SERVICE MANUAL
DATASETTE
MODEL C2N/1530/1531

Preliminary

OCT. 1984 **PN-314002-02**

commodore
COMPUTERS

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DATASETTE
MODEL C2N/1530/1531

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The Commodore Datasette has undergone many changes both in physical appearance and electronic circuitry. This preliminary package is an attempt to cover as many different versions as possible. If you need information for a version of Commodore Datasette not covered, please write to Service Documentation, Box C-2654, West Chester, PA 19380. Be sure to include an accurate description of the datasette in need of repair.

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CONTENTS

Title	Page
SPECIFICATIONS	1
DATASETTE OVERVIEW	1
COMMODORE PARTS LIST	2
TROUBLESHOOTING FLOW CHART	
TAPE DOES NOT RUN	3
DOES NOT LOAD	4
DOES NOT SAVE	5
DOES NOT AUTO STOP	6
DOES NOT LIGHT	6
PCB ASSEMBLY #320009	
BOARD LAYOUT	7
PARTS LIST AND SCHEMATIC	8
PCB ASSEMBLY #320109	
BOARD LAYOUT	9
PARTS LIST AND SCHEMATIC	10
PCB ASSEMBLY #320275	
BOARD LAYOUT	11
PARTS LIST AND SCHEMATIC	12
PCB ASSEMBLY #CMR-001-0	
BOARD LAYOUT	13
WIRING DIAGRAM	14
PARTS LIST AND SCHEMATIC	15
PCB ASSEMBLY #NP-090	
WIRING DIAGRAM	16
PARTS LIST AND SCHEMATIC	17
PCB ASSEMBLY #017-5001-01	
BOARD LAYOUT	18
WIRING DIAGRAM	19
PARTS LIST AND SCHEMATIC	20

SPECIFICATIONS

SPEED

300 baud throughput, programs saved twice for internal error checking, check-summing for data files.

CONTROLS

Keys for play, record, fast-forward, rewind, and stop. Sensor for software detection of key press. Counter for tape location.

FORMAT

Commodore propriety format using pulse-width modulation and square waves. Allows naming of programs and files, verification of programs, end of tape marker sensing.

TAPES

Uses standard audio cassette tapes. Digital tapes not required.

COMPATABILITY

C2N/1530 — VIC20, C64, PET Series Computer
1531 — PLUS 4, C16

DATASETTE OVERVIEW

The electronics of the datasette contains read/write circuits that replace the audio-type circuits in a standard audio tape recorder.

Status/Motor Control — When the play switch is depressed, a ground potential is applied to the cassette enable line of the microprocessor. It, in turn, signals the cassette drive motor through a transistor switch located on the main computer board. The cassette is then ready for read/write operation.

Write/Record Amplifier — The computer outputs a square wave signal to the datasette. These TTL logic-level shifts are converted by the pre-amplifier and power amplifier to a proportional current output. This current output is then applied to the read/write coil of the head. Through induction, magnetic fields are produced on the tape representing the data.

Read/Playback Amplifier — The read amplifier circuit takes the reproduced transition signals from the tape and converts them back to TTL logic-level shifts. This is accomplished by an amplifier limiter which removes the amplitude variations and a switching circuit that toggles the output data between 0 and 5 volts. The signal is then ready for output to the computer.

NOTE: We are unable to stock the numerous small parts of the various mechanisms that have been used in the Commodore Datasette. Therefore, references have been made throughout this document to the vendor names we have used as our suppliers. If you would like to have parts for these mechanisms, may we suggest you contact the vendors directly.

PARTS LIST

Parts that are available from Commodore at this printing:

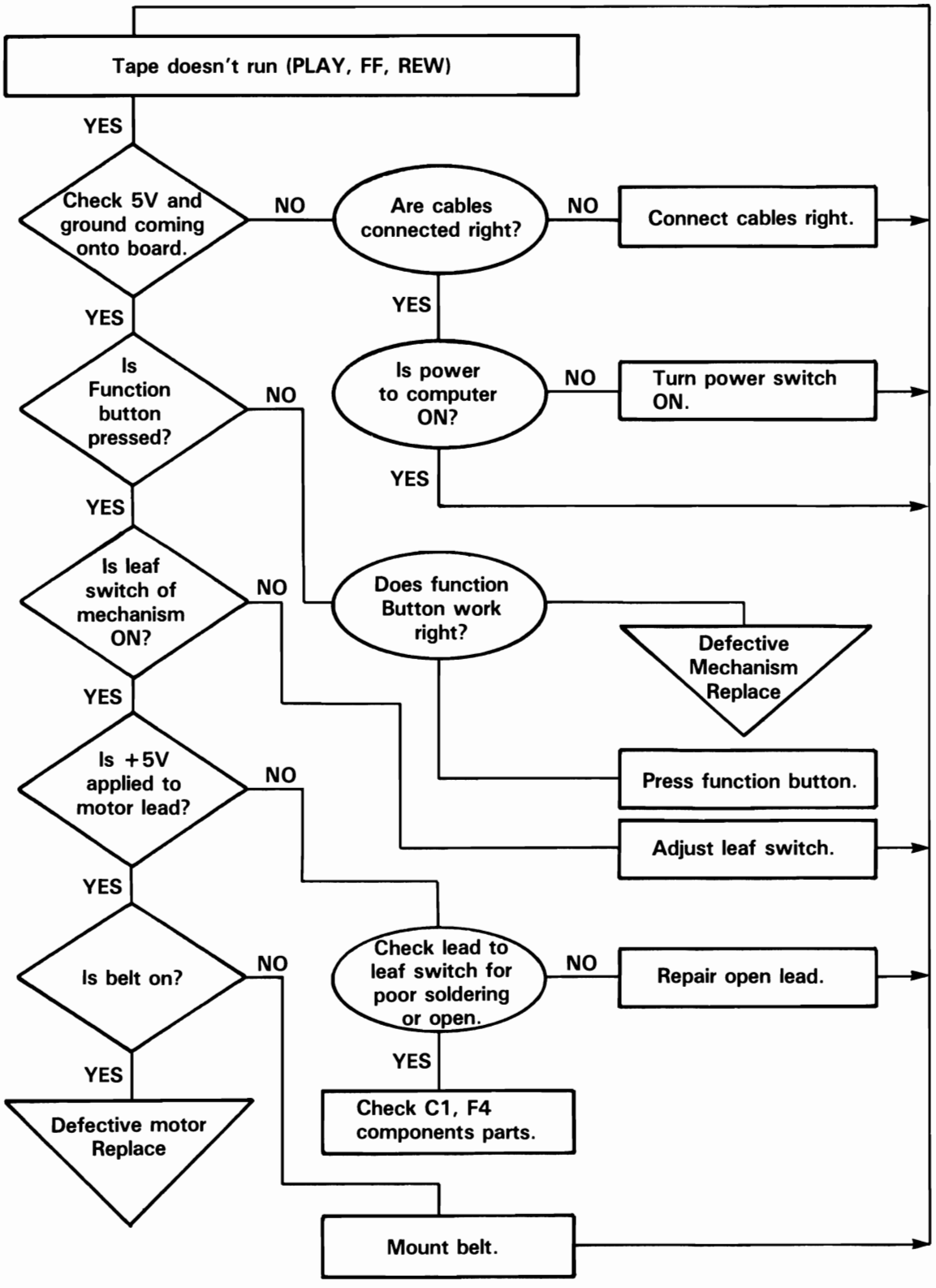
32004001	C2N/1530 I/O Harness Assembly
980040	C2N/1530 Case (2 piece) OLD style
980048	C2N/1530 Replacement PCB Assembly #320275

Parts that will be available from Commodore — Call for Part Number, Price, Availability.

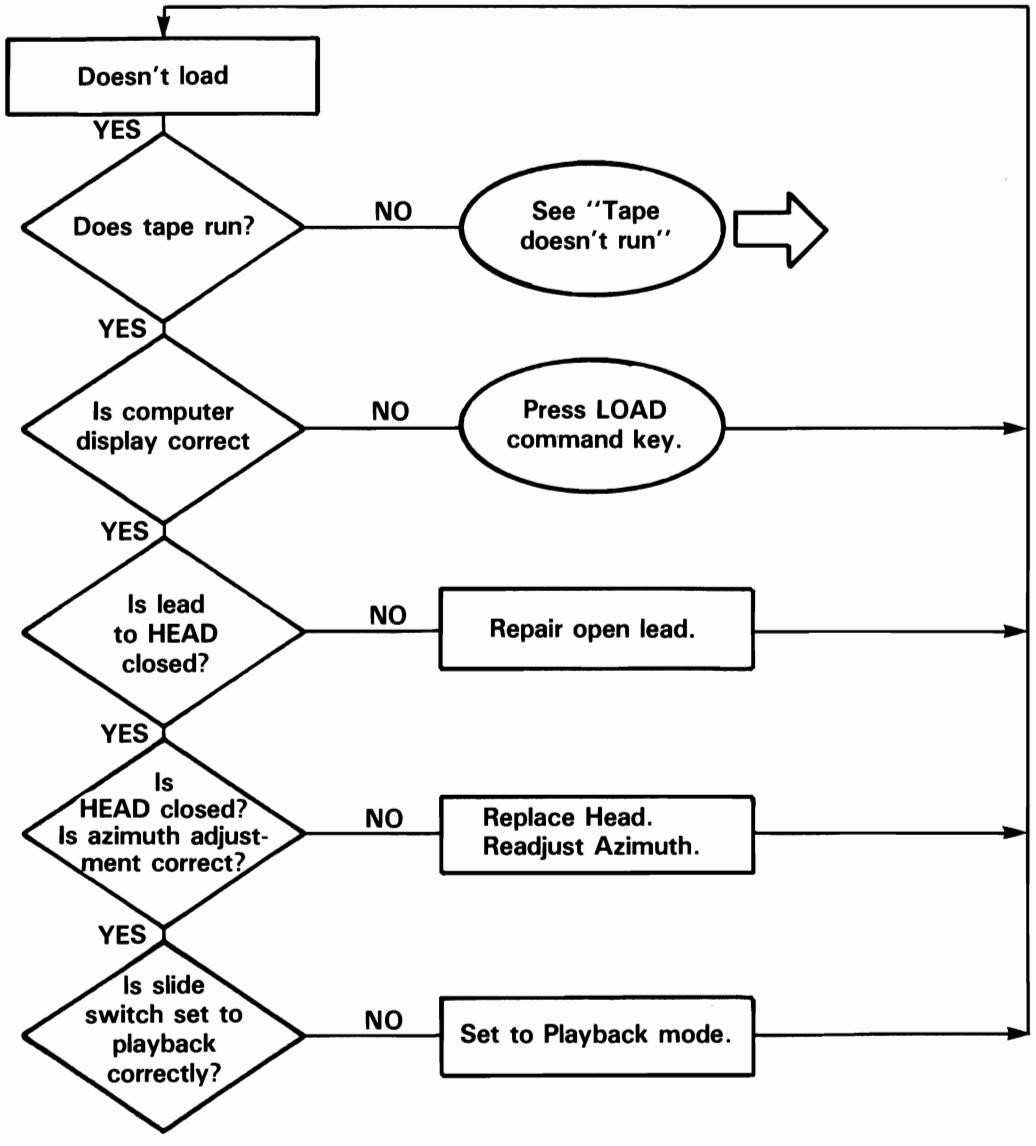
C2N/1530 Case (2 piece) NEW style
1531 Case (2 piece)
1531 I/O Harness Assembly

