

CENTURY DATA

TECHNICAL NOTES

**FOR TRAINING USE ONLY**

GENERAL AUTOMATION, INC.  
1055 S. East St.  
Anaheim, California 92805

April 1, 1973

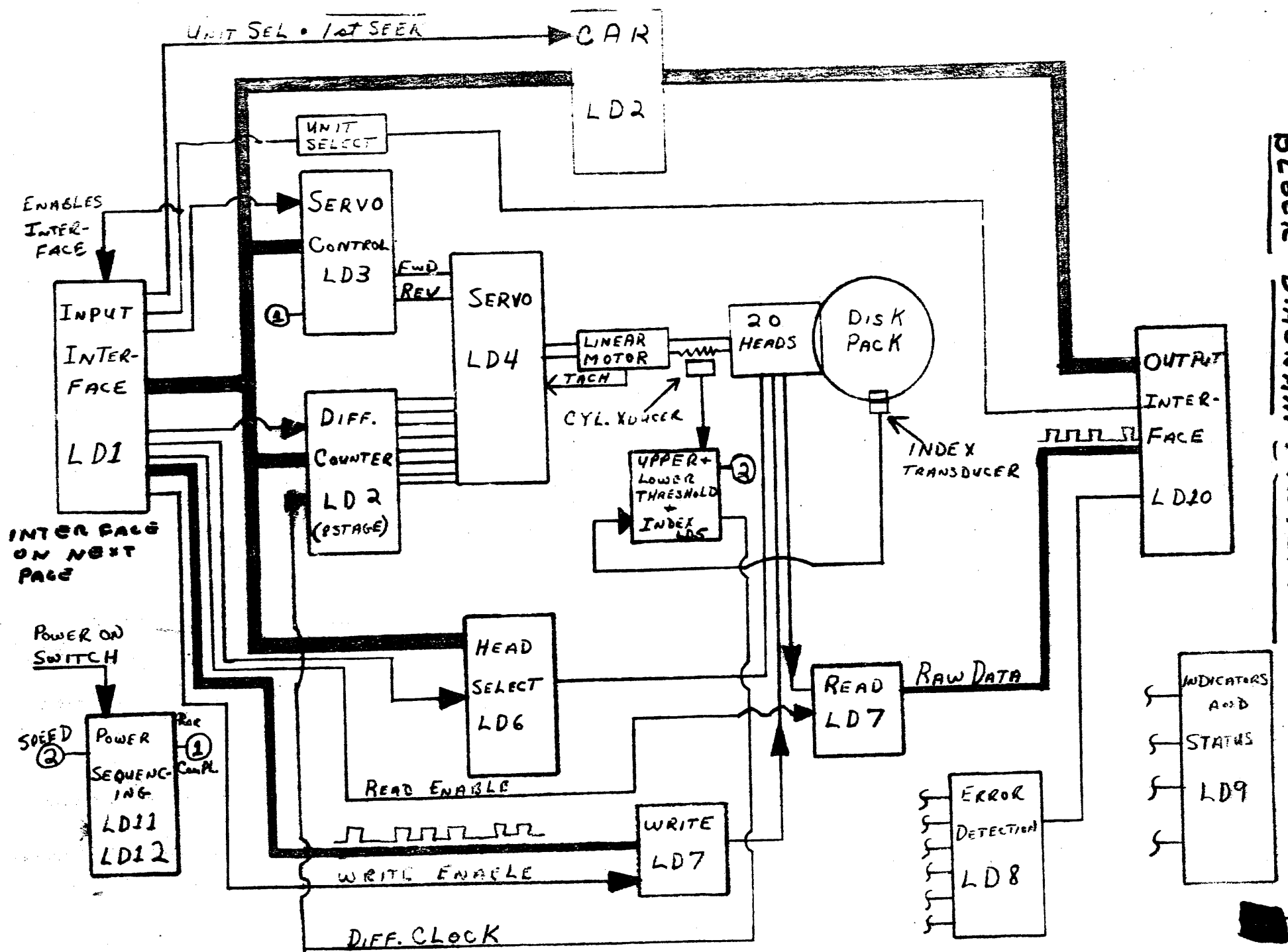


GENERAL AUTOMATION, INC.

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Block Diagram & Interface



111 OR 114 BLOCK DIAGRAM

111  
INTERFACE

INPUT		OPERATION COMMAND ←	PULSE DURATION OF	CYLINDER ADDRESS	HEAD ADDR. & DIRECTION	DIFF. COUNT	
111							
SIGNAL CABLE	(MSB)	UB0	Write Gate (WRGATE/)	Entire Write Operation	CYL 128	Servo Direction*	D128/
	Bus	UB1	Read Gate (RDGATE/) ‡	Entire Read Operation	CYL 64		D64/
		UB2	Seek Start (SKSTRT/)	800 nanosec, min.	CYL 32	D32/	
		UB3	Reset Head Register	800 nanosec, min.	CYL 16	D16/	
	Lines	UB4	Erase Gate (ERGATE/)	During Write Op & 9 Bytes	CYL 8	Head Add. 8	D8/
		UB5	Head Select (HDSEL)	During Write and Read	CYL 4	Head Add. 4	D4/
		UB6	Restore	15 to 20 millisecc.	CYL 2	Head Add. 2	D2/
(LSB)		UB7	Head Advance (HDADV/)	800 nanosec, min.	CYL 1	Head Add. 1	D1/
DC CABLE	Control Tag Lines	UTCC	--- (Control) --- ‡		(Not Used in 111 W/Subtractor)		
		UTSC	--- (Set Cylinder) ---				
		UTSH	--- (Set Head) ---				
		UTSD	--- (Set Difference) ---				
Unit Select Line	UMS	UMS Selects Drive To Be Online With Controller					
Write Data	RWDATA	RDDATA & WRDATA are on separate coax lines in DC Cable					
SIG	Special Inputs	Controlled Ground					
SIG		+36V Sequence Pick In					
DC		±3V (Q Logic Level)					

‡ATTEN\*R = UB1 • UTCC

114 OEM  
INTERFACE

INPUT		OPERATION COMMAND ←	PULSE DURATION OF	CYLINDER ADDRESS	HEAD ADDR. & DIRECTION	DIFF. COUNT	
114							
SIGNAL CABLE	(MSB)	UB0	Write Gate (WRGATE/)	Entire Write Operation	CYL 128	Servo Direc- tion*	D128/
	Bus	UB1	Read Gate (RDGATE/) ‡	Entire Read Operation	CYL 64		Head Add. 16
		UB2	Seek Start (SKSTRT/)	800 nanosec, min.	CYL 32	D32/	
		UB3	Reset Head Register	800 nanosec, min.	CYL 16	D16/	
	Lines	UB4	Erase Gate (ERGATE/)	During Write Op & 9 Bytes	CYL 8	Head Add. 8	D8/
		UB5	Head Select (HDSEL)	During Write and Read	CYL 4	Head Add. 4	D4/
		UB6	Restore	15 to 20 millisecc.	CYL 2	Head Add. 2	D2/
(LSB)		UB7	Head Advance (HDADV/)	800 nanosec, min.	CYL 1	Head Add. 1	D1/
DC CABLE	Control Tag Lines	UTCC	-- (Control)---				
		UTSC	-- (Set Cylinder)---				
		UTSH	-- (Set Head)---				
		UTSD	-- (Set Difference)---	(Not Used in 114 W/Subtractor)			
			*Servo Direction is forward if UB0=Logical 1 Servo Direction is reverse if UB0=Logical 0 Not Used in 114 W/Subtractor				
	Unit Select Line	UMS	UMS Selects Drive To Be Online With Controller				
	Write Data	RWDATA	RDDATA & WRDATA are on separate coax lines in the D.C. cable.				
SIG	Special Inputs	Controlled Ground					
SIG		+36V Sequence Pick In					
DC		+3V (Q Logic Level)					

‡ATTEN\*R = UB1 · UTCC

214 OEM  
INTERFACE

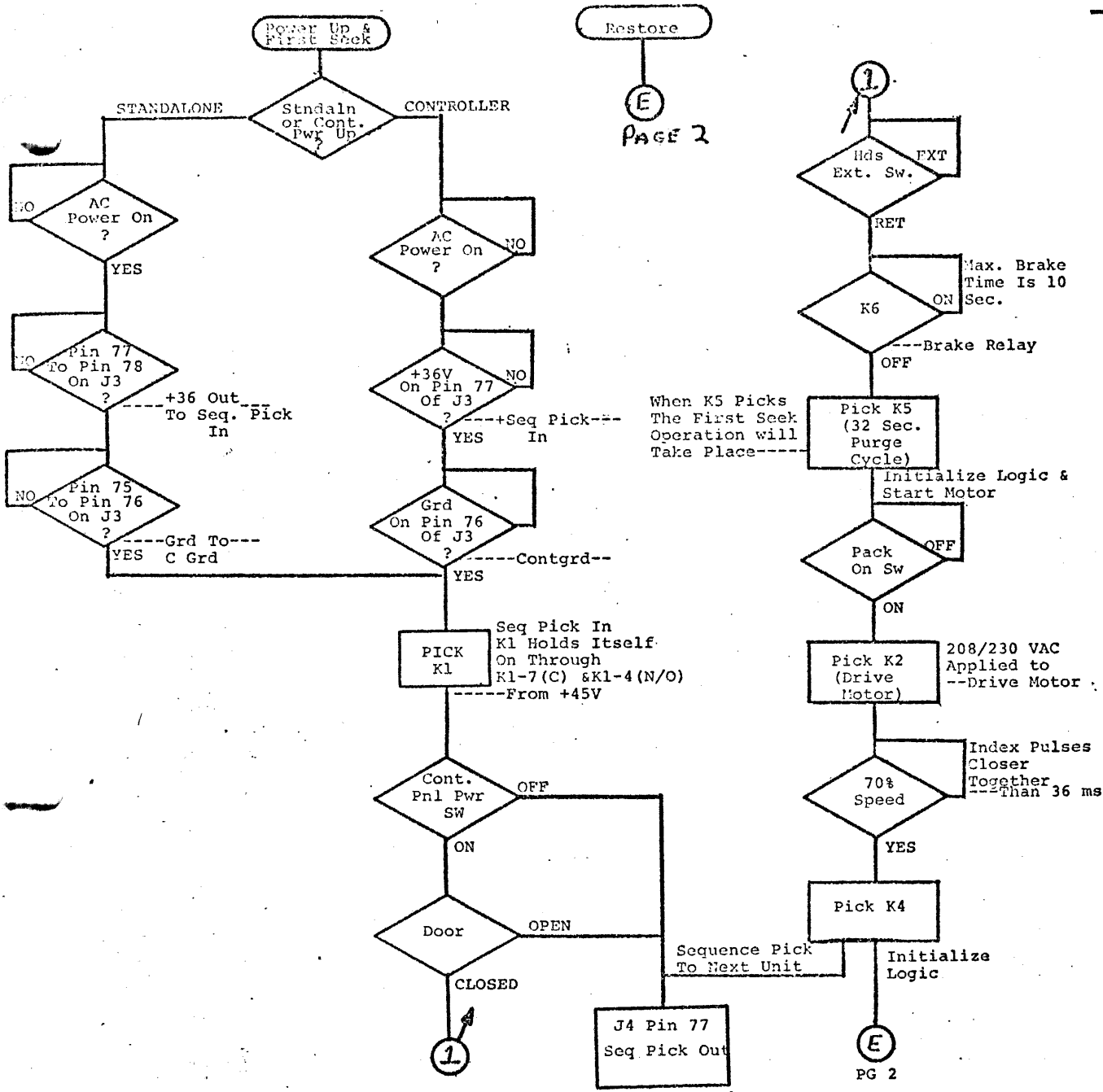
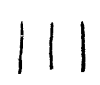
INPUT		OPERATION COMMAND ←	PULSE DURATION OF	CYLINDER ADDRESS	HEAD ADDR. & DIRECTION	DIFF. COUNT	
214							
SIGNAL CABLE	(MSB)	UB0	Write Gate (WRGATE/)	Entire Write Operation	CYL 128	Servo Direc- tion*	D128/
	Bus Lines	UB1	Read Gate (RDGATE/) ‡	Entire Read Operation	CYL 64		
		UB2	Seek Start (SKSTRT/)	800 nanosec, min.	CYL 32		
		UB3	Reset Head Register	800 nanosec, min.	CYL 16		
		UB4	Erase Gate (ERGATE/)	During Write Op & 9 Bytes	CYL 8		
	(LSB)	UB5	Head Select (HDSEL)	During Write and Read	CYL 4	Head Add. 4	D4/
		UB6	Restore	15 to 20 millisec.	CYL 2	Head Add. 2	D2/
UB7		Head Advance (HDADV/)	800 nanosec, min.	CYL 1	Head Add. 1	D1/	
DC CABLE	Control Tag Lines	UTCC	--- (Control) ---				
		UTSC	--- (Set Cylinder) ---				
		UTSH	--- (Set Head) ---				
		UTSD	--- (Set Difference) --- (Not Used in 214 W/Subtractor)				
			*Servo Direction is forward if UB0=Logical 1 Servo Direction is reverse if UB0=Logical 0 Not Used in 214 W/Subtractor				
	Unit Select Line	UMS	UMS Selects Drive To Be Online With Controller				
	Write Data	RWDATA	RDDATA & WRDATA are on separate coax lines				
SIG	Special Inputs	Controlled Ground					
SIG		+36V Sequence Pick In					
DC		+3V (Q Logic Level) ‡ATTEN*R = UB1 · UTCC					

④

215 OEM or STANDARD  
INTERFACE

INPUT		OPERATION COMMAND ←	PULSE DURATION OF	CYLINDER ADDRESS	HEAD ADDR. & DIRECTION	
215						
SIGNAL CABLE	(MSB)	UB0	None		CYL 256	Not Used
	Bus Lines	UB1	Write Gate (WRGATE/)	Entire Write Operation	CYL 128	
		UB2	Read Gate (RDGATE/) ‡	Entire Read Operation	CYL 64	
		UB3	Seek Start (SKSTRT/)	800 nanosec, min.	CYL 32	Not Used
		UB4	Reset Head Register	800 nanosec, min.	CYL 16	Head Add. 16
		UB5	Erase Gate (ERGATE/)	During Write Op & 9 Bytes	CYL 8	Head Add. 8
	(LSB)	UB6	Head Select (HDSEL)	During Write and Read	CYL 4	Head Add. 4
		UB7	Restore	15 to 20 millisec.	CYL 2	Head Add. 2
UB8		Head Advance (HDADV/)	800 nanosec, min.	CYL 1	Head Add. 1	
DC CABLE	Control Tag Lines	UTCC	--- (Control) ---			
		UTSC	--- (Set Cylinder) ---			
		UTSH	--- (Set Head) ---			
DC CABLE	Unit Select Lines	UMS	UMS Selects Drive To Be Online With Controller			
		Write Data	RWDATA	RDDATA & WRDATA are on separate coax lines		
SIG	Special Inputs	Controlled Ground				
SIG		+36V Sequence Pick In				
DC		±3V (Q Logic Level) ‡ATTEN *R = UB1 · UTCC				

9



LEGEND:

- M = Mark (D.C. Set) a F/F
- E = Erase (D.C. Reset) a F/F
- S = Set a F/F
- R = Reset a F/F
- T/O = Turn On (Activate) a Logic Signal

- K1 is held on through its 7(C) and 4(N/O) points to +24V
- T/F = Turn Off (Deactivate) a Logic Signal
- C = Relay Common Point
- N/O = Relay Normally Open Point
- N/C = Relay Normally Closed Point

JAN 20 1973



111

111 Terms in Parenthesis

(RETRACT HD)  
 (START PULSE)  
 T/O (RECALIB)  
 E CYL1 to CYL128  
 E (SEEKERROR)  
 T/O (RECALIB-1)  
 E (HAI to HAS)  
 T/O (RECALIB-2)  
 H (FWD SERVO)  
 E VZERO  
 M (FIRST SEEK)  
 T/O (RECALIB-3)  
 M(DIFF1 to DIFF128)

(3)

E 51 from Diff. Counter

Difference Count Is Now 204

E A, B & C  
 E (CYLPHASE)  
 T/F (D/A ENABLE)  
 E ONRACK

Allow a Seek Error to cause a Seek Unsafe (Emerg. Retract)

NO Squared Osc. ?

R (Detent)  
 (Seeksw) •  
 (Slowspeed) =  
 S (Seek Enable)

First Seek or Restore

First Seek

Restore

K5 Transferred Yet

YES

NO

111-K5, Seeksw Delay Relay, Just Picked

T/O SKSW Latch (Seeksw)

Squared Osc. ?

YES

NO

SKSW (Seeksw) •  
 SKINI (Firstseek) =  
 S SLOW (Slowspeed)

T/F SKSWDL (Seekswdly) for 190 ms.

Enables the Servo System to operate without "Heads Extended"

Prevents checking the oscillator for low amplitude while the rack magnet passes the cylinder xducer.

|||

I PG 2

H PG 2

(Seekenable)  
• Fwdservo =  
T/O FWD  
• Slowspeed =  
T/O VSLOW

FWD & VSLOW cause  
the servo to move  
forward at slow  
velocity

First Seek or Restore

First Seek

Restore

SKSWDL  
(Seekswdly)  
On ?

Are The Heads  
Extended ?

Within  
190 ms.

Has  
carriage  
Hit ENDSTOP ?

(VEL-TACH)  
dropping causes  
(VZEROCLK)

Servosystem is disabled; the  
First Seek will not occur,  
and after (SEEK ENABLE) has  
been set for one second,  
(SEEKERROR) sets, and with  
(SLOWSPEED) causes a  
(SEEKUNSAFE), (UNSAFE), and a  
Select Lock.

(VZEROCLK)  
clocks the VZERO  
F/F;S VZERO

SQDOSC  
?

VZERO  
• (SLOWSPEED) =  
R (FIRSTSEEK)

(FIRSTSEEK)  
• (SLOWSPEED) =  
T/O (E/FWDSERVO)

SQDOSC  
?

(FIRSTSEEK) =  
R (SLOWSPEED)

SLOW (SLOWSPEED):  
T/O (D/A Enable)  
T/F VSLOW

J

J

The Address is now  
moving backwards at  
a velocity propor-  
tional to the  
count in the  
Difference Counter.

Diff  
Count = 202  
Yes

(Diffclk)  
?

S ONRACK

ON (ENABLEON)  
LATCH

Ready (Green)  
Indicator will not  
come on, and online  
status will not be  
generated.

The Difference  
Counter is decre-  
mented by (DIFFCLK)  
and the speed de-  
creases as the Dif-  
ference approaches  
zero.

Difference  
Counter =  
Zero ?

SQDOSC  
?

S (DETENT)

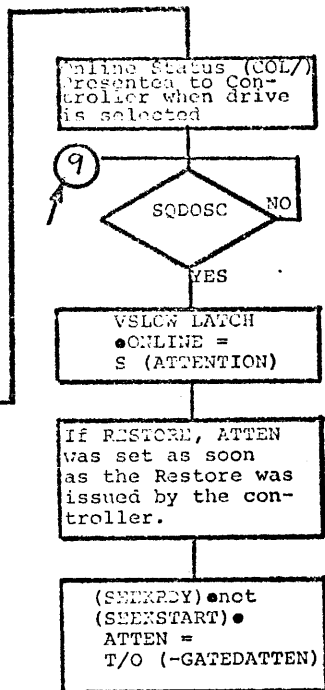
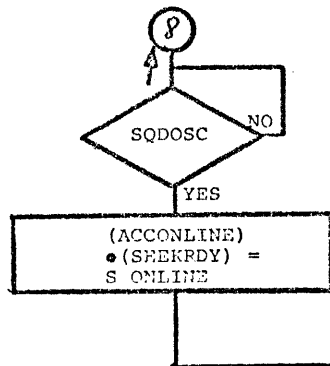
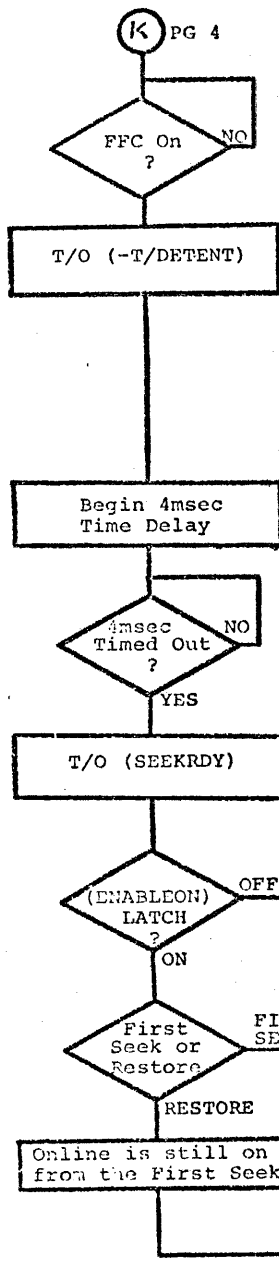
SQDOSC  
?

R (SEEKENABLE)

(CYL PHASE) off •  
(DETENT) = T/O (-REV),  
allowing the Demodu-  
lator card in SC to  
drive the carriage  
the rest of the way  
into cylinder zero.

K PG 4

T/O READY  
(Green) Indicator



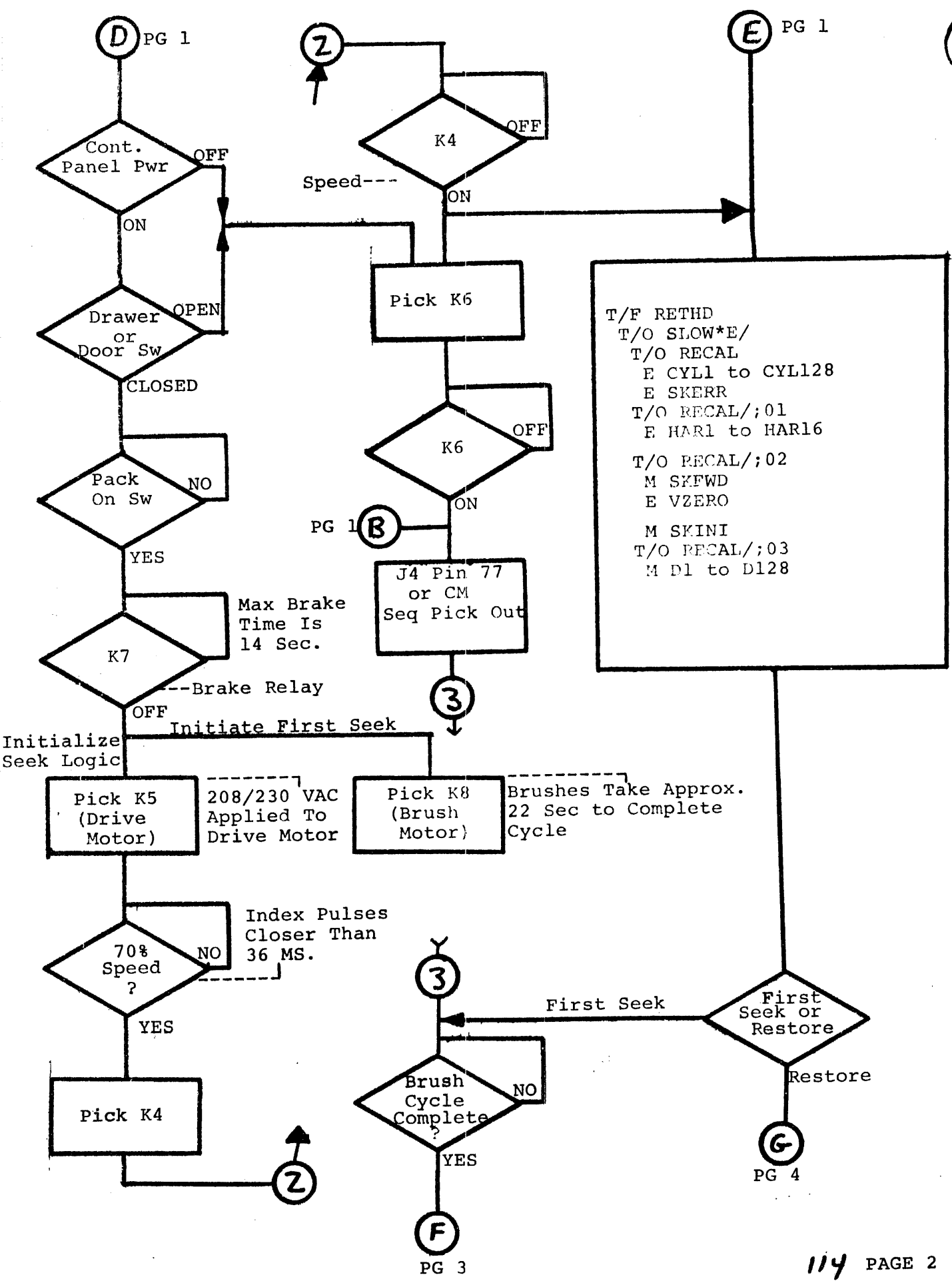
The First Seek or Restore Operation is now complete. The controller will select the drive because of the Gated Attention, and will reset the Gated Attention with Control Tag and Unit Bus 1

Gated Attention will not be presented to the controller because the operator has disabled the drive.

Online is still on from the First Seek



8



① PG 2  
Brush  
Cycle Just  
Completed

T/O SKSW Latch

② PG 3  
Squared  
Osc.  
?  
NO  
YES

SKSW •  
SKINI =  
S SLOW

③

③  
E 51 from Diff.  
Counter  
Difference Count Is  
Now 204  
E A, B & C  
E CPHASE  
T/F DAENA  
E ONRACK  
Allow a Seek Error to  
cause a Seek Unsafe  
(Emerg. retract)

NO  
Squared  
Osc.  
?  
YES

R DET  
SKSW •  
SLOW =  
S SKENA

④ PG 4

T/F SKSWDL  
for  
190 ms

Enables the Servo  
System to operate  
without "Heads  
Extended"

Prevents checking  
the oscillator for  
low amplitude while  
the rack magnet  
passes the cylinder  
xducer.

④  
PG 4

10

PG 3

I

SKENA  
 ●SKFWD =  
 T/O FWD  
 ●SLOW =  
 T/O VSLOW

FWD & VSLOW cause the servo to move the head carriage forward at slow velocity

First Seek or Restore

First Seek

Restore

H PG 3

4

Has Carriage Hit ENSTOP?

VELTACH;S dropping causes VZERO\*C

VZERO\*C clocks the VZERO F/F;S VZERO

SQDOSC ?

VZERO●SLOW = R SKINI

SKINI ●SLOW = T/O SKFWD\*E

SQDOSC ?

SKINI = R SLOW

SLOW = T/O DAENA T/F VSLOW

Servosystem is disabled; the First Seek will not occur, and after SKENA has been set for one second, SKERR sets, and with SLOW causes a SKUSF, USF and a SELECT LOCK.

4

J

114

J PG 4

The Access is now moving backwards at a velocity proportional to the count in the Difference Counter.

Diff Count=202 Yet

YES

D1\*C ?

YES

S ONRACK

OEM, or STD ?

OEM

ENASW LATCH

OFF

Ready (Green) Indicator will not come on, and online status will not be generated.

7

T/O READY (Green) Indicator

6

The Difference Counter is decremented by D1\*C, and the speed decreases as the Difference approaches zero.

Difference Counter = Zero ?

YES

SQDOSC ?

YES

S DET

SQDOSC ?

YES

R SKENA

Model Number ?

212, 214

CPHASE off  
•DET = T/O REV/, allowing the Demodulator card in 5C to drive the carriage the rest of the way into cylinder zero.

CPHASE off •DET=T/O REV/, allowing the Servo Preamplifier in 13A to drive the carriage the rest of the way into cylinder zero.

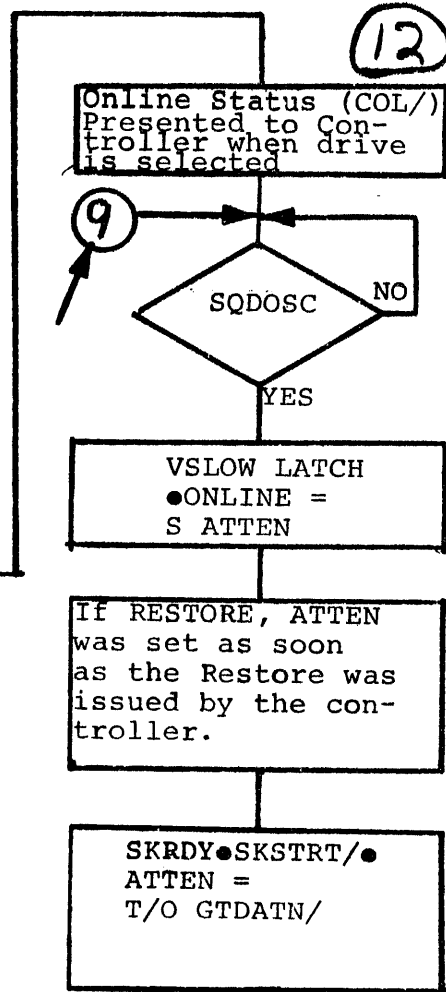
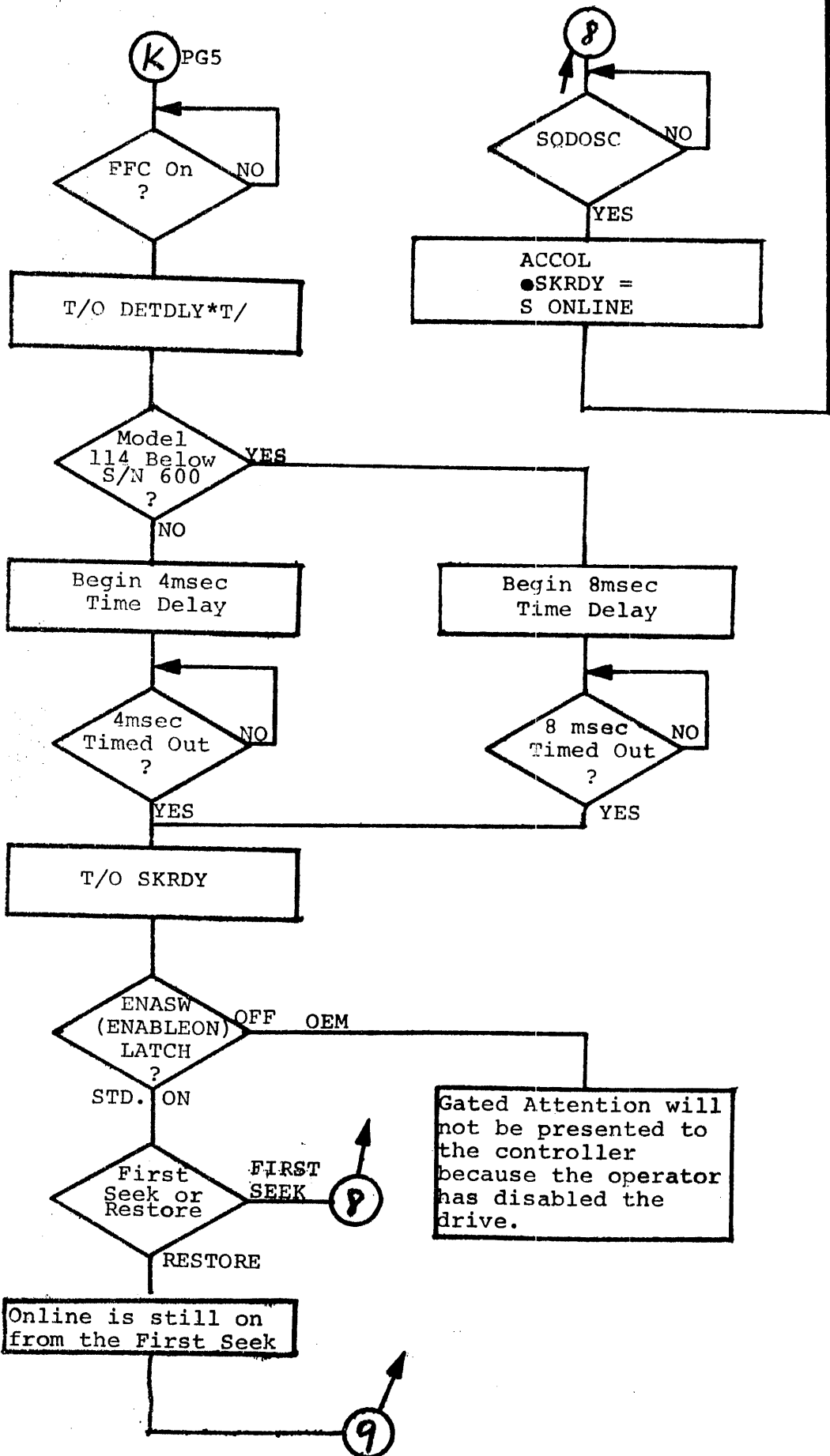
K PG 6

114 Pg 5

11

7

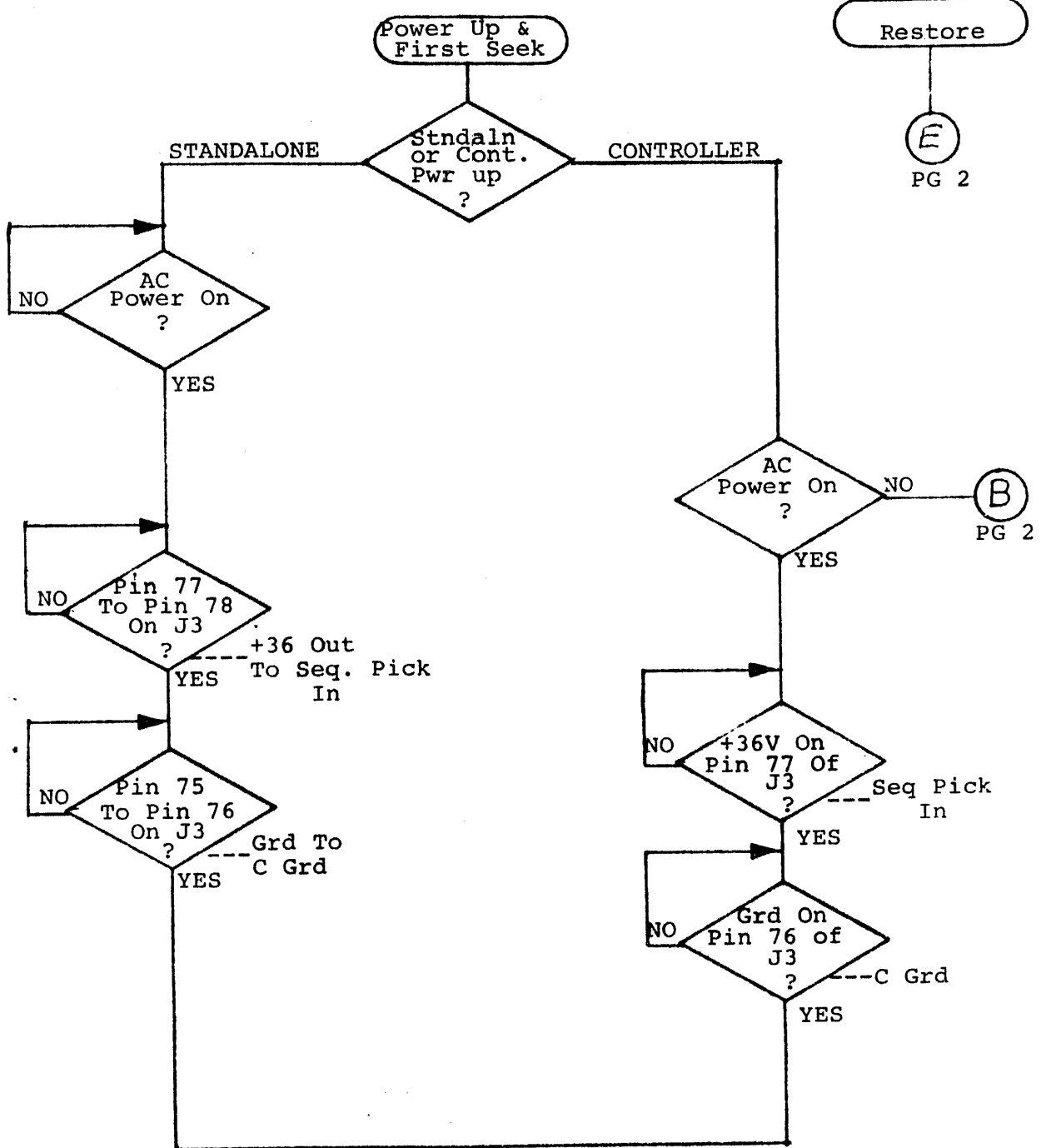




The First Seek or Restore Operation is now complete. The controller will select the drive because of the Gated Attention, and will reset the Gated Attention with Control Tag and Unit Bus 1

13

213, 215



LEGEND:

- M = Mark (D.C. Set) a F/F
- E = Erase (D.C. Reset) a F/F
- S = Set a F/F
- R = Reset a F/F
- T/ O = Turn On (Activate) a Logic Signal.

