510Ω
R3068	SM652101332	SM3.3KΩ
R3069	SM652101621	SM620Ω
R3070	SM652101431	SM430Ω
R3071	SM652101431	SM430Ω
R3072	SM651104392	SM3.9KΩ25PPM
R3073	SM652101512	SM5.1KΩ
R3074	SM652101512	SM5.1KΩ
R3075	SM652101512	SM5.1KΩ
R3076	SM168659297	SM100Ω-1/oo
R3078	SM652101154	SM150KΩ
R3079	SM652101103	SM10KΩ
R3080	SM652101683	SM68KΩ

PART: F9374-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9374/M/L/TM

Location	Part Number	Description
R3081	SM652101472	SM4.7KΩ
R3082	SM652101512	SM5.1KΩ
R3083	SM652101102	SM1KΩ
R3084	SM652101204	SM200KΩ
R3085	SM651081102	SM1.0KΩ-1/oo
R3086	SM651081102	SM1.0KΩ-1/oo
R3087	SM652101102	SM1KΩ
R3088	SM651081102	SM1.0KΩ-1/oo
R3089	SM651081102	SM1.0KΩ-1/oo
R3092	SM652101241	SM240Ω
R3095	SM652101822	SM8.2KΩ
R3096	SM652101181	SM180Ω
R3097	SM652101431	SM430Ω
R3098	SM652101181	SM180Ω
R31	SM654101000	SM0Ω
R3101	SM654101000	SM0Ω
R3102	SM654101000	SM0Ω
R3103	SM652101241	SM240Ω
R3105	SM652101182	SM1.8KΩ
R3106	SM652101750	SM75Ω
R3108	SM652101300	SM30Ω
R32	SM652101102	SM1KΩ
R33	SM652101102	SM1KΩ
R34	SM652101103	SM10KΩ
R35	SM652101102	SM1KΩ
R3506	SM652101680	SM68Ω
R3508	SM652101153	SM15KΩ
R3510	SM652101750	SM75Ω
R3513	SM652101103	SM10KΩ
R3514	SM652101122	SM1.2KΩ
R3515	SM185457501	SM500Ω-1T
R3516	SM653206222	SMNTC-2.2KΩ
R3517	SM652101272	SM2.7KΩ
R3518	SM185457202	SM2KΩ-1T
R3519	SM652101822	SM8.2KΩ
R3520	SM652101103	SM10KΩ
R3521	SM652101151	SM150Ω
R3522	SM652101151	SM150Ω
R3523	SM652101201	SM200Ω
R3524	SM652101201	SM200Ω
R3525	SM652101201	SM200Ω
R3526	SM652101201	SM200Ω
R3527	SM652101680	SM68Ω
R3528	SM652101680	SM68Ω
R3529	SM654101000	SM0Ω
R3530	SM652101201	SM200Ω
R3531	SM652101201	SM200Ω
R3532	SM652101151	SM150Ω
R3533	SM652101151	SM150Ω
R3534	SM652101220	SM22Ω
R3535	SM652101750	SM75Ω
R3536	SM652101151	SM150Ω
R3537	SM652101151	SM150Ω
R3538	SM652101201	SM200Ω
R3539	SM652101201	SM200Ω
R3540	SM652101182	SM1.8KΩ
R3541	SM652101103	SM10KΩ
R3542	SM652101101	SM100Ω
R3544	SM654101000	SM0Ω
R3545	SM652101431	SM430Ω
R3546	SM652101431	SM430Ω
R3547	SM652101431	SM430Ω
R3548	SM652101431	SM430Ω
R3549	SM652101431	SM430Ω
R3550	SM652101431	SM430Ω
R3551	SM652101431	SM430Ω
R3552	SM652101431	SM430Ω
R3553	SM652101431	SM430Ω
R3554	SM652101910	SM91Ω
R3555	SM652101910	SM91Ω
R3556	SM652101910	SM91Ω
R3557	SM652101910	SM91Ω
R3558	SM652101910	SM91Ω
R3559	SM652101910	SM91Ω
R3560	SM652101910	SM91Ω
R3561	SM652101910	SM91Ω
R3562	SM652101910	SM91Ω
R3563	SM652101301	SM300Ω
R3564	SM652101301	SM300Ω
R3567	SM652101201	SM200Ω
R3568	SM652101201	SM200Ω
R3569	SM652101151	SM150Ω
R3570	SM652101151	SM150Ω
R3571	SM652101201	SM200Ω
R3572	SM652101201	SM200Ω
R3573	SM185457501	SM500Ω-1T
R3574	SM652101472	SM4.7KΩ
R3575	SM652101223	SM22KΩ
R3576	SM185457503	SM50KΩ-1T
R3577	SM185457501	SM500Ω-1T

PART: F9374-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9374/M/L/TM

Location	Part Number	Description	Location	Part Number	Description
R3579	SM652101182	SM1.8KΩ	R4038	SM185457203	SM20KΩ-1T
R3580	SM653206222	SMNTC-2.2KΩ	R404	SM652101121	SM120Ω
R36	SM652101102	SM1KΩ	R4042	SM652101105	SM1MΩ
R37	SM652101220	SM22Ω	R4043	SM652101105	SM1MΩ
R38	SM652101103	SM10KΩ	R4046	SM652101271	SM270Ω
R39	SM652101220	SM22Ω	R4047	SM652101102	SM1KΩ
R4	SM652101103	SM10KΩ	R4048	SM652101103	SM10KΩ
R40	SM652101220	SM22Ω	R4049	SM652101513	SM51KΩ
R400	SM652101201	SM200Ω	R405	SM652101121	SM120Ω
R4000	168909001	900KΩ-500V	R4050	SM652101681	SM680Ω
R4001	SM652101330	SM33Ω	R4051	SM652061820	SM82Ω-0603
R4002	SM652101301	SM300Ω	R4052	SM652101202	SM2KΩ
R4003	SM652061024	SM2.4Ω-0603	R4053	SM652101512	SM5.1KΩ
R4004	SM652101330	SM33Ω	R4054	SM654101000	SM0Ω
R4005	SM652101220	SM22Ω	R4055	SM652101391	SM390Ω
R4006	SM652101103	SM10KΩ	R4056	SM652101510	SM51Ω
R4007	SM652101331	SM330Ω	R4057	SM652101131	SM130Ω
R4008	SM652101103	SM10KΩ	R4058	SM652101100	SM10Ω
R4009	SM652101202	SM2KΩ	R4059	SM652061024	SM2.4Ω-0603
R401	SM652101201	SM200Ω	R406	SM652101121	SM120Ω
R4010	SM652101470	SM47Ω	R4060	SM652101103	SM10KΩ
R4011	SM652181590	SM113KΩ50PPM	R4061	SM652101332	SM3.3KΩ
R4012	SM168651315	SM154Ω1MMHF	R4062	SM652101510	SM51Ω
R4013	SM168651315	SM154Ω1MMHF	R4063	SM652101332	SM3.3KΩ
R4015	SM652101331	SM330Ω	R4065	SM652101122	SM1.2KΩ
R4016	168909001	900KΩ-500V	R4066	SM185457101	SM100Ω-1T
R4017	SM652181590	SM113KΩ50PPM	R4067	SM652101511	SM510Ω
R4018	SM652101510	SM51Ω	R4068	SM652101332	SM3.3KΩ
R4019	SM652101510	SM51Ω	R4069	SM652101621	SM620Ω
R402	SM652101201	SM200Ω	R407	SM652101121	SM120Ω
R4020	SM652101510	SM51Ω	R4070	SM652101431	SM430Ω
R4021	SM652101101	SM100Ω	R4071	SM652101431	SM430Ω
R4023	SM652101301	SM300Ω	R4072	SM651104392	SM3.9KΩ25PPM
R4024	SM654101000	SM0Ω	R4073	SM652101512	SM5.1KΩ
R4025	SM652101364	SM360KΩ	R4074	SM652101512	SM5.1KΩ
R4026	SM654101000	SM0Ω	R4075	SM652101512	SM5.1KΩ
R4027	SM652101182	SM1.8KΩ	R4076	SM168659297	SM100Ω-1/oo
R4028	SM652101364	SM360KΩ	R4078	SM652101154	SM150KΩ
R4029	SM653185107	SM100MΩ	R4079	SM652101103	SM10KΩ
R403	SM652101201	SM200Ω	R408	SM652101101	SM100Ω
R4031	SM652101364	SM360KΩ	R4080	SM652101683	SM68KΩ
R4032	SM652101364	SM360KΩ	R4081	SM652101472	SM4.7KΩ
R4034	SM652101102	SM1KΩ	R4082	SM652101512	SM5.1KΩ
R4036	SM652101394	SM390KΩ	R4083	SM652101102	SM1KΩ
R4037	SM652101394	SM390KΩ	R4084	SM652101204	SM200KΩ

PART: F9374-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9374/M/L/TM

Location	Part Number	Description
R4085	SM651081102	SM1.0KΩ-1/oo
R4086	SM651081102	SM1.0KΩ-1/oo
R4087	SM652101102	SM1KΩ
R4088	SM651081102	SM1.0KΩ-1/oo
R4089	SM651081102	SM1.0KΩ-1/oo
R409	SM652101181	SM180Ω
R4092	SM652101241	SM240Ω
R4095	SM652101822	SM8.2KΩ
R4096	SM652101181	SM180Ω
R4097	SM652101431	SM430Ω
R4098	SM652101181	SM180Ω
R41	SM652101220	SM22Ω
R410	SM652101101	SM100Ω
R4101	SM654101000	SM0Ω
R4102	SM654101000	SM0Ω
R4103	SM652101241	SM240Ω
R4105	SM652101182	SM1.8KΩ
R4106	SM652101750	SM75Ω
R4108	SM652101300	SM30Ω
R411	SM652101181	SM180Ω
R415	SM652101331	SM330Ω
R417	SM652101101	SM100Ω
R418	SM652101750	SM75Ω
R42	SM652101680	SM68Ω
R43	SM652101680	SM68Ω
R44	SM652101680	SM68Ω
R45	SM652101102	SM1KΩ
R4506	SM652101680	SM68Ω
R4508	SM652101153	SM15KΩ
R4510	SM652101750	SM75Ω
R4513	SM652101103	SM10KΩ
R4514	SM652101122	SM1.2KΩ
R4515	SM185457501	SM500Ω-1T
R4516	SM653206222	SMNTC-2.2KΩ
R4517	SM652101272	SM2.7KΩ
R4518	SM185457202	SM2KΩ-1T
R4519	SM652101822	SM8.2KΩ
R4520	SM652101103	SM10KΩ
R4521	SM652101151	SM150Ω
R4522	SM652101151	SM150Ω
R4523	SM652101201	SM200Ω
R4524	SM652101201	SM200Ω
R4525	SM652101201	SM200Ω
R4526	SM652101201	SM200Ω
R4527	SM652101680	SM68Ω

Location	Part Number	Description
R4528	SM652101680	SM68Ω
R4529	SM654101000	SM0Ω
R4530	SM652101201	SM200Ω
R4531	SM652101201	SM200Ω
R4532	SM652101151	SM150Ω
R4533	SM652101151	SM150Ω
R4534	SM652101220	SM22Ω
R4535	SM652101750	SM75Ω
R4536	SM652101151	SM150Ω
R4537	SM652101151	SM150Ω
R4538	SM652101201	SM200Ω
R4539	SM652101201	SM200Ω
R4540	SM652101182	SM1.8KΩ
R4541	SM652101103	SM10KΩ
R4542	SM652101101	SM100Ω
R4544	SM654101000	SM0Ω
R4545	SM652101431	SM430Ω
R4546	SM652101431	SM430Ω
R4547	SM652101431	SM430Ω
R4548	SM652101431	SM430Ω
R4549	SM652101431	SM430Ω
R4550	SM652101431	SM430Ω
R4551	SM652101431	SM430Ω
R4552	SM652101431	SM430Ω
R4553	SM652101431	SM430Ω
R4554	SM652101910	SM91Ω
R4555	SM652101910	SM91Ω
R4556	SM652101910	SM91Ω
R4557	SM652101910	SM91Ω
R4558	SM652101910	SM91Ω
R4559	SM652101910	SM91Ω
R4560	SM652101910	SM91Ω
R4561	SM652101910	SM91Ω
R4562	SM652101910	SM91Ω
R4563	SM652101301	SM300Ω
R4564	SM652101301	SM300Ω
R4567	SM652101201	SM200Ω
R4568	SM652101201	SM200Ω
R4569	SM652101151	SM150Ω
R4570	SM652101151	SM150Ω
R4571	SM652101201	SM200Ω
R4572	SM652101201	SM200Ω
R4573	SM185457501	SM500Ω-1T
R4574	SM652101472	SM4.7KΩ
R4575	SM652101223	SM22KΩ

PART: F9374-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9374/M/L/TM

Location	Part Number	Description
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R4576	SM185457503	SM50KΩ-1T
R4577	SM185457501	SM500Ω-1T
R4579	SM652101182	SM1.8KΩ
R4580	SM653206222	SMNTC-2.2KΩ
R46	SM652101103	SM10KΩ
R47	SM652101103	SM10KΩ
R48	SM652101103	SM10KΩ
R49	SM652101103	SM10KΩ
R5	SM652101103	SM10KΩ
R5000	SM652101330	SM33Ω
R5001	SM652101220	SM22Ω
R5002	SM652101100	SM10Ω
R5003	SM652101330	SM33Ω
R5004	SM652101330	SM33Ω
R5005	SM652101104	SM100KΩ
R5006	168909001	900KΩ-500V
R5007	SM652101101	SM100Ω
R5008	SM652101182	SM1.8KΩ
R5010	168909001	900KΩ-500V
R5011	SM652101510	SM51Ω
R5012	SM652101182	SM1.8KΩ
R5013	SM652101122	SM1.2KΩ
R5014	SM652101681	SM680Ω
R5015	SM653185107	SM100MΩ
R5016	SM168659006	SM111.1KΩ-1/oo
R5017	SM652101153	SM15KΩ
R5018	SM652101183	SM18KΩ
R5019	SM185457201	SM200Ω-1T
R5020	SM652101101	SM100Ω
R5021	SM652101391	SM390Ω
R5022	SM652101680	SM68Ω
R5023	SM652101474	SM470KΩ
R5024	SM652101684	SM680KΩ
R5025	SM652101103	SM10KΩ
R5026	SM652101104	SM100KΩ
R5027	SM652101330	SM33Ω
R5028	SM652101391	SM390Ω
R5029	SM652110904	SM900KΩ-5/oo
R5030	SM652101101	SM100Ω
R5031	SM652101511	SM510Ω
R5032	SM652101103	SM10KΩ
R5033	SM652101680	SM68Ω
R5034	SM652101100	SM10Ω
R5035	SM652101471	SM470Ω
R5036	SM652101101	SM100Ω

Location	Part Number	Description
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R5038	SM652101824	SM820KΩ
R5039	SM652101510	SM51Ω
R5040	SM652101182	SM1.8KΩ
R5041	SM652101510	SM51Ω
R5042	SM652101182	SM1.8KΩ
R5045	SM652101561	SM560Ω
R5049	SM652101561	SM560Ω
R5051	SM652101512	SM5.1KΩ
R5052	SM652101163	SM16KΩ
R5053	SM185457203	SM20KΩ-1T
R5054	SM652101163	SM16KΩ
R5055	SM185457203	SM20KΩ-1T
R5056	SM652101332	SM3.3KΩ
R5057	SM654101000	SM0Ω
R5060	SM654101000	SM0Ω
R5061	SM652101332	SM3.3KΩ
R5062	SM652101332	SM3.3KΩ
R5064	SM654101000	SM0Ω
R5066	SM654101000	SM0Ω
R5067	SM652101332	SM3.3KΩ
R5068	SM652101512	SM5.1KΩ
R507	SM652101102	SM1KΩ
R5071	SM652101510	SM51Ω
R5072	SM652101510	SM51Ω
R5073	SM652101182	SM1.8KΩ
R5074	SM652101182	SM1.8KΩ
R5075	SM652101561	SM560Ω
R5076	SM652101561	SM560Ω
R5077	SM652101163	SM16KΩ
R5078	SM185457203	SM20KΩ-1T
R5079	SM652101163	SM16KΩ
R5080	SM185457203	SM20KΩ-1T
R5081	SM652101332	SM3.3KΩ
R5082	SM654101000	SM0Ω
R5084	SM654101000	SM0Ω
R5086	SM652101332	SM3.3KΩ
R5087	SM652101512	SM5.1KΩ
R5088	SM652101332	SM3.3KΩ
R5089	SM654101000	SM0Ω
R5091	SM654101000	SM0Ω
R5093	SM652101332	SM3.3KΩ
R5094	SM652101512	SM5.1KΩ
R5095	SM652101510	SM51Ω
R5096	SM652101561	SM560Ω
R5097	SM652101182	SM1.8KΩ

PART: F9374-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9374/M/L/TM

Location	Part Number	Description
R5099	SM652101561	SM560Ω
R5100	SM652101271	SM270Ω
R5101	SM652101510	SM51Ω
R5103	SM652101163	SM16KΩ
R5104	SM652101331	SM330Ω
R5106	SM652101471	SM470Ω
R5107	SM652101512	SM5.1KΩ
R5108	SM185457203	SM20KΩ-1T
R5109	SM652101471	SM470Ω
R511	SM652101102	SM1KΩ
R5110	SM652101512	SM5.1KΩ
R5111	SM652101512	SM5.1KΩ
R5112	SM652101332	SM3.3KΩ
R5113	SM654101000	SM0Ω
R5115	SM654101000	SM0Ω
R5117	SM652101332	SM3.3KΩ
R5118	SM652101512	SM5.1KΩ
R5119	SM652101562	SM5.6KΩ
R5120	SM652101562	SM5.6KΩ
R5121	SM652101512	SM5.1KΩ
R5122	SM652101562	SM5.6KΩ
R5123	SM652101562	SM5.6KΩ
R5124	SM654101000	SM0Ω
R5125	SM652101271	SM270Ω
R5126	SM168651297	SM100Ω-1MM
R5127	SM168651297	SM100Ω-1MM
R5129	SM185457502	SM5KΩ-1T
R5130	SM652101683	SM68KΩ
R5131	SM652101392	SM3.9KΩ
R5132	SM652101105	SM1MΩ
R5133	SM652101512	SM5.1KΩ
R5134	SM652101512	SM5.1KΩ
R5135	SM652101512	SM5.1KΩ
R5136	SM652101822	SM8.2KΩ
R5137	SM652101332	SM3.3KΩ
R5138	SM652101102	SM1KΩ
R5139	SM652101102	SM1KΩ
R514	SM652101102	SM1KΩ
R5140	SM652101821	SM820Ω
R5141	SM652101512	SM5.1KΩ
R5142	SM652101512	SM5.1KΩ
R5143	SM652101510	SM51Ω
R5144	SM652101510	SM51Ω
R5145	SM652101510	SM51Ω
R5146	SM652101510	SM51Ω
R5147	SM652101330	SM33Ω
R5148	SM652101101	SM100Ω
R515	SM652101102	SM1KΩ
R516	SM652101102	SM1KΩ
R517	SM652101201	SM200Ω
R518	SM652101201	SM200Ω
R519	SM652101201	SM200Ω
R52	SM652115062	SM6.2Ω-1W
R520	SM652101201	SM200Ω
R521	SM652101121	SM120Ω
R522	SM652101121	SM120Ω
R523	SM652101121	SM120Ω
R524	SM652101121	SM120Ω
R525	SM652101201	SM200Ω
R526	SM652101201	SM200Ω
R527	SM652101121	SM120Ω
R528	SM652101121	SM120Ω
R529	SM652101102	SM1KΩ
R530	SM652101102	SM1KΩ
R54	SM652101103	SM10KΩ
R550	SM652101621	SM620Ω
R551	SM652101621	SM620Ω
R552	SM652101153	SM15KΩ
R553	SM652101751	SM750Ω
R554	SM652101223	SM22KΩ
R556	SM652101153	SM15KΩ
R557	SM652101751	SM750Ω
R558	SM652101223	SM22KΩ
R56	SM652101100	SM10Ω
R562	SM652101121	SM120Ω
R563	SM652101121	SM120Ω
R564	SM652101201	SM200Ω
R565	SM652101201	SM200Ω
R566	SM652101121	SM120Ω
R567	SM652101121	SM120Ω
R568	SM652101201	SM200Ω
R569	SM652101201	SM200Ω
R57	SM652101122	SM1.2KΩ
R570	SM652101103	SM10KΩ
R571	SM652101103	SM10KΩ
R572	SM652101103	SM10KΩ
R573	SM652101103	SM10KΩ
R574	SM652101103	SM10KΩ
R575	SM652101103	SM10KΩ
R578	SM652101103	SM10KΩ

PART: F9374-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9374/M/L/TM

Location	Part Number	Description	Location	Part Number	Description
R579	SM652101103	SM10KΩ	R630	SM652101102	SM1KΩ
R58	SM652101220	SM22Ω	R650	SM652101621	SM620Ω
R6	SM652101103	SM10KΩ	R651	SM652101621	SM620Ω
R6000	SM652101330	SM33SΩ	R652	SM652101153	SM15KΩ
R6001	SM168659007	SM3.0KΩ-1/oo	R653	SM652101751	SM750Ω
R6002	SM168659297	SM100Ω-1/oo	R654	SM652101223	SM22KΩ
R6003	SM168659297	SM100Ω-1/oo	R656	SM652101153	SM15KΩ
R6004	SM652101331	SM330Ω	R657	SM652101751	SM750Ω
R6005	SM652101112	SM1.1KΩ	R658	SM652101223	SM22KΩ
R6006	SM652101330	SM33Ω	R662	SM652101121	SM120Ω
R6007	SM652101181	SM180Ω	R663	SM652101121	SM120Ω
R6008	SM652101112	SM1.1KΩ	R664	SM652101201	SM200Ω
R6009	SM652101621	SM620Ω	R665	SM652101201	SM200Ω
R6010	SM652101512	SM5.1KΩ	R666	SM652101121	SM120Ω
R6011	SM652101512	SM5.1KΩ	R667	SM652101121	SM120Ω
R6012	SM652101131	SM130Ω	R668	SM652101201	SM200Ω
R6013	SM652101391	SM390Ω	R669	SM652101201	SM200Ω
R6014	SM168659007	SM3.0KΩ-1/oo	R670	SM652101103	SM10KΩ
R6015	SM168659007	SM3.0KΩ-1/oo	R671	SM652101103	SM10KΩ
R6016	SM168659004	SM900Ω-1/oo	R672	SM652101103	SM10KΩ
R6017	SM168659297	SM100Ω-1/oo	R673	SM652101103	SM10KΩ
R6018	SM652101392	SM3.9KΩ	R674	SM652101103	SM10KΩ
R6019	SM652101112	SM1.1KΩ	R675	SM652101103	SM10KΩ
R6020	SM168659007	SM3.0KΩ-1/oo	R678	SM652101103	SM10KΩ
R6021	SM652101220	SM22Ω	R679	SM652101103	SM10KΩ
R6022	SM652101101	SM100Ω	R7	SM652101103	SM10KΩ
R6023	SM652101101	SM100Ω	R7000	SM652101820	SM82Ω
R607	SM652101102	SM1KΩ	R7001	SM652101151	SM150Ω
R611	SM652101102	SM1KΩ	R701	SM652101131	SM130Ω
R614	SM652101102	SM1KΩ	R702	SM652101181	SM180Ω
R615	SM652101102	SM1KΩ	R703	SM652101181	SM180Ω
R616	SM652101102	SM1KΩ	R704	SM652101391	SM390Ω
R617	SM652101121	SM120Ω	R705	SM652101131	SM130Ω
R618	SM652101121	SM120Ω	R706	SM652101181	SM180Ω
R619	SM652101201	SM200Ω	R707	SM652101181	SM180Ω
R620	SM652101201	SM200Ω	R708	SM652101131	SM130Ω
R621	SM652101201	SM200Ω	R709	SM652101102	SM1KΩ
R622	SM652101201	SM200Ω	R710	SM652101220	SM22Ω
R623	SM652101121	SM120Ω	R711	SM652101131	SM130Ω
R624	SM652101121	SM120Ω	R712	SM652101131	SM130Ω
R625	SM652101201	SM200Ω	R713	SM652101102	SM1KΩ
R626	SM652101201	SM200Ω	R714	SM652101181	SM180Ω
R627	SM652101121	SM120Ω	R715	SM652101181	SM180Ω
R628	SM652101121	SM120Ω	R716	SM652101131	SM130Ω
R629	SM652101102	SM1KΩ	R717	SM652101391	SM390Ω

PART: F9374-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9374/M/L/TM

Location	Part Number	Description
R718	SM652101820	SM82Ω
R719	SM652101181	SM180Ω
R720	SM652101181	SM180Ω
R721	SM652101181	SM180Ω
R722	SM652101181	SM180Ω
R723	SM652101131	SM130Ω
R724	SM652101131	SM130Ω
R725	SM652101131	SM130Ω
R726	SM652101131	SM130Ω
R727	SM652101471	SM470Ω
R728	SM652101391	SM390Ω
R729	SM652101181	SM180Ω
R730	SM652101181	SM180Ω
R731	SM652101181	SM180Ω
R732	SM652101181	SM180Ω
R733	SM652101181	SM180Ω
R734	SM652101181	SM180Ω
R735	SM652101680	SM68Ω
R736	SM652101271	SM270Ω
R737	SM652101271	SM270Ω
R738	SM652101181	SM180Ω
R739	SM652101181	SM180Ω
R740	SM652101181	SM180Ω
R741	SM652101181	SM180Ω
R742	SM652101102	SM1KΩ
R743	SM652101102	SM1KΩ
R744	SM652101102	SM1KΩ
R745	SM652101471	SM470Ω
R746	SM652101471	SM470Ω
R747	SM652101471	SM470Ω
R748	SM652101471	SM470Ω
R749	SM652101181	SM180Ω
R750	SM652101181	SM180Ω
R751	SM652101181	SM180Ω
R752	SM652101181	SM180Ω
R753	SM652101121	SM120Ω
R754	SM652101121	SM120Ω
R755	SM652101181	SM180Ω
R756	SM652101181	SM180Ω
R757	SM652101181	SM180Ω
R758	SM652101181	SM180Ω
R759	SM652101101	SM100Ω
R760	SM652101102	SM1KΩ
R761	SM652101102	SM1KΩ
R762	SM652101201	SM200Ω
R763	SM652101201	SM200Ω
R764	SM652101510	SM51Ω
R765	SM652101391	SM390Ω
R766	SM652101471	SM470Ω
R767	SM652101680	SM68Ω
R768	SM652101181	SM180Ω
R769	SM652101181	SM180Ω
R770	SM652101181	SM180Ω
R771	SM652101181	SM180Ω
R772	SM652101181	SM180Ω
R773	SM652101512	SM5.1KΩ
R775	SM652101181	SM180Ω
R776	SM652101181	SM180Ω
R777	SM652101471	SM470Ω
R778	SM652101181	SM180Ω
R779	SM652101181	SM180Ω
R781	SM652101181	SM180Ω
R782	SM652101181	SM180Ω
R783	SM652101101	SM100Ω
R784	SM652101220	SM22Ω
R785	SM652101220	SM22Ω
R786	SM652101181	SM180Ω
R787	SM652101181	SM180Ω
R788	SM652101101	SM100Ω
R789	SM652101220	SM22Ω
R790	SM652101181	SM180Ω
R791	SM652101181	SM180Ω
R792	SM652101181	SM180Ω
R793	SM652101181	SM180Ω
R794	SM652101181	SM180Ω
R795	SM652101220	SM22Ω
R797	SM652101181	SM180Ω
R799	SM652101181	SM180Ω
R8	169416473	NTC-DISC-47KΩ
R800	SM652101181	SM180Ω
R801	SM652101181	SM180Ω
R802	SM652101181	SM180Ω
R803	SM652101131	SM130Ω
R804	SM652101181	SM180Ω
R805	SM652101181	SM180Ω
R806	SM652101181	SM180Ω
R807	SM652101181	SM180Ω
R808	SM652101131	SM130Ω
R809	SM652101181	SM180Ω
R812	SM652101471	SM470Ω

PART: F9374-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9374/M/L/TM

Location	Part Number	Description	Location	Part Number	Description
R813	SM652101181	SM180Ω	R873	SM652101510	SM51Ω
R814	SM652101181	SM180Ω	R874	SM652101131	SM130Ω
R820	SM652101181	SM180Ω	R877	SM652101471	SM470Ω
R821	SM652101202	SM2KΩ	R878	SM652101471	SM470Ω
R822	SM652101181	SM180Ω	R879	SM651104204	SM200KΩ25PPM
R823	SM652101181	SM180Ω	R880	SM652101751	SM750Ω
R824	SM652101181	SM180Ω	R881	SM652101152	SM1.5KΩ
R826	SM652101391	SM390Ω	R882	SM652101101	SM100Ω
R827	SM652101510	SM51Ω	R883	SM652101101	SM100Ω
R829	SM652101181	SM180Ω	R885	SM652101181	SM180Ω
R830	SM652101181	SM180Ω	R886	SM652101101	SM100Ω
R832	SM652101181	SM180Ω	R887	SM652101471	SM470Ω
R833	SM652101181	SM180Ω	R888	SM652101471	SM470Ω
R834	SM652101821	SM820Ω	R889	SM652101471	SM470Ω
R835	SM652101751	SM750Ω	R890	SM652101102	SM1KΩ
R836	SM652101820	SM82Ω	R891	SM652101152	SM1.5KΩ
R837	SM652101820	SM82Ω	R892	SM652101131	SM130Ω
R838	SM652101131	SM130Ω	R893	SM652101561	SM560Ω
R840	SM652101510	SM51SΩ	R894	SM652101101	SM100Ω
R841	SM652101510	SM51Ω	R895	SM652101220	SM22Ω
R842	SM652101510	SM51Ω	R897	SM652101102	SM1KΩ
R843	SM652101181	SM180Ω	R898	SM651104241	SM240Ω25PPM
R844	SM652101181	SM180Ω	R899	SM651104392	SM3.9KΩ25PPM
R845	SM652101181	SM180Ω	R9	SM652101223	SM22KΩ
R847	SM652101102	SM1KΩ	R900	SM652101101	SM100Ω
R848	SM652101102	SM1KΩ	R901	SM652101751	SM750Ω
R849	SM652101181	SM180Ω	R902	SM652101751	SM750Ω
R850	SM652101471	SM470Ω	R903	SM652101102	SM1KΩ
R851	SM652101102	SM1KΩ	R904	SM652101102	SM1KΩ
R852	SM652101102	SM1KΩ	R905	SM651104183	SM18KΩ25PPM
R855	SM652101471	SM470Ω	R906	SM651104182	SM1.8KΩ25PPM
R857	SM652101510	SM51Ω	R907	SM651104201	SM200Ω25PPM
R858	SM652101103	SM10KΩ	R908	SM185457201	SM200Ω-1T
R859	SM652101510	SM51Ω	R909	SM652101181	SM180Ω
R861	SM652101510	SM51Ω	R910	SM652101181	SM180Ω
R862	SM652101510	SM51Ω	R911	SM652101181	SM180Ω
R863	SM652101510	SM51Ω	R912	SM652101181	SM180Ω
R864	SM652101471	SM470Ω	R913	SM652101750	SM75Ω
R865	SM652101512	SM5.1KΩ	R914	SM652101510	SM51Ω
R866	SM652101562	SM5.6KΩ	R915	SM652101271	SM270Ω
R867	SM652101510	SM51Ω	R916	SM652101221	SM220Ω
R869	SM652101181	SM180Ω	R918	SM652101301	SM300Ω
R870	SM652101112	SM1.1KΩ	R919	SM652101391	SM390Ω
R871	SM652101510	SM51Ω	R920	SM652101181	SM180Ω
R872	SM652101103	SM10KΩ	R921	SM652101181	SM180Ω

PART: F9374-31 DESC: MAIN CARD (FRONT END, ADC, TDC) FOR 9374/M/L/TM

Location	Part Number	Description
R923	SM652101750	SM75Ω
R924	SM652101220	SM22Ω
R925	SM652101220	SM22Ω
R926	SM652101512	SM5.1KΩ
R927	SM652101562	SM5.6KΩ
R929	SM652101103	SM10KΩ
R935	SM652101181	SM180Ω
R936	SM652101181	SM180Ω
R937	SM652101181	SM180Ω
R938	SM652101181	SM180Ω
R939	SM652101181	SM180Ω
R940	SM652101181	SM180Ω
R941	SM652101181	SM180Ω
R942	SM652101181	SM180Ω
R943	SM652101181	SM180Ω
R944	SM652101181	SM180Ω
R945	SM652101512	SM5.1KΩ
R946	SM652101562	SM5.6KΩ
R947	SM652101181	SM180Ω
R948	SM652101181	SM180Ω
R950	SM652101221	SM220Ω
R951	SM652101221	SM220Ω
R952	SM652101221	SM220Ω
R953	SM652101221	SM220Ω
R954	SM652101221	SM220Ω
R955	SM652101221	SM220Ω
R956	SM652101221	SM220Ω
R957	SM652101221	SM220Ω
R958	SM652101221	SM220Ω
R959	SM652101221	SM220Ω
R960	SM652101112	SM1.1KΩ
R963	SM652101181	SM180Ω
R964	SM652101181	SM180Ω
R965	SM652101181	SM180Ω
R966	SM652101181	SM180Ω
R967	SM652101181	SM180Ω
R968	SM652101181	SM180Ω
R969	SM652101181	SM180Ω
R970	SM652101181	SM180Ω
R971	SM652101181	SM180Ω
R972	SM652101471	SM470Ω
R973	SM652101471	SM470Ω
R974	SM652101471	SM470Ω
R975	SM652101471	SM470Ω
R976	SM652101471	SM470Ω

Location	Part Number	Description
R977	SM652101510	SM51S
R978	SM652101391	SM390Ω
R979	SM652101510	SM51Ω
R980	SM652101391	SM390Ω
R981	SM652101471	SM470Ω
R982	SM652101471	SM470Ω
R983	SM652101510	SM51Ω
R984	SM652101391	SM390Ω
R985	SM652101510	SM51Ω
R986	SM652101181	SM180Ω
R987	SM652101181	SM180Ω
R989	SM652101181	SM180Ω
R990	SM652101512	SM5.1KΩ
R991	SM652101562	SM5.6KΩ
RL1000	430430004	RL-RP1-12
RL1001	430430004	RL-RP1-12
RL1002	430430004	RL-RP1-12
RL1003	430490005	RL-RK1-12
RL1004	430430004	RL-RP1-12
RL1005	430490005	RL-RK1-12
RL1006	430430004	RL-TK1-12P4
RL200	430430004	RL-RP1-12
RL2000	430430004	RL-RP1-12
RL2001	430430004	RL-RP1-12
RL2002	430430004	RL-RP1-12
RL2003	430490005	RL-RK1-12
RL2004	430430004	RL-RP1-12
RL2005	430490005	RL-RK1-12
RL2006	430430004	RL-TK1-12-P4
RL201	430430004	RL-RP1-12
RL202	430430004	RL-RP1-12
RL203	430430004	RL-RP1-12
RL3000	430430004	RL-RP1-12
RL3001	430430004	RL-RP1-12
RL3002	430430004	RL-RP1-12
RL3003	430490005	RL-RK1-12
RL3004	430430004	RL-RP1-12
RL3005	430490005	RL-RK1-12
RL3006	430430004	RL-TK1-12-P4
RL4000	430430004	RL-RP1-12
RL4001	430430004	RL-RP1-12
RL4002	430430004	RL-RP1-12
RL4003	430490005	RL-RK1-12
RL4004	430430004	RL-RP1-12
RL4005	430490005	RL-RK1-12