TROUBLESHOOTING

TAPE DOES NOT RUN



DOES NOT LOAD



Due to the variety of Datasettes in the field, it is not possible to develop a flowchart to cover all of the component failures that are possible. From this point it is suggested that you:

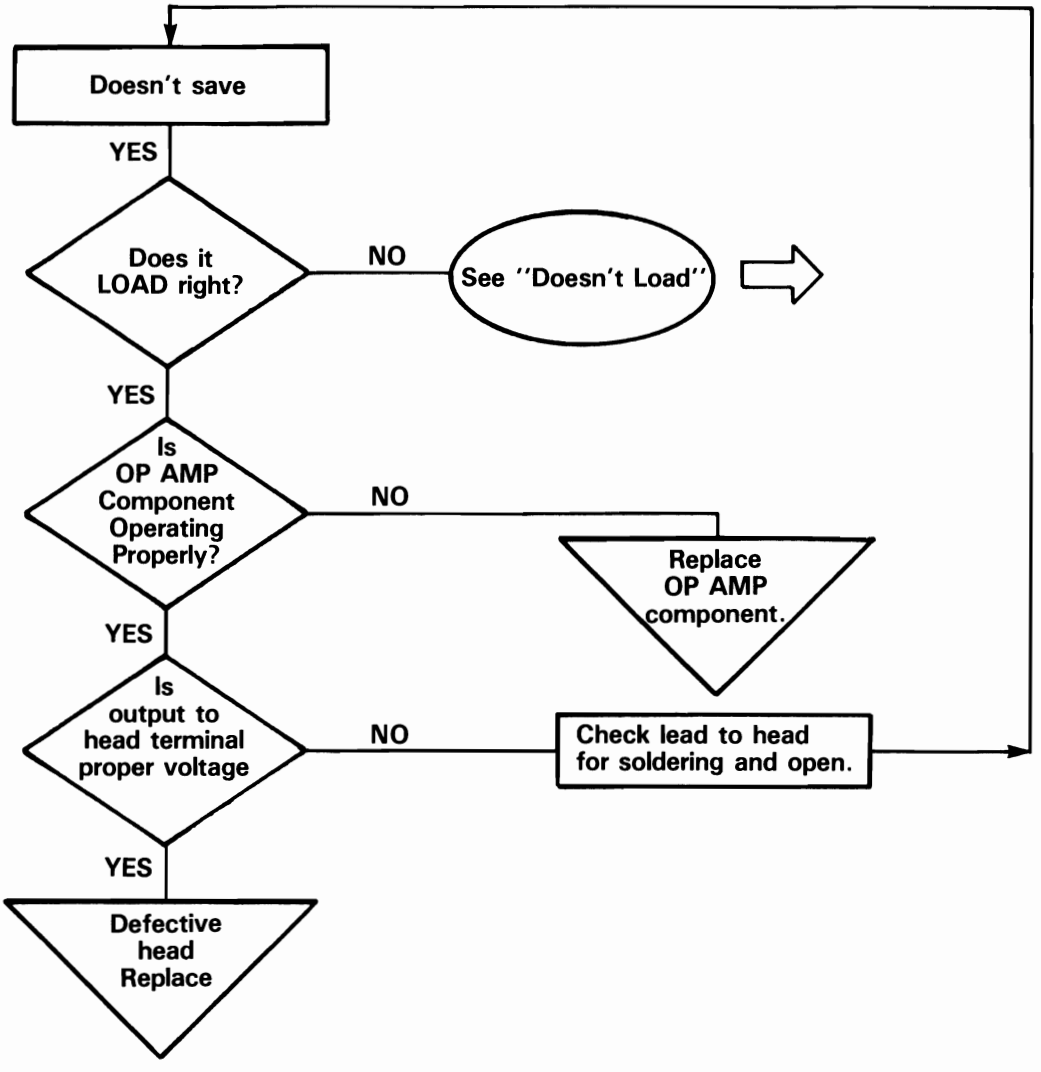
1) Check for proper head alignment

2) Check for proper operation of the semi-conductor components on the PCB assembly

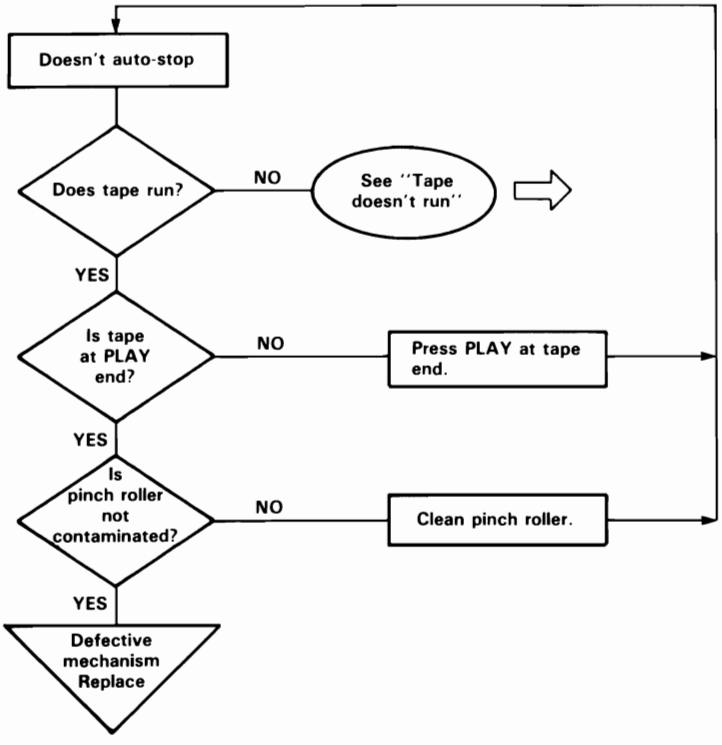
3) Check component parts directly related to the proper operation of the I.C.'s and transistors in the circuit.

4) Check I/O cable to computer and proper operation of the computer.

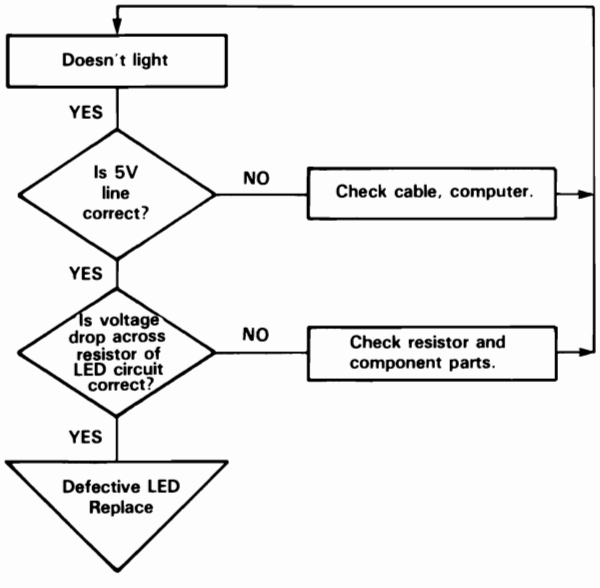
DOES NOT SAVE

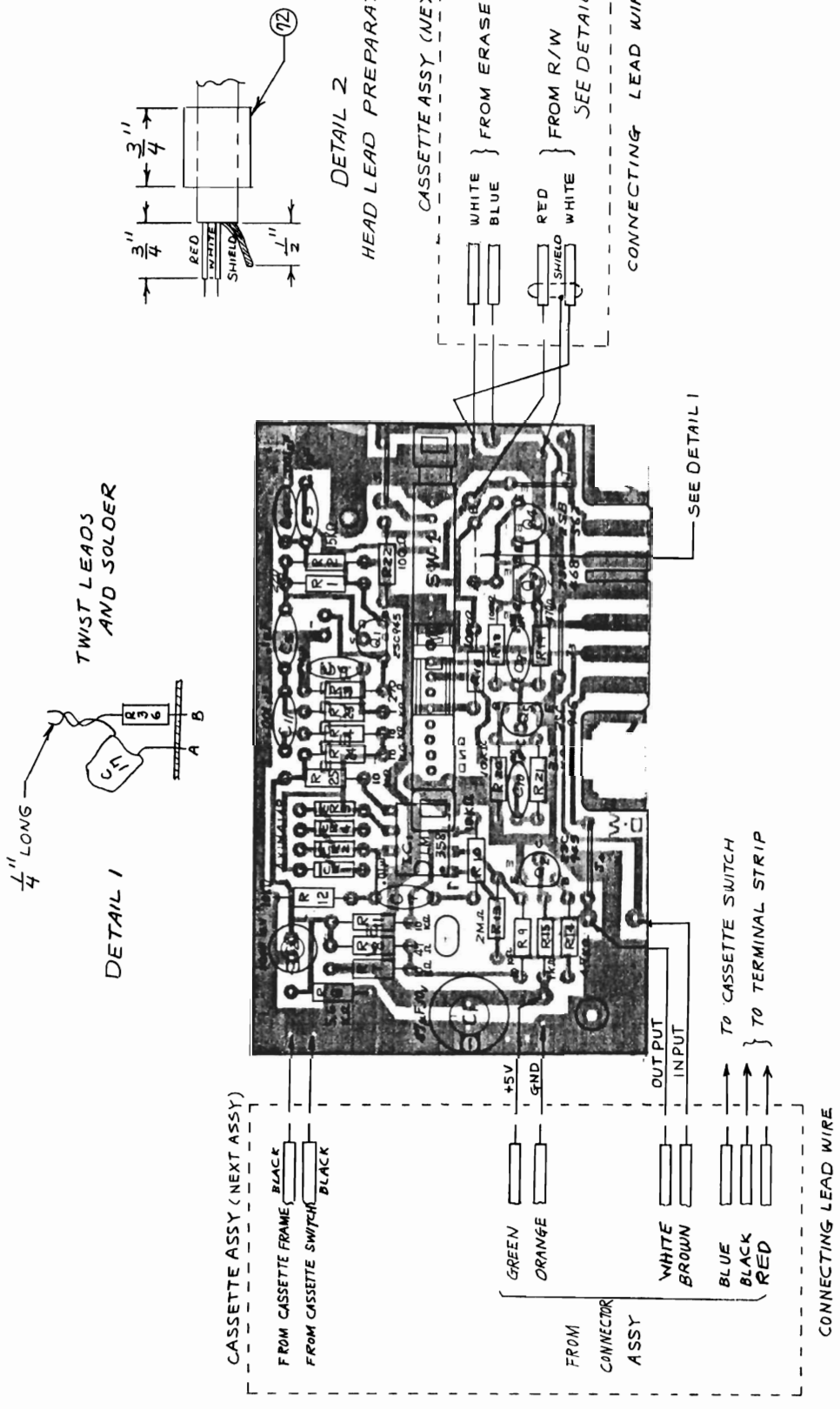


DOES NOT AUTO STOP



DOES NOT LIGHT





NOTE:

1. **R6, R7, R8 TOLERANCE ±2% RESISTORS**

PARTS LIST — PCB ASSEMBLY #320009

NOTE: DATASETTE PARTS ARE NOT AVAILABLE FROM COMMODORE — parts list is for cross reference only.

