

U.S. DATA DRIVE TROUBLE SHOOTING GUIDE

SUPPLIES BASIC INFORMATION NEEDED TO TROUBLE SHOOT REV. 3 DATA DRIVES

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DATA DRIVE CHECK POINTSPAGE

I. Source voltages and signals

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A. Eight pin connector

1

B. Nine pin connector

1

C. Ribbon connector

1

D. J1 of Servo board motor and encoder connection

2

E. J2 of Read/Write head wire connections

2

II. Test and trouble shoot data drive

2

A. Test Data Drive using the polish (computer) box

B. Check C.I.P.

2

C. Check Motion

3

D. Check forward and reversed motors

3

E. Check SPD. SEL.

3

F. Check read and write

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DATA DRIVE TROUBLE SHOOTING

I. Some of Data Drive problems are assembly problems.

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II. C.I.P.

5

III. Motion

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IV. Motors

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V. Read/Write

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VI. Problems found on assembly line

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DATA DRIVE CHECK POINTS

I. Source voltages and signals

- A. Eight (8) pin connector J1 which has eight color coded wires starting with Black and stopping at Violet.

Pin #1 (Black) GND wire connecting to R/W board @ E24
Pin #2 (Brown) write enable (WRENA) connecting R/W @ E23
Pin #3 (Red) +12VL connecting to R/W board @ E22
Pin #4 (Orange) data output connected to R/W @ E21
Pin #5 (Yellow) +5V connected to R/W @ E20
Pin #6 (Green) Ground connected to R/W @ E19
Pin #7 (Blue) Track A/B select input connected to R/W @ E18
Pin #8 (Violet) data input connected to R/W @ E17

- B. Nine (9) pin connector J2 which also connects to Read/Write

1. Connectors has nine (9) color coded wire starting with black and ending with gray.

Pin #1 (Black) C.I.P. signal @ E33
Pin #2 (Brown) +12I signal @ E32
Pin #3 (Red) Motion sense @ E31
Pin #4 (Orange) GND @ E30
Pin #5 (Yellow) speed select @ E29
Pin #6 (Green) Stop @ E28
Pin #7 (Blue) Go forward @ E27
Pin #8 (Violet) Go reverse @ E25
Pin #9 (Gray) Brake @ E26

2. See figures 1,2 for location. 3,4 for schematic.

- C. The ribbon connector connects the Read/Write to servo.

E1 is E count
E2 is D source
E3 is D +5V source
E4 is voltage reference
E5 is tackout
E6 is brake
E7 is go reverse
E8 is go forward

E9 is stop
E10 is speed select
E11 is GND
E12 is motion sense
E13 is 12VI
E14 is C.I.P.
E15 is 12 VL

As labeled in figure #1.

D. Servo board has J connecting the motor and encoder wires.

J1 1 is N/C
J1 2 is black wire of C.I.P. switch
J1 3 is orange wire of encoder is (GND)
J1 4 is blue wire of encoder (1.5VDC)
J1 5 is brown wire of encoder which is (tack out)
J1 6 is gray wire of encoder (+12V)
J1 7 is black forward motor wire
J1 8 is red forward motor wire
J1 9 is black reverse motor wire
J1 10 is red reverse motor wire

E. Read/Write board has J2 connecting the head wires to the board.

J21 (black) shield of wire GND	Yellow	
J22 (blue)	Blue	Track A
J23 (orange)	Green	
J24 (brown)		
J25 (red)		
J26 (green)	Red	
J27 (yellow)	Brown	Track B
	Orange	

II. Test and trouble shoot data drive-

A. Test data drive using the polish box

1. Make sure power switch is in "OFF" position.
2. Plug data drive into J1 & J2 of polish box.
3. Check J1 & J2 color code to make sure the wiring is correct.
4. Set switches to the following positions:

Stop @ on (LED lit)
Go forward @ off (LED lit)
Go reverse @ off (LED lit)
Speed select @ off (LED not lit)
Brake @ off (LED not lit)
TRK A/B @ B (LED lit)
Write enable/read @ read (LED lit)
Data in @ on (LED lit)

(NOTE): C.I.P. motors do not work unless stop is in the "ON" position. Make sure write enable is in read position when not writing.

5. Turn power switch to "ON" position. No motors should be running and all LED's should be lit except brake, speed select, C.I.P. and motion.

B. Check C.I.P.

1. Push C.I.P. switch in (located in front of data drive). Should get C.I.P. light lit, and forward/reverse slow motors running. If not, you have C.I.P. problem.

C. Check Motion

1. Spin encoder wheel. Motion LED should light. If not, you have motion problems.

D. Check Forward and Reverse Motors

1. Put forward switch to "ON" position and STOP switch to "OFF" position.
2. Forward motor should be running hard fast, not able to stop. Reverse motor should be running slow and able to stop with your finger.
3. Turn stop switch to "ON" position and forward switch to "OFF" position. (LED lit).

NOTE: Forward motor located on right side of data drive just above the encoder wheel.

4. Turn reverse switch to "ON" position and then STOP switch to "OFF" position. Reverse motor (left side of data drive) should be running hard fast (hard to stop). Forward motor should be slow, easy to stop.
5. Turn stop switch to "ON" position and reverse switch to "OFF" position.

E. Check Speed Select

1. Insert any known good blank tape into data drive (CIP light should be lit).
2. Using either forward or reverse, put switch in the "ON" position. Turn STOP switch to "OFF" position. Motion LED should light and tape should be moving slowly in direction of switch being used.
3. Put speed select switch to the "ON" position. Speed of the tape should pick up making it go faster.
4. Turn speed select to "OFF" position.
5. Turn STOP switch to "ON" position.
6. Turn either forward or reverse switch to "OFF" position.
7. Both forward and reverse switches should be in the "OFF" position.

F. CHECK READ AND WRITE

1. Connect data out of polish box using BNC connector and RG/59 cable to an oscilloscope.

F. Check Read/Write (Continued)

2. Set oscilloscope switches as follows:

sec/div @ 20us.
volts/div. @ 1 volt
AC/GND/DC @ DC

3. Set data in switch of polish box to the "ON" position. (LED lit)
4. Write enable to write position (LED not lit).
5. TRK A/B switch to A position and 8KHZ/16 switch to 8KHZ position.
6. Insert blank tape. C.I.P. LED should light.
7. Put either forward or reverse switch to the "ON" position.
8. Set STOP switch to "OFF" position. Motion light should be "ON" and tape moving in direction selected by forward or reverse switch.
9. Oscilloscope will have a 8KHZ square wave appearing on the screen.
10. Flipping data in switch ON then OFF for reference pattern to look for when trying to read.
11. Set STOP switch to "ON" position.
12. Motion light should be out and tape should stop.
13. Set either forward or reverse switch that is in "ON" position to "OFF" position and turn the one that is in "OFF" position to the "ON" position.
14. Set write enable switch to read position (LED lit).
15. Turn STOP switch to "OFF" position.
16. C.I.P. and motion LED should be lit and tape should be moving in opposite direction from III A. #7.
17. Oscilloscope should be showing 8KHZ signal that was written earlier
18. For writing/or reading on track B, set TRK A/B switch to B position and 8KHZ/16KZ switch to 16KHZ position and complete steps III A. #6 thru #17.

I. Some data drive problems are assembly problems.

1. Solder shorts
2. Wiring assembled wrong
3. Components missing and/or wrong value
4. Shield shorting.
5. Wires severed.

II. C.I.P. (See figure 3 servo)

C.I.P. works when C.I.P. switch is pushed in which turn forward and reverse motors on slow and LED's light up. STOP switch has to be in the "ON" position.

