DOE/NASA CONTRACTOR REPORT

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SYSTEM DESIGN AND INSTALLATION FOR RS600 PROGRAMMABLE CONTROL SYSTEM FOR SOLAR HEATING AND COOLING

Prepared by

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11922 Valerio Street
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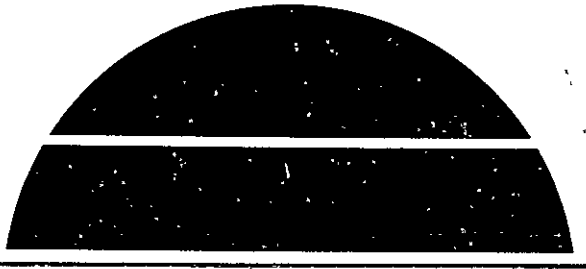
Under Contract NAS8-32256 with

National Aeronautics and Space Administration
George C. Marshall Space Flight Center, Alabama 35812

for the U. S. Department of Energy



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Solar Energy

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16. ABSTRACT

This document contains the installation, operation and maintenance manual, the system design drawings, installation drawings and the system design data brochure. It provides detailed information necessary for the building/purchase and installation of the RS600 Programmable Control System for solar heating, combined heating and cooling and/or hot water systems.

Included are such items as general specifications, user configuration and options, displays, theory of operation, trouble-shooting procedures, parts lists, drawings, diagrams, wiring lists and warranty and assistance.

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	Unclassified-Unlimited William A. Brooksbank, Jr. WILLIAM A. BROOKSBANK, JR. Manager, Solar Heating and Cooling Project Ofc

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SECTION A

INSTALLATION, OPERATION AND MAINTENANCE MANUAL

RS 600

PROGRAMMABLE CONTROL SYSTEM

WARRANTY AND ASSISTANCE

Unless otherwise stated Rho Sigma, Inc. warrants its products to be free from defects in material and workmanship and to perform in accordance with applicable specifications for one year from date of shipment.

Rho Sigma, Inc. will provide free factory service, including parts, labor and transportation back to the customer for any malfunction of its products which, upon authorization from Rho Sigma, are returned to the factory transportation charges prepaid. A complete description of the reason for return must accompany the unit. A nominal handling charge will be made on units for which a rejection is not verified.

Service contracts and customer assistance are available for Rho Sigma products that require on-site repair or maintenance. Unless otherwise arranged, customer pays all transportation and labor costs for on-site repair performed 31 days or more after initial system delivery. For repair assistance, contact Rho Sigma directly or any of our sales representatives.

This warranty is void if the product is subjected to misuse, neglect, accident, or improper installation or application.

CAUTION

Always turn power "off" on the RS600 PCS before inserting or removing a card or component. Never force anything, use a screwdriver or other dull instrument to remove an I. C. from the socket.

SECTION A

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LIST OF ILLUSTRATIONS

1.0 SPECIFICATIONS

1.1 Introduction

The RS 600 Programmable Control System (PCS) is a highly versatile, programmable controller. The RS 600 accepts inputs from a wide variety of sensors and coverts them to engineering units. Control equations, customer designated, are then solved and the appropriate outputs occur. Typical of the equations are those used in a solar heating system which include: differential temperature measurement to turn the appropriate pumps on, turning back-up systems on when solar is not enough and off-peak control for back-up systems.

The RS 600 Programmable Control System utilizes a Fairchild F8 microprocessor to perform all timing, control and calculation functions. The microprocessor follows a program which is stored on plug-in, UV erasable prom's. These prom's are changed to customize the system's performance for individual control requirements.

1.2 General Specifications

The following specifications apply in general to all RS 600's. However, the exact specifications for any unit may vary depending upon the amount of customizing or options ordered. Check Section 1.3 for User Options and Specifications.

1.2.1 Analog Inputs

Eight single ended analog input channels, expandable to 16. Reed relay analog matrix for best noise and isolation. The inputs are used for thermistor, pyranometer, flowmeters and switched inputs. Conversion rate is 8 channels/2 sec. or every channel once every .25 seconds.

1.2.1.1 Thermistor Inputs

Optional Thermistor circuit card provides reference resistors for 10,000 ohm thermistors. Standard thermistor output linearized over a range of -40°F to +300°F. Each thermistor circuit card contains 8 thermistor reference resistors and a 1.7vdc reference supply. Power supply drift is 0.02%°C max. Linearization error is ± 1.0°F.

1.0 SPECIFICATIONS - Continued

1.2.1.2 Analog Flowmeter Input

The analog input can accomodate an input from an analog flowmeter where 0-2vdc is representative of the flow.

1.2.1.3 Isolation

The analog inputs can directly accomodate a solar cell type pyranometer input and with an optional amplifier can also handle a thermopile type pyranometer.

1.2.1.4 Switch Closures

The analog inputs can be utilized to handle a switch closure input. To debounce the switch, its input will be scanned twice separated by 200 milsec.

1.2.2 Logic Level Inputs

Eight TTL compatible inputs expandable to 16. Logic '0' is 0+0.5vdc @ 1.6ma or a contact closure of less than 300 ohms. Logic '1' is +2.4 to +5vdc or an open circuit. Debounce be requiring 2 consecutive inputs .3 sec apart to act upon new condition. A pulse type flowmeter can also be inputed to these inputs, provided its rate is less than 240 pulses per minute.

1.2.3 Outputs

There are sixteen relay driver type outputs available internally to the PCS. These outputs can drive either solid state or contact relays to provide sixteen different control functions. The types of relays used will depend upon the customer's system requirements.

1.2.3.1 Solid State Relays

Optical coupled solid state switches are available as control outputs. They can be used to run pumps, fans, and control valves. Outputs can also be proportionally controlled. The output is 120VAC at 10 amps.

1.0 SPECIFICATIONS - Continued

1.2.3.2 Contact Relays

Contact relays are available as controlled outputs. The type used (DP/DT, SP/ST,etc.) will depend on the customer's needs.

1.2.4 Controls

RS 600 controls include an inner panel power switch and an optional front panel keyboard and a keyboard protect keyswitch.

1.2.5 Display (Optional)

Multifunction display, uses large, 0.6 inch high, broad stroke LED's for good visibility at 25 feet. For each input channel, the display shows the two digit channel number, preceeded by the channel designator, [. The sequential display is the value of the channel in engineering units. The display also used for date entering and to show time and date functions. The display shows flashing time display after a power loss.

1.2.6 Internal Clock

Internal calendar clock operates for a 365 day year. User sets clock from
switch at power turn-on or time can also be set from keyboard.

1.2.7 Physical

The PCS Enclosure is 20" wide x 10" deep x 30" high. Four mounting holes are on rear plane for wall mounting.

1.2.8 Environment

Operating temperature	0 to +50°C
Storage temperature	-20 to +70°C
Humidity (no condensation)	0 to 95% RH
Shock	normal handling
Vibration	normal handling

1.2.9 Power

115VAC ± 10%, 60±3Hz,100 watts nominal.

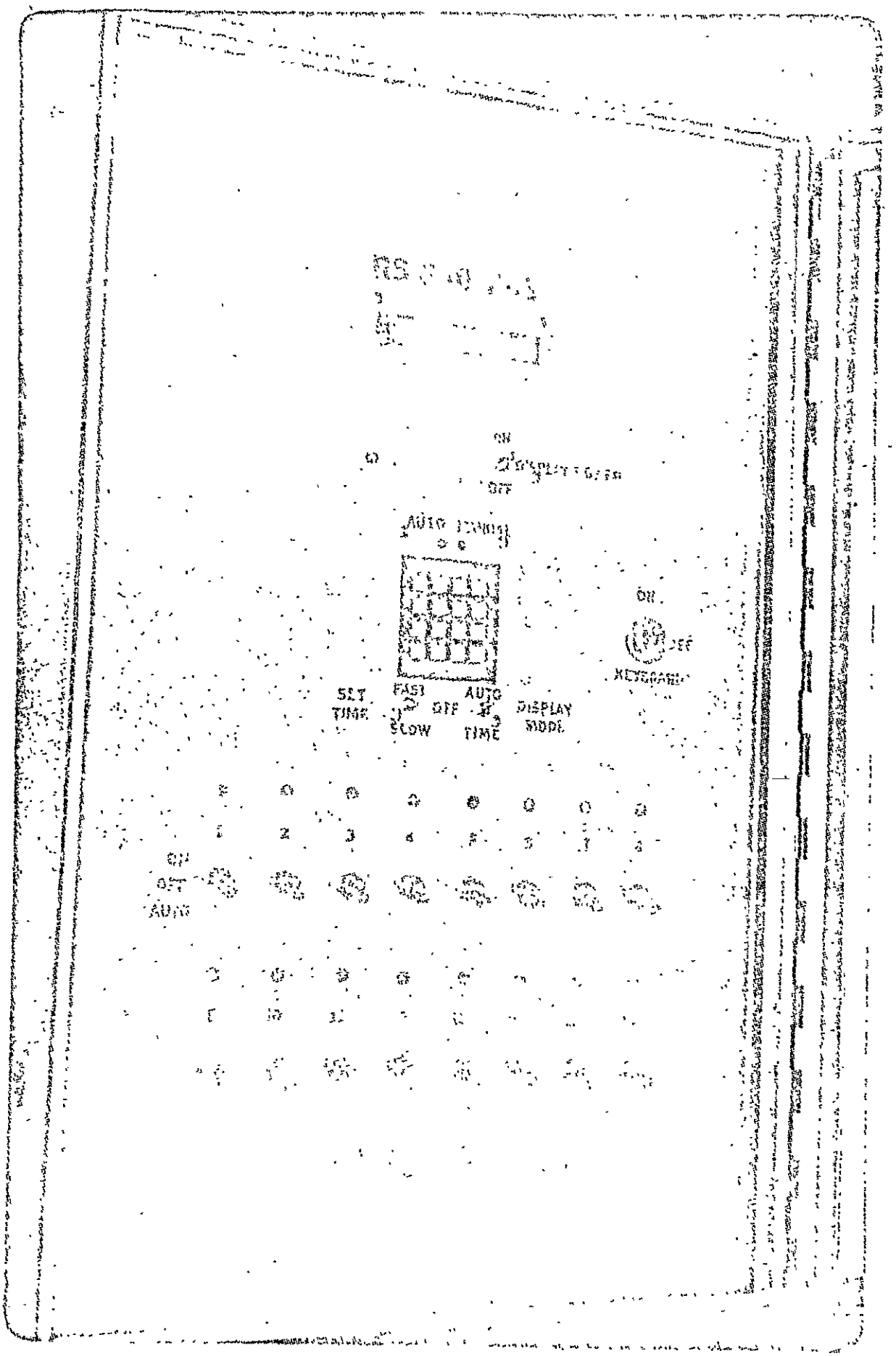

Figure 1.1
RS 600 Programmable Control System

1.0 SPECIFICATIONS - Continued

1.3 User Configuration and Options

1.3.1 Inputs

Channel	Type	Ref. Designation	Remarks
00	01	T1	Temp Hot Tank
01		T2	Collector
02		T3	Cold Tank
03		T4	Dom. Hot Water
04		T5	Pool
05		T6	Ref.
06		T7	Spare
16		S1	Themostat Heat
17		S2	Switch Summer/Wint
18	01	S3	Themostat -Cool

1.3.2 Outputs

Channel	Type	Ref. Designation	Remarks
33	01	HCR	115 VAC
34		CCR	115 VAC
35		DWR	Contacts
36		PHR	"
37		HDR	"
38		HDB	"
39		BCR	"
40		CDR	"
41	01	BCRS	"

1.3.3 Constants

Channel	Type	Ref. Designation	Value
64	02	1K2	2°F
65		1K10	10°F
66		2K1	1°F
67		2K3	3°F
68		3K1	1°F
69		3K3	3°F
70		4K1	1°F
71		4K4	4°F
72		4K100	100°F
73		5K100	100°F
74	02	6K100	100°F
75	05	7K1	0800 (Time)
76	05	7K8	0800 (Time)
77	02	7K40	40°F
78	02	7K65	65°F
79	02	8K65	65°F
80	02	9K175	175°F
81	02	9K45	45°F

1.0 SPECIFICATIONS - Continued

1.3.4 Input Connections

RS 600 input terminal board S/N 0001 thru 0003
Date 8/27/77

TB1	CH	
1	00	T1
2	01	T1
3	02	T2
4	03	T2
5	04	T3
6	05	T3
7	06	T4
8	07	T4
9	08	T5
10	09	T5
11	10	T6
12	11	T6

TB6	
1	115VAC Black
2	115VAC Ret. White
3	Chassis GRD.
4	

TB2	CH	
1	12	Spare
2	13	"
3	14	"
4	15	"
5	16	"
6	17	"
7	18	"
8	19	"
9	20	"
10	21	"
11	22	"
12	23	"

TB3	CH	
1		S1 GND
2	16	S1 COM
3		S2 GND
4	17	S2 COM
5		S3 GND
6	18	S3 COM
7		Spare
8		"
9		"
10		"

1.0 SPECIFICATIONS - Continued

1.3.5 Output Connections

TB4		CH	Ref. Designation
1	115VAC	33	HCR
2			
3			
4	115VAC	34	CCR
5			
6			
7	K1-NC		
8	K1-C	35	PWR
9	K1-NO		
10	K2-NC		
11	K2-C	36	PHR
12	K2-NO		
13	K3-NC		
14	K3-C		
		37	HDR
TB5			
1	K3-NO		
2	K4-NC		
3	K4-C	38	HDB
4	K4-NO		
5	K5-NC		
6	K5-C	39	BCR
7	K5-NO		
8	K6-NC		
9	K6-C	40	CDR
10	K6-NO		
11	K7-NC		
12	K7-C	41	BCRS
13	K7-NO		

1.3.6 Control Equations

1.3.6.1 Heat Collection: Pump will turn on when collector temperature (T2) is 10°F greater than the hot tank temperature (T1). The turn off is at a ΔT of 2°F.

$HCR = (T2 - T1) \geq 10°F$

$\overline{HCR} = (T2 - T1) \leq 2°F$

Out 32 = out 32.and.(IN01-IN00.GE.1K2).
or .(IN01-IN00.GE.1K10)

1.0 SPECIFICATIONS - Continued

1.3.6.2 Nocturnal Radiation Pump will turn on at a ΔT of 3°F and off at a ΔT of 1°F between the cold tank and collector.

$CCR = (T3 - T2) \geq 3°F$

$\overline{CCR} = (T3 - T2) \leq 1°F$

Out 33 = out 33.and.(IN0 -IN0 .GE.2K1).
or.(IN02-IN01.GE.2K3)

1.3.6.3 Solar-Domestic Hot Water: Turn circulator pump to heat exchanger on a ΔT of 3°F and off a ΔT of 1°F between hot water tank and hot tank.

$DWR = (T1 - T4) \geq 3°F$

$\overline{DWR} = (T1 - T4) \leq 1°F$

Out 34 = out 34.and.(IN0 -IN03.GE.3K1).
or.(IN00-IN03.GE.3K3)

1.3.6.4 Solar-Swimming Pool - Open valve to heat exchanger when ΔT between pool and hot tank is 4°F and off when ΔT is 1°F. Also, heat will not be extracted for the pool if the hot tank is below 100°F or the pool is above the reference temp. that is settable from an inner panel potentiometer.

$PHR = [(T1 - T5) \geq 4°F]\ T1 > 100°F\ [T5 < T6]$

$\overline{PHR} = (T1 - T5) \leq 1°F$ and $T5 \leq T6$

Out 35 = out 35.and.(IN00-IN04.GE.41.1).
and. (IN014 .LE. IN015).
or.(IN00-IN0 .GE.4K4).and.(IN00.GE.4K100)
and (IN04.LE.IN05).

1.3.6.5 Solar-Heat Distribution: The hot tank will be used for heating if heat is required and the H.T. is above 100°F.

$HDR = S1 \cdot (T1 > 100°F)$

Out 36 = IN16.and.(IN00.GT.5K100)

1.0 SPECIFICATIONS - Continued

1.3.6.6 Back-Up Heat-To-Heat Distribution: Turn on back-up supply if the H.T. is less than 100°F.

HDB = S1 . (T1 $\leq$ 100°F)

Out 37 = IN16.and.(IN00.LE.6K100)

1.3.6.7 Back-Up Chiller: Cools cold tank (C.T.) if the C.T. temperature is greater than 65°F, cooling will be needed, and time is not in the peak loading hours. Tank will be cooled to 40°F.

BCR = (T3 $\geq$ 65°F) S2.(0100 $\geq$t$\leq$0800). (T3 $\geq$ 40°F)

Out 38 = (IN02.GE.7K65)OR.OUT38.and. (IN02.GE.7K40).and.IN17.and.

(TIME.GE.7K1.).and.(TIME.LE.7K8).

1.3.6.8 Cool Distribution: Turns on if cold tank is below 65°F and "cool" is required.

CDR = S3 and (T3 $<$ 65°F)

Out 39 - IN18.AND.(IN02.LT.8K65)

1.3.6.9 Back-Up Chiller (Solar Assist): The absorption chiller will use solar if collector temperature is 175°F or greater, the cold tank is above 45°F and cooling will be required.

BCRS = (T2 $\geq$ 175°F) . (T3 $>$ 45°).S2

Out 40 = IN1 .and.(IN01.GE.9K175). and.(IN02.GT.9K45)

2.0 INSTALLATION

2.1 Unpacking

Although the RS 600 PCS is a rugged instrument, care must be exercised to properly package the instrument for shipment to avoid damage in transit. When shipped from the factory, the unit was packaged with sufficient inserts and foam padding to cushion the shock and vibration normally encountered in transit.

2.0 INSTALLATION - Continued

2.1 Unpacking - Continued

When the unit is received, examine the shipping container for evidence of damage. If none found, unpack the unit carefully, watching for signs of damage. If evidence of any damage is found, notify Rho Sigma and the carrier immediately. Rho Sigma will start the necessary repair or replacement process immediately without waiting for the carrier to settle the damage claim.

Verify that the contents match the enclosed shipper and that there are no shortages or over shipments. Compare the serial and model numbers in the front of the manual against those on the nameplate on the rear of the unit. Notify Rho Sigma immediately of any shipping errors or discrepancies. Check all printed circuit cards to be sure they are completely plugged in prior to applying power to the unit.

2.2 Mounting

1. The standard RS 600 PCS is delivered in it NEMA 12 type cabinet and is for wall mounting. The hanging instructions are enclosed in the NEMA cabinet.

2. Connect power cord, cables, sensor inputs and controlled outputs as shown in Figure 1.3.

Although the RS 600 PCS does not require an air conditioned environment, do not place it where it will experience wide temperature changes or undue heat rise.

2.3 Repacking, Returning The Instrument

Notify Rho Sigma prior to returning the instrument to obtain return approval. If the unit is to be shipped by common carrier, it must be packed so that there is a minimum of 2 inches of packing material or space between the unit and the shipping case or carton. Include any cabling and auxiliary devices necessary to recreate the problem to be fixed. Also include your name, phone number, extension and a written description of the problem. This information will assist Rho Sigma in making a prompt and accurate repair of the unit.

2.0 INSTALLATION - Continued

2.4 Power Connections

The RS 600 PCS is designed to operate on 115VAC, 60Hz power. Any deviations from this type of power will damage the unit. To use, connect the supplied power cord to an outlet with an ampere capacity of 20 amps.

2.5 Sensor Input Connections

All sensor input connections are made on terminal strips or connectors mounted on the top of the inner panel. Refer to Section 1.3 for the exact input pin or terminal number designations. Use the following instructions to connect sensors to the PCS.

2.5.1 Thermistors

The PCS uses two wires to measure the resistance of 10K ohm thermistors. On units equipped with terminal strips, connect one side of the thermistor to Terminal 1, the other side of the thermistor to Terminal 2 for the appropriate input channel.

2.5.2 Voltages

Voltage outputs from sensors or other sources may be connected directly to the RS 600. Connect voltages only to those pins specifically designated as voltage inputs in Section 1.3.4. Use shielded lines for voltages less than 100mv full scale or on voltages less than 200mv full scale if the line length exceeds 25 feet. The RS600 can monitor D.C. voltage.

2.5.3 Pulse Inputs (non-isolated)

Pulse inputs from flow sensors, counters, etc., may be connected directly to the RS 600 discrete inputs. All pulse inputs should be as specified in Section 1.2. A series dropping resistor or other technique should be used to reduce the amplitude of pulses greater than +5 volts peak. Pulses with amplitudes less than 2.5 volts should be amplified to assure consistant and accurate readings. Input frequency should not exceed 240 pulses per minute. Connect the positive sensor output line to the RS 600 + Flow

2.5.3 Pulse Inputs (non-isolated) - Continued

inputs, the negative sensor lead to - Flow input or Flow return.

2.5.4 Discrete Inputs

Contacts or voltage levels may be used as the source of discrete input levels for the RS 600 PCS. Controls may be SPDT or SPST type, switching between open and ground. Maximum contact resistance is 300 ohms. Connect arm to contact input, normally open contact to PCS contact common. Voltage inputs are similar to contacts. Input voltage levels should not be more positive than +5VDC or less than -0.5VDC. Shielded leads are not required for the discrete inputs.

2.6 Outputs

All control outputs are made on the terminal strips or connectors mounted on the bottom of the front panel. Refer to Section 1.3 for exact output pin or terminal number designations. Use the following instructions to connect the output controls to the PCS.

2.6.1 Solid State Relay

The output will be 120VAC when on and can be proportional. Connect the device requiring 120VAC control to two terminal designated in Section 1.3.

2.6.2 Contact Relays

The PCS uses double throw contact relays so that the terminals for each relay will be NC-C-NO. Wire the terminals to the appropriate contact in accordance with Section 1.3.

3.0 OPERATION

3.1 Controls

Controls for the RS 600 PCS consists of a keyboard (optional), a time set switch, a display mode switch, a keyboard enabling switch and a display on/off switch (optional). The controls perform the following functions:

3.0 OPERATION

3.1 Controls - Continued

POWER ON/OFF	Front panel toggle switch that applies 115 VAC power to the system.
KEYBOARD ON/OFF	Front panel key switch than enables the RS 600 keyboard when ON. OFF position disables all keyboard inputs.
KEYBOARD	Inner panel keyboard is grouped into two major functions: numeric data and auxiliary functions. The operator uses combinations of the various keys to control the RS600 PCS. Paragraphs 3.1.1 thru 3.1.4 describe the keyboard functions.
SET TIME FAST/SLOW	Switch will advance time in hours and minutes at either a fast or slow rate. Operator activates switch down until correct time is reached and then releases switch.
DISPLAY MODE	Sets the RS 600 display to either a sequential or time display
DISPLAY ON/OFF	Enables the display to function or disables.
OUTPUTS ON/OFF/AUTO	Manual override switch for all outputs. Switch for each channel will either turn the output on or off or place it under computer control (auto).

3.1.1 Numeric Keys

The numeric keys include ten numbers 0 thru 9.

Ten numbered keys that cause their respective number to appear in the active portion of the PCS display.

3.1.2 Auxiliary Functions

The auxiliary function keys are the alpha keys A thru F.

Key	Function	Description
A	Clear/reset	Sets PCS to normal sequence mode.
B	Enter	Causes the RS 600 to execute any display request or store the data entered.
C	Time	Designates the next numeric key as a time category.
D	Channel	Designates the next numeric key as a channel number.
E	Delimiter	Used in "entering data" mode.
F	Clear Entry	Clears last entry mode.

3.1.3 Time Category

C	Time	Designates the next numeric key as a time category. Time categories are: 1. Seconds 2. Hours and Minutes 3. Day of Year 4. Manual Mode (equations not being solved) 5. Auto mode

3.1.4 Keyboard Control Examples

3.1.4.1 Display Time

To display any time parameter press the following keys:

C (TIME) P,B (ENTERED)

└—Time category code, 1 thru 5

3.1.4.2 Time Set

To set a time parameter, press the following keys:

C (TIME), P,ENNNN, B (ENTER)
- P: Time category code, 1 thru 3
- ENNNN: 2 or 4 digits

3.1.4.3 Display a Data Channel

To display an input/output channel or a constant, press the following keys:

D (CHANNEL), NN, B (ENTER)
- NN: 2 digit channel number, 01 thru 99
  - 0 - 31 input channels
  - 32 - 47 output channels
  - 48 - 99 constants

3.1.4.4 Enter Data

To change a constant or set or reset an output:

D (CHANNEL), NN, E(deliminator),XXXX,B(ENTER)
- NN: 2 digit channel number
  - 32 - 47 output channel
  - 48 - 99 constant
- XXXX: Output
  - 0 = reset
  - 200 = set

Constant
0-9999 = positive integers

32768-65536 = negative integers
(65536-N)

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3.0 OPERATION - Continued

3.2 Displays

RS 600 PCS has a multi-function display. The display is used to show time parameters, data channels, data units and to verify operator keyed-in data prior to its entry into the system. The display is continually serviced by a refresh program that updates the display at preset rate. To freeze or hold any value, use the keyboard to enter a display request as shown in 3.1.5.1 or 3.1.5.3. Press A(CLEAR) to resume the prior display operation.

For data, the display shows a two digit channel number, then sequences to a value of XX +.1999. For time, the display shows a two or four digit number with a colon for hours: minutes. Seconds appear as a two digit number.

3.2.1 Display Symbols

The display utilizes symbols to designate the units and type of display shown. The symbols and their description are:

Symbols	Data	Description
C		Channel
□		Temp. (°F or °C)
U		Isolation (BTU)
F		Flow rate-analog input
HI		Input at +5VDC level
LO		Input at GND level
P		Flow rate-D pulse input (GPM)
A		Constant
± d		Time, day of year 0-364
± H		Time, hours:min.
± S		Time, seconds
E		Equation syntax error

3.3 Initialization Procedure

3.3.1 Pre Operation Setup

Connect outputs and inputs to terminal strips per Section 2.5. & 2.6.

3.0 OPERATION - Continued

3.2.2 Operation

Turn on POWER switch. Display should show a flashing display of + H XX:XX. Set internal calendar clock by keying in:

C(TIME) 2,HHMM, B(ENTER) for Time //X hours:minutes

C(TIME) 3,DDD,B(ENTER) for Day of Year

The outputs can be set or reset via the keyboard. Section 3.1.4.4 explains the correct operation.

4.0 THEORY OF OPERATION

4.1 Block diagram Description

Figure 2 is the Block Diagram for the control section of the PCS. The inputs, both analog and discrete are multiplexed onto the common buss. The analog inputs are digitized by the A/D converter. The F8 microprocessor controls the inputs, outputs and all timing functions via the program stored in memory (4K Prom). The memory (1K RAM) is used for temporary storage by the F8. The keyboard communicates to the F8 via the common buss and the display is utilized by the F8 via the common buss.

4.2 Program Concept

A separate manual is available ~~from~~ from Rho Sigma of the complete program stored in the Prom's.

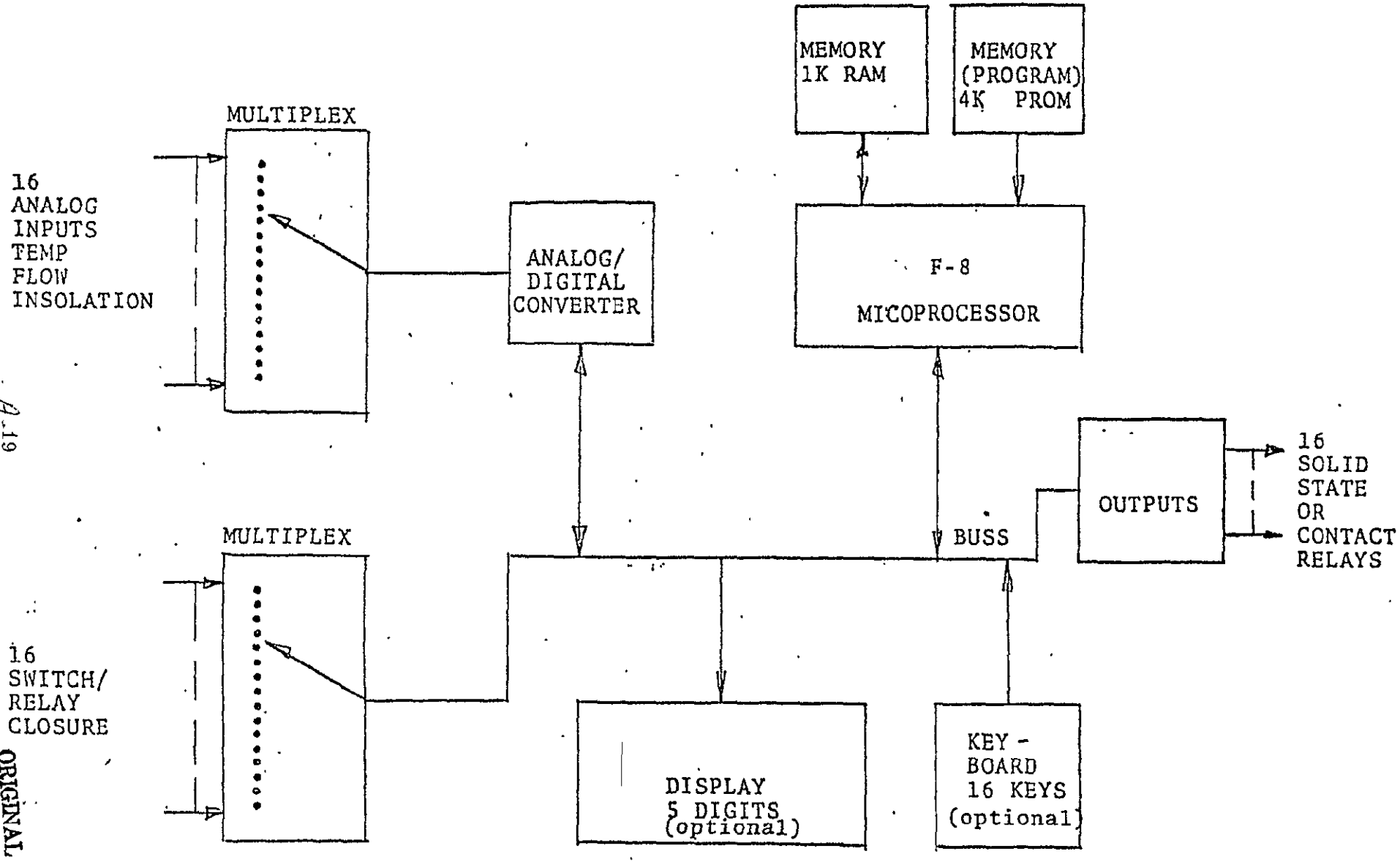

Figure 2.1. PROGRAMMABLE CONTROL SYSTEM

5.0 MAINTENANCE

5.1 Introduction

This section describes the maintenance and troubleshooting procedures for the RS 600 PCS. Section 5.4 is an overview of the troubleshooting procedure to be followed in the event of a field failure.

5.2 Reference Designations

The RS 600 PCS is assembled on a single chassis as shown in Figure 5.2. Each PC card of sub-assembly has its own set of partial reference designators that refer only to the components on that particular sub-assembly. The same reference designator number may be repeated on different assemblies. All components on schematics, assembly drawings and schematics are cross referenced by partial reference designators. No attempt has been made to assign reference designators so that a connector on one assembly mates with corresponding numbered plug on another assembly. However, mating cable connectors are tagged "Mates to J" to aid in system assembly.

5.3 Calibration and Maintenance

Perform the calibration and maintenance listed below if necessary.

The instructions in Section 5.3 require that the calibrator be a qualified technician and has the following equipment available to him:

1. Oscilloscope, Tektronix Model 545 or equivalent.
2. DVM, 4 1/2 digist, 10uv resolution, assurate to 50uv.
3. Resistance standard with 0.1 ohm steps, accurate to 0.01 ohms.
4. Optional display and keyboard assembly if not on PCS.

The following basic instructions are to be followed when performing any of the calibration procedures. Always turn power off before inserting or removing a component or card. Never force anything. Use a screw drive or other dull instrument when removing an IC from a socket. Review the proper schematic before plunging into the calibration procedure. Be sure you have a good knowledge of the RS 600 PCS and its operation before starting.

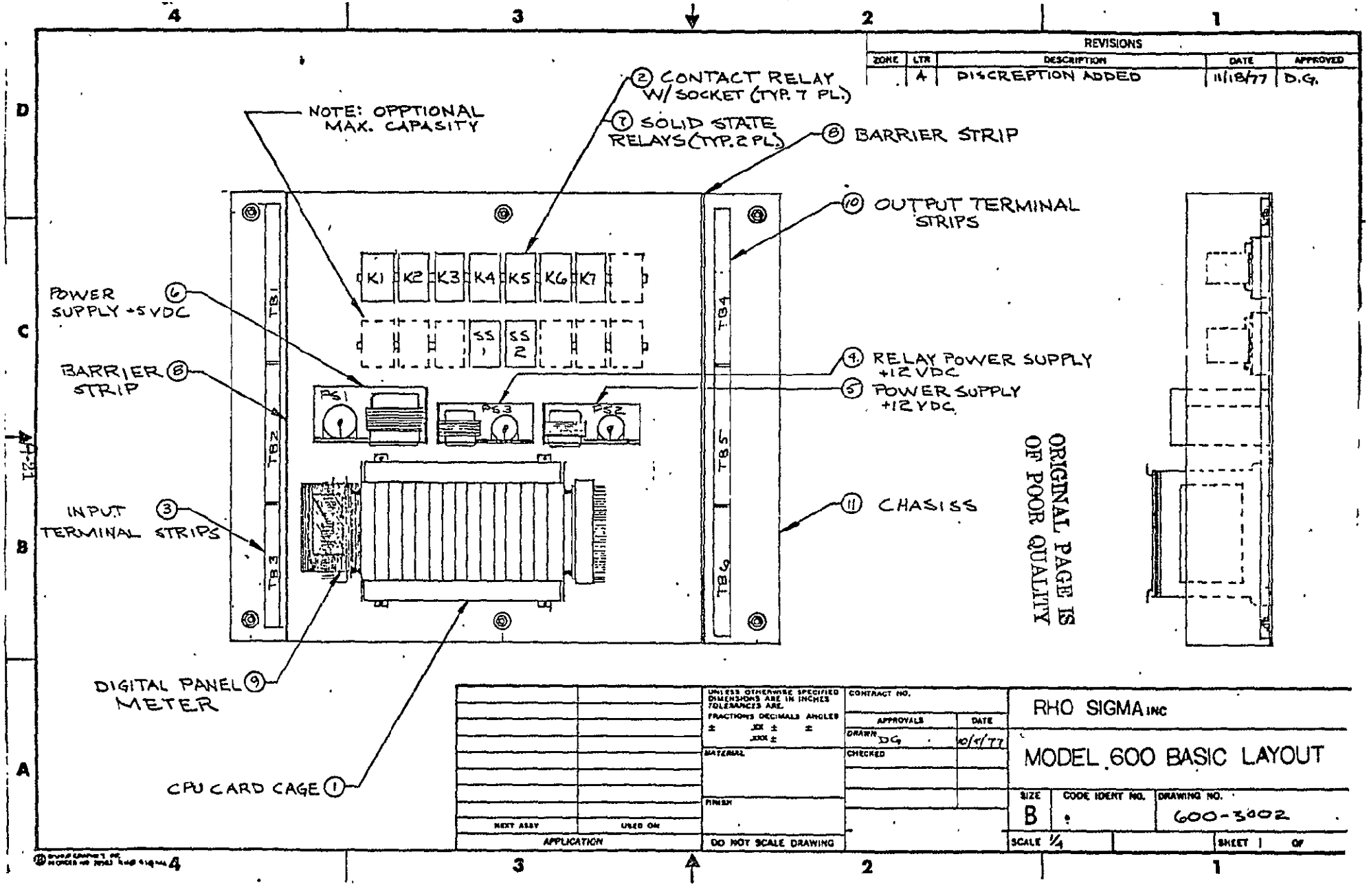
REVISIONS
ZONE | LTR | DESCRIPTION | DATE | APPROVED
4 | DISCREPTION ADDED | 11/18/77 | D.G.
NOTE: OPPTIONAL MAX. CAPASITY
(2) CONTACT RELAY W/ SOCKET (TYP. 7 PL.)
(7) SOLID STATE RELAYS (TYP. 2 PL.)
(8) BARRIER STRIP
(10) OUTPUT TERMINAL STRIPS
(6) POWER SUPPLY +5 VDC
(8) BARRIER STRIP
(3) INPUT TERMINAL STRIPS
(9) DIGITAL PANEL METER
(1) CPU CARD CAGE
(4) RELAY POWER SUPPLY +12 VDC
(5) POWER SUPPLY +12 VDC
(11) CHASIS
K1 K2 K3 K4 K5 K6 K7
SS 1
SS 2
PS1
PS3
PS2
TB1
TB2
TB3
TB4
TB5
TB6
ORIGINAL PAGE IS OF POOR QUALITY
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES ± .XX ± .XXX ± ±
MATERIAL
FINISH
NEXT ASSY | USED ON
APPLICATION
DO NOT SCALE DRAWING
CONTRACT NO.
APPROVALS | DATE
DRAWN DG | 10/1/77
CHECKED
RHO SIGMA INC
MODEL 600 BASIC LAYOUT
SIZE B | CODE IDENT NO. | DRAWING NO. 600-3002
SCALE 1/4 | SHEET 1 OF

FIGURE 5.2

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5.3 Calibration and Maintenance - Continued

TABLE 5.3 PERIODIC MAINTENANCE CHART

UNIT	PERIOD	MAINTENANCE
+5V Pwr Sup	1 yr.	Adjust to 5.0 ±.1VDC
+12 Pwr Sup	1 yr.	Adjust to +12.0 ±.1VDC
Universal Board	1 yr.	Adjust to +1.70 ±.01VDC

5.3.1 Power Supply Adjustments

The RS 600 power supplies are adjusted in the following manner: Install an extender card in the chassis. Measure the power supply voltages on the extender card. (See 5.4 for connector pin layout). Use an insulated shaft screwdriver to avoid shorting the supply's regulator. Use a short screwdrive or a right angle driver to adjust the +12 & +5V supply. By turning VADJ on the appropriate power supply, adjust R1 on the universal board to get proper voltage on J1-B12.

5.4 Troubleshooting Procedures

This section describes procedures for locating circuit malfunction. It is assumed that all power supplies are properly functioning and there is only one malfunction in the unit. For multiple failures, use this guide to isolate one of the failures. Repair it and continue to find the remaining failures.

Troubleshooting can be broken down into fault isolation and repair. Successful fault isolation in a microprocessor based system requires a good understanding of the system's operation to determine whether the fault lies in the microprocessor proper or somewhere else in the system.

Due to the complex nature of a microprocessor based system, the conventional troubleshooting procedures will only find gross faults. Subtle errors can only be found with a good knowledge of the units program and a Program Analyzer. Before attempting any repairs, review the following manual sections:

Sections 1.0, 3.0 and 4.0
Section 5.5

5.4 Troubleshooting Procedures - Continued

Repair consists of changing a card or component to put the unit back into operation. Consult the spare parts list, Section 6.0, when ordering any module, component or front panel replacement part.

As a guide, the basic fault isolation procedure for the unit is shown in Table 5.4. However, if obvious fault symptoms are present, skip the elementary fault-isolation steps and proceed directly to a diagnosis and repair of the fault area.

WARNING

If the fault-isolation procedure requires internal measurements, always remove power when disassembling or assembling the unit. Use extreme caution during troubleshooting, adjustment, or repair to prevent shorting components and further damage to the unit.

5.5 Logic Conventions

The unit uses positive logic, which means the normally active or high signal state is +3.5±1 volts and the inactive or low state is 0.0 ±0.5 volt. The high state is refered to a logic 1 and the low state is logic 0. The terms true and false relate to the signal being in or out of its active state and normally correspond to logic 1 and 0.

Complements of signals are indicated by an F or N suffix or by an inversion dot on the logic symbol. Complemented signals are always low when the original signals are high and vice versa. See Figure 5.5 for the standard logic symbols.

TABLE 5.4 FAULT ISOLATION STEPS

SYMPTOM	POSSIBLE FAULT	CHECK
Initial Turn-On No operation		Loose control panel cable. Push cables into sockets on cards.
		Blown fuse

TABLE 5.4 FAULT ISOLATION STEPS - Continued

SYMPTOM	POSSIBLE FAULT	CHECK
Flashing "Time"	Power Failure	Reset Times 2,3 and 4
Wrong Readings	Input fault	Check input connections. Use display to read inputs. Check input with DVM.
	Wrong Units	Check units assigned to channel.
	Flow channel error.	Check flow counter with scope or analyzer. Replace card.
	Descrete error	Check input gate. Check input for proper voltage swing.
Wrong Calculations	Wrong equation	Check Section 1.3.6.
Display	Defective LED or LED Driver	Check logic and signals on PCS Display Card.
	Defective output latch	Check latch output signals on card.

6.0 PARTS LIST AND LOCATION

6.1 Introduction

This section contains all information necessary to locate, identify and order parts. The listing of parts and information for an exact replacement is shown on pages 28 thru 49. Major sub-assembly locations are shown in Figure 5.2. All component locations are identified by reference designators in the parts list or upon their mounting surface.

6.2 Replacement Parts

6.2.1 Standard Parts

All parts can be purchased directly from Rho Sigma Inc. at current market price, plus a

6.2.1 Standard Parts - Continued

handling charge. However, since most parts are standard electronic components, it is suggested that they be secured locally for prompt replacement. The parts list gives all pertinent information including the recommended manufacturers. Where not noted, equivalent parts meeting the original part specifications may be substituted. A list of manufacturers by abbreviations may be substituted.

6.2.2 Special Parts

Parts marked with a Rho Sigma part number should be procured directly from Rho Sigma. These parts are manufactured or selected to satisfy specific requirements. Substitution of other parts might not yield equivalent performance and will void any warranty.

6.3 Parts List

The parts lists contains all components and sub-assemblies that make up the system. Subsequent tables break the major sub-assemblies down to the component level.

ARTS LIST | RHO SIGMA INC. 11922 Valerio Street No. Hollywood, Ca. 91605 | CONTRACT NO. | CODE IDENT. NO. 19133 | 600-1000 | REV

TITLE: RS 600 PCS ASSY

REV.	E.O. NO.	DATE	APPROVED	REV.	E.O. NO.	DATE	APPROVED

SHEET 2 OF 2

CHECKED BY: JJY | APPROVED ESP | DATE 8/28/77

IND NO.	QTY. REQ'D	CODE IDENT.	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	REFERENCE DESIGNATION	SPECIFICATION	REV
1	1		A-30N24C	NEMA 1 TYPE ENCLOSURE 20 IN. WIDE X 30 IN HIGH X 10 IN DEEP		HOFFMAN ENG.	
2	1		600-1001	INNER PANEL ASSY		RHO SIGMA	
3	1		600-3002	PCS CHASSIS ASSY		RHO SIGMA	

PARTS LIST | RHO SIGMA INC. 11922 Valerio Street No. Hollywood, Ca. 91605 | CONTRACT NO. | CODE IDENT. NO. 19133 | 600-3002

TITLE: RS600 PC'S CHASSIS Assy.

REV.	E.O. NO.	DATE	APPROVED	REV.	E.O. NO.	DATE	APPROVED

SHEET 1 OF 1

CHECKED BY: JLI | APPROVED ESP | DATE 8/29/77

FIND NO.	QTY. REQ'D			U.L. CODE IDENT.	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	REFERENCE DESIGNATION	SPECIFICATION
1	1				97472000	CPU CARD CAGE ASSY		FAIRCHILD
2	7				A283NAX22-RELAY 5X8153A-SOCKET	CONTACT RELAY W/SOCKET	K1 THRU K7	SP/DT 10 AMP 12VDC
3	3			E47811	600-16	TERMINAL STRIPS	TB1, TB2, TB3	KULKA
4	2				2B15-1.3B	12VDC @1.5A - POWER SUPPLY	PS3, PS2	POWERTEC
6	1				2C5-6B	5VDC @6A - POWER SUPPLY	PS1	11
7	2				D12/0	SOLID STATE RELAYS 120VAC @ 10AMPS	SS1 & SS2	CRYDOM
8	2				600-3001	BARRIER STRIP - AC		RHO SIGMA
9	1				MODEL 54-AC	DIGITAL PANEL METER	DPM	FAIRCHILD
10	3			E47811	600-16	TERMINAL STRIPS	TB4, TB5, TB6	KULKA
11	1				600-3002	CHASSIS		

PARTS LIST	RHO SIGMA INC. 11922 Valerio Street No. Hollywood, Ca. 91605	CONTRACT NO.	CODE IDENT. NO. 19133	600-1001

TITLE: RS 600 INNER PANEL ASSY

REV.	E.O. NO.	DATE	APPROVED	REV.	E.O. NO.	DATE	APPROVED

SHEET _ OF _

CHECKED BY: JLI | APPROVED: ESO | DATE: 8/28/77

FIND NO.	QTY. REQ'D			CODE IDENT.	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	REFERENCE DESIGNATION	SPECIFICATION
1	1				97470111	DISPLAY ASSY		FAIRCHILD
2	1				97470112	KEY BOARD ASSY		FAIRCHILD
3	1				600-3000	INNER PANEL PL.		RHO SIGMA
4					5-51115-501	KEYLOCK SWITCH 2 POSITION - 90° TURN	S1	OAK INDUSTRIES
5	10				2FC53	TOGGLE SW. SP/3T	S3 THRU S12	CARLINGSWITCH
6	10				515-9145/ 515-6003-	LED INDICATORS PANEL MOUNT	L1 THRU L10	DIALLIGHT
7	1				HKP	FUSE HOLDERS PANEL MOUNT	F1	BUSSMANN MFG.
8	1				DA284	TOGGLE SW. SP/ST 16A @ 125VAC	S2	CARLINGSWITCH

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PAGE 1 OF 1

FAIRCHILD LIST OF MATERIAL

LM NO		REV	QTY	UM	DESCRIPTION	NEXT ASSY				
147200	-03				ASSY, MECH-CARD CAGE		BY JC	CHK	MFG ENG	DATE
							DATE	DATE	ENGR	DATE

ITEM	PART NO	REV	QTY PER ASSM	UM	DESCRIPTION	REFERENCE DESIGNATION	CHANGE DOCUMENT REV	CHANGE DOCUMENT EN NO
1	35108125		2		BRACKET, SIDE			
2	35108126		2		BRACE, CARD CAGE			
3	97147010		1		MOTHER BOARD			
4	64018490		28		CARD GUIDE			
5	60516490		28		SCREW, 6-32 x 3/16 PH			
6	60516580		14		SCREW, 8-32 x 3/8 PH			
7	62106390		28		LKWASHER, #6			
8	62003670		28		FLATWASHER, #6			
9	62003680		14		FLATWASHER, #8			
10	61039450		14		KEPNUT, #8			

FAIRCHILD LIST OF MATERIAL

LM NO	-03	REV	QTY	UM	DESCRIPTION	NEXT ASSY	BY	CHK	MFG ENG	DATE
		01	01	01	FINAL ASSY, CARD CAGE		DATE 5/17	DATE	ENGR	DATE

ITEM	PART NO	REV	QTY PER ASSM	UM	DESCRIPTION	REFERENCE DESIGNATION	CHANGE DOCUME REV	CHANGE DOCUME EN NO
001	97472000	01	001	01	MECH. ASSY, CARD CAGE			
002	97470110	01	001	01	UNIVERSAL CARD			
003	97470103	01	002	01	INPUT CARD			
004	97470108	01	001	01	A/D CONTROL CARD			
005	97470100	01	001	01	CPU CARD			
006	97470109	01	001	01	DISPLAY DRIVER CARD			
007	97470107	01	001	01	MEMORY ADDRESS CARD			
008	97470105	01	002	01	4K EROM CARD			
009	97470104	01	001	01	OUTPUT CARD			

FAIRCHILD LIST OF MATERIAL

PAGE 1 OF 1

LM NO		REV	QTY	UM	DESCRIPTION	NEXT ASSY		
9,74,7,0,1,06	-03	0,1	0,1	0,1	ASSY EROM BD		BY ____ CHK ____ MFG ENG ____ DATE ____	DATE ____ DATE ____ ENGR ____ DATE ____

ITEM	PART NO	REV	QTY PER ASSM	UM	DESCRIPTION	REFERENCE DESIGNATION	CHANGE DOCUMENT REV	CHANGE DOCUMENT EN NO
0,0,1	4,0,0,4,8,4,6,9		0,0,1	EA	P.C.B. EROM BD			
0,0,2	0,3,2,9,1,0,4,0		0,0,2	EA	CAP .1UF	C3, C7		
0,0,3	0,3,2,7,9,1,0,0		0,0,2	EA	CAP 10UF 15V	C2,		
0,0,4	0,3,2,8,2,5,6,0		0,0,1	EA	CAP 22 UF 15V	C1		
0,0,5	2,6,9,0,1,0,4,0		0,0,4	EA	DIODE 1N914	D1A,2A,3A,4A OR D1B,2B,3B,4B		
0,0,6								
0,0,7	0,2,3,5,4,8,5,0		0,0,1	EA	RES 1.0K, 1/4W, 5%	R5		
0,0,8								
0,0,9								
0,1,0			0,0,1	EA	RES 3.9 Ω 1/4W 5%	R4		
0,1,1								
0,1,2								
0,1,3								
0,1,4			0,0,1	EA	DIODE ZENER 1N5231 5V	D2		
0,1,5	2,6,9,0,5,0,2,2		0,0,4	EA	IC 2708 UV PROM	U1 THRU U4		
0,1,6								
0,1,7	2,6,9,0,5,5,5,9		0,0,1	EA	IC 74LS138	U6		
0,1,8	2,6,9,0,4,8,1,6		0,0,1	EA	IC 4049	U8		
0,1,9			0,0,1	EA	CARD EJECTOR, S.A.E. 6200	A-33		

FAIRCHILD LIST OF MATERIAL

PAGE 1 OF 1

LH NO		REV	QTY	UM	DESCRIPTION	NEXT ASSY				
8,2,5,4,0,5,2,0	-03	03	0,1	0,1	4 1/2 AC DPM ASSY CONN (ZV)		BY TJ	CHK [illegible]	MFG ENG [illegible]	DATE
							DATE 12/6/76	DATE	ENGR	DATE

ITEM	PART NO	REV	QTY PER ASSM	U M	DESCRIPTION	REFERENCE DESIGNATION	CHANGE DOC LTV	CHANGE DOC IN
0,0,1	9,7,4,0,0,3,1,2	0,3	,0,0,1	EA	ASSY BASE BD CONN	N/A	0,3	6,4
0,0,2	9,7,4,0,0,3,0,9	0,3	,0,0,1	EA	ASSY ANALOG BD (ZV)	N/A		
0,0,3	9,7,4,0,0,4,0,2	0,3	0,0,1	EA	ASSY DISPLAY BD 4 1/2	N/A		
0,0,4	9,7,4,0,1,0,5,5	0,3	0,0,1	EA	ACCESSORY KIT 4 1/2 CONN	N/A		

PAGE 1 OF 1

FAIRCHILD LIST OF MATERIAL

LM NO		REV	QTY	UM	DESCRIPTION	NEXT ASSY				
9,7,4,7,0,1,0,7	-03	0,1	0,1	0,1	ASSY MEMORY ADDRESS CARD		BY	CHK	MFG ENG	DATE
							DATE	DATE	ENGR	DATE

ITEM	PART NO	REV	QTY PER ASSM	U M	DESCRIPTION	REFERENCE DESIGNATION	CHANGE DOCUMENT REV	CHANGE DOCUMENT NO
001	4,0,0,4,8,4,7,P		001	EA	PCB MEMORY ADDRESS			
002	0,3,2,9,1,0,4,0		001	EA	CAP .1UF	C2		
003	0,3,2,8,2,5,6,0		001	EA	CAP 22UF 15V	C1		
004	0,3,2,7,9,1,0,0		001	EA	CAP 10UF 15V	C3		
005			004	EA	IC3539 256X8 RAM	U3 THRU U6		
006	2,6,9,0,4,8,0,8		001	EA	IC3853 STATIC MEM INT	U1		
007	2,6,9,0,4,8,2,6		003	EA	IC4050 CMOS BUFFER	U2,7,10		
008	2,6,9,0,4,8,1,6		001	EA	IC4049 CMOS INVERTER	U8		
009			001	EA	IC4075 CMOS 3IN. 'OR'	U9		
010	2,6,9,0,4,5,9,0		001	EA	IC 74LS02 2 IN 'NOR'	U9X		
011			001	EA	CARD EJECTOR, S.A.E.6200			
012	0,9,9,1,7,0,2,2		001	EA	SOCKET 40PIN	U1		

FAIRCHILD LIST OF MATERIAL

LM NO		REV	QTY	UM	DESCRIPTION	NEXT ASSY				
9747105	-03	01	01	01	ASSY, DISPLAY DRIVER BD		BY	CHK	MFG ENG	DATE
							DATE	DATE	ENGR	DATE

ITEM	PART NO	REV	QTY PER ASSM	UM	DESCRIPTION	REFERENCE DESIGNATION	CHANGE DOCUME REV	CHANGE DOCUME EN NO
001	400484677		001	EA	P.C.B. DISPLAY BD			
002	03291040		001	EA	CAP .1UF	C1		
003	03282560		001	EA	CAP 22UF, 15V	C2		
004			004	EA	IC F40175	U1, U4, U5, U7		
005	26905559		001	EA	IC 9LS138	U2		
006	26904593		001	EA	IC 9LS133	U3		
007	26904564		001	EA	IC 9LS04	U6		
008	09917009		001	EA	SOCKET 16 PIN	J1		
009			001	EA	CARD EJECTOR, S.A.E. 6200			