INTERGRATED CIRCUITS	
IC1	LM 358 (T.I.) Sub: NA 798 (Fairchild) Sub: LM 258 (T.I.)

TRANSISTORS	
Q1	NPN 2SC945 Sub: 2N3904
Q2	NPN 2SC945 Sub: 2N3904
Q3	NPN 2SD468 (H) Sub: 2SD471 (NEC)
Q4	NPN 2SB562 (H) Sub: 2SB564 (NEC)
Q5	NPN 2SC945 Sub: 2N3904

DIODES	
CR1—CR4	IN4148

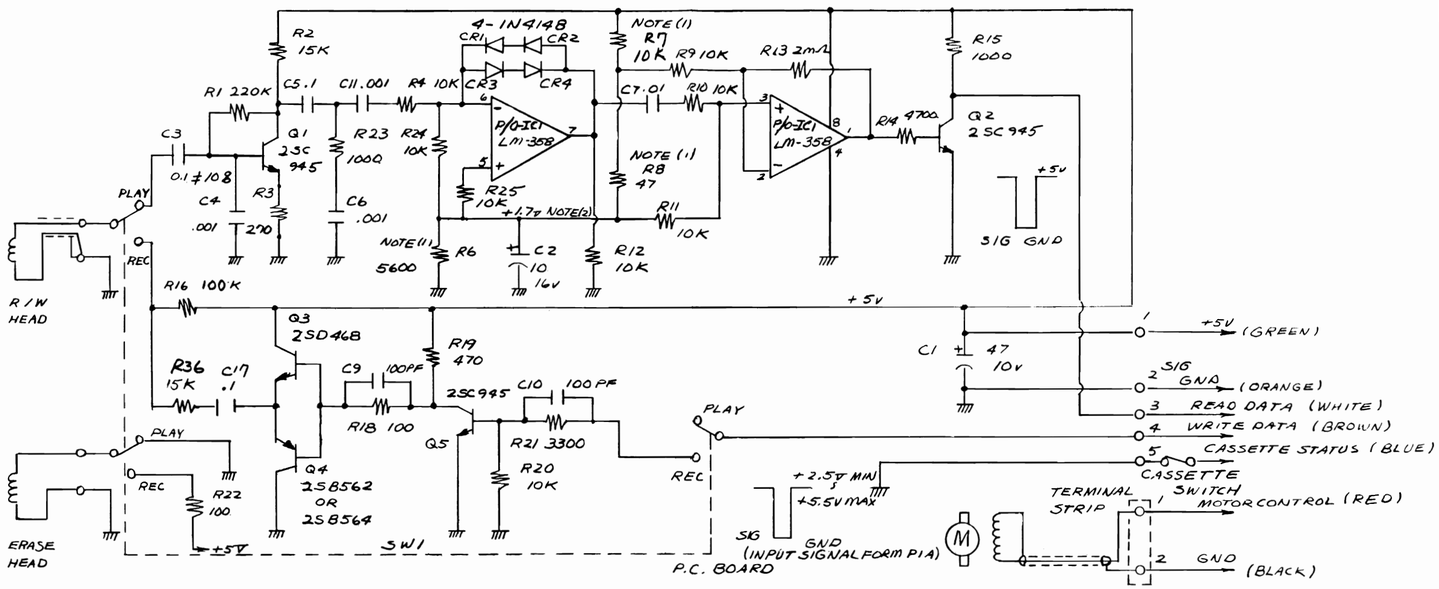
RESISTORS — All values are in ohms-1/4 W 5% unless noted otherwise.		
R1	220K	
R2	15K	
R3	270	
R4	10K	
R6	5.6K	1/4w 2% (sub 1%)
R7	10K	1/4w 2% (sub 1%)
R8	47	1/4w 2% (sub 1%)
R9	10K	
R10	10K	
R11	10K	
R12	10K	
R13	2M	
R14	4.7K	
R15	1K	

RESISTORS (Continued)	
R16	100K
R18	100
R19	470
R20	10K
R21	3.3K
R22	100
R23	1K
R24	10K
R25	10K
R36	15K

CAPACITORS		
C1	Electrolytic	47 μF 10V
C2	Electrolytic	10 μF 10V
C3	Film	.1 μF 100V
C4	Ceramic	.001 μF 50V
C5	Ceramic	.1 μF 16V
C6	Ceramic	.001 μF 50V
C7	Ceramic	.01 μF 50V
C9	Ceramic	100 pF 50V
C10	Ceramic	100 pF 50V
C11	Ceramic	.001 μF 50V
C17	Ceramic	.1 μF 16V

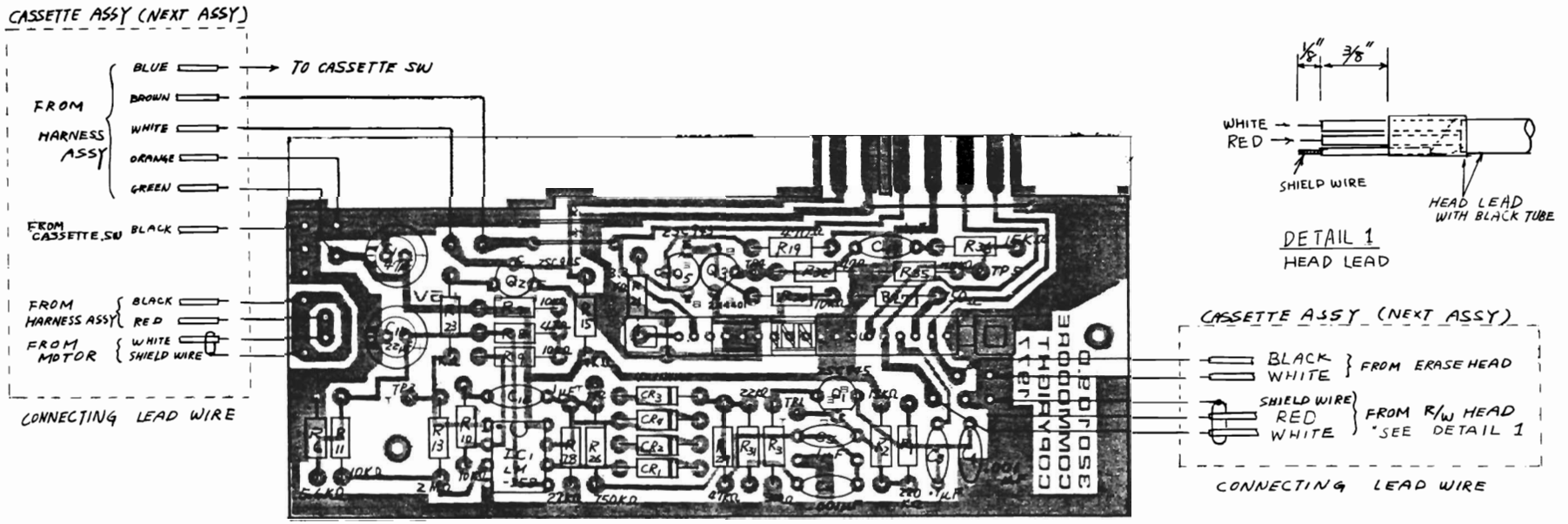
MISC.	
SW1	Slide Switch SEA-621

Schematic Circuit Diagram — PCB Assembly #320009



NOTES:

1. R6, R7, R8, ±2%, 1/4 WATT.
2. THE BIAS SHOULD BE +1.7 ±0.005V AT 5V POWER SUPPLY.
3. UNLESS OTHERWISE NOTED, 1/4 WATT CARBON FILM 5% WITH VALUES IN OHMS.
4. UNLESS OTHERWISE NOTED, ALL CAPACITOR VALUES IN MICRO FARADS.



NOTES:

1. **R6, R7, R8 ±2%, 1/4W RESISTOR**
2. **※MARK ARE JUMPER WIRES**
3. **ALL CONNECTIONS TO COMPONENTS SIDE**

PARTS LIST — PCB ASSEMBLY #320109

NOTE: DATASETTE PARTS ARE NOT AVAILABLE FROM COMMODORE — parts list is for cross reference only.

INTERGRATED CIRCUITS	
IC1	LM 358 (T.I.) Sub: NA 798 (Fairchild) Sub: LM 258 (T.I.)