PART: F9374-31 DESC: MAIN CARD (FRONT END, ADC, TDC) for 9374/M/L/TM

Location	Part Number	Description	Location	Part Number	Description
RL4006	430430004	RL-TK1-12-P4	TC1000	F9374_7	9374-7
RL5000	430490003	RL-TQ2-12	TC2000	F9374_7	9374-7
RL5001	430430002	RL-FBR22-12	TC3000	F9374_7	9374-7
S1	SM654101000	SM0Ω-2P	TC4000	F9374_7	9374-7
S1000	SM654101000	SM0Ω-2P	TP1001	454312004	2x2-ST-M-NW
S1001	SM654101000	SM0Ω-2P	TP1500	454315008	2x4-ST-M-NW
S2	SM654101000	SM0Ω-2P	TP2001	454312004	2x2-ST-M-NW
S2000	SM654101000	SM0Ω-2P	TP201	454313010	2x5-ST-M-NW
S2001	SM654101000	SM0Ω-2P	TP202	454313010	2x5-ST-M-NW
S3	SM654101000	SM0Ω-2P	TP203	454313010	2x5-ST-M-NW
S3000	SM654101000	SM0Ω-2P	TP2500	454315008	2x4-ST-M-NW
S3001	SM654101000	SM0Ω-2P	TP3001	454312004	2x2-ST-M-NW
S4	SM654101000	SM0Ω-2P	TP3500	454315008	2x4-ST-M-NW
S4000	SM654101000	SM0Ω-2P	TP4001	454312004	2x2-ST-M-NW
S4001	SM654101000	SM0Ω-2P	TP4500	454315008	2x4-ST-M-NW
S5	SM654101000	SM0Ω-2P	TP5000	454340002	2x1-ST-M-NW
S6	SM652101510	SM51Ω-2P	Y5001	SM311414318	SM14.31818MHz
S7	SM652101510	SM51Ω-2P	Y700	311210000	OSC-18D-10MHz

PART : F9374-31 DESC : MAIN CARD (FRONT END,ADC,TDC) for 9374/M/L/TM

COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
520001020	SELF LOCK FRAME GROUND.SPACER	2
530009002	SHIELD (RFI/EMI) FINGER STOCK	4
554416000	NAIL RIVET 1.6X6	2
554425003	SCREW S/TAP PHIL M2.5X6 BLACK	6
709354331	BASE SHIELD	1
709354351	SHIELD LOWER PARTITION	5
709354361	SHIELD LEFT LOWER PARTITION	1
709354411	9354-4 OCILLATOR SHIELD	1
7093XXP41	PROBE HOLDER	6
7093XXP91	PROBE RING CONTACT	6
F9354-4	400-500MHZ PLL OSCILLATOR	1
FP9374-3	MAIN CARD PANEL 9374-3	1
S9374-31	MAIN CARD QUAD 500MS/s, 1GHz	1

PART : S9374-31 DESC : MAIN CARD (FRONT END,ADC,TDC) for 9374/M/L/TM

COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
146544471	CAP MINI ALUM 20% 470µF	1
146554476	CAP MINI ALUM 20% 47 µF	2
146574227	CAP MINI ALUM 20% 220 µF	3
158849010	CAP VARIABLE 1 - 5 PF	4
168909001	RES ULTRA PREC 900K 0.25%	10
169416473	RESISTOR DISC NTC 47 K	1
208122002	IC VOLT REG POS UA7805	1
208123002	IC +12 VOLT REG LM340T-12	3
208124003	IC VOLT REG NEG LM320T-12	3
290120002	DELAY LINE 2 N-SEC	4
290120004	DELAY LINE 4 NS	1
290120005	DELAY LINE 5NS	1
290120009	DELAY LINE 9 N-SEC	2
290199015	DELAY LINE 1.5 NS	2
311210000	CRYSTAL OSCILLATOR 3PPM 10MHZ	1
430430002	RELAY 1 FORM C SPDT	1
430430004	RELAY HF 12V MINIATURE	24
430490003	RELAY 2 FORM C DPDT	1
430490005	RELAY HF 12V	8
454111024	HDR 2MM PRESSFIT TO FEM 4X6	14
454115016	HDR FRICTION LOCK 16-PIN	1
454220096	HDR PRESSFIT TO FEM 96	1
454312004	HDR MALE PIN TO WW (2X2)4	4
454313010	HDR DIP SOLD TO PCB 2X5	3
454315008	HDR DIP SOLD TO PCB 2X4	4
454340002	HDR MALE PIN TO WW 02	1
454390002	HDR FRICTION LOCK 2-PIN	1
505019968	HEAT SINK VERTICAL MTG	2
505070220	HEAT SINK + TAG FOR TO220	5
505132001	HEATSINK (DIAMETER 19MM)	4
505368202	HEATSINK FOR 68 PIN PGA	4
530040007	BUZZER 85DB 5V SMALL	1
709370311	HFE419 HEATSINK	4
709370321	HFE419 HEATSINK CLIP	4
709374331	HSH423 HEAT SPREADER	4
7093XXP01	RIGHT ANGLE RECEPT. CONNECTOR	6
7093XXP21	BULKHEAD RECEPTACLE FEMALE	6
709450321	HEAT SINK FOR FADC	1
719374313	PC BD PREASS'Y 9374-3	1
CH599043022	HEAT SINK EPOXY	1
F9374-7	T-COIL 9374	4
HFE419	HYBRID DSO FRONTEND (1GHZ)	4
HSH423	HYB 500MS/S SAMPLE&HOLD 50 OHM	4
MCL404 IC	MEM GATE ARRAY MCL404	1

PART : S9374-31 DESC : MAIN CARD (FRONT END,ADC,TDC) for 9374/M/L/TM

COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
MDX416IC	DEMUX/MINMAX GATE ARRAY	4
MST412	IC SMART TRIGGER GATE-ARRAY	1
MTB411	IC TIME BASE GATE-ARRAY	1
MTR408	TRIGGER COUPLING & COMPARATOR	5
SM158240200	CAP VARIABLE .6 - 2.5 PF	5
SM158240201	CAP VARIABLE 1 - 5 PF	4
SM158240202	CAP VARIABLE 2.5 - 10 PF	8
SM168651297	RES METAL FILM 1% 100 Ω	2
SM168651315	RES METAL FILM 1% 154 Ω	8
SM168659004	RES METAL FILM .1% 900 Ω	1
SM168659006	RES METAL FILM .1% 111.1 KΩ	1
SM168659007	RES METAL FILM .1% 3.00KΩ	4
SM168659297	RES METAL FILM .1% 100 Ω	7
SM185457101	RES VARI CERMET 100 Ω	4
SM185457201	RES VARI CERMET 200 Ω	2
SM185457202	RES VARI CERMET 2 KΩ	4
SM185457203	RES VARI CERMET 20 KΩ	9
SM185457501	RES VARI CERMET 500 Ω	12
SM185457502	RES VARI CERMET 5 KΩ	1
SM185457503	RES VARI CERMET 50 KΩ	4
SM200167102	IC NOR GATE 10H102	2
SM200167131	IC M-S TYP D FLOP 10H131	2
SM200167164	IC 8 TO 1 MPLX 10H164	1
SM200169016	IC BINARY UP COUNTER 10E016	3
SM200169191	IC UP-DOWN BIN COUNTER 74F191	5
SM200172008	IC AND GATE 74F08	1
SM200178000	IC 2-INPUT NAND HCT00	1
SM200178002	IC 2-INPUT NOR HCT02	2
SM200178030	IC 8-IN NAND HCT30	1
SM200178074	IC D-TYP FLOP 74HCT74	2
SM200178138	IC 3-8 LINE DECOD HCT 138	4
SM200178273	IC D-TYP FLOP 74HCT273	2
SM200178374	IC D-TYP FLOP 74HCT374	1
SM200278040	IC COUNTER HCT4040	1
SM201164104	IC QUINT 2-IN AND/NAND	1
SM201164131	IC M/S D-TYP FLOP 10E131	1
SM201164167	IC 6-BIT 2:1 MUX REGISTER	1
SM201166195	IC ECL PROG DELAY 2NS 10E195	4
SM201174001	IC ECL 4 IN OR/NOR 10EL01D	2
SM201174005	IC ECL 2-IN DIF AND/NAND	8
SM201174011	IC ECL 1:2 DIF CLOCK DRVR	12
SM201174031	IC ECL FLIP/FLOP SET/RES	6
SM201274032	IC ECL DIV:2 10EL32D	3
SM201274033	IC ECL DIV:4 10EL33D	1

PART : S9374-31 DESC : MAIN CARD (FRONT END,ADC,TDC) for 9374/M/L/TM

COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
SM201570016	IC ECL DIF RECEIVER 10EL16D	2
SM205045300	PROGRAMMED GAL MIMOSA-A	1
SM205045350	PROGRAMMED GAL ROUTE1-A	1
SM205045351	PROGRAMMED GAL ROUTE2-A	1
SM205045352	PROGRAMMED GAL ROUTE2-B	1
SM205045354	PROGRAMMED GAL AVENUE-A	1
SM205045355	PROGRAMMED GAL RUELLE-A	1
SM205045357	PROGRAMMED GAL CHEMIN-A	1
SM205045358	PROGRAMMED GAL ROUTE3-C	1
SM205045359	PROGRAMMED GAL ARTERE-B	1
SM205108016	IC EEPROM 16K BIT IIC BUS	1
SM205618165	IC 8-BIT SHIFT REG 74HCT165	1
SM205618594	IC 8-BIT SHIFT REG 74HC594T	24
SM205701070	IC 128KX8 STAT RAM 70 NS	8
SM206070584	IC BUS CONTROLLER PCF8584T	1
SM206260858	IC OCT 8-BIT ADC0858	1
SM206884623	IC OCTAL BUS TRANSCVR ABT623	10
SM206885245	IC BUS TRANSCVR ABT245	2
SM206970457	IC 3 DIF 2:1 MUX MC10E457	3
SM207130025	TRANSISTOR NPN BFT25A	1
SM207170367	IC HEX BUF FER 74HC367	1
SM207171244	IC OCTAL BUF FER ABT244	6
SM207172241	IC OCTAL BUF FER ABT241	3
SM207260718	IC 8-BIT ADC 8718	4
SM207280703	IC 16-BIT DAC 703	1
SM207288800	IC OCTAL 8-BIT CMOS D/A CONV	2
SM207360125	IC TRANSLATO MC10125	3
SM207367124	IC TRANSLATOR 10H124	1
SM207367125	IC TRANSLATOR 10H125	2
SM207770201	IC ANALOG SWITCH DG201	4
SM207770403	IC ANALOG SWITCH DG403	1
SM207770442	IC ANALOG SWITCH DG442	5
SM207960157	IC QUAD 2:1 MULTIPLEX 10E157	1
SM207961158	IC 5 BIT 2:1 MUX 10E158	2
SM207970139	IC DECODER/DEMUX 74F139	4
SM207970351	IC OCTAL ANALOG MUX/DEMUX	1
SM207970508	IC ANALOG MULT PLX 8-1 DG508	1
SM207972157	IC DATA SEL/MUX 74F157A	1
SM207978153	IC 4-INPUT MUX HCT153	1
SM207978251	IC 8-IN MUX 3-ST 74HCT251	2
SM208030245	IC TRANS ARRAY NPNX6 SL3245	1
SM208470037	IC OP AMP 37GS	1
SM208470111	IC HF BµF FER CLC111	4
SM208470324	IC OP AMP LM324M	1

PART : S9374-31 DESC : MAIN CARD (FRONT END,ADC,TDC) for 9374/M/L/TM

COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
SM208470347	IC J-FET OP AMP 347	4
SM208470351	IC J-FET OP AMP 351	1
SM208470353	IC DUAL OP AMP 353	2
SM208470705	IC OP AMP PICOAMP INPUT AD705	13
SM208480640	IC WIDEBAND OP AMP OPA640	4
SM208570078	IC LOW POWER REG +12V 78L12	1
SM208570805	IC POS VOLT REG 78L05	2
SM208591336	IC VOLT REF DIODE LM336	1
SM208870339	IC VOLT COMPARATOR 339	6
SM208880079	IC LOW POWER REG -12V 79L12	1
SM208880337	IC ADJ VOLT REG LM337	4
SM208971881	IC VIDEO SYNC SEPARATOR LM1881	1
SM229020150	MLC TR.VOLT SUP.VC0805056150B	6
SM232022822	DIODE ARRAY SCHTTKY 2822	3
SM232120070	DIODE ARRAY BAV70	3
SM236030099	DIODE SO-PKG BAV99	35
SM236654004	DIODE RECTIFIER 4004	5
SM240050033	DIODE ZENER TZM-C-3V3	5
SM240050051	DIODE ZENER TZM-C-5V1	9
SM240218451	DIODE ZENER BZX84C5V1	19
SM240218462	DIODE ZENER BZX84C6V2	4
SM240218475	DIODE ZENER BZX84C7V5	2
SM252023018	DIODE PIN BAT 18	5
SM252080682	DIODE PIN BA682	5
SM253032823	DIODE SCHOTTKY 2823	11
SM270030020	TRANSISTOR NPN BFS20	1
SM270130092	TRANSISTOR NPN BFR92A	2
SM270130093	TRANSISTOR NPN BFR93A	3
SM270160520	TRANSISTOR NPN HF BFG520/X	13
SM270330848	TRANSISTOR NPN BC848C	5
SM275030092	TRANSISTOR PNP BFT92	4
SM275030093	TRANSISTOR PNP BFT93	2
SM275030550	TRANSISTOR PNP BF550	6
SM275330858	TRANSISTOR PNP BC858C	18
SM280120416	TRANSISTOR JFET N MMBF4416	5
SM280171005	TRANS POWER MOSFET MTD10N05E	2
SM289240061	TRANSISTOR NPN BCV61	4
SM289240062	TRANSISTOR ARRAY BCV62	4
SM289772003	TRANSISTOR ARRAY 2003	4
SM300446150	INDUCTOR .015UH	1
SM301502001	BEAD (FERRITE CHIP)	34
SM311414318	CRYSTAL OSCILLATOR 14.31818MHZ	1
SM454120025	CONN 1MM FEMALE 25	1
SM651081102	RES CHIP 0.1% 1 Kv	16

PART : S9374-31 DESC : MAIN CARD (FRONT END,ADC,TDC) for 9374/M/L/TM

COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
SM651104182	RES CHIP 1% 25PPM 1.8KΩ	1
SM651104183	RES CHIP 1% 25PPM 18 KΩ	1
SM651104201	RES CHIP 1% 25PPM 200 Ω	1
SM651104204	RES CHIP 1% 25PPM 200 KΩ	1
SM651104241	RES CHIP 1% 25PPM 240 Ω	1
SM651104392	RES CHIP 1% 25PPM 3.9KΩ	5
SM652061024	RES CHIP 1% PRECISION 2.4 Ω	8
SM652061820	RES CHIP 1% PRECISION 82 Ω	4
SM652101100	RES CHIP (E24) 1% 10 Ω	7
SM652101101	RES CHIP (E24) 1% 100 Ω	32
SM652101102	RES CHIP (E24) 1% 1 KΩ	75
SM652101103	RES CHIP (E24) 1% 10 KΩ	91
SM652101104	RES CHIP (E24) 1% 100 KΩ	2
SM652101105	RES CHIP (E24) 1% 1 MΩ	9
SM652101112	RES CHIP (E24) 1% 1.1 KΩ	5
SM652101121	RES CHIP (E24) 1% 120 Ω	26
SM652101122	RES CHIP (E24) 1% 1.2 KΩ	11
SM652101131	RES CHIP (E24) 1% 130 Ω	20
SM652101151	RES CHIP (E24) 1% 150 Ω	33
SM652101152	RES CHIP (E24) 1% 1.5 KΩ	3
SM652101153	RES CHIP (E24) 1% 15 KΩ	9
SM652101154	RES CHIP (E24) 1% 150 KΩ	4
SM652101163	RES CHIP (E24) 1% 16 KΩ	5
SM652101181	RES CHIP (E24) 1% 180 Ω	113
SM652101182	RES CHIP (E24) 1% 1.8 KΩ	23
SM652101183	RES CHIP (E24) 1% 18 KΩ	1
SM652101201	RES CHIP (E24) 1% 200 Ω	74
SM652101202	RES CHIP (E24) 1% 2 KΩ	9
SM652101204	RES CHIP (E24) 1% 200 KΩ	4
SM652101220	RES CHIP (E24) 1% 22 Ω	23
SM652101221	RES CHIP (E24) 1% 220 Ω	11
SM652101223	RES CHIP (E24) 1% 22 K	9
SM652101241	RES CHIP (E24) 1% 240 Ω	8
SM652101271	RES CHIP (E24) 1% 270 Ω	9
SM652101272	RES CHIP (E24) 1% 2.7 KΩ	4
SM652101273	RES CHIP (E24) 1% 27 KΩ	1
SM652101300	RES CHIP (E24) 1% 30 Ω	4
SM652101301	RES CHIP (E24) 1% 300 Ω	17
SM652101302	RES CHIP (E24) 1% 3 KΩ	1
SM652101330	RES CHIP (E24) 1% 33 Ω	17
SM652101331	RES CHIP (E24) 1% 330 Ω	11
SM652101332	RES CHIP (E24) 1% 3.3 KΩ	30
SM652101364	RES CHIP (E24) 1% 360 KΩ	16
SM652101391	RES CHIP (E24) 1% 390 Ω	16

PART : S9374-31 DESC : MAIN CARD (FRONT END,ADC,TDC) for 9374/M/L/TM

COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
SM652101392	RES CHIP (E24) 1% 3.9 KΩ	2
SM652101394	RES CHIP (E24) 1% 390 KΩ	8
SM652101431	RES CHIP (E24) 1% 430 Ω	48
SM652101470	RES CHIP (E24) 47 Ω	4
SM652101471	RES CHIP (E24) 1% 470 Ω	26
SM652101472	RES CHIP (E24) 1% 4.7 KΩ	8
SM652101474	RES CHIP (E24) 1% 470 KΩ	1
SM652101510	RES CHIP (E24) 1% 51 Ω	61
SM652101511	RES CHIP (E24) 1% 510 Ω	5
SM652101512	RES CHIP (E24) 1% 5.1 KΩ	42
SM652101513	RES CHIP (E24) 1% 51 KΩ	4
SM652101561	RES CHIP (E24) 1% 560 Ω	7
SM652101562	RES CHIP (E24) 1% 5.6 KΩ	9
SM652101621	RES CHIP (E24) 1% 620 Ω	9
SM652101680	RES CHIP (E24) 1% 68 Ω	19
SM652101681	RES CHIP (E24) 1% 680 Ω	5
SM652101683	RES CHIP (E24) 1% 68 KΩ	5
SM652101684	RES CHIP (E24) 1% 680 KΩ	1
SM652101750	RES CHIP (E24) 1% 75 Ω	15
SM652101751	RES CHIP (E24) 1% 750 Ω	8
SM652101820	RES CHIP (E24) 1% 82 Ω	6
SM652101821	RES CHIP (E24) 1% 820 Ω	2
SM652101822	RES CHIP (E24) 1% 8.2 KΩ	9
SM652101824	RES CHIP (E24) 1% 820 KΩ	2
SM652101910	RES CHIP (E24) 1% 91 Ω	36
SM652110904	RES CHIP 900KΩ 0.5%	1
SM652115062	RES CHIP (E24) 5% 6.2 Ω	1
SM652181590	RES CHIP 1% PRECISION 113 KΩ	8
SM653185107	RES CHIP 5% 100PPM 100M Ω	5
SM653206222	RESISTOR NTC 10% 2.2K Ω	8
SM654101000	CHIP JUMPER ZERO Ω	58
SM661205472	CAP CERA CHIP 5% 4700 PF	4
SM661205822	CAP CERA CHIP 8200PF	5
SM661207102	CAP CERA CHIP 10% .001μF	12
SM661207103	CAP CERA CHIP 20% .01μF (0805)	503
SM661207104	CAP CERA CHIP 20% .1 μF	174
SM661207223	CAP CERA CHIP 20% .022 μF	8
SM661255010	CAP CERA CHIP 1.0 PF	1
SM661255012	CAP CERA CHIP 5% 1.2 PF	4
SM661255022	CAP CERA CHIP 2.2 PF	4
SM661255033	CAP CERA CHIP 3.3 PF	4
SM661255047	CAP CERA CHIP 4.7 PF	1
SM661255056	CAP CERA CHIP 5.6 PF	3
SM661255100	CAP CERA CHIP 10PF	15

PART : S9374-31 DESC : MAIN CARD (FRONT END,ADC,TDC) for 9374/M/L/TM

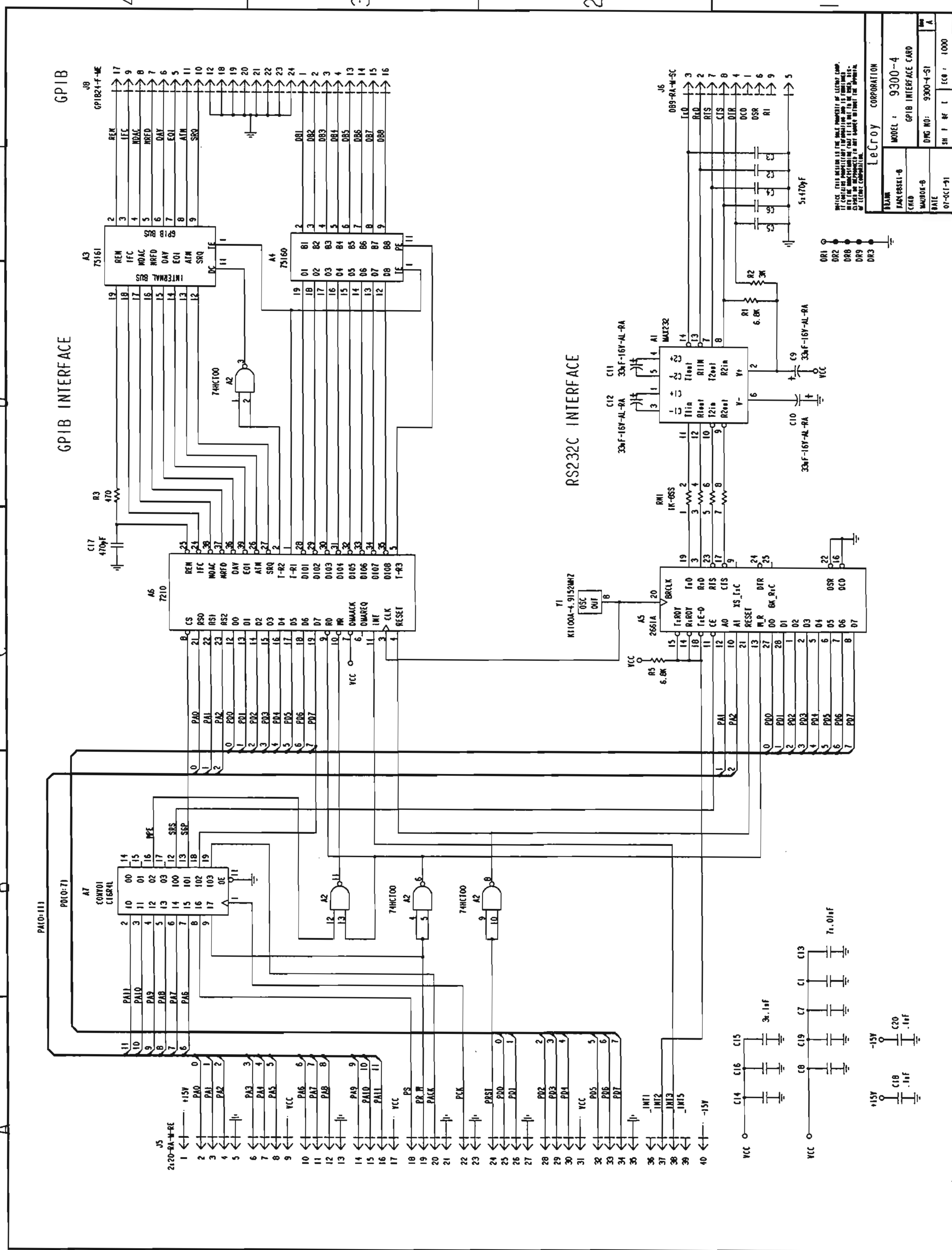
COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
SM661255101	CAP CERA CHIP 5% 100 PF	18
SM661255102	CAP CERA CHIP 5% 1000 PF	1
SM661255150	CAP CERA CHIP 5% 15 PF	1
SM661255152	CAP CERA CHIP 5% 1500 PF	4
SM661255180	CAP CERA CHIP 5% 18PF	1
SM661255181	CAP CERA CHIP 5% 180 PF	1
SM661255220	CAP CERA CHIP 5% 22 PF	5
SM661255270	CAP CERA CHIP 27PF	5
SM661255330	CAP CERA CHIP 5% 33 PF	1
SM661255560	CAP CERA CHIP 56PF	2
SM661255821	CAP CERA CHIP 5% 820 PF	5
SM661446474	CAP CERA CHIP 10% .47 µF	2
SM661526561	CAP CERA CHIP 560PF 500V	5
SM661535620	CAP CERA CHIP 62PF 200V	4
SM661540033	CAP CERA CHIP 3.3PF 500V	6
SM661540082	CAP CERA CHIP 8.2PF 500V	8
SM661555103	CAP PPS METAL FILM .01 µF	15
SM666086226	CAP MOLD TANT CHIP 22 µF	1
SM666237476	CAP MOLD TANT CHIP 47 µF	3
SM666247106	CAP MOLD TANT CHIP 10 µF	4
SM666257336	CAP MOLD TANT CHIP 33 µF	4
SM666327225	CAP MOLD TANT CHIP 2.2 µF	47
SM666377226	CAP MOLD TANT CHIP 22 µF	6
SM666427105	CAP MOLD TANT CHIP 1 µF	5
SM669080181	CHIP FERRITE BEAD	8

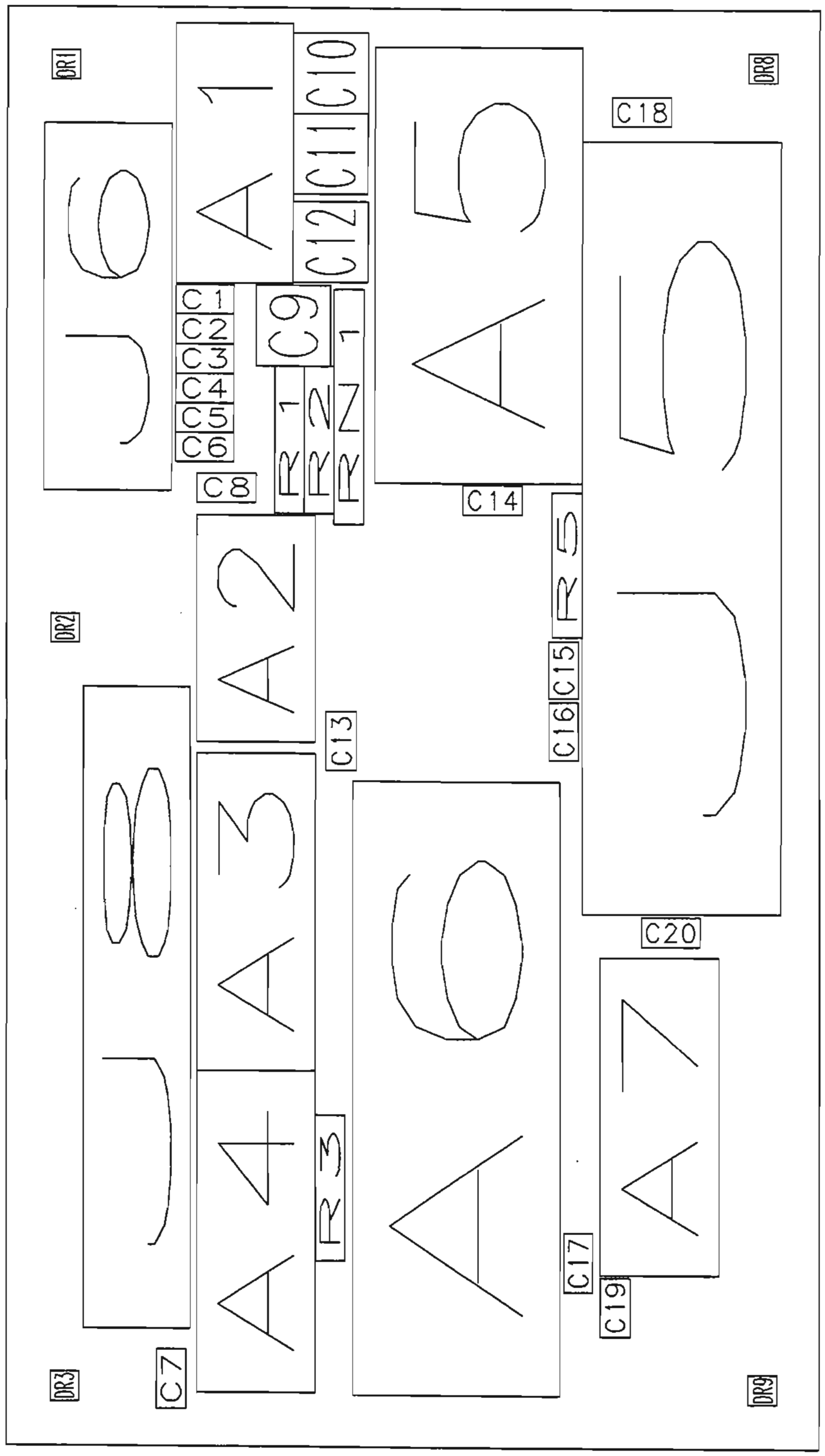
PART:F9354-4 DESC : 400-500 MHz PLL OSCILLATOR

Location	Part Number	Description	Location	Part Number	Description
A100	SM200169016	SM10E016	C128	SM661207104	SM.1μF
A101	SM208880079	SM79L12	C129	SM661255027	SM2.7pF
A102	SM201570016	SM10EL16	C130	SM661207104	SM.1μF
A103	SM208272148	SM12148	C131	SM661255121	SM120pFS
A104	SM201274032	SM10EL32	C132	SM661255820	SM82pFS
A105	SM201549040	SM12040	CR100	SM230080619	BB619
A106	SM208470027	SMOP27	CR101	SM236030099	BAV99
A107	SM208570078	SM78L12	CR103	SM236030099	BAV99
A108	SM208570805	SM78L05	CR104	SM236030099	BAV99
C100	SM661207103	SM.01μF	CR105	SM236030099	BAV99
C101	SM666247106	SM10uF	CR106	SM240218475	BZX84
C102	SM661207103	SM.01μF	CR107	SM240218475	BZX84
C103	SM661207103	SM.01μF	J100	SM454110025	SM1x12
C104	SM666247106	SM10uF	L100	SM303062068	LQP31A6N8
C105	SM661207103	SM.01μF	L101	SM301502001	BEAD1206
C106	SM661207103	SM.01μF	Q100	SM281120610	TP0610T
C108	SM661207104	SM.1μF	R100	SM652101151	SM150 Ω
C109	SM661207103	SM.01μF	R101	SM652101513	SM51 KΩ
C110	SM661207103	SM.01μF	R102	SM652101181	SM180 Ω
C111	SM666247106	SM10uF	R103	SM652101181	SM180 Ω
C112	SM661207103	SM.01μF	R104	SM652101102	SM1K Ω
C113	SM661207103	SM.01μF	R105	SM652101911	SM910 Ω
C114	SM661255152	SM1500pF	R106	SM652101102	SM1 KΩ
C115	SM661207223	SM.022μF	R107	SM652101511	SM510 Ω
C116	SM661207103	SM.01μF	R108	SM652101181	SM180 Ω
C117	SM661207103	SM.01μF	R109	SM652101362	SM3.6 KΩ
C118	SM661207104	SM.1μF	R110	SM652101362	SM3.6 KΩ
C119	SM666247106	SM10uF	R111	SM652101181	SM180 Ω
C120	SM661207103	SM.01μF	R112	SM652101181	SM180 Ω
C121	SM661255152	SM1500pF	R113	SM652101362	SM3.6 KΩ
C122	SM661207103	SM.01μF	R114	SM652101362	SM3.6 KΩ
C123	SM661207223	SM.022μF	R115	SM652101102	SM1 KΩ
C124	SM666247106	SM10uF	R116	SM652101511	SM510 Ω
C125	SM666247106	SM10uF	R117	SM652101911	SM910 Ω
C126	SM666247106	SM10uF	R118	SM652101222	SM2.2 KΩ
C127	SM661255270	SM27pF			

PART:F9354-4 DESC : 400-500 MHz PLL OSCILLATOR

COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
719354403	PC BD PREASS'Y 9354-4	1
SM200169016	IC BINARY UP COUNTER 10E016	1
SM201274032	IC ECL DIV:2 10EL32D	1
SM201549040	IC PHASE-FREQ. DET	1
SM201570016	IC ECL DIF RECEIVER 10EL16D	1
SM208272148	IC LOW POWER VCO MC12148	1
SM208470027	IC SINGLE OP AMP OP-27	1
SM208570078	IC LOW POWER REG +12V 78L12	1
SM208570805	IC POS VOLT REG 78L05	1
SM208880079	IC LOW POWER REG -12V 79L12	1
SM230080619	DIODE TUNING SMD BB619	1
SM236030099	DIODE SO-PKG BAV99	4
SM301502001	BEAD (FERRITE CHIP)	1
SM303062068	INDUCTOR CHIP COIL 2% 6.8 NH	1
SM454110025	CONN 1MM MALE 25	1
SM652101102	RES CHIP (E24) 1% 1 KΩ	3
SM652101151	RES CHIP (E24) 1% 150 Ω	1
SM652101181	RES CHIP (E24) 1% 180 Ω	5
SM652101362	RES CHIP (E24) 1% 3.6 KΩ	4
SM652101511	RES CHIP (E24) 1% 510 Ω	2
SM652101513	RES CHIP (E24) 1% 51 KΩ	1
SM652101911	RES CHIP (E24) 1% 910 Ω	2
SM661207103	CAP CERA CHIP 20% .01μF (0805)	13
SM661207104	CAP CERA CHIP 20% .1 μF	2
SM661207223	CAP CERA CHIP 20% .022 μF	2
SM661255010	CAP CERA CHIP 1.0 PF	1
SM661255152	CAP CERA CHIP 5% 1500 PF	2
SM661255270	CAP CERA CHIP 27PF	1
SM666247106	CAP MOLD TANT CHIP 10 μF	7

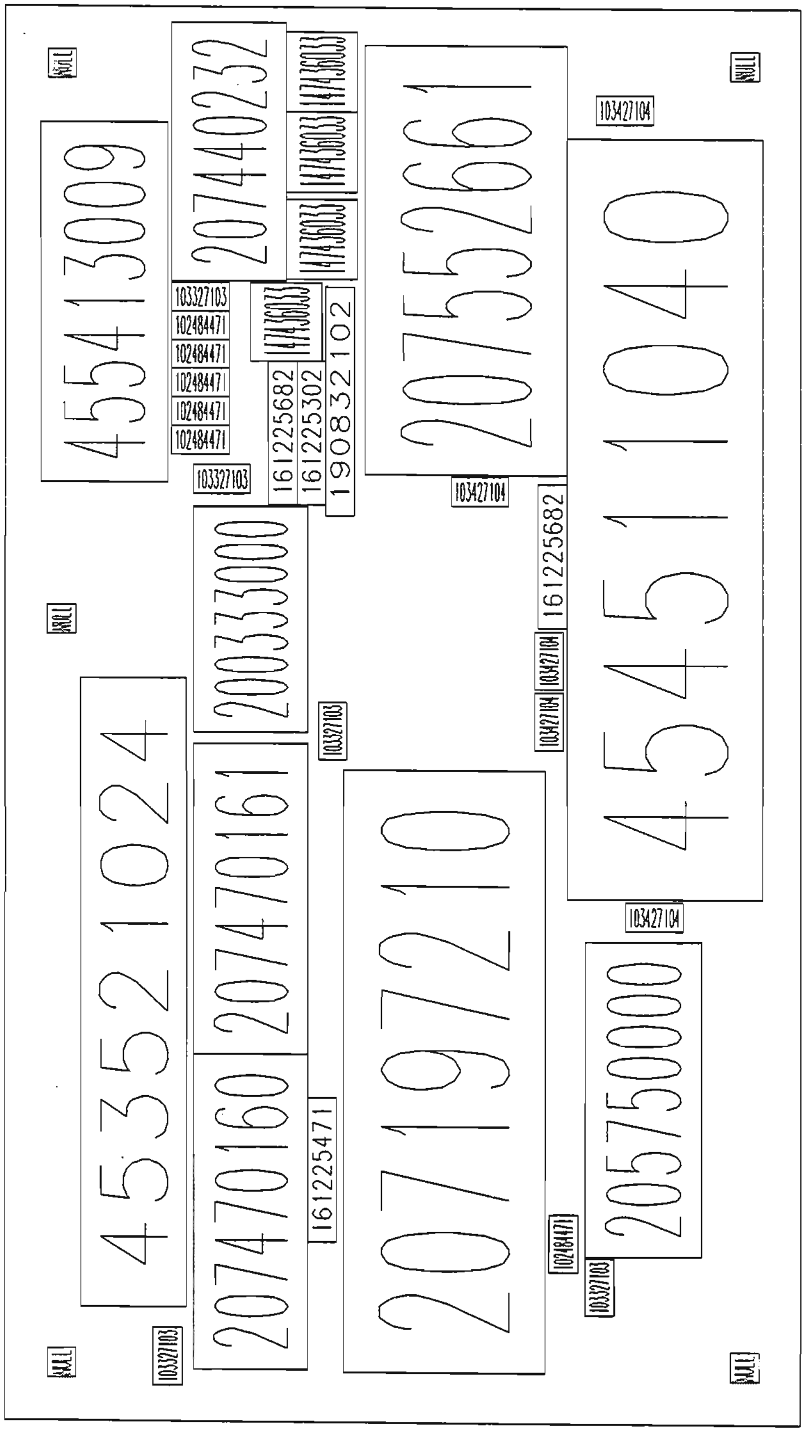

GPIB
GPIB INTERFACE
RS232C INTERFACE
LeCroy CORPORATION
9300-4
GPIB INTERFACE CARD


DR1
DR2
DR3
DR8
DR9
J6
J8
J5
A1
A2
A3
A4
A5
A6
A7
C1
C2
C3
C4
C5
C6
C7
C8
C9
C10
C11
C12
C13
C14
C15
C16
C17
C18
C19
C20
R1
R2
RN1
R3
R5

