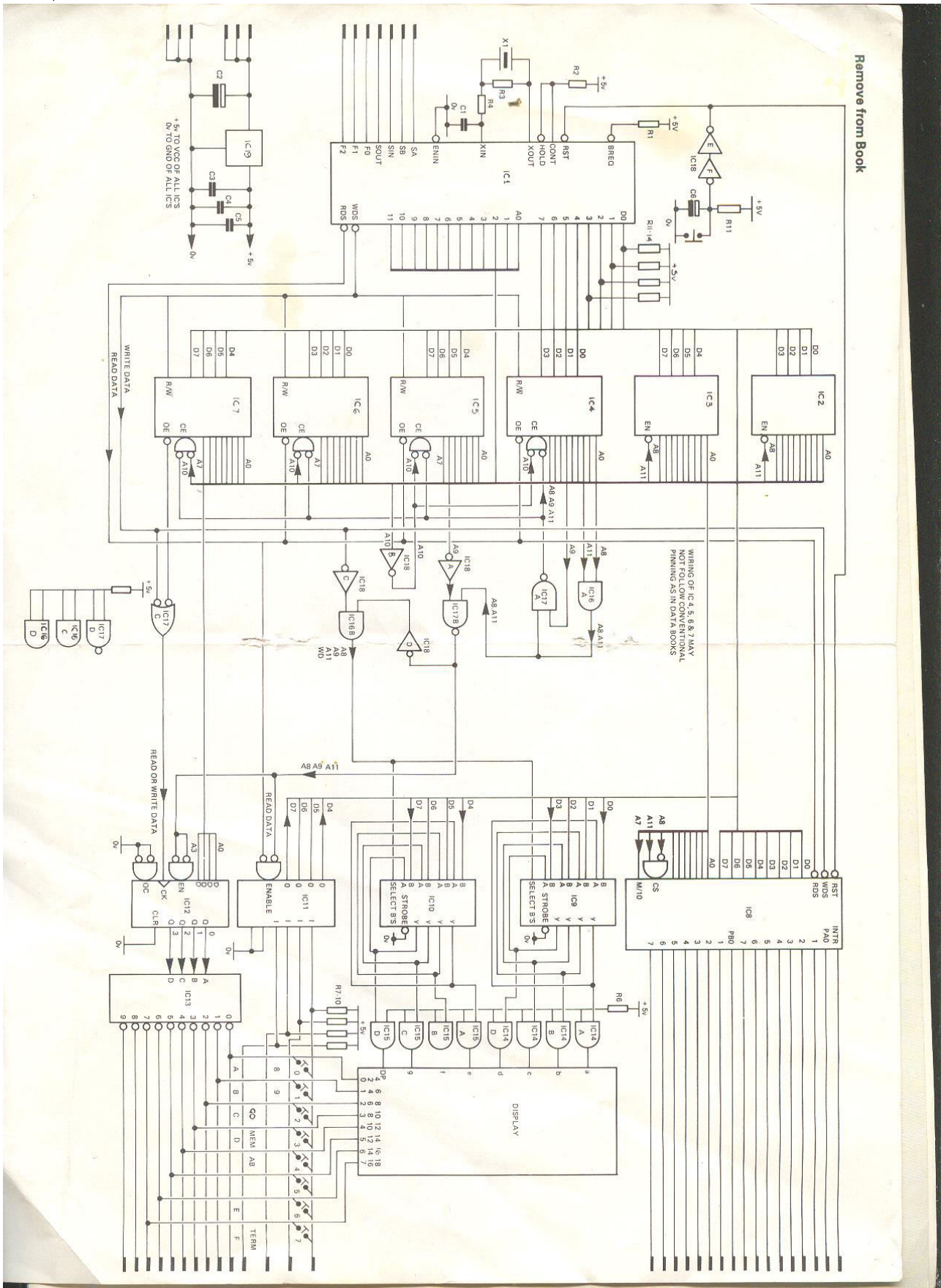This last part is a collection of remaining MK14 documents I had filed.

The actual Issue 8 was, I think, printed on electrostatic paper, and is lost, as are many of the printed programs, and possibly further issues.

1) Circuit diagram.
2)

TWO SC/MP PROCESSORS PER MK14?

by G. Phillips.

There are many times when running a program on the MK14 that it would be useful to keep the program running, but at the same time switch to the monitor and see just what is actually happenning!!

Examples of this are using cassette loads and dumps where you could wait a minute to find the cassette loading rubbish into memory.

It occurred to me that since the SC/MP has internal logic for multiprocessing, it would not be too hard to wire up another SC/MP in parallel with the first.

The neat way to start is to wire up ribbon cable from under the board to all the pins on the SC/MP device. However, the SC/MP i.c. is fairly robust, and I soldered the second i.c. onto the first, pin by pin.

Not all the pins should be soldered, I hasten to add! The pins which should be left away from the other SC/MP are: Xx3,4,7,17,18,19,21,22,23,24.