TRANSISTORS	
Q1	NPN 2SC945 Sub: 2N3904
Q2	NPN 2SC945 Sub: 2N3904
Q3	NPN 2N4401
Q5	NPN 2SC945 Sub: 2N3904

DIODES	
CR1—CR4	IN4148

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

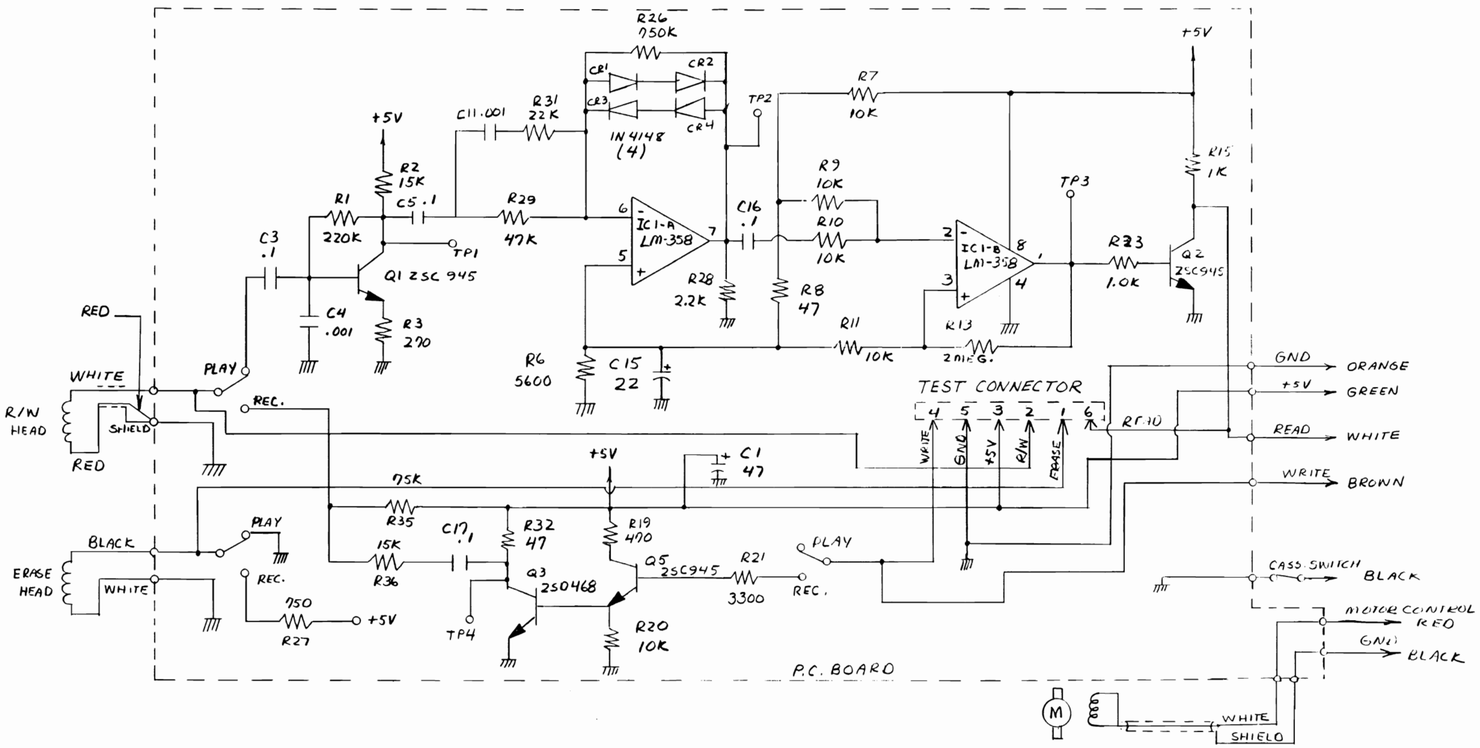
R1	220K	
R2	15K	
R3	270	
R6	5.6K	1/4w 2% (sub 1%)
R7	10K	1/4w 2% (sub 1%)
R8	47	1/4w 2% (sub 1%)
R9	10K	
R10	10K	
R11	10K	
R13	2M	
R15	1K	
R19	470	
R20	10K	

RESISTORS (Continued)	
R21	3.3K
R22	100
R23	1K
R26	750K
R27	750
R28	2200
R29	47K
R31	22K
R32	47
R35	75K
R36	15K

CAPACITORS		
C1	Electrolytic	47 μF 10V
C3	Film	.1 μF 16V
C4	Ceramic	.001 μF 50V
C5	Ceramic	.1 μF 16V
C11	Ceramic	.001 μF 50V
C15	Electrolytic	22 μF 10V
C16	Ceramic	.1 μF 16V
C17	Ceramic	.1 μF 16V

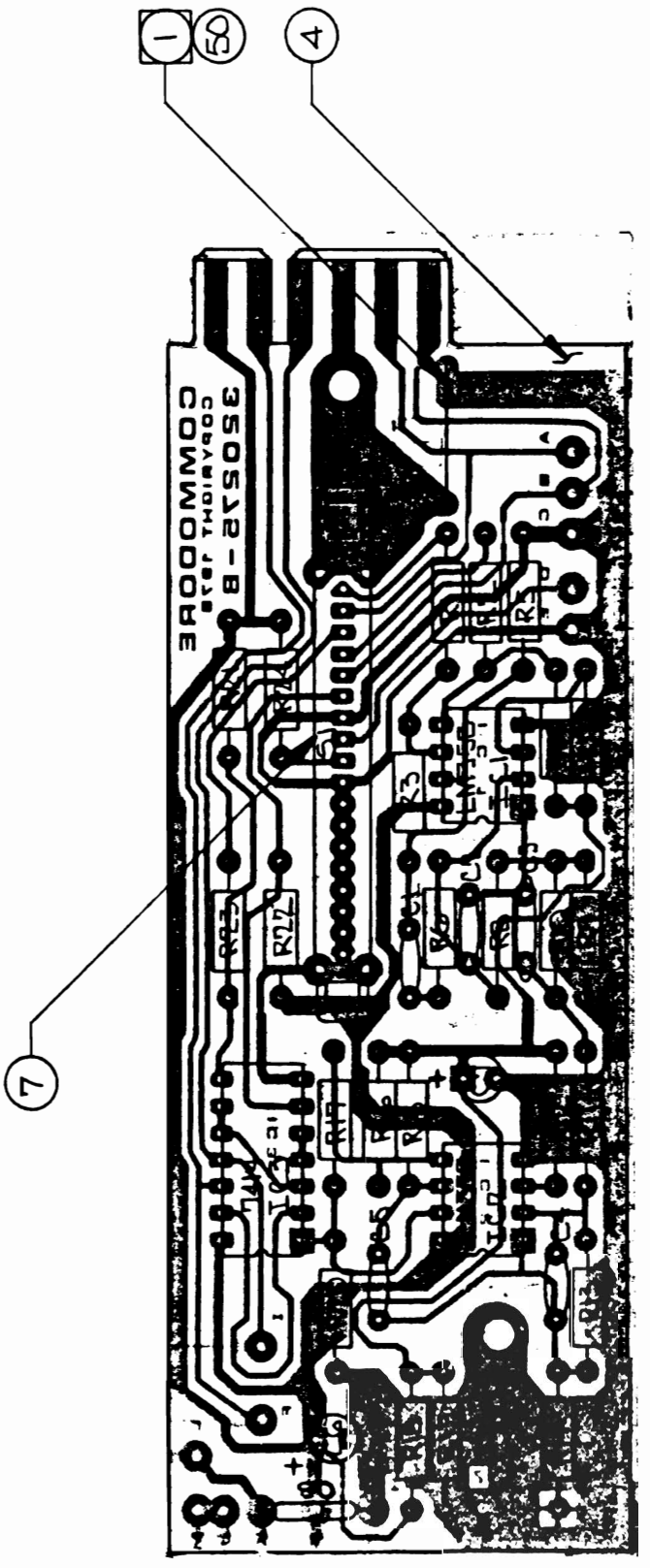
MISC.	
SW1	Slide Switch SEA-621

Schematic Circuit Diagram — PCB Assembly #320109



NOTES:

1. **R6, R7, R8, ±2%, 1/4 WATT.**
2. **THE BIAS SHOULD BE +1.7 ±0.005V AT 5V POWER SUPPLY.**
3. **UNLESS OTHERWISE NOTED, 1/4 WATT CARBON FILM 5% WITH VALUES IN OHMS.**
4. **UNLESS OTHERWISE NOTED, ALL CAPACITOR VALUES IN MICRO FARADS.**



1. SYMBOL INDICATES JUMPER WIRE.

NOTES: UNLESS OTHERWISE SPECIFIED

PARTS LIST — PCB ASSEMBLY #320275

NOTE: DATASETTE PARTS ARE NOT AVAILABLE FROM COMMODORE — parts list is for cross reference only.

INTERGRATED CIRCUITS	
IC1	LM 358 (T.I.) Sub: NA798 (Fairchild) Sub: LM258 (T.I.)
IC2	LM 358 (T.I.) Sub: NA798 (Fairchild) Sub: LM 258 (T.I.)
IC3	7414 Hex Inverter

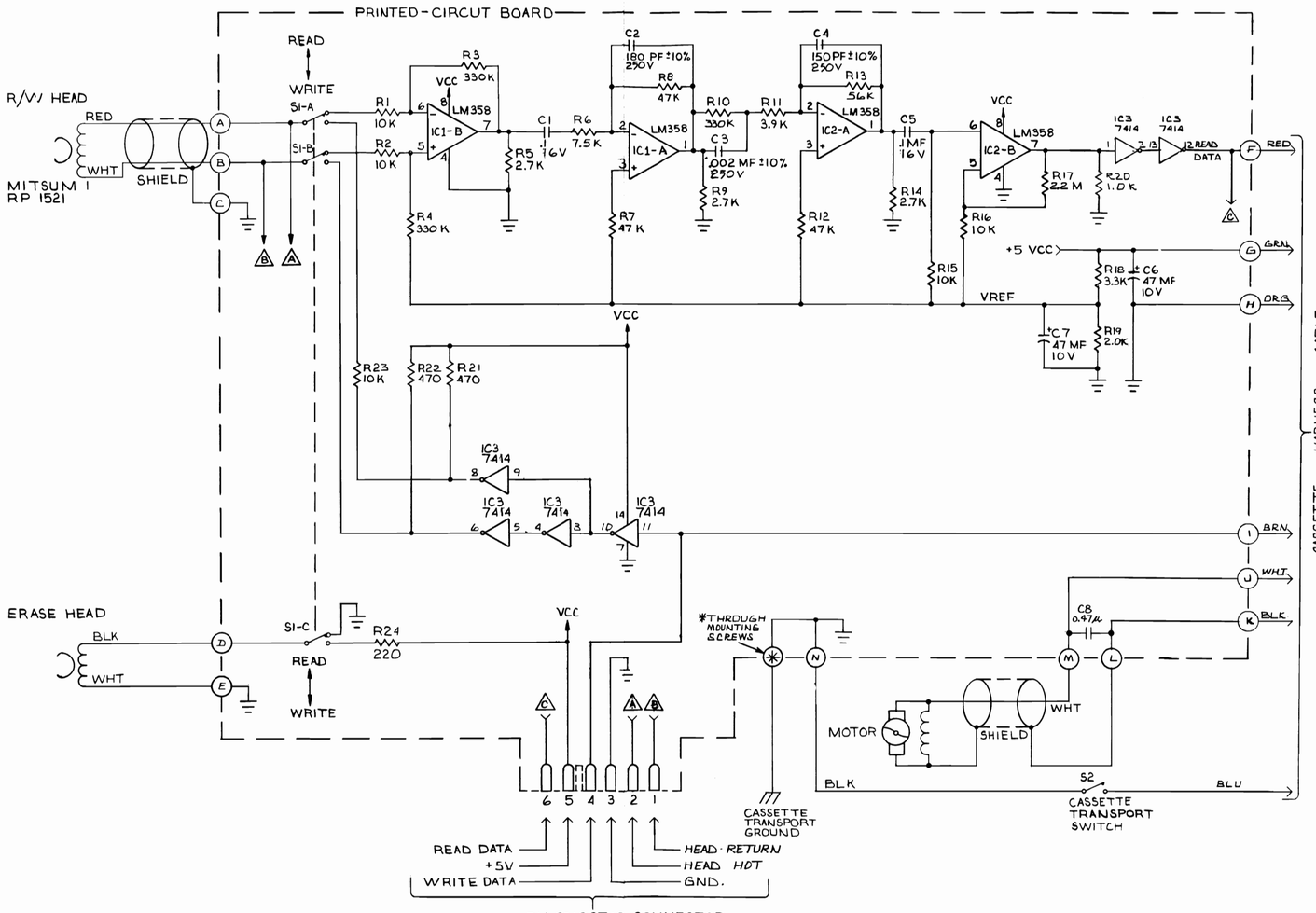
RESISTORS — All Values are in ohms-1/4 W 5% unless noted otherwise.	
R1	10K
R2	10K
R3	330K
R4	330K
R5	2.7K
R6	7.5K
R7	47K
R8	47K
R9	2.7K
R10	330K
R11	3.9K
R12	47K
R13	56K
R14	2.7K
R15	10K