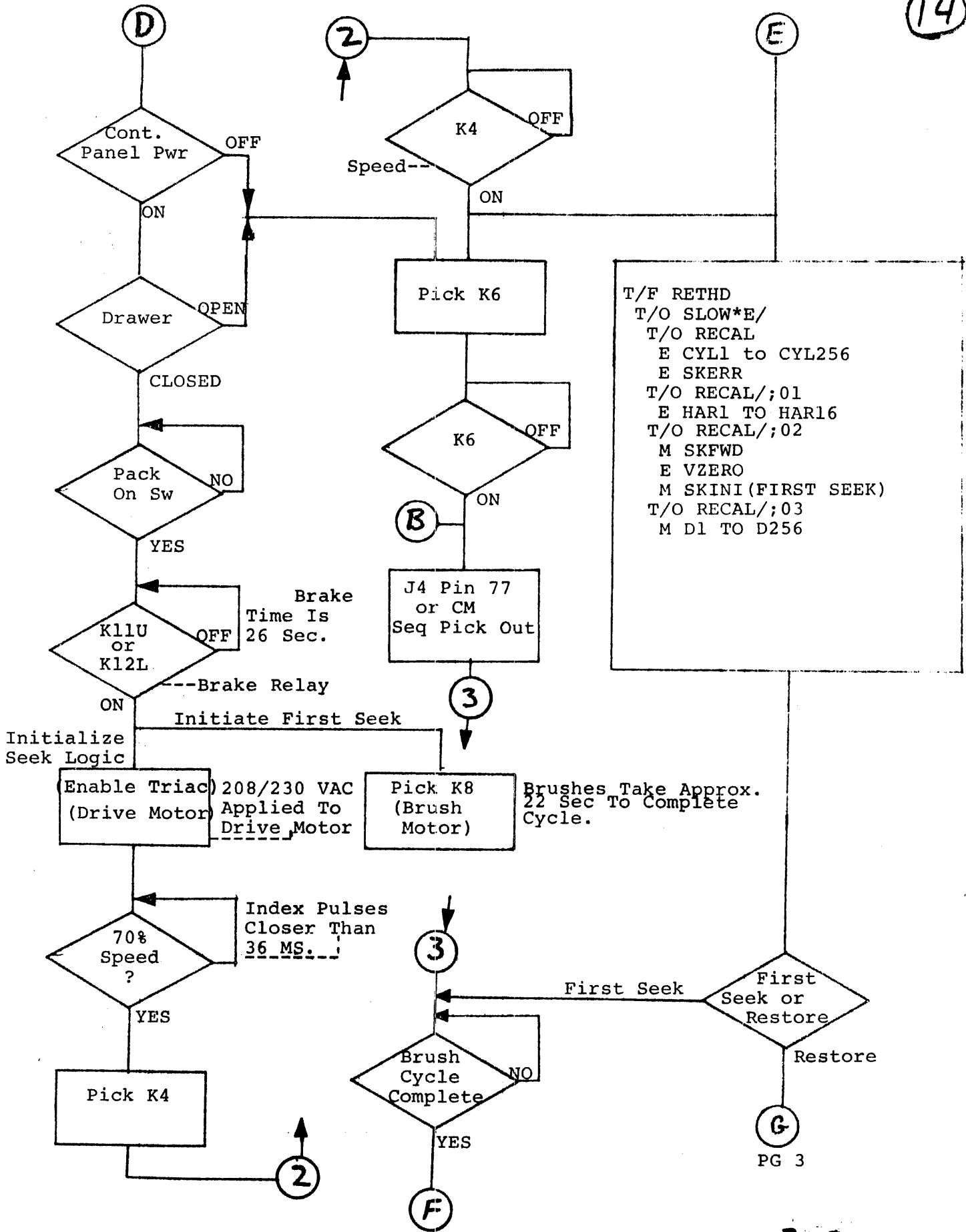
K1 is held on through its 7(Q) and 4(N/O) points to +24V

- T/F = Turn Off (Deactivate) a Logic Signal
- C = Relay Common Point
- N/O = Relay Normally Open Point
- N/C = Relay Normally Closed Point

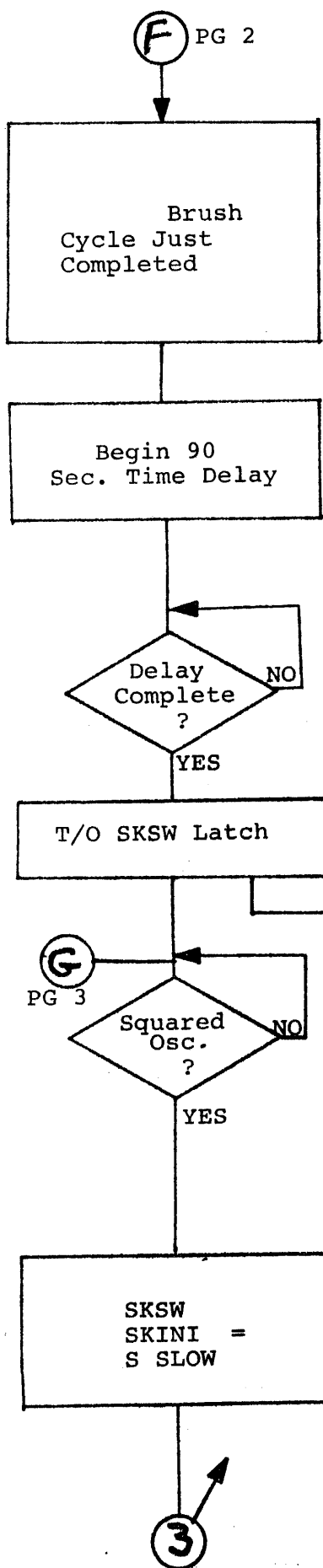
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PG 2

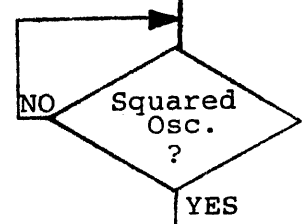
14



(15)



E 103 from Diff. Counter  
 Difference Count Is Now 408  
 E A, B & C  
 E CPHASE  
 T/F DAENA  
 E ONRACK  
 Allow a Seek Error to cause a Seek Unsafe (Emerg. retract)



R DET  
 SKSW  
 SLOW =  
 S SKENA

I  
 PG 4

T/F SKSWDL for 300 ms

H  
 PG 4

Enables the Servo System to operate without "Heads Extended"

(I)

SKENA  
 ●SKFWD =  
 T/O FWD  
 ●SLOW =  
 T/O VSLOW

FWD & VSLOW cause  
 the servo to move  
 the head carriage  
 forward at slow  
 velocity

First  
 Seek or  
 Restore

First Seek

Restore

SKSWDL  
 On ?

NO --Has 300 MS  
 Expired Yet

S SKSWDLYB

Are  
 The Heads  
 Extended ?

YES

NO

Servosystem is disabled;  
 the First Seek will not occur,  
 and after SKENA has been set  
 for one second, SKERR sets, and  
 with SLOW causes a SKUSF, USF,  
 and a Select Lock.

Light ?

YES

NO

SKSWDLYBOLIGHT =  
 T/O LIGHTL

(S)

(H) PG 3

(5)

(16)

Dark ?

NO

YES

LIGHTL ●  
 DARK =  
 T/O OFFRACK

OFFRACK  
 clocks the VZERO  
 F/F;S VZERO

SQDOSC ?

NO

YES

VZERO ● SLOW =  
 R SKINI

SKINI  
 ● SLOW =  
 T/O SKFWD \* E

SQDOSC ?

NO

YES

SKINI  
 R SLOW =

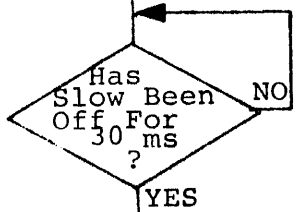
SLOW  
 T/O DAENA  
 T/F VSLOW

PG 5 (J)

17

J PG 4

The Access is now moving backwards at a velocity proportional to the count in the Difference Counter.



T/O SLOWLY/

S ONRACK

G

6

T/O READY (Green) Indicator

The Difference Counter is decremented by  $D1 \cdot C$ , and the speed decreases as the Difference approaches zero.



SQDQSC?

S DET

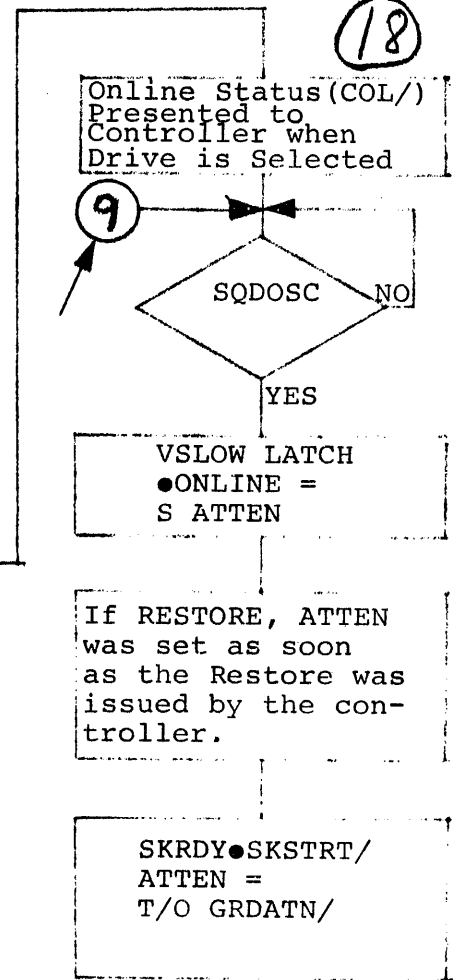
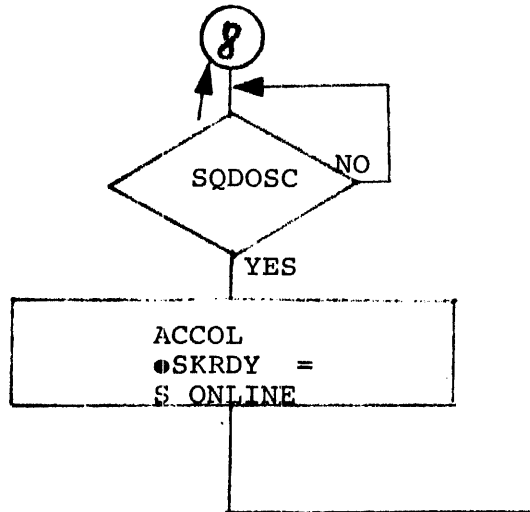
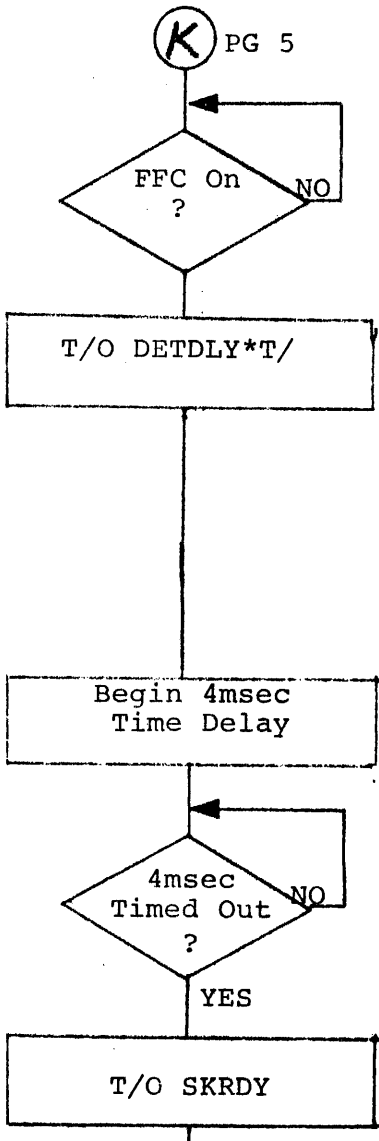
SQDOSC?

R SKENA

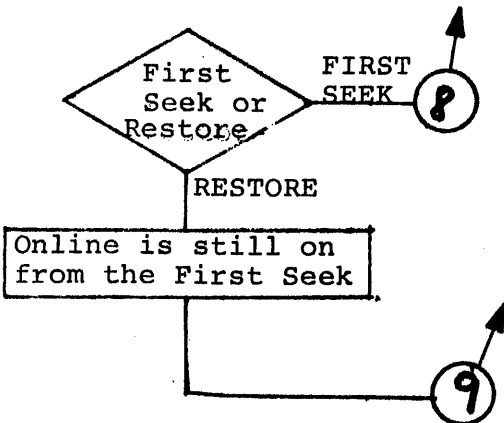
CPHASE off • DET=T/O REV/, allowing the detent portion of the Servo Preamplifier in 13A to drive the carriage the rest of the way into cylinder zero.

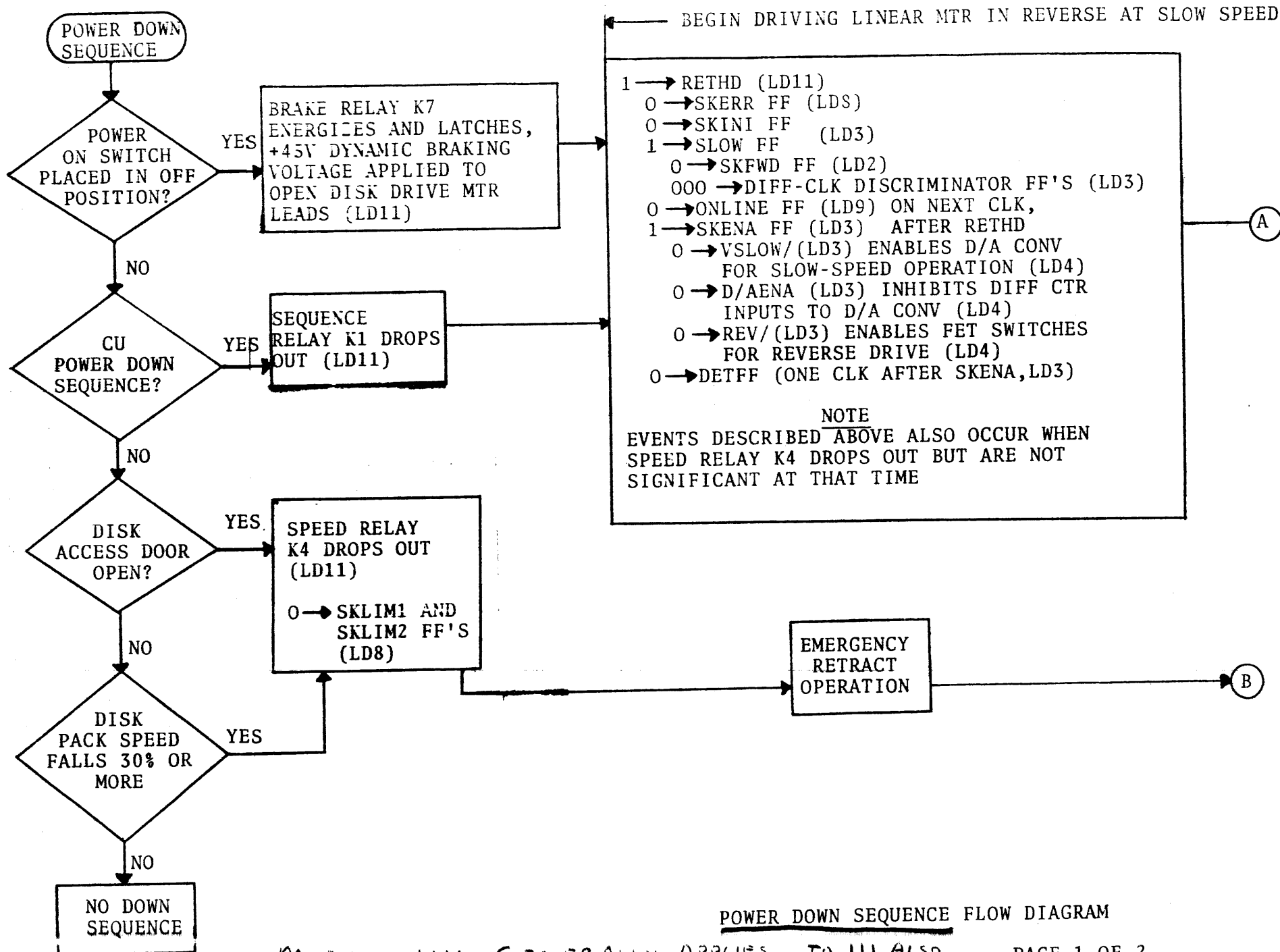
K

PG 6



The First Seek or Restore Operation is now complete. The controller will select the drive because of the Gated Attention, and will reset the Gated Attention with Control Tag and Unit Bus



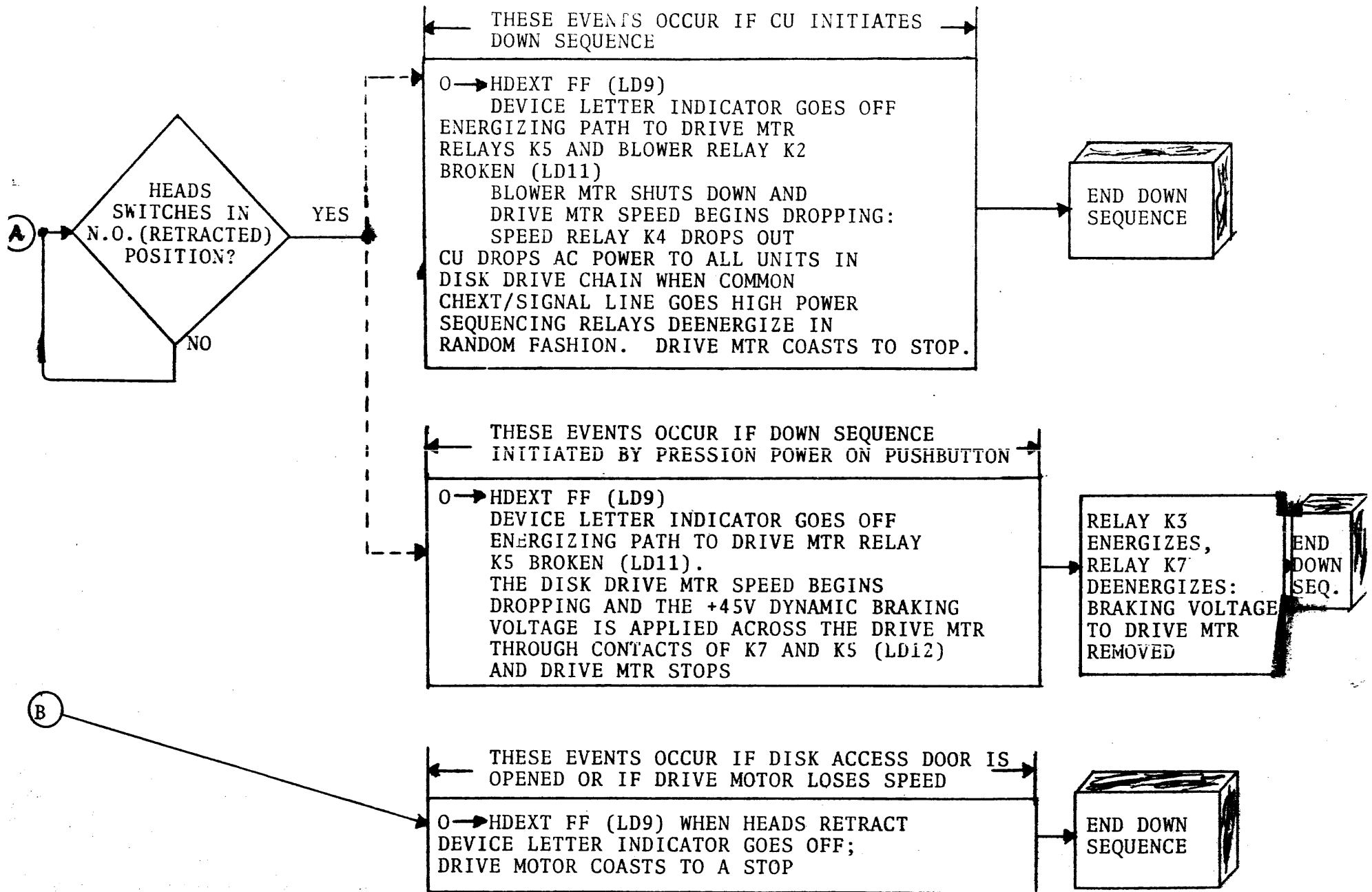


POWER DOWN SEQUENCE FLOW DIAGRAM

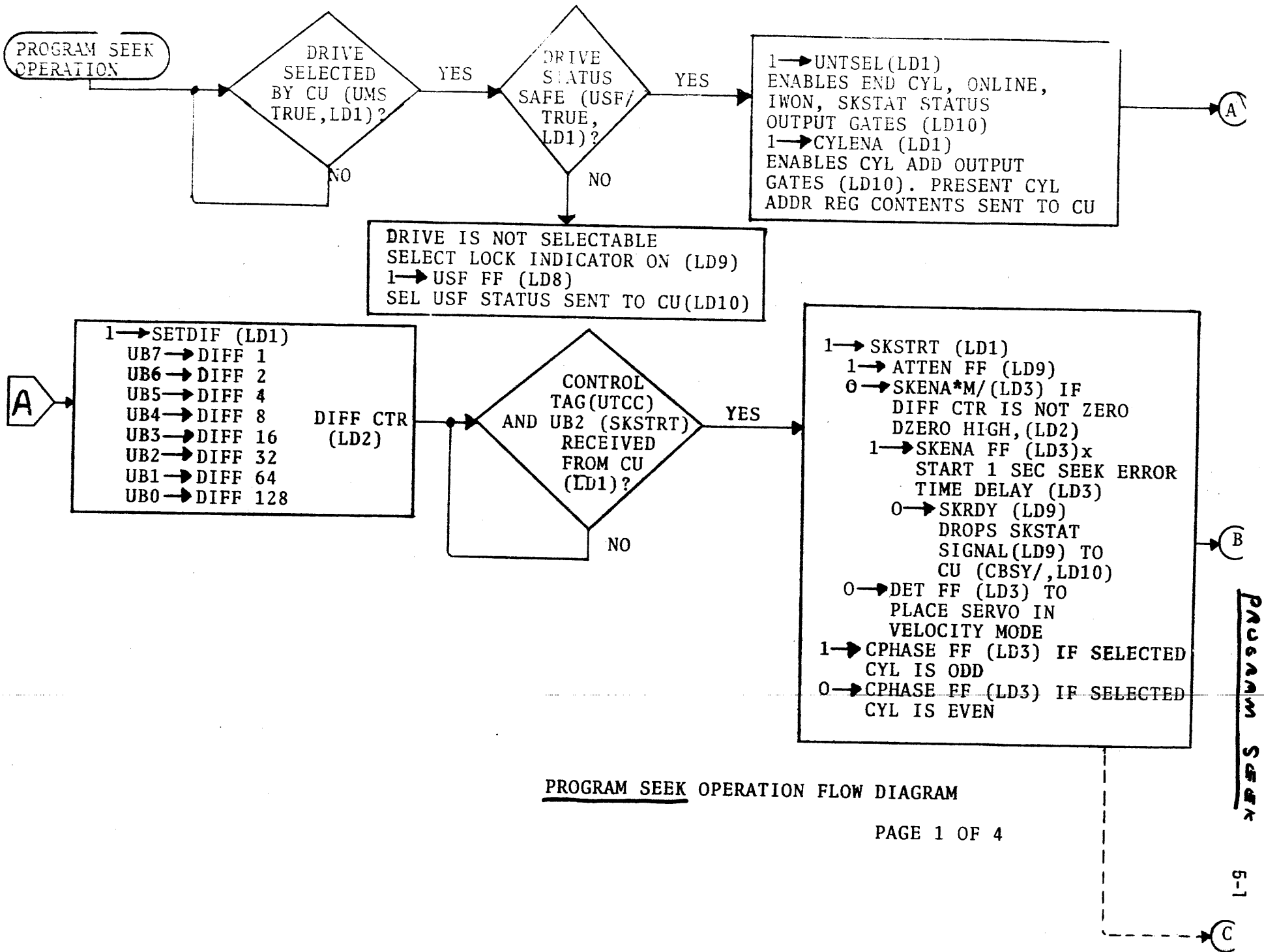
MODEL 114, GENERALLY APPLIES TO 111 ALSO

POWER DOWN



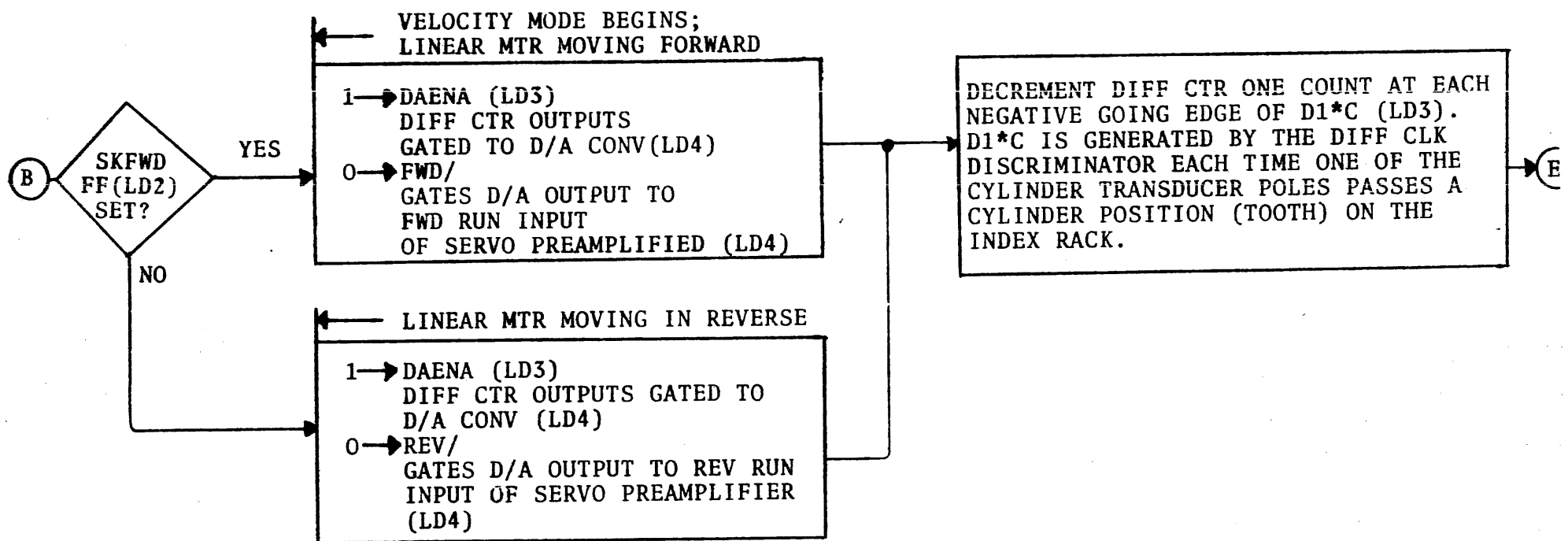
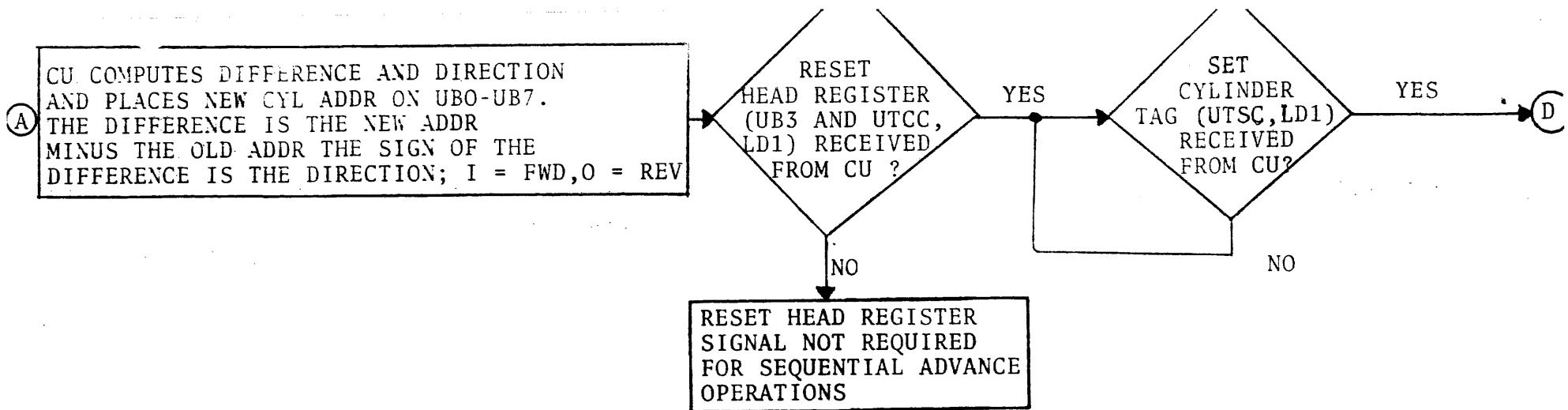


POWER DOWN SEQUENCE FLOW DIAGRAM

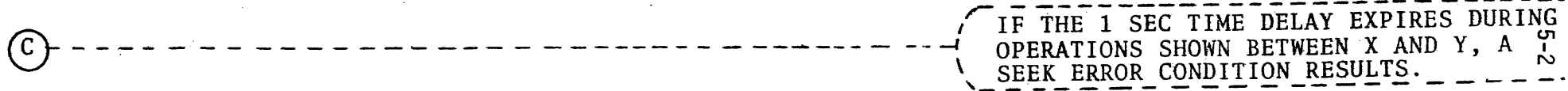


PROGRAM SEEK OPERATION FLOW DIAGRAM

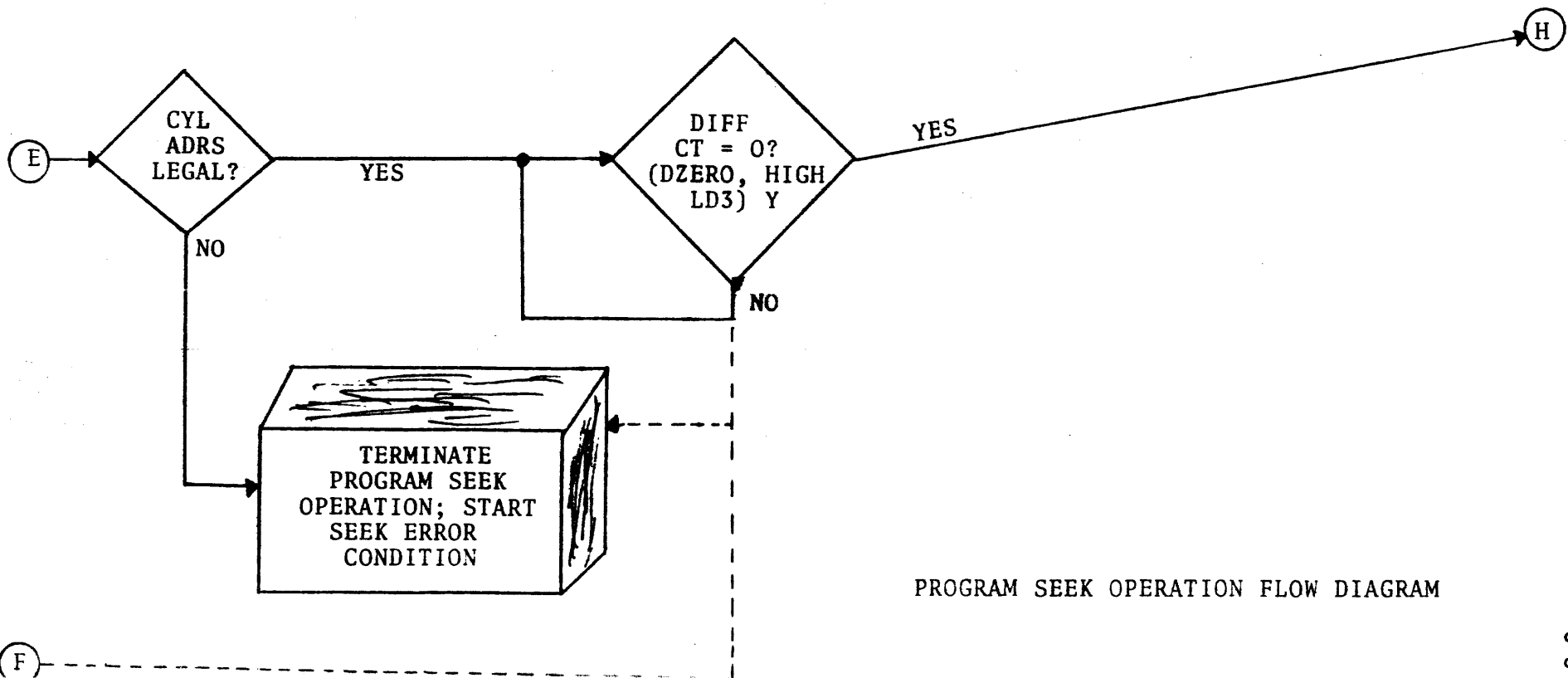
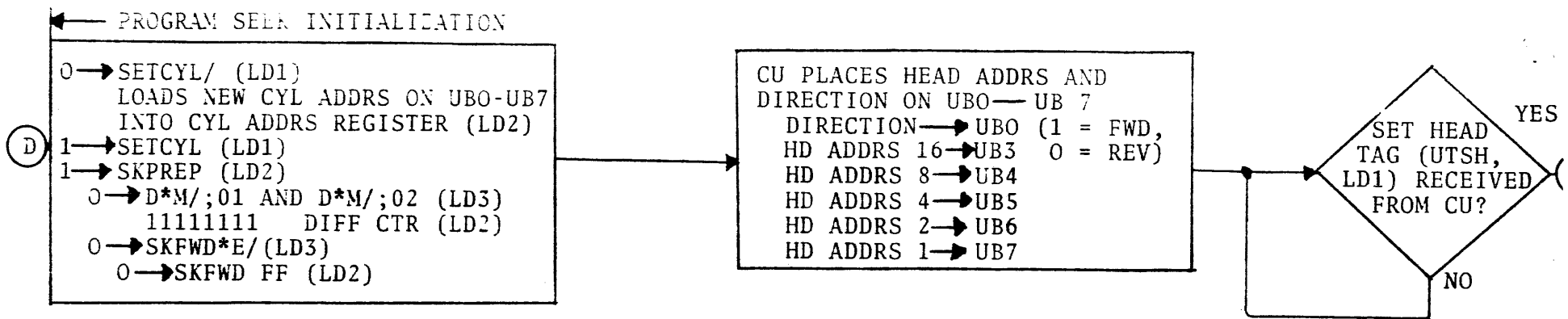
PROGRAM SEEK 5-1



