Work Book 2 - Log for MISC / 77NT / SCAMP

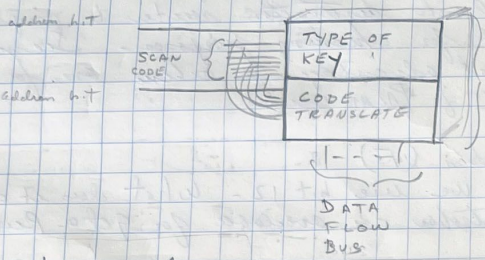
2580-00
Dept A41

P/s return to:

J. D. GEORGE
P.O. BOX 66
LOS GATOS CALIF. 95030
IBM CORP

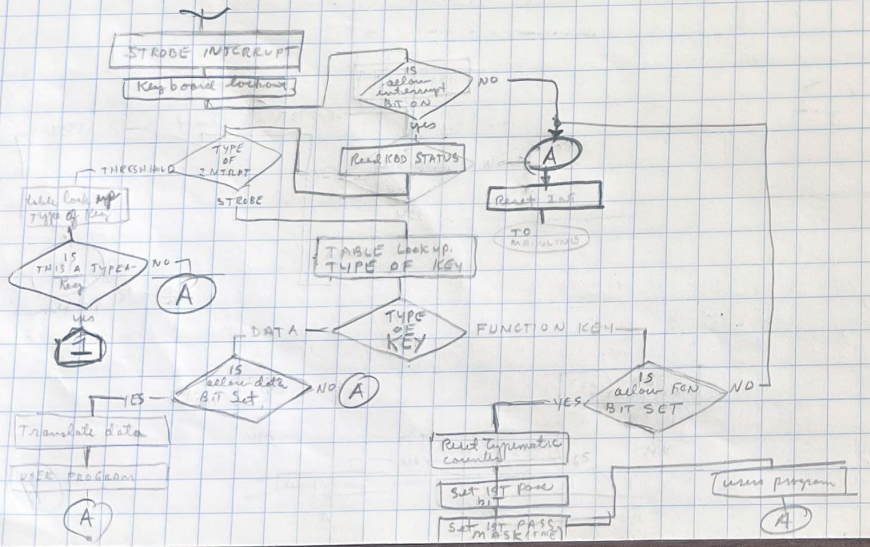
7/26/70 KEYBOARD

a) Interrupt controller on energy key stroke.
b) Begin process of keystroke if keyboard interrupt is not masked off in software.
c) interrogate a KBD MAP/ROS with scan code which defines type of key (typematic, function, upper/lower shift, alternate code, etc) as defined by using system.
ROS is divided into two sections -



User Personalized ROS or Writable table.
128 x 9
Including machine code.
(EBCDIC, ASCII, 6 bit, etc.)

d) New line from KBD called Threshold will cause additional interrupts if KBD attachment typematic latch is set. (could be software latch bit) Threshold line emits a pulse each time the keyed address is interrogated after the strobe line has been detected. Threshold line does not emit during strobe time.



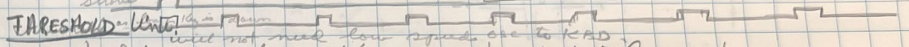
7/26. Conversation with John Fox - KBD 441-6319

Constraints of KBD - Upper/lower shift key positions should be in fixed locations. Space bar, what else.

a) One strobe per keystroke -

b) Can we send back info to keyboard after stroke to identify typematic key - ? No.! Must be before the fact - Too restrictive for our application.

c) Can we have a line that tells us that any key other than shift is being held down? YES



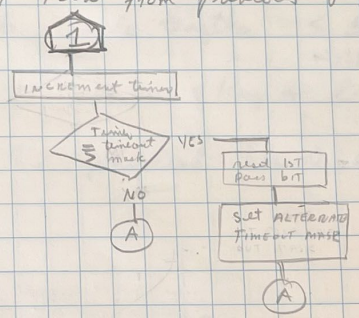
d) If function keys in predefined can we get a function strobe - YES Too restrictive for our application.

e) timing charts & logics for KBD - ? Being Sent by J Fox.

f) If KBD lockout is used does it inhibit threshold output? YES. Freezes output lines in whatever state they were in. Stops scan drive.

g) on n Key Rollover, if keyboard lockout is used & is on long enough to allow one or two additional keys to be depressed, what happens?
a) do we get a strobe for each key as long as it does not exceed 4? YES if lockout is not on.

CONT FLOW from previous page



7/26/72 Review of New PALM.

Page 12 - More halfword - | 0 | R2 | R1 | MOD |

1) R2 & R1 are reversed from old in order of operation - Re: Contents of Reg specified first is altered.

2) GET TO Register.
How long is data present on Bus Out from
Can we Extend (Hold) last E cycle to allow
new data entered into destination register to propaga
back to attachment for checking purposes - Seems
me to be of great advantage for online one for on
checking. (page 15 of PALM Spec)

3) Get/Put instruction (F)
a) How do we use bit 12 - What does it do.
b) What strobes are available for Get or Put.

4) Error Processing:

New KBD Attachment. See previous page 7/26/72

Status Register

bit M : ADAPTOR READY.
Power on
KBD cable connected

bit N : BUS OUT ERROR
a) KBD selected & bus out error detected.

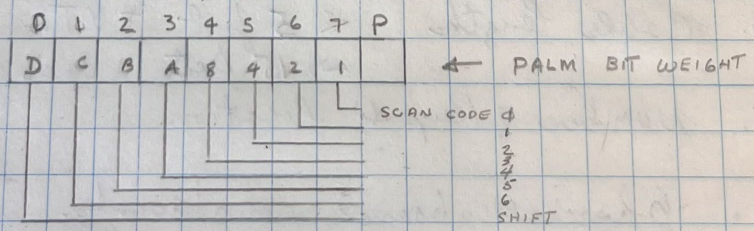
bit P : KEYBOARD DATA BUS ERROR
a) bit "M" on
b) parity error detected from KBD to KBD attachment

bit Q : ADAPTOR ENABLED
a) BIT M ON
b) Set on by P.O.R or Program instruction
c) reset by program (disable CMD)

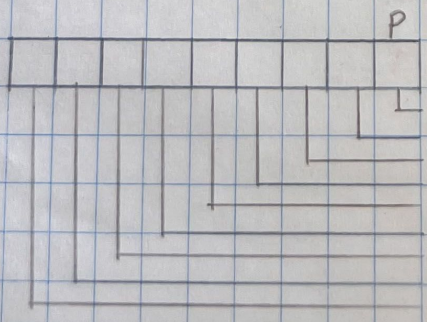
bit R : INTERRUPT REQUEST
a) Set if bits M & Q are on & strobe or threshhold
b) reset by next CMD

bit S : LOCKOUT
CAN BE EXTERNALLY JUMPERED TO LOCKOUT WITH INTERRUPT TR ON. WE WILL PROGRAM LOCKOUT. (open loop)