FAIRCHILD LIST OF MATERIAL

LM NO		REV	QTY	UM	DESCRIPTION	NEXT ASSY	BY / DATE	CHK / DATE	MFG ENG / ENGR	DATE / DATE
3747013	-03	01	01	01	ASSY INPUT CARD 1,2					

ITEM	PART NO	REV	QTY PER ASSM	UM	DESCRIPTION	REFERENCE DESIGNATION	CHANGE DOCUM REV	CHANGE DOCUM EN N
001	40048465		001	EA	PCB, INPUT CARD			
002	03291040		001	EA	CAP .1UF	C1		
003	03282560		001	EA	CAP 22UF, 15V	C2		
004	03279100		001	EA	CAP 10UF, 15V	C3		
005	26901040		008	EA	DIODE IN914	D1 THRU D8		
006	05036850		008	EA	RELAY	K1 THRU K8		
007	26904575		002	EA	IC 9LS05	U2, U3		
008			001	EA	IC 3861	U1		
009			004	EA	IC 75451	U4, 5, 6, 7		
010			001	EA	CARD EJECTOR, S.A.E. 6200			
011	09917022		001	EA	SOCKET, 40 PIN	U1		

FAIRCHILD LIST OF MATERIAL

LM NO		REV	QTY	UM	DESCRIPTION	NEXT ASSY	BY	CHK	MFG ENG	DATE
9747010 4	-03	01	01	01	ASSY OUTPUT CARD 1, 2		DATE	DATE	ENGR	DATE

ITEM	PART NO=	REV	QTY PER ASSM	U M	DESCRIPTION	REFERENCE DESIGNATION	CHANGE DOCUME. REV	CHANGE DOCUME. EN NO
001	400484 66		001	EA	PC B OUTPUT CARD			
002	03291040		001	EA	CAP .1UF	C1		
003	03282560		001	EA	CAP 22UF, 15V	C2		
004			001	EA	IC F40175	U1, U4		
005	26905559		001	EA	IC 9LS138	U2		
006	26904593		001	EA	IC 9LS133	U3		
007			004	EA	IC 3611 NAT. SEMICON.	U6, U7, U8, U9		
008	26904564		001	EA	IC 9LS04	U5		
009	26901040		008	EA	DIODE IN914	D1 THRU D8		
010			001	EA	CARD EJECTOR, S.A.E. 6200			

FAIRCHILD LIST OF MATERIAL

LM NO		REV	QTY	UM	DESCRIPTION	NEXT ASSY				
9,7A,7,0,1,1,0	-03	0,1	0,1	0,1	ASSY, UNIVERSAL CARD		BY	CHK	MFG ENG	DATE
							DATE	DATE	ENGR	DATE

ITEM	PART NO	REV	QTY PER ASSM	UM	DESCRIPTION	REFERENCE DESIGNATION	CHANGE DOCUM REV	CHANGE DOCUM EN N
2,01	4,0,0,4,8,4,7,3		0,0,1	EA	P,C,B, UNIVERSAL, CARD			
202	26905801		0,0,1	EA	IC UA723	U1		
2,0,3			0,0,3	EA	TRANSISTOR 2N6124	Q1		
2,0,4			0,0,1	EA	POT 1K	R1		
2,05			0,0,1	EA	RES 1K	R2		
2,0,6			0,0,1	EA	RES 62 Ω	R3		
2,0,7			0,0,1	EA	RES 5.1K	R4		
2,08			0,0,1	EA	RES .25Ω	R53		
2,09			0,4,8	EA	SELECTED	R5 THRU R52		
2,10			0,0,1	EA	CAP .001 μF	C1		
2,11			0,0,1	EA	CARD EJECTOR, S.A.E.6200			

FAIRCHILD LIST OF MATERIAL

LM NO		REV	QTY	UM	DESCRIPTION	NEXT ASSY	
9,7,4,7,0,1,0,8	-03	0,1	0,1	0,1	ASSY A/D CONTROL CARD		BY ____ CHK ____ MFG ENG ____ DATE ____ DATE ____ DATE ____ ENGR ____ DATE ____

ITEM	PART NO	REV	QTY PER ASSM	U M	DESCRIPTION	REFERENCE DESIGNATION	CHANGE DOCUM REV	CHANGE DOCUM EN N
0,0,1	4,0,0,4,8,4,7,1		0,0,1	EA	P.C.B. A/D CONTROL CARD			
0,0,2	2,6,9,0,5,0,9,0		0,0,1	EA	IC 3851 PSU	U1		
0,0,3	2,6,9,0,4,5,6,4		0,0,1	EA	IC 74LS04	U2		
0,0,4	2,6,9,0,4,5,7,8		0,0,1	EA	IC 74LS00	U3		
0,0,5	2,6,9,0,4,5,9,0		0,0,1	EA	IC 74LS02	U4		
0,0,6	2,6,9,0,5,6,0,1		0,0,1	EA	IC 9602	U5		
0,0,7	2,6,9,0,5,6,0,5		0,0,3	EA	IC 75451	U6, U7, U8		
0,0,8	2,6,9,0,1,0,4,0		0,0,6	EA	DIODE 1N914	D1 THRU D6		
0,0,9	2,6,0,1,2,5,5,0		0,0,1	EA	ZENER 1N758A, 10V, 5%	D7		
0,1,0	2,6,9,0,1,0,1,6		0,0,1	EA	ZENER 1N4569, 6.4V, 5%	D8		
0,1,1	0,5,0,3,6,8,5,0		0,0,6	EA	RELAY	K1 THRU K6		
0,1,2	0,3,2,9,1,0,4,0		0,0,1	EA	CAP .1μF	C1		
0,1,3	0,3,2,8,2,5,6,0		0,0,1	EA	CAP 22μF, 15V	C2		
0,1,4	0,3,2,7,9,1,0,0		0,0,1	EA	CAP 10μF, 15V	C3		
0,1,5	0,3,2,9,1,8,5,0		0,0,1	EA	CAP .05μF	C4		
0,1,6	0,3,8,7,0,0,0,1		0,0,3	EA	CAP 1μF	C5, C6, C7		
0,1,7	0,2,3,5,4,8,5,0		0,0,3	EA	RES 10K, 1/4W, 5%	R5, R6, R7		
0,1,8			0,0,1	EA	RES 235Ω, 1%, 50PPM	R1		
0,1,9			0,0,1	EA	RES 2.4K, 1%, 25PPM	R2		

FAIRCHILD LIST OF MATERIAL

LM NO		REV	QTY	UM	DESCRIPTION	NEXT ASSY	
9,7,4,7,0,1,0,8	-03	01	01	01	ASSY A/D CONTROL CARD		BY ____ CHK ____ MFG ENG ____ DATE ____ DATE ____ DATE ____ ENGR ____ DATE ____

ITEM	PART NO	REV	QTY PER ASSM	UM	DESCRIPTION	REFERENCE DESIGNATION	CHANGE DOCUME REV	CHANGE DOCUME EN NO
020			001	EA	RES, 4.5K, 1%	R3		
021			001	EA	RES, 1.9K, 1%	R4		
022			001	EA	CARD EJECTOR, S.A.E.6200			
023			001	EA	SOCKET 40 PIN	U1		

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FAIRCHILD LIST OF MATERIAL

LM NO		REV	QTY	UM	DESCRIPTION	NEXT ASSY				
9,7,4,7,0,1,0,2	-03	01	0,1	01	ASSY EXTENDER BD		BY	CHK	MFG ENG	DATE
							DATE	DATE	ENGR	DATE

ITEM	PART NO	REV	QTY PER ASSM	UM	DESCRIPTION	REFERENCE DESIGNATION	CHANGE DOCUMENT REV	CHANGE DOCUMENT EN NO
0,0,1	4,0,0,4,8,4,6,4		0,0,1	EA	P.C.B. EXTENDER BD			
0,0,2			0,0,1	EA	CONNECTOR			
0,0,3			0,0,2	EA	LED, FLV 104	Q1, Q2		
0,0,4			0,0,2	EA	RESISTOR	R1, R2		

FAIRCHILD LIST OF MATERIAL

LM NO		REV	QTY	UM	DESCRIPTION	NEXT ASSY	BY / DATE	CHK / DATE	MFG ENG / ENGR	DATE
7747010 9	-03	01	01	01	ASSY, DPM READ BOARD					

ITEM	PART NO	REV	QTY PER ASSM	UM	DESCRIPTION	REFERENCE DESIGNATION	CHANGE DOCUMENT REV	CHANGE DOCUMENT EN NO
001	40048486		001	EA	PC.B DPM READ CARD			
002			004	EA	CAP .047 μF	C1, 2, 3, 4		
003	26904817		003	EA	IC 4518	U1, 3, 5		
004			003	EA	IC 81LS96	U2, 4, 6		
005	26904816		001	EA	IC 4049	U7		
006	02355090		002	EA	RES 100K, 1/4W, 5%	R1, 2		
007			001	SET	CONN 7 PIN SET			

MAY 01 1971

FAIRCHILD LIST OF MATERIAL

LM NO		REV	QTY	UM	DESCRIPTION	NEXT ASSY	
374701 01	-03	01	01	01	ASSY MOTHER BD		BY ____ CHK ____ MFG ENG ____ DATE ____ DATE ____ DATE ____ ENGR ____ DATE ____

ITEM	PART NO	REV	QTY PER ASSM	UM	DESCRIPTION	REFERENCE DESIGNATION	CHANGE DOCUMENT REV	CHANGE DOCUMENT EN NO
001	4004846 8		001	EA	P.C.B. MOTHER BD			
002			014	EA	CONNECTOR			
003	0329104 0		003	EA	CAP .1 UF	C1, C2, C5		
004	0328256 0		002	EA	CAP 22 UF, 15V	C3, C4		

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FAIRCHILD LIST OF MATERIAL

LM NO		REV	QTY	UM	DESCRIPTION	NEXT ASSY				
9747011-00	-03	01	01	01	ASSY CPU BD		BY [illegible]	CHK	MFG ENG	DATE
							DATE 5/77	DATE	ENGR	DATE

ITEM	PART NO	REV	QTY PER ASSM	UM	DESCRIPTION	REFERENCE DESIGNATION	CHANGE DOCUMENT REV	CHANGE DOCUMENT EN NO
001	40048472	01	001	EA	PCB CPU CARD			
002	26905090	01	001	EA	IC 3851	U1		
003	26904805	01	001	EA	IC 3850	U2		
004	26905407	01	001	EA	IC MC1489	U3		
005		01	001	EA	IC 4066	U4		
006	26904823	01	001	EA	IC 4001	U5		
007	02354380	01	004	EA	RES 100Ω 1/4W 5%	R2,3,4,7		
008	02354620	01	002	EA	RES 1KΩ 1/4W 5%	R8,12		
009	02354780	01	001	EA	RES 5.1K 1/4W 5%	R10		
010	02354850	01	003	EA	RES 10K 1/4W 5%	R1,6,9		
011	02355330	01	001	EA	RES 1MΩ 1/4W 5%	R13		
012	03175060	01	002	EA	CAP 10PF	C5,6		
013	02379120	01	001	EA	CAP .22UF 35V TANT	C4		
014	03291040	01	001	EA	CAP .1UF CERAMIC	C2		
015	03855004	01	001	EA	CAP .47UF CERAMIC	C7		
016	03279100	01	002	EA	CAP 10UF 15V TANT	C3		
017	03282560	01	001	EA	CAP 2.2UF 15V TANT	C1		
018	26006930	01	001	EA	DIODE FDH600	D1		
019	26903006	01	002	EA	TRANSISTOR 2N3904	Q1,2		

FAIRCHILD LIST OF MATERIAL

LM NO		REV	QTY	UM	DESCRIPTION	NEXT ASSY				
9,7,4,7,0,1,00	-03	0,1	0,1	0,1	ASSY CPU BOARD		BY	CHK	MFG ENG	DATE
							DATE	DATE	ENGR	DATE

ITEM	PART NO	REV	QTY PER ASSM	UM	DESCRIPTION	REFERENCE DESIGNATION	CHANGE DOCUMENT REV	CHANGE DOCUMENT EN NO
020		0.1	0.01	EA	TRANSISTOR ZN4871	Q3		
021	27903005	0.1	001	EA	CRYSTAL 2MHZ	Y1		
022	099170220	0.1	002	EA	SOCKET 40 PIN DIP	REF - U1, 2		
023	099170009	0.1	002	EA	SOCKET 16 PIN DIP	REF - J1, 2		
024		01	002	EA	SWITCH, SLIDE	SW1, 2		
025		01	001	EA	CARD EJECTOR, S.A.E.6200			
026	26903502	01	001	EA	TRANSISTOR 2N3906	Q4		
027		01	001	EA	.22 µf. MYLAR CAP.	C8		

FAIRCHILD LIST OF MATERIAL

LM NO		REV	QTY	UM	DESCRIPTION	NEXT ASSY		
9747011	-03	01	01	01	DISPLAY CARD		BY SC	CHK ____ MFG ENG ____ DATE ____
							DATE 5/77	DATE ____ ENGR ____ DATE ____

ITEM	PART NO	REV	QTY PER ASSM	UM	DESCRIPTION	REFERENCE DESIGNATION	CHANGE DOCUM REV	CHANGE DOCUM EN NO
001	40048491	01	001	EA	PCB DISPLAY CARD			
002	03291040	01	004	EA	CAP .1UF CERAMIC	C1,2,3,4		
003	03282560	01	001	EA	CAP 22UF 15V TANT	C5		
004		01	001	EA	DIODE 1N4002	D1		
005	26901040	01	002	EA	DIODE 1N914	D2,3		
006		01	002	EA	RES 9.1Ω ½W 1%	R20,21		
007	02354140	01	003	EA	RES 10Ω ¼W 5%	R17,18,19		
008	02354400	01	006	EA	RES 120Ω ¼W 5%	R1,2,3,10,11,12		
009	02354420	01	007	EA	RES 150Ω ¼W 5%	R4,5,6,7,8,9,13		
010		01	006	EA	IC 4042	U9,10,11,12,13,14		
011	26904820	01	004	EA	IC 4511	U4,5,6,7		
012		01	001	EA	IC 9667	U2		
013		01	001	EA	IC 74LS42	U8		
014	26904594	01	001	EA	IC 7414	U1		
015		01	001	EA	IC 82S23 OR EQUIVALENT	U3 -PROM CODE #6177-		
016	26905223	01	004	EA	LED FND560	DS3,4,5,6		
017	26905224	01	001	EA	LED FND 567	DS2		
018	26905225	01	001	EA	LED FND 568	DS1		
019	26903502	01	003	EA	TRANSISTOR 2N3906	Q1,2,3		
020		01	004	EA	SWITCH, TOGGLE	SW1,2,3,4		
021		01	001	EA	CARD EJECTOR, S.A.E. 6200			

04 1977

FAIRCHILD LIST OF MATERIAL

LM NO		REV	QTY	UM	DESCRIPTION	NEXT ASSY				
9747011 2	-03	01			KEYBOARD ASSY		BY G.C	CHK	MFG ENG	DATE
							DATE	DATE	ENGR	DATE

ITEM	PART NO	REV	QTY PER ASSM	U M	DESCRIPTION	REFERENCE DESIGNATION	CHANGE DOCUMENT REV	CHANGE DOCUMENT EN NO
001	4004855-7	01	001	01	PCB KEYBOARD			
002	26905605	01	001	01	IC 75451	QA1		
003		01	001	01	IC 74C922	QA2		
004	26904816	01	001	01	IC 4049	QA3		
005	26904823	01	001	01	IC 4001	QA4		
006	03291040	01	002	01	CAP .1 MF CERAMIC DISC	C1, 3		
007	03282560	01	001	01	CAP 22 MF 15V TANT.	C2		
008		01	001	01	CAP 5.6 MF TANT	C4		
009		00	002	01	LED, RED	DS1, 2		
010	09917009	01	001	01	SOCKET, IC, 16 PIN DIP	J1		
011		01	001	01	SWITCH SPDT, TOGGLE	SW1		
012		01	001	01	SWITCH SPDT, TOG., CENTER OFF	SW2		
013	02354400	01	002	01	RESISTOR, 120 Ω 1/4 5% CMF.	R1, 2		
014		01	001	01	KEYBOARD, DIGITRAN-KL	0042		
015		01	001	01	LED, GRN	DS		
016		01	001	01	RESISTOR 15K 1/4 W 5%	R3		
017		01	001	01	CAP. .001 µf CER.	C5		
018								
019								

7.0 DRAWINGS, SCHEMATICS AND WIRING DIAGRAMS

This section includes the following figures:

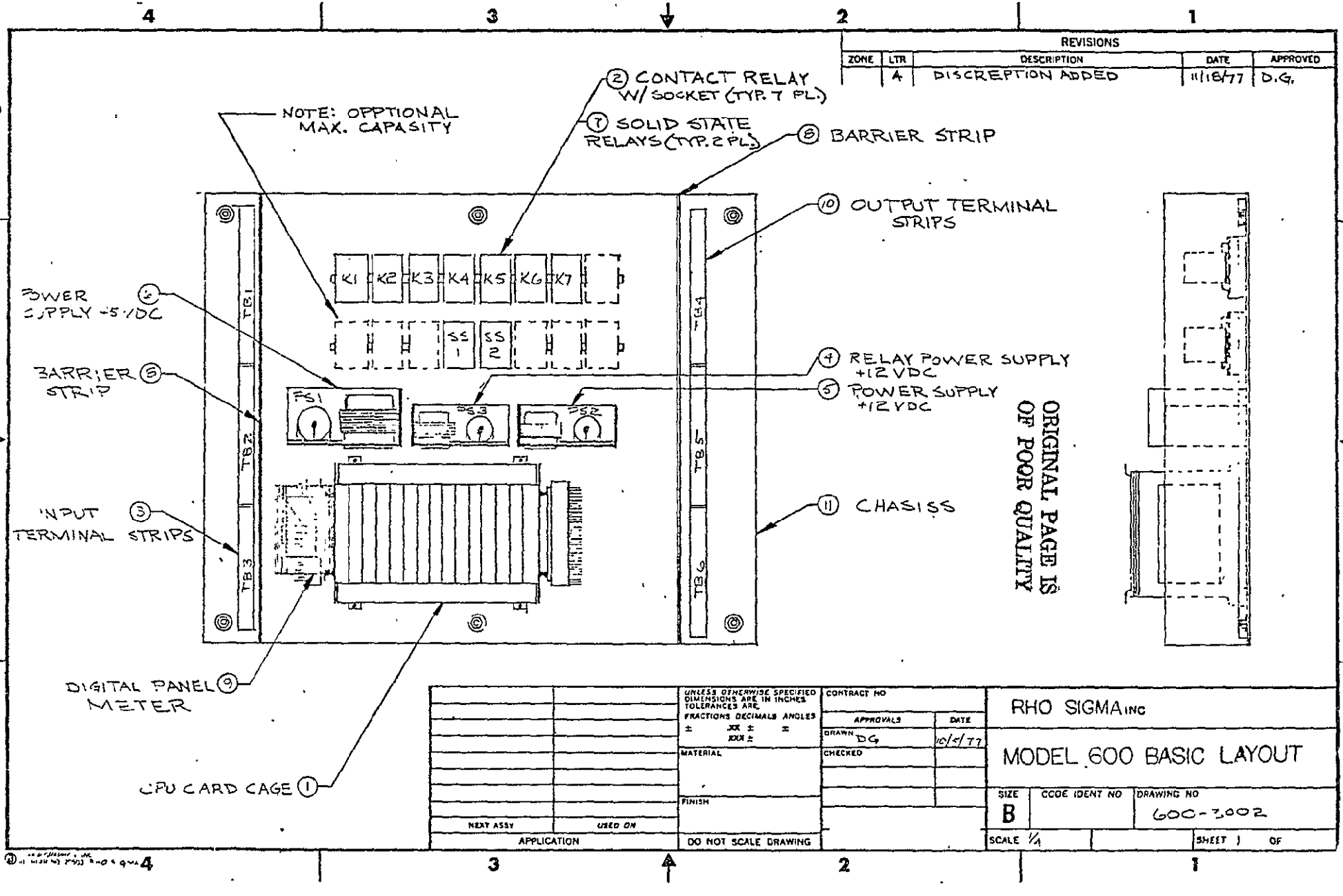
REVISIONS
ZONE | LTR | DESCRIPTION | DATE | APPROVED
A | DISCREPTION ADDED | 11/18/77 | D.G.
NOTE: OPPTIONAL MAX. CAPASITY
2 CONTACT RELAY W/ SOCKET (TYP. 7 PL.)
7 SOLID STATE RELAYS (TYP. 2 PL.)
8 BARRIER STRIP
10 OUTPUT TERMINAL STRIPS
POWER SUPPLY +5 VDC
BARRIER STRIP
INPUT TERMINAL STRIPS
DIGITAL PANEL METER
CPU CARD CAGE
4 RELAY POWER SUPPLY +12 VDC
5 POWER SUPPLY +12 VDC
11 CHASISS
K1 K2 K3 K4 K5 K6 K7
SS 1 SS 2
PS1 PS3 PS2
TB1 TB2 TB3 TB4 TB5 TB6
ORIGINAL PAGE IS OF POOR QUALITY
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE FRACTIONS DECIMALS ANGLES
MATERIAL
FINISH
NEXT ASSY | USED ON
APPLICATION
DO NOT SCALE DRAWING
CONTRACT NO
APPROVALS | DATE
DRAWN DG 10/5/77
CHECKED
RHO SIGMA INC
MODEL 600 BASIC LAYOUT
SIZE B | CODE IDENT NO | DRAWING NO 600-3002
SCALE 1/4 | SHEET 1 OF

Figure 7.1

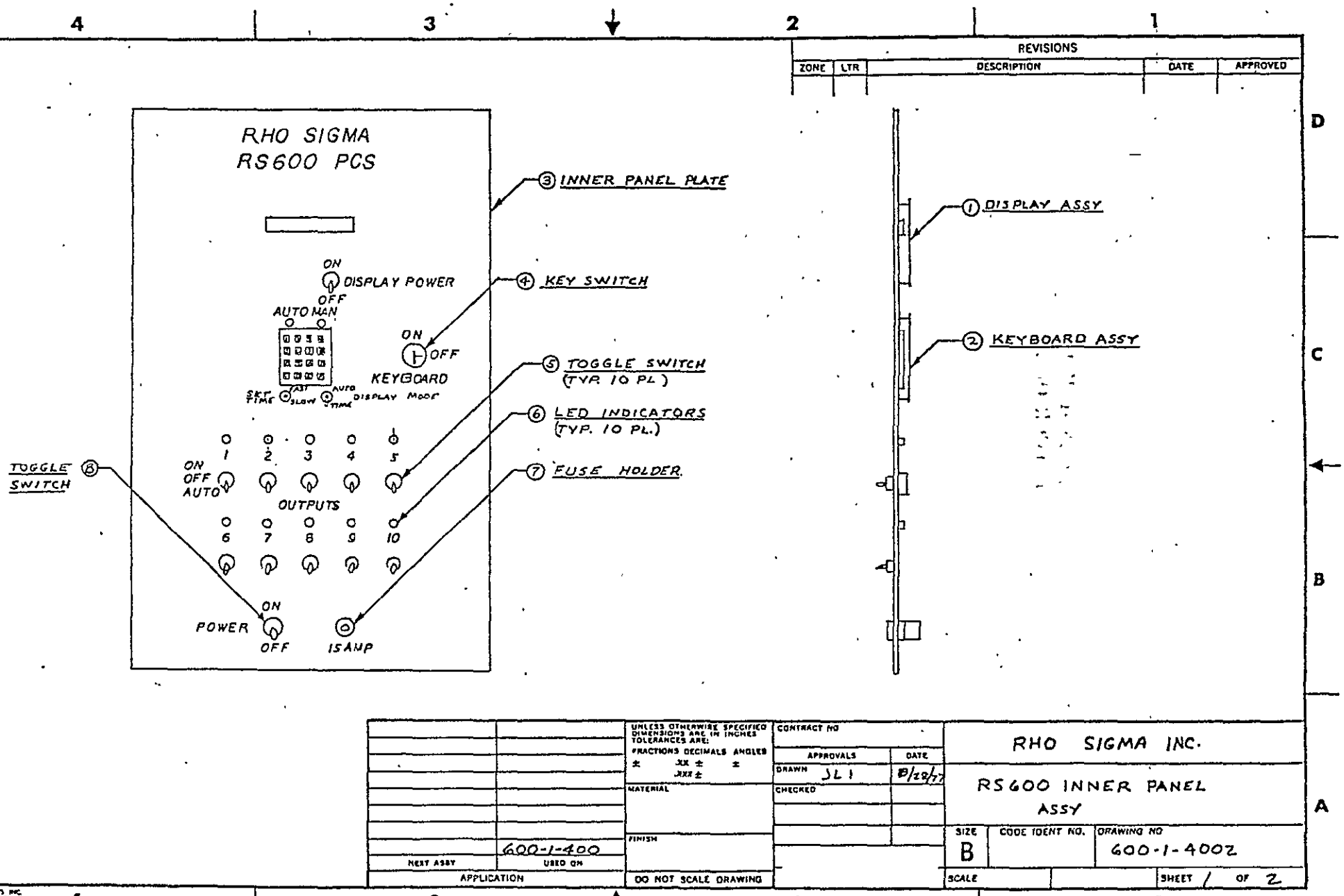
REVISIONS
ZONE
LTR
DESCRIPTION
DATE
APPROVED
RHO SIGMA
RS600 PCS
ON
DISPLAY POWER
OFF
AUTO MAN
ON
OFF
KEYBOARD
SET TIME
SLOW
Auto TIME
DISPLAY Mode
ON
OFF
AUTO
1
2
3
4
5
OUTPUTS
6
7
8
9
10
ON
POWER
OFF
ISAMP
TOGGLE SWITCH
3 INNER PANEL PLATE
4 KEY SWITCH
5 TOGGLE SWITCH (TYP. 10 PL)
6 LED INDICATORS (TYP. 10 PL.)
7 FUSE HOLDER
1 DISPLAY ASSY
2 KEYBOARD ASSY
D
C
B
A
4
3
2
1
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE:
FRACTIONS DECIMALS ANGLES
± .XX ± ±
.XXX ±
CONTRACT NO
APPROVALS
DATE
DRAWN JLI 12/29/77
CHECKED
MATERIAL
FINISH
600-1-400
NEXT ASSY
USED ON
APPLICATION
DO NOT SCALE DRAWING
RHO SIGMA INC.
RS600 INNER PANEL ASSY
SIZE B
CODE IDENT NO.
DRAWING NO 600-1-4002
SCALE
SHEET 1 OF 2

Figure 7.2

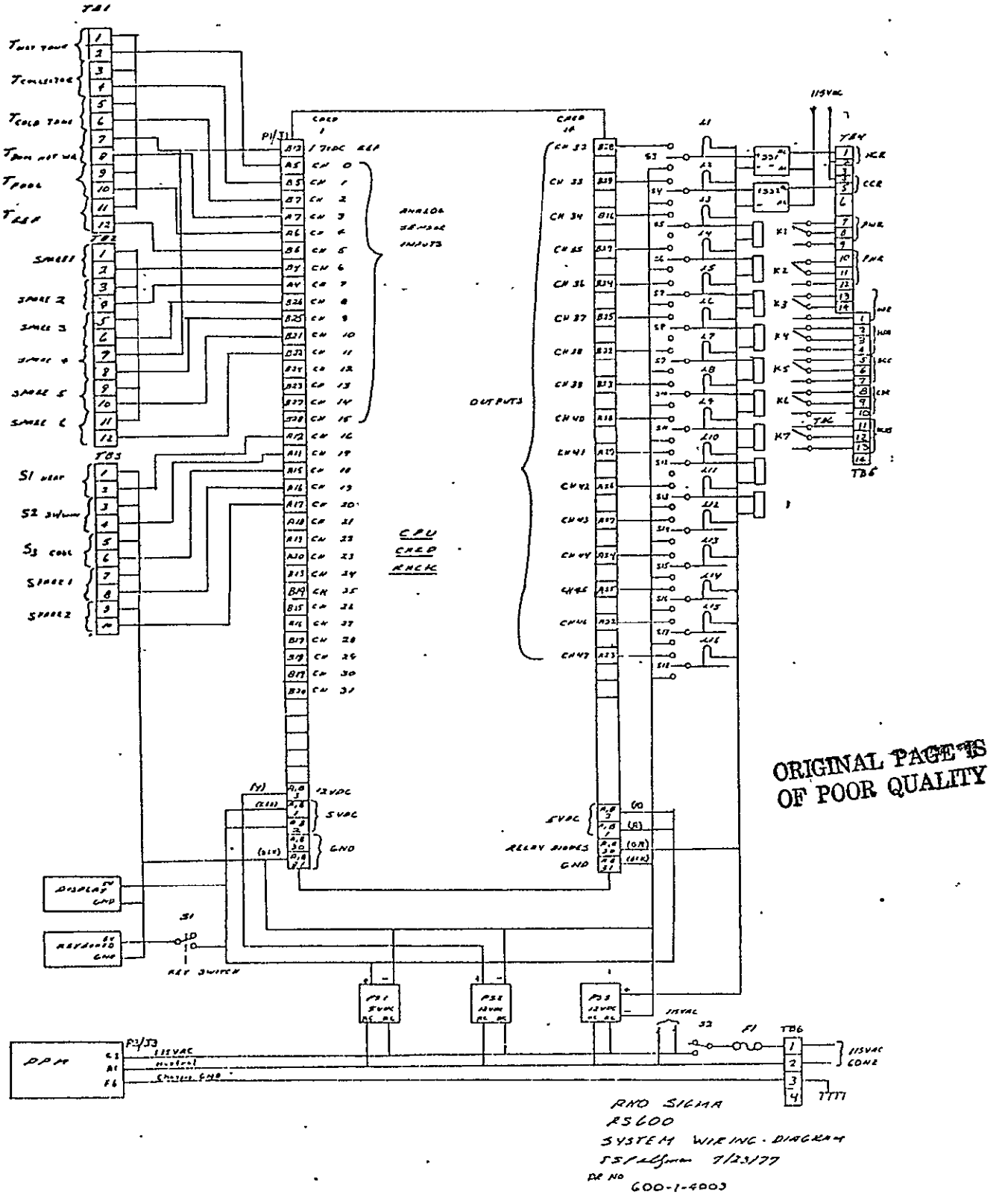

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Figure 7.3

REVISIONS					
ZONE	REV	DESCRIPTION	BY	DATE	APPROVED
	1	RELEASED TO MFG PER EN			

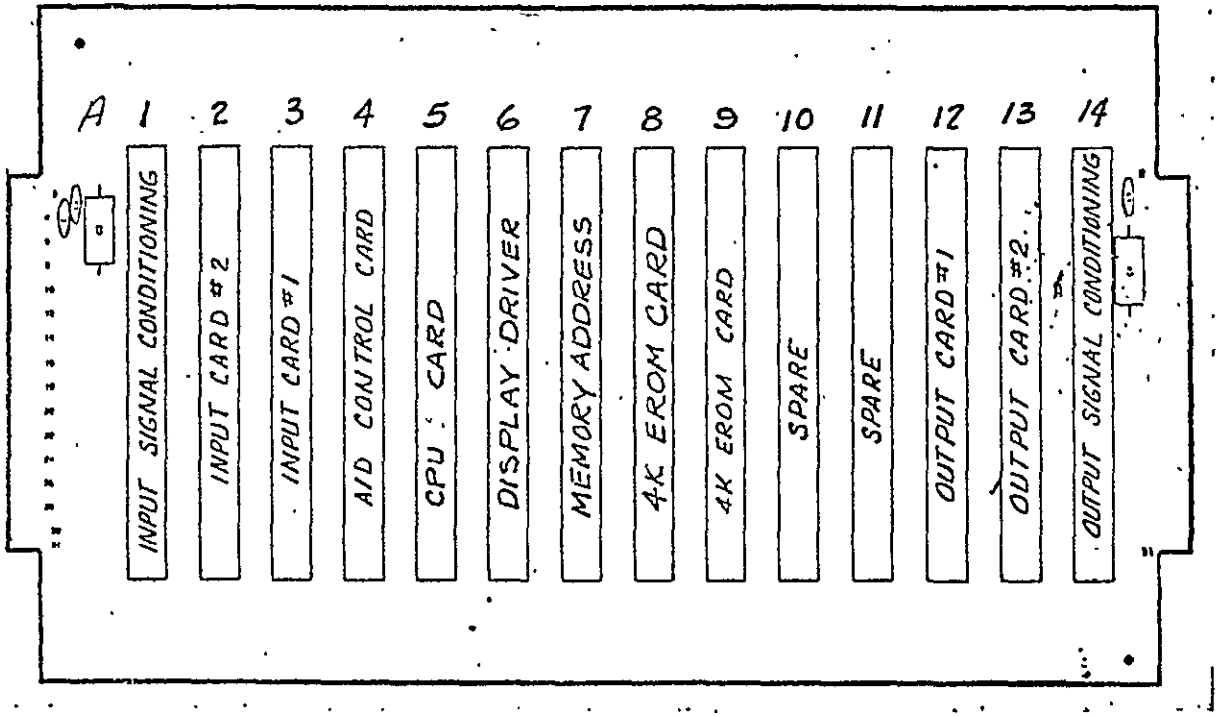


Figure 7.4

PRINCIPLE DRAWING TABLE		
DRAWING NO.	DOCUMENTATION	REV NO.
40048468	A/W AND SPEC. DWG.	1
9747010	LIST OF MAT'L	1

ITEM NO	QTY	PART NUMBER	DESCRIPTION
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES ON DECIMALS ANGLES MATERIAL: SEE LIST OF MAT'L FINISH: PHOSPHATE COATING			

DRAWN: J. Fields 7/11/74
CHK: DATE
ENGR: D. Wilcox 7/11/74
MFG: DATE
PROJ ENGR: DATE
APPVD:
APPVD:

FAIRCHILD INSTRUMENTATION

TITLE: ASSEMBLY - MOTHER BOARD

SIZE C | CODE IDENT NO | DWG NO 9747010 | REV 1

REV	DESCRIPTION	BY	DATE	APPROVAL
1	RELEASED TO MFG PER EN			

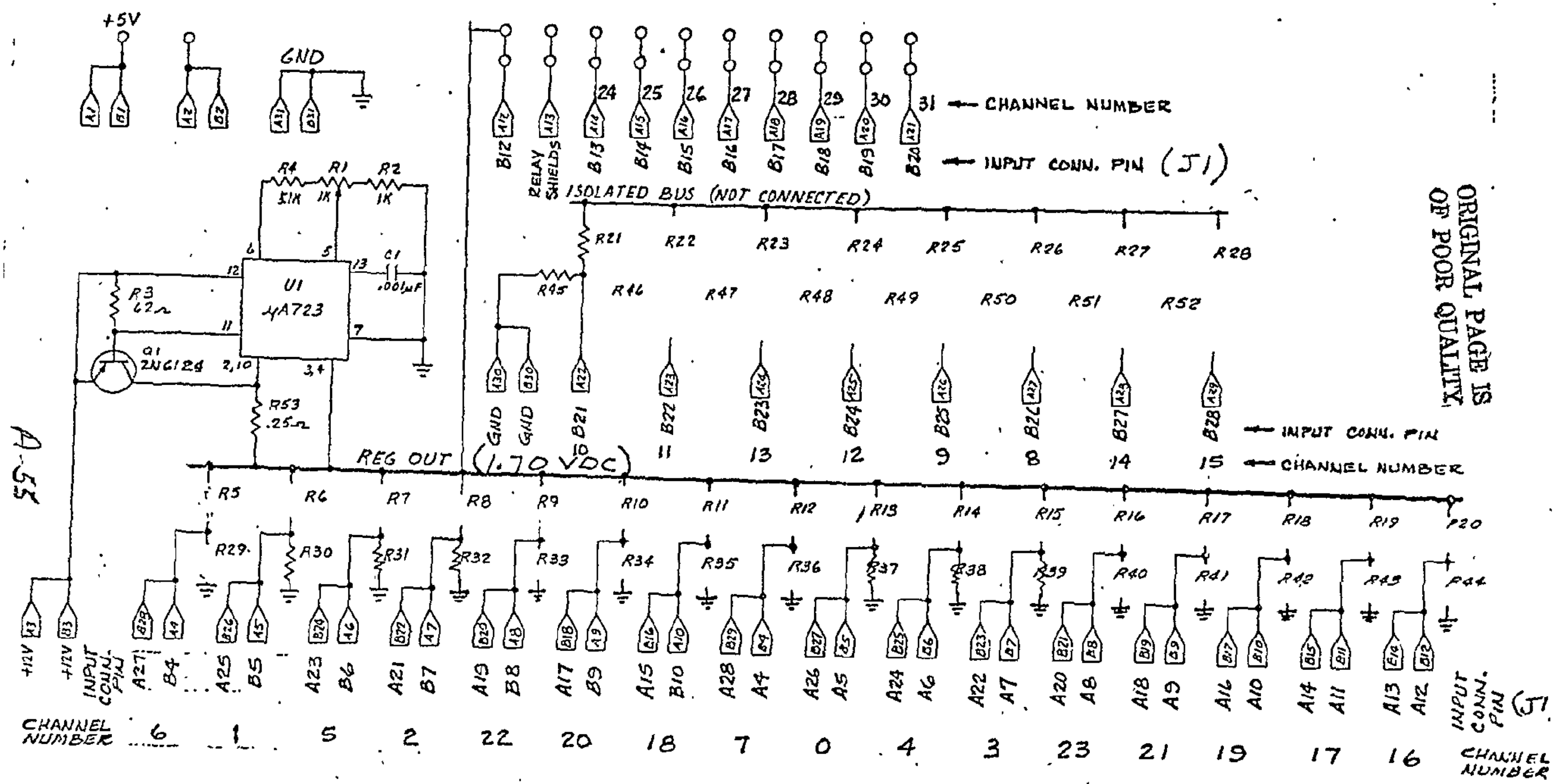


Figure 7.5

1. ALL RESISTOR VALUES NOT SHOWN ARE FACTORY SELECTED.

NOTES:

R30, R31, R32, R37, R38, R39 } 3.570K ±1%

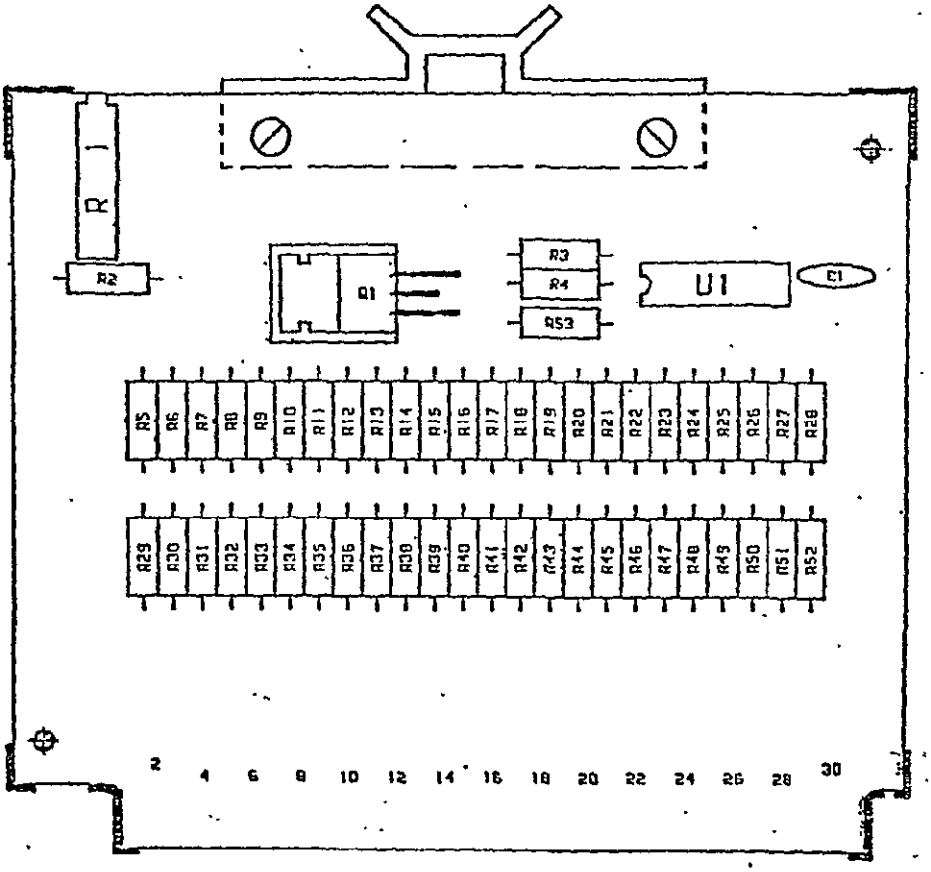
FAIRCHILD

SCHEMATIC — UNIVERSAL BOARD INPUT SIG. COND.

SIZE C | DWG NO 97470110-04 | 1

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVED
1	RELEASED TO MFG PER EN			



PRINCIPLE DRAWING TABLE	
DRAWING NO.	DOCUMENTATION
40048473	A/W AND SPEC
97470110-04	SCHEMATIC
97470110	LIST OF MAT'L

UNLESS OTHERWISE SPECIFIED

DIMENSIONS ARE IN INCHES. TOLERANCES ON

DECIMALS	ANGLES
X ±.1	±2°
XX ±.03	
XXX ±.010	BREAK SHARP EDGES .010 MAX

TRIAL: SEE LIST OF MAT'L

NEXT ASSY: 82

		DATE
DRAWN		
CHK		
ENGR		
MFG		
PROJ. ENGR		
APPVD.	A-56	

FAIRCHILD INSTRUMENTATION

TITLE: ASSEMBLY — UNIVERSAL CARD

SIZE	CODE IDENT NO.	DWG NO.
A		97470110

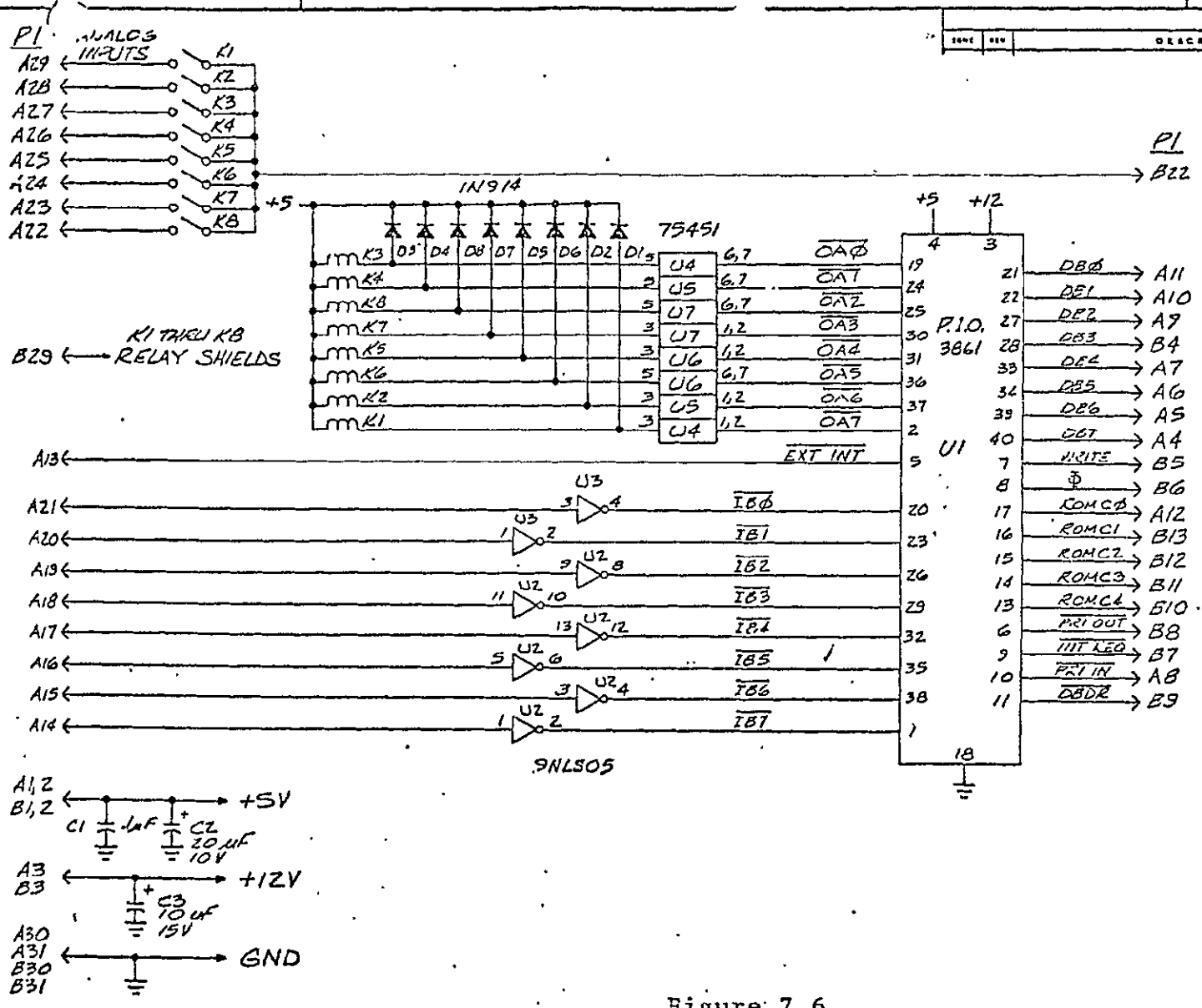


Figure 7.6

SCHEMATIC - RHO SIGMA; INPUT CARD

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REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVED
1	RELEASED TO MFG PER EN			

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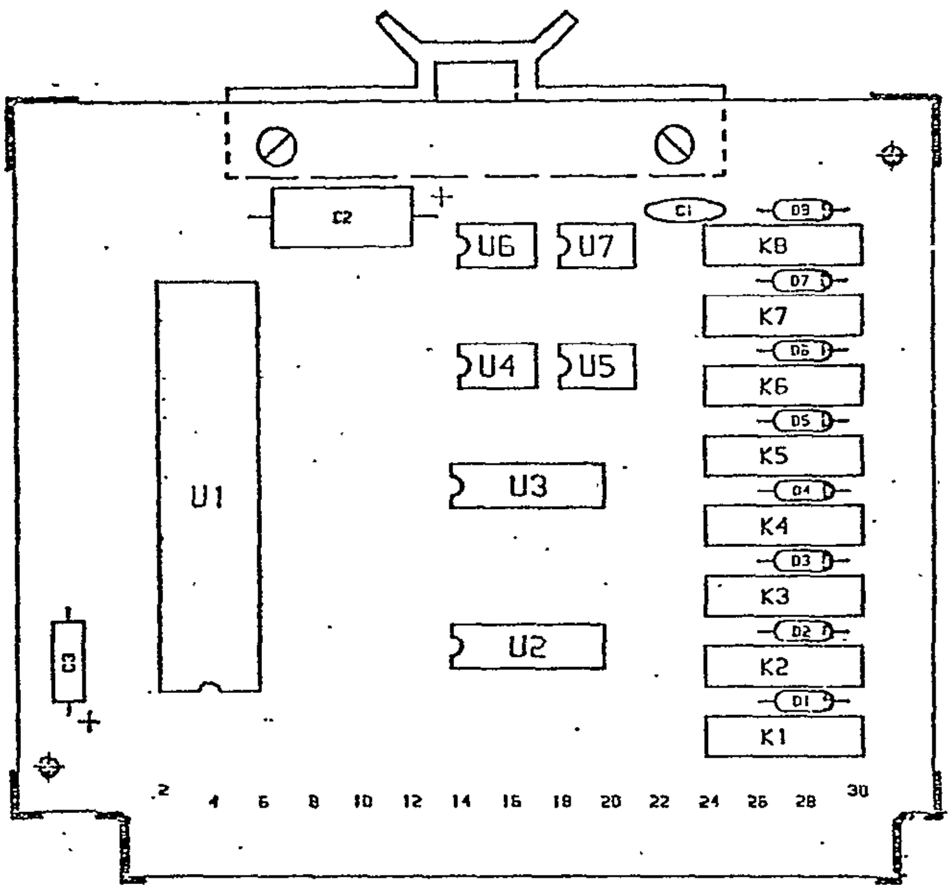

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PRINCIPLE DRAWING TABLE

DRAWING NO.	DOCUMENTATION	RE N[illegible]
40048465	A/W AND SPEC	[illegible]
97470103-04	SCHEMATIC	R[illegible]
97470103	LIST OF MAT'L	[illegible]

UNLESS OTHERWISE SPECIFIED

DIMENSIONS ARE IN INCHES. TOLERANCES ON
DECIMALS X ±.1 XX ±.03 XXX ±.010
ANGLES ±2°
BREAK SHARP EDGES .010 MAX.

MATERIAL
SEE LIST OF MAT'L

NEXT ASSY
82

USED ON [illegible]

DRAWN [illegible] DATE [illegible]
CHK DATE
ENGR DATE
MFG DATE
PROJ. ENGR DATE
APPVD. A-59
CONTR NO. [illegible]

FAIRCHILD
INSTRUMENTATION

TITLE
ASSEMBLY — INPUT CARD

SIZE A
CODE IDENT NO.
DWG NO 97470103
REV

SCALE [illegible]

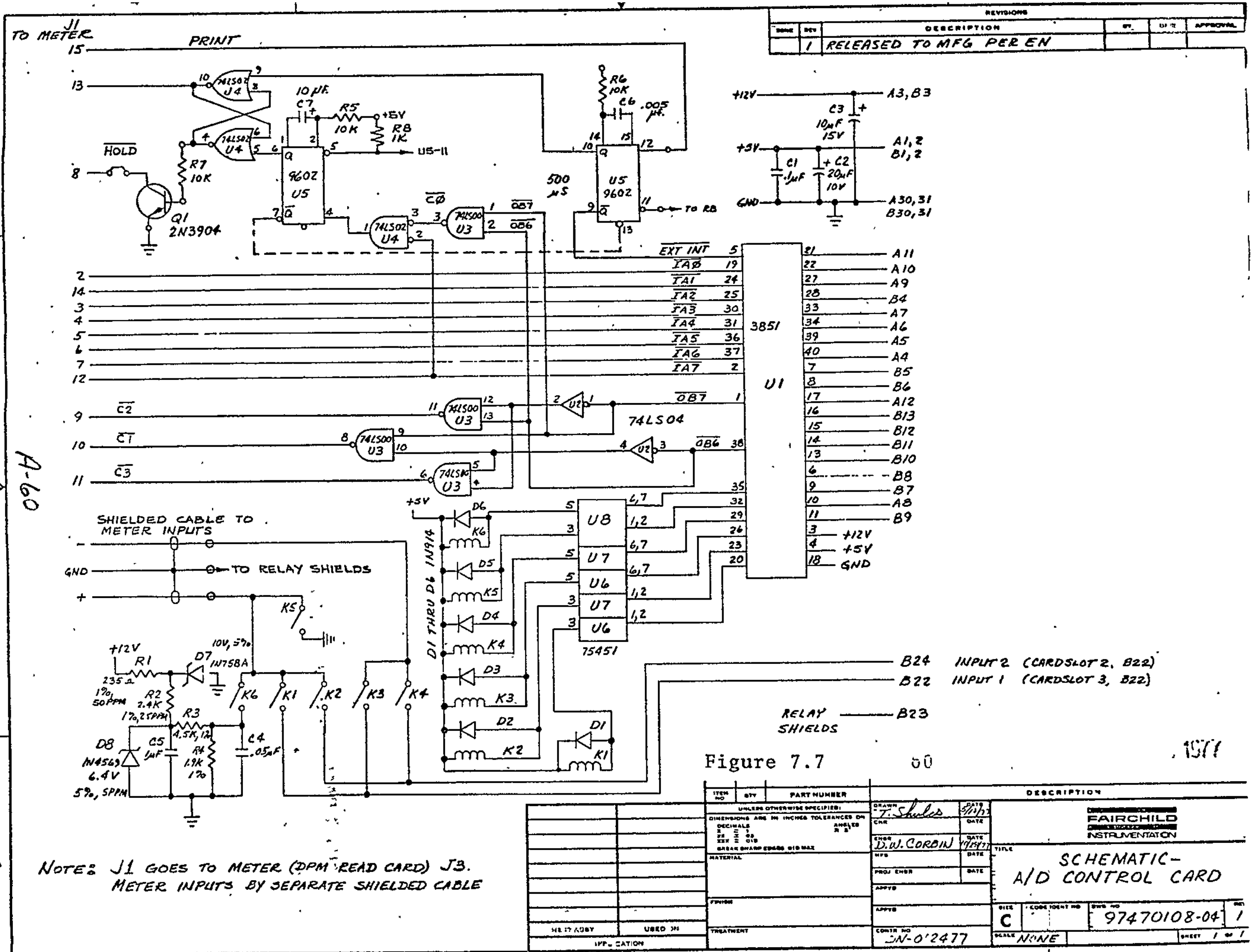
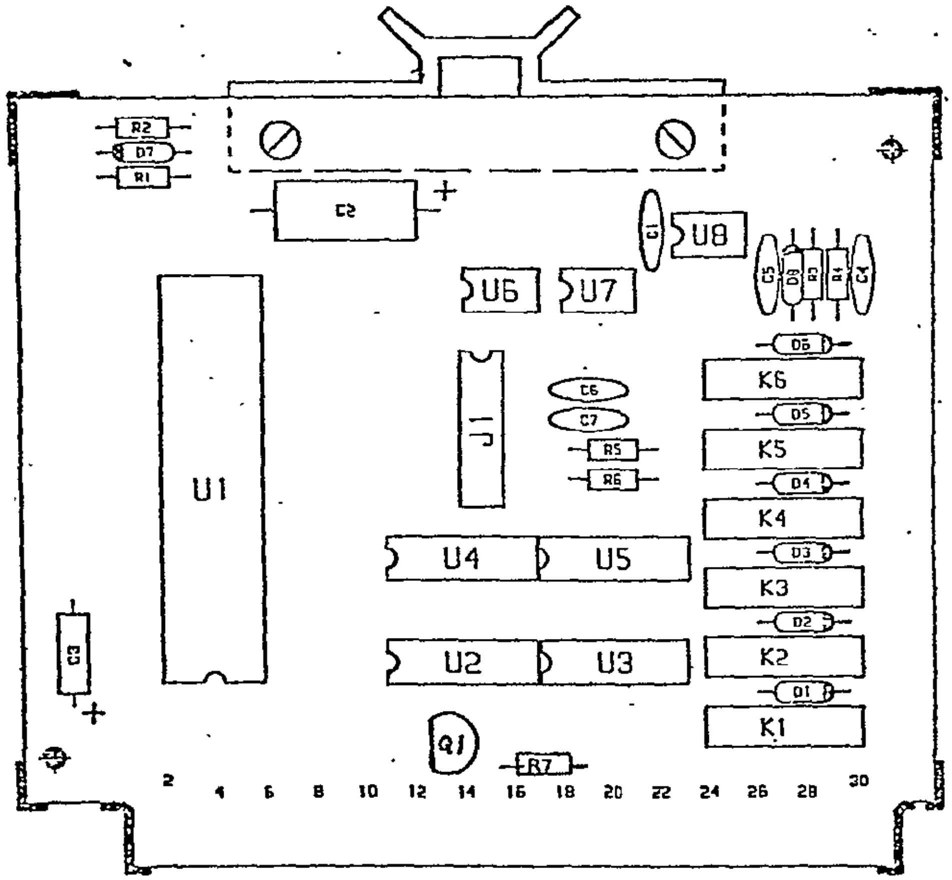

REVISIONS
1 RELEASED TO MFG PER EN
J1 TO METER
PRINT
HOLD
Q1 2N3904
9602 U5
74LS02 U4
74LS00 U3
74LS04
3851 U1
EXT INT
75451
SHIELDED CABLE TO METER INPUTS
TO RELAY SHIELDS
D1 THRU D6 1N914
INPUT 2 (CARDSLOT 2, B22)
INPUT 1 (CARDSLOT 3, B22)
RELAY SHIELDS
NOTE: J1 GOES TO METER (DPM READ CARD) J3.
METER INPUTS BY SEPARATE SHIELDED CABLE
FAIRCHILD INSTRUMENTATION
SCHEMATIC-
A/D CONTROL CARD
D.W. CORBIN
97470108-04
SCALE NONE
A-60

Figure 7.7

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVED
1	RELEASED TO MFG PER EN			



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PRINCIPLE DRAWING TABLE

DRAWING NO.	DOCUMENTATION	RE N
40048471	A/W AND SPEC	[illegible]
97470108-04	SCHEMATIC	[illegible]
97470108	LIST OF MAT'L	[illegible]

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES, TOLERANCES ON
DECIMALS: X ±.1, XX ±.03, XXX ±.010
ANGLES ±2°
BREAK SHARP EDGES .010 MAX.