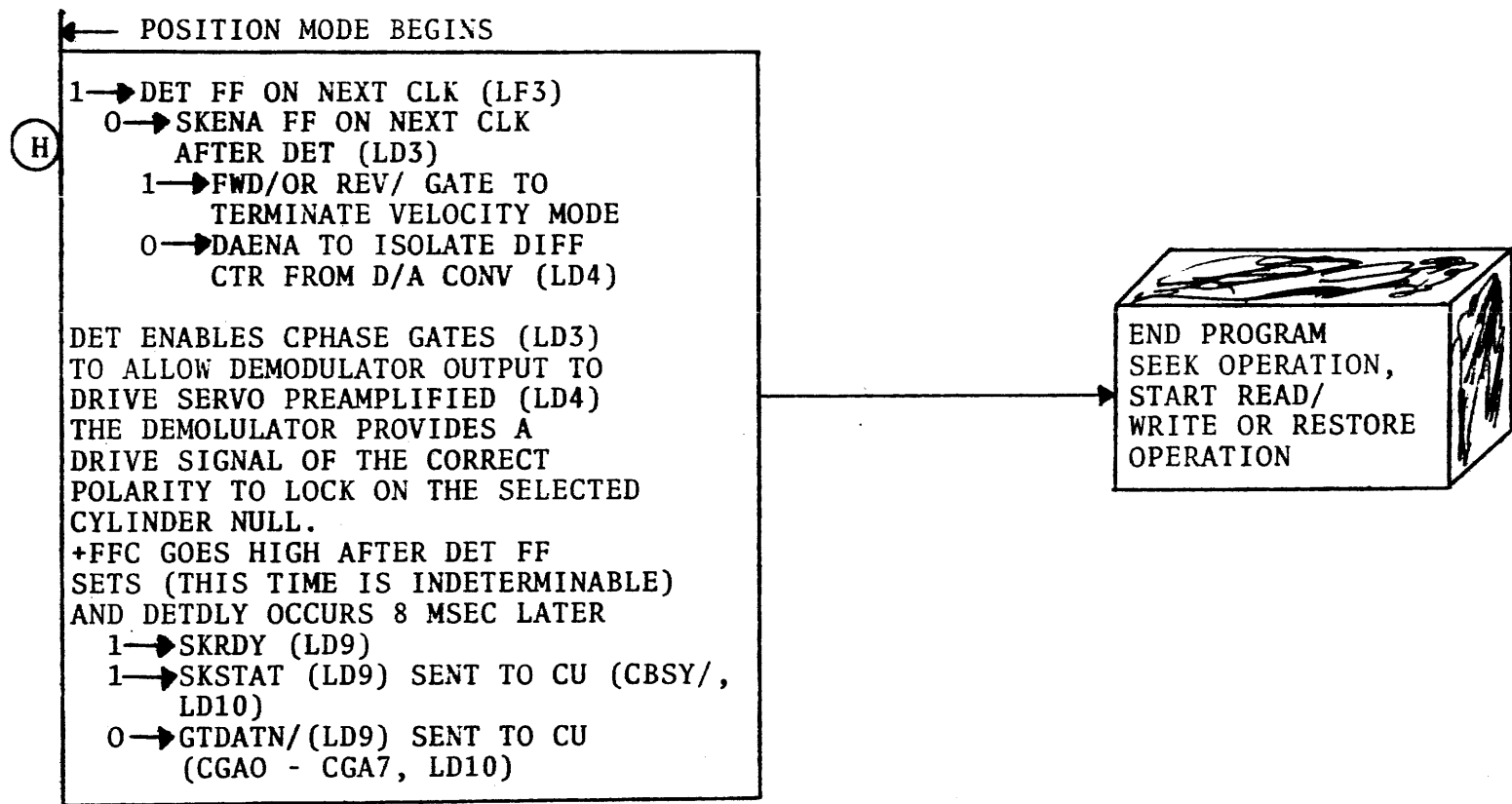
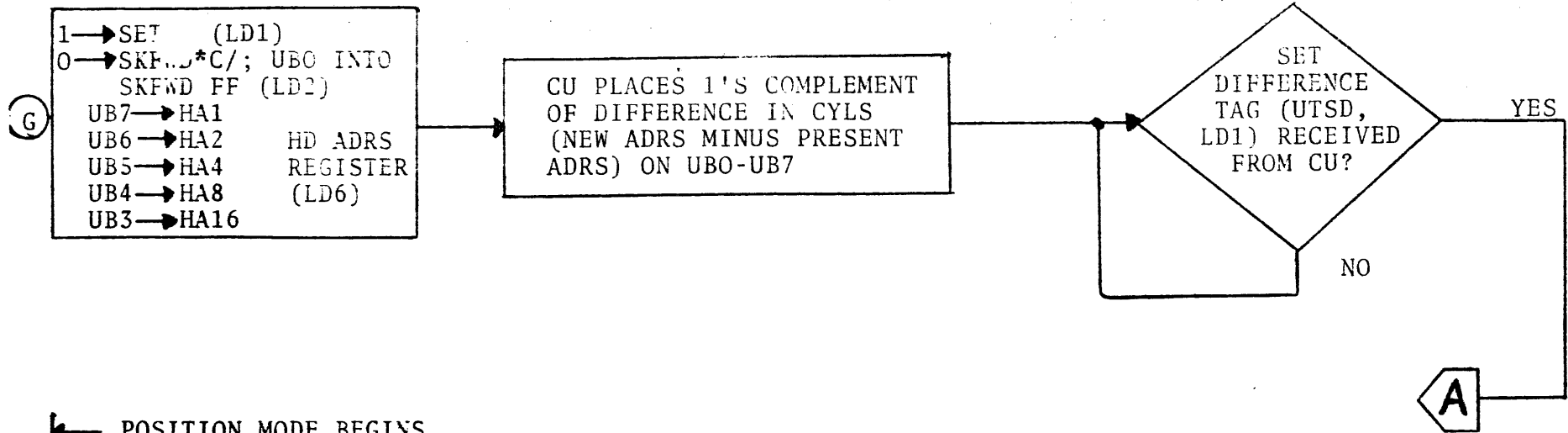
OPERATIONS SHOWN ABOVE OCCUR IMMEDIATELY AFTER SKENA FF IS SET



PROGRAM SEEK OPERATION FLOW DIAGRAM

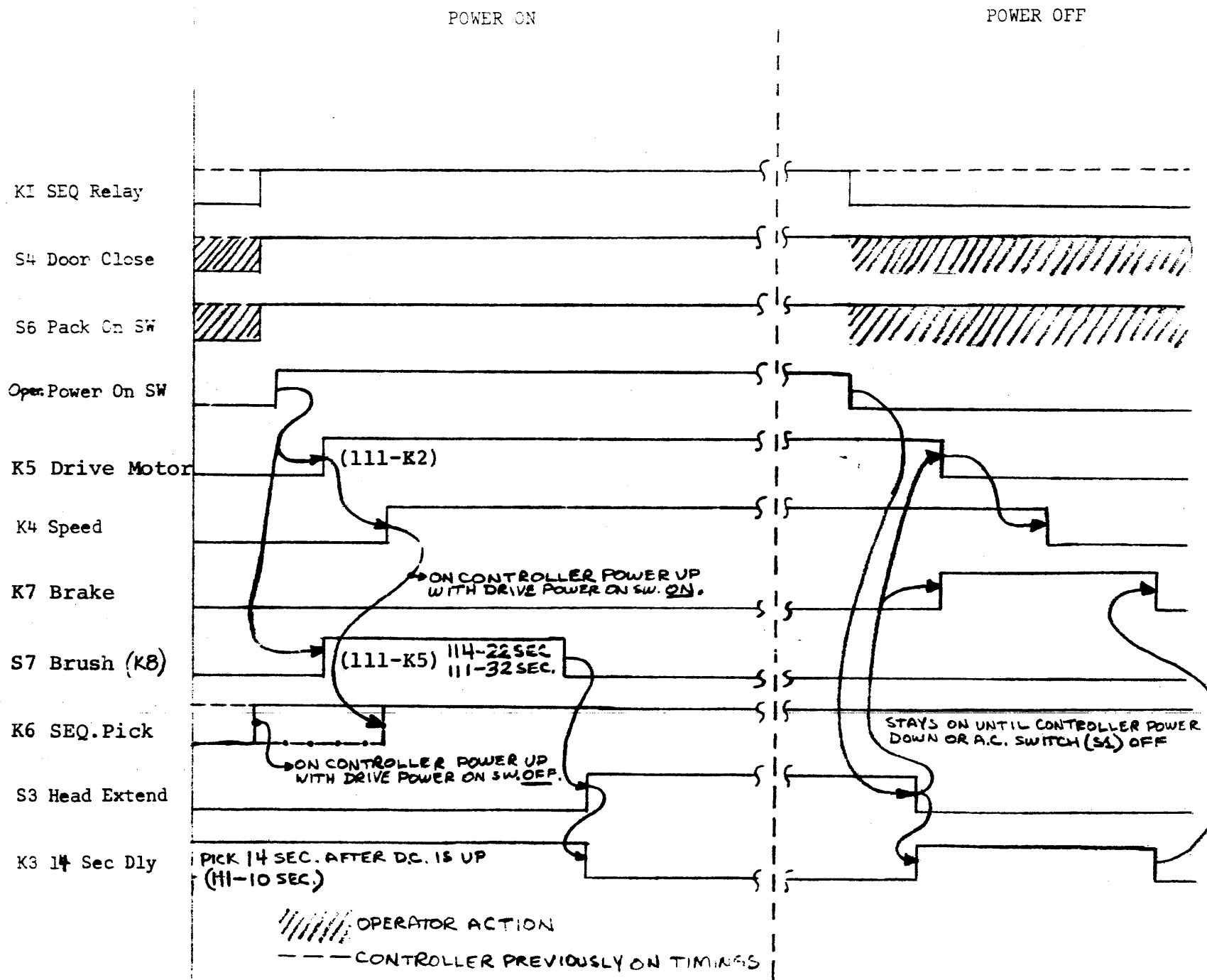


PROGRAM SEEK OPERATION FLOW DIAGRAM

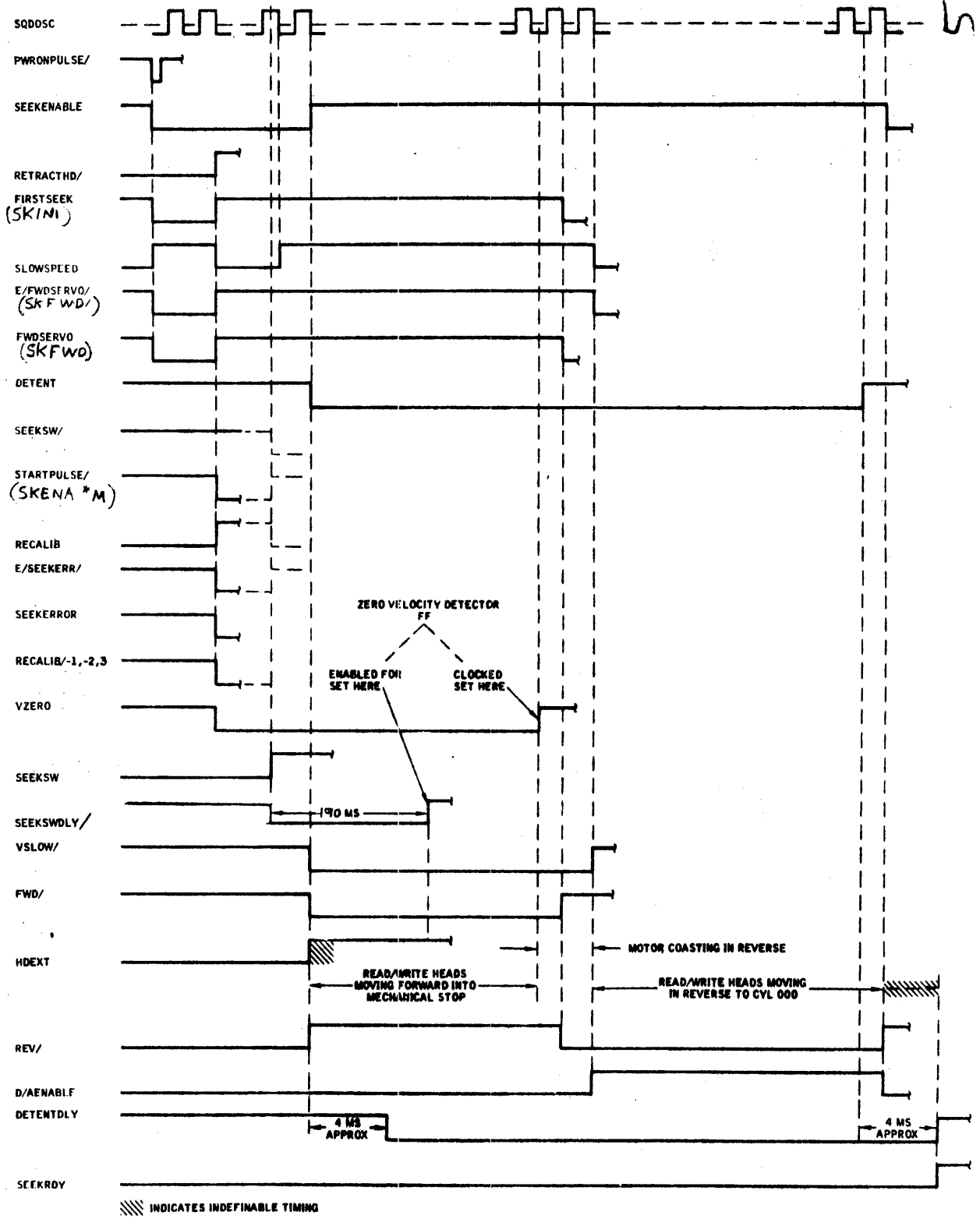


PROGRAM SEEK OPERATION FLOW DIAGRAM

# TIMING DIAGRAMS



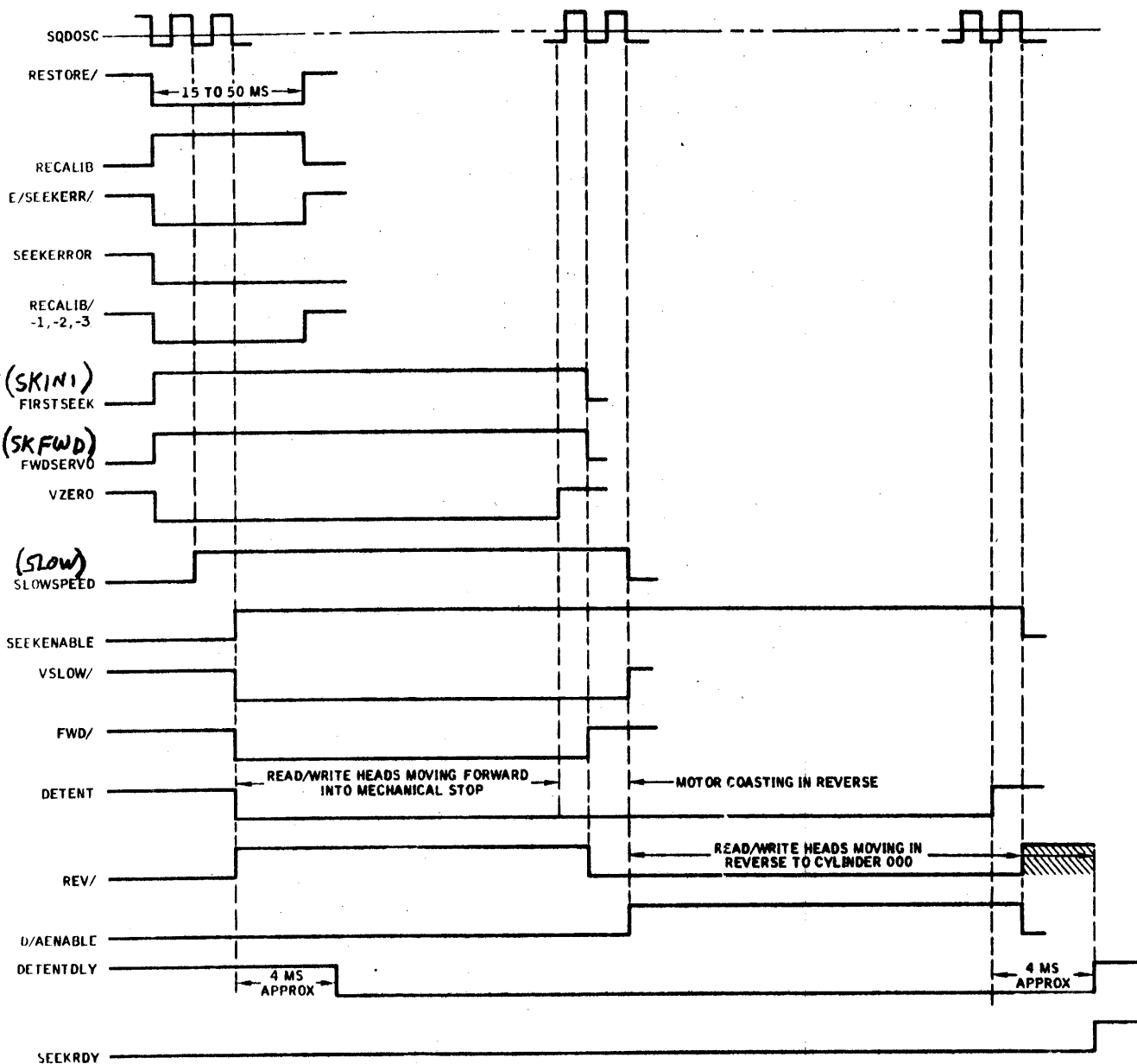
5A



K4- SPEED

First Seek Operation, Timing Diagram

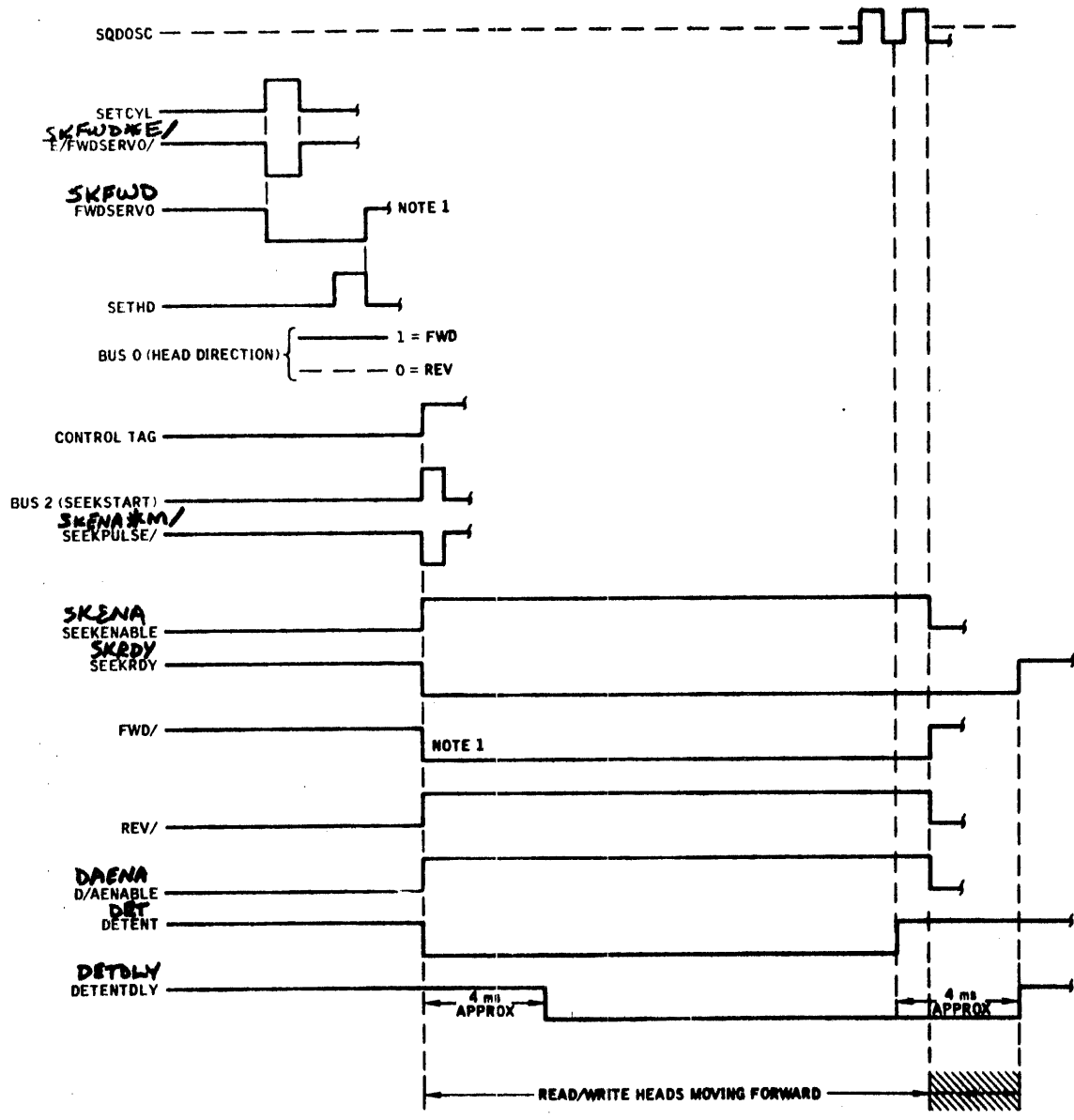
6



NOTE:  
 INDICATES INDEFINABLE TIMING

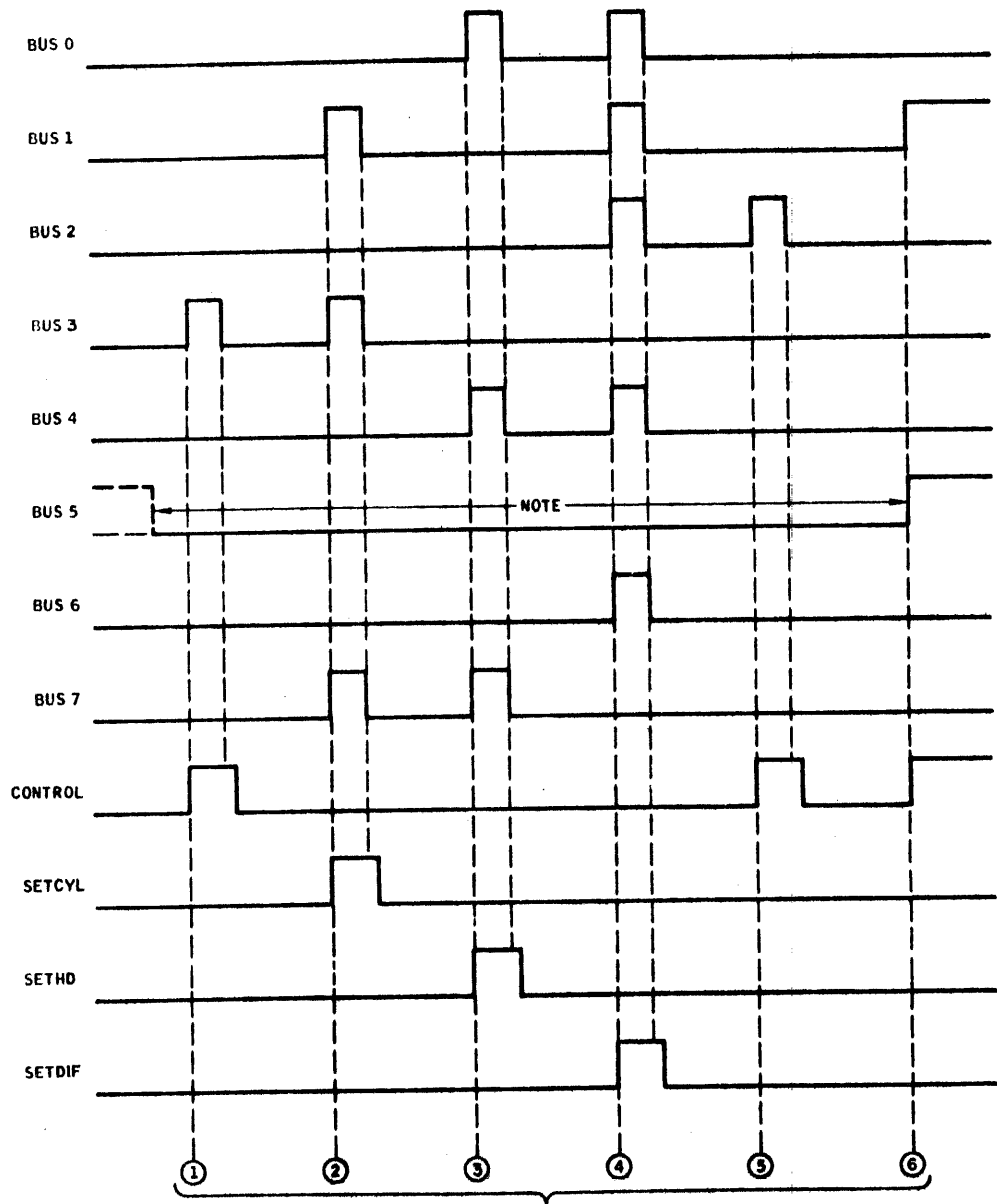
Recalibrate Operation, Timing Diagram





NOTES  
 1. FORWARD MOTOR DIRECTION IS ASSUMED  
 2. // INDICATES INDEFINABLE TIMING

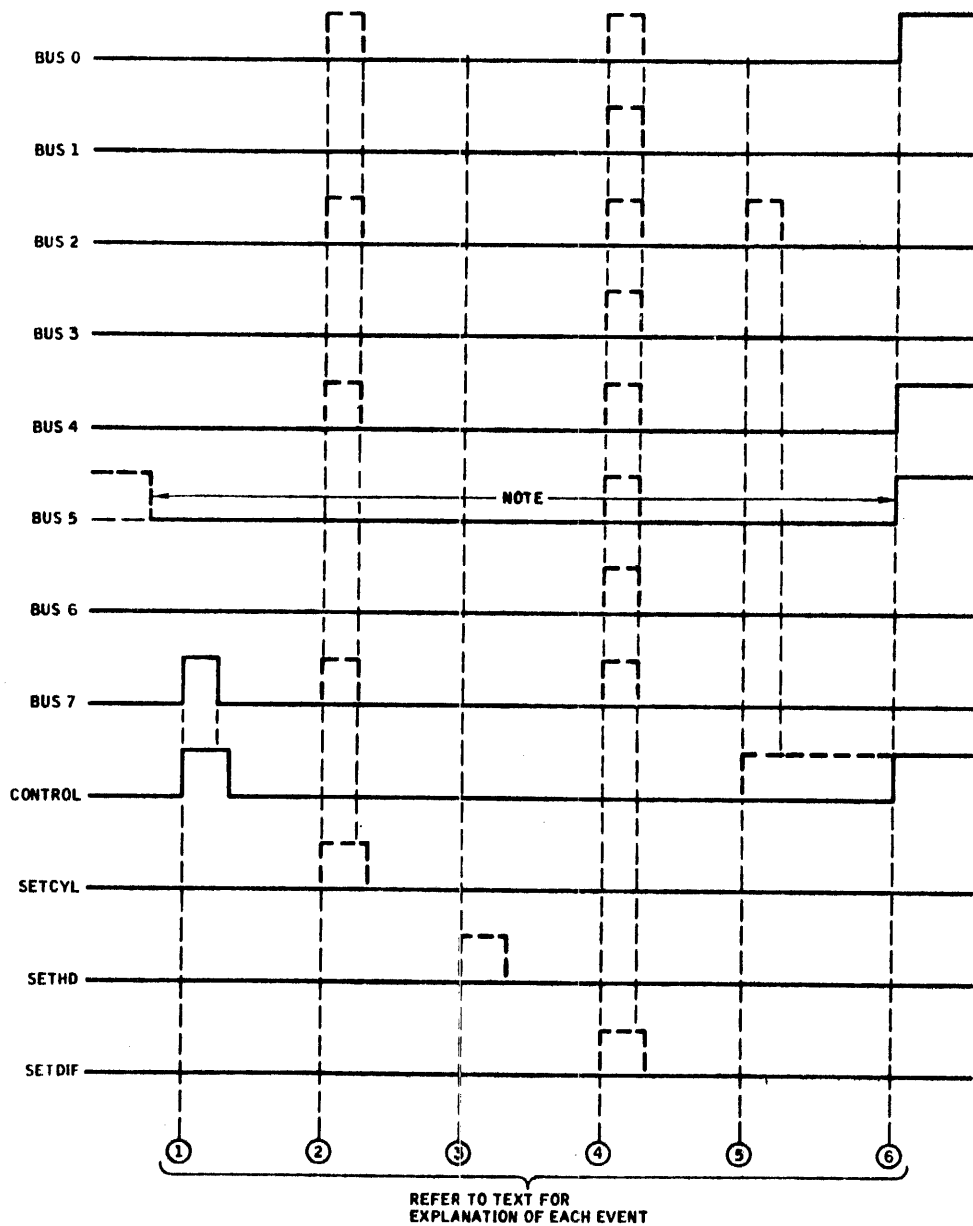
Program Seek Operation, Timing Diagram



REFER TO TEXT FOR EXPLANATION OF EACH EVENT

NOTE: HDSEL MUST BE LOW DURING BUS ENABLE TIME

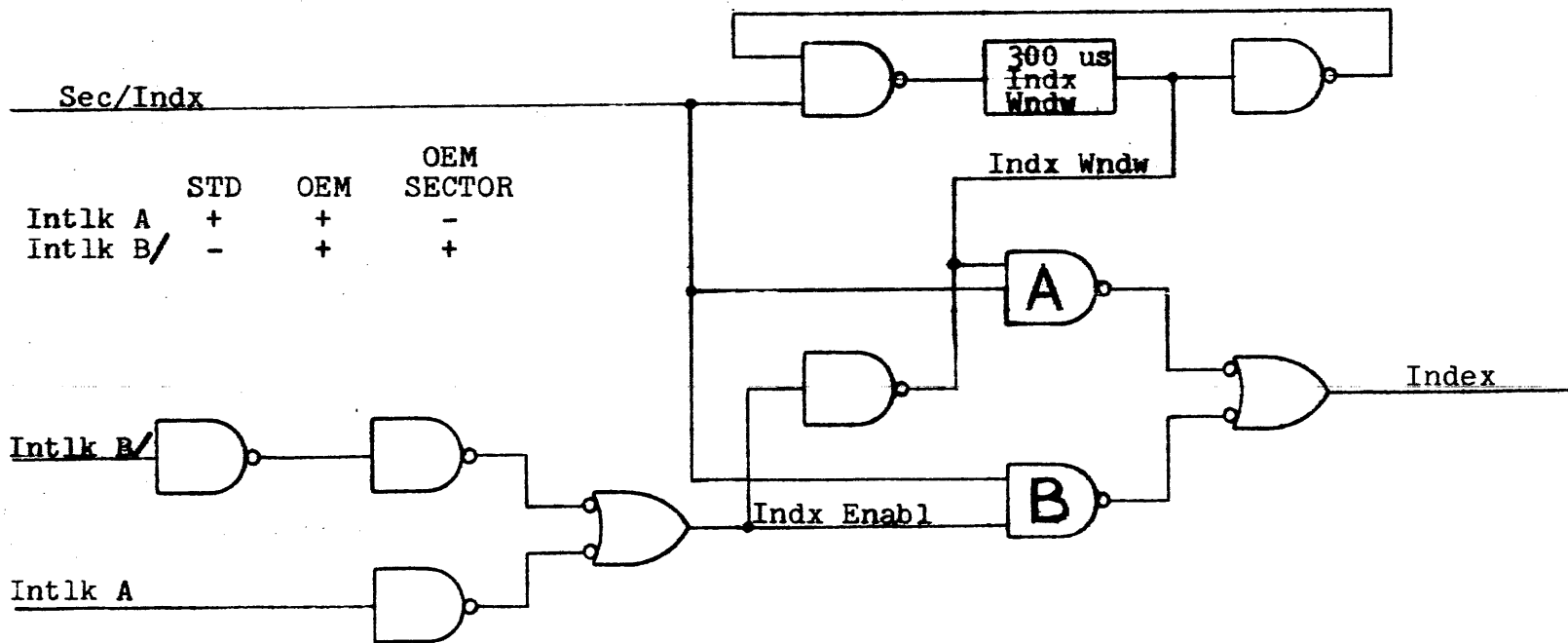
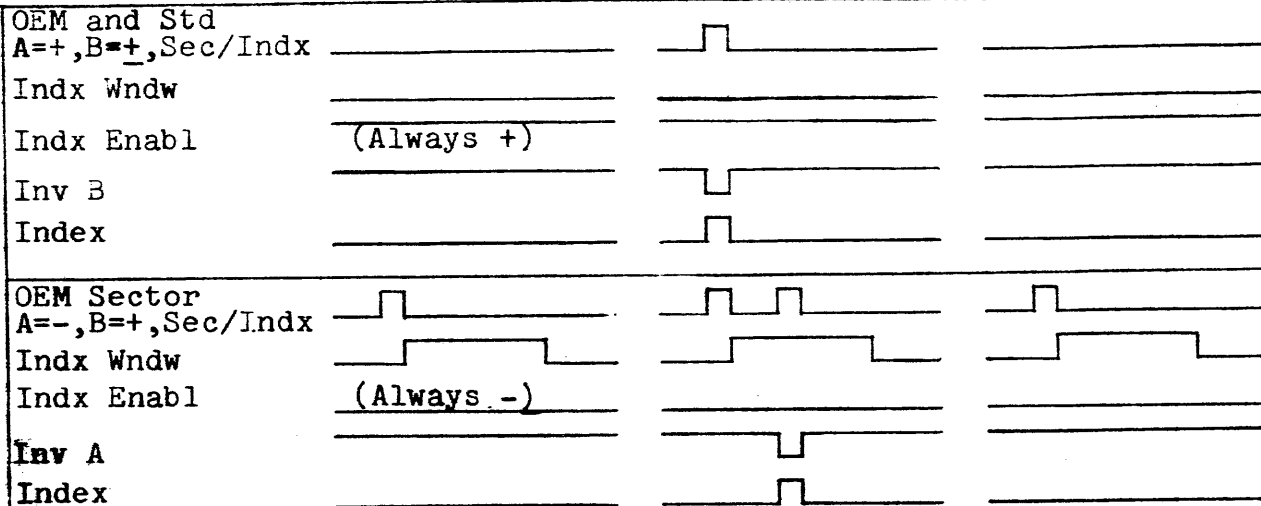
Timing Diagram for Typical Random Seek and Read Operation



NOTE: HOSEL MUST BE LOW DURING BUS ENABLE TIME

**Timing Diagram for Typical Sequential Write Operation**

CDS 114  
Simplified Logic  
and Timing Diagram  
for Index (CEM and  
Standard)

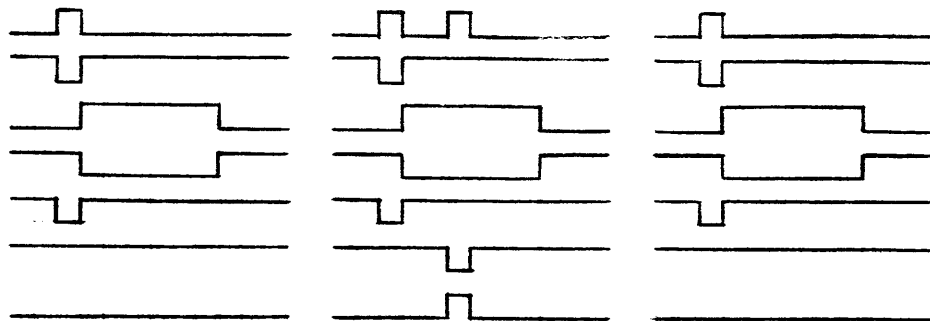


	STD	OEM	OEM SECTOR
Intlk A	+	+	-
Intlk B/	-	+	+

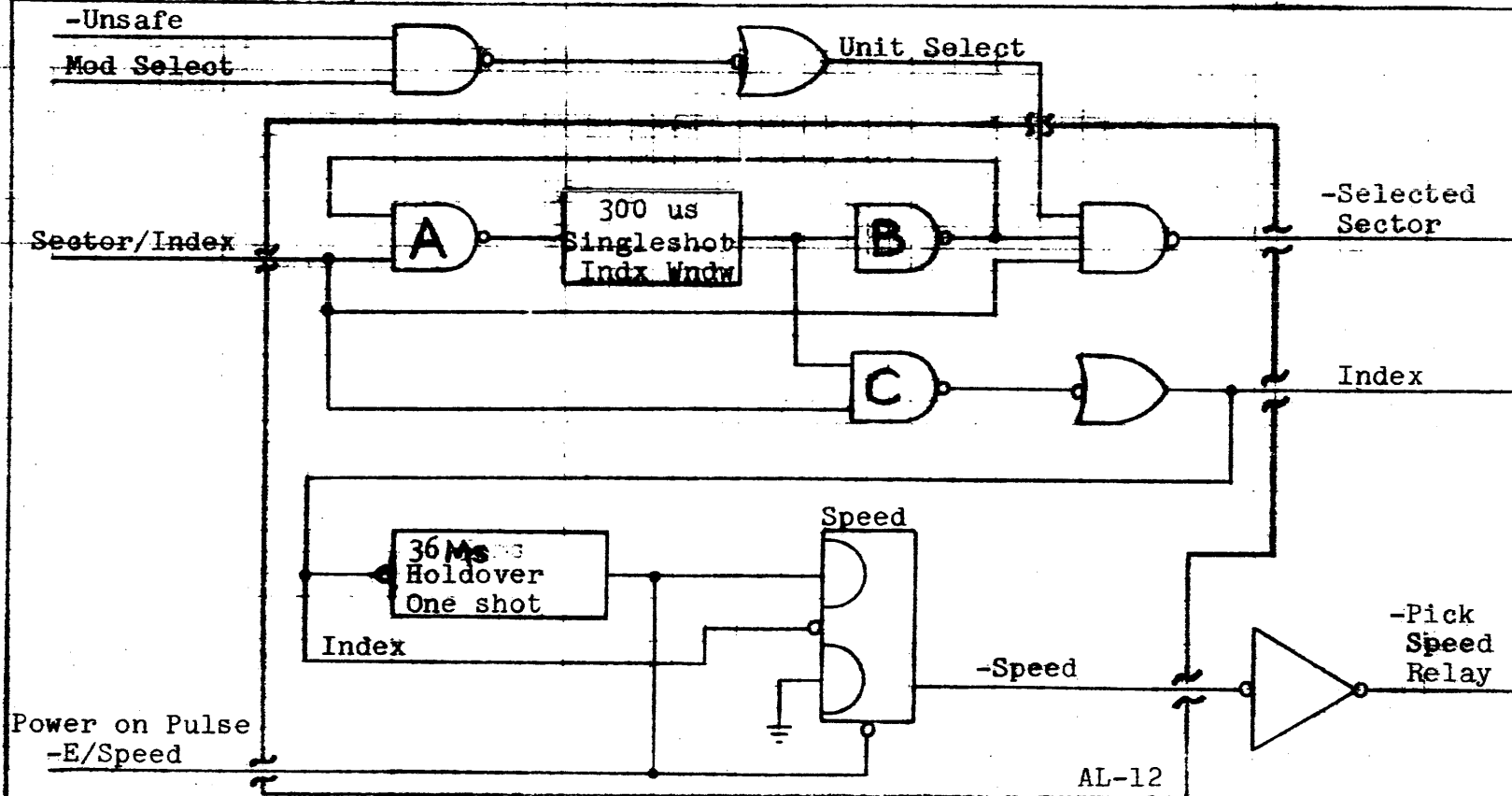
RCN

Simplified  
Schematic and  
Timing Diagram of  
the Index and Speed  
Detector  
CDS 111