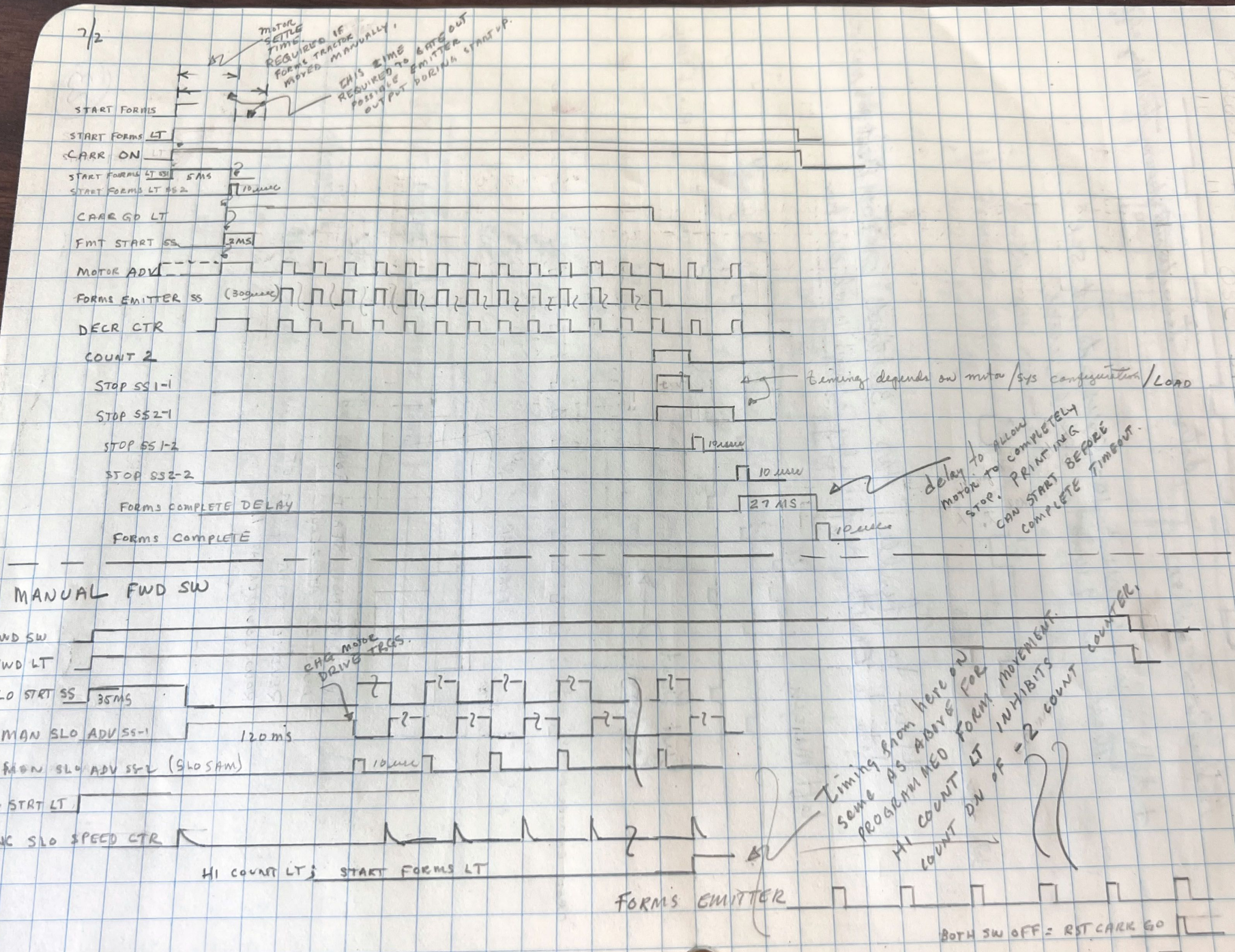
KBD DATA BYTE

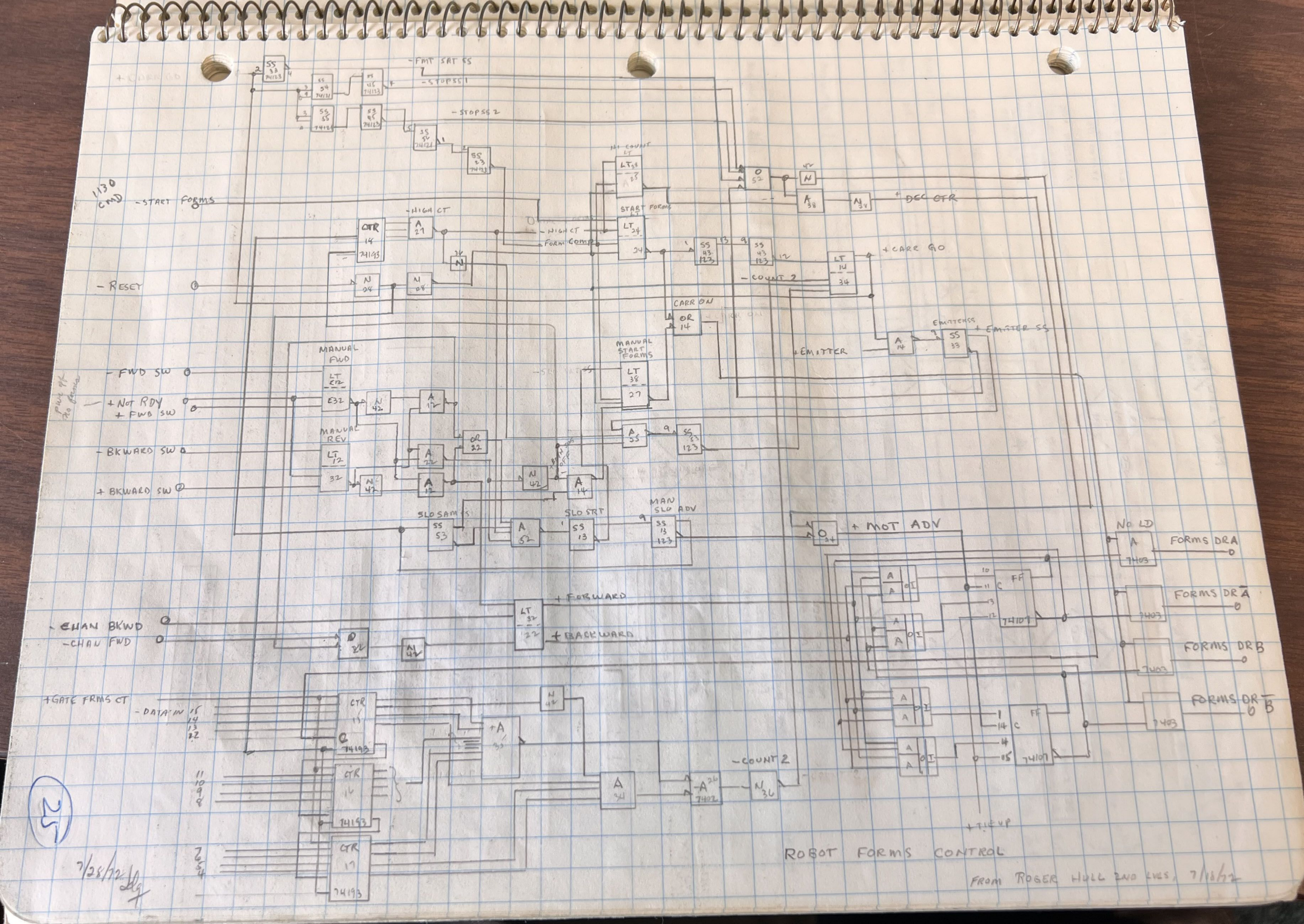


KBD STATUS BYTE

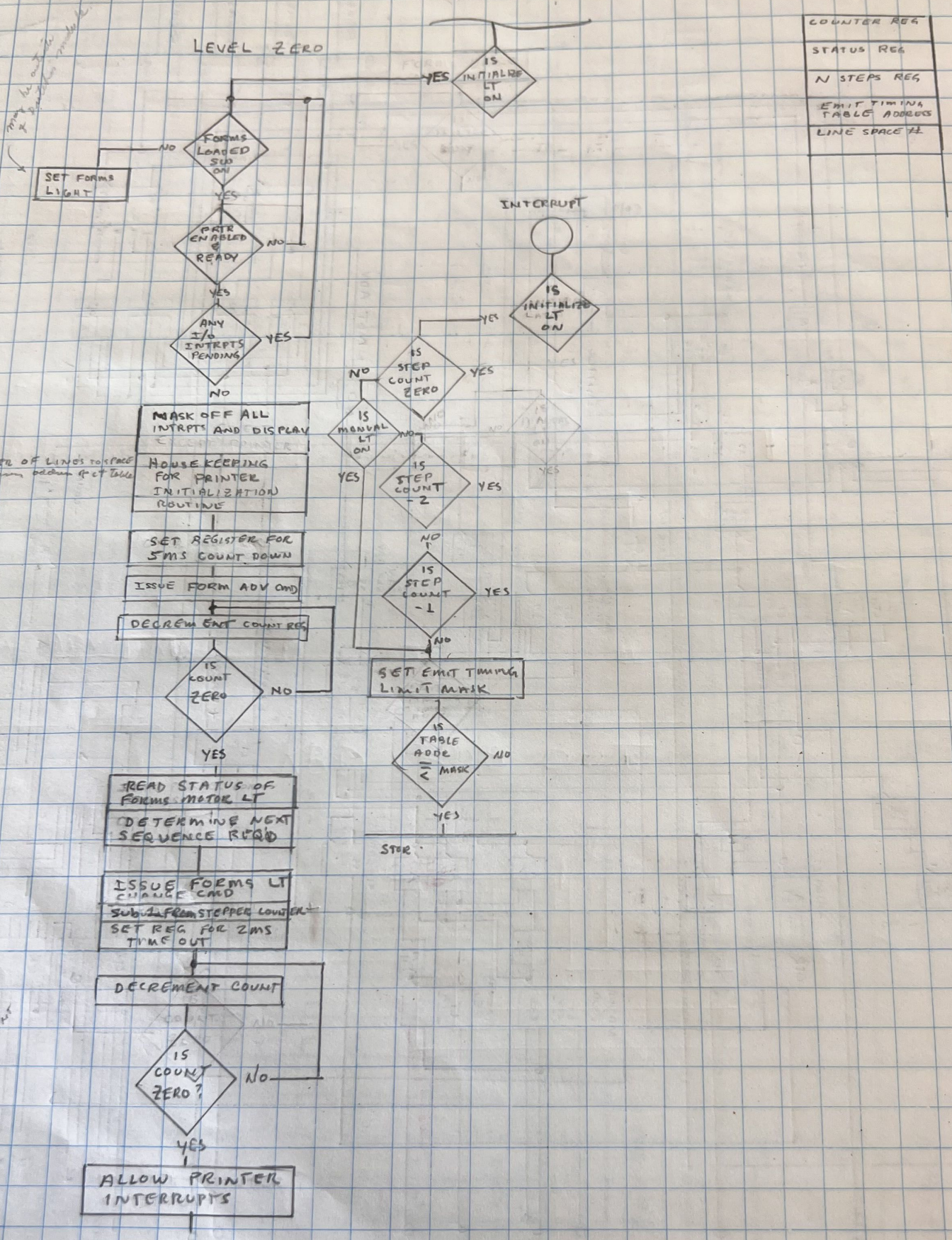


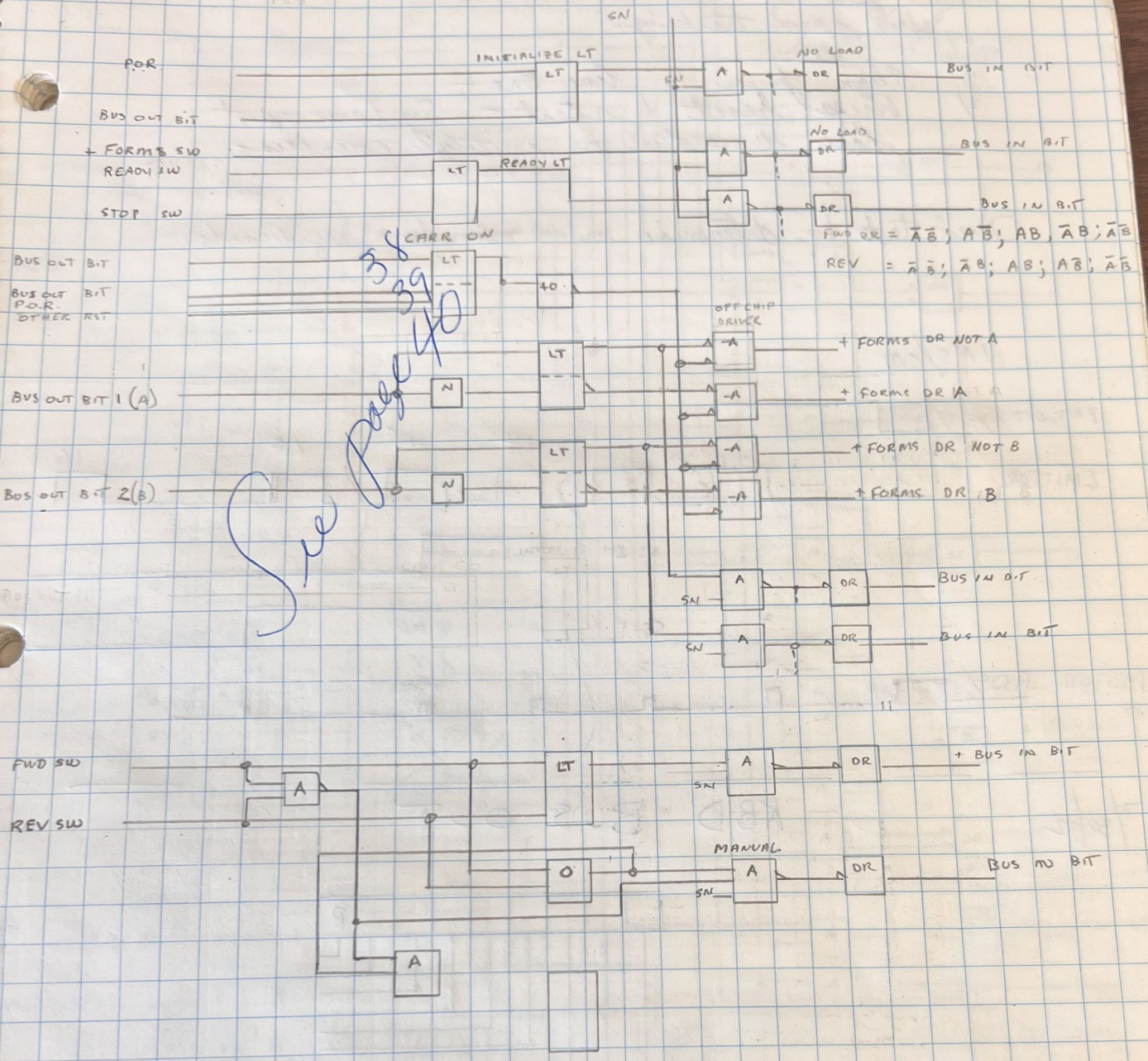
DOS


MOTOR SETTLE TIME REQUIRED IF FORMS TRACTOR MOVED MANUALLY.
THIS TIME REQUIRED TO GATE OUT POSSIBLE EMITTER OUTPUT DURING START UP.
START FORMS
START FORMS LT
CARR ON
START FORMS LT SS1
5MS
START FORMS LT SS2
10 μsec
CARR GO LT
FMT START SS
2MS
MOTOR ADV
FORMS EMITTER SS
(300 μsec)
DECR CTR
COUNT 2
STOP SS1-1
STOP SS2-1
