


SERVICE MANUAL
MODEL C16 COMPUTER
OCT. 1984 PN-314001-03

 **commodore**
COMPUTERS

SERVICE MANUAL
MODEL C16 COMPUTER
OCT. 1984 PN-314001-03

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C16 PRODUCT SPECIFICATION

MEMORY

16K RAM Standard

ROM

32K ROM Standard (includes operating system and BASIC interpreter).

MICROPROCESSOR

7501/8501 Microprocessor with a two speed clock (.89 or 1.76 MHz).

DISPLAY

40 Columns x 25 lines of text.

COLORS

121 Colors (15 colors; 8 luminance levels and Black).

CHARACTERS

Upper & lower case letters, numerals and symbols. Reverse and flashing characters. All PET graphic characters.

DISPLAY MODES

Text characters. High resolution graphics. Split screen text/high resolution graphics. MultiColor graphics. Split screen/multi-color graphics.

RESOLUTION

320 x 200 Pixels

SOUND

2 Tone generators or 1 Tone and 1 noise generator.

VOLUME

8 Volume levels

KEYBOARD

Full size/full stroke C64 style design.

KEYS

66 Keys total. 4 Cursor control keys. 4 Function keys (up to 8 user defined/programmable functions possible). Color control keys. HELP key. Upper and lower case character set.

INPUTS/OUTPUTS

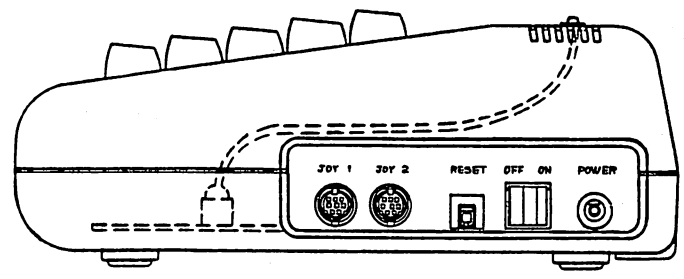
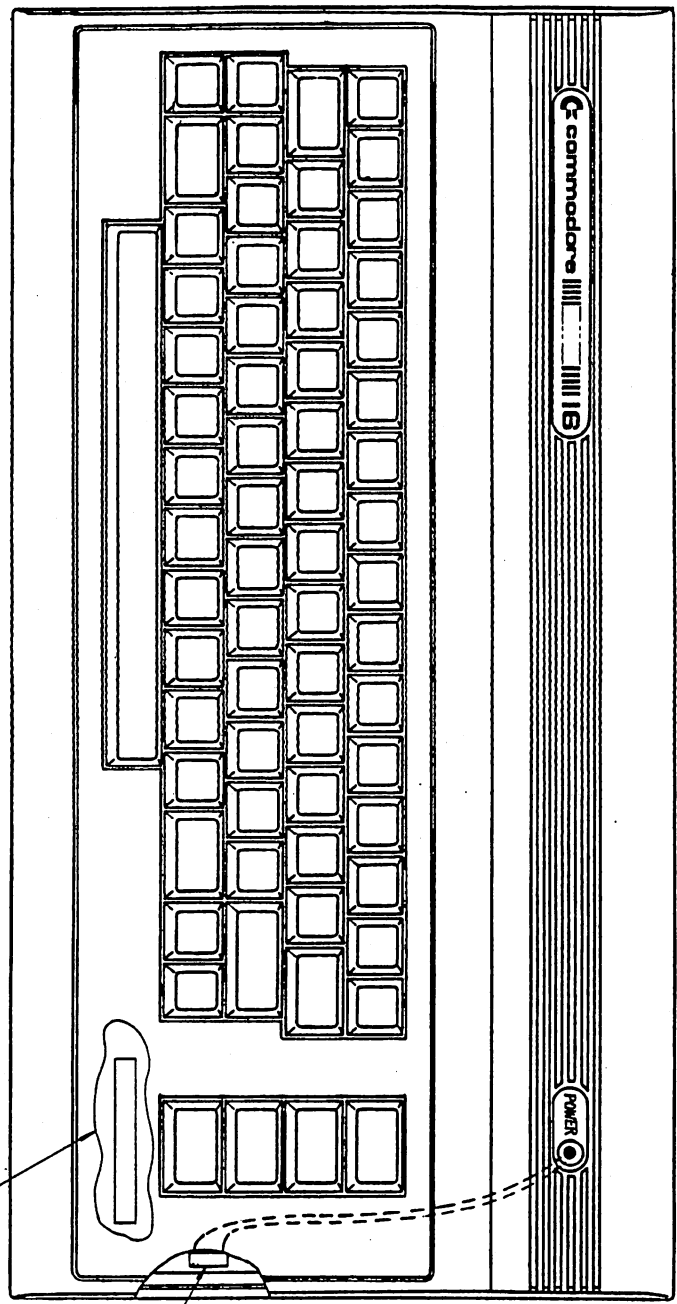
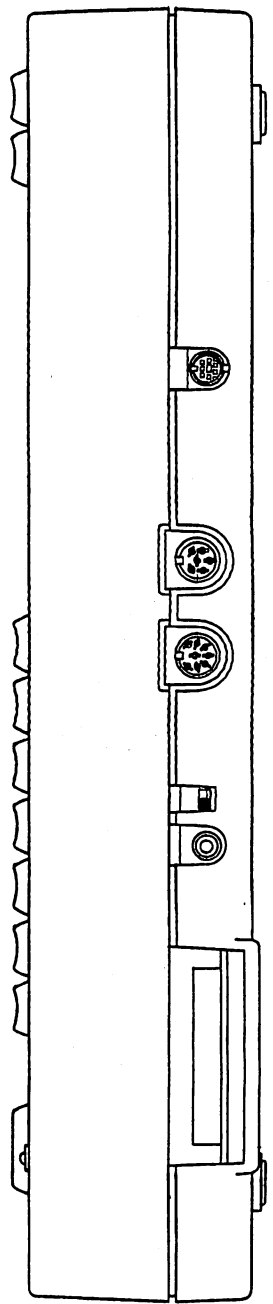
Serial port. ROM cartridge and parallel disk drive port. 2 Joystick ports. C1531 Cassette drive interface port. RF Output — channel 3 or 4. Video output — composite/chrominance/luminance, audio input/output. Power supply input.