9300-4 REV:D


DB9-RA-M-SC
MAX232
2661A
2x20-RA-M-RE
74HCT00
GPIB24-F-ME
75161
75160
7210
C16R4L
6.8K
3K
1K-8SS
470
.1uF
.01uF
470pF

9300-4 REV:D



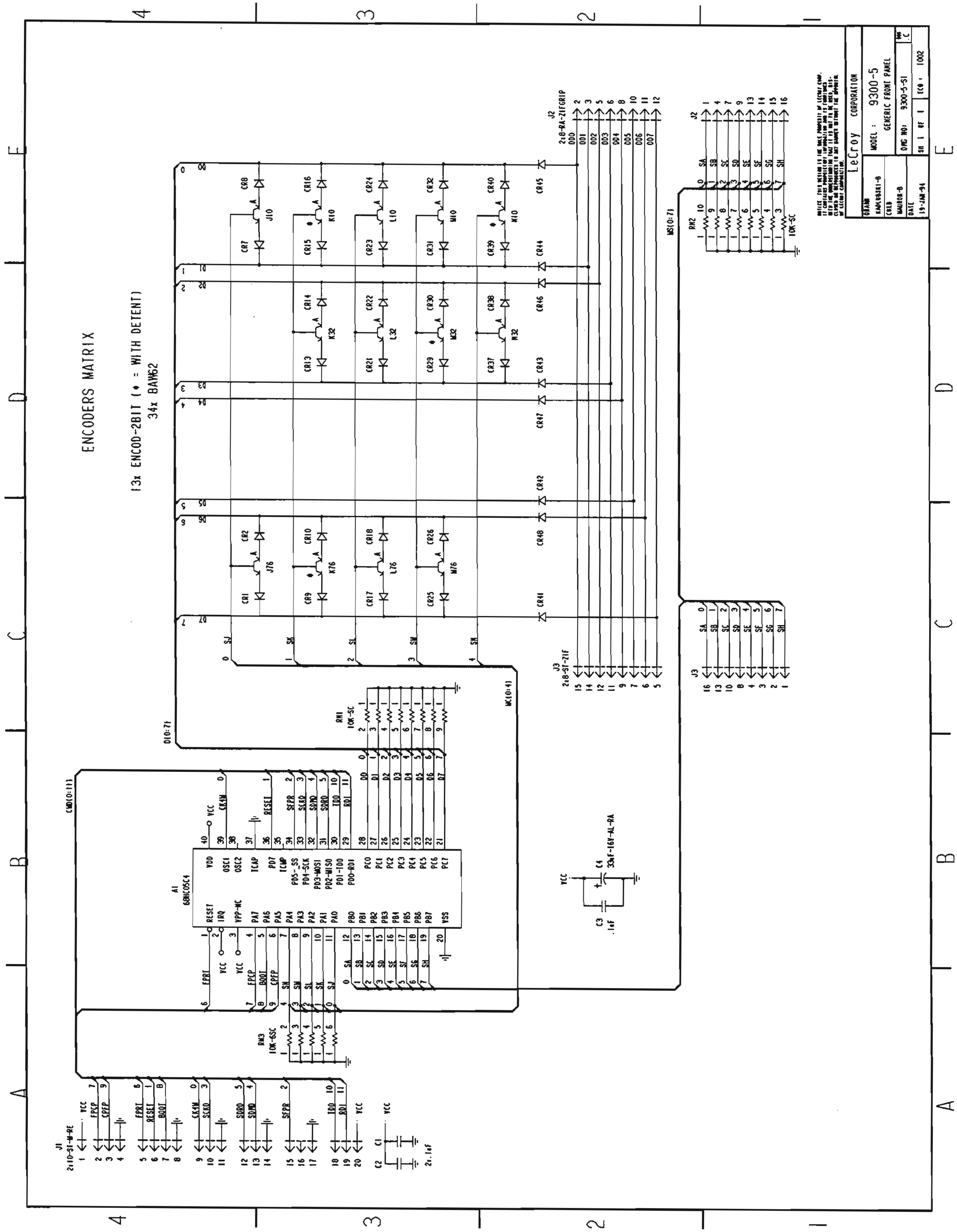
9300-4 REV:D

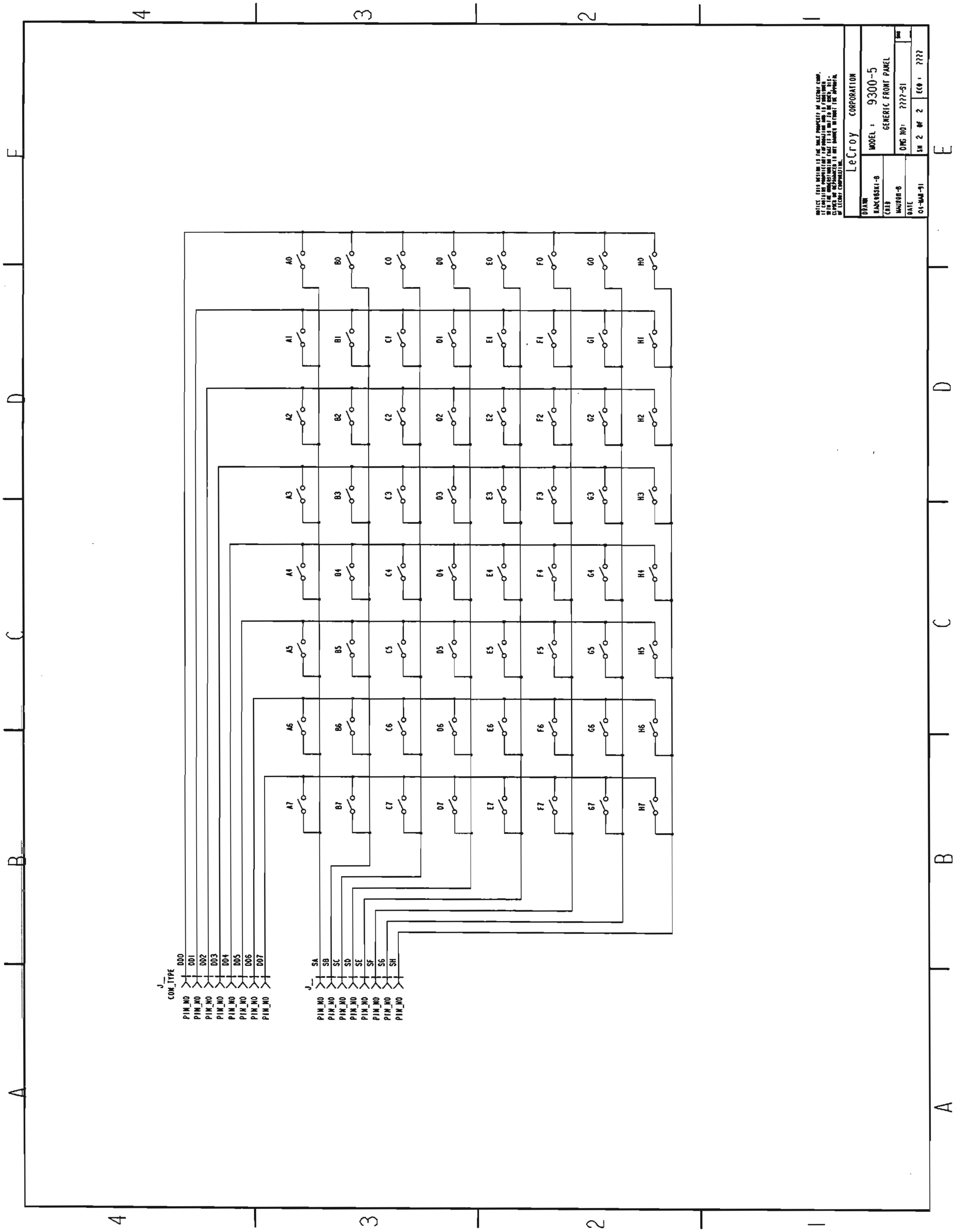
PART: F9300-4 **DESC: GPIB + RS232 INTERFACE CARD**

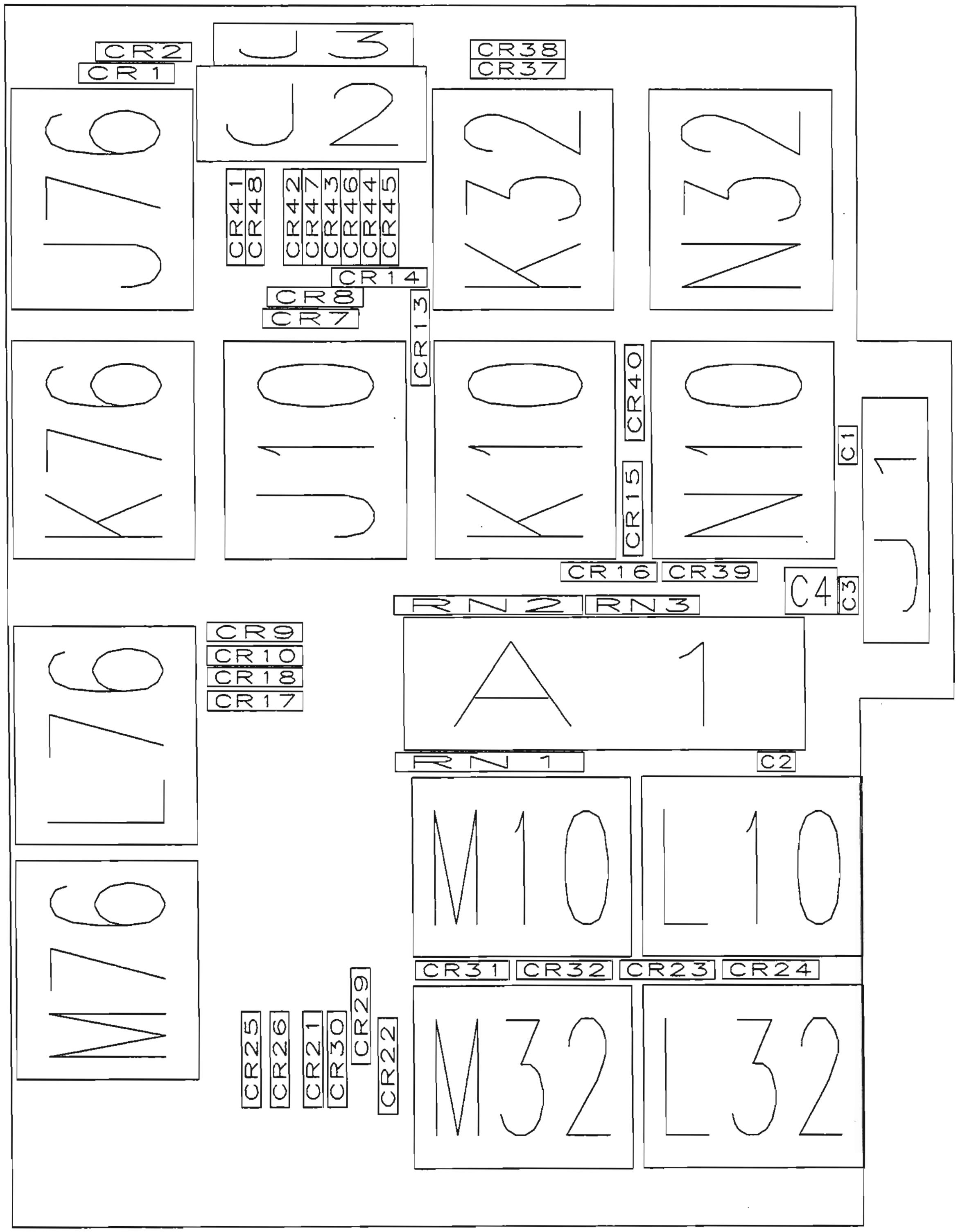
Location	Part Number	Description
----------	----------------	---------------
A1	207440232	MAX232
A2	200333000	74HCT00
A3	207470161	75161
A4	207470160	75160
A5	207552661	2661A
A6	207197210	7210
A7	205750000	C16R4L
C1	103327103	.01µF
C2	102484471	470pF
C3	102484471	470pF
C4	102484471	470pF
C5	102484471	470pF
C6	102484471	470pF
C7	103327103	.01µF
C8	103327103	.01µF
C9	147436033	33µF -16V-AL-RA
C10	147436033	33µF -16V-AL-RA
C11	147436033	33µF -16V-AL-RA
C12	147436033	33µF -16V-AL-RA
C13	103327103	.01µF
C14	103427104	.1µF
C15	103427104	.1µF
C16	103427104	.1µF
C17	102484471	470pF
C18	103427104	.1µF
C19	103327103	.01µF
C20	103427104	.1µF
J5	454511040	2x20-RA-M-RE
J6	455413009	DB9-RA-M-SC
J8	453521024	GPIB24-F-ME
R1	161225682	6.8KΩ
R2	161225302	3KΩ
R3	161225471	470Ω
R5	161225682	6.8KΩ
RN1	190832102	1KΩ-8SS
Y1	309040005	K1100A-4.9152MHZ

PART: F9300-4 **DESC: GPIB +RS232 INTERFACE CARD**

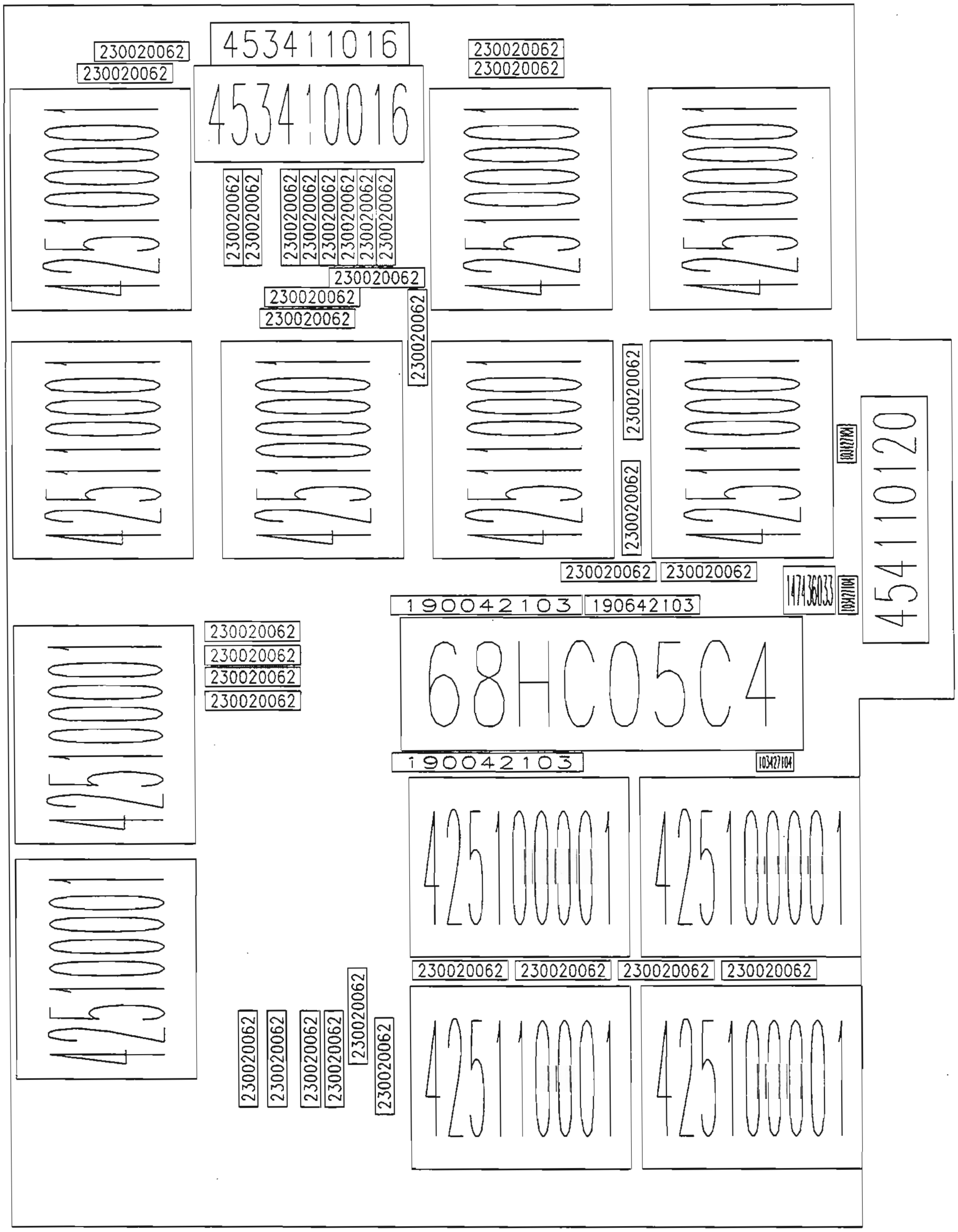
COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
102484471	CAP CERA DISC 100V 470 PF	6
103327103	CAP CERA MONO 50V .01 µF	5
103427104	CAP CERA MONO 100V .1 µF	5
147436033	CAP ALUM METAL CAN 33 µF	4
161225302	RES COMP 1/8W 5% 3 KΩ	1
161225471	RES COMP 1/8W 5% 470 Ω	1
161225682	RES CARBON FILM 6.8 KΩ	2
190832102	RES NETWORK 1 KΩ	1
200333000	IC QUAD 2-IN NAND HCT00	1
205750000	IC AND-OR GATE ARRAY 16V8	1
207197210	IC BUS INTERF CONTR 7210	1
207440232	IC XMTR/RCVR MAX 232	1
207470160	IC OCTAL BUS XCVR 75160A	1
207470161	IC OCTL BUS XCEIR 75161A	1
207552661	IC INTERFACE 2661A	1
309040005	CRYSTAL OSCIL. 4.9152MHZ	1
453521024	CONN RT ANGLE IEEE FEM 24	1
454511040	HDR SOLD TAIL/MALE/40/RT	1
455413009	CONN RT ANGLE MALE 9 S-CLIP	1
455980002	MOUNTING HDW FOR CONN SHELL	2
550130108	SCREW CYL HD M3X8	2
550430106	SCREW CYL HD PHIL M3X6	1
551430400	WASHER SHAKEPROOF M3	1
709300411	GPIB-RS232 INTERFACE BRACKET D	1
709300421	LABEL RS232-IEEE488-2 A	1
719300403	PC BD PREASS'Y 9300-4 D	1


ENCODERS MATRIX
13x ENCOD-2BIT (* = WITH DETENT)
34x BAW62
68HC05C4
33uF-16V-AL-RA
LeCroy CORPORATION
MODEL : 9300-5
GENERIC FRONT PANEL
DWG NO: 9300-5-S1
19-JAN-94


LeCroy CORPORATION
MODEL : 9300-5
GENERIC FRONT PANEL
SH 2 OF 2


CR2
CR1
J3
J2
CR38
CR37
J76
CR41
CR48
CR42
CR47
CR43
CR46
CR44
CR45
K32
N32
CR14
CR8
CR7
CR13
K76
J10
K10
CR40
N10
C1
CR15
J1
CR16
CR39
C4
C3
RN2
RN3
CR9
CR10
CR18
CR17
L76
A1
RN1
C2
M10
L10
M76
CR31
CR32
CR23
CR24
CR25
CR26
CR21
CR30
CR29
CR22
M32
L32

9300-5 Rev:B


230020062
230020062
453411016
453410016
230020062
230020062
425100001
425100001
425100001
230020062
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230020062
230020062
230020062
230020062
230020062
230020062
230020062
230020062
230020062
425110001
425100001
425110001
425110001
230020062
230020062
454110120
230020062
230020062
147436033
190042103
190642103
425100001
230020062
230020062
230020062
230020062
68HC05C4
190042103
425100001
425100001
425100001
230020062
230020062
230020062
230020062
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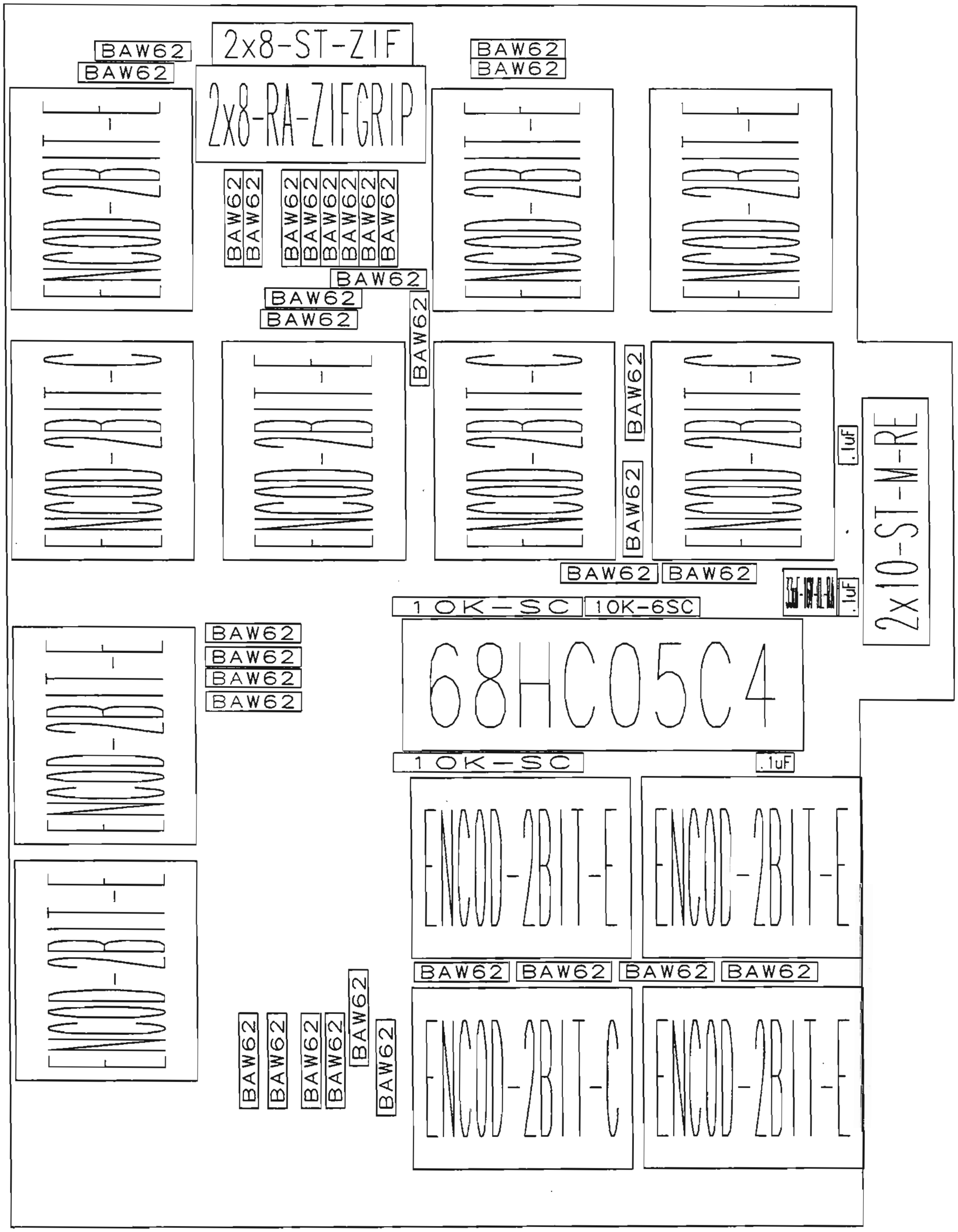
425100001

9300-5 Rev:B

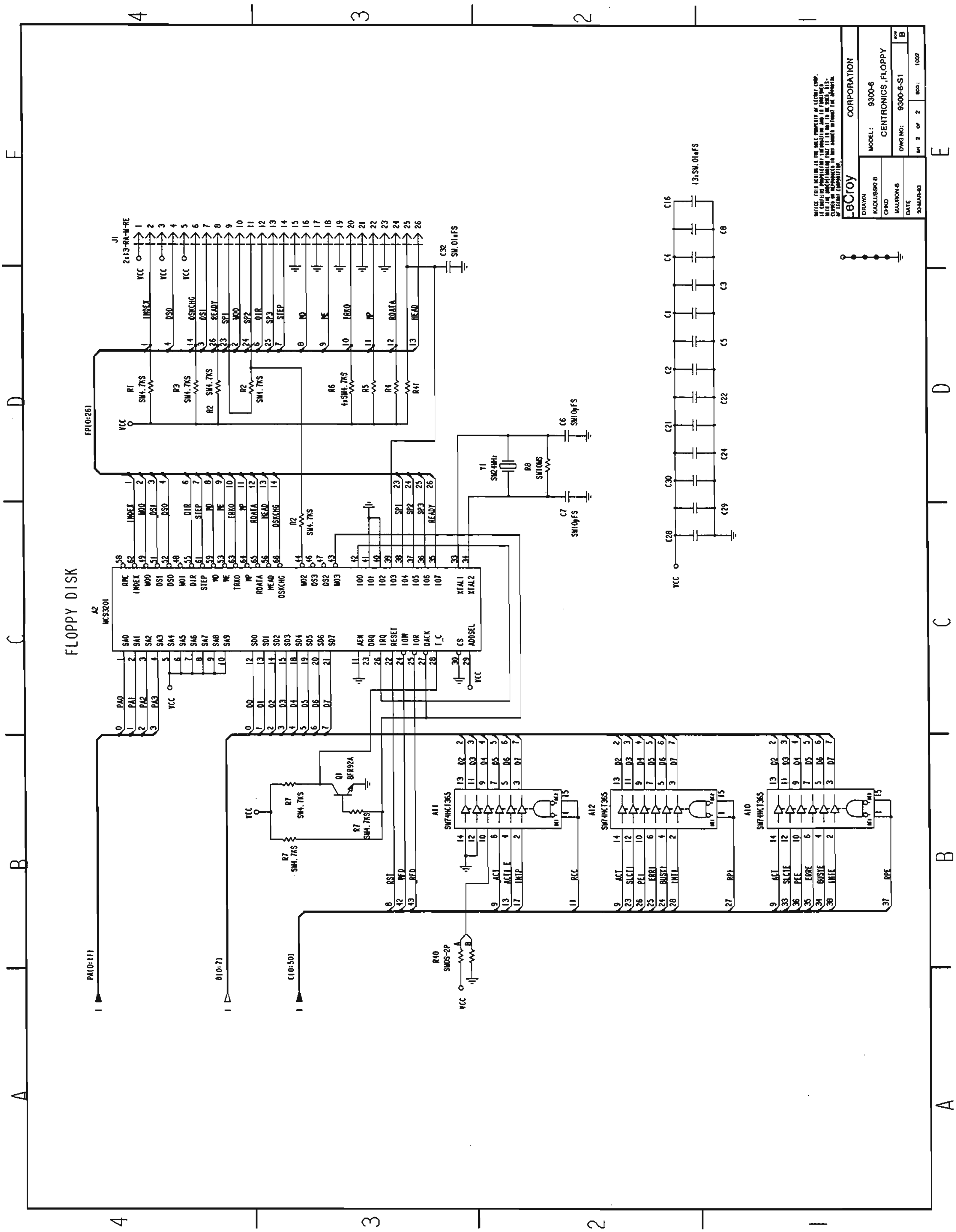

2x8-ST-ZIF
2x8-RA-ZIFGRIP
BAW62
ENCOD-2BIT-E
ENCOD-2BIT-C
10K-SC
10K-6SC
68HC05C4
.1uF
2x10-ST-M-RE

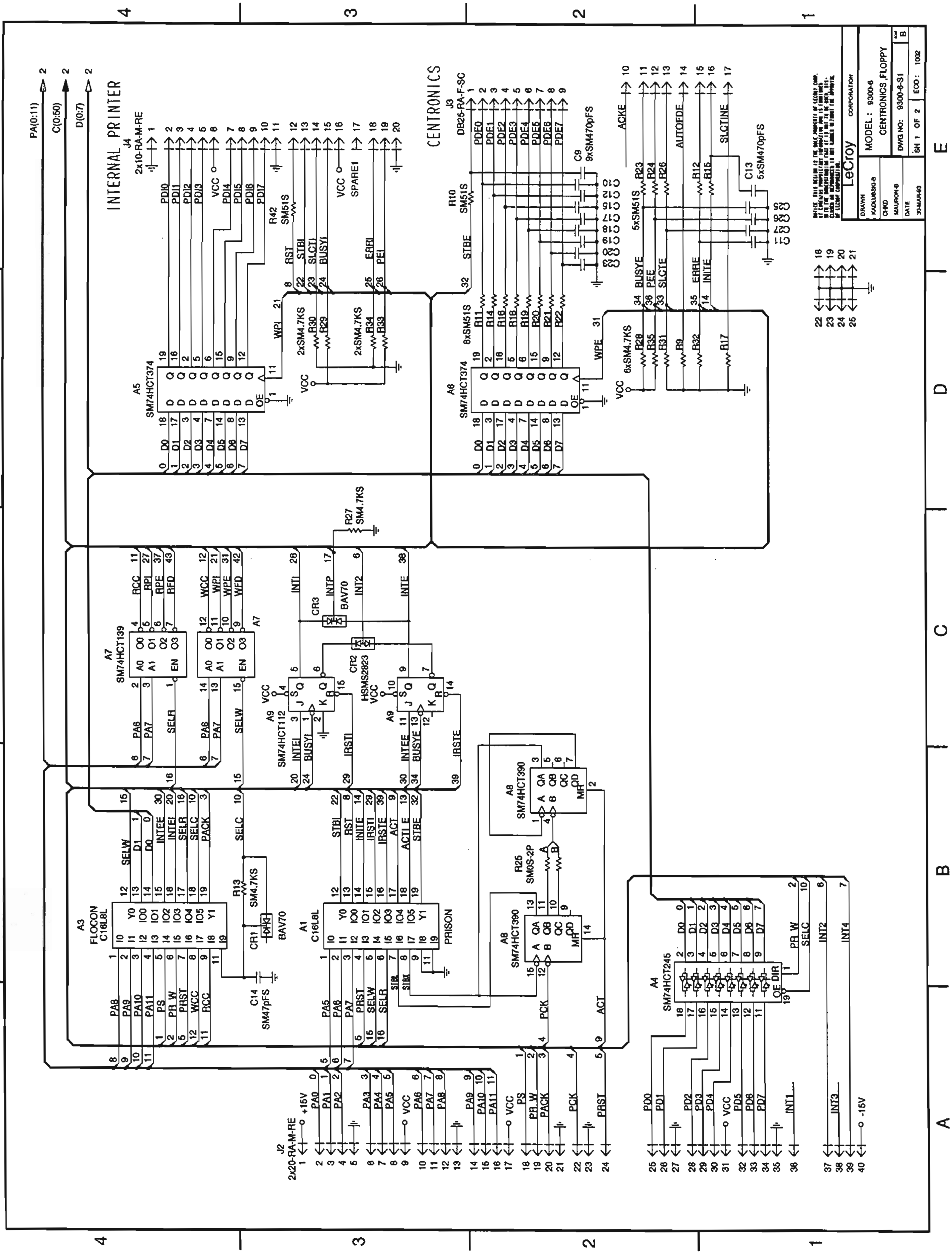
9300-5 Rev:B

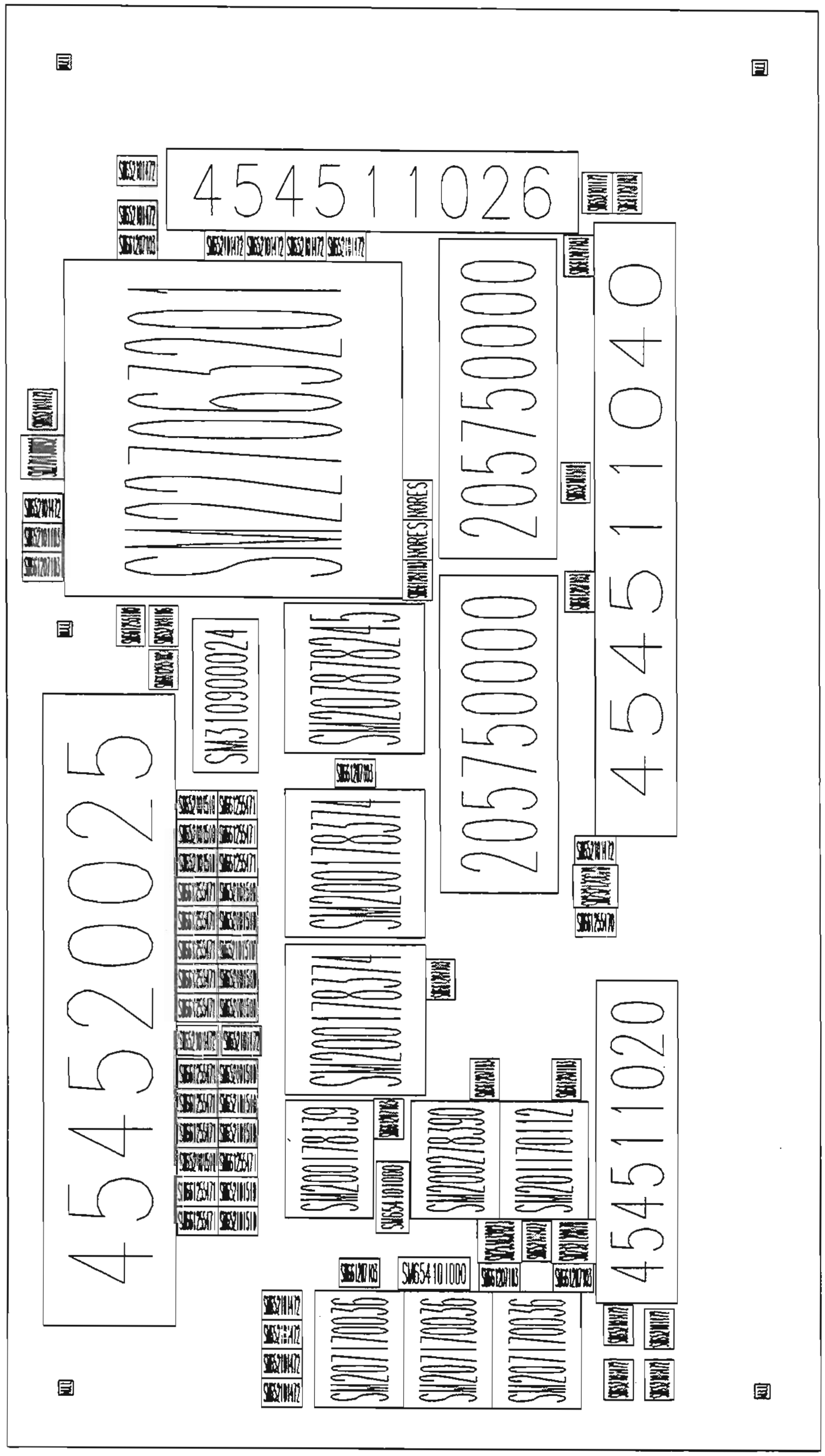
PART: F9354-5 **DESC : Quad Channel Front Panel**