RESISTORS (Continued)	
R16	10K
R17	2.2M
R18	3.3K
R19	2K
R20	1K
R21	470
R22	470
R23	10K
R24	220

CAPACITORS			
C1	Ceramic	.1 μF 16V	
C2	Ceramic	180 pF 250V	(+ −) 10%
C3	Ceramic	.002 μF 250V	(+ −) 10%
C4	Ceramic	.150 pF 250V	(+ −) 10%
C5	Ceramic	.1 μF 16V	
C6	Electrolytic	47 μF 10V	
C7	Electrolytic	47 μF 10V	
C8	Monolythic	.47 μF 50V	

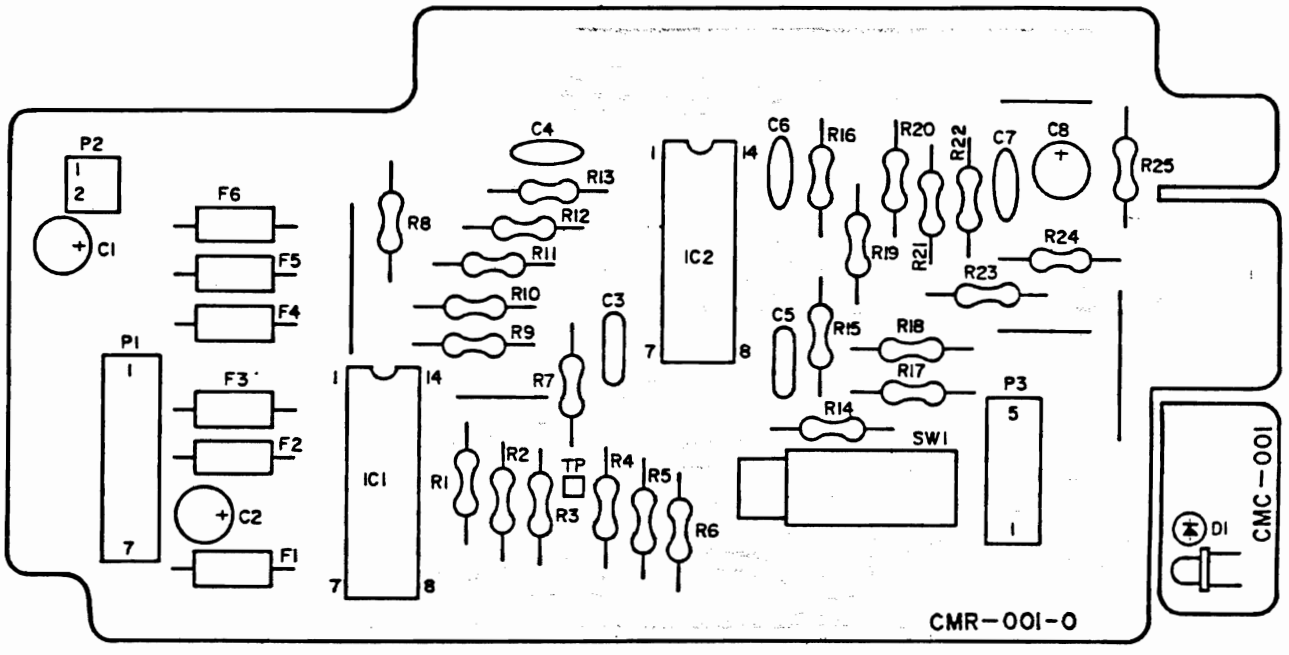
MISC.	
SWI	Slide Switch SEA-621

Schematic Circuit Diagram — PCB Assembly #320275

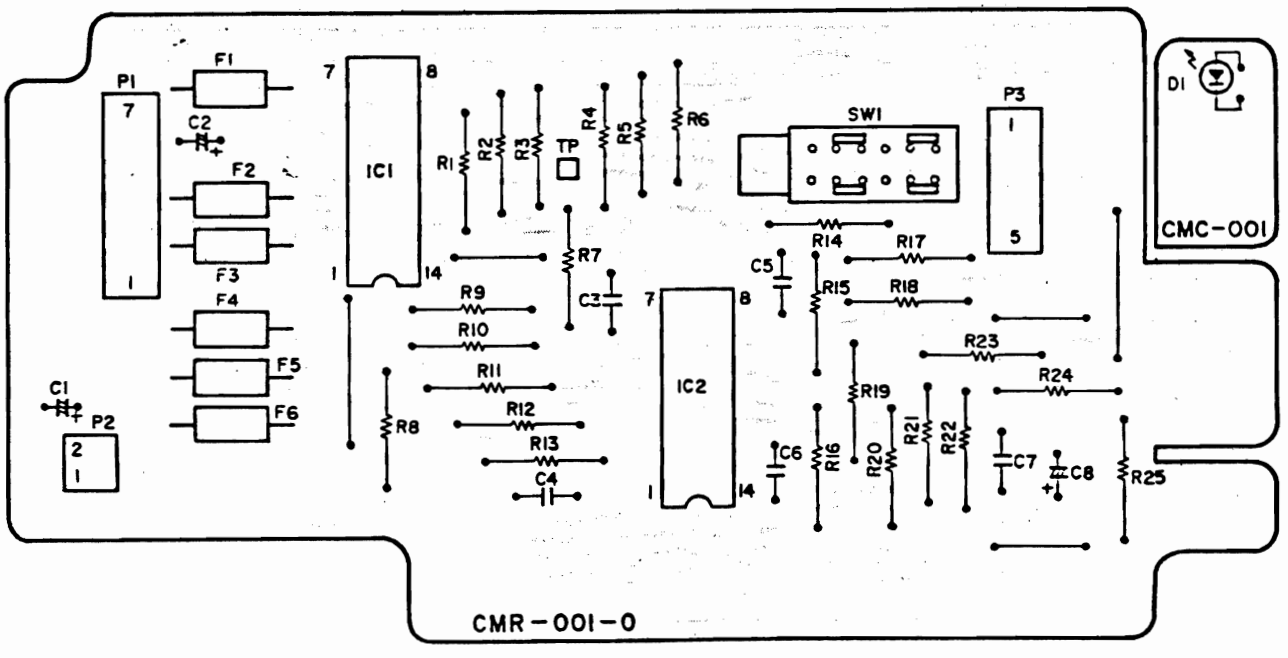


NOTES: UNLESS OTHERWISE SPECIFIED —

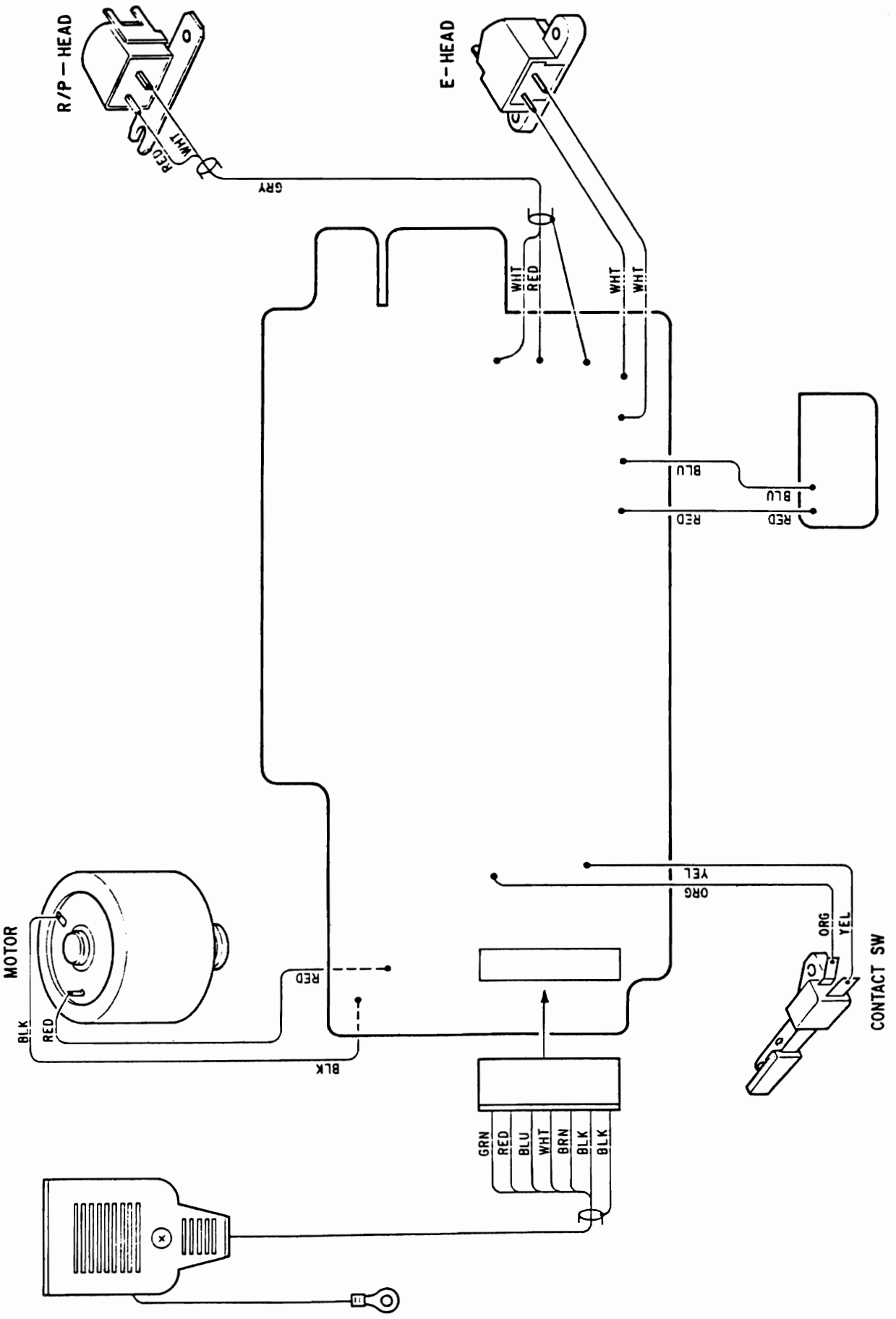
1. **ALL RESISTANCE VALUES IN OHMS, 1/4W ±5%.**



TOP VIEW



BOTTOM VIEW


R/P — HEAD
E-HEAD
RED
WHT
GRY
WHT
RED
WHT
WHT
BLU
BLU
RED
RED
YEL
ORG
ORG
YEL
CONTACT SW
MOTOR
BLK
RED
RED
BLK
GRN
RED
BLU
WHT
BRN
BLK
BLK

PARTS LIST — PCB ASSEMBLY #CMR-001-0

NOTE: DATASETTE PARTS ARE NOT AVAILABLE FROM COMMODORE — parts list is for cross reference only.