FEATURES

Built-in BASIC 3.5 — over 100 commands, statements and functions. Built-in Machine Language Monitor — over 12 commands. Built-in graphics and sound commands. Screen window capability. Extended screen editor.

PERIPHERALS

C1541 Disk drive, C1551 Fast Disk Drive, C1531 Datasette, MPS 802 Dot matrix printer, MPS 803 Dot matrix printer, DPS 1101 Daisy wheel printer, C1520 Plotter/Printer, C1802/1803 Color monitor, C1702 Color monitor.



20-PIN CONNECTOR
FROM KEYBOARD
CN2 REF.

3 PIN CONNECTOR
FROM LED LAMP
CN9 REF.

C-16 Casework Identification

PARTS LIST
C-16

TOP CASE ASSY

Top Case	C 251813-01
Keyboard, 66 Key	C 251798-01
LED Plate	C 326160-02
Nameplate	C 251794-01
Lamp Holder Set	C 903820-03
LED Assembly	C 1001039-01

BOTTOM CASE ASSY

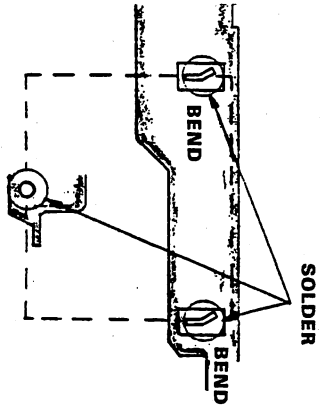
Bottom Case	C 251790-01
Foot, Self-Adhesive	C 950157-04
PCB Shield Plate, top	C 251795-01
PCB Shield Plate, bottom	C 251796-01
PCB Insulation Sheet	C 251797-01

ACCESSORIES

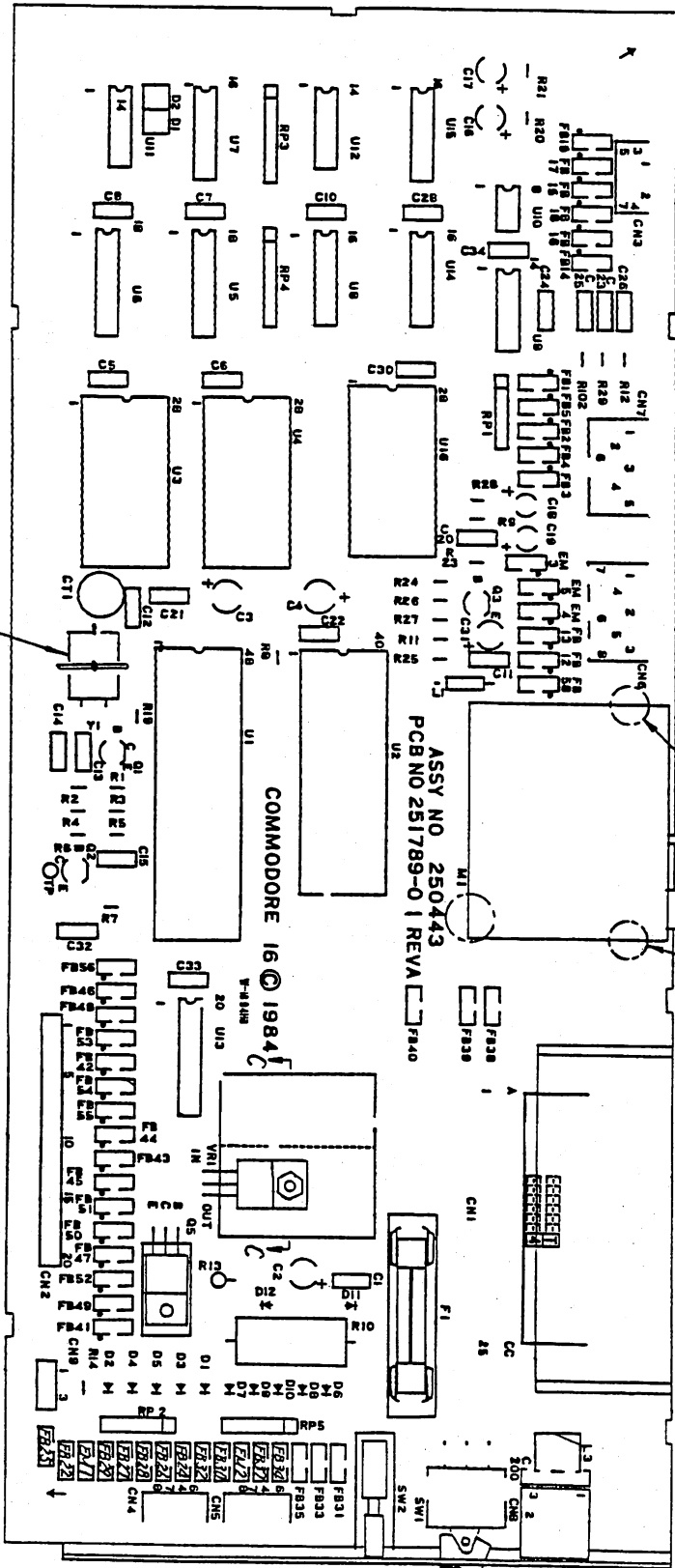
Users Manual	C 251799-01
Power Supply	C 251539
RF Cable	C 326189-02
Switch Box	C 904778-01