STOP SS1-2
10 μsec
STOP SS2-2
10 μsec
FORMS COMPLETE DELAY
27 MS
10 μsec
FORMS COMPLETE
timing depends on motor/sys configuration/LOAD
delay to allow motor to completely stop. PRINTING CAN START BEFORE COMPLETE TIMEOUT
MANUAL FWD SW
FWD SW
FWD LT
CHG MOTOR DRIVE TRGS.
SLO STRT SS
35MS
MAN SLO ADV SS-1
120 mS
MAN SLO ADV SS-2 (SLOSAM)
10 μsec
MAN STRT LT
INC SLO SPEED CTR
HI COUNT LT; START FORMS LT
Timing from here on same as above for programmed forms movement
HI COUNT LT INHIBITS COUNT DN OF -2 COUNT
FORMS EMITTER
BOTH SW OFF = RST CARR GO
CARR GO LT


-FMT SAT SS
-STOPSS 1
-STOPSS 2
1130 CMD -START FORMS
-RESET
+HIGH CT
-HIGH CT
FORM COMP
START FORMS
+DEC CTR
+CARR GO
-COUNT 2
CARR ON
+EMITTER
+EMITTER SS
MANUAL FWD
-FWD SW
+NOT RDY
+FWD SW
MANUAL REV
-BKWARD SW
+BKWARD SW
MANUAL START FORMS
SLO SAMPLE
SLO STRT
MAN SLO ADV
+MOT ADV
+FORWARD
+BACKWARD
-CHAN BKWD
-CHAN FWD
+GATE FRMS CT
-DATA IN
-COUNT 2
+TIE UP
No LD
FORMS DRA
FORMS DR Ā
FORMS DR B
FORMS DR B̄
ROBOT FORMS CONTROL
FROM ROGER HULL 2ND LVES, 7/18/72
7/28/72