INTERGRATED CIRCUITS	
IC1	IC LA6324 or NJM-2902N
IC2	IC M53214P or DM7414N

DIODES	
D1	LED RED 3ϕ
	LED Spacer

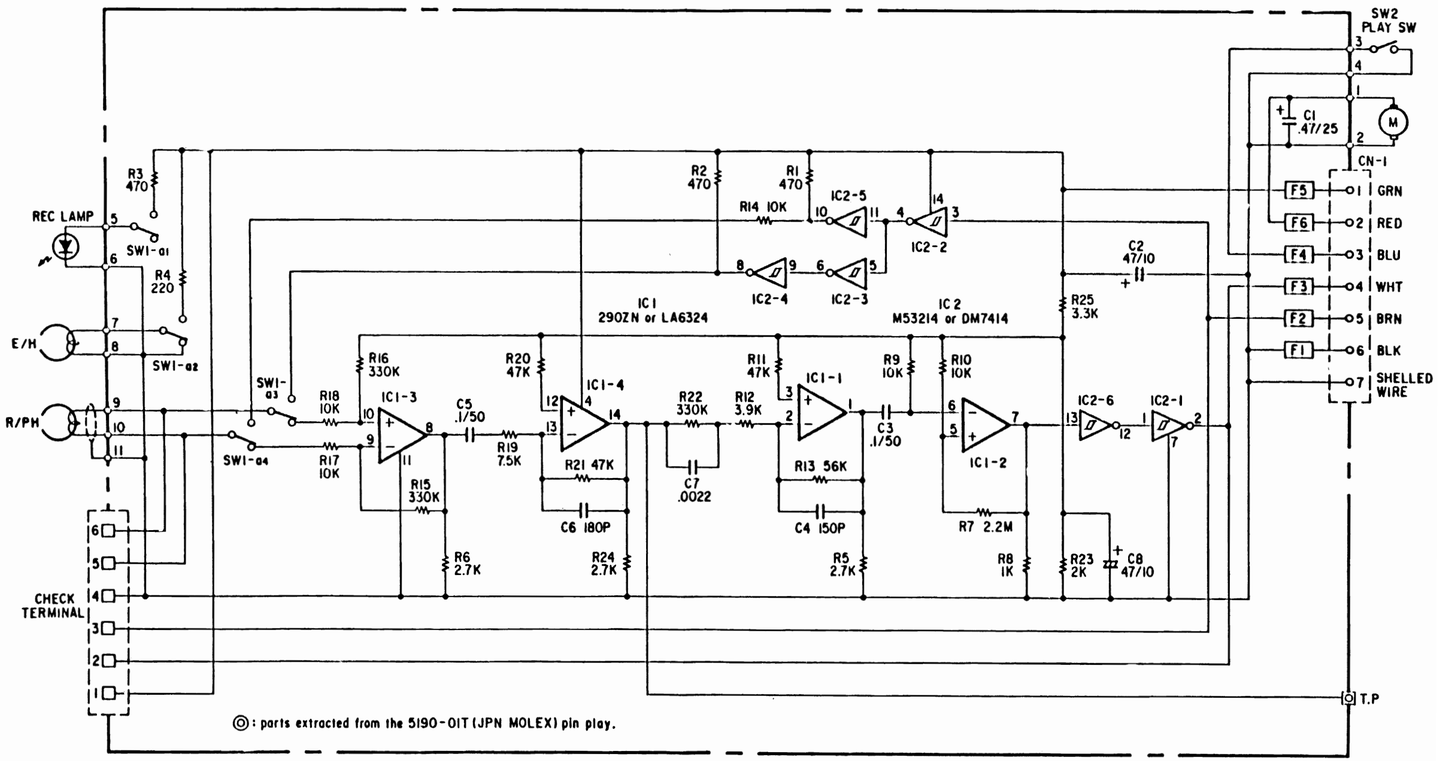
RESISTORS — All Values are in ohms-1/4 W 5% unless noted otherwise.	
R1	470 ohm
R2	470 ohm
R3	470 ohm
R4	220 ohm
R5	2.7k ohm
R6	2.7k ohm
R7	2.2M ohm
R8	1k ohm
R9	10k ohm
R10	10k ohm
R11	47k ohm
R12	3.9k ohm
R13	56k ohm
R14	10k ohm
R15	330k ohm
R16	330k ohm
R17	10k ohm
R18	10k ohm

RESISTORS (Continued)	
R19	7.5k ohm
R20	47k ohm
R21	47k ohm
R22	330k ohm
R23	2k ohm
R24	2.7k ohm
R25	3.3k ohm

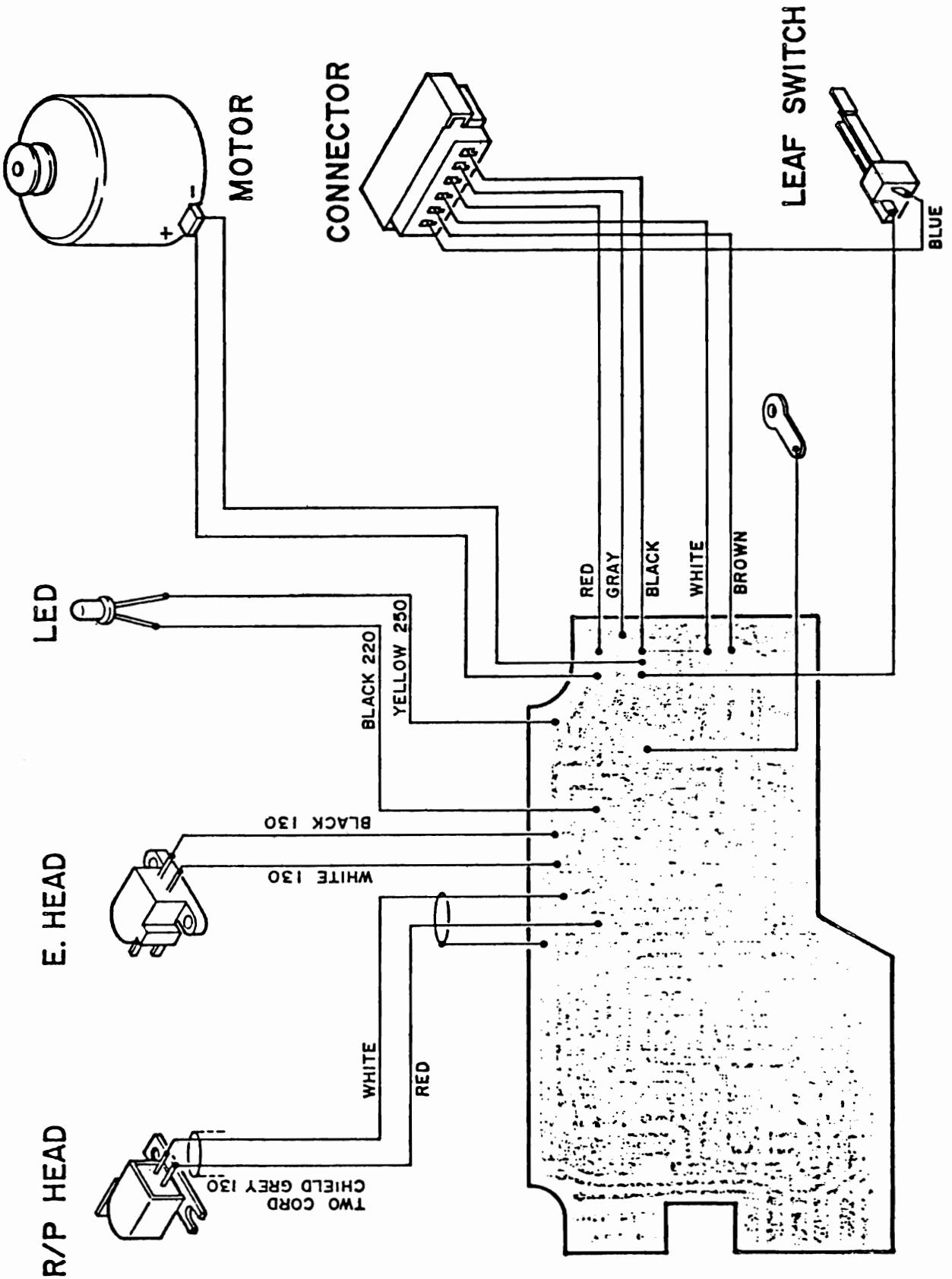
CAPACITORS		
C1	Aluminum	0.47μ/25V
C2	Electrolytic	47μ/10V
C3	Mylar	47μ/10V
C4	Ceramic	150p
C5	Mylar	0.1μ
C6	Ceramic	180p
C7	Ceramic	0.0022μ
C8	Electrolytic	47μ/10V

MISC.	
SWI	Slide Switch
F1	Ferrite Bead
F2-F6	Ferrite Bead QIBRHW3.5x4.5x0.8
CN1	7 Pin Connector

Schematic Circuit Diagram — PCB Assembly #CMR-001-0



- All Resistance values are in Ω, K=10^3, M=10^6.
- All Resistors are rated at 1/4 watt, ± 5%.
- All Capacitance values are in μF, P=10^{-6}μF.
- All Capacitors are rated at 50WV.


MOTOR
CONNECTOR
LEAF SWITCH
BLUE
RED
GRAY
BLACK
WHITE
BROWN
LED
BLACK 220
YELLOW 250
E. HEAD
BLACK 130
WHITE 130
R/P HEAD
WHITE
RED
TWO CORD
CHIELD GREY 130

PARTS LIST — PCB ASSEMBLY #NP-090

NOTE: DATASETTE PARTS ARE NOT AVAILABLE FROM COMMODORE — parts list is for cross reference only.