C — Indicates Commodore Stock Part

BOTTOM VIEW
DETAIL E

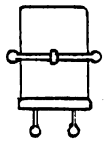


SEE DETAIL E
FOR -01 TO -03



SEE DETAIL A

251081-01 SHOWN



251081-03 SHOWN



DETAIL A

C-16 PCB Assembly

PARTS LIST — C-16 PCB ASSEMBLY #250443-01

PLEASE NOTE: Commodore part numbers are provided for reference only and do not indicate the availability of parts from Commodore. Industry standard parts (Resistors, Capacitors, Connectors) should be secured locally. Approved cross-reference for TTL chips, Transistors, etc., will be available in manual form through the Service Department in November of 1984. Unique or non-standard parts will be stocked by Commodore and are indicated on the parts list by a "C".

INTEGRATED CIRCUITS				RESISTORS (Continued)			
U1	IC 7360 VSLI, Text Display (TED)	C 251535-01		R5	18K	R20	47K
	Sub: IC8360	C 251535-02		R6	1.5K	R21	100K
U2	IC 7501 Custom Microprocessor	C 251536-01		R7	470K	R23	10K
				R8	1K	R24	1K
U3	IC 23128 ROM TED Basic	C 318006-01		R9	12K	R25	100K
				R10	Wound 20K 5W, 10%	R26	240K
U4	IC 23128 ROM TED Kernal	C 318005-05		R11	10K	R27	240K
	Sub: IC23128	C 318005-04		R12	3.3K	R28	1K
U5,U6	IC D-RAM 16 x 4	251538-02		R13	470K	R29	100K
U7,U8	IC 74LS257	901521-57		R14	470K	R102	330K
U9	IC 7406	901522-06		RESISTOR PACK			
U10	IC 555	901523-01		RP1	1K 6 PIN 0.19W 2%	902441-22	
U11	IC 74LS125	901521-20		RP2	3.3K 6 PIN 0.19W 2%	902441-29	
U12	IC 74LS02	901521-21		RP3	68K 8 PIN	326149-06	
U13	IC 6529B Single Port Interface	C 251640-03		RP4	68K 8 PIN	326149-06	
				RP5	3.3K 6 PIN 0.19W 2%	902441-29	
U14	IC 74LS139	901521-18		CAPACITORS			
U15	IC 74LS175	901521-34		C1	Elect 1 μ F 25V	900100-32	
U16	IC 7700-010 PLA	C 251641-02		C2	Elect 47 μ F 25V	900100-33	
TRANSISTORS				C3	Elect 10 μ F 25V	900100-01	
Q1	2SC 1815	902693-01		C4	Elect 10 μ F 25V	900100-01	
Q2	2SC 1815			C5	Ceramic 0.1 μ F 25V	251075-06	
Q3	2SC 1815			C6	Ceramic 0.1 μ F 25V	251075-06	
Q5	2SD 880	902694-01		C7	Ceramic 0.22 μ F 25V	251075-07	
DIODES				C8	Ceramic 0.22 μ F 25V	251075-07	
D1—D10	IN914B FORMING	251819-16		C10	Ceramic 0.1 μ F 25V	251075-06	
	Sub:			C11	Ceramic 0.1 μ F 25V	251075-06	
	15953(3) FORMING	251819-07		C12	Ceramic 22 pF 50V	251070-14	
D11	IN4001	900750-01		C13	Ceramic 220 pF 50V	251071-26	
D12	ZENER RD 6.8EB	900927-01		C14	Ceramic 150 pF 50V	251071-24	
	Sub: ZENER IN754A	900927-02		C15	Ceramic 0.01 pF 25V	251075-01	
RESISTORS — All values are in ohms-1/4 W 5%, Carbon Comp - Forming Typ, unless noted otherwise.				C16	Elect 10 μ F 25V	900100-01	
R1	10K	R3	470K	C17	Elect 1 μ F 16V	900100-16	
R2	4.7K	R4	220K	C18	Elect 10 μ F 25V	900100-01	
				C19	Elect 10 μ F 25V	900100-01	
				C20	Ceramic 0.01 μ F 25V	251075-01	
				C21	Ceramic 0.1 μ F 25V	251075-06	
				C22	Ceramic 0.1 μ F 25V	251075-06	

C — Commodore Stock Item

PART LIST — C16 PCB ASSEMBLY # 250443-01 (Continued)

