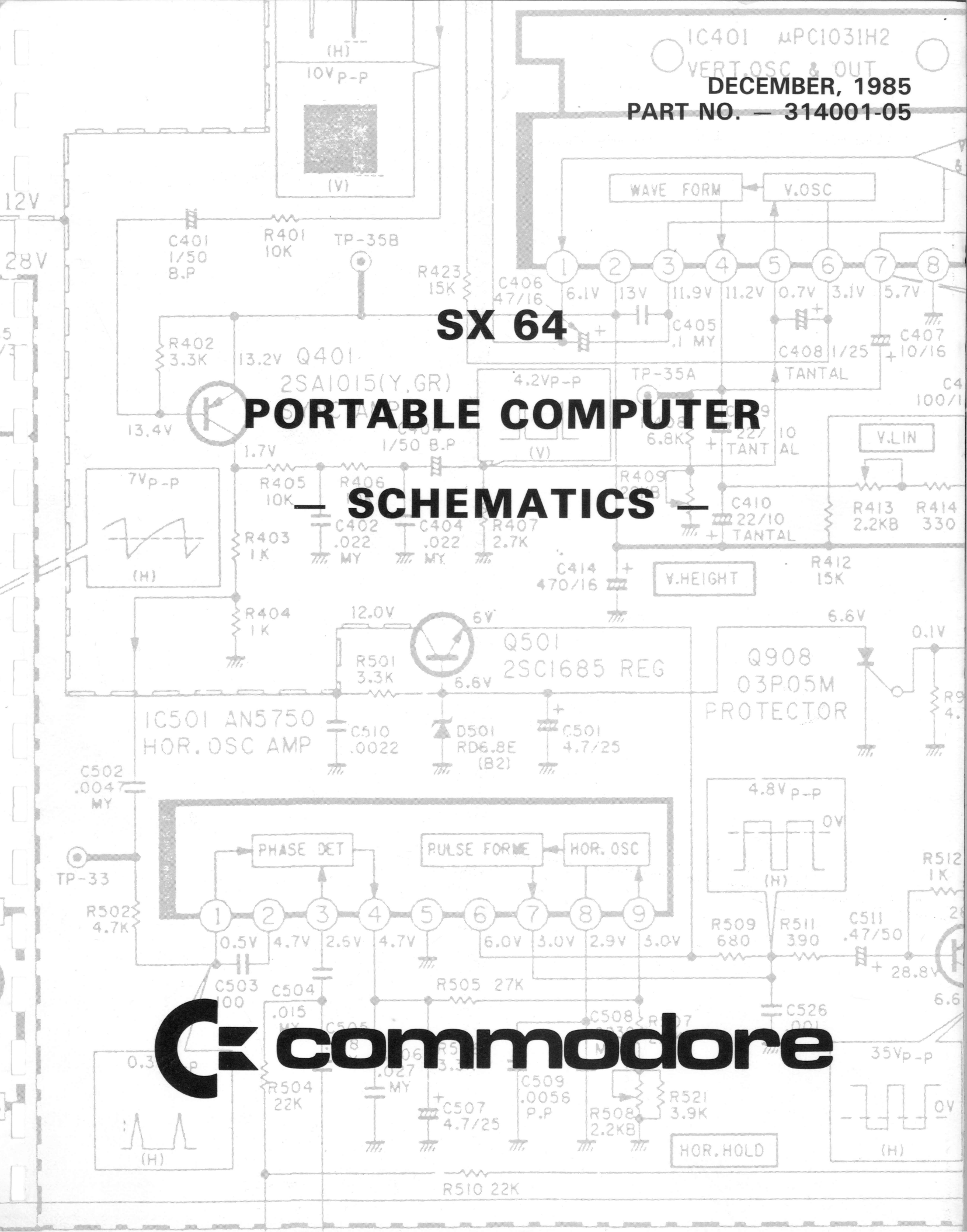


DECEMBER, 1985
PART NO. — 314001-05

SX 64

PORTABLE COMPUTER

— SCHEMATICS —

commodore

PART NO. — 314001-05

SX 64

PORTABLE COMPUTER

— SCHEMATICS —

Commodore Business Machines, Inc.
1200 Wilson Drive, West Chester, Pennsylvania 19380 U.S.A.

CONTENTS

INTRODUCTION

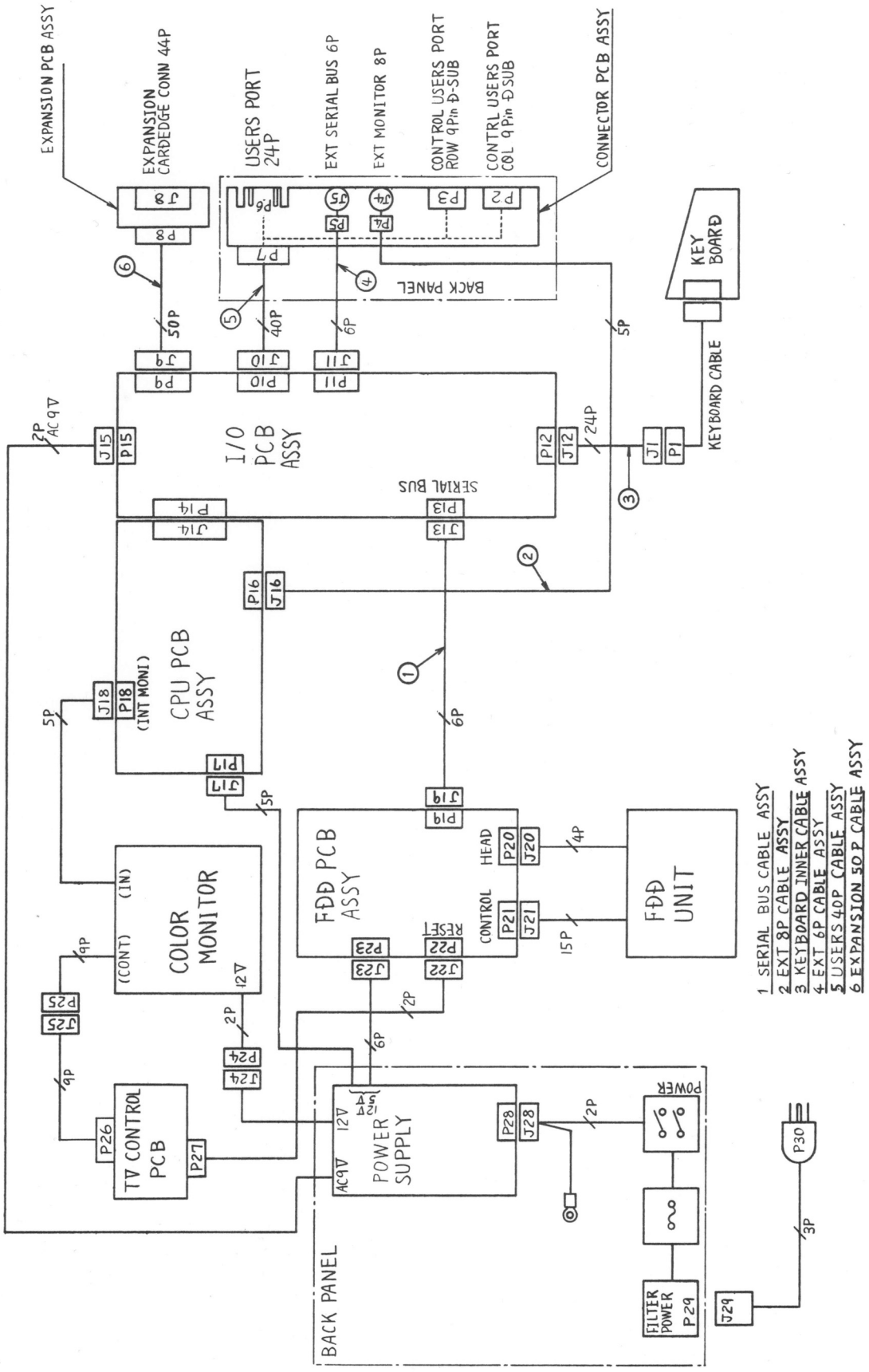
The SCHEMATICS and PARTS LISTS provided herein are intended for use by QUALIFIED SERVICE PERSONNEL. The troubleshooting, theory and diagnostics of the C64, 1702 and 1541 SERVICE MANUALS are **generally** applicable to the SX 64.

Parts availability from Commodore is limited. Some of the custom chips are used in many devices and are in stock. However, parts used in the monitor and power supply may be unique to the OEM manufacturer who supplied those assemblies. Only those parts indicated with a "C" are available from Commodore.

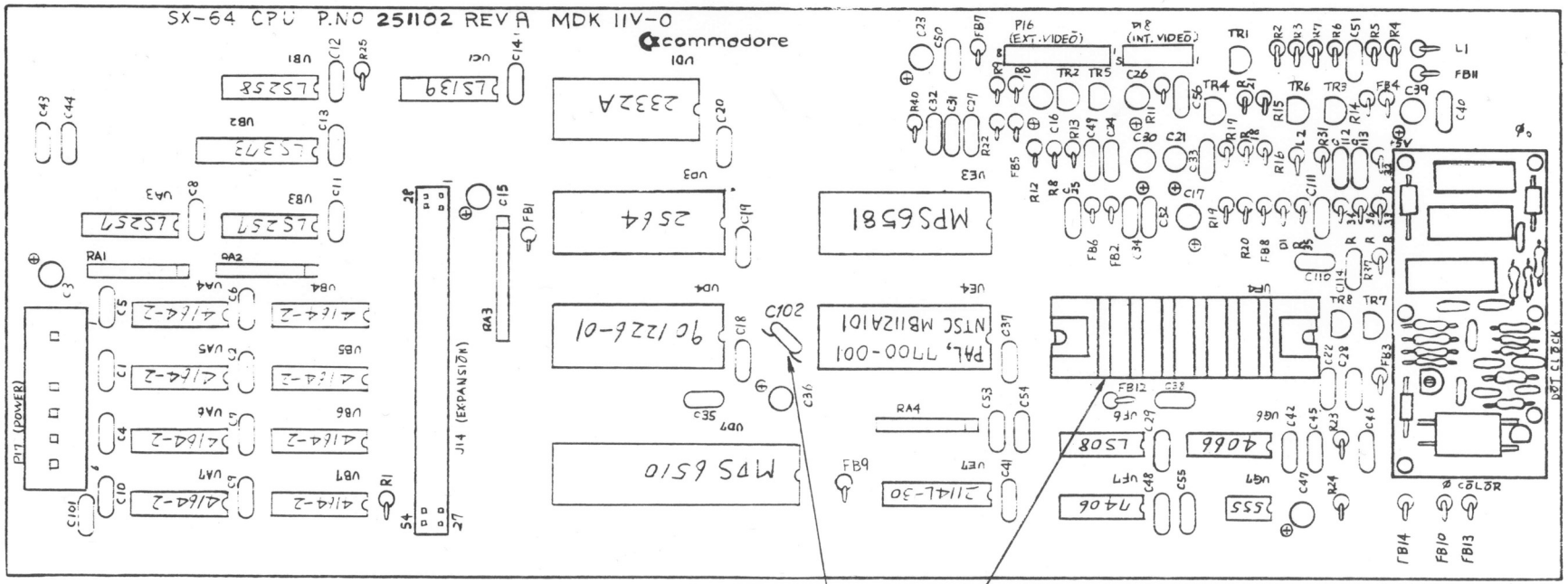
ASSEMBLY PARTS

C 250634-01	SX 64	KEYBOARD CABLE
C 251249-01	SX 64	USERS MANUAL
C 251250-01	SX 64	DEMO DISK
C 251555-01	SX 64	KEYBOARD
C 314095-01	SX 64	SINGLE KEY ASSY
C 325519-03	SX 64	ALPS DRIVE ASSY

BLOCK DIAGRAM



SX 64 CPU
PCB LAYOUT



PARTS LIST
SX 64 CPU
PCB ASSEMBLY #250408-01

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.