C.I.P. does not work check for:

1. Correct wiring at J1 of polish box.
2. C.I.P. switch and good connection of wires.
3. +5 volts at E9 (STOP) with stop switch in the "ON" position.
4. U12 pin 7 for 3.6VDC.
5. U8 pin 9 for +5VDC going to 0VDC when C.I.P. switch is pushed in and U8 pin 8 to go from 0VDC to +5VDC when C.I.P. switch is pushed.
6. U12 pin 6 should be same as U8 pin 8.
7. U12 pin 5 should have 2.4 VDC (with stop switch in "ON" position).
8. U12 pin 5 should go from 2.4 to 0VDC when pushed in and go back to 2.4 VDC when released. U12 and U6 are inverters. Low in/high out or high in/low out.
9. U12 pin 5 should have 12V when stop is in the "OFF" position.
10. U12 pin 5 should go from 12V to 1.2 volts when forward motor is turned on 2.5 volts when reverse is turned ON.
11. U12 pin 8 5VDC
12. U12 pin 4 GND.

III. Motion

1. Encoder wires going to servo board for
 - a. Gray wire - +12 VDC
 - b. Brown wire - sineusodeI sine wave at DC level 0-12V
 - c. Blue wire - 1.2 VDC
 - d. Orange wire - GND

2. U5 pins on Read/Write Board

Pin 5 2.5 VDC

Pin 4 2.5 VDC

Pin 2

signal =

3. U10

Servo board

Pin 4 

Pin 5  (inverted)

Pin 6 

Pin 7  (interted)

SPEED/
FREQ
CONTROL

[Pin 1 1.2 VDC

[Pin 2  @ 1.2 VDC level.

Pin 8 GND

Pin 10 OVDC float above OVDC when turning encoder wheel.

Problems found:

wiring wrong

broken wires

UTO bad

encoder bad (photo transistor not putting out signal)

no voltages to encoder.

IV.

Motors.

A. With switches set @ the following:

Stop - on - light lit

Go forward - off - light lit

Go reverse - off - light lit

Speed select - off - not lit

Brake - off - not lit

STOP ON POSITION

<u>component</u>	<u>base</u>	<u>collector</u>	<u>emitter</u>
Q2	2.8VDC	12VDC	2.2VDC
Q3	12VDC	2.8	12VDC
Q4	2.8 VDC	0VDC	2.8VDC
Q7	0 VDC	2.8 VDC	0 VDC
Q5	0 VDC	2.8 VDC	0 VDC
Q6	2.8 VDC	0 VDC	2.8 VDC

STOP OFF POSITION

<u>BASE</u>	<u>COLLECTOR</u>	<u>EMITTER</u>
<u>12 VDC</u>	12 VDC	<u>12 VDC</u>
12 VDC	<u>12 VDC</u>	12 VDC
<u>12 VDC</u>	0 VDC	<u>12 VDC</u>
0 VDC	<u>12 VDC</u>	0 VDC
0 VDC	<u>12 VDC</u>	0 VDC
<u>12 VDC</u>	0 VDC	<u>12 VDC</u>

2. U12 pin 5 should be 2.5 VDC with stop in the "ON" position, (light on).
U12 pin 5 should be 12 VDC with stop in the "OFF" position. U12 pin 5 should drop to 1.5 VDC with forward motor switch in the "ON" position (light out). U12 pin 5 should be 2.5 VDC with reverse motor in the "ON" position.

3. U7 - 78L05 has voltage reference of 1.5 VDC.

4. Square wave coming from U10 pin 6 goes thru R116, C8, R37, R38, C10 producing a DC voltage for control of motor speed.

5. With STOP switch in the "ON" position:

U9 pin 2 = 1.2 VDC Pin 1 = 0 volts
pin 3 = .1 VDC

With STOP switch in the "OFF" position:

U9 pin 2 = .1 VDC Pin 1 = 12 VDC
pin 3 = 1.2 VDC

6. With STOP switch in the "ON" position:

U9 pin 5 should be 1.4 VDC Pin 7 = 1.4 VDC
pin 6 should be 1.4 VDC

7. With STOP in the "OFF" position:

U9 pin 5 should be 10 VDC pin 7 = 11 volts DC
pin 6 should be 6.8 VDC

8. With STOP on:

Q2 C = 11.8 volts B = 1.4 volts E = 2 volts

9. With STOP off:

Q2 C = 11.7V B = 11V E = 10.2VDC

10. With STOP on:

Q3 C = 12V B = 2.5V E = 12V

With STOP off:

Q3 C = 12V B = 12V E = 12V

IV. Motors

11. GO forward OFF with stop in "OFF" position.

U12 pin 1 = 4 VDC

pin 5 = 12 VDC

U8 pin 11 = 0 VDC

pin 10 = 12VDC

Q4 E = 12 VDC

Go forward in the "ON" position

U12 pin 1 = 0 VDC

pin 5 = 1.2 VDC

U8 pin 11 = 5 VDC

pin 10 = 0 VDC

Q4 E = 1.2 VDC

E8 GO forward also goes to (Slow motor) U9 & Q7

U9 pin 12 = 1.2 VDC

pin 13 = 3.3 VDC

pin 14 = 0 VDC

With stop OFF & forward OFF

With STOP OFF & forward PM

U9 pin 12 = 1.2 VDC

pin 13 = 1.2 VDC

pin 14 = 1.6 VDC then goes to 3.3 VDC sine wave.

Biassing Q7 for take up motor.

12. A. Reverse motors

1. GO reverse OFF, STOP on (LED lit)

U8 pin 1 = 4 VDC

pin 2 = 0 VDC

U12 pin 5 = 2.4 VDC

2. Turn STOP off.

U12 pin 5 = 12 VDC

3. Turn reverse ON:

U12 pin 5 goes from 12 VDC down to 3 VDC with motor's running.

U8 pin 1 = 0 VDC

pin 2 = 5 VDC which goes to U8 pin 5 making the output of U8 pin 6 go from 12 VDC to 0-VDC that biases Q6 for fast forward motor.

B. GO reverse E7 also goes to U9, Q5, for take up motor.

1. Go reverse at OFF

U9 pin 10 = 18VDC

pin 9 = 3.2 VDC

pin 8 = 0VDC

(STOP ON)

2. GO reverse at ON

U9 pin 10 = 1.2 VDC

pin 9 = 1.3 VDC

pin 8 = 1.6 VDC

(STOP OFF)

3. Q5 take up motor is biased with 1.6 VDC

V. Read/Write

A. R/W board Select track A or B

A = high

B = low

1. E18 input selects either track A or B using U1, U2, Q1, and Q2.

Ohm head from brown to red (12 Ohms) brown to orange (12 Ohms) (Trk B)
Blue to yellow (12 ohms) blue to green (12 ohms)

2. E23 (WRENA) write enable goes to U1 & U2 when in a writing condition.

3. Data input E17 supplies data to U1.

4. E21 data output from U2 pin 2.

5. Q3 & U5 supply reference voltage to E4 servo.

B. 1. Track select output on head with polish box set at Track A or B.
8KHZ/16KHZ switch set at 8KHZ along with track A, 16 KHZ with track B.
Write switch in write position.

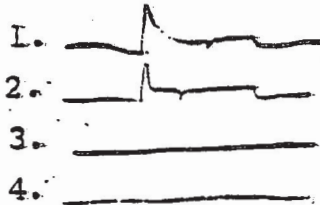
1.. 8 KHZ U3 pin 4

2.. 8 KHZ pin 11

3. 16 KHZ pin 15

4. 16 KHZ pin 2

TRACK A



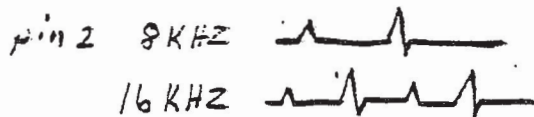
TRACK B



2. U3 pin 13 & 3 6 VDC

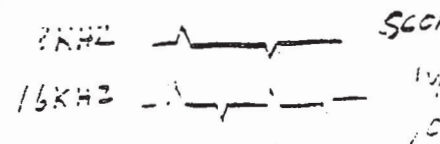
3. U4 pins 12, 13, 14, 9, 10, 8, = 6 VDC.

U4 pins 2 & 3



Scope E
1.5mV/cm
1045

pin 2



4. U4 pin 1 amplified to 5 VDC

5. U4 pin 6 6 VDC level.

U4 pin 7 3 VDC level.

