TECHNICAL SUPPORT MANUAL

Section 1

HX-20 INFORMATION

EPSON

compiled, edited and written by:
Esther Bayer

Foreword by the compiler and editor

Introduction

This booklet is the first and most up to date release of the HX-20 section of the second edition of the Technical Support Manual. The complete manual comprises both updated versions of the documents contained in the first edition and many other new documents.

Only information concerning the Epson HX-20 is contained herein. The documents are arranged in alphabetical order, with hardware information preceding software. Other booklets available are: PX-8 information, QX-10 information and interfacing, printer and software information. These can be purchased for a nominal charge from Epson UK Limited in Wembley.

If you consider that some useful information has been omitted, I should be grateful if you would pass on the relevant details to me. Otherwise, I should appreciate your views and opinions on the booklets; that is, have they been of great help, do they have their limitations ?, etc. Your ideas on the subject will prove to be invaluable when preparing future editions and will certainly influence the shape of things to come.

As the need arises, I shall produce new documents together with an up to date index. If you would like to receive updates, please send me your name and address.

In all instances, please write to me (marking the envelope Technical Support Manual) at:

Epson UK Limited
Dorland House
388 High Road
Wembley Middlesex
HA9 6UH
England

I hope that these booklets will be as well received as the first edition of the Technical Support Manual. I would like to acknowledge the assistance and support of John Sharp, the Technical Author.

Esther Bayer

1st March 1985

HX-20 index

HX-20 documents

Hardware

Software

Technical Support Document number 1a

HX-20 general specifications

CPU and memory

Main CPU: CMOS 8 bit microprocessor 6301, 614 kHz clockrate

Slave CPU: CMOS 8 bit microprocessor 6301, 614 kHz clockrate

RAM: 16k (standard) expandable to 32k with Epson expansion unit
or 96k with P and M Data Services' unit

ROM: 32k (standard) expandable to 40k internally;
to 64k with expansion unit

Built in peripherals

Display: Liquid crystal screen; 120 x 32 dot matrix;
20 x 4 character display; 5 x 7 font;
virtual width to 255 characters by BASIC "WIDTH" command

Printer: 24 column dot matrix impact microprinter;
graphic print rate: 42 lines per minute;
bit addressable graphics;
full ASCII upper and lower case character set;
cartridge ribbon

Clock: Time and calendar, alarm, interval timer,
built in CMOS battery backup

Tone generator: Programmable pulse drive, four octaves with half tones

Communications

RS-232C: Full/half duplex, 110 to 4800 baud rate, 8 pin DIN connector

Serial: Full/half duplex, 150, 600, 4800, 38400 baud rate,
RS-232C level, 5 pin DIN connector

Peripheral interfaces

Barcode reader: HP barcode reader with special connector

Cassette: Standard audio cassette interface

System bus: 16 bit address bus; 8 bit data bus and control lines;
40 pin connector

ROM cartridge/microcassette interface:
I/O port with 3 input, 6 output lines

Display controller:
See Oval HO-80 and UD-80 display controller documents

Technical Support Document number 1a

Internal switches

4 bit DIP: 3 bits for international character set selection;
1 bit programmable

External switches

Mains power, printer on/off, reset

Power supply

Four NiCd batteries, internal;
sub C type, 1100 mAh capacity;
50 hour capacity running BASIC (or less depending on
use of RS-232C port, printer or optional microcassette)

Recharge: Full charge within 8 hours

Keyboard and character set

ASCII keyboard; interruptible; 68 keys, including
5 function keys and 13 special keys;
10 key pad simulator (locked in by [NUM] key);
graphic shift key for 32 graphic characters;
international character set (DIP switch selectable)

Environmental requirements

Temperatures

Operating: 5 to 35 degrees Celsius (41 to 95 degrees Fahrenheit)

Charge: 5 to 35 degrees Celsius (41 to 95 degrees Fahrenheit)

Data integrity: -5 to 40 degrees Celsius (22 to 104 degrees Fahrenheit)

Data storage: -20 to 60 degrees Celsius (-5 to 140 degrees Fahrenheit)

Humidity: Operating/nonoperating: 10 to 80% noncondensing

Physical characteristics

Dimensions: 28.9 cm x 21.6 cm x 4.44 cm;
weight: 1.73 kg

Options

Expansion units: Epson: Several combinations of ROM and RAM size (see p.4-34
of HX-20 Technical Manual). Total expansion is 32k.
P and M Data Services: Software switchable in banks
of 16k. Total expansion is either 48 or 96k.

Microcassette: Uses standard microcassette tapes

Technical Support Document number 2a

HX-20 serial port specifications

General information

The HX-20 has 2 serial ports available for use; the standard RS-232C port and the high speed serial port. The high speed serial port is used primarily for Epson peripheral products and interconnections; the TF-20 disk drive in particular. The following is an outline of the RS-232C port and how to use it.

Hardware connections

The HX-20 uses an 8 pin DIN connector for its RS-232C interface. The pin connections are as follows:

Signal pin number	Signal	Signal direction	Meaning of signal
1	GND	-	signal ground level
2	TXD	out	transmitting data
3	RXD	in	receiving data
4	RTS	out	request to send
5	CTS	in	clear to send
6	DSR	in	data set ready
7	DTR	out	data terminal ready
8	CD	in	carrier detect
E	FG	-	case ground level

Using the RS-232C port with BASIC

Through special BASIC commands and the COM0: device code, you can use the RS-232C port directly from BASIC. Information on how to do this is contained in the HX-20 Basic Reference manual, pp. 3-46 and 3-47.

Technical Support Document number 3a

HX-20 memory expansion units

Epson 16k expansion unit

General information

The HX-20 memory expansion unit provides an additional 16k of RAM (random access memory) and/or 32k of ROM (read only memory) space to the HX-20 portable microcomputer. The unit attaches directly to the HX-20, becoming an integral part of the system. It requires no special programming or separate power supply to function properly.

RAM and ROM capacity

The memory expansion unit comes equipped with 16k of RAM. This doubles the internal memory of the HX-20, giving the user more room for program instructions and variables. In addition to the RAM, the unit also provides the user with space for up to 32k of ROM. ROM is used for built in programs, such as the Communications package and the RAX device (random access cassette system).

ROM compatibility

The HX-20 can use HN613128 ROMs, SMM2365 Mask ROMs, MBM27C64 EPROMs and any ROMs or EPROMs which are completely compatible. Installation of these ROMs should only be performed by a qualified Epson authorised service technician, because these devices are highly susceptible to breakage and static electricity.

Getting started

Before installing the unit, save any programs in memory which you wish to keep on cassette (ordinary or micro). Install the unit according to the instructions given in the installation guide. After installing the memory expansion unit, turn the power on and press CTRL @ to initialise the system. After you have entered the date and time, press RETURN. The HX-20 will then begin to use the extra RAM and ROM memory which you have installed.

P and M Data Services 96k expansion unit

General information

A 48 or 96k software switchable expansion unit consisting of either 3 or 6 banks of 16k ROMs has recently become available. For further details, ring P and M Data Services on: 0942 497123.