INTEGRATED CIRCUITS

UA3	74LS257	DO NOT USE TI OR NS
UA4-UA7	4164 DRAM 200NS	
UB1	74LS258	
UB2	74LS373	
UB3	74LS257	DO NOT USE TI OR NS
UB4-UB7	4164 DRAM 200NS	
UC1	74LS139	
UD1	2332 ROM CHAR	C 901225-01
UD3	2364 ROM Kernal	C 251104-04
UD4	2364 ROM Basic	C 901226-01
UD7	6510 Microprocessor	C 906107-01
UE3	6581 SID	C 906112-01
UE4	7700-001 PLA	C 906114-01
UE7	2114 RAM 300NS	
UF4	6567 VIC	C 906109-04
UF6	7408	
UF7	7406	
UG6	4066	
UG7	555 TIMER	

TRANSISTORS

TR1-8	2SC 458

DIODES

D1	Diode, Signal WG 713C

RESISTORS — All Values are in ohms-1/4 W 5% unless noted otherwise.

R1	82
R2	150
R3	100
R4	1.5K
R5	3.3K
R6	18K
R7	8.2K
R8	1K
R9	1K
R10, 11, 12	10K
R13	1K
R14	270
R15	100
R16	27K
R17	20K
R18	820
R19	2K
R20	510

RESISTORS (Continued)

R21	270
R22	1K
R23	1M
R24	47K
R25	330
R31, 32, 33	3.3K
R34	150
R35	1K
R36	120
R37	200

RESISTOR PACKS

RA1, 2	33 8Pin
RA3	3.3K 10Pin
RA4	3.3K 8Pin

CAPACITORS

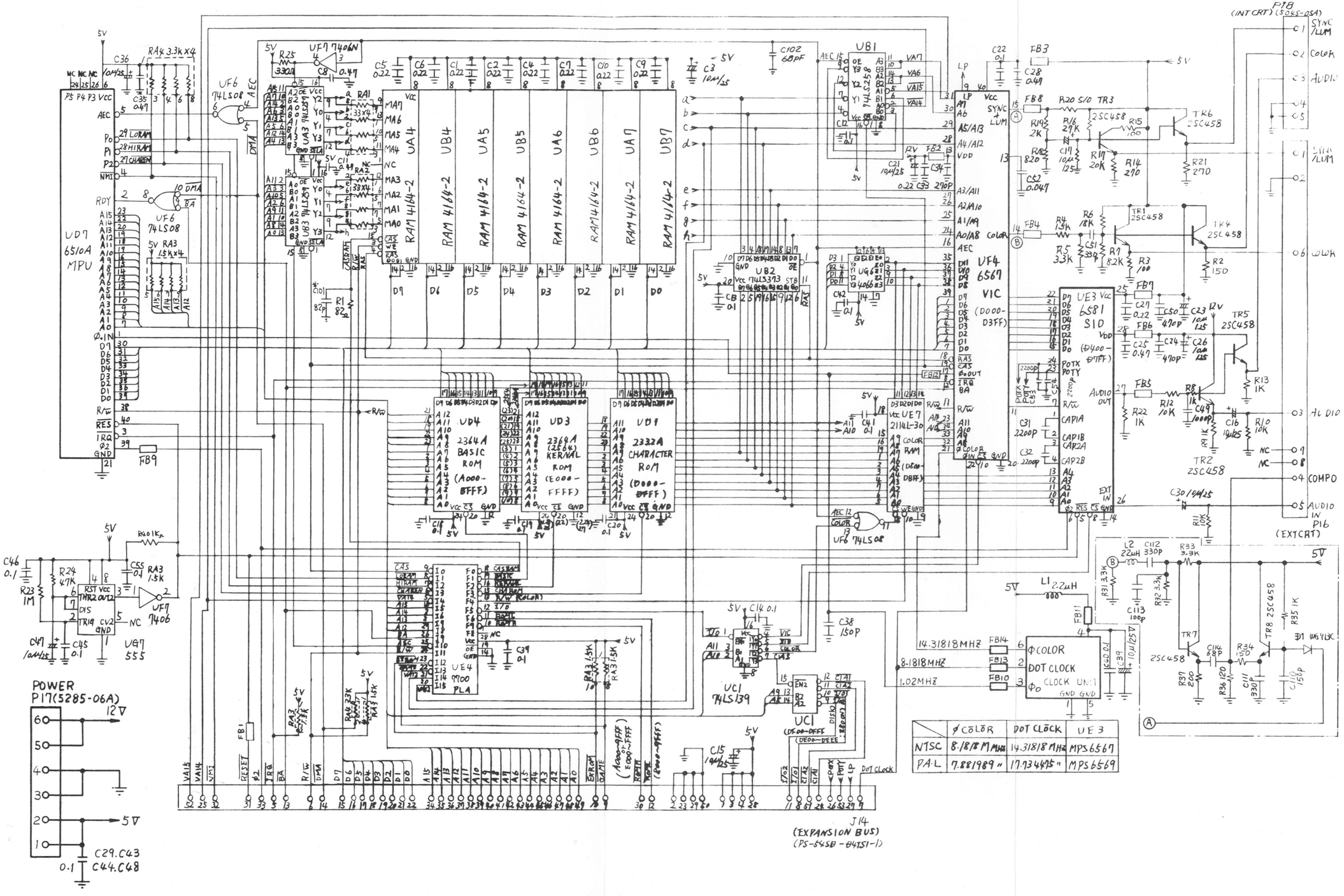
C1, 2	Ceramic	0.22μF, 25V
C3	Elect	10μF, 25V
C4-7	Ceramic	0.22μF, 25V
C8	Ceramic	0.47μF, 50V
C9,10	Ceramic	0.22μF, 25V
C11	Ceramic	0.47μF, 50V
C12-14	Ceramic	0.1μF, 25V
C15-17	Elect	10μF, 25V
C18-20	Ceramic	0.1μF, 25V
C21	Elect	10μF, 25V
C22	Ceramic	0.1μF, 25V
C23	Elect	10μF, 25V
C24	Ceramic	470pF, 50V
C25	Ceramic	0.47μF, 50V
C26	Elect	10μF, 25V
C27	Ceramic	0.22μF, 25V
C28	Ceramic	0.47μF, 50V
C29	Ceramic	0.1μF, 25V
C30	Elect	10μF, 25V
C31, 32	Ceramic	2200pF, 50V
C33	Ceramic	0.22μF, 50V
C34	Ceramic	270pF, 50V
C35	Ceramic	0.47μF, 50V
C36	Elect	10μF, 25V
C37	Ceramic	0.01μF, 25V
C38	Ceramic	150pF, 50V
C39	Elect	10μF, 25V
C40-46	Ceramic	0.1μF, 25V
C47	Elect	10μF, 25V
C48	Ceramic	0.1μF, 25V

C - Indicates Commodore Stocked Part Number

CAPACITORS (Continued)			
C49	Ceramic	1000pF,	25V
C50	Ceramic	470pF,	50V
C51	Ceramic	33pF,	50V
C52	Ceramic	0.047μF,	25V
C53, 54	Ceramic	1800pF,	50V
C55	Ceramic	0.1μF,	25V
C101	Ceramic	82pF	
C102	Ceramic	68pF	
C110	Ceramic	150pF,	50V
C111, 12	Ceramic	330pF	
C113	Ceramic	100pF	
C114	Ceramic	68pF	

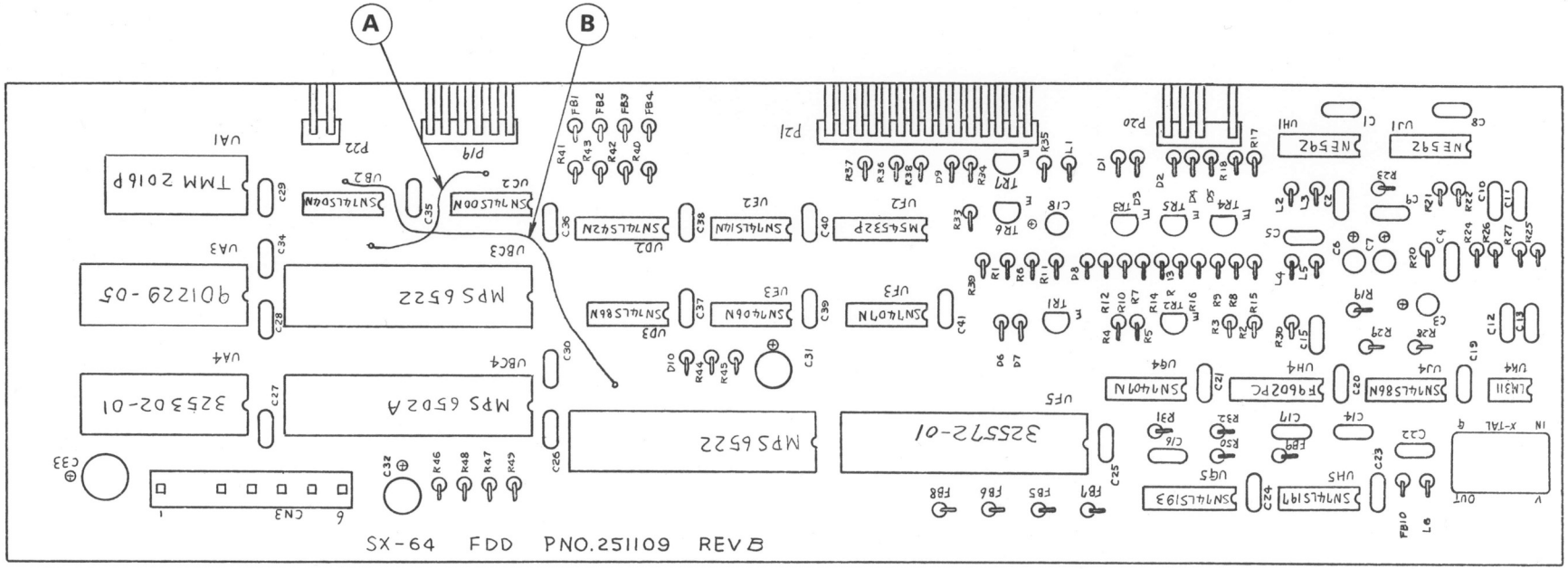
MISCELLANEOUS	
FB1-14	Ferrite bead
L1	Coil Inductor 2.2μH
L2	Coil Inductor 22μH
Y1	Clock Osc 14.31818 MHz 251105-01

SX 64 CPU
SCHEMATIC DIAGRAM

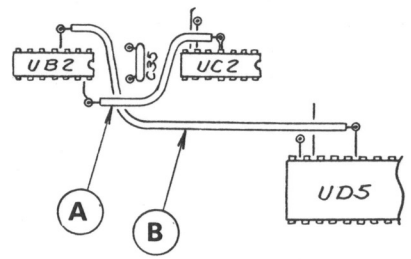


	ϕ COLOR	DOT CLOCK	UE3
NTSC	8.1818 MHz	14.31818 MHz	MPS6567
PAL	7.881989 "	17.734475 "	MPS6569

SX 64 FDD
PCB LAYOUT



DETAIL OF ITEM A & B SOLDERING



PARTS LIST
SX 64 DISK CONTROL PCB
PCB ASSEMBLY #250410-01

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.