MATERIAL: SEE LIST OF MAT'L

NEXT ASSY: 82

USED ON: [illegible]

DRAWN	DATE 5/12/77
CHK	DATE
ENGR	DATE
MFG	DATE
PROJ. ENGR	DATE
APPVD. A-61	
CONTR NO. [illegible]	

FAIRCHILD
INSTRUMENTATION

TITLE: ASSEMBLY — A/D CONTROL CARD

SIZE	CODE IDENT NO	DWG NO	REV
A		97470108	1

SCALE 1/1

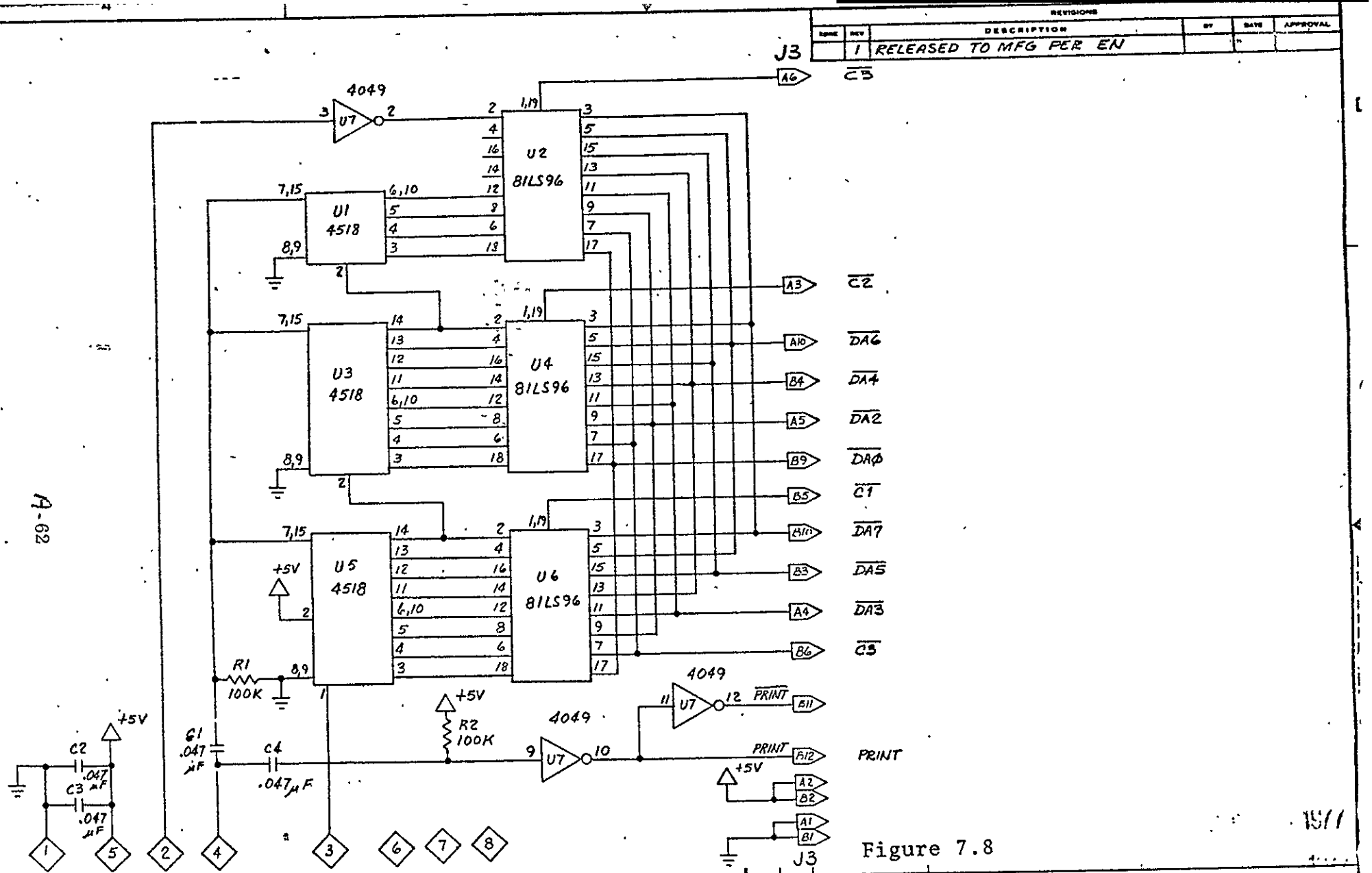
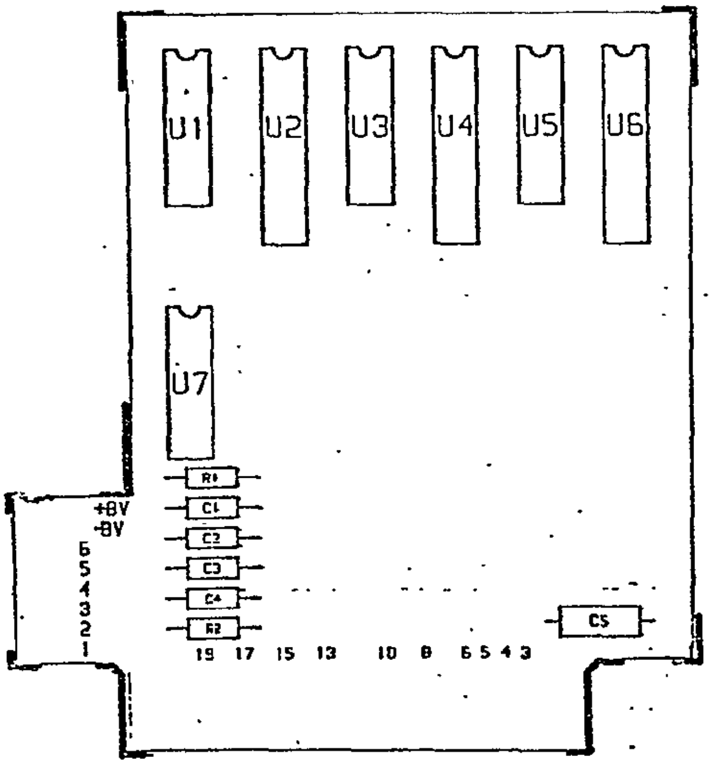


Figure 7.8

NOTE. J3 CONNECTS TO A/D CONTOL CARD "J1"

REV.	DESCRIPTION	BY	DATE	APPROVED
1	RELEASED TO MFG PER EN			



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PRINCIPLE DRAWING TABLE

DRAWING NO.	DOCUMENTATION	RE NO
40048486	A/W AND SPEC	1
97470109-04	SCHEMATIC	RE
97470109	LIST OF MAT'L	1

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES. TOLERANCES ON
DECIMALS: X ± .1, XX ± .03, XXX ± .010
ANGLES: ± 2°
BREAK SHARP EDGES .010 MAX.

MATERIAL: SEE LIST OF MAT'L

NEXT ASSY: 82

USED ON: [illegible]

DRAWN: T. Sheilos	DATE: 5/12/77	
CHK	DATE	
ENGR	DATE	
MFG	DATE	
PROJ. ENGR	DATE	
APPVD. A-63		
CONTR NO. [illegible]		

FAIRCHILD
INSTRUMENTATION

TITLE: ASSEMBLY— DPM READ BOARD

SIZE	CODE IDENT NO	DWG NO	REV.
A		97470109	1

SCALE 1/1 SHEET 1 OF 1

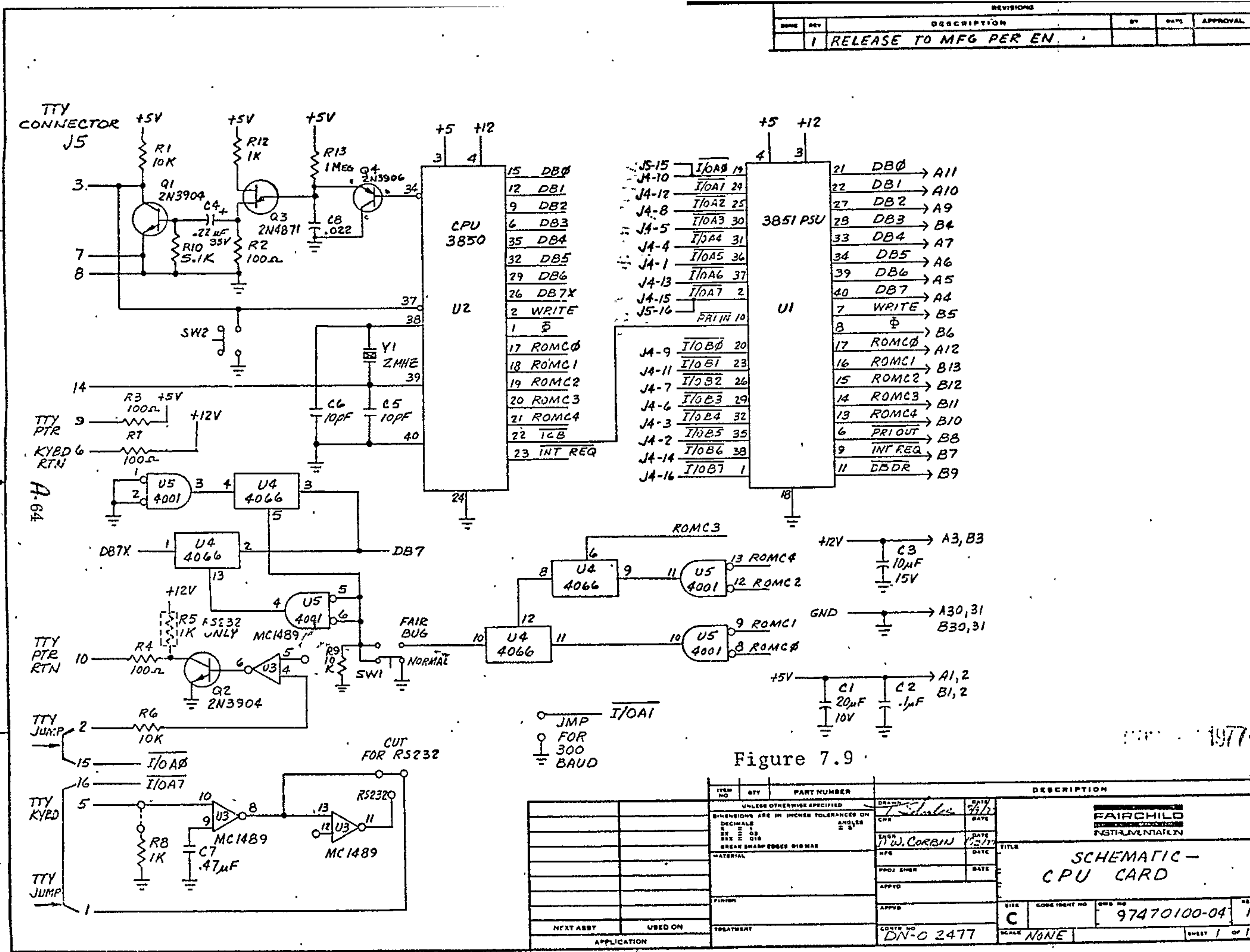
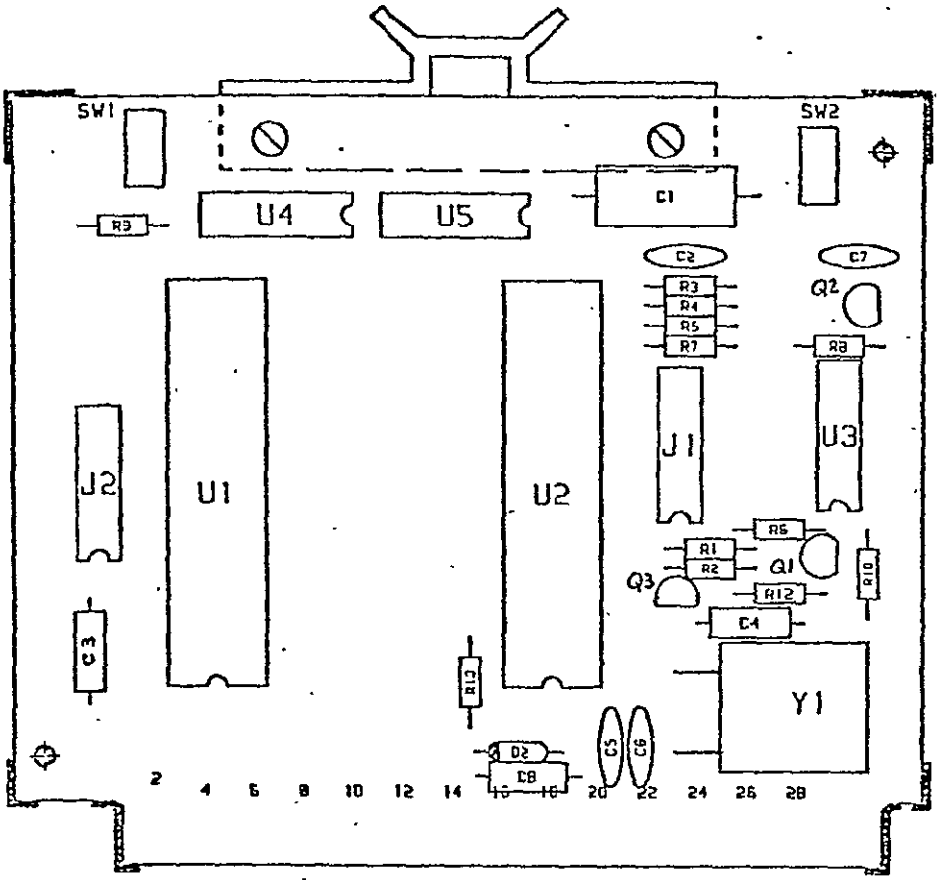

REVISIONS
DESCRIPTION
APPROVAL
1 RELEASE TO MFG PER EN
TTY CONNECTOR J5
+5V
R1 10K
Q1 2N3904
R12 1K
Q3 2N4871
R13 1MEG
Q4 2N3906
C8 .022
C4 .22μF 35V
R10 5.1K
R2 100Ω
CPU 3850
U2
+5
+12
DB0
DB1
DB2
DB3
DB4
DB5
DB6
DB7X
WRITE
Φ
ROMC0
ROMC1
ROMC2
ROMC3
ROMC4
ICB
INT REQ
SW2
Y1 2MHZ
C6 10pF
C5 10pF
TTY PTR
KYBD RTN
R3 100Ω
R7 100Ω
+12V
U5 4001
U4 4066
DB7X
DB7
R5 1K RS232 ONLY
MC1489
FAIR BUG
NORMAL
SW1
R9 10K
TTY PTR RTN
R4 100Ω
Q2 2N3904
U3
TTY JUMP
R6 10K
I/OA0
I/OA7
TTY KYBD
CUT FOR RS232
RS232
R8 1K
C7 .47μF
3851 PSU
U1
I/OA0
I/OA1
I/OA2
I/OA3
I/OA4
I/OA5
I/OA6
I/OA7
PRI IN
I/OB0
I/OB1
I/OB2
I/OB3
I/OB4
I/OB5
I/OB6
I/OB7
PRI OUT
DBDR
J5-15
J4-10
J4-12
J4-8
J4-5
J4-4
J4-1
J4-13
J4-15
J5-16
J4-9
J4-11
J4-7
J4-6
J4-3
J4-2
J4-14
J4-16
A11
A10
A9
B4
A7
A6
A5
A4
B5
B6
A12
B13
B12
B11
B10
B8
B7
B9
ROMC3
ROMC4
ROMC2
ROMC1
ROMC0
C3 10μF 15V
A3, B3
GND
A30,31
B30,31
+5V
C1 20μF 10V
C2 .1μF
A1,2
B1,2
JMP FOR 300 BAUD
I/OA1
A-64
1977
PART NUMBER
DESCRIPTION
FAIRCHILD INSTRUMENTATION
D.W. CORBIN
TITLE
SCHEMATIC — CPU CARD
SIZE C
97470100-04
DN-C 2477
SCALE NONE
SHEET 1 OF 1
NEXT ASSY
USED ON
APPLICATION

Figure 7.9

REV.	DESCRIPTION	BY	DATE	APPROVED
1	RELEASED TO MFG PER EN			



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OF POOR QUALITY

PRINCIPLE DRAWING TABLE

DRAWING NO.	DOCUMENTATION	REV NO
40048472	A/W AND SPEC	1
97470100-04	SCHEMATIC	RE
97470100	LIST OF MAT'L	1

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES. TOLERANCES ON
DECIMALS: X ±.1, XX ±.03, XXX ±.010
ANGLES ±2°
BREAK SHARP EDGES .010 MAX.

MATERIAL: SEE LIST OF MAT'L

NEXT ASSY: 82

USED ON: PROGRAM CONTROLLER

DRAWN	T. Sutter	DATE 5/12/77
CHK		DATE
ENGR		DATE
MFG		DATE
PROJ. ENGR		DATE
APPVD.	A-65	
CONTR NO.	DN-012477	

FAIRCHILD INSTRUMENTATION

TITLE: ASSEMBLY — CPU BOARD

SIZE	CODE IDENT NO.	DWG NO.	REV
A		97470100	1

SCALE 1/1 SHEET 1 OF 1

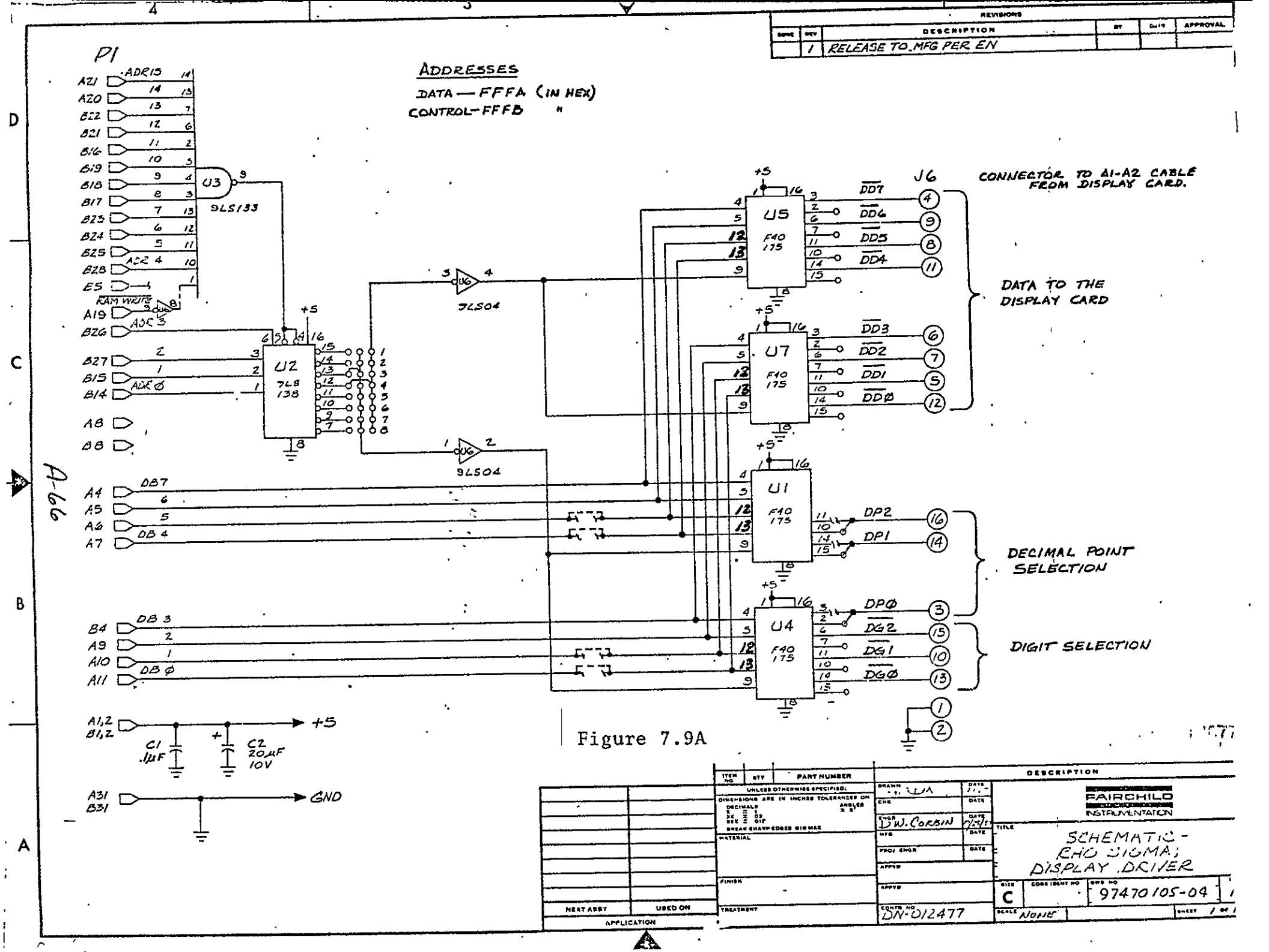


Figure 7.9A

REVISIONS					
SERIAL	QTY	DESCRIPTION	BY	DATE	APPROVAL
	1	RELEASE TO MFG PER EN			

ITEM NO	QTY	PART NUMBER	DESCRIPTION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES TOLERANCES ON
DECIMALS: X ± .1, XX ± .05, XXX ± .01
ANGLES ± 1°
BREAK SHARP EDGES .010 MAX
MATERIAL
FINISH
TREATMENT
NEXT ASSY | USED ON
APPLICATION

DRAWN T. LUA
CHK
ENGR D.W. CORBIN
MFG
PROJ ENGR
APPVD
APPVD
CONTR NO DN-D12477

FAIRCHILD INSTRUMENTATION

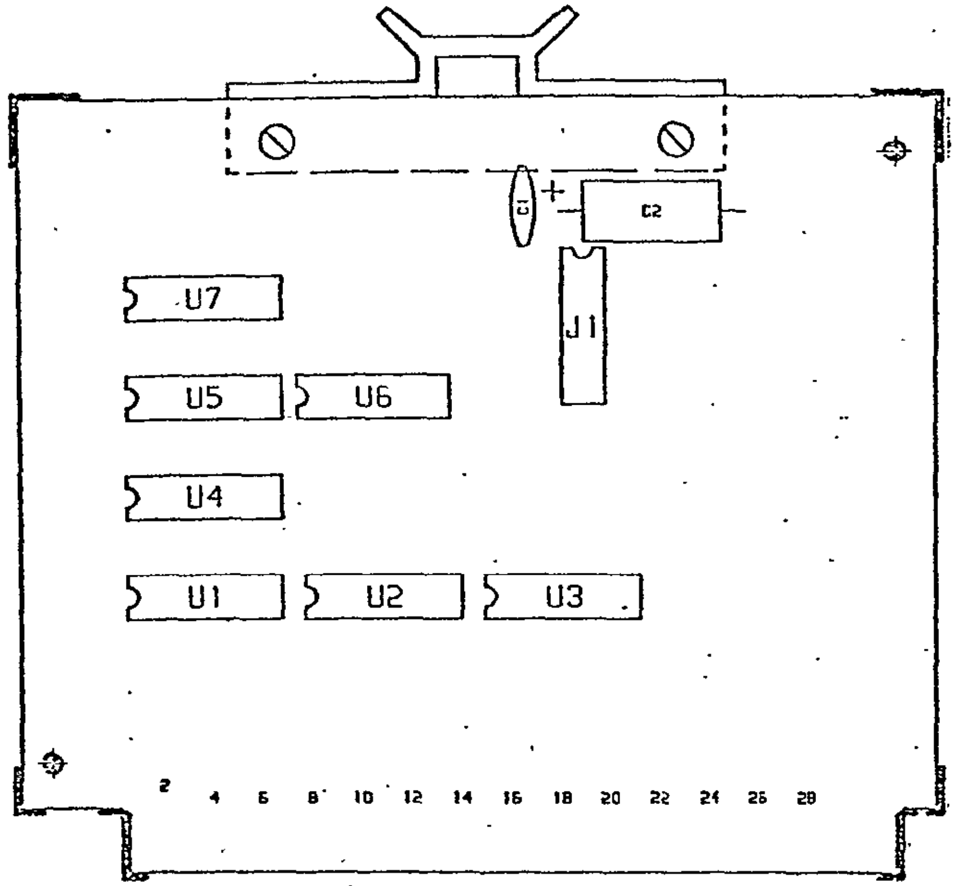
TITLE: SCHEMATIC - ECHO SIGMA; DISPLAY DRIVER

SIZE C | CODE IDENT NO | DWG NO 97470105-04 | REV

SCALE NONE | SHEET 1 OF 1

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVED
1	RELEASED TO MFG PER EN			



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OF POOR QUALITY

PRINCIPLE DRAWING TABLE

DRAWING NO.	DOCUMENTATION	RE N
40048467	A/W-AND SPEC	1
97470105-04	SCHEMATIC	RE
97470105	LIST OF MAT'L	1

UNLESS OTHERWISE SPECIFIED

DIMENSIONS ARE IN INCHES. TOLERANCES ON
DECIMALS: X ±.1, XX ±.03, XXX ±.010
ANGLES ±2°
BREAK SHARP EDGES .010 MAX.

MATERIAL: SEE LIST OF MAT'L

NEXT ASSY: 82

DRAWN: T. Shirlas — DATE: 5/12/77
CHK — DATE
ENGR — DATE
MFG — DATE
PROJ. ENGR — DATE
APPVD — A-67

FAIRCHILD INSTRUMENTATION

TITLE: ASSEMBLY — DISPLAY DRIVER CARD

SIZE: A | CODE IDENT NO. | DWG NO. 97470105 | REV 1

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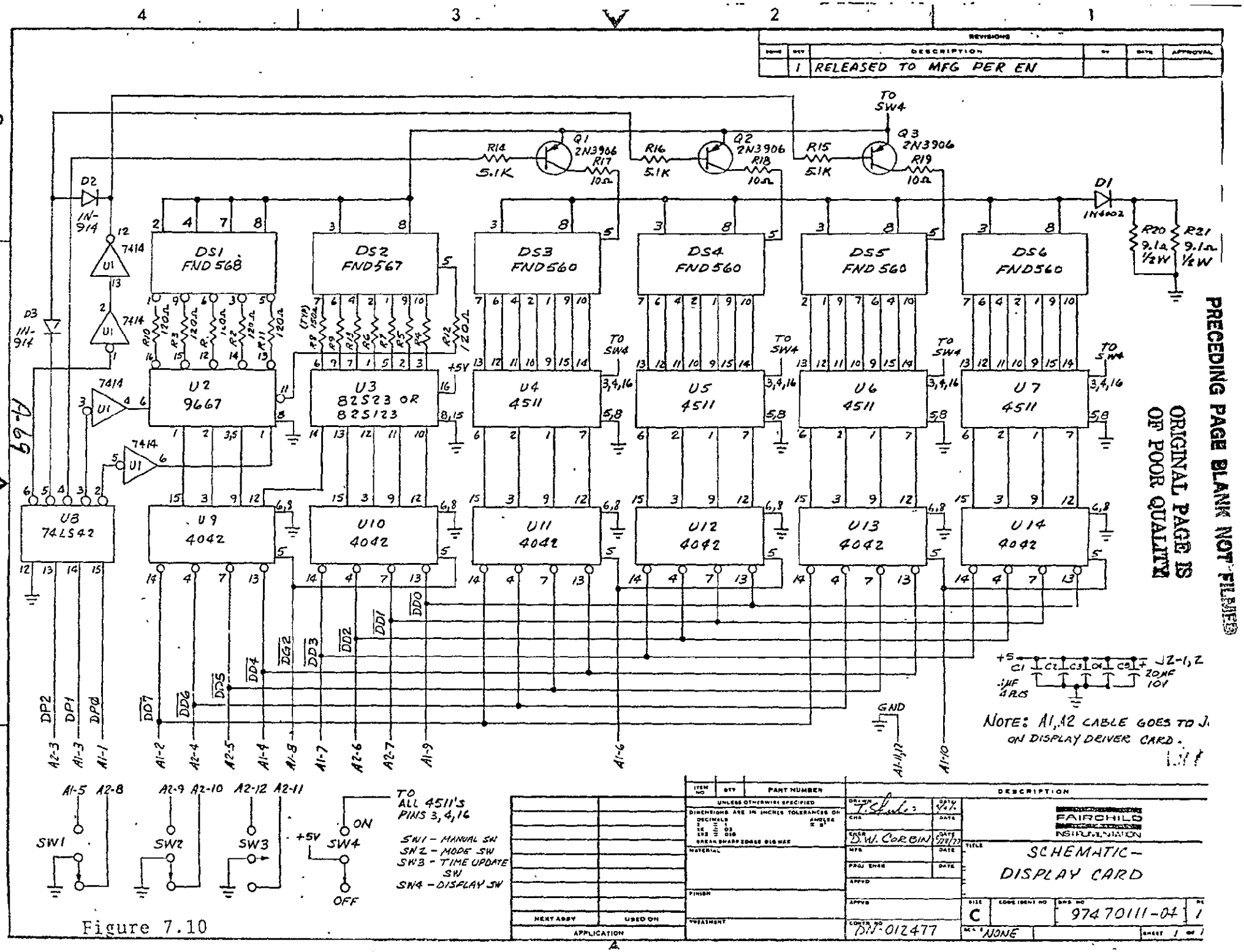
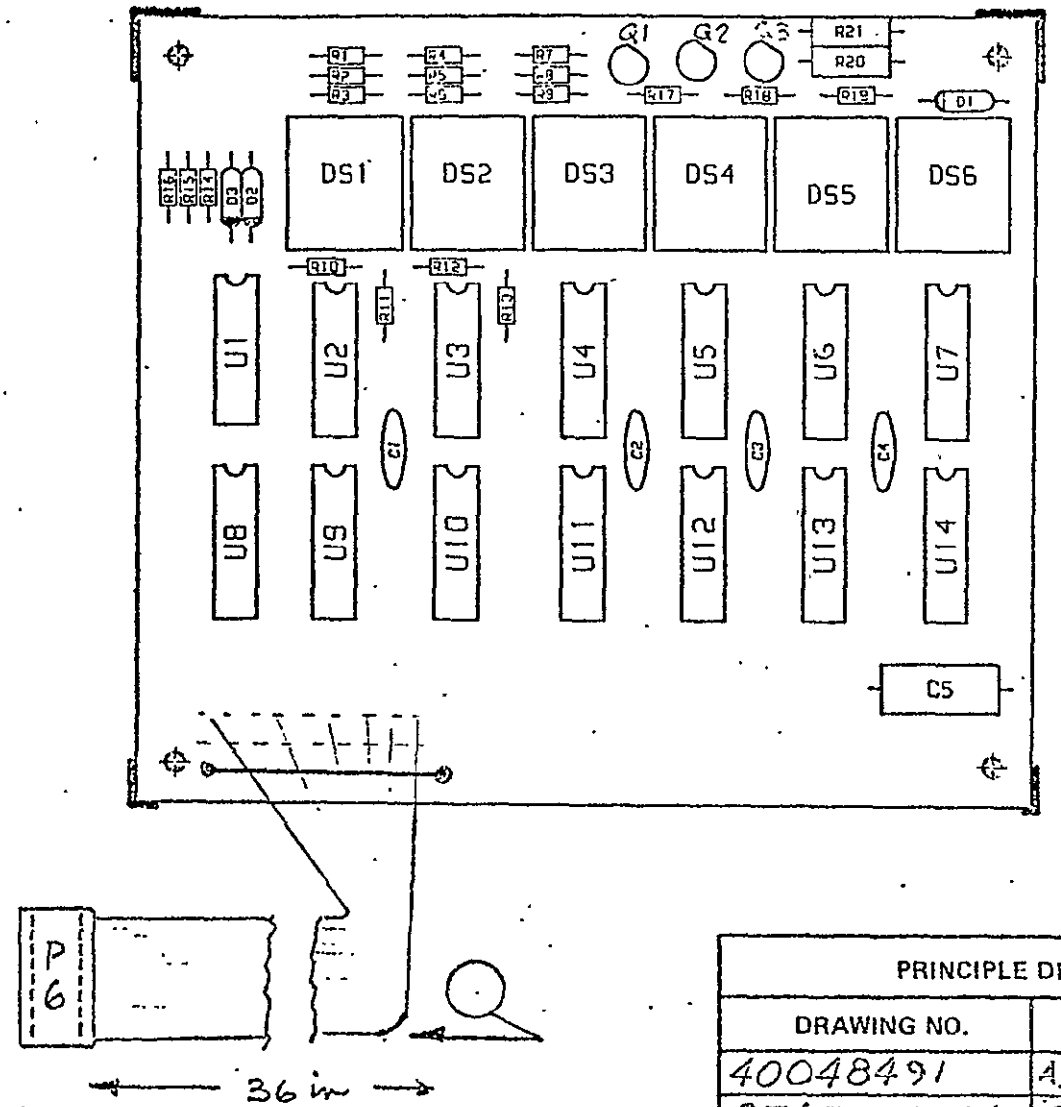


Figure 7.10

REVISIONS

V.	DESCRIPTION	BY	DATE	APPROVED
1	RELEASED TO MFG PER EN			



PRINCIPLE DRAWING TABLE		
DRAWING NO.	DOCUMENTATION	REV NO.
40048491	A/W AND SPEC	1
9747011-04	SCHEMATIC	REF
9747011	LIST OF MAT'L	1

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES. TOLERANCES ON
DECIMALS: X ±.1, XX ±.03, XXX ±.010
ANGLES: ±2°
BREAK SHARP EDGES .010 MAX.

MATERIAL: SEE LIST OF MAT'L

NEXT ASSY: 82

USED ON: DISPLAY CONTROLLED

DRAWN: T. Shidler — DATE
CHK — DATE
ENGR: D. W. Cordis — DATE 11/4/71
MFG — DATE
PROJ. ENGR — DATE
APPVD: A-70
CONTR NO. 041-01477

FAIRCHILD INSTRUMENTATION

NOV - 4 1971

TITLE: ASSEMBLY — DISPLAY CARD

SIZE	CODE IDENT NO	DWG NO	REV
A		9747011	1

SCALE 1/1 — SHEET 1 OF 1

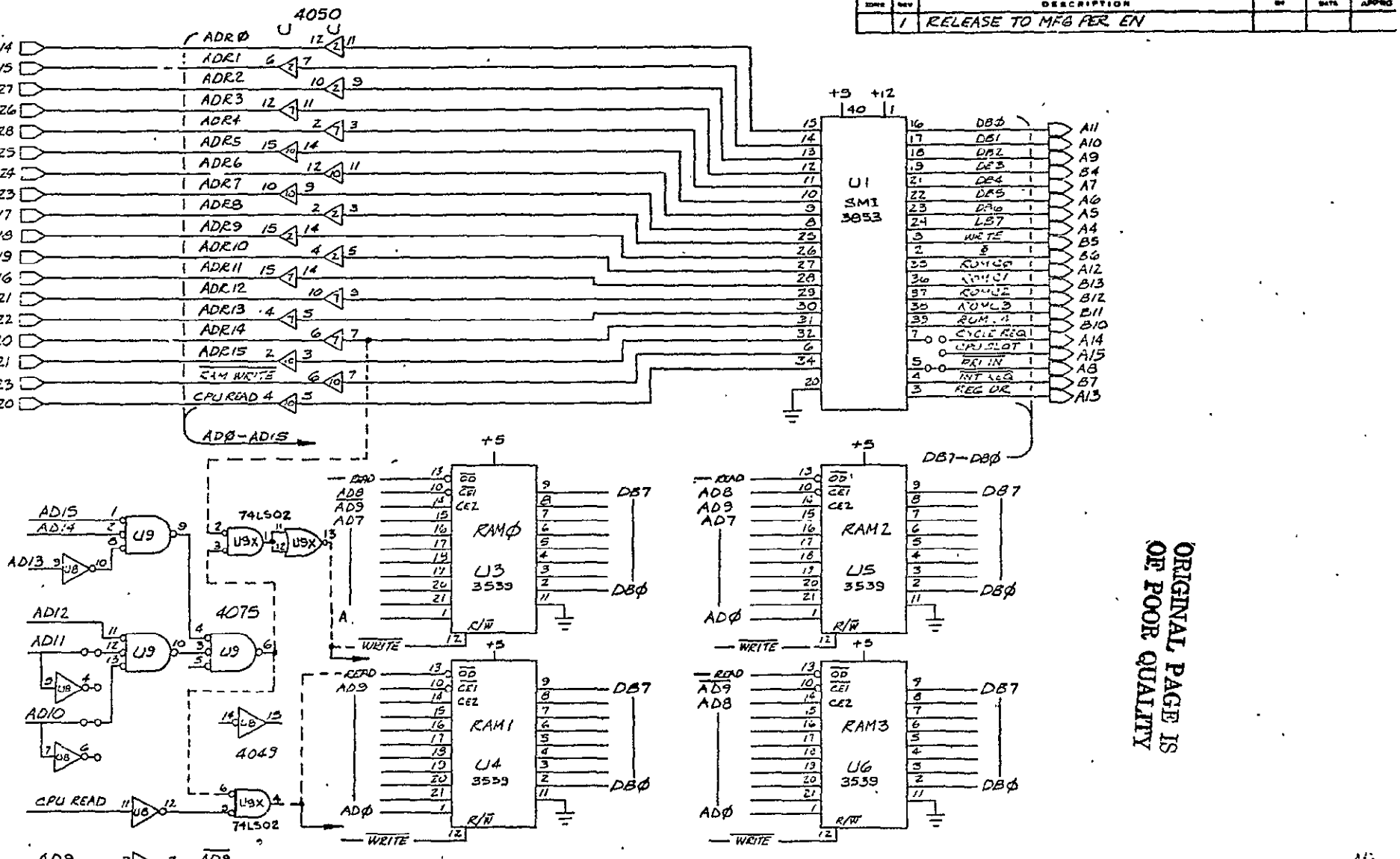


Figure 7.11

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REVISIONS					
ZONE	REV	DESCRIPTION	BY	DATE	APPRD
	1	RELEASE TO MFG PER EN			

ITEM NO	QTY	PART NUMBER	DESCRIPTION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES TOLERANCES ON
DECIMALS ANGLES
MATERIAL
FINISH
TREATMENT
NEXT ASSY | USED ON
APPL' AVION

DRAWN L. Sanchez 11/5/82
CHK
ENGR L.W. Corbin 11/5/82
MFG
PROJ ENGR
APPVD
APPVD
CONTR NO LN-012477

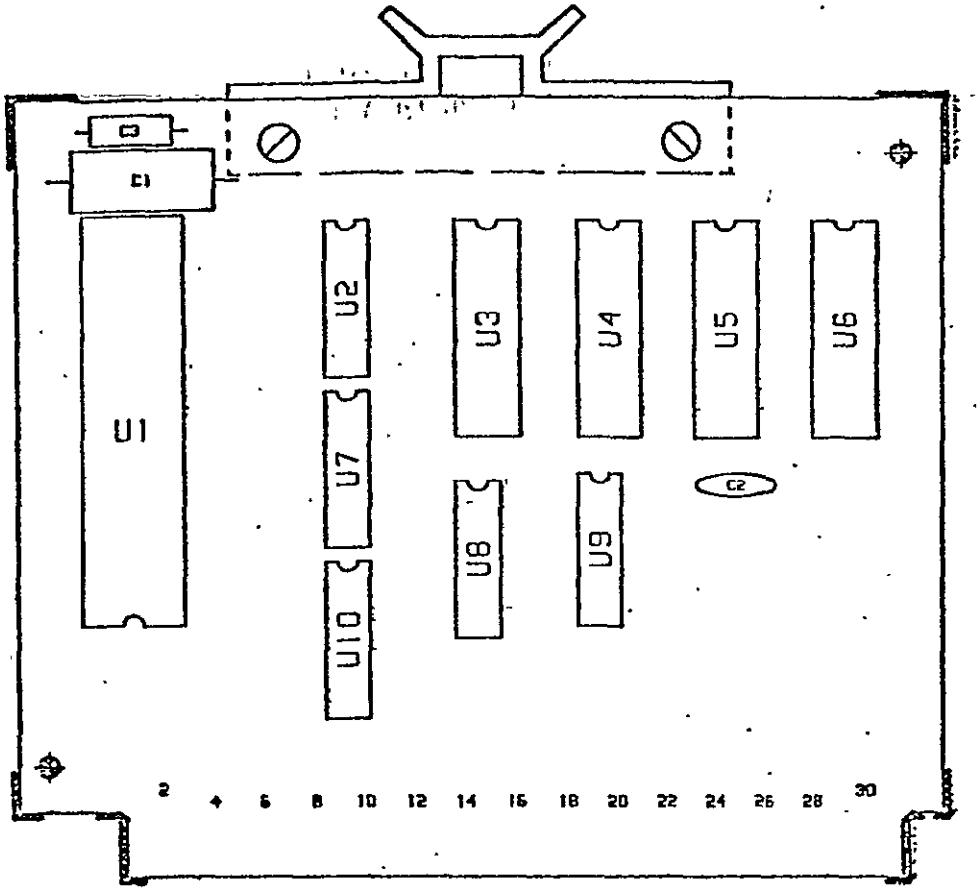
FAIRCHILD INSTRUMENTATION

TITLE: SCHEMATIC - RHO SIGMA; MEMORY ADDRESS

SIZE C | CODE IDENT NO | DWG NO 97470107-04

SCALE NONE | SHEET 1

REV.	DESCRIPTION	BY	DATE	APPROVED
1	RELEASED TO MFG PER EN			



PRINCIPLE DRAWING TABLE

DRAWING NO.	DOCUMENTATION	REV. NO.
40048470	A/W AND SPEC	
97470107-04	SCHEMATIC	R
97470107-03	LIST OF MAT'L	

UNLESS OTHERWISE SPECIFIED

DIMENSIONS ARE IN INCHES. TOLERANCES ON
DECIMALS: X ±.1, XX ±.03, XXX ±.010
ANGLES: ±2°
BREAK SHARP EDGES .010 MAX.

MATERIAL: SEE LIST OF MAT'L

NEXT ASSY: 82

USED ON: PROGRAM CONTROLLER

DRAWN	T. Shelton	DATE 9/1/77
CHK		DATE
ENGR		DATE
MFG		DATE
PROJ. ENGR		DATE
APPVD.	A-72	
CONTR NO.	DN-012477	

FAIRCHILD INSTRUMENTATION

TITLE: ASSEMBLY— MEMORY ADDRESS CAR

SIZE	CODE IDENT NO.	DWG NO.	REV.
A		97470107	

SCALE 1/1 SHEET 1 OF 1

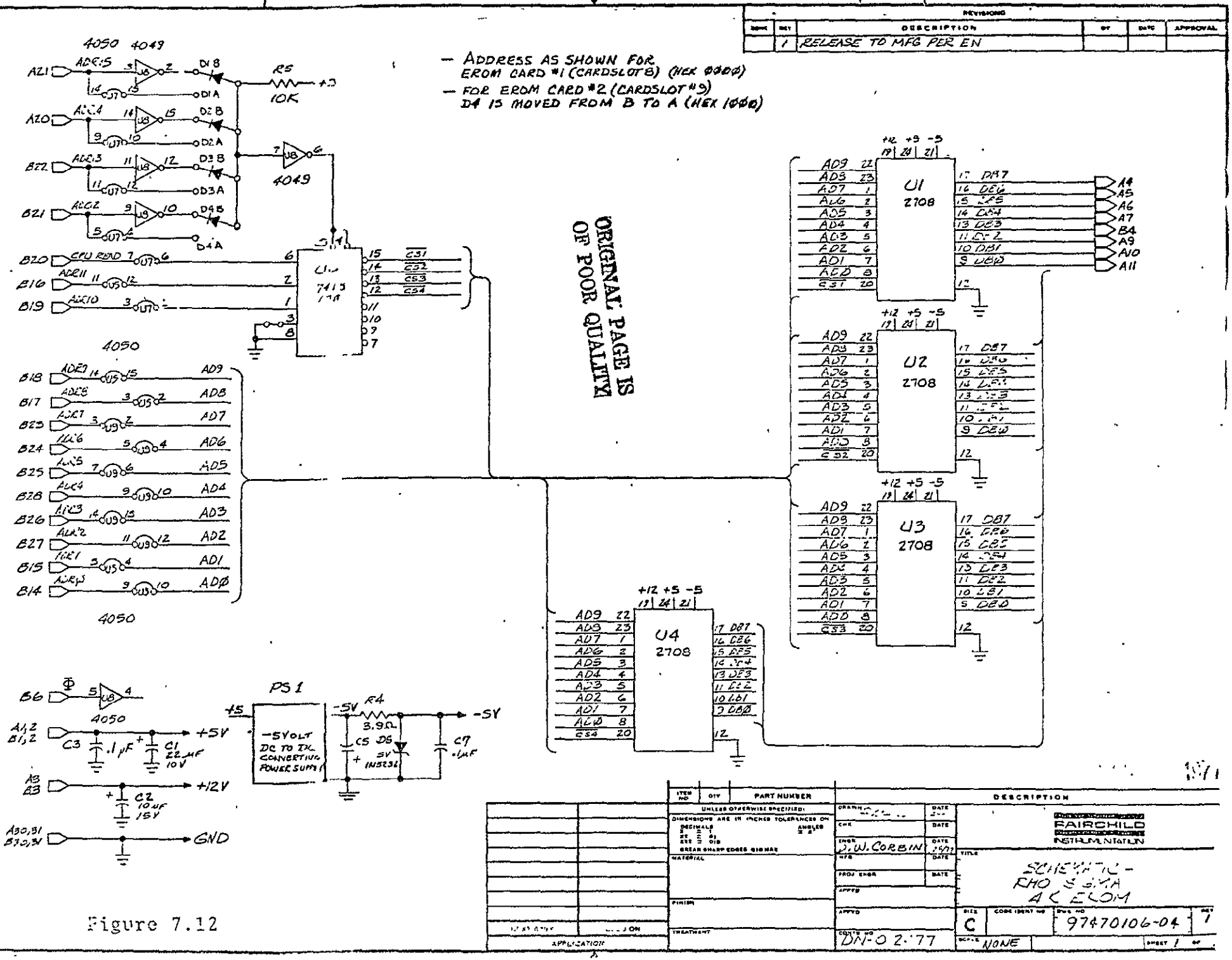
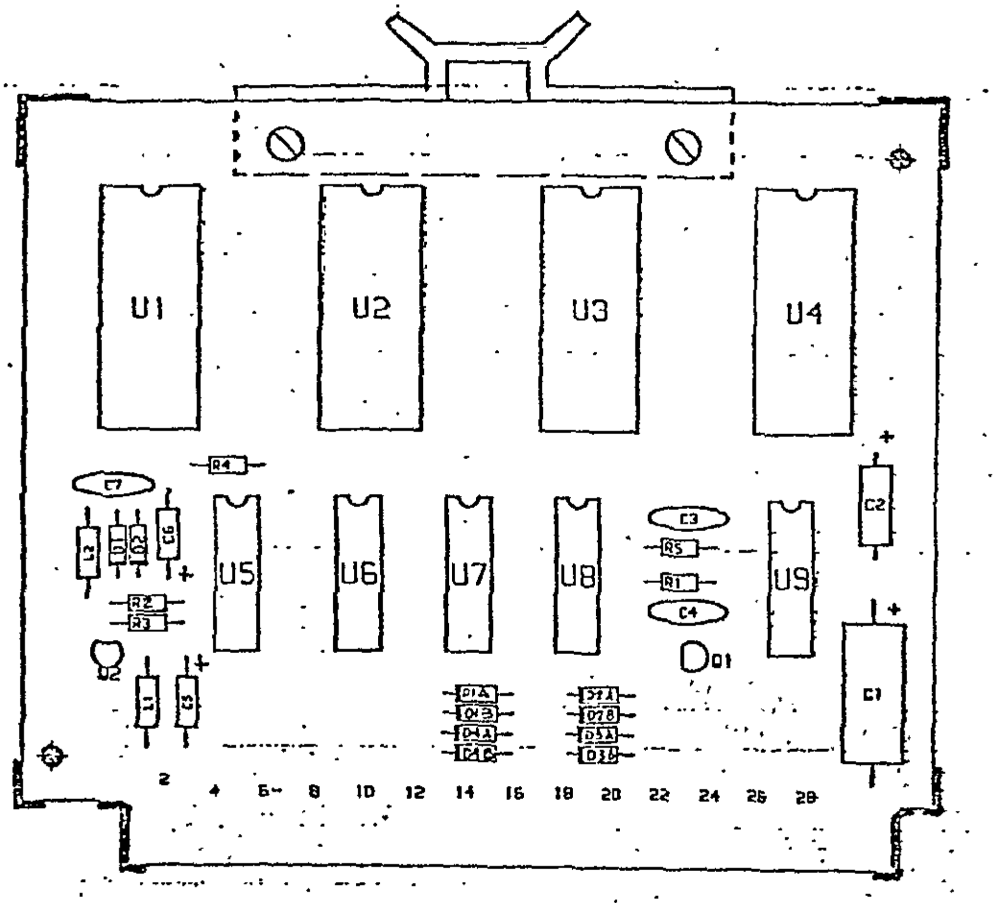

REVISIONS
REV 1 RELEASE TO MFG PER EN
— ADDRESS AS SHOWN FOR EROM CARD #1 (CARDSLOT 8) (HEX ØØØØ)
— FOR EROM CARD #2 (CARDSLOT #9) D4 IS MOVED FROM B TO A (HEX 1ØØØ)
ORIGINAL PAGE IS OF POOR QUALITY
4050 4049
4049
4050
4050
U1 2708
U2 2708
U3 2708
U4 2708
+12 +5 -5
PS 1
-5VOLT DC TO DC CONVERTING POWER SUPPLY
R4 3.9Ω
R5 10K
C1 22 µF 10V
C2 10 µF 15V
C3 .1 µF
C7 .1µF
+5V
+12V
-5V
GND
DN-02-77
J.W. CORBIN
FAIRCHILD INSTRUMENTATION
SCHEMATIC - RHO SIGMA ALGOM
97470106-04
SCALE NONE

Figure 7.12

REV.	DESCRIPTION	BY	DATE	APPROVED
1	RELEASED TO MFG PER EN			



PRINCIPLE DRAWING TABLE

DRAWING NO.	DOCUMENTATION	REV NO
40048469	A/W AND SPEC	1
97470106-04	SCHEMATIC	RE..
97470106	LIST OF MAT'L	1

UNLESS OTHERWISE SPECIFIED

DIMENSIONS ARE IN INCHES. TOLERANCES ON
DECIMALS: X ±.1, XX ±.03, XXX ±.010
ANGLES ±2°
BREAK SHARP EDGES .010 MAX.

