

SERVICE MANUAL
MODEL C16 COMPUTER
Preliminary

OCT. 1984 PN-314001-03

 **commodore**
COMPUTERS

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Preliminary

OCT. 1984 PN-314001-03

Commodore Business Machines, Inc.

1200 Wilson Drive, West Chester, Pennsylvania 19380 U.S.A.

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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.

**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

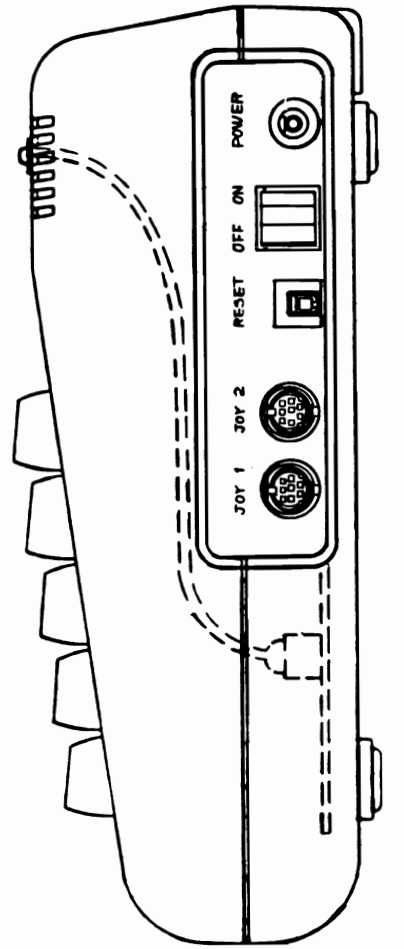
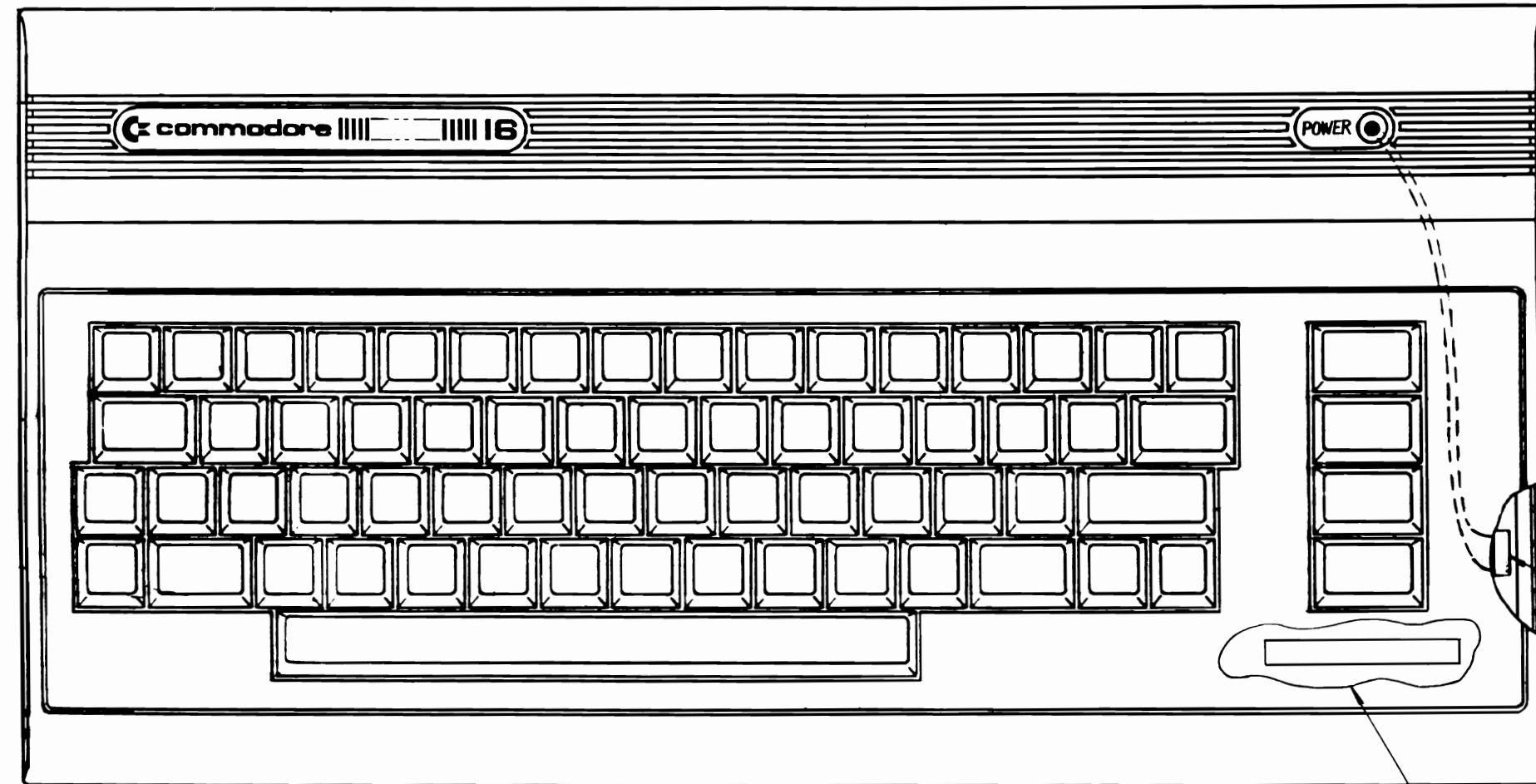
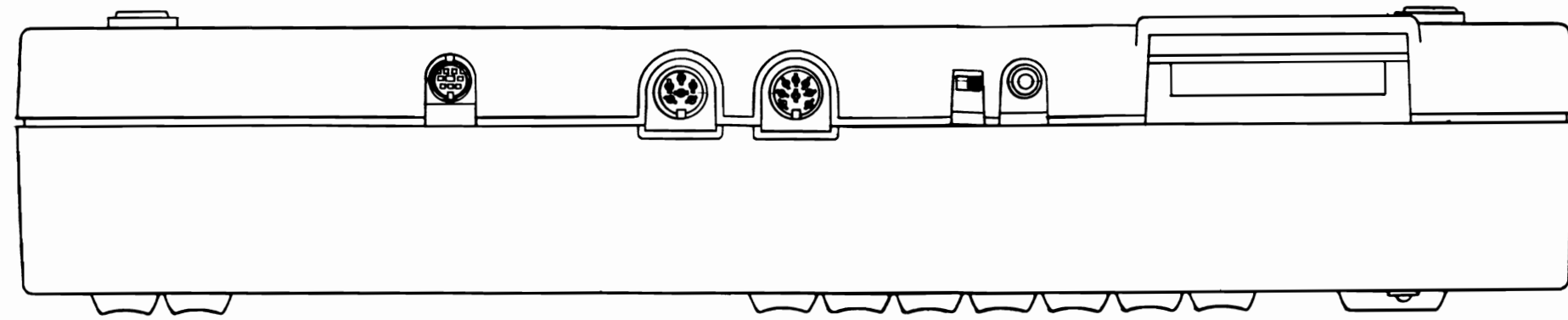
BOTTOM CASE ASSY