INTEGRATED CIRCUITS

UA1	TMM2016P RAM	
UA3	ROM $E000-$FFFF	C 901229-05
UA4	ROM $C000-$DFFF	C 325302-01
UB2	74LS04	
UBC3	6522 VIA	C 901437-01
UBC4	6502A CPU	C 901435-02
UC2	74LS00	
UD2	74LS42	
UD3	74LS86	
UDC5	6522 VIA	C 901437-01
UE2	74LS14	
UE3	7406	
UF2	M54532P TRANS ARRAY ULN2064 TRANS ARRAY	MITSUBISHI SUB:
UF3	7404	
UF5	GATE ARRAY	C 325572-01
UG4	7407	
UG5	74LS193	
UH1	592 VIDEO AMP	
UH4	9602 ONE SHOT	
UH5	74LS197	
UJ1	592 VIDEO AMP	
UJ4	74LS86	
UK4	LM311 COMPARATOR	

TRANSISTORS

TR1	2SC 945	SUB:2SC 1815
TR2-5	2SA 733	SUB:2SA 1015
TR6	2SA 673	
TR7	2SC 945	SUB:2SC 1815

DIODES

D1-6	Signal, 1N4148
D7	Zener, 5.1V, 500mW, +/-5% HZ5C-2
D8	Signal, 1N4148
D9	Zener, 3.3V, 500mW, +/-5% HZ3C-2
D10	Signal, 1N4148

RESISTORS – All are carbon 1/4 watt, 5% unless noted

R1	680
R2	22K
R3	91 1/4W, 1%
R4	1.5K
R5	470
R6	680

RESISTORS (Continued)
– All are carbon 1/4 watt, 5% unless noted

R7, 8	470
R9	2.2K
R10	150 1/4W, 1%
R11	100 1/4W, 1%
R12	2.2K
R13	470
R14	2.2K
R15, 16	22K
R17, 18	9.1K 1/4W, 1%
R19, 20	220
R21, 22	150
R23	330
R24, 25	2.2K
R26, 27	470
R28	360
R29	510
R30	22K
R31	360
R32	5.1K
R33	220
R34	330
R35	1K
R36	330
R37, 38	150
R39	100K
R40-43	1K
R44	10K
R45	100
R46-49	1K
R50	47

CAPACITORS

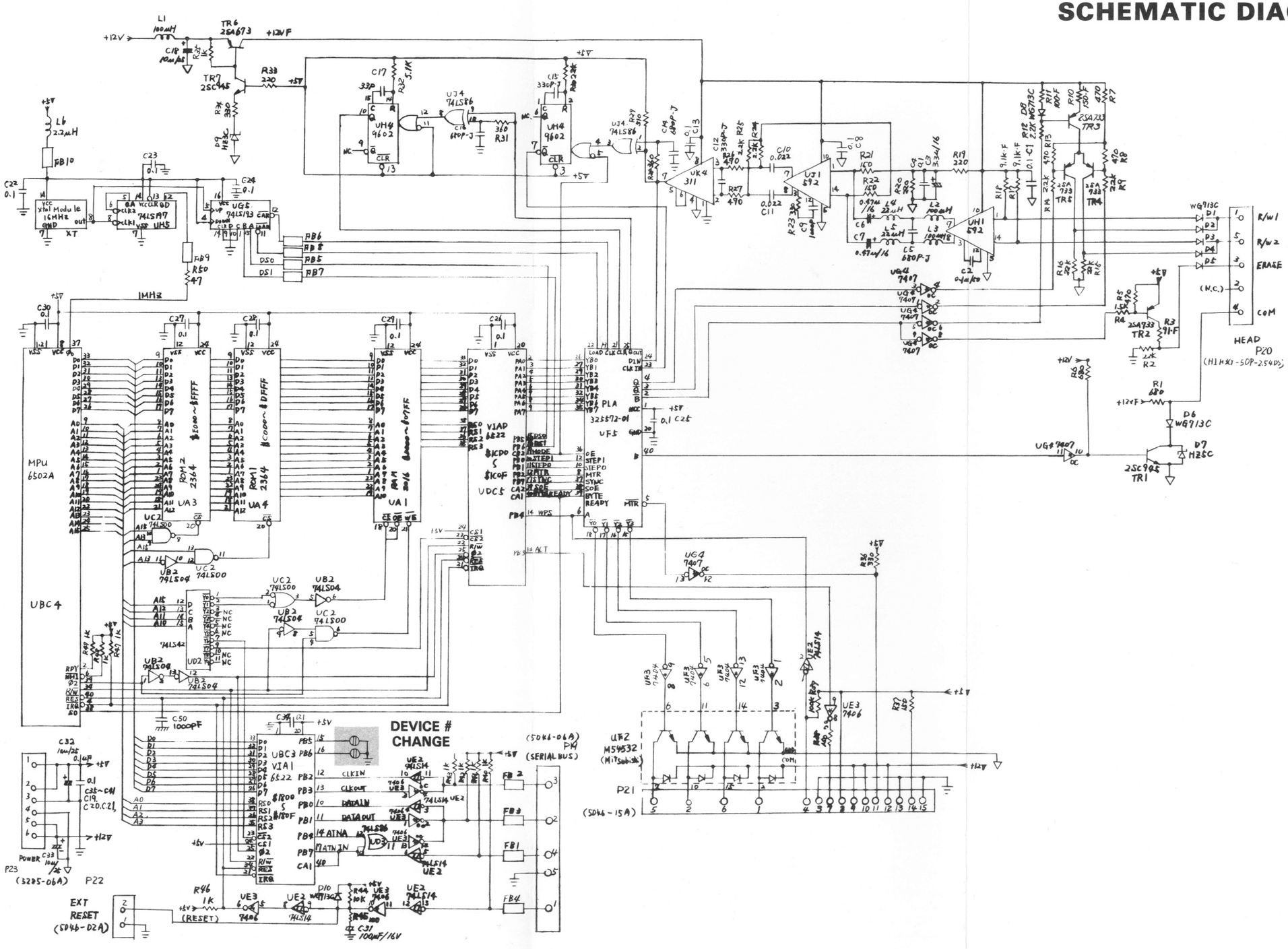
C1, 2	Ceramic	.1μF,	25V
C3	Electrolytic	3.3μF,	16V
C4	Ceramic	.1μF,	25V
C5	Ceramic	680pF,	50V
C6, 7	Tantalium	0.47μF,	16V
C8	Ceramic	.1μF,	25V
C9	Ceramic	1000pF,	25V
C10, 11	Ceramic	.022μF,	25V
C12	Ceramic	330pF,	50V
C13	Ceramic	.1μF,	25V
C14	Ceramic	680pF,	50V
C15	Ceramic	330pF,	50V
C16	Ceramic	680pF,	50V
C17	Ceramic	33pF,	50V
C18	Electrolytic	10μF,	25V
C19-21	Ceramic	.1μF,	25V

C - Indicates Commodore Stocked Part Number

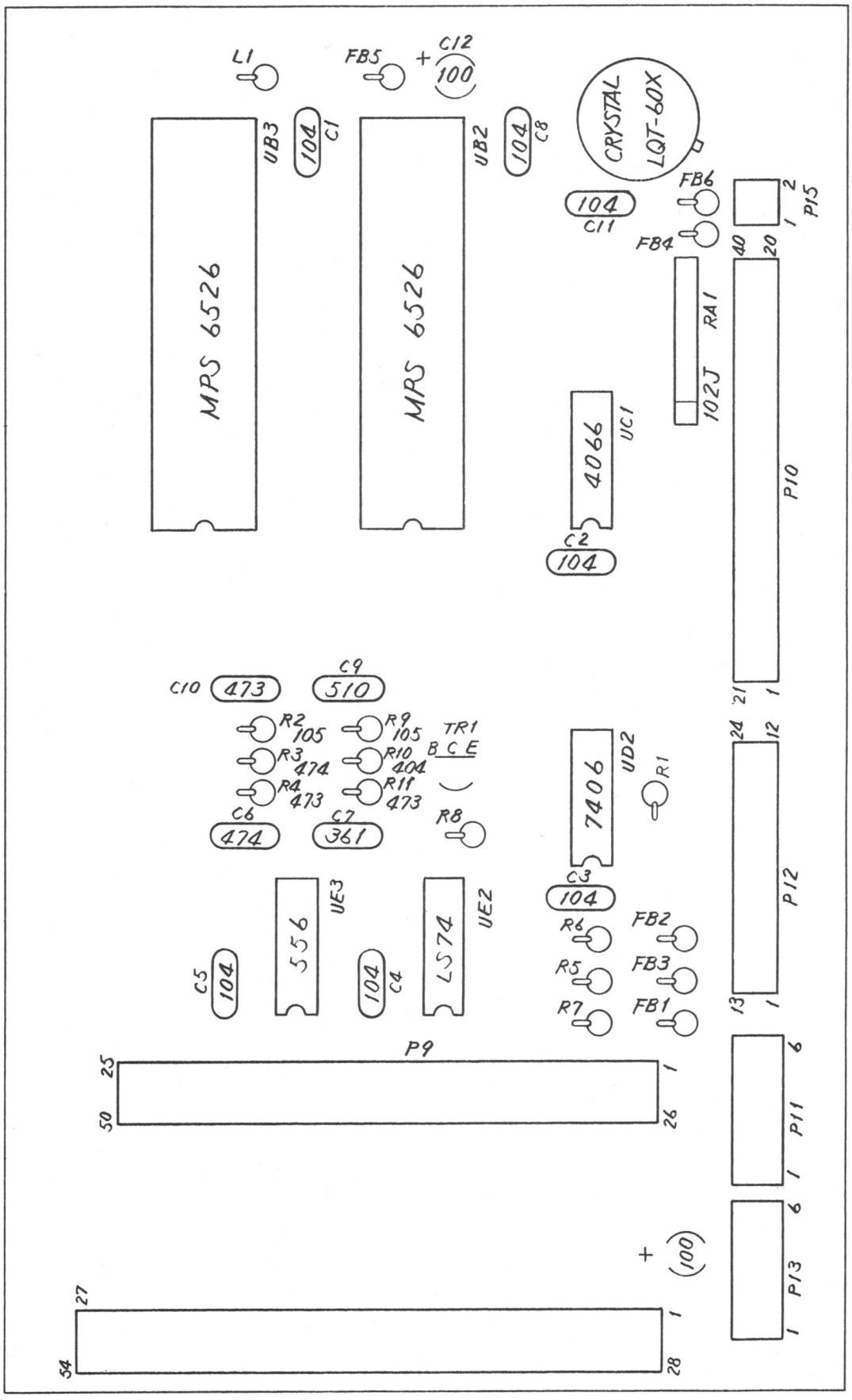
CAPACITORS (Continued)			
C22-30	Ceramic	.1μF,	25V
C31	Electrolytic	100μF,	16V
C32, 33	Electrolytic	10μF,	25V
C34-41	Ceramic	.1μF,	25V
C50	Ceramic	1000pF,	25V