Sector/Index  
Inverter A  
Index Window  
Inverter B  
-Sel Sector  
Inverter C  
Index



AL12 90258

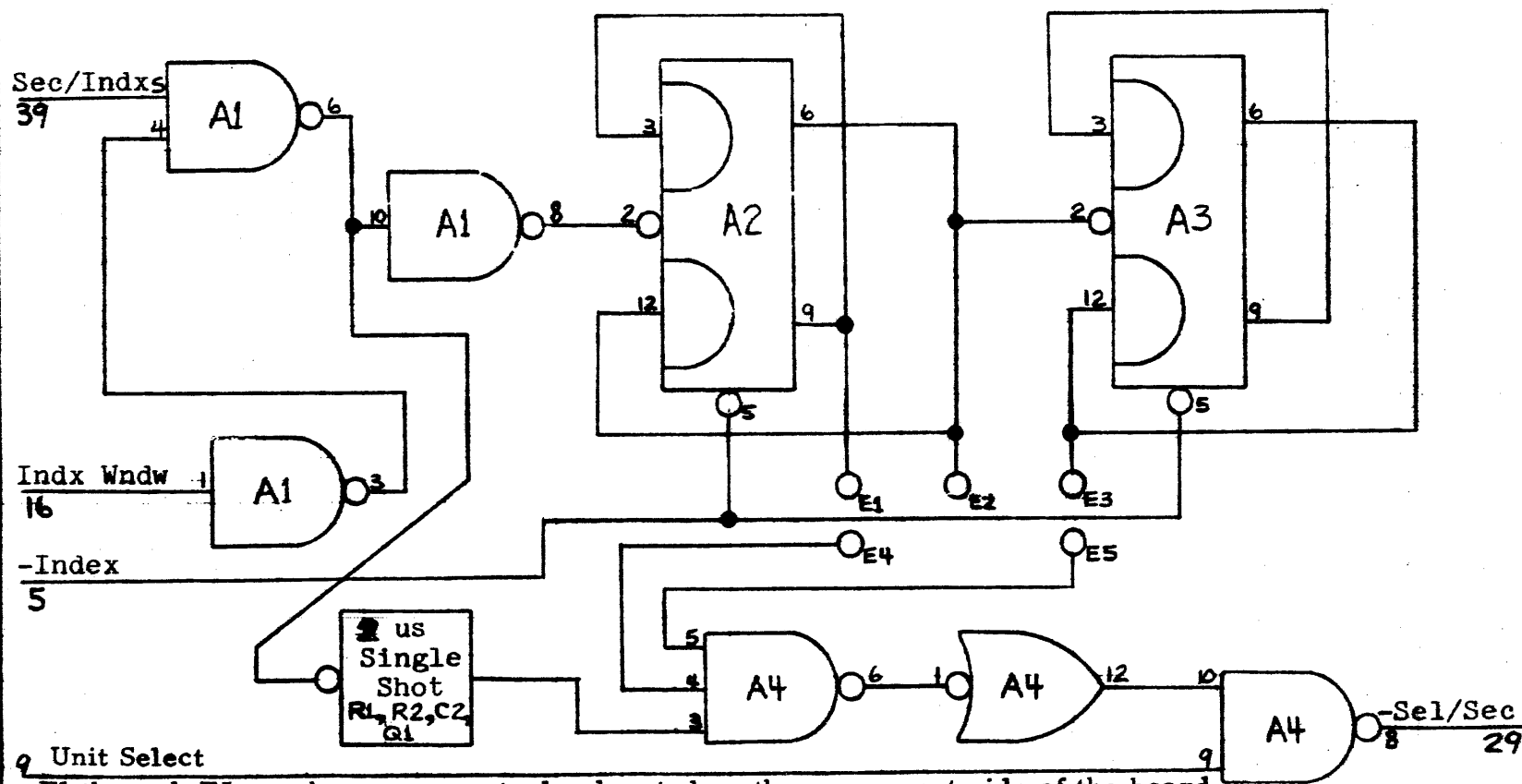


PCN

# CDS 114

## OEM MULTIPLE SECTOR GENERATOR

(NO COST, BUT MUST GO THRU ENGINEERING)



E1 through E5 are jumper receptacles located on the component side of the board, top right (pins held facing down), numbered top to bottom, left to right:

AL22

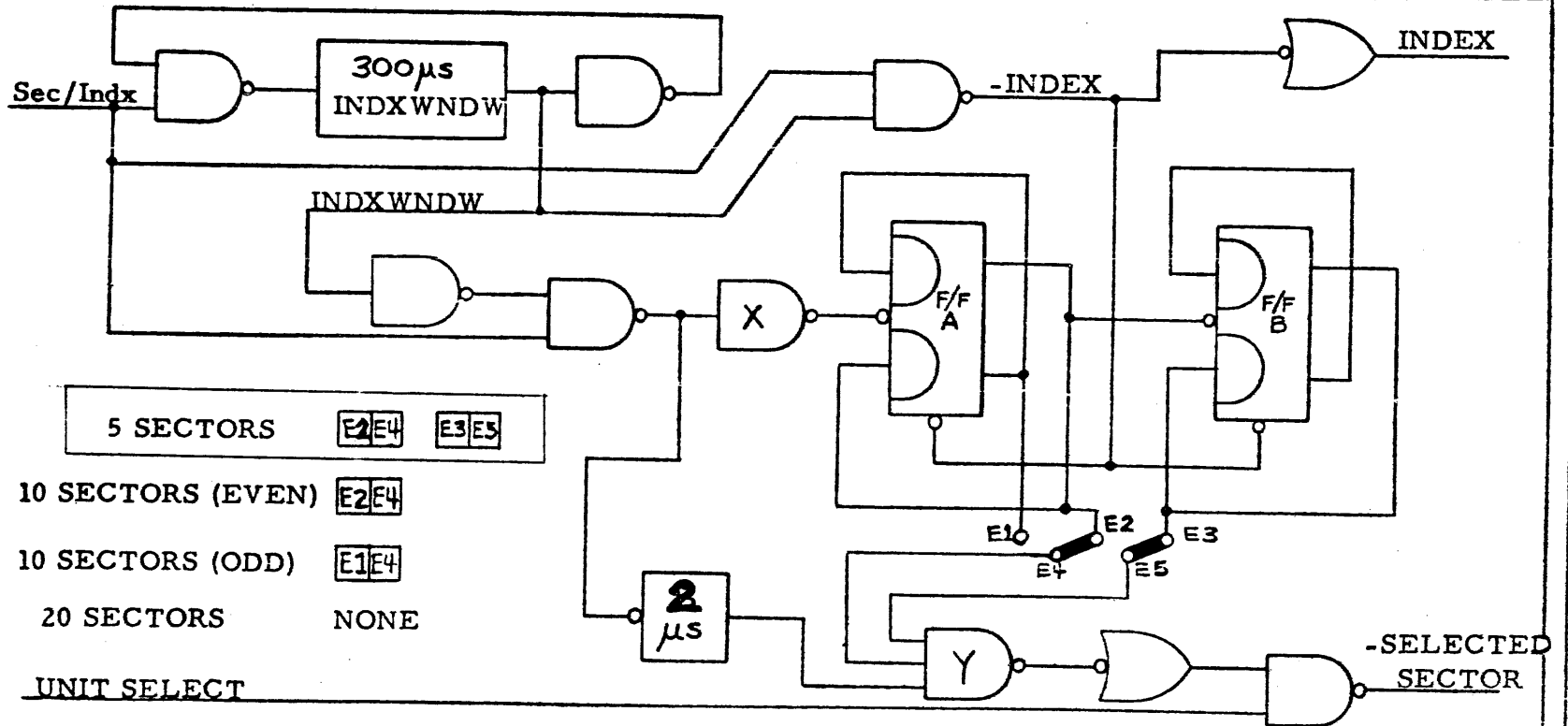
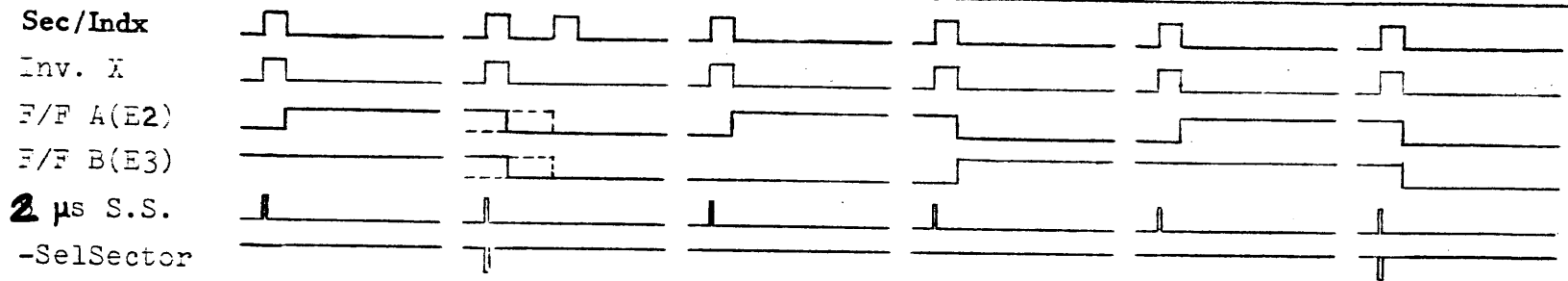
01	04
02	05
03	

91725 2

RCN

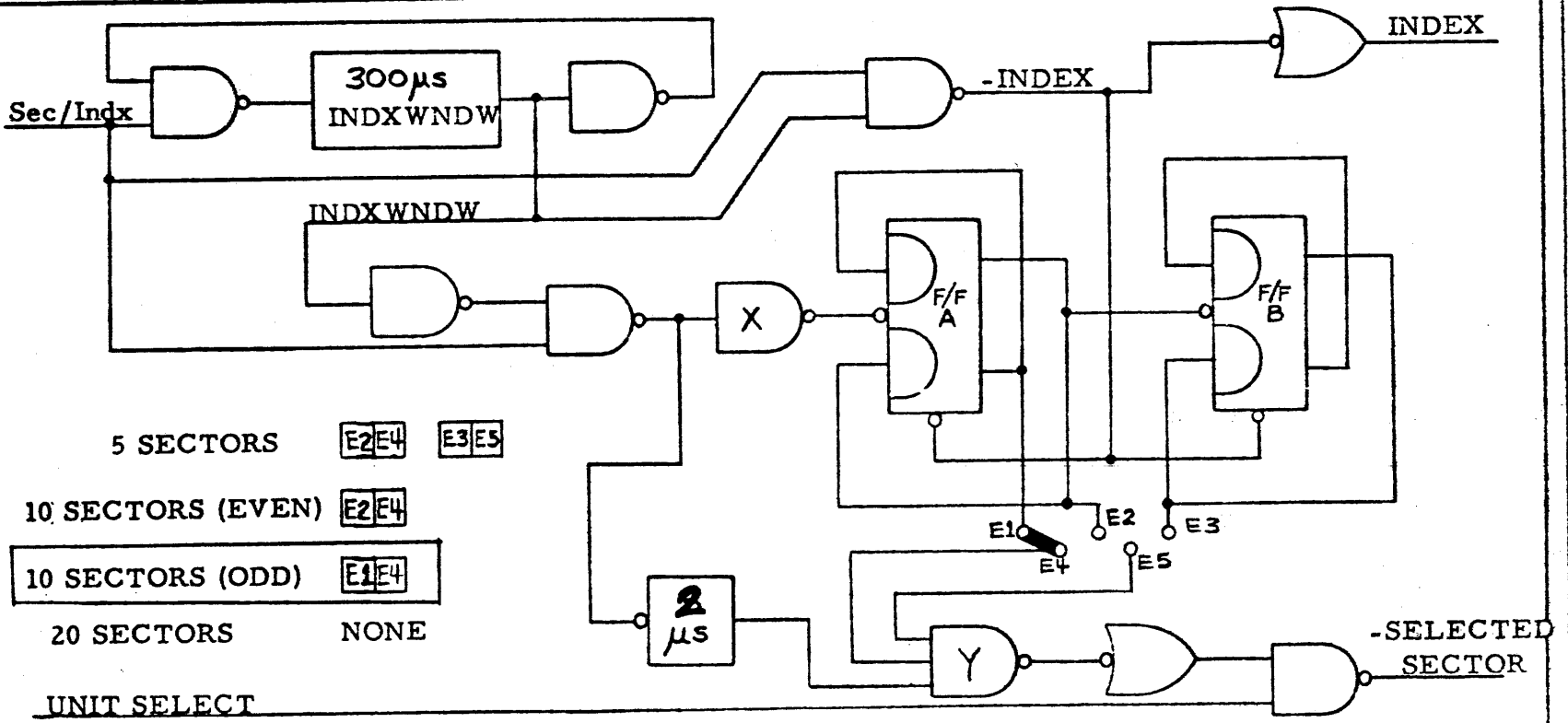
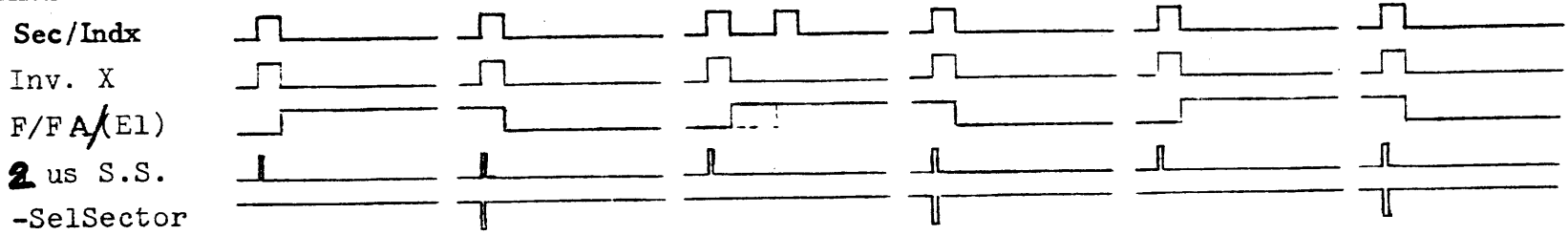
GENERALLY THESE OPTIONS DO NOT APPLY TO GA EQUIPMENT WHICH USES 20 SECTORS & DIVIDES BY FIVE IN THE CONTROLLER. THEY ARE INCLUDED FOR REF. FOR SPECIAL CASES.

CDS 114 SIMPLIFIED SCHEMATIC AND TIMING DIAGRAM- 5 SECTORS AL 22



RCN  
REV. 11-12-70

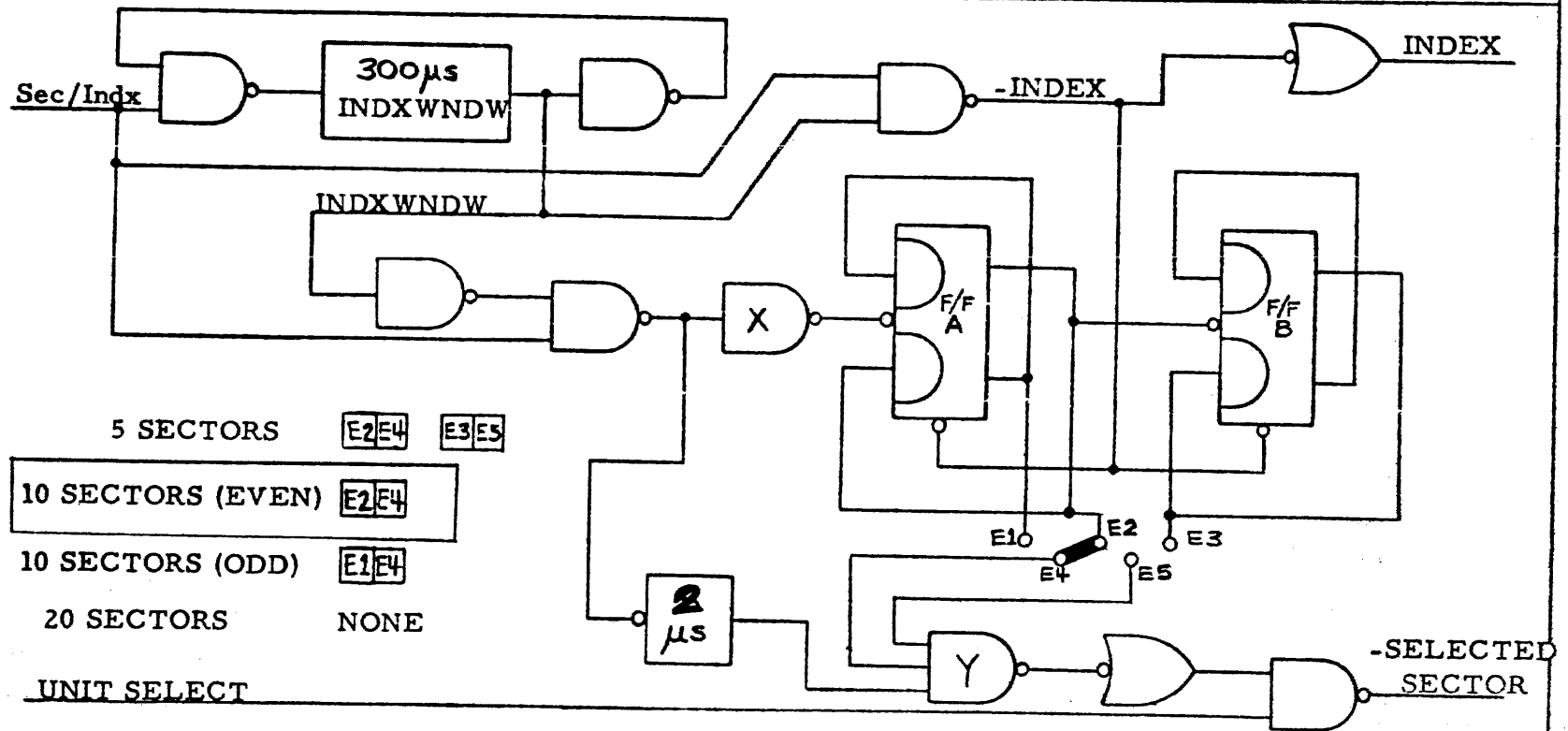
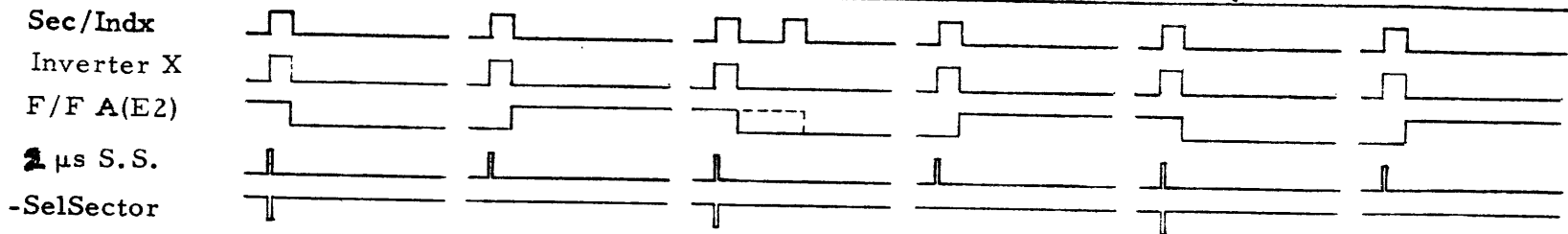
# CDS 114 SIMPLIFIED SCHEMATIC AND TIMING DIAGRAM - 10 SECTORS (ODD)



- 5 SECTORS     E2E4   E3E5
- 10 SECTORS (EVEN)   E2E4
- 10 SECTORS (ODD)   E1E4
- 20 SECTORS     NONE
- UNIT SELECT



CDS 114 SIMPLIFIED SCHEMATIC AND TIMING DIAGRAM - 10 SECTORS (EVEN) AL 22



5 SECTORS E2E4 E3E5

10 SECTORS (EVEN) E2E4

10 SECTORS (ODD) E1E4

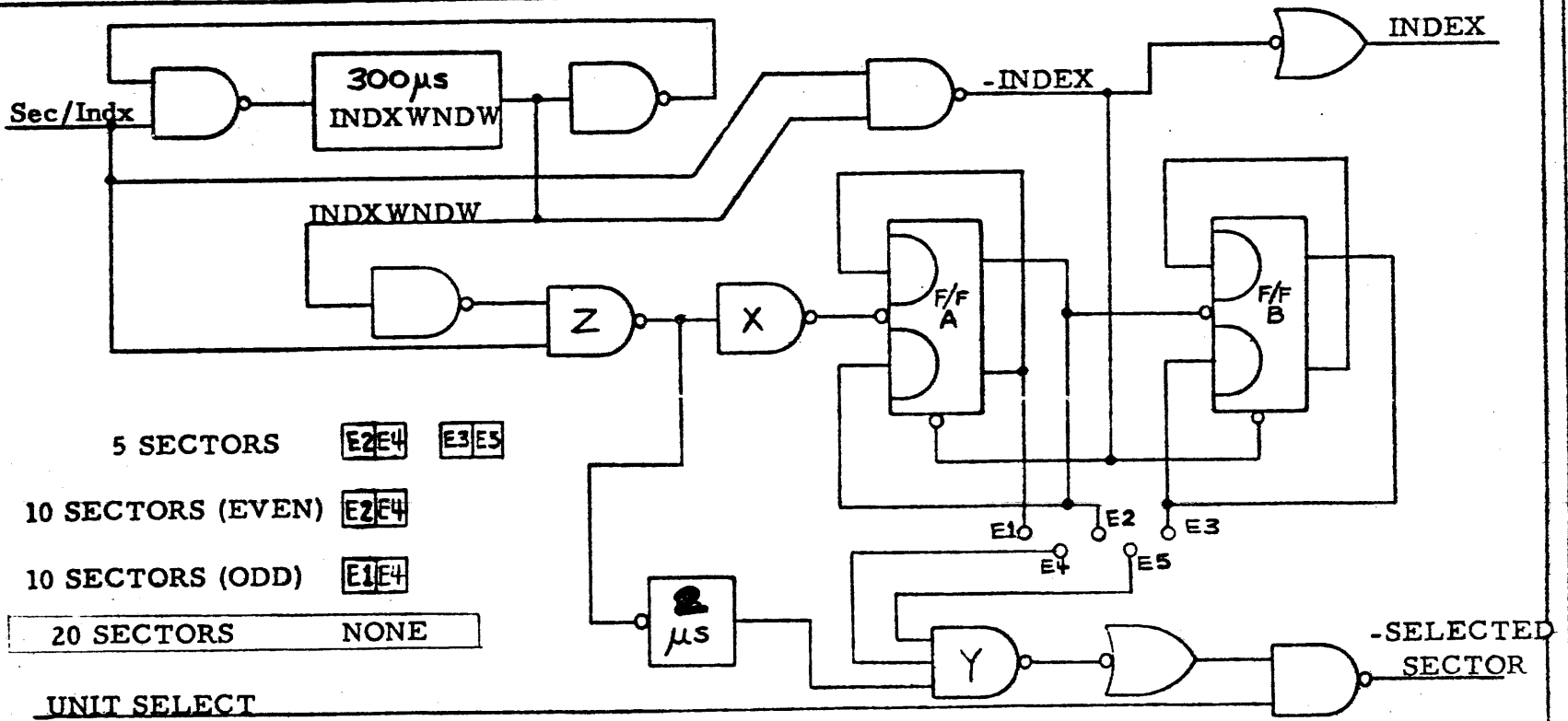
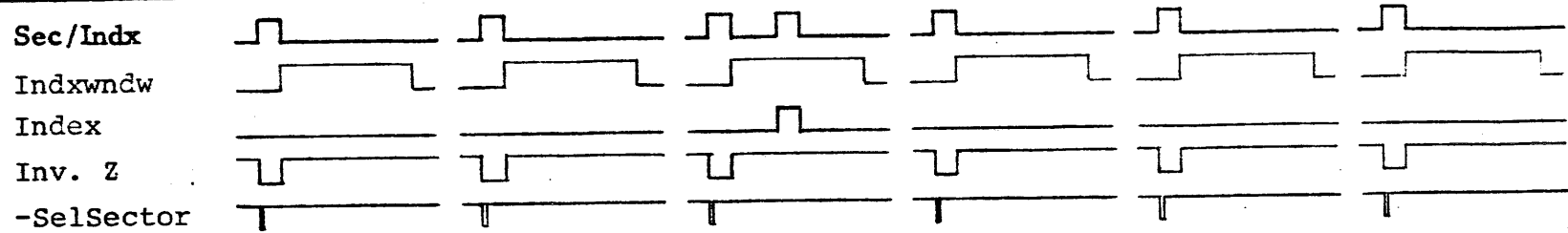
20 SECTORS NONE

UNIT SELECT

RCN

REV. 11-12-70

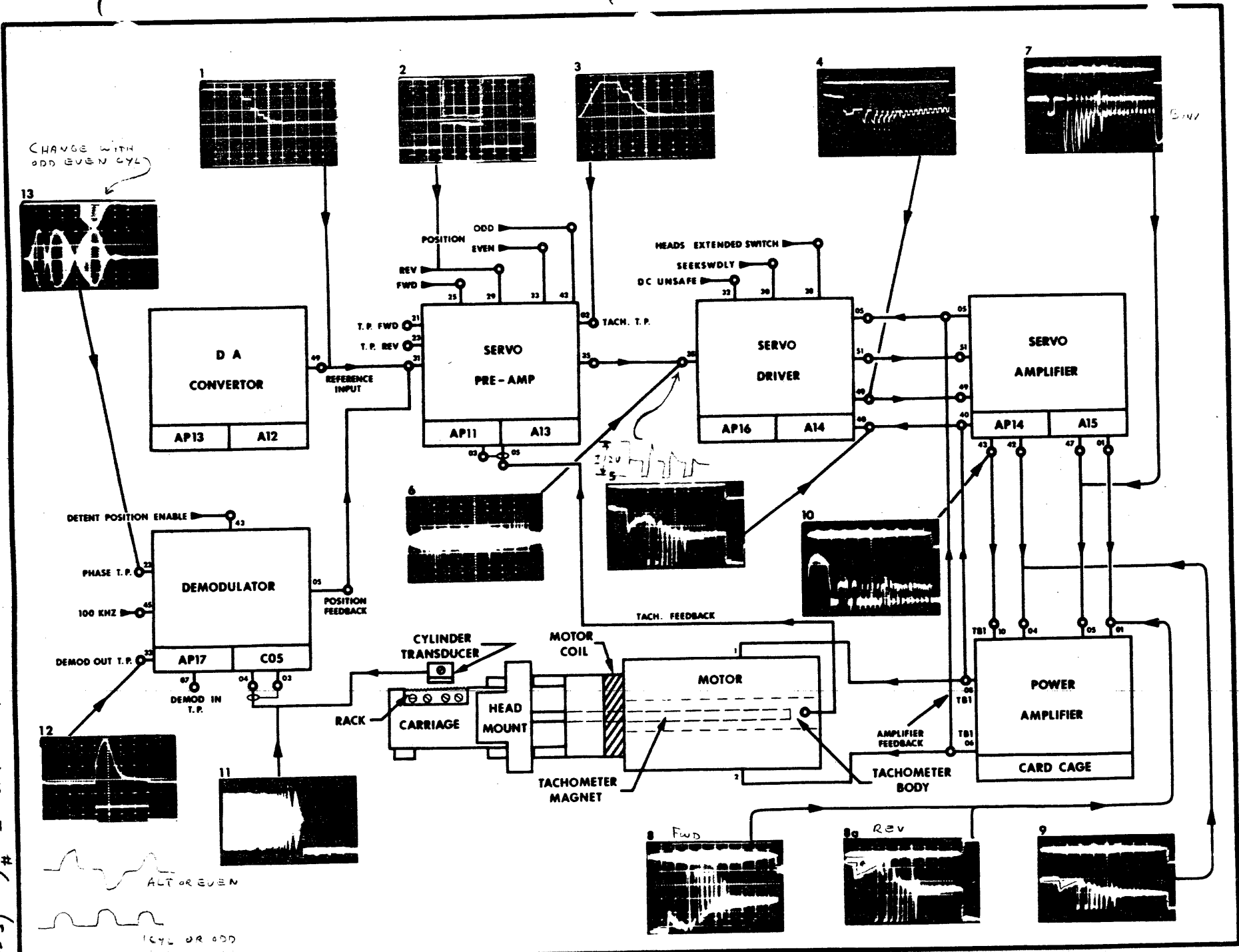
CDS 114 SIMPLIFIED SCHEMATIC AND TIMING DIAGRAM-INDEX AND 20 SECTOR GENERATOR AL 22



REV. 11-12-70

RCN

SELECTION SERVO LOOP TEST POINTS



LNB HANDOUT # 6 (5 SHEETS)

- LAB 6
1. OUTPUT OF D/A CONVERTER
    - Scope
    - Monitor A12-49 + DEMOD OUT
    - Time 10 ms/cm
    - Amplitude 2 v/cm
    - Sync 9A05 Fwd Servo
    - Program 0-202 Cylinder
  
  2. REVERSE RUN (Complimentary to Fwd Run)
    - Scope
    - Monitor
      - A. Fwd Servo 9A05
      - B. Rev Run 13A29
    - Amplitude
      - A. 5v/cm
      - B. 200 mv/cm
    - Time 5ms/cm
    - Sync 9A05 Fwd Servo
    - Program 0-3 cylinders
  
  3. VELOCITY TRANSDUCER
    - Scope
    - Monitor
      - A. 13A02 OUTPUT OF VELOCITY OP. AMP
    - Amplitude 2v/cm
    - Time 10 ms/cm
    - Sync 9A05 Fwd Servo
    - Program 0-202 cylinders
  
  4. FORWARD DRIVE (Complimentary to Rev Drive)
    - Scope
    - Monitor
      - A. Forward Servo 9A05
      - B. Forward Drive 14A49
    - Amplitude
      - A. 5v/cm
      - B. 5v/cm
    - Time Approx 7ms/cm
    - Sync 9A05 Forward Servo
    - Program 0-202 cylinders
  
  5. FORWARD FEED BACK
    - Scope
      - A. Forward Servo 9A05

LAB 6

B. Forward Feed Back 14A40  
 Amplitude  
 A. 5v/cm  
 B. 10v/cm  
 Time Approx. 7ms/cm  
 Program 0-202 cylinders

## 6. SERVO DRIVE

Monitor  
 A. Servo Drive <sup>13</sup> 9A35  
 B. \_\_\_\_\_ Note: both Fwd and Rev is shown.

Amplitude: 50 mv/cm  
 Time 20 ms/cm  
 Sync 9A05 Forward Servo  
 Program 0-202 Cylinders

## 7. REVERSE OUTPUT - 15A47

Monitor  
 A. Forward Servo 9A05  
 B. Reverse OP-15A47

Amplitude  
 A. 5v/cm  
 B. 500 mv/cm  
 Time Approx. 7ms/cm  
 Sync Forward Servo 9A05  
 Program - 0-202 CYL

## 8. REVERSE OUTPUT +

Monitor  
 A. Forward Servo 9A05  
 B. Reverse output + 15A01

Amplitude  
 A. 5v/cm  
 B. 10mv/cm  
 Time Approx. 7 ms/cm  
 Sync Forward Servo 9A05  
 Program 0-202 cylinders  
 NOTE: Picture 8= Reverse output + when system is  
 in the fwd mode.  
 Picture 8A= Reverse output when system is  
 in the Rev mode.

## 9. FORWARD OUTPUT +

Scope  
 Monitor  
 A. Forward Servo 9A05

LAB 6

B. Forward output 15A42  
 Amplitude  
 A. 5V/cm  
 B. 20 mv/cm  
 Time Approx. 7ms/cm  
 Sync Forward Servo 9A05  
 Program 0-202 cylinders

## 10. FORWARD OUTPUT

Servo  
 Monitor  
 A. Forward Servo 9A05  
 B. Forward output - 15A/43  
 Amplitude  
 A. 5v/cm  
 B. 500 mv/cm  
 Time Approx. 7ms/cm  
 Sync Forward Servo 9A05  
 Program 0-202 cylinders

## 11. CYLINDER TRANSDUCER OUTPUT

Scope  
 Monitor  
 A. 5C04 + *cyLxducer*  
 B. -GATED ATTENTION *11A30*  
 Amplitude  
 A. 200 mv/cm  
 B. 200 mv/cm  
 Mode Add  
 Time 10 ms cm  
 Sync Forward Servo 9A05  
 Program 0-202 cylinders

## 12. DEMOD OUTPUT TP

Scope  
 A. 05C33 - *TEST POINT JUST BEFORE OSCOP ON LD4*  
 B. 7B45 + *DETENT*  
 Amplitude  
 A. 500 mv/cm  
 B. 5v/cm  
 Time 2 ms/cm  
 Sync *07B45* DETENT  
 Program 0-3 cylinders

## 13. PHASE TEST POINT

LAB 6

Scope  
 Monitor  
 A. Phase Test Point 5C23. LD4  
 B. Cylinder Transducer output 5C04

Amplitude  
 A. 200 mv/cm  
 B. 200 mv/cm  
 Time 2 ms/cm  
 Sync Fwd Servo 9A05  
 Program 0-3 cylinders

LAB. AOI.  
 SERVO - 4/13-25  
 HEADS - 4/72-73  
 4/59-69  
 CYLTRANS 4/36-46

111 AND 114 ADJUSTMENTS -

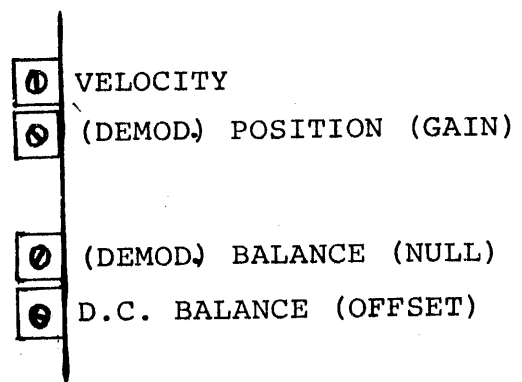
21

THEIR MEANINGS

<u>POT LOCATION</u>	<u>NAME OF ADJUSTMENT</u>	<u>WHAT ADJUSTMENTS ACTUALLY DO</u>
6B	OSC	Adjusts oscillator for exact amplitude of 5v.p. to p.
13A Top	D.C. Bal. (Offset)	Adjusts Servo System for no movement with no input to Servo Preamp 13A. Corrects for component tolerances in cards 13A, 14A, 15A & DRVR Xistors.
13A Bot	Velocity	Determines maximum velocity of access, thus seek time.
5C Outside (away from pins)	Position (Gain)	Actually should be called "Gain"- adjusts Cyl. Xducer level for input to the demodulator.
5C Inside (closest to pins)	Demod. Bal. (Null)	(Adjusted for minimum)-adjusts D.C. Balance of Demod. No input = no output. Similar to D.C. Bal. on Servo Preamp.
5C Middle (111 only)	Phase	Adjusts the phase of the 100 kHz reference to be used as a "chopper" to look at phasing of Cyl. Xducer. Adjusted so that positive half cycle turns on FET.

214 ADJUSTMENTS

The 214 has the same number of adjustments as the 114, but the demodulator function has been incorporated in the Servo Preamp in 13A. Below are the names by location on 13A. Meanings are unchanged.





(22)

PRELIMINARY POTENTIOMETER SETUP,  
CDS 111-114

(This procedure should only be necessary if 13A or 5C is replaced)

1. 111 and 114: All potentiometers on 5C and 13A fully CCW.
2. 111 and 114: 13A top (SERVO BALANCE or DC OFFSET ) - turn CW until 14A pins 51 and 49 are equal, with the transducer not on the rack and bobbin lead pulled.  
  
Alternate: 12 turns CW.  
  
111 and 114: 5C away from pins (POSITION GAIN or DEMOD GAIN) - nine turns CW.  
  
111 and 114: 5C closest to pins (DEMOM NULL or DEMOD BALANCE) - twelve turns CW.  
  
111 only: 5C center - seven turns CW.
3. Verify rack - cylinder transducer alignment is correct.
4. Proceed with power on Servo adjustments.

CDS 214

1. All potentiometers on 13A fully CCW.
2. Top pot (VELOCITY) - Fully CCW.
3. Second pot down (DEMOM GAIN or POSITION GAIN) - ten turns CW.
4. Third pot down (DEMOM BALANCE or NULL) - ten turns CW.
5. Forth pot down (DC OFFSET or SERVO BALANCE) - eleven turns CW.