Pin 3 of the new device should be connected to pin 4 of the old SC/MP i.c. This will enable the second SC/MP when SC/MP 1 does not want use of the busses.
Pin 7 should be connected to a toggle switch, so that it is connected between either OV or 5V. Initially position the switch to OV. This switch then turns the second SC/MP device on and off.
Pin 17 of the new chip should be hard wired to OV.
All the other pins can remain floating.

If your toggle switch is set to OV, the MK14 should behave normally on power-up. Make the machine do something which will stop it using the display (such as a tape load) and then when the display blanks out, flick the toggle switch, and instantly your second machine should spring to life!!

The speed of the first SC/MP should not be affected, the second sc/mp will run slightly (but very slightly!) slower.

I have been running the x two SC/MPs in this way for a couple of months, mostly just to check tape loads, though there must be many applications where two processors can cut down processing time by half.

....

Outline

The purpose of this program is to enable you to play with an MK14 at mastermind whilst letting the machine do all the work. On first entering the program, the machine will guess a random four digit number and display it.

You must now mark it by entering in   a) No. of Blacks.
                                        b) No. of whites.

It will then use this information to produce another, hopefully more accurate, reply.

The game continues in this way until the correct guess is made. At any point in the game, except when the Mk14 is 'thinking', you can start afresh by typing ABORT followed by GO.

Description of The Game Mastermind

The ordinary mastermind game is played with 4 pegs - which can be any of six colours - selected by one player and hidden behind a screen on the board in a row.

The other player must then guess the colour of these pegs by making a series of tries. Each try will be placed at the opposite end of the board to the hidden pegs.

The first player will then 'mark' the guess according to whether each peg is in the right position (1 black) or is not in the right place but is a correct colour. A peg that has been marked once for a black cannot be marked again for a white.

Example   Hidden pegs- Green Black Blue Black

          Guess -   Black Red   Blue Black

In this case the marking would be 2 blacks and one white.

          for   Guess -   Blue Red   red Black

the marking is 1 black and 1 white.

Hardware Requirements

1 x MK14 or similar, with ram, extra ram and ram I/O.

Operation Of The Program

Instead of Colours, numbers are guessed with no change to the basic rules of mastermind.

The sequence of play is as follows:

a) Run the program from 0F30 — the display will show a four digit number on the left, this is its first guess.

b) Enter the total number of blacks to the keyboard, the display will briefly flicker.

c) Enter the total number of whites to the keyboard. The machine will now work out another guess, until it does the display will be blank. From now on, the previous mark that you gave the machine will appear on the right.

As mentioned before, to restart, enter ABORT followed by GO, or re-run the program after resetting.

If a mistake is made while marking, e.g. 5 whites are entered, the program will loop eternally and reset must be used.

When playing, it is easier to keep track of marking if the 'hidden' number is written down along with each of the guesses.

Length of Time between Guesses

At the start of each game, the machine takes perhaps 1 second maximum for its thinking and this extends to about 30 seconds towards the end of a game.

Each move is determined on a fairly random basis, and often the machine shows a sixth sense and makes a startling prediction!

Location Of the Program

The program has been written for a MK14 with extra ram (0B00-FF) and the ram I/O (0880-FF).

The program is situated at 0B00-FF with part of the normal stermind game at 0F7B-F8.

Locations 0880-FF are used to store each guess and markings.

The setting up procedures are at 0F30, where execution of the program should begin.

If no ram I/o is available, or alternative off board memory, the setting up procedure at OF30 could be removed and references to 0880 changed to OF30 with the following disadvantages:

i) The first guess may consist of non-numeric characters.

ii) The start of a new game (Abort-Go) will make the first guess 1 greater than the last guess for the last game.

iii) Only 7 guesses can be allowed, otherwise the program will be corrupted.

Program Listings

Mastermind Marking Routine

This is taken from the mastermind routine in the MK14 programming manual and is used as a subroutine to mark each guess with previous tries. Only a listing of the program in hex is given as the Mk14 manual describes the program.

```
OF7B  C4 0B CA 00 CA 02 C4 OF 35 C4 14 31 c4 80 01 C4 04 CA 11
OF8E  C1 F0 E5 01 9C 0C AA 02 C1 FF 58 C9 FF C1 EF 58 C9 EF
OFA0  BA 11 9C EA C4 04 CA 11 C4 OF 37 C4 08 33 C5 FF 94 0A
OFB6  BA 11 9C EE 90 13 BA 10 98 F6 C1 00 E7 FF 9C F6 AA 00
OFC8  C3 00 58 CB 00 90 E7 C4 04 CA 11 C1 00 D4 7F CD 01 BA 11
OFDB  9C F6 C4 01 35 C2 00 31 C1 00 CA 00 C2 02 31 C1 00 CA 02
OFEE  C4 0E 37 C4 63 33 3F
```

The area 0880-FF need not be initialised.

