INTERFACING SC/MP WITH A BURROUGHS SELF-SCAN DISPLAY

General Description

The SC/MP-and-display interface shown in figure 2C2-15 provides an easy and relatively inexpensive method of generating 64 alphanumeric characters – any 32 of which are simultaneously shown on a single-row display panel. This SC/MP-based system can be used efficiently for any close-view (up to 10 feet) moving-message or static display.

System Operation

As shown in figure 2C2-15, data are input from SC/MP via a low-power TRI-STATE buffer (DM81LS95) and these data are latched by the DM74199. Under software supervision, flag 0 is used to generate the "write" pulse and Sense B is used to indicate "status" – the status specifying when a new character can be input to the display. Each of the 64 characters is defined by a 6-bit binary-to-hexadecimal code; the characters and their equivalent hexadecimal codes are shown in table 2C2-1.

Table 2C2-1. Alphanumeric Characters and Corresponding Hex-Input Codes

HEX INPUT	CHARACTER	HEX INPUT	CHARACTER	HEX INPUT	CHARACTER	HEX INPUT	CHARACTER
00	@	10	P	20	(BLANK)	30	0
01	A	11	Q	21	!	31	1
02	B	12	R	22	"	32	2
03	C	13	S	23	#	33	3
04	D	14	T	24	$	34	4
05	E	15	U	25	·/.	35	5
06	F	16	V	26	&	36	6
07	G	17	W	27	/	37	7
08	H	18	X	28	<	38	8
09	I	19	Y	29	>	39	9
A	J	1A	Z	2A	*	3A	:
B	K	1B	[	2B	+	3B	;
C	L	1C	~	2C	'	3C	<
D	M	1D	]	2D	–	3D	=
E	N	1E	{	2E	•	3E	>
F	O	1F	}	2F	⌐⌋	3F	?

Software Considerations

Memory interfaces for the SC/MP-display system are shown in figure 2C2-15. The control program is stored in ROM – X'000 through X'01FF; RAM utilizes locations X'0F00 through X'0FFF with a display address of X'0800. There are no special timing restraints required to communicate with the self-scan display.

Each character of the message is brought in from the buffer; then, the program checks to see if the character is valid, and if it is valid, the software converts the 7-bit ASCII input code to a 6-bit ASCII output code. After this conversion is made, the clear bit and display-blanking bit are set to the proper condition and are ORed with the character. The character word now is written into the DM74199 latch. Subsequently, the Data Present line is pulsed and the Write Flag is tested to see if the display is ready to accept new data. Figures 2C2-16 and 2C2-17, respectively, show the flowchart and the program listing for the Control and Message-Moving Program that is used to print a message that is greater than 32 words long.