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

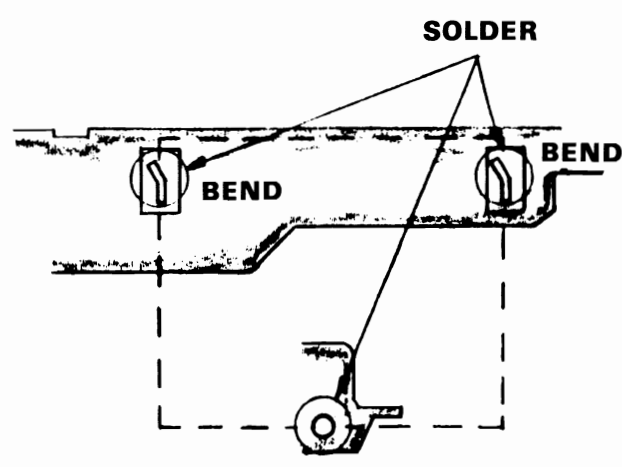
C — Indicates Commodore Stock Part



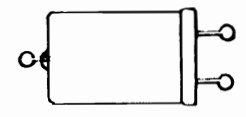
3 PIN CONNECTOR
FROM LED LAMP
CN9 REF.

20-PIN CONNECTOR
FROM KEYBOARD
CN2 REF.