6. U5 pin 7 6 VDC level.

Pin 6 6 VDC level.

Pin 1 11.5 pp

U5 pin 13 motor on 5 VDC level

7. U2 pin 1 32us 35us

pin 2 35us 32us

8. U2 pin 3 35us 32us

pin 4 32us 35us

9. U2 at track A

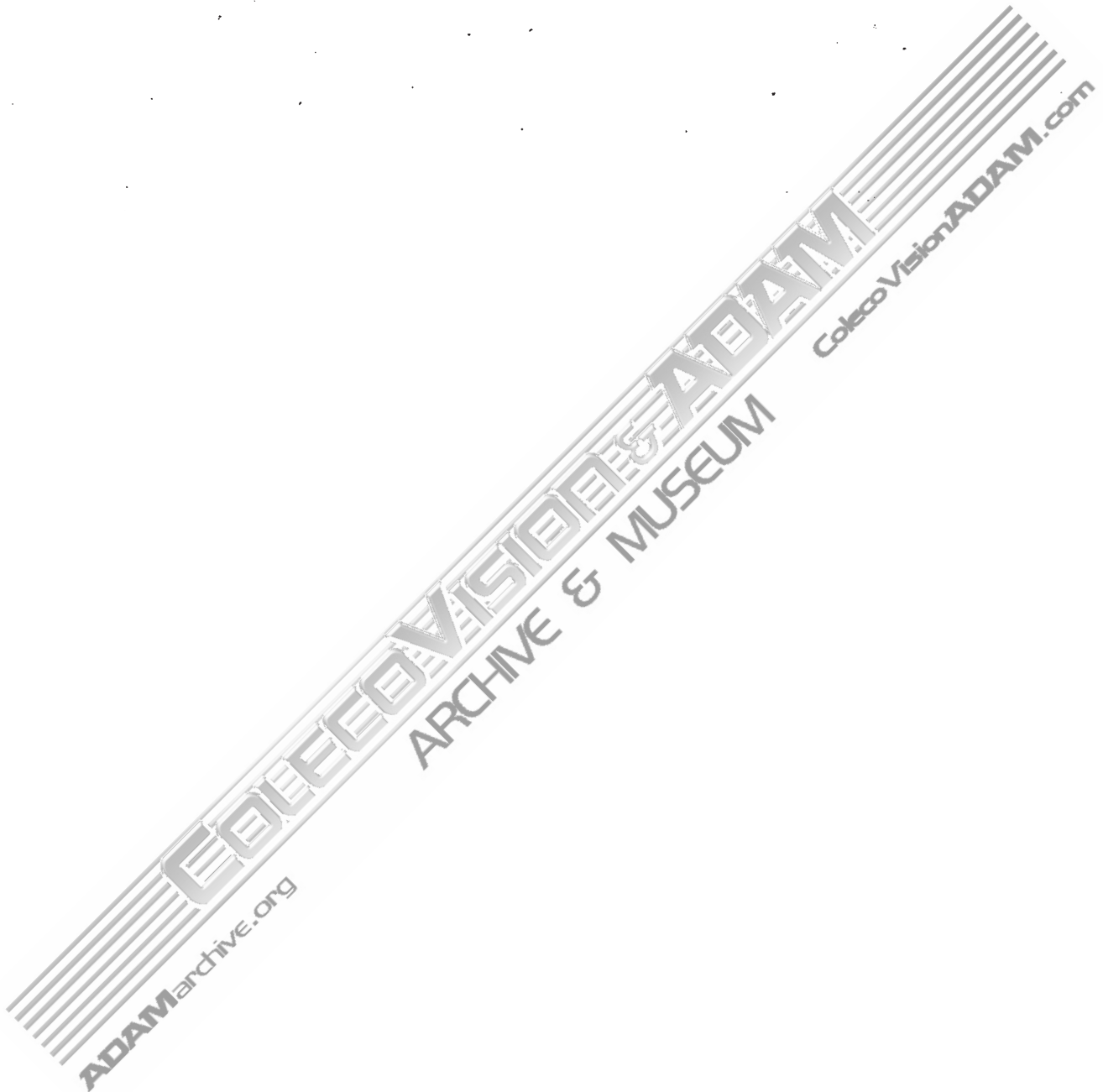
Pin 5 = 0 V

Pin 6 = 5 V

At track B

Pin 5 = 4 VDC

Pin 6 = 0 VDC



PROBLEMS FOUND ON ASSEMBLY LINE

A. 1E No tape munt.

Q2 in backwards (servo)
bad motor
resoldered motor wires
C71 shorted
solder short between brake & reverse wires
Q1 missing servo
bad pot
Q2 in backwards (servo)
GND and CIP wire reversed on harness at board conn.
E27 & E28 shorted together R/W board

B. If no left slow

cold solder on motor wire
broken trace at U9 pin 13
R40 missing or wrong value
open trace at U9 pin 13 and R42 (servo)
cold solder at E7
solder short where harness cable gets soldered into read/write board
CR2 missing (servo)
CR11 reverse
left motor bad
U10 bad
(12V) E32 shorted GND
R41 missing or wrong value
UT2 - pins 1,2,3, not inserted into board
open trace U8 pin 10 - Q4 of (servo) board
open trace at R46
open trace at UT2 & R35 (servo)
open trace at U8 pin 4
U9 bad
Q5 bad
R115 missing

C. IG no right slow

solder bridge on R107
forward motor bad
R3 & R54 shorted by solder E12 & E11 shorted
E8 (go forward) shorted to E9 (stop)
Q4 bad
R28 wrong value
R31 wrong value
R40 missing

D. If no left fast

R40 missing
Q3 bad
motor bad
Q2 bad
IC shorted to Q3
CR11 in backwards
left motor bad
motor wire not connected

E. 1I no right fast

Q4 bad (shorted internally)
cold solder joint on servo Q4
from U9 pin 3 trace open to R115
E12 open trace to board
E33 - E14 open trace to U10
replaced motor
Q5 cold solder joint
U9 bad

F. TK no motor

wires not connected
wires connected wrong
open trace to motor wire
open trace at R43 & R29
open trace from U5 R/W to R100 R/W
R50 missing
E9 shorted to ribbon connector
solder short at R50
harness wiring wired wrong order
R40 wrong value
open trace C13 to R31 (servo)
C20 solder short
E15 12V shorted to E14 CIP
C2 shorted by solder splash
E15 (12V) shorted to ground
cable harness shorting to shield
solder short by R100 & R102
E15 open
open trace from E23 to E13

G. 1M short out

spacer shorted to board
shield shorting to board
C21 solder short
J2 wires assembled wrong
E13 (+12V) shorted to E11 GND
CIP wire shorted by shield

H. 1N slow motor

solder bridge on motor wire
R45 wrong value
R32 wrong value
solder short Q3 C-E
reference voltage shorted
U12 bad
R71 servo bad

I. 1O reversed motor

motor wires assembled wrong
harness wires assembled wrong

J. 1P motor on

R52 missing
U9
U12 pin 1 & 3 solder short
E20 & E19 wire from harness reversed
J1 of servo E2 shorted to E3 (orange
encoder wire)
Motor wire shorted to GND
Ribbon connector shorted to shield
U12 bad
R54 & R3 solder short
Q3 shorted base to collector
Q5 bad
Cold solder on motor wires

K. 2A bad pot (no speed)

reset speed
bad head
bad encoder
R7T bad
U10 bad
wire clipping shorting U10 out
R3 wrong value or missing
hub wobbling causing frequency to be off
open trace from head wire to U3

L. 2B Runaway

shield shorting motor wires
R116 bad
U10 bad
open trace E7 (go reverse) to U8 pin 1 R/W

M. 2C No read/write

solder short E18 to E17 (track A/B to data)
open trace from U3 to CR4
E17 data in wire not stripped before it was
inserted into board
Encoder too tight (binding)
Open trace
C5 shorted by trim wire
green harness wire not trimmed before being
inserted into board
U3 bad
bad head
cold solder joints
U10 bad
Q3 solder splash