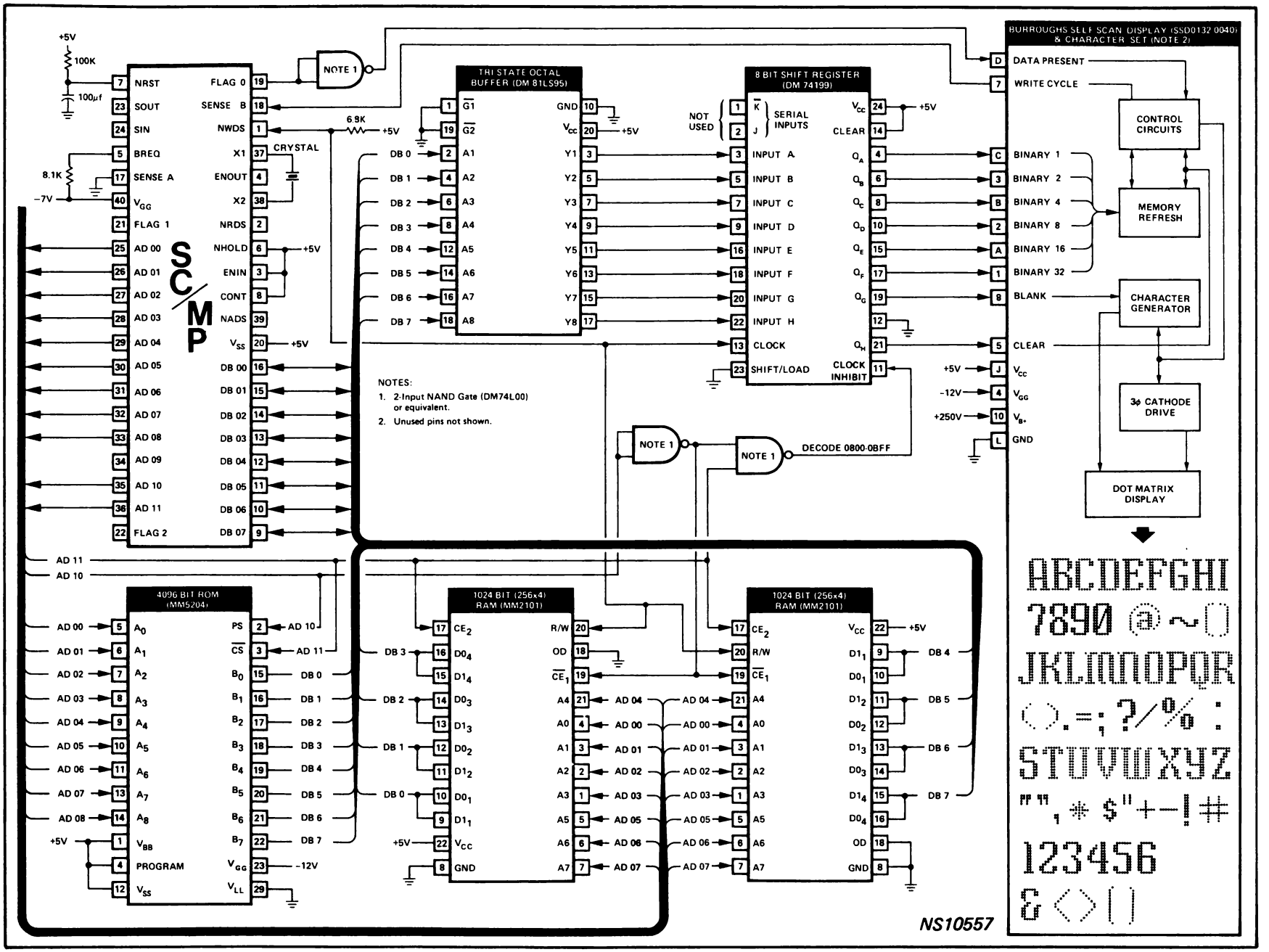

Figure 2C2–15. SC/MP Interfaced with Burroughs Self-Scan Display

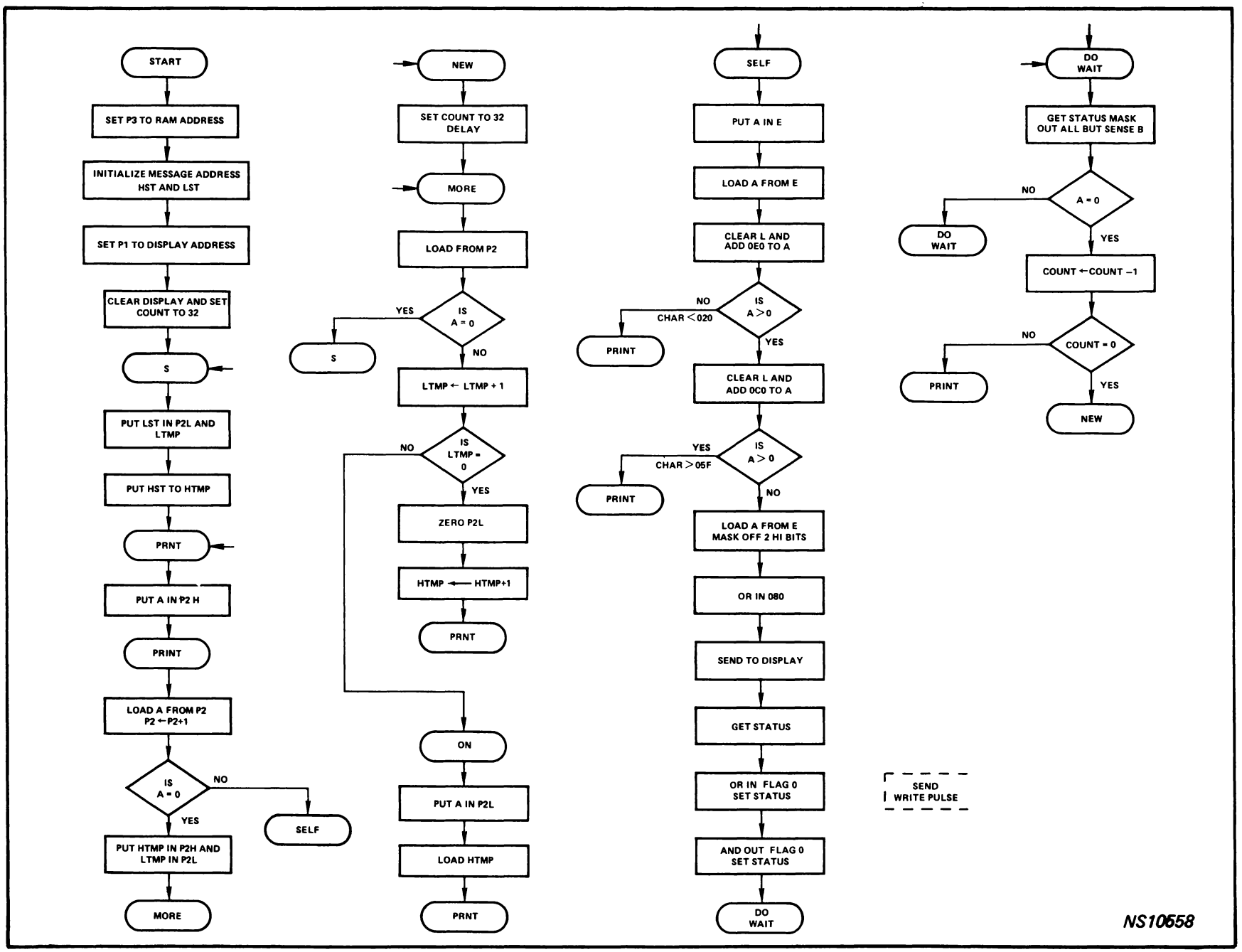

Figure 2C2–16. Flowchart for Control and Moving-Message Program

```
                         TITLE  DISP, 'MOVING MESSAGE

                         MESSAGE MUST BE    32 CHARACTERS.



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                         RAM LOCATIONS USED.


                         0F00     ADDRESS OF MESSAGE HIGH
                         0F01     ADDRESS OF MESSAGE LOW
                         0F02     NEXT ADDRESS OF MESSAGE HIGH
                         0F03     NEXT ADDRESS OF MESSAGE LOW
                         0F04     CHAR PER LINE COUNTER



        0000  HST        =        0                 ;SAME AS 0F00
        0001  LST        =        1                 ;SAME AS 0F01
        0002  HTMP       =        2                 ;SAME AS 0F02
        0003  LTMP       =        3                 ;SAME AS 0F03
        0004  COUNT               4                 ;SAME AS 0F04
        0800  ADR        =        0800              ;ADDRESS OF DISPLAY.
        0F00  RAM        =        0F00              ;START OF RAM.

        0000                      0                 ;STARTING ADDRESS.


                         MESSAGE IS ASCII STRING IN MEMORY.
                         END OF MESSAGE IS A BYTE OF ALL 0.




        0F20  MMSG                0F20              ;ADDRESS OF MESSAGE.



                          PAGE

              START:
0000 08                  NOP
0001 C40F                LDI      H(RAM)            ;PUT RAM ADDRESS IN P3.
0003 37                  XPAH     3
0004 C400                LDI      L(RAM)
000C 33                  XPAL     3
0007 C40F                LDI      H(MMSG)           ;SET STARTING ADDRESS IF MESSA
0009 CB00                ST       HST(3)            ;SAVE IN RAM.
000B C420                LDI      L(MMSG)
000D C901                ST       LST(3)
000F C408                LDI      H(ADR)            ;PUT ADDRESS OF DISPLAY IN P1.
0011 35                  XPAH     1
0012 C400                LDI      L(ADR)
0014 31                  XPAL     1
0015 C400                LDI      0                 ;CLEAR DISPLAY.
```

