LOADING A PROGRAM FROM THE KEYBOARD

1. Touch 'NORMAL RESET' key
2. Clear keyboard register
3. Key-in the address of the first instruction
4. Touch the 'LOAD ADDR' key
5. Key-in the first instruction
6. Touch the 'LOAD STORE' key
7. Touch the 'INCR ADDR' key
8. Key-in the next instruction
9. Touch the 'LOAD STORE' key
10. If any more instructions, repeat from 7
11. Load data stores in the same way
    (enter negative sign last)

RUNNING A PROGRAM

1. Touch 'NORMAL RESET' key
2. Clear keyboard register
3. Key-in the address of the first instruction
4. Touch the 'LOAD IAR' key
5. Touch the stage keys 'A'–'B'–'C' or 'RUN'
6. Machine will stop if
   a) 'STOP' key is touched
   b) An input or display instruction is obeyed
   c) An overflow occurs or there is an invalid instruction

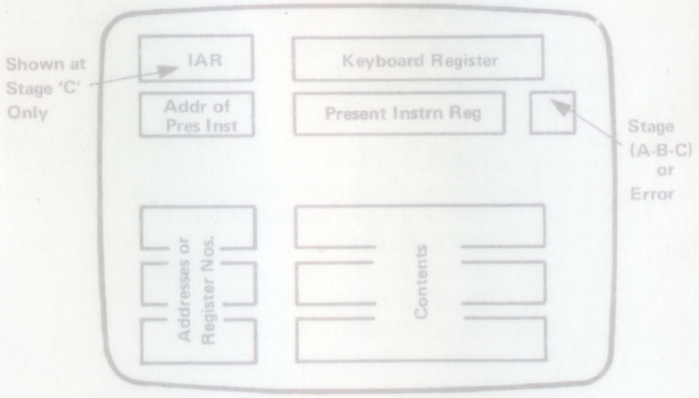
REASON FOR STOPPAGE	*ACTION*
'STOP' or stage keys touched	Touch 'A'–'B'–'C' or 'RUN'
Input instruction	Key-in required data and touch 'RUN'
Output instruction	To continue a program, touch 'RUN'
Overflow or invalid instruction	Correct program and start again

OBEYING INSTRUCTIONS FROM THE KEYBOARD

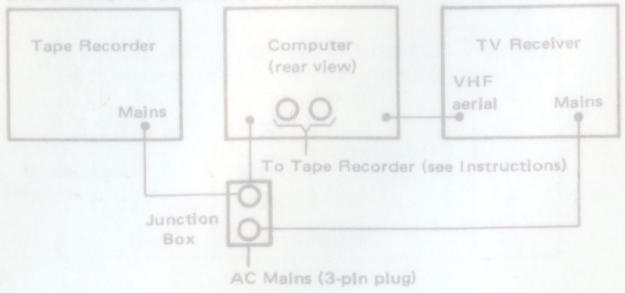
1. Touch 'KI RESET' key
2. Clear keyboard register
3. Key-in one 8-digit or two 4-digit instructions
4. Touch 'A', 'B' or 'C' as required

If two 4-digit instructions are entered, they will be obeyed in sequence.

LAYOUT OF TV DISPLAY



ELECTRICAL CONNECTIONS



IBM UNITED KINGDOM LTD

EXPERIMENTAL

SCHOOLS COMPUTER

INSTRUCTION CARD

INSTRUCTION CODES →

← BRIEF OPERATING INSTRUCTIONS

BASIC INSTRUCTIONS (4 digits)

General Form | a | b | c | d |

a b is the 2-digit function code

REGISTER INSTRUCTIONS

Register and digit		*2 Registers*	
c is a register number d is a decimal digit		c and d are register numbers	
CODES		CODES	
a b		a b	
0 0	$(R_c) \leftarrow (R_c) + d$	1 0	$(R_c) \leftarrow (R_c) + (R_d)$
0 1	$(R_c) \leftarrow (R_c) - d$	1 1	$(R_c) \leftarrow (R_c) - (R_d)$
0 2	$(R_c) \leftarrow d - (R_c)$	1 2	$(R_c) \leftarrow (R_d) - (R_c)$
0 3	$(R_c) \leftarrow d$	1 3	$(R_c) \leftarrow (R_d)$
0 4	INVALID CODE	1 4	$(R_c) \leftarrow$ R H 6 dig (R_d)
0 5	Test (R_c) for d	1 5	INVALID CODE
0 6	Left shift (R_c) by d	1 6	Left shift (R_c) by $\|(R_d)\|$
0 7	Right shift (R_c) by d	1 7	Right shift (R_c) by $\|(R_d)\|$
0 8	INVALID CODE	1 8	INVALID CODE
0 9	INVALID CODE	1 9	Display (R_c) & (R_d)

Conditions for code 05

If the condition is fulfilled, then the CONTROL LATCH (CL) is set at 1, otherwise 0

Value of d	*Condition*
0	$(R_c) = 0$
1	$(R_c) > 0$
2	$(R_c) < 0$
3	L H dig $(R_c) = 0$
4	R H dig $(R_c) = 0$

SINGLE-ADDRESS INSTRUCTIONS

a determines the type of addressing
b determines the function
cd gives the 2-digit base address

CODES (For direct addressing)

a b	
2 0	$(R_0,R_1) \leftarrow$ (cd)
2 1	(cd) $\leftarrow (R_0,R_1)$ as data
2 2	(cd) $\leftarrow (R_0,R_1)$ as instruction
2 3	INVALID CODE
2 4	Branch & link to cd unconditionally
2 5	Branch & link to cd if (CL) = 1
2 6	Branch & link to cd if (CL) = 0
2 7	(cd) $\leftarrow (R_{LINK})$
2 8	Input to cd
2 9	Display (cd)

Digit a	*Type of addressing*		*True address*
2	Direct		cd
3	Modified by	(R_3)	cd + (R_3)
4		(R_4)	cd + (R_4)
5		(R_5)	cd + (R_5)
6	Indirect		(cd)

THREE-ADDRESS INSTRUCTIONS (8 digits)

General form :

a	b	c	d	e	f	g	h

a b is the 2-digit function code

cd, ef, and gh are the three 2-digit addresses

CODES (For direct addressing)

a b	
7 0	(cd) $\leftarrow$ (ef) + (gh)
7 1	(cd) $\leftarrow$ (ef) - (gh)
7 2	(cd) $\leftarrow$ (ef) x (gh)
7 3	(cd) $\leftarrow$ (ef) $\div$ (gh)
7 4	Branch to cd if (ef) = (gh)
7 5	Branch to cd if (ef) > (gh)
7 6	Branch to cd if $\|$(ef)$\|$ > $\|$(gh)$\|$
7 7	If (gh) $\neq$ 0 branch to cd & store link address in ef.
7 8	Input to cd; display (ef) & (gh)
7 9	Display (cd), (ef), (gh)

The type of addressing is determined by the digit a :

Digit a	*Type of addressing*	*True addresses*
7	Direct	cd, ef, gh
8	Modified by (R_3), (R_4), (R_5) respectively	cd + (R_3), ef + (R_4), gh + (R_5)
9	Indirect	(cd), (ef), (gh)