Technical Support Document number 4a

HX-20 barcode reader

General information

The Epson barcode reader (H00BRJA) is a hand held scanner designed to read all common barcode formats. It is a normal resolution scanner; that is, it has a minimum nominal bar width of 0.3 mm. The barcode reader comes equipped with a push to read switch which is used to activate the electronics in battery powered applications requiring lowest power consumption. Optimum performance will be obtained when the barcode reader is tilted at an angle of 10 to 20 degrees and when the tip of the reader is in contact with the tag. The barcode reader requires software to enable it to be used (see HX-20: version one barcode software document).

Specifications

Resolution: 0.3 mm

Scan velocity: 76 to 760 mm/s

PCS (contrast): 70%

Temperature: Storage temperature; -25 to 70 degrees Celsius
(-13 to 158 degrees Fahrenheit)
Operating temperature; -25 to 55 degrees Celsius
(-13 to 131 degrees Fahrenheit)

Humidity: 0 to 95%

Power consumption:

2.5 W; that is, 500 mA maximum at 5 V

Supply voltage: 3.6 to 5.75 V

Tilt angle: 0 to 30 degrees

Clearance: 0.5 mm maximum

Peak light emission wavelength:
700 nm

Technical Support Document number 5a

HX-20 microcassette drive

General information

The microcassette is controlled by the main and slave CPUs. Its operation is regulated by storing the commands sent from the slave CPU as serial data into an instruction register. A counter circuit employing a photoreflector is provided, so that it is possible to feed the tape fast to the required area by using this counter.

The microcassette consists of a power supply, motor drive circuit block, read/write control block, motor speed control block, etc and is designed to turn power on only when it is used. The tape is fed at a speed of 2.4 cm/s by a 2400 rev/min capstan motor. Data is read or written at about 1300 bits/s and about 50 kbytes of data can be input to a 30 min cassette.

Specifications

Tape:	Microcassette MC-30 or MC-60
Tape drive:	Centre capstan
Tape speed:	2.4 cm/s
Maximum charge:	100 mAh

Technical Support Document number 6a

HO-80 Oval display controller

General information

The HO-80 display controller from Oval Automation Ltd (0903 725225) can produce 80 column monochrome alphanumerics, a keystroke line, block and symbol graphics only on either a monitor or a television screen. It also offers a 40 column mode and an HO-20 emulating 32 column mode, so that software written for the HO-20, a display controller which has been discontinued, will run on the HO-80, provided that no graphics commands have been used.

The HO-80 should only be used with the HX-20.
It is not suitable for use with the PX-8.

Technical Support Document number 7a

UD-80 Oval universal display controller (for the HX-20 and the PX-8)

General information

The new UD-80 universal display controller from Oval Automation Ltd (0903 725225) offers 40 or 80 column operation with colour or monochrome outputs. It supports 50 or 60 Hz frame rate video, interlaced or noninterlaced, PAL or NTSC coding, "BBC" or "IBM" type RGB output and will operate from 110, 120, or 240 V and 50 or 60 Hz mains supplies.
Its internally defined character set covers ASCII, has many special European language characters, permits six different types of accents, supports mosaic or separated semigraphic characters and also has a set of graphics characters, offering diagonal as well as vertical and horizontal lines.
Additionally, up to 100 user defined characters may be downloaded from the host computer to cover characters not internally provided, such as nonEuropean languages, or symbols and pictographs.
It has a serial input capable of supporting normal ASCII at 4800 baud and responding to the standard Epson family of cursor and screen control codes. This allows faster display operation from within applications programs using the serial output of the PX-8.
Although primarily intended for use with the PX-8, limited functionality can be obtained with the HX-20 using a special console output redirection utility, but full feature operation is not possible.
For the PX-8, a special utility program will be supplied to redirect the console output to the serial line. Note that Operating System Revision B or later is required.

Options

The basic UD-80 is supplied with only 2 kbytes of video memory; enough for 40 column operation with limited attributes and 80 column monochrome operation with no attributes.
Additionally, a plug in video memory module will be available, allowing expansion to 16 kbytes, giving a corresponding level of improvement in performance. A 16 kbyte unit, for example, supports multiple pages, full attributes and user defined characters.
Also available as plug in modules will be colour coders and modulators, providing composite and RF outputs, specific to particular national standards. Initially, modules will be available for PAL and NTSC with UHF and RF output. Other modules will be made available at a later date, depending on requirements.

Provisional specifications

Screen formats: 25 lines of 40 characters or 25 lines of 80 characters;
(only 21 lines in 60 Hz video);
50 or 60 Hz video frame rate;
interlaced or noninterlaced operation

Technical Support Document number 7a

Characters:	128 internally defined alphanumeric characters; 128 internally defined semigraphic characters; user definable alphanumeric or semigraphic characters (downloadable from host computer)
Attributes:	80 character mode; colour, underline, blink, reverse 40 character mode; foreground and background colour, double height and width, underline, blink, reverse, accentuation
Input/Output:	8 pin DIN socket using PX-8 compatible voltage levels
Outputs:	RGB, BBC or IBM type (factory selected) composite video (or monochrome); (optional PAL or NBC coded video and UHF/VHF RF output to suit different countries)

Technical Support Document number 8a

HX-20 microcassette azimuth alignment procedure

Requirements

1)10 MHz oscilloscope;
2)azimuth test tape (part number B777600101)
3)jeweller's screwdriver set;
4)sharp knife.

With the power turned off, remove the microcassette unit from the HX-20.
Remove the two retaining screws on the lower case of the microcassette and then the lower case itself.
Locate TP3 and TP4 on the microcassette printed circuit board. Solder a six inch piece of insulated wire onto TP3 and another piece of similar length onto TP4.
Remove the azimuth adjustment window using the sharp knife and place the azimuth tape into the microcassette unit.
Set the oscilloscope to the following:
Volts per division: 20 mV (using an X10 probe)
Time per division: 0.1 ms
Fit the X10 probe onto the two insulated wires; attach the tip to TP3 and attach earth to TP4.
Switch on the HX-20 and go into BASIC (option 2 on the menu). Type WIND and hit ⟨RETURN⟩. When the HX-20 has rewound the tape, type LOAD and hit ⟨RETURN⟩.
In approximately 30 seconds you should see the 3 kHz sine wave displayed on the oscilloscope. If not, check your connections.
Insert a small flat blade screwdriver (jeweller's type) into the hole under the window cover on the microcassette unit. Adjust the peak to peak amplitude of the sine wave for maximum output. This may require some fine adjustment.
The signal levels must exceed 0.6 V peak to peak. If the signal is less than this, the microcassette is faulty. The maximum value obtainable is 0.9 to 1.0 V peak to peak. This can be achieved with some fine adjustment.
When you have adjusted the azimuth to maximum, press the ⟨BREAK⟩ key to stop the tape, switch off the HX-20 and replace the azimuth window, remove the two insulated leads from the microcassette unit and replace the bottom cover.
Note: during adjustment, take care not to damage the azimuth screw.