CAPACITORS (Continued)		MISCELLANEOUS (Continued)	
C23	Ceramic 470 pF 50V 251071-30		
C24	Ceramic 470 pF 50V 251071-30		
C25	Ceramic 470 pF 50V 250171-30		
C26	Ceramic 0.1 μ F 25V 251075-06		
C28	Ceramic 0.1 μ F 25V 251075-06		
C30	Ceramic 0.1 μ F 25V 251075-06		
C31	Elect 10 μ F 25V 900100-01		
C32	Ceramic 0.1 μ F 25V 251075-06		
C33	Ceramic 0.1 μ F 25V 251075-06		
C34	Ceramic 0.1 μ F 25V 251075-06		
C200	Ceramic .22 μ F 25V 251075-07		
CT1	Capacitor, Trimmer 251029-02		
MISCELLANEOUS		CONNECTORS	
Y1	Crystal 14.31818 MHZ — CL = 32 pF 251081-03 Sub: Crystal 14.31818 MHZ 251081-01	M1	Cartridge Guide C 310171-01 Connector Panel 251791-01 RF Modulator C 251844-01
L1	Coil Inductor 1.2 μ H 325570-01	FB1-5, FB12-19 FB22, FB24-35 FB37-56, FB58	Ferrite Bead 325563-01
L3	Line Filter 251701-01	EM1-5	EMI Filter 251842-01
SW1	Switch, Rocker (PC Mount) C 251587-01		
SW2	Switch, Push Button C 251260-01		
VR1	Voltage Regulator 7805 901527-02		
F1	Fuse, Normal BLOW 250V 1.5A 903556-18		
F1	Fuse, Clip 906102-01		
		CN1	Connector, 50 PIN Female Edge, Expan. Gold Plated 251630-02
		CN2	Header Pin, 20 PIN, Keyboard 903364-01
		CN3	Connector, 7 PIN MINI DIN, Cassette C 251616-01
		CN4	Connector, 8 PIN MINI DIN, Joy 0 Joy 1 C 251259-01
		CN5	Connector, 8 PIN MINI DIN, Joy 0 Joy 1 C 251259-01
		CN6	Connector, 8 PIN DIN, Audio/Video C 325573-01
		CN7	Connector, 6 PIN DIN, Serial Bus C 903361-01
		CN8	Connector Jack, DC Power, Power C 251263-01
		CN9	Header Assembly, 3 PIN, LED 903332-03

C — Commodore Stock Item

**PIN
ASSIGNMENT**

A2	1	48	-A3
A1	2	47	-A4
A0	3	46	-A5
VDD	4	45	-A6
CS0	5	44	-A7
CS1	6	43	-A8
R/W	7	42	-A9
IRQ	8	41	-A10
MUX	9	40	-A11
RAS	10	39	-A12
CAS	11	38	-A13
ϕ	12	37	-A14
COLOR	13	36	-A15
CLK IN	14	35	-AEC
K0	15	34	-BA
K1	16	33	-SND
K2	17	32	-D7
K3	18	31	-D6
K4	19	30	-D5
K5	20	29	-D4
K6	21	28	-D3
K7	22	27	-D2
SYNC	23	26	-D1
VSS	24	25	-D0

**U1-251535-01
VLSI, TEXT DISPLAY
(TED)**

**PIN
ASSIGNMENT**

ϕ OIN	1	40	-RES
RDY	2	39	-R/W
IRQ	3	38	-D0
AEC	4	37	-D1
VCC	5	36	-D2
A0	6	35	-D3
A1	7	34	-D4
A2	8	33	-D5
A3	9	32	-D6
A4	10	31	-D7
A5	11	30	-P0
A6	12	29	-P1
A7	13	28	-P2
A8	14	27	-P3
A9	15	26	-P4
A10	16	25	-P5
A11	17	24	-P6
A12	18	23	-GATE IN
A13	19	22	-A15
GND	20	21	-A14

**U2-251536-01
CUSTOM MICROPROCESSOR**

**PIN
ASSIGNMENT**

ENABLE	1	18	-VSS
D0	2	17	-D3
D1	3	16	-CAS
WE	4	15	-D2
RAS	5	14	-A0
A6	6	13	-A1
A5	7	12	-A2
A4	8	11	-A3
VDD	9	10	-A7

U5-U6 16 X 4 D-RAM

**PIN
CONFIGURATION**

NC	1	28	-VCC
A12	2	27	-CS ₃
A7	3	26	-A13
A6	4	25	-A8
A5	5	24	-A9
A4	6	23	-A11
A3	7	22	-CS ₁
A2	8	21	-A10
A1	9	20	-CS ₂
A0	10	19	-D8
D1	11	18	-D7
D2	12	17	-D6
D3	13	16	-D5
GND	14	15	-D4