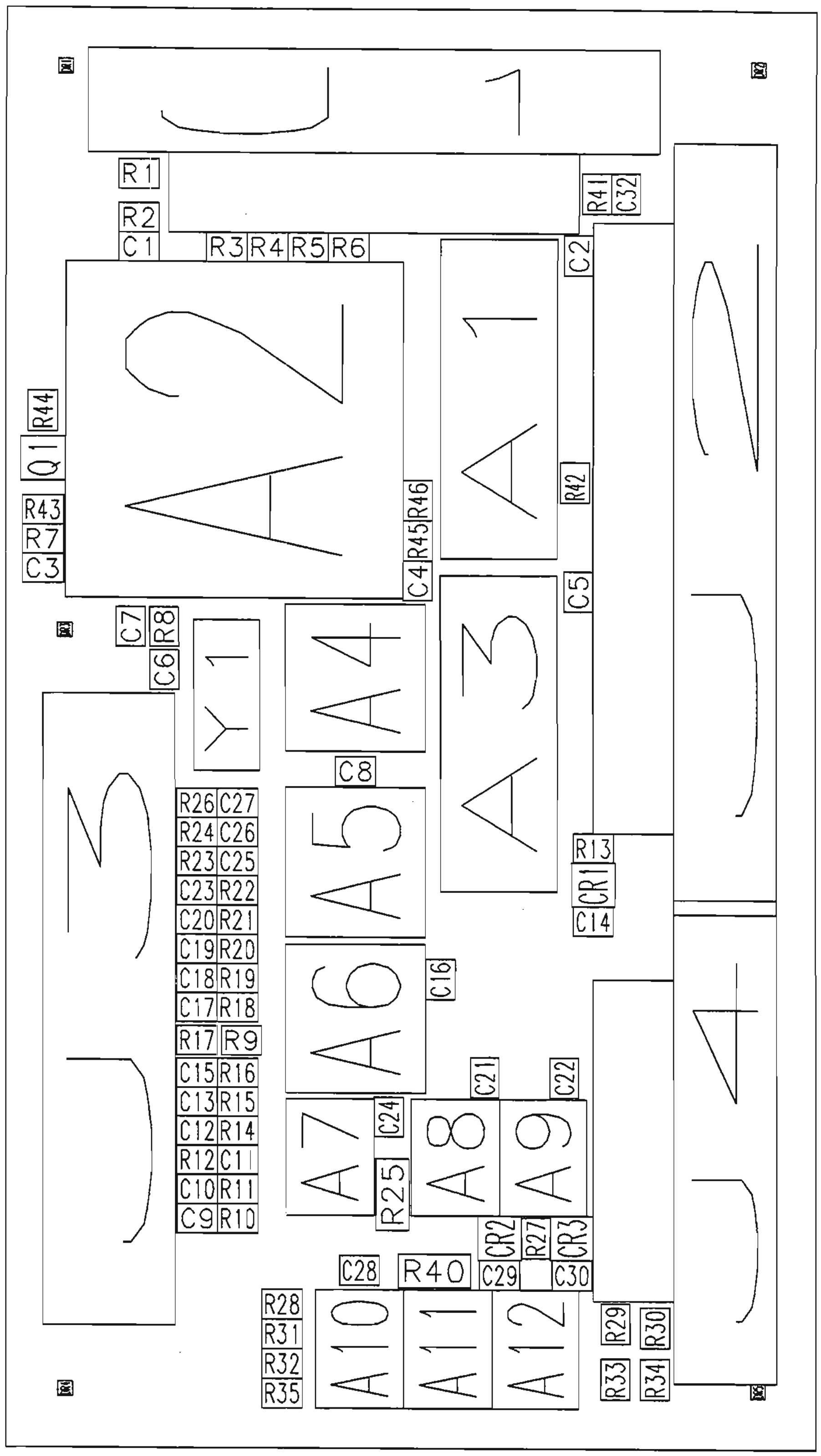
Location	Part Number	Description	Location	Part Number	Description
A1	68HC05C4	68HC05C4	CR15	230020062	BAW62
C1,2,3	103427104	.1µF	CR16	230020062	BAW62
C4	147436033	33µF -16V	CR17	230020062	BAW62
J1	454110120	2x10-ST-M-RE	CR18	230020062	BAW62
J2	453410016	2x8-RA-ZIFGRIP	CR21	230020062	BAW62
J3	453411016	2x8-ST-ZIF	CR22	230020062	BAW62
J10	425100001	ENCOD-2BIT-E	CR23	230020062	BAW62
J76	425100001	ENCOD-2BIT-E	CR24	230020062	BAW62
K10	425110001	ENCOD-2BIT-C	CR25	230020062	BAW62
K32	425100001	ENCOD-2BIT-E	CR26	230020062	BAW62
K76	425110001	ENCOD-2BIT-C	CR29	230020062	BAW62
L10	425100001	ENCOD-2BIT-E	CR30	230020062	BAW62
L32	425100001	ENCOD-2BIT-E	CR31	230020062	BAW62
L76	425100001	ENCOD-2BIT-E	CR32	230020062	BAW62
M10	425100001	ENCOD-2BIT-E	CR37	230020062	BAW62
M32	425110001	ENCOD-2BIT-C	CR38	230020062	BAW62
M76	425100001	ENCOD-2BIT-E	CR39	230020062	BAW62
N10	425110001	ENCOD-2BIT-C	CR40	230020062	BAW62
N32	425100001	ENCOD-2BIT-E	CR41	230020062	BAW62
CR1	230020062	BAW62	CR42	230020062	BAW62
CR2	230020062	BAW62	CR43	230020062	BAW62
CR7	230020062	BAW62	CR44	230020062	BAW62
CR8	230020062	BAW62	CR45	230020062	BAW62
CR9	230020062	BAW62	CR46	230020062	BAW62
CR10	230020062	BAW62	CR47	230020062	BAW62
CR13	230020062	BAW62	CR48	230020062	BAW62
CR14	230020062	BAW62	RN1,2,3	190042103	10K-SC

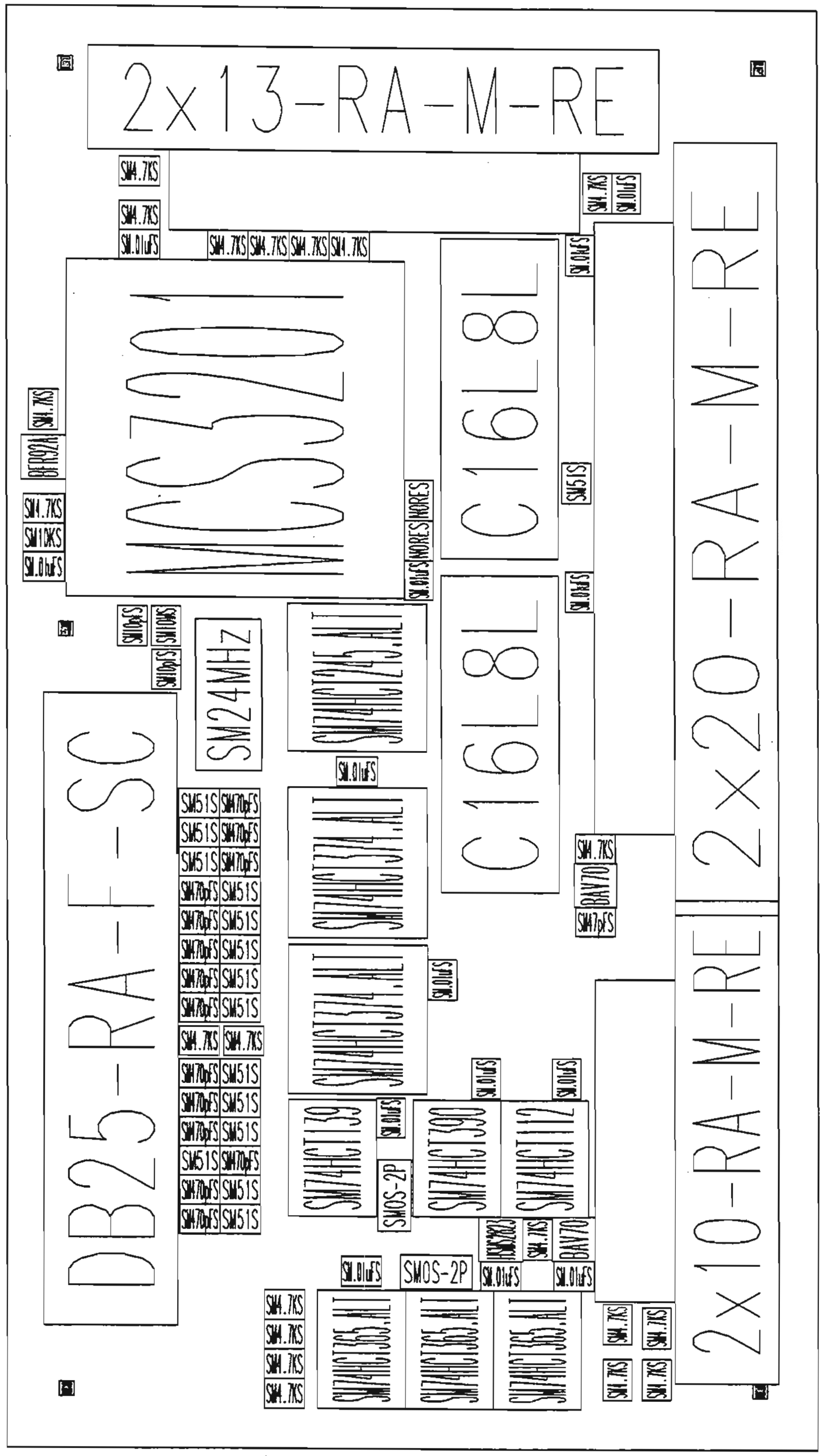
COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
103427104	CAP CERA MONO 100V .1 µF	3
147436033	CAP ALUM METAL CAN 33 µF	1
190042103	RESISTOR NETWORK 10 KΩ	2
190642103	RESISTOR NETWORK 10 KΩ	1
230020062	DIODE SWITCHING BAW62	34
425100001	ENCODER DIGITAL 24 POS	8
425110001	ENCODER DIGITAL 24 POS	3
453410016	CONN FLEX CIRCUIT 16-POS	1
454110120	HDR SLD TAIL/MALE/20/STRAIGHT	1
554435004	SCREW PT PHIL KA35X10	1
7093XX511	KNOB 10MM DIAMETRE	7
7093XX521	KNOB 14MM DIAMETRE	4
719300503	PC BD PREASS'Y 9300-5	1
729354513	FP KEYBOARD ASS'Y 9354-5	1
MFP414	IC FRT PANEL PROCESSOR MFP414	1


FLOPPY DISK
A2
MCS3201
LeCroy
CORPORATION
9300-6
CENTRONICS,FLOPPY
9300-6-S1


INTERNAL PRINTER
CENTRONICS
LeCroy
MODEL : 9300-8
CENTRONICS,FLOPPY


454511026
2057500000
454511040
SM3109000024
2057500000
454520025
454511020
SM654101000


J1
J2
J3
J4
A1
A2
A3
A4
A5
A6
A7
A8
A9
A10
A11
A12
Y1
Q1
R1
R2
C1
R3
R4
R5
R6
R41
C32
C2
R44
R43
R7
C3
R46
R45
C4
R42
C5
C7
R8
C6
C8
R26 C27
R24 C26
R23 C25
C23 R22
C20 R21
C19 R20
C18 R19
C17 R18
R17 R9
C15 R16
C13 R15
C12 R14
R12 C11
C10 R11
C9 R10
R13
CR1
C14
C16
C21
C22
C24
R25
CR2
R27
CR3
C28
R40
C29
C30
R28
R31
R32
R35
R29
R30
R33
R34


2x13-RA-M-RE
2x20-RA-M-RE
2x10-RA-M-RE
DB25-RA-F-SC
C16L8L
C16L8L
SM24MHz
SMOS-2P
SMOS-2P
BAV70
BAV70

PART: F9300-6 **DESC: CENTRONICS, FLOPPY AND PRINTER INTERFACE**

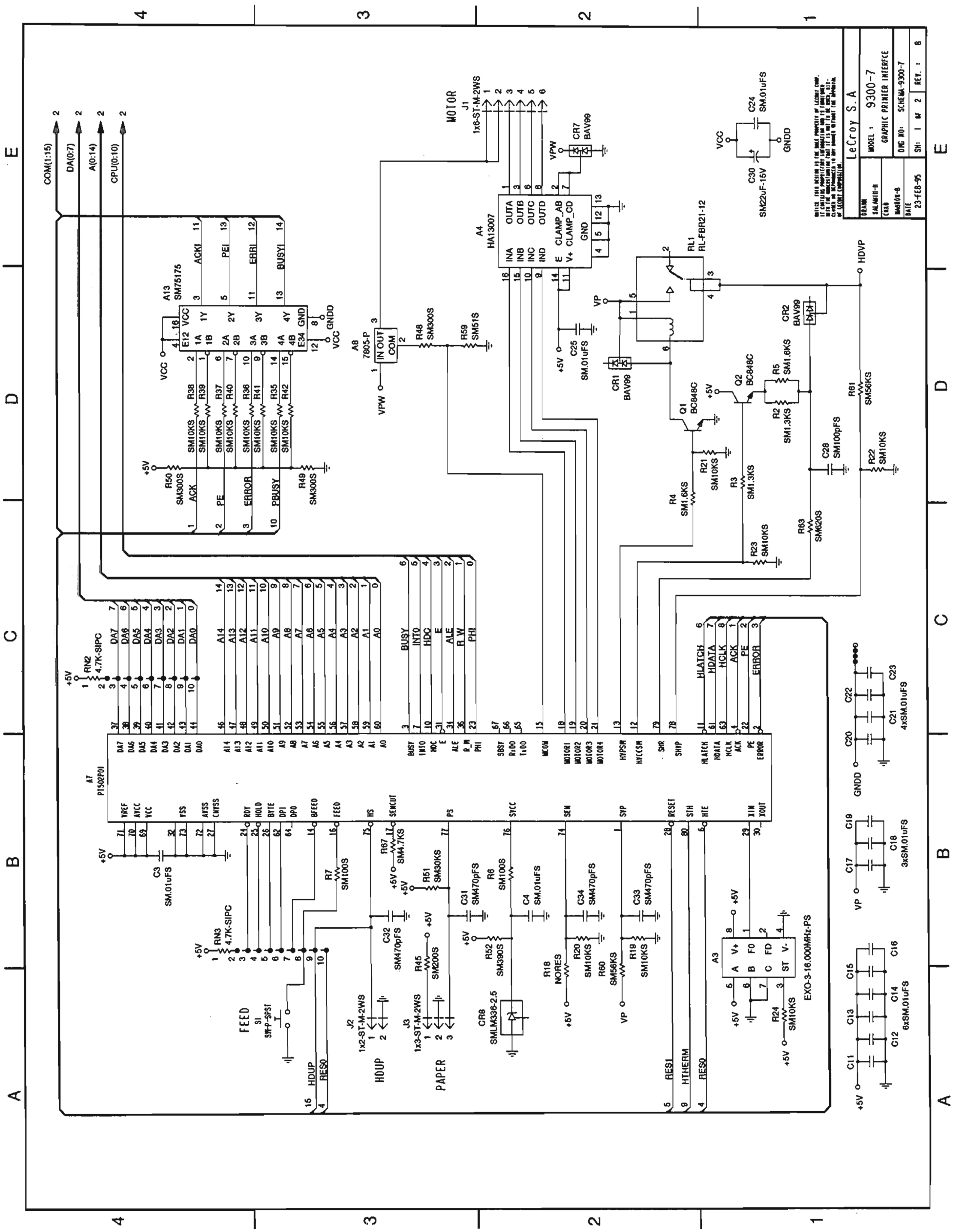
Location	Part Number	Description	Location	Part Number	Description
A1	205750000	C16L8L	CR2	SM253032823	HSMS2823
A2	SM227063201	MCS3201	CR3	SM232120070	BAV70
A3	205750000	C16L8L	J1	454511026	2x13-RA-M-RE
A4	SM207878245	SM74HCT245	J2	454511040	2x20-RA-M-RE
A5	SM200178374	SM74HCT374	J3	454520025	DB25-RA-F-SC
A6	SM200178374	SM74HCT374	J4	454511020	2x10-RA-M-RE
A7	SM200178139	SM74HCT139	Q1	SM270130092	BFR92A
A8	SM200278390	SM74HCT390	R1	SM652101472	SM4.7KΩ
A9	SM201170112	SM74HCT112	R2	SM652101472	SM4.7KΩ
A10	SM207170036	SM74HCT365	R3	SM652101472	SM4.7KΩ
A11	SM207170036	SM74HCT365	R4	SM652101472	SM4.7KΩ
A12	SM207170036	SM74HCT365	R5	SM652101472	SM4.7KΩ
C1	SM661207103	SM.01µF	R6	SM652101472	SM4.7KΩ
C2	SM661207103	SM.01µF	R7	SM652101103	SM10KΩ
C3	SM661207103	SM.01µF	R8	SM652101106	SM10MΩ
C4	SM661207103	SM.01µF	R9	SM652101472	SM4.7KΩ
C5	SM661207103	SM.01µF	R10	SM652101510	SM51Ω
C6	SM661255100	SM10pF	R11	SM652101510	SM51Ω
C7	SM661255100	SM10pF	R12	SM652101510	SM51Ω
C8	SM661207103	SM.01µF	R13	SM652101472	SM4.7KΩ
C9	SM661255471	SM470pF	R14	SM652101510	SM51Ω
C10	SM661255471	SM470pF	R15	SM652101510	SM51Ω
C11	SM661255471	SM470pF	R16	SM652101510	SM51Ω
C12	SM661255471	SM470pF	R17	SM652101472	SM4.7KΩ
C13	SM661255471	SM470pF	R18	SM652101510	SM51Ω
C14	SM661255470	SM47pF	R19	SM652101510	SM51Ω
C15	SM661255471	SM470pF	R20	SM652101510	SM51Ω
C16	SM661207103	SM.01µF	R21	SM652101510	SM51Ω
C17	SM661255471	SM470pF	R22	SM652101510	SM51Ω
C18	SM661255471	SM470pF	R23	SM652101510	SM51Ω
C19	SM661255471	SM470pF	R24	SM652101510	SM51Ω
C20	SM661255471	SM470pF	R25	SM654101000	SM0Ω-2P
C21	SM661207103	SM.01µF	R26	SM652101510	SM51Ω
C22	SM661207103	SM.01µF	R27	SM652101472	SM4.7KΩ
C23	SM661255471	SM470pF	R28	SM652101472	SM4.7KΩ
C24	SM661207103	SM.01µF	R29	SM652101472	SM4.7KΩ
C25	SM661255471	SM470pF	R30	SM652101472	SM4.7KΩ
C26	SM661255471	SM470pF	R31	SM652101472	SM4.7KΩ
C27	SM661255471	SM470pF	R32	SM652101472	SM4.7KΩ
C28	SM661207103	SM.01µF	R33	SM652101472	SM4.7KΩ
C29	SM661207103	SM.01µF	R34	SM652101472	SM4.7KΩ
C30	SM661207103	SM.01µF	R35	SM652101472	SM4.7KΩ
C32	SM661207103	SM.01µF	R40	SM654101000	SM0Ω-2P
CR1	SM232120070	BAV70	R41	SM652101472	SM4.7KΩ

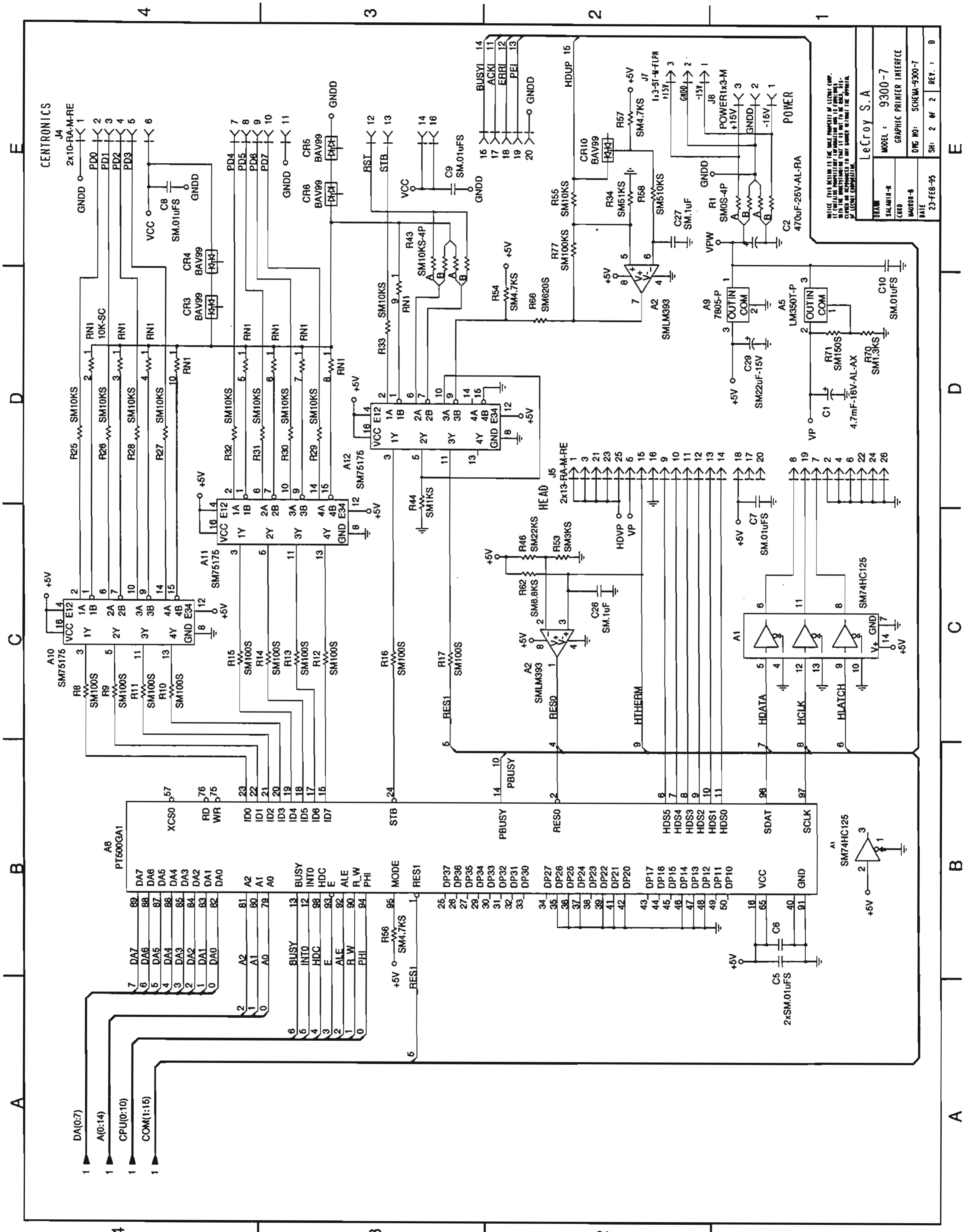
PART: F9300-6 **DESC: CENTRONICS/FLOPPY/PRINTER INTERFACE**

Location	Part Number	Description
R42	SM652101510	SM51Ω
R43	SM652101472	SM4.7KΩ
R44	SM652101472	SM4.7KΩ
Y1	SM310900024	SM24MHz

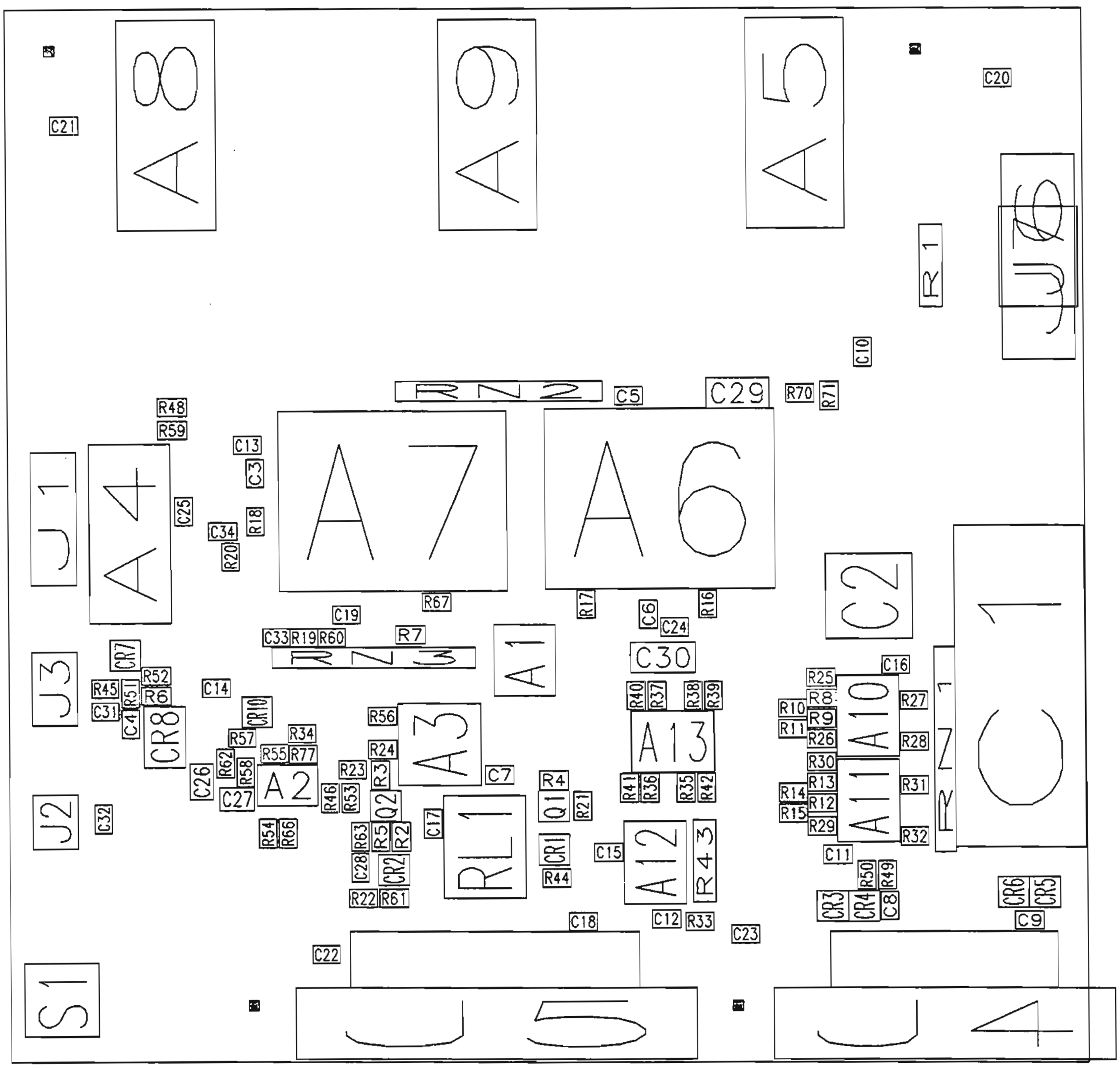
PART: F9300-6 **DESC: CENTRONICS/FLOPPY/PRINTER INTERFACE**

COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
205750000	IC AND-OR GATE ARRAY 16V8	2
454511020	HDR SOLD TAIL/MALE 20	1
454511026	HDR SOLD TAIL/MALE 26	1
454511040	HDR SOLD TAIL/MALE/40/RT	1
454520025	CONN RT ANGLE FEM 25 S-CLIP	1
455980002	MOUNTING HDW FOR CONN SHELL	2
550430106	SCREW CYL HD PHIL M3X6	4
551430400	WASHER SHAKEPROOF M3	4
709300611	CENTR. FLOPPY INTERF. BRACKET	1
709300621	LABEL PARA-INTERF. CENTRONICS	1
719300603	PC BD PREASS'Y 9300-6 C	1
SM200178139	IC 2-TO-4-LINE DEC HCT139	1
SM200178374	IC D-TYP FLOP 74HCT374	2
SM200278390	IC 4-BIT RIPPLE COUNTER	1
SM201170112	IC DUAL JK FF WITH SET-RESET	1
SM207170036	IC HEX BµF FER 3-STATE	3
SM207878245	IC BUS TRANSCVR HCT 245	1
SM227063201	IC IBM PC FLOPPY DISK CONTR.	1
SM232120070	DIODE ARRAY BAV70	1
SM253032823	DIODE SCHOTTKY 2823	1
SM270130092	TRANSISTOR NPN BFR92A	1
SM310900024	CRYSTAL 24 MHZ SMD	1
SM652101103	RES CHIP (E24) 1% 10 KΩ	1
SM652101106	RES CHIP (E24) 1% 10 MEGΩ	1
SM652101472	RES CHIP (E24) 1% 4.7 KΩ	21
SM652101510	RES CHIP (E24) 1% 51 Ω	15
SM654101000	CHIP JUMPER ZERO Ω	2
SM661207103	CAP CERA CHIP 20% .01µF	14
SM661255100	CAP CERA CHIP 10 PF	2
SM661255470	CAP CERA CHIP 47 PF	1
SM661255471	CAP CERA CHIP 5% 470 PF	14


LeCroy S.A
MODEL : 9300-7
GRAPHIC PRINTER INTERFCE
DWG NO: SCHEMA-9300-7
SH: 1 OF 2
REV. : 8
23-FEB-95


LeCroy S.A
9300-7
GRAPHIC PRINTER INTERFACE
SCHEMA-9300-7
23-FEB-95

9300-7 Rev:D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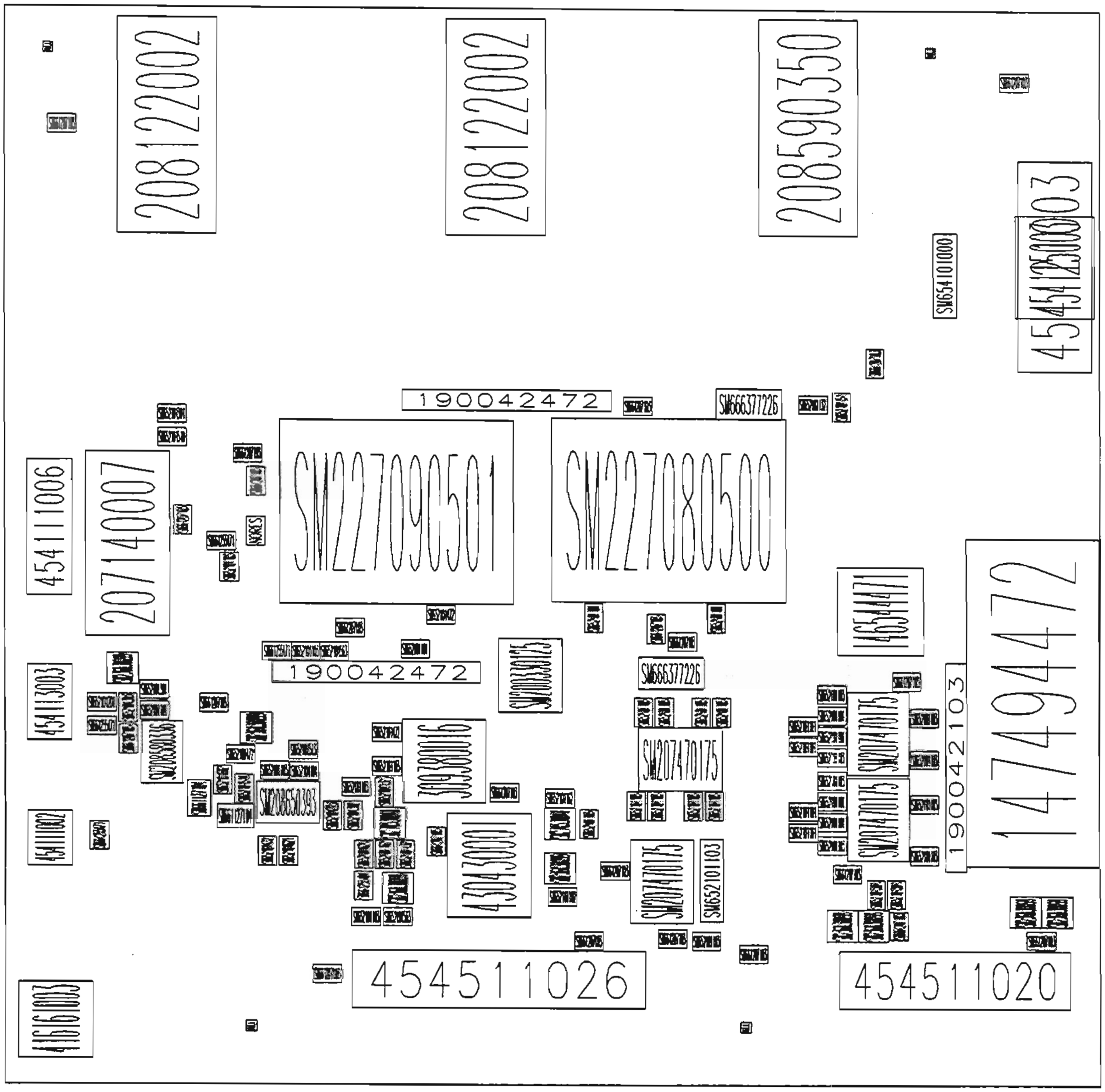
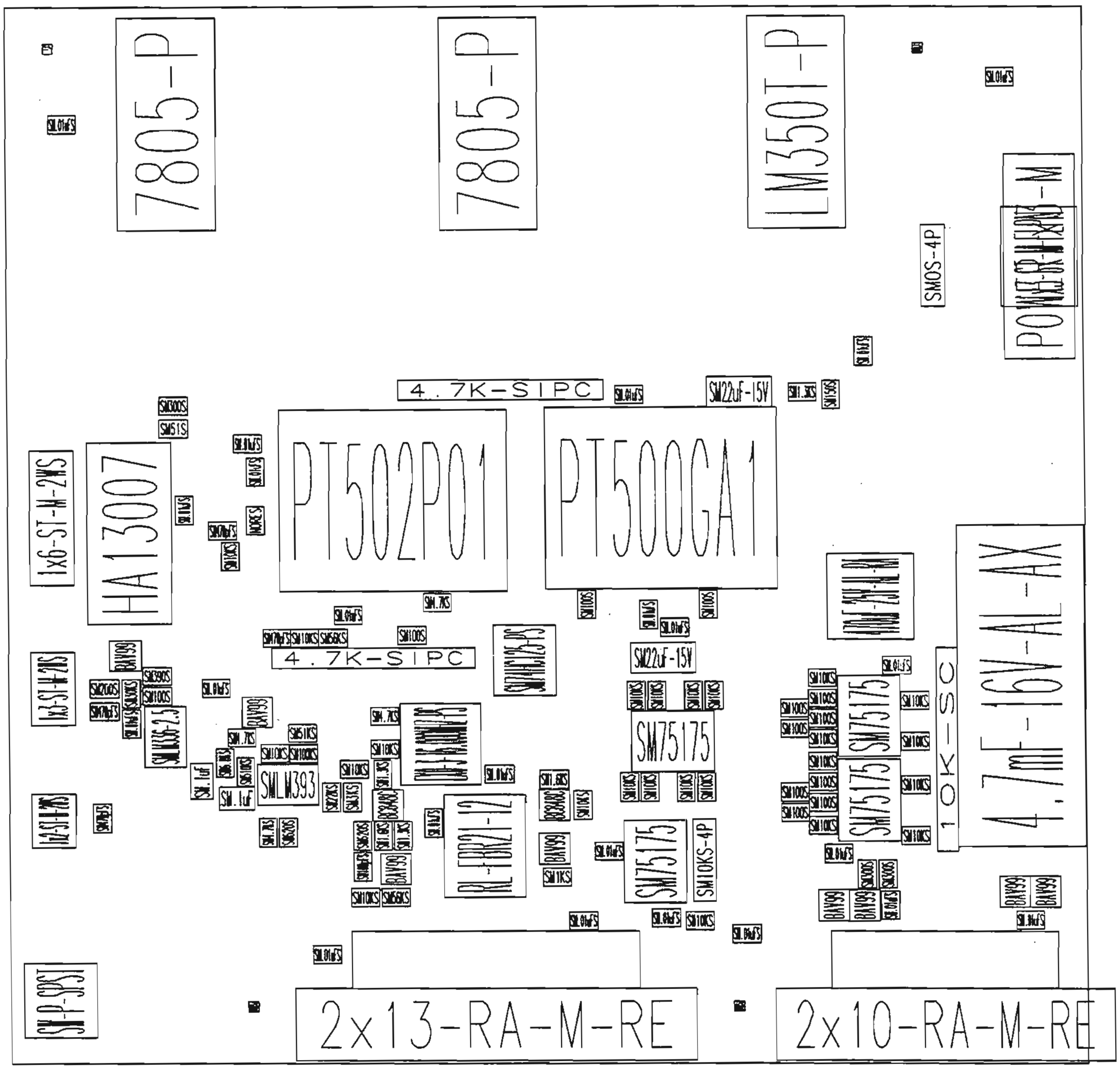
A9
A5
C21
C20
R1
J6
C10
RN2
C5
C29
R70
R71
R48
R59
C13
C3
A7
A6
J1
A4
C25
C34
R18
R20
C2
C1
R67
R17
C6
C24
R16
C19
C33
R19
R60
R7
RN3
A1
C30
J3
CR7
R52
R45
R51
R6
C14
CR10
C31
C4
CR8
R40
R37
R38
R39
R25
C16
R8
R10
R9
A10
R27
R11
R26
R28
RN1
R56
R57
R34
A3
A13
R55
R77
R24
R62
R58
C26
R23
R3
C7
R4
R41
R36
R35
R42
R30
R13
R31
R14
R12
R15
A2
C27
R46
R53
Q2
R21
Q1
J2
C32
R54
R66
R63
R5
R2
C17
RL1
R29
A11
R32
C11
C28
CR2
CR1
C15
A12
R43
R50
R49
R44
CR6
CR5
CR3
CR4
C8
R22
R61
C18
C12
R33
C9
C23
C22
S1
J5
J4