Technical Support Document number 51a

HX-20 BASIC filefinder program

General information

FILEFINDER is a BASIC program which when run will search one complete side of a microcassette tape and pick out and list all the files found. The program listing is given below.

FILEFINDER listing

```
10  TITLE "FILEFIND"
20  WIDTH 20,8,1
30  MSG$="Insert tape & return":GOSUB 330
32  A$=INKEY$:IF A$=CHR$(13) THEN 40 ELSE 32
40  LPRINT"     FILEFINDER"
50  LPRINT
60  LPRINT"File Name     Location"
70  LPRINT
80  WIND
90  MSG$="Searching tape":GOSUB 330
100 CLOSE
110 ON ERROR GOTO 240
120 OPEN "I",#1,"CAS0:"
130 IF ERCOUNT>0 THEN LPRINT USING "IO Error #####";((TAPCNT-25)/10)*10
    :ERCOUNT=0
140 ON ERROR GOTO 0
150 MSG$="Found a file":GOSUB 330
160 FILNAM$=""
170 FOR I=&H032C TO &H0336
180 FILNAM$=FILNAM$+CHR$(PEEK(I))
190 NEXT I
200 IF RIGHT$(FILNAM$,3) = "" THEN 220
210 FILNAM$=LEFT$(FILNAM$,8)+"."+RIGHT$(FILNAM$,3)
220 LPRINT USING"\           \   #####";FILNAM$,((TAPCNT-25)/10)*10
230 GOTO 90
240 IF ERR = 53 THEN 260
250 RESUME 130
260 ERCOUNT = ERCOUNT + 1
270 IF ERCOUNT > 3 THEN GOTO 300
280 MSG$="IO Error":GOSUB 330
290 RESUME 90
300 MSG$="End of tape":GOSUB 330
310 LPRINT USING"End of tape     #####";TAPCNT
320 CLOSE:END
330 CLS:LOCATE 0,0,0:SCROLL,0:PRINT"* * FILEFINDER * *"
340 IF MSG$<>"" THEN PRINT:PRINT SPC(10-LEN(MSG$)/2);MSG$;
350 RETURN
```

Technical Support Document number 52a

HX-20 BASIC programming language

Overview

The HX-20 portable microcomputer package includes a powerful version of the BASIC computer language resident in read only memory (ROM). HX-20 ROM BASIC contains many features not found in other versions of BASIC, as well as features designed exclusively for the HX-20.

Extended features

In addition to statements common to BASIC, HX-20 ROM BASIC contains the following features:

IF...THEN...ELSE - two way conditional statements

INPUT$ (X) - inputs X characters and places them in a character string

INSTR - checks for the occurrence of a substring with a string

LINE INPUT - inputs a line of text exactly as typed including commas, quotes, etc

HX-20 special BASIC features

ROM BASIC also contains statements and functions unique to the HX-20 and its special capabilities. From ROM BASIC you can tell the HX-20 to play you a tune, mix text with screen graphics, move the virtual screen around and store/retrieve programs using your cassette recorder. You can also set the HX-20 internal real time clock, create RAM files to move variables from one program to another and many other things.

Getting started

To get started using HX-20 ROM BASIC, simply turn on the power, choose BASIC from the initial menu and you are there. For detailed instructions on BASIC programming, see the HX-20 Basic Reference Manual or HX-20 Easy Basic.

Technical Support Document number 53a

HX-20 battery temperature test

General information

This document contains the results of a temperature test for the HX-20's battery. It was carried out in the USA using Sanyo and GE batteries.

Procedure

The HX-20 was connected to an HX charger and left on continuous charge for a period of two months. A digital temperature probe was attached to the HX-20's battery (Sanyo 1100 mA) and the temperature was measured at regular intervals during each working day. Room temperature was also recorded. The HX-20 was periodically tested for proper operation during this test to determine if the continuous charge caused any operational failure.

Results

The continuous charge had no effect on the operation of the HX-20.
The continuous charge had no apparent effect on the operation of the battery. A resultant change of overall battery life was not determined. However, the factory (Sanyo) predicted an expected reduction in battery life if charged in excess of 60 days of up to 40% loss after one year. GE indicated that no appreciable loss in battery life should be experienced due to overcharge for 60 days, with a loss of up to 20% after one year.

The battery temperature varied proportionally with room temperature. The actual length of time of charge had no effect on the temperature. The battery temperature was on average 8 degrees Celsius above room temperature. The actual temperature varied betwen 7 and 10 degrees Celsius.

Recommendations

Continuous charge of the HX-20 will not have any detrimental effect on the computer or its batteries for a period of up to 60 days. After 60 days, the Sanyo battery's life may decrease by up to 40% after one year. The GE battery's life may decrease by up to a loss of 20% after one year. Neither battery exhibited a temperature problem caused by continuous charge.

The HX-20 may be operated in the continuous charge mode for a period of at least 60 days without any detrimental effect to either the computer or the battery.

Those concerned about battery life problems should contact G.S. Smith and Associates in Delaware, USA. Their telephone number is 0101-302 738 7308. They provide an external charging unit for the HX-20 which can be plugged in for longer than 60 days without damaging the computer. Please bear in mind that a step up transformer will have to be added to the system in the UK, in order to be able to operate at 240 V. In the USA, the mains voltage operates at 120 V.