### DRIVE ERRORS

When troubleshooting the cause of select locks, a preliminary determination can be made by knowing whether the heads retract, the SELECT LOCK indicator lights, and Ready drops (READY indicator goes out). The chart shows the symptoms for the different failures.

An observation that may help in diagnosing select locks on power up is the lighting of the SELECT LOCK indicator relative to the brush cycle and first seek. Three cases shown on the chart in which the drive can drop ready without lighting the SELECT LOCK indicator are

- If SPEED drops while the heads are extended, the carriage will go into an emergency retract condition.
- For Illegal cylinder and No detent 1 second after SK START conditions, the carriage will generally stay in position but can be moved manually. The carriage will be held in place by the feedback from the tach rod.
- The third case is usually caused by the servo alignment being incorrect. This is most critical when doing continuous restores, which is the condition when the carriage attains its highest speeds. The carriage sets near cylinder zero after the move from inner stop to cylinder zero and drops Ready after the 1-second timeout. This most often can be corrected by adjusting the gain for less than 100 mv and for a slight overshoot at detent. Here again the heads remain out on the pack. To be certain that this adjustment is correct, both a forward and reverse cylinder transducer signal must be displayed after a 201-cylinder seek.

Malfunction	Symptom			Select Lock Type	Comment
	Emergency Retract	SELECT LOCK Light	Ready Drops		
+45v low	X	X	X	+45v low	
Any voltage low	X	X	X	DCUSF	Includes SKUSF
Slow + SKERROR	X	X	X	SKUSF	
SPEED/+heads extended	X		X	SKUSF	See note 1
Oscillator fails	X	X	X	SKUSF	
SKLIM1 & SKLIM2 FF	X	X	X	SKUSF	
Multiple head select		X		HDS USF	
Write current, no erase current		X		HDS USF	
Erase current, no write current		X		HDS USF	
Not ready, write or erase current		X		HDS USF	
Read gate, write or erase gate		X		HDS USF	
Write gate, no write current		X		HDS USF	
Erase gate, no erase current		X		HDS USF	
Air unsafe		X		HDS USF	
Illegal cylinder			X	SKERR	See note 2
No detent 1 second after SK START			X	SKERR	See note 3

## NOTES

1. SKUSF normally sets a select lock, but in this case it won't since SPEED/+ resets the select lock latch.
2. Illegal cylinder, sent from the CU, will drop Ready and reset Detent. Servo held only by tach feedback.
3. May be caused by the difference not counting down - generally because of cylinder transducer adjustment or demodulator gain. This is most critical during continuous restores; if access speed is too fast, access will drift unless it hits the off-rack switch, which causes emergency retract and select lock.

## CONDITIONS CAUSING SELECT LOCK

1. \*Seek which results in the access "off rack"; i.e.,  
    <sup>o</sup>at maximum pack penetration.
2. \*Out of Detent mode for one second on a First Seek.
3. \*Out of Detent mode for one second on a Restore.
4. \*Losing speed ( 70% of normal) while heads are extended.
5. \*Machine clock failure while ready.
6. \*+45V (servo power) drops to +37V.  
    <sup>o</sup>
7. ‡\*Any DC power supply fails.
8. ‡\*More than one read/write head selected.
9.    No read/write head selected.
10. ‡Writing allowed or erasing allowed but not ready.
11. ‡Writing allowed or erasing allowed and read issued.
12.    Erasing sensed but no writing sensed.
13. ‡Writing sensed but no erasing sensed.
14.    Erasing allowed but no erasing sensed.
15. ‡Erasing sensed but no erasing allowed.
16. ‡Writing allowed but no writing sensed.
17. ‡Writing sensed but no writing allowed.

A SELECT LOCK condition disables the drive to communications and prevents writing or erasing.

\*These conditions also result in an emergency retract to get the read/write heads off the pack.

‡These conditions are also monitored by IBM.

<sup>o</sup>Not on lll.

READ/WRITE HEAD CLEANING PROCEDURE

1. Wrap a lint-free wiper around a paddle (tongue depressor) and dampen with 91-percent isopropyl alcohol.
2. Support the back of the R/W head and thoroughly wipe the face of each head with the alcohol-dampened wiper. Use the dental mirror to inspect the head surface. Be very sure that all dirt is cleaned off. Any extraneous material can build up dirt and oxide and damage and disks. Finally, wipe the head with dry wiper.

CAUTION

Do not touch the face of the head with your fingers. Acids from the skin can etch and ruin a head. Do not leave any residue or lint on the face of the head. Do not blow on heads or disks. Moisture will rust and contaminate the heads.

AP14 AND AP35 FAILURES - MANUAL SEEKS

If the leads of the servomotor are to remain disconnected for longer than 5 minutes while power is on, the servodriver card in slot 15A (AP14 for CD1, CD12, and CD22; AP35 for Model 215) should be removed. If the card is not removed, the components on the card will overheat and may cause damage to other components of the servo circuit.

SHORTED ID SWITCHES - 214

The following example typifies a situation in which a 214 has a shorted ID switch. The addresses used are merely for this example.

- Module A has a shorted ID 5 switch and has a 3 ID plug. Its address is 133.
- Module B has no ID switch problems and has a 5 ID plug. Its address is 135.
- When the channel attempts to select address 135, both modules (A and B) recognize the UNIT MOD SELECT line; this results in a Multiple Module Select error (sense bit 6 of sense byte 3).

If the same situation happened with the Spare ID switch shorted, an Index and No Record Found or similar error would result when inline routines were attempted.

INTERCHANGEABILITY OF POWER MONITORS

AP18 Power Monitor cards 90904 are no longer being manufactured. AP26 Power Monitor card 93059 can be substituted for the AP18 when an AP18 is not available.

SPINDLE GROUNDING BRUSH REPLACEMENT

A small pair of vise-grip or channel-lock pliers can be used to remove the old spindle grounding brushes. The replacement procedure is as follows:

- Lock the spindle.
- Grip the brush with the pliers perpendicular to the spindle shaft and twist the pliers back and forth. This breaks the setscrew but does not harm the hardened shaft.
- Remove the brush with the pliers or pry it off with a screwdriver.

This replacement method eliminates bent and broken Allen/Bristol wrenches and stripped setscrews.

OR

Buy an easy out at Sears.

DISABLING THE 90-SECOND TIME DELAY

The correct procedure for disabling the 90-second time delay for Model 213 and 215 Disk Drives is as follows:

- Power down the disk drive.
- Pull the AT17 PCB from Location 14B.
- Add a jumper between 14B05 and 14B09.

Any other procedure will eventually cause the 01B chip to fail.

This procedure should only be used when troubleshooting an area that requires repetitive power on and off cycles. Following maintenance, return the circuits to normal.

TROUBLESHOOTING PROCEDURE FOR INTERMITTENT TRIPPING OF +45V CIRCUIT BREAKERInitial Operations

- Check the voltages.
- Check the servo alignment.
- Check the rack and switch adjustment.
- Check brake relay K7 for pitted or binding contacts.

45- or 50-Volt Circuit Breakers Tripped By Pack Brush Switch

The pack brush switch on the 114, 214 and 215 Disk Drives can cause the 45- or 50-volt circuit breaker to trip.

### 45- or 50-Volt Circuit Breakers Tripped By Pack Brush Switch (Cont'd)

If the drive is ready (heads extended) and brush motor switch S7 goes from RET to EXT, the following will occur:

- The drive will go through a complete brush cycle.
- Upon completion of the brush cycle, the head carriage will go forward in the slow mode, trying to recalibrate.
- If the 190-millisecond delay has not expired before the head carriage hits the end stop, VZERO will be inhibited and the following will occur:
  1. The servo driver will not be turned off when the head carriage hits the end stop.
  2. The 45- or 50-volt circuit breaker will trip.
  3. The heads will retract with a select lock of seek error.
- If the 190-millisecond delay has expired before the head carriage hits the end stop, a normal recalibration to cylinder 0 will occur.

To prevent this from happening, ensure that the contacts of pack brush switch S7 do not chatter. Either adjustment or replacement of the pack brush assembly may be necessary.

### If Failure Continues

- Change the circuit breaker.
- Change the power amplifier transistors.
- Change the servo printed-circuit boards.

### REMOVAL OF PACK FROM BROKEN SPINDLE

The pack is held on the spindle by a shaft that runs through the middle of the spindle vertically with threads at the top.

This shaft is held from turning by a roll pin that fits into a keyway in the shaft.

If for any reason the roll pin is sheared with a pack on the spindle, the shaft is free to turn and the pack cannot be removed by the normal method.

A method of removing the pack if the pin shears is to:

- Remove the spindle ground brush at the bottom of the spindle by loosening with a .050 Allen wrench.
- Insert a 5/32 long handled Allen wrench into the keyway on the bottom of the spindle assembly.

REMOVAL OF PACK FROM BROKEN SPINDLE (Cont'd)

- With a very firm hold on the Allen wrench to keep shaft from turning, remove pack with other hand, either using the pack lid or a 9/16 socket and ratchet.

POSSIBLE DAMAGE TO HEAD BLOCKNOTE

This bulletin applies to all disk drives except Model 111.

Two of the rear head clamp screws coincide with the space occupied by the threads of the tach rod and, thereby, cause damage to the head block.

Exercise extreme care when removing the heads and installing a set of head weights. The rear screw of the third set from the bottom on either side facing the spindle (Figure 1) can be screwed into and strip the threads of the tach rod. After the threads have been stripped, the entire carriage and way assembly will have to be replaced if the tach rod has to be removed.

Whenever the heads must be removed and head weights installed in the field, tighten only the extreme top and bottom screws of each block to affix the head weights. Remove all other screws.



READ/WRITE HEADS USED ON **114** AND **214** DISK DRIVES

Two types of heads are currently used on **114** and **214** Disk Drives. One of these has a Mumetal cap over the R/W head transformer area to protect the head from the magnetic field of the linear motor. This type head (part no. 91158-XXX) can be used on either drive.

The other type head (part no. 93434-XXX) does not have a Mumetal cap and can be used on **214** units and on those **114** units that have the round Infomag motor, which has a shield that confines the magnetic field. If a head without the Mumetal cap were used on a **114** unit that does not have an Infomag motor, intermittent read/write errors would occur.

### PROPER HANDLING OF READ/WRITE HEADS

The read/write heads used in our disk drives are fairly delicate. If carefully handled, they will function properly for many years. If mishandled, they may crash or cause read/write errors.

The pad that contacts the disk surface contains the coils and magnetic core that transfer the data to and from the disk pack. The pad actually flies (like an airplane) a small distance from the disk and does not physically touch the disk surface. Since it flies like an airplane, it has to angle into the wind coming off the disk just right. It also has to angle in correctly when it first comes down on the disk -- like a plane coming in for a landing. The proper angles for flying the pad are determined partly by the gimbal spring that holds the pad to the arm. The gimbal spring is flexible in the direction of pitch, roll, and up and down, but not in yaw (rotation) or side-to-side direction. The flexibility of the gimbal spring allows the pad to fly over bumps and waves in the disk.

The gimbal spring must be flexible, but at the same time it must hold the pad in position. Care must be taken so that the spring does not get bent. This applies to inspecting the heads, cleaning, installing, removing, and boxing them. When inspecting heads, do not push the pads down further than required to determine proper operation and free action. Do not push hard on the edge of the pad. In other words, do not stress the gimbal spring to the point where it does not come back to its original position.

When cleaning heads, support the back of the pad so that the pressure will not bend the gimbal spring. Fingers should not touch the pad because oils left on the pad collect dirt and may cause a head crash. Skin acids may also corrode portions of the read/write core. If the pad is to be touched it is best to use your finger nail. Always clean the pads if they are touched, and clean them before flying.

When installing and removing heads, care must be used when putting on the camming tool. The camming tool flattens out the bend in the head to fit over the cam and slip into the head block easily. A new camming tool is under development that will be easier to use. The bend in the middle of the head is there to put pressure on the pad when it is flying to make it stable in flight and fly at the proper height from the disk surface. The pressure on the arm is set by the manufacturer to  $350 \pm 25$  grams at the pad center. If the arm is bent further than flat, there is a good chance the pressure will be reduced below 325 grams. Too low

a pressure will cause the pad to fly too far from the disk. That will give a low output signal and cause read/write errors.

When inserting the head into a machine, use care not to catch the pad or gimbal spring on the cam or another head. The head must not be forced into the head tower, as a chip or burr of aluminum may lodge between the surfaces, throwing the head out of alignment. The gap scatter (or head timing) would then be off.

The heads are shipped in protective boxes. The new white foam packaging inside the boxes is intended to protect the pad surface. The heads go into the box with the pad face up. (It would seem that the pad would fit face down into the hole in the foam, but it goes face up instead). The U-shaped top piece is shorter than the box length. It goes over the arm only, leaving the pad uncovered (but inside the clear plastic film). That way, nothing is touching the pad area that could cause the attitude angles to be thrown out. The connector is wedged between the arms of the U.

### CHECK LIST TO HELP ELIMINATE INTERMITTENT READ ERRORS

Each of the following has contributed to intermittent read error problems. This listing can be used as a memory jogger to assist you in correcting this kind of trouble.

1. Clean the heads.
2. Check all voltages (including +36v).
3. Check the 100 kHz oscillator.
4. Check servo alignment\*.
5. Check head alignment\*.
6. Check for loose head connections.
7. Check for wear to read/write preamp cables near the top cover.
8. Place IBM cards between the card in location 3B and the paddle connector **IN 02B  
IF 02B DOES NOT HAVE COVER ASSEMBLY INSTALLED.**
9. Clean the drive interface paddle connectors
10. Check that the crossover detector board in location 2A is of revision level G or higher.
11. Check and remove bus and tag cables from the vicinity of the power cables.
13. Verify that preamps (AR16 and AR17) on **114** and **214** units are of revision F or higher.
14. Check that the spindle grounding brush is in good condition and is clean. If the brush has been worn down enough to damage the flat steel spring, turn the spring over when the grounding brush is replaced.

\*The 100 kHz oscillator and all voltages must be correct before attempting servo adjustment. Servo alignment must be checked if all heads appear to be misaligned in the same direction. Servo adjustment affects head positioning.

### DISK DRIVE SPINDLE GROUNDING

If the disk drive spindle is not grounded properly, static electricity will be developed while the disk drive is running and cause random read errors. The spindle is grounded through the carbon spindle grounding brush and the pack switch.

The carbon brush tends to wear excessively which builds up carbon particles between the brush and the upper leaf spring of the pack switch. (Refer to the Maintenance Manual for a more detailed description of the pack switch and spindle grounding brush.) The buildup of carbon particles increases the resistance between the carbon brush and the pack switch. Static electricity develops with the increase in resistance and causes the random read errors.

Resistance between the spindle grounding brush and the pack switch must be kept below 1 ohm. The disk drive must be running and have a pack installed before this resistance can be measured. Connect an ohmmeter between the upper leaf spring and the brass ring just above the carbon grounding brush and measure the resistance. If the resistance is greater than 1 ohm, clean the point of contact of the upper leaf spring and carbon brush with a piece of coarse paper, NOT SANDPAPER! Do not use alcohol on the carbon brush. After cleaning the contact point, verify that the upper leaf spring is flush with the carbon brush when a pack is installed. Replace the brush if the carbon is worn excessively. If the carbon is worn through, replace the brush and the pack switch.

Although the maintenance manual does not include a schedule for checking the pack switch, inspect it during the monthly preventive maintenance procedures.

## HEAD-TO-DISK INTERFERENCE (HDI)

Head-to-disk interference (frequently referred to as a head crash) is the result of head contact with a disk surface. HDI is caused most commonly by a buildup of dirt on a read/write head or by a foreign particle in the airstream that is used as a bearing between the head and disk. If the cause is not eliminated completely, the problem will be propagated from drive to drive through pack after pack.

### RECOGNITION

Head crashes can be recognized by one or more of the following:

- Repetitive Hard Read Errors

Because of the propagation effect, do not move a pack that has this problem to more than one other drive. If errors persist, stop both drives and remove their packs. Do not allow these packs or drives to be used until the problem is fully resolved.

- Uncommon Noise

The noise from the disk is characterized by a tinkling sound that will progress to a screech.

- Disk Surface Damage

A pack that exhibits any of the following defects must be replaced:

1. Deposits or smears that cannot be removed completely with alcohol-dampened Kimwipes.
2. A single concentric scratch more than 3 inches long or any scratch that exposes the aluminum substrate. (The edge of the disk might have exposed aluminum and not cause trouble.)
3. Multiple adjacent, concentric scratches regardless of length.
4. An imbedded particle with a trailing scratch (comet tail).

- Read/Write Head Damage

Read/write head damage is characterized by any of the following defects:

1. Dark brown or black streaks through the R/W element are caused by burned oxide or aluminum. Do not reuse a head even though the streaks can be removed; the heat generated by prolonged HDI can soften the epoxy, which is used to retain

the R/W element, and cause it to protrude beyond the slider surface. This, in turn, causes oxide to accumulate in the pole tip area.

2. Bent or broken flexures result from prolonged HDI or mis-handling; replace any head that has this type of damage. Do not attempt repair!
3. Dirty Heads - Follow the inspection and cleaning procedures in the appropriate manual.

#### Note

The cleaning procedure in early versions of some manuals mentions using cotton swabs (Q-Tips) to clean the heads; their use is not recommended. Use only lint-free Kimwipes.

4. Gross Physical Damage - Try to determine the true cause of the damage to make certain that the trouble is not repeated.

#### PREVENTION

- Inspect R/W heads and shroud at one month intervals. Clean heads only when dirty.
- Verify that the air filtration system has no leaks and that the filters are clean; a dirty filter will cause contamination buildup and excessive heating of the drive unit.
- Verify that particles are not being liberated within the drive due to wear caused by lack of lubrication or by cover interference. Particularly, check the rack and carriage for lubrication. Be sure they are clean.
- Maintain disk pack cleanliness by always keeping the disk pack top and bottom covers together (replace a broken cover immediately).
- Do not leave the drive drawer extended through the front or rear for prolonged periods, except as necessary for required maintenance.
- Handle disk packs carefully. Bumping disk packs against cabinets or drive front covers can bend the sector disks. Index transducer/sector disk interference will result in particle generation and subsequent HDI.



Defective CE disk packs can damage heads and the index transducer and result in subsequent damage to customer data packs. Mechanical condition of CE pack MUST be checked prior to each use. Check the following items:

1. Sector disk for runout (check visually).
2. Loose labels or glue remaining after removal of a label.
3. Broken covers. They can result in damaged or dirty disk surfaces.
4. Loose or missing balancing weights (located inside of lower hub).
5. Deformed pack filter. It can touch the spindle housing and liberate particles.

A defective or damaged CE pack should be returned to IBM immediately for repair to avoid propagation of head/disk crashes.

- Ensure that the customer's operator personnel are aware of the following facts:

Data checks could indicate abnormal conditions and should be investigated accordingly. To determine whether the data check can be circumvented, move the pack to another drive and try again. If the operation on the second drive is successful and data checks are not experienced, continue with normal operation. If data checks continue, call the problem to the CE's attention and follow this procedure:

1. Tag the original drive, the second drive, and the pack as suspect.
2. Do not permit packs to be placed on either suspect drive.
3. Do not move suspect pack to additional drives.

Successful recovery after trying two drives is highly unlikely. Moving this suspect pack again and/or placing other packs on these suspect drives could cause a cascade of damage to other packs and drives, since this type of repeating data failure may be indicative of physical damage to the pack surface and/or drives.

Review with the customer the trouble analysis flow charts in IBM System/360 Operator's Reference Guide IBM Form No. R20-1078-2 with emphasis on page 11, which shows the correct procedures to be followed during disk failures.

## RECOVERY FROM HDI

- Inspect heads and disk packs. Determine which heads and surfaces were involved in the crash. Check all heads and total pack library for possible spreading of a general crash problem.
- Replace all damaged heads and disk packs.
- Clean remaining heads as follows:
  1. Saturate head cleaning brush P/N 220016 with 99 percent isopropyl alcohol. Shake off excess. Be sure brush is clean prior to use. Do not use a substitute for alcohol.
  2. Support the back of read/write head and scrub the face of each read/write head thoroughly; use a rotary motion and pay special attention to bleed holes and leading and trailing edges. Take care not to extend the metal stem of the brush into the head area. Use a dental mirror to inspect the head surface, bleed holes, and edges.
  3. Wrap a Kimwipe tissue around a head-cleaning paddle and dampen the tissue with alcohol. Support the back of the read/write head and wipe the face of the head with a lint-free tissue dampened with alcohol.
  4. Wipe each head dry with Kimwipes. Do not use a substitute. Several other types of paper or cloth, although lint free, deposit a waxy residue on heads or disks, particularly when used with isopropyl alcohol.

## CAUTION

Do not touch the face of the read/write head with your fingers. Oil from the skin can cause a buildup of foreign particles on the head. Do not leave any residue or lint on the face of the read/write head. Do not blow on heads or disks.

Moisture will attract contamination. When the head cleaning brush shows signs of wear, discard it. Do not apply excessive pressure to the head as this may bend the head arm stiffener or flex gimbal.

5. If contamination cannot be removed, the head must be replaced.
- Clean disk packs (if necessary) as follows:
    1. Remove front door assembly.
    2. Install disk pack to be cleaned on a machine spindle.

3. Wrap a Kimwipe tissue around a disk pack cleaning paddle and dampen (do not soak) with 99 percent isopropyl alcohol.
  4. Insert paddle between disks and manually rotate pack while exerting pressure on disk surface being cleaned.
  5. With pack rotating, slowly withdraw paddle.
  6. Using the same procedure, but with a dry Kimwipe, repeat above procedure. (Be sure that all alcohol residue has been removed from disk surfaces before reloading heads and that no torn pieces of Kimwipes are present.) Do not use any substitute type of cloth or cleaning paper.
- Check base filter, absolute filter, and disk pack filter for contamination. Replace as necessary. Check door seals and rear cover seals for leaks. Open cover; insert an IBM card between seal and frame. Close cover; IBM card should drag when removed.
  - Clean shroud and disk pack area; watch particularly for filings, shaved metal, etc. Check and/or replace the pack cleaning brushes. Do not wash them or try to clean them.
  - Mount a CE pack on a drive, turn on power and permit it to come Ready. Turn power OFF and check for oxide buildup on heads or other signs of head/disk interference. If satisfactory, turn power back on and run inline routine 80 for 15 minutes. Turn power OFF and again check for signs of head/disk interference. If oxide buildup is noted, replace head, clean and inspect pack and repeat. Perform this operation for each drive.
  - Check and align heads replaced or removed for cleaning.
  - If original pack on which crash occurred does not appear damaged, mount it on a drive that has been checked. Turn power ON and permit it to come Ready. Turn power OFF and check for signs of head/disk interference. If satisfactory, turn power back on and run inline routine 80 for 15 minutes. Perform this operation for each pack.

#### CAUTION

Do not run any inline routines that will write on customer packs.

- If customer data is on a suspected pack, ensure that it is dumped before proceeding to the next operation.
- Have the customer run DASDI to determine if pack read/write quality is satisfactory, or run data integrity 6BE. DASDI will affect customer data on packs; data integrity will not.

- Request the customer to log pack locations for one week for a physical history to be used in tracing the problem if one exists.
- Inspect heads for oxide after four hours of run time. If oxide appears, determine the cause and correct it. If no oxide is visible, check daily for a week, then weekly for a month.
- After one month, revert to monthly PM schedule.
- Unless all damaged packs and all damaged heads are removed from the machines involved, and the actual cause of the HDI is determined (when possible) and corrected, the problem will recur in a short period of time -- usually within a month.
- Report details of incident to your immediate supervisor.

Some additional data on heads that may be found useful in spotting potential problems are as follows:

Heads for a **114** fly at 80 microinches.

Heads for a **111** fly at 140 microinches.

Heads for both drives fly at the same height as those of IBM's drives.

The bend in the head arm is called the preload angle. This angle is approximately 8 degrees on the **114** and 15 degrees on the **111**

A potential problem that can occur during head replacement or head cleaning is that the flying surface of the head may be pushed back and stick against the inner circumference of the gimbal ring. If the head arms are crooked in the carriage, the gimbal ring may bind on the cam tower. This is a hazard especially when doing the first head load after installing a new head.

Pack brushes should be checked periodically for burning. This is most easily detected by removing the pack and looking straight into the brushes. A light-brown color indicates that burning is taking place. Brushes that are burning will leave deposits on the pack or the burnt strand will dig into the pack surface. Either condition is a potential cause for a head crash. Burnt brushes are caused by the brushes riding too hard on the pack.

Ensure that the entire sweep of the brushes is centered between the platters. If individual brushes are riding too hard, the strand block will have to be replaced. If individual brush arms are off center, the brush assembly will have to be replaced. If all the arms are riding too low, the brush assembly may be shimmed up to a more optimum position. Pack brushes may be off center approximately

0.015" in either direction. This allows for height differences in various packs and also allows tolerance for the brushes to fly.

Pack filters may become saturated with lubricant from the inner surface of the spindle. If this happens, wipe the excess oil from the spindle and spindle threads, and replace the pack filters.



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DATE September 16, 1970

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TITLE:

Models Affected: 114, 213 and 214

RACK END SWITCH

REASON FOR BULLETIN:

There have been several reports from field personnel concerning problems directly related to the RACK END SWITCH.

The RACK END SWITCH is the microswitch located beside the carriage and way assembly closed to the end stop. It is also defined as the OFFRACK SWITCH in the Model 114 Logic Diagrams, LD8- (91541 and 91575).

The task of the RACKEND SWITCH is to monitor the position of the carriage in relation to the end stop. During normal operations, i.e., not FIRSTSEEKS or RESTORES, if the carriage should get too close to the end stop, which means that the CYLXDUCER can no longer monitor the INDEX RACK; the RACKEND SWITCH should make and cause a SEEK-UNSAFE condition which in turn will cause an emergency retract and remove the heads from the disk pack area.

The problem has been that during a FIRSTSEEK or a RESTORE, an emergency retract occurs because of a mis-adjusted RACKEND SWITCH. What occurs is that the RACKEND SWITCH is made during the time that the carriage is at the end stop. Velocity Zero is set which will reverse the direction of the carriage. As the carriage begins its' high speed return to cylinder zero, the RACKEND SWITCH doesn't open fast enough and when the ONRACK flipflop is set, the RACKEND switch is still made. The result is that the SEEKLIMITS flipflops are marked and cause a SEEKUNSAFE condition which in turn causes an emergency retract.

EQUIPMENT/MODEL EFFECTED:

CDS Model 114 Disk Drives.

OTHER EQUIPMENT EFFECTED:

None.

APPROVED	DATE	SUPERCEDES	DATED	ORIGINATED BY	DATE
<i>Henry P. Bond</i>	9-15-70			A. L. Ortiz	9/12/70
<i>Dick [unclear]</i>	9-22-70				



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DOCUMENTS EFFECTED:

Technical Manual- Model 114 Disk Drive  
Installation Procedure, Section 3, Pages 3-8 and 3-9.

TECHNICAL INFORMATION:

The current method of check and adjusting the RACKEND SWITCH as called out in the Model 114 Technical Manual is good and should be followed. The suggestion is that the following procedure for checking the time relationship between opening of the RACKEND SWITCH and the setting of the ONRACK flipflop should be appended to the Technical Manual.

The rule is that the RACKEND SWITCH must open before the ONRACK flipflop sets. Set up an oscilloscope as follows:

Sync:	EXT	POS	5MS	12A29	VZERO
Chan:	ONE	DC	2V	13A49	OFFRACK
Chan:	TWO	DC	2V	13A47	ONRACK
Mode:	ALTERNATE				

Now perform RESTORES utilizing the CDS Model 2011A Disk Drive Exerciser, or if the 114 is a standard controller version, pop the ID plug. Observe that when the oscilloscope triggers because Velocity Zero has been detected that the OFFRACK signal goes high. Ensure that the OFFRACK signal goes low before the ONRACK signal goes high by adjusting the RACKEND SWITCH.

REFERENCE DOCUMENTS:

Telephone conversations with several Product Specialists  
Field Service Engineers.


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 NUMBER 42

 DATE September 15, 1970

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TITLE

 Models Affected: 111, 114, 212,  
214 & 2011

USE OF THE DISK DRIVE EXERCISOR, MODEL 2011A
REASON FOR BULLETIN

The reason for this Bulletin is to explain the use of the modified Disk Drive Exercisor, Model 2011A.

The Disk Drive Exercisor, Model 2011, has been modified to enable the use of the Exercisor on Model 114 Disk Drives. The modified Exercisor is the Model 2011A. This Model 2011A was to be used universally on all Disk Drives, both Model 114 and Model 111. Unfortunately, due to the differences between 114 Disk Drives, e. g., the Standard or Controller (1014) type and the OEM versions, the Exercisor is not now universal.

Depending on the particular version of Disk Drive to be exercised, temporary modifications must be made to enable the 2011A Exercisor to be used. The following table reflects the different versions of Disk Drives and the temporary modification, if any, to be used.

MODEL	VERSION	MODIFICATION
111	All	None
114-214	Standard or 1014 Controller Type	12B29 to 12B03 Remove and Insert the ID plug
114-214	OEM 5VDTL	None
114-214	OEM 3V"Q"	2011A-tape CPM pin 41 114-02B56 to 02B41 and 03B14 to 03B03

In the case of the Standard 114, it is possible to have the RDONLY flip-flop come true on initial power up. The above temporary modification eliminates this possibility.

In the case of the "Q" Logic OEM 114 the differences in the WRTDATA inputs necessitate this temporary modification to enable the 2011A to bring up WRITE.

APPROVED	DATE	SUPERCEDES	DATED	ORIGINATED BY	DATE
<i>Harold T. Byrd</i>	<i>9-16-70</i>	E-2011-T-70-003	A 4/3/70	<i>A.L. Oetj</i>	4/3/70
<i>Richard Jaeger</i>	<i>9-16-70</i>				





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When removing the 2011A, remove the temporary modifications.

EQUIPMENT/MODEL EFFECTED

2011A Disk Drive Exercisor

DOCUMENTS EFFECTED

Logic Diagrams - 2011

CDS #90506

TECHNICAL INFORMATION

See "Reason for Bulletin".


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 NUMBER 48

 DATE November 18, 1970

 PAGE 1 OF 2
TITLE:

 Models Affected: Miscellaneous -  
All Drives

PACKS STICKING TO SPINDLE
REASON FOR BULLETIN:

1. Excessive force is occasionally required to remove packs from the spindle.
2. Following procedure should be included in preventative maintenance procedure.

EQUIPMENT/MODEL EFFECTED

All CDS Disk Storage Drives.

OTHER EQUIPMENT EFFECTED

None.

DOCUMENTS EFFECTED

None.

TECHNICAL INFORMATION

If packs are difficult to remove from a spindle, it may be due to an accumulation of dirt on the spindle cone and spindle screw hole. To fix the problem, moisten a "Kimwipe" with alcohol and swab the spindle cone and spindle screw hole to remove the dirt. It is usually a small quantity of black residue that collects on the "Kimwipe".

CAUTION

Excessive amounts of alcohol may run down the spindle into the bearing and remove some of the lubricating grease.

Spray a small amount of silicone grease, "SLIX-IT" into a "Kimwipe". Wipe the "Kimwipe" over the spindle cone to put on a light coat of lubricant as a precaution against corrosion. Wipe off any surplus lubricant by wiping the spindle cone again with a clean dry "Kimwipe".

APPROVED	DATE	SUPERCEDES	DATED	ORIGINATED BY	DATE
<i>Gerald T. Byrd</i>	<i>12-3-70</i>			A. Bollschweiler	11/16/70
<i>Robert J. ...</i>	<i>12-7-70</i>				



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CAUTION

Do not spray around unprotected disk packs or around the air shroud interior. Do not use too much lubricant. Too much lubricant could find its way into a disk pack and result in head crashes.

Check disk packs for dirt on the two cone taper surfaces that contact the spindle. To inspect, remove the disk pack bottom cover and turn the pack upside down. If dirty, clean with a "Q-Tip", lightly moistened with alcohol. DO NOT put any lubricant on the disk pack.

REFERENCE DOCUMENTS

Inter-Office Memo to Ray Rogers from R. J. Elliott dated November 10, 1970.



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NUMBER 65  
DATE February 18, 1971  
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Models Affected: 111,114,115,212,  
214,215,216,1014

TITLE:

Latch Card AF14 93245-001.

REASON FOR BULLETIN:

To establish a procedure for using the C.E. Latch Card.

TECHNICAL INFORMATION:

A multipurpose latch card has been provided for service personnel. It is an AF14 card part number 93245-001. It can be used to monitor and latch any signal condition he so desires. It has six latches explained below.

The latch card is intended to be plugged into location 13B in the 111, 114, 212 and 214 drives, location 14B in the 115, 215 and 216 and location 07C in the 1014 controller. The voltage requirements are +5VDC and 24VDC. In the 111, 114, 212, 214 drives +5VDC is already on 13B pins 59 and 60. In the 115, 215 and 216 +5VDC is on 14B 59 and 60. +24VDC must be temporarily jumpered from pin 01A 58 to 13B 58 on the 111, 114, 212 and 214 drives and to 14B 58 on the 115, 215 and 216 drives. On the 1014 controller +5VDC is also already on the pins required. +24VDC is available on pin 25C 56 and can be jumpered to 07C 58.

Upon initial application of power the Flip Flops will arbitrarily assume a set or reset condition. Direct set and reset pins are available to pre-condition the Flip-Flops to the desired state before using the card. These pins are listed below for each of the six latches.

APPROVED	DATE	SUPERCEDES	DATED	ORIGINATED BY	DATE
<i>[Signature]</i>	3-3-71			J.S. Snow	2-18-71
<i>[Signature]</i>	3-3-71				



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	<u>Direct Set</u>	<u>Direct Reset</u>
Latch A	26	27
Latch B	9	2
Latch C	11	4
Latch D	53	39
Latch E	28	25
Latch F	52	49

When a Flip-Flop is set the appropriate lamp will be on.

Below are some examples of how the card may be used.

1. Suppose a select lock is occurring and the C.E. suspects that SKUSF is the problems. We will use latch A to latch this condition. Any of the other latches could be used in the same manner. After power is applied check to see if lamp A is on. If it is momentarily ground pin 13B27 to reset Flip-Flop A. Then connect a jumper from 6B35, which is SKUSF/, to 13B26. If, at any time, 6B35 goes low, latch A will be set. Other conditions may be monitored in the same way on the five other latches.
2. If the C.E. suspects he is intermittently losing speed he may latch speed in the same way as SKUSF/ in example one with one difference. Since it is normal for the speed Flip-Flop to be reset until 70% speed is reached, the jumper from the speed Flip-Flop (3A43) should not be connected until the speed Flip-Flop has initially been set. If speed is then lost even for a moment the Flip-Flop on the latch card will set and stay set until it is manually reset by grounding the appropriate reset pin on the latch card.



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3. ANDing conditions can also be used to set a Flip-Flop. For an example of this let us look at latch A. (note: All latches work the same way only the pin numbers are different).
- A.) If you need to latch two positive and one negative signal occurring at the same time monitor the two positive signals on pins 22 and 24 and the negative signal on pin 19. The latch will then set only when pins 22 and 24 are positive and pin 19 is negative.
- B.) If you need to monitor two positive signals jumper pin 19 to ground and apply the two positive signals to pins 22 and 24. The latch will then set when pins 22 and 24 are positive.
- C.) Note on the schematic (drawing number 93245-001) that pin 24 has a holdup resistor so that it is held high at a 5 VDC level unless a ground is applied to pin 24. With this in mind let us look at the conditions necessary to latch a positive and negative signal occurring simultaneously. Do not apply any input to pin 24, it will be held high by the holdup resistor R9. Apply the positive signal to pin 22 and the negative signal to pin 19. The latch will then set when pin 22 is positive and pin 19 is negative. When using the latch card refer to drawing number 93245-001 and this Technical Bulletin to establish the proper jumper configuration and correct procedures for using the latch card.