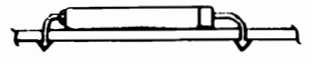
SEE DETAIL E
FOR -01 TO -03



BOTTOM VIEW
DETAIL E

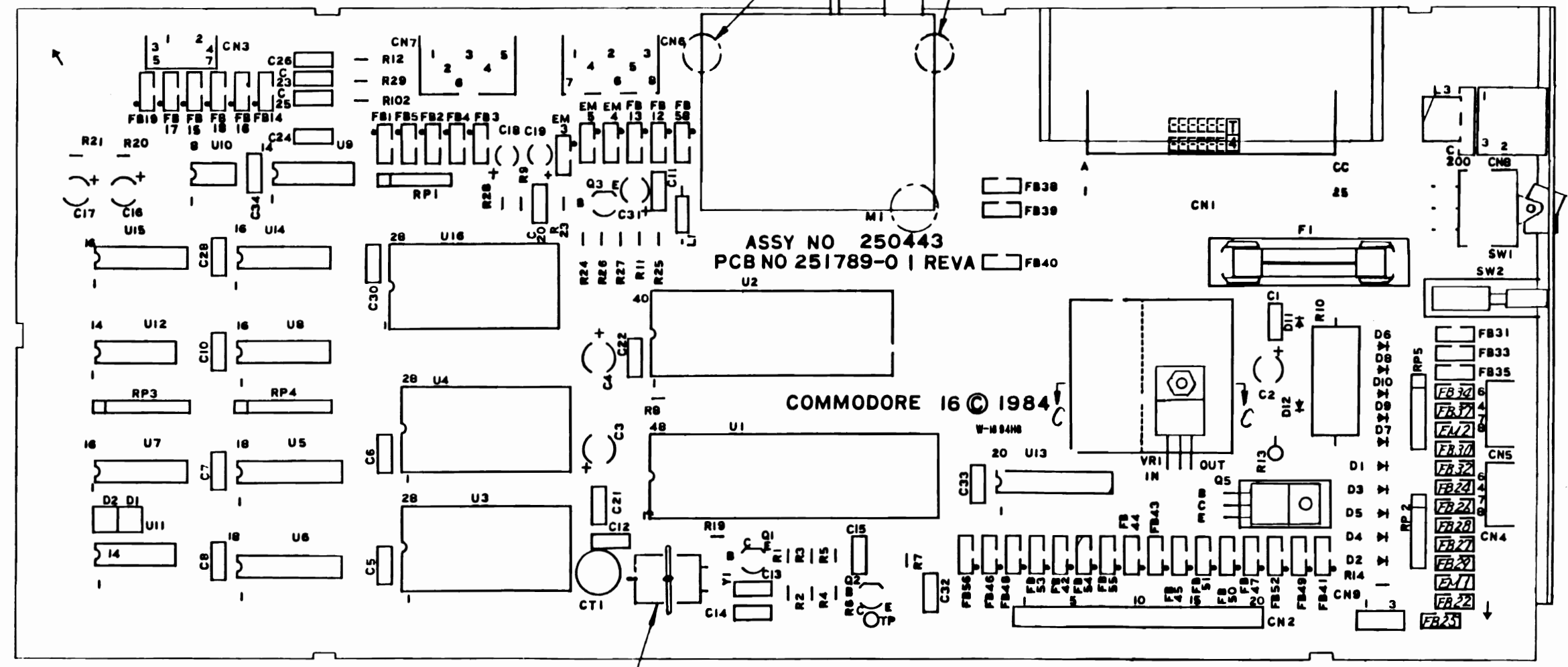


251081-01 SHOWN



251081-03 SHOWN

DETAIL A



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

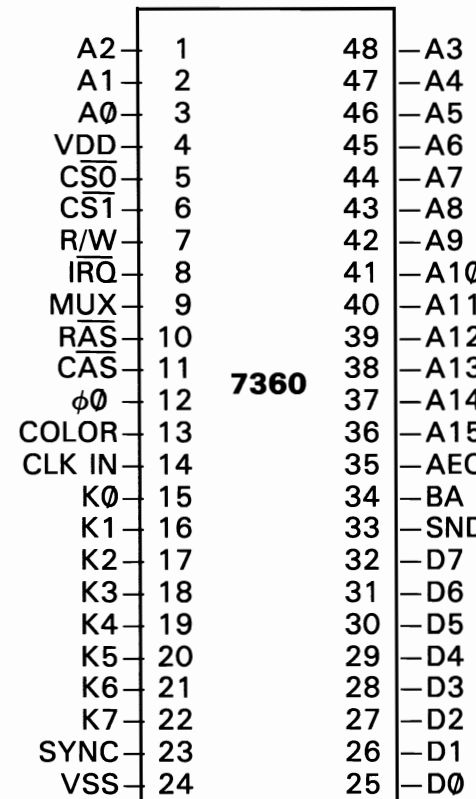
C — Commodore Stock Item

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 uH 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 O Joy 1 C 251259-01
		CN5	Connector, 8 PIN MINI DIN, Joy O 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

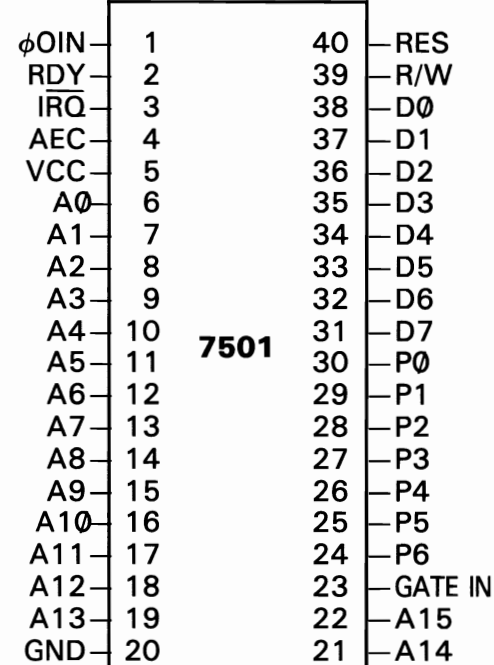
C — Commodore Stock Item

PIN ASSIGNMENT



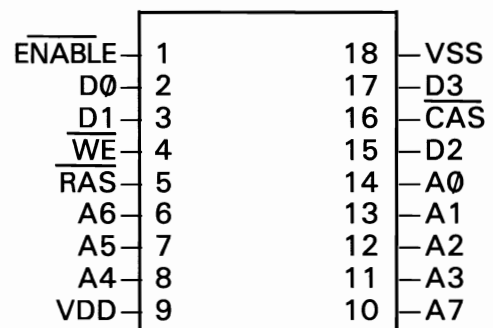
U1-251535-01
VLSI, TEXT DISPLAY (TED)