Technical Support Document number 54a

HX-20 character defining program

Use this program on your HX-20 to create your own character set.

```
1     REM User defined character utility for use on the HX-20.
2     REM This program will NOT work on any other computer.
3     REM
4     REM Use this program to design your own characters and then
5     REM copy the first non REM line of this program into your
6     REM program in order to use the characters you designed.
7     REM To print the characters: PRINT CHR$(n); ' n=224 --> 255
8     REM Note: this program uses the first 192 bytes of the RAM
9     REM file to store your characters.
10    POKE &H11E,PEEK(&H5A2):POKE &H11F,PEEK(&H5A3)
20    WIDTH 20,16:DEFINT  A-Z:DEFFIL 1,0:S$=SPACE$(4)
30    PRINT "Push SPACE if you"
40    PRINT "need help, or RETURN"
50    PRINT "if you do not"
60    PRINT "need it. :";
70    IF INPUT$(1)="" THEN GOSUB 860
80    'CLEAR SCREEN, DISPLAY CHARACTERS
90    CLS
100   FOR I=0 TO 24 STEP 8
110   FOR J=0 TO 7:PRINT CHR$(I+J+224);:NEXT J
120   IF I<>24 THEN PRINT
130   NEXT I
140   LOCATE 13,0:PRINT "Select"
150   LOCATE 13,1:PRINT "a char"
160   LOCATE 13,2:PRINT "& push"
170   LOCATE 13,3:PRINT "RETURN";
180   X=0:Y=0:LX=7:LY=3:CMD=0
190   ' MOVE THE CURSOR AND DISPLAY THE CHARACTER IT IS POINTING TO.
200   CH=Y*8+X
210   LOCATE 9,0:PRINT USING "###";CH+224;
220   LOCATE 10,1:PRINT CHR$(156);
230   LOCATE 10,3:PRINT CHR$(155);
240   LOCATE 10,2:PRINT CHR$(CH+224);
250   LOCATE X,Y,1:GOSUB 760
260   IF A$<>CHR$(13) THEN 200
270   LOCATE 12,0:PRINT " CR";S$
280   LOCATE 12,1:PRINT CHR$(155);" ";CHR$(156);S$
290   LOCATE 12,2:PRINT "(-)";S$
300   LOCATE 12,3:PRINT "] [";S$;
310   LOCATE X,Y,1
```

```
320  'THE CHARACTER IS SELECTED, PUT IT INTO THE EDIT BUFFER.
330  FOR I=0 TO 7:PSET(96,I*3+5):PSET(115),I*3+5):NEXT I
340  FOR I=0 TO 5
350  PSET(I*3+98,3):PSET(I*3+98,28)
360  FOR J=0 TO 7
370  P=POINT(I+60,J+16)
380  FOR K=0 TO 2
390  LINE(I*3+97,J*3+4+K)-(I*3+99,J*3+4+K),PSET,P
400  NEXT K,J,I
410  X=0:Y=0:LX=5:LY=7:CMD=1
420  ' DISPLAY THE CROSSHAIRS FOR THE DOT.
430  LINE (92,Y*3+5)-(95,Y*3+5),PSET
440  LINE (116,Y*3+5)-(119,Y*3+5),PSET
450  LINE (X*3+98,0)-(X*3+98,2),PSET
460  LINE (X*3+98,29)-(X*3+98,31),PSET
470  P=POINT(X*3+97,Y*3+4)
480  LINE(X*3+98,Y*3+5)-(X*3+98,Y*3+5),PSET,1-P
490  X2=X:Y2=Y:GOSUB 760
500  LINE (92,Y2*3+5)-(95,Y2*3+5),PRESET
510  LINE (116,Y2*3+5)-(119,Y2*3+5),PRESET
520  LINE (X2*3+98,0)-(X2*3+98,2),PRESET
530  LINE (X2*3+98,29)-(X2:3+98,31),PRESET
540  P=POINT(X2+60,Y2+16)
550  LINE(X2*3+98,Y2*3+5),PSET,P
560  'SELECT ACTION FOR A USER'S COMMAND
570  IF A$="[" OR A$="]" THEN GOTO 700
580  IF A$>CHR$(13) AND A$<" " THEN GOTO 430
590  IF A$<>CHR$(13) THEN SOUND 1,1:GOTO 430
600  ' PUT THE NEW CHARACTER INTO THE CHARACTER ARRAY.
610  FOR I=0 TO 5
620  C=0
630  FOR J=7 TO 0 STEP -1
640  C=C*2+POINT(I+60,J+16)
650  NEXT J
660  PUT% CH*6+I,CHR$(C)
670  NEXT I
680  GOTO 90
690  ' DRAW THE DOT
700  FOR K=0 TO 2
710  LINE(X*3+97,Y*3+4+K)-(X*3+99,Y*3+4+K),PSET,A$="[" AND 1
720  NEXT K
730  PSET(X+60,Y+16),A$="[" AND 1
740  GOTO 430
750  ' READ IN A COMMAND.
760  A$=INPUT$(1)
770  IF A$="Q" OR A$="q" THEN CLS:END
780  IF A$>" " AND CMD>0 THEN RETURN
790  IF A$=CHR$(13) THEN RETURN
800  IF A$=CHR$(28) AND X<LX THEN X=X+1:RETURN
810  IF A$=CHR$(29) AND X>0 THEN X=X-1:RETURN
820  IF A$=CHR$(30) AND Y>0 THEN Y=Y-1:RETURN
830  IF A$=CHR$(31) AND Y<LY THEN Y=Y+1:RETURN
840  SOUND 1,1:GOTO 760
```

```
850  ' HELP INSTRUCTIONS
860  PRINT "Turn on the micro-"
870  PRINT "printer and press"
880  PRINT "RETURN"
890  A$=INPUT$(1)
900  LPRINT
910  LPRINT "User defn char utility"
920  LPRINT "program, written Nov 83,"
930  LPRINT
940  LPRINT "CHAR SELECTION FUNCTs:"
950  LPRINT
960  LPRINT "Use the arrow keys to"
970  LPRINT "select the character."
980  LPRINT "(The chars ASCII code"
990  LPRINT "is shown on the top"
1000 LPRINT "line of the LCD.)"
1010 LPRINT
1020 LPRINT "Return selects the char"
1030 LPRINT "to edit."
1040 LPRINT "Note: the program takes"
1050 LPRINT "10 seconds to enter the"
1060 LPRINT "character into the edit"
1070 LPRINT "buffer"
1080 LPRINT
1090 LPRINT "EDIT FUNCTIONs"
1100 LPRINT
1110 LPRINT "Use the arrow keys to"
1120 LPRINT "move the crosshairs and"
1130 LPRINT "select a dot position."
1140 LPRINT
1150 LPRINT "[ Turns on a given dot."
1160 LPRINT
1170 LPRINT "] Turns off a given dot."
1180 LPRINT
1190 LPRINT "Return enters the char"
1200 LPRINT "into the user defn char"
1210 LPRINT "set."
1220 LPRINT:LPRINT
1230 LPRINT "Q exits the program at"
1240 LPRINT "any time."
1250 FOR I=1 TO 5:LPRINT:NEXT I
1260 RETURN
```

Technical Support Document number 55a

HX-20: comparison of HX-20 BASIC and PX-8 BASIC

The PX-8 and the HX-20 both contain powerful BASIC languages. However, there are substantial differences between the two versions and these differences are identified below.

BASIC commands unique to the HX-20

COLOR
DEFFIL
DEFUSR
EXEC
GCLS
LOAD?
LOADM
LOCATES
MEMSET
MON
MOTOR
SAVEM
SCROLL
SWAP

BASIC commands unique to the PX-8

ALARM
ALARM$
AUTO START
BEEP
CALL
CHAIN
COMMON
CVI/CVS/CVD
DSKF
EDIT
FIELD
INP
KILL
LOC
LPOS
LSET/RSET
MENU
MKI$/MKS$,MKD$
MOUNT
OPTION COUNTRY
OPTION CURRENCY
OUT
POWER

REMOVE
RESET
STOP
SYSTEM
WAIT
WHILE...WEND
WRITE
WRITE#

Different ways of saving files

The PX-8 does not save files in RAM like the HX-20. The PX-8 will lose programs if care is not taken when saving files. In order to save programs to the program areas on the PX-8 so that they are retained in memory, you need to use the menu function to make BASIC resident in the computer. This will retain programs unless .COM files are executed at the system level.

Conclusion

The PX-8 has many more extensions to BASIC than the HX-20. There are some subtle differences in the BASIC between the two machines. For example, the screen command is not exactly the same between the two machines. The HX-20 supports an external monitor and the PX-8 supports both an external monitor and multiple screen modes.