Set-Up Procedure

The following routine is entered at the start of any game to ensure only valid numbers are chosen, and to make these at least slightly random.

```
OF30  C4 08 36 C4 8C 32       Load 088C to pointer P2.
OF36  C4 01 35 C4 0B 31       Load 010B to P1, conversion
                                       table.
OF3C  C4 OF 37 C4 14 33       Load OF14 to P3, storage for
                                       guess.
```

```
OF42 C4 04 C8 EA      Load 4 into count (F2F).
OF46 AA 08            Get a random number from P2 plus 8.
OF48 D4 07            Narrow it down to 0-7.
OF4A CE 01            Store first(next) digit.
OF4C 01 C1 80         Get display-code from table.
OF4F CF 01            Put display code into guess digit.
OF51 B8 DD 9C F1      Loop 4 times.
OF55 C4 0B 37
OF58 C4 00 33 3F      Jump to main program at 0B01.
```

Main Program

```
0B00  temp - set to 00 initially.
0B01  C4 08 36 C4 8C 32        Set up P2 to actual numbers.
0B07  C4 00 CA 04              Put 0 to table of moves-no previous
                               guesses yet.
0B0B  C4 0F 37 C4 14 33        Set P3 to coded numbers (guess)
0B11  03                       Set carry so to add least sig. digit.
0B12  C4 01 35 C4 0B 31        Set P1 to conversion table.
0B18  C2 00 F4 00 CE 01        Increment current digit-may be 'OA'.
0B1E  D4 0F 01                 Ensure less than 10 and remember in e.
0B21  C1 80 CF 01              Convert and store guess.
0B25  E4 77 9C 12              If not past 10 ($A_{16}$) go to 0B3B.
0B29  C4 00 CA FF              Reset digit to 0.
0B2D  C4 3F CB FF              Store code for 0 at last digit of guess
0B31  03                       Set carry for next time.
0B32  32 01 40 32              Leave P2 low in extension.
0B36  40 E4 90                 Is P2 equal to 90? i.e. number finished
0B39  9C DD                    No-back to OF18 for next digit.
0B3B  C4 08 35 C4 90 31        Restore P1 to 0890.
0B41  C4 0F 36 C4 04 32        Set P2 to OF04.
0B47  C1 00 98 4C              Get first entry in table. At end goto
                                                               0B97.
0B4B  C4 04 C8 E2              Another loop for 4 times.
0B4F  C5 01                    Get a digit from table of previous move
0B51  CE 01                    Store it as a guess for marking routine
0B53  B8 AC 9C F8              End of loop.
0B57  C4 00 32                 Put P2 to OF00.
0B5A  31 CA 20                 Remember P1 low.
0B5D  C4 0F 37 C4 7A 33 3F     Jump to marking routine at OF7B.
                               At this point, OF14-7 contains what is
                               from the marking routine's view, a
                               hidden no. OF02-5 contains the guess
                               taken from a previous move.
                               The test is to see whether the same
                               mark (i.e. no of blacks/whites) is
0B64  C2 20 31                 generated.
0B67  C4 08 35                 First restore P1.
0B6A  C1 00 E4 3F              No. blacks in table 00 ?
0B6E  9C 16                    If not goto 0B86.
```

```
0B70   C4 08 37 C4 80 33          Set P3 to 0880.
0B76   C1 FF E2 17                Is highest digit same in table and
0B7A   9C 0A          - no -      current guess?
0B7C   C4 09 CB 0C CB 0D CB 0E    Yes-so go to end of this block.
0B84   90 6E                      Go to 0BF4.
0B86   C5 01 E2 02 9C 68          Same no. of blacks? if not go 0BF4.
0B8C   C5 01 E2 00 9C 62          Same no. of whites? if not go 0BF4.
0B92   90 B0                      So far so good! Go to 0B44.
0B94   P1 low.
0B95   non-zero.                  This section displays the guess and
0B96   Count                      inputs the blacks and whites.
0B97   C4 04 C8 FC                Yet another loop for 4 times.
0B9B   C2 10 CD 01 CE 01          Move out current guess to next
0BA1   B8 F4 9C F6                location in table. Also to 0F04-7.
0BA5   C4 00 CA F9
0BA9   31 C8 E9                   Remember P1 low - monitor uses it.
0BAC   C4 01 37 C4 84 33          Display routine to P3.
0BB2   C4 00 32                   P2 points to 0F00.
0BB5   3F                         Jump to monitor til key pressed.
0BB6   90 FD                      Ignore command keys.
0BB8   C4 08 35 C0 D8 31          Restore P1 to health!
0BBE   C4 01 37 C4 0B 33          Conversion table address to P3.
0BC4   C3 80 CD 01                Move converted no. of blacks to
0BC8   C0 CC 98 08                table.
0BCC   C4 00 C8 C6                If flag is not set (to 0) go back
0BD0   3F FF 90 D5                for whites, after delaying ½sec.
0BD4   A8 C0                      Unset flag for next time.
0BD6   C4 00 C9 00                Finish table entry off with a '0'.
0BDA   C4 08 36 C4 8C 32          Set up P2 for next guess.
0BE0   C4 04 C8 1C                A last loop to randomize next no.s
0BE4   AA 00 01 70 E2 02          Get a random no.
0BEA   EC 00 D4 0F CE 01          Limit to 0-9 and put back.
0BF0   B8 0E 9C F0                End of loop. Finish after 4 times.
0BF4   C4 08 36 C4 8C 32          Set P2 to 088C.
0BFA   C4 0A 30                   Back to 0B0B.
```