PIN ASSIGNMENT



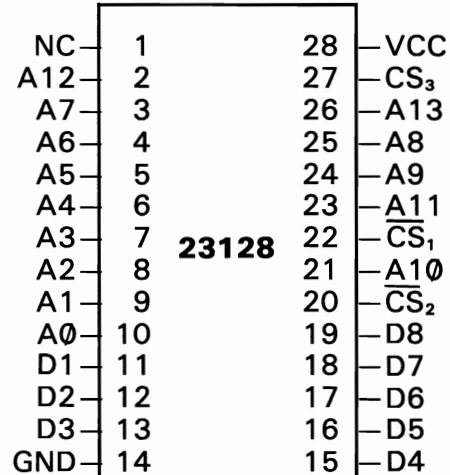
U2-251536-01
CUSTOM MICROPROCESSOR

PIN ASSIGNMENT



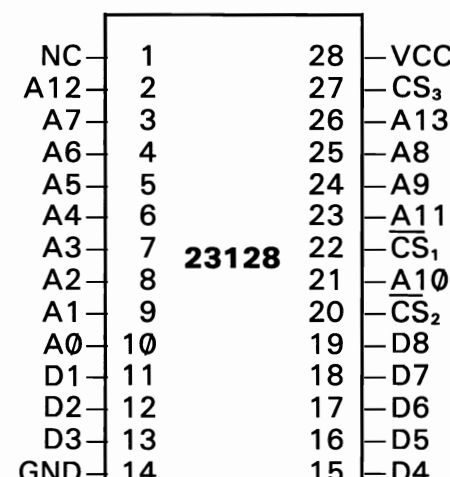