The PX-8 has two useful commands which help you to write structured BASIC programs; the WHILE and WEND commands. PX-8 BASIC is also constructed for operation within the CP/M operating system and therefore has extensions. For example, the microcassette drive is supported as if it were a disk drive. The PX-8 also supports operation of the timer function, so that it is possible to control the powered status of the machine from within BASIC.

The PX-8 cannot directly read an HX-20 BASIC program which has been written on a microcassette tape, since the HX-20 tape does not have a directory which the PX-8 can read.

Technical Support Document number 56a

HX-20: creating user definable characters

The hexadecimal character codes E0 to FF are not defined for the HX-20, but may be used to create your own custom character set.

When the system is cold booted, hexadecimal locations 11E and 11F are set to 0000. These two locations point to an alternate user defined character set. This character set may be placed anywhere in the user RAM space, but must be below the value set using the MEMSET command.

To use this feature, you must first define a 6 x 8 character set on paper. Each character is 6 bytes wide by 5 bits high.

A character would be designed as follows:

```
            ...00. bit 0
            ..0..0
            ..0...
            .000..
            ..0...
            ..0...
            .00000
            ...... bit 7
      byte 1
           2
            3
             4
              5
               6
```

As an example of placing a custom character set in RAM, let us decide to start our character set at hex memory location 2000. There should be enough room for 32 characters (E0 to FF). Each character takes up 6 bytes. 6 x 32 = 192, so it will take 192 bytes to define our character set. We need to add C0 hex (192 decimal) to our starting point of 2000 hex. 2000 hex + C0 hex = 20C0 hex. Using the MEMSET command, set the low memory point to 20C0 hex. Now set locations 11E and 11F to 20 hex and 00 hex. These locations may be changed using the BASIC poke command or from the system monitor. Now you may enter your custom character set starting at location 2000 hex. Any time you enter the codes E0 to FF hex, your custom characters will be displayed.

The value of low memory set by MEMSET is not changed when the system is turned on and turned off. A character set will remain in the HX-20 until it is deleted. The pointers at locations 11E hex and 11F hex will also remain set until you change them or do a cold boot.

The system uses codes FC hex and FE hex as special codes for the menu key and for function keys. If you want to use these codes as redefined characters, you should not use the keyboard to send these codes. You must use the CHR$ command of BASIC.

There is a utility program for defining characters on the HX-20 in the 'HX-20 character defining program' document.

Technical Support Document number 57a

HX-20: downloading to the HX-20 from the TRS-80 model 1

General information

This document contains the procedure for downloading files to the HX-20 from a Tandy TRS-80 model 1. You will need the following:

Hardware: TRS-80 model 1 with RS-232C board and cable;
HX-20 with number 714 RS-232C cable;
cable with female to female DB-25 connectors.

Software: TRS-80 operating with Omniterm, terminal software;
HX-20: none.

Before entering Omniterm, convert all files to be transferred to ASCII format on disk. Load the BASIC file into memory and then save it to disk. For example: SAVE "NAME/BAS:0",A

Enter Omniterm, specify the RS-232C as the modem, set the baud rate to 4800, word length to 8 bits, 2 stop bits and no parity.

Load the buffer from disk with the desired file to transfer. Open the buffer for output, type Enter (default of none) for the Prompt string question and enter 10 for the number of zeros between characters. Before pressing Enter, during the zeros question, type LOAD "COM0:" on the HX-20.

Omniterm will tell you when output is complete. Then press (BREAK) on the HX-20. The program should then be resident in the HX-20.

Conversion statements encountered

PRINT@ - remove the @ sign or use LOCATE X,Y:PRINT

IF A=5 GOSUB 120 - insert THEN between 5 and GOSUB
(HX-20 BASIC will not accept an implied THEN)

IF A$="HELLO" THEN GOTO 100 - the lack of spaces behind logical operators and THEN statements will sometimes cause syntax errors. Use: IF A$="HELLO" THEN GOTO 100

Technical Support Document number 58a

HX-20: Epson user group

There is only one Epson user group in Great Britain and it is located in London. The full address, telephone number and contact is:

Address: Epson user group
25 Sawyers Lawn
Drayton Bridge Road
London W13

Telephone: 01-998 1494

Contact: Mr. T. Ronson

Technical Support Document number 59a

HX-20 machine code program copy

General information

Several HX-20 programs consist of sections of machine code which cannot be saved to cassette by the simple SAVE command. In such cases you must use the SAVEM command and specify the start, end and run addresses. For all the programs listed below, the start and run addresses are the same. Thus the general BASIC command (with optional verification) would be:

SAVEM "filename",start address,end address,run address[,V]

Name of program	Name of program section	Start address	End address	Use SAVE or SAVEM
CARD INDEX	CARD	loader		SAVE
	CARD1.HEX	&H0A40	&H0AA0	SAVEM
	CARD2.HEX	&H1870	&H3270	SAVEM
	CARDI.BAS			SAVE
FORMAT (used with CARD INDEX, DIARY and MLIST)	FORMAT	loader		SAVE
	FMTDATA.HEX	&H0AC0	&H0AEF	SAVEM
	FMTPROG.HEX	&H1810	&H182F	SAVEM
	FORMI.BAS			SAVE
MLIST	MLIST	loader		SAVE
	MAIL1.HEX	&H0A40	&H0AA0	SAVEM
	MAIL2.HEX	&H1870	&H33C0	SAVEM
	MAILI.BAS			SAVEM
CORR20	CORR20	loader		SAVE
	CORR1.HEX	&H0A40	&H13FF	SAVEM
	CORR2.BAS			SAVE
DIARY	DIARY	loader		SAVE
	DIARY1.HEX	&H0A40	&H0FFF	SAVEM
	DIARY2.HEX	&H1870	&H3869	SAVEM
	DIARY.BAS			SAVE
PROTECT	PROTECT.BIN	&H0A40	&H0C64	SAVEM
DBLFUN	DBLFUN.BIN	&H0A40	&H1054	SAVEM
DIY	RUNTIM.BIN	&H0A40	&H17A8	SAVEM

Technical Support Document number 60a

HX-20 machine language monitor

General information

The HX-20 contains on ROM a machine language monitor designed as a software tool for machine code programmers. The monitor includes commands used to directly modify memory, look at memory and the systems level status registers and execute machine language routines. The monitor uses hexadecimal notation when dealing with numeric quantities or machine language addresses.

The monitor is entered from BASIC by typing the keyword MON. On entering the monitor program, the current value of the system registers will appear on the screen. (Note: the monitor does not use the virtual screen; thus the cursor controls, the SCRN command and the insert command are unusable.)

Monitor functions

When you have entered the monitor, the following one letter commands are at your disposal:

A - provides read and write addresses when reading or writing files
B - return to caller
D - dump memory 15 bytes at a time
G - call subroutine
K - respond to keystack sequence
R - read object file into memory
S - set memory
V - verify an object file saved on a device
W - write an object file to device
X - display and/or change the value of a 6301 register

For a detailed explanation of these commands and their parameters see pp. 9-3 to 9-13 of the HX-20 Operation Manual.