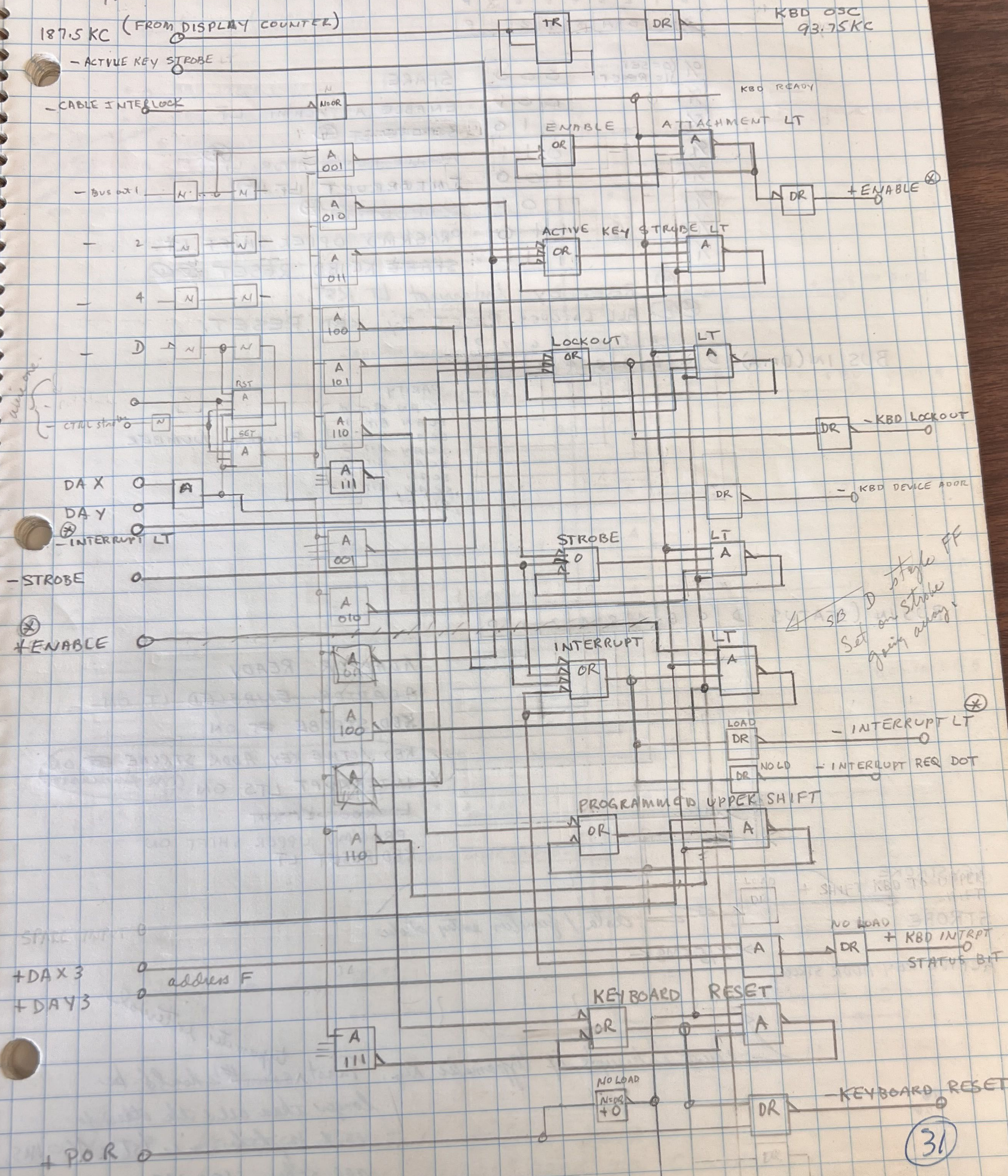
POR / IPL / PRINT MACRO




SN
P.O.R
INITIALIZE LT
LT
A
NO LOAD
DR
BUS IN BIT
BUS OUT BIT
+ FORMS SW
READY SW
STOP SW
READY LT
FWD DR = $\bar{A}\bar{B}$; $A\bar{B}$; AB; $\bar{A}B$; $\bar{A}\bar{B}$
REV = $\bar{A}\bar{B}$; $\bar{A}B$; AB; $A\bar{B}$; $\bar{A}\bar{B}$
38
CARR ON
39
40
BUS OUT BIT
BUS OUT BIT P.O.R. OTHER RET
OFF CHIP DRIVER
-A
+ FORMS DR NOT A
+ FORMS DR A
+ FORMS DR NOT B
+ FORMS DR B
BUS OUT BIT 1 (A)
BUS OUT BIT 2 (B)
N
See Page 40
FWD SW
REV SW
+ BUS IN BIT
MANUAL
O
BUS IN BIT

8/31/72

KBD LATCHES, Set / Reset


187.5 KC (FROM DISPLAY COUNTER)
TR
DR
KBD OSC 93.75KC
- ACTIVE KEY STROBE
- CABLE INTERLOCK
KBD READY
ENABLE
ATTACHMENT LT
OR
A
001
010
011
100
101
110
111
- Bus out 1
2
4
D
N
+ENABLE
ACTIVE KEY STROBE LT
LOCKOUT
LT
RST
SET
- CTRL strobe
- KBD LOCKOUT
DA X
DA Y
- INTERRUPT LT
- KBD DEVICE ADDR
STROBE
- STROBE
SB D style FF
Set on strobe going away.
+ENABLE
INTERRUPT
LOAD
NO LOAD
- INTERRUPT LT
- INTERRUPT REQ DOT
PROGRAMMED UPPER SHIFT
+ KBD INTRPT STATUS BIT
+DAX3
+DAY3
address F
KEYBOARD RESET
- KEYBOARD RESET
+ P O R

8/31/72

KBD CONTROL, BUS IN DATA AND STATUS INFORMATION.

BUS OUT

0	1	2	3	4	5	6	7	P
D	C	B	A	8	4	2	1	P

%	0=SET 1=RESET	0	0	0 SPARE
%		0	0	1 × ENABLE ATTACH'MT LT
~~%~~		0	1	0 ~~STROBE LT~~ ⊗
~~%~~		0	1	1 ~~ACTIVE KEY(S) ADDR~~ LT ⊗ (KBD ADDRESS STROBE) LT
%		1	0	0 × INTERRUPT LT ⊗
%		1	0	1 ~~LOCKOUT LT~~ ⊗
%	1	1	1	0 × PROG'RMD UPPER SHIFT LT
%		1	1	1 × ~~SPARE~~ KEYBD RESET ⊗⊗

⊗ RESET BY interrupt LT RST.

⊗⊗ ALL LATCHES RESET BY KBD RESET.

BUS IN (DATA)

0	1	2	3	4	5	6	7	P
D	C	B	A	8	4	2	1	P

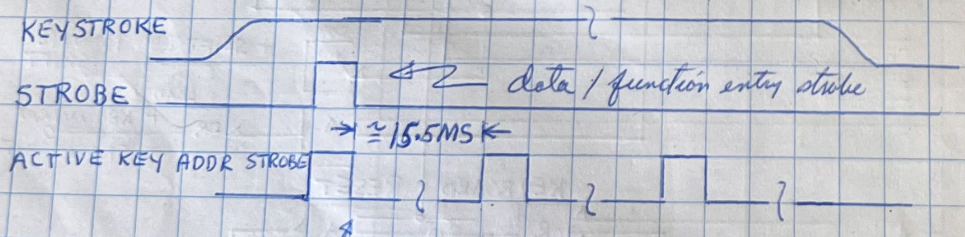
PARITY
SCAN BIT 0
SCAN BIT 1
SCAN BIT 2
SCAN BIT 3
SCAN BIT 4
SCAN BIT 5
SCAN BIT 6 } BINARY NUMBER
SHIFT

BUS IN (STATUS

D	C	B	A	8	4	2	1	P

ADAPTOR READY
~~ADAPTOR ENABLED LT ON~~
~~K~~BD STROBE ~~LT~~ ON
KBD ~~ACTIVE KEY~~ ADDR STROBE ~~LT~~ ON
INTERRUPT LTS ON One indicator
× ~~LOCKOUT LT ON~~
PROG'MD UPPER SHIFT ON
KBD RESET LT

4-6 μsec.



count interrupts if typomatic Key. First typomatic interval ~~count #1~~ should be longer than all of the others for each keystroke. ie 1ST = 400 MS, all others 100 MS.

78
20
15.6

8/1/72

FORMS CONTROL (Refer to pages 24 & 25)

1. Assume availability of 1.016 MS timer.
   a. Must track form being used. Need switch or operator procedure to initiate "line one" of forms.
   b. 16 increments per line space.
   c. Can space up or down.
      1. space up sequence is $\overline{A}\,\overline{B}$; $A\,\overline{B}$; $A\,B$; $\overline{A}\,B$; repeat seq.
      2. space down sequence is $\overline{A}\,\overline{B}$; $\overline{A}\,B$; $A\,B$; $A\,\overline{B}$; $\overline{A}\,\overline{B}$ etc
   d. Beginning and ending of carriage motion requires special attention.

1.0 issue carriage GO instruction. Power to carriage motor is energized. (Mask off carriage interrupts)

Use 3 MS cycle timer →

1.1 Delay 50 MS. (allow motor to settle if previously moved by hand.)

1.2 determine states of motor drive latches

1.3 issue CMD to change motor drive latches ± 1 depending on direction desired. Value set into latches must be different than original to cause motor movements.

Use 1 MS timer → 1.4 delay 2 MS; (ALLOW carriage interrupts)

Due to possible erroneous carriage emitter output during start up we must inhibit interrupts until motor is almost up to speed.

NOTE: The two delays mentioned above and any other delays required by the printer should be easily changed by Keyboard input.