9300-7 Rev:D



9300-7 Rev:D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7805-P
LM350T-P
POWER-RH-M
SMOS-4P
4.7K-SIPC
SM22uF-15V
PT502P01
PT500GA1
HA13007
1x6-ST-M-2WS
4.7K-SIPC
SM22uF-15V
SM75175
SMLM393
SM75175
SM75175
SM75175
SM10KS-4P
10K-SC
4.7mF-16V-AL-AX
BAY99
SW-P-SPST
2x13-RA-M-RE
2x10-RA-M-RE

PART: F9300-7 **DESC: LTP 5446 PRINTER CONTROLLER**

Location	Part Number	Description	Location	Part Number	Description
A1	SM200330125	SM74HC125	C32	SM661255471	SM470pF
A2	SM208650393	SMLM393	C33	SM661255471	SM470pF
A3	309380016	16.000MHZ	C34	SM661255471	SM470pF
A4	207140007	HA13007	CR1	SM236030099	BAV99
A5	208590350	LM350T-P	CR2	SM236030099	BAV99
A6	SM227080500	PT500GA1	CR3	SM236030099	BAV99
A7	SM227090501	PT501P01	CR4	SM236030099	BAV99
A8	208122002	7805-P	CR5	SM236030099	BAV99
A9	208122002	7805-P	CR6	SM236030099	BAV99
A10	SM207470175	SM75175	CR7	SM236030099	BAV99
A11	SM207470175	SM75175	CR8	SM208580336	SMLM336-2.5
A12	SM207470175	SM75175	CR10	SM236030099	BAV99
A13	SM207470175	SM75175	J1	454111006	1x6-ST-M-2WS
C1	147494472	4.7µF -16V	J2	454111002	1x2-ST-M-2WS
C2	146544471	470µF -25V	J3	454113003	1x3-ST-M-2WS
C3	SM661207103	SM.01µF	J4	454511020	2x10-RA-M-RE
C4	SM661207103	SM.01µF	J5	454511026	2x13-RA-M-RE
C5	SM661207103	SM.01µF	J6	454121003	POWER1x3-M
C6	SM661207103	SM.01µF	Q1	SM270330848	BC848C
C7	SM661207103	SM.01µF	Q2	SM270330848	BC848C
C8	SM661207103	SM.01µF	R1	SM654101000	SM0Ω-4P
C9	SM661207103	SM.01µF	R2	SM652101132	SM1.3KΩ
C10	SM661207103	SM.01µF	R3	SM652101132	SM1.3KΩ
C11	SM661207103	SM.01µF	R4	SM652101162	SM1.6KΩ
C12	SM661207103	SM.01µF	R5	SM652101162	SM1.6KΩ
C13	SM661207103	SM.01µF	R6	SM652101101	SM100Ω
C14	SM661207103	SM.01µF	R7	SM652101101	SM100Ω
C15	SM661207103	SM.01µF	R8	SM652101101	SM100Ω
C16	SM661207103	SM.01µF	R9	SM652101101	SM100Ω
C17	SM661207103	SM.01µF	R10	SM652101101	SM100Ω
C18	SM661207103	SM.01µF	R11	SM652101101	SM100Ω
C19	SM661207103	SM.01µF	R12	SM652101101	SM100Ω
C20	SM661207103	SM.01µF	R13	SM652101101	SM100Ω
C21	SM661207103	SM.01µF	R14	SM652101101	SM100Ω
C22	SM661207103	SM.01µF	R15	SM652101101	SM100Ω
C23	SM661207103	SM.01µF	R16	SM652101101	SM100Ω
C24	SM661207103	SM.01µF	R17	SM652101101	SM100Ω
C25	SM661207103	SM.01µF	R19	SM652101103	SM10KΩ
C26	SM661127104	SM.1µF	R20	SM652101103	SM10KΩ
C27	SM661127104	SM.1µF	R21	SM652101103	SM10KΩ
C28	SM661255101	SM100pF	R22	SM652101103	SM10KΩ
C29	SM666377226	SM22µF -15V	R23	SM652101103	SM10KΩ
C30	SM666377226	SM22µF -15V	R24	SM652101103	SM10KΩ
C31	SM661255471	SM470pF	R25	SM652101103	SM10KΩ

PART: F9300-7 **DESC: LTP 5446 PRINTER CONTROLLER**

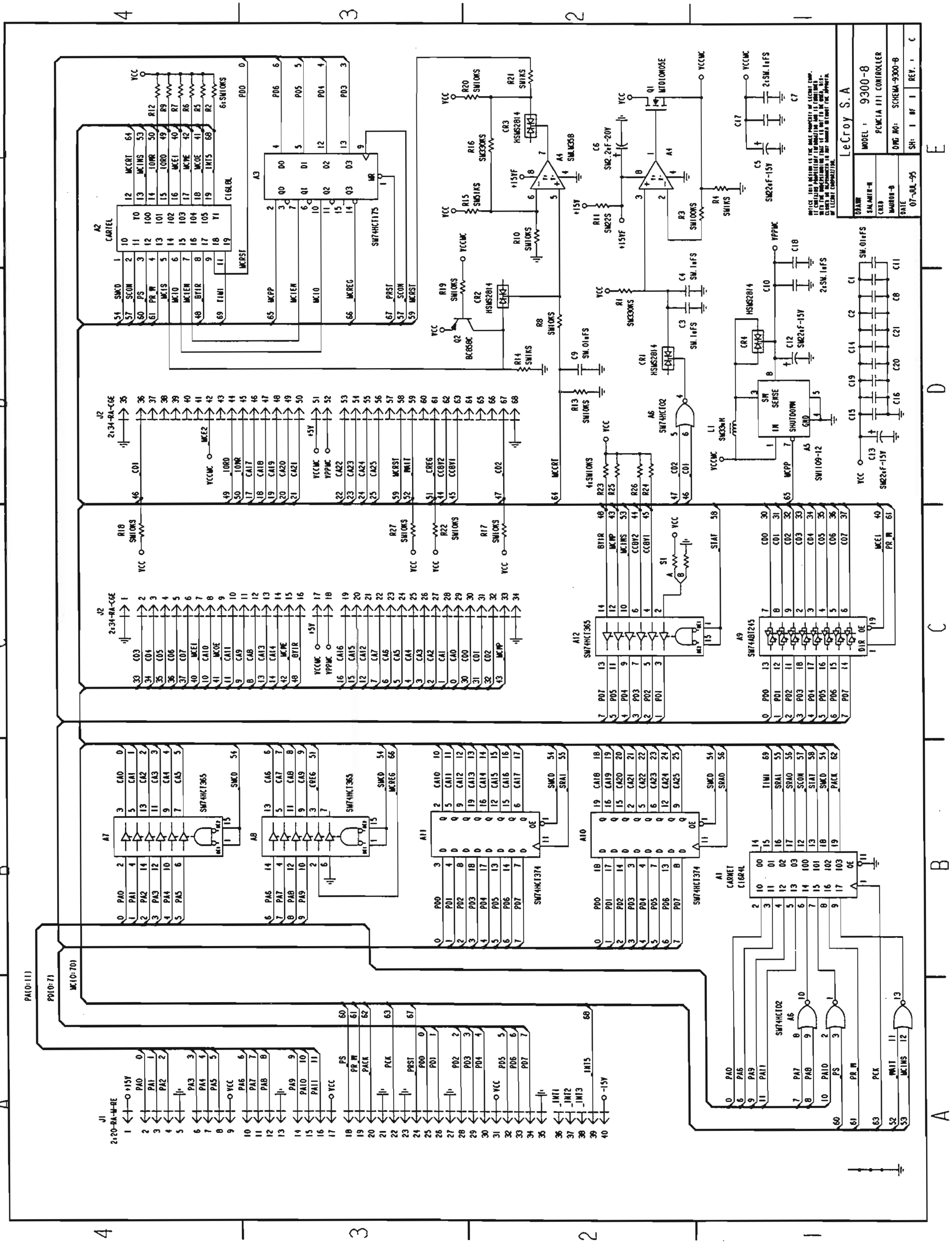
Location	Part Number	Description	Location	Part Number	Description
R26	SM652101103	SM10KΩ	R50	SM652101301	SM300Ω
R27	SM652101103	SM10KΩ	R51	SM652101303	SM30KΩ
R28	SM652101103	SM10KΩ	R52	SM652101391	SM390Ω
R29	SM652101103	SM10KΩ	R53	SM652101302	SM3KΩ
R30	SM652101103	SM10KΩ	R54	SM652101472	SM4.7KΩ
R31	SM652101103	SM10KΩ	R55	SM652101103	SM10KΩ
R32	SM652101103	SM10KΩ	R56	SM652101472	SM4.7KΩ
R33	SM652101103	SM10KΩ	R57	SM652101472	SM4.7KΩ
R34	SM652101513	SM51KΩ	R58	SM652101514	SM510KΩ
R35	SM652101103	SM10KΩ	R59	SM652101510	SM51Ω
R36	SM652101103	SM10KΩ	R60	SM652101563	SM56KΩ
R37	SM652101103	SM10KΩ	R61	SM652101563	SM56KΩ
R38	SM652101103	SM10KΩ	R62	SM652101682	SM6.8KΩ
R39	SM652101103	SM10KΩ	R63	SM652101621	SM620Ω
R40	SM652101103	SM10KΩ	R66	SM652101621	SM620Ω
R41	SM652101103	SM10KΩ	R70	SM652101132	SM1.3KΩ
R42	SM652101103	SM10KΩ	R71	SM652101151	SM150Ω
R43	SM652101103	SM10KΩ-4P	R77	SM652101104	SM100KΩ
R44	SM652101102	SM1KΩ	RL1	430430001	RL-FBR21-12
R45	SM652101201	SM200Ω	RN1	190042103	10KΩ-SC
R46	SM652101223	SM22KΩ	RN2	190042472	4.7KΩ-SIPC
R48	SM652101301	SM300Ω	RN3	190042472	4.7KΩ-SIPC
R49	SM652101301	SM300Ω	S1	416161003	SW-P-SPST

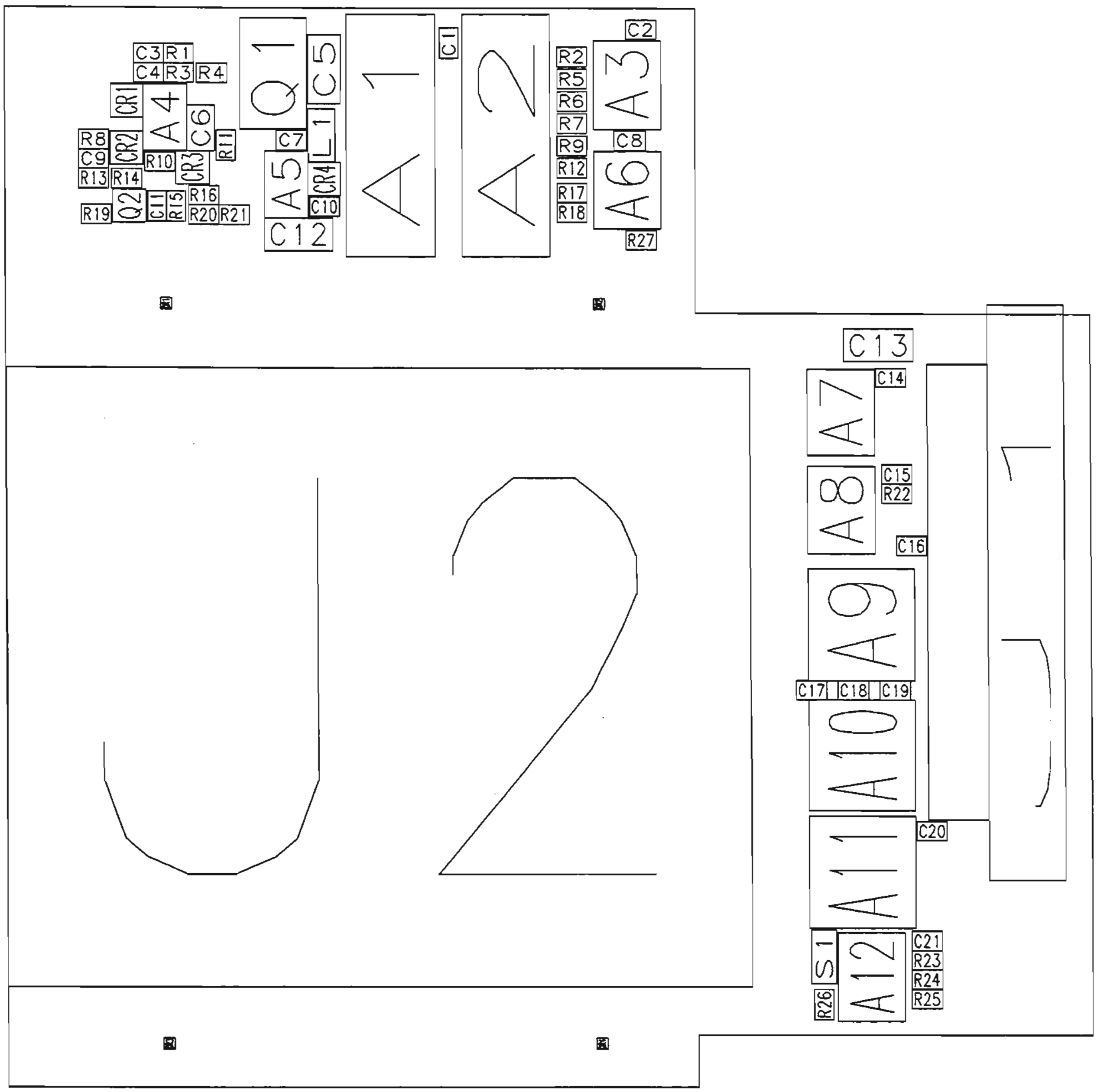
PART: F9300-7 **DESC: LTP 5446 PRINTER CONTROLLER**

COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
146544471	CAP MINI ALUM 20% 470μF	1
147494472	CAP ALU COMPACT AXIAL 4700 μF	1
190042103	RESISTOR NETWORK 10 KΩ	1
190042472	RESISTOR NETWORK 4.7 KΩ	2
207140007	IC QUAD STEP MOTOR DRIVER	1
208122002	IC VOLT REG POS UA7805	2
208590350	IC ADJ POWER REG 3A LM350	1
309380016	CRYSTAL OSC (PROGR) 16 MHZ	1
416161003	SWITCH PUSHBUTTON SPST	1
430430002	RELAY 1 FORM C SPDT	1
454111002	HEADER STRAIGHT 2-PINS	1
454111006	HEADER STRAIGHT 6-PINS	1
454113003	HEADER STRAIGHT 3-PINS	1
454121003	BLOC FOR SOCKETS 3-PIN	1
454511020	HDR SOLD TAIL/MALE 20	1

PART: F9300-7 **DESC: LTP 5446 PRINTER CONTROLLER**

COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
454511026	HDR SOLD TAIL/MALE 26	1
554435401	RIVET "RIVSCREW" M 3.5	3
719300703	PC BD PREASS'Y 9300-7	1
SM200330125	IC QUAD BμF FER 74HC125	1
SM207470175	IC QUAD DIFF LINE RECEIVER	4
SM208580336	IC REF DIODE LM336-2.5V	1
SM208650393	IC DUAL VOLT COMP LM393M	1
SM227080500	IC THERM PRINTER GATE ARRAY	1
SM227090501	IC THERM PRINTER CPU	1
SM236030099	DIODE SO-PKG BAV99	8
SM270330848	TRANSISTOR NPN BC848C	2
SM652101101	RES CHIP (E24) 1% 100 Ω	12
SM652101102	RES CHIP (E24) 1% 1 KΩ	1
SM652101103	RES CHIP (E24) 1% 10 KΩ	25
SM652101104	RES CHIP (E24) 1% 100 KΩ	1
SM652101132	RES CHIP (E24) 1% 1.3 KΩ	3
SM652101151	RES CHIP (E24) 1% 150 Ω	1
SM652101162	RES CHIP (E24) 1% 1.6 KΩ	2
SM652101201	RES CHIP (E24) 1% 200 Ω	1
SM652101223	RES CHIP (E24) 1% 22 KΩ	1
SM652101301	RES CHIP (E24) 1% 300 Ω	3
SM652101302	RES CHIP (E24) 1% 3 KΩ	1
SM652101303	RES CHIP (E24) 1% 30 KΩ	1
SM652101391	RES CHIP (E24) 1% 390 Ω	1
SM652101472	RES CHIP (E24) 1% 4.7 KΩ	3
SM652101510	RES CHIP (E24) 1% 51 Ω	1
SM652101513	RES CHIP (E24) 1% 51 KΩ	1
SM652101514	RES CHIP (E24) 1% 510 KΩ	1
SM652101563	RES CHIP (E24) 1% 56 KΩ	2
SM652101621	RES CHIP (E24) 1% 620 Ω	2
SM652101682	RES CHIP (E24) 1% 6.8 KΩ	1
SM654101000	CHIP JUMPER ZERO Ω	1
SM661127104	CAP CERA CHIP 20% .1 μF	2
SM661207103	CAP CERA CHIP 20% .01μF	23
SM661255101	CAP CERA CHIP 5% 100 PF	1
SM661255471	CAP CERA CHIP 5% 470 PF	4
SM666377226	CAP MOLD TANT CHIP 22 μF	2


LeCroy S.A
9300-8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CR1 A4 C6 R11
R8 CR2
C9 R10 CR3
R13 R14
R19 Q2 C11 R15 R16 R20 R21
Q1 C5
C7 L1
A5 CR4 C10
C12
A1
C1
A2
R2 R5 R6 R7 R9 R12 R17 R18
C2 A3
C8 A6
R27
J2
C13
A7 C14
A8 C15 R22
C16
A9
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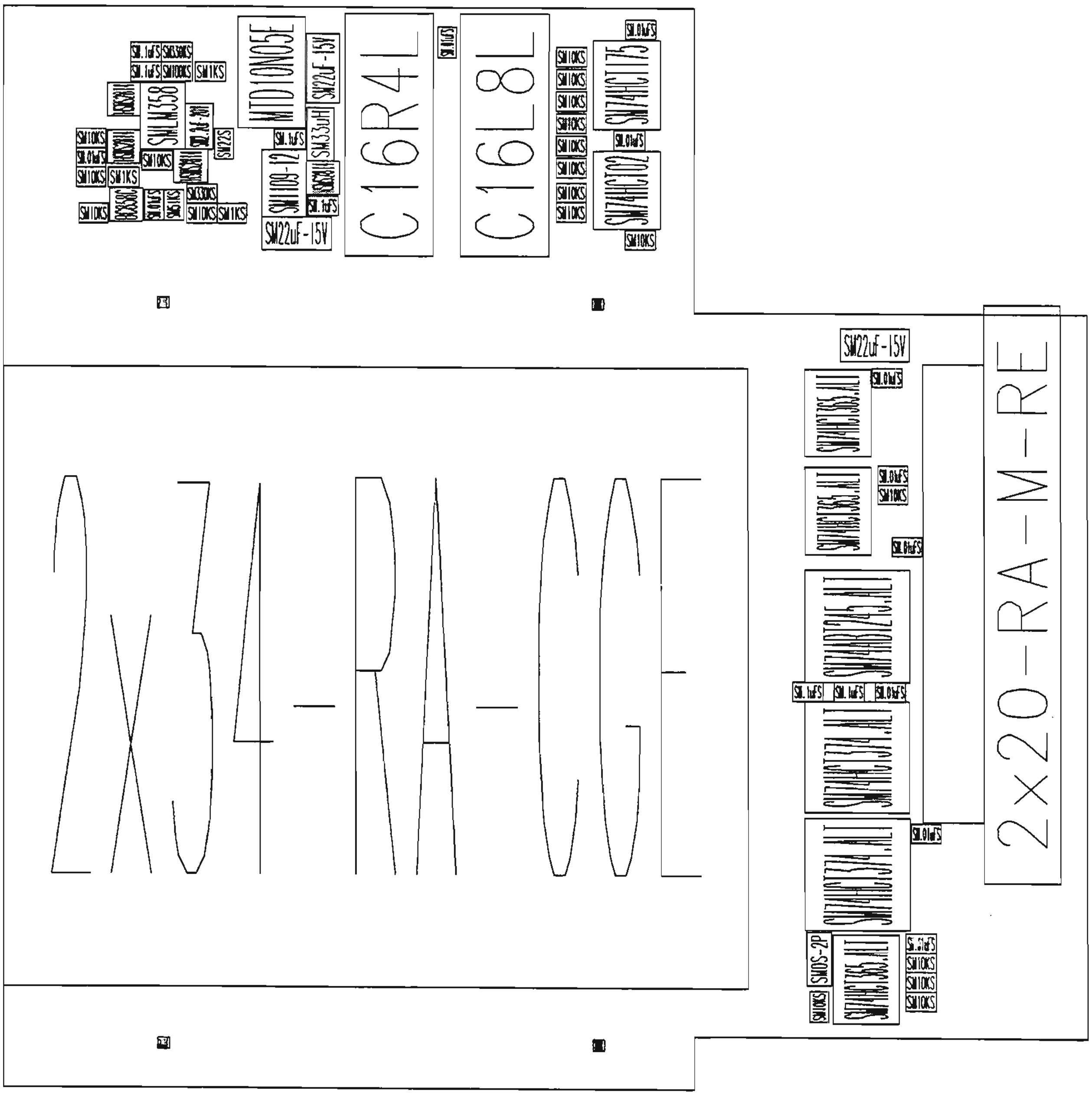
A10
C20
A11
1
S1 A12
C21 R23 R24 R25
R26

9300-8 Rev:B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2x20-RA-M-RE
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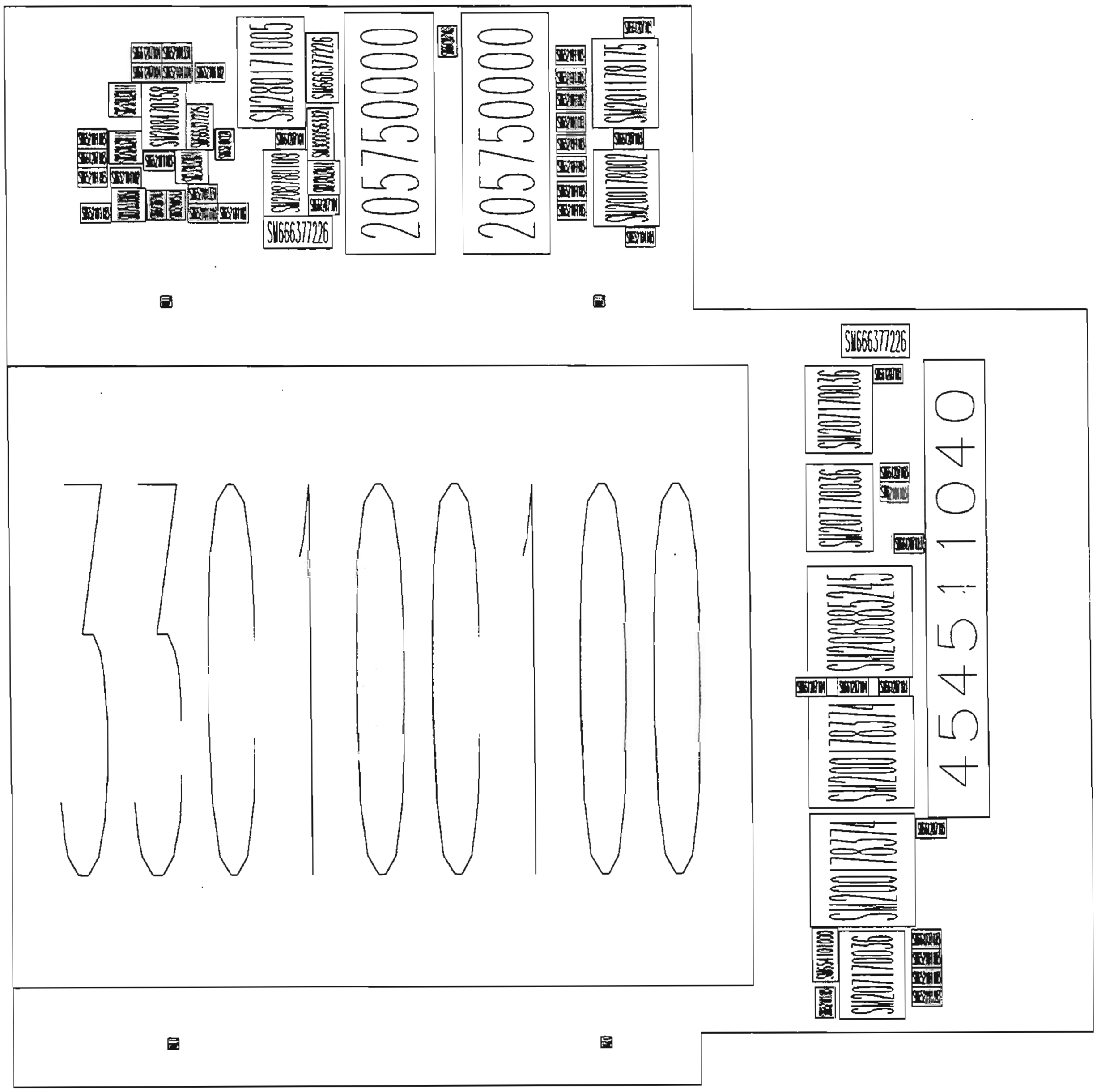
SMLM358
SM74HC175
SM74HC102
SM22uF-15V
SM33uH

9300-8 Rev:B



9300-8 Rev:B

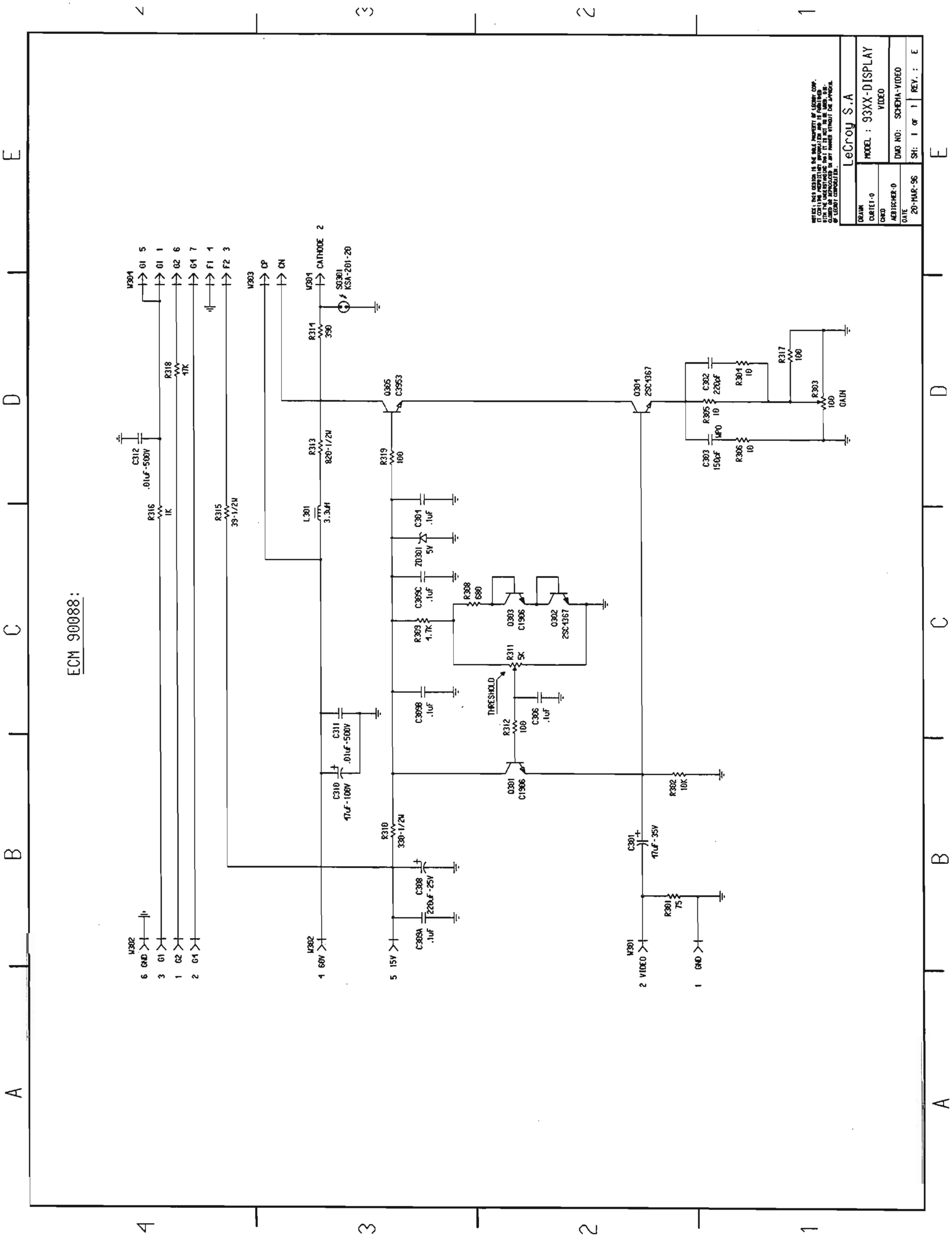
PART: F9300-8 **DESC: PCMCIA 3 HARD DISK CONTROLLER**

Location	Part Number	Description
A1	205750000	C16R4L
A2	205750000	C16L8L
A3	SM201178175	SM74HCT175
A4	SM208470358	SMLM358
A5	SM208780109	SM1109-12
A6	SM200178002	SM74HCT02
A7	SM207170036	SM74HCT365
A8	SM207170036	SM74HCT365
A9	SM206885245	SM74ABT245
A10	SM200178374	SM74HCT374
A11	SM200178374	SM74HCT374
A12	SM207170036	SM74HCT365
C1	SM661207103	SM.01μF
C2	SM661207103	SM.01μF
C3	SM661207104	SM.1μF
C4	SM661207104	SM.1μF
C5	SM666377226	SM22μF-15V
C6	SM666327225	SM2.2μF-20V
C7	SM661207104	SM.1μF
C8	SM661207103	SM.01μF
C9	SM661255101	SM100pF
C10	SM661207104	SM.1μF
C11	SM661207103	SM.01μF
C12	SM666377226	SM22μF-15V
C13	SM666377226	SM22μF-15V
C14	SM661207103	SM.01μF
C15	SM661207103	SM.01μF
C16	SM661207103	SM.01μF
C17	SM661207104	SM.1μF
C18	SM661207104	SM.1μF
C19	SM661207103	SM.01μF
C20	SM661207103	SM.01μF
C21	SM661207103	SM.01μF
J1	454511040	2x20-RA-M-RE
J2	330100100	2x34-RA-CGE

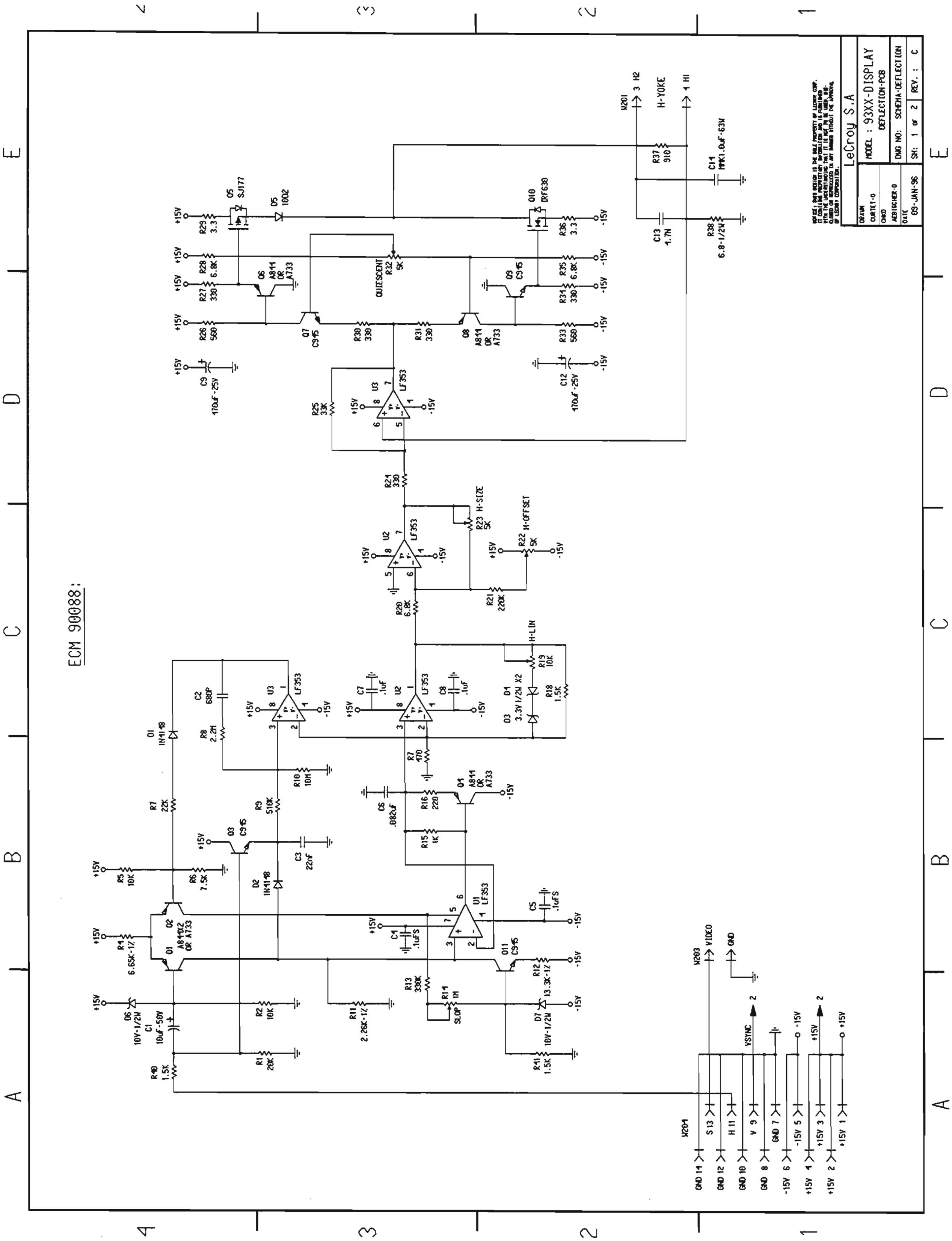
Location	Part Number	Description
L1	SM300056332	SM33uH
Q1	SM280171005	MTD10N05E
Q2	SM275330858	BC858C
R1	SM652101334	SM330KΩ
R2	SM652101103	SM10KΩ
R3	SM652101104	SM100KΩ
R4	SM652101102	SM1KΩ
R5	SM652101103	SM10KΩ
R6	SM652101103	SM10KΩ
R7	SM652101103	SM10KΩ
R8	SM652101103	SM10KΩ
R9	SM652101103	SM10KΩ
R10	SM652101103	SM10KΩ
R11	SM652101220	SM22Ω
R12	SM652101103	SM10KΩ
R13	SM652101334	SM330KΩ
R14	SM652101102	SM1KΩ
R15	SM652101104	SM100KΩ
R16	SM652101334	SM330KΩ
R17	SM652101103	SM10KΩ
R18	SM652101103	SM10KΩ
R19	SM652101103	SM10KΩ
R20	SM652101103	SM10KΩ
R21	SM652101102	SM1KΩ
R22	SM652101103	SM10KΩ
R23	SM652101103	SM10KΩ
R24	SM652101103	SM10KΩ
R25	SM652101103	SM10KΩ
R26	SM652101103	SM10KΩ
R27	SM652101103	SM10KΩ
S1	SM654101000	SM0Ω-2P
CR1	SM232032814	HSMS2814
CR2	SM232032814	HSMS2814
CR3	SM232032814	HSMS2814
CR4	SM232032814	HSMS2814