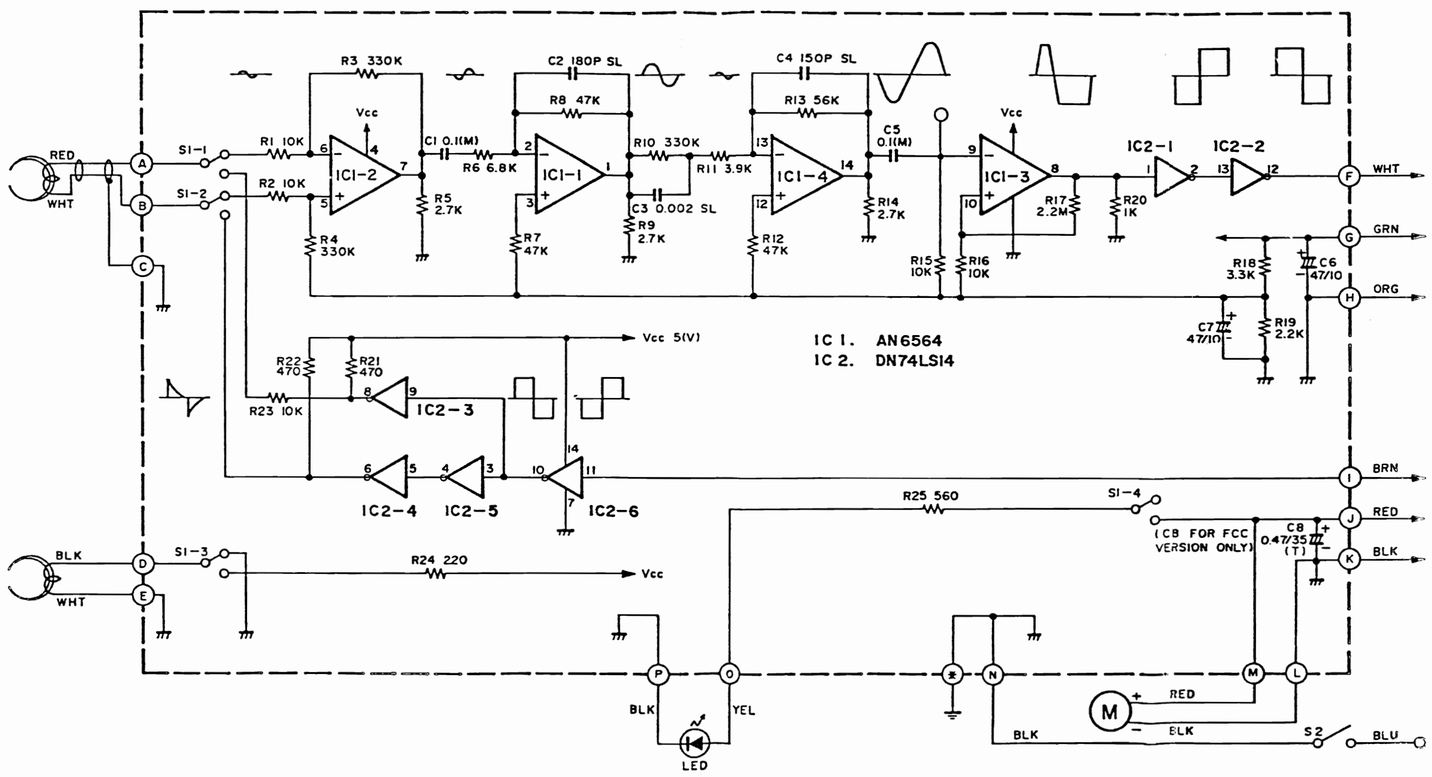
INTERGRATED CIRCUITS	
IC1	AN-6562
IC2	AN-6562
IC3	74LS14

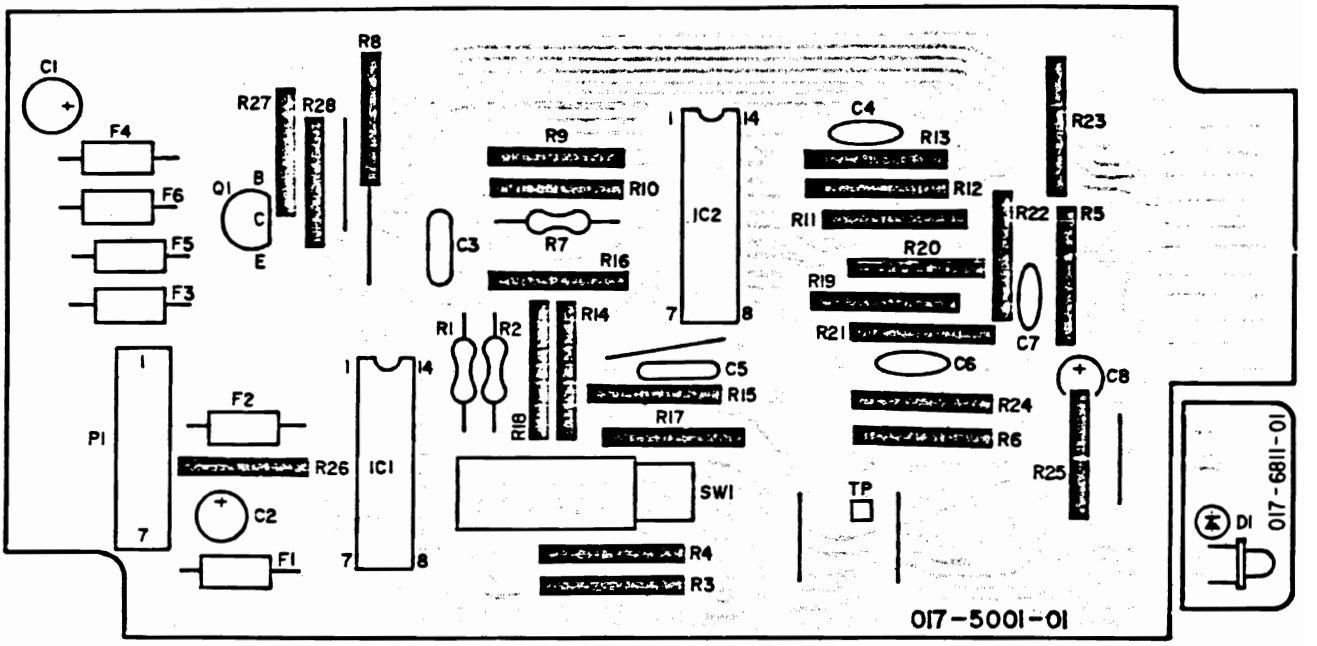
RESISTORS — All Values are in ohms-1/4 W 5% unless noted otherwise.	
R1	10K
R2	10K
R3	330K
R4	330K
R5	2.7K
R6	6.8K
R7	47K
R8	47K
R9	2.7K
R10	330K
R11	3.9K
R12	47K
R13	56K
R14	2.7K
R15	10K

RESISTORS (Continued)	
R16	10K
R17	2.2M
R18	3.3K
R19	2.2K
R20	1K
R21	470
R22	470
R23	10K
R24	220
R25	560

CAPACITORS			
C1	Mylar	0.1 μF	
C2	Ceramic	180 pF	
C3	Ceramic	0.002 μF	
C4	Ceramic	150 pF	
C5	Mylar	.1 μF	
C6	Electrolytic	47 μF 10V	
C7	Electrolytic	47 μF 10V	
C8	Tantalum	0.47 μF 35V	FCC Version Only

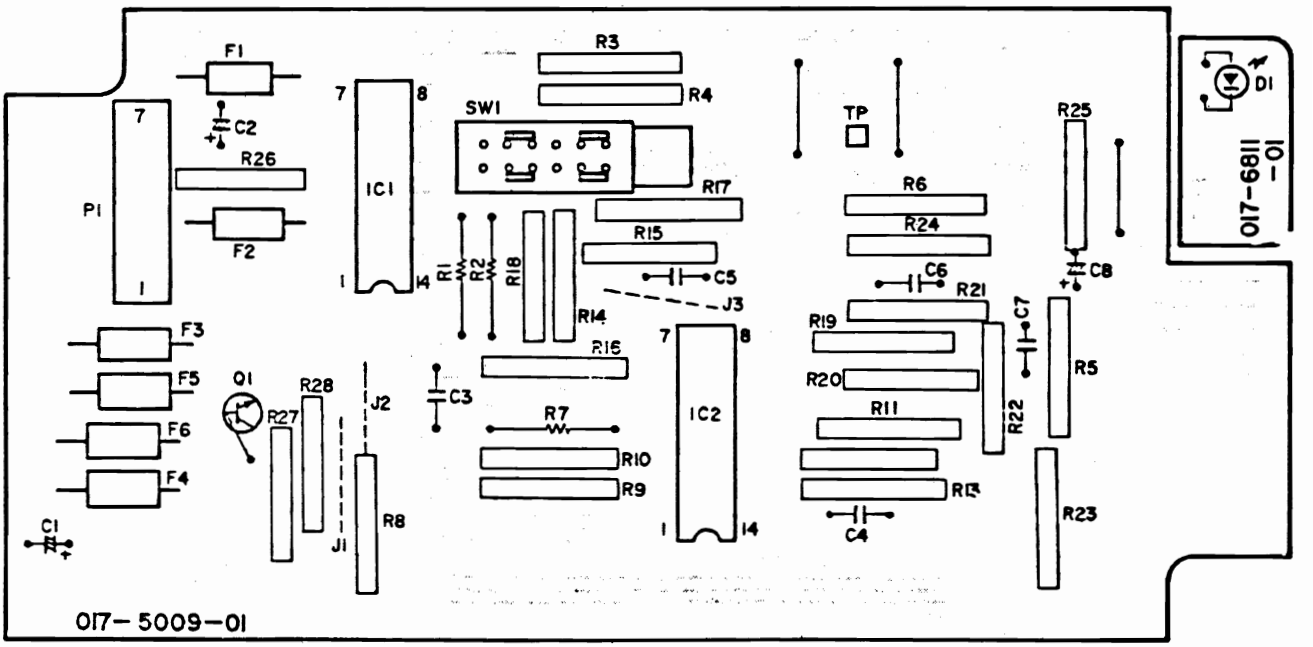
Schematic Circuit Diagram — PCB Assembly #NP-090