2.0. For any given number of line spaces, the last two motor increments require special attention. In most cases the drive change to the motor will be delayed.

Final machine may require more than two slowdown iterations. →

2.1 At count Plus 2 MASK Carriage Interrupt.

2.2 start 10 KC timer

2.3 present machine requires 3.2 MS delay

2.4 issue next carriage motor drive change.

2.5 Restart timer + count 4.8 MS. (present machine)

2.6 issue last motor increment.

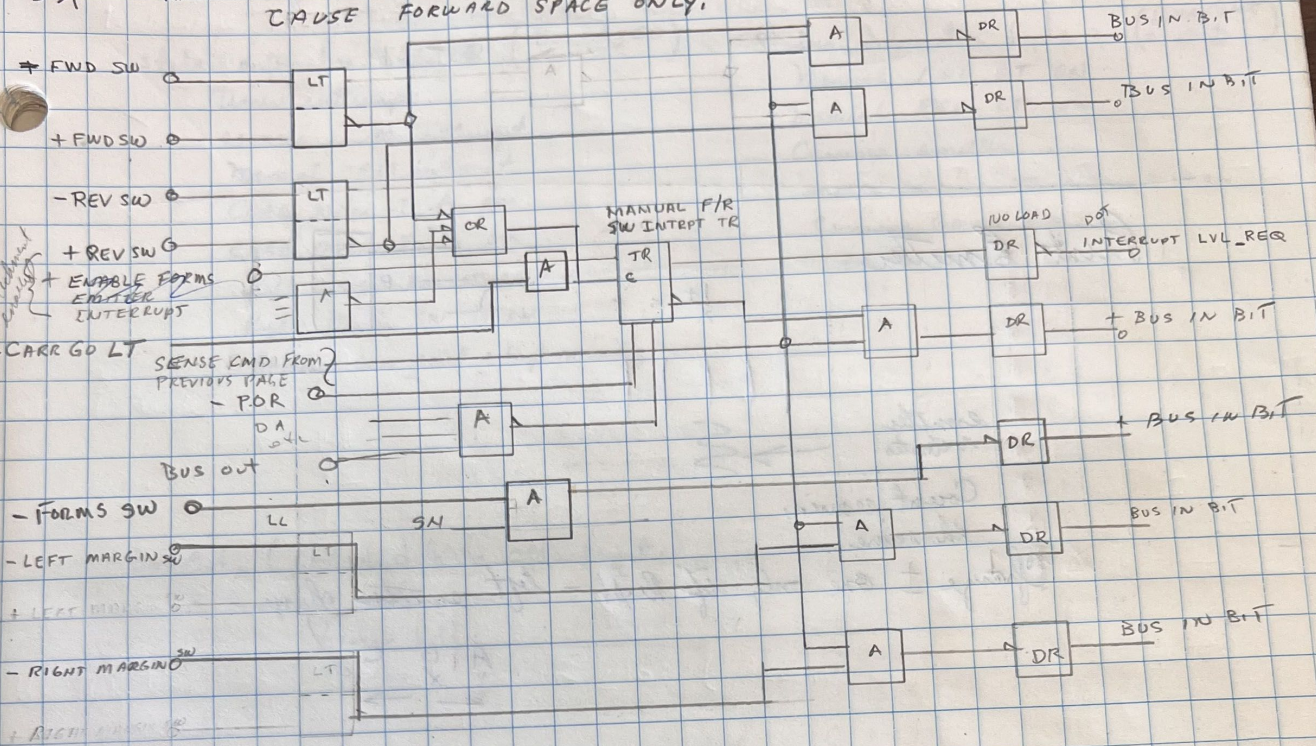
3.0. Restart timer and count appproximately 27 MS

3.1. END Operation.

Note: Printing may begin some where before 27 MS delay — TO be defined.

8/4/77
Jdg

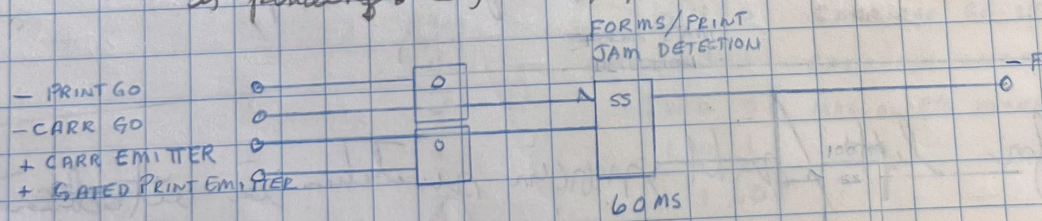
NOTE: IF both SWITCHES ARE HELD DOWN, MICRO PROGRAM WILL CAUSE FORWARD SPACE ONLY.



(1) Micro program will use timer to cause 250 MS delay for "n" increments for manual switches. After n increments and if switch is still depressed micro program should then advance paper at the regular speed. ~~Robot~~ n = 14. Appears to be too many -

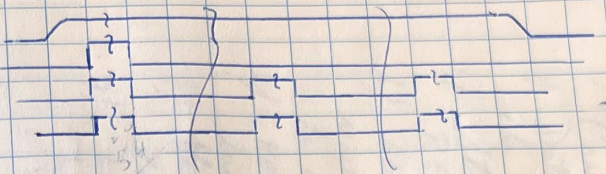
(2) May be necessary to delay reset of forms emitter interrupt trigger

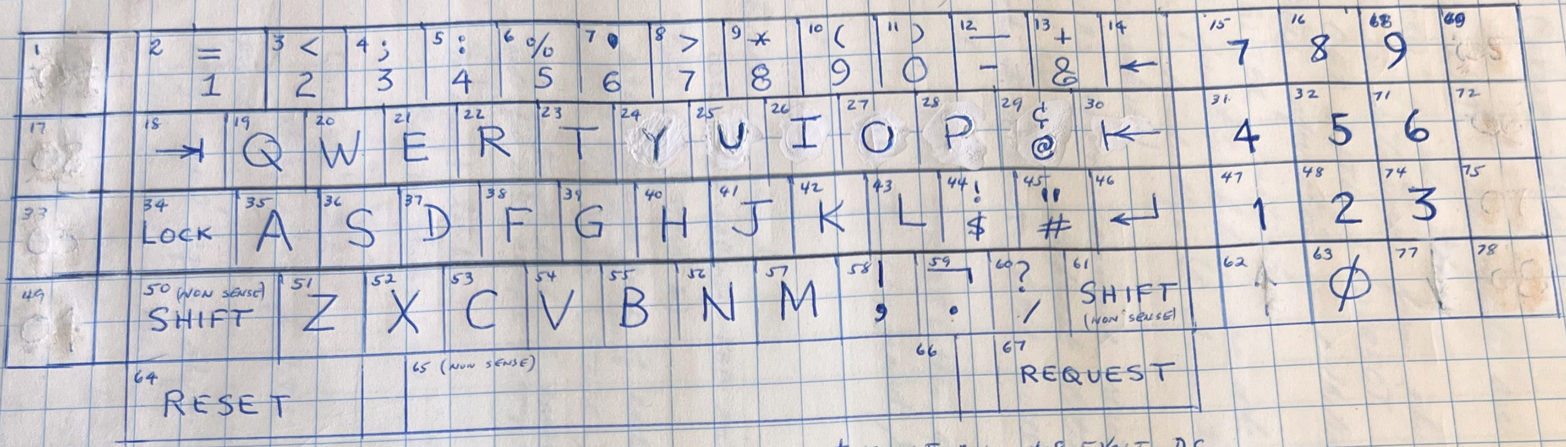
(3) Micro program must not release manual operation if print cmd is pending. If Carriage Go latch is on manual operation is disabled.