PART: F9300-8 **DESC: PCMCIA III HARD DISK CONTROLLER**

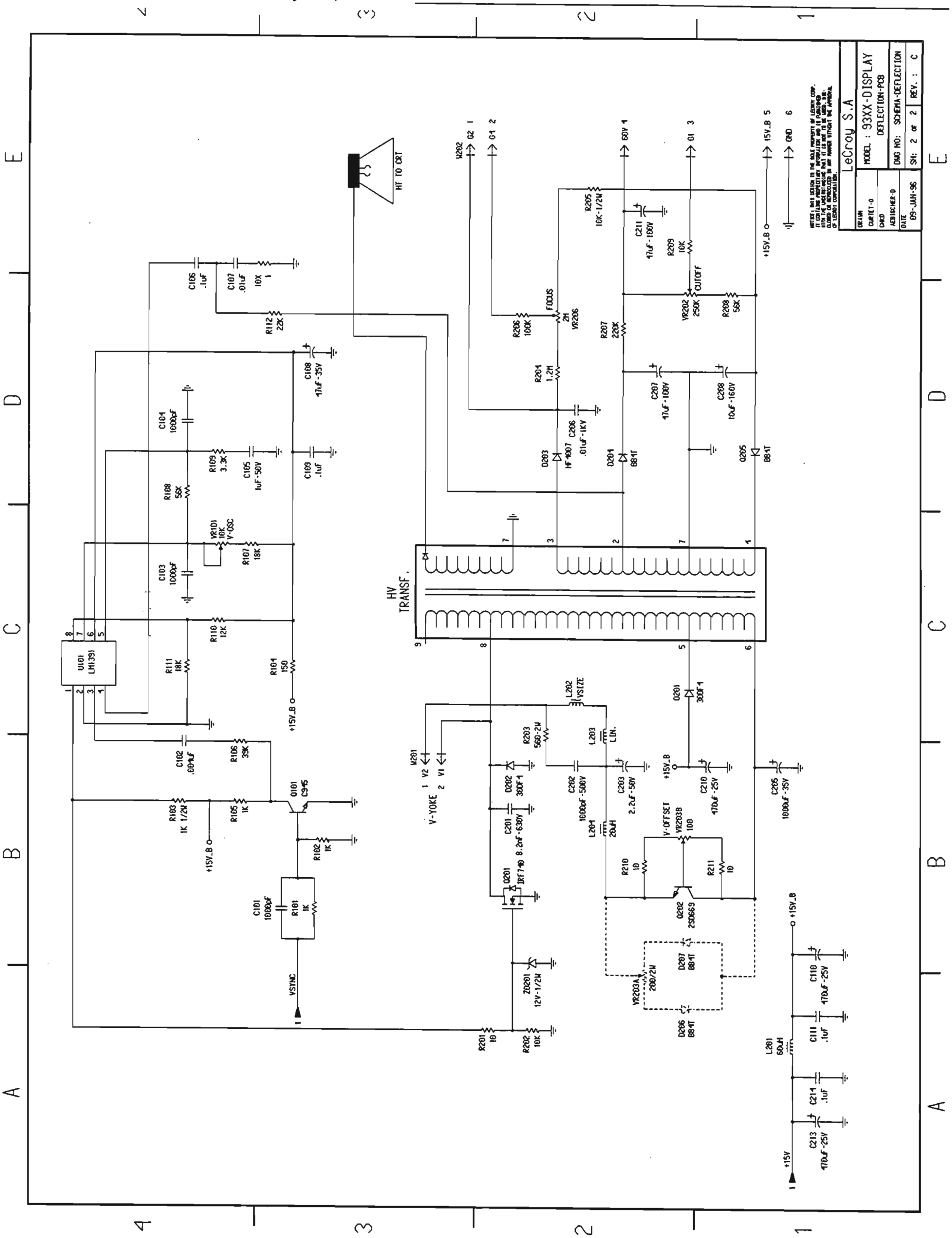
COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
205750000	IC AND-OR GATE ARRAY 16V8	2
330100100	PCMCIA HEADER ASS'Y TOP/LEFT	1
389340009	AUTO-ADHES. RUBBER BAND	1
454511040	HDR SOLD TAIL/MALE/40/RT	1
550120606	SCREW OVAL HD PHIL M2X6	4
550430106	SCREW CYL HD PHIL M3X6	4
551430400	WASHER SHAKEPROOF M3	4
552120100	NUT HEX M2X0.5D	4
594230002	CABLE CLIP ADHESIVE BACK	1
709300811	9300-8 PCMCIA III CONT.BRACKET	1
709300821	9300-8 PCMCIA III CONT. COVER	1
709300831	9300-8 PCMCIA III CONTR. LABEL	1
719300803	PC BD PREASS'Y 9300-8	1
SM200178002	IC 2-INPUT NOR HCT02	1
SM200178374	IC D-TYP FLOP 74HCT374	2
SM201178175	IC QUAD D FLIP/FLOP 74HCT175	1
SM206885245	IC BUS TRANSCVR ABT245	1
SM207170036	IC HEX BµF FER 3-ST. PC74HCT365	3
SM208470358	IC DUAL OP AMP 358D	1
SM208780109	IC MICROPOWER DC-DC CONV.	1
SM232032814	DIODE 2814	4
SM275330858	TRANSISTOR PNP BC858C	1
SM280171005	TRANS POWER MOSFET MTD10N05E	1
SM300056332	INDUCTOR WOUND 33 UH	1
SM652101102	RES CHIP (E24) 1% 1 KΩ	3
SM652101103	RES CHIP (E24) 1% 10 KΩ	18
SM652101104	RES CHIP (E24) 1% 100 KΩ	2
SM652101220	RES CHIP (E24) 1% 22 Ω	1
SM652101334	RES CHIP (E24) 1% 330 KΩ	3
SM654101000	CHIP JUMPER ZERO Ω	1
SM661207103	CAP CERA CHIP 20% .01µF (0805)	10
SM661207104	CAP CERA CHIP 20% .1 µF	6
SM661255101	CAP CERA CHIP 5% 100 PF	1
SM666327225	CAP MOLD TANT CHIP 2.2 µF	1
SM666377226	CAP MOLD TANT CHIP 22 µF	3



ECM 90088:
LeCroy S.A
MODEL : 93XX-DISPLAY
VIDEO
DWG NO: SCHEMA-VIDEO
SH: 1 OF 1
REV. : E
20-MAR-96
THRESHOLD
GAIN
CATHODE



LeCroy S.A
MODEL : 93XX-DISPLAY
DEFLECTION-PCB
DWG NO: SCHEMA-DEFLECTION
SH: 1 OF 2
REV. : C
09-JAN-96
ECM 90088:
H-YOKE
H-SIZE
H-OFFSET
H-LIN
QUIESCENT


LeCroy S.A
MODEL : 93XX-DISPLAY
DEFLECTION-PCB
DWG NO: SCHEMA-DEFLECTION
SH: 2 of 2
REV. : C
09-JAN-96
HV TRANSF.
HT TO CRT
V-YOKE
VSYNC
U101 LM1391

PART : **F93XX-DEFLECTION**

Location	Description	Location	Description
C1	10µF 50V	D204	BB4T
C2	680pF	D205	BB4T
C3	22nF	D206	BB4T
C4	.1µF	D207	BB4T
C5	.1µF	L201	60µH
C6	82nF	L202	V-SIZE
C7	.1µF	L203	V-LIN
C8	.1µF	L204	20µH
C9	470µF 25V	Q1	A733P
C12	470µF 25V	Q2	A733P
C13	4.7nF 250V	Q3	C945
C14	1µF -63V	Q4	A733P
C101	1000pF	Q5	SJ177
C102	4700pF	Q6	A733P
C103	1000pF	Q7	C945
C104	1000pF	Q8	A733P
C105	1µF -50V	Q9	C945
C106	.1µF	Q10	IRF630
C107	.01µF	Q11	C945
C108	47µF -35V	Q101	C945
C109	.1µF	Q201	IRF740
C110	470µF 25V	Q202	2SD669
C111	.1µF	R1	20 KΩ
C201	8.2nF-630V	R2	10 KΩ
C202	1000pF-500V	R4	6.65 KΩ-1%
C203	2.2µF -50V	R5	10 KΩ
C205	1000µF -35V	R6	7.5 KΩ
C206	.01µF -1KV	R7	22 KΩ
C207	47µF -100V	R8	2.2 MΩ
C208	10µF -100V	R9	510 KΩ
C210	470µF -25V	R10	10 MΩ
C211	47µF -100V	R11	2.26 KΩ-1%
C212	100µF -25V	R12	13.3 KΩ-1%
C213	470µF -25V	R13	330 KΩ
C214	.1µF	R14	1 MΩ
D1	1N4448	R15	1 KΩ
D2	1N4448	R16	220 Ω
D3	1N746A 3.3V 1/2W	R17	470 Ω
D4	1N746A 3.3V 1/2W	R18	1.5 KΩ
D5	1002	R19	10 KΩ
D6	1N758D 10V 1/2W	R20	6.8 KΩ
D7	1N758D 10V 1/2W	R21	220 KΩ
D201	30DF4	R22	5 KΩ
D202	30DF4	R23	5 KΩ
D203	HF4007	R24	330 Ω

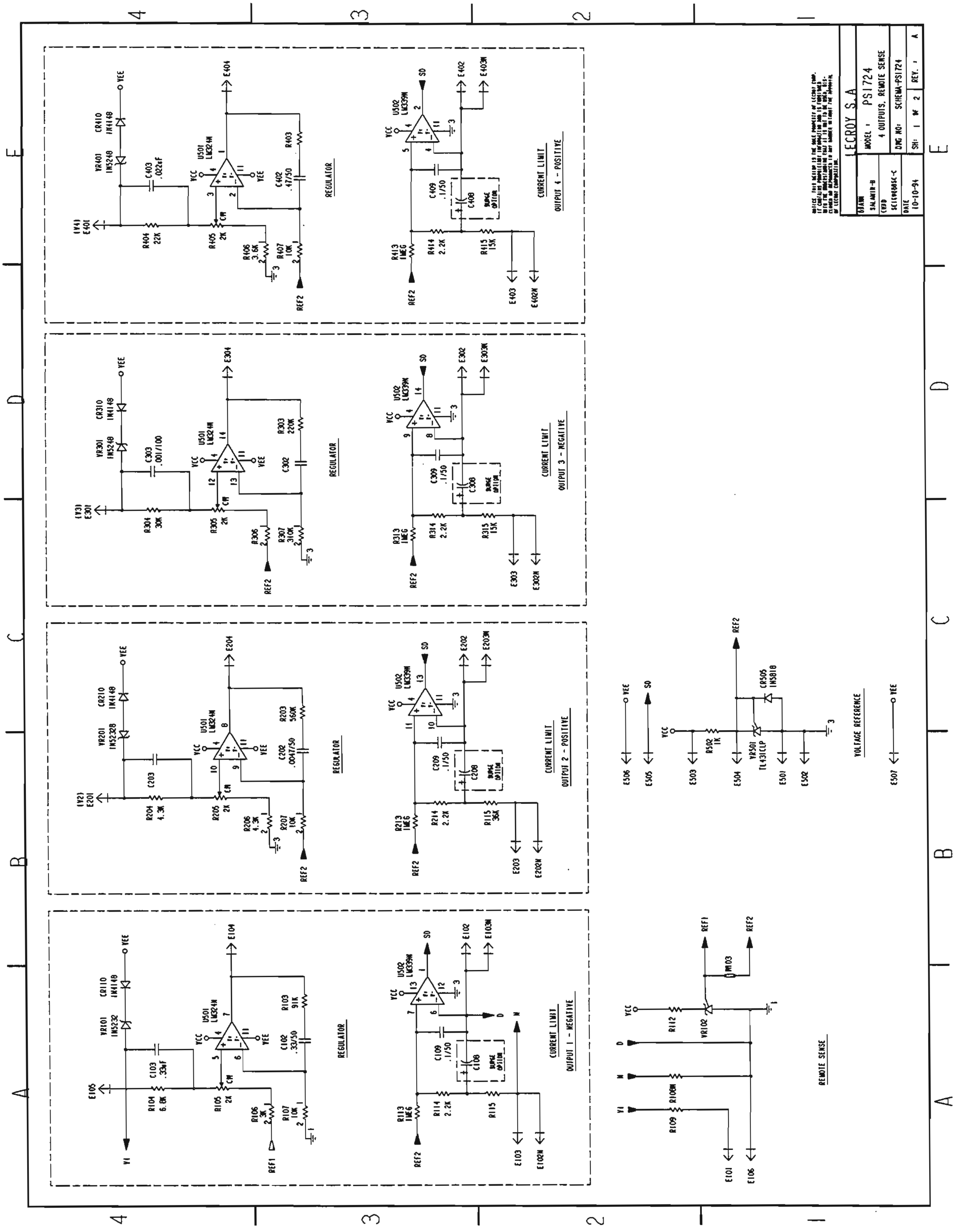
PART : **F93XX-DEFLECTION**

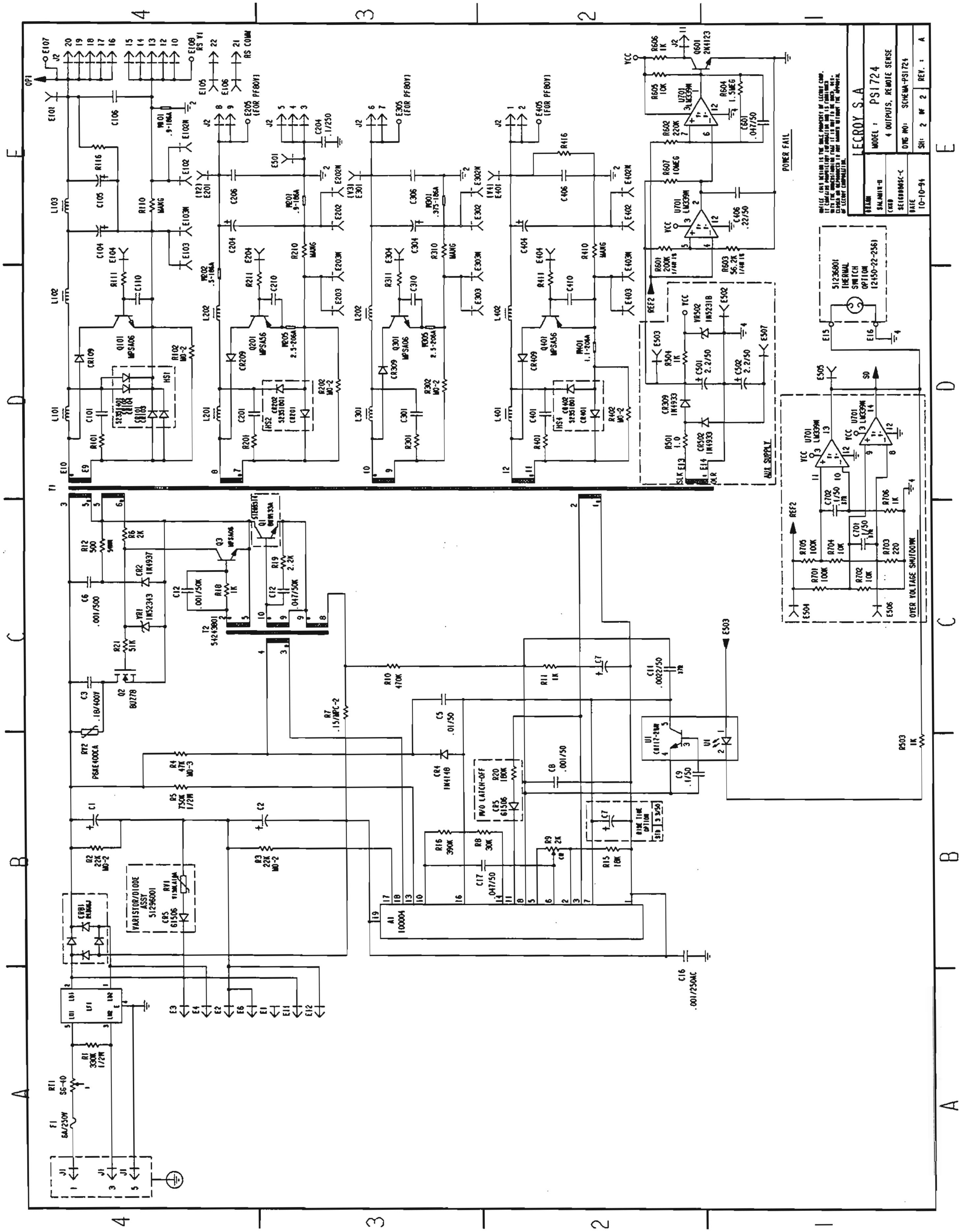
Location	Description
----------	--------------
R25	33 KΩ
R26	560 Ω
R27	330 Ω
R28	6.8 KΩ
R29	3.3 Ω
R30	330 Ω
R31	330 Ω
R32	5K Ω
R33	560 Ω
R34	330 Ω
R35	6.8 KΩ
R36	3.3 Ω
R37	910 Ω
R38	6.2 Ω-1/2W
R40	1.5 KΩ
R41	1.5 KΩ
R101	1 KΩ
R102	1 KΩ
R103	1 KΩ-1/2W
R104	150 Ω
R105	1 KΩ
R106	39 KΩ
R107	18 KΩ
R108	56 KΩ
R109	3.3 KΩ
R110	12 KΩ
R111	18 KΩ
R112	22 KΩ
R201	10 Ω
R202	10 KΩ
R203	560 Ω-2W
R204	1.2 MΩ-1/2W
R205	10 KΩ-1/2W
R206	100 KΩ
R207	220 KΩ
R208	56 KΩ
R209	10 KΩ
R210	10 Ω
R211	10 Ω
T201	HT
U1	LF353
U2	LF353
U3	LF353
U101	LM1391
VR101	10 KΩ
VR202	250 KΩ

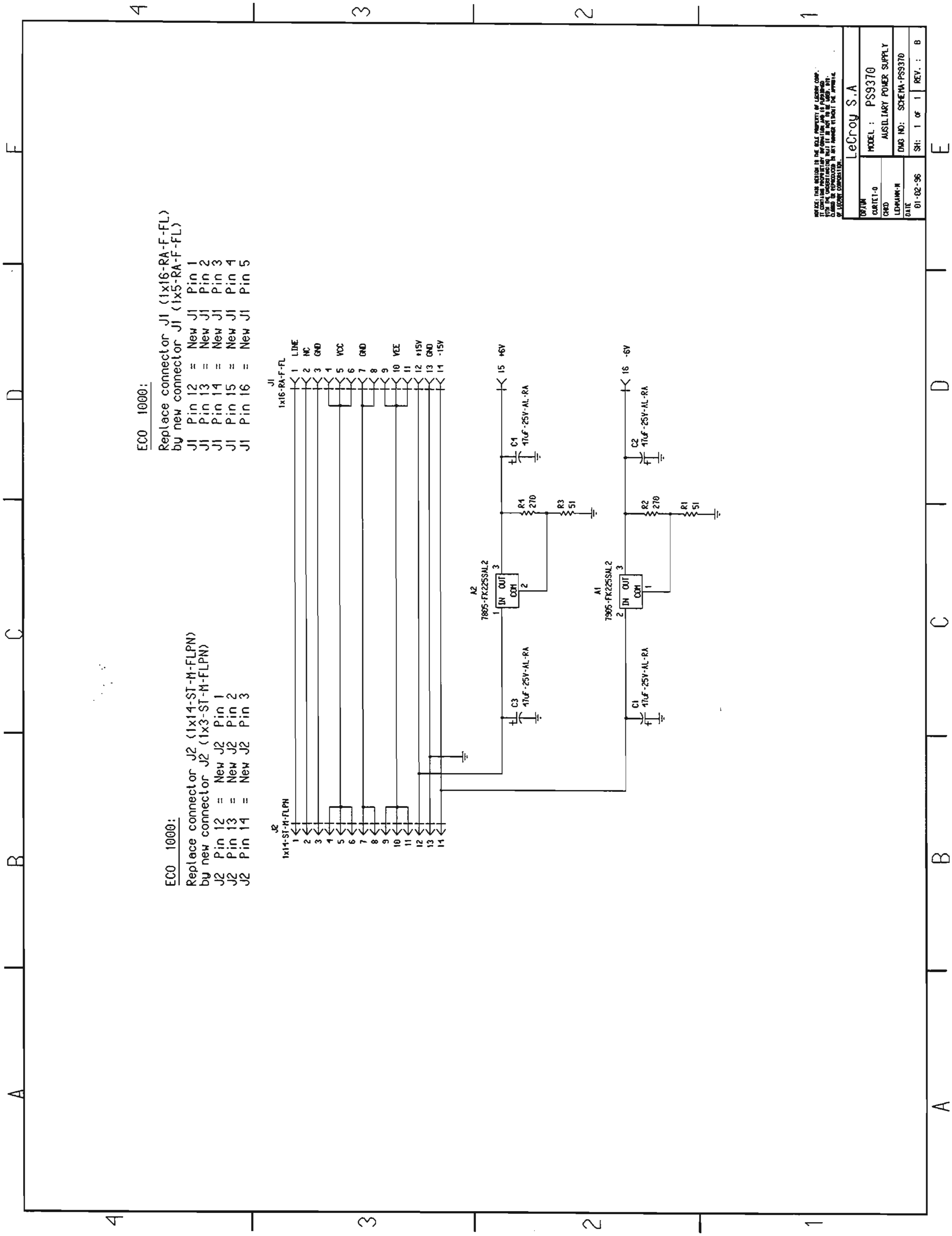
Location	Description
----------	--------------
VR203A	200 Ω -2W
VR203B	100 Ω
VR206	2 MΩ
ZD201	12V-1/2W

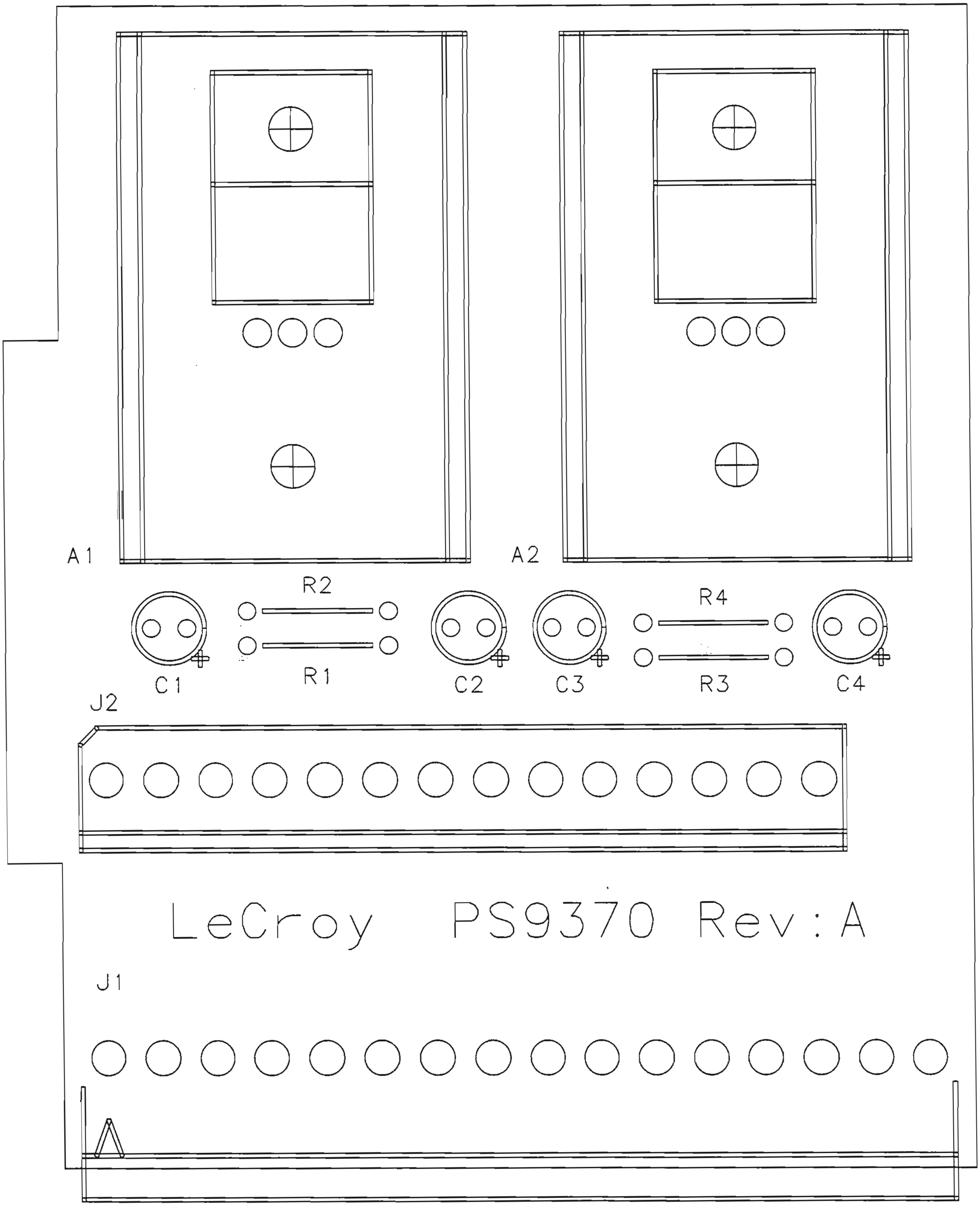
PART : **F93XX-VIDEO**

Location	Description
----------	--------------
C301	47μF -35V
C302	220pF
C303	150pF
C304	100nF
C306	100nF
C308	220μF -25V
C309A	100nF
C309B	100nF
C309C	100nF
C310	47μF -100V
C311	10nF-500V
C312	10nF-500V
ZD301	5.0V
SG301	KΩA-201-20
L301	3.3uH
Q301	2SC1906
Q302	2SC4367
Q303	2SC1906
Q304	2SC4367
Q305	2SC3953
R301	75 Ω
R302	10 KΩ
R303	100 Ω
R304	10 Ω
R305	10 Ω
R306	10 Ω
R308	680 Ω
R309	4.7 KΩ
R310	330 Ω-1/2W
R311	5 KΩ
R312	100 Ω
R313	820 Ω-1/2W
R314	390 Ω
R315	39 Ω-1/2W
R316	1 kΩ
R317	100 Ω
R318	47 KΩ
R319	100 Ω


LECROY S.A
MODEL : PS1724
4 OUTPUTS, REMOTE SENSE
DWG NO: SCHEMA-PS1724
SH: 1 OF 2
REV. : A
DATE 10-10-94
REGULATOR
CURRENT LIMIT
OUTPUT 1 - NEGATIVE
OUTPUT 2 - POSITIVE
OUTPUT 3 - NEGATIVE
OUTPUT 4 - POSITIVE
VOLTAGE REFERENCE
REMOTE SENSE
U501 LM324N
U502 LM339N
VR501 TL431CLP
CR505 1N5818


LECROY S.A
PS1724
4 OUTPUTS, REMOTE SENSE


ECO 1000:
Replace connector J1 (1x16-RA-F-FL)
by new connector J1 (1x5-RA-F-FL)
J1 Pin 12 = New J1 Pin 1
J1 Pin 13 = New J1 Pin 2
J1 Pin 14 = New J1 Pin 3
J1 Pin 15 = New J1 Pin 4
J1 Pin 16 = New J1 Pin 5
ECO 1000:
Replace connector J2 (1x14-ST-M-FLPN)
by new connector J2 (1x3-ST-M-FLPN)
J2 Pin 12 = New J2 Pin 1
J2 Pin 13 = New J2 Pin 2
J2 Pin 14 = New J2 Pin 3
J1
1x16-RA-F-FL
LINE
NC
GND
VCC
GND
VEE
+15V
GND
-15V
+6V
-6V
C1
47uF-25V-AL-RA
C2
47uF-25V-AL-RA
C3
47uF-25V-AL-RA
R1
270
R3
51
R2
270
A2
7805-FK225SAL2
A1
7905-FK225SAL2
IN
OUT
COM
J2
1x14-ST-M-FLPN
LeCroy S.A
MODEL : PS9370
AUSILIARY POWER SUPPLY
DWG NO: SCHEMA-PS9370
SH: 1 OF 1
REV. : B
DATE
01-02-96


A1
A2
R2
R1
R4
R3
C1
C2
C3
C4
J2
LeCroy PS9370 Rev:A
J1

PART: M937X **DESC: MECHANICAL FOR 9374/M/L/TM**

COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
315910006	COMBI FILTER WITH FUSES - 6AMP	1
377051005	LABEL "DANGER-------ONLY"	1
377131001	LABEL (GROUND SYMBOL)	1
433162630	FUSE SLO-BLO 250V 6.3AMP	2
485023462	FOOT BUMPON GREY	4
485123001	BUMPER (FOOT) SQUARE GREY RUB	2
530301009	BLK HANDLE W/2 BLACK END CAPS	1
550430106	SCREW CYL HD PHIL M3X6	11
550430116	SCREW CYL HD PHIL M3X16	6
550430120	SCREW CYL HD PHIL M3X20	10
550430508	SCREW FLAT HD PHIL M3X8	2
550430706	SCREW ECO-FIX M3X6	7
550440605	SCREW OVAL HD PHIL M4X5	8
550440608	SCREW OVAL PHIL M4X8	7
551430400	WASHER SHAKEPROOF M3	6
551450400	WASHER SHAKEPROOF M5	2
554030101	NUT BANC-LOK TYPE MV M3	7
554035101	CLIP-ON NUT DIAM. 3.5	4
554425003	SCREW S/TAP PHIL M2.5X6 BLACK	6
554435003	SCREW PT PHIL KA35X20	4
554435004	SCREW PT PHIL KA35X10	4
554435005	SCREW CYL HD PHIL 3.5X9.5	4
554440001	SCREW PT PHIL KA 40 X 12	4
554440202	FLAT WASHER M4	4
560032008	SCREW PHILIPS 10-32X1/2	2
594120003	TIEWRAP	1
7093XX041	FOOT SUPPORT 93XX	2
7093XX051	FOOT 93XX	2
7093XX091	FRONT FRAME BRACKET 93XX	4
7093XX321	MAIN CARD STANDOFF 12MM	2
7093XX902	FAN 93XX-9 ASSEMBLY	1
7093XX931	INTERF. HOLE CLOSURE 93XX-9	2
709424096	INSERTION GUIDE FOR MC	1
780661104	FLAT CABLE 2X7 (4 CM)	1
780671110	FLAT CABLE 2X20 (10 CM)	1
780721105	FLAT CABLE 2X10 (5,5CM)	1
780834509	GROUND CABLE YELLOW/GREEN 9CM A	1
93XX-DISPLAY	RASTER MONITOR KIT	1
FF93X1	FRONT FRAME DSO 93XX	1
LC93X1	LOWER COVER DSO 93XX	1
PS9351	POWER SUPPLY	1
PS9370	+/- 5,8V AUX. POWER SUPPLY	1
RP9354-9	REAR PANEL 9354-9	1
UC93X1	UPPER COVER DSO 93XX	1
US9374-3	937X-3 MAIN CARD SHIELD	1

PART: ACCESSORIES-9374 DESC: ACCESSORIES FOR 9374/M/L/TM

COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
407099008	PLUG FOR AC LINE - ENGLAND	1
433162630	FUSE SLO-BLO 250V 6.3AMP	2
589202200	AC CORD/PLUG FOR GERMANY	1
589203100	AC CORD/"SEV-ASE" PLUG	1
589203218	AC CORD/US-CANADA PLUG	1
597930001	CARTON FOR 93XX	1
597930002	ETHAFOAM FOR 93XX	2
597940014	PLASTIC BAG FOR 94XX & 93XX	2
597940015	MANUAL/ACCESSORY CTN 9400	2
7093XX061	FRONT COVER 93XX	1
931X-RCM-E	931X SERIES REMOTE CONTROL MAN	1
937X-AD-E	ADDENDUM	1
937X-OM-E	9370/74 OPERATOR'S MANUAL	1
93XX-HG	9300 DSO HANDS-ON GUIDE	1
PP005	10 M OHM 10:1 500V 500MHZ 11PF	4
PP093	2GS/s ADAPTOR FOR 9374	1

PART: 93XX-GP01 DESC: GRAPHIC PRINTER

COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
340000402	THERMAL PAPER FOR SEIKO PRINT	1
334000832	THERMAL PRINTER UNIT	1
530040005	SLIDE LATCH TAB STYLE	2
550430106	SCREW CYL HD PHIL M3X6	4
551430100	FLAT WASHER M3	3
551430400	WASHER SHAKEPROOF M3	4
552430300	NUT OPEN-END ACORN M3	3
554430002	SCREW S/TAP PHIL M3X5	6
594120003	TIE WRAP	2
709450523	PUSH SWITCH EXTENDER	1
70GP01031	GRAPHIC PRINTER FRAME	1
70GP01041	GRAPHIC PRINTER COVER AXLE	1
70GP01051	GRAPHIC PRINTER CUTTER	1
70GP01061	GRAPHIC PRINTER SWITCH BUTTON	1
780210030	DISPLAY POWER CABLE	1
780721022	FLAT CABLE 2X10 (22CM)	1
780791604	FLAT CABLE 2X13 (4CM)	1
780801015	FLAT CABLE 2X20 (3 CONNECT.)	1
BOX-GP01	GP01 GRAPHIC PRINTER BOX	1
COVER-GP01	GP01 GRAPHIC PRINTER COVER	1
F9300-6	CENTRONICS/FLOPPY/PRINTER INT	1
F9300-7	LTP 5446 PRINTER CONTROLLER	1
UC93X1-GP01	UPPER COVER FOR GP01 OPTION	1

PART: 93XX-FD01 **DESC: FLOPPY DISK**

COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
335023203	FLOPPY DISK DRIVE 31/2"	1
550425104	SCREW CYL HD PHIL M2,5X4	4
550430106	SCREW CYL HD PHIL M3X6	4
551430400	WASHER SHAKEPROOF M3	2
551430400	WASHER SHAKEPROOF M3	2
554030101	NUT BANC-LOCK TYPE MV M3	2
554430002	SCREW S/TAP PHIL M3X5	4
70FD01021	FLOPPY DISK DRIVE SUPPORT	1
70FD01031	FLOPPY DISK DRIVE FRAME	1
780791630	FLAT CABLE 2X13 (30CM)	1
780801015	FLAT CABLE 2X20 (3 CONNECT.)	1
CUP-FD01	FD01 FLOPPY DISK DRIVE CUP	1
F9300-6	CENTRONICS/FLOPPY/PRINTER INT. B	1
UC93X1-FD01	UPPER COVER FOR FD01 OPTION	1

OR

330000002	FLOPPY DISK DRIVE 3.5"	1
550425103	SCREW CYL HD PHIL M 2,5X3	4
550430106	SCREW CYL HD PHIL M3X6	4
551430400	WASHER SHAKEPROOF M3	2
554030101	NUT BANC-LOK TYPE MV M3	2
554430002	SCREW S/TAP PHIL M3X5	4
70FD01031	FLOPPY DISK DRIVE FRAME	1
70FD01091	FLOPPY DISK DRIVE SUPPORT	1
780801015	FLAT CABLE 2X20 (3 CONNECT.)	1
780901624	FLAT CABLE 26 P. / 24CM LENGTH	1
780919905	FLAT FLEX CABLE 26 P. 5CM	1
CUP-FD01-1	FD01 FLOPPY DISK DRIVE CUP	1
F9300-6	CENTRONICS/FLOPPY/PRINTER INT.	1
F9301-6	FLOPPY ADAPTOR	1
UC93X1-FD01	UPPER COVER FOR FD01 OPTION	1