MATERIAL: SEE LIST OF MAT'L

NEXT ASSY: 82

USED ON: PROGRAM CONTROLLED

DRAWN: [signature] DATE: 9/14/77
CHK — DATE
ENGR — DATE
MFG — DATE
PROJ. — DATE
APPV: A-74
CON: 012477

FAIRCHILD INSTRUMENTATION

TITLE: ASSEMBLY — 4K EROM CARD

SIZE	CODE IDENT NO.	DWG NO	REV
A		97470106	1

SCALE 1/1 — SHEET 1 OF 1

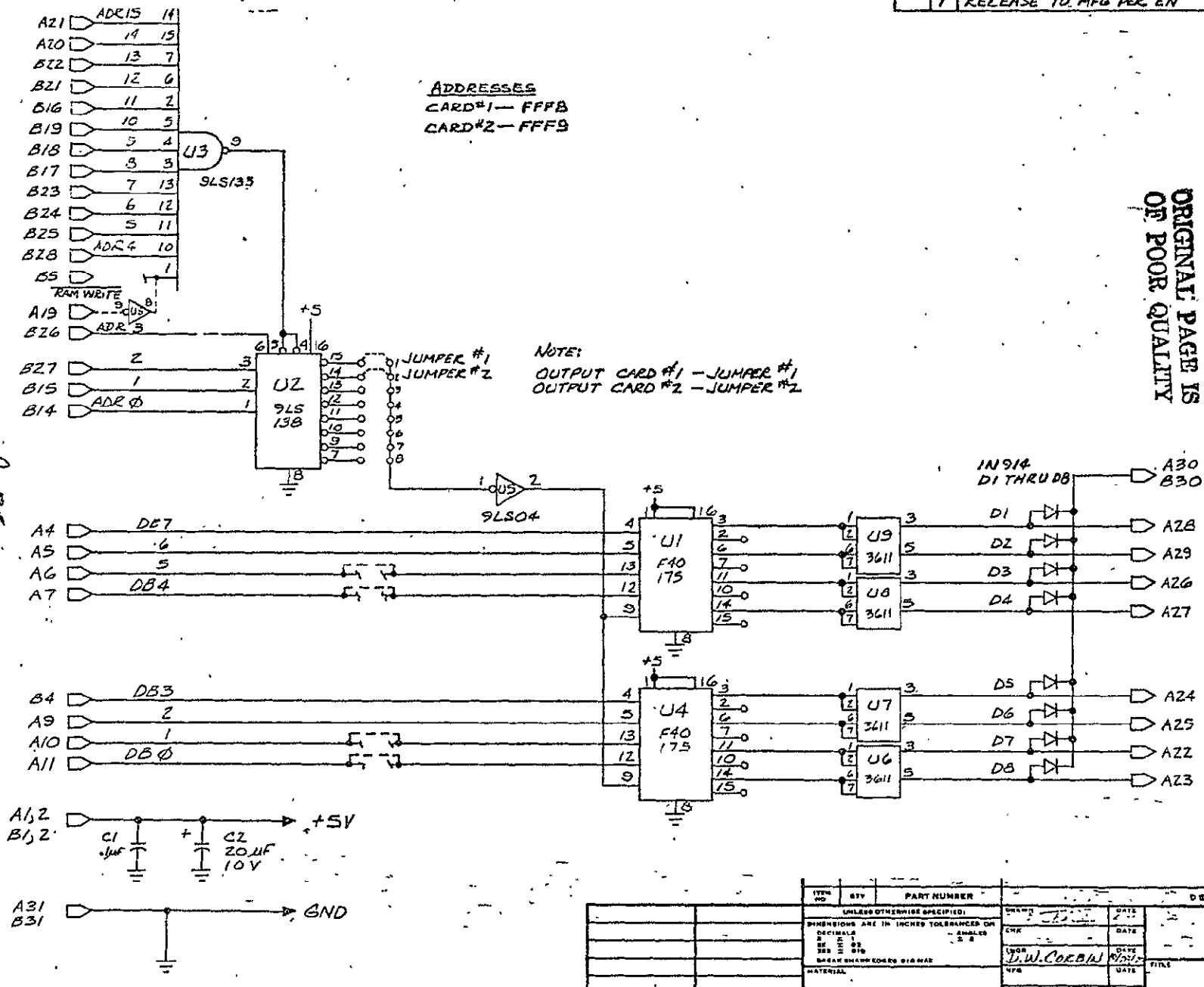


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Figure 7.13

REVISIONS					
ZONE	REV	DESCRIPTION	BY	DATE	APPROVAL
	1	RELEASE TO MFG PER EN			

ITEM NO	QTY	PART NUMBER	DESCRIPTION	
		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES ON DECIMALS .X ± .1 .XX ± .03 .XXX ± .010 BREAK SHARP EDGES 010 MAX ANGLES ± 2° MATERIAL FINISH	DRAWN	DATE
			CHK	DATE
			ENGR D.W. CORBIN	DATE 4/20/77
			MFG	DATE
			PROJ ENGR	DATE
			APPVD	
			APPVD	
NEXT ASSY	USED ON	TREATMENT	CONTR NO DN-012477	
APPLICATION				

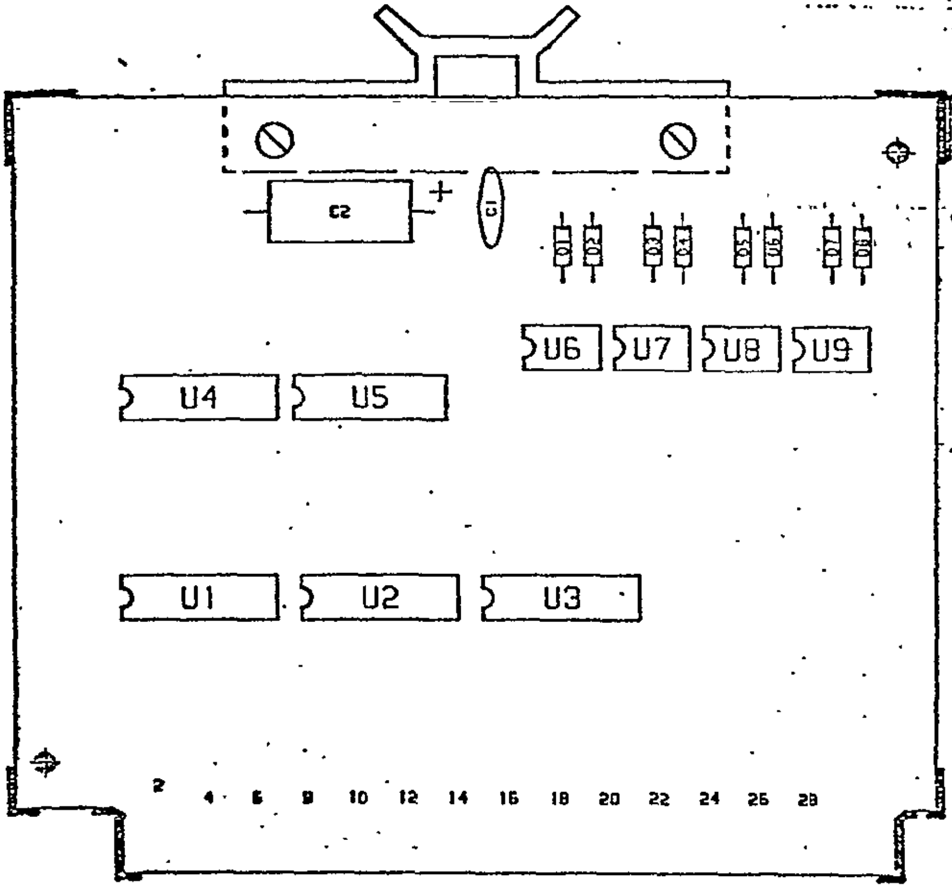
FAIRCHILD INSTRUMENTATION

TITLE: SCHEMATIC - RHO SIGMA; OUTPUT CARD

SIZE C | CODE IDENT NO | DWG NO 97470104-04 | REV 1

SCALE | SHEET 1 of 1

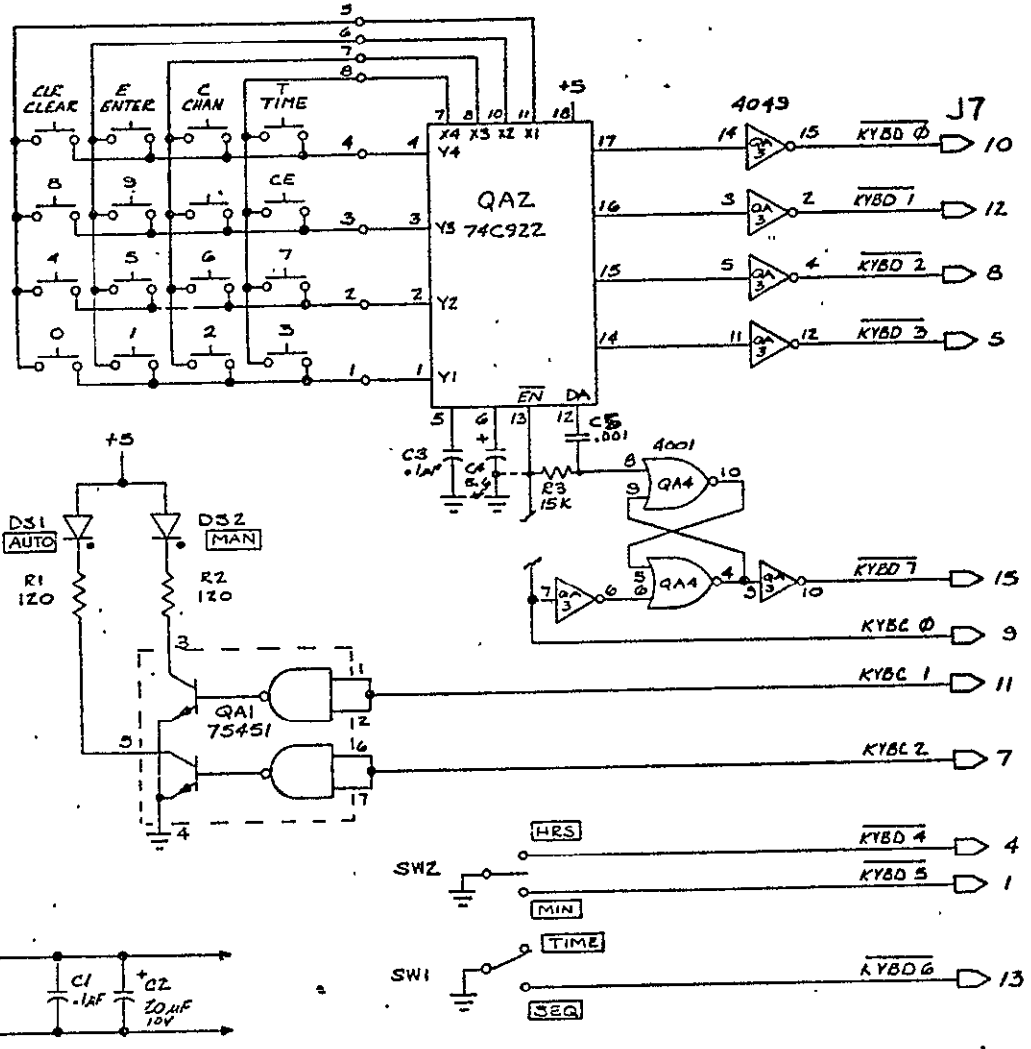
REV.	DESCRIPTION	BY	DATE	APPROVED
1	RELEASED TO MFG PER EN			



PRINCIPLE DRAWING TABLE		
DRAWING NO.	DOCUMENTATION	RE NO
40048466	A/W AND SPEC	-1
97470104-04	SCHEMATIC	RE
97470104	LIST OF MAT'L	/

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES ON DECIMALS X ±.1 XX ±.03 XXX ±.010 ANGLES ±2° BREAK SHARP EDGES .010 MAX.	DRAWN T. Shulter DATE 5/12/7	FAIRCHILD INSTRUMENTATION
MATERIAL: SEE LIST OF MAT'L	CHK DATE ENGR DATE MFG DATE PROJ. ENGR DATE	TITLE ASSEMBLY — OUTPUT CARD
NEXT ASSY 82	APPVD. A-76	SIZE A · CODE IDENT NO. · DWG NO 97470104 · REV 1
USED ON PROGRAM CONTROLLER	CONTR NO. DN-012477	SCALE 1/1 · SHEET 1 OF 1

REVISIONS					
ZONE	REV	DESCRIPTION	BY	DATE	APPROVAL
	1	RELEASE TO MFG PER EN	CR		



NOTE: +5 VOLT AND GND RETURN SUPPLIED BY TWISTED PAIR TO POWER SUPPLY.

Figure 7.14

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ITEM NO	QTY	PART NUMBER	DESCRIPTION
		UNLESS OTHERWISE SPECIFIED:	
		DIMENSIONS ARE IN INCHES TOLERANCES ON DECIMALS x = ± .1, xx = ± .03, xxx = ± .010; ANGLES = ± 1°; BREAK SHARP EDGES .010 MAX	
		MATERIAL	
		FINISH	
		TREATMENT	
NEXT ASSY	USED ON	APPLICATION	

DRAWN — DATE 5-1-87
CHK — DATE
ENGR J.W. CORBIN — DATE 4/5/87
MFG — DATE
PROJ ENGR — DATE
APPVD
APPVD
CONTR NO DNO12477

FAIRCHILD INSTRUMENTATION

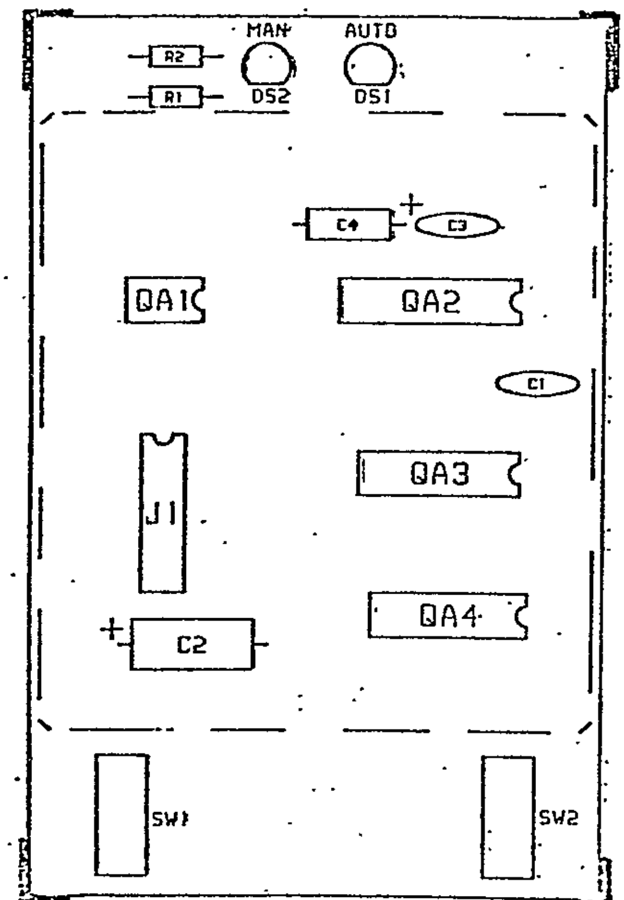
TITLE: SCHEMATIC- RHO SIGMA, KEYBOARD

SIZE C | CODE IDENT NO | DWG NO 97470112-04 | REV 1

SCALE | SHEET

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVED
1	REL TO MFG PER EN			



PRINCIPLE DRAWING TABLE

DRAWING NO.	DOCUMENTATION	REV NO
40048507	A/W AND SPEC	1
97470112-04	SCHEMATIC	RE
97470112-03	LIST OF MAT'L	1

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES ON DECIMALS X ±.1 XX ±.03 XXX ±.010 ANGLES ±2° BREAK SHARP EDGES .010 MAX.	DRAWN T. Shules DATE 5/13/77 CHK DATE ENGR DATE MFG DATE PROJ. ENGR DATE	FAIRCHILD INSTRUMENTATION
MATERIAL: SEE LIST OF MAT'L		TITLE ASSEMBLY — KEY BOARD CARD
NEXT ASSY 82	APPVD. A-78	NASA—MSFC
	CONTR NO	SIZE A / CODE IDENT NO / DWG NO 97470112 / REV 1

SECTION B

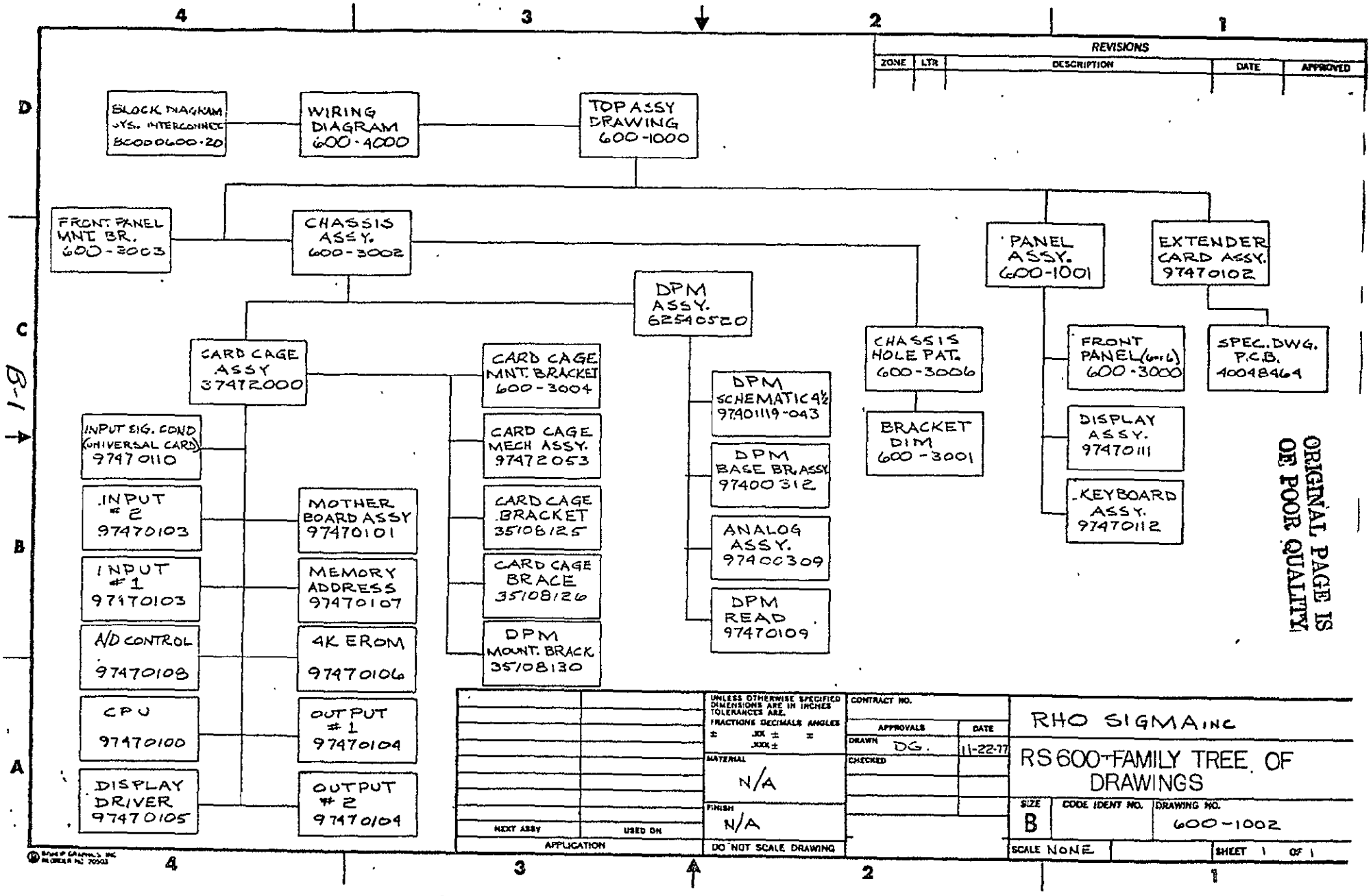
TABLE OF CONTENTS

SECTION B

SYSTEM DESIGN DRAWINGS

RS600

PROGRAMMABLE CONTROL SYSTEM



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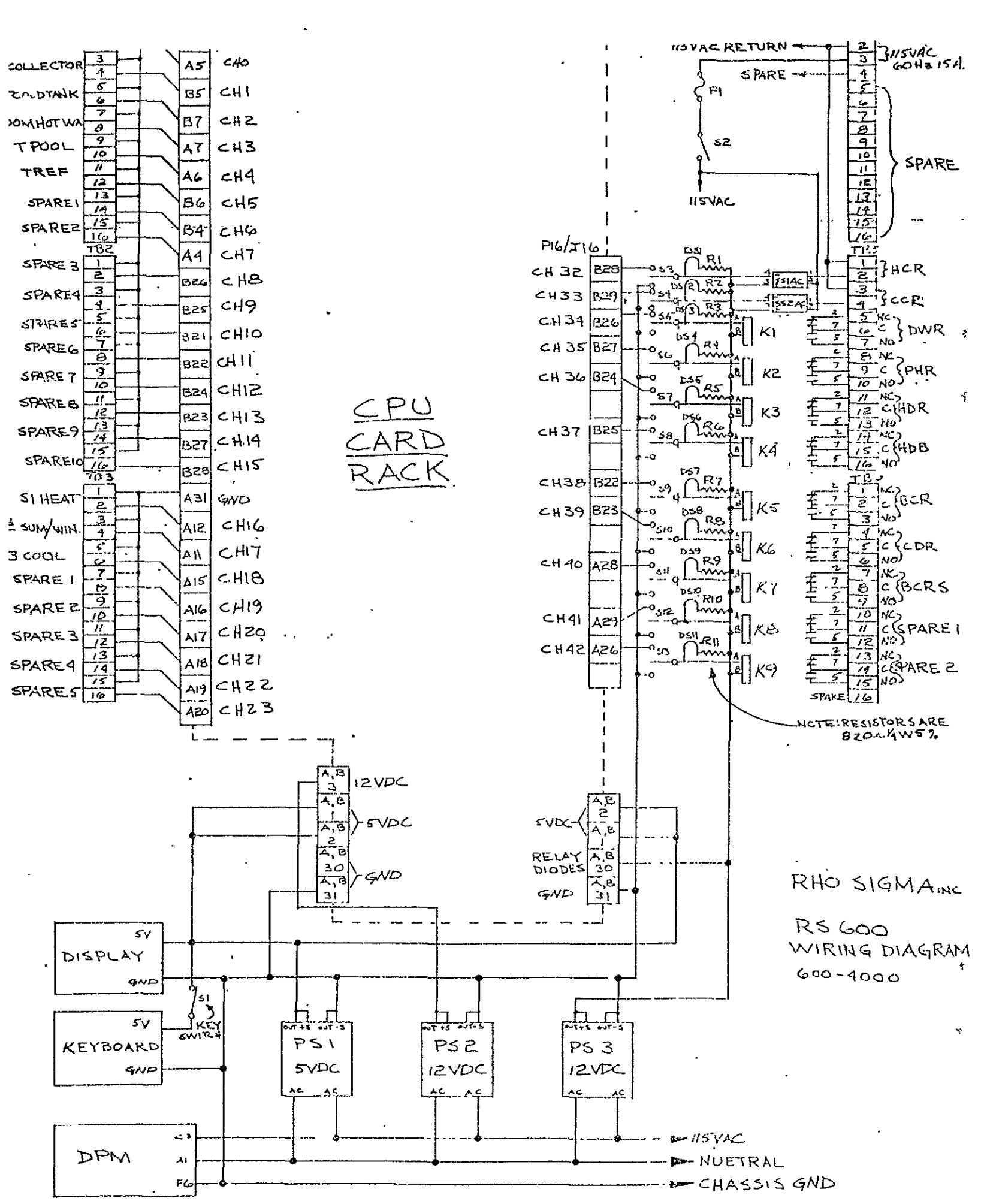
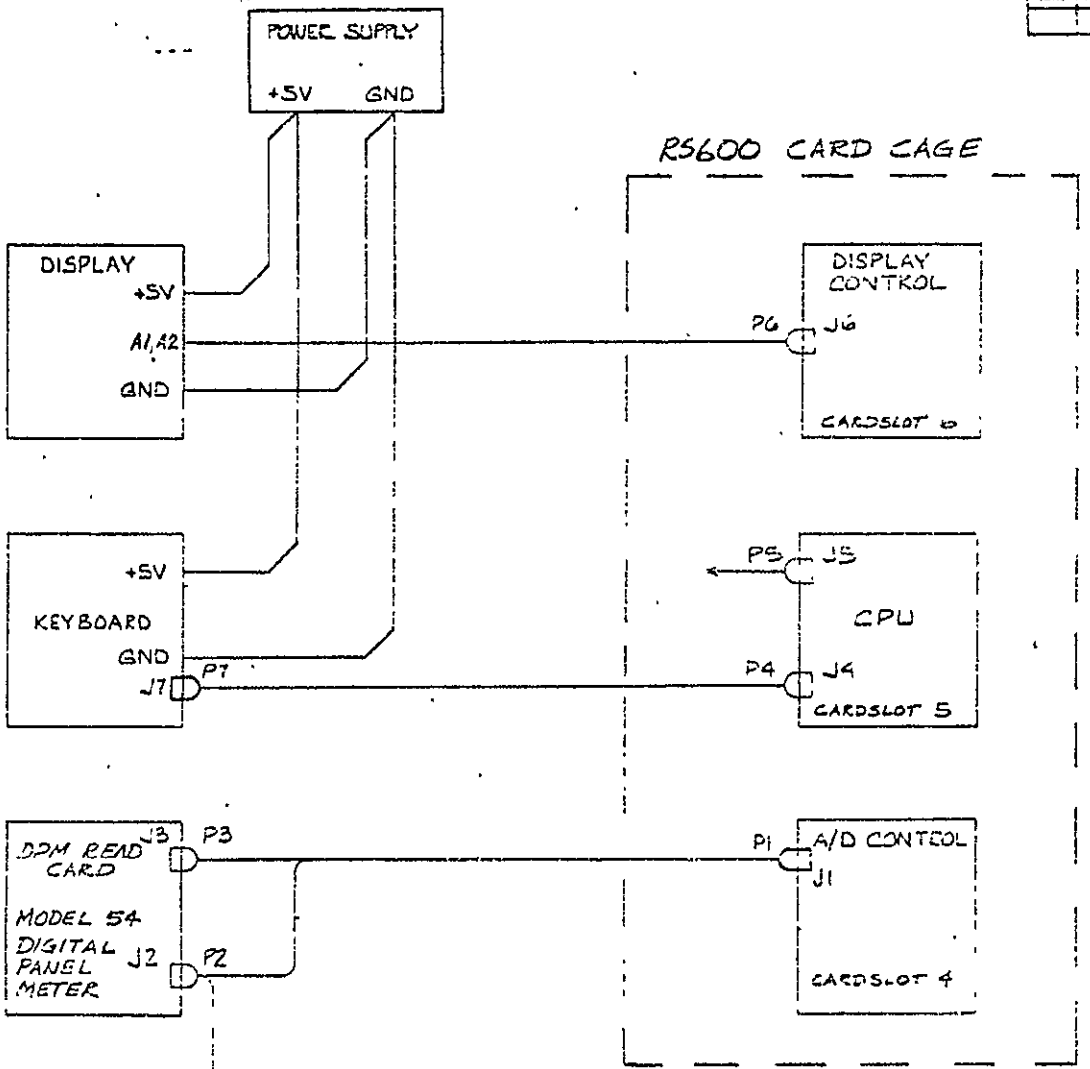
RS 600
PROGRAMMABLE
CONTROL
SYSTEM
RHO SIGMA
11922 VALERIO
NO. HOLLYWOOD CA. 91605
B-2
1 ENCLOSURE
2 INNER PANEL ASSY
3 PCS CHASSIS ASSY
APPROVED
TOLERANCES ARE:
FRACTIONS DECIMALS ANGLES
± .XX ± ±
.XXX ±
MATERIAL
FINISH
NEXT ASSY
USED ON
APPLICATION
DO NOT SCALE DRAWING
APPROVALS
DATE
DRAWN JLI
8/78
CHECKED
RHO SIGMA INC.
RS 600 PCS ASSEMBLY
SIZE
B
CODE IDENT NO.
DRAWING NO
600-1000
SCALE
SHEET 1 OF 2

PARTS LIST	RHO SIGMA INC. 11922 Valerio Street No. Hollywood, Ca. 91605	CONTRACT NO.	CODE IDENT. NO. 19133	600-1000	REV

TITLE: RS 600 PCS ASSY	REV.	E.O. NO.	DATE	APPROVED	REV.	E.O. NO.	DATE	APPROVED	SHEET 2 OF 2
CHECKED BY: [illegible] APPROVED ESP DATE 8/28/77									

FIND NO.	QTY. REQ'D			CODE IDENT.	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	REFERENCE DESIGNATION	SPECIFICATION	REV
1	1				A30N24C	NEMA 1 TYPE ENCLOSURE 20 IN. WIDE X 30 IN. HIGH X 10 IN DEEP		HOFFMAN ENG.	
2.	1				600-1001	INNER PANEL ASSY		RHO SIGMA	
3	1				600-3002	PCS CHASSIS ASSY		RHO SIGMA	


CPU CARD RACK
COLLECTOR
COLDTANK
COMHOTWA
TPOOL
TREF
SPARE1
SPARE2
TB2
SPARE 3
SPARE4
SPARE5
SPARE6
SPARE 7
SPARE 8
SPARE9
SPARE10
TB3
S1 HEAT
SUM/WIN.
COOL
SPARE 1
SPARE 2
SPARE 3
SPARE 4
SPARE 5
A5 CH0
B5 CH1
B7 CH2
A7 CH3
A6 CH4
B6 CH5
B4 CH6
A4 CH7
B26 CH8
B25 CH9
B21 CH10
B22 CH11
B24 CH12
B23 CH13
B27 CH14
B28 CH15
A31 GND
A12 CH16
A11 CH17
A15 CH18
A16 CH19
A17 CH20
A18 CH21
A19 CH22
A20 CH23
115VAC RETURN
SPARE
F1
S2
115VAC
3 115VAC 60Hz 15A.
SPARE
P16/J16
CH 32 B29
CH 33 B29
CH 34 B26
CH 35 B27
CH 36 B24
CH 37 B25
CH 38 B22
CH 39 B23
CH 40 A28
CH 41 A29
CH 42 A26
DS1 R1
DS2 R2
DS3 R3
DS4 R4
DS5 R5
DS6 R6
DS7 R7
DS8 R8
DS9 R9
DS10 R10
DS11 R11
S3
S4
S6
S7
S8
S9
S10
S11
S12
S13
1S1AC
1SSEAC
K1
K2
K3
K4
K5
K6
K7
K8
K9
HCR
CCR
DWR
PHR
HDR
HDB
BCR
CDR
BCRS
SPARE 1
SPARE 2
SPARE
NOTE: RESISTORS ARE B20 1/4W 5%
12VDC
5VDC
GND
5VDC
RELAY DIODES
GND
DISPLAY
5V
GND
KEYBOARD
5V
GND
S1
KEY SWITCH
PS1 5VDC
PS2 12VDC
PS3 12VDC
OUT+S OUT-S
AC AC
DPM
115VAC
NUETRAL
CHASSIS GND
RHO SIGMA INC
RS 600
WIRING DIAGRAM
600-4000



REVISIONS					
ZONE	REV	DESCRIPTION	BY	DATE	APPR.
	1	RELEASED TO MFG PER EN	BR		

B-5

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19/7

ITEM NO.	QTY	PART NUMBER	DESCRIPTION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES TOLERANCES ON
DECIMALS ANGLES
MATERIAL
FINISH
NEXT ASSY | USED ON
APPLICATION

DR		DATE
CHK		DATE
ENGR		DATE
MFG		DATE
PROJ. LDR.		DATE
APPVD		
APPVD		
CONTR NO.	DN-212477	

FAIRCHILD INSTRUMENTATION

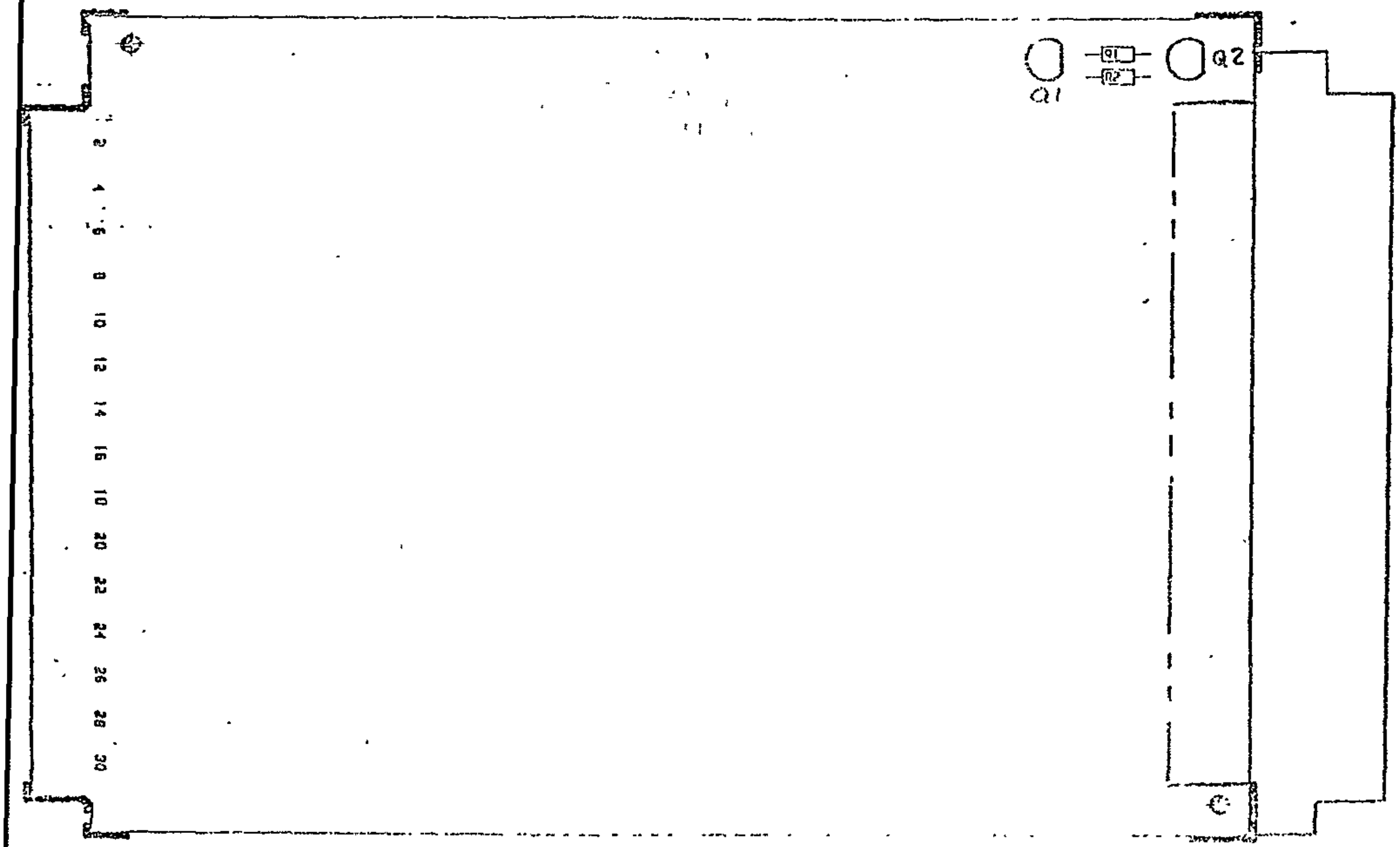
TITLE: BLOCK DIAGRAM - RS-600 CONTROLLER SYSTEM INTERCONNECT

SIZE	SUBSTITUTE FOR	DWG NO
C		80000600-20

SCALE | SHEET | OF

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVED
1	RELEASED TO MFG PER EN			



PRINCIPLE DRAWING TABLE

DRAWING NO.	DOCUMENTATION	REV NO.
40048064	A/W AND SPEC	1
97470102	LIST OF MAT'L	1

UNLESS OTHERWISE SPECIFIED

DIMENSIONS ARE IN INCHES, TOLERANCES ON
DECIMALS: X ±.1, XX ±.03, XXX ±.010
ANGLES ±2°
BREAK SHARP EDGES .010 MAX.

MATERIAL: SEE LIST OF MAT'L

NEXT ASSY: 82

DRAWN: [illegible] Shields — DATE: [illegible]
CHK — DATE
ENGR: D.W. Corbin — DATE: 10/23/72
MFG — DATE
PROJ ENGR — DATE

B-6

FAIRCHILD NOV - 4 1971
DOCUMENTATION

TITLE: ASSEMBLY — EXTENDER CARD

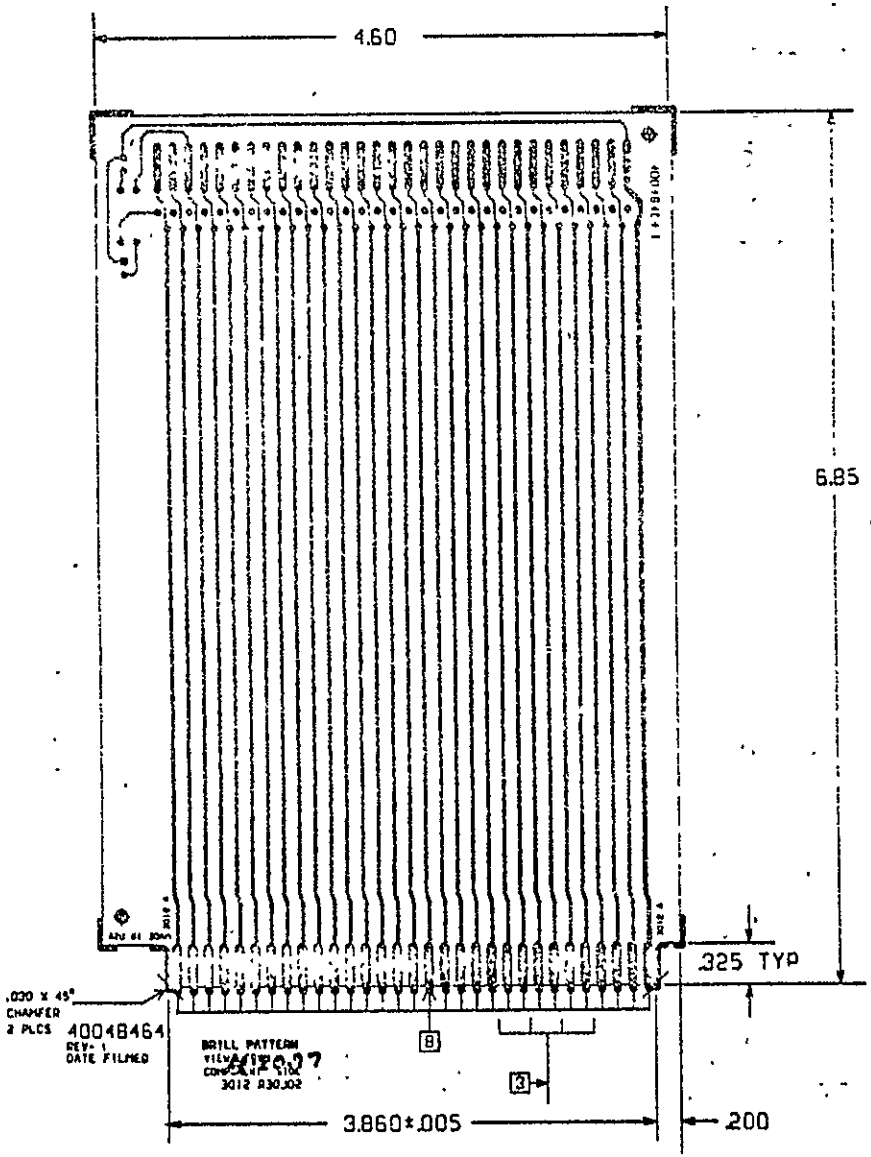
SIZE: A | CODE IDENT NO. | DWG NO. 97410102 | REV 1

FAIRCHILD LIST OF MATERIAL

LM. NO		REV	QTY	UM	DESCRIPTION	NEXT ASSY				
9,7,4,7,0,1,0,2	-03	,01	0,1	01	ASSY, EXTENDER BD		BY	CHK	MFG ENG	DATE
							DATE	DATE	ENGR	DATE

ITEM	PART NO	REV	QTY PER ASSM	U M	DESCRIPTION	REFERENCE DESIGNATION	CHANGE DOCUMENT REV	CHANGE DOCUMENT EN NO
0,0,1	4,0,0,4,8,4,6,4		,0,0,1	EA	PCB, EXTENDER BD			
0,0,2			001	EA	CONNECTOR			
0,0,3			002	EA	LED, FLV104	Q1, Q2		
0,0,4			0,0,2	EA	RESISTOR	R1, R2		

4-8



8-9

REVISION

REV	DESCRIPTION	BY	DATE
1	ENG. MODEL	DC	4-17-77

9. GOLD PLATE FINGERS PAR. 6.2.
[8] FINGER EDGES PAR 4.0.
7. HOLE SIZE PAR 2.5.
6. SILKSCREEN PAR 5.0.
5. SOLDER RESIST PAR 5.1.
4. SOLDER PLATE PAR 6.9, 6.11.
[3] NOTCH - PAR 5.1. 4 EACH
2. MATERIAL PAR 7.1.1, 7.2.4, 7.3.1.
1. GENERAL PAR 1.0, 2.0, 3.0.

NOTES, PER FS 67095639

HOLE SCHEDULE

SYM	DESCRIPTION	QTY
UNMARKED	.141 ± .003 DIA	
B	.050 ± .003 DIA	
C	.125 ± .003 DIA	
D		

TOLERANCE
DECIMAL
X ± .1
XX ± .01
XXX ± .005
ANGLES ±2°

FILM REQUIRED	X	APPLICATION
PAD PATTERN	X	NEXT ASSY
SILKSCREEN	X	
COMPONENT SIDE	X	
GROUND LAYER		
SOLDER SIDE	X	
SOLDER MASK	X	

T. SHIELDS 4-17-77

FARCHILD

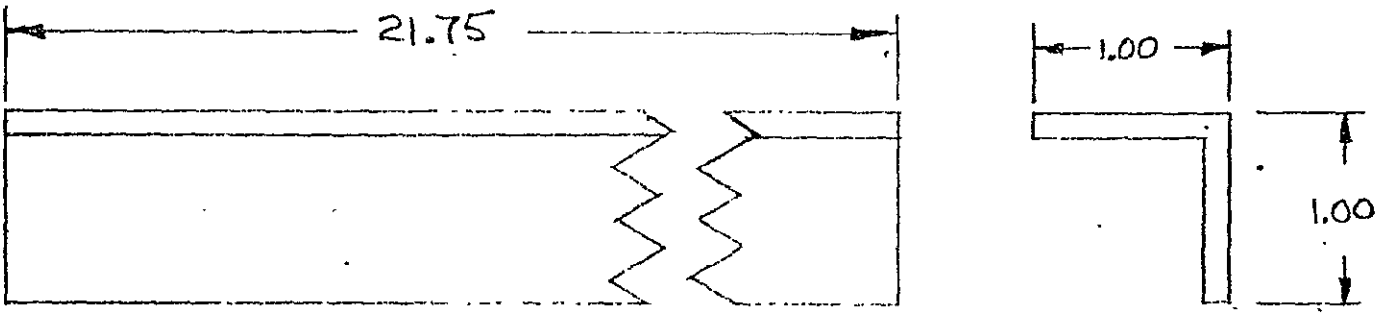
SPEC DWG
PCB - EXTENDER CARD

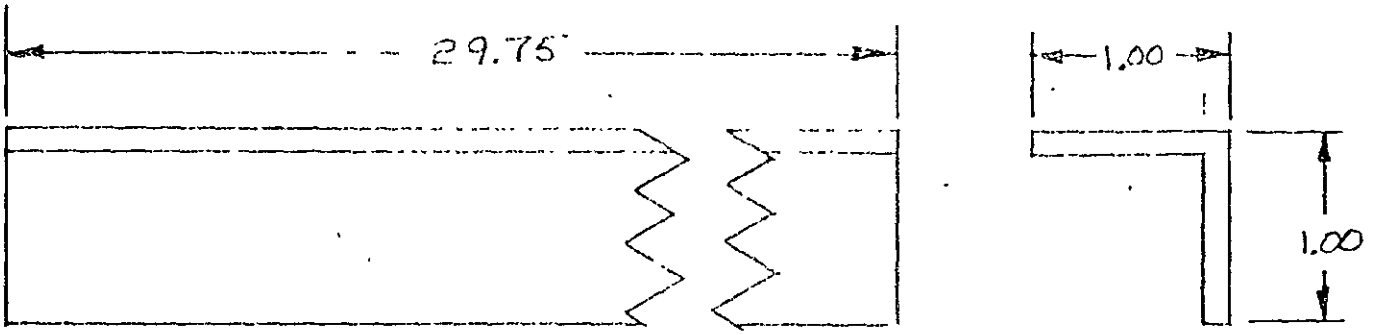
SIZE B | 40048464

SCALE 1/1

APPLICATION

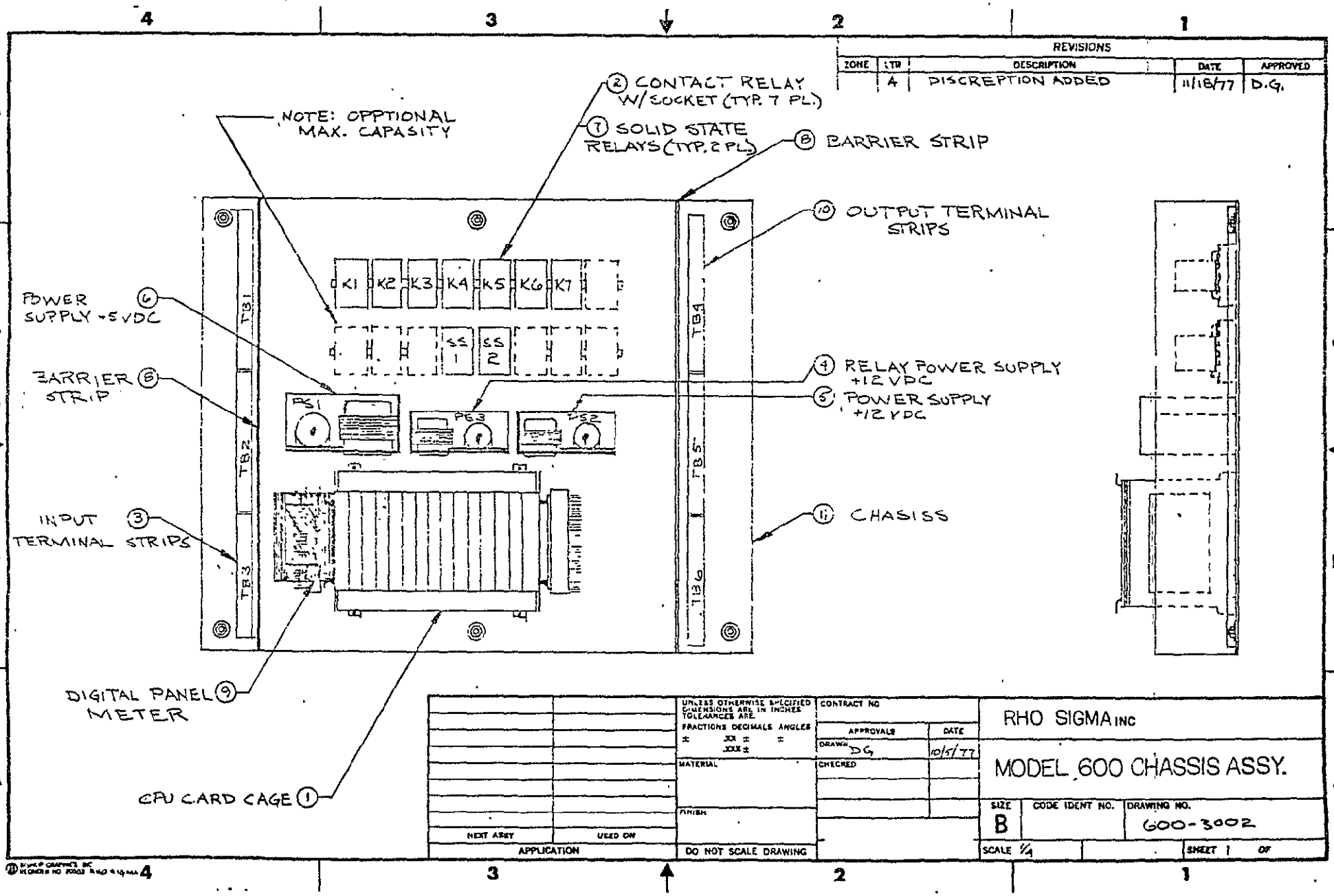
NEXT ASSY	USED ON	LTR	DESCRIPTION	DATE	APPROVED





NOTE: TWO OF EACH PER BOX

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE. FRACTIONS DECIMALS ANGLES ± .XX ±.03 ± .XXX ±	CONTRACT NO		RHO SIGMA INC
	APPROVALS	DATE	
	DRAWN D.G.	11/1/71	RS 600 FRONT PANEL MOUNTING BRACKET
MATERIAL 3GAGE ALUM. 1IN CHANNEL	CHECKED		
FINISH NONE			SIZE A / CODE IDENT NO. / DRAWING NO 600-3003
DO NOT SCALE DRAWING			SCALE FULL / SHEET 1 OF 1



REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	DISCREPTION ADDED	11/18/77	D.G.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES ± .XX ± .XXX ± °	CONTRACT NO	RHO SIGMA INC	
	APPROVALS / DRAWN DG	DATE 10/5/77	MODEL 600 CHASSIS ASSY.
MATERIAL	CHECKED		SIZE B · CODE IDENT NO. · DRAWING NO. 600-3002
FINISH			SCALE 1/4 · SHEET 1 OF
NEXT ASSY / USED ON			
APPLICATION	DO NOT SCALE DRAWING		

B-10A

PARTS LIST	RHO SIGMA INC. 11922 Valerio Street No. Hollywood, Ca. 91605	CONTRACT NO.	CODE IDENT. NO. 19133	600-3002	REV

TITLE: RS600 PC'S CHASSIS ASSY.

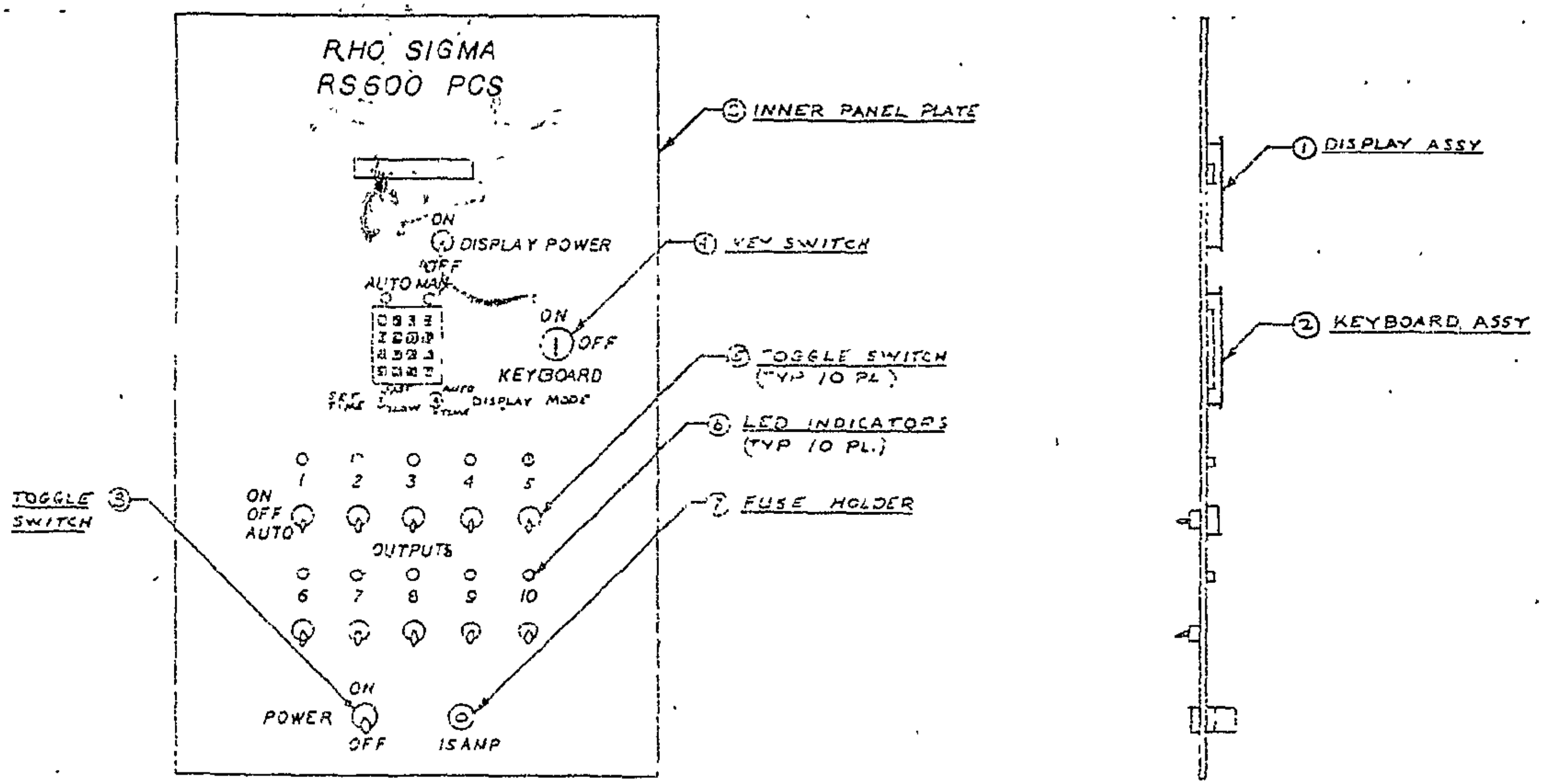
REV.	E.O. NO.	DATE	APPROVED	REV.	E.O. NO.	DATE	APPROVED

SHEET 2 OF 3

CHECKED BY: JLI | APPROVED: ESP | DATE: 8/29/77

FIND NO.	QTY. REQ'D	U.S. IDENT.	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	REFERENCE DESIGNATION	SPECIFICATION	REV
1	1		97477000	CPU CARD CAGE ASSY		FAIRCHILD	
2	7		A2B3XAX22-RELAY SY2.53A-SOCKET	CONTACT RELAY W/SOCKET	K1 THRU K7	SP/DT 10 AMP 12 VDC	
3	3	E47811	600-16	TERMINAL STRIPS	TB1, TB2, TB3	KULKA	
4	2		2815-1.3B	12VDC @1.5A - POWER SUPPLY	PS3, PS2	POWERTEC	
6	1		2C5-6B	5VDC @6A - POWER SUPPLY	PS1	11	
7	2		D1210	SOLID STATE RELAYS 120VAC @ 10AMPS	SS1 & SS2	CRYDOM	
8	2		600-3001	BARRIER STRIP - AC		RHO SIGMA	
9	1		MODEL 54-AC	DIGITAL PANEL METER	DPM	FAIRCHILD	
10	3	E47811	600-16	TERMINAL STRIPS	TB4, TB5, TB6	KULKA	
11	1		600-3002	CHASSIS			

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED



	600-1-400
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE:
FRACTIONS ± DECIMALS .XX ± .XXX ± ANGLES ±
MATERIAL
FINISH
DO NOT SCALE DRAWING

CONTRACT NO.