U5-U6 16 X 4 D-RAM

PIN CONFIGURATION



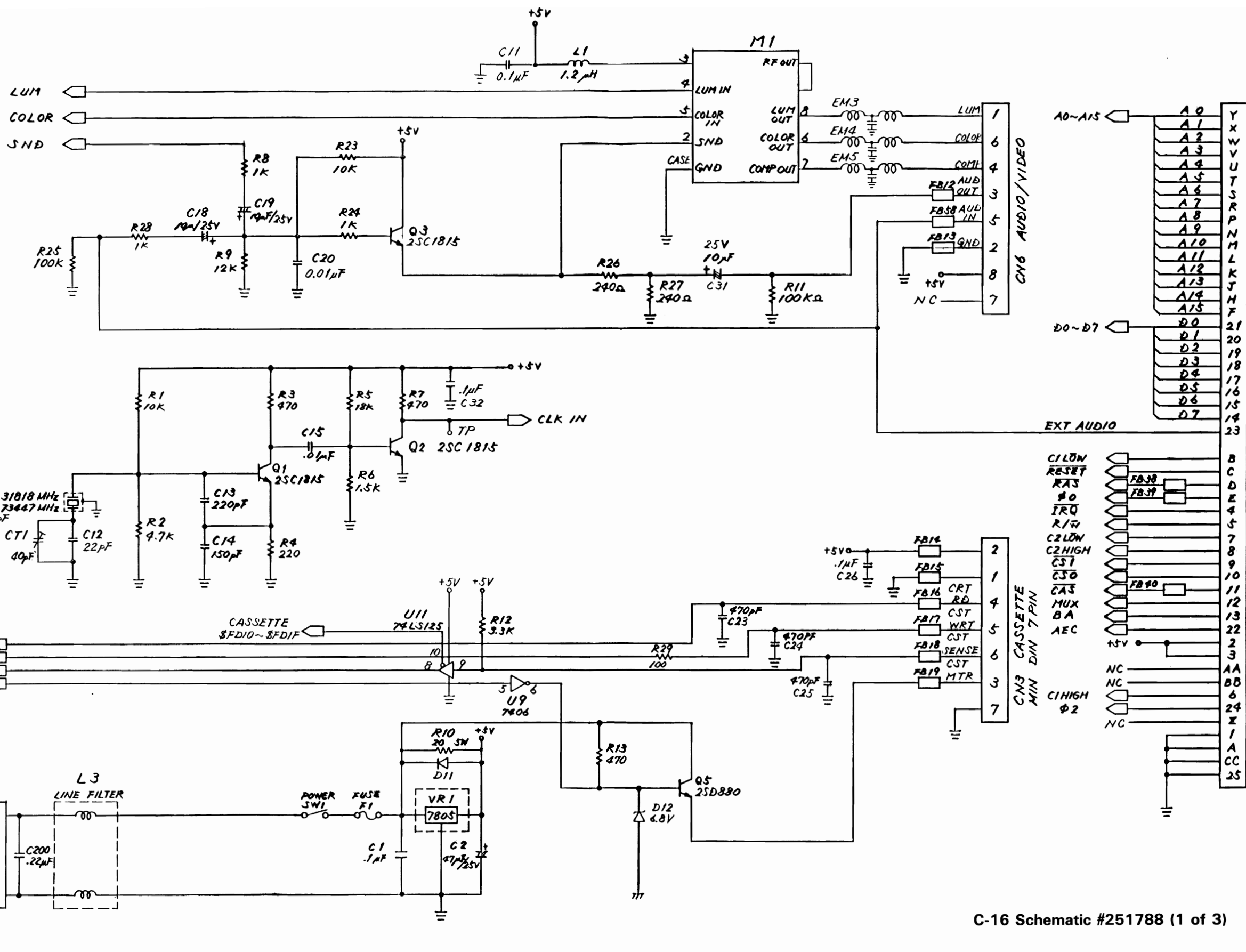
U3-318006-01
ROM TED - BASIC

PIN CONFIGURATION

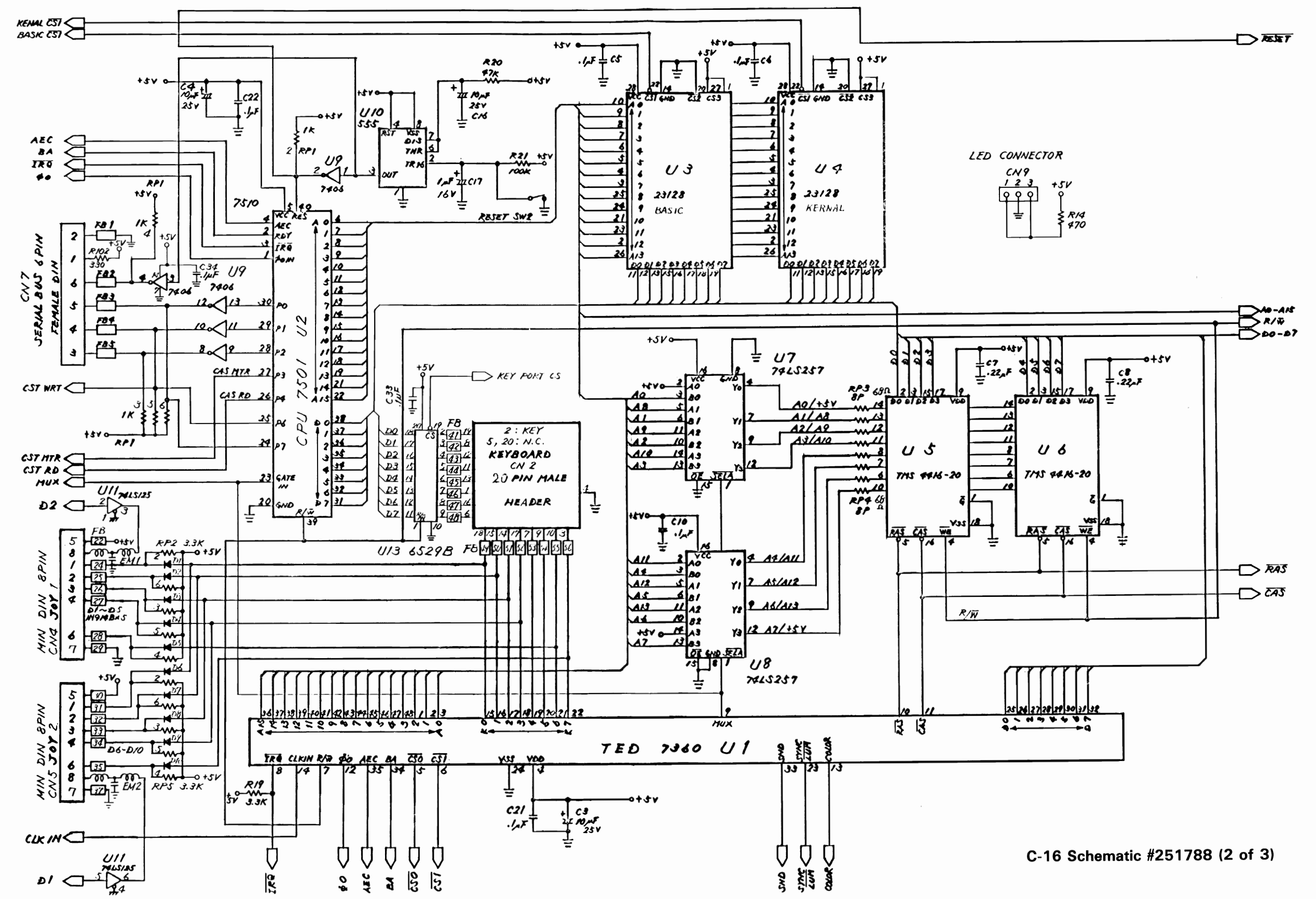