When you call the monitor from BASIC and want to return, type B and press ⟨RETURN⟩. You should then be back in the BASIC language. If you call the monitor from the initial start up menu, press MENU to return to normal operation.

Technical Support Document number 61a

HX-20 power consumption

General information

This document defines the power consumption of the HX-20 in different modes of operation. The amount of power which the HX-20 uses varies according to the I/O operations being performed. Even when the computer is off, power is being drawn from the batteries.

Sleep mode

Configuration	Current [mA]
HX-20 only	10
HX-20 with serial	83
HX-20 with RS-232C	95
HX-20 with serial and RS-232C	100
HX-20 with Epson expansion unit	11.5

Operators mode

Configuration	Current [mA]
Key input approx.	5-10
Slave CPU operation approx.	3
Microprinter approx.	500-1100
Microcassette approx.	120
RS-232C transmission approx.	5

Backup current

Configuration	Current [μA]
HX-20 only	20
HX-20 Epson expansion unit	1.5

The current value shown above is the current drawn at a battery voltage of +5.0 V. In actual operation, a difference of approximately +10% may exist depending on the battery voltage. The total current is calculated by adding "sleep mode" and "operational mode" current. For example, the RS-232C current drawn on operation is 95 + 5 = 100 mA.

Technical Support Document number 62a

HX-20 program protection

Disabling the keyboard

The following POKEs can be used to disable and enable various keys and functions. Using these effectively disables the keyboard almost completely.

```
POKE 125,4      disables BREAK

POKE 125,0      re-enables BREAK

X=PEEK(123)     saves original RUN mode for later reset

POKE 123,65     disables function keys

POKE 123,X      restores original situation and re-enables function keys

POKE 290,249    disables MENU
POKE 291,202

POKE 290,255    re-enables MENU
POKE 291,37

POKE 127,160    enables printer even when switched off

POKE 127,0      resets printer
```

Autostarting

To autostart a program when the HX-20 is switched on, follow this procedure:

1)LOAD the program and TITLE it.

2)Go back to the menu and select option 1 (Monitor).

3)Type in K n CTRL @ where n = the option number of the program on the menu.

4)Switch the HX-20 off and then on.

5)The computer will automatically run the program when it is switched on.

6)To remove the autostart, hit (BREAK) the moment you switch on the computer. Go into Monitor, type K CTRL @ and then switch the computer off and on again.

Technical Support Document number 62a

Stopping the fiddler

RENUMber the program starting at 100 or higher; this stops the fiddler who usually types his program starting at line 10.

Safety first

Copy the program into another page or two of memory so that if the program does get corrupted, you can run it again in another area.

Using a loader

Use a BASIC loader program so that the user must type RUN"PROGNAME" instead of just LOAD. This, coupled with keyboard disable and setting the protection byte, will ensure that the user never gets into BASIC in the same LOGIN area as the program.

Setting the protection byte

Set the protection byte:

```
POKE &H7E,128  (deprotects RAM protection byte)
POKE(PEEK(&H4B5)*256+PEEK(&H4B6)+10),255 (sets program protection byte)
POKE &H7E,0  (resets RAM protection byte)
```

To deprotect:

```
POKE &H7E,128
POKE (PEEK(&H4B5)*256+PEEK(&H4B6)+10),0
POKE &H7E,0
```

Technical Support Document number 63a

HX-20 ROM cartridge: file format

General information

The HX-20 ROM cartridge can hold up to 31 files. Each file is composed of a 32 byte header and a data block.

The headers for all the files are grouped together at the top of the ROM with the data blocks following after the last header. To separate headers from data a dummy header block is used; see the table below, which gives the composition of the header.

Byte number	Contents of memory locations
0-7	file name in ASCII. If byte 0 is hex FF, then this is the dummy header before the file data and the next 31 bytes are ignored. If byte 0 is hex 00, this is an erased file and the data block is disregarded.
8-10	file name extension in ASCII
11-12	byte 11; 00 - BASIC program 01 - BASIC data 02 - machine code program byte 12; 00 - binary file FF - ASCII file
13-15	all zeros
16-19	file start address within the ROM in hex; 4 ASCII digits
20-23	file end address +1 within the ROM in hex; 4 ASCII digits
24-29	creation date if required; 6 ASCII characters/digits
30-31	unused; can be used for ROM version etc if required

The files themselves follow after the last header and their structures are described below.

BASIC programs and data; ASCII format

Each character in each line of text (BASIC line numbers included) is coded with the corresponding ASCII byte, with the two bytes 0D and 0A hex added at the end of each line of BASIC for carriage return and line feed. Obviously data files do not need line numbering and CR/LF.

Technical Support Document number 63a

BASIC programs; internal binary format

The first byte is hex FF; this is followed by two bytes for the program length (number of bytes in binary). Thereafter, each line of binary is coded as follows:

1)two bytes dummy data (nonzero);
2)two bytes for the line number (binary);
3)the BASIC program line coded as it would be stored in memory;
4)a single byte 00 hex to mark the end of the line.

The file is terminated with two bytes 00 hex after the last line.

Machine code files; binary format

Machine code programs are split up into records of 16 bytes. Each record is coded as follows:

Byte numbers	Contents of memory locations
1	number of bytes in this record; always 16 (hex 10) except for the last record
2,3	address into which the bytes in this record are to be loaded, coded as a two byte binary number
4-15	the bytes making up the machine code
16	checksum; sum of bytes 1-15 subtracted from zero

The last record is coded slightly differently as follows:

Byte numbers	Contents of memory locations
1	00 hex
2,3	program entry address, coded as a two byte binary number
4-15	00 hex
16	checksum, coded as above

Technical Support Document number 64a

Example 1: Opening for data transfer

Sending side	Receiving side
10 OPEN "I",#1,"COM0:(68N2B)"	10 OPEN "O",#2,"COM0:(68N2B)"
20 OPEN "O",#2,"COM0:(68N2B)"	20 OPEN "I",#1,"COM0:(68N2B)"
30 PRINT 32,"A";	30 IF LOF(1)=0 THEN 30
40 FOR I=1 TO 300: NEXT I	40 A$=INPUT$(LOF(1),1)
50 IF LOF(1)=0 THEN 30	50 IF A$<>"A" THEN 30
60 A$=INPUT$ (LOF(1),1)	60 PRINT #2,"A";
70 IF A$<>"A" THEN 30	

Another method is for both the sending and receiving sides to check one another's status before beginning data communications. This is shown in Example 2.

Example 2

Sending side	Receiving side
10 OPEN "I",#1,"COM0:(68N2B)"	10 OPEN "O",#2,"COM0:(68N2B)"
20 A$=INPUT$(1) (waits for key input)	20 A$=INPUT$(1) (waits for key input)
30 OPEN "O",#2,"COM0:(68N2B)"	30 OPEN "I",#1,"COM0:(68N2B)"

Here data transfer begins after a key has been pressed on both the sending and receiving sides. Voltage fluctuation when power is first applied to the line can affect the RTS and DTR control lines in a similar manner.