MISCELLANEOUS – PCB ASSY #1540048	
FB1-10	Ferrite Bead
L1-3	Coil Inductor 100μH
L4, 5	Coil Inductor 22μH
L6	Coil Inductor 2.2μH
Y1	Crystal Module 16 MHz 50ppm (NDK, Tyocom) 325566-01 Sub: Crystal Module 16 MHz 100ppm (NDK, Tyocom, Kyocera) 325566-02

SX 64 FDD
SCHEMATIC DIAGRAM



SX 64 I/O
PCB LAYOUT



PARTS LIST
SX 64 I/O
PCB ASSEMBLY #250409-01

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.

INTEGRATED CIRCUITS		
UC1	4066	
UB2, 3	6526 CIA	C 906108-02
UD2	7406	
UE2	74LS74A	
UE3	556	

TRANSISTORS	
TR1	2SC 945

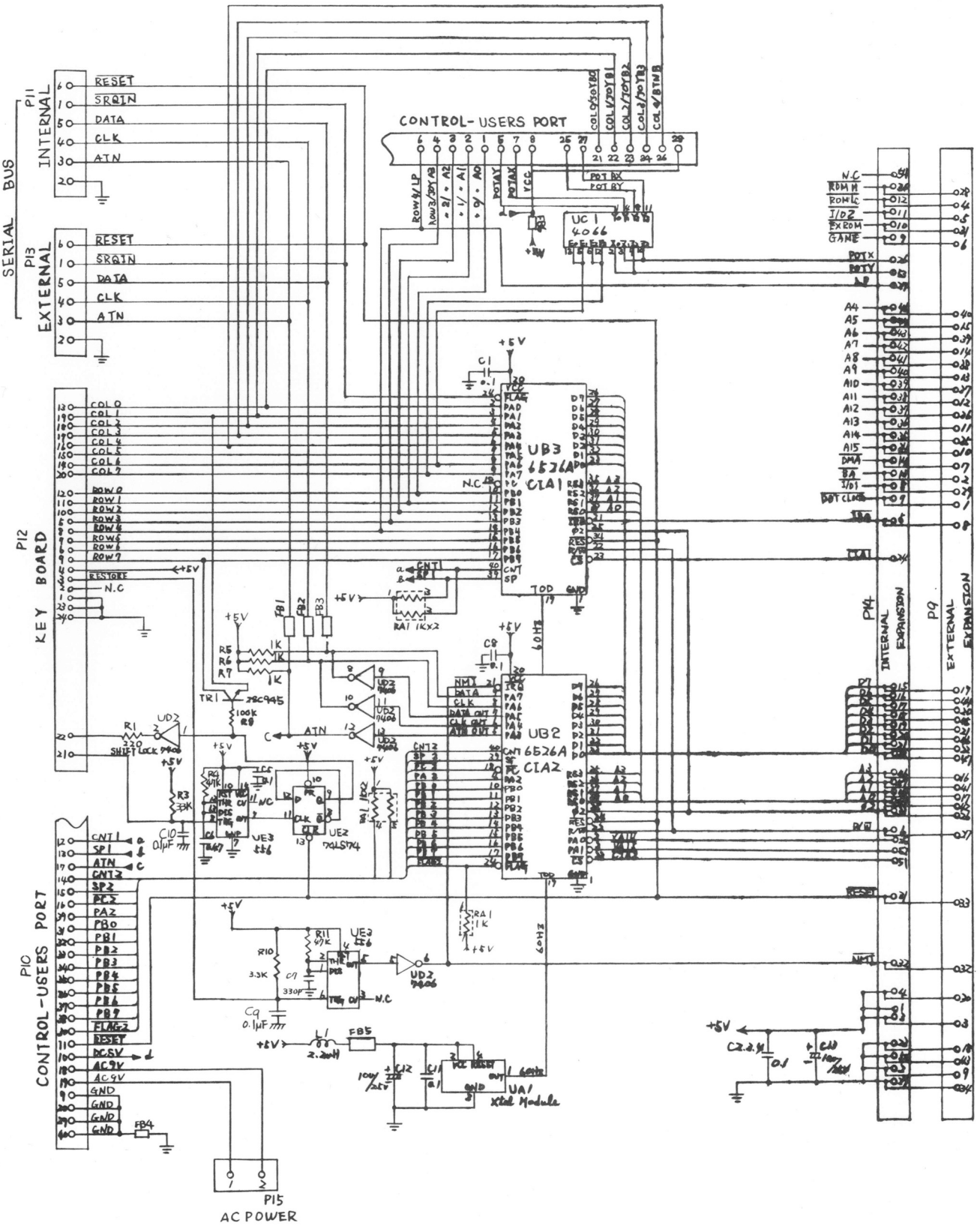
RESISTORS – All Values are in ohms-1/4 W 5% unless noted otherwise.	
R1	220
R3	3.3K
R4	47K
R5, 6, 7	1K
R8	100K
R10	3.3K
R11	47K

RESISTOR PACK	
RA1	1K 8Pin

CAPACITORS		
C1-5	Ceramic	0.1μF, 25V
C6	Ceramic	0.47μF, 50V
C7	Ceramic	330pF, 50V
C8-11	Ceramic	0.1μF, 25V
C12, 13	Elect	10μF, 25V

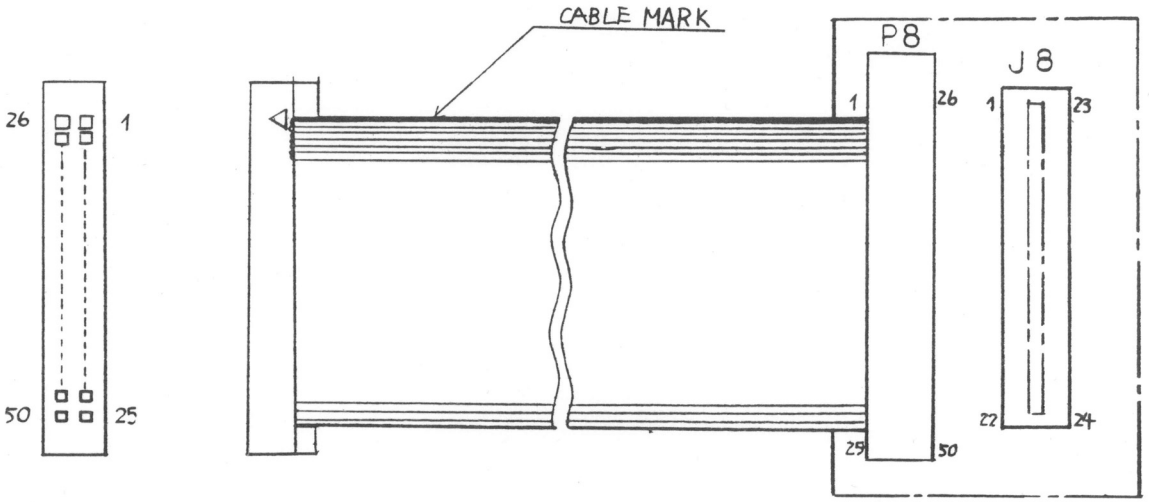
MISCELLANEOUS	
FB1-6	Ferrite Bead
L1	Coil Inductor 2.2μH
UA1	Crystal Module 60Hz