PART: 93XX-FDGP **DESC: GRAPHIC PRINTER & FLOPPY DISK**

COMPONENT	PART DESCRIPTION	QTY PER ASSEMBLY
------------------	----------------------------	----------------------------
334000402	THERMAL PAPER FOR SEIKO PRINT	1
334000832	THERMAL PRINTER UNIT	1
335023203	FLOPPY DISK DRIVE 31/2"	1
530040005	SLIDE LATCH TAB STYLE	2
550425104	SCREW CYL HD PHIL M2,5X4	4
550430106	SCREW CYL HD PHIL M3X6	6
551430100	FLAT WASHER M3	3
551430400	WASHER SHAKEPROOF M3	4
552430300	NUT OPEN-END ACORN M3	3
554030101	NUT BANC-LOK TYPE MV M3	2
554430002	SCREW S/TAP PHIL M3X5	10
594120003	TIE WRAP	2
709450523	PUSH SWITCH EXTENDER	1
70FD01021	FLOPPY DISK DRIVE SUPPORT	1
70FD01031	FLOPPY DISK DRIVE FRAME	1
70GP01031	GRAPHIC PRINTER FRAME	1
70GP01041	GRAPHIC PRINTER COVER AXLE	1
70GP01051	GRAPHIC PRINTER CUTTER	1
70GP01061	GRAPHIC PRINTER SWITCH BUTTON	1
780210030	DISPLAY POWER CABLE	1
780721022	FLAT CABLE 2X10 (22CM)	1
780791604	FLAT CABLE 2X13 (4CM)	1
780791630	FLAT CABLE 2X13 (30CM)	1
780801015	FLAT CABLE 2X20 (3 CONNECT.)	1
BOX-GP01	GP01 GRAPHIC PRINTER BOX	1
COVER-GP01	GP01 GRAPHIC PRINTER COVER	1
CUP-FD01	FD01 FLOPPY DISK DRIVE CUP	1
F9300-6	CENTRONICS/FLOPPY/PRINTER INT	1
F9300-7	LTP 5446 PRINTER CONTROLLER	1
UC93X1-FDGP	UPPER COVER FOR FD/GP OPTIONS	1

OR

330000002	FLOPPY DISK DRIVE 3.1/2	1
550425103	SCREW CYL HD PHIL M 2,5X3	4
70FD01091	FLOPPY DISK DRIVE SUPPORT	1
780901624	FLAT CABLE 26 P. / 24CM LENGTH	1
780919905	FLAT FLEX CABLE 26 P. 5CM	1
CUP-FD01-1	FD01 FLOPPY DISK DRIVE CUP	1
F9301-6	FLOPPY ADAPTOR	1

SECTION 8 MECHANICAL PARTS

9374, 9374M, 9374L & 9374TM

Digital Storage Oscilloscope

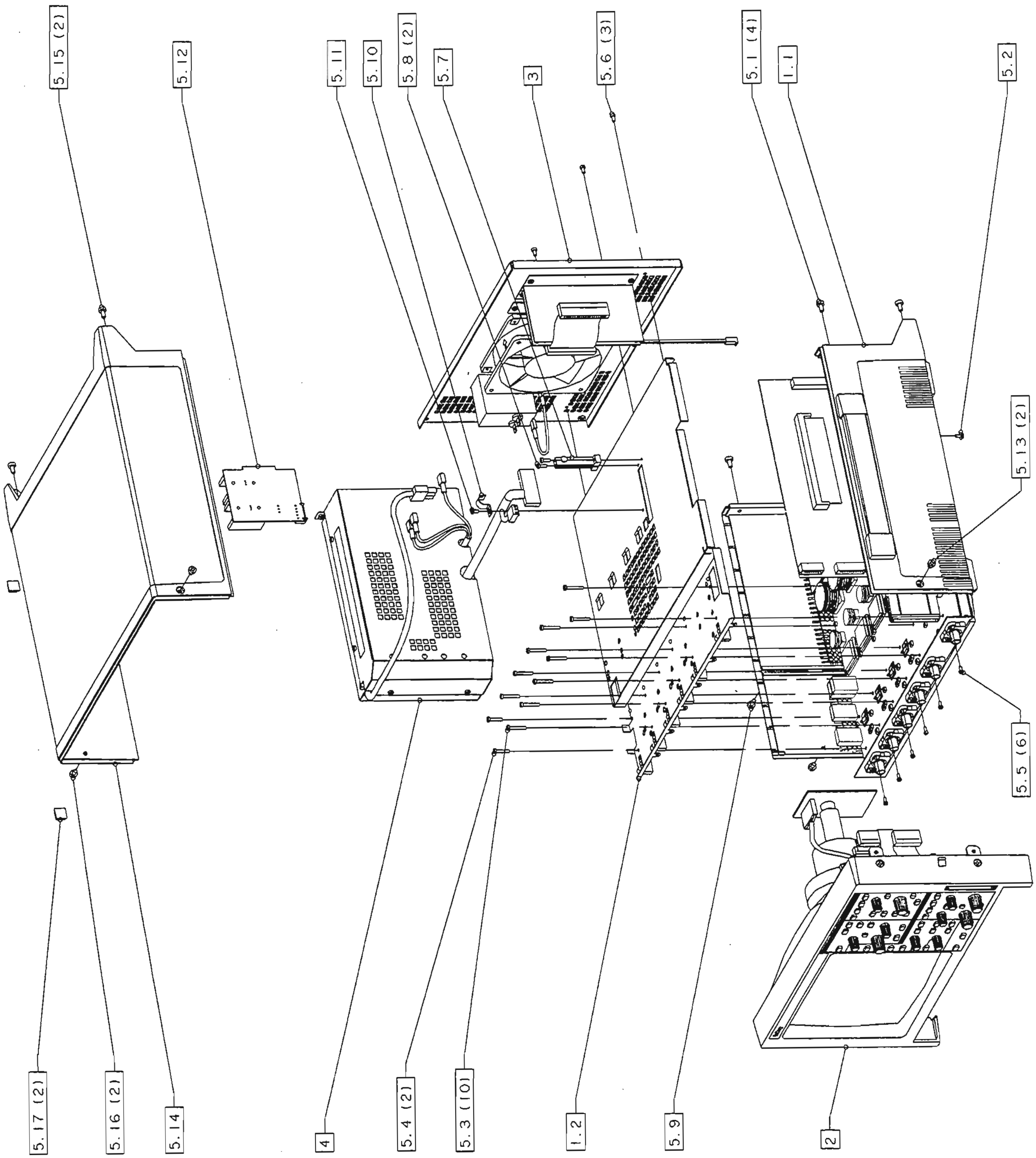


Figure 8.1 : 9374/M/L/TM DSO Exploded View

8.1.1	**9374/M/L/TM Assembly**	**Part Description**	**Quantity per Assembly**
1.1	9374 lower cover assembly	LC93X1	1
1.2	9374 upper shield assembly	US9370-3	1
2.	9374 front frame assembly		1
3.	9374 rear panel assembly		1
4.	PS9351power supply	PS9351	1
5.1	Screw oval head M4x8	550 440 608	4
5.2	Screw eco fix M3x6	550 430 706	1
5.3	Screw cyl head M3x20	550 430 120	10
5.4	Screw M3x16	550 430 116	2
5.5	Self tapping screw M2.5x6	554 425 003	6
5.6	Screw M3x6	554 430 706	3
5.7	Card guide lockable	530410050	1
5.8	Screw M3x10	550430110	2
5.9	Screw oval head M4x8	550 440 608	1
5.10	Cable clip 10 mm	594240089	1
5.11	Screw M3x6 Washer M3	550430106 551430301	1 1
5.12	Auxiliary power supply	PS9370	1
5.13	Screw M4x5	550 440 605	2
5.14	9374 Upper cover	UC 93X1	1
5.15	Screw oval head M4x8	550 440 608	2
5.16	Screw M4x5	550 440 605	2
5.17	Foot bumpon grey 6 mm	485 023 462	2

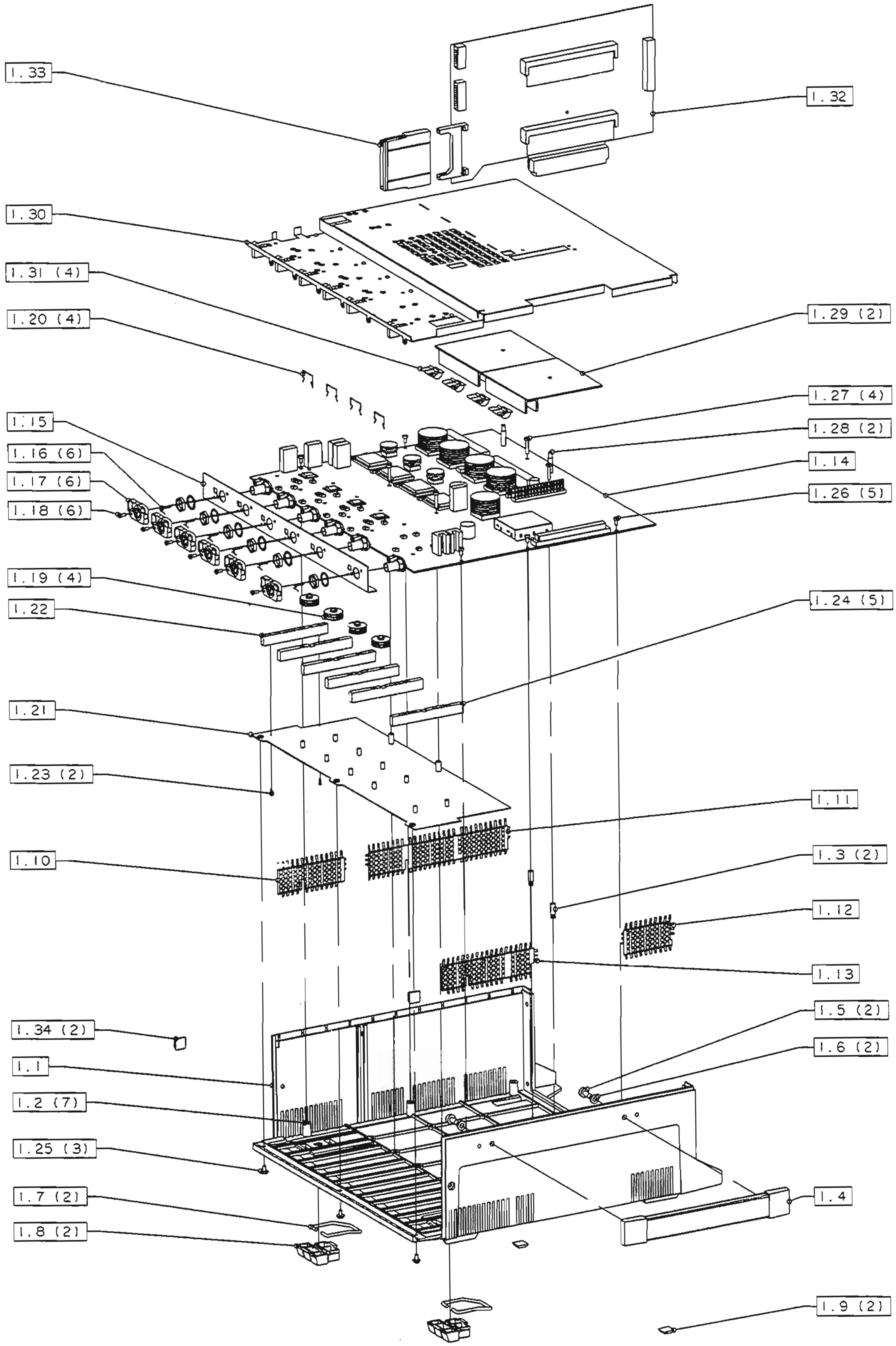


Figure 8.2 : 9374/M/L/TM Lower Cover Exploded View

8.2.1	**9374 Lower Cover Assembly**	**Part Description**	**Quantity per Assembly**
1.1	Lower cover	LC 93X1	1
1.2	Nut Banc-Lock M3	554 030 101	7
1.3	Main card standoff 12 mm M3	709 3XX 321	2
1.4	Handle with caps	530 301 009	1
1.5	Screw cyl head 10-32 x 1/2	560 032 008	2
1.6	Lockwasher M5	551 450 400	2
1.7	Foot	709 3XX 051	2
1.8	Foot support	709 3XX 041	2
1.9	Foot bumpon grey 3 mm	485 123 001	2
1.10	Front left shielding grid	709 354 371	1
1.11	Rear left shielding grid	709 354 372	1
1.12	Rear right shielding grid	709 354 373	1
1.13	Front right shielding grid	709 354 374	1
1.14	Main board 9374/M/L/TM	F9374-3 or -31	1
1.15	Main board panel 9374/M/L/TM	FP9374-3	1
1.16	Probe ring contact	709 3XX P91	6
1.17	Probe holder	709 3XX P41	6
1.18	Self tapping screw M2,5x6	554 425 003	6
1.19	HFE419 Heatsink	709 370 311	4
1.20	HFE419 Heatsink clip	709 370 321	4
1.21	9374/M/L/TM base shield	709 354 331	1
1.22	Left lower partition	709 354 361	1
1.23	Nail rivet 1.6x6	554 416 000	2
1.24	Lower partition	709 354 351	5
1.25	Screw eco-fix M3x6	550 430 706	3
1.26	Screw cyl head M3x6	550 430 106	5
1.27	Screw cyl head M3x16	550 430 116	4
1.28	Self locking nylon spacer	520 000 118	2
1.29	9374 Acquisition memory card	F9350-21	2
	9374M Acquisition memory card	F9350M-21	2
	9374L Acquisition memory card	F9350L-2	2
	9374TM Acquisition memory card	F9350TM-21	2
1.30	Upper shield assembly	US9370-3	1
	Upper shield	709 370 341	1
	Upper partition shield	709 354 341	6
	Shield contact	709 3XX 371	6
	Nail rivet M2,5x6	554 425 004	12
1.31	Shield finger stock	530 009 002	4
1.32	9374 Processor card	F9302-1-4	1
	9374M & 9374TM Processor	F9302-1-8	1
	9374L Processor card	F9302-1-16	1
1.33	Memory card insertion guide	709 424 096	1
1.34	Self adhesive foot	485 023 462	2

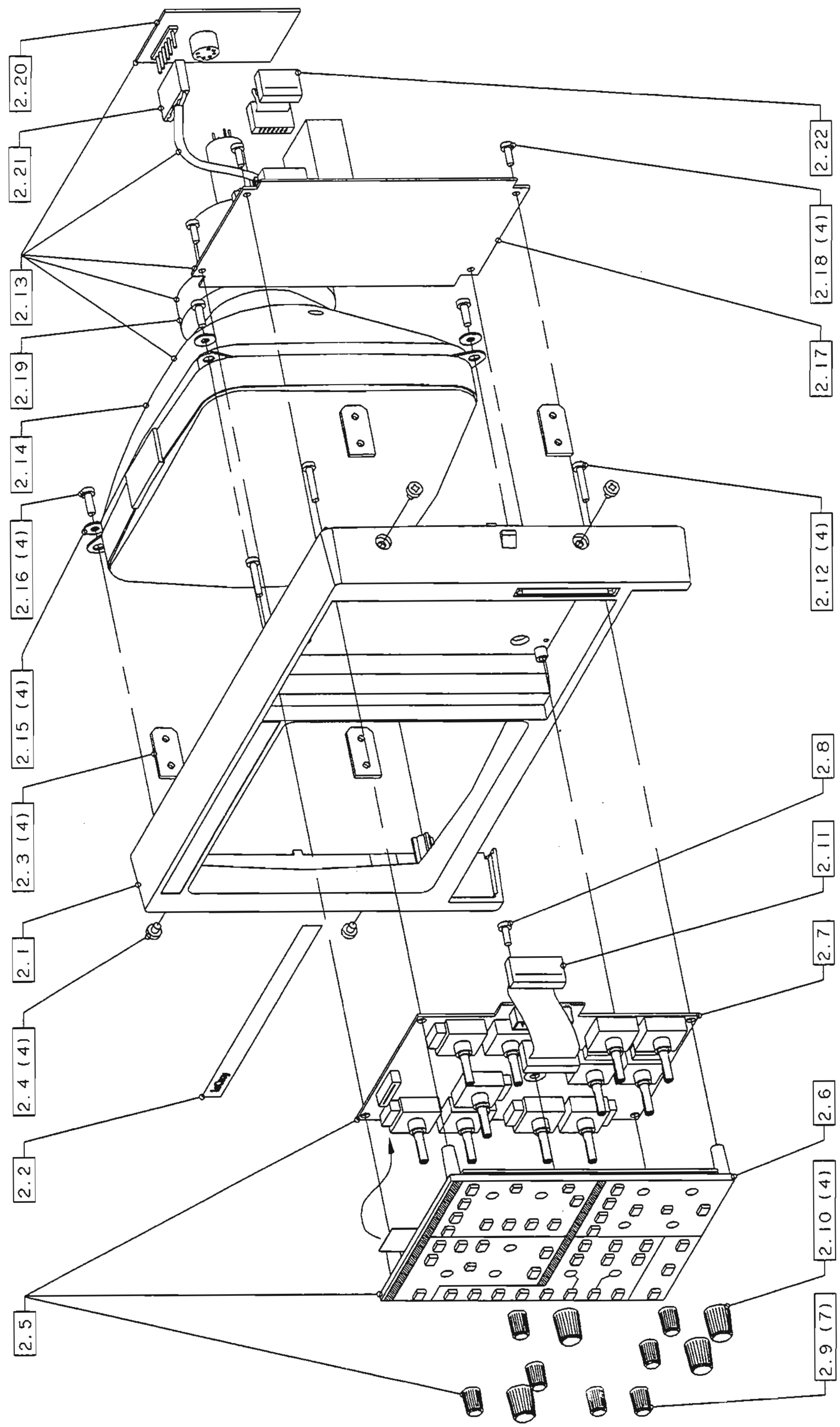


Figure 8.3 : 9374/M/L/TM Front Frame Exploded View

8.3.1	**9374 Front Panel Assembly**	**Part Description**	**Quantity per Assembly**
2.1	Front frame	FF 93X1	1
2.2	Front label 9374	709 374 016	1
	Front label 9374M	709 374 M16	1
	Front label 9374L	709 374 L16	1
	Front label 9374TM	709 374 TM16	1
2.3	Front frame bracket	709 3XX 091	4
2.4	Screw oval head M4x5	550 440 605	4
2.5	Front panel assembly	F9354-5	1
2.6	Front panel keyboard ass'y	729 354 513	1
2.7	Front panel pcb ass'y	9354-5	1
2.8	Screw PT KA 35x10	554 435 004	1
2.9	Knob diameter 10mm	709 3XX 511	7
2.10	Knob diameter 14mm	709 3XX 521	4
2.11	20 lines flat cable	780 721 105	1
2.12	Screw PT KA 35x20	554 435 003	4
2.13	Raster monitor kit	93XX-Display	1
2.14	9 inch CRT	93XX-CRT	1
2.15	Flat washer M4	554 440 202	4
2.16	Screw PT KA 40x12	554 440 001	4
2.17	Deflection board	93XX-Deflection	1
2.18	Screw PT KA 35x10	554 435 004	4
2.19	Deflection yoke	93XX-Yoke	1
2.20	Video board	93XX-Video	1
2.21	Monitor cable		1
2.22	14 lines flat cable	780 661 104	1

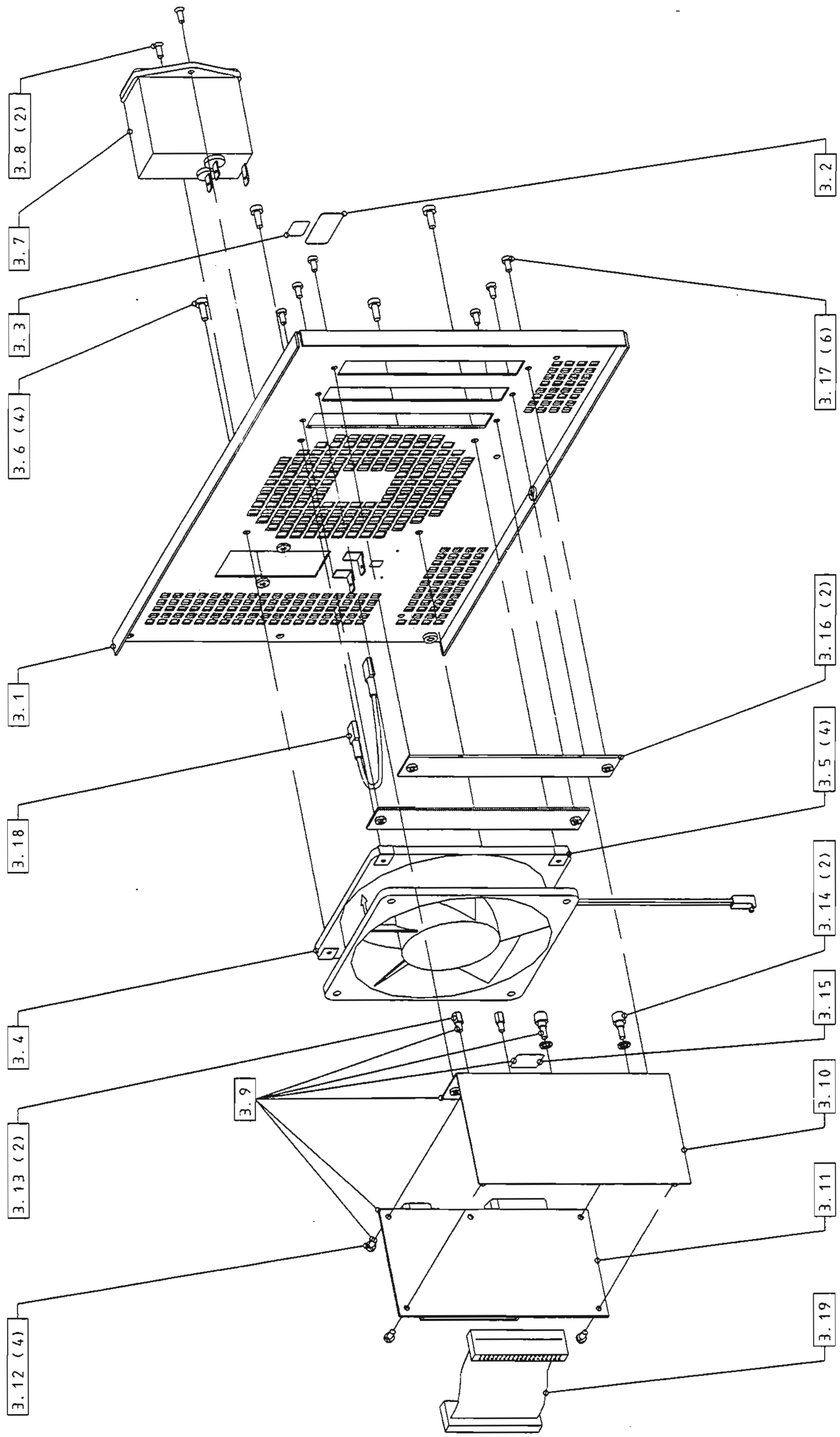


Figure 8.4 : 9374/M/L/TM Rear Panel Exploded View

8.4.1	**9374 Rear Panel Assembly**	**Part Description**	**Quantity per Assembly**
3.1	Rear panel	RP 9374-9	1
3.2	Serial number plate	709 374 913	1
3.3	CE label	709 300 941 709 300 931	1 1
3.4	Fan asssembly	709 3XX 902	1
3.5	Clip on nut 3.5	554 035 101	4
3.6	Screw 3.5 X 9.5	554 435 005	4
3.7	Line input module Fuse holder Fuse 6.3A / 250 V	315 910 006 433 162 630	1 1 2
3.8	Screw flat head M3x8	550 430 508	2
3.9	RS232/GPIB interface assembly	F9300-4	1
3.10	Interface card bracket	709 300 411	1
3.11	Interface card	9300-4	1
3.12	Screw cyl head M3x6 Washer Shakeproof M3	550 430 106 551 430 400	4 4
3.13	Mounting hardware	455 980 002	2
3.14	Connector kit	435 521 024	2
3.15	Label " RS232C "	709 300 421	1
3.16	Interface hole closure	709 3XX 931	1
3.17	Screw cyl head M3x6 Washer shakeproof M3	550 430 106 551 430 400	4 1
3.18	Ground wire cable	780 834 509	1
3.19	40 lines flat cable	780 671 110	1

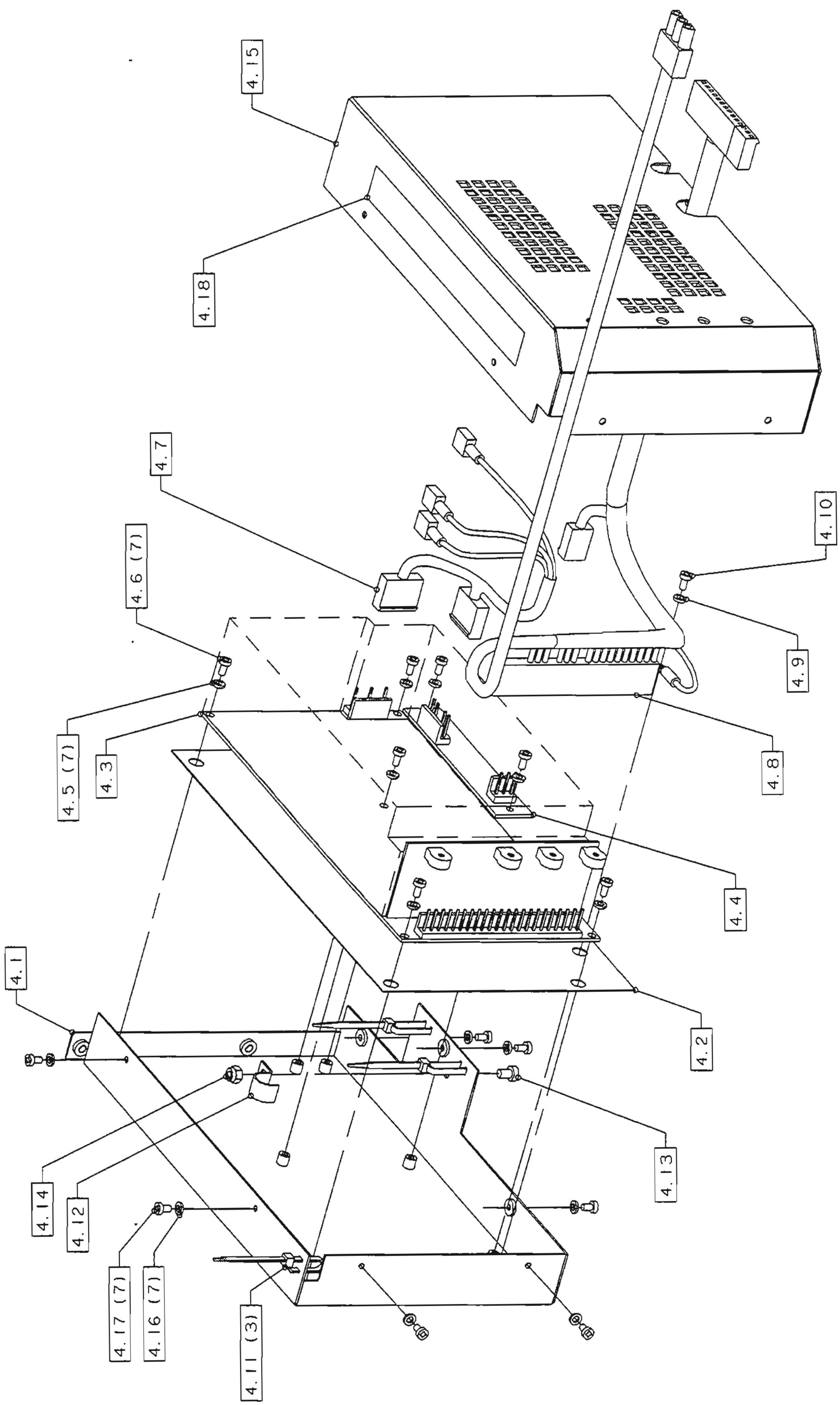


Figure 8.5 : PS9351 Power Supply Exploded View

8.5.1	**Power supply PS9351**	**Part Description**	**Quantity per Assembly**
4.1	Power supply bracket	709 351 041	1
4.2	Power supply insulator	709 351 031	1
4.3	Power supply board	PS 1724	1
4.4	Power supply line sync card	FPS9351-2	1
4.5	Lockwasher M3	551 430 400	7
4.6	Screw cyl head M3x6	550 430 106	7
4.7	Power supply input cable	780 811 622	1
4.8	Power supply output cable	780 932 972	1
4.9	Lockwasher M3	551 430 400	1
4.10	Screw cyl head M3x6	550 430 106	1
4.11	Tie wrap	594 120 006	3
4.12	Cable clip	594 240 099	1
4.13	Screw cyl head M4x6	550 440 106	1
4.14	Nut open-end Acorn M4	552 440 300	1
4.15	Power supply cover	709 351 051	1
4.16	Lockwasher M3	551 430 400	7
4.17	Screw cyl head M3x5	550 430 105	7
4.18	Label " Danger....only "	377 051 005	1

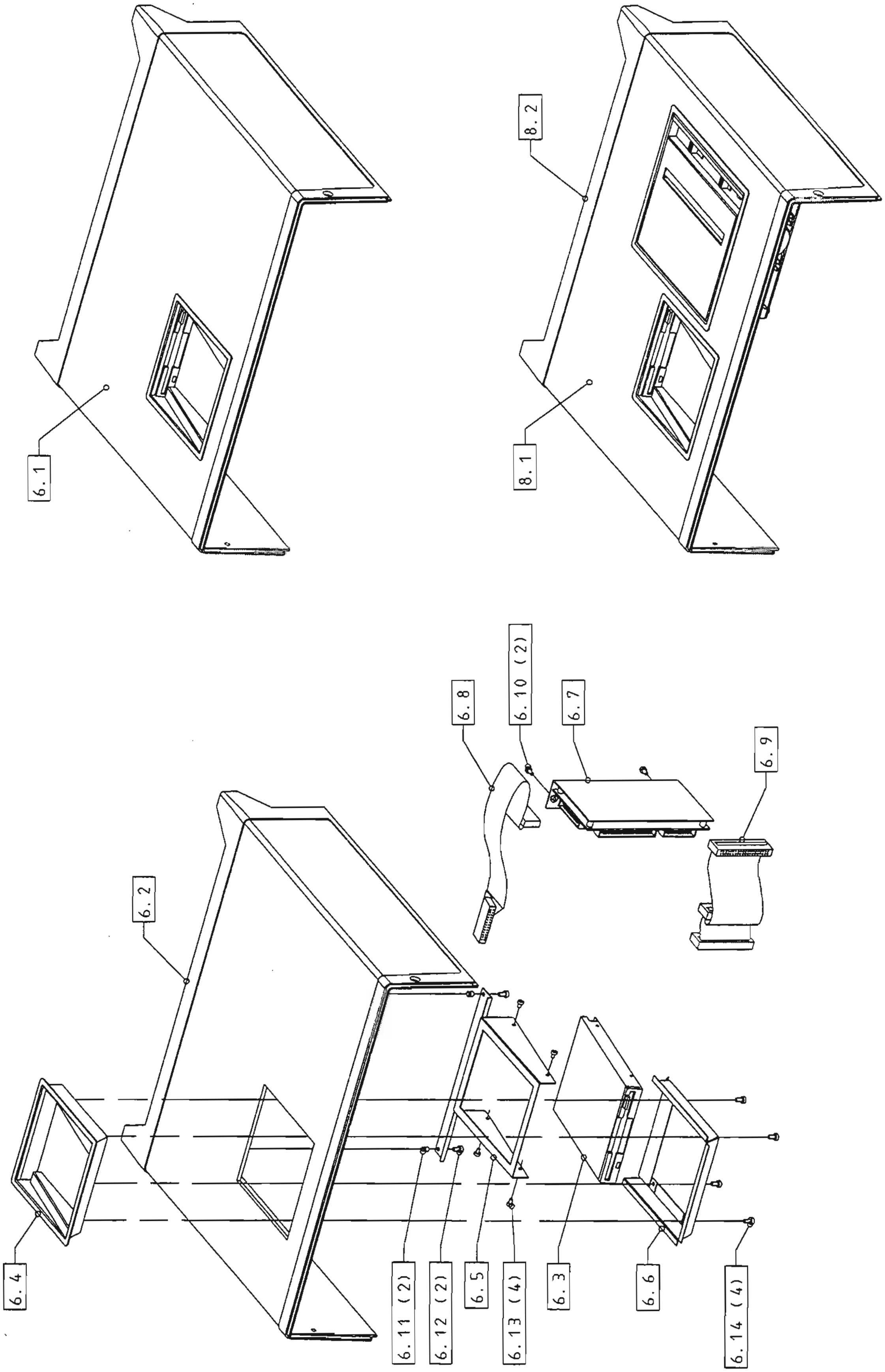


Figure 8.6 : Floppy Drive Assembly, Model 0.6 " height

8.6.1	**FD01 Floppy Option**	**Part Description**	**Quantity per Assembly**
6.1	Floppy drive option	93XX-FD01	1
6.2	Upper cover	UC93X1-FD01	1
6.3	Floppy drive	335 023 203	1
6.4	Cup	CUP-FD01	1
6.5	Support	70FD01021	1
6.6	Frame	70FD01031	1
6.7	Floppy/Printer/Cent interface	F9300-6	1
6.8	Flat cable 26 P	780 791 630	1
6.9	Flat cable 40 P	780 801 015	1
6.10	Screw M3x6	550 430 106	2
	Washer M3	551 430 400	2
6.11	Nut banc lock M3	554 030 101	2
6.12	Screw M3x6	550 430 106	2
6.13	Screw M2.5x4	550 425 104	4
6.14	Screw self taping M3x5	554 430 002	4
8.1	Floppy and Printer options	93XX-FDGP	1
8.2	Floppy&Printer Upper cover	UC93X1-FDGP	1

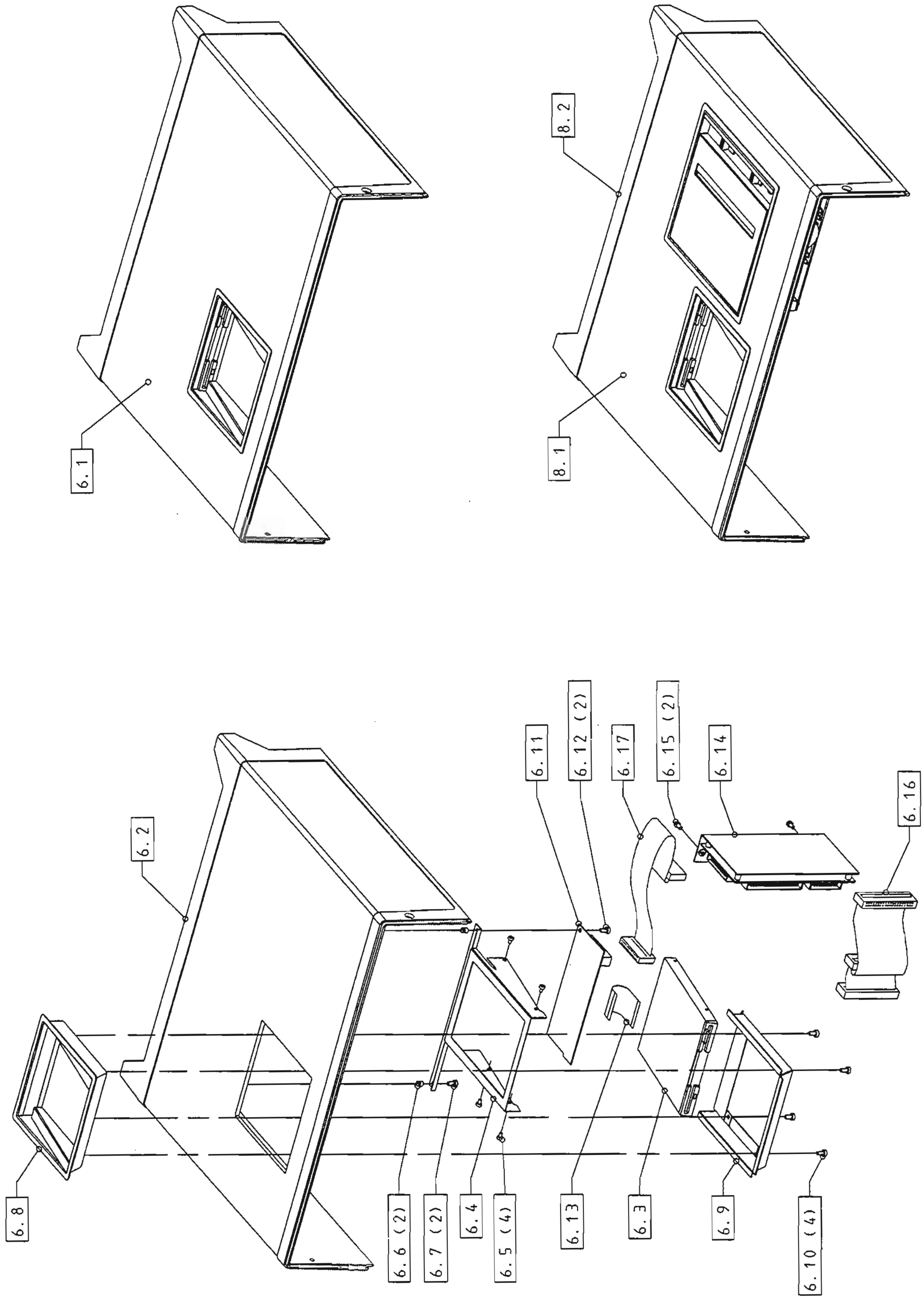


Figure 8.7 : Floppy Drive Assembly Model 0.43 "height

8.6.3	FD01 Floppy Option	Part Description	Quantity per Assembly
6.1	Floppy drive option	93XX-FD01	1
6.2	Upper cover	UC93X1-FD01	1
6.3	Floppy drive	330 000 002	1
6.4	Support	70FD01091	1
6.5	Screw M2.5X4	550 425 104	4
6.6	Nut banc lock M3	554 030 101	2
6.7	Screw M3x6	550 430 106	1
6.8	Cup	CUP-FD01-1	1
6.9	Frame	70FD01031	1
6.10	Screw self taping M3x5	554 430 002	4
6.11	Transfer PCB	F9301-6	1
6.12	Screw M3x6	550 430 106	2
6.13	Flat cable 26 P	780 919 905	1
6.14	Floppy/Printer/Centronics interface	F9300-6	1
6.15	Screw M3x6	550 430 106	2
	Washer M3	551 430 400	2
6.16	Flat cable 40 P	780 801 015	1
6.17	Flat cable 26 P	780 901 624	1
8.1	Floppy and Printer options	93XX-FDGP	1
8.2	Floppy&Printer Upper cover	UC93X1-FDGP	1