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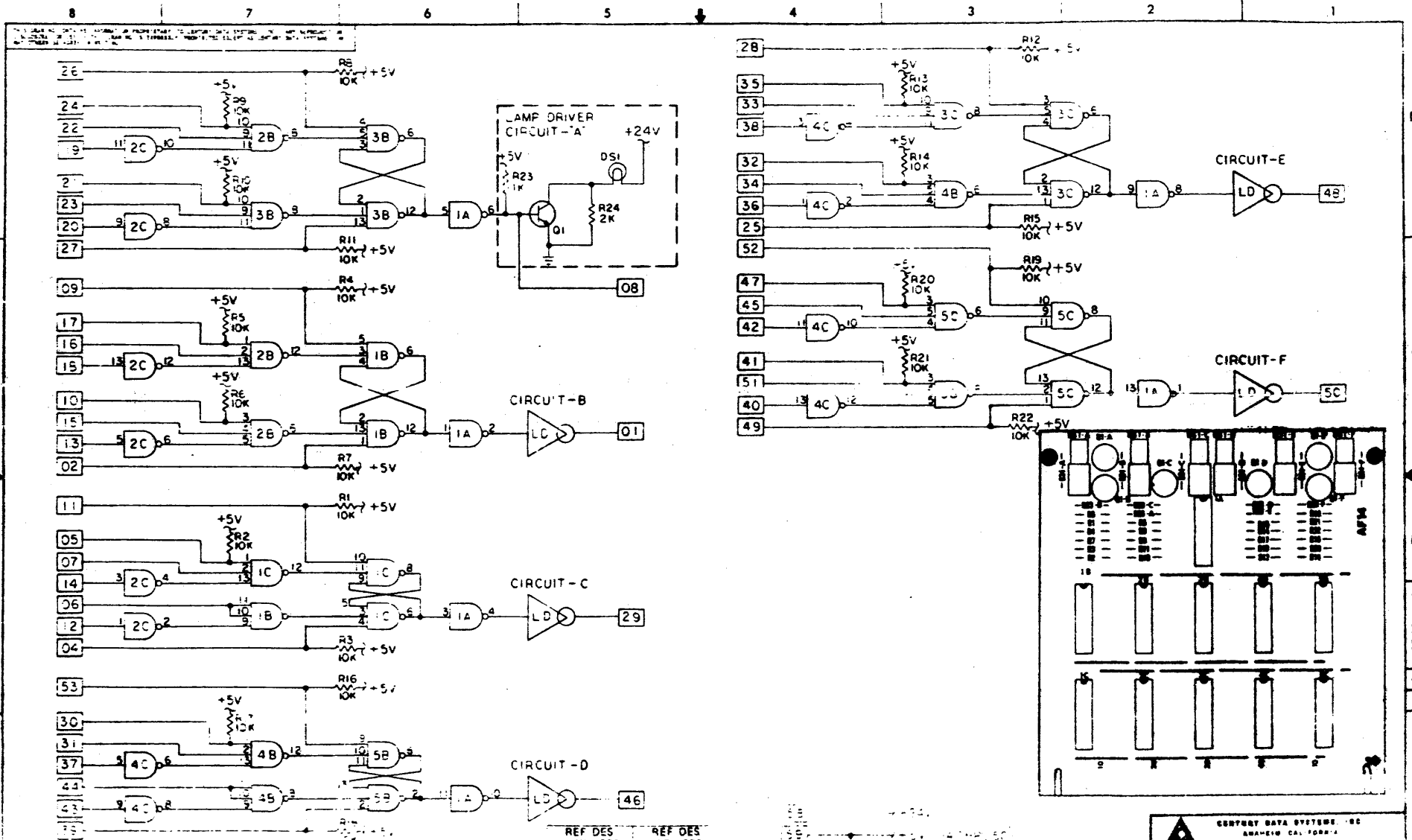
---

NOTE

Unless otherwise specified a negative signal is a 0 VDC logic voltage and a positive signal is a 5 VDC logic voltage.


CAUTION

The only voltages to be applied on the logic input pins are 0 VDC (or ground) and 5 VDC. Any other voltage levels will damage the logic.



1. RESISTANCE VALUES ARE IN OHMS 1/4 W 5%  
NOTE: UNLESS OTHERWISE SPECIFIED

REF DES	LAST USED	REF DES	NOT USED
1A	DSFF		
5B			
5C			
5D			


**CONTROL DATA SYSTEMS, INC.**  
 ANAHEIM, CALIFORNIA

**SCHEMATIC DIAGRAM -**  
**LATCH MODULE - AF14**

DATE	BY	APP'D BY	SIZE	REV
			D	001

80745-1  
 80745-1





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TECHNICAL BULLETIN

**Century Data** SYSTEMS, INC.

NUMBER 68  
 DATE February 25, 1971  
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Models Affected: 1014,114,111

TITLE:

Description of Type 7475 CHIP.

REASON FOR BULLETIN:

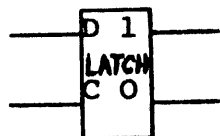
To provide personnel with a description of how chip type 7475 works. Chip Type 7475 will be present on AL15 boards revision F, and is currently used extensively in the 1014.

There is a common misconception that this latch is set with a position transition on the clock (C) line, that is not necessarily true.

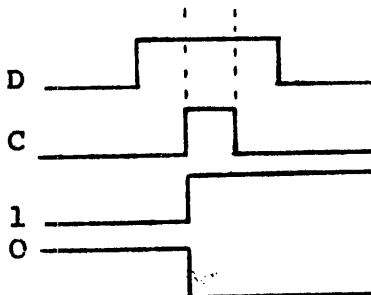
DOCUMENTS EFFECTED:

1014 - Dwg. #93504-001 page 1 of 45.

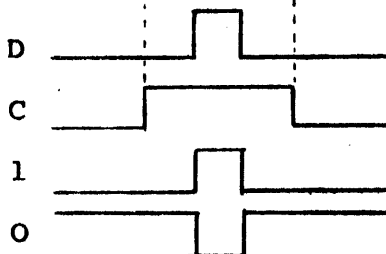
TECHNICAL INFORMATION:



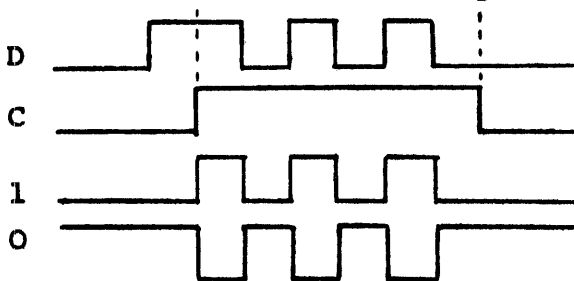
Example 1



Example 2



Example 3



APPROVED	DATE	SUPERCEDES	DATED	ORIGINATED BY	DATE
<i>Wanda P. Bunn</i>	2-26-71			J. Larney	2-19-71
<i>[Signature]</i>	2-26-71				



**Century Data** SYSTEMS, INC.

TECHNICAL BULLETIN

NUMBER 68

DATE February 25, 1971

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Information present at the (D) input is transferred to the (1) output when the clock (C) is high, and the (1) output will follow the data input as long as the clock remains high.

When the clock goes low, the information (that was present at the data input at the time the transition occurred) is retained at the (1) output until the clock is permitted to go high. (0) output is always the compliment of the (1) output.

Example #1:

The (D) input is high before the (C) input goes high. With the positive transition of (C), the (1) output goes high, the (0) output goes low. When the (C) line goes LOW, the (D) input is still high so (1) output stays high and (0) output stays low.

Example #2:

When the (C) line goes high, the (D) input is low; consequently, (1) output stays low and the (0) output stays high. When the (D) line goes high, the (C) line is high so the (1) output comes high and the (0) output goes low. When the (D) line goes low, the (1) output goes low and the (0) output goes high. When the (C) line goes low, the (D) input is still low so the (1) output stays low and the (0) output stays high.

Example #3:

When the (C) line goes high, the (D) input is high so the (1) output goes high and the (0) output goes low. As long as the (C) line remains high, the (1) output follows the (D) input and the (0) output is the inverse of the (D) input. When the (C) input goes low, the (D) input is low; consequently the (1) output stays low and the (0) output stays high.

REFERENCE DOCUMENTS:

Texas Instruments Catalog #CC-201 Page 6-1.



TECHNICAL OPERATIONS

**Century Data** SYSTEMS, INC.

TECHNICAL BULLETIN

NUMBER 70

DATE July 21, 1971

PAGE 1 OF 6

MODELS AFFECTED: 111, 114,  
133, 166,  
212, 214

TITLE:

CYLINDER TRANSDUCER OUTPUT CRITERIA

REASON FOR BULLETIN:

Feedback from field service personnel indicates that there is some question regarding the criteria for the output amplitudes of the cylinder transducer. The intent of this bulletin is to provide clarification of the cylinder transducer's output during its various phases of operation.

DOCUMENTS AFFECTED:

Maintenance Manual

TECHNICAL INFORMATION:

The following paragraphs define the outputs of the cylinder transducer and are concerned with four basic items:

- The output amplitude of the cylinder transducer between the time that DETENT is set and the time that READY is active.
- The output amplitude of the cylinder transducer during a null (Detent Mode).
- The output amplitude of the cylinder transducer during a seek (Velocity Mode).
- The tooth-to-tooth amplitude of the cylinder transducer as it detects one cylinder position and an adjacent cylinder position.

APPROVED	DATE	SUPERCEDES	DATED	ORIGINATED BY	DATE
<i>Donald T. Byrd</i>	8-5-71	T.B. 70	04-14-71	A. L. Ortiz	7-21-71
<i>V. R. ...</i>	8-10-71				



**Century Data** SYSTEMS, INC.

TECHNICAL BULLETIN

NUMBER 70

DATE July 21, 1971

PAGE 2 OF 6

TECHNICAL INFORMATION (Cont'd)

- The output amplitude of the cylinder transducer between the time that DETENT is set and the time that READY is active: The first peak after the DETENT flip-flop is set is the final positioning signal. Any other peaks after this first peak until READY is active shall be less than 400 millivolts and shall be separated by nulls of 50 millivolts. Check by programming the disk drive to perform sequential single cylinder seeks in a forward direction then in a reverse direction. Utilize an oscilloscope in the following manner:

PROG: Sequential Single Cylinder Seeks  
 \*\*SYNC: Ext Pos 5ms 09A05 FWDSEVO(111,133) or  
 SKFWD(114,166,212,214)  
 CHAN: One DC 200mv 05C04 CYLXDUCCER Model 111,114  
 133,166  
 CHAN: One DC 200mv 13A31 CYLXDUCCER Model 212,214  
 CHAN: Two DC 1v 07B44 READY  
 MODE: Alternate  
 NOTE: DETENT is set at Upper Threshold (\*) of the final positioning signal. The following signal shall not exceed 400 millivolts peak-to-peak prior to READY time, refer to Figure 1

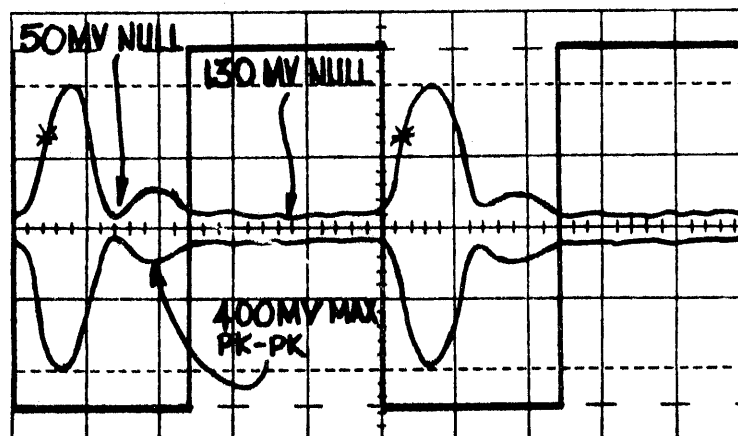


Figure 1. Final Positioning Waveform

The amplitude of the small peak (overshoot) may vary from cylinder position to cylinder position but must not exceed 400 millivolts.







# Century Data

SYSTEMS, INC.

## TECHNICAL BULLETIN

NUMBER 70

DATE July 21, 1971

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### TECHNICAL INFORMATION (Cont'd)

#### 3. (Cont'd)

There may be a shallow dip in the output signal as the drive reaches full velocity. This is a normal condition.

4. The tooth-to-tooth amplitude variation must not exceed 20% of the amplitude of the larger tooth. Check by programming the disk drive to perform repetitive 203 cylinder seeks alternately forward and reverse. To monitor the "tooth-to-tooth" relationship prepare an oscilloscope in the following manner:

```

PROG: Repetitive 203 Cylinder Seeks
SYNC: Ext Pos 10ms 09A05 FWDSEVO(111,133) or
      SKFWD(114,166,212,214)
CHAN: One DC 200mv 05C04 CYLXDUCER Model 111,114,
      133,166
CHAN: One DC 200mv 13A31 CYLXDUCER Model 212,214
CHAN:
MODE: Chan one only - magnify times 10
NOTE: To observe the tooth-to-tooth relationship
      magnify by 10 and utilize the horizontal
      position adjust on the oscilloscope, refer
      to Figure 4.
  
```

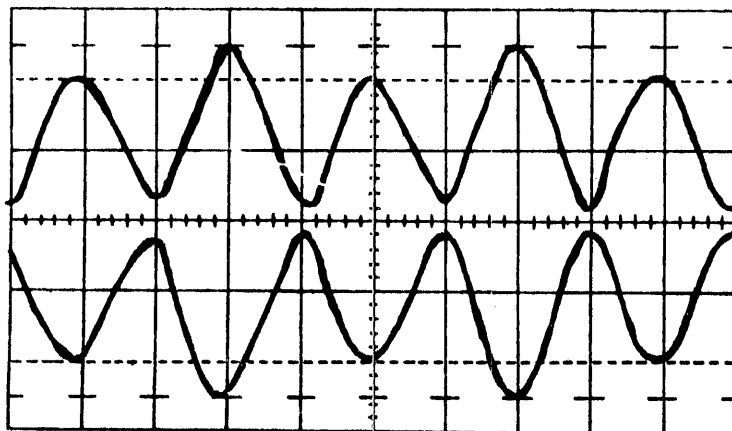


Figure 4. Tooth-to-Tooth Relationship

Observe the difference in amplitude between two adjacent teeth must not exceed 20% of the amplitude of the larger tooth.



**Century Data** SYSTEMS, INC.

TECHNICAL BULLETIN

NUMBER 70  
DATE July 21, 1971  
PAGE 6 OF 6

TECHNICAL INFORMATION (Cont'd)

SUMMARY

1. The output signal following the final positioning signal and prior to the READY signal must not exceed 400 millivolts.
2. The output of the cylinder transducer during a null must not exceed 130 millivolts.
3. The output of the cylinder transducer during a seek should be approximately 800 millivolts with a maximum variation in amplitude of 400 millivolts from end-to-end. Minimum peak-to-peak amplitude is 600 millivolts and maximum peak-to-peak amplitude is 1500 millivolts.
4. The difference in amplitudes between two adjacent teeth must not exceed 20% of the amplitude of the larger of the two teeth.

\*\*The specified scope synch setting will display the output of the cylinder transducer during a forward seek. To observe the output in reverse just change the sync from POS to NEG.





TECHNICAL OPERATIONS

**Century Data** SYSTEMS, INC.

TECHNICAL BULLETIN

NUMBER 72

DATE April 12, 1971

PAGE 1 OF 4

Models Affected: 114,212,214

TITLE

Air Pressure Gauge - 94408

REASON FOR BULLETIN

To announce the release and availability of a portable air pressure gauge to be utilized in lieu of the differential air pressure switch to monitor the efficiency of the absolute air filter.

DOCUMENTS EFFECTED

Technical Bulletin Number 53, dated December 7, 1970.

TECHNICAL INFORMATION

The portable air pressure gauge is a small, light weight device that utilizes a pith ball in an air column. It is approximately 7 inches long and about 2.5 inches wide. There are two sides to the gauge, one side is intended to measure velocity in feet per minute. This is the red scale and for our purposes is to be ignored. The other side measures pressure in inches of water. This is the black scale and this scale will be utilized to check the absolute filter. The black scale is a dual purpose scale in that the left side is for low pressure and the right side is for high pressure. The high pressure side is the scale which will be utilized to check the filter. The scale is graduated in inches of water from 0.05 to 1.00.

The differential air pressure switch monitored the difference in pressure between the input to absolute filter and the output from the absolute filter. It has been determined that all that is required to check the efficiency of the filter is to have a positive pressure in the filter's output plenum. The portable air pressure gauge provides the means to check this positive pressure. The following paragraphs describe the procedure for checking the positive pressure and should be performed on a monthly basis.

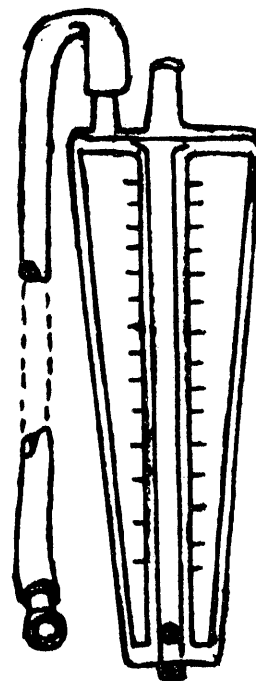


Figure 1. Gauge

APPROVED	DATE	SUPERCEDES	DATED	ORIGINATED BY	DATE
<i>Harold T. Byrd</i>	6-24-71			A. L. Ortiz	4/9/71
<i>[Signature]</i>	6-28-71				



**Century Data** SYSTEMS, INC.

TECHNICAL BULLETIN

NUMBER 72

DATE April 12, 1971

PAGE 2 OF 4

To check the filter on a Model 114 Disk Drive proceed as follows:

- a. Install a disk pack and power up the unit.
- b. Remove the front panel and check the output of the filter assembly with the portable air pressure gauge as indicated in Figure 2 below.

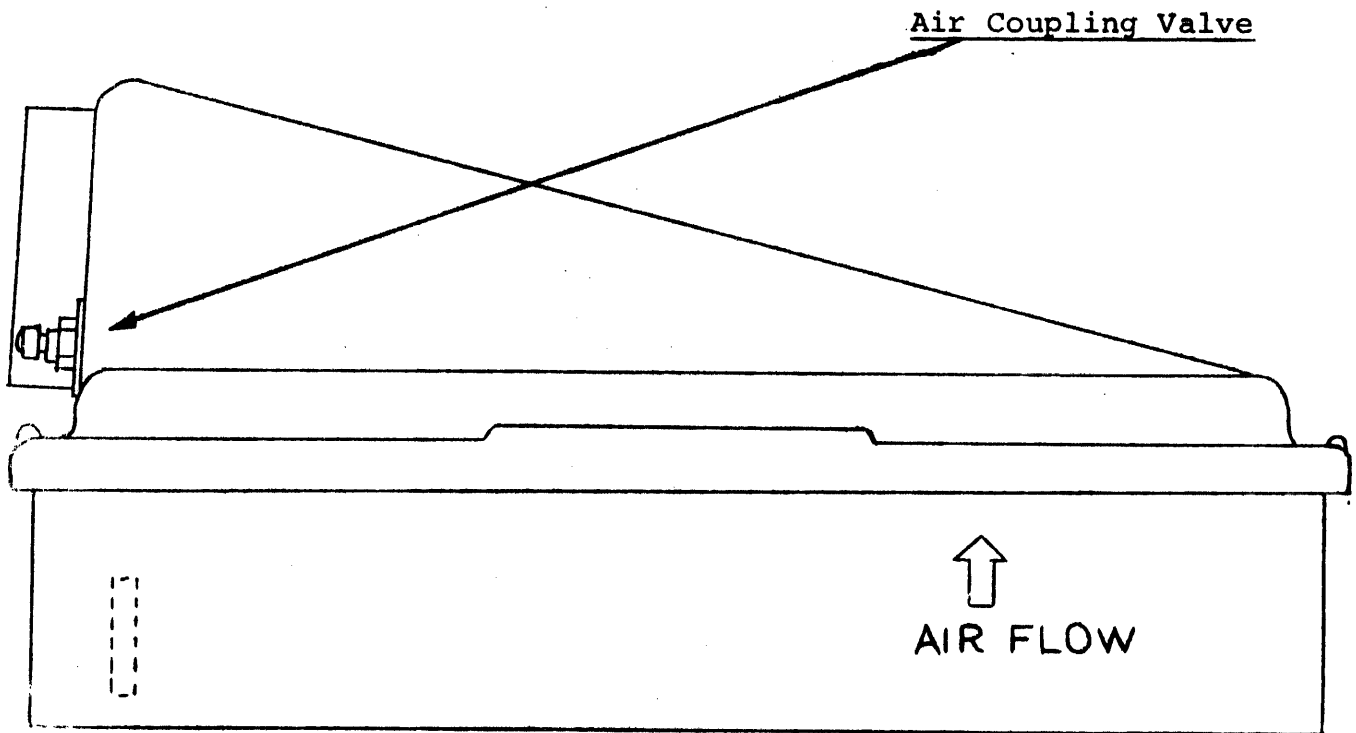


Figure 2. Model 114 Filter Assembly - Top View.

- c. If a positive pressure is indicated, 0.05" H<sub>2</sub>O or greater, the filter is functioning properly.
- d. If no pressure is indicated; investigate the blower, absolute filter, or the pre-filter.
- e. After the check is completed replace the front panel.

To check the filter on a Model 214 Disk Drive proceed as follows:

- a. Install a disk pack, place the drive in the Reverse Maintenance Position, and power up the unit.



**Century Data** SYSTEMS, INC.

TECHNICAL BULLETIN

NUMBER 72

DATE April 12, 1971

PAGE 3 OF 4

- b. Check the output of the filter assembly with the portable gauge (see Figure 3).

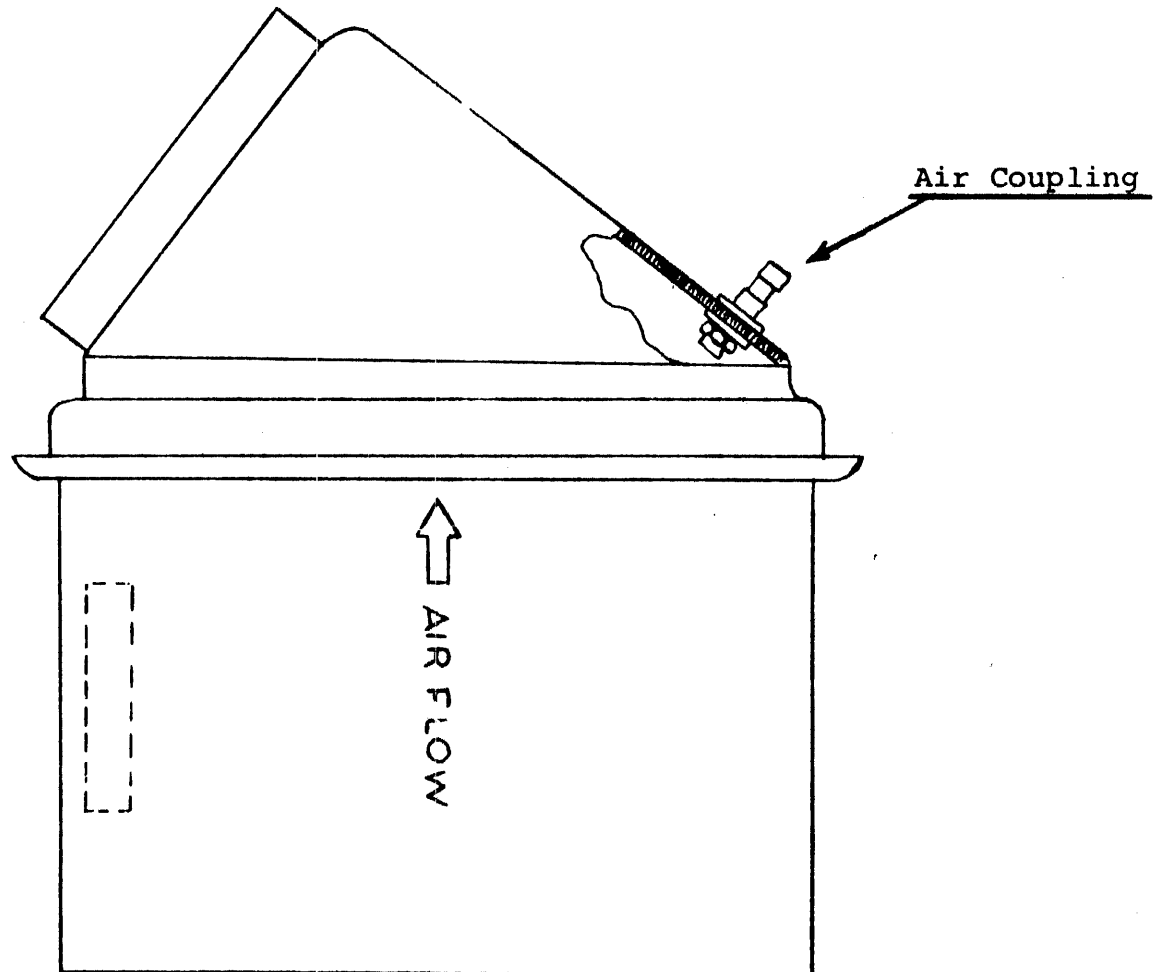


Figure 3. Model 214 Filter Assembly - Top View.

- c. If a positive pressure is indicated, 0.05" H<sub>2</sub>O or greater, the filter is functioning properly.
- d. If no pressure is indicated, investigate the blower, absolute filter or pre-filter.
- e. After the check is complete, restore the drive to its normal mode of operation.



**Century Data** SYSTEMS, INC.

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TECHNICAL BULLETIN

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DATE April 12, 1971

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Update Technical Bulletin Number 52, Technical Representative Equipment List, Part I in the following manner:

On page 5 add:

Item 75    94408-001    Pressure Gauge



TECHNICAL OPERATIONS

**Century Data** SYSTEMS, INC.

TECHNICAL BULLETIN

NUMBER 77  
 DATE June 18, 1971  
 PAGE 1 OF 2

Models Affected: 111, 114, 115, 133,  
 166, 194, 212, 213,  
 214, 215, 216, 812,  
 813, 814, 815

TITLE:

Sector Transducer Alignment Tool

REASON FOR BULLETIN:

To inform field service personnel and other technical personnel involved in the maintenance of disk drives of a new and improved alignment tool for the sector/index transducer block.

TECHNICAL INFORMATION:

Currently the proximity of the sector/index transducer block to the edges of the recording disk platters is performed with an 0.033 shim or feeler gauge. Generally, this adjustment was correct but occasionally a disk pack with worst case tolerances would be installed and either the sector/index platter of the pack would hit the inside of the sector/index transducer or the platter would be so far away from the transducer that it never detected the sector/index notches.

The new alignment tool consists of a collar that slips onto the spindle cone. A radial bar then extends outward to the edge of the disk pack area. Attached to the end of the bar is an index spacer which has a flange at the bottom. The entire assembly spins on the spindle cone and to make the sector/index transducer adjustment the flange at the bottom of the spacer is rotated into the sector/transducer block gap. Refer to Figure 1 on the next page.

APPROVED	DATE	SUPERCEDES	DATED	ORIGINATED BY	DATE
<i>Harold T. Byrd</i>	6-21-71			A. L. Ortiz	6-18-71
<i>[Signature]</i>	6-23-71				



**Century Data** SYSTEMS, INC.

TECHNICAL BULLETIN

NUMBER 77

DATE June 18, 1971

PAGE 2 OF 2

TECHNICAL INFORMATION (Cont'd)

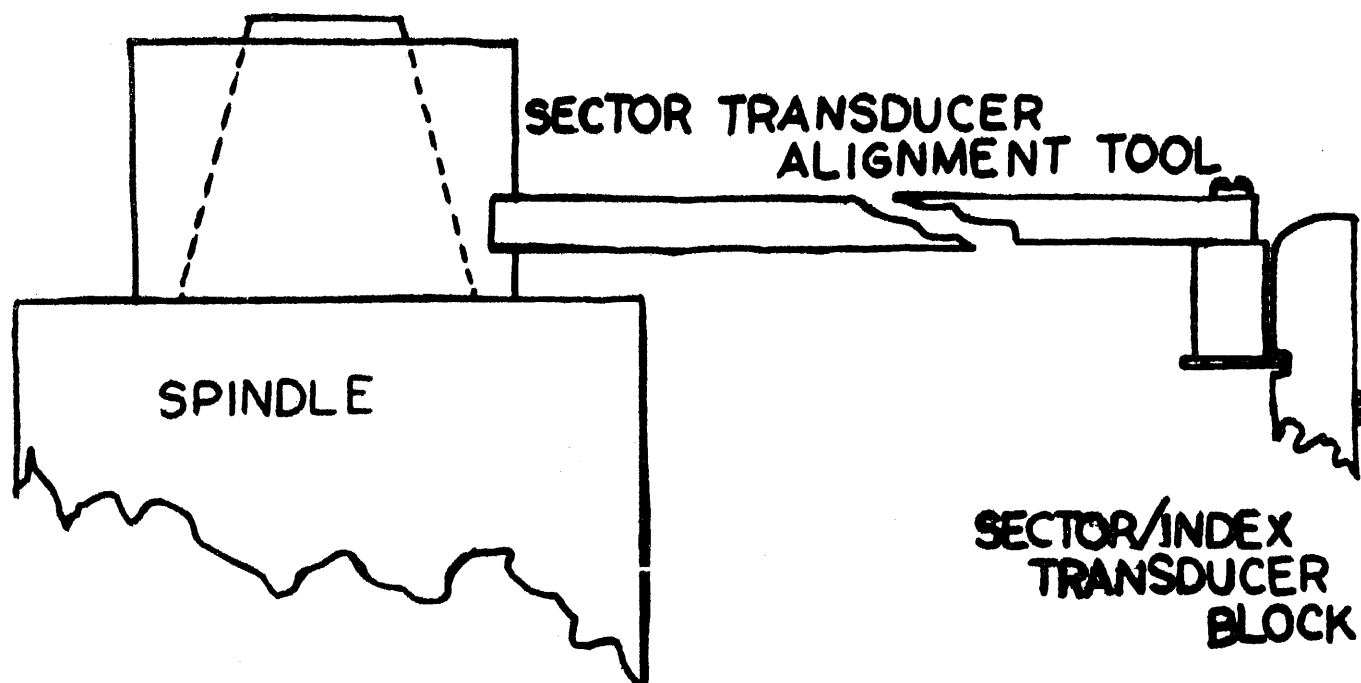


Figure 1. Sector/Index Transducer Alignment

Adjust the transducer block until the flange is held firmly in place then slowly back up until the flange can barely be rotated away.

The alignment tool comes with two index spacers. The short one is for the drives that utilize the IBM 1316 type of disk packs while the long one is for the drives that use the IBM 2316 type disk packs. The spacers are fastened to the radial bar with a shoulder screw and can be easily removed and replaced.

The part number for the alignment tool is:

94298-001 B1 Tool, Alignment, Sector Transducer

The availability of the alignment tool is 90 days ARO.

REFERENCE DOCUMENT:

Engineering Change Notice Number 2455.


TECHNICAL OPERATIONS
**Century Data** SYSTEMS, INC.

TECHNICAL BULLETIN

 NUMBER 81

 DATE July 27, 1971

 PAGE 1 OF 2

 Models Affected: 111,114,166,212,  
213,214,215,812,  
813,814, and 815

TITLE:

2015 DISK DRIVE EXERCISER, 94328-001

REASON FOR BULLETIN:

To inform the field of a new piece of service equipment.

DOCUMENTS AFFECTED:

None.

TECHNICAL INFORMATION:

Production release of the 2015 Disk Drive Exerciser has been recently made. This exerciser is similar to the 2011A and may be used on all CDS Disk Drives currently being manufactured with the exception of the 133.

This exerciser is similar to the 2011A and is operationally identical. The 2015 has facilities for exercising the 400 cylinder machines due to the addition of bit 256 in the exerciser. Temporary modifications for certain drives still must be made. Refer to Table 1 for temporary modifications. These modifications are only temporary and must be removed prior to returning the drive to customer.

Table 1. Temporary Modifications

Model	Version	Modification Required
114/166 212/214	Standard	Jumper 12B29 to 12B03 (Disable Read Only FF)
114/166 212/214	OEM, 3V "Q" Interface	Tape Pin 41 on exerciser's CPM Jumper 2B56 - 04B41 (enable write data) Jumper 3B14 - 3B03 (disable normal write data line)

REFERENCE DOCUMENTS:

ECN 2782

APPROVED	DATE	SUPERCEDES	DATED	ORIGINATED BY	DATE
<i>David T. Byrd</i>	8-24-71			E. Lutz	7-23-71
<i>[Signature]</i>	8-28-71				



**Century Data** SYSTEMS, INC.

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TECHNICAL BULLETIN

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NUMBER 81

DATE July 27, 1971

PAGE 2 OF 2

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REFERENCE DOCUMENTS (Cont'd):

The following is the list of applicable documents:

94328-001	Disk Drive Exerciser
94357-001	Schematic, Exerciser
94356-001	Wire List, Exerciser
94603-001	Wire List, Interface Cable
94619-001	Wire List, Interface Connector
94618-001	Wire List, Exerciser Console





TECHNICAL OPERATIONS

**Century Data** SYSTEMS, INC.

TECHNICAL BULLETIN

NUMBER 137  
 DATE January 16, 1973  
 PAGE 1 OF 1

Models Affected: 111, 114, 113,  
 166, 212, 213, 214, 215, 815,  
 244, 268, 242, 857, 859, 819,  
 818

TITLE

EXTRA GATED ATTENTION INTERRUPTS

REASON FOR BULLETIN

To make the field aware that there is a possibility that they may encounter Gated Attention problems caused by spikes out of the Detent Delay Circuit.

TECHNICAL INFORMATION

Century Data Systems uses many vendors of components to ensure cost effectiveness. One such vendor manufactures a 6.2 Zener Diode that, when used as a level converter, can oscillate in and out of the Zener point. There was an unknown quantity of these diodes used in the Detent Delay Circuits of most of the disk drives that CDS manufactures.

If you encounter Gated Attention problems that have no apparent cause, remove the AP29, P/N 91933-001; AP46, P/N 95086-001; or DP34, P/N 99381-001 from Location 14A. Check to see that CR11 is NOT a clear glass diode. If it is clear glass, replace it with another diode, CDS P/N 90346-062, specifying either Texas Instruments or Motorola as the manufacturer.

APPROVED	DATE	SUPERCEDES	DATED	ORIGINATED BY	DATE
<i>[Signature]</i>	1-17-73			R. Alpaugh	01/16/73
<i>[Signature]</i>	1-19-73				



TECHNICAL OPERATIONS

TECHNICAL BULLETIN

**Century Data** SYSTEMS, INC.

NUMBER 25  
 DATE September 16, 1970  
 PAGE 1 OF 1

TITLE: Model Affected: 114

READ/WRITE ELECTRONICS CHASSIS "C"

REASON FOR BULLETIN:

To reduce system noise.

EQUIPMENT/MODEL EFFECTED:

CDS Model 114 Disk Drives below S/N 218.

OTHER EQUIPMENT EFFECTED:

None.

DOCUMENTS EFFECTED:

91133 Assembly List of the Read/Write Electronics Chassis.

TECHNICAL INFORMATION:

Remove the fiber washers that currently isolate the "C" Chassis from the chassis bracket which is ground. The removal of the fiber washers ensure a good ground connection and reduces the system noise.

REFERENCE DOCUMENT:

ECN 1248.

APPROVED	DATE	SUPERCEDES	DATED	ORIGINATED BY	DATE
<i>Harold D. Byrd</i>	<i>9-22-70</i>			A. L. Ortiz	9/8/70
<i>W. J. Jager</i>	<i>9-28-70</i>				



TECHNICAL OPERATIONS

**Century Data** SYSTEMS, INC.

TECHNICAL BULLETIN

NUMBER 27  
 DATE September 22, 1970  
 PAGE 1 OF 1

TITLE

Model Affected: 114

AP21 SERVO PREAMPLIFIER 91.093

REASON FOR BULLETIN

To facilitate the servo preamplifier adjustments. The Technical information in this bulletin will enable field personnel to preset the adjustment into the "ball park".

EQUIPMENT MODEL EFFECTED

CDS Model 114 Disk Drives.

OTHER EQUIPMENT EFFECTED

None.

DOCUMENTS EFFECTED

None.

TECHNICAL INFORMATION

1. Preset the top pot, DC BALANCE, by first turning it fully counter-clockwise to the pot end. Then turn it clockwise twelve to thirteen turns.
2. Preset the bottom pot, VELOCITY, by just turning it fully counter-clockwise.
3. The above procedure has set the values of the pots approximately in the "ball park". Now proceed with the normal Servo alignment procedure.

REFERENCE DOCUMENT

None.

APPROVED	DATE	SUPERCEDES	DATED	ORIGINATED BY	DATE
<i>Harold P. Byrd</i>	9-22-70			A. L. Ortiz	9/18/70
<i>W. K. Dege</i>	9-28-70				


TECHNICAL OPERATIONS
**Century Data** SYSTEMS, INC.

TECHNICAL BULLETIN

 NUMBER 28

 DATE September 22, 1970

 PAGE 1 OF 1
TITLE:

Model Affected: 114

AP25 DEMODULATOR 91109
REASON FOR BULLETIN:

To facilitate the demodulation adjustments. The technical information in this bulletin will enable field personnel to preset the adjustments into the "ball park".

EQUIPMENT/MODEL EFFECTED:

CDS Model 114 Disk Drives.

OTHER EQUIPMENT EFFECTED:

None.

DOCUMENTS EFFECTED:

None.

TECHNICAL INFORMATION:

1. Preset the outside pot, GAIN, by turning it fully counter-clockwise to the pot end. Then turn it clockwise five turns.
2. Preset the inside pot, NULL, by turning it fully counter-clockwise to the pot end. Then turn it twelve turns clockwise.
3. The above procedure has set the values of the approximately in the "ball park". Now proceed with the normal Servo alignment procedure.

REFERENCE DOCUMENT:

None.