APPROVALS		DATE
DRAWN	JLI	8/22/7
CHECKED		

RHO SIGMA INC.

RS600 INNER PANEL ASSY

SIZE	CODE IDENT NO.	DRAWING NO.
B		600-1001

SCALE — SHEET 1 OF 2

PARTS LIST	RHO SIGMA INC. 11922 Valerio Street No. Hollywood, Ca. 91605	CONTRACT NO.	CODE IDENT. NO. 19133	600-1001	REV

TITLE: RS 600 INNER PANEL ASSY

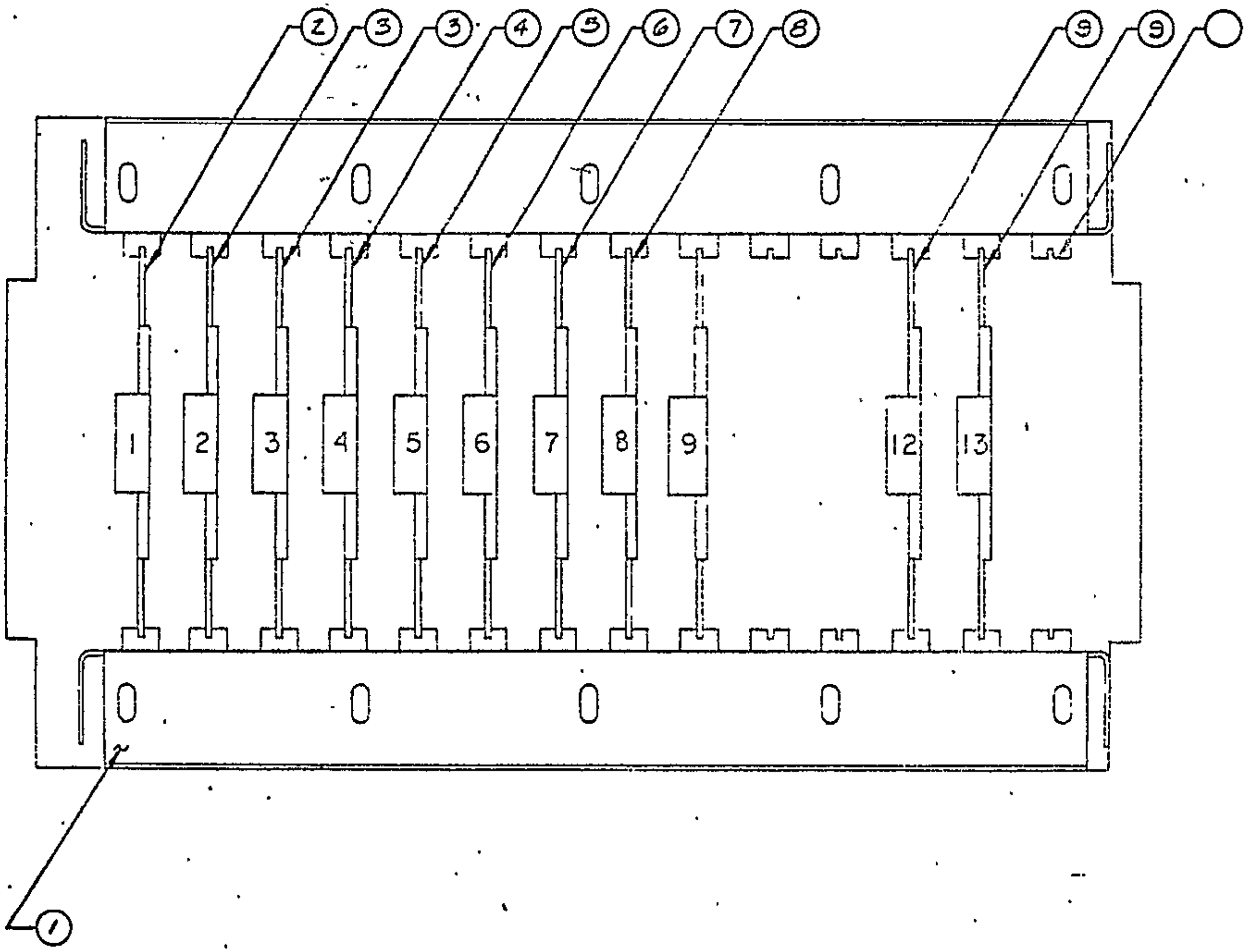
REV.	E.O. NO.	DATE	APPROVED	REV.	E.O. NO.	DATE	APPROVED

SHEET 2 OF

CHECKED BY: JLI | APPROVED: ESP | DATE: 8/28/77

FIND NO.	QTY. REQ'D	CODE IDENT.	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	REFERENCE DESIGNATION	SPECIFICATION	RE
1	1		97470111	DISPLAY ASSY		FAIRCHILD	
2	1		97470112	KEY BOARD ASSY		FAIRCHILD	
3	1		600-3000	INNER PANEL PL.		RHO SIGMA	
4			5-51115-501	KEYLOCK SWITCH 7 POSITION - 90° THROW.	S1	OAK INDUSTRIES	
5	10		2FC53	TOGGLE SW. SP/3T	S3 THRU S12	CARLINGSWITCH	
6	10		515-9165/ 515-6003	LED INDICATORS PANEL MOUNT	L1 THRU L10	DIALLIGHT	
7	1		HKP	FUSE HOLDERS PANEL MOUNT	F1	BUSSMANN MFG.	
8	1		DA284	TOGGLE SW. 3P/ST 16A @ 125VAC	S2	CARLINGSWITCH	

REVISIONS					
ZONE	REV	DESCRIPTION	BY	CHK	APPROVAL
	1	RELEASE TO MFG PER EN	GC		



B-14

1977

ITEM NO	QTY	PART NUMBER
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES ON DECIMALS ANGLES BREAK SHARP EDGES		
MATERIAL	SEE L/M	
FINISH		
TREATMENT		

DESCRIPTION

DRAWN	DATE 5/77
CHK	DATE
ENGR J.W. CORBIN	DATE
MFG	DATE
PROJ ENGR	DATE
APPVD	
APPVD	
CONTR NO DN-012477	

FAIRCHILD INSTRUMENTATION

TITLE: FINAL ASSY, CARD CAGE RS-600 CONTROLLER

SIZE	CODE IDENT NO.	DWG NO	REV
C		97472000	1

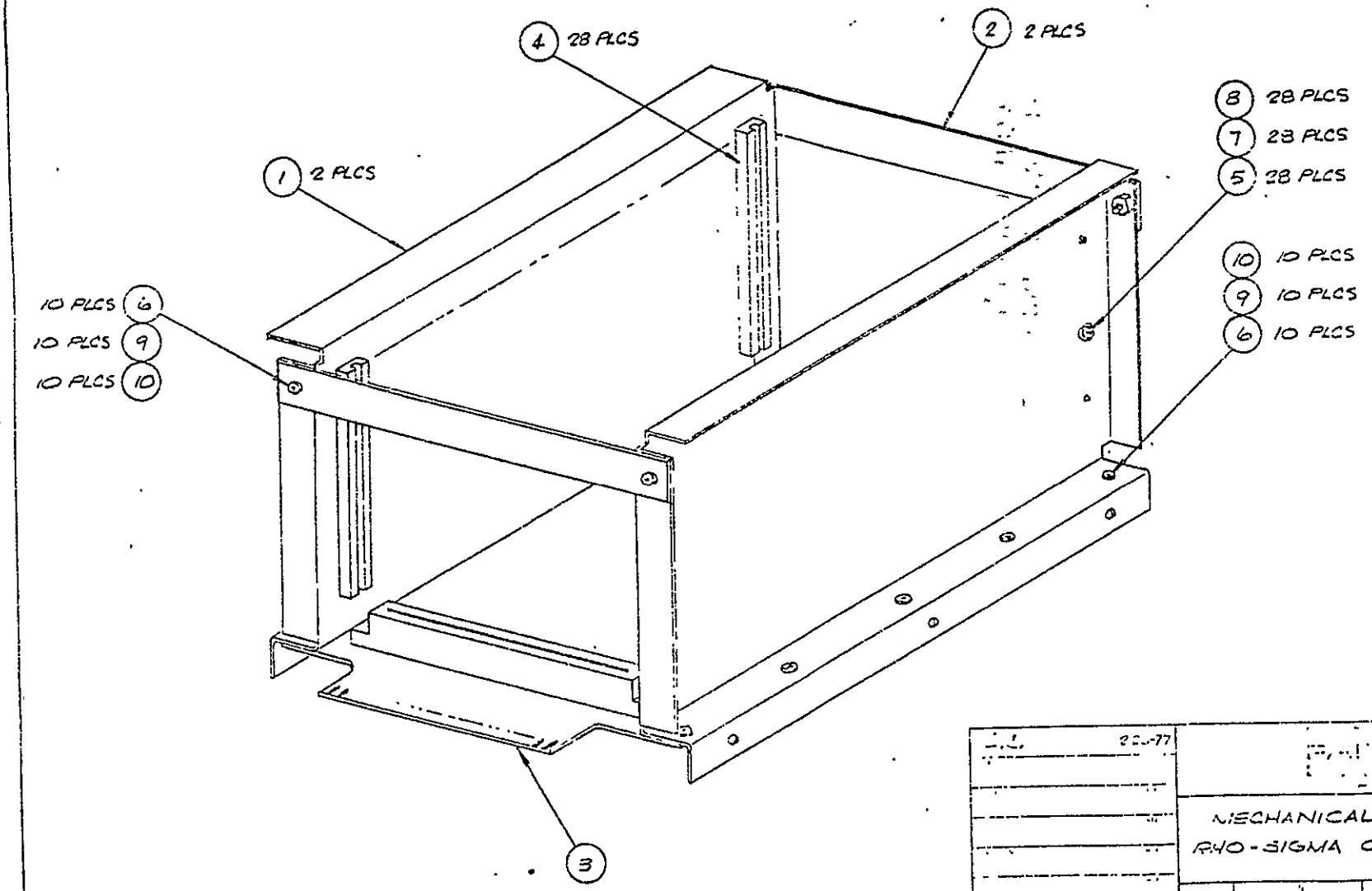
SCALE FULL — SHEET 1 OF 1

NEXT ASSY	USED ON
APPLICATION	

FAIRCHILD LIST OF MATERIAL

LM NO		REV	QTY	UM	DESCRIPTION	NEXT ASSY		
	-03	01	01	01	FINAL ASSY, CARD CAGE		BY [illegible] DATE 5/7-	CHK ____ DATE ____ MFG ENG ____ DATE ____ ENGR ____ DATE ____

ITEM	PART NO	REV	QTY PER ASSM	UM	DESCRIPTION	REFERENCE DESIGNATION	CHANGE DOCUMENT REV	CHANGE DOCUMENT NO
001	97472000	01	001	01	MECH. ASSY, CARD CAGE			
002	97470110	01	001	01	UNIVERSAL CARD			
003	97470103	01	002	01	INPUT CARD			
004	97470108	01	001	01	A/D CONTROL CARD			
005	97470100	01	001	01	CPU CARD			
006	97470105	01	001	01	DISPLAY DRIVER CARD			
007	97470107	01	001	01	MEMORY ADDRESS CARD			
008	97470106	01	002	01	4K EROM CARD			
009	97470104	01	002	01	OUTPUT CARD			



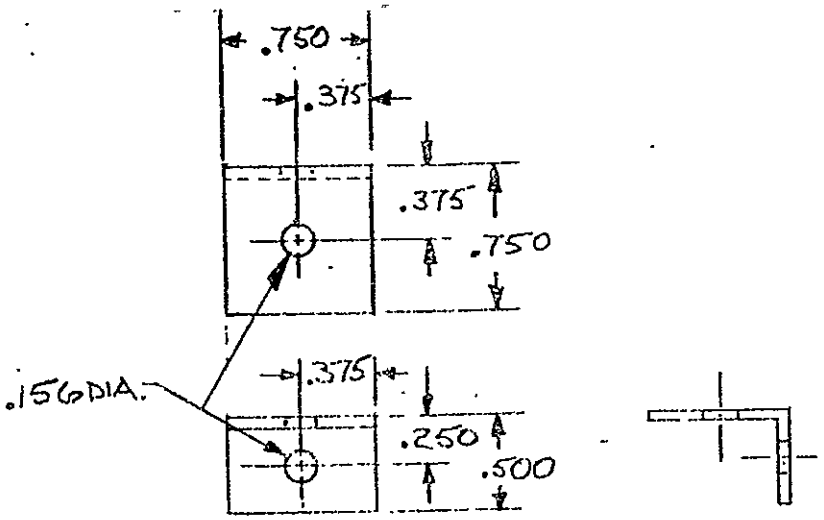
22-77		
MECHANICAL ASSY, RHO-SIGMA CARD CAGE		
B		97472053
NONE		

FAIRCHILD LIST OF MATERIAL

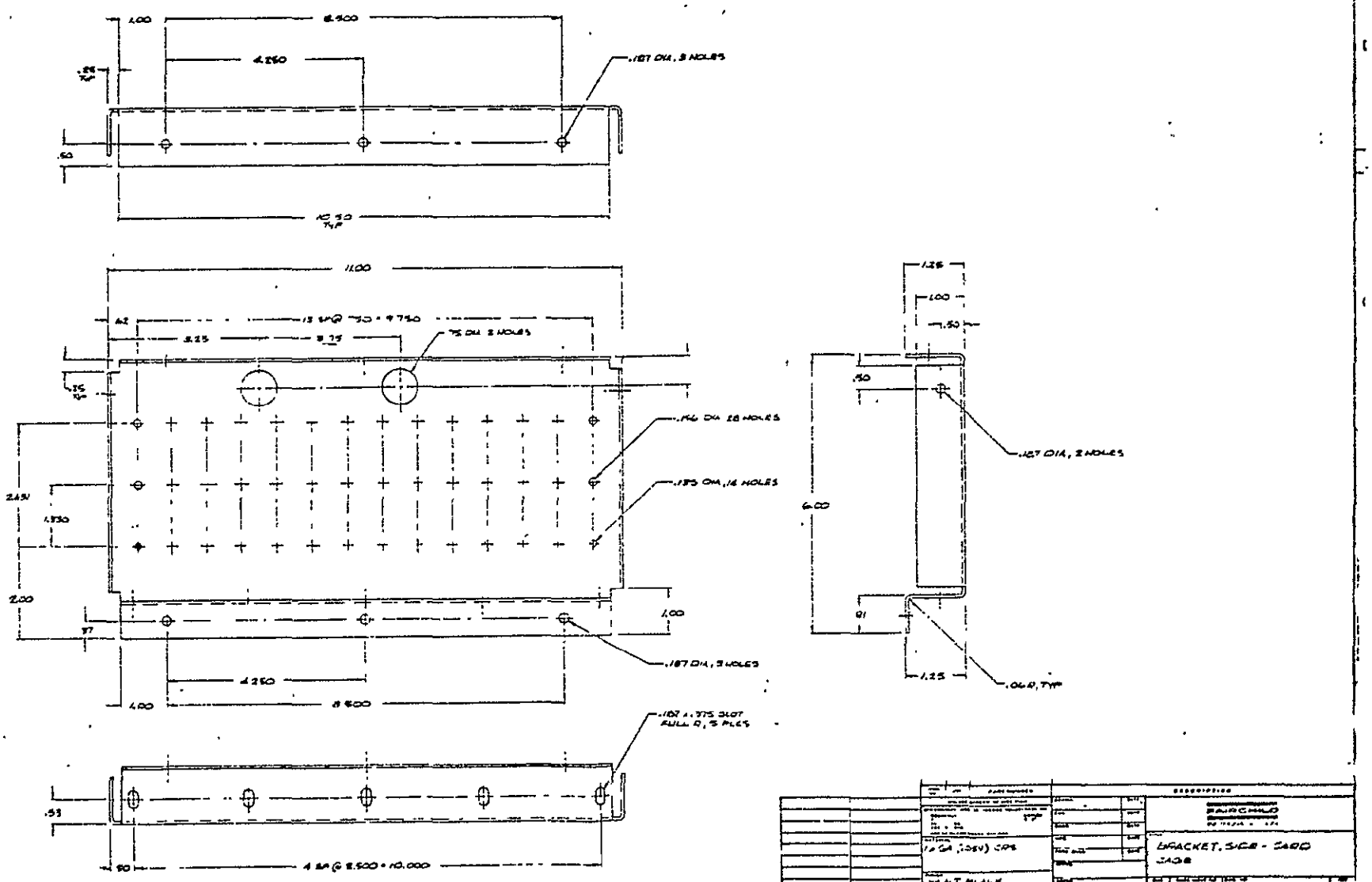
LH NO		REV	QTY	UM	DESCRIPTION	NEXT ASSY				
97472000	-03				ASSY, MECH-CARD CAGE		BY JC	CHK	MFG ENG	DATE
							DATE	DATE	ENGR	DATE

ITEM	PART NO	REV	QTY PER ASSM	UM	DESCRIPTION	REFERENCE DESIGNATION	CHANGE DOCUM REV	CHANGE DOCUM EN NO
1	35108125		2		BRACKET, SIDE			
2	35108126		2		BRACE, CARD CAGE			
3	97470101		1		MOTHER BOARD			
4	64018490		28		CARD GUIDE			
5	60516490		28		SCREW, 6-32 x 3/16 PH			
6	60516580		14		SCREW, 8-32 x 3/8 PH			
7	62106390		28		LKWASHER, #6			
8	62003670		28		FLATWASHER, #6			
9	62003680		14		FLATWASHER, #8			
10	61039450		14		KEPNUT, #8			

APPLICATION		REVISION			
NEXT ASSY	USED ON	LTR	DESCRIPTION	DATE	APPROVED

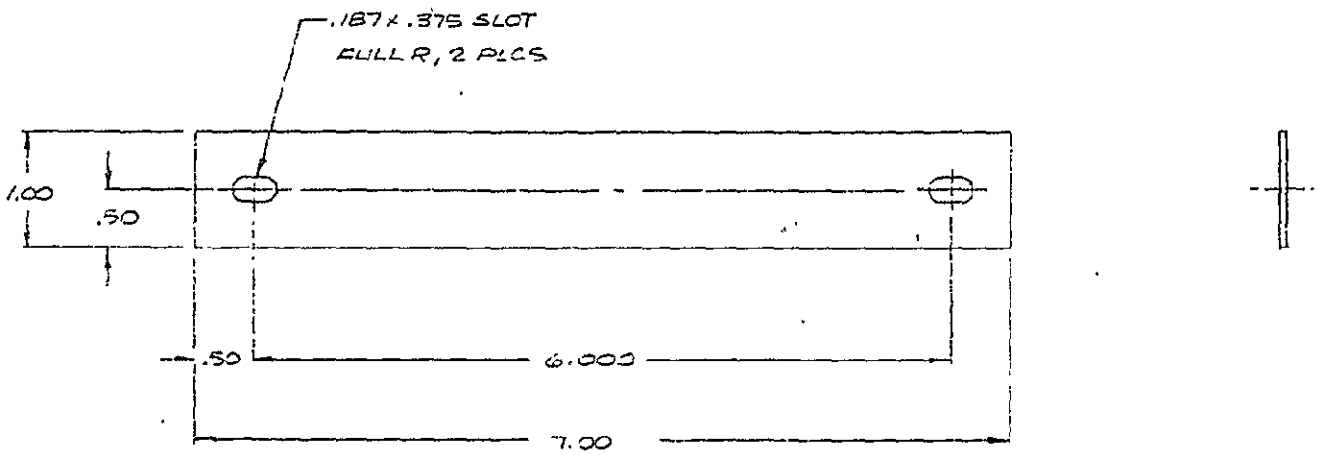


UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES ± .XX ± ± .XXX ± .020	CONTRACT NO	RHO SIGMA INC.	
	APPROVALS / DATE		
MATERIAL 16 GAGE	DRAWN D.G. 11/1/77	RS 600 CARD CAGE MOUNTING BRACKET	
	CHECKED	SIZE A	CODE IDENT NO.
FINISH NONE		DRAWING NO. 600-3004	
DO NOT SCALE DRAWING		SCALE FULL	SHEET 1 OF 1



REVISIONS				
SYM	DESCRIPTION	BY	DATE	APPROVAL

3510812G



ITEM NO	QTY	PART NUMBER	DESCRIPTION

MATERIAL: 16 GA (.059) CRS

TREATMENT:

FINISH: PAINT BLACK

TOLERANCES AND NOTES UNLESS OTHERWISE SPECIFIED

DECIMAL: X ± .1, XX ± .03, XXX ± .010 — ANGLES: ± 2°

⊥ PERPENDICULAR
∥ PARALLEL
O CONCENTRIC
⏥ FLAT OR STRAIGHT
√ SURFACE ROUGHNESS

BREAK ALL SHARP EDGES .010 MAX DO NOT SCALE THIS DRAWING

NEXT ASS'Y

MODEL

DRAWN JC DATE 5-3-77
CHK
MECH. ENGR DATE
ELEC ENGR DATE
MFG DATE
PROJ ENGR DATE

FAIRCHILD INSTRUMENTATION

TITLE: BRACE, CARD CAGE

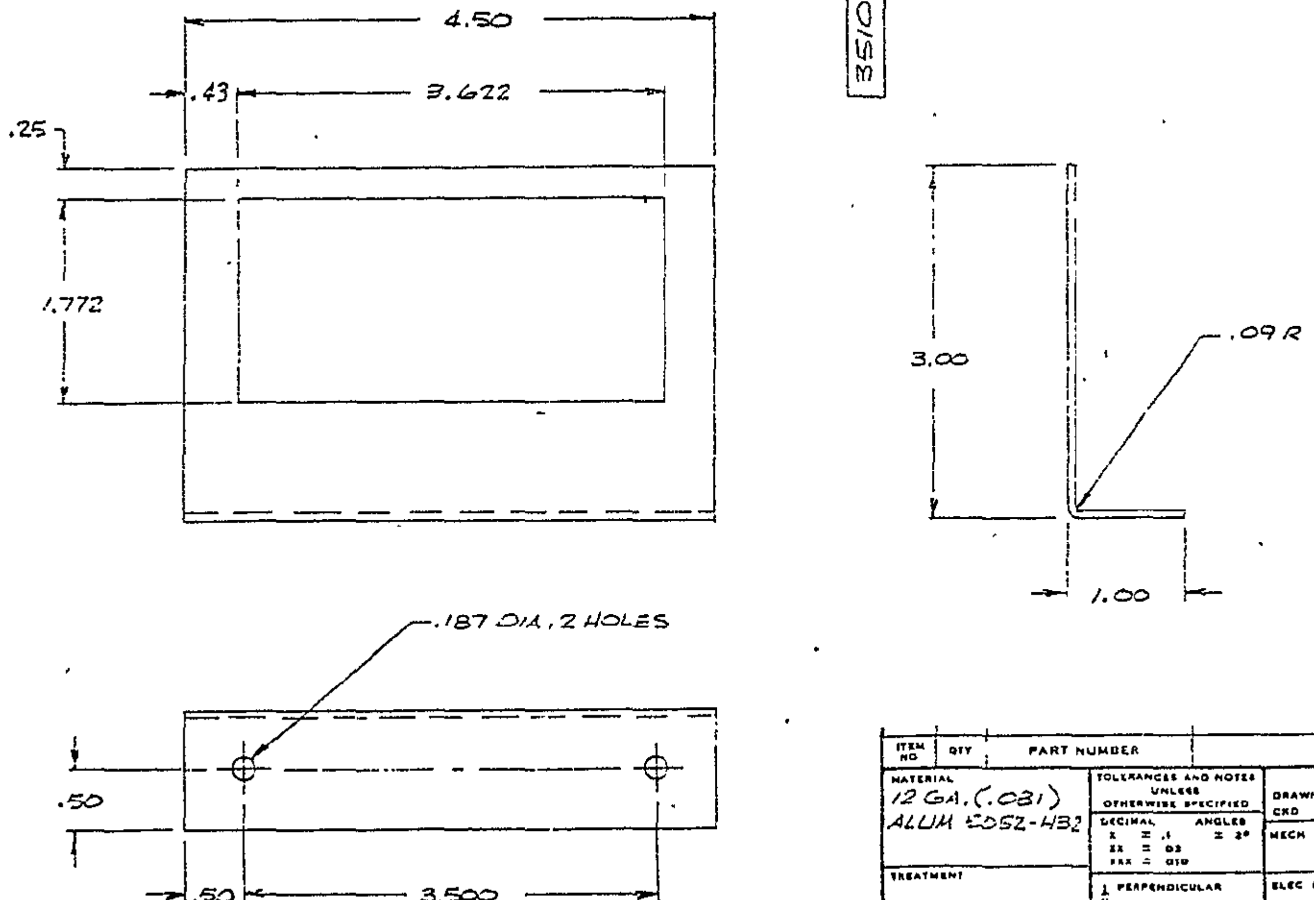
SIZE: B NO. 3510812G

SCALE 1/1 SHEET OF REV

35108130

REVISIONS

SYM	DESCRIPTION	BY	DATE	APPROVAL



ORIGINAL PAGE IS OF POOR QUALITY

ITEM NO	QTY	PART NUMBER	DESCRIPTION

MATERIAL: 12 GA. (.081) ALUM 5052-H32

TREATMENT:

FINISH: PAINT BLACK

TOLERANCES AND NOTES UNLESS OTHERWISE SPECIFIED
DECIMAL: .X ± .1, .XX ± .03, .XXX ± .010; ANGLES ± 2°
⊥ PERPENDICULAR
∥ PARALLEL
○ CONCENTRIC
⏤ FLAT OR STRAIGHT
✓ SURFACE ROUGHNESS

BREAK ALL SHARP EDGES .010 MAX
DO NOT SCALE THIS DRAWING

DRAWN J.C. DATE
CKD
MECH ENGR DATE
ELEC ENGR DATE
MFG DATE
PROJ ENGR DATE

NEXT ASS'Y | MODEL

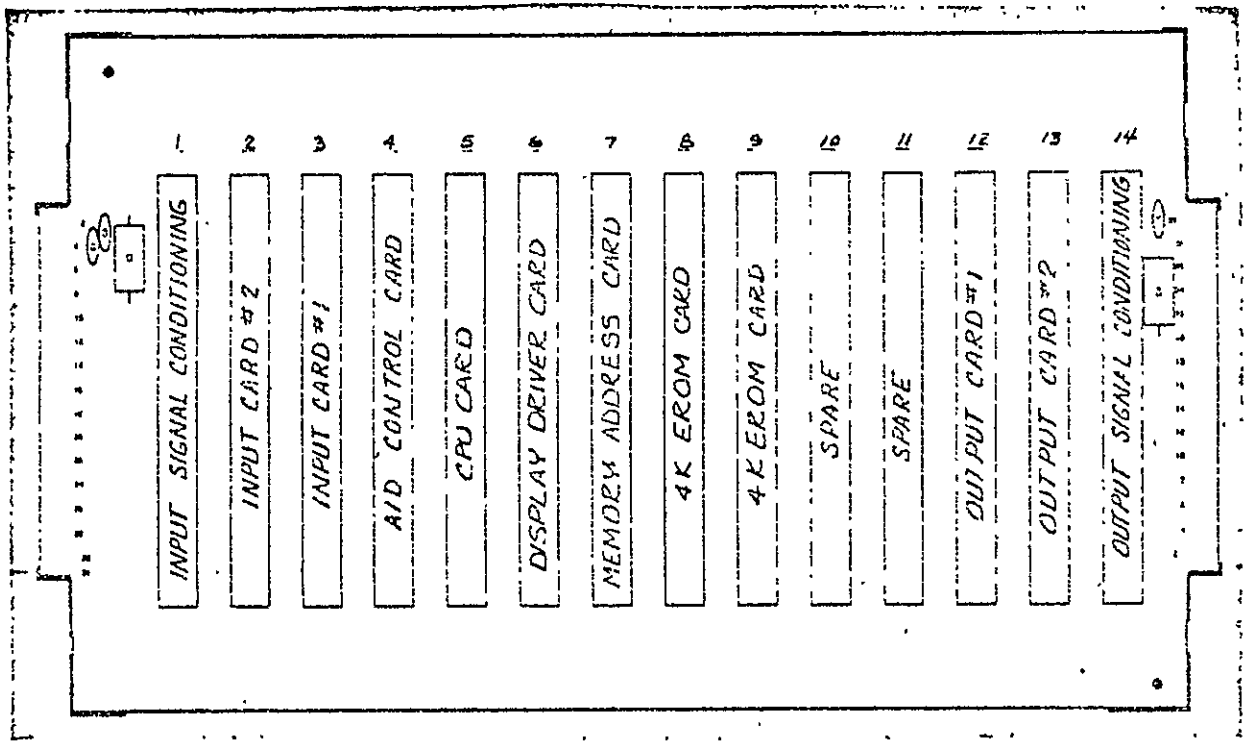
FAIRCHILD INSTRUMENTATION

TITLE: BRACKET, MOUNTING - OPM

SIZE: B | NO: 35108130

SCALE 1/1 | SHEET OF | REV.

REVISIONS					
ZONE	REV	DESCRIPTION	BY	DATE	APPRD
	1	RELEASED TO MFG PER EN			



PRINCIPLE DRAWING TABLE		
DRAWING NO	DOCUMENTATION	REV NO
40048468	A/W AND SPEC DWG.	1
97470101	LIST OF MAT'L	1

ITEM NO	QTY	PART NUMBER	DESCRIPTION

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES TOLERANCES ON
DECIMALS ANGLES
X ± .1 ± 1°
XX ± .03
XXX ± .010
BREAK SHARP EDGES .010 MAX

MATERIAL: SEE LIST OF MAT'L

FINISH

TREATMENT

PROGRAM NO-IC

NEXT ASSY | USED ON

APPLICATION

DRAWN		DATE
CHK		DATE
ENGR	W. W. CORBIN	11/5/71
MFG		DATE
PROJ ENGR		DATE
APPVD		
APPVD		
CONTR NO	DN-012477	

FAIRCHILD INSTRUMENTATION

TITLE: ASSEMBLY - MOTHER BOARD

SIZE: C | LOCG IDENT NO | DWG NO: 97470101

SCALE: 1/1 | SHEET 1 OF

1971

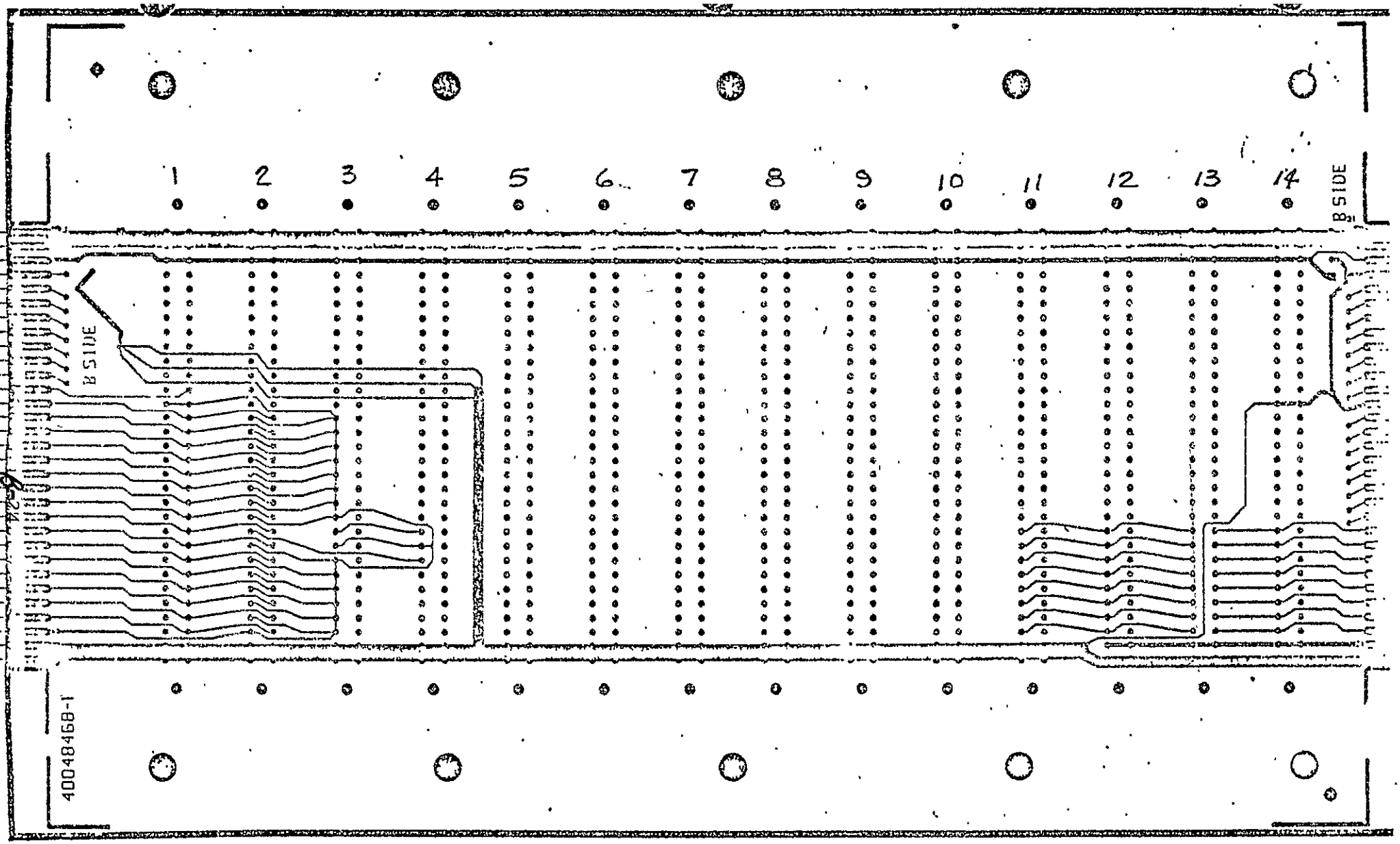
NOV 04 1977

FAIRCHILD LIST OF MATERIAL

PAGE 1 OF 1

LM NO		REV	QTY	UM	DESCRIPTION	NEXT ASSY			
9747010 1	-03	01	01	01	ASSY MOTHER BD		BY	CHK	MFG ENG	DATE.
							DATE	DATE	ENGR	DATE

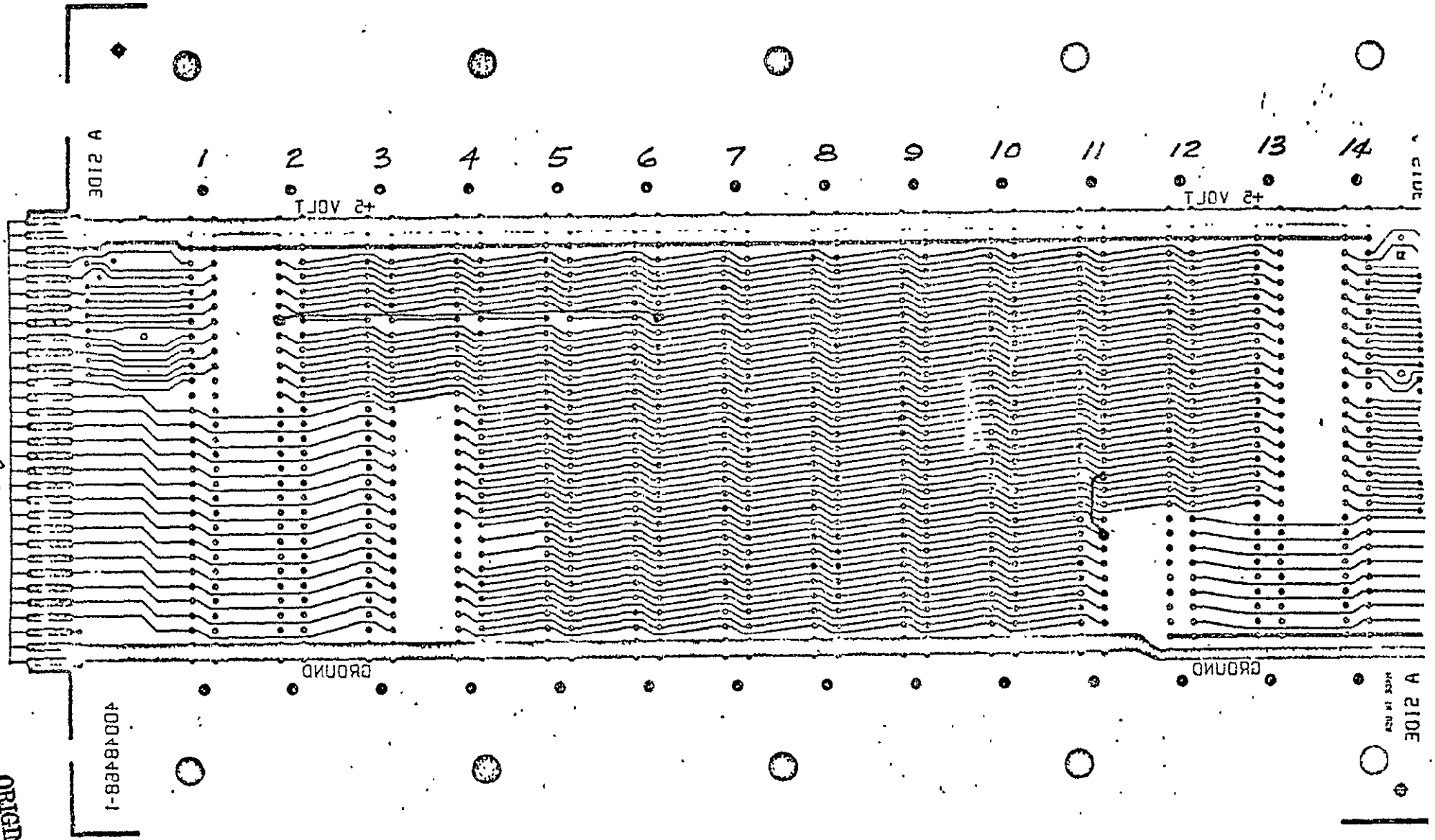
ITEM	PART NO	REV	QTY PER ASSM	UM	DESCRIPTION	REFERENCE DESIGNATION	CHANGE DOCUM REV	CHANGE DOCUM EN N
001	40048468		001	EA	PCB MOTHER BD			
002			014	EA	CONNECTOR			
003	03291040		003	EA	CAP .1UF	C1, C2, C5		
004	03282560		002	EA	CAP 22UF, 15V	C3, C4		



40048468
REV- 1
DATE FILMED 4.13.99

COMPONENT SIDE
DRILL PATTERN

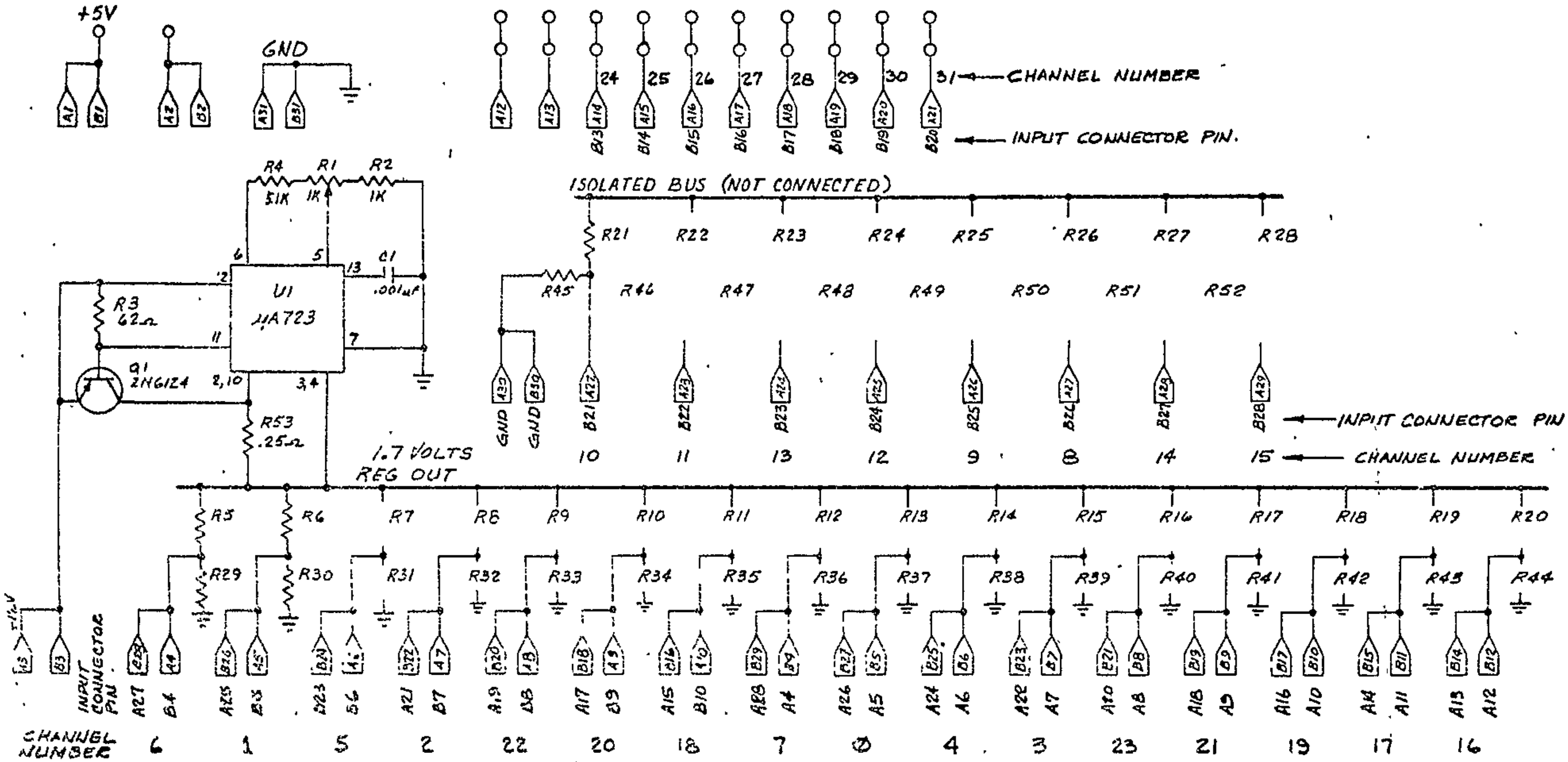
MOTHER BOARD TOP SIDE



40048468 DRILL PATTERN
REV- 1
DATE FILMED 4.18.77

MOTHER BOARD - BOTTOM SIDE AS IF VIEWED THROUGH THE TOP.

DWNG	REV	DESCRIPTION	BY	DATE	APPROVAL
	1	RELEASED TO MFG PER EN			



1. ALL RESISTOR VALUES NOT SHOWN MAY BE CUSTOMER SELECTED AND INSTALLED.

NOTES:

B-26

DRAWN	5/1/77
CHK	
D.W. CORBIN	
DN-012477	

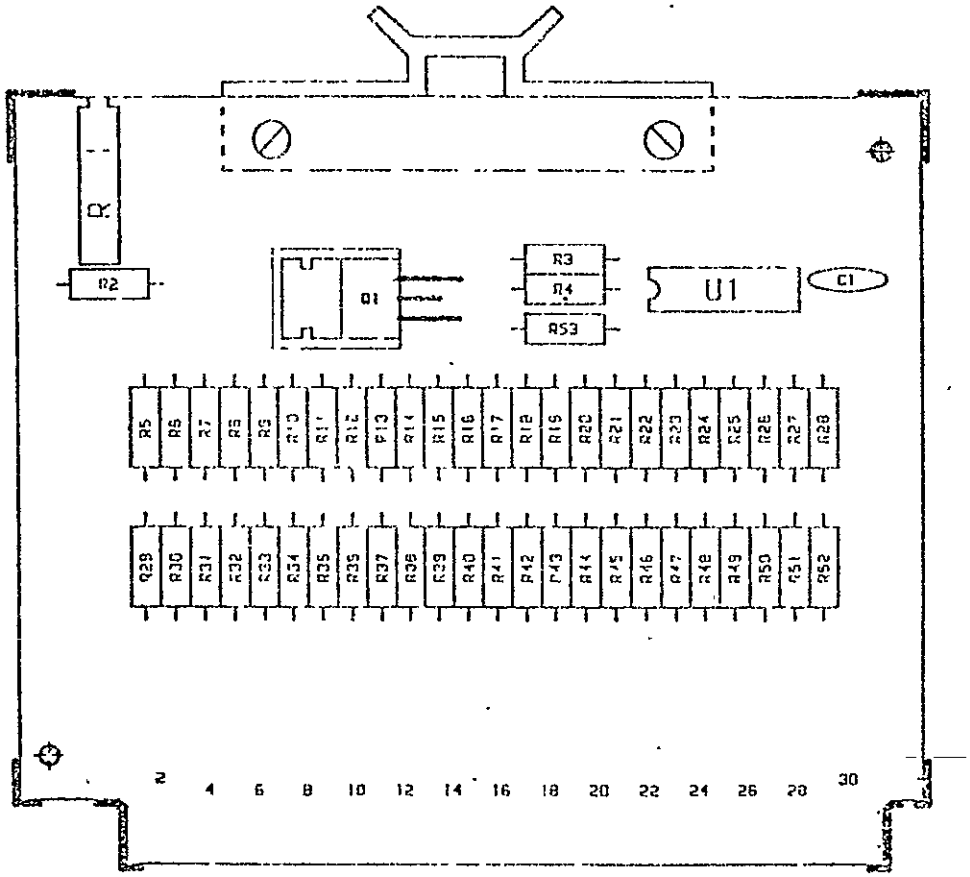
FAIRCHILD INSTRUMENTATION

SCHEMATIC — UNIVERSAL BOARD

SIZE C | DWG NO 97470110-04 | REV 1

SCALE NONE | SHEET 1 OF 1

REV.	DESCRIPTION	BY	DATE	APPROVED
1	RELEASED TO MFG PER EN			



PRINCIPLE DRAWING TABLE		
DRAWING NO.	DOCUMENTATION	REV NO.
40048473	A/W AND SPEC	1
97470110-04	SCHEMATIC	REF
97470110	LIST OF MAT'L	1

UNLESS OTHERWISE SPECIFIED

DIMENSIONS ARE IN INCHES. TOLERANCES ON
DECIMALS: X ±.1, XX ±.03, XXX ±.010
ANGLES: ±2°
BREAK SHARP EDGES .010 MAX.

MATERIAL: SEE LIST OF MAT'L

NEXT ASSY: 82

USED ON: PROGRAM CONTROLLER

DRAWN — DATE
CHK — DATE
ENGR: D.W. Corrin — DATE: 11/21/77
MFG — DATE
PROJ ENGR — DATE
APPVD.
COMP NO. DN-012477

FAIRCHILD INSTRUMENTATION

3 - 4 1977

TITLE: ASSEMBLY — UNIVERSAL CARD

SIZE	CODE IDENT NO.	DWG NO	REV.
A		97470110	1

SCALE 1/1

SHEET 1 OF 1

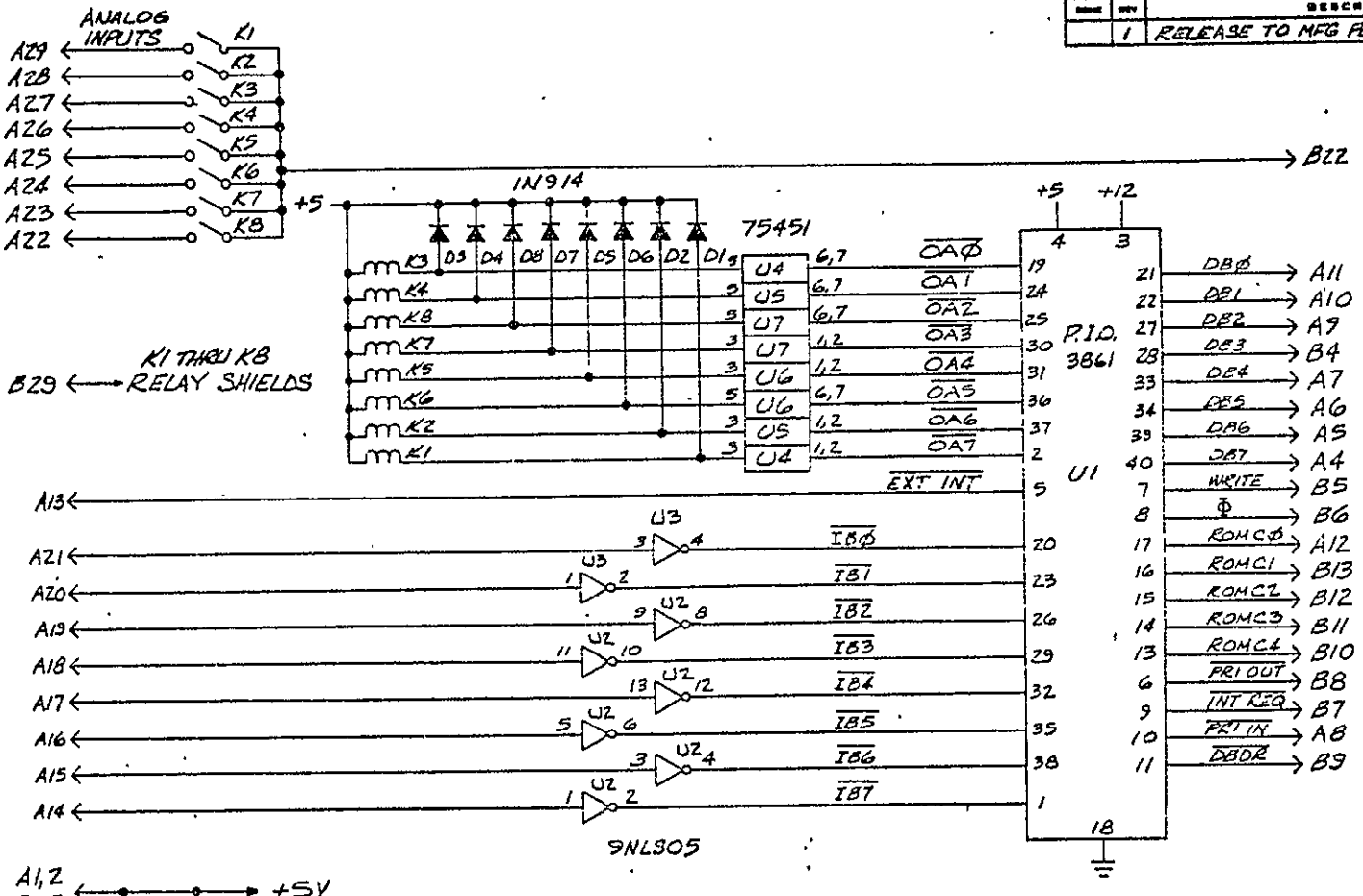
04 1977

FAIRCHILD LIST OF MATERIAL

LM NO		REV	QTY	UM	DESCRIPTION	NEXT ASSY	BY / DATE	CHK / DATE	MFG ENG / ENGR	DATE / DATE
9,7A7,0,1,1,0	-03	0,1	0,1	0,1	ASSY UNIVERSAL CARD					

ITEM	PART NO	REV	QTY PER ASSM	UM	DESCRIPTION	REFERENCE DESIGNATION	CHANGE DOCUMENT REV	CHANGE DOCUMENT NO
0,0,1	4,0,0,4,8,4,7,3		0,0,1	EA	P.C.B. UNIVERSAL CARD			
0,0,2	2,6,9,0,5,8,0,1		0,0,1	EA	IC UA723	U1		
0,0,3			0,0,3	EA	TRANSISTOR 2N6124	Q1		
0,0,4			0,0,1	EA	POT 1K	R1		
0,0,5			0,0,1	EA	RES 1K	R2		
0,0,6			0,0,1	EA	RES 62 Ω	R3		
0,0,7			0,0,1	EA	RES 5.1K	R4		
0,0,8			0,0,1	EA	RES .25 Ω	R53		
0,0,9			0,4,8	EA	SELECTED	R5 THRU R52		
0,1,0			0,0,1	EA	CAP .001 μF	C1		
0,1,1			0,0,1	EA	CARD, EJECTOR, S.A.E. 6200			

REVISIONS					
ZONE	REV	DESCRIPTION	BY	DATE	APPROVAL
	1	RELEASE TO MFG PER EN			



INPUT 1 (CARD SLOT 3) TO A/D-B22
INPUT 2 (CARD SLOT 2) TO A/D-B24

ORIGINAL PAGE IS OF POOR QUALITY

B-29

1977

ITEM NO.	QTY	PART NUMBER	DESCRIPTION
		UNLESS OTHERWISE SPECIFIED	
		DIMENSIONS ARE IN INCHES TOLERANCES ON DECIMALS .XX ±.03 .XXX ±.010 ANGLES ±2°	
		MATERIAL	
		FINISH	
		TREATMENT	

NEXT ASSY | USED ON

APPLICATION

DRAWN		DATE
CHK		DATE
ENGR D.W. CORBIN		DATE 7/8/77
MFG		DATE
PROJ ENGR		DATE
APPVD		
APPVD		
CONTR NO. DN-012477		

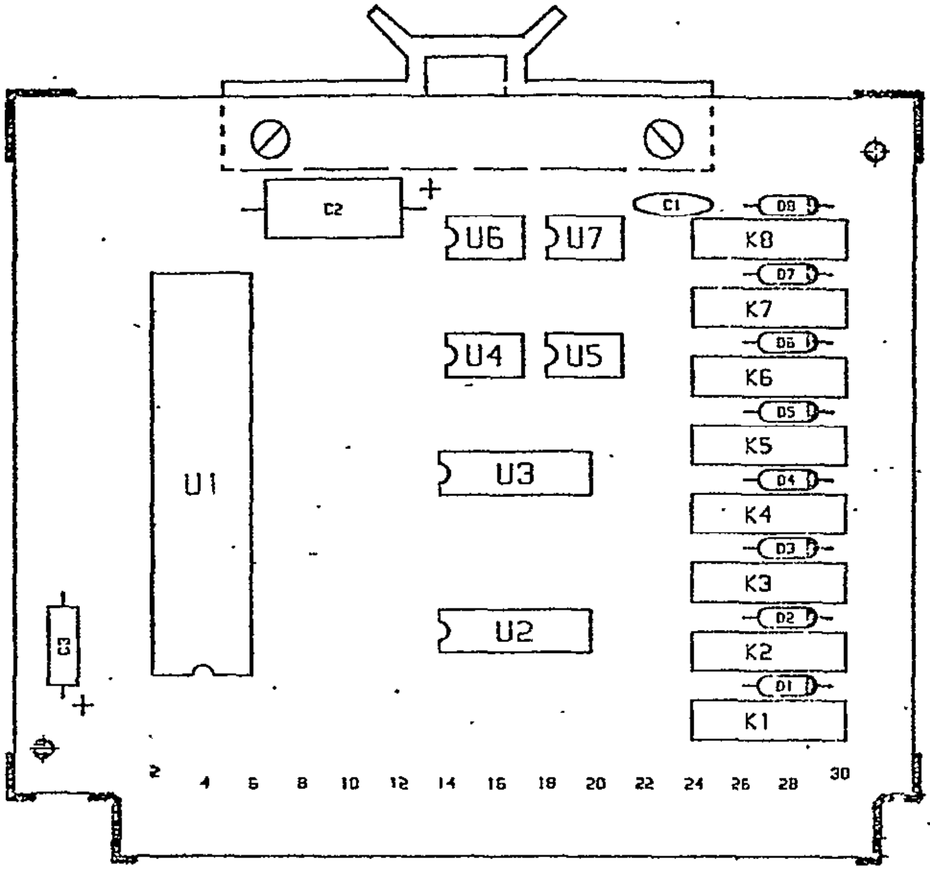
FAIRCHILD INSTRUMENTATION

TITLE: SCHEMATIC - RHO SIGMA; INPUT CARD

SIZE	CODE IDENT NO.	DWG NO.	REV
C		97470103-04	1

SCALE NONE SHEET 1 OF 1

REV.	DESCRIPTION	BY	DATE	APPROVED
1	RELEASED TO MFG PER EN			



PRINCIPLE DRAWING TABLE		
DRAWING NO.	DOCUMENTATION	REV NO.
40048465	A/W AND SPEC	1
97470103-04	SCHEMATIC	REF
97470103	LIST OF MAT'L	1

UNLESS OTHERWISE SPECIFIED

DIMENSIONS ARE IN INCHES. TOLERANCES ON DECIMALS X ±.1 XX ±.03 XXX ±.010 ANGLES ±2° BREAK SHARP EDGES .010 MAX.