**U3-318006-01
ROM TED - BASIC**

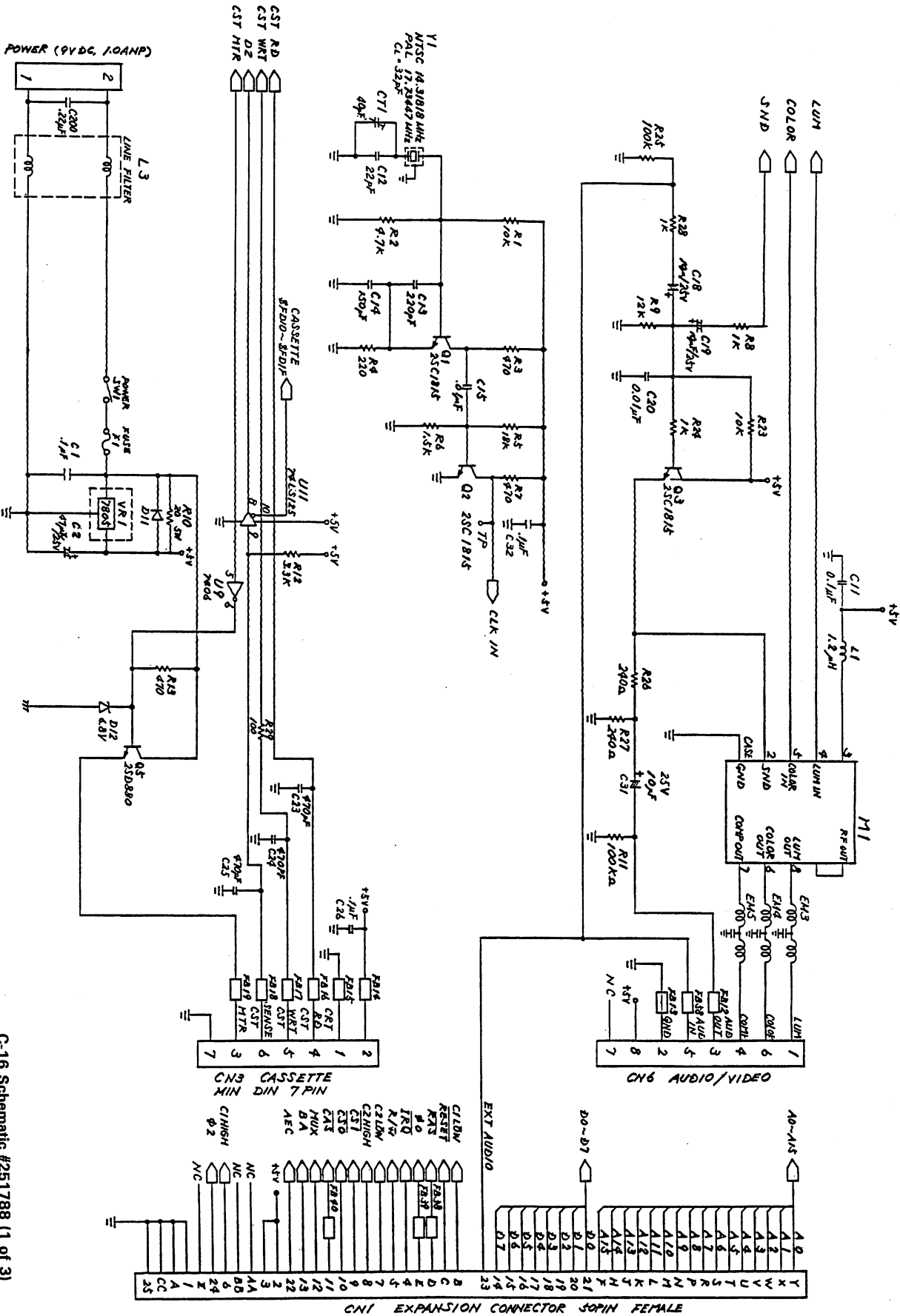
**PIN
CONFIGURATION**

NC	1	28	-VCC
A12	2	27	-CS ₃
A7	3	26	-A13
A6	4	25	-A8
A5	5	24	-A9
A4	6	23	-A11
A3	7	22	-CS ₁
A2	8	21	-A10
A1	9	20	-CS ₂
A0	10	19	-D8
D1	11	18	-D7
D2	12	17	-D6
D3	13	16	-D5
GND	14	15	-D4