Sample Run

```
My number is 0978.    Machine guesses: 1) 7405 marks: 0 2
                                        2) 3014 marks: 0 1
                                        3) 1157 marks: 0 1
                                        4) 2270 marks: 1 1
                                        5) 2746 marks: 0 1
                                        6) 5520 marks: 0 1
                      (after some thinking)7) 0878 marks: 3 0
                                        8) 0879 marks: 2 2
                                        9) 0978!
```

FIRST EXPERIENCES

I suspect that I must be destined to be one of the worlds beginners. I begin many things, and no matter how hard I try, a beginner is what I always remain. No sooner is one hurdle overcome, but low and behold the next is there waiting for me, as large and as awkward as the one before, there is never a clear view from the summit. I wonder if my experience is in any way comprable to that of other people.

I ordered my MK 14 at the end of October, all bright eyed with anticipation, knowing that I had time before Christmas to enjoy the pleasure of its construction, and to get it working with time to spare. Of course it did not arrive, and the first flush of eager excitement evaporated, leaving a faint tinge of exasperation. After Christmas I wrote a " polite " letter to S of C, and a few days later the package arrived.

I had already acquired a set of DIL sockets and a PSU from Microdigital of Liverpool, so setting to with a will the PC board was soon complete and switch on time had arrived. Hey Presto it worked, and page 18 of the training manual congratulated me on my success. Unfortunately I hadn't the foggiest notion what to do next, so consulting chapter 5 I proceeded to go into an eternal loop, and my family looked on me with pity, all that waiting and work and all it did was " switch off its lights ".

The next problem was now very apparent, the keyboard provided was not working properly. Address numbers flashed around with the unstoppable rapidity of a fruit machine, and it required the patience of Job to key in any data. The reason was obvious, the conductive rubber sheet was either sticking or touching the contacts unevenly. I tried putting french chalk on the rubber and carefully cleaning the contacts on the board, but this was not successful. Another problem, by now the legend sheet was acquiring small dents in it, and not returning to its flat state, which only aggravated the original trouble. The next solution I tried was to put a stiffer sheet of plastic behind the legend sheet andalso to reduce the size of the holes in the keyboard seperator, this worked to some extent , but it now required the blunt end of a ball pen instead of a finger to make contact. Not very satisfactory.

Wandering around Debenhams at sale time, I came across a defunct Casio calculator for 75 pence. Well nothing could be worse than the existing arrangements, so I disembowelled the calculator and linked its keyboard up to a multitude of coloured wires via a small piece of .1" veroboard. Gradually I pieced together how the thing was connected up, it seemed to have 3 common and 8 individual connections, i.e. 24 keys, whereas the MK14 keyboard works with 4 common and 8 individual connections, some of the combinations not being used. The two systems were made compatible by using a switch on the calculator so that either the numbers 8 & 9 can be keyed or the four command buttons. in use this switching is not proving difficult, even though the layout of the keys is somewhat novel. The whole calculator is on a flying lead so that all key operations can be done comfortably seated, rather than having to lean forward over the instrument. I wonder how other people have got on with the on board keypad , and what modifications they have made?

What other problems have I encountered so far ? Well I wonder if anyone can make any suggestions and give advice on the following:-

a) I do not always find the manual crystal clear, and I would welcome practical but simple examples of " AND ", " OR ", and "XOR". Boolean algebra is not my strong point, but I do possess a "truth table" which shows what is what, however my main puzzle is how is it put to practical use, and when ? Any sympathetic mathematicians about ?

b) I have a tape interface which refuses to work, well to be more accurate it "writes" but does not "read ". So far I have replaced the LED, the diode, the 2N2926G, the 4001, and I have added a ..1 mfd capacitor as C3. I have also checked that 5v DC is reaching the board and that the audio signal is reaching the board from the cassette recorder. I know that it writes,that LED flashes and an audible signal is recorded on the tape. Has anyone else had a TI which didnt work, and are there any suggestions regarding my tempramental TI ?

Finally I would like to take this opportunity of wishing the MK 14 Users Club well, hopefully it will help to build up a library of programs and technical information which must be of benefit to all owners. Incidentally why not include all SC MP 11 users ?

CLIVE R. ISBELL

2)
TWO SC/MP PROCESSORS PER MK14? by G. Phillips.