SX 64 I/O
SCHEMATIC DIAGRAM

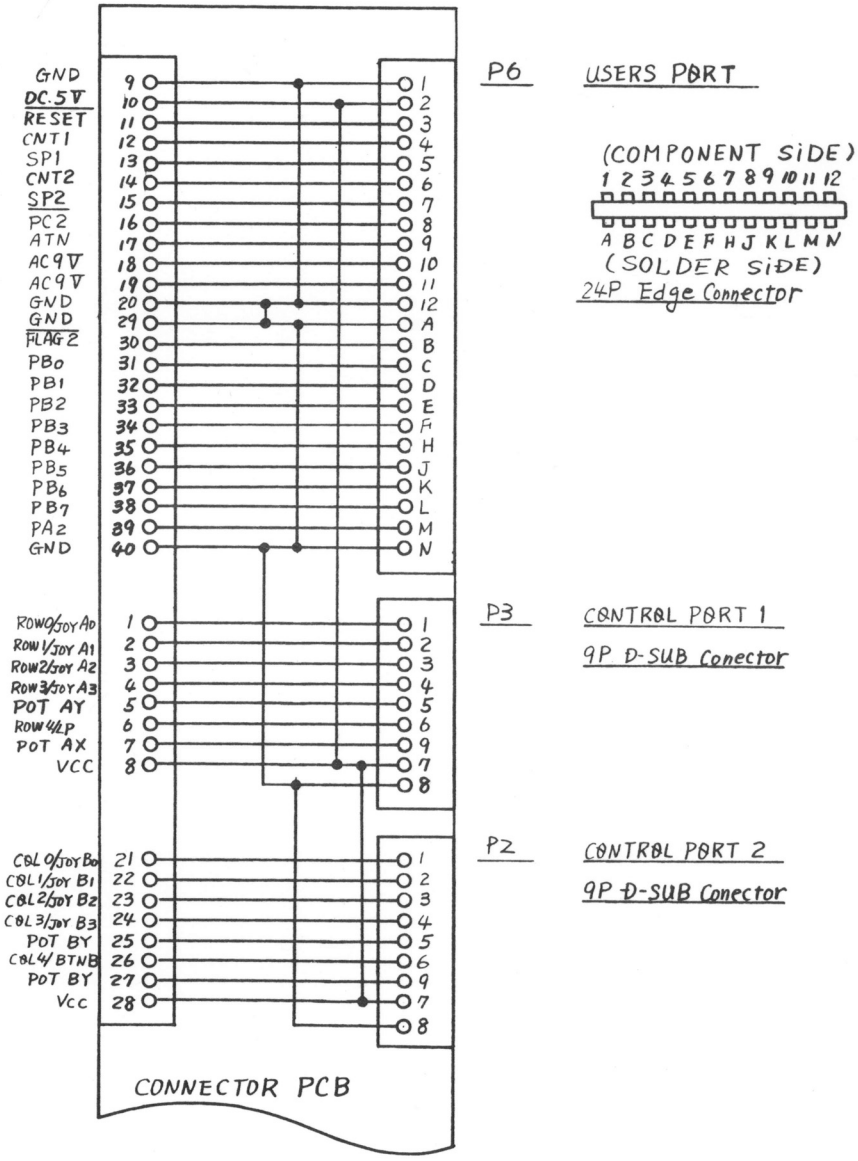


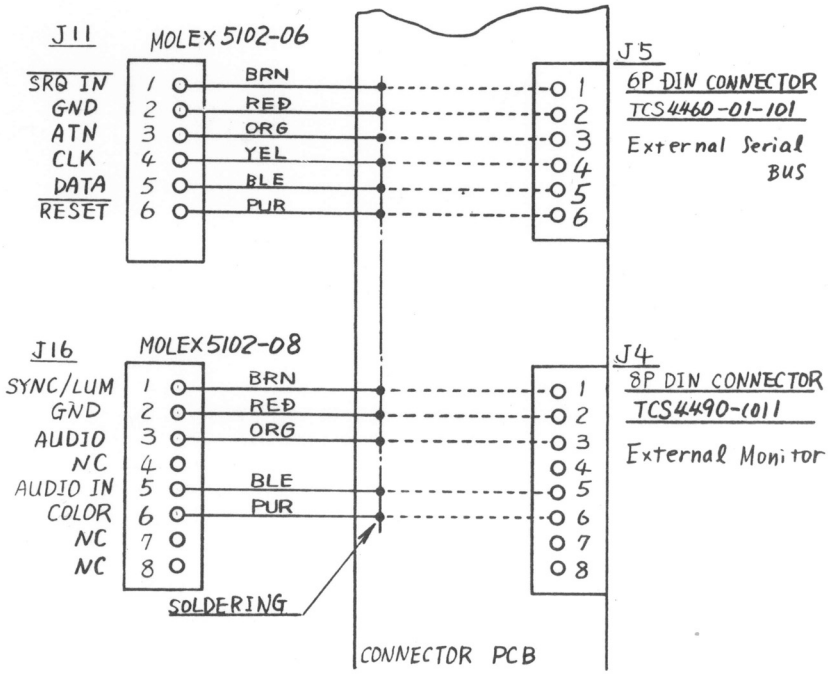
SX 64 EXPANSION
PCB LAYOUT

EXPANSSION	P8	J8	EXPANSSION	P8	J8
GND	9	1	GND	34	23
+5V	3	2	$\overline{\text{ROMH}}$	28	24
+5V	30	3	$\overline{\text{RESET}}$	33	25
$\overline{\text{IRQ}}$	8	4	$\overline{\text{NMI}}$	32	26
R/$\overline{\text{W}}$	27	5	Sø2	26	27
DOT CLOCK	1	6	A15	10	28
$\overline{\text{I/O1}}$	29	7	A14	35	29
$\overline{\text{GAME}}$	6	8	A13	11	30
$\overline{\text{EXROM}}$	31	9	A12	36	31
$\overline{\text{I/O2}}$	5	10	A11	12	32
$\overline{\text{ROML}}$	4	11	A10	37	33
$\overline{\text{BA}}$	2	12	A9	13	34
$\overline{\text{DMA}}$	7	13	A8	38	35
D7	19	14	A7	14	36
D6	44	15	A6	39	37
D5	20	16	A5	15	38
D4	45	17	A4	40	39
D3	21	18	A3	16	40
D2	46	19	A2	41	41
D1	22	20	A1	17	42
D0	47	21	A0	42	43
GND	18	22	GND	43	44
OPEN	23	—	OPEN	48	—
"	24	—	"	49	—
"	25	—	"	50	—



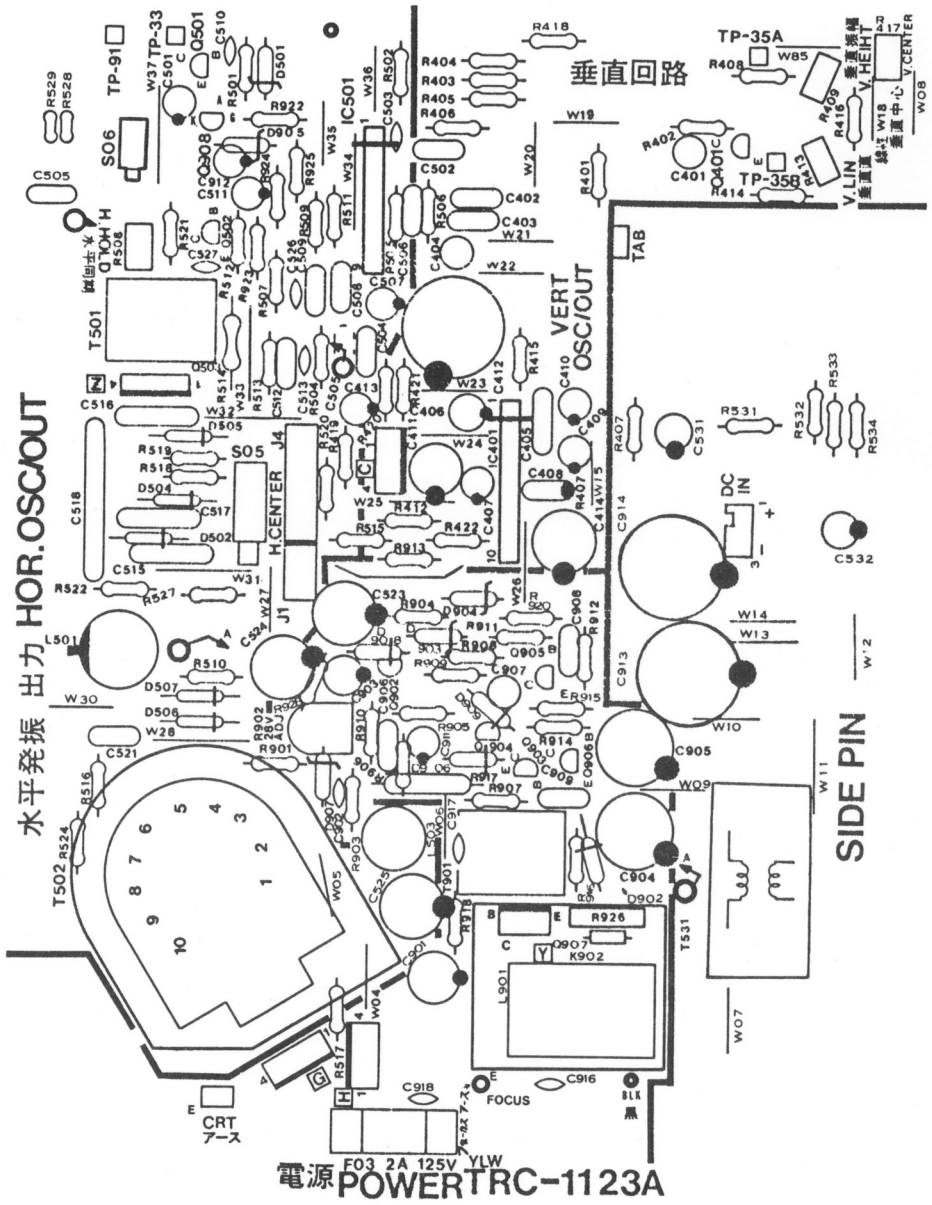
SX 64 EXPANSION
SCHEMATIC DIAGRAM

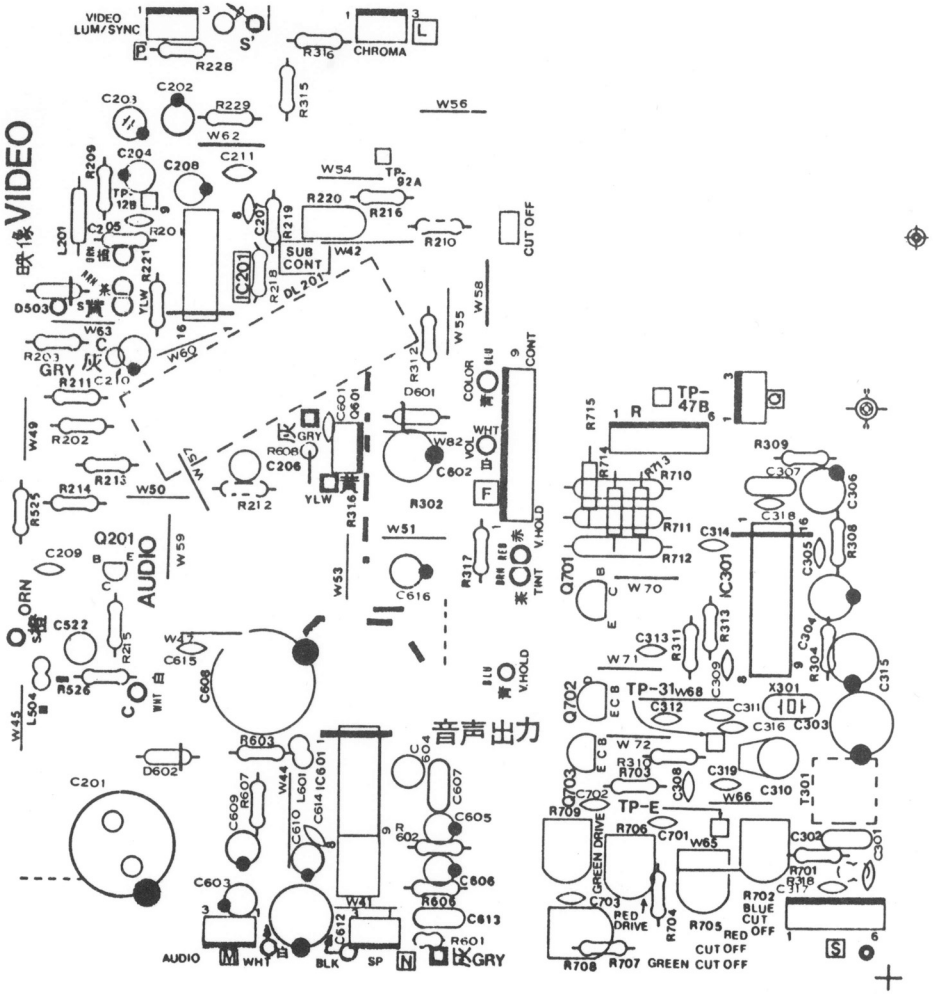




Wier Material
AWG26
AWM1007 VW-1

SX 64 MONITOR
PCB LAYOUT





SX 64 MONITOR ASSEMBLY PARTS LIST

PLEASE NOTE:

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CHASSIS PARTS

V01	*CRT,	150BMB22-AF
	*CRT Socket,	C39158-D
DY1	*Def. Yoke,	C29131-VA (See note below)
T502	*F.B. Transf.	CJ39587-00A
Q907	Transistor,	2SD1118
Q503	Transistor,	2SC2335
R523	*Focus Pack,	CJ49510-257
C001	*Ceramic Cap,	1000pF, 3KV, +100%, −0%

NOTE:
IF DEFLECTION YOKE CJ26235-00A IS USED, THE FOLLOWING PARTS VALUES CHANGE:

DEF and POWER REG PCB 1124 A-1		
CAPACITORS		
C515, 517	*Polypropylene,	5600pF,630V, ±5%
C519, 520	*Elect,	4.7μF,160V, +30%, −10%

VIDEO and AUDIO PCB 1124 A-2		
CAPACITORS		
C201	Elect,	1000μF,25V, ±20%
C206	Bi-Polar Elect,	4.7μF,50V, ±20%
C522	Mylar,	.1μF,50V, ±20%

*SAFETY COMPONENTS — Use EXACT replacement ONLY.