MATERIAL: SEE LIST OF MAT'L

NEXT ASSY: 82

USED ON: PROGRAM CONTROLLED

DRAWN	[illegible]	DATE 9/12/77
CHK		DATE
ENGR	D.W. CORBIN	DATE 10/25/77
MFG		DATE
PROJ. ENGR		DATE
APPVD.		
CONTR NO.	[illegible]	

FAIRCHILD INSTRUMENTATION DIV - 4 1977

TITLE: ASSEMBLY — INPUT CARD

SIZE	CODE IDENT NO	DWG NO	REV
A		97470103	1

SCALE 1/1 SHEET 1 OF 1

FAIRCHILD LIST OF MATERIAL

LM NO		REV	QTY	UM	DESCRIPTION	NEXT ASSY	BY	DATE	CHK	DATE	MFG ENG	DATE	ENGR	DATE
97470103	-03	01	01	01	ASSY INPUT CARD 1,2									

ITEM	PART NO	REV	QTY PER ASSM	UM	DESCRIPTION	REFERENCE DESIGNATION	CHANGE DOCUMENT REV	CHANGE DOCUMENT EN NO
001	40098465		001	EA	PCB INPUT CARD			
002	03291040		001	EA	CAP .1UF	C1		
003	03282500		001	EA	CAP 22UF, 15V	C2		
004	03279100		001	EA	CAP 10UF, 15V	C3		
005	26901040		008	EA	DIODE 1N914	D1 THRU D8		
006	05036350		008	EA	RELAY	K1 THRU K8		
007	26904575		002	EA	IC 9LS05	U2, U3		
008			001	EA	IC 3861	U1		
009			004	EA	IC 75451	U4, 5, 6, 7		
010			001	EA	CARD EJECTOR, S.A.E. 6200			
011	09917022		001	EA	SOCKET 40 PIN	U1		

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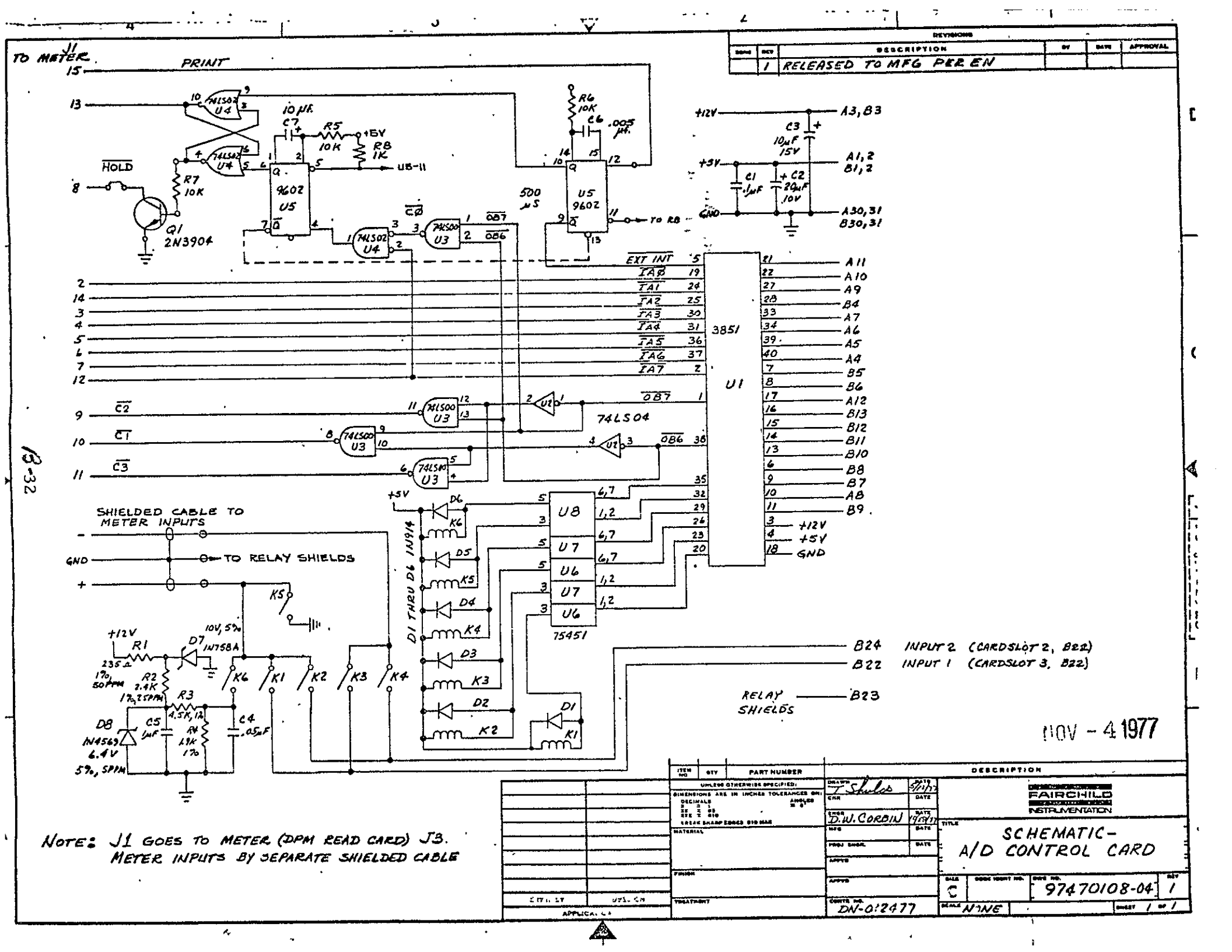


REVISIONS					
ZONE	REV	DESCRIPTION	BY	DATE	APPROVAL
	1	RELEASED TO MFG PER EN			

ITEM NO	QTY	PART NUMBER	DESCRIPTION

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES TOLERANCES ON:
DECIMALS X ± 1, XX ± .05, XXX ± .010
BREAK SHARP EDGES .010 MAX
ANGLES ± 0°
MATERIAL
FINISH
TREATMENT
APPLICATION

DRAWN	T. Shulos	5/11/77 DATE
CHK		DATE
ENGR	D.W. CORBIN	11/4/77 DATE
MFG		DATE
PROJ ENGR		DATE
APPVD		
APPVD		
CONTR DR	DN-0:2477	

FAIRCHILD INSTRUMENTATION

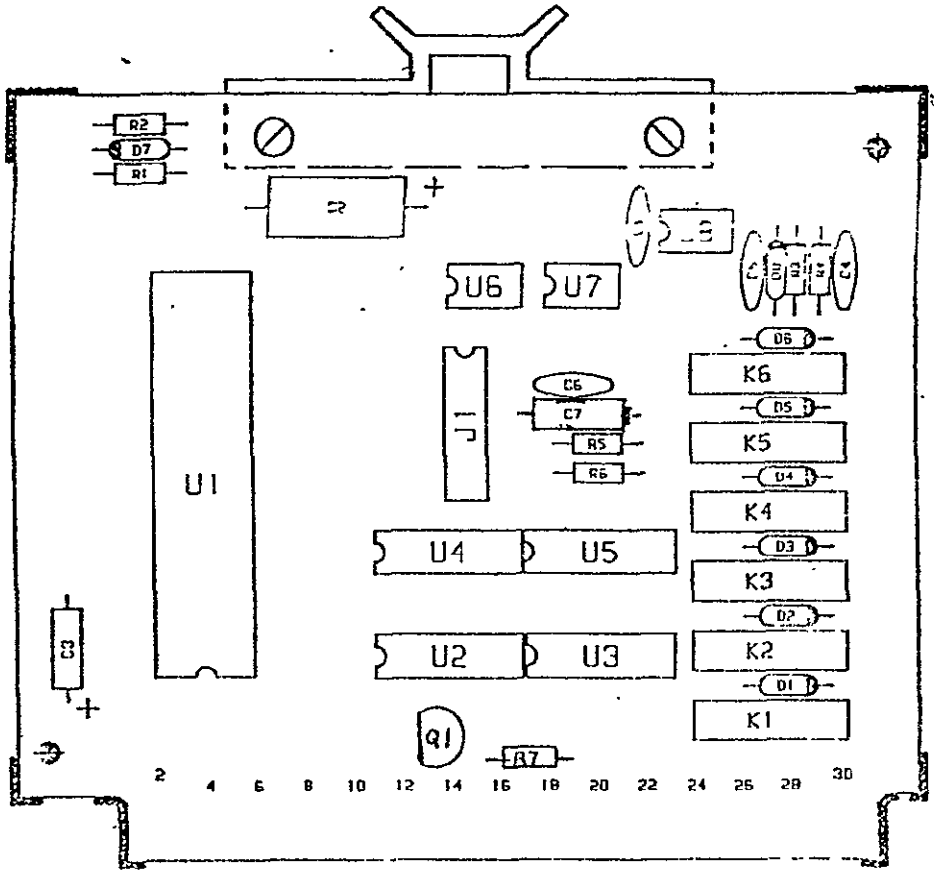
TITLE: SCHEMATIC - A/D CONTROL CARD

SIZE	CODE IDENT NO.	DWG NO.	REV
C		97470108-04	1

SCALE NONE SHEET 1 OF 1

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVED
1	RELEASED TO MFG PER EN			



PRINCIPLE DRAWING TABLE		
DRAWING NO.	DOCUMENTATION	REV NO.
40048471	A/W AND SPEC	1
97470108-04	SCHEMATIC	REF
97470108	LIST OF MAT'L	1

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES. TOLERANCES ON
DECIMALS: X ±.1, XX ±.03, XXX ±.010
ANGLES ±2°
BREAK SHARP EDGES .010 MAX.

MATERIAL: SEE LIST OF MAT'L

NEXT ASSY: 82

USED ON

DRAWN: I. Sutton — DATE: 5/14/77
CHK — DATE
ENGR: D.W. CORBIN — DATE: 10/28/77
MFG — DATE
PROJ. ENGR — DATE
APPVD.
CONTR NO.

FAIRCHILD
INSTRUMENTATION

TITLE: ASSEMBLY — A/D CONTROL CARD

SIZE	CODE IDENT NO	DWG NO	REV.
A		97470108	1

FAIRCHILD LIST OF MATERIAL

LM NO		REV	QTY	UM	DESCRIPTION	NEXT ASSY	
9,7,4,7,0,1,0,8	-03	0,1	0,1	0,1	ASSY A/D CONTROL CARD		BY ____ CHK ____ MFG ENG ____ DATE ____ DATE ____ DATE ____ ENGR ____ DATE ____

ITEM	PART NO	REV	QTY PER ASSM	UM	DESCRIPTION	REFERENCE DESIGNATION	CHANGE DOCUME REV	CHANGE DOCUME EN NO
0,0,1	4,0,0,4,8,4,7,1		0,0,1	EA	PC,B A/D CONTROL CARD			
0,0,2	2,6,9,0,5,0,9,0		0,0,1	EA	IC 3851 PSU	U1		
0,0,3	2,6,9,0,4,5,6,4		0,0,1	EA	IC 74LS04	U2		
0,0,4	2,6,9,0,4,5,7,8		0,0,1	EA	IC 74LS00	U3		
0,0,5	2,6,9,0,4,5,9,0		0,0,1	EA	IC 74LS02	U4		
0,0,6	2,6,9,0,5,6,0,1		0,0,1	EA	IC 9602	U5		
0,0,7	2,6,9,0,5,6,0,5		0,0,3	EA	IC 75451	U6, U7, U8		
0,0,8	2,6,9,0,1,0,4,0		0,0,6	EA	DIODE 1N914	D1 THRU D6		
0,0,9	2,6,0,1,2,5,5,0		0,0,1	EA	ZENER 1N758A, 10V, 5%	D7		
0,1,0	2,6,9,0,1,0,1,6		0,0,1	EA	ZENER 1N4569, 6.4V, 5%	D8		
0,1,1	0,5,0,3,6,8,5,0		0,0,6	EA	RELAY	K1 THRU K6		
0,1,2	0,3,2,9,1,0,4,0		0,0,1	EA	CAP .1μF	C1		
0,1,3	0,3,2,8,2,5,6,0		0,0,1	EA	CAP 22μF, 15V	C2		
0,1,4	0,3,2,7,9,1,0,0		0,0,1	EA	CAP 10μF, 15V	C3		
0,1,5	0,3,2,9,1,8,5,0		0,0,1	EA	CAP .05μF	C4		
0,1,6	0,3,1,7,0,0,0,1		0,0,3	EA	CAP 1μF	C5, C6, C7		
0,1,7	0,2,3,5,4,8,5,0		0,0,3	EA	RES 10K, 1/4W, 5%	R5, R6, R7		
0,1,8			0,0,1	EA	RES 235Ω, 1%, 50PPM	R1		
0,1,9			0,0,1	EA	RES 2.4K, 1%, 25PPM	R2		

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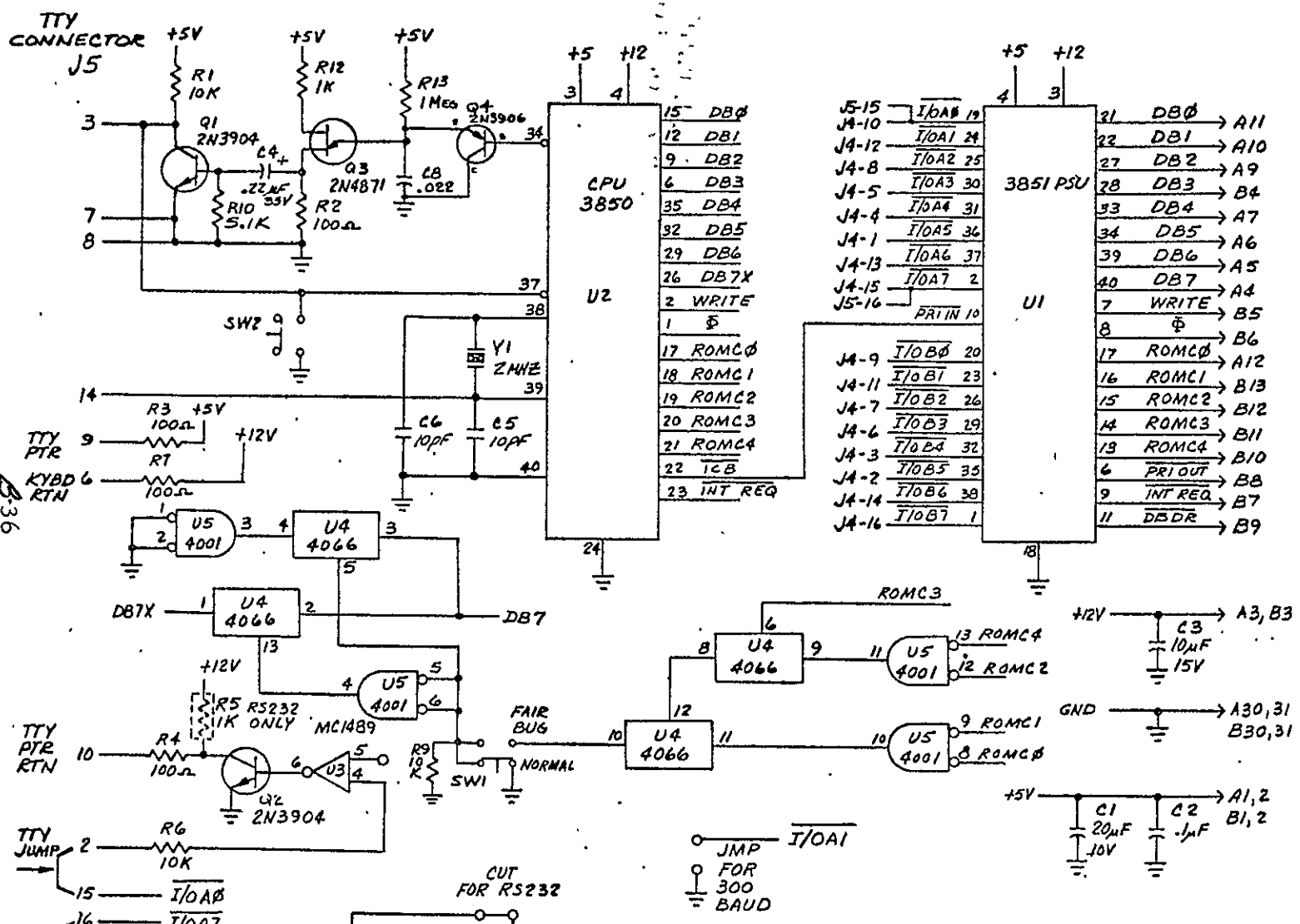
FAIRCHILD LIST OF MATERIAL

LM NO		REV	QTY	UM	DESCRIPTION	NEXT ASSY
9,7,4,7,0,1,0,8	-03	0,1	0,1	0,1	ASSY A/D CONTROL CARD	

BY _____ CHK _____ MFG ENG _____ DATE _____
DATE _____ DATE _____ ENGR _____ DATE _____

ITEM	PART NO	REV	QTY PER ASSM	UM	DESCRIPTION	REFERENCE DESIGNATION	CHANGE DOCUMENT REV	CHANGE DOCUMENT EN NO
020			001	EA	RES, 4.5K, 1%	R3		
021			001	EA	RES, 1.9K, 1%	R4		
022			001	EA	CARD EJECTOR, S.A.E.6200			
023			001	EA	SOCKET 40 PIN	U1		

REVISIONS					
ZONE	REV	DESCRIPTION	BY	DATE	APPROVAL
	1	RELEASE TO MFG PER EN			



NOV - 4 1977

ITEM NO	QTY	PART NUMBER	DESCRIPTION
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES ON DECIMALS .X ±.1, .XX ±.03, .XXX ±.010, ANGLES ± 1°, BREAK SHARP EDGES .010 MAX			
MATERIAL			
FINISH			
TREATMENT			
APPLICATION			

DRAWN T. Sinclair 5/1/77
CAE
ENGR D.W. CORBIN 5/5/77
MFG
PROJ. ENGR.
APPVD
APPVD
ENGR'G NO. DN-012477

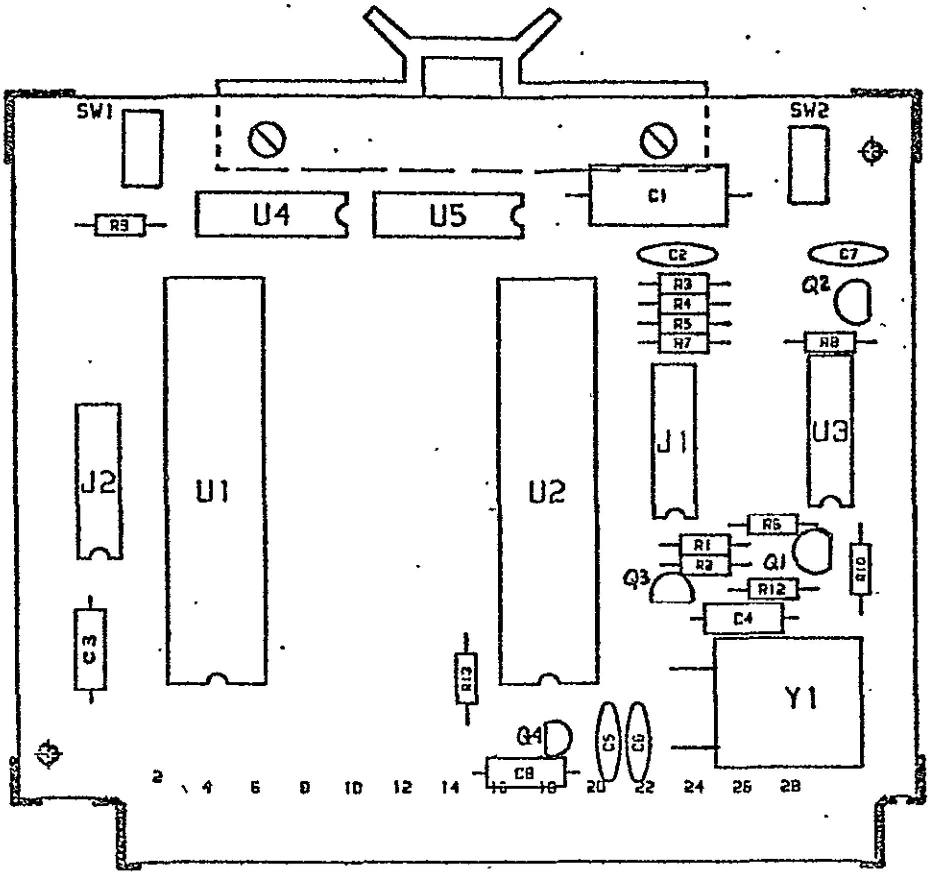
FAIRCHILD INSTRUMENTATION

TITLE: SCHEMATIC — CPU CARD

SIZE C | CODE IDENT NO. | DWG NO. 97470100-04 | REV 1

SCALE NONE | SHEET 1 OF 1

REV.	DESCRIPTION	BY	DATE	APPROVED
1	RELEASED TO MFG PER EN			



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OF POOR QUALITY

PRINCIPLE DRAWING TABLE		
DRAWING NO.	DOCUMENTATION	REV NO.
40048472	A/W AND SPEC	1
97470100-04	SCHEMATIC	REF
97470100	LIST OF MAT'L	1

UNLESS OTHERWISE SPECIFIED

DIMENSIONS ARE IN INCHES. TOLERANCES ON
DECIMALS: X ±.1, XX ±.03, XXX ±.010
ANGLES: ±2°
BREAK SHARP EDGES .010 MAX.

MATERIAL: SEE LIST OF MAT'L

NEXT ASSY: 82

USED ON: [illegible]

DRAWN: T. Shutes — DATE: 5/12/77
CHK — DATE
ENGR: D.W. CORBIN — DATE: 10/28/77
MFG — DATE
PROJ. ENGR — DATE
APPVD.
CONTR NO.

FAIRCHILD
INSTRUMENTATION

TITLE: ASSEMBLY — CPU BOARD

SIZE	CODE IDENT NO.	DWG NO.	REV.
A		97470100	1

FAIRCHILD LIST OF MATERIAL

LM NO		REV	QTY	UM	DESCRIPTION	NEXT ASSY	
9,7,4,7,0,1,0,0	-03	01	01	01	ASSY CPU BD		BY [illegible] CHK ____ MFG ENG ____ DATE ____ DATE 5/11 DATE ____ ENGR ____ DATE ____

ITEM	PART NO	REV	QTY PER ASSM	UM	DESCRIPTION	REFERENCE DESIGNATION	CHANGE DOCUME REV	CHANGE DOCUME EN NO
001	40048472	01	001	EA	PCB CPU CARD			
002	26905090	01	001	EA	IC 3851	U1		
003	26904805	01	001	EA	IC 3850	U2		
004	26905407	01	001	EA	IC MC1489	U3		
005		01	001	EA	IC 4066	U4		
006	26904823	01	001	EA	IC 4001	U5		
007	02354380	01	004	EA	RES 100Ω 1/4W 5%	R2,3,4,7		
008	02354620	01	002	EA	RES 1KΩ 1/4W 5%	R8,12		
009	02354780	01	001	EA	RES 5.1K 1/4W 5%	R10		
010	02354850	01	003	EA	RES 10K 1/4W 5%	R1,6,9		
011	02355330	01	001	EA	RES 1MΩ 1/4W 5%	R13		
012	03175060	01	002	EA	CAP 10PF	C5,6		
013	02379120	01	001	EA	CAP .22UF 35V TANT	C4		
014	03291040	01	001	EA	CAP .1UF CERAMIC	C2		
015	03855004	01	001	EA	CAP .47UF CERAMIC	C7		
016	03279100	01	002	EA	CAP 10UF 15V TANT	C3		
017	03282560	01	001	EA	CAP 22UF 15V TANT	C1		
018	26006930	01	001	EA	DIODE FDH600	D1		
019	26903006	01	002	EA	TRANSISTOR ZN3904	Q1,2		

FAIRCHILD LIST OF MATERIAL

LM NO		REV	QTY	UM	DESCRIPTION	NEXT ASSY				
9747010	-03	01	01	01	ASSY CPU BOARD		BY	CHK	MFG ENG	DATE
							DATE	DATE	ENGR	DATE

ITEM	PART NO	REV	QTY PER ASSM	UM	DESCRIPTION	REFERENCE DESIGNATION	CHANGE DOCUMENT REV	CHANGE DOCUMENT NO
020		01	001	EA	TRANSISTOR 2N4871	Q3		
021	27903005	01	001	EA	CRYSTAL 2MHZ	Y1		
022	0991702 2	01	002	EA	SOCKET 40 PIN DIP	REF - U1, 2		
023	0991700 9	01	002	EA	SOCKET 16 PIN DIP	REF - J1, 2		
024		01	002	EA	SWITCH, SLIDE	SW1, 2		
025		01	001	EA	CARD EJECTOR, S.A.E. 6200			
026	26903502	01	001	EA	TRANSISTOR 2N3906	Q4		
027		01	001	EA	.22 µf. MYLAR CAP.	C8		

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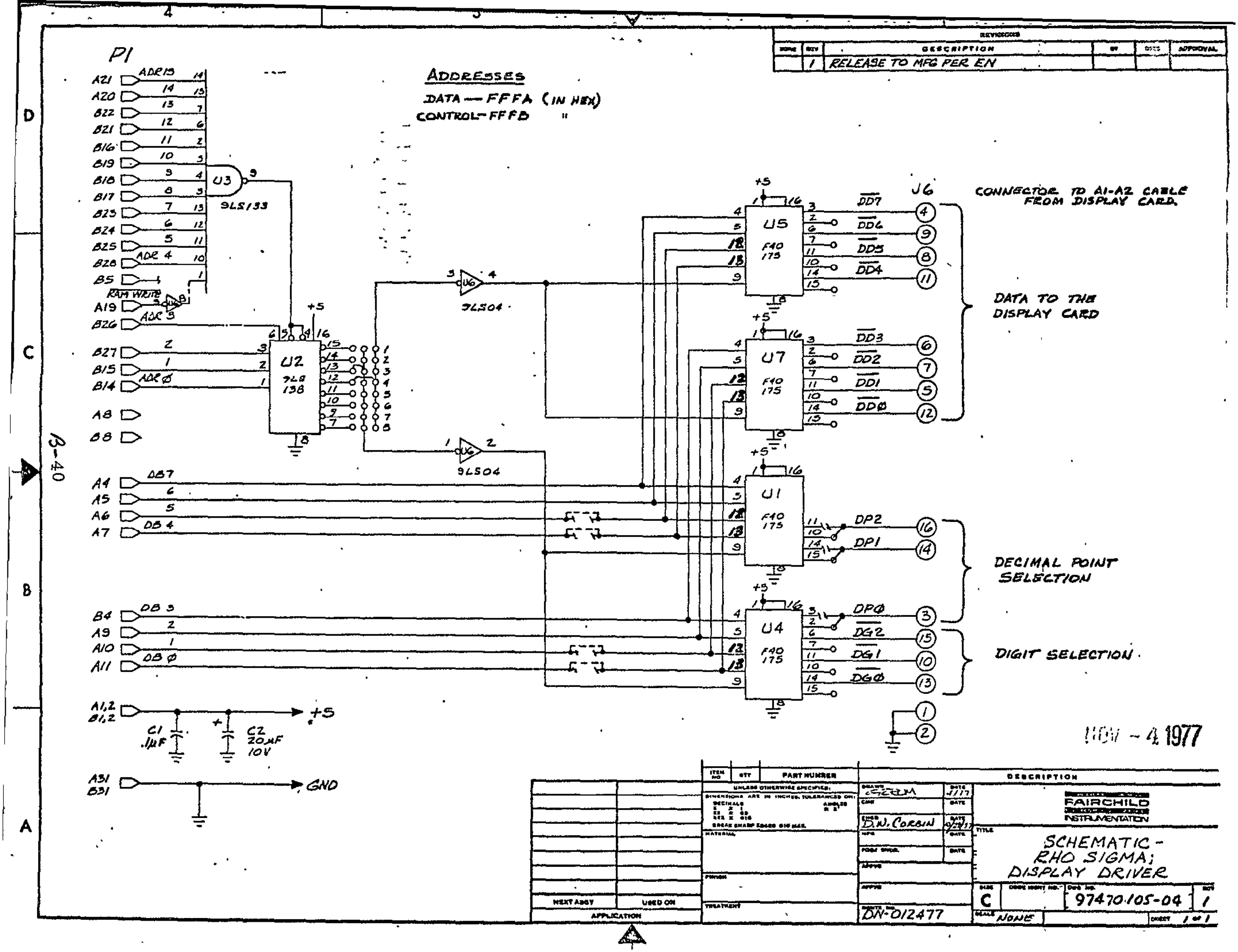
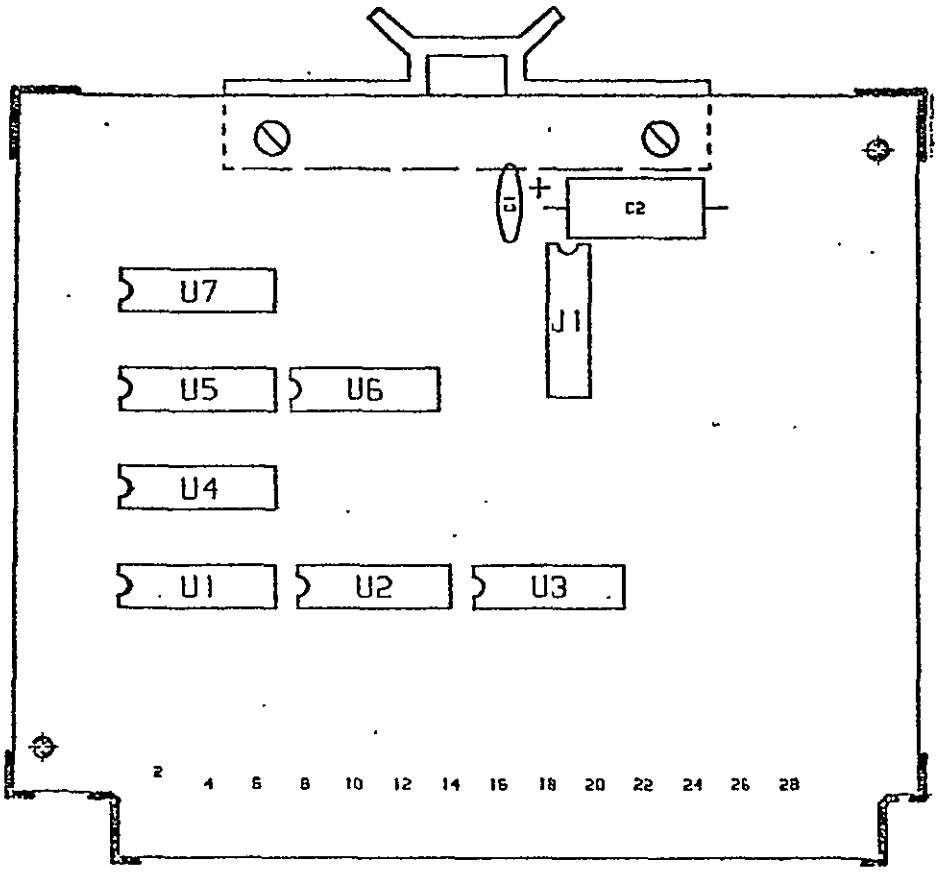


RELEASE TO MFG PER EN
P1
ADDRESSES
DATA — FFFA (IN HEX)
CONTROL — FFFB "
U3
9LS133
RAM WRITE
U2
9LS138
U6
9LS04
U5
U7
U1
U4
F40 175
J6
CONNECTOR TO A1-A2 CABLE FROM DISPLAY CARD
DD7
DD6
DD5
DD4
DD3
DD2
DD1
DDØ
DATA TO THE DISPLAY CARD
DP2
DP1
DPØ
DECIMAL POINT SELECTION
DG2
DG1
DGØ
DIGIT SELECTION
C1 .1µF
C2 20µF 10V
+5
GND
B-40
NOV - 4 1977
PART NUMBER
DESCRIPTION
NEXT ASSY
USED ON
APPLICATION
D.N. CORBIN
FAIRCHILD INSTRUMENTATION
SCHEMATIC - RHO SIGMA; DISPLAY DRIVER
C
97470-105-04
DN-012477
NONE

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVED
1	RELEASED TO MFG. PER EN			



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PRINCIPLE DRAWING TABLE		
DRAWING NO.	DOCUMENTATION	REV NO.
40048467	A/W AND SPEC	1
97470105-04	SCHEMATIC	REF
97470105	LIST OF MAT'L	1

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES. TOLERANCES ON
DECIMALS: X ±.1, XX ±.03, XXX ±.010
ANGLES ±2°
BREAK SHARP EDGES .0100 MAX.

ATERIAL
SEE LIST OF MAT'L

EXT ASSY
82

DRAWN	T. Santos	5/5/77
CHK		DATE
ENGR	D.W. CORBIN	10/28/77
MFG		DATE
PROJ. ENGR		DATE
APPVD		

FAIRCHILD
INSTRUMENTATION

TITLE
ASSEMBLY —
DISPLAY DRIVER CARD

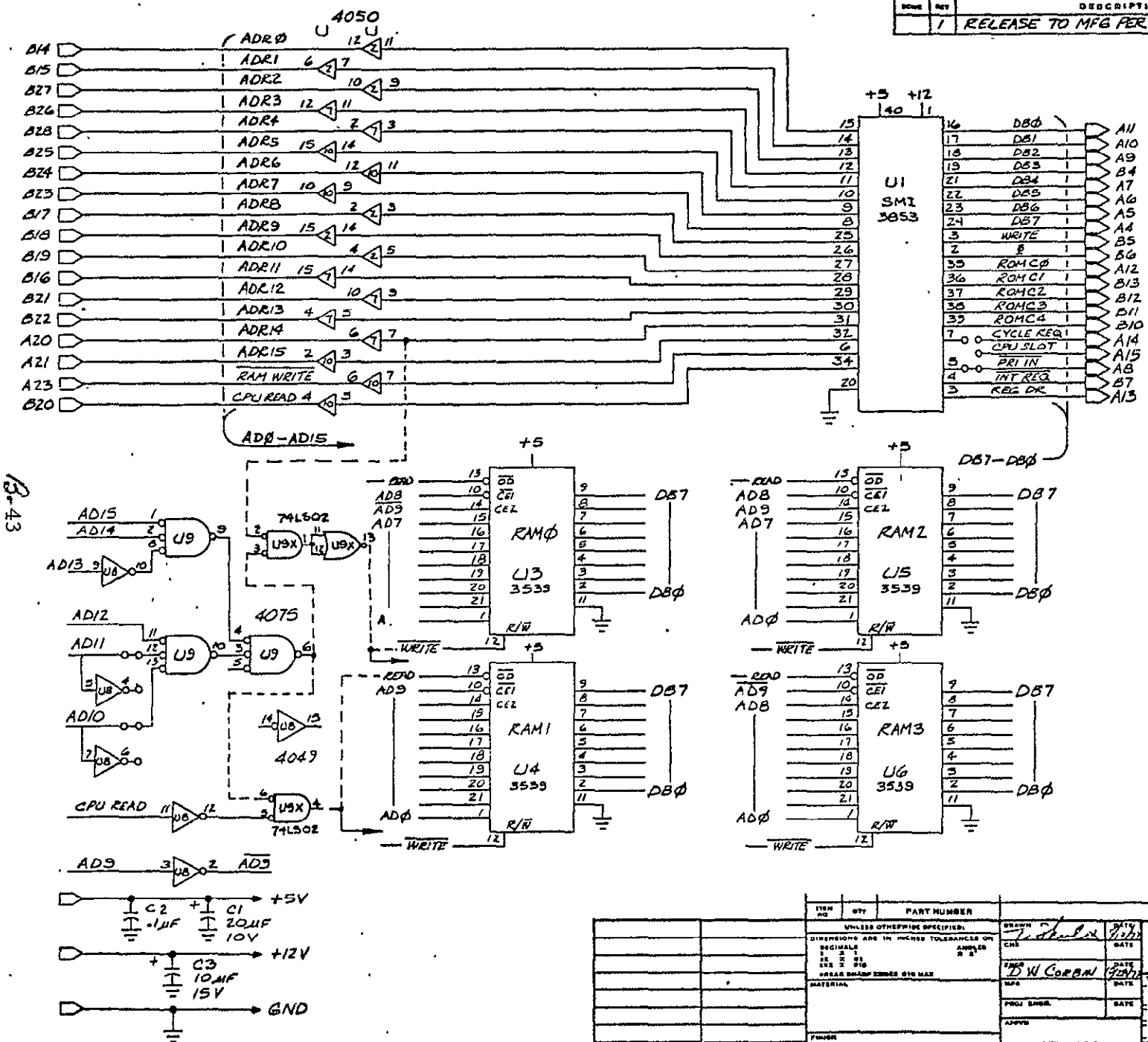
SIZE	CODE IDENT NO	DWG NO	REV.
A		97470105	1

FAIRCHILD LIST OF MATERIAL

LM NO		REV	QTY	UM	DESCRIPTION	NEXT ASSY			
9747105	-03	01	01	01	ASSY DISPLAY DRIVER BD		BY	CHK	MFG ENG / DATE
							DATE	DATE	ENGR / DATE

ITEM	PART NO	REV	QTY PER ASSM	UM	DESCRIPTION	REFERENCE DESIGNATION	CHANGE DOCUMENT REV	CHANGE DOCUMENT EN NO
001	40048467		001	EA	PCB DISPLAY BD			
002	03291040		001	EA	CAP .1UF	C1		
003	03282560		001	EA	CAP 22UF, 15V	C2		
004			004	EA	IC F40175	U1, U4, U5, U7		
005	26905559		001	EA	IC 9LS138	U2		
006	26904593		001	EA	IC 9LS133	U3		
007	26904564		001	EA	IC 9LS04	U6		
008	09917009		001	EA	SOCKET 16 PIN	J1		
009			001	EA	CARD EJECTOR, S.A.E. 6200			
442								

REVISIONS					
ZONE	REV	DESCRIPTION	BY	DATE	APPROVAL
	1	RELEASE TO MFG PER EN			



B-43

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OF POOR QUALITY

NOV - 4 1977

ITEM NO	QTY	PART NUMBER	DESCRIPTION
		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES ON DECIMALS ANGLES BREAK SHARP EDGES .010 MAX	

NEXT ASSY	USED ON
APPLICATION	

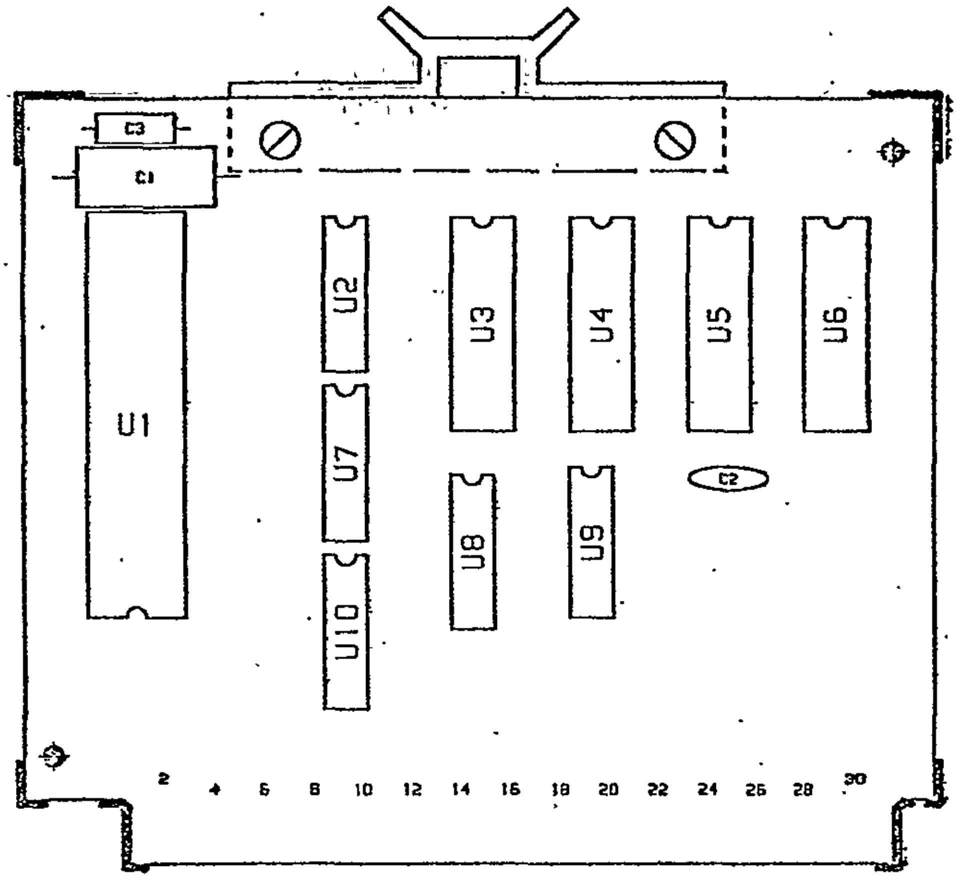
DRAWN		DATE 11/5/77
CHK		DATE
ENG	D W CORBIN	DATE 11/4/77
MFG		DATE
PROJ ENGR		DATE
APPVD		
APPVD		
QA/QC NO.	DN-0'2477	

FAIRCHILD INSTRUMENTATION

TITLE: SCHEMATIC - RHO SIGMA; MEMORY ADDRESS

SIZE	SCALE	DRWG NO	SHEET
C	NONE	97470107-04	1 OF

REV.	DESCRIPTION	BY	DATE	APPROVED
1	RELEASED TO MFG PER EN			



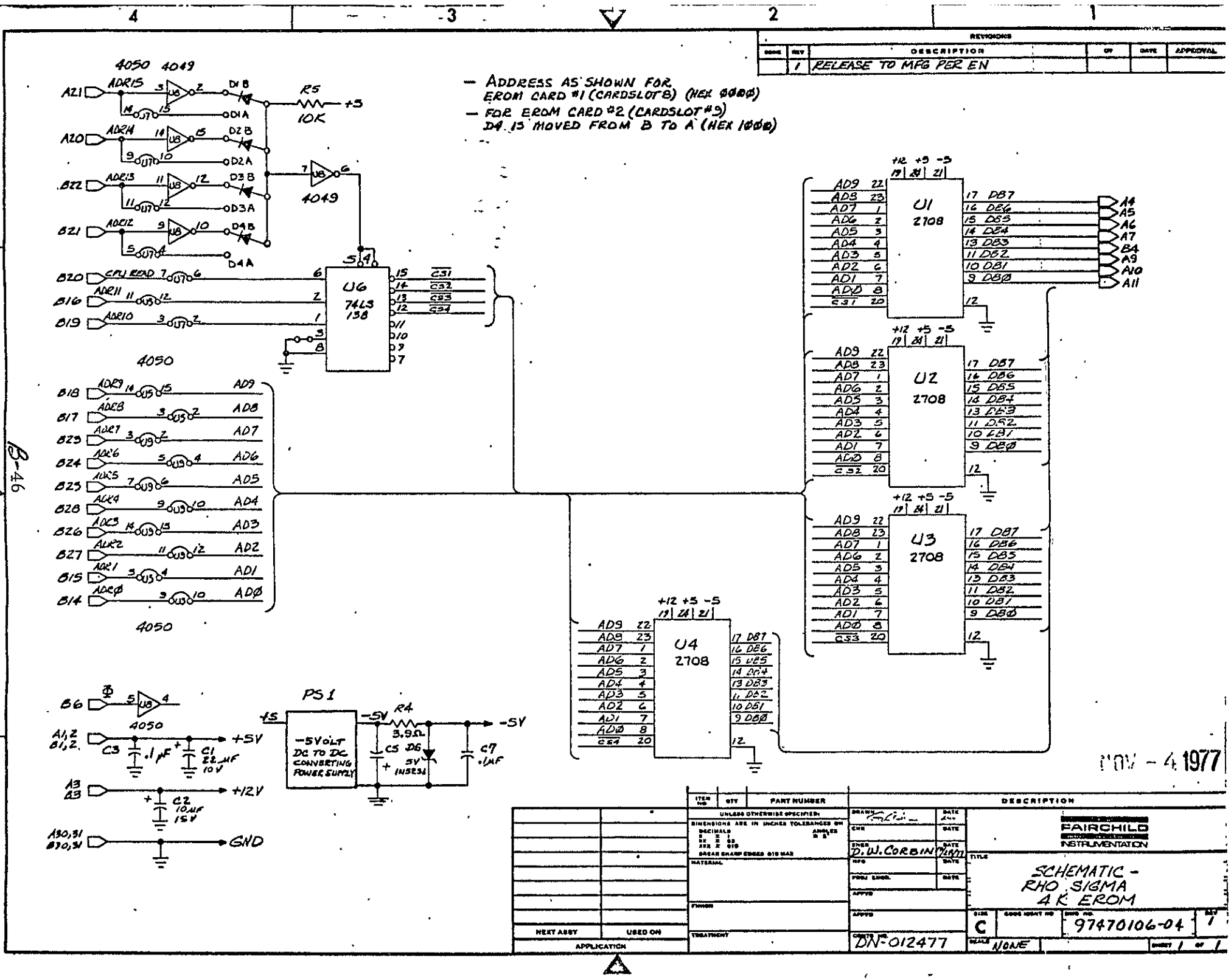
PRINCIPLE DRAWING TABLE		
DRAWING NO.	DOCUMENTATION	REV NO.
40048470	A/W AND SPEC	1
97470107-04	SCHEMATIC	REF
97470107-03	LIST OF MAT'L	1

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES ON DECIMALS: X ±.1, XX ±.03, XXX ±.010 ANGLES ±2° BREAK SHARP EDGES .010 MAX.	DRAWN T. Shulse	DATE 9/2/77	FAIRCHILD INSTRUMENTATION
	CHK	DATE	
MATERIAL: SEE LIST OF MAT'L	ENGR D.W. CORBIN	DATE 10-28-77	TITLE: ASSEMBLY— MEMORY ADDRESS CARD
	MFG	DATE	
	PROJ. ENGR	DATE	
NEXT ASSY: 82	APPVD.		SIZE A · CODE IDENT NO. · DWG NO 97470107 · REV 1
USED ON	CONTR NO.		SCALE

FAIRCHILD LIST OF MATERIAL

LM NO		REV	QTY	UM	DESCRIPTION	NEXT ASSY				
9747012-07	-03	01	01	01	ASSY MEMORY ADDRESS CARD		BY	CHK	MFG ENG	DATE
							DATE	DATE	ENGR	DATE

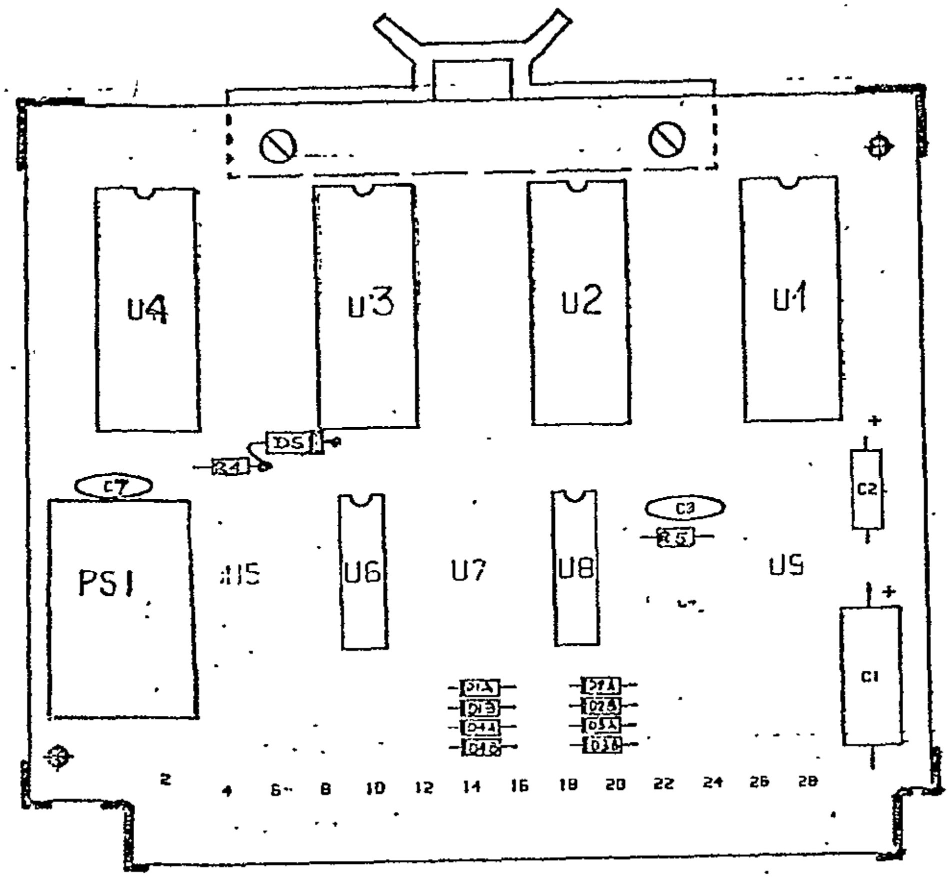
ITEM	PART NO	REV	QTY PER ASSM	UM	DESCRIPTION	REFERENCE DESIGNATION	CHANGE DOCUMEN REV	CHANGE DOCUMEN EN NO
001	4004847P		001	EA	PCB MEMORY ADDRESS			
002	03291040		001	EA	CAP .1UF	C2		
003	03282560		001	EA	CAP 22UF 15V	C1		
004	03279100		001	EA	CAP 10UF 15V	C3		
005			004	EA	IC 3539 - 256X8 RAM	U3 THRU U6		
006	26904808		001	EA	IC 3853 STATIC MEM INT	U1		
007	26904826		003	EA	IC 4050 CMOS BUFFER	U2, 7, 10		
008	26904816		001	EA	IC 4049 CMOS INVERTER	U8		
009			001	EA	IC 4075 CMOS 3IN. 'OR'	U9		
010	26904590		001	EA	IC 74LS02 2 IN 'NOR'	U9X		
011			001	EA	CARD EJECTOR, S.A.E. 6200			
012	09917022		001	EA	SOCKET 40 PIN	U1		



REVISIONS					
ZONE	REV	DESCRIPTION	BY	DATE	APPROVAL
	1	RELEASE TO MFG PER EN			

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVED
1	RELEASED TO MFG PER EN			



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PRINCIPLE DRAWING TABLE

DRAWING NO.	DOCUMENTATION	REV NO.
40048469	A/W AND SPEC	1
97470106-04	SCHEMATIC	REF
97470106	LIST OF MAT'L	1

UNLESS OTHERWISE SPECIFIED

DIMENSIONS ARE IN INCHES. TOLERANCES ON DECIMALS X ±.1 XX ±.03 XXX ±.010 ANGLES ±2°

BREAK SHARP EDGES .010 MAX.