There are many times when running a program on the MK14 that it would be useful
to keep the program running, but at the same time switch to the monitor and see
just what is actually happening!!
Examples of this are using cassette loads and dumps where you could wait a
minute to find the cassette loading rubbish into memory.
It occurred to me that since the SC/MP has internal logic for multiprocessing,
it would not be too hard to wire up another SC/MP in parallel with the first.
The neat way to start is to wire up ribbon cable from under the board to all the
pins on the SC/MP device. However, the SC/MP i.c. is fairly robust, and I
soldered the second i.c. onto the first, pin by pin.
Not all the pins should be soldered, I hasten to add! The pins which should be
left away from the other SC/MP are: 3,4,7,17,18,19,21,22,23,24.
Pin 3 of the new device should be connected to pin 4 of the old SC/MP i.c. This
will enable the second SC/MP when SC/MP I does not want use of the busses. Pin 7
should be connected to a toggle switch, so that it is connected between either
0V or 5v. Initially position the switch to OV. This switch then turns the second
SC/MP device on and off. Pin 17 of the new chip should be hard wired to OV. All
the other pins can remain floating.
If your toggle switch is set to 0v, the MK14 should behave normally on power-up.
Make the machine do something which will stop it using the display (such as a
tape load) and then when the display blanks out, flick the toggle switch, and
instantly your second machine should spring to life!!
The speed of the first SC/MP should not be affected, the second sc/mp will run
slightly (but very slightly!) slower.
I have been running the two SC/MPs in this way for a couple of months, mostly
just to check tape loads, though there must be many applications where two
processors can cut down processing time by half.

3)
MASTERMIND - The Correct Way Round!
[Mastermind was a game in the MK14 instruction book where you guessed the
machine's pegs]

The purpose of this program is to enable you to play with an MK14 at mastermind
whilst letting the machine do all the work. On first entering the program, the
machine will guess a random four digit number and display it. You must now mark
it by entering in a) No. of Blacks. b) No. of whites. It will then use this
information to produce another, hopefully more accurate, reply. The same
continues in this way until the correct guess is made. At any point in the came,
except when the MK14 is 'thinking', you can start afresh by typing ABORT
followed by GO.

Description of the Game Mastermind

The ordinary mastermind game is played with 4 pegs - which can be any of six
colours - selected by one player and hidden behind a screen on the board in back
row.
The other player must then guess the colour of these pegs by making a series of
tries. Each try will be placed at the opposite end of the board to the hidden
pegs.
The first player will then mark the guess according to whether each peg is in
the right position (1 black) or is not in the right place but is a correct
colour. A peg that has been marked once for a black cannot be marked again for a
white.
Example Hidden pegs- Green Black Blue Black
Guess - Black red Blue Black In this case the marking would be 2 blacks and one
white.

for guess - Blue Red red Black the marking is 1 black and 1 white.
Hardware Requirements
I MK14 or similar with RAM, extra RAM and I/O.

4)

Operation Of The Program

Instead of colours, numbers are guessed with no change to the basic rules of
mastermind.
The sequence of play is as follows:
a) Run the program from OF30 - the display will show a four digit number on the
left, this is its first guess.
b) Enter the total number of blacks to the keyboard, the display will briefly
flicker.
c) Enter the total number of whites to the keyboard. The machine will now work
out another guess, until it does the display will be blank. From now on, the
previous mark that you gave the machine will appear on the right. As mentioned
before, to restart, enter ABORT followed by GO, or re-run the program after
resetting. If a mistake is made while marking, e.g. 5 whites are entered, the
program will loop eternally and reset must be used.
When playing, it is easier to keep track of the marking if the 'hidden' number
is written down along with each of the guesses.

Length of Time between Guesses

At the start of each game, the machine takes perhaps 1 second maximum for its
thinking; and this extends to about 30 seconds towards The end of a game.

Each move is determined on a fairly random basis, and often the machine shows a
sixth sense and makes a startling prediction!

Location of the Program
The program has been written for a MK14 with extra ram (OBOO-FF) and the ram I/0
(0880-FF).
The program is situated at B00-FF with part of the normal mastermind game at
OF7B-F8.
Locations 0880-FF are used to store each guess and markings.
The setting up procedures are at OF30, where execution of the program should
begin.

5)

If no ram I/O is available, or alternative off board memory, the setting up
procedure at OF30 could be removed and references to 0880 changed to OF30 with
the following disadvantages:
i) The first guess may consist of non-numeric characters.
ii) The start of a new game (Abort-Go) will make the first guess 1 greater than
the last guess for the last game.
iii) Only 7 guesses can be allowed, otherwise the program will be corrupted.