APPROVED	DATE	SUPERCEDES	DATED	ORIGINATED BY	DATE
<i>Harold R. Byrd</i>	9-25-70			A. L. Ortiz	9/18/70
<i>Rich G...</i>	9-28-70				

TECHNICAL OPERATIONSTECHNICAL BULLETIN**Century Data** SYSTEMS, INC.NUMBER 30DATE November 31, 1970PAGE 1 OF 3TITLE

Model Affected: 114

SCHEMATIC, AP28, SERVO EMERGENCY RETRACT - 91826REASON FOR BULLETIN

To clarify the schematic and to indicate etch connections that were not previously shown.

EQUIPMENT/MODEL EFFECTED

CDS Model 114 Disk Drives

OTHER EQUIPMENT EFFECTED

None.

DOCUMENTS EFFECTED

91826 Rev. C1 was Rev. C - Schematic, Servo Emergency Retract, AP28.

TECHNICAL INFORMATION

Refer to the attached schematics of the AP28 Board. Both Rev. C and Rev. C1 are supplied. Note that pin 56 has been moved to indicate that it is an input power pin. Also note that the etch connections for the five volts and ground are indicated as to which pins on the chip pad they feed.

REFERENCE DOCUMENT

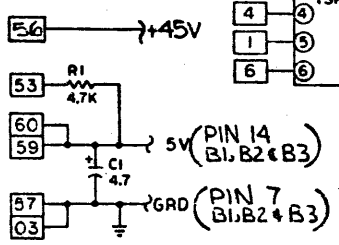
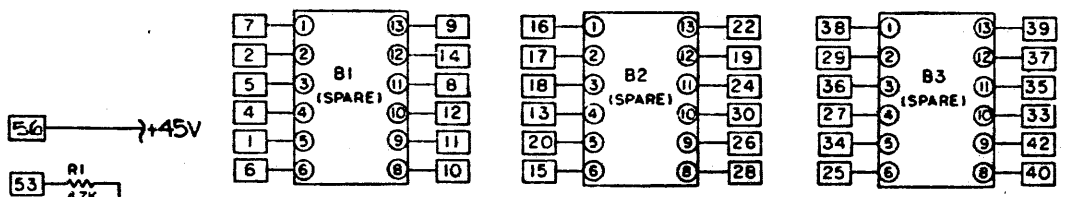
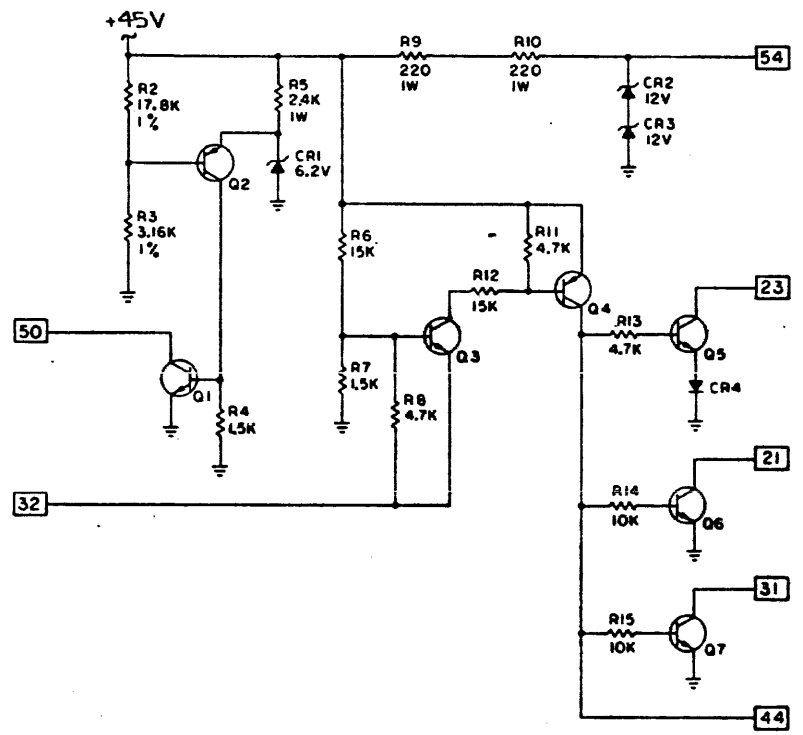
ECN. 1727

APPROVED	DATE	SUPERCIDES	DATED	ORIGINATED BY	DATE
<i>David T. Byrd</i>	12-1-70			A. L. Ortiz	11/23/70
<i>Robert J. ...</i>	12-7-70				

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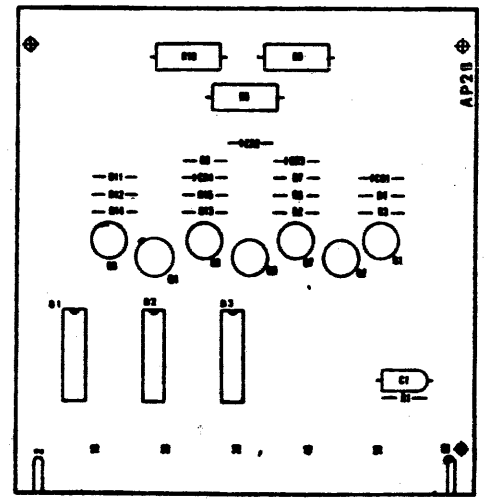
8 7 6 5 4 3 2

D  
C  
B  
A



REF DES	DES LAST USED	REF DES	DES NOT USED
C1		B1,2,3	
CR4			
Q7			
R15			

- ALL RESISTORS IN OHMS, 1/4W, 5%
  - ALL CAPACITORS IN MF.
- NOTF: UNLESS OTHERWISE SPECIFIED



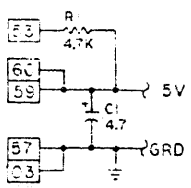
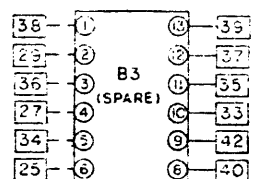
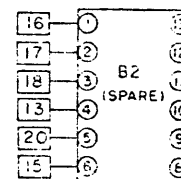
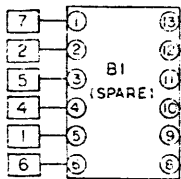
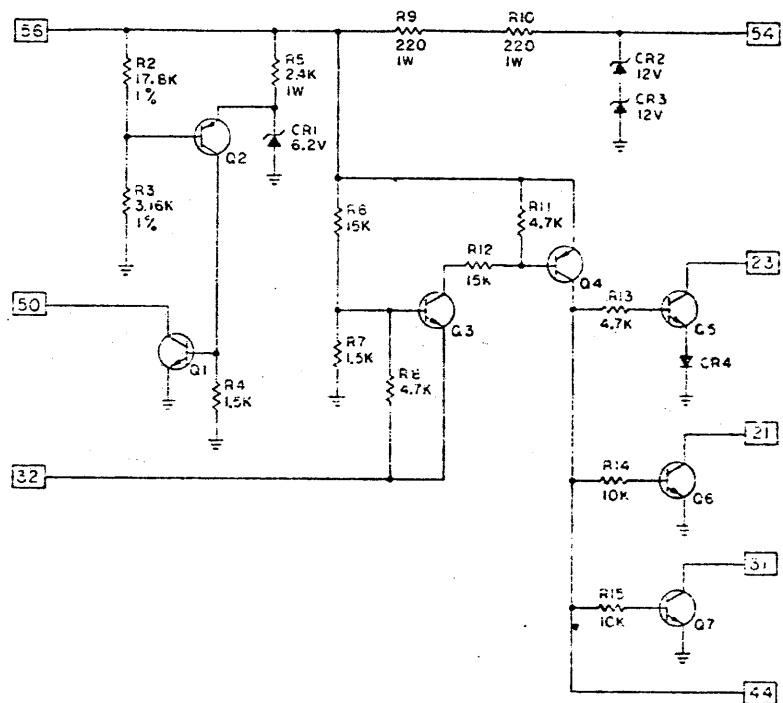
CENTURY DATA SYSTEMS, INC.  
ADAMSBURG, CALIFORNIA

**SCHEMATIC-SERVO  
EMERGENCY RETRACT AP28**

DESIGN	W. H. H. 1-58-2	SIZE	
DATE	6-1-58	REV	1
APP'D	W. H. H.	QTY	91826
SCALE:			SHEET 4 OF 4

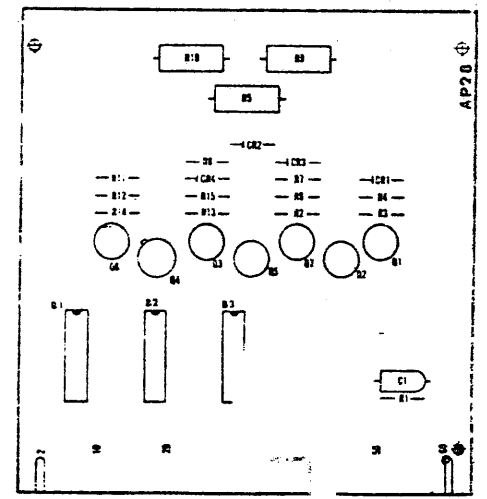
92816 (C)

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REF DES	LAST USED	REF DES	NOT USED
C1		B1, 2, 3	
CR4			
Q7			
R15			

- ALL CAPACITORS IN MF.
- ALL RESISTORS IN OHMS, 1/4W, 5%  
NOTE: UNLESS OTHERWISE SPECIFIED



CENTURY DATA SYSTEMS, INC.  
ANAHAIM, CALIFORNIA

**SCHEMATIC—SERVO  
EMERGENCY RETRACT AP28**

APPD: [Signature] P. 25 70

SCALE: SHEET 4 OF 4



TECHNICAL OPERATIONS

**Century Data** SYSTEMS, INC.

TECHNICAL BULLETIN

NUMBER 31

DATE December 29, 1970

PAGE 1 OF 1

Model Affected: 114

TITLE:

Velocity Change in CDS 114 Disk Drives

REASON FOR BULLETIN:

Notify service personnel of velocity change.

DOCUMENTS EFFECTED:

Schematics- Servo-Preamplifier, AP21, location 13A,  
CDS P/N 91093 Rev. level E or higher.

Demodulator, AP25, location 5C,  
CDS P/N 91109, Rev. level F or higher.

TECHNICAL INFORMATION:

All CDS drives with serial number 600 and higher will be adjusted for 65MS full seek of 202 cylinders. The velocity alignment procedure remains the same as before.

REFERENCE DOCUMENTS:

Card Schematic - Servo preamplifier, AP31, P/N 91093-001  
Demodulator, AP25, P/N 91109-001

APPROVED	DATE	SUPERCEDES	DATED	ORIGINATED BY	DATE
<i>Harold T. Byrd</i>	12-30-70			D. Hedegaard	12/29/70
<i>R. J. ...</i>	1-5-71				





# Century Data SYSTEMS, INC.

## TECHNICAL BULLETIN

NUMBER 58  
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### TECHNICAL INFORMATION (continued)

Each brush assembly should be checked at least once to insure that the arms are moving through the pack at the center of the disks. Also any time an assembly or the brushes are changed, the brushes should be checked to make sure they are placed in straight and not at an upward or downward angle. It is possible that the brush shaft or the brush holder may have burrs that will not allow the brushes to seat properly in their holders.

If the arms enter the pack low, there is a nylon washer available, CDS P/N 90048-020, that can be installed at the bottom of the shaft to give necessary clearance. See Figure 1.

If the brush holder or the brushes have any burrs, they may be removed with an X-acto knife.

The brushes have a small guide on their shaft which should not be mistaken for a burr, see figure 2. This guide is used to hold the brush in its holder and is destroyed when the brush is removed so a brush can not be re-used.

There are two brush drive assemblies in use, an old style and a new style. They can easily be identified by the thickness of the base of the assembly. The old style has a thinner base. See figure 3. If it becomes necessary to replace an old style assembly, it will be necessary to also order screws (2) each, CDS P/N 90448-052. The screws could also be purchased locally, the screws are: 10/32 by 1 3/4", pan head slotted. Also on the very early 114's, it will be necessary to splice in more wire for the wires to the brush drive switch. The wire used is 18 gauge, CDS P/N 90537-818.

### REFERENCE DOCUMENTS

ECN 1909



TECHNICAL OPERATIONS

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TITLE

Models Affected: 114/214

BRUSH DRIVE ASSEMBLY

REASON FOR BULLETIN

Maintenance Aid

Existing Field reports indicate there are several vague areas concerning the Brush Drive Assembly.

DOCUMENTS EFFECTED

None.

TECHNICAL INFORMATION

The brush motor has a very high gear ratio and manual operation of the brush assembly will strip the gears. Do not move the brush assembly arms by hand.

If the motor stops for some reason with the brushes still in the pack, check to see if you still have 24VAC, which is needed for the motor and +24VDC, which is needed for the relay. If these conditions are met, the brush motor can be run to get the brushes out of the pack by grounding the common contact of the microswitch on the brush drive assembly. The common contact is the one on the side of the switch body by itself.

Adjustment of the switch can be made by loosening the switch and moving it back away from the arm. Ground the normally open contact (the one closest to the front of the drive) with AC power on. The brushes will make continuous cycles now and it should be noted how far the arms travel back before starting to move forward again. The microswitch should be moved forward just enough so the switch is fully depressed before the arm reaches its fully retracted position.

The brushes should be checked frequently for dirt and wear and replaced accordingly. Once the brushes begin to wear, they will continue to wear at a rather rapid rate. Also when the brushes get dirty they will put more dirt on a pack than they will take off.

APPROVED	DATE	SUPERCEDES	DATED	ORIGINATED BY	DATE
<i>H. J. Boyd</i>	1-7-71			D. Smith	1/5/71
<i>R. O. J. J. J.</i>	1-8-71				

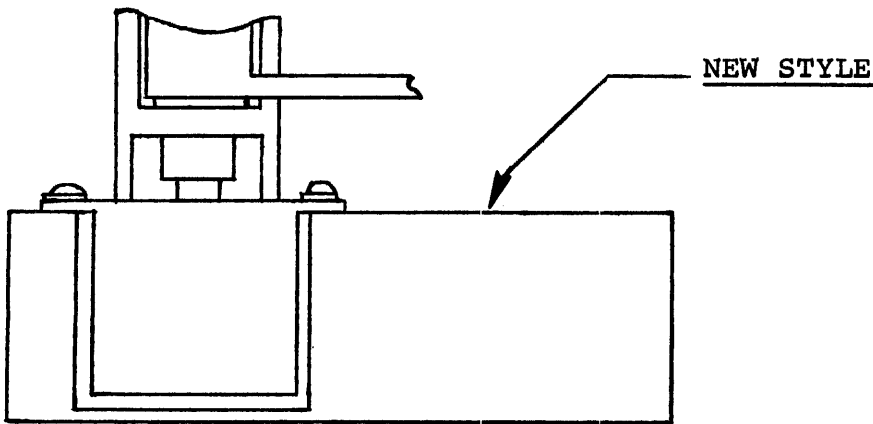
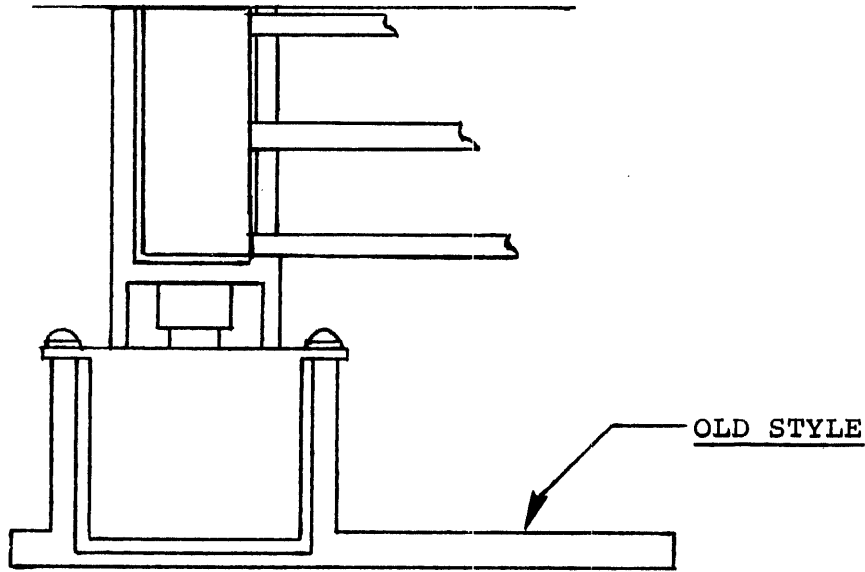


FIGURE 3



**Century Data** SYSTEMS, INC.

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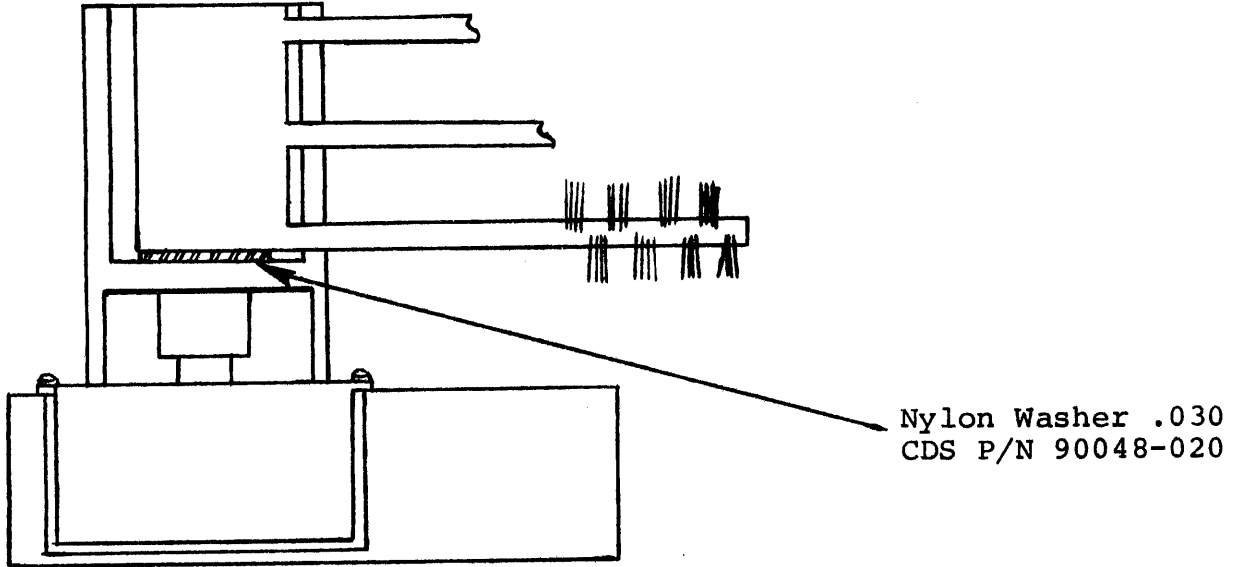


FIGURE 1

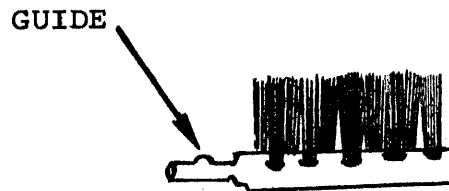


FIGURE 2



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Caution

If polarity of linear motor is wrong and power is applied, the bobbin will go from end stop, to hole stop, to end stop etc., at a high rate and the resulting noise will sound like a 30 caliber machine gun. The resulting damage will probably cause replacement of linear motor (again), carriage and way, or both.

Additional 214 Test Points

1. Tach Rod Polarity 13A14
2. Servo Drive 13A51

TECHNICAL OPERATIONS**Century Data** SYSTEMS, INC.TECHNICAL BULLETIN

NUMBER 59  
 DATE 2-26-71  
 PAGE 1 OF 2

TITLE:

Linear Motor Polarity Check

Models Affected: 114, 212, 213, 214, 215,  
 216, INFOMAG MOTORS  
 ONLY.

REASON FOR BULLETIN:

To ensure the correct polarity of the linear motor in the event of a motor change or the two bobbin leads are disconnected.

DOCUMENTS EFFECTED:

None

TECHNICAL INFORMATION:

After completion of the motor change, and the tach rod and bobbin alignment, disconnect P19 (bobbin lead plug). The following steps must be completed in the listed sequence (heads not installed).

1. Turn S1 to "on" position.
2. Turn front power on switch to "off" position.
3. Move carriage to approximate center of rack.
4. Wait approximately 20 seconds. (Time for all relays to transfer.)
5. Trip +45 volt circuit breaker.
6. Install plug (P19) into the jack. Bobbin should go reverse. (Toward hole)
7. If step 6 does not function the way it is stated, (i.e; bobbin goes forward toward end stop) reverse bobbin leads.
8. There is no hurry installing P19 as capacitor will remain sufficiently charged for approximately 30 seconds, with enough power to move bobbin.
9. Install heads and do complete head alignment.

APPROVED	DATE	SUPERCEDES	DATED	ORIGINATED BY	DATE
<i>Harold T. Byrd</i>	3-9-71			D. Hedegaard	2-26-71
<i>R. Byrd</i>	3-10-71				



**Century Data** SYSTEMS, INC.

TECHNICAL BULLETIN

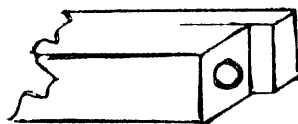
NUMBER 61

DATE January 21, 1971

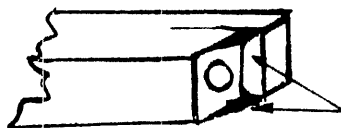
PAGE 2 OF 2

TECHNICAL INFORMATION (continued)

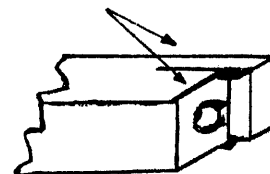
If one angle is greater than the other, the brush head should be removed and discarded. The burrs or flashes, (see illustration below), should be removed and a new brush head installed.



GOOD



BAD



BAD

Brush head - p/n 93008 (set of ten)

REFERENCE DOCUMENT

ECN 1909.



TECHNICAL OPERATIONS

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DATE January 21, 1971  
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MODELS AFFECTED: 114 and 214

TITLE:

BRUSH HOLDER 91013

REASON FOR BULLETIN:

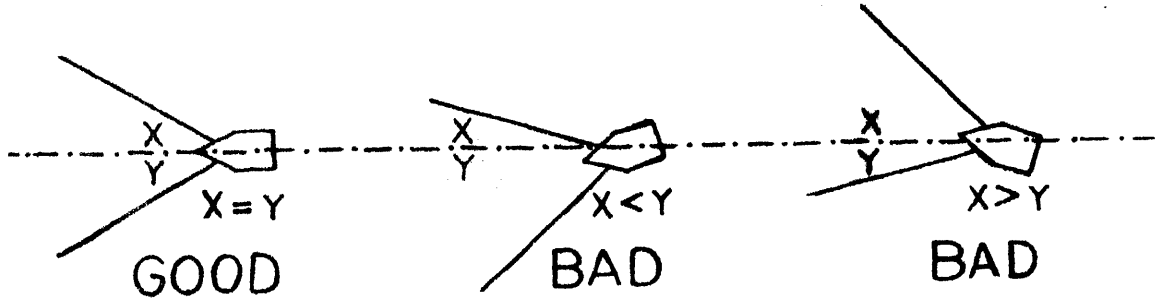
Burrs and flashes left on the brush holder where the brush head is installed into the holder causes the brush head to rotate at installation. This rotation affects the angle of the brushes on the brush head; the result being that one set of brushes would be more vertical while the other set of brushes would be more horizontal. The result is that the horizontal brushes no longer clean its respective disk surface while the vertical brushes apply too much pressure to its respective disk surface and literally burns itself up. The melting of the brushes result in the brushes becoming fused and at the same time leaving residue deposits on the disk surface which in turn increases the probability of head to disk interference.

DOCUMENTS AFFECTED:

Drawing, brush holder -91013 F was E.

TECHNICAL INFORMATION:

Visually inspect the brushes for the correct angularity as indicated in the illustration below. Do not remove the brush head unless it is required for replacement.



If the angle above the horizontal center is equal to the angle below the horizontal center, the brush head is installed correctly.

APPROVED	DATE	SUPERCEDES	DATED	ORIGINATED BY	DATE
<i>Richard T. Byrnes</i>	1-21-71			A. L. Ortiz	1/21/71
<i>Richard J. Sauer</i>	2-2-71				





**Century Data** SYSTEMS, INC.

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DATE March 26, 1971  
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Update Technical Bulletin Number 49, the Master Spare Parts List, date January 20, 1971 as follows:

Page 18 of 32 -

	111	114	214	Class
93077-001 Blower Assy.	1			2
<u>Add</u> 93142-010 Fuse, 10A, SC-10	2	2	2	1
<u>Add</u> 93143-001 Fuseholder	2	2	2	2

Page 23 of 32 -

Fuse, 10A, FNM-10 90659-010	2	2		1
<u>Add</u> *Fuse, 10A, SC-10 93142-010	2	2	2	1
Fuseholder 90658-001	2	2		2
<u>Add</u> *Fuseholder 93143-001	2	2	2	2
<u>Add</u> *Model 111 s/n 796 & up, Model 114 s/n 1311 & up, Model 214 s/n 123 & up.				

REFERENCE DOCUMENT:

Engineering Change Notice Number 1747.



TECHNICAL OPERATIONS

TECHNICAL BULLETIN

**Century Data** SYSTEMS, INC.

NUMBER 71  
 DATE March 26, 1971  
 PAGE 1 OF 2

Models Affected: 111, 114

TITLE:

Input AC Fuses & Fuse Holders

REASON FOR BULLETIN:

The intent of this technical bulletin is to inform field personnel and other technical personnel directly involved in the maintenance of the Model 111 and Model 114 disk drives of a modification to the power distribution panels which facilitates the use of new fuses and fuse holders for input AC power.

DOCUMENTS EFFECTED:

Model 111 Power Distribution Panel 90186 T was S  
 Model 114 Power Distribution Panel 91423 N was M  
 Technical Bulletin Number 49, dated January 20, 1971.

TECHNICAL INFORMATION:

Model 111 Disk Drives serial number 795 and below,  
 Model 114 Disk Drives serial number 1310 and below;  
     Input AC Fuses, F1 & F2 ----- 90659-010  
     Input AC Fuseholders ----- 90658-001  
 Model 111 Disk Drives serial number 796 and up,  
 Model 114 Disk Drives serial number 1311 and up;  
     Input AC Fuses, F1 & F2 ----- 93142-010  
     Input AC Fuseholders ----- 93143-001  
 The two fuses, 90659-010 and 93142-010, and their fuseholders, 90658-001 and 93143-001, are different sizes and cannot be intermixed.

APPROVED	DATE	SUPERCEDES	DATED	ORIGINATED BY	DATE
<i>Harold T. Byrd</i>	3-26-71			A.L. Ortiz	3-25-71
<i>[Signature]</i>	3-26-71				



TECHNICAL OPERATIONS

**Century Data** SYSTEMS, INC.

TECHNICAL BULLETIN

NUMBER 80  
 DATE July 21, 1971  
 PAGE 1 OF 1

MODELS AFFECTED:  
 All 114's Below SN 600

TITLE:

114 SQUEAL PROBLEM

REASON FOR BULLETIN:

To eliminate a possible squeal problem caused by updating the Servo Preamplifier.

DOCUMENTS AFFECTED:

None.

TECHNICAL INFORMATION:

The Servo Preamplifier AP21 has been changed from Revision D to Revision E due to capacitor C7 being changed from 0.1 MFD to 0.033 MFD to improve velocity response.

If the AP21 Card Revision E is installed in a 114 drive below SN 600, the possibility exists to create a squeal while detenting. The squeal is normally audible while the carriage is detented at the inner tracks (approximately Cyl. 200). To eliminate this squealing, increase the velocity of the Servo system by adjusting the bottom potentiometer on the Servo Preamplifier Card (Location 13A). The squealing should cease at a velocity of approximately 70 ms or less while performing a full length seek (0-202).

APPROVED	DATE	SUPERCEDES	DATED	ORIGINATED BY	DATE
<i>Richard T. Byrd</i>	7-26-71			J. Lems	7-21-71
<i>[Signature]</i>	7-27-71				



TECHNICAL INFORMATION (Cont'd)

7. If the output of 12A49 at Detent is not within specification, replace the D/A Converter.  

AP23	91101-001	114, 166, 212, 214
AP12	91852-001	213, 215, 815
8. Utilize an exerciser or the controller in-line diagnostic (50) to perform a read operation on Head 00, any cylinder.
9. Monitor the test points indicated in Table 1 and verify the appropriate voltage levels.
10. Perform a read operation on Head 01, any cylinder.
11. Monitor the indicated test points and verify the appropriate levels.
12. If the voltage levels at 03C06 or 03C12 are more positive than -2.5 vdc, replace the write driver module, AR18 (91057).
13. If the voltage levels on the power transistors are more positive than -20 vdc, replace the write driver module, AR18 (91057).
14. Refer to Figure 1 and Figure 2 for the location of the write power amps on the left and right preamps. To monitor their voltage level, place the scope probe right on the exterior "can" of the transistors.



TECHNICAL OPERATIONS

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 DATE August 9, 1971  
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Models Affected: 114,166,212,  
 213,214,215,  
 and 815 (See  
 Note)

TITLE:

TRANSISTOR LEAKAGE CHECK

REASON FOR BULLETIN:

Due to bad batch of transistors several sites have been experiencing a high rate of Data Checks, Temporary Reads, and Temporary Writes. The condition that is caused by this transistor failure is to flow excessive current through the read/write coils which causes a partial erase while a read operation is in progress.

This bulletin will give field personnel a method for checking this condition.

TECHNICAL INFORMATION:

1. Monitor the +36 volts from the DC Power Monitor and Regulator in Location 15B at 15B53.
2. The +36 volts must be 34.2 volts to 37.8 volts (5%).
3. If the +36 volts is not within the 34.2 to 37.8 volts, check the +5 volt and ensure that it is 5 volts  $\pm$  50 millivolts.
4. If the +5 volts is okay and the +36 volts is still not within specifications, replace the DC Power Monitor and Regulator:

AP18 90904-001 114  
 AP26 93059-001 166, 212, 213, 214, 215, 815

5. Monitor the output of the D/A converter in Location 12A at 12A49 when the drive is in Detent Mode.
6. The output must be 0.00 volts  $\pm$  50 millivolts.

APPROVED	DATE	SUPERCEDES	DATED	ORIGINATED BY	DATE
<i>Donald T. Byrd</i>	8-9-71			A. L. Ortiz	8-9-71
<i>Lozano</i>	8-9-71				



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TABLE 1

TEST POINT & LOCATION	MINIMUM NEGATIVE VOLTAGE	REMARKS
03C06 IEL 03C12 IER	-2.5 vdc -2.5 vdc	Erase Current Left Erase Current Right
LH PREAMP	-20 vdc	Write Power Amplifiers
RH PREAMP	-20 vdc	Write Power Amplifiers

NOTE: For 815's S/N 101 - 130 only



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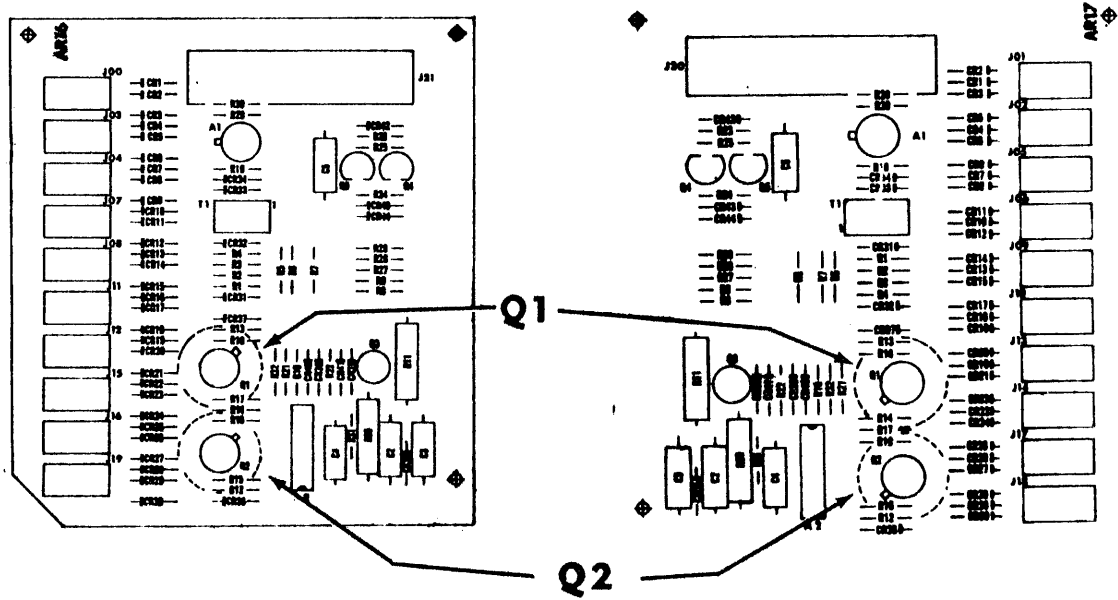


Figure 1. Locations of Transistors Q1, Q2 - 114,166,212,214

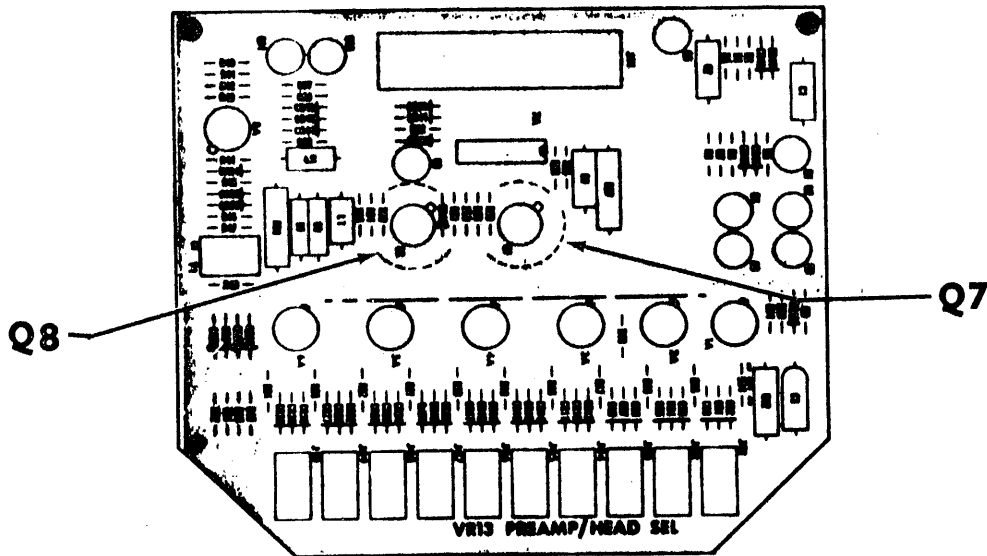


Figure 2. Locations of Transistors Q7, Q8 - 213,215,815



# Century Data SYSTEMS, INC.

## TECHNICAL BULLETIN

NUMBER 109  
 DATE March 16, 1972  
 PAGE 2 OF 4

### TECHNICAL INFORMATION:

The AF14 Latch Board should be plugged into location 13B and the necessary jumper wires temporarily connected to achieve the following goals:

- Supply +24VDC for the indicator lamps.
- Supply an AC Power-On reset to initially reset all flip flops.
- Supply a gate term (UNSAFE F/F) to latch the unsafe condition.
- Monitor possible unsafe condition with the latch circuits.

The following is the connections necessary and the signals being used. Each circuit is explained in the notes following the chart.

<u>SIGNAL</u>	<u>FROM</u>	<u>TO</u>	<u>REMARKS</u>	<u>LENGTH</u>
+24VDC	01A58	13B58	Lamp voltage	9"
-PWRINI Pulse	*11A06	13B27	AC Power-On Reset	9"
-PWRINI Pulse	*11A06	13B02	AC Power-On Reset	4"
-PWRINI Pulse	*11A06	13B04	AC Power-On Reset	4"
-PWRINI Pulse	*11A06	13B39	AC Power-On Reset	4"
-PWRINI Pulse	*11A06	13B25	AC Power-On Reset	4"
-PWRINI Pulse	*11A06	13B49	AC Power-On Reset	4"
-DCUSF	08B13	13B19	Light A, See NOTE 1	6"
-HDAUSF	08B15	13B18	Light B, See NOTE 2	6"
Read/Write/Erase Gate	08B39	13B07	Light C, See NOTE 3	6"
Write Gate/Current	08B53	13B31	Light D, See NOTE 4	6"
Erase Gate/Current	08B49	13B33	Light E, See NOTE 5	6"
-SEEK UNSAFE	06B45	13B42	Light F, See NOTE 6	6"
HDEXT*R/S	07B05	13B22	Head Extended	6"
UNSAFE F/F	*08B07	13B24	Gates Term	9"
UNSAFE F/F	*08B07	13B17	Gates Term	4"
UNSAFE F/F	*08B07	13B05	Gates Term	4"
UNSAFE F/F	*08B07	13B30	Gates Term	4"
UNSAFE F/F	*08B07	13B35	Gates Term	4"
UNSAFE F/F	*08B07	13B47	Gates Term	4"
GND	13B57	13B14	Ground Unused Terms	4"
GND	13B57	13B37		4"
GND	13B57	13B38		4"

\*This connection can be made by soldering six push-on pins together and taping to insulate.