Figure 2C2—17. Program Listing for Control and Moving-Message Program

```
 56 0017 C900           ST      (1)
 57 0019 C420           LDI     32              ;SET LINE COUNT.
 58 001B CB04           ST      COUNT(3)
 59                 S.
 60 001D C301           LD      LST(3)          ;PUT ADDRESS IN TEMP.
 61 001F CB03           ST      LTMP(3)
 62 0021 32             XPAL    2               ;SET P2 TO ADDRESS.
 63 0022 C300           LD      HST(3)
 64 0024 CB02           ST      HTMP(3)
 65                 PRNT:
 66 0026 36             XPAH    2               ;HIGH ADDRESS IN P2.
 67                 PRINT:
 68 0027 C601           LD      @1(2)           ;GET NEXT WORD.
 69 0029 9C22           JNZ     SELF            ;CHECK IF DONE.
 70 002B C302           LD      HTMP(3)         ;RESTORE POINTER.
 71 002D 36             XPAH    2
 72 002E C303           LD      LTMP(3)
 73 0030 32             XPAL    2
 74 0031 90DD           JMP     MORE
 75                 ON:
 76 0033 32             XPAL    2               ;SAVE IN P2 LOW.
 77 0034 C302           LD      HTMP(3)         ;RESTORE HIGH.
 78 0036 90EE           JMP     PRNT
 79                 NEW:
 80 0038 C420           LDI     32              ;SAVE LINE COUNT.
 81 003A CB04           ST      COUNT(3)
 82 003C C4FF           LDI     0FF             ;DO A SHORT DELAY.
 83 003E 8F00           DLY     000
 84                 MORE:
 85 0040 C200           LD      (2)             ;CHECK IF DONE.
 86 0042 98D9           JZ      S
 87 0044 AB03           ILD     LTMP(3)         ;BUMP RAM POINTER.
 88 0046 9CEB           JNZ     ON
 89 0048 32             XPAL    2               ;NEXT ADDRESS.
 90 0049 AB02           ILD     HTMP(3)         ;BUMP HIGH.
 91 004B 90DA           JMP     PRINT
 92                 SELF:
 93 004D 01             XAE                     ;SAVE CHAR.
 94 004E 40             LDE                     ;GET CHAR.
 95 004F 02             CCL                     ;CLEAR LINK.
 96 0050 F420           ADI     0E0             ;CHECK IF LESS THAN 020.
 97 0052 9401           JP      GTIF            ;NO > 01F.
 98 0054 90D1           JMP     PRINT           ;LESS THAN 01F RETURN.
 99                 GTIF
100 0056 02             CCL                     ;CLEAR LINK.
101 0057 F400           ADI     000             ;CHECK IF > 05F.
102 0059 94CC           JP      PRINT           ;YES RETURN.
103 005B 40             LDE                     ;CHAR IS VALID.
104 005C D43F           ANI     03F             ;STRIP OFF HIGH BITS.
105 005E DC00           ORI     000             ;SET CLEAR AND DISPLAY BITS.
106 0060 C900           ST      (1)             ;SEND WORD.
107 0062 06             LSA
108 0063 DC01           ORI     1               ;SET WRITE CYCLE FLAG 0.
109 0065 07             LAS                     ;NOW SET FLAG 0.
110 0066 D4FE           ANI     0FE             ;NOW RESET FLAG.
111 0068 07             LAS                     ;DO IT.
```

Figure 2C2–17 (Continued)

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                  DOWAIT:
     0069 06                CSA                     ;GET STATUS.
     006A D420              ANI      020            ;CHECK IF SENSE B IS SET.
     006C 9CFB              JNZ      DOWAIT         ;WAIT IF SET.
     006E BB04              DLD      COUNT(3)       ;BUMP COUNTER.
     0070 98C6              JZ       NEW
     0072 90B3              JMP      PRINT



          0000               END

        ADR        0500          COUNT     0004          DOWAIT   0069
        GT1F       0056          HST       0000          HTMP     0002
        LST        0001          LTMP      0003          MMSG     0F20
        MORE       0040          NEW       0038          ON       0033
        PRINT      0027          PRNT      0026          RAM      0F00
        S          001D          SELF      004D          START    0000 *

        NO ERROR LINES
        SOURCE CHECKSUM=39A5
```

NS10559

Figure 2C2–17 (Concluded)