Program Listing
Mastermind Marking Routine
This is taken from the mastermind routine in the MK14 programming manual and is
used as a subroutine to mark each guess with previous tries. Only a listing of
the program in hex is given as the mk14 manual describes the program.

```
0F7B C4 0B CA 00 CA 02 C4 0F 35 C4 14 31 C4 80 01 C4 04 CA 11
0F8E C1 F0 E5 01 9C 0C AA 02 C1 FF 58 C9 FF C1 EF 58 C9 EF
0FA0 BA 11 9C EA C4 04 CA 11 C4 04 CA 1C C4 0F 37 C4 08 33 C5 FF 94 0A
0FB6 BA 11 9C EE 90 13 BA 10 98 F6 C1 00 E7 FF 9C F6 AA 00
```

```
0FC8 C3 00 58 CB 00 90 E7 C4 04 CA 11 C1 00 D4 7F CD 01 BA 11
0FDB 9C F6 C4 01 35 C2 00 31 C1 00 CA 00 C2 02 31 C1 00 CA 02
0FEE C4 0E 37 C4 63 33 3F
[0fc8 is unclear 03? C3?]
The area 0880-FF need not be initialised


Set-up Procedure

The following routine is entered [called] at the start of any game to ensure
only valid numbers are chosen, and to make these at least slightly random,

0F30 C4 08 36 C4 8C 32    Load 088C to pointer P2.
OF36 C4 01 35 C4 OB 31    Load 010B to Pl, conversion table.
OF3C C4 OF 37 C4 14 33    Load 0F14 to P3, storage for guess.


6)
OF42 C4 04 C8 EA  Load 4 into count
OF46 AA 08 Rand from P2 + 8
OF48 D4 07 narrow it down
OF4A CE 01 store first (next)digit
OF4C 01 C1 80 Get display code from table
OF4F CF 01 Put display code into guess digit
0F51 B8 DD 9C F1  Loop 4 times
0F55 C4 0B 37
0F58 C4 00 33 3F Jump to main program at 0B01


Main Program

OBOO 00 temp - set to 00 initially.
OBO1 C4 08 36 C4 8C 32      Set up P2 to actual numbers.
0B07 C4 00 CA 04  Put 0 to table of moves-no previous guesses yet.
OBOB C4 OF 37 C4 14 33 Set P3 to coded numbers (GUESS)
0B11 03 Set carry so to add least sig. digit.
OB12 C4 01 35 C4 0B 31    Set Pl to conversion table.
0B18 C2 00 F4 00 CE 01    Increment current digit-may be 'OA'.
OB1E D4 OF 01             Ensure less than 10 and remember in e.
0B21 Cl 80 CF 01          Convert and store guess.
OB25 E4 77 9C 12          IF not past 10 go to OB3B.
OB29 C4 00 CA FF          Reset digit to 0
OB2D C4 3F CB FF          Store code for 0 at last DIGIT of GUESS
OB31 03                   Set carry For next time.
0B32 32 01 40 32          Leave P2 low in extension.
0B36 40 E4 90             p2 equal to 90? i.e. number FINISHED
0B39 9C DD                No-back to 0B18 for next digit.
0B3B C4 08 35 C4 90 31    Restore Pl to 0890.
0B41 C4 OF 36 C4 04 32    Set F2 to OF04.
0B47 C1 00 98 4C          Get first entry: in table. At end Goto 0B97
0B4B C4 04 C8 E2          Another loop for 4 times.
OB4F C5 01                get a digit from table of previous moves
OB51 CE 01                Store it as a guess ior marking routine
OB53 B8 AC 9C F8          End of loop.
OB57 C4 00 32             Put P2 to OFOO.
OB5A 31 CA 20             Remember P1 low.
OB5D C4 0F 37 C4 7A 33 3F Jump to marking routine at OF7B.
At this point, OF14-7 contains what is from the marking routine's view, a hidden
no, OF02-5 contains the guess taken from a previous move. The test is to see
whether the same mark (i.E. no or blacks/whites) is generated.
0B64 C2 20 31
0B67 C4 08 35             First restore p1
OB6A C1 00 E4 3F          No. blacks in table 0?
```

```
0B6E 9C 16              If not goto 0B86.

7)


0B70 C4 08 37 C4 80 33 Set P3 To 0880
0B76 C1 FF E2 17       Is highest digit same in table and current guess
0B7A 9C 0A
0B7C C4 09 CB 0C CB 0D CB 0E Yes, so go to end of this block
0B84 90 6E                 go to 0bf4
0B86 C5 01 E2 02 9C 68  Same no. blacks? If not go 0BF4
0B8C C5 01 E2 00 9C 62  same no. whites? if not go 0Bf4
0B92 90 B0               so far so good, go to 0B44
0B93 P1 LOW
0B95 NON-ZERO          This section displays the guess
0B96 COUNT             and inputs the black and whites
0B97 C4 04 C8 FC
0B9B C2 10 CD 01 CE 01
0BA1 B8 F4 9C F6
0BA5 C4 00 CA F9
0BA9 31 C8 E9
0BAC C4 01 37 C4 84 33
0BB2 C4 00 32
0BB5 3F
0BB6 90 FD
0BB8 C4 08 35 C0 D8 31
0BBE C4 01 37 C4 0B 33
0BC4 C3 80 CD 01
0BC8 C0 CC 98 08
0BCC C4 00 C8 D6
0BD0 8F FF 90 D5
0BD4 A8 C0
0BD6 C4 00 C9 00
0BDA C4 08 36 C4 8C 32
0BE0 C4 04 C8 1C
0BE4 AA 00 01 70 E2 02
0BEA EC 00 D4 0F CE 01
0BF0 B8 0E 9C F0
0BF4 C4 08 36 C4 8C 32
0BFA C4 0A 30


Sample Run
My number is 0978. Machine guesses:
1) 7405 marks: 0 2
2) 3014 marks: 0 1
3) 1157 marks: 0 1
4) 2270 marks: 1 1
5) 2746 marks: 0 1
6) 5520 marks: 0 1 (after some thinking):
7) 0878 marks: 3 0
8) 0879 marks: 2 2
9) 0978!
```

8)
The following was sent to be included in an issue of C&A by CLIVE R. ISBELL. It would have been added to the end of one of the (early) newsletters, as were many other submissions and programs.