	LIGHT ON	NO LIGHT	NO MOTORS	
IA C.I.P.	X		X	short C.I.P. wire
	X		X	short J1 @ E2 (servo board)
	X	X		C.I.P. switch
	X	X		U10 bad
	X	X		C.I.P. switch bent
	X			open trace U10 pin 10 to E12
		X	X	C.I.P. wire broken
			X	U12 bad
		X	X	E1 & E2 and/or E3 short
			X	parts missing
	X		X	C.I.P. wire not stripped
				and not soldered
			X	U12 pin 5 shorted
	X	X	X	cold solder
	X			C.I.P. switch stuck in ON position

1B Bad hub

bad hub
bad hub/replace motor
noisy motor/replace

1C Runaway

bad photo transistor

R37 shorted to ground

C3 shorted by solder

Diode in backwards

Encoder too tight

R16 shorted to ground

Solder shorts

U10 bad

R48 missing

Ribbon connector solder short

R49 wrong value

Solder splash U12 pin 2 & 3

C.I.P. wire not soldered

Wiring wrong @ board and/or plug

Q4, bad
Q3, shorted C-3
R111 missing
solder short from C168 to R50
bad motor
QT R/W in backwards

1D motion

U10 bad
open trace U10 pin 10 to E12
solder short U5 @ R/W pin 4,5,2
C2 missing
encoder bad

1D motion

not connecting/or encoder
wiring wrong
no voltage @ encoder input
open trace
J2 wired wrong
connector not plugged in
GND wire of 8 pin connector out
colder solder on harness wires
replaced R31 wrong value
1 hub shorter than other
solder splash C66, R2, R3
R71 bad (broken) pot
bad trace pin 4, U10 to E5
E11 (GND) shorted to E12, M. ser

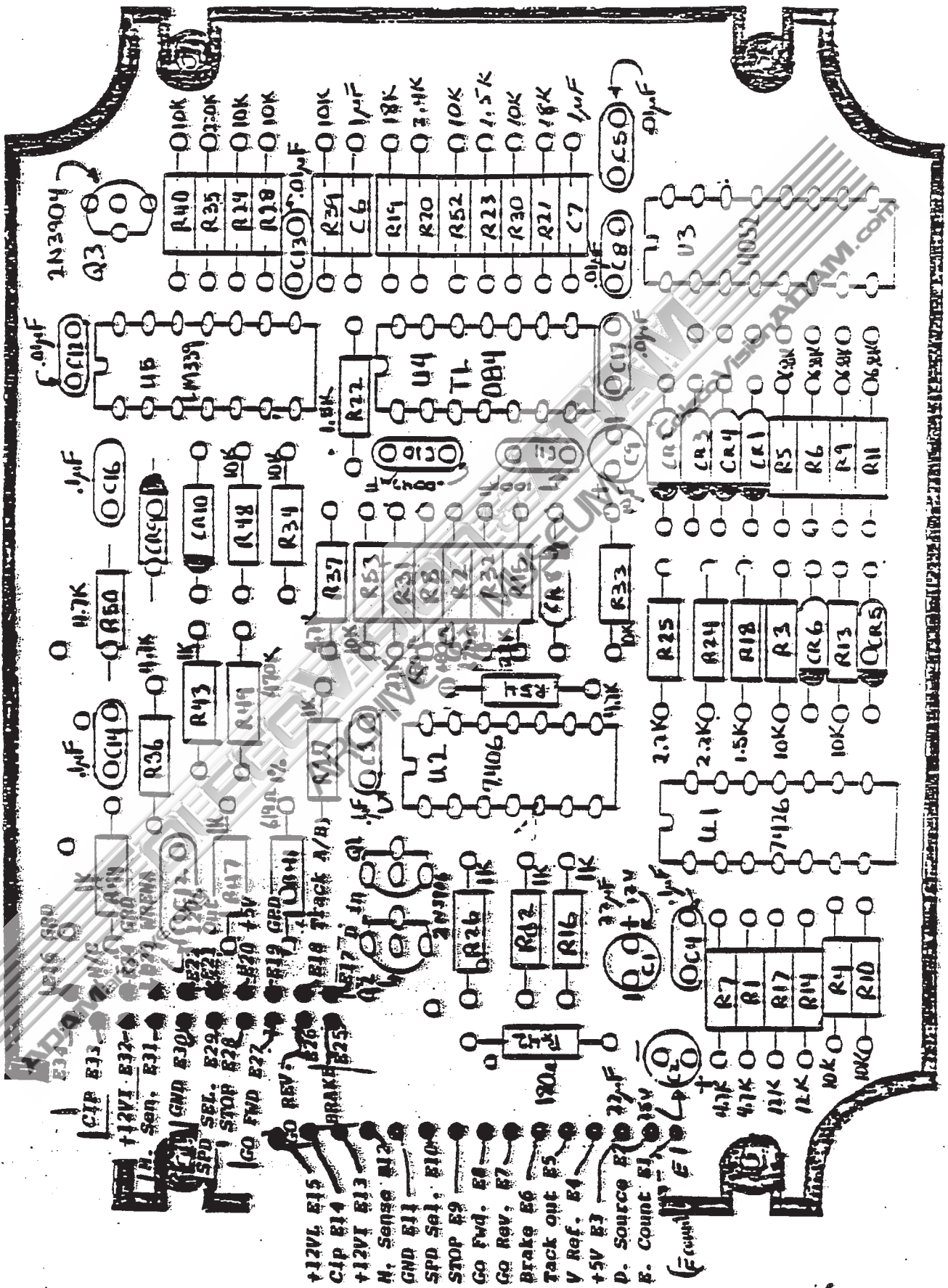
R. Common read/write problems

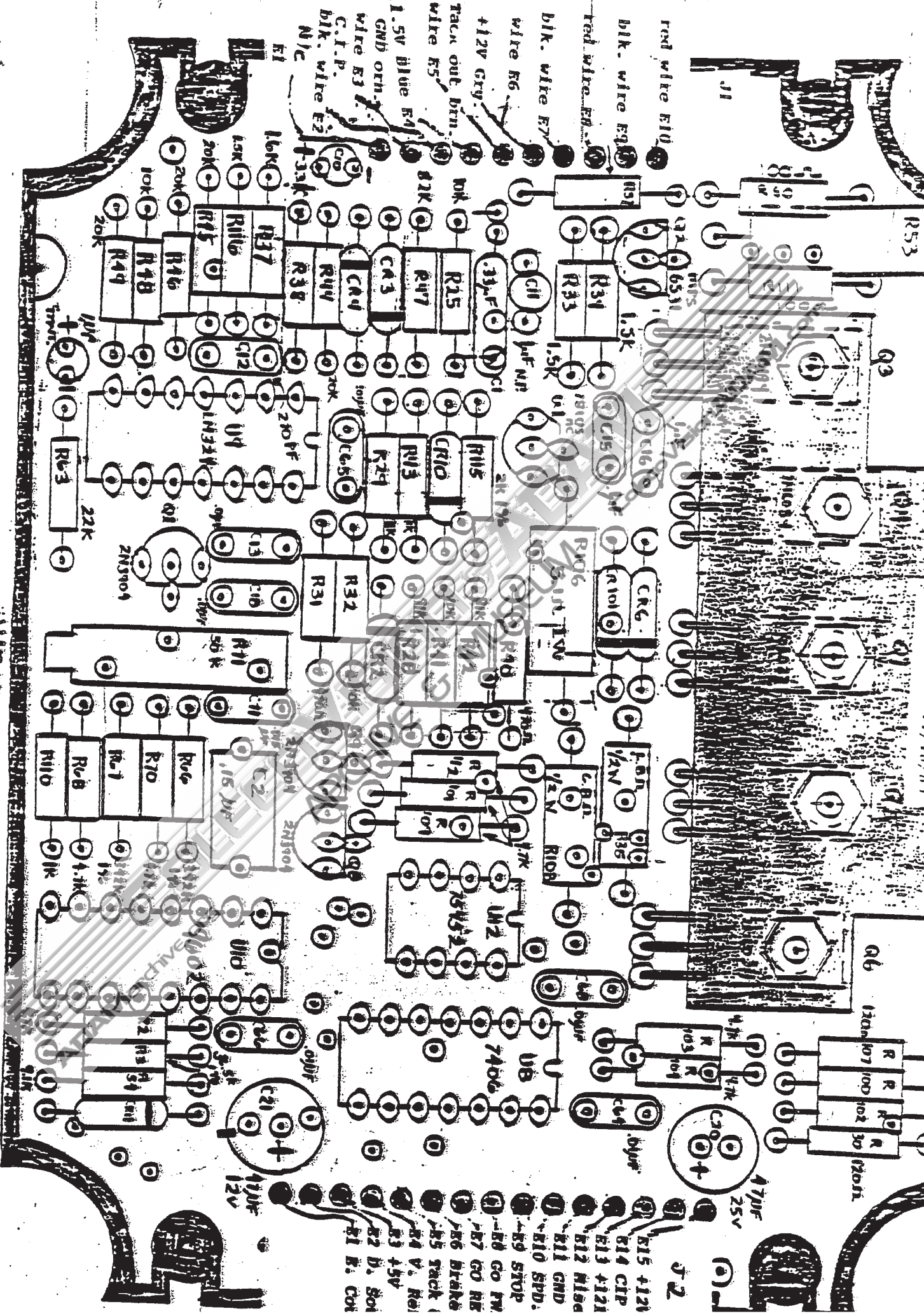
1. Head alignment (replaced head)
2. Frequency of data drive.
3. Check for good tape.
4. T.I.R. of motor hubs for ten thousandths tolerance (.010)
5. Encoder wheel for good mechanical and electrical functions.
6. U1 & U2.
7. Check for rev. modifications of Rev. C, A5, A12 boards.