MATERIAL: SEE LIST OF MAT'L

NEXT ASSY: 82

USED ON

DRAWN: J. Steeler DATE: 8/12/77

CHK DATE

ENGR: D. W. CORBIN DATE: 10/25/77

MFG DATE

PROJ. ENGR DATE

APPVD.

FAIRCHILD INSTRUMENTATION

TITLE: ASSEMBLY — 4K EROM CARD

SIZE: A | CODE IDENT NO | DWG NO: 97470106 | REV. 1

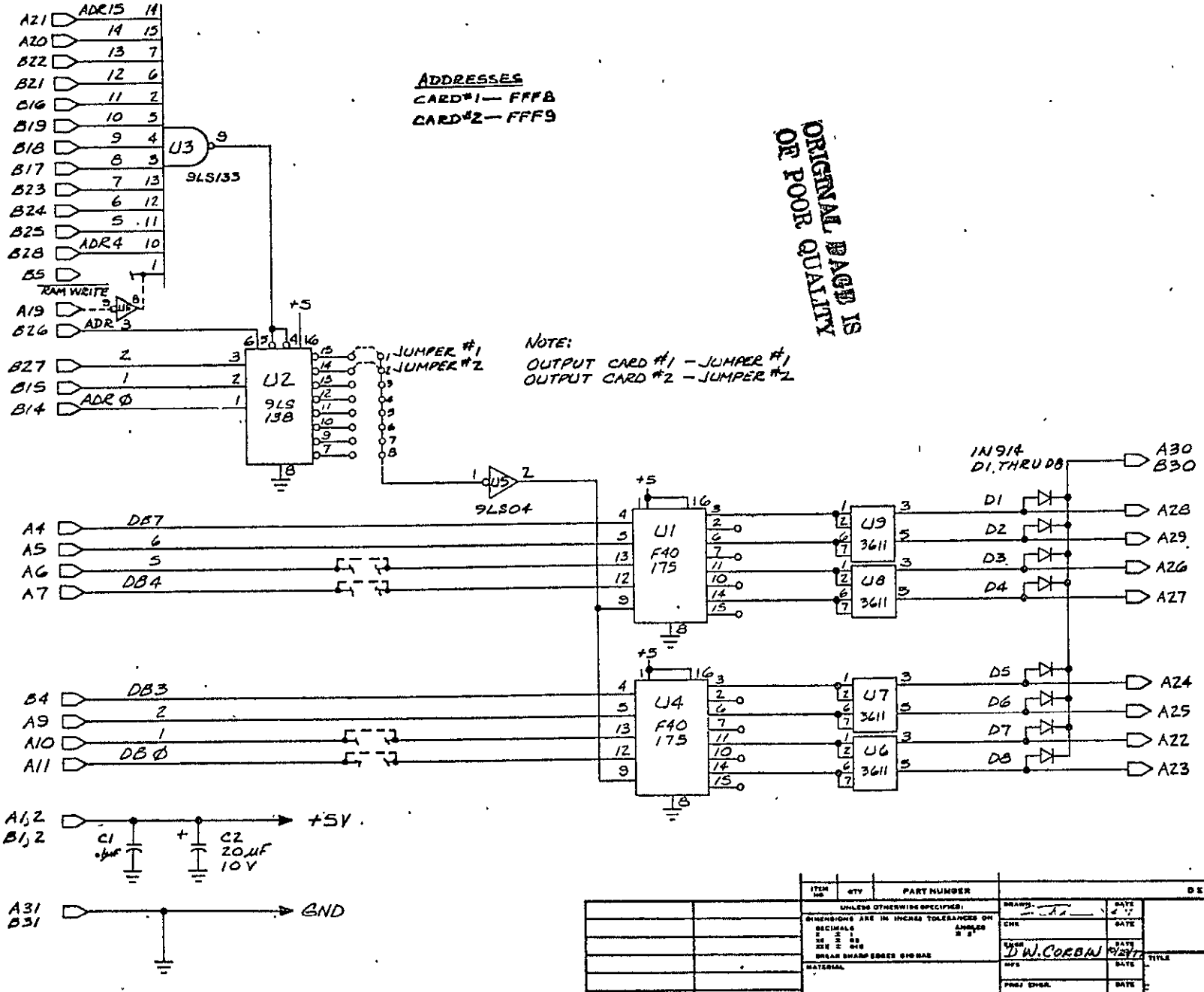
FAIRCHILD LIST OF MATERIAL

PAGE 1 OF 1

LM NO		REV	QTY	UM	DESCRIPTION	NEXT ASSY				
9747010606	-03	01	01	01	ASSY EROM BD		BY	CHK	MFG ENG	DATE
							DATE	DATE	ENGR	DATE

ITEM	PART NO	REV	QTY PER ASSM	UM	DESCRIPTION	REFERENCE DESIGNATION	CHANGE DOCUMEN REV	CHANGE DOCUMEN EN NO
001	400048469		001	EA	PCB EROM BD			
002	03291040		002	EA	CAP .1UF	C3, C7		
003	03279100		002	EA	CAP 10UF 15V	C2		
004	03282560		001	EA	CAP 22UF 15V	C1		
005	26901040		004	EA	DIODE 1N914	D1A,2A,3A,4A OR D1B,2B,3B,4B		
006								
007	02354850		001	EA	RES 10K, 1/4W, 5%	R5		
008								
009								
010			001	EA	RES 3.9Ω 1/4W 5%	R4		
011								
012								
013								
014			001	EA	DIODE ZENER IN5231 5V	D2		
015	26905022		004	EA	IC 2708 UV PROM	U1 THRU U4		
016								
017	26905559		001	EA	IC 74LS138	U6		
018	26904816		001	EA	IC 4049	U8		
019			001	EA	CARD EJECTOR, S.A.E. 6200			

REVISIONS					
ZONE	REV	DESCRIPTION	BY	DATE	APPROVAL
	1	RELEASE TO MFG PER EN			



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MAR 4 1977

ITEM NO	QTY	PART NUMBER	DESCRIPTION
		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES ON DECIMALS .X ± .1, .XX ± .05, .XXX ± .010, ANGLES ± 2°, BREAK SHARP EDGES .010 MAX	
		MATERIAL	
		FINISH	
		TREATMENT	
NEXT ASSY	USED ON	APPLICATION	

DRAWN D.W. CORBIN 9/29/77
CHK
MFG
PROJ. ENGR.
APPVD
APPVD
CONTR NO DN-012477

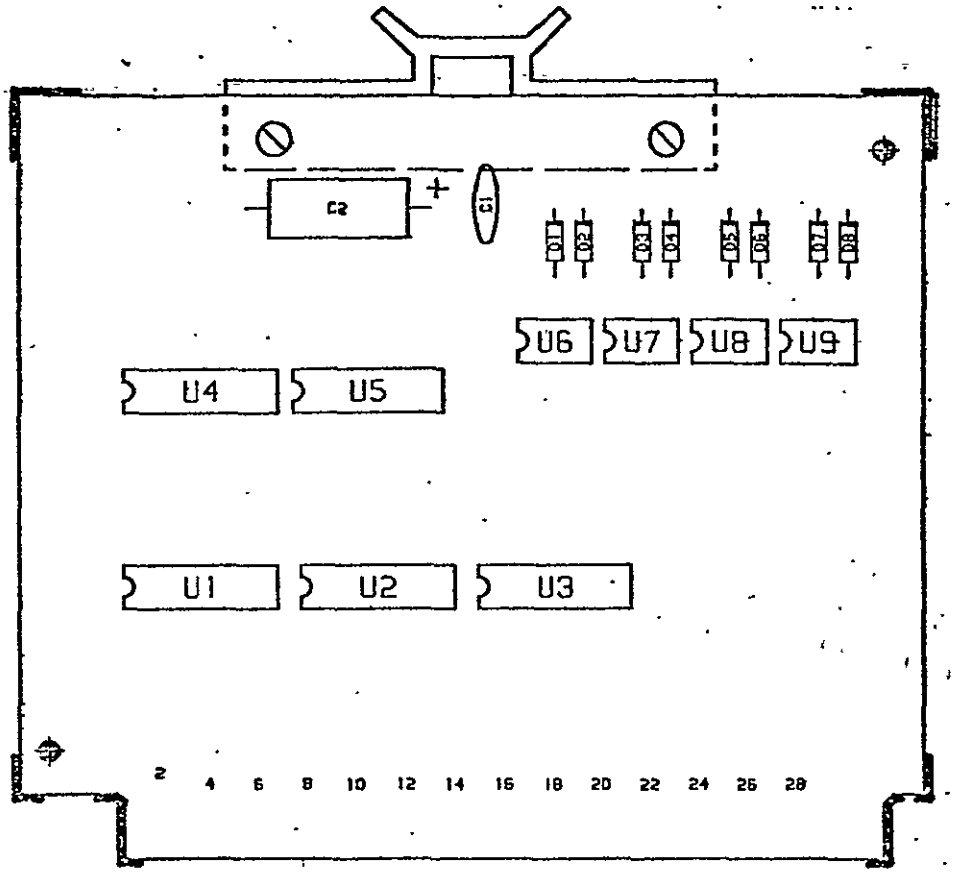
FAIRCHILD INSTRUMENTATION

TITLE: SCHEMATIC - RHO SIGMA; OUTPUT CARD

SIZE C | CODE IDENT NO. | DWG NO 97470104-04 | REV 1

SCALE | SHEET 1 OF 1

REV.	DESCRIPTION	BY	DATE	APPROVED
1	RELEASED TO MFG PER EN			



PRINCIPLE DRAWING TABLE		
DRAWING NO.	DOCUMENTATION	REV NO.
40048466	A/W AND SPEC	1
97470104-04	SCHEMATIC	REF
97470104	LIST OF MAT'L	1

UNLESS OTHERWISE SPECIFIED

DIMENSIONS ARE IN INCHES. TOLERANCES ON
DECIMALS: X ±.1, XX ±.03, XXX ±.010
ANGLES: ±2°
BREAK SHARP EDGES .010 MAX.

MATERIAL: SEE LIST OF MAT'L

NEXT ASSY: 82

USED ON: PROGRAM CONTROLLER

DRAWN	T. Shelton	5/11/77
CHK		DATE
ENGR	D.W. CORBIN	10/25/77
MFG		DATE
PROJ. ENGR		DATE
APPVD.		
CONTR NO.	DAL-C12477	

FAIRCHILD INSTRUMENTATION

TITLE: ASSEMBLY — OUTPUT CARD

SIZE	CODE IDENT NO.	DWG NO	REV.
A		97470104	1

SCALE 1/1 SHEET 1 OF 1

FAIRCHILD LIST OF MATERIAL

LM NO		REV	QTY	UM	DESCRIPTION	NEXT ASSY		
9747010 4	-03	01	01	01	ASSY, OUTPUT CARD 1, 2		BY ____ CHK ____ MFG ENG ____ DATE ____	DATE ____ DATE ____ ENGR ____ DATE ____

ITEM	PART NO	REV	QTY PER ASSM	UM	DESCRIPTION	REFERENCE DESIGNATION	CHANGE DOCUMENT REV	CHANGE DOCUMENT EN NO
001	40048466		001	EA	P.C.B. OUTPUT CARD			
002	03291040		001	EA	CAP .1UF	C1		
003	03282560		001	EA	CAP 22UF, 15V	C2		
004			001	EA	IC F40175	U1, U4		
005	26905559		001	EA	IC 9LS138	U2		
006	26904593		001	EA	IC 9LS133	U3		
007			004	EA	IC 3611 NAT. SEMICON.	U6, U7, U8, U9		
008	26904564		001	EA	IC 9LS04	U5		
009	26901040		008	EA	DIODE IN914	D1 THRU D8		
010			001	EA	CARD EJECTOR, S.A.E. 6200			

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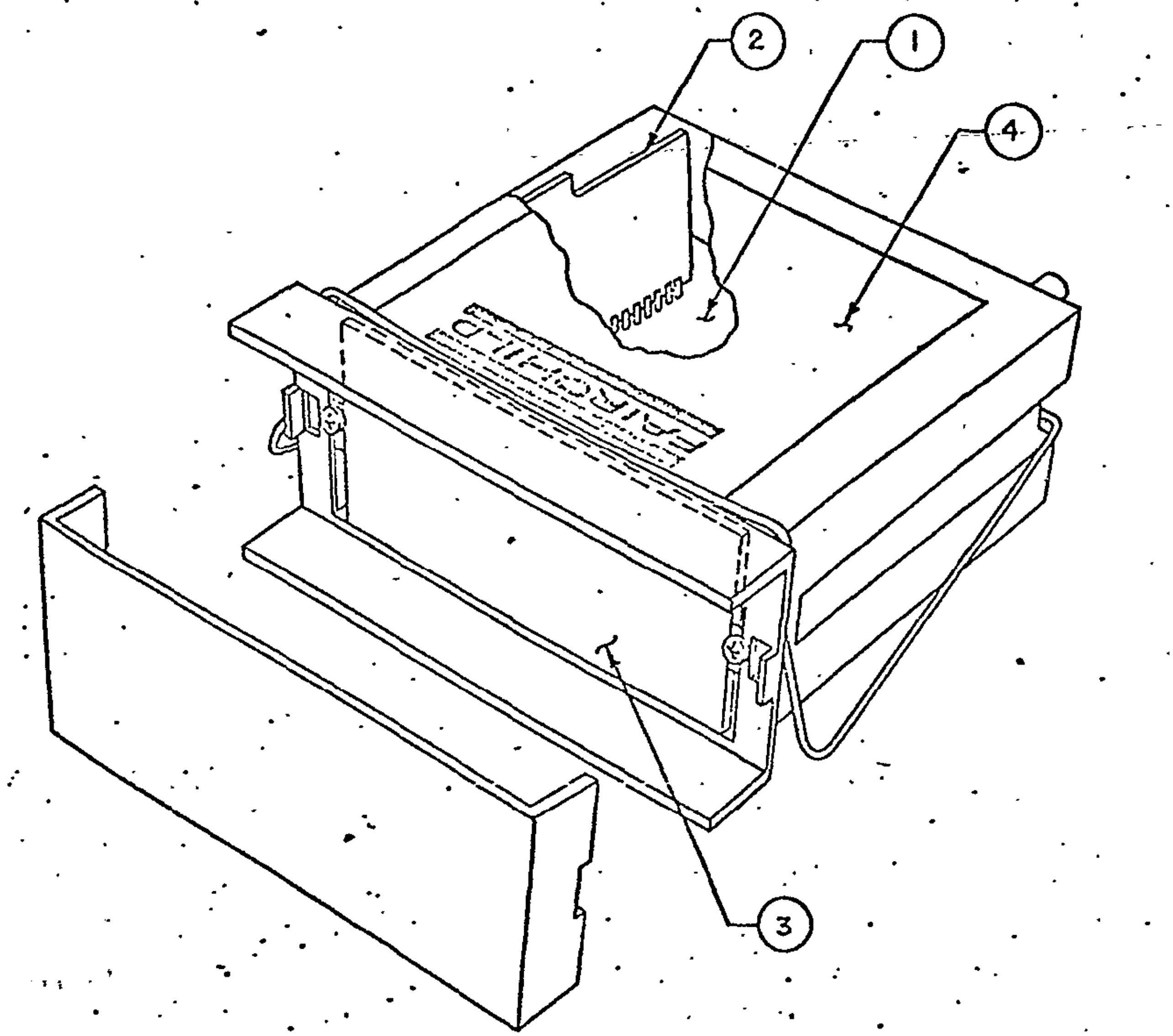
REV.	DESCRIPTION	BY	DATE	APPROVED
3	REVISED AND REDRAWN PER EN6464	T.S.		D.P. 1-3-77



PRINCIPLE DRAWING TABLE		
DRAWING NO.	DESCRIPTION	REV.
82540520-03	LIST OF MAT'L	3
97401119-04	SCHEMATIC AC 4½	REF

UNIT CONFIGURATION TABLE		
PART NO.	DESCRIPTION	REV.
97400312	ASSY BASE BD	I
97400309	ASSY ANALOG BD (2V)	I
97400402	ASSY DISPLAY BD 4½	I
97401055		I

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES. TOLERANCES ON
DECIMALS: .X ±.1, .XX ±.03, .XXX ±.010
ANGLES: ±2°
BREAK SHARP EDGES .010 MAX.

MATERIAL

NEXT ASSY

USED ON: DPM

DRAWN: T. Shuler — DATE: 12/2/76
CHK: DJJ — DATE: —
ENGR — DATE
RPG — DATE: 12-20-76
PROJ. ENGR — DATE
APPVD.
CONTR NO.

FAIRCHILD
SYSTEMS TECHNOLOGY

TITLE
4 1/2 AC DPM ASSY
CONN (2V)

SIZE	CODE IDENT NO	DWG NO	REV
A	25677	82540520	3

SCALE NONE — SHEET 1 OF 1

FAIRCHILD LIST OF MATERIAL

LM NO		REV	QTY	UM	DESCRIPTION	NEXT ASSY	
82540520	-03	03	01	01	4 1/2 AC DPM ASSY CONN (ZV)		BY [illegible] DATE 12/6/76 CHK [illegible] DATE MFG ENG [illegible] DATE ENGR DATE

ITEM	PART NO	REV	QTY PER ASSM	UM	DESCRIPTION	REFERENCE DESIGNATION	CHANGE DOCUMENT REV	CHANGE DOCUMENT EN NO
001	974003120	03	001	EA	ASSY BASE BD CONN	N/A	03	646[illegible]
002	974003090	03	001	EA	ASSY ANALOG BD (ZV)	N/A		
003	974004020	03	001	EA	ASSY DISPLAY BD 4 1/2	N/A		
004	974010550	03	001	EA	ACCESSORY KIT 4 1/2 CONN	N/A		

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8-54

	1	RELEASE TO MFG PER EN 6468		
	2	REVISED PER EN 6506		
	3	REVISED PER EN 6821	ECE	

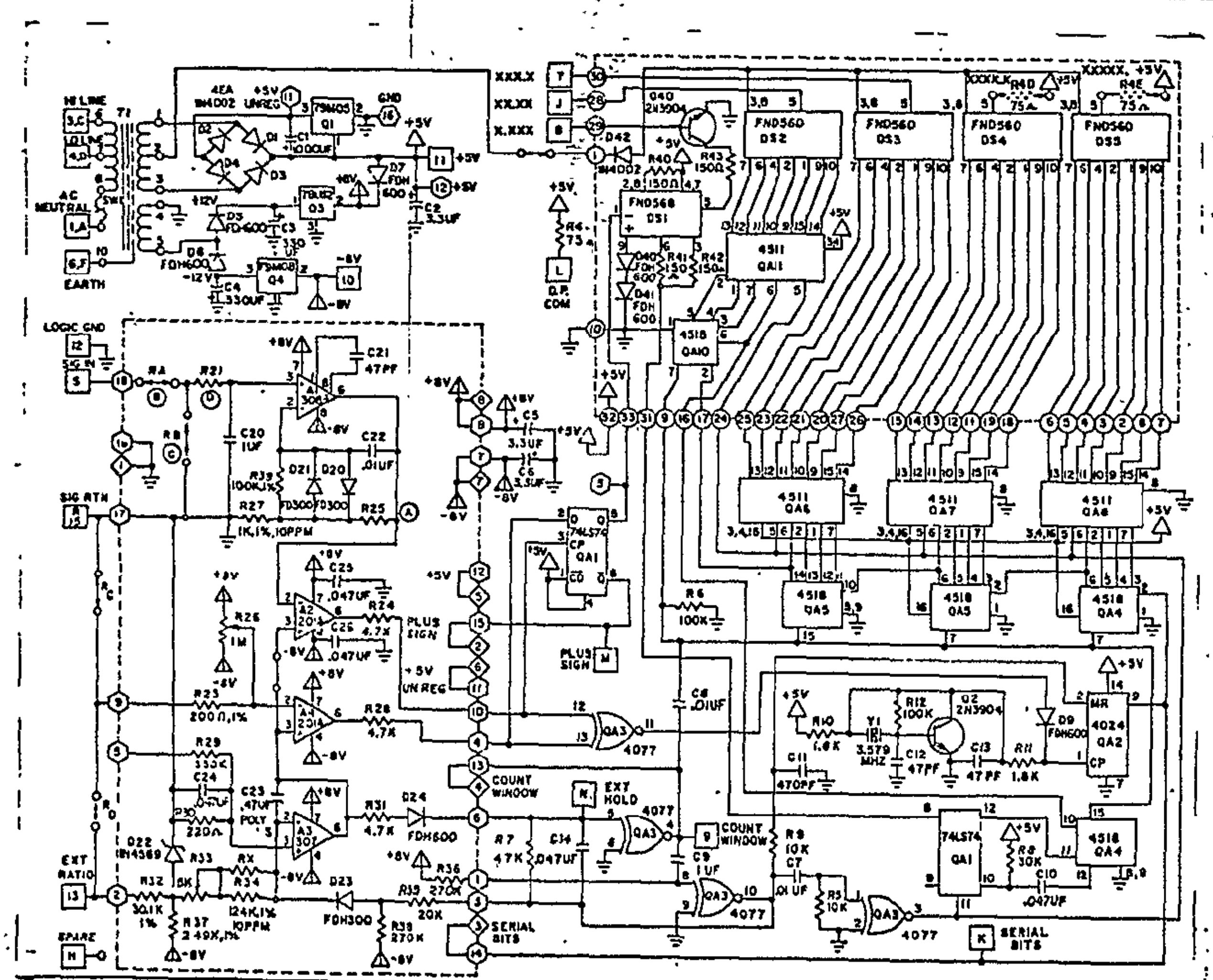


TABLE 1

		4½ (2V)	4½ (20V)	4½ (200V)
Ⓐ	R25	1.5K, ¼W 1%, 10 PPM	23.7K, ¼W 1%, 10 PPM	1.5K, ¼W 1%, 10 PPM
Ⓑ	RA	JUMPERED	10 MEG 50 PPM	10 MEG 50 PPM
Ⓒ	RB	OPEN	100K 10 PPM	100K 10 PPM
Ⓓ	R21	100K, ¼W 1%, 100 PPM	JUMPERED	JUMPERED

2. ALL RESISTORS ARE .25W, 5%.

1. USAGE AND VALUE TO BE DETERMINED AT TEST.

NOTES: UNLESS OTHERWISE SPECIFIED

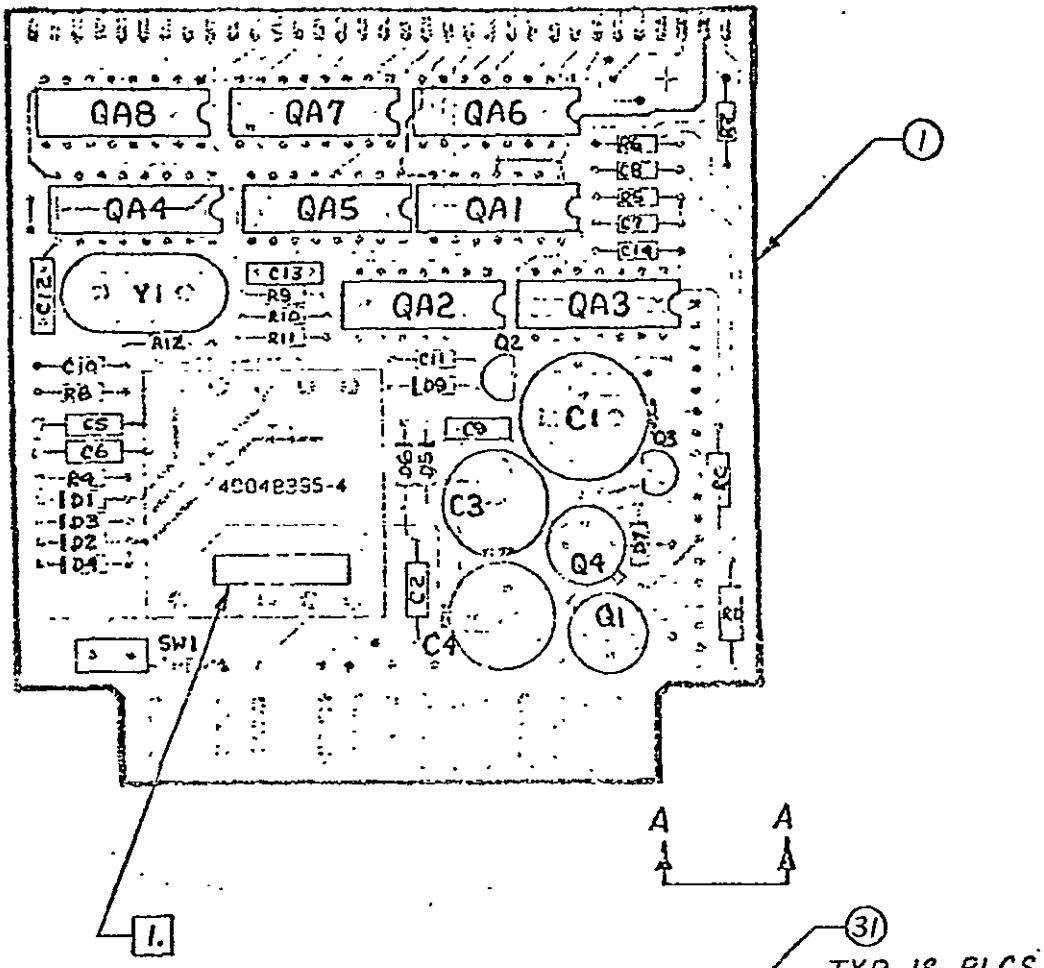
DPM

FAIRCHILD

SCHEMATIC DPM 4½ AC

D 97401119-0

NONE



VIEW A-A
NOT TO SCALE

BASE BD. ASS'Y

PRINCIPLE DRAWING TABLE		
DRAWING NO.	DOCUMENTATION	REV
4004B395	A/W & SCHEM	4
97400312-05	LIST OF MAT'L	1

FAIRCHILD LIST OF MATERIAL

LM NO		REV	QTY	UM	DESCRIPTION	NEXT ASSY				
740312	-03	02	01	01	AC BASE BD ASSY VA/VE CONN		BY [illegible] DATE [illegible]	CHK [illegible] DATE	MFG ENG ENGR	DATE DATE

ITEM	PART NO	REV	QTY PER ASSM	UM	DESCRIPTION	REFERENCE DESIGNATION	CHANGE DOCUMENT REV	CHANGE DOCUMENT NO
001	40048395	01	001	EA	PCB BASE BOARD COMM	N/A	3	[illegible]
002	26904584	01	001	EA	IC 74LS74	QA1	02	650[illegible]
003	26904824	01	001	EA	IC 4077	QA3		
004	26904815	01	001	EA	IC 4024 CMOS	QA2		
005	26904817	01	002	EA	IC 4518 CMOS	QA4, QA5		
006	26904820	01	003	EA	IC 4511 CMOS	QA6, QA7, QA8		
007	26902004	01	004	EA	DIODE 1N4002	D1 THRU D4		
008	26006930	01	004	EA	DIODE FDH600	D7, D9, D5, D6		
009	26905800	01	001	EA	TRANSISTOR 79M08	Q1		
010	26905810	01	001	EA	TRANSISTOR 79M05	Q1		
011	26903006	01	001	EA	TRANSISTOR 2N3904	Q2		
012	27903007	01	001	EA	XTAL 3.579 MHZ	Y1		
013	03924003	02	002	EA	CAP .01UF	C7, C8		
014	03283530	01	003	EA	CAP 3.3UF, 15V, 10%	C2, C5, C6		
015	03980001	01	001	EA	CAP 1000UF 16V ELE	C1		
016	03980002	01	002	EA	CAP 330UF	C3, C4		
017	03891060	01	001	EA	CAP 1UF, 50V, 20%	C9		
018	03924007	02	001	EA	CAP 470PF	C11		
019	03175190	01	002	EA	CAP 47PF	C12, C13		
020	03924007	01	002	EA	CAP .047UF	C14, C10		
021	11009540	01	001	EA	THERMAL SW	SW1		

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FAIRCHILD LIST OF MATERIAL

LM NO		REV	QTY	UM	DESCRIPTION	NEXT ASSY
7,4,0,0,3,1,2	-03	0,2	0,1	0,1	A/C BASE BD ASSY V.A/V.E CONN	

BY [illegible] CHK _____ MFG ENG _____ DATE _____
DATE [illegible] DATE _____ ENGR _____ DATE _____

ITEM	PART NO	REV	QTY PER ASSM	UM	DESCRIPTION	REFERENCE DESIGNATION	CHANGE DOCUMENT REV	CHANGE DOCUMENT EN NO
22	2000914,0	0,1	0,01	EA	TRANSFORMER	T1	01	64,65
23	2690581,6	0,1	001	EA	TRANSISTOR 78L82	Q3		
24	0235490,60	0,1	0,01	EA	RESISTOR 30K, 1/4W, 5%	R8		
25	4,10,14,180	0,1	002	EA	TRANSIPAD TO-5	Q1, Q4		
26	0235500,0	0,1	002	EA	RESISTOR 100K, 1/4W, 5%	R6, R12		
27	0235467,0	0,1	002	EA	RESISTOR 1.8K, 1/4W, 5%	R10, R11		
28	02354350	0,1	001	EA	RESISTOR 75Ω, 1/4W, 5%	R4		
29	0235485,0	0,1	002	EA	RESISTOR 10K 1/4W, 5%	R5, R9		
30	0235477,0	0,1	001	EA	RESISTOR 4.7K 1/4W, 5%	R7		
31	099,1,1053	0,1	0,01	EA	CONN 18 PIN			

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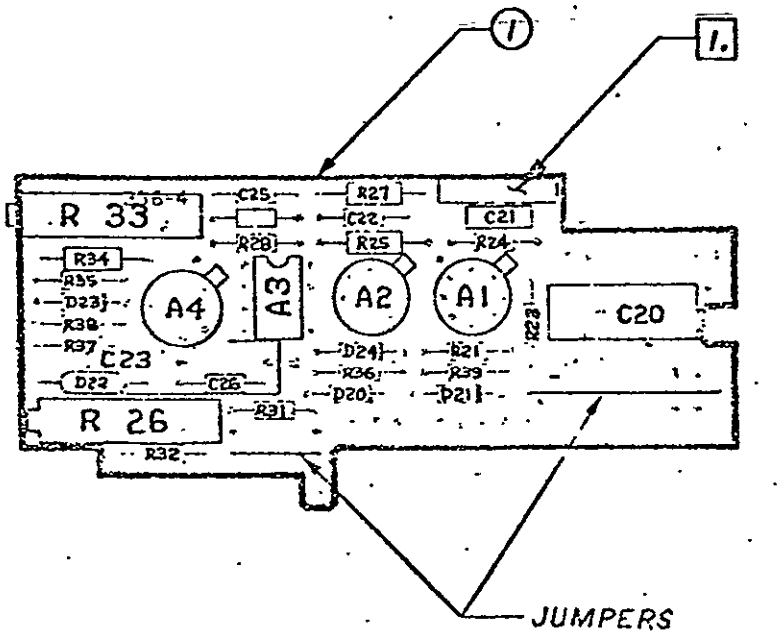

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ANALOG ASS'Y

PRINCIPLE DRAWING TABLE		
DRAWING NO.	DOCUMENTATION	REV
40048396	A/W & SPECING	4
97400301-03	LIST OF MAT'L	1

FAIRCHILD LIST OF MATERIAL

LM NO		REV	QTY	UM	DESCRIPTION	NEXT ASSY	
140309	-03	02	01	01	ANALOG ASSY 4 1/2 (2V)		BY T. Shulos DATE 12/10/76 CHK RJB DATE — MFG ENG ___ ENGR ___ DATE ___ DATE ___

ITEM	PART NO	REV	QTY PER ASSM	UM	DESCRIPTION	REFERENCE DESIGNATION	CHANGE DOCUMENT REV	CHANGE DOCUMENT EN NO
01	40048396	01	001	EA	PCB ANALOG BD	N/A	01	646[illegible]
02	26905332	01	001	EA	OP AMP 308A	A1	02	650[illegible]
03	26905326	01	002	EA	OP AMP 201A	A2, A4		
04	26905327	01	001	EA	OP AMP 307	A3		
05	26012320	01	003	EA	DIODE FD 300	D23, D21, D20		
06	26006930	01	001	EA	DIODE FDH600	D24		
07	26901016	01	001	EA	DIODE 1N4569	D22		
08	03870001	01	001	EA	CAP 1UF 100V 10%	C20		
09	03932004	01	001	EA	CAP .47UF POLY S	C23		
10	03175190	01	001	EA	CAP 47PF	C21		
11	03924007	01	004	EA	CAP .047Uf	C25, C26, C24, C22		
12	02909002	01	002	EA	RES 100K, 1/4W, 1%, 100PPM	R21, R39		
13	02354460	01	001	EA	RES 220Ω, 1/4W, 5%	R30		
14	02936022	01	001	EA	RES 124K, 1/4W, 1%, 10PPM	R34		
15	02354920	01	001	EA	RES 20K, 1/4W, 5%	R35		
16	02372290	01	001	EA	RES 200Ω, 1/4W, 1%	R23		
17	02354770	01	003	EA	RES 4.7K, 1/4W, 5%	R28, R24, R31		
18	02936011	01	001	EA	RES 1K, 1/4W, 1% 10PPM	R27		
19	02373340	01	001	EA	RES 2.49K, 1/4W, 1%	R37		
20	02936013	01	001	EA	RES 1.5K, 1/4W, 1% 10PPM	R25		
21	02355170	01	002	EA	RES 270K, 1/4W, 5%	R38, R36		

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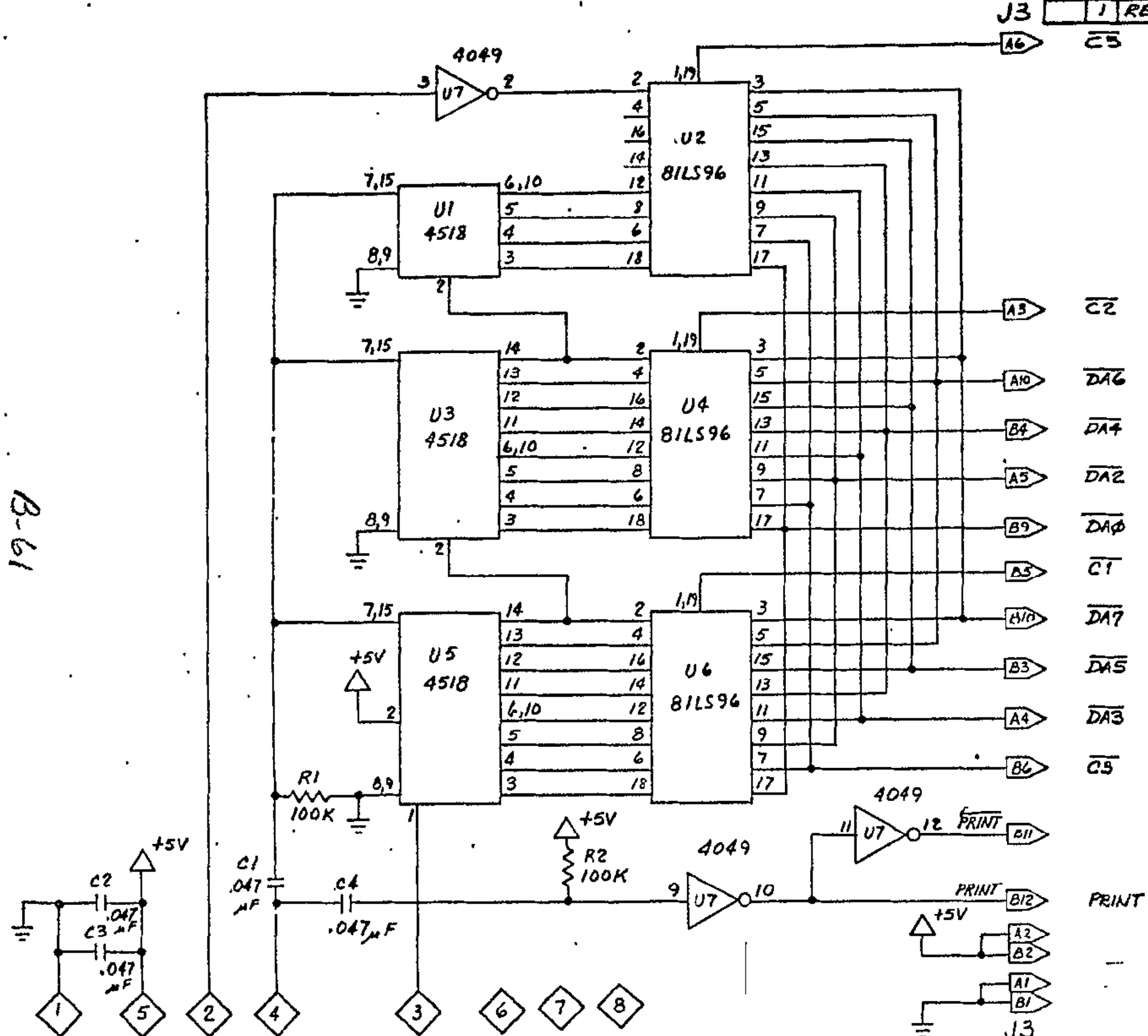
FAIRCHILD LIST OF MATERIAL

LM NO		REV	QTY	UM	DESCRIPTION	NEXT ASSY	BY	CHK	MFG ENG	DATE
40,0309	-03	02	01	01	ANALOG ASSY 4 1/2 (2V)		BY [illegible] DATE 12/10/76	CHK DATE	MFG ENG ENGR	DATE DATE

	PART NO	REV	QTY PER ASSM	UM	DESCRIPTION	REFERENCE DESIGNATION	CHANGE DOCUMENT REV	EN NO
2	0293601 4	01	001	EA	RES 30.1K, 1/4W, 1% 25PPM	R32		
3								
4								
5	02355210	02	001	EA	RES 330K, .25W, 5%	R29		
6	01923002	01	001	EA	POT 1M .75W	R26		
7	01111360	01	001	EA	POT 5K .75W	R33		
8	50906703	01	001	EA	JUMPER .9	RA		

SHOP GRAPHICS/ACCUPRESS

ISSUE	REV	DESCRIPTION	BY	DATE	APPROVAL
	1	RELEASED TO MFG PER EN			



B-61

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1977

NOTE. J3 CONNECTS TO A/D CONTOL CARD "J1"

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES

DN-0 2477

FAIRCHILD INSTRUMENTATION

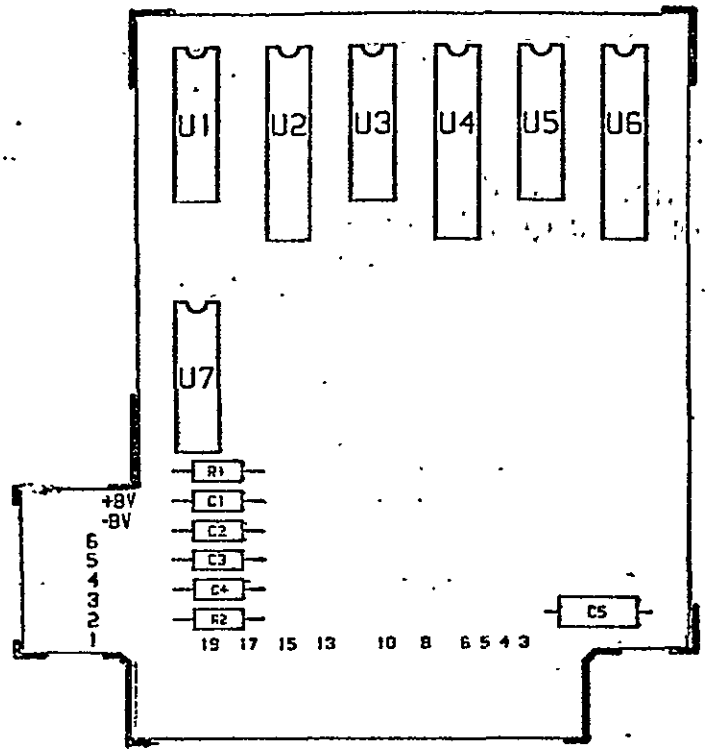
SCHEMATIC - DPM READ CARD

SIZE C | DWG NO. 97470109-04 | REV 1

SCALE NONE | SHEET 1 of 1

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVED
1	RELEASED TO MFG PER EN			



PRINCIPLE DRAWING TABLE		
DRAWING NO.	DOCUMENTATION	REV NO.
40048486	A/W AND SPEC	1
97470109-04	SCHEMATIC	REF
97470109	LIST OF MAT'L	1

UNLESS OTHERWISE SPECIFIED

DIMENSIONS ARE IN INCHES. TOLERANCES ON
DECIMALS: X ±.1, XX ±.03, XXX ±.010
ANGLES: ±2°
BREAK SHARP EDGES .010 MAX.

MATERIAL: SEE LIST OF MAT'L

NEXT ASSY: 82

DRAWN	T. Stubs	DATE 5/13/72
CHK		DATE
ENGR	D.W. CORBIN	DATE 10-28-71
MFG		DATE
PROJ. ENGR		DATE
APPVD.		

FAIRCHILD INSTRUMENTATION

TITLE: ASSEMBLY— DPM READ BOARD

SIZE	CODE IDENT NO.	DWG NO	REV.
A		97470109	1

FAIRCHILD LIST OF MATERIAL

LM NO		REV	QTY	UM	DESCRIPTION	NEXT ASSY	
9747010 9	-03	01	01	01	ASSY DPM READ BOARD		BY ____ CHK ____ MFG ENG ____ DATE ____ DATE ____ DATE ____ ENGR ____ DATE ____

ITEM	PART NO	REV	QTY PER ASSM	UM	DESCRIPTION	REFERENCE DESIGNATION	CHANGE DOCUMENT REV	CHANGE DOCUMENT EN NO
001	40048486		001	EA	PCB DPM READ CARD			
002			004	EA	CAP .047μF	C1, 2, 3, 4		
003	26904817		003	EA	IC 4518	U1, 3, 5		
004			003	EA	IC 81LS96	U2, 4, 6		
005	26904816		001	EA	IC 4049	U7		
006	02355090		002	EA	RES 100K, 1/4W, 5%	R1, 2		
007			001	SET	CONN 7 PIN SET			

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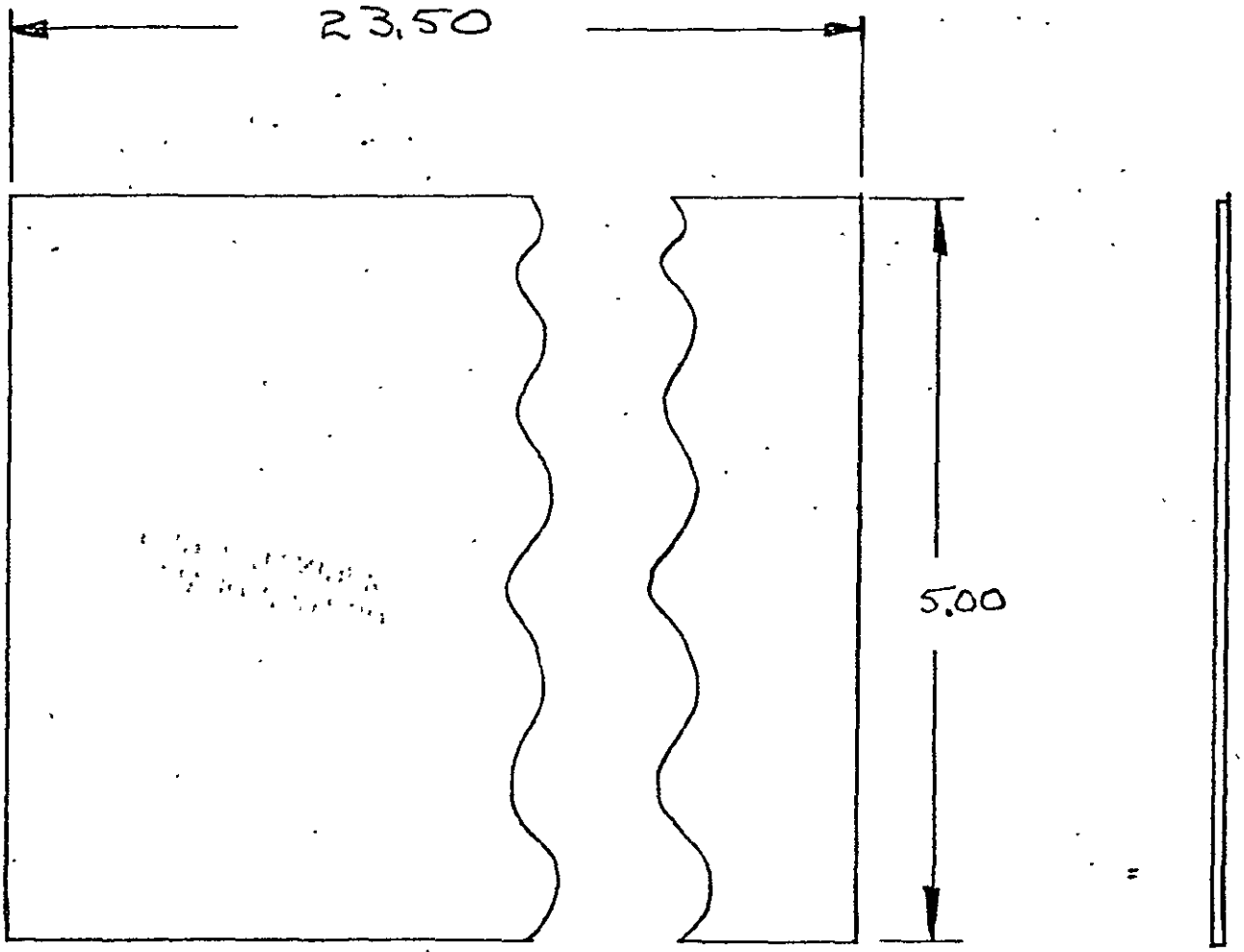
APPLICATION		REVISION			
NEXT ASSY	USED ON	LTR	DESCRIPTION	DATE	APPROVED



UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE:
FRACTIONS DECIMALS ANGLES
± .XX ± ±
.XXX ±

MATERIAL
ALUM. 18GAGE

FINISH
NONE

DO NOT SCALE DRAWING

CONTRACT NO.

APPROVALS	DATE
DRAWN D.G.	10/12/77
CHECKED	

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RHO SIGMA INC

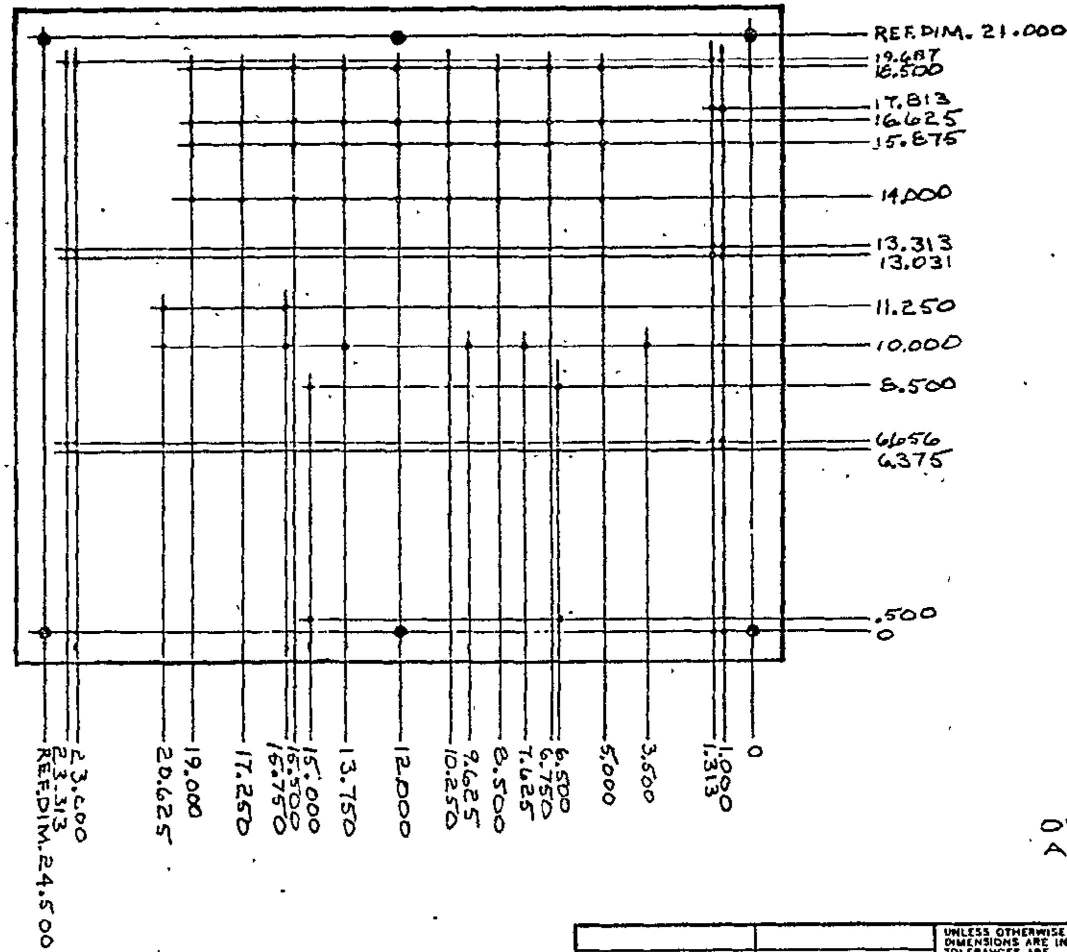
RS 600 BRACKET DIM

SIZE	CODE IDENT NO.	DRAWING NO.
A		600-3001

SCALE FULL

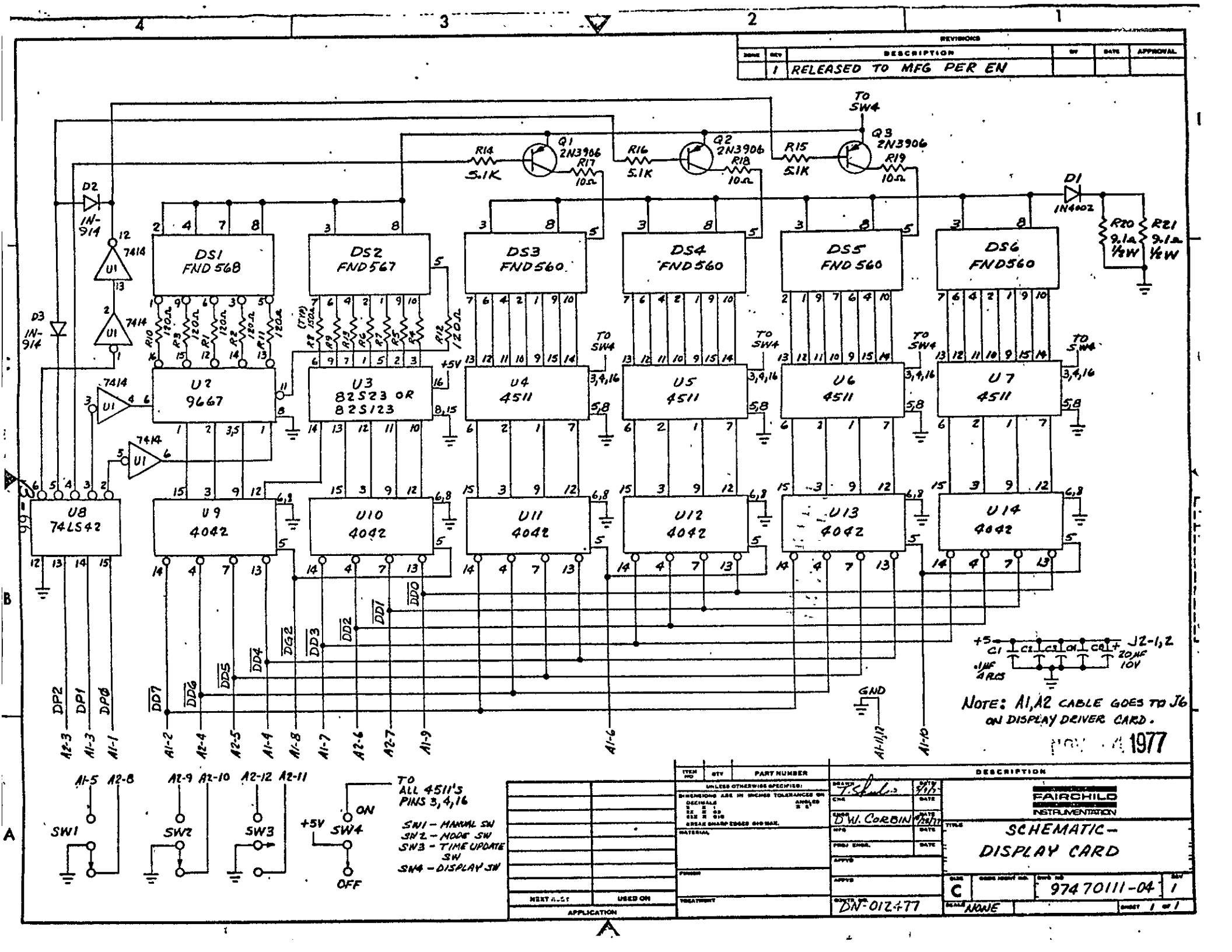
SHEET 1 OF 1

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED



OVERALL DIM. 22.5 X 26
ALL HOLE DIM .156 DIA.
78 PLACES

NEXT ASSY	USED ON	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS ± DECIMALS .XX ± .XXX ±.020 ANGLES ±	CONTRACT NO.	RHO SIGMA INC.
APPLICATION		MATERIAL HOFFMAN A-30N24CNEMA TYPE 1 30X24X10	APPROVALS / DATE — DRAWN D. Cm. 10/24/77; CHECKED	MODEL 600 BOTTOM PANEL HOLE DIM.
		FINISH		SIZE B; CODE IDENT NO.; DRAWING NO 600-3006
		DO NOT SCALE DRAWING		SCALE; SHEET 1 OF 1


REVISIONS
REV 1 RELEASED TO MFG PER EN
D1 1N4002
D2 IN-914
D3 IN-914
Q1 2N3906
Q2 2N3906
Q3 2N3906
R14 5.1K
R15 5.1K
R16 5.1K
R17 10Ω
R18 10Ω
R19 10Ω
R20 9.1Ω ½W
R21 9.1Ω ½W
TO SW4
DS1 FND568
DS2 FND567
DS3 FND560
DS4 FND560
DS5 FND560
DS6 FND560
U1 7414
U2 9667
U3 82S23 OR 82S123
U4 4511
U5 4511
U6 4511
U7 4511
U8 74LS42
U9 4042
U10 4042
U11 4042
U12 4042
U13 4042
U14 4042
+5V
GND
C1 .1MF 4 REQ
C2 C3 C4 C5 20MF 10V
J2-1,2
DP2
DP1
DP0
DD7
DD6
DD5
DD4
DD3
DD2
DD1
DD0
A2-3
A1-3
A1-1
A1-2
A2-4
A2-5
A1-4
A1-8
A1-7
A2-6
A2-7
A1-9
A1-6
A1-11,12
A1-10
A1-5
A2-8
A2-9
A2-10
A2-12
A2-11
SW1
SW2
SW3
SW4
ON
OFF
TO ALL 4511'S PINS 3,4,16
SW1 - MANUAL SW
SW2 - MODE SW
SW3 - TIME UPDATE SW
SW4 - DISPLAY SW
NOTE: A1,A2 CABLE GOES TO J6 ON DISPLAY DRIVER CARD.
© 1977
ITEM NO QTY PART NUMBER DESCRIPTION
UNLESS OTHERWISE SPECIFIED:
DRAWN T.S.L. 9/17
CHK DATE
ENGR D.W. CORBIN 9/17/77
MFG DATE
PROJ ENGR. DATE
APPVD
APPVD
DN-012477
FAIRCHILD INSTRUMENTATION
TITLE SCHEMATIC - DISPLAY CARD
SIZE C
DWG NO 9747011-04
REV 1
SCALE NONE
SHEET 1 OF 1
NEXT ASSY USED ON
APPLICATION

REVISIONS

REV.	DESCRIPTION	BY	DATE	APPROVED
1	RELEASED TO MFG PER EN .			