First Experiences
I suspect that I must be destined to be one of the worlds beginners, T begin many things, and no matter how hard I try, a beginner is what I always remain. No sooner is one burdle overcome, but low and behold the next is there waiting

for me, as large and as awkward as the one before, there is never a clear view from the summit. I wonder if my experience is in any way comparable to that of other people.

I ordered my MK14 at the end of October, all bright eyed with anticipation, knowing that I had time before Christmas to enjoy the pleasure of its construction, and to get it working with time to spare. Of course it did not arrive, and the first flush of eager excitement evaporated, leaving a faint tinge of exasperation. After Christmas I wrote a "polite" letter to S of C. and a few days later the package arrived.

I had already acquired a set of DIL Sockets and a psu from Microdigital of Liverpool. So setting to with a will the PC board was soon complete and switch on time had arrived. Hey Presto it worked, and page 19 of the training manual Congratulated me on my success. Unfortunately I hadn't the foggiest notion what to do next, so consulting chapter 5 I proceeded to go into an eternal loop, and my family looked on me with pity, all that waiting and work and all it did was "switch off its lights".

The next problem was now very apparent, the keyboard provided was not working properly. Address numbers flashed around with the unstoppable rapidity of a fruit machine, and it required the patience or Job to key in any data. The reason was obvious, the conductive rubber sheet was either sticking or touching the contacts unevenly. I tried putting French chalk on the rubber and carefully cleaning the contacts on the board, but this was not successful. Another problem, by now the legend sheet was acquiring small dents in it, and not returning to its flat state, which only aggravated the original trouble. The next solution I tried was to put a stiffer sheet of plastic behind the legend sheet and also to reduce the size of the holes in the keyboard separator, this worked to some extent, but it non required the blunt end of a ball pen instead of a finger to make contact, Not very satisfactory.

Wandering around Debenhams at sale time, I came across a defunct Casio calculator for 75 pence, Well nothing could be worse than the existing arrangements, so I disembowelled the calculator and linked its keyboard up to a multitude of coloured wires via a small piece of 1" veroboard. Gradually I pieced together how the thing was connected up, it seemed to have 3 common and 8 individual connections, i, e. 24 keys, whereas the HK14 keyboard works with 4 common and 8 individual connections, some of the combinations not being used. The two systems were made compatible by using a switch on the calculator so that either the numbers 8 & 9 can be keyed or the four command buttons, in use this switching is not proving difficult, even though the layout of the keys is somewhat novel. The whole calculator is on a flying lead so that all key operations can be done comfortably seated, rather than having to lean forward over the instrument. I wonder how other people have got on with the on board keypad, and what modifications they have made?

9)
what other problems have I encountered so far? Well I wonder if anyone can make any suggestions and give advice on the following -

a) I do not always find the manual crystal clear, and I would welcome practical but simple examples of
"AND", "OR", and "XOR", Boolean algebra is not my strong point, but I do possess a "truth table" which shows me what is what, however my main puzzle is how to put it to practical use and when. Any sympathetic mathematicians about?
b) I have a tape interface which refuses to work, well to be more accurate it "writes" but does not "read". So far I have replaced the LED, the diode, the 2N2926G, the 4001, and I have added a 1 mfd capacitor as C3. I have also checked that 5V DC is reaching the board and that the audio signal is reaching the board from the cassette recorder, I know that it writes, that LED flashes and an

audible signal is recorded on the tape, Has anyone else had a TI which didn't
work, and are there any suggestions regarding my temperamental TI?
Finally I would like to take this opportunity of wishing the MK 14 Users club
well, hopefully it will help to build up a library of programs and technical
information which must be of benefit to all owners. Incidentally why not include
all SC/MP 11 users ?
CLIVE R. ISBELL, ESSEX.

10)

[2019 comment: This is of uncertain state. It was one of many programs that used
to exist printed on electrostatic paper. Alas, it is the only listing I have
retained. It says "zig zag", so may be a snake game on the VDU. Looking at the
listings there seem to be errors in the disassembly itself. I have only the
vaguest memory of writing a disassembler, it may have been written on another
computer entirely. I have not attempted to OCR it.]

```
C05 00      C05 00      HLT
B12 C4 04   LDI 04
B14 36      XPAH (2)
B15 C4 00   LDI 00
B17 32      XPAL (2)
B18 C4 20   LDI 20
B1A CE 01   ST @ (2) 01
B1C 36      XPAH (2)
B1D 01      XAE
B1E 40      LDE
B1F 36      XPAH (2)
B20 40      LDE
B21 E4 07   XRI 07
B23 9C F3   JNZ (B18)
B25 C4 0B   LDI 0B
B27 35      XPAH (1)
B28 C4 00   LDI 00
B2A 31      XPAL (1)
B2B C4 04   LDI 04
B2D 32      XPAL (2)
B2E C1 0A   LD (1) 0A
B30 F1 0B   ADD (1) 0B
B32 C9 0A   ST (1) 0A
B34 1E      RR
B35 C9 0B   ST (1) 0B
B37 D4 05   ANI 05
B39 DC 0C   ORI 0C
B3B 37      XPAH (3)
B3C C1 0A   LD (1) 0A
B3E 33      XPAL (3)
B3F C4 60   LDI 60
B41 CB 00   ST (3) 00
B43 B8 C2   DLD (B06)
B45 9C EF   JNZ (B36)
B47 C5 02   LD @ (1) 02
B49 9C 16   JNZ (B61)
B4B C8 B4   ST (B00)
B4D C1 FF   LD (1) FF
B4F 01      XAE
B50 C4 3F   LDI 3F
B52 CE 80   ST @ (2) 80
B54 8F 08   DLY 08
B56 B8 A9   DLD (B00)
B58 9C F6   JNZ (B50)
B5A 03      SCL
```