TECHNICAL OPERATIONS

**Century Data** SYSTEMS, INC.

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 DATE March 16, 1972  
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Models Affected: 111, 114 ,  
 212, 214

TITLE:

UNSAFE/SELECT LOCK PROBLEMS

GENERAL INFORMATION:

When a SELECT LOCK occurs, several factors make it difficult to locate and correct the cause. They are as follows:

- If the disk pack is stopped and restarted again, the latches used to store the failure on the AL15 PWB are cleared and will not reset until another error occurs.
- The error indication stored in the AL15 Latch represents several possible failures, and it is often not possible to determine the actual failure.

A possible approach to trouble-shooting the problem is the use of the AF14 (PN 93245-001) Latch Module. This procedure explains the connections and subsequent interpretation of errors indicated by the AF14.

PREREQUISITES:

AL15 (PN 90218-001) Must be revision F or greater.  
 AL14 (PN 90226-001) Must be revision G or greater. If this PWB is less than G, change C4 from 4.7 to 33 microfarad. This increases the AC power on pulse (PWRINI) to allow the AF14 circuits to be initially cleared.

MATERIAL REQUIRED:

1 each AF14, Latch Module	PN 93245-001
3 each jumper wire, 9"	PN 94835-009
14 each jumper wire, 4"	PN 94835-004
7 each jumper wire, 6"	PN 94835-006

APPROVED	DATE	SUPERCEDES	DATED	ORIGINATED BY	DATE
<i>[Signature]</i>	4-17-72			H. T. Byrd	03-16-72



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light) but no indications on the AF14 Latch Module. The F/F's may be cleared by grounding the Direct Reset input to the F/F. They are as follows:

Circuit A, 13B27  
Circuit B, 13B02  
Circuit C, 13B04

Circuit D, 13B39  
Circuit E, 13B25  
Circuit F, 13B49

REFERENCE DOCUMENTS:

Technical Bulletin 65  
Schematic Diagram, AF14, 93245-001  
Schematic Diagram, AL15, 90218-001, Revision F or greater  
Logic Diagrams

ATTACHMENTS:

Schematic, AF14, 93245-001  
Schematic, AL15, 90218-001



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NOTE 1: (Causes Emergency Retract)

If only light A is on, the problem is caused by a DC voltage failure or the voltage monitor at 15B. If light F is also on, see NOTE 6.

NOTE 2:

If light B is on, more than one R/W head has been selected, or no head was selected during a read or write operation.

NOTE 3:

Light C indicates one of the following problems:

1. Write Gate and/or Erase Gate without Ready.
2. Write Gate and/or Erase Gate with Read Gate.

NOTE 4:

Light D indicates one of the following conditions:

1. Write Gate without write current.
2. Write current without Write Gate.

NOTE 5:

Light E indicates one of the following conditions:

1. Erase current without Erase Gate.
2. Erase Gate without Erase current.

NOTE 6: (Causes Emergency Retract)

If light F is on, light A will also be on and one of the following conditions is indicated:

1. The oscillator at 06B failed while the heads were extended.
2. A seek error occurred during a first seek or a restore operation.

The only Select Lock condition not indicated by the AF14, when wired in this fashion, is when the Erase current remains high for longer than 60 microseconds after Write Current drops. This failure will cause a SELECT LOCK indication (red



TECHNICAL OPERATIONS

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 DATE September 16, 1970  
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Model Affected: 114

TITLE:

Correction to MM114-670-B-200/114 Tech Manual

REASON FOR BULLETIN:

Page 4-54, Figure 4-35, Radial Adjustment Picture is incorrect.

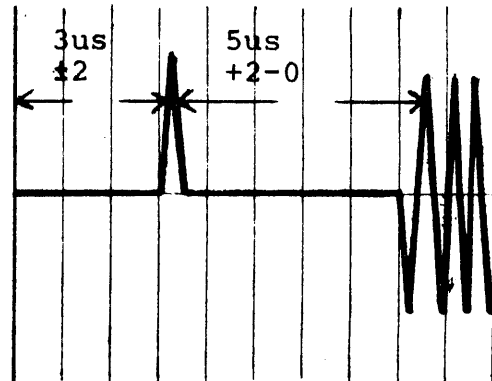
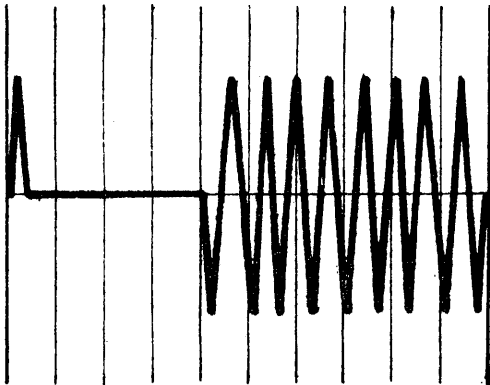
DOCUMENTS EFFECTED:

114 Maintenance Manual.

TECHNICAL INFORMATION:

Picture is:

Picture should be:



REFERENCE DOCUMENTS:

None.

APPROVED	DATE	SUPERCEDES	DATED	ORIGINATED BY	DATE
<i>W. J. Byrd</i>	9-18-70			G. French	9/9/70
<i>Dick Jager</i>	9-22-70				



TECHNICAL OPERATIONS

**Century Data** SYSTEMS, INC.

TECHNICAL BULLETIN

NUMBER 2  
 DATE August 11, 1971  
 PAGE 1 OF 1

Models Affected: All Disk Drives

TITLE:

FUSE REPLACEMENT PROCEDURE

REASON FOR BULLETIN:

Fuses must "NOT" be inserted into a fuse holder while ac input power is applied to the drive.

DOCUMENT AFFECTED:

None.

TECHNICAL INFORMATION:

In the event that a fuse must be replaced, input ac power must be removed from the drive. This is accomplished via the primary power switch (S1) on the power distribution panel.

The rate of applied voltage is considerably different if the fuse is replaced with ac power applied and may cause circuit failures. An example would be the replacement of the +5 volt fuse. If the +5 volt fuse is replaced with ac power applied it may cause a failure in the +36 volt regulator on the DC Power Monitor & Regulator in location 15B.

REFERENCE DOCUMENT:

Memo - G. W. Zeisser, 8/26/70

APPROVED	DATE	SUPERCEDES	DATED	ORIGINATED BY	DATE
<i>Harold T. Byrd</i>	8-12-71	T.B. 2	9-16-70	A. L. Ortiz	8-11-71
<i>LaGrange</i>	8.12.71				



TECHNICAL OPERATIONS

**Century Data** SYSTEMS, INC.

TECHNICAL BULLETIN

NUMBER 3  
 DATE September 15, 1970  
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Models Affected: 111, 114

TITLE:

5V Current Limit Adjustment

REASON FOR BULLETIN:

Properly set upper limit on 5 Volt Supply.

DOCUMENTS EFFECTED:

None.

TECHNICAL INFORMATION:

Note: Do not attempt this adjustment without several  
4 amp. fuses.

ADJUSTMENT PROCEDURE:

1. Monitor the 5 volt output on the logic buss, Board C.
2. Adjust the 5 volt pot to +5.8v. If the fuse blows before the supply reaches 5.8v, continue to step 3. If it does not blow, proceed to step 5.
3. Back the 5v Adjustment Pot off and replace fuse; remove power supply cover and adjust the upper pot on the Regulator Board (5V current limit) 2 turns counterclockwise.
4. Re-adjust the 5V Pot clockwise to 5.8V.
5. Turn the limit adjust Pot clockwise until the fuse blows. Back the 5V adjust Pot off one-half turn, replace fuse and adjust 5V Pot to normal setting. Replace Power Supply cover.

REFERENCE DOCUMENTS:

Tech Support Memo.

NOTE: This adjustment cannot be made on the VARO (Mfg.) supply.

APPROVED	DATE	SUPERCEDES	DATED	ORIGINATED BY	DATE
<i>Harold P. Byrd</i>	9-22-70	D-111/114-	8/31/70	R. Bailey	8/31/70
<i>Wick</i>	9-28-70	L-70-009-A			



TECHNICAL OPERATIONS

**Century Data** SYSTEMS, INC.

TECHNICAL BULLETIN

NUMBER 8  
 DATE September 23, 1970  
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Models Affected: 111, 114

TITLE:

Power Supply 5V Adjustment

REASON FOR BULLETIN:

Change in 5V adjustment location.

DOCUMENTS EFFECTED:

None.

TECHNICAL INFORMATION:

The 5V adjustment on the VARO (mfg.) version of the 91950 Power Supply in the 114 is found on the regulator card. It is accessible only by removing the back cover of the Power Supply.

REFERENCE DOCUMENTS:

Memo from Sustaining Engineering to Ray Rogers, dated August 26, 1970.

APPROVED	DATE	SUPERCEDES	DATED	ORIGINATED BY	DATE
<i>Donald P. Bend</i>	9-25-70			D. Guss	9/8/70
<i>Huck Jager</i>	9-18-70				


TECHNICAL OPERATIONS
**Century Data** SYSTEMS, INC.

TECHNICAL BULLETIN

 NUMBER 10

 DATE December 1, 1970

 PAGE 1 OF 1
TITLE:

 Models Affected: 111,114,212,213,  
214 and 215

MARGINAL FIRST SEEK OPERATION
REASON FOR BULLETIN

1. Speed F/F resetting above 70% speed and causing K4 to drop.
2. Stop speed F/F from resetting and corrective action.

EQUIPMENT/MODEL EFFECTED

CDS Model 111.

OTHER EQUIPMENT EFFECTED

CDS Model 114 and 214.

DOCUMENTS EFFECTED

Card Schematic - Detector, Index, Speed and Cylinder AL12 drawing 90258.

TECHNICAL INFORMATION

To check for proper operation, sync scope ext. on 3A12, Chan 1 on 3A30, Chan 2 on 3A42, 2V/cm, 5ms/cm, chopped mode. Verify when pulses on Chan 1 are 35(+0/-5)ms, level on Chan 2 probe goes high and observe for any negative going spikes. With drive at full speed, there should not be any negative going pulses. If there are any spikes or the level does not go high within the specified time, change card AL12 in location 03A and recheck.

REFERENCE DOCUMENT

Card Schematic - Detector, Index, Speed and Cylinder AL12.

APPROVED	DATE	SUPERCEDES	DATED	ORIGINATED BY	DATE
<i>Harold T. Byrd</i>	12-7-70			D. Hedegaard	12/1/70
<i>Harold T. Byrd</i>	12-7-70				





**Century Data** SYSTEMS, INC.

TECHNICAL BULLETIN

NUMBER 11  
DATE November 16, 1970  
PAGE 2 OF 2

5. Place paper between the heads and slowly load them.
6. Move the rack forward as rapidly as you can.
7. A 111 motor with a good field will give a reading of 575-650 ma.  
A 114 motor with a good field will give a reading of 600-675 ma.
8. If either the 111 or 114 give a reading under 525 ma., the motor should be replaced.



TECHNICAL OPERATIONS

**Century Data** SYSTEMS, INC.

TECHNICAL BULLETIN

NUMBER 11

DATE November 16, 1970

PAGE 1 OF 2

TITLE

Models Affected: 111,114,214

EASY CHECK OF LINEAR MOTOR AND BOBBIN

REASON FOR BULLETIN

To aid in trouble shooting a linear motor with a weak field or an incompatible motor to bobbin relationship.

MODEL/EQUIPMENT EFFECTED

CDS 111.

OTHER EQUIPMENT EFFECTED

CDS 114.

DOCUMENTS EFFECTED

None.

TECHNICAL INFORMATION

A linear motor with the correct field will induce a predictable amount of current into the bobbin when the bobbin is moved rapidly.

1. Remove the front bobbin lead.
2. Measure the internal resistance of the bobbin:
  - 111 should be  $2\frac{1}{2}$ - $3\frac{1}{2}$  Ohm
  - 114 should be 3-4 Ohm
 Any bobbin that reads outside these tolerances should be replaced.
3. Place an Ammeter across the bobbin terminals, + lead to the front terminal using 1000 ma. scale.
4. If a 1000 ma. meter is not available, the 500 ma. scale of the tool kit meter can be doubled by placing a  $3\frac{1}{2}$  Ohm resistor in series with the meter.

APPROVED	DATE	SUPERCEDES	DATED	ORIGINATED BY	DATE
<i>R. Jaeger</i>	<i>11.16.70</i>			F. Davenport	11/14/70



**Century Data** SYSTEMS, INC.

TECHNICAL OPERATIONS

NUMBER 12  
DATE December 14, 1970  
PAGE 2 OF 2

FIGURE 1



FIGURE 2





TECHNICAL OPERATIONS

**Century Data** SYSTEMS, INC.

TECHNICAL BULLETIN

NUMBER 12  
 DATE December 14, 1970  
 PAGE 1 OF 2

TITLE:

REMOVAL OF PACK FROM BROKEN SPINDLE

REASON FOR BULLETIN:

To inform the field of a method of removing a pack from a spindle on a drive where the safety pin has sheared.

EQUIPMENT/MODEL EFFECTED:

Model 114.

OTHER EQUIPMENT EFFECTED:

Model 111.

DOCUMENTS EFFECTED:

None.

TECHNICAL INFORMATION:

The pack is held on the spindle by a shaft that runs through the middle of the spindle vertically with threads at the top.

This shaft is held from turning by a roll pin that fits into a keyway in the shaft.

If for any reason the roll pin is sheared with a pack on the spindle, the shaft is free to turn and the pack cannot be removed by the normal method.

A method of removing the pack if the pin shears is to:

1. remove the spindle ground brush at the bottom of the spindle by loosening with a .050 Allen wrench.
2. insert a 5/32 long handled Allen wrench into the keyway shown in Figures 1 and 2.
3. with a very firm hold on the Allen wrench to keep shaft from turning, remove pack with other hand, either using the pack lid or a 9/16 socket and ratchet.

REFERENCE DOCUMENTS:

None.

APPROVED	DATE	SUPERCEDES	DATED	ORIGINATED BY	DATE
<i>Harold T. Byrd</i>	<i>12-30-70</i>			D. Smith	12/14/70
<i>R. J. Jargon</i>	<i>1-5-71</i>				



TECHNICAL OPERATIONS

**Century Data** SYSTEMS, INC.

TECHNICAL BULLETIN

NUMBER 13

DATE August 26, 1971

PAGE 1 OF 1

MODELS AFFECTED: 111,114,166,212,  
213,214,215,812,  
813,814,815

TITLE:

INDEX TRANSDUCER PROXIMITY AND RADIAL ADJUSTMENTS

REASON FOR BULLETIN:

- Inform field personnel of pulse width criteria and proper procedure to achieve same.
- Performing radial adjustment may affect proximity. If proximity was initially marginal, a readjustment of radial may cause intermittent data errors.

DOCUMENTS AFFECTED:

Maintenance Manual

TECHNICAL INFORMATION:

If, for any reason, the index transducer radial or proximity adjustments are changed, the following check must be performed:

Using CE Pack:

- Check proximity adjustment with a .033" feeler gauge.
- Scope the output of index transducer.
- Verify pulse width is  $70 \pm 30$  usec ( $\pm 20$  usec for 111).
- If pulse width exceeds 100 usec, adjust the index transducer proximity to achieve a pulse width of  $90 \pm 5$  usec.

REFERENCE DOCUMENTS:

Model 212/214 Test Specifications, Rev. F  
ECN 2787

APPROVED	DATE	SUPERCEDES	DATED	ORIGINATED BY	DATE
<i>Harold T. Boyd</i>	<i>8-27-71</i>	T.B. 13	12-22-70	J. B. Snow	12-18-70
<i>Al Jaeger</i>	<i>8.30.71</i>			E. C. Lutz	8-26-71



TECHNICAL OPERATIONS

**Century Data** SYSTEMS, INC.

TECHNICAL BULLETIN

NUMBER 15

DATE October 22, 1970

PAGE 1 OF 1

Models affected: 111

TITLE

INDEX SECTOR ASSEMBLIES

REASON FOR BULLETIN

Intermittent problems due to Index/Sector Block Assembly

EQUIPMENT/MODEL EFFECTED

CDS 111 Disk Drive

OTHER EQUIPMENT EFFECTED

None.

DOCUMENTS EFFECTED

None.

TECHNICAL INFORMATION

Intermittent problems such as inability to perform a first seek or heads retracting into the hole without a select lock indication, have been traced back to improper position of the Index/Sector Block Assembly.

On older Model 111 Disk Drives the improper position has been due to an old style sector mounting spring.

If you are experiencing problems of similar nature, the sector mounting spring should probably be replaced.

The part number for the sector mounting spring is 90068-001.

REFERENCE DOCUMENTS

None.

APPROVED	DATE	SUPERCEDES	DATED	ORIGINATED BY	DATE
<i>[Signature]</i>	10.30.70			J. Lems	10/21/70



**Century Data** SYSTEMS, INC.

TECHNICAL BULLETIN

NUMBER 16  
DATE December 3, 1970  
PAGE 2 OF 2

TECHNICAL INFORMATION (continued)

2. Final adjustment of the slider to be made such that the pack stops at least  $\frac{1}{2}$  second, but not more than 2 seconds before time delay relay K3 picks.

REFERENCE DOCUMENT

ECN 380  
Dwg. 90186-001 K

NOTE: On some early units the lead from K6-4 was wired to R4-1 and will have to be moved to R4-3 to accomodate Dayton motors.



TECHNICAL OPERATIONS

**Century Data** SYSTEMS, INC.

TECHNICAL BULLETIN

NUMBER 16

DATE December 3, 1970

PAGE 1 OF 2

Models Affected: 111

TITLE:

SPINDLE MOTOR REPLACEMENT/BRAKING PROBLEMS

REASON FOR BULLETIN

1. Replacement of the spindle drive motor may require resetting of the slider on R4.
2. Make sure pack stops at least  $\frac{1}{2}$  second, but not more than 2 seconds, before Time Delay Relay K3 picks.

EQUIPMENT/MODEL EFFECTED

111 early models.

OTHER EQUIPMENT EFFECTED

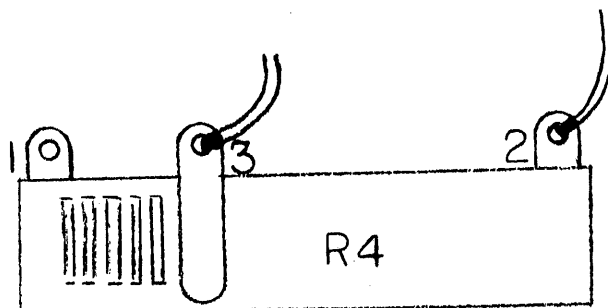
None.

DOCUMENTS EFFECTED

Drawing 90186-001

TECHNICAL INFORMATION

1. Initial Adjustment of the R4 slider:



set slider

5 turns visible on units with Dayton motors  
(approximately  $1\frac{1}{2}$  OHM)  
0 turns visible on units with G. E. motors.

APPROVED	DATE	SUPERCEDES	DATED	ORIGINATED BY	DATE
<i>Harold T. Byrd</i>	12-7-70			D. Hedegaard	11/25/70
<i>Robert J. ...</i>	12-7-70				





TECHNICAL OPERATIONS

**Century Data** SYSTEMS, INC.

TECHNICAL BULLETIN

NUMBER 17  
 DATE December 22, 1970  
 PAGE 1 OF 1

Models Affected: 111

TITLE:

Model 111 Index Transducer Adjustment.

REASON FOR BULLETIN:

There have been several 111's that have had intermittent Power On problems during installation in the field due to a binding index transducer.

DOCUMENTS EFFECTED:

None.

TECHNICAL INFORMATION:

Visually inspect the index transducer spring to see if it is compressed too tightly. If it is, the index transducer will probably bind at some point during its range of movement. All Model 111's should be checked for this problem during installation since it is a quick check and could be a problem source at a later date.

The procedure for correcting the problem is outlined as follows:

1. Remove shroud.
2. Loosen index block mounting screws.
3. Position block toward heads as far as it will go and tighten screws.
4. Re-install shroud.
5. Install a C.E. Pack and perform the radial adjustment. (Note: The index transducer prior to the radial adjustment will be closer to the heads as a result of moving the mounting block. When the radial adjustment is performed, the compression of the springs will be reduced thus eliminating the binding of the index transducer.)

REFERENCE DOCUMENTS:

None.

APPROVED	DATE	SUPERCEDES	DATED	ORIGINATED BY	DATE
<i>Harold T. Byrd</i>	<i>12-22-70</i>			J. B. Snow	12/22/70
<i>[Signature]</i>	<i>1-5-71</i>				

LAB 1

OFF LINE DISK DRIVE EXERCISERGENERAL

The Model 2011 Disk Drive Exerciser provides off-line test capability for Century Data Systems' Disk Drives.

Power for the Exerciser and all data communications is provided via the cable plug module, PB 02

DESCRIPTION

The console of the Model 2011 contains the following controls:

Position Rate Adjust:

Provides a continuous adjustment for controlling the **Seek** interval.

Automatic/Manual (Toggle IJP):

Provides continuous operation during a seek command. The manual portion (Momentary down) provides a step sequencing of a seek command under operator control.

Head Advance:

(Momentary Switch) which will advance the Head Address Register in the Disk Drive.

Reset HAR:

(Momentary Switch) which will reset the Head Address Register in the Disk Drive.

Set Head:

(Momentary Switch) used in conjunction with bit switches 1 through 8 to set the desired head address in the Disk Drive.

Unsafe Clear:

(Momentary Switch) which clears an unsafe condition in the Disk Drive.

Restore:

(Momentary Switch) which restores the cylinder.

Address to 000 in the Disk Drive.

Load HAR:

(Monetary Switch) is used in conjunction with Bit switches 1 through 128 to load the selected address (Bit Switches) into Register within the exerciser.

Bit Switches (Toggle Switch):

Bit 1 through 128 reflect time shared data on eight Bus line which controls the Disk Drive to perform:

Cylinder Address  
Head Address  
Head Select  
Erase  
Read  
Write

Function Selection:

(Rotary) enables the operator to Read, Write 0's or 1's and seek in four different modes, alternate reverse, forward, and random.

Installation

To install the Model 2011 Exerciser the following sequence shall be followed:

Shut down all power on the Disk Drive.

Remove the I/O Cable plug Module from Location 02B

Swing out the selection unit card cage.

Attach the exerciser on top of the card cage and connect the cable plug module PC2B into location 0213 of the selection unit.

(Note: Do not insert or remove cable plug module PO2B with Power on).

Apply power in the normal sequence. When the Disk has completed it's first seek cylinder address 000 the exerciser is ready to use.

e

LAB 1

OPERATIONRead Mode:

The Read Mode, when activated enables the Disk Drive to read previously written or stored data from the disk. With the Model 2011 Exerciser any legal head or cylinder address may be programmed. To enable the Read Mode, the outlined sequence should be followed:

Select ALT on the function select switch.

Select Automatic (Switch Up).

Select the desired cylinder address via bit switches 1 thru 128. (Note: Legal Address = 0 thru 202)

Activate the LOAD NAR momentary switch.

Depress the SEEK MODE switch. (Single Position)  
The Disk Drive will position to the selected Cylinder Address.

De-Select the bit switches.

Select the desired HEAD ADDRESS via bit switches 1 thru 8 (Note: Legal Address = 0 thru 9)

Activate RESET HAR and SET HEAD momentary switches in that order.

De-Select the Bit switches.

Select READ on the function select switch.

Enable HEAD select (Bit switch 4) and READ (bit switch 64) in that order.

The Disk Drive is now reading data on the selected head at the Selected Cylinder Address.

WRITE MODE:

The Write Modes, when activated enable a continuous pattern of "0"s or "1"s to be transmitted over the +LWRDATA line to the WRITE DRIVER module. To enable the write modes, the outlined sequence should be followed.

Position the Disk Drive to the selected Cylinder Address.

Select the desired cylinder address via bit switch 1 thru 128. (Note: Legal Address = 0 thru 202)

Activate the LOAD NAR momentary switch.

Depress the SEEK MODE switch. (Single Position)  
The Disk Drive will position to the selected Cylinder Address.

De-Select the bit switches.

Select the desired HEAD ADDRESS.

Select the desired HEAD ADDRESS via bit switches 1 thru 8 (Note: Legal Address = 0 thru 9)

Activate RESET HAR and SET HEAD momentary switches in that order.

De-Select the Bit switches.

Select Write 0 or Write 1 on the function select switch.

In the following order, enable HEAD Select (Bit switch 4), ERASE (Bit switch 8), WRITE (Bit switch 128).

**RESET UNSAFE**

The Disk Drive is now writing data on the Selected Head at the selected Cylinder Address.

SEEK ALTERNATE:

The Seek Alternate Mode, enables the Disk Drive to alternately seek between two selectable cylinder address location. To enable the seek alternate mode, the outlined sequence should be followed.

Select the ALT mode on the function select switch.

Select Automatic (Switch Up)

Select the first cylinder address via the Bit switches 1 thru 128 (Note: Legal Address = 0 thru 202)

Activate the LOAD NAR momentary switch.

De-Select the first cylinder address and select the second cylinder address via the bit switches 1 thru 128.

Select the desired seek mode with the seek mode swi

LABI

CONTINUOUS (up)

SINGLE (down)

The Disk Drive will now alternately seek between the first and second selected cylinder address at a rate determined by the setting of the POSITION RATE ADJUST.

SEEK REVERSE:

The seek reverse mode positions the Disk Drive in one-cylinder increments to cylinder address 000, and in one step returns to cylinder address 202. To enable the seek reverse mode the outlined sequence should be followed.

Select REV on the function select switch.

Select AUTOMATIC. (Switch up)

De-Select all bit switches.

Select the desired seek mode with the SEEK MODE switch.

CONTINUOUS (up)

SINGLE (down)

The Disk Drive will now seek in one cylinder increments starting from cylinder address 202 to address 000 and repeat. The position rate adjust may be varied to increase or decrease the positioning time.

SEEK FORWARD:

The seek forward mode positions the Disk Drive in one cylinder increments from cylinder address 000 to 202, and returns to cylinder address in one step. To enable the seek forward mode the outlined sequence should be followed:

Select FWD on the function select switch.

The Disk Drive will now seek forward at a rate set by the position rate adjust.

Select Automatic. (Switch up)

De-Select all bit switches.

Select the desired seek mode with the SEEK Mode Switch.

CONTINUOUS (up)

SINGLE (down)

SEEK RANDOM:

The seek random mode, enables the Disk Drive to seek to any legal cylinder address in a pseudo random manner. To enable the seek random mode the outlined sequence should be followed:

Select RDM on the function select switch.

Select AUTOMATIC. (switch up)

Select the desired seek mode with the SEEK MODE switch.

CONTINUOUS (up)


SINGLE (down)

The Disk Drive will now seek to random cylinder address locations at a rate set by the position rate adjust.

LABI

CUSTOMER ENGINEERING  
 RECOMMENDED SPARE  
 PARTS CONFIGURATION  
 CDS 114

MODEL NO. 3343,1343


DR. <i>Seal O'Neill</i>			 GENERAL AUTOMATION, INC.  CUSTOMER ENGINEERING RECOMMENDED SPARE PARTS CONFIGURATION	REV C
CHK <i>[Signature]</i>				
ENG <i>[Signature]</i>				
APPR <i>[Signature]</i>				
C. Castilla 5/8/75			86A00075A	
SHT NR	NXT SHT	SCALE		
1	2			



REVISIONS

SYM	DESCRIPTION	APPR	Date
A	ENGINEERING RELEASE	<i>[Signature]</i>	4/15/5
B	PRICE UPDATE	<i>[Signature]</i>	7/23/5
C	PRICE UPDATE		12/4/75

8/27/5

 GENERAL AUTOMATION, INC.	SHT NR	NEXT SHT	86A00075A	REV C
	2	3		

RECOMMENDED SPARE PARTS

1.0 INVENTORY SUPPORT LEVELS

- 1.1 SITE SUPPORT SHOULD MAINTAIN PARTS AT THE "A" LEVEL.
- 1.2 FIELD DEPOT SUPPORT SHOULD MAINTAIN PARTS AT THE "A" AND "B" LEVEL.
- 1.3 NATIONAL DEPOT SUPPORT SHOULD MAINTAIN PARTS AT THE "A", "B", AND "C" LEVEL.

2.0 DESCRIPTION OF LEVEL SPARES

- 2.1 "A" LEVEL SPARES REPRESENTS HIGH USAGE ITEMS EASILY CARRIED BY THE C.E. THESE ITEMS SHOULD ALSO BE STOCKED AT THE "B" AND "C" LEVELS.
- 2.2 "B" LEVEL SPARES REPRESENTS LOW USAGE ITEMS AND ITEMS NOT EASILY CARRIED BY THE C.E. THESE ITEMS SHOULD ALSO BE STOCKED AT THE "C" LEVEL.
- 2.3 "C" LEVEL SPARES REPRESENTS ITEMS WHICH HAVE A VERY LOW SPECIAL USAGE.

3.0 DESCRIPTION OF COLUMN HEADINGS

- 3.1 "L" INDICATES PARTS SUPPORT LEVEL
- 3.2 "QTY" REPRESENTS ACTUAL NUMBER OF ITEM PER UNIT, NOT A RECOMMENDED QUANTITY.
- 3.3 "D" INDICATES ITEM DISCOUNT STATUS. "Y" INDICATES PRODUCT IS DISCOUNTABLE UNDER CURRENT DISCOUNT AGREEMENT, NON-DISCOUNTABLE ITEMS ARE INDICATED BY "N".
- 3.4 UNIT PRICE IS THE TOTAL U.S. DOLLAR PURCHASE LIST PRICE OF THE PRODUCT.

4.0 PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE.

DATE
5/18/75
7/22/75

CUSTOMER ENGINEERING  
RECOMMENDED SPARE PARTS

VENDOR CODE: 3040

GAI MODEL NO. : 3343,1343  
VENDOR NAME : Cal Comp  
VENDOR MODEL : 114  
DATE : 4/15/75

GAI PART NO.	VENDOR PART NO.	DESCRIPTION	QTY	L	D	UNIT PRICE
	91826-001	AP28 Emer Retract	1	B	N	\$135.00
	91933-001	AP29 Servo Driver	1	B	N	174.38
	92816-001	VL10 Sequencing Mod	1	B	N	376.88
	93587-001	AL28 Sector Gen 32	1	B	N	112.50
	97721-001	Spindle Assy.	1	C	N	444.38
	95304-001	Belt, Spindle Drive	1	B	N	18.75
	91158-001	Head Assy.	5	B	N	177.50
	91158-002	Head Assy.	5	B	N	177.50
	91158-003	Head Assy.	5	B	N	177.50
	91158-004	Head Assy.	5	B	N	177.50
	90136-001	Filter Cabinet	1	A	N	3.30
	91179-001	Filter, Absolute	1	A	N	36.65
	91535-001	Brush, Gnd.	1	A	N	13.13
	90344-001	Diode IN4001	25	A	N	.95
	90336-001	Transistor 2N5885	4	A	N	20.63
	90380-001	Relay, Time Delay	1	A	N	80.63
	90382-001	Relay, Power Dist.	2	A	N	45.00
	90381-001	Relay, G.P.	5	A	N	24.38
	90437-003	Fuse, 3A (3AB) or ABC	3	A	N	1.50
	90987-130	Fuse, 3A (3AG) or AGC	1	A	N	3.20
	90659-010	Fuse, 10A (FNML0)	4	A	N	5.45
45A00003A02	90922-001	Lamp #387	1	A	N	1.96
	90935-001	Pack Switch	1	B	N	43.13
	91914-001	Jack Screw	1	C	N	3.58
	91915-001	Jack Shaft	1	C	N	6.75
	91010-001	Bobbin Assy.	1	C	N	195.00
	90030-001	Motor Spring	1	B	N	1.13
	90899-001	Camming Tool	1	B	N	58.13
	94328-001	Disk Exercisor	1	B	N	2626.88
	91515-001	Torque Wrench	1	B	N	198.75
	90913-001	Cyl. Transducer Align	1	C	N	76.88
	90990-001	Head Weight	1	C	N	54.38
	90202-001	AF10 Cyl. Add Reg.	1	B	N	101.25
	90206-001	AF11 Diff Counter	1	B	N	95.63
	90210-001	AL10 Diff Counter	1	B	N	108.75
	90218-001	AL15 Unsafe	1	B	N	148.13
	90222-001	AL13 Seek Logic 1	1	B	N	112.50
	90226-001	AL14 Seek Logic 2	1	B	N	140.63
	90230-001	AL16 Control 2	1	B	N	105.00

DATE
5/8/75
7/22/75
12/4/75

CUSTOMER ENGINEERING  
RECOMMENDED SPARE PARTS

VENDOR CODE: 3040

GAI MODEL NO.: 3343,1343  
VENDOR NAME : Cal Comp  
VENDOR MODEL : 114  
DATE : 4/15/75

GAI PART NO.	VENDOR PART NO.	DESCRIPTION	QTY	L	D	UNIT PRICE
	90246-001	AL11 Control 1	1	B	N	\$123.75
	90250-001	AN10 Q Line Dr.	2	B	N	163.13
	90254-001	AN11 Q Line Receiver	1	B	N	153.75
	90258-001	AL12 Det. Index Sped	1	B	N	146.25
	90262-001	AX10 Index/Cyl. Pre Amp.	1	B	N	153.25
	90266-001	AT10 OSC	1	B	N	166.88
	90306-001	AP10 Lamp/Relay Dr.	1	B	N	120.00
	90382-001	AR12 Head Select	1	B	N	213.75
	90557-001	AZ10 Extender	1	A	N	110.62
	90559-001	AP14 Servo Amp	1	B	N	150.00
	90680-001	AP16 Servo Dr.	1	B	N	172.50
	90904-001	AP18 Power Monitor	1	B	N	153.75
	91057-001	AR18 Write Driver	1	B	N	200.63
	91061-001	AR19 Read Amp	1	B	N	198.75
	91065-001	AR20 Crossover Det.	1	B	N	187.50
	91069-001	AF13 Head Add Reg	1	B	N	110.63
	91073-001	AN14 Q Line dr.	1	B	N	174.38
	91089-001	AL10 Control Logic 3	1	B	N	110.63
	91093-001	AP21 Servo Pre amp	1	B	N	181.88
	91101-001	AP23 D-A Converter	1	B	N	161.25
	91109-001	AP25 Demodulator	1	B	N	163.13
	91122-001	AR17 PH Pre Amp	1	B	N	249.38
	91126-001	AR16 LH Pre Amp	1	B	N	298.13
	91321-001	Az16 Jumper	1	B	N	46.88
	91725-001	AL22 Sector Gen	1	B	N	90.00
	92135-001	I.C.	1	A	N	7.78
	90319-001	I.C.	2	A	N	9.38
	90310-001	I.C. (945)	42	A	N	4.13
	92136-001	I.C.	2	A	N	6.95
	90311-001	I.C. (946)	37	A	N	4.13
70A00002A01	90312-001	I.C. (962)	10	A	N	5.25
70A00003A01	90313-001	I.C. (944)	10	A	N	3.95
70A00004A01	90314-001	I.C. (936)	30	A	N	3.95
70A00001A01	92131-001	I.C.	2	A	N	3.75
	90316-001	I.C.	6	A	N	6.70
	92133-001	I.C. (7475)	2	A	N	7.50
70A00016A01	90315-001	I.C.	11	A	N	8.63
	90326-001	Transistor (2N3904)	110	A	N	1.88

DATE
5/8/75
7/22/75

CUSTOMER ENGINEERING  
RECOMMENDED SPARE PARTS

VENDOR CODE: 3040

GAI MODEL NO.: 3343,1343  
VENDOR NAME : Cal Comp  
VENDOR MODEL : 114  
DATE : 4/15/75

<u>GAI PART NO.</u>	<u>VENDOR PART NO.</u>	<u>DESCRIPTION</u>	<u>QTY</u>	<u>L</u>	<u>D</u>	<u>UNIT PRICE</u>
66A00004A01	90328-001	Transistor	71	A	N	\$ 2.45
	90330-001	Transistor (2N3503)	18	A	N	4.75
	90331-001	Transistor (2N3054)	3	A	N	6.95
	90337-001	Transistor (2N4899)	2	A	N	11.25
	90338-001	Transistor (2N2895)	30	A	N	3.95
	90336-001	Transistor (2N3772)	4	A	N	20.63
			Disk Pack, Alignment	1	B	N
TOTAL UNIT COST FOR:		1. SITE SUPPORT	-			471.36
		2. FIELD DEPOT SUPPORT	-			11,614.58
		3. NATIONAL DEPOT SUPPORT	-			12,395.55

DATE
5/8/75
7/24/75
12/4/75