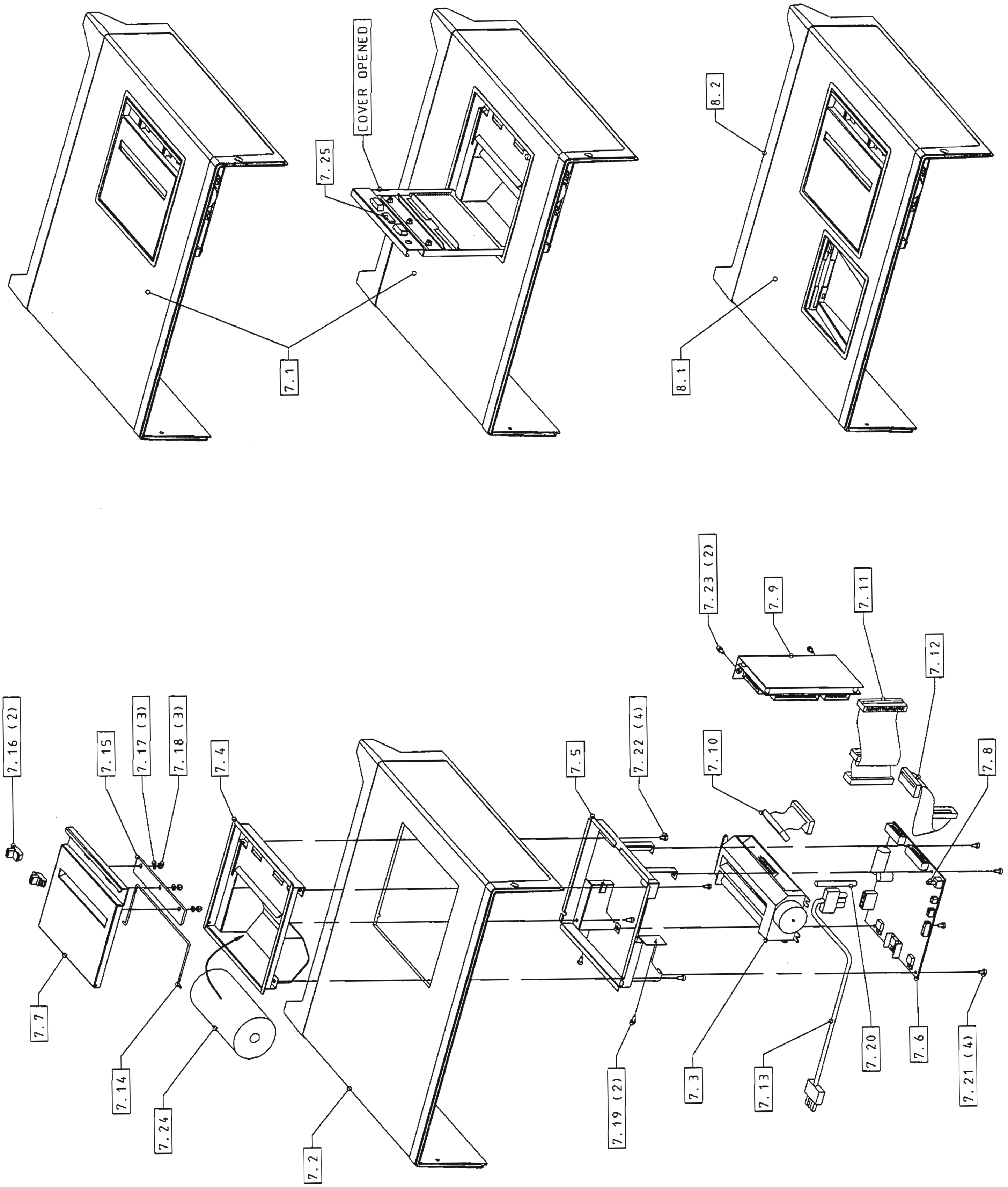


Figure 8.8 : GP01 Printer Option

8.7.1	GP01 Printer Option	Part Description	Quantity per Assembly
7.1	Graphic printer option	93XX-GP01	1
7.2	Upper cover	UC93X1-GP01	1
7.3	Graphic printer	334 000 832	1
7.4	Box	BOX-GP01	1
7.5	Frame	70GP01031	1
7.6	Printer interface card	F9300-7	1
7.7	Cover	COVER-GP01	1
7.8	Switch push button	709 450 523	1
7.9	Floppy/Printer/Cent interface	F9300-6	1
7.10	Flat cable 26 P	780 791 604	1
7.11	Flat cable 40 P	780 801 015	1
7.12	Flat cable 20 P	780 721 022	1
7.13	Power supply cable	780 210 030	1 not used
7.14	Cover Axle	70GP01041	1
7.15	Cutter	70GP01051	1
7.16	Slide latch	530 040 005	2
7.17	Flat washer M3	551 430 100	3
7.18	Nut acorn M3	552 430 300	3
7.19	Screw self taping M3x5	554 430 002	2
7.20	Push switch extender	70GP01061	1
7.21	Screw M3x6	550 430 106	4
	Washer M3	551 430 400	4
7.22	Screw M3x5	554 430 002	4
7.23	Screw M3x6	550 430 106	2
	Washer M3	551 430 400	2
7.24	Thermal paper roll	344 000 042	1
7.25	Auto adhesive rubber band		1
8.1	Floppy and Printer options	93XX-FDGP	1
8.2	Floppy&Printer Upper cover	UC93X1-FDGP	1

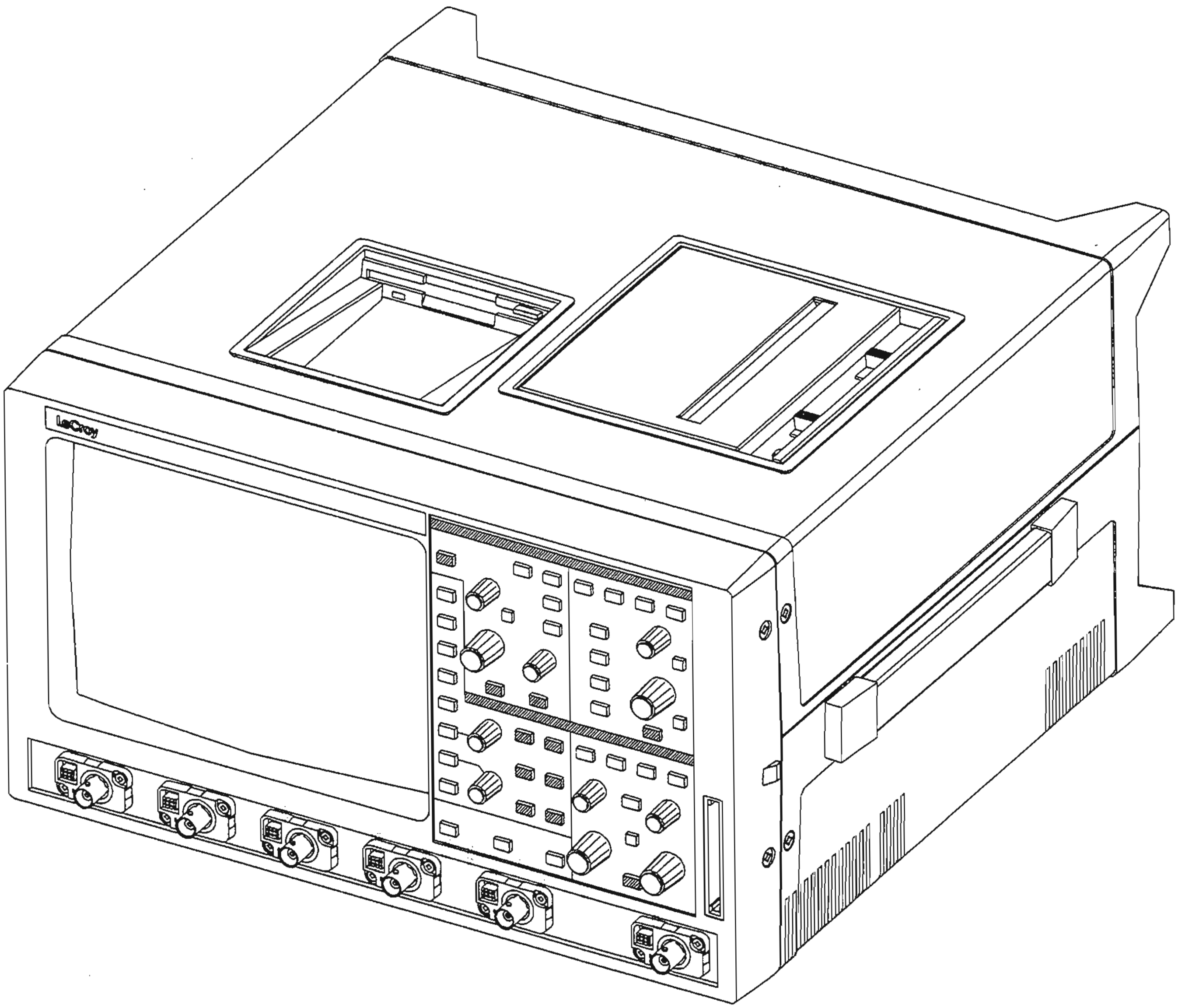


Figure 8.9 : 9374/M/L/TM DSO Front View

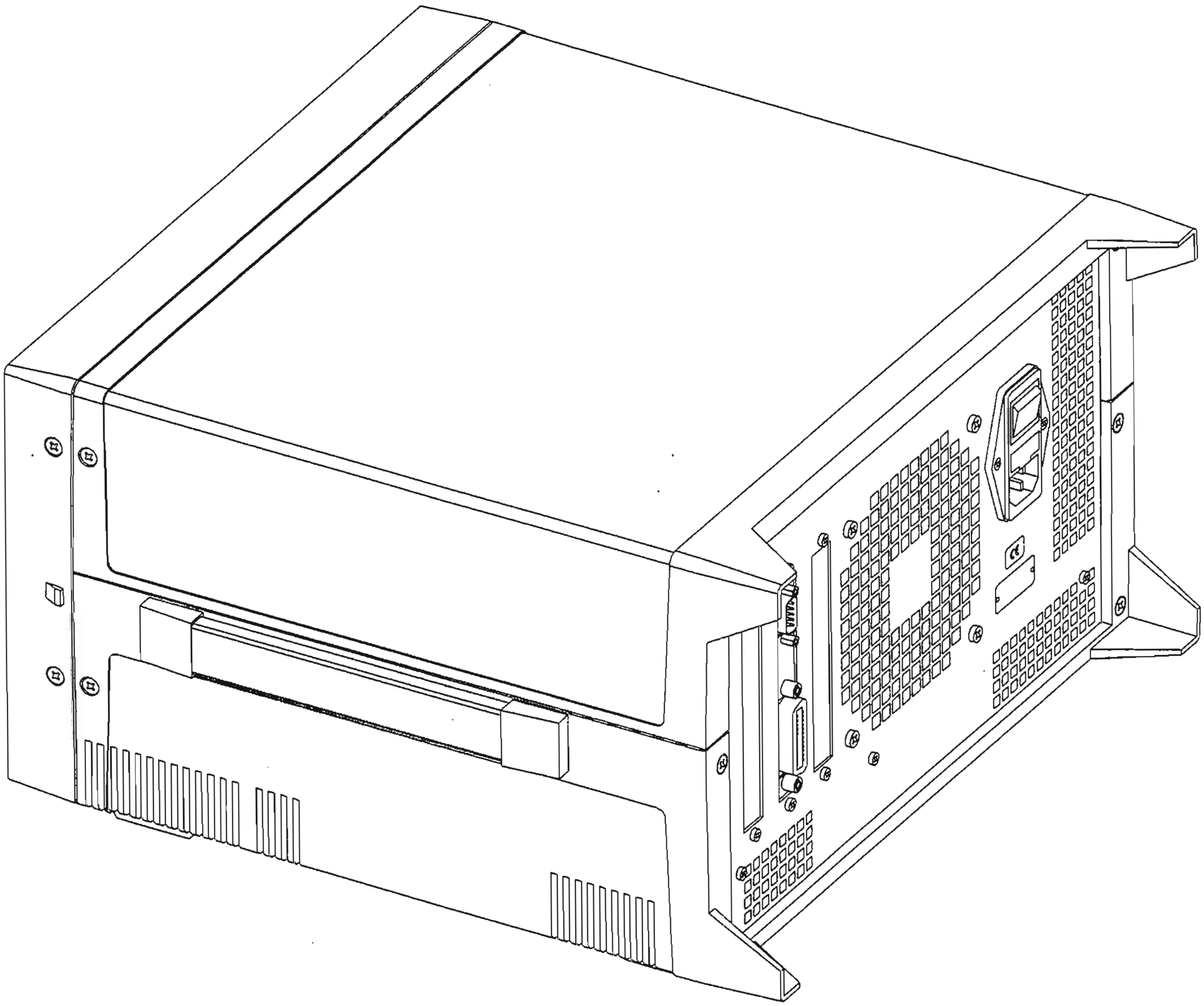


Figure 8.10 : 9374/M/L/TM DSO Rear View

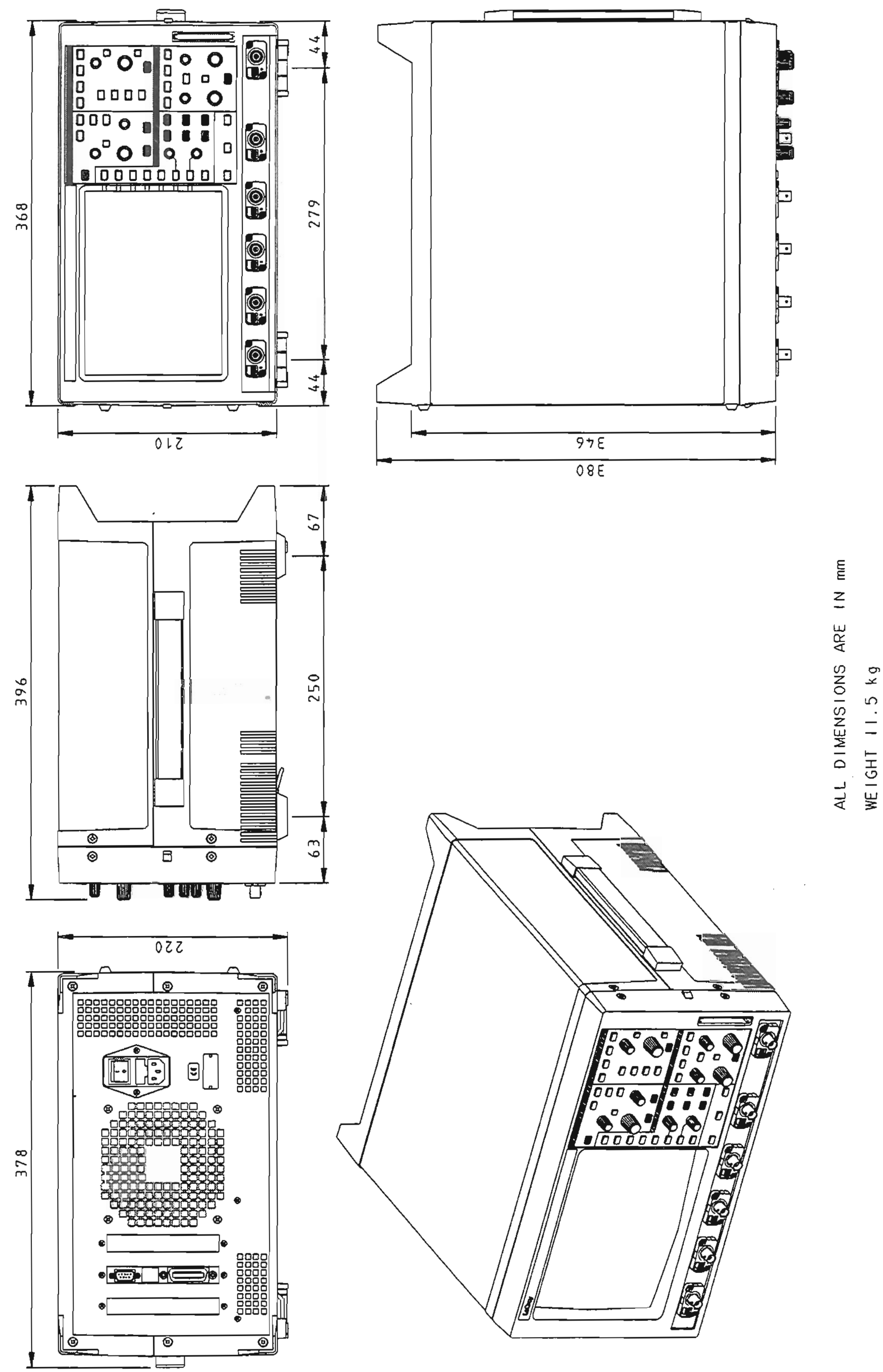


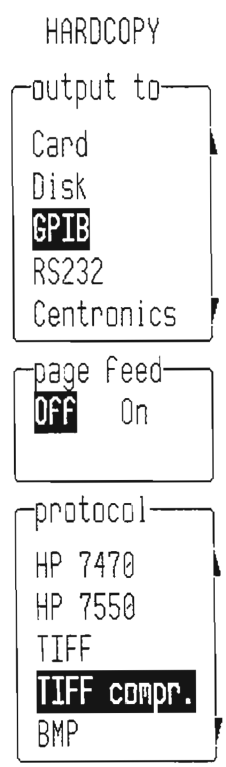
Figure 8.11 : 9374/M/L/TM DSO Dimensions

SECTION 9 CONNECTING the 9374/M/L/TM to a PLOTTER or a PRINTER

9.1 Introduction

LeCroy oscilloscopes are supplied with a list of plotters and printers known to work with them.
This list is not final, so any suggestions are welcome.

HP plotter responses to some RS-232 configuration commands have been evolved. Consequently, the 9374/M/L/TM generation DSO support HP plotters of two types, 7470A and 7550A. The only difference lies in the RS-232 initialization codes. They may however, despite these changes, work with HPGL compatible plotters from other manufacturers. If the HPGL data is used as input for a CAD or word processing system, it might be necessary to remove the data preceding the in command. Before connecting a plotter to a 9374/M/L/TM, do not forget to select the appropriate settings in the printer setup menu and the GPIB & RS-232 setup menu.



RS-232 connection

The following settings are assumed for the scope.

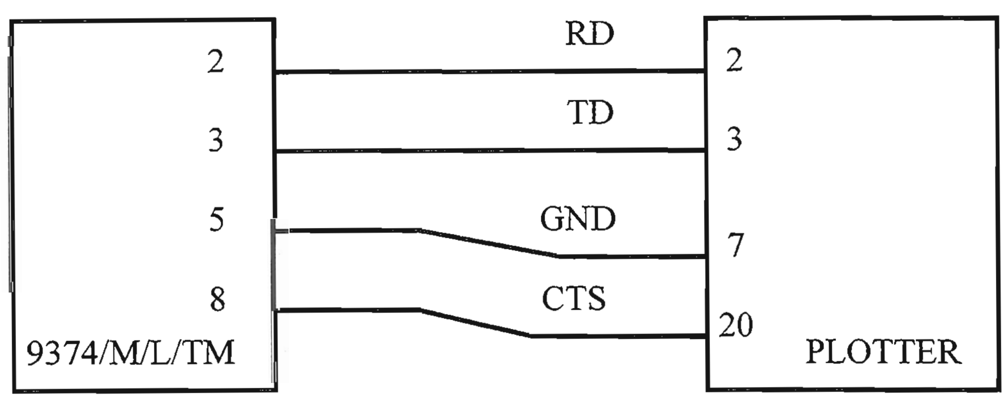
Baud rate	:	9600
Character	:	8 bits
Parity	:	none
Stop bits	:	1

Any exceptions will be mentioned.

RS 232 interface

Pin	1	:	DCD
	2	:	RD
	3	:	TD
	4	:	DTR
	5	:	GND
	6	:	DSR
	7	:	RTS
	8	:	CTS
	9	:	RI

A cable with the following pinout can be used in almost every case:



The cable has D25 connector with male pins on the plotter side, and a D9 connector with female pins on the 9374/M/L/TM oscilloscope side.

GPIB Connection

To have a plot done through GPIB initiated with the front panel screen dump push button, you must set the 9374/M/L/TM in talk only mode by selecting remote control from RS-232, and the plotter in listen only mode.
If a computer controls the GPIB Bus, both the scope and the plotter must be set in addressed mode (remote control from GPIB).
Remark: the listen only mode does not work on some old HP plotters such as HP7585B or HP7475. The plotter must be set to listener before being able to receive any commands, which is a violation of the GPIB standard.

9.2 Plotters

9.2.1 HP 7470A Plotter

Switch settings:

- RS-232 Connection:
  S1 and S2 : 0 0
  Y/D : D
  A4/US : User selectable
  B4 to B1 : 1 0 1 0

- GPIB listen only:
  A4/US : User selectable
  16 to 1 : 1 1 1 1 1

- GPIB Addressed:
  A4/US : User selectable
  16 to 1 : 0 0 1 1 1

9.2.2 HP 7550A Plotter

Responses to some ESC characters commands are not the same in this plotter as in older HP models like the 7470A. In fact, ESC sequences of commands which give excellent results in the 7470A can prevent any handshake in RS-232.
Problems of this kind have been reported in the case of ESC.R and ESC.@ commands. When combined with ESC.I and ESC.N, ESC.@ breaks up all handshakes.

RS-232 configuration:

- Enter into display 5 (HP-IB MONITOR...).
- Select STANDARD OF STANDARD/ENHANCED.
- Enter into SERIAL sub-menu (display 6)
- For DATA_FLOW, select REMOTE. Either STANDALONE or EAVESDROP may be chosen.
- Enter into display 7 (DUPLEX, PARITY, BAUD).
- Select FULL duplex.
- Configuration PARITY and BAUD rate to the same values as on the DSO.

A standard cable may be used.
Do not start a plot while a sheet of paper is being loaded!

GPIB configuration:

If the scope is in TALK ONLY, the plotter must be in LISTEN ONLY.
Selection will be done at display 5.

Note : Its seems that the plotter must be powered off, then on again, to take any configuration change into account.

9.2.3 Hitachi 672 Graph Plotter (or NSA 672)

As this plotter is compatible with the 7470A, select this mode on the plotter menu page. Switch settings

- RS-232 Connection:

Sw. A, 1 and 2	:	1 1 (ISO A3) or (ISO A4).
Sw. A, 3 to 8	:	1 0 1 1 0 1
Sw. B	:	1 1 1 1

Note : When switches are set to ISO A4, the pen must be manually repositioned at the top of the page (or plotter reset by powering it off and on) before loading a new sheet of paper.

9.3 Printers

Interfacing is possible through RS-232, GPIB directly, and in option through Centronics. The parallel interface F9300-6 (Centronics) is an option, see section 4.5.

9.3.1 Centronics Printers

Most printers use a Centronics parallel connection which makes direct connection possible if the 9374/M/L/TM is equipped with the optional Centronics interface F9300-6 board. If the printer has a Centronics connector then it's a parallel printer, and the F9300-6 board is required or a serial to parallel converter.

If a serial to parallel converter is used, in the printer setup menu select device type Epson, and remote control from RS-232.

RS-232 Remote control port settings:

Baud rate	: 9600 or 19200
Characters length (bits)	: 8
Parity	: none
Number of stop bits	: 1

The following printers and printer switch positions have been tested via serial to parallel adapter.

	Switch 1	Switch 2
1. Epson LQ-1000	1, 2, 3, 4 : ON	2, 6, 7 : ON
2. Diconix 150P	1: ON	2, 6, 7 : ON
3. HP-ThinkJet 2225C	2, 4, 5 : ON	
4. HP-DeskJet 550 C	all down	6 up for 19200 bauds

Note: all Epson and Epson Compatible printers are likely to work if the switches are set properly, (Some experimentation may be required).

Some available serial to parallel converters need power through the RS-232 lines. Do not use them, as we do not guarantee that the serial port is able to furnish enough power.

9.3.2 RS-232 Printers

9.3.2.1 Epson FX80

It is possible to use the standard RS-232 cable. Such a printer has the optional RS-232 interface " #8143 " installed. The configuration that follows is valid for the default scope setting. The standard cable is usable.

In the particular case of an FX850:

- the main switches SW1 SW2 remain at the factory configuration

SW1	:	1	2	3	4	5	6	7	8
		OFF	OFF	ON	OFF	OFF	ON	ON	ON

SW2	:	1	2	3	4
		ON	OFF	OFF	OFF

- the 8143 switches are set to:

1	2	3	4	5	6	7	8
ON	OFF	OFF	OFF	n/a	OFF	OFF	ON

- the 8143 jumpers remain at the factory settings:

J1	J2	J3	J4	J5	JC	JNOR	JRVE	JF	JX
OFF	OFF	OFF	OFF	ON	OFF	ON	OFF	ON	OFF

Note: Epson printers only support XON/XOFF support handshake if they have a print buffer. Such printer are : FX, FX+, JX-80, LQ-800/1000, EX-800 and LQ-25000. Otherwise, use DTR/RTS handshake.

9.3.2.2 Citizen 120D

To use this printer with the default RS-232 setting and default printer setting of the 9374/M/L/TM, select the following switch configuration:
DIP switch bank 1 : all OFF except 3 and 8, DIP switch bank 2 : all OFF.

9.3.2.3 HP LaserJet

Make sure that page feed is ON in the plotter menu to use the LaserJet. It is advisable to start out in single density with a size of A5. Then, depending upon the internal buffer size on the LaserJet, the image size and/or density can be increased. At one point, the internal buffer size of the DSO is also reached. The image is simply truncated, indicating that either density or size have to be reduced.

9.3.2.4 HP QuietJet

9.3.2.5 HP ThinkJet

To use printer with the default RS-232 setting and with the default cable select the following switch configuration:

- mode switch:

1 2 3 4		5 6 7 8
0 0 0 0	: 11" page length	0 0 0 0
1	: 12" page length	

- RS-232 switch:

1	2 3	4 5
1	0 0	0 0
(use DTR handshake)	(8bits, parity none)	(9600 bauds)

Note : it may be possible that old ThinkJet recognize only the Epson protocol. If it is the case use the Epson.

9.3.2.6 HP DeskJet 550C

The standard cable is usable. The printer has been tested at 19200 bauds with the following configuration :

Switch 1 or Bank A : all down

Switch 2 or Bank B : 6 up for 19200 bauds, all the other down

9.3.2.7 Brother Printers

The Brother M-1509 and M-1709 have been tested with a serial connection. On the oscilloscope select "Epson FX-80 or compatible printer".

The switch settings are identical for both the printers:

		1	2	3	4	5	6	7	8
- SW1	:	ON	ON	ON	OFF	ON	n/a	n/a	ON

		1	2	3	4	5	6	7	8
- SW1	:	←		ALL OFF			→		

		1	2	3	4	5	6	7	8
- SW1	:	OFF	OFF	OFF	OFF	11" : OFF 12" : ON	OFF	ON	OFF

9.3.3 GPIB Printers

9.3.3.1 HP QuietJet

Make sure the dip switches on the backplane of the printer are set to

- SRQ enable:	0
- GPIB listen only:	
Listen always:	1
A5 to A1:	0 0 1 1 1
- GPIB Addressed:	
Listen always:	0
A5 to A1:	0 0 1 1 1

9.3.3.2 HP ThinkJet (HP 2225A)

Make sure the dip switches on the backplane of the printer are set to

- SRQ Enable:	0
- GPIB listen only:	
Listen always	1
A5 to A1:	0 0 1 1 1
- GPIB Addressed:	
Listen always:	0
A5 to A1:	0 0 1 1 1

9.3.3.3 HP PaintJet (black/white only)

Make sure the dip switches near the GPIB connector are set to:

- GPIB Listen only:	
NORM/SCS:	NORM
A3 to A1:	1 1 1
PC8/ROM8:	N/A
ENG/MET:	has to match paper size ENG = 11" MET = 12"
- GPIB addressed:	
NORM/SCS:	NORM
A3 to A1:	any combination except 1 1 1 (correspond to add. 0-6)
PC8/ROM8:	N/A
ENG/MET:	has to match paper size ENG = 11" MET = 12"

9.4 Information on GPIB

9.4.1 Introduction

This section is a simple description of the GPIB interface as an aid to understanding the interface in the 9374/M/L/TM DSO: it is not intended as a complete specification of the system.

The GPIB system is designed for the interaction of a number of devices, which may transmit or receive information as required. The system includes data lines over which the actual data are sent, bus management lines for control, and handshake lines to ensure correct acceptance of data at the right destination. The main features of the bus are summarized below:

Maximum number of devices	15
Maximum bus length	20 meters or 2 meters per device, whichever is less.
Connection	star or chain

Note that more than half of any connected devices must be powered up, even if they will not be used.

Data lines	8 DIO	1 to 8
Handshake lines	DAV	Data available
	NRFD	Not ready for data
	NDAC	not data accepted
Bus management lines	EOI	End or identity
	IFC	Interface clear
	SRQ	Service request
	ATN	Attention
	REN	Remote enable
Active level	+0.4 V	
Inactive level	+3,3 V	

Note that all signal lines are active low, and that they are wire 0Red to allow participation by all devices.
In addition, there are 8 ground lines, making a total of 24 lines.

9.4.2 Functions in the GPIB

In order to allow satisfactory interconnection of several devices the following functions must be provided

- Enabling any device to transmit data
- Preventing any device from transmitting data
- Enabling any device to receive data

- Preventing any device to receive data
- Transmitting data to a specific device
- Ensuring that only one device is transmitting
- Ensuring that transmitting takes place only when reception is possible
- Enabling any device to request servicing
- Identify type of data to be sent

Any device can be activated into the "talk" or "listen" state, and can be deactivated by the commands "untalk" and "unlisten". Also a device can be a "controller".

Maximum number of current talkers	1
Maximum number of current listeners	14
Maximum number of current controllers	1

Function of bus lines:

- DAV Data available; talker says the data on the line are valid.

- NRFD Not ready for data; listener says it is not ready for more data. All listeners must release the NRFD line, i.e., let it go high, before talker can send.

- NDAC Not data accepted; listener says it has not yet accepted the data. Talker must hold all data lines steady until all listeners have released this line, i.e., it goes high.

Clearly, the NRFD and NDAC are easy to implement by a wired OR system, so that any one device asserting the signal prevents progress to the next step. Progress is made at the speed of the slowest listener. A simple timing diagram is given in figure 9.1.

The bus management lines functions as follows:

- EOI End Or Identify; talker sends this with last byte of a block transfer to indicate last byte. Also used with ATN to parallel poll devices for their status bit.

- IFC InterFace Clear; places the GPIB system into a quiescent state.

- SRQ Service ReQuest; any device can send it to the controller to indicate need for attention, and to request interruption of current operations.

- ATN ATeNtion; controller sends this to specify whether DIO lines are to be used for interface messages, e.g., addressing, or for data.

- REN Remote ENable; selects a device as being under local or remote control.

Addressing of the devices on the GPIB bus consult a specialized GPIB-IEEE488 document.

The principles of GPIB are quite simple - the system must wait for all users, and lines are wire ORed so that all can pull the lines down. The handshake sequence is illustrated in two ways. In figure 9.1 the signal waveforms are sketched.

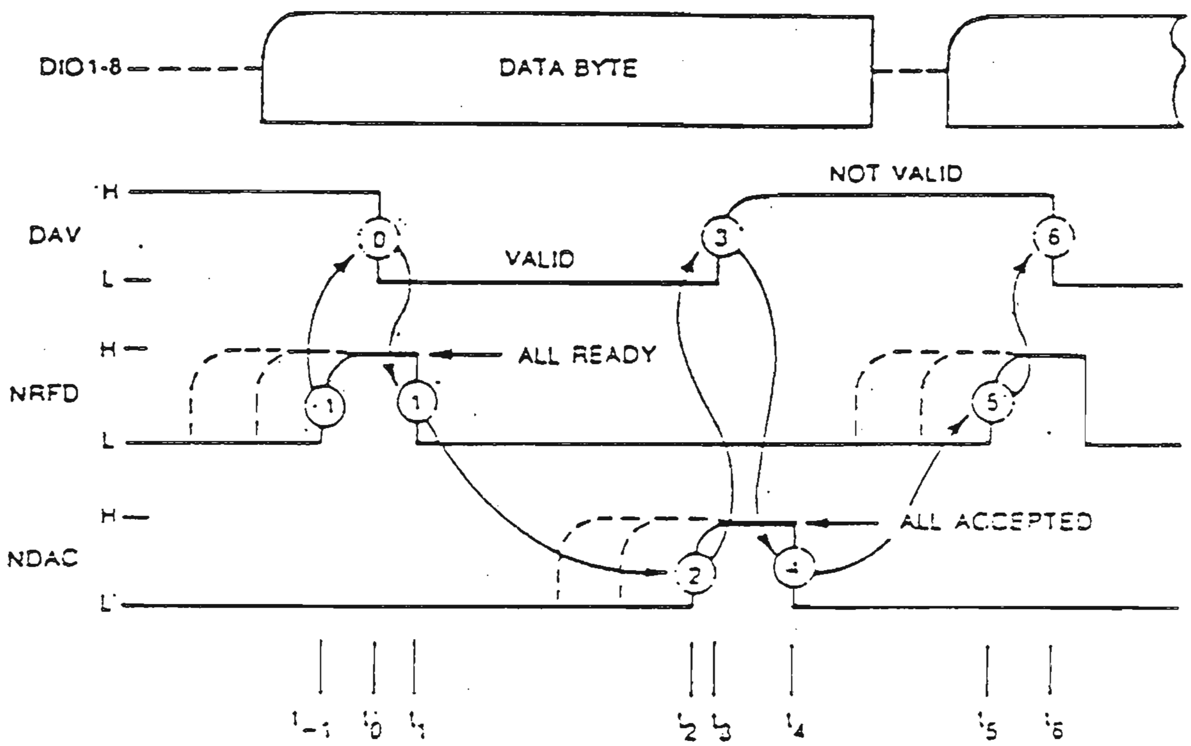


Figure 9.1 : DATA BYTE TRANSFER IN GPIB IEEE-488

The handshake timing sequence proceeds as follows:

Preliminary	The source checks for presence of listeners and places the next data byte on the data lines DI01-8.
t-1	Acceptors one by one become ready for byte. Last one allows NRFD to go high.
t0	Sources pulls down DAV to validate data.
t1	The first litener to accept the data pulls down NRFD to show it is no longer ready for a new byte.
t2	The listeners one by one accept the data, and the last one lets NDAC go high.
t3	The source sets DAV high to show this byte is no longer valid.
t4	The listeners one by one accept this, the first one pulling NDAC low for the next cycle.
t5	As for t-1.

LeCroy