All operations of the slave CPU are controlled by commands from the main CPU. For this reason, some operations cannot be performed simultaneously. For example, data input through the RS-232C port will be interrupted if data is output to the printer.

Technical Support Document number 64a

HX-20 RS-232C data transfer

General information

When the RS-232C is used to transmit data serially on the HX-20, TXD rises to +8 volts for a short time and then falls to -8 volts and stabilises. This may result in incorrect reception by the receiving side, depending on the bit rate and other conditions.

As a result, one incorrect bit may be received at the beginning of a data transmission when a program list is serially output by the BASIC command LIST "COM0:". When programs are transferred from one HX-20 to another (one using LIST "COM0:" and the other using LOAD "COM0:"), this incorrect bit can prevent the expected results from being obtained.

There are several ways to circumvent this problem:

1)Use a bit rate which is slow enough for the incorrect bit to be ignored.
2)Apply current to the line ahead of time to avoid signal instability during voltage rise.
3)Synchronise the receiving and sending sides.

The sequence for applying current ahead of time is as follows:

Sending side	Receiving side
1)OPEN "I",#1, "COM0:(28N2B)" (line power ON)	
2)WIDTH "COM0:",255	
	3)LOAD "COM0:(28N2B)" (start program reception)
4)LIST "COM0:(28N2B)" (start program transmission)	
5)CLOSE #1	

A procedure which can be used to synchronise the sending and receiving sides is shown in Example 1. The sending side sends the character "A" (synchronisation character) and then the receiving side responds with "A" when the synchronisation character is received. The sending side begins transmission after it receives the synchronisation character from the receiving side.

Technical Support Document number 65a

HX-20: sending BASIC programs from one HX-20 to another

The procedure below describes a simple method for transmitting files between two HX-20s. To avoid data loss, make sure that the ports on both computers are open before sending. Also make sure that you use the WIDTH command to allow for BASIC lines longer than 80 characters.

1)Turn on both computers and connect the two RS-232C ports with a 716 cable.

2)On the sending HX-20, type:

```
OPEN "I",#2,"COM0:(28N2B)" [RETURN]
WIDTH "COM0:",255 [RETURN]
```

3)On the receiving HX-20, type:

```
LOAD "COM0:(28N2B)" [RETURN]
```

4)Send the data by typing on the sending HX-20:

```
LIST "COM0:(28N2B)" [RETURN]
```

Verify that the file was sent by finding it on the receiving HX-20.

Technical Support Document number 67a

HX-20: sending BASIC programs from the QX-10 to the HX-20

Use the procedure below to send a BASIC program from the QX-10 to the HX-20. Before a program can be transferred, it must be stored in ASCII format, using the SAVE command with the A option. For example, to store a BASIC program named "INTEREST.BAS", you would give the command:

SAVE "INTEREST.BAS",A [RETURN]

The A stores the program as an ASCII file. You can use the TYPE command to display the file, if you want to make sure it is in ASCII format. (An ASCII file lists clearly on the screen; nonASCII files display as garbled text.)

Then follow this procedure to send an MBASIC program from the QX-10 to the HX-20:

1)Use the SETUP program to set the QX-10 serial options to 300 baud, 8 bit word and no parity.

2)Type the following on the HX-20:

LOAD "COM0:(28N1B)" [RETURN]

3)Set up the QX-10 to send by typing:

STAT PUN:=UP1: [RETURN]

4)Send the program from the QX-10 by typing:

PIP PUN:=filename.ext [RETURN]

Technical Support Document number 68a

HX-20 simultaneous I/O operations

The table below shows operations which can be performed simultaneously on the HX-20. Those combinations which are possible are shown on the same line. For example, during input from the microcassette drive (line 1 in the table), both the main and the slave CPUs are occupied. Therefore, operations such as output to the speaker are not possible, although input from the keyboard is accepted.

In line 11 of the table, the slave CPU does not operate during high speed serial communication, because this mode is used for the exchange of data with the main CPU; that is, the link between the main CPU and the slave CPU is severed during high speed serial communication. (However, if a command is issued to the slave CPU to sound the speaker, for example, for 10 seconds, high speed serial communication can be started whilst the speaker is sounding.) With the standard I/O routines provided, sounding the speaker after the RS-232C has been opened for input using BASIC COMO: statements will cause the input to be interrupted. However, RS-232C input automatically resumes after the specified operation has been completed.

Simultaneous I/O operations

Item number	Main CPU interrupt		Main CPU	Slave CPU
1	keyboard input	battery voltage	microcassette input	
2	interrupt	interrupt	microcassette output	
3	interrupt	interrupt	external cassette input	
4	interrupt	interrupt	external cassette output	
5	interrupt	interrupt	LCD display (input)	speaker output
6	interrupt	interrupt	LCD display (input)	printer output
7	interrupt	interrupt	LCD display (input)	RS-232C input
8	interrupt	interrupt	RS-232C output	speaker output
9	interrupt	interrupt	RS-232C output	printer output
10	interrupt	interrupt	RS-232C output	RS-232C input
11	interrupt	interrupt	high speed serial operation	nonoperational

Technical Support Document number 69a

HX-20: version one barcode software

General information

The demonstration program listed at the back of the manual accompanying the version one barcode ROM provides an example of the operation of the ROM, but it does not make clear how the subroutines in the ROM can be employed by the user in a custom applications program.

There are four subroutines in the ROM intended for use by programmers, which are as follows:

Entry point		Purpose of subroutine
Hex	Decimal	
614C	24908	tells the barcode system where the work area is
6100	24832	tells the system which type of code is to be read
6104	24836	reads the line of barcode
6108	24840	tells the system whether check digits are to be used

If BASIC is being used, these should be set up using the DEF USR statement; for example:

```
10 DEF USR0=24908:DEF USR1=24832:DEF USR2=24836:DEF USR3=24840
```

The barcode system always uses the six bytes of memory at locations 0A40 to 0A45 hex (2624 to 2629 decimal). It also requires a 364 byte work area and it is normal to use locations 0A46 to 0BB1 (2630 to 2993) for this purpose. This is carried out from BASIC as follows:

```
20 MEMSET 2994
30 D=USR0(2630)
```

D is a dummy variable and 2630 indicates the start address of the work area. MEMSET is set to just above the end of the work area.

The three lines of BASIC used so far will be needed at the start of every package which is going to use the version one barcode ROM. However, the commands below may be used at any time during the course of a program to switch between different code types or select check digits.

Technical Support Document number 69a

Selecting different barcode types

The USR1 function defined above is used for selecting the type of barcode to be read. The argument supplied to USR1 is the address of the internal ROM routine for decoding the barcode and varies, depending on which code type is to be used, as described below:

Barcode type	Argument for USR1	
	Hex	Decimal
CODE 39	6823	26659
INTERLEAVED 2 OF 5	69EE	27118
MODIFIED PLESSEY (MSI)	6C1D	27677
CODABAR	6E22	28194
EAN 8/13 or UPC A/E	7050	28752

For example, to set up reading some CODE 39 barcode from BASIC:

```
40 D=USR1(26659)
```

Once again D is a dummy variable.