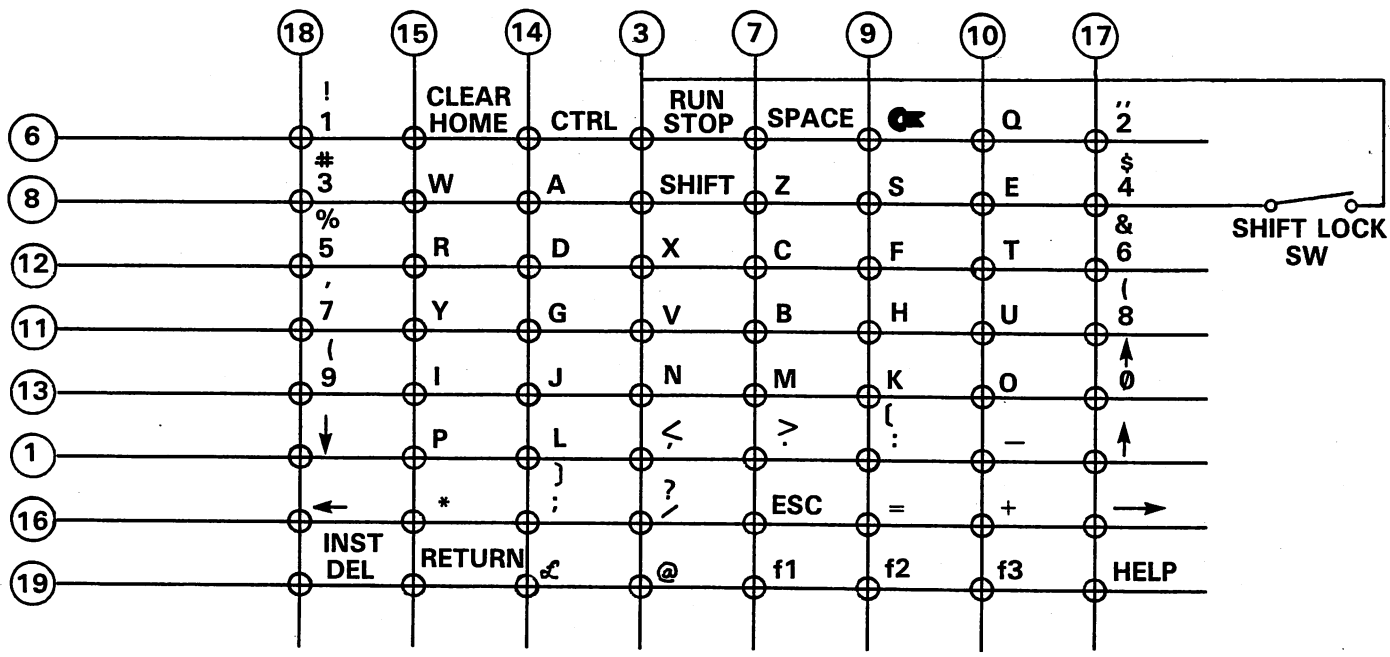
**U4-318005-04
ROM TED - KERNAL**

PART NO.	SUGGESTED SOURCE OF SUPPLY	VENDOR PART NO.	ACCESS TIME FROM RAS TRAC (ns)	RANDOM READ/ WRITE CYCLE TIME TRACT (ns)
251538-02	TEXAS INSTRUMENT	TMS4416-15	150	260
-02	FUJITSU	MB81416-15	150	260
-02	MITSUBISHI	M5M4416P-15	150	260
-02	HITACHI	HM48416AP-15	150	260

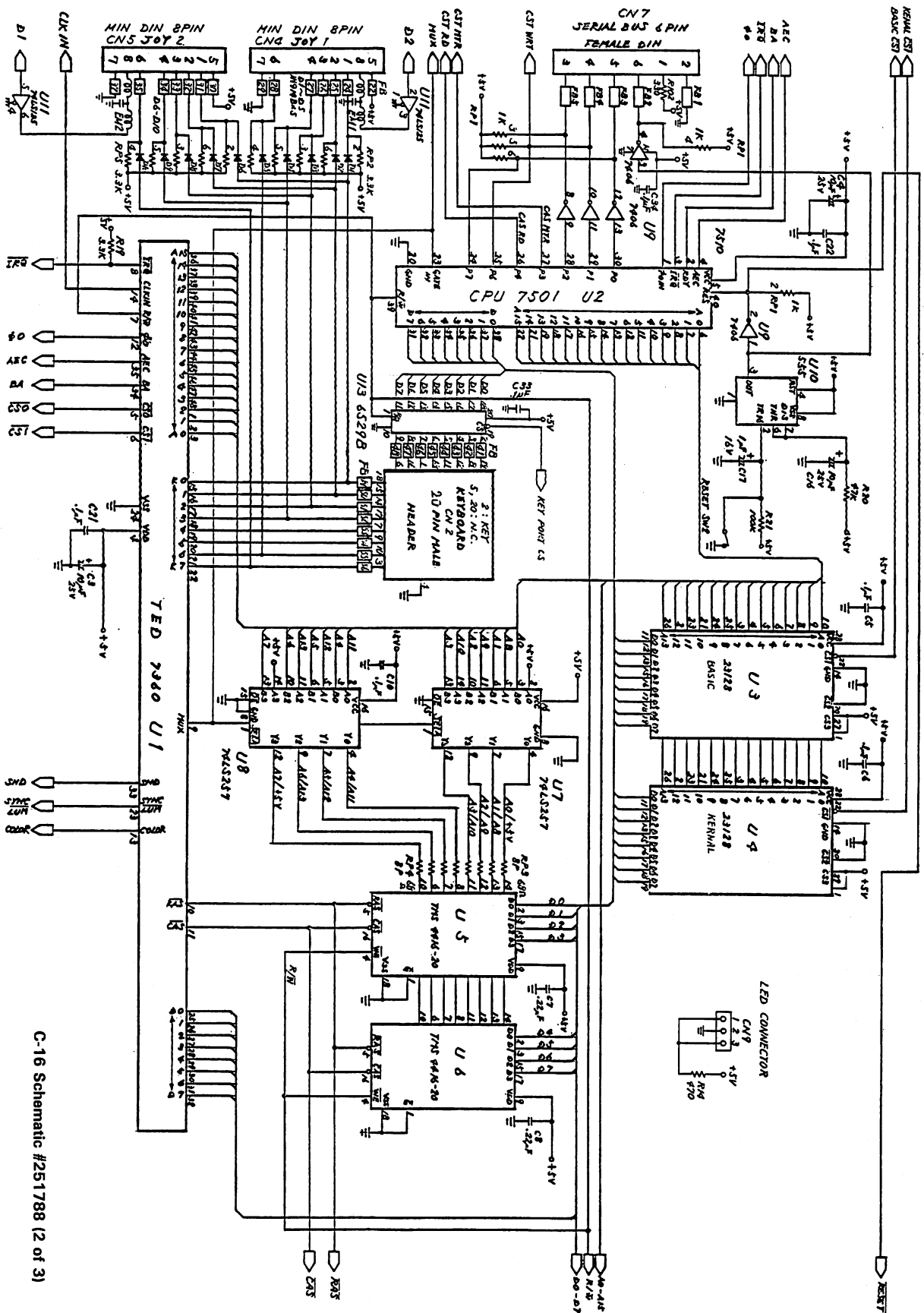
CN8 POWER (9VDC, 10AMP)



C-16 Schematic #251788 (1 of 3)



**C16
KEYBOARD MATRIX**

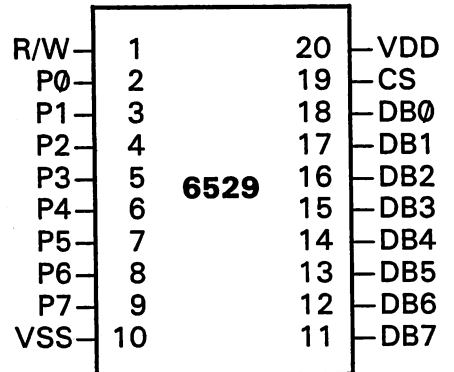


C-16 Schematic #251788 (2 of 3)