8/3/72

KEYBOARD FOR PALM/BAHIA





L. USER TO SUPPLY OSCILLATOR DRIVE AND ±5VOLT AND +8.5VOLT DC.

~~K. EIGHT (8) EXTRA BLANK KEYS S/B REQUESTED REPLACEMENT FOR KEYS LABELED 01–08.~~

A. RIGHT AND LEFT SHIFT KEYS SHOULD HAVE UNIQUE OUTPUT LINES. SHOULD NOT GENERATE STROBE 1 OR 2.

B. STROBE 1 OCCURS ONCE PER KEYSTROKE. STROBE 2 OCCURS ONCE EACH TIME AN ACTIVE (HELD DOWN) KEY IS ADDRESSED BY THE KEYBOARD SCAN LOGIC. LEADING EDGE OF STROBE 1 & 2 SHOULD COINCIDE.

C. KEYBOARD TO PROVIDE N KEY ROLL OVER. N ≥ 4

D. SCAN CODE OUTPUT DATA LINES.

E. ~~KEYBOARD TO ACCEPT SHIFT UPSHIFT CONTROL FROM KBD ATTACHMENT. UPSHIFT FROM ATTACHMENT WILL BE MODIFIED BY SETTING OF RIGHT SHIFT / LEFT SHIFT (ALPHA NUMERIC) KEYS. MODIFICATION TO BE DONE BY KBD ATTACHMENT.~~ KBD ATTACHMENT WILL DETERMINE SHIFT STATUS TO BE SENT TO CONTROLLER.

M. CABLE INTERLOCK

F. KEYBOARD STYLE: SLOPED

G. TYPAMATIC AND FUNCTION KEYS WILL BE DEFINED BY USER.

H. KEYS # 50, 61, and 65 WILL NOT CAUSE STROBE OUTPUT.

J. KEYS # 1, 17, 33, 49, 15, 16, 68, 69, 31, 32, 71, 72, 47, 48, 74, 75, 62, 63, 77, 78 to be color BLUE. all other keys GRAY.

5

8/14/72

8/14 Copy sent to Dick Pratt

PRINTER CONTROL COMMANDS

See Pages 78/79

CONTROL BYTE

D	C	B	A	8	4	2	1	P	
%₁	0	1			0	0	0		ENABLE ~~CARR~~ FORMS INTERRUPT LT
%₁	0	1			0	0	1		~~CARR~~ FORMS GO LT
~~%₁~~	~~0~~	~~1~~			~~0~~	~~1~~	~~0~~		~~MANUAL F/R INTERRUPT LT~~
%₁	0	1			0	1	1		~~CARR~~ FORMS INTERRUPT LT
%₁	1	0			1	0	0		ENABLE PRINT INTRPT LT
%₁	1	0			1	0	1		PRINT INTRPT LT
%₁	0	1			1	1	0		ENABLE TIMER INTRPT LT
%₁	0	1			1	1	1		TIMER INTRPT LT
X	0	1	X	1	X	X	X		SET ~~CARR~~ FORMS MOTOR DR LT A
X	0	1	1	X	X	X	X		SET ~~CARR~~ FORMS MOTOR DR LT B
X	1	0	X	1	X	X	X		SET PRINT MOTOR DR LT A (OPTIONAL PRINT MOTOR GO)
X	1	0	1	X	X	X	X		SET PRINT MOTOR DR LT B (OPTIONAL PRINT F/R)
%₁	1	1	X	%₁	%₁	%₁	%₁		SET/RESET TIMER. (BITS 1, 2, 4, 8 = PRESET) STARTING VALUE IF BIT D = 1.
~~%₁~~	~~0~~	~~1~~			~~1~~	~~0~~	~~0~~		~~SET FORMS MOTOR DIRECTION = FWD, bit 2 = 1~~
%₁	1	0			0	0	1		PRINT GO

update Pratt copy: 10 → (rows ENABLE PRINT INTRPT LT and PRINT INTRPT LT changed to C B = 1 0)

STATUS BYTE 1 (BUS IN) — BUS OUT MUST ~~CONT~~ HAVE BIT 1 ON.

D	C	B	A	8	4	2	1	P

- 1 — FORMS EMITTER INTERRUPT STATUS BIT
- 2 — ~~MANUAL F/R INTERRUPT~~ "
- 4 — PRINT EMITTER INTERRUPT "
- 8 — TIMER INTERRUPT "
- A — LEFT MARGIN SW ON "
- B — RIGHT MARGIN SW ON "
- C — FORMS SWITCH "
- D — EXPECTED INTERRUPT MISSING. (single shot)

STATUS BYTE 2 (BUS IN) — BUS OUT MUST HAVE BIT 2 ON.

D	C	B	A	8	4	2	1	P

- 1 — MANUAL FORWARD LT ON
- 2 — MANUAL REVERSE LT ON
- 4 — CARRIAGE (FORMS) EMITTER
- 8 — ENABLE CARRIAGE EMITTER INTERRUPT LT
- A — FORMS GO LT
- B — FORMS MOTOR LT A
- C — FORMS MOTOR LT B

STATUS BYTE 4 (BUS IN) — BUS OUT MUST HAVE BIT 4 ON

1	C	B	A	8	4	2	1	P

- 1 — PRINT MOTOR LT A
- 2 — PRINT MOTOR LT B
- 4 — PRINT EMITTER SINGLE SHOT
- 8 — ENABLE TIMER
- A — PR EMTTR A
- B — PR EMITTR B
- C — PR EMITTR C

8/22/72

Conversation with Ed -

File programs for level ~~PAB~~ running - He is now writing program to tie both level + controller together -

a/ does not think R+S programmer has to come out.
b/ His documentation good enough for programmer to interpret.