Zig

P1 = 0B00
P2 = 0400

+A
+B = rnd.

no baten on

P3 =

output

60 or rnd patch in?

next odb
end of setup.

?ok

end.

0 → nu..

```
B5A 03      SCL
B5B 78      CAE
B5C 01      XAE
B5D C6 80   LD @ (2) 80
B5F 90 E6   JMP (B47)
B61 C4 00   LDI 00
B63 31      XPAL (1)
B64 C4 04   LD @ (2) 04
B66 08      NOP
B67 10
B68 C4 05   LDI 05
B6A C9 12   ST (1) 12
B6C C4 40   LDI 40
B6E 00 C9 17
B6F 12
B70 C4 75   LDI 75
B72 C9 13   ST (1) 13
B74 C4 0D   LDI 0D
B76 37      XPAH (3)
B77 C4 00   LDI 00
B79 33      XPAL (3)
B7A CB 04   ST (3) 04
B7C AB 04   ILD (3) 04
B7E 98 04   JZ (B84)
B80 C4 F0   LDI F0
B82 90 08   JMP (B8C)
B84 CB 00   ST (3) 00
B86 AB 00   ILD (3) 00
B88 98 04   JZ (B8E)
B8A C4 01   LDI 01
B8C 90 08   JMP (B96)
B8E CB 07   ST (3) 07
B90 AB 07   ILD (3) 07
B92 98 14   JZ (BA8)
B94 C4 10   LDI 10
B96 90 08   JMP (BA0)
B98 CB 09   ST (3) 09
B9A AB 09   ILD (3) 09
B9C 98 44   JZ (BE2)
B9E C4 FF   LDI FF
BA0 90 08   JMP (BAA)
BA2 8F 02   DLY 02
BA4 B9 0F   DLD (1) 0F
BA6 9C D2   JNZ (B7A)
BA8 D1 0E   AND (1) 0E
BAA C9 0E   ST (1) 0E
BAC 01      XAE
BAD C1 12   LD (1) 12
```

q - no

g° bacle 1.

P 1 = 0B00
?
eln?

12-13 = 0575

poschar?
ot Player

i obied
tag

OFcout

e = move

```
BAD C1 12    LD (1) 12
BAF 36       XPAH (2)
BB0 C1 13    LD (1) 13        P2 = b
BB2 32       XPAL (2)      C6
BB3 B6 80       @ (2) 80  C680
BB5 C2 00    LD (2) 00
BB7 D4 3F    ANI 3F
BB9 E4 20    XRI 20      empty?
BBB 98 0B    JZ (BC8)    yes
BBD C4 21    LDI 21      no.
BBF CA 00    ST (2) 00
BC1 8F FF    DLY FF
BC3 8F FF    DLY FF
BC5 C4 EF    LDI EF      go b cBF0
BC7 30       XPAL (0)
BC8 C4 0F    LDI 0F                    ok
BCA CA 00    ST (2) 00   put 0
BCC 3E 36    XPPC (2)    ? 36
BCD CB 12    ST @ (1) 12
BCF 32       XPAL (2)
BD0 C9 13    ST (1) 13
BD2 8F 00    DLY 00
BD4 B8 2B    DLD (BFD)   ✓
BD6 9C FA    JNZ (BD2)
BD8 C4 0B    LDI 0B
BDA 37       XPAH (3)
BDB C4 1F    LDI 1F
BDD 33       XPAL (3)
BDE C1 00    LD (1) 00
BE0 F1 0B    ADD (1) 0B
BE2 F4 73    ADI 73
BE4 C9 0C    ST (1) 0C
BE6 C1 1B    LD (1) 1B
BE8 3F       XPPC (3)   go b 0B20
BE9 C4 0B    LDI 0B
BEB 37       XPAH (3)
BEC C4 7F    LDI 7F
BEE 33       XPAL (3)
BEF 3F       XPPC (3)
BF0 C4 0B    LDI 0B
BF2 37       XPAH (3)   8C0
BF3 C4 BF    LDI BF
BF5 33       XPAL (3)
BF6 3F       XPPC (3)
BF7 80 0B       (C00)
BF9 0F
BFA 12
BFB 0C
BFC 00       HLT
BFD 00       HLT
BFE 00       WLT
BFF 0A
```