CS	R/W	D0-D7
L	L	DATA BUS TO PORT
L	H	PORT TO DATA BUS
H	X	ISOLATION

L = LOW LEVEL
H = HIGH LEVEL
X = IRREVELANT

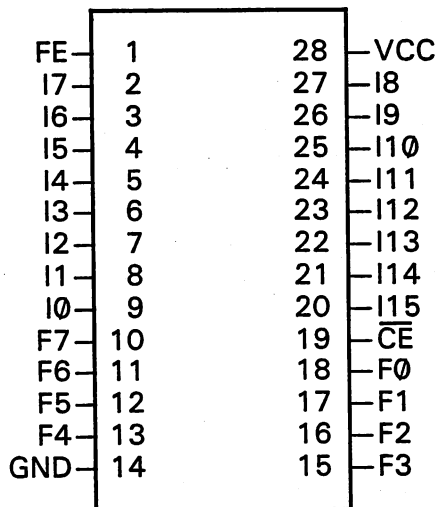
PIN CONFIGURATION



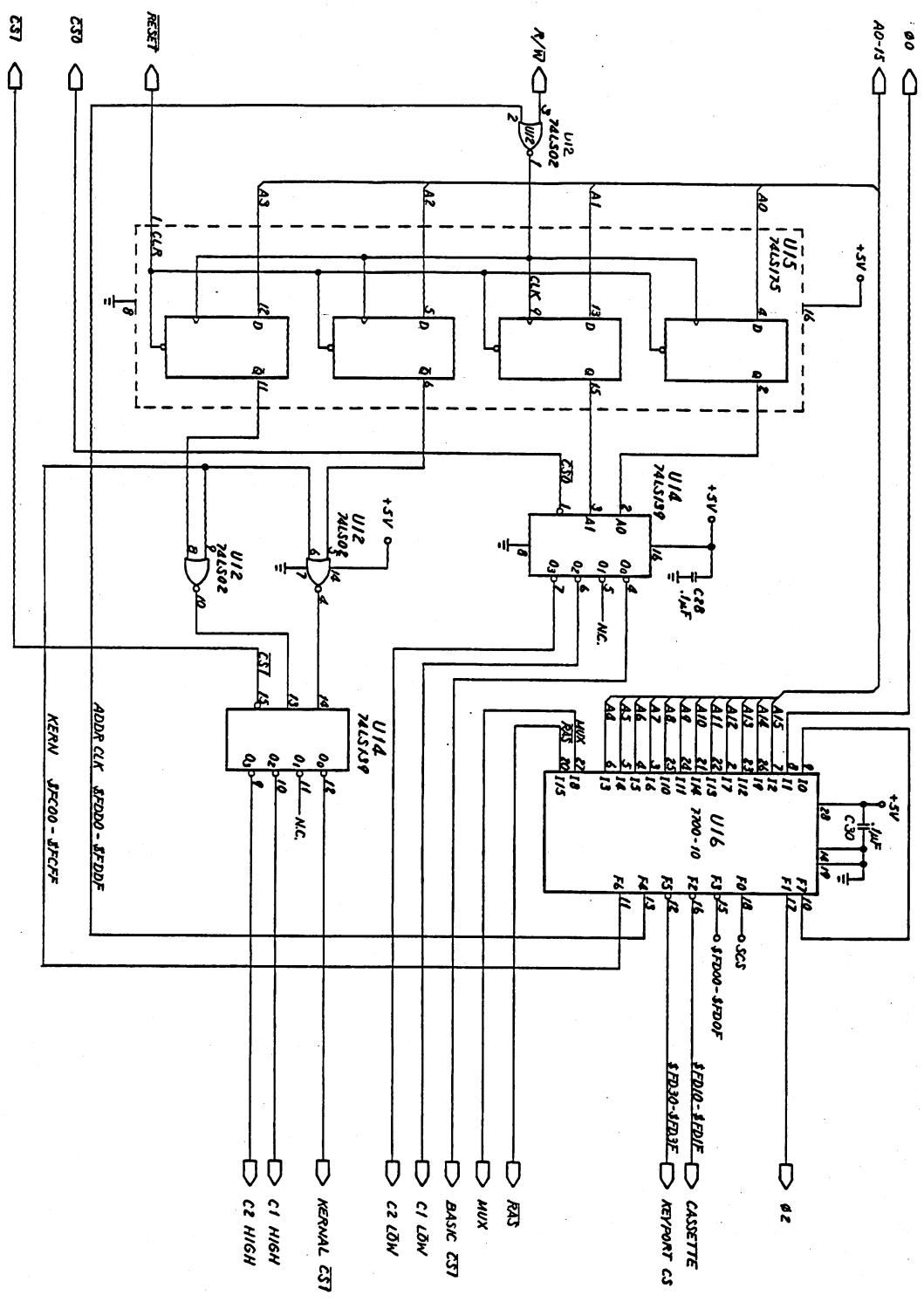
U13-251640-03
SINGLE-PORT INTERFACE

MOS	6529B	3 MHZ
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PIN CONFIGURATION