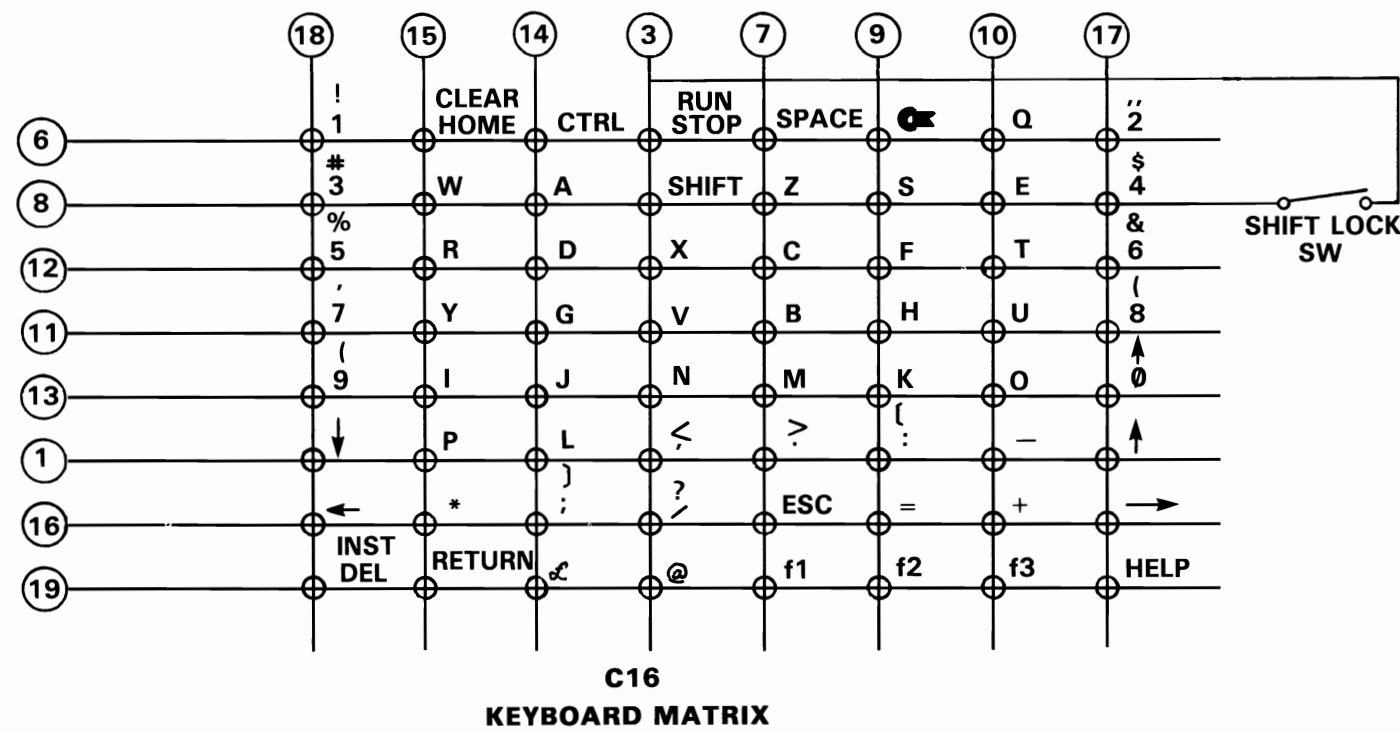


U4-318005-04
ROM TED - KERNAL

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



C-16 Schematic #251788 (1 of 3)