Use of check digits

Some types of barcode support check digits to guard against bad reads. The argument passed to USR3 determines whether check digits are to be used.

Code type	Argument passed		
	0	256	512
CODE 39	no	yes	-
INTERLEAVED 2 OF 5	no	IBM MOD 9/10	-
MODIFIED PLESSEY (MSI)	no	IBM MOD 10	IBM MOD 10/11
CODABAR	no	yes	-
EAN 8/13 and UPC A/E	-	-	-

For example, to use check digits with CODE 39 barcode:

```
50 D=USR3(256)
```

Once again, D is a dummy variable. The EAN and UPC standard barcodes employ check digits as part of their design and USR3 has no effect if these codes are being used. MODIFIED PLESSEY has the option of two check digit schemes; the MOD 10/11 being more comprehensive.

Reading the barcode

To read a code, the USR2 function is used; for example:

```
60 B$=SPACE$(20)
70 R=USR2(VARPTR(B$))
```

B$ is the string variable into which the code is to be read and must first be filled with a number of spaces equal to or greater than the maximum number of characters which the barcode is expected to contain. R is a return status variable and its contents are as follows:

1 to 253	good read; value returned is the number of characters read
255 or -255	keyboard interrupt occurred; read terminated
254 or -254	unwanted interrupt (eg RS-232C, paper feed)
-253 to 0	decoding error

Use of the barcode ROM with the Epson expansion unit

If the HX-20 Epson expansion unit is used with the barcode ROM, the DIP switches in the expansion unit must be changed to reduce the memory available from 32 to 24k. This is necessary in order that the HX-20 recognises the ROM as being installed.

Technical Support Document number 70a

HX-20 with Epson printers

Serial interface compatibility with the HX-20

If an HX-20 is connected to an FX or an RX printer using an 8148 serial board there is a problem with printing. This is caused by the switching noise of the HX-20 RS-232C port when the OPEN or CLOSE statements are executed. If a serial board has not yet been fitted, make sure that either an 8143 or an 8145 is used if the printer is to be used with an HX-20. If an 8148 has already been fitted, the following patch will solve the problem. This will not affect printing if it is run with a printer using either of the other interfaces.

```
10  MEMSET &H0A50
20  FOR I = 0 TO 5
30  READ A
40  POKE &H0A40 + I, A
50  NEXT I
60  DATA &H0086, &H0001, &H00BD, &H00FF, &H0073, &H0039
70  EXEC &H0A40
80  OPEN "0", #1, "COM0:"
90  WIDTH "COM0:", 255
100 PRINT #1, "AAAAAAAAAA"
110 PRINT #1, "BBBBBBBBBB"
120 CLOSE
130 END
```

Explanation

Line numbers	Purpose
10	set aside an area of memory for machine code routine
20-60	read data into bottom of memory
70	execute machine code routine
80	open RS-232C port as a file for output to test routine
90	suppress carriage return/line feed
100-110	test print
120	close RS-232C port

Technical Support Document number 71a

Loading HX-20 binary format RAM files

The RAM files used by BASIC can be saved to and loaded from tape quickly by using the SAVEM and LOADM commands. However, any attempt to load the RAM file back in will produce a BD (bad data) error. This may be overcome by using the program listed below:

```
10  CLS
20  DEFFIL 25,0
30  A$ = "This is record 0"
40  PUT% 0,A$
50  GET% 0,B$
60  PRINT B$
70  RFS = PEEK(&H5A2)*256+PEEK(&H5A3)
80  RFL = PEEK(&H4FE)*256+PEEK(&H4FF)
90  WIND:SAVEM "RAMFILE",RFS,RFS+RFL-1,RFS
100 A$ = "This will be erased"
110 PUT% 0,A$
120 GET% 0,B$
130 PRINT B$
140 TVH = PEEK(&H500):TVL = PEEK(&H501)
150 POKE &H500,PEEK(&H4B2):POKE &H501,PEEK(&H4B3)
160 WIND:LOADM "RAMFILE"
170 POKE &H500,TVH:POKE &H501,TVL
180 GET% 0,B$
190 PRINT B$
```

Note: this program will produce odd effects and will probably crash if the length of the RAM file is decreased before loading it from cassette.

The program works as follows:

Line number	Purpose
10-60	initialise RAM files record size and demo of setting a record
70	obtains starting address of RAM file
80	obtains length of RAM file
90	saves the complete file in binary format
100-130	demo of setting a record to a value that will be overwritten once the RAM file is reloaded
140	obtains the original value of the highest address in memory that LOADM can use
150	sets the highest address that LOADM can use to the highest address that BASIC can use
160	loads the complete RAM file
170	restores the highest address that LOADM can use back to its original value
180-190	proof that it works by getting the record written in line 40

Technical Support Document number 72a

Using the Epson HX-20 expansion unit

Installation

Refer to the 'Expansion Unit Mounting Procedure' booklet supplied with the unit for physical attachment to the HX-20. After mounting the unit you MUST cold start the machine by pressing CTRL @ the first time you use the machine. A cold start must also be carried out when the expansion unit is removed or the configuration changed.

RAM and ROM options

There are three basic configurations for the expansion unit as follows:

1)16k RAM + 18k ROM; with the expansion unit configured this way, the internal optional expansion ROM is disabled and cannot be used. This is particularly relevant to those users who wish to use the packages which contain the COMMS or RAX ROMS.

2)8k RAM + 24k ROM; the internal optional expansion ROM is usable.

3)32k ROM; the internal optional expansion ROM is usable.

In addition to being able to select the RAM/ROM combination for the expansion unit, you can also select the type of ROM which is used within the expansion unit. The types of ROM available for use are as follows:

1)MBM 27C64 CMOS EPROM
SMM 2365 masked ROM

2)NM613128
MBM 27C128

Note: CMOS EPROMS should be used, otherwise battery life will be reduced from the normal 50 hours.

Setting the options

The options described above are selected as follows:

1)RAM/ROM mixture:

Option	Switches 1	2	Configuration
1	ON	OFF	16k RAM + 16k ROM
2	OFF	ON	8k RAM + 24k ROM (when using RAX or COMMS)
3	OFF	OFF	32k ROM

2)ROM type:

ROM type	Switches 3	4	Jumpers 1	2
27C64	OFF	ON	B	B
27128	ON	OFF	A	A

Bank switching

When ROM is installed in both the main HX-20 and the expansion unit, it must be possible to switch between the banks of ROMs. This should only be carried out from machine code; the locations are as follows:

$30 or $31 selects bank 1; the expansion unit ROMs

$32 or $33 select bank 0; the HX-20 main ROMs

Technical Support Document number 73a

HX-20 applications software summary

This is an up to date list of HX-20 software currently available.
In no way is the description of each program complete. For further details, please ring the firm which produced the software package.

Category	Package	Purchase	Telephone number	Description
ACCOUNTING	CASHBOOK	