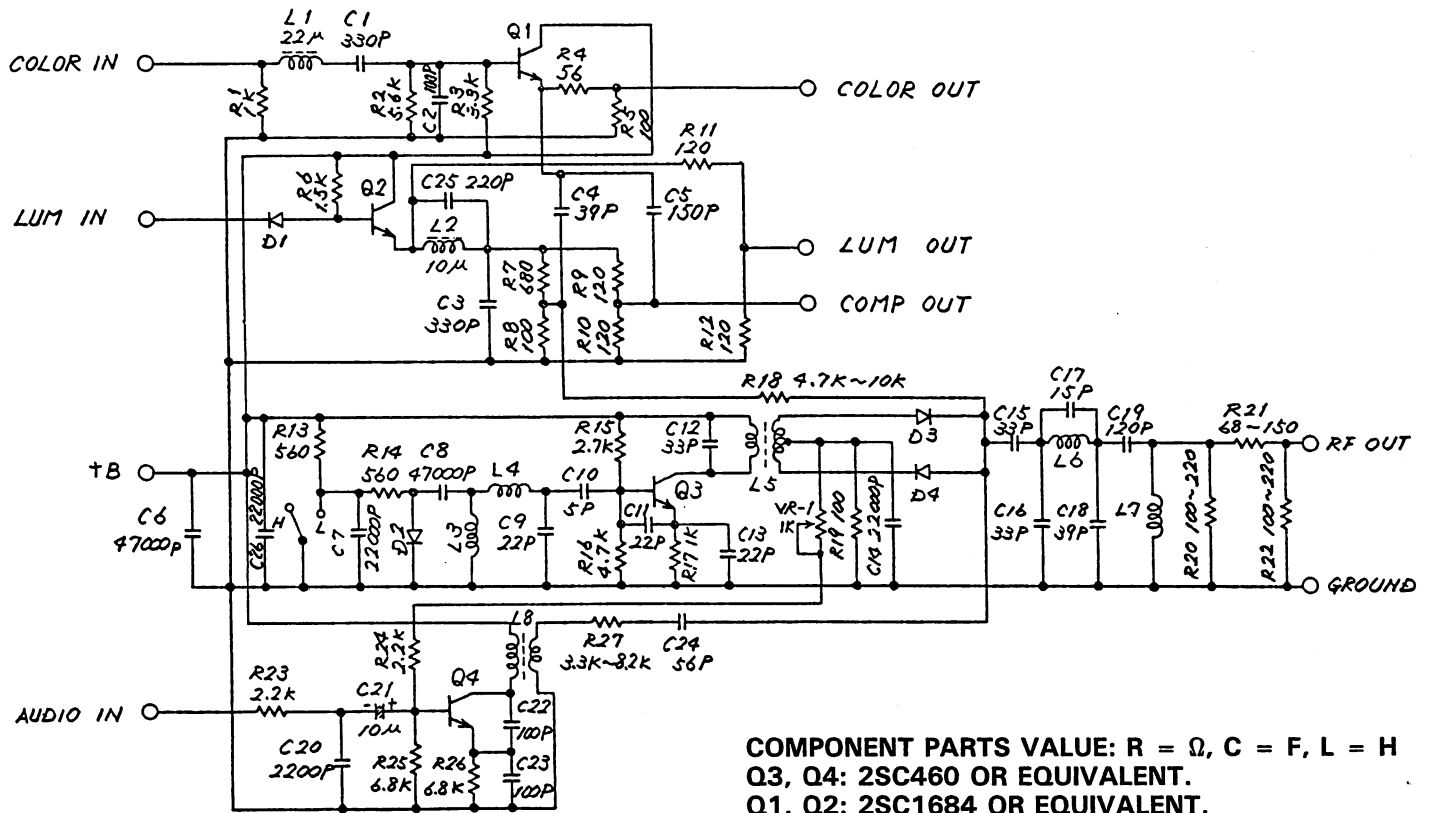


U16-251641-02
PLA

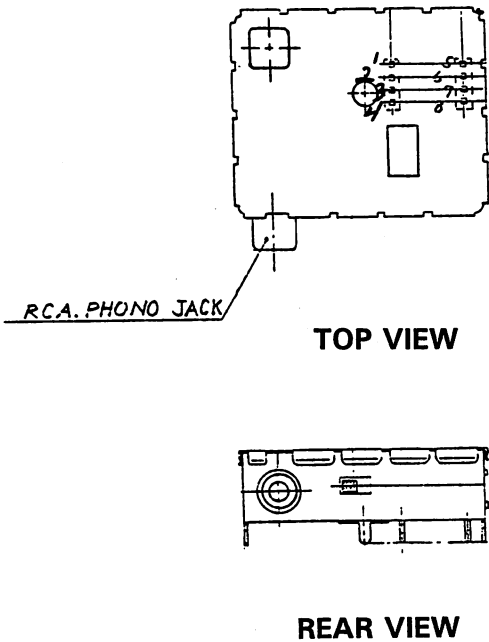


1. ALL RESISTANCE VALUES IN OHMS, 1/4W ± 5%.
 NOTES: UNLESS OTHERWISE SPECIFIED —

C-16 Schematic #251788 (3 of 3)



COMPONENT PARTS VALUE: R = Ω , C = F, L = H
 Q3, Q4: 2SC460 OR EQUIVALENT.
 Q1, Q2: 2SC1684 OR EQUIVALENT.
 D3, D4: 1SS198 OR EQUIVALENT.
 D2 : 1SS110 OR EQUIVALENT.
 D1 : 1SS119 OR EQUIVALENT.



NO.	TERMINALS
1	N.C.
2	AUDIO SIG. INPUT
3	+B (+5V)
4	SYNC + LUM. SIG. INPUT
5	COLOR SIG. INPUT
6	COLOR SIG. OUTPUT
7	COMPO. SIG. OUTPUT
8	SYNC + LUM. SIG. OUTPUT
9	RF OUTPUT
10	CHANNEL SELECT SW.

RF Modulator Layout and Schematic #251844

Date: _____

Manual Name: _____

Part Number: _____

Issue Date: _____

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