FIGURE 1

READ/WRITE

REV. B 11/18/83



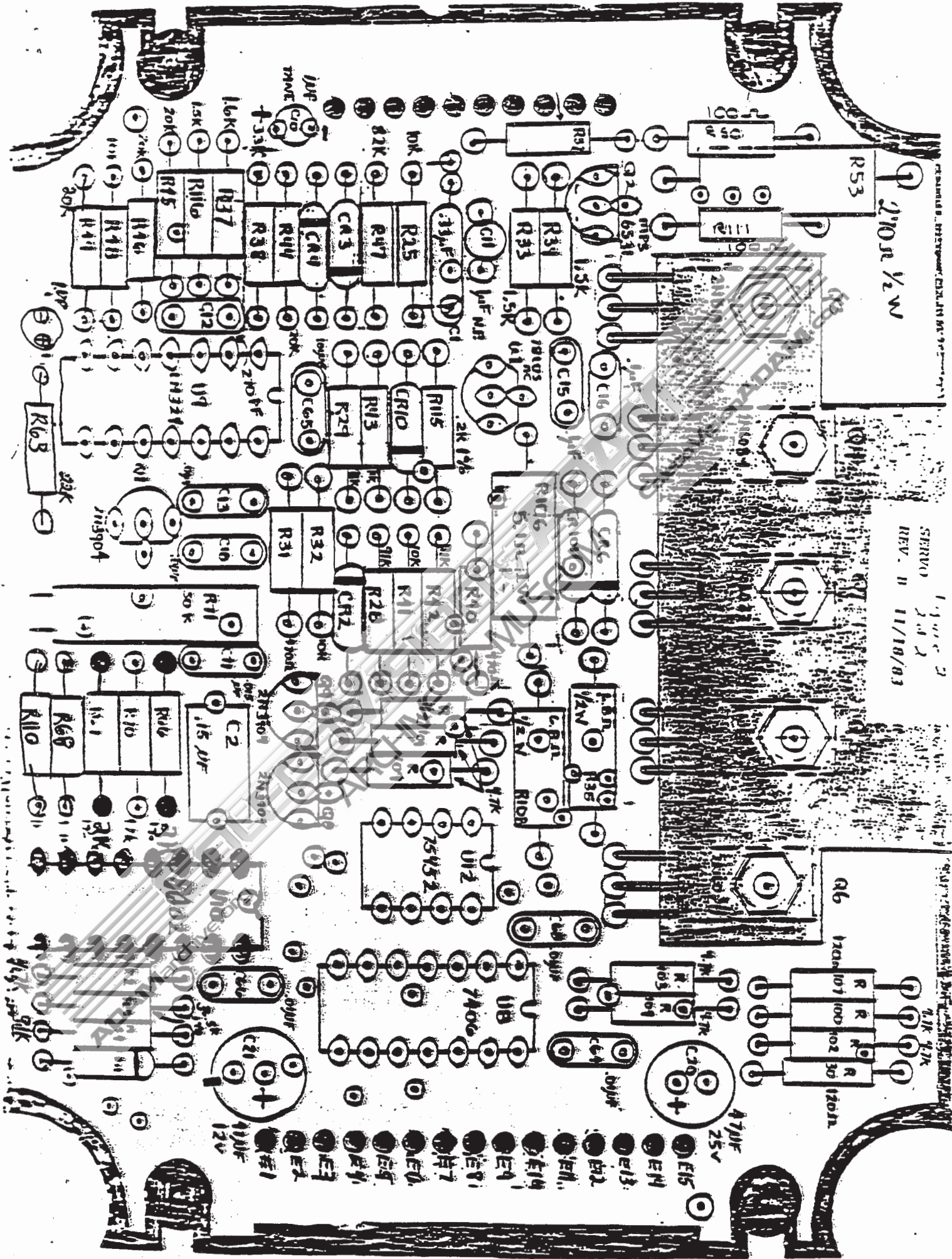


AVIC 13

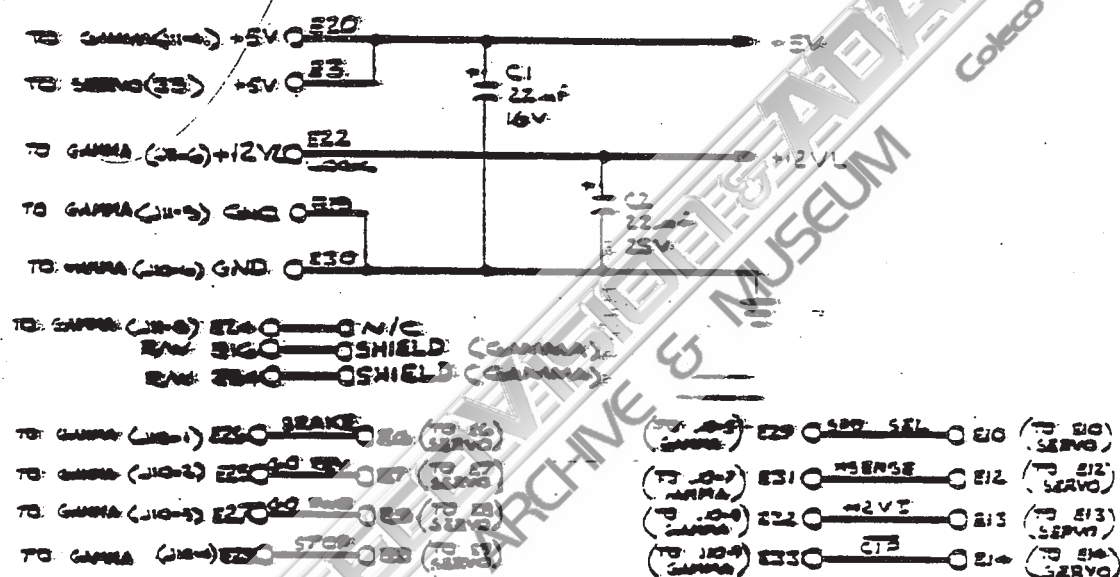
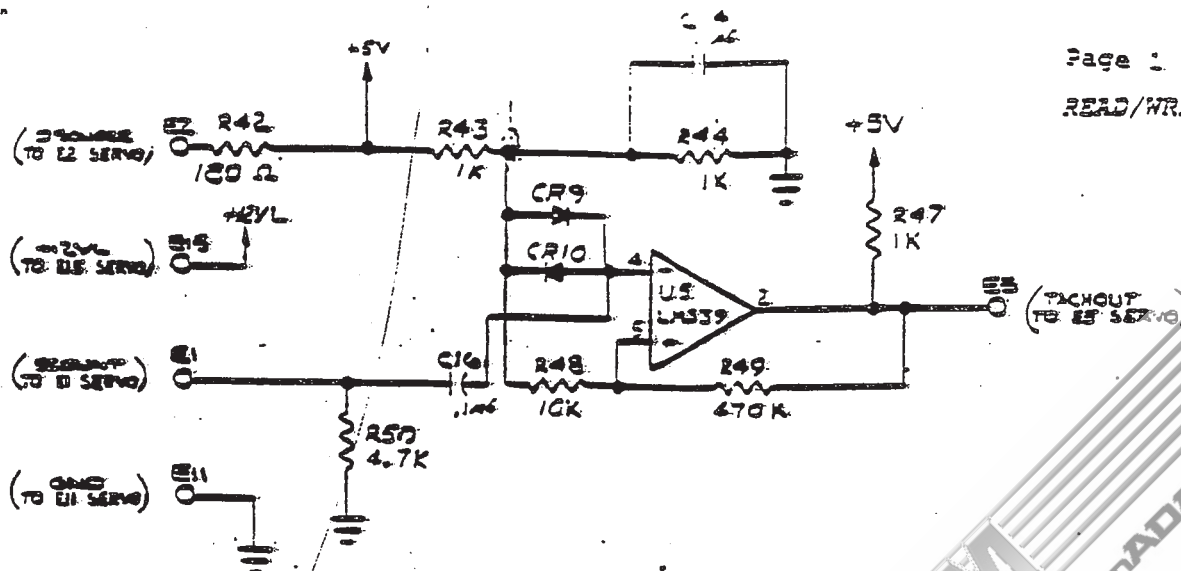
File Specs
Inventory