DEF and POWER REG PCB 1123 A-1

INTEGRATED CIRCUITS

IC401	Vert., μPC1031H2
IC501	Hor., AN5750

TRANSISTORS

Q401	2SA1015 (Y, GR)
Q501	2SC1685
Q502	2SA817A (O,Y)
Q902	2SA1015 (Y, GR)
Q903,4,5	2SC1685
Q906	2SA817A (O,Y)
Q907	2SD1118

DIODES

D501	Zener RD6.8E (B2)
D502	V19E
D504,5, 6,7	V09E
D902	U19B
D903	*Zener RD6.8E (B2)
D904	Zener Hz12 (B)
D905	*Zener RD6.8E (B2)
D906	1S2473H
D907	*Zener RD13E (B1)
D908, 9	1S2473H

RESISTORS

R901	*Carbon, 8.2K, 1/4W, ±5%
R910	*Carbon, 9.1K, 1/4W, ±5%
R917	Oxide Mtl Film, 1.5K, 1W, ±5%
R923	*Carbon, 27K, 1/4W, ±5%
R924	*Carbon, 10K, 1/4W, ±5%
R925	*Carbon, 68K, 1/4W, ±5%
R926	Mtl Film, 0.22, 2W, ±10%

VARIABLE RESISTORS

R409	V. Hght, 22K
R413	V. Lin, 2.2K
R417	V. Center, 1K
R508	Hor. Hold, 2.2K
R909	*B1 Adj., 2K

CAPACITORS

C401, 404	Bi-Polar Elect,	1μF,	50V, ±20%
C408	Tantalium,	1μF,	25V, ±10%
C409, 410	Tantalium,	22μF,	10V, ±10%
C412	Elect,	1000μF,	25V, ±20%
C413	Elect,	0.22μF,	50V, ±20%
C509	Polypropylene,	5600pF,	50V, ±5%
C515,16, 17	*Polypropylene,	4700pF,	630V, ±5%
C518	Mtl Mylar,	1.5μF,	100V, ±5%
C520	*Polypropylene,	0.047μF,	200V, ±10%
C523, 24	*Elect,	470μF,	16V, +30%, −10%
C525	Elect,	4.7μF,	160V, +30%, −10%
C901	*Elect,	100μF,	35V, +30%, −10%
C904, 905	*Elect,	470μF,	35V, +30%, −10%
C907	Bi-Polar Elect,	10μF,	25V, ±20%
C913, 914	*Elect,	2200μF,	16V, +30%, −10%

TRANSFORMERS

T901	Pwr Drive,	A76567-MA
T501	Hor Drive,	A76568-MA
T502	*F.B.,	CJ39587-00A
T531	*Side Pin,	C39084-A

MISCELLANEOUS

F03	*Fuse, 2A, 125V

VIDEO and AUDIO PCB ASSY 1123 A-2

INTEGRATED CIRCUITS

IC201	Audio, HA11401
IC601	Video, AN5250

TRANSISTORS

Q201	2SA562TM (Y)
Q601	2SD1133

DIODES

D601	Zener, RD10E (B3)
D503	1S2076A

*SAFETY COMPONENTS — Use EXACT replacement ONLY.

VIDEO and AUDIO PCB ASSY 1123 A-2 (Continued)

VARIABLE RESISTOR

R220	Sub Cont, 2K

CAPACITORS

C201	Elect,	2200μF,	16V, +30%, −10%
C202	Bi-Polar Elect,	10μF,	16V, ±20%
C203	Elect,	3.3μF,	25V, +30%, −10%
C204	Tantalium,	0.47μF,	35V, ±20%
C206	Bi-Polar Elect,	3.3μF,	50V, ±20%
C208	Tantalium,	33μF,	16V, ±10%
C210	Tantalium,	1μF,	25V, ±20%
C604	Bi-Polar Elect,	1μF,	50V, ±20%
C608	Elect,	1000μF,	25V, ±20%
C522	Bi-Polar Elect,	0.47μF,	50V, ±20%

MISCELLANEOUS

FR526	*Fusible Resistor,	10, 1/4W, ±5%
L504	Peaking Coil	100μH
L601	Peaking Coil	4.7μH

CHROMA PCB ASSY 1123 A-3

INTEGRATED CIRCUITS

IC301	HA11247

TRANSISTORS

Q701,2,3	2SC2610

RESISTORS

R710,11, 12	Oxide Mtl Film, 12K, 1W, ±5%

VARIABLE RESISTORS

R702	B. Cut-Off, 10K
R705	R. Cut-Off, 10K
R706	R. Drive, 500
R708	G. Cut-Off, 10K
R709	G. Drive, 500

CAPACITORS

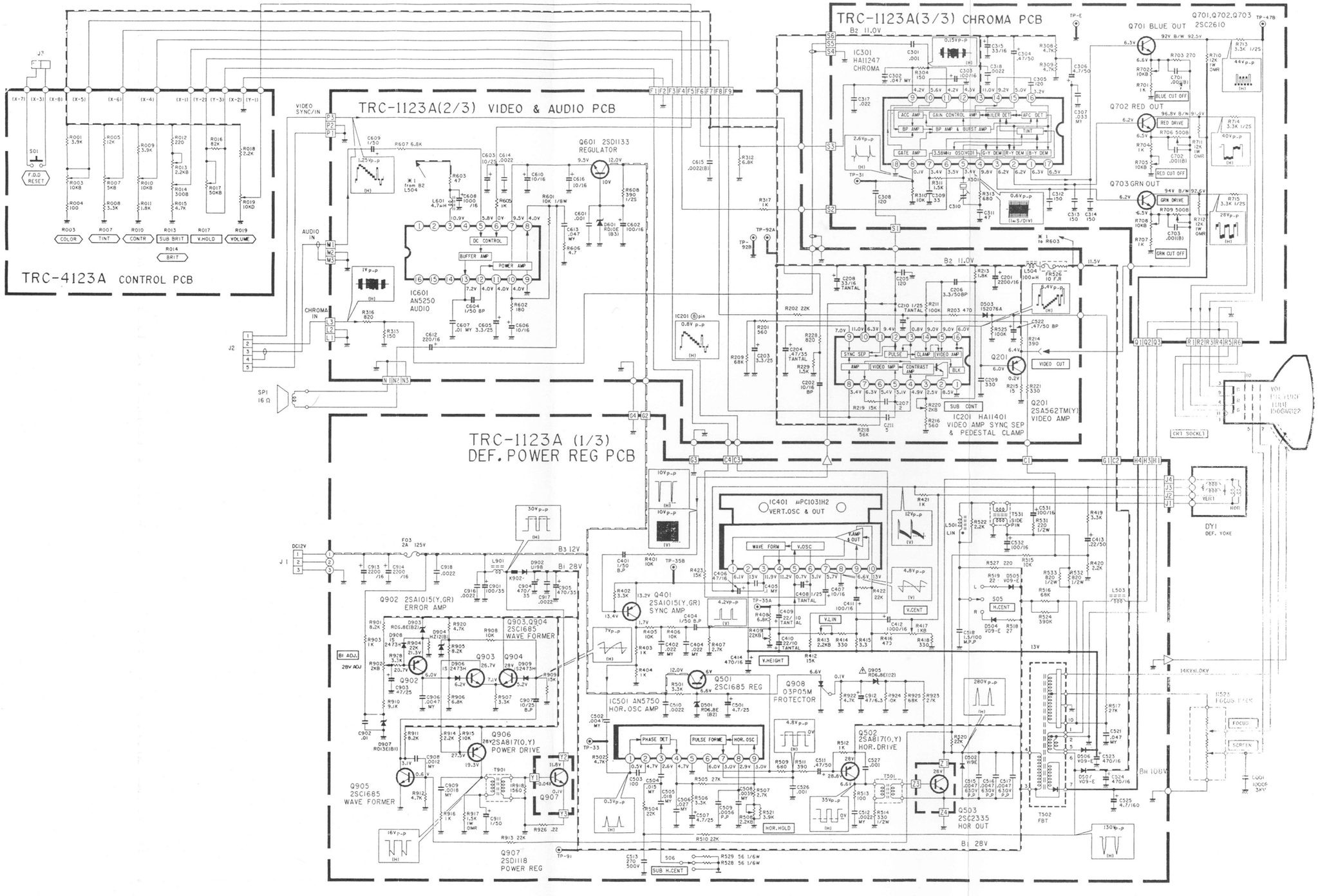
C303	Elect,	100μF,	16V, ±20%
C304	Elect,	0.47μF,	50V, ±20%
C306	Elect,	4.7μF,	50V, ±20%
C310	Trimmer		
C315	Elect,	33μF,	16V, ±20%