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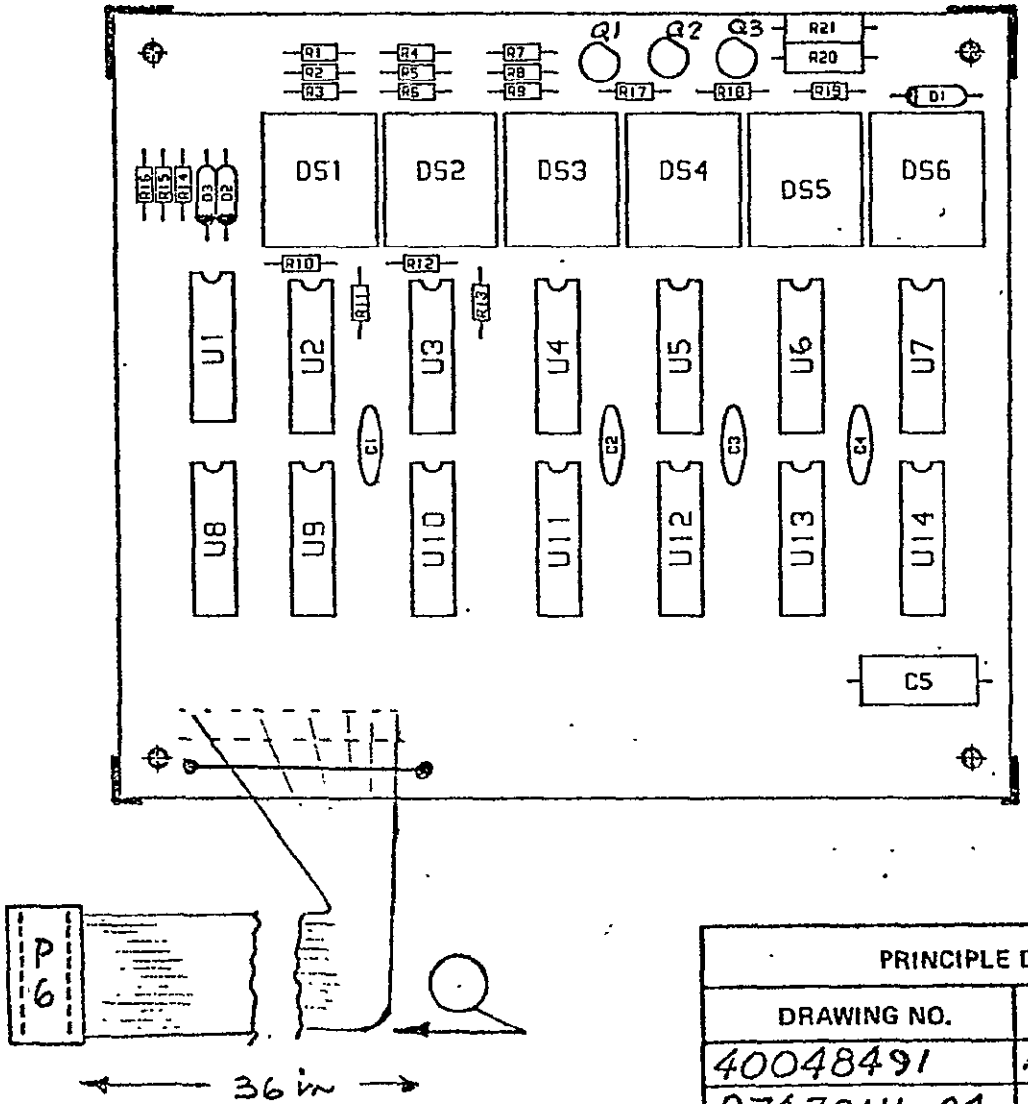


PRINCIPLE DRAWING TABLE		
DRAWING NO.	DOCUMENTATION	REV NO.
40048491	A/W AND SPEC	1
97470111-04	SCHEMATIC	REF
97470111	LIST OF MAT'L	1

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES. TOLERANCES ON
DECIMALS: X ±.1, XX ±.03, XXX ±.010
ANGLES: ±2°
BREAK SHARP EDGES .010 MAX.

MATERIAL: SEE LIST OF MAT'L

NEXT ASSY: 82

DRAWN: T. Shields — DATE
CHK — DATE
ENGR: D.W. CORBIN — DATE 10/28/77
MFG — DATE
PROJ. ENGR — DATE
APPVD.

FAIRCHILD INSTRUMENTATION

TITLE: ASSEMBLY — DISPLAY CARD

SIZE: A | CODE IDENT NO. | DWG NO: 97470111 | REV: 1

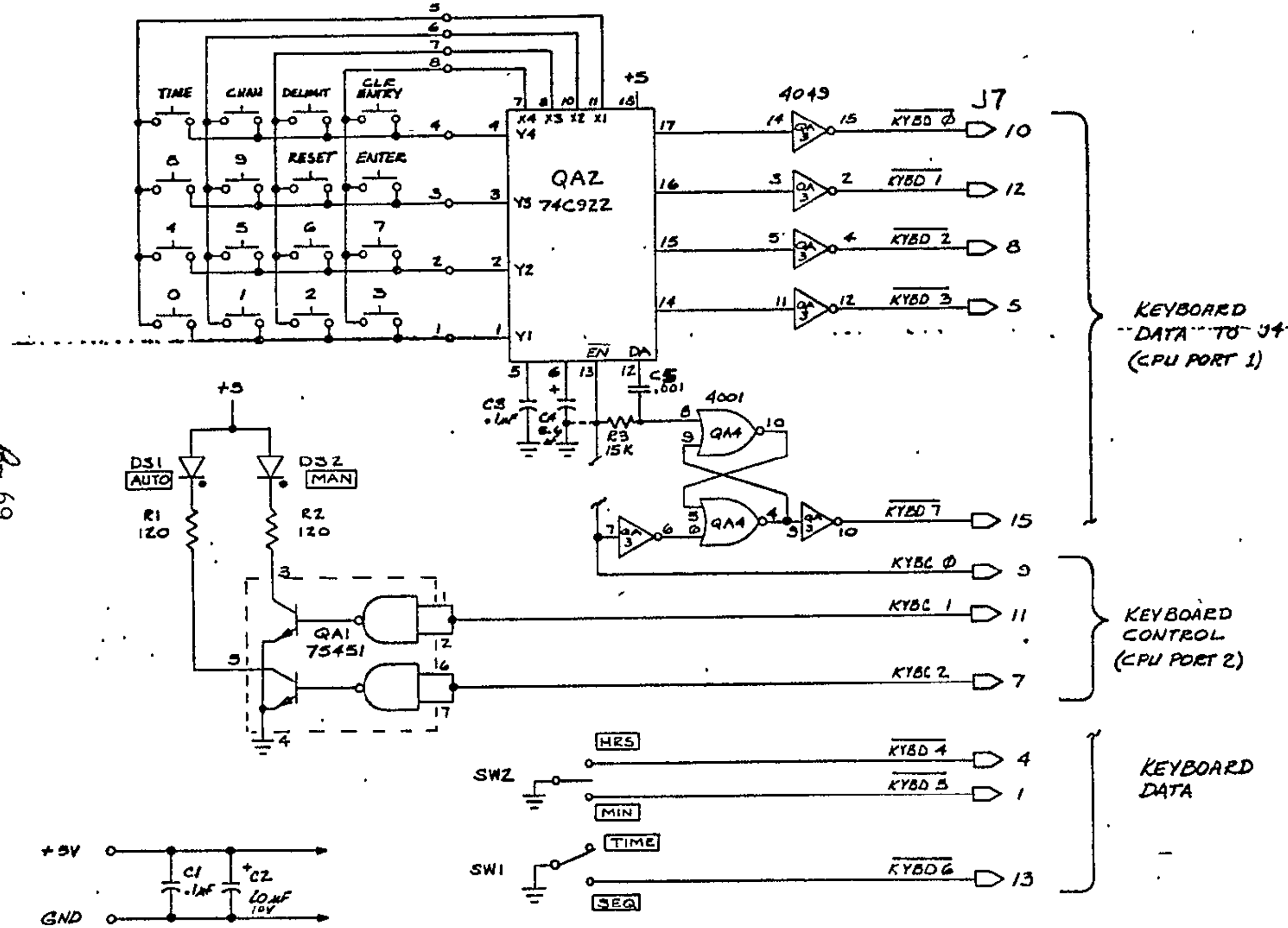
FAIRCHILD LIST OF MATERIAL

LM NO		REV	QTY	UM	DESCRIPTION	NEXT ASSY				
9747011.1	-03	01	01	01	DISPLAY CARD		BY FJC	CHK	MFG ENG	DATE
							DATE 5/77	DATE	ENGR	DATE

ITEM	PART NO	REV	QTY PER ASSM	UM	DESCRIPTION	REFERENCE DESIGNATION	CHANGE DOCUMEN REV	CHANGE DOCUMEN EN NO
001	40048491	01	001	EA	PCB DISPLAY CARD			
002	03291040	01	004	EA	CAP .1μF CERAMIC	C1,2,3,4		
003	03282560	01	001	EA	CAP 22μF 15V TANT	C5		
004		01	001	EA	DIODE 1N4002	D1		
005	26901040	01	002	EA	DIODE 1N914	D2,3		
006		01	002	EA	RES 9.1Ω ½W 1%	R20,21		
007	02354140	01	003	EA	RES 10Ω ¼W 5%	R17,18,19		
008	02354400	01	006	EA	RES 120Ω ¼W 5%	R1,2,3,10,11,12		
009	02354420	01	007	EA	RES 150Ω ¼W 5%	R4,5,6,7,8,9,13		
010		01	006	EA	IC 4042	U9,10,11,12,13,14		
011	26904820	01	004	EA	IC 4511	U4,5,6,7		
012		01	001	EA	IC 9667	U2		
013		01	001	EA	IC 74LS42	U8		
014	26904594	01	001	EA	IC 7414	U1		
015		01	001	EA	IC 82S23 OR EQUIVALENT	U3 - PROM CODE #6177 -		
016	26905223	01	004	EA	LED FND560	DS3,4,5,6		
017	26905224	01	001	EA	LED FND 567	DS2		
018	26905225	01	001	EA	LED FND 568	DS1		
019	26903502	01	003	EA	TRANSISTOR 2N3906	R1,2,3		
020		01	004	EA	SWITCH, TOGGLE	SW1,2,3,4		
021		01	001	EA	CARD EJECTOR, S.A.E. 6200			

REV	DESCRIPTION	BY	DATE	APPROVAL
1	Release to MFG per EN			

ORIGINAL PAGE IS
OF POOR QUALITY



NOV - 4 1977

Note: +5 VOLT AND GND RETURN SUPPLIED BY TWISTED PAIR TO POWER SUPPLY.

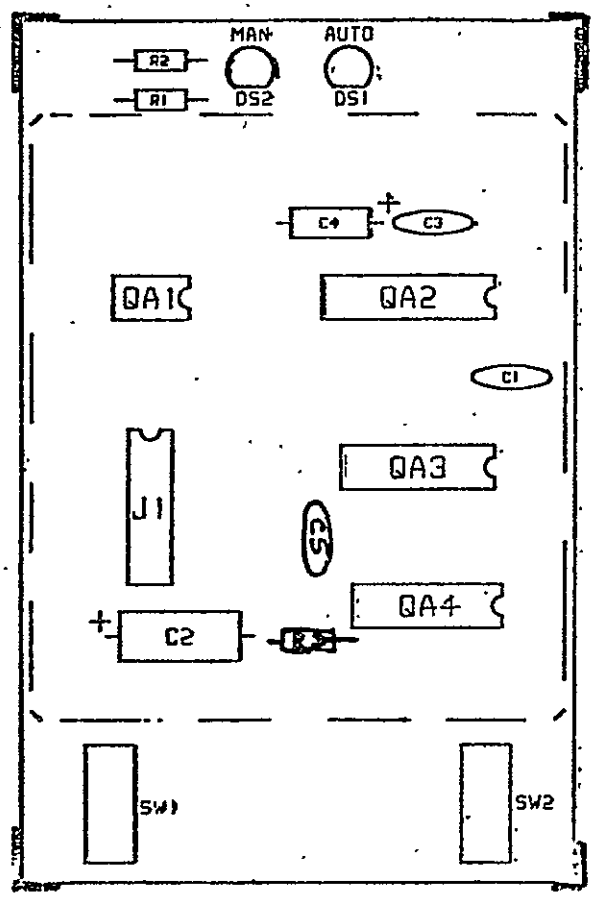
Drawn	5/77
Engr	D. W. Corbin
Contr No.	DN012477

FAIRCHILD INSTRUMENTATION

SCHEMATIC-
RHO SIGMA;
KEYBOARD

Size C — Dwg No. 97470112-04

REV.	DESCRIPTION	BY	DATE	APPROVED
1	REL TO MFG PER EN			



PRINCIPLE DRAWING TABLE		
DRAWING NO.	DOCUMENTATION	REV NO.
40048507	A/W AND SPEC	1
97470112-04	SCHEMATIC	REF
97470112-03	LIST OF MAT'L	1

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES. TOLERANCES ON
DECIMALS: X ±.1, XX ±.03, XXX ±.010
ANGLES ±2°
BREAK SHARP EDGES .010 MAX.

MATERIAL: SEE LIST OF MAT'L

NEXT ASSY: 82

USED ON: PROGRAM CONTROLLER

DRAWN	T. Shuler	3/13/77
CHK		DATE
ENGR	D.W. Corbin	DATE 10-28-77
MFG		DATE
PROJ. ENGR		DATE
APPVD.		
CONTR NO.	D.U-012477	

FAIRCHILD INSTRUMENTATION

TITLE: ASSEMBLY - KEY BOARD CARD

SIZE	CODE IDENT NO	DWG NO	REV
A		9747012	1

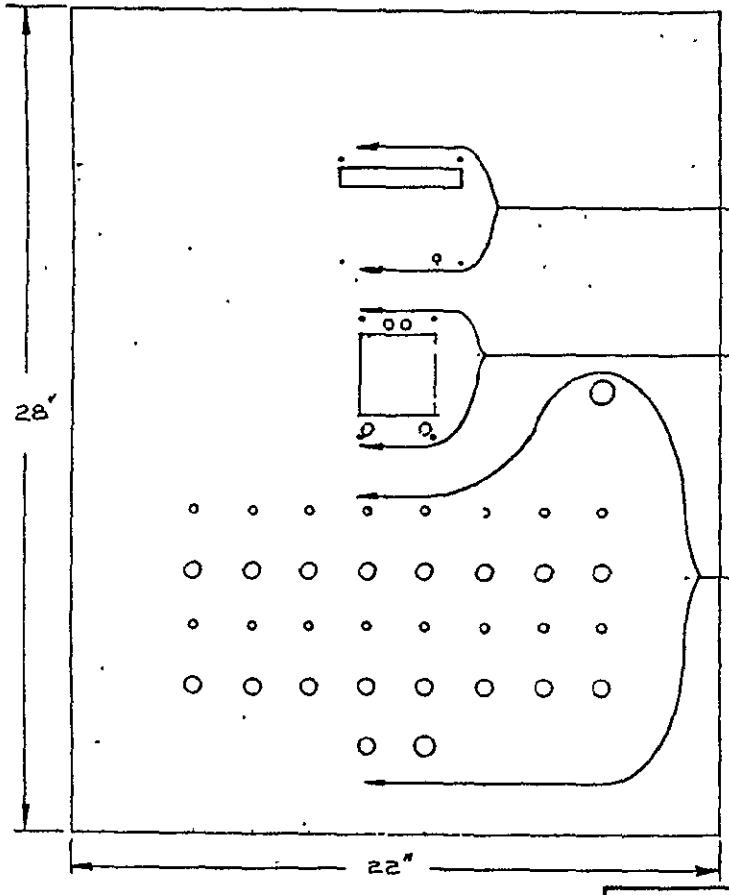
SCALE 1/1 SHEET 1 OF 1

FAIRCHILD LIST OF MATERIAL

LM NO		REV	QTY	UM	DESCRIPTION	NEXT ASSY	BY	CHK	MFG ENG	DATE
97470112	-03	01			KEYBOARD ASSY		SC			
							DATE	DATE	ENGR	DATE

ITEM	PART NO	REV	QTY PER ASSM	UM	DESCRIPTION	REFERENCE DESIGNATION	CHANGE DOCUMENT REV	CHANGE DOCUMENT EN NO
001	40048507	01	001	01	PCB KEYBOARD			
002	26905605	01	001	01	IC 75451	QA1		
003		01	001	01	IC 74C922	QA2		
004	26904816	01	001	01	IC 4049	QA3		
005	26904823	01	001	01	IC 4001	QA4		
006	03291049	01	002	01	CAP .1 MF CERAMIC DISC	C1,3		
007	03282560	01	001	01	CAP 22 MF 15V TANT.	C2		
008		01	001	01	CAP 5.6 MF TANT	C4		
009		00	002	01	LED, RED	DS1,2		
010	09917009	01	001	01	SOCKET, IC, 16 PIN DIP	J1		
011		01	001	01	SWITCH SPDT, TOGGLE	SW1		
012		01	001	01	SWITCH SPDT, TOG., CENTER OFF	SW2		
013	02354400	01	002	01	RESISTOR, 120Ω 1/4 5% CARB.	R1,2		
014		01	001	01	KEYBOARD, DIGITRAN KL0042			
015		01	001	01	LED, GRN	DS		
016		01	001	01	RESISTOR 15K 1/4W 5%	R3		
017		01	001	01	CAP. .001 μF CER.	C5		
018								
019								

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED



MOUNTING PAT. DISPLAY PCB — SEE DRAWING #600-3000 SHEET 2

MOUNTING PAT. KEY BOARD — SEE DRAWING #600-3000 SHEET 3

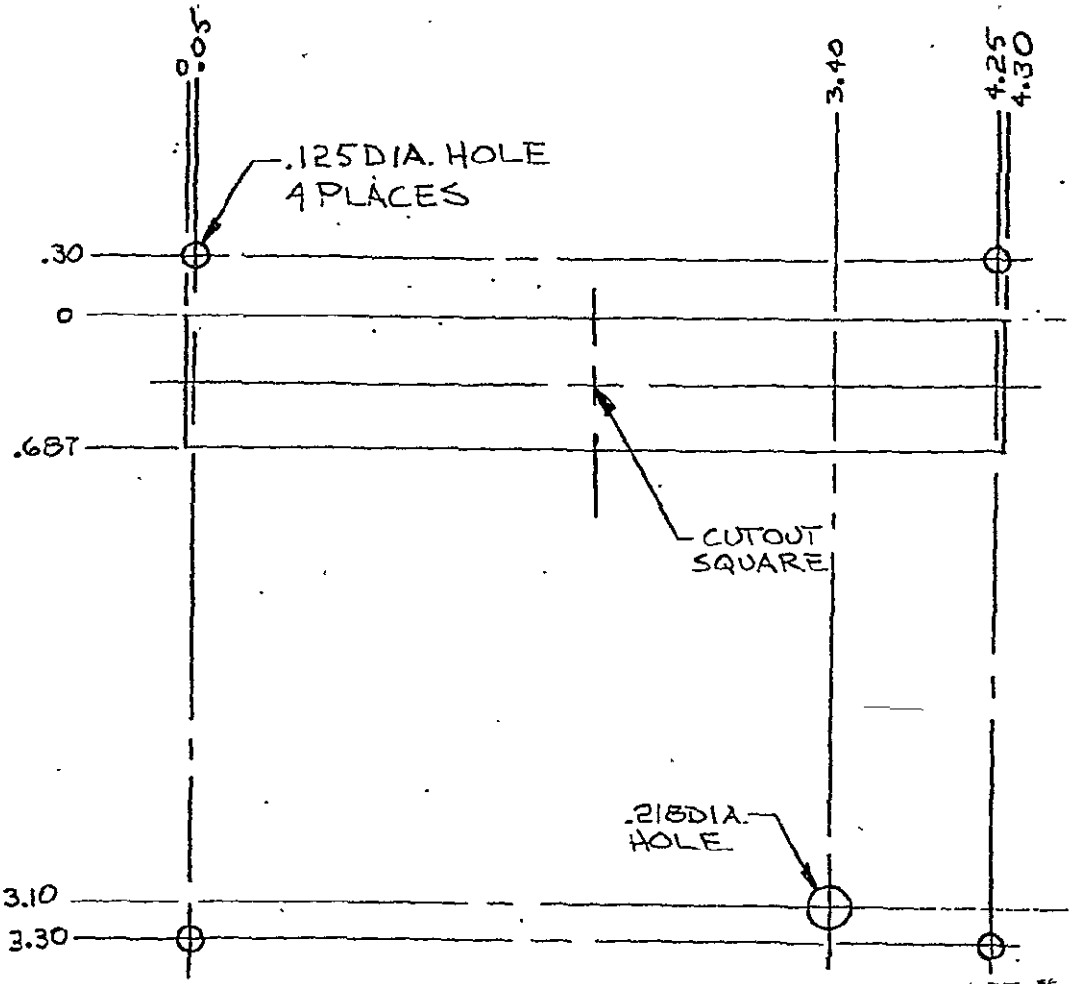
HOLE PAT SWICHES; LIGHTS FUSE; KEY SWICH — SEE DRAWING #600-3000 SHEET 4

OVERALL DIM #600-3000 SHEET 5

B-72

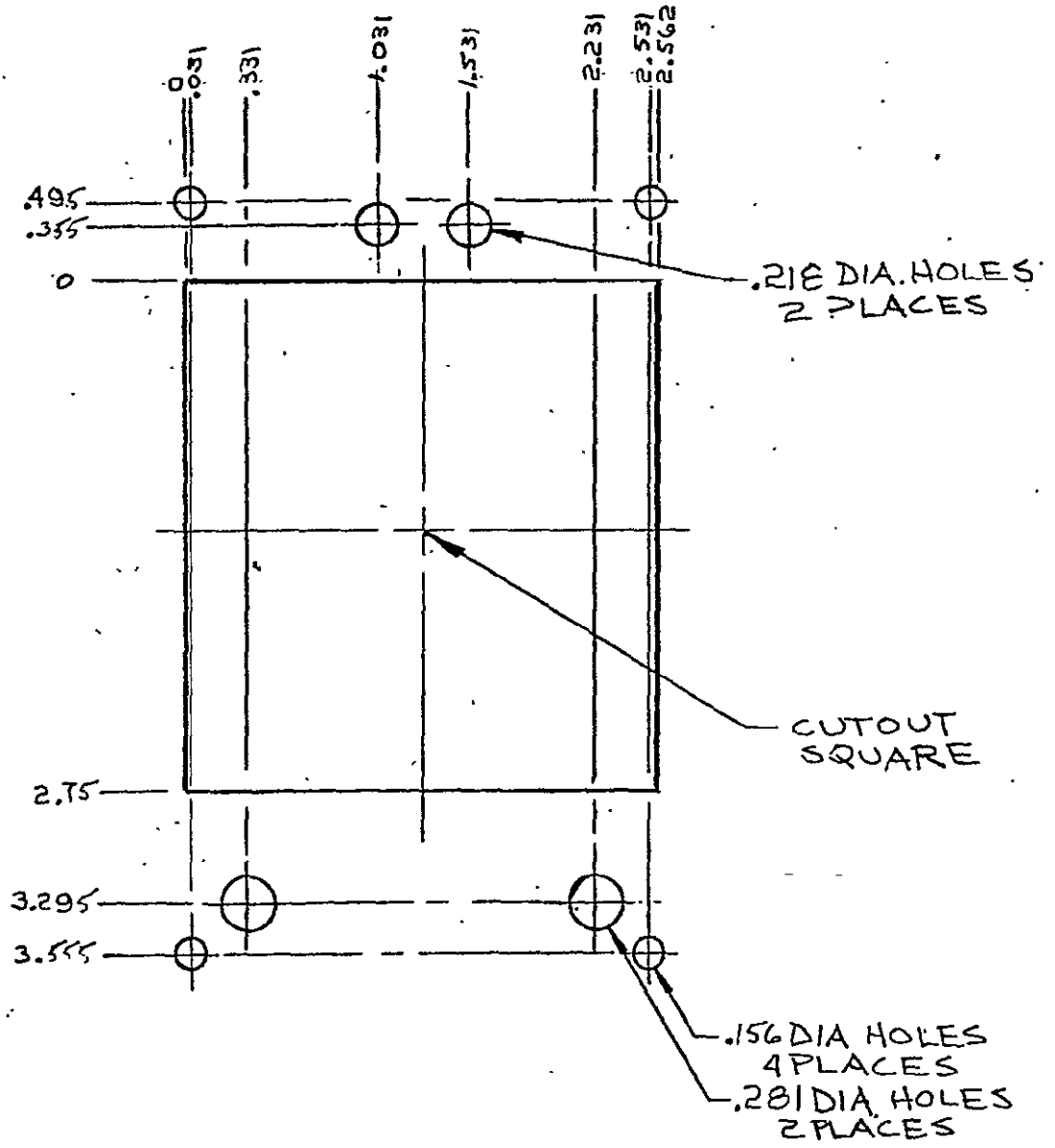
NEXT ASSY	USED ON	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES ± .XX ±.01 ± .XXX ±	CONTRACT NO.	RHO SIGMA INC
APPLICATION		MATERIAL	APPROVALS / DATE: DRAWN D.G. 10/10/77; CHECKED	RS 600 FRONT PANEL
		FINISH		SIZE: B; CODE IDENT NO; DRAWING NO: 600-3000
		DO NOT SCALE DRAWING		SCALE 1/4"; SHEET 1 OF 6

APPLICATION		REVISION			
NEXT ASSY	USED ON	LTR	DESCRIPTION	DATE	APPROVED

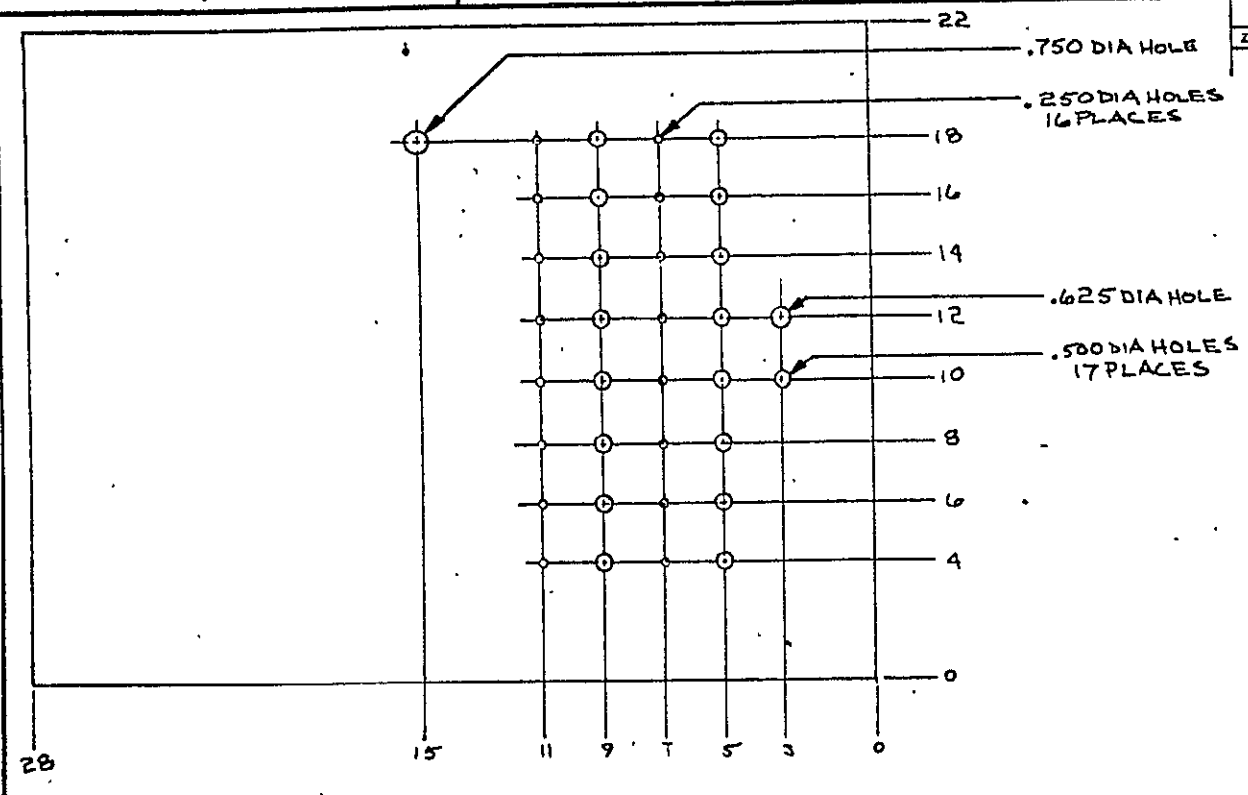


UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES ± .XX ±.01 ± .XXX±.010	CONTRACT NO.		RHO SIGMA INC.
	APPROVALS	DATE	
	DRAWN D.G.	8/4/77	MOUNTING PATTERN DISPLAY PCB
MATERIAL	CHECKED		
FINISH			SIZE A / CODE IDENT NO. / DRAWING NO. 600-3000
DO NOT SCALE DRAWING	B-73		SCALE / SHEET 2 OF 6

APPLICATION		REVISION			
NEXT ASSY	USED ON	LTR	DESCRIPTION	DATE	APPROVED



UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES ± .XX ±.01 ± .XXX ± .010	CONTRACT NO.	RHO SIGMA INC.	
	APPROVALS / DATE		
MATERIAL	DRAWN D.G.	MOUNTING PATTERN KEYBOARD	
	CHECKED		
FINISH		SIZE: A	CODE IDENT NO.
DO NOT SCALE DRAWING		DRAWING NO. 600-3000	
		SCALE	SHEET 3 OF 6



NOTE: ALL DIM. IN INCHES

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE.
FRACTIONS DECIMALS ANGLES
± .XX ± ±
.XXX ±.025'

MATERIAL 6061-T6 ALUM.

FINISH

DO NOT SCALE DRAWING

CONTRACT NO.

APPROVALS	DATE
DRAWN D.C.	10/10/77
CHECKED	

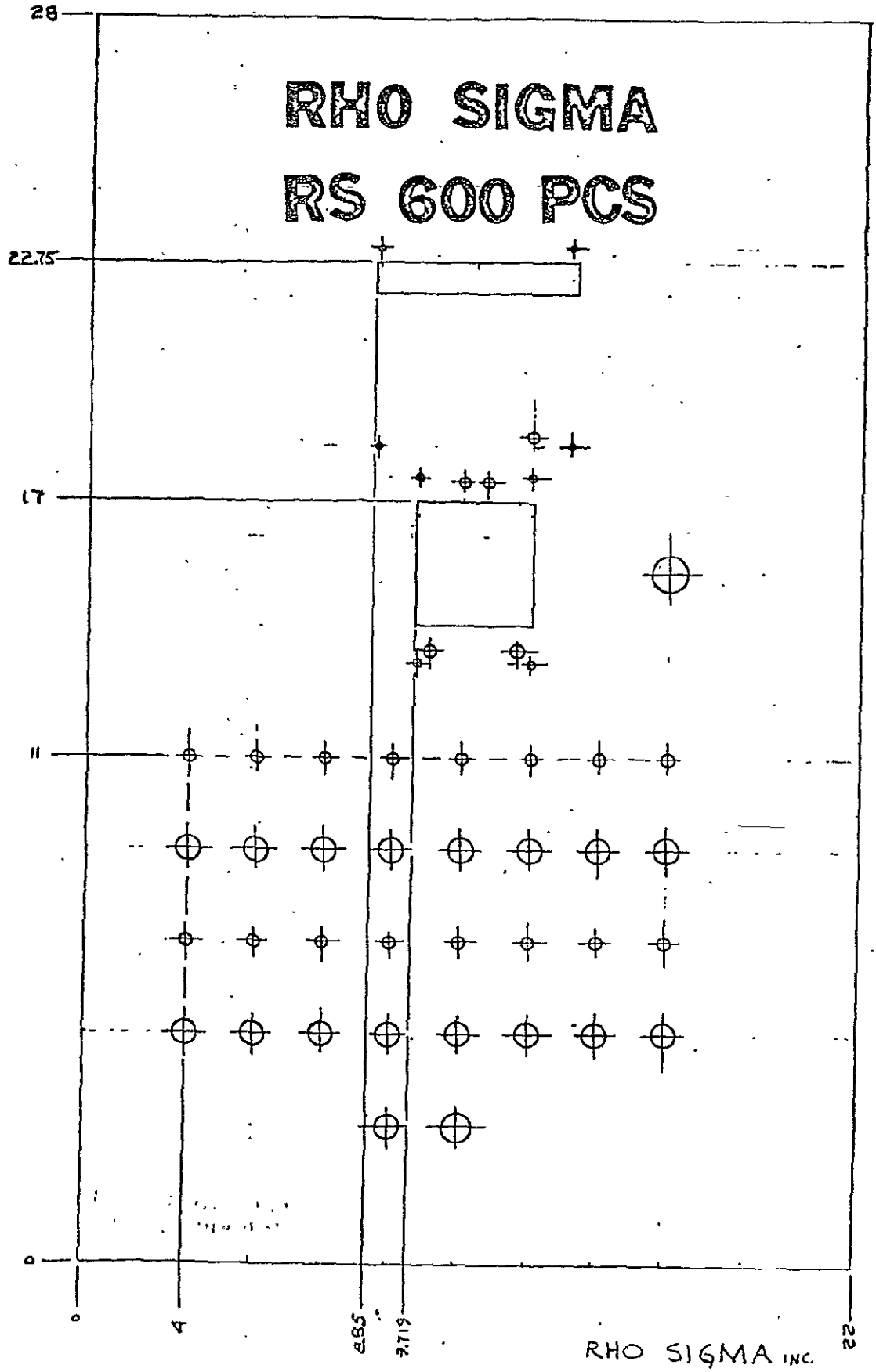
RHO SIGMA INC

HOLE PAT. FOR SWITCHES; LIGHTS; FUSE; KEY-SWITCH

SIZE	CODE IDENT NO.	DRAWING NO.
B		600-3000

SCALE 1/4" SHEET 4 OF 6

B-75

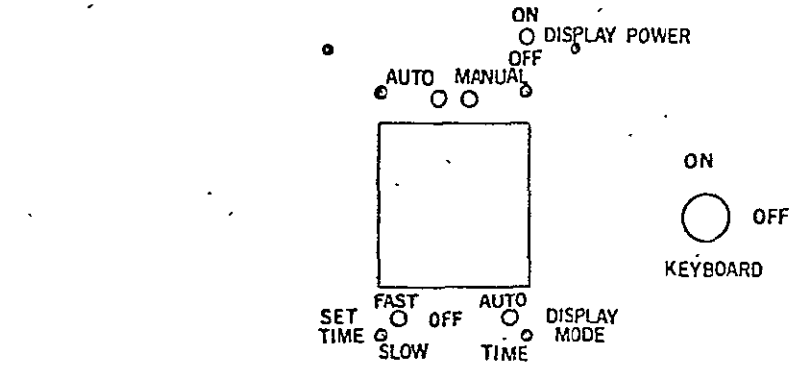


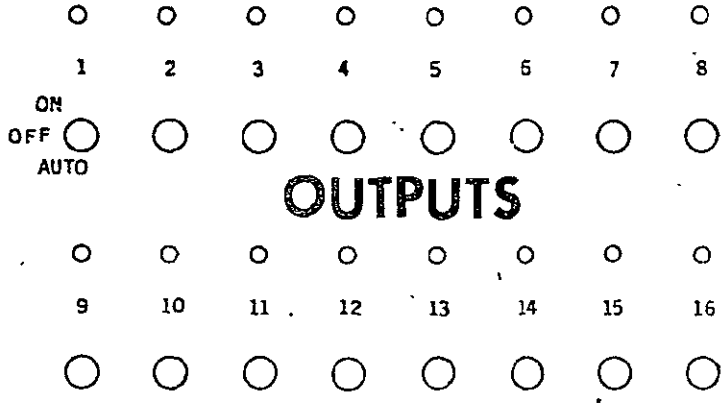
NOTE: ALL DIM IN INCHES
±.010

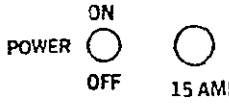
600-3000
SHEET 5 OF 6

RHO SIGMA

RS 600 PCS







RHO SIGMA
CCO—3000
Sheet 6 of 6

SECTION C

SYSTEM DESIGN DATA BROCHURE

RS600

PROGRAMMABLE CONTROL SYSTEM

RHO-SIGMA INCORPORATED

RS 600 PROGRAMMABLE CONTROL SYSTEM

SEPT., 1, 1977

Rho Sigma, Inc., a leading manufacturer of solar controls, has developed the RS600 Programmable Control System (PCS) as its newest generation of controls. The RS600 is designed for use with commercial, multi-family dwelling, and complex residential HVAC systems. Its versatility allows it to be programmed to control any type system where multiple sensor inputs and control outputs are needed.

The RS600 PCS is a programmable microprocessor-based control system. It can scan sensor inputs such as temperature, pressure, flow, relay and switch closures. The controller solves the system functional equations which may be a combination of arithmetic functions, time and switch logic. The outputs can be in the form of relay closures or solid state devices which can pulse a damper system or operate fractional HP motors.

Figure 1 shows the general block diagram of the PCS. Figure 2 shows the front panel of the PCS with the keyboard/display and the output monitor and control switches.

The RS600 has a "front end conditioning" module which is designed to allow the use of thermistors as temperature sensors. There are 16 such inputs available along with 16 discrete inputs.

Mounted inside the RS600 enclosure is an optional 5 digit LED display and the 16-key keyboard as shown in Figure 2. This display will automatically sequence through all input channels or can be set to monitor one channel via the keyboard. The display is in engineering units for the analog channels. The discrete input channels will be represented by a "HI" or "LO" for "ON" and "OFF".

The display also will show the time, day of year, hour and minute. Time can be changed via the keyboard for initialization and updating in the event of start-up and power outage.

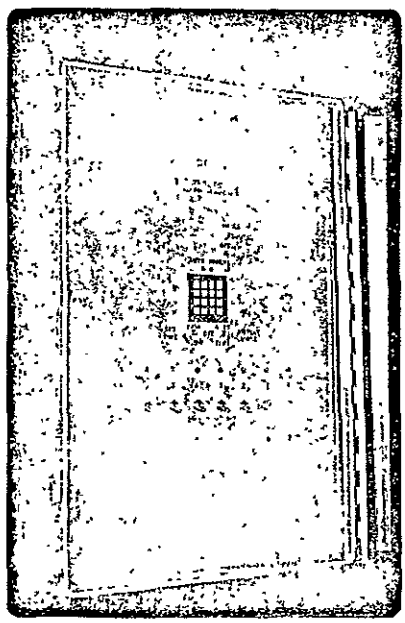


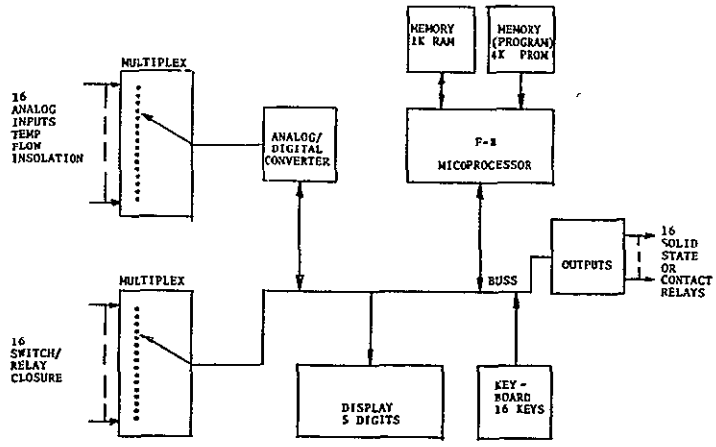
FIGURE 2

The keyboard, besides allowing the user to monitor a particular input or output channel, can be used to change up to fifty-two (52) constants used in the programmed equations. This feature of the RS600 is ideal for prototype or first time systems. The program constants can be changed via the keyboard to modify any of the equations. In this manner system changes can be tried without any hardware modifications.

On the same panel as the display/keyboard are 16 optional LED's and 3 position toggle switches. The LED's will indicate an output in the "ON" stage; the toggle switches will allow the user to manually turn each output to either "ON" or "OFF", or to put the output in the "AUTO" state, which is then under computer control.

The RS600 has sixteen output control signals which can be used either to drive contact relays or solid state relays.

The RS600 PCS will be programmed to solve a set of logical/arithmetic equations. The equations will be contained in programmable read only memories (PROM's) The associated constants for each equation are temporarily held in the random access memory (RAM's) which will allow the user to alter and experiment with the constants via the keyboard.



RS 600
PROGRAMMABLE CONTROL SYSTEM

FIGURE 1

11922 VALERIO STREET • NO. HOLLYWOOD, CA. 91605 • (213) 982-6800

RS600 TECHNICAL SPECIFICATIONS

AUG. 15, 1977

RS600 PROGRAMMABLE CONTROL SYSTEM

INPUTS:

Sensors: 8 Channels expandable to 16

Sensor types:

1. Temperature – Thermistors or RTD's
2. Insolation – Photovoltaic Pyranometer
3. Flow – 0-2 VDC
4. Pressure Transducer – 0-2 VDC
5. Any analog voltage input ± 2.0 VDC

Resolution of input: 1 mv

Discrete: 8 channels expandable to 16

Sensor types:

1. Switch closure
2. Relay closure
3. Pulse flow meter – 200 pulse/min. Max.

Input signal: contact open or 5 VDC
closed – ground

Power: 105-130 VAC 50-60 Hz 100 watts

OUTPUTS:

16 channels available

Output types: (selectable by design)

1. 10 Amp solid state switch
2. 10 Amp contact relay
3. 200 ma 24 VDC relay driver

COMPUTER FUNCTIONS:

a. Conversions of inputs to engineering units
   1. Thermistor inputs to temperature °C or °F
      Accuracy 0-100°C ± 1°C, -40 to 140°C ± 2°C
      32-212°F ± 1°F, -40 to 300°F ± 3°F
   2. Photocell input to insolation (Btu/ft^2-Hr).
   3. Flow rates to GPM or GPH
   4. Calculates real time: 365 day clock time to nearest second.

b. Solves logical and arithmetic equations of the type:
   Output = F (temperature, time, flow, switch closure, etc.)

PHYSICAL SIZE:

a. 30 in. high x 20 in. wide x 10 in. deep enclosure
   (NEMA – 12 type)
b. Approximate weight- 80 lbs.

ENVIRONMENT:

Controller will operate from 0° to 120°F
and from 0 to 95% Rh without condensation

OPTIONS:

Keyboard:
Mounted on the inner panel, allows the user to

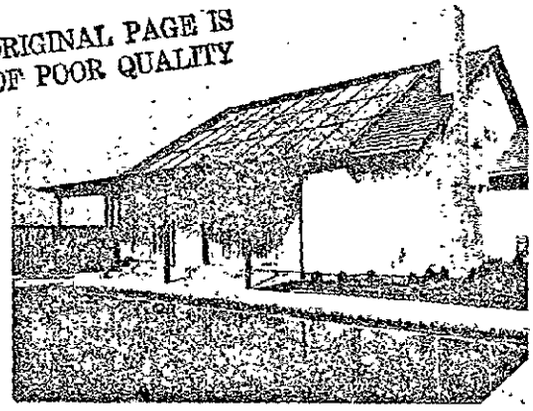
1. Select input channels for continuous monitoring
2. Set time
3. Alter specified constants used in the program
4. Set/reset outputs

Display:
A 6-digit LED display mounted on the inner panel. The display will either sequence through all inputs or monitor one input or output continuously (via keyboard command). 12 symbols designate the type of data being displayed.

Manual Override Switches:
Each output has a 3-position switch that allows the user to select the on-off-auto state for each output. A LED designates the outputs ON/OFF state.

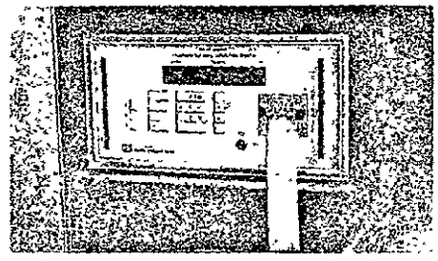
PROGRAMMABLE DATA ACQUISITION SYSTEMS

for Energy-related Engineering Studies.



One of PG&E's three Solar Energy conservation homes. This one is heated by Solaron; all three are instrumented by Rho Sigma.

See Reverse Side for Technical Specifications



Microprocessor on-site at the Pacific Gas & Electric Company's Solar Energy Conservation Home, (San Jose, CA). Rho Sigma is instrumenting two additional homes in PG & E's ambitious solar program designed to study how the energy of the sun may become one part of the solution to the nation's problem of diminishing supplies of natural gas.

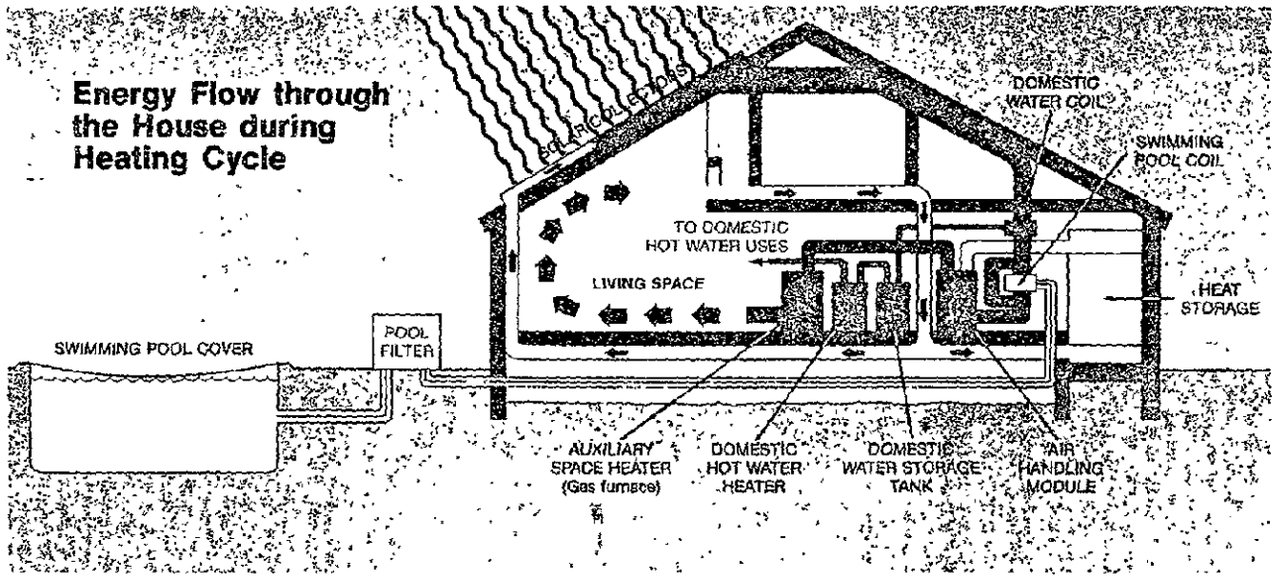
Rho Sigma is a complete, single source for controls and instrumentation designed specifically for the solar energy industry. Our in-field experience and close customer-contact has guided the development of our product lines and has resulted in the increasing selection of Rho Sigma's solar controls and instruments to meet the special needs of our customers.

For example, Rho Sigma's Programmable Data Acquisition Systems (PDAS), is monitoring all the energy-related parameters in the Pacific Gas & Electric Company's three-house solar energy evaluation program. The RS5080 was programmed to PG & E's specifications. Rho Sigma also supplied all the sensors necessary to measure the temperatures, flow rates, energy consumption of various back-up systems, and the meteorological conditions of interest to engineers at PG & E. Installation of the package by Rho Sigma's field engineers assured turn-key operation for PG & E.

During the three year monitoring period, the RS5080 is providing PG & E with answers to the following questions:

1.) How much energy is consumed by the house?
2.) What percentage of the total is supplied by the solar system?
3.) How much energy is consumed to heat domestic water, space and the swimming pool?
4.) What percentage of the energy used for each purpose comes from solar sources?
5.) What is the efficiency of the collectors under conditions actually encountered in residential applications?

Rho Sigma's solar controls are in the field regulating the conversion of solar energy to forms useful to man. Rho Sigma's instruments are at the sites answering the questions which are under study.



RHO SIGMA INCORPORATED

TECHNICAL SPECIFICATIONS RS5080

JANUARY 31, 1977

Inputs:

1.) 20 analog channels to monitor
   a) Temperature inputs from RTD's, thermocouples and thermistors, and
   b) Solar inputs from pyranometers

2.) 5 pulsed inputs (expandable in groups of five) to monitor
   a) flowmeters and
   b) instrumented gas and watt-hour meters

3.) 8 discrete inputs to monitor
   a) relay closures signaling states of operation and
   b) switch positions

Outputs:

1.) broad-stroke LED display of all inputs in either engineering units or raw data

2.) printer output of
   a) all inputs,
   b) energy flow calculations based on inputs,
   c) performance efficiencies, and
   d) other energy-related quantities of interest to engineers.

3.) capability to interface with
   a) cassette record
   b) teletype terminal
   c) acoustical coupler (telephone)

Internal Capabilities:

1.) scans all channels once per second,

2.) solves energy flow equations once per minute,

Typical equations:

$$Q = Cp \int \dot{m}\, \Delta T\, dt$$

$$Q = Area \int Insolation\ (T)\, dt$$

3.) solves performance efficiency formulas at each customer-selected print-out time.

Typical formulas:

$$\eta_{collector} = \frac{Q\ collector}{Q\ solar}$$

$$\%\ solar = \frac{Q\ solar}{Q\ solar + Q\ back\text{-}up}$$

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