- K15 +12V
- K14 CIP
- K13 +12V
- K12 N150
- K11 GND
- K10 SPD.
- K9 STOP
- K8 GO FW
- K7 GO RE
- K6 Brake
- K5 Tack
- K4 V. Re
- K3 +5V
- K2 D. Sol
- K1 R. Cor

SERVO 2.4.2
REV. II 11/18/83



Page 1 of 2
REAL/WR-22

[illegible]

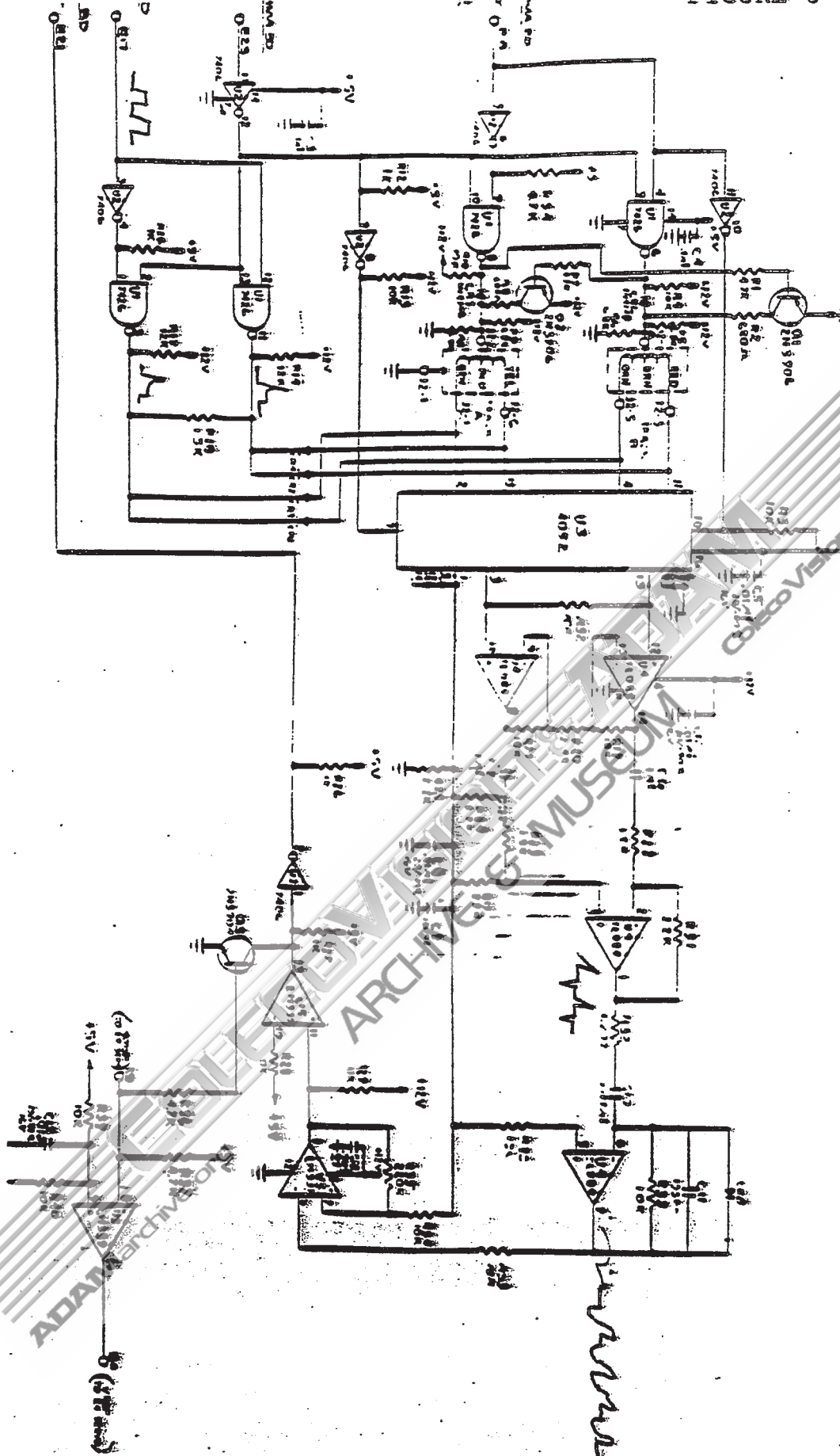
**PRODUCTION
RELEASE**
For Manufacturing
Or Purchasing

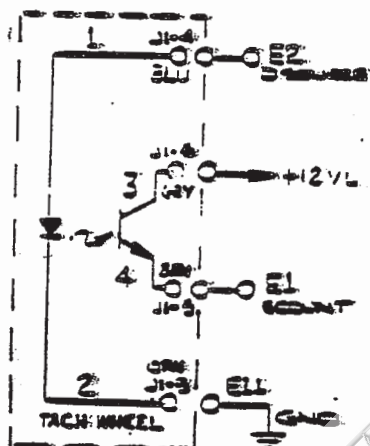
TES:
UNLESS OTHERWISE SPECIFIED:
CAPACITORS ARE CERAMIC DISC,
VALUED IN PICOFARADS
RESISTORS ARE CARBON FILM,
VALUED IN OHMS, 2 1/2%, 1/4WATT
INDUCTANCE VALUES ARE IN
MICROHENRIES
DIMENSIONS ARE 1/4x1/4x1/8

FOR ASSEMBLY:
SEE DRAWING: 417205
FOR PRINTED WIRING BOARD:
SEE DRAWING: 417205

Component Comparison:		
TYPE	LAST ROW	SELECTED ROW
WIRE	254	
WIRE	257	
WIRE	258	
WIRE	259	
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WIRE	392	
WIRE	393	
WIRE	394	