MISCELLANEOUS

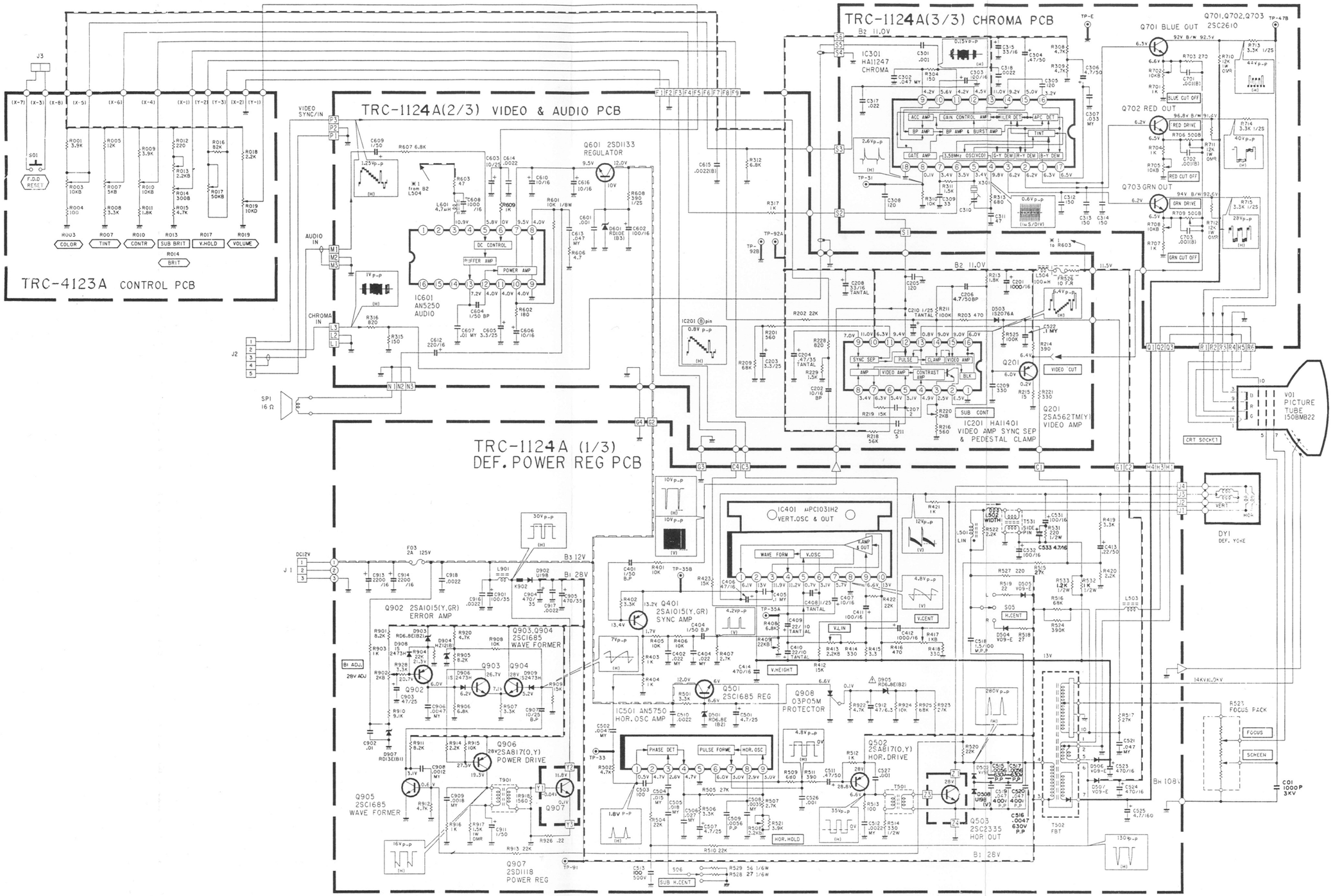
X301	Crystal A75746

*SAFETY COMPONENTS — Use EXACT replacement ONLY.

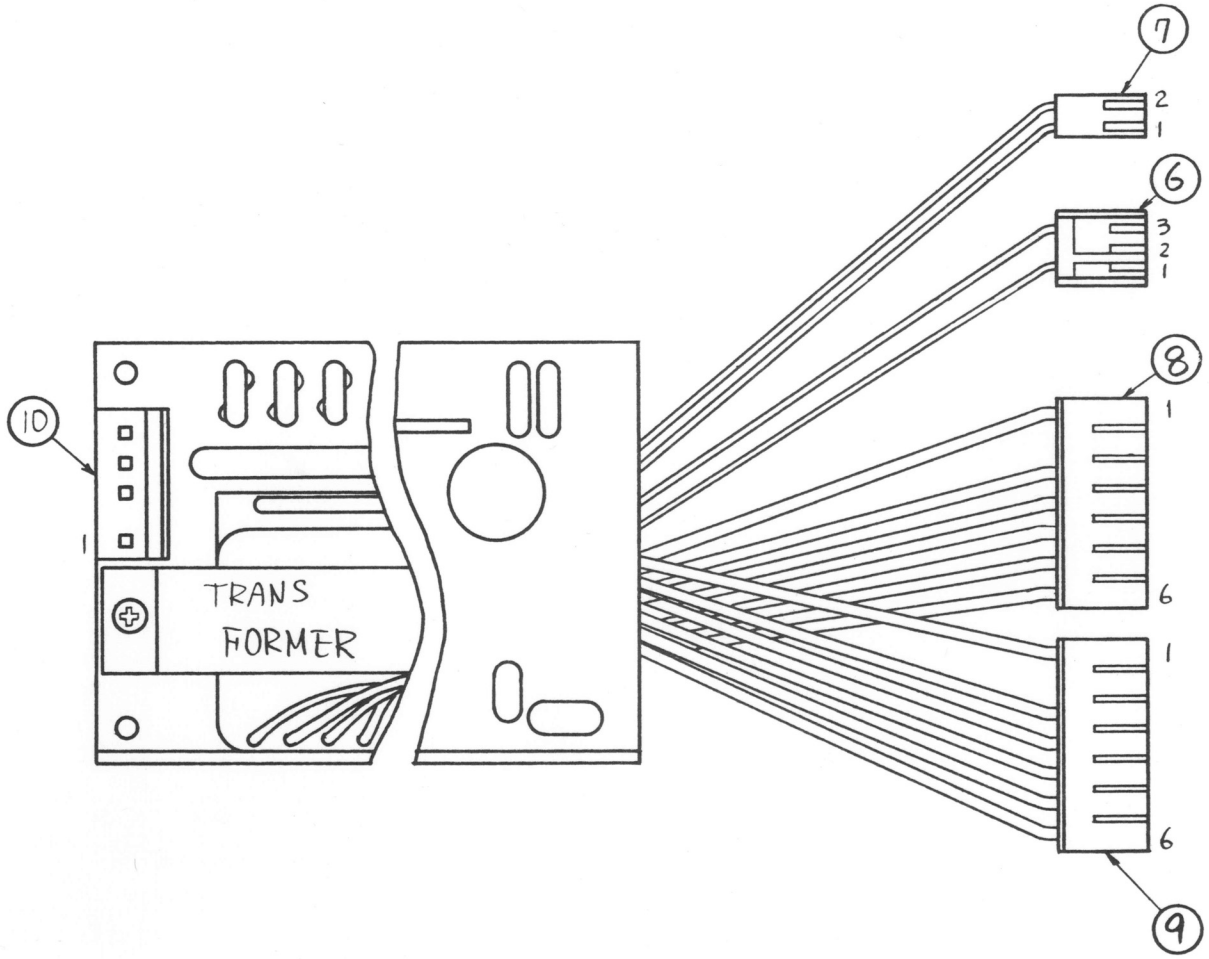
SX 64 MONITOR SCHEMATIC -01



SX 64 MONITOR SCHEMATIC -01A



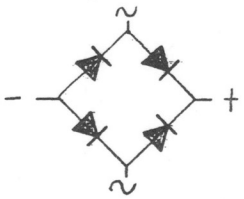
POWER SUPPLY #250623
WIRING DIAGRAM

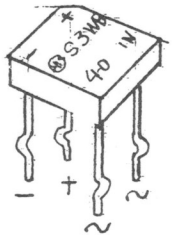


PART NO		VENDOR NO	VENDOR'S NAME	POLE	PIN NO	NAME OF SIGNAL	WIRE COLOR	WIRE	NOTE
6		Ei 171822-3	AMP	3	1	12V	BRN	UL1007 AWG24	
					2	NC			
					3	GND	BLK		
7		5102-02	MOLEX	2	1	AC9V	BLU	UL1007 AWG24	
					2	AC9V	BLU		
8		5227-06	MOLEX	6	1	5V	ORG	UL1007 AWG18	
					2	5V	ORG		
					3	GND	BLK		
					4	GND	BLK		
					5	12V	RED		
					6	12V	RED		
9		5227-06	MOLEX	6	1	5V	ORG	UL1007 AWG18	
					2	5V	ORG		
					3	GND	BLK		
					4	GND	BLK		
					5	12V	RED		
					6	12V	RED		
10		5285-04A	MOLEX	4	1	AC IN			
					2	AC IN			
					3	NC			
					4	F.G			

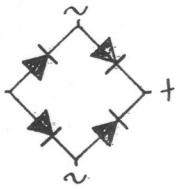
PARTS INFORMATION

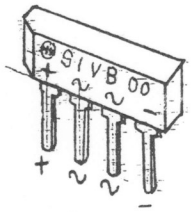
1, REC1 S3WB40 RECTIFIER STACKS DIODES



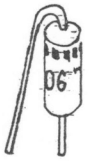


2, REC2 S1VB10 RECTIFIER STACKS DIODES

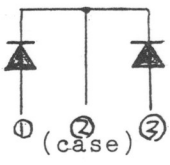


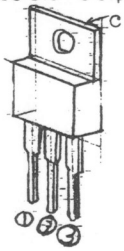


3, D1 ERB24-06C FAST RECOVERY DIODES



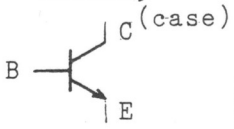
4, D6,7 ESAC85-009 , ESAC82-004 SCHOTTKY BARRIER DIODES

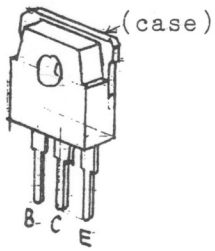




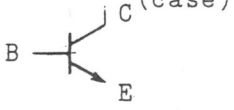
JEDEC:TO-220AB

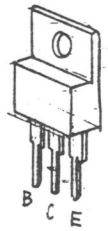
5, Q1 2SC2625 POWER TRANSISTOR





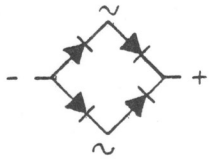
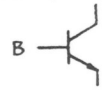
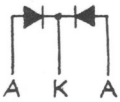
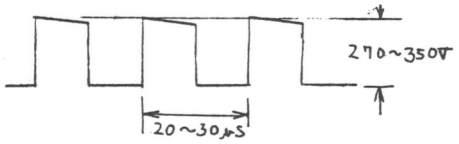
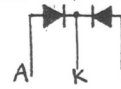
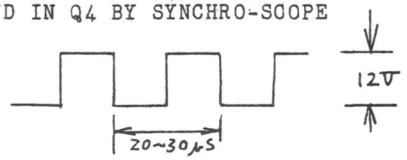
6, Q3 2SC2334 POWER TRANSISTOR