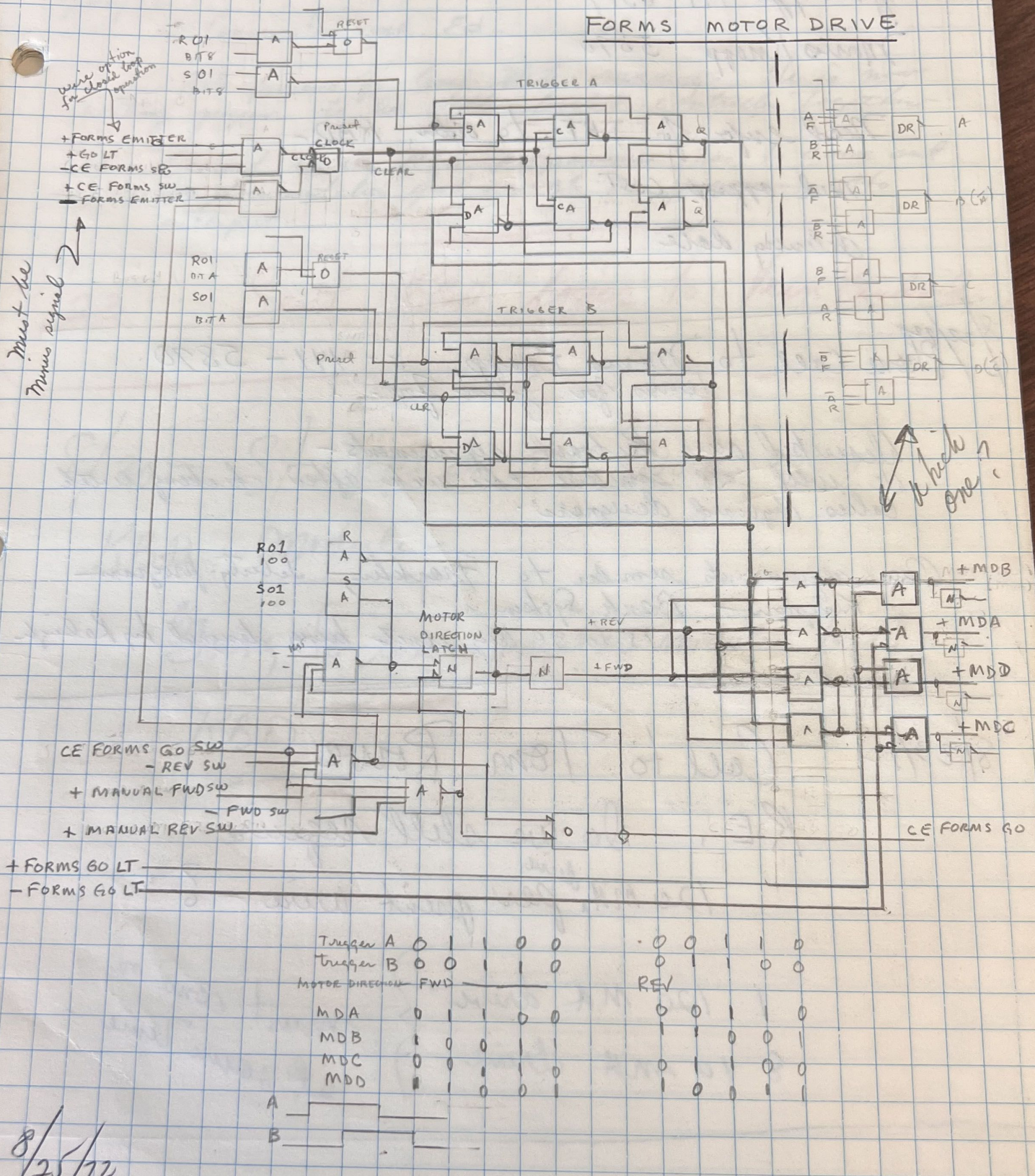
8/23 Sent KBD logics to Vern Kendrick.

8/30 - Stopped all work on KBD Module -

Going to use printer module for KBD

Think about CE Print Run mode -

FORMS MOTOR DRIVE



8/25/72

Discussion with Dave Nielsen: Above scheme too costly

Going back to original design, Page 40.

8/26/72. Printer

Bit D on = Set

D	C	B	A	8	4	2	1	
0/1	0	X	1			0	1	enable forms interrupt
0/1	0	X	1			0	0	Forms Go latch
0/1	0	X	1			1	0	Forms interrupt LT
1	0	X	1	1/0	1/0	1	1	Forms Motor A & B

D	C	B	A	8	4	2	1	
0/1	0	1	X			0	1	enable Print interrupt
0/1	0	1	X			0	0	Print Go
0/1	0	1	X			1	0	Print interrupt
1	0	1	X	1/0	1/0	1	1	Print motor A/B
0/1	0	1	0	X	1	0	0	

D	C	B	A	8	4	2	1	
0/1	1	X	1		X	X	1	enable Timer interrupts
0/1	1	X	1		1	X	X	Enable 3 MS INTERRUPT
0/1	1	X	1		X	1	X	Timer interrupt
0/1	1	1	X		X	X	1	enable error LT
0/1	1	1	X		X	1	X	error interrupt LT

Print

8 Print wires
1 Print ctrl
4 moto drive
3 EMITTERS →
2 emitter SS
(3 Timeout error SS)

8 Bus in
9 Bus out
2 ctrl / Put
4 address ←
1 hi speed os

Forms

4 motor drive
1 emitter
1 Forms SW
2 margin SWs
2 Manual SWs.

8 bus in
9 bus out
1 ctrl
4 address

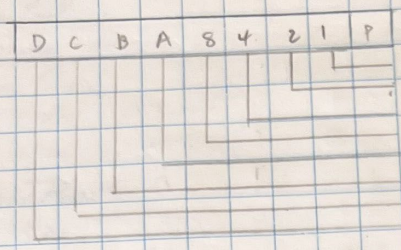
Timer
15.7 kc osc
Timer 4 + 8.

8/26/77

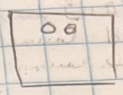
clearing.

status byte 1 status byte 2

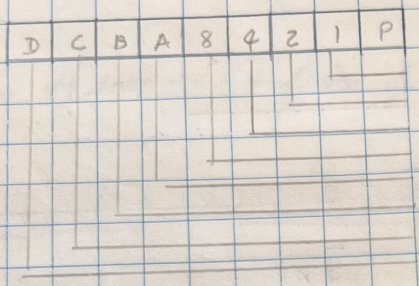
STATUS BYTE 2



TIMER INTERRUPT
FORMS INTERRUPT
FORMS MOTOR LTA
FORMS MOTOR LTB
ERROR INTERRUPT
PRINT INTERRUPT
PRINT MOTOR LTA
PRINT MOTOR LTB

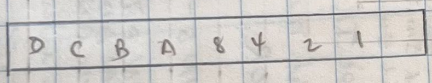


STATUS BYTE 1



LEFT MARGIN
FORMS SW
MANUAL FWD
MANUAL REV
RIGHT MARGIN
PRINT EMIT A
PRINT EMIT B
PRINT EMIT C

CONSIDER SOFTWARE STATUS



FORMS ENABLE
FORMS GO
PRINT ENABLE
PRINT GO
TIMER ENABLE
3MS TIMER ENABLE
ERROR INTERRUPT ENABLE

- Ready: absences of ready disables moto drive and emitter action.