1. NAME OF THE PARTY 2. ADDRESS 3. CITY 4. STATE 5. ZIP 6. PHONE 7. FAX 8. E-MAIL 9. WEBSITE 10. OTHER		11. NAME OF THE PARTY 12. ADDRESS 13. CITY 14. STATE 15. ZIP 16. PHONE 17. FAX 18. E-MAIL 19. WEBSITE 20. OTHER	21. NAME OF THE PARTY 22. ADDRESS 23. CITY 24. STATE 25. ZIP 26. PHONE 27. FAX 28. E-MAIL 29. WEBSITE 30. OTHER	31. NAME OF THE PARTY 32. ADDRESS 33. CITY 34. STATE 35. ZIP 36. PHONE 37. FAX 38. E-MAIL 39. WEBSITE 40. OTHER	41. NAME OF THE PARTY 42. ADDRESS 43. CITY 44. STATE 45. ZIP 46. PHONE 47. FAX 48. E-MAIL 49. WEBSITE 50. OTHER
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1. DECOUPLING CAPACITORS ARE 0.01
2. U.O. 3. ALL RESISTORS ARE 1/4W, 5%
3. TRANSISTORS Q3-THRU Q7 ARE
HEATSLINK
4. DELETED REFERENCE DESIGNATIONS:
RESISTORS: R14-24, 26, 27, 36, 39, 51, 52, 62, 64,
65, 68, 72-99, 105, 113, 114
CAPACITORS: C4-9, 14-17, 19, 22-63, 67, 68, 70

TOOLING RELEASE
ECR/ ECR

STAINLESS OTHERWISE SPECIFIED
CAPSCREWS ARE CAPSCREWS ONLY
VALUED IN PREPARATION
NUTSCREWS ARE CAPSCREWS FROM
VALUED IN CAPS. 2.5X 1/4" NUT
6. NUTSCREWS ARE NUTSCREWS ONLY
VALUED IN NUTS. 2.5X 1/4" NUT
NUTSCREWS ARE NUTSCREWS ONLY
VALUED IN NUTS. 2.5X 1/4" NUT

[illegible]

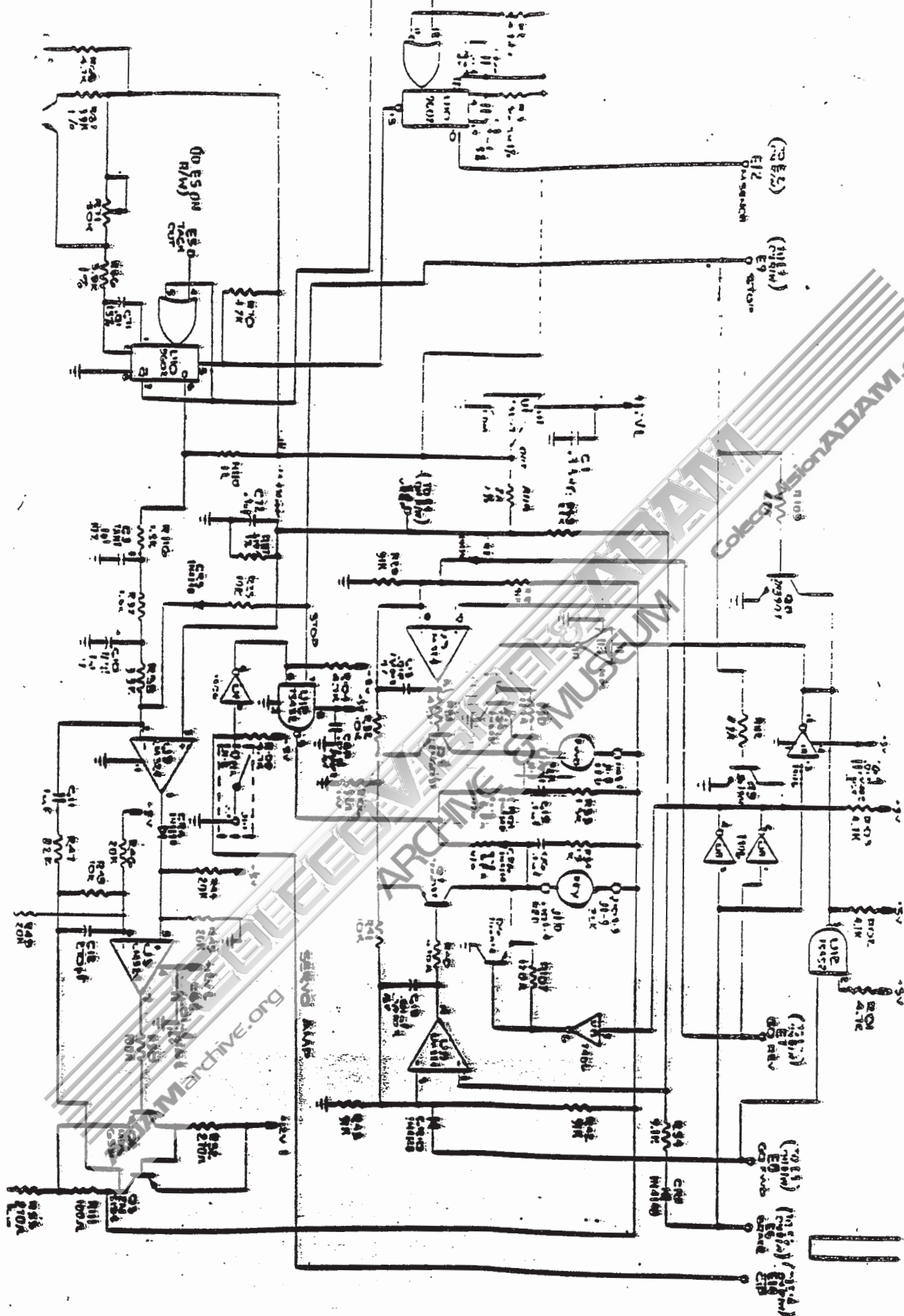
**PRODUCTION
RELEASE**
For Manufacturing
Or Purchasing:

FOR SCHEDULE SEE ONE

FOR PRINTED WORKS SEEN

SEE DRAWING 11-7

PREVIOUS EDITIONS 2030. 1011 1012 1013		1014 1015 1016 1017 1018 1019 1020 1021 1022 1023 1024 1025 1026 1027 1028 1029 1030 1031 1032 1033 1034 1035 1036 1037 1038 1039 1040 1041 1042 1043 1044 1045 1046 1047 1048 1049 1050 1051 1052 1053 1054 1055 1056 1057 1058 1059 1060 1061 1062 1063 1064 1065 1066 1067 1068 1069 1070 1071 1072 1073 1074 1075 1076 1077 1078 1079 1080 1081 1082 1083 1084 1085 1086 1087 1088 1089 1090 1091 1092 1093 1094 1095 1096 1097 1098 1099 1100 1101 1102 1103 1104 1105 1106 1107 1108 1109 1110 1111 1112 1113 1114 1115 1116 1117 1118 1119 1120 1121 1122 1123 1124 1125 1126 1127 1128 1129 1130 1131 1132 1133 1134 1135 1136 1137 1138 1139 1140 1141 1142 1143 1144 1145 1146 1147 1148 1149 1150 1151 1152 1153 1154 1155 1156 1157 1158 1159 1160 1161 1162 1163 1164 1165 1166 1167 1168 1169 1170 1171 1172 1173 1174 1175 1176 1177 1178 1179 1180 1181 1182 1183 1184 1185 1186 1187 1188 1189 1190 1191 1192 1193 1194 1195 1196 1197 1198 1199 1200 1201 1202 1203 1204 1205 1206 1207 1208 1209 1210 1211 1212 1213 1214 1215 1216 1217 1218 1219 1220 1221 1222 1223 1224 1225 1226 1227 1228 1229 1230 1231 1232 1233 1234 1235 1236 1237 1238 1239 1240 1241 1242 1243 1244 1245 1246 1247 1248 1249 1250 1251 1252 1253 1254 1255 1256 1257 1258 1259 1260 1261 1262 1263 1264 1265 1266 1267 1268 1269 1270 1271 1272 1273 1274 1275 1276 1277 1278 1279 1280 1281 1282 1283 1284 1285 1286 1287 1288 1289 1290 1291 1292 1293 1294 1295 1296 1297 1298 1299 1300 1301 1302 1303 1304 1305 1306 1307 1308 1309 1310 1311 1312 1313 1314 1315 1316 1317 1318 1319 1320 1321 1322 1323 1324 1325 1326 1327 1328 1329 1330 1331 1332 1333 1334 1335 1336 1337 1338 1339 1340 1341 1342 1343 1344 1345 1346 1347 1348 1349 1350 1351 1352 1353 1354 1355 1356 1357 1358 1359 1360 1361 1362 1363 1364 1365 1366 1367 1368 1369 1370 1371 1372 1373 1374 1375 1376 1377 1378 1379 1380 1381 1382 1383 1384 1385 1386 1387 1388 1389 1390 1391 1392 1393 1394 1395 1396 1397 1398 1399 1400 1401 1402 1403 1404 1405 1406 1407 1408 1409 1410 1411 1412 1413 1414 1415 1416 1417 1418 1419 1420 1421 1422 1423 1424 1425 1426 1427 1428 1429 1430 1431 1432 1433 1434 1435 1436 1437 1438 1439 1440 1441 1442 1443 1444 1445 1446 1447 1448 1449 1450 1451 1452 1453 1454 1455 1456 1457 1458 1459 1460 1461 1462 1463 1464 1465 1466 1467 1468 1469 1470 1471 1472 1473 1474 1475 1476 1477 1478 1479 1480 1481 1482 1483 1484 1485 1486 1487 1488 1489 1490 1491 1492 1493 1494 1495 1496 1497 1498 1499 1500 1501 1502 1503 1504 1505 1506 1507 1508 1509 1510 1511 1512 1513 1514 1515 1516 1517 1518 1519 1520 1521 1522 1523 1524 1525 1526 1527 1528 1529 1530 1531 1532 1533 1534 1535 1536 1537 1538 1539 1540 1541 1542 1543 1544 1545 1546 1547 1548 1549 1550 1551 1552 1553 1554 1555 1556 1557 1558 1559 1560 1561 1562 1563 1564 1565 1566 1567 1568 1569 1570 1571 1572 1573 1574 1575 1576 1577 1578 1579 1580 1581 1582 1583 1584 1585 1586 1587 1588 1589 1590 1591 1592 1593 1594 1595 1596 1597 1598 1599 1600 1601 1602 1603 1604 1605 1606 1607 1608 1609 1610 1611 1612 1613 1614 1615 1616 1617 1618 1619 1620 1621 1622 1623 1624 1625 1626 1627 1628 1629 1630 1631 1632 1633 1634 1635 1636 1637 1638 1639 1640 1641 1642 1643 1644 1645 1646 1647 1648 1649 1650 1651 1652 1653 1654 1655 1656 1657 1658 1659 1660 1661 1662 1663 1664 1665 1666 1667 1668 1669 1670 1671 1672 1673 1674 1675 1676 1677 1678 1679 1680 1681 1682 1683 1684 1685 1686 1687 1688 1689 1690 1691 1692 1693 1694 1695 1696 1697 1698 1699 1700 1701 1702 1703 1704 1705 1706 1707 1708 1709 1710 1711 1712 1713 1714 1715 1716 1717 1718 1719 1720 1721 1722 1723 1724 1725 1726 1727 1728 1729 1730 1731 1732 1733 1734 1735 1736 1737 1738 1739 1740 1741 1742 1743 1744 1745 1746 1747 1748 1749 1750 1751 1752 1753 1754 1755 1756 1757 1758 1759 1760 1761 1762 1763 1764 1765 1766 1767 1768 1769 1770 1771 1772 1773 1774 1775 1776 1777 1778 1779 1780 1781 1782 1783 1784 1785 1786 1787 1788 1789 1790 1791 1792 1793 1794 1795 1796 1797 1798 1799 1800 1801 1802 1803 1804 1805 1806 1807 1808 1809 1810 1811 1812 1813 1814 1815 1816 1817 1818 1819 1820 1	
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COLECO
INDUSTRIES, INC.

EDS NO. _____

NAME _____

PRODUCT: _____

Effective Date

12/27/83

ASSY LVL: _____

Page: _____

Revision

0

ISSUED BY: _____

J. Hout

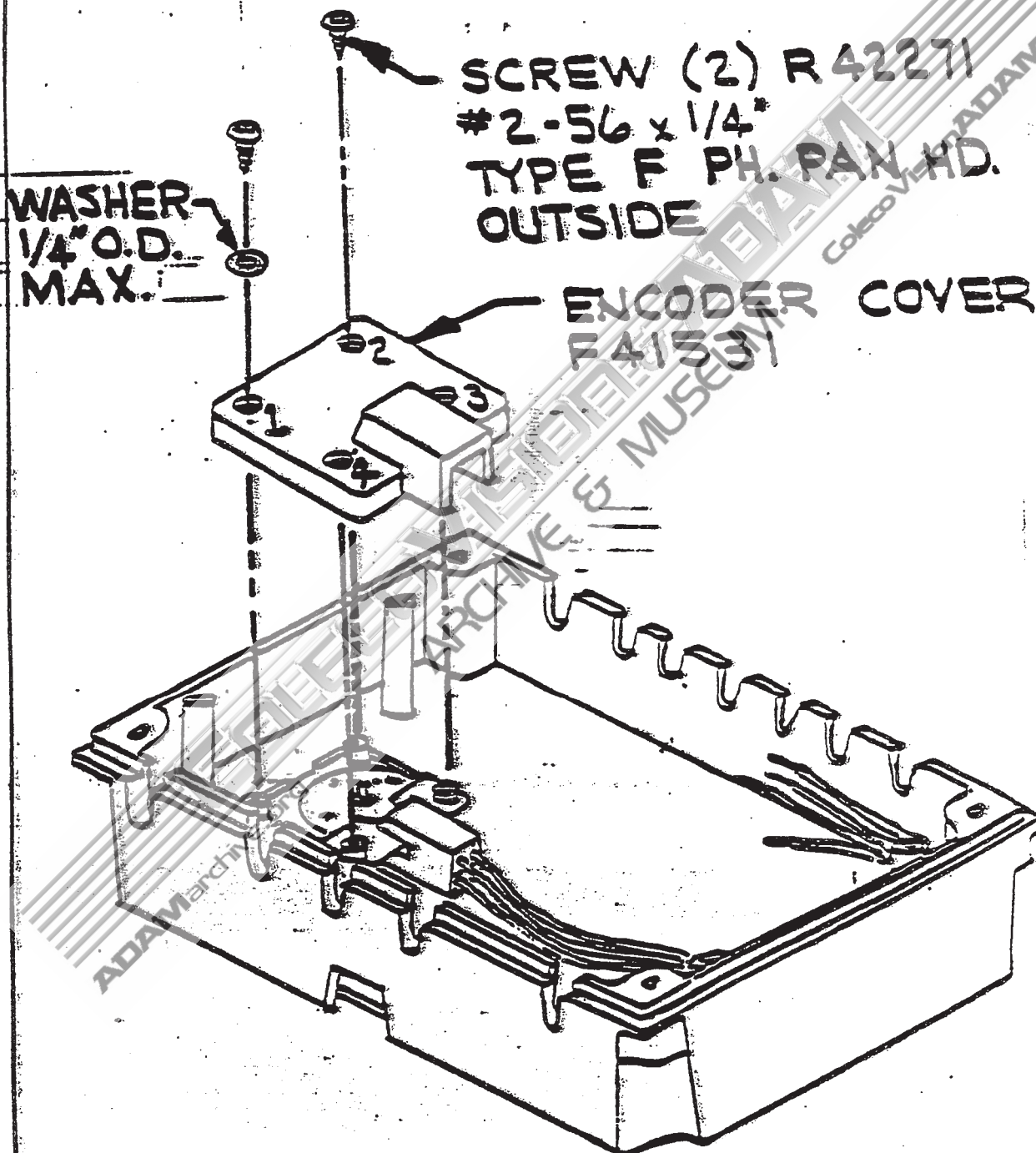


FIGURE 5

(Read/Write



(SERVO)

COLECO ARCHIVE
ADAMarchive.org