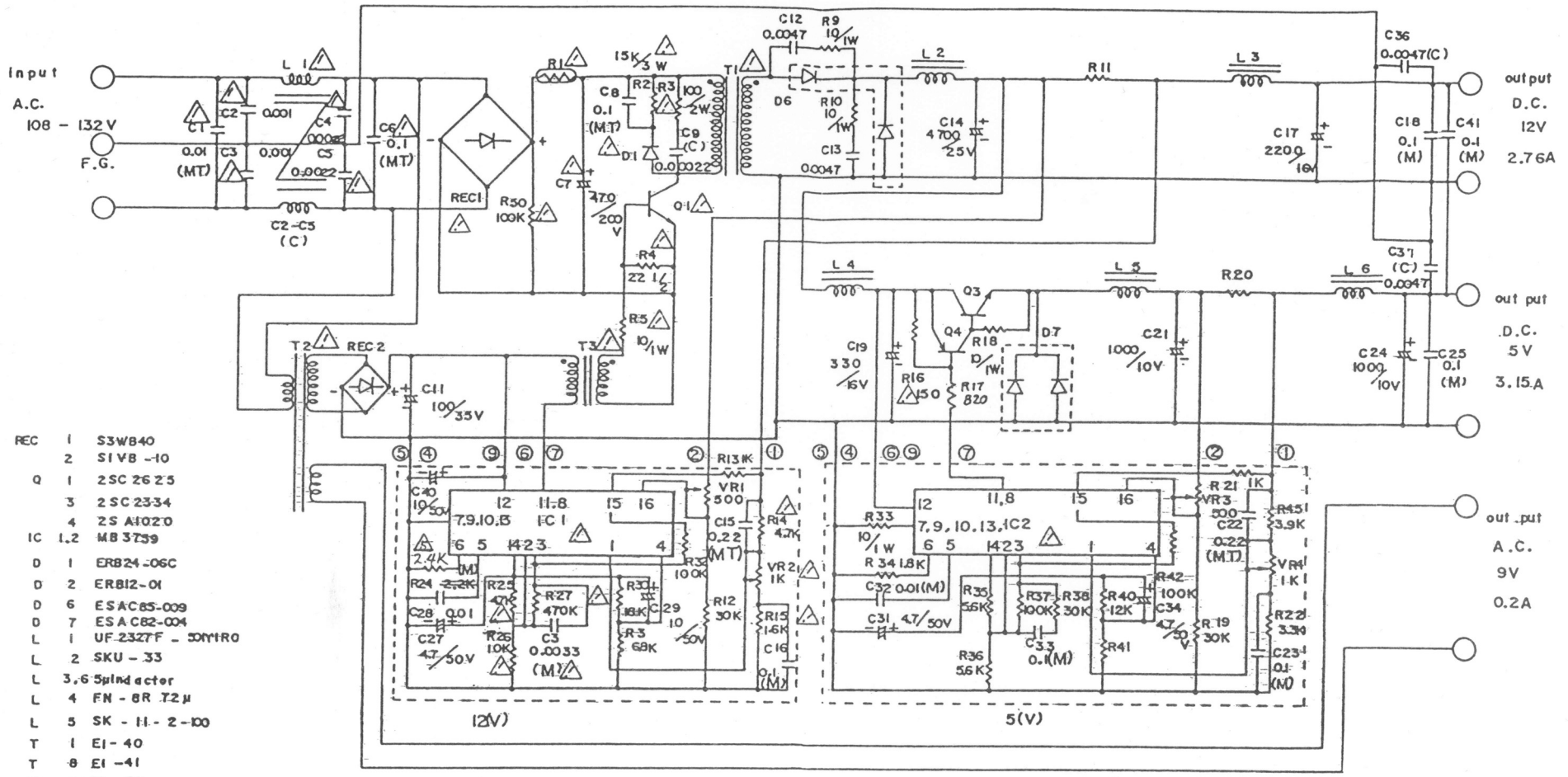


JEDEC:TO-220AB

TROUBLESHOOTING GUIDE

TROUBLE	CHECK POINT	CAUSES AND TEST	SOLUTION
NO OUTPUT	SOME SCRAP INSIDS	SHORT CIRCUIT BIY SCRAP — YES	CLEANING
	OK		
NO AC 9V OUTPUT	SUPPLEMENTARY CIRCUIT	T2 TRANSFORMER SHORT OR OPEN — YES	CHANGE T2
	OK	T2 PRIMARY LEAD WHITE TO WHITE 160~200Ω SECONDARY LEAD RED TO RED 9~12Ω SECONDARY LEAD BLUE TO BLUE 3.2~3.7Ω	
		OK	
		REC2 S1VB-10 DIODE RECTIFIED VOLTAGE DC 12~15V	
IN CASE OF REC1 SHORT FUSE IS CUT	CHECK BRIDGH DIODE	REC1 S3WB40 SHORT OR OPEN — YES	CHANGE REC1
	OK		
IN CASE OF Q1 SHORT FUSE IS CUT	CHECK SWITCHING TRANSISTOR	Q1 2SC2625 SHORT OR OPEN — YES	CHANGE Q1
	OK		
	CHECK HIGH-SPEED RECTIFY DIODE	D6 ESAC85-009 SHORT OR OPEN — YES	CHANGE D6
	OK		
	12V CONTROL CIRCUIT	CHECK BETWEEN COLLECTOR AND EMITTER OF 2SC2625 IN Q1 BY SYNCHRO-SCOPE — NO	CHANGE A BOARD OF 12V CONTROL
			
		YES	
		12V OUTPUT ADJUSTMENT SHIFT — YES	RE-ALIGNMENT
5V output ONLY NO OUTPUT	CHECK SWITCHING TRANSISTOR	Q3 2SC2334 SHORT OR OPEN — YES	CHANGE Q3
	OK		
	CHECK DRIVE TRANSISTOR	Q4 2SA1020-OorY SHORT OR OPEN — YES	CHANGE Q4
	OK		
	CHECK HIGH-SPEED RECTIFY DIODE	D7 ESAC82-004 SHORT OR OPEN — YES	CHANGE D7
	OK		
	5V CONTROL CIRCUIT	CHEC BETWEEN EMITTER OF 2SC2334 AND GRUND IN Q4 BY SYNCHRO-SCOPE — NO	CHANGE A BOARD OF 5V CONTROL
			
		YES	
		5V OUTPUT ADJUSTMENT SHIFT — YES	RE-ALIGNMENT

POWER SUPPLY #250623
SCHEMATIC DIAGRAM



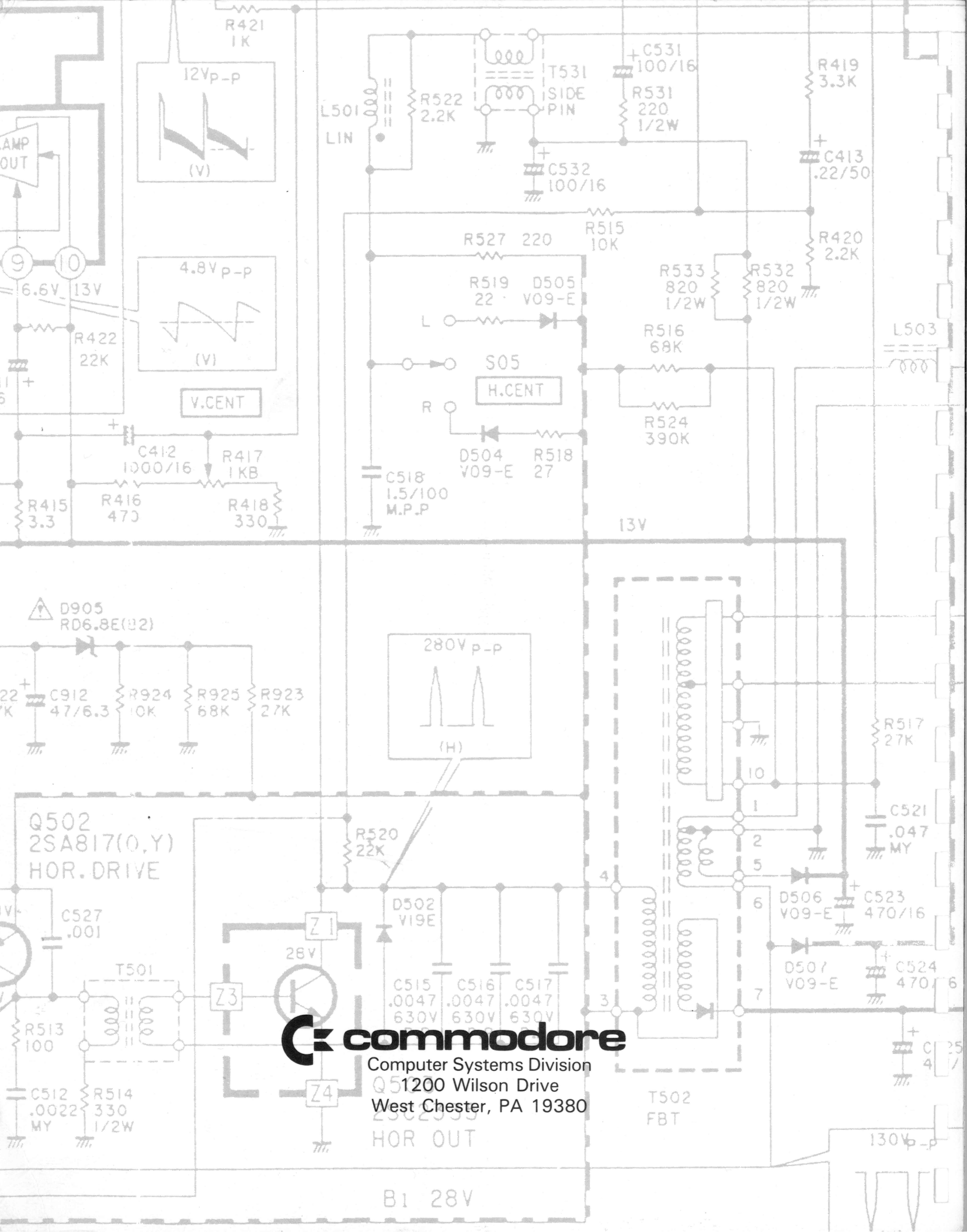
REC	1	S3WB40
	2	S1VB -10
Q	1	2SC2625
	3	2SC2334
	4	2SA1020
IC	1,2	MB3759
D	1	ERB24-06C
D	2	ERB12-01
D	6	ESAC85-009
D	7	ESAC82-004
L	1	UF-2327F - 50MHRO
L	2	SKU - 33
L	3,6	5μ Inductor
L	4	FN - 8R 72μ
L	5	SK - 11 - 2 - 100
T	1	EI - 40
T	8	EI - 41
T	3	EI - 22
R	1	80 - 13
R	11, 20	manganin resistor

CAPACITOR

(M) POLYESTER FILM CAPACITOR
(MT) METALLIZED POLYESTER FILM CAPACITOR
(C) CERAMIC CAPACITOR

NOTE
ALL CAPACITANCE ARE IN MICROFARADS
ALL RESISTANCE VALUES ARE IN OHMS 1/4W,
UNLESS OTHERWSE SPECIFIED IN THE DIAGRAM.

⚠ CRITICAL COMPONENT



commodore

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