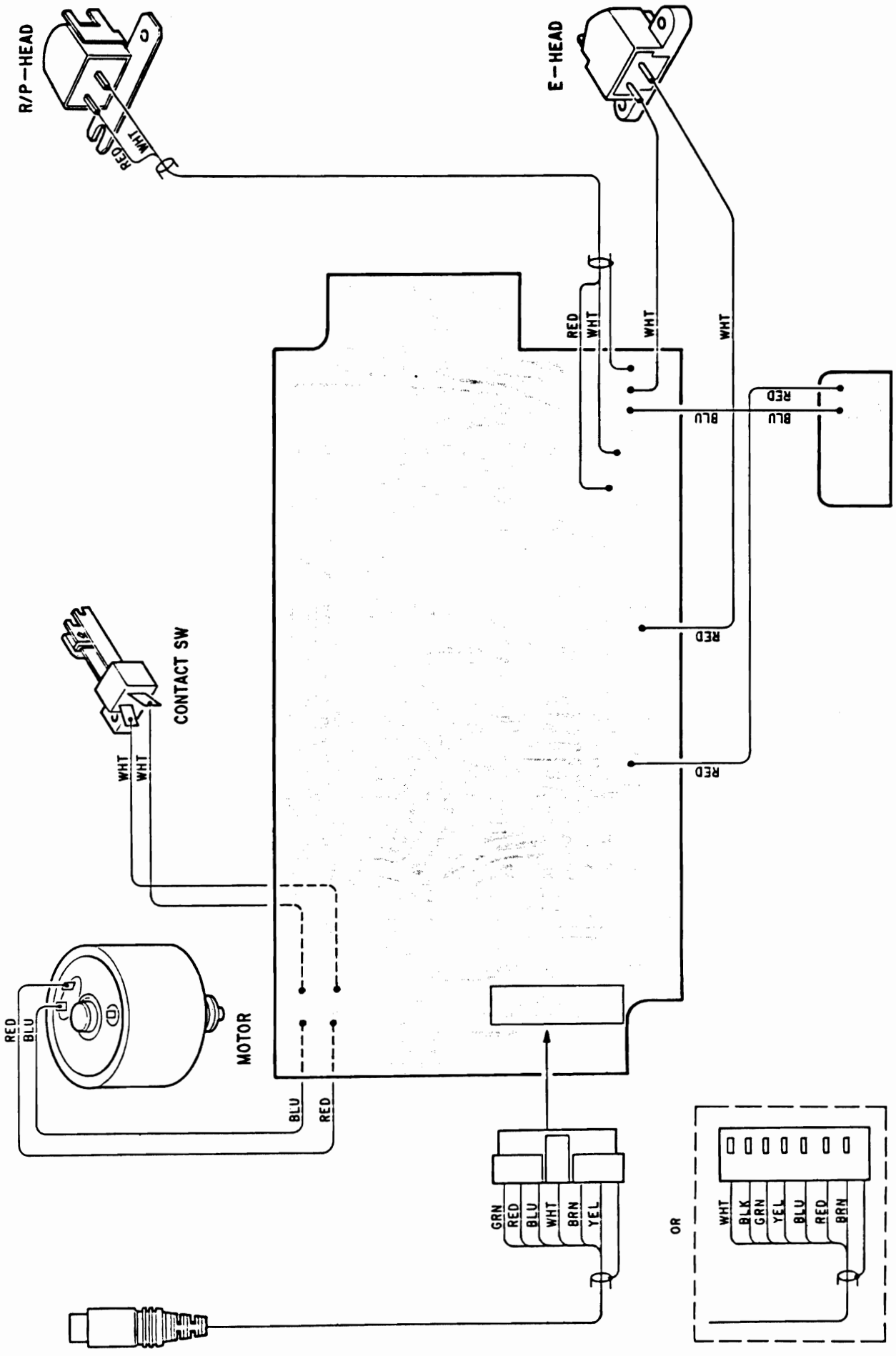


NOTE: "▬" Resistors are printed resistor

TOP VIEW



BOTTOM VIEW


R/P-HEAD
E-HEAD
RED
WHT
RED
WHT
WHT
BLU
RED
BLU
RED
RED
CONTACT SW
WHT
WHT
MOTOR
RED
BLU
BLU
RED
GRN
RED
BLU
WHT
BRN
YEL
OR
WHT
BLK
GRN
YEL
BLU
RED
BRN

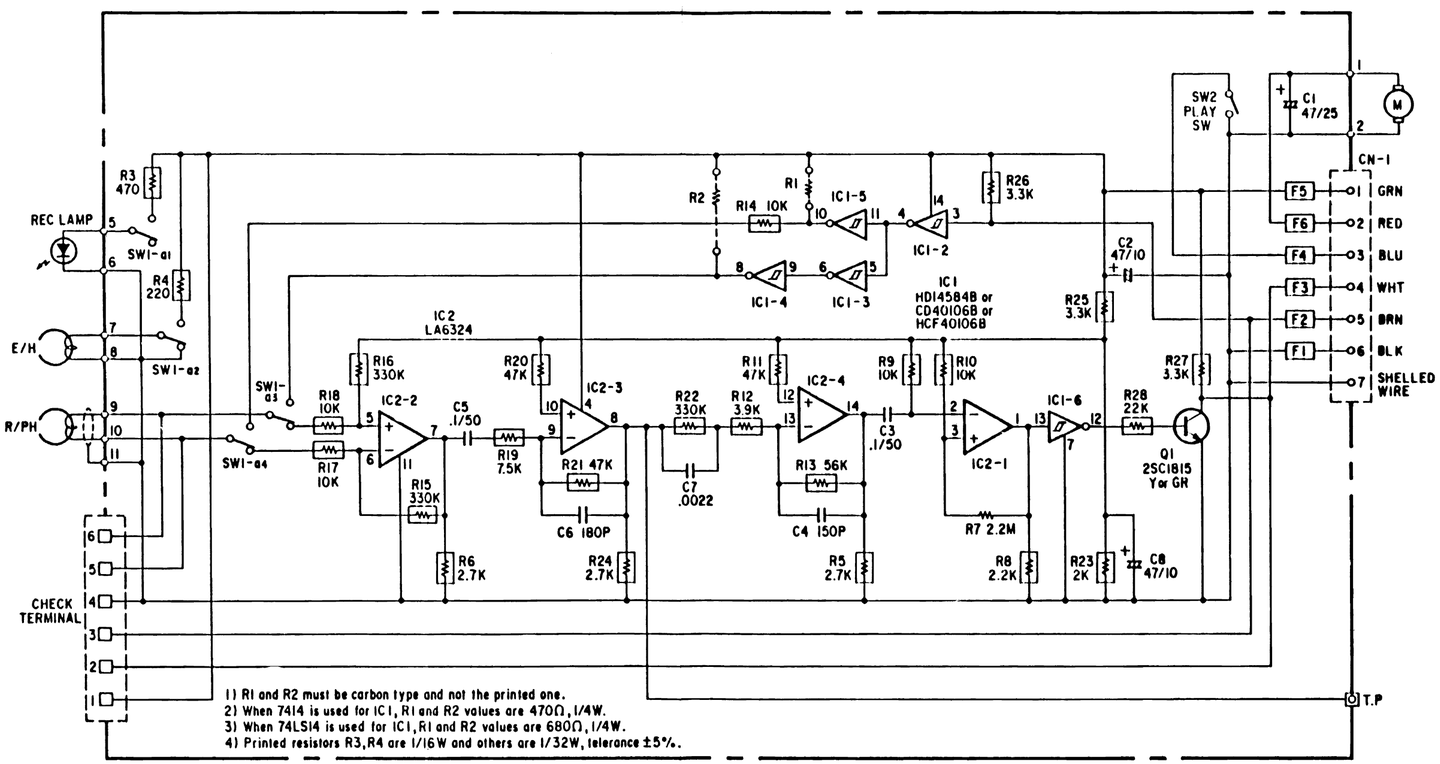
PARTS LIST — PCB ASSEMBLY #017-5001-01

NOTE: DATASETTE PARTS ARE NOT AVAILABLE FROM COMMODORE — parts list is for cross reference only.

INTERGRATED CIRCUITS	
IC1	IC LA6324
IC2	IC DM7414
TRANSISTORS	
Q1	2SC1815Y or GR
DIODES	
D1	LED RED 3ϕ
RESISTORS — All Values are in ohms-1/4 W 5% unless noted otherwise.	
R1	470 ohm
R2	470 ohm
R7	2.2M ohm

CAPACITORS		
C1	Aluminum	0.47μ/25V
C2	Electrolytic	47μ/10V
C3	Mylar	0.1μ
C4	Ceramic	150p
C5	Mylar	0.1μ
C6	Ceramic	180p
C7	Ceramic	0.0022μ
C8	Electrolytic	47μ/10V
MISC.		
F1-F6	Ferrite Bead Q1BRHW3.5x4.5x0.8	
SWI	Slide Switch	
CN1	7 Pin Connector	

Schematic Circuit Diagram — PCB Assembly #017-5001-01



1) R1 and R2 must be carbon type and not the printed one.
2) When 7414 is used for IC1, R1 and R2 values are 470Ω, 1/4W.
3) When 74LSI4 is used for IC1, R1 and R2 values are 680Ω, 1/4W.
4) Printed resistors R3, R4 are 1/16W and others are 1/32W, tolerance ±5%.

- All Resistance values are in Ω, K=10^3, M=10^6.
- All Resistors are rated at 1/4 watt, ± 5%.
- All Capacitance values are in μF, P=10^{-6}μF.
- All Capacitors are rated at 50WV.
- Resistors are printed Resistors.

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TECHTOPICS

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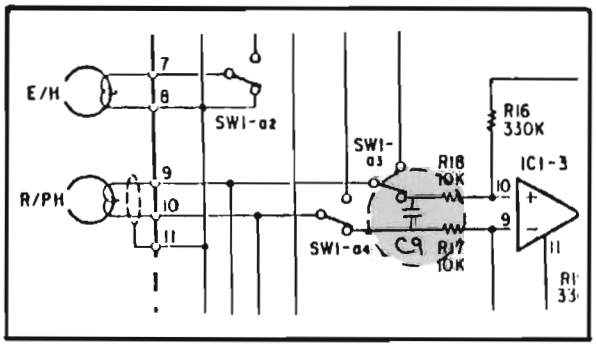
Issue 1, 1984 : Datasette 1

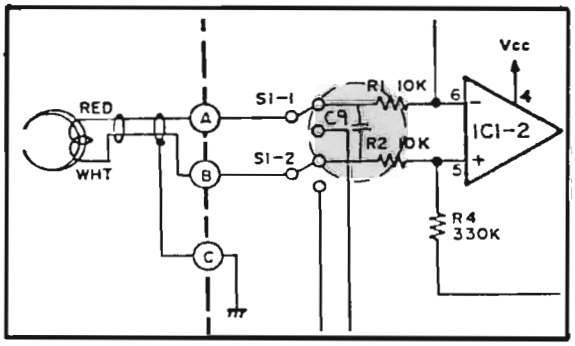
Model: 1530, 1531

PROBLEM: External noise interferences cause a LOAD ERROR with some newer model datasettes. An engineering change has been issued; however, the possibility remains that some units have reached the field uncorrected. SOLUTION:

PCB Assy # CMR-001-0	PCB Assy# 017-5001-01	PCB Assy # NP-090
1) REMOVE the 150pF cap at C4 and REPLACE with a Ceramic 470pF 50WV	1) REMOVE the 150pF cap at C4 and REPLACE with a Ceramic 470pF 50WV	1) Check C4 for 470pF cap
2) ADD C9 across R17 and R18	2) ADD C9 across R17 and R18 Note: use pins on SW1 - resistors are printed type	2) ADD C9 across R1 and R2



PCB Assy #:
CMR-001-0
017-5001-01



PCB Assy #:
NP-090

Note - Correct Values:

C4	Ceramic capacitor	470pF	+/- 20%	50 Working Volts
C9	Ceramic capacitor	.0033uF	+/- 20%	50 Working Volts

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