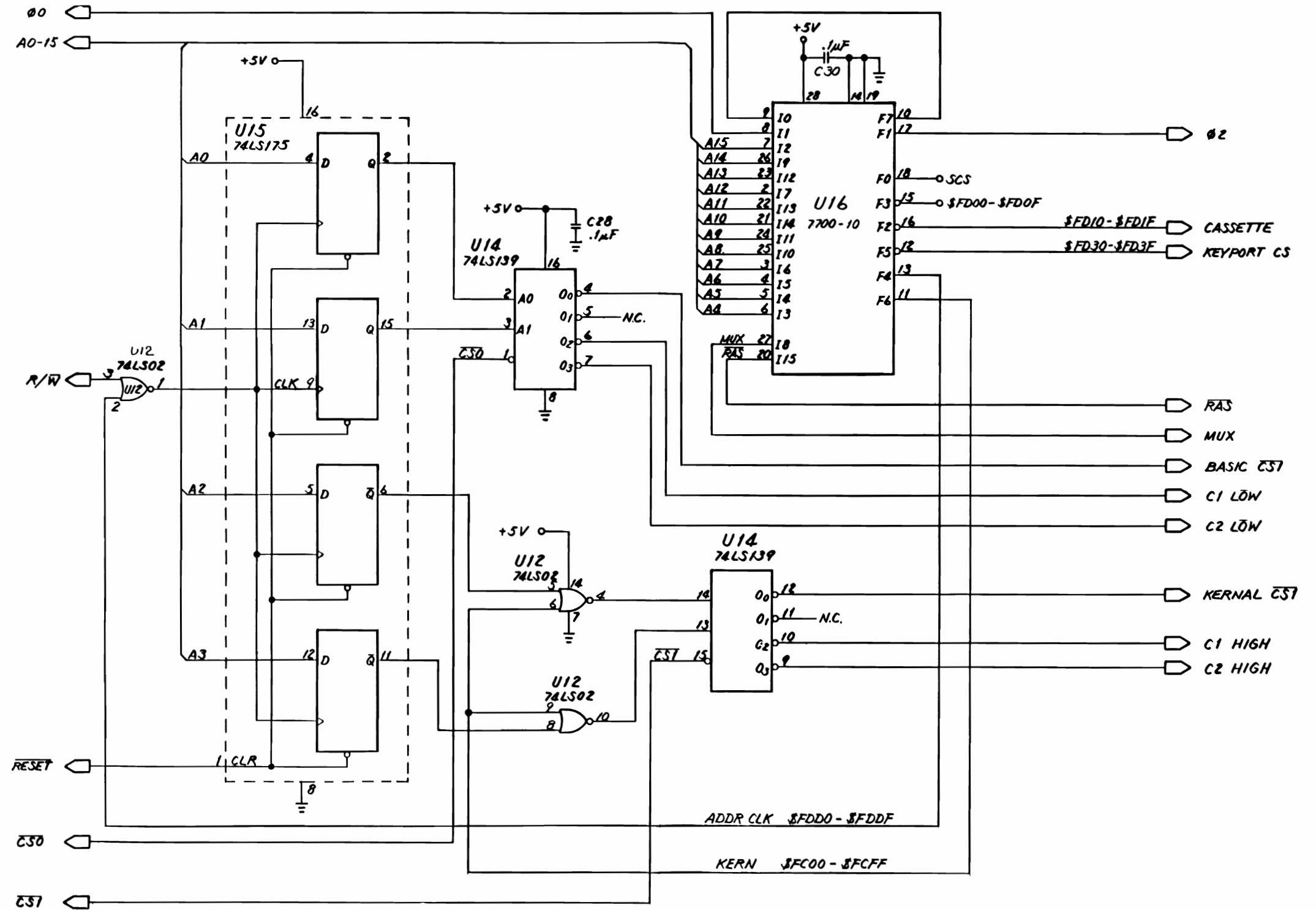
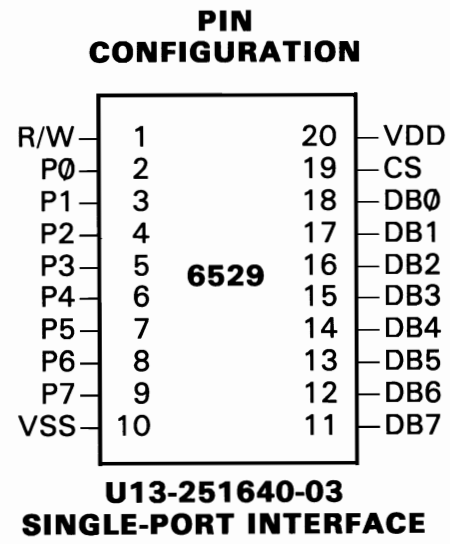
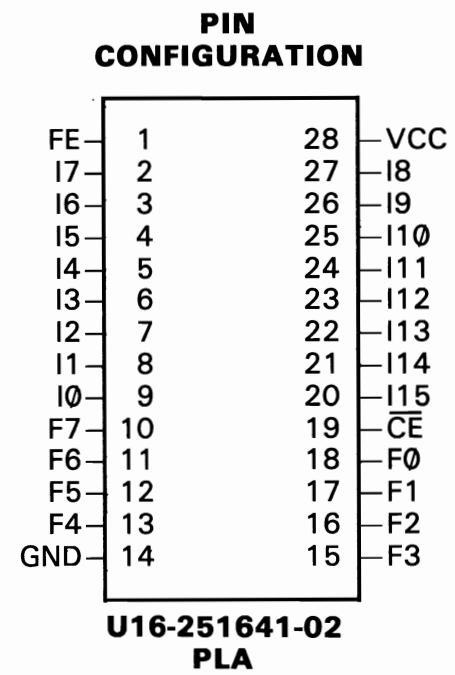


C-16 Schematic #251788 (2 of 3)

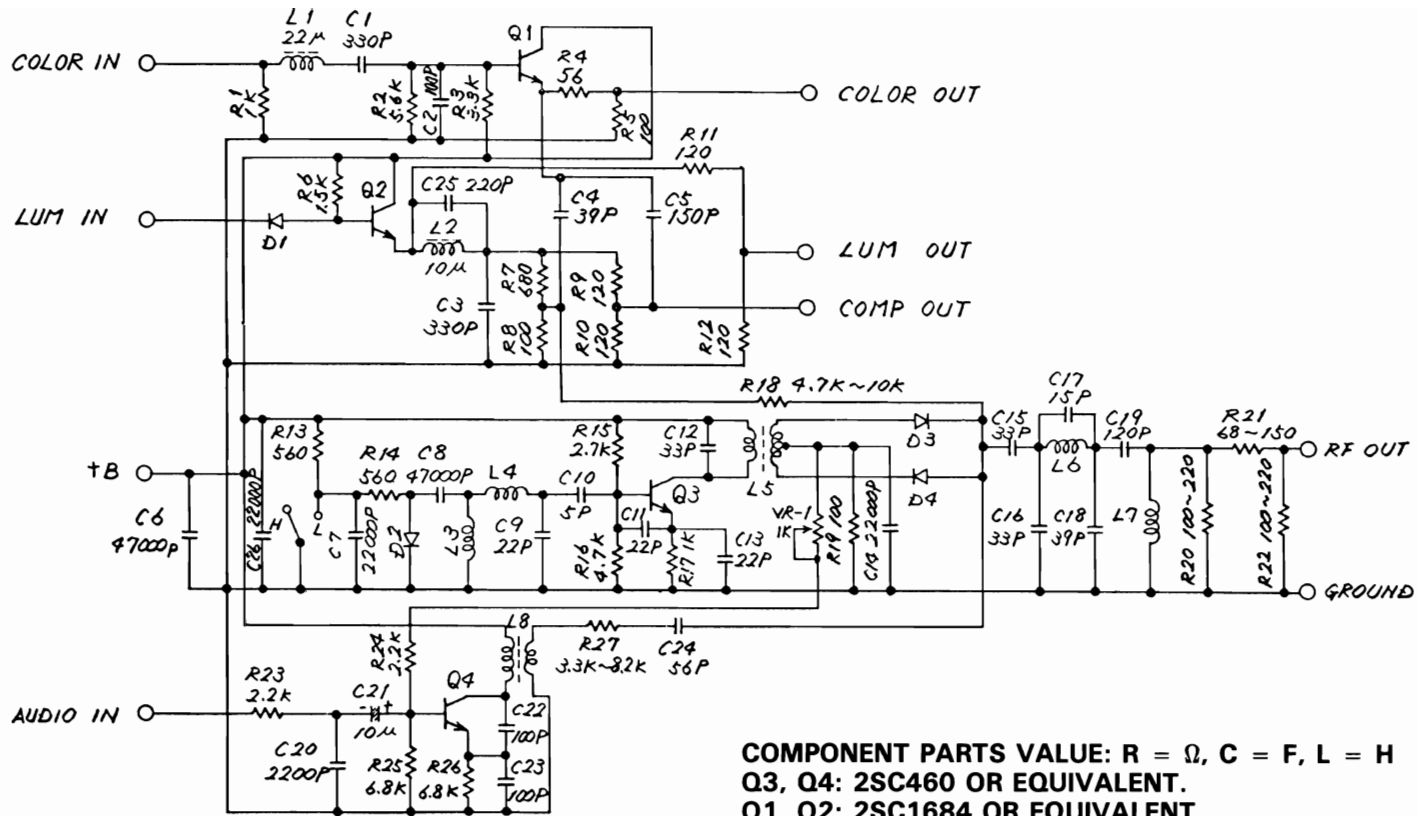
CS	R/W	D0-D7
L	L	DATA BUS TO PORT
L	H	PORT TO DATA BUS
H	X	ISOLATION

L = LOW LEVEL
H = HIGH LEVEL
X = IRRELEVANT

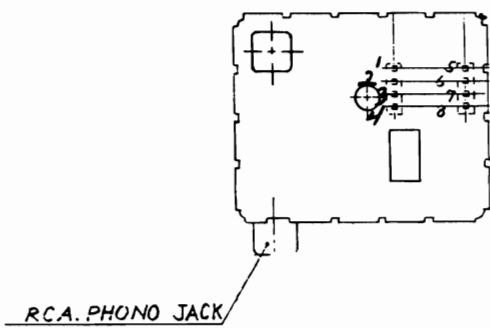
MOS	6529B	3 MHZ
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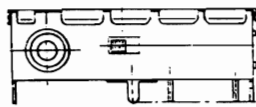
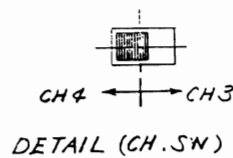
1. ALL RESISTANCE VALUES IN OHMS, 1/4W ± 5%.
NOTES: UNLESS OTHERWISE SPECIFIED —



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.



TOP VIEW



REAR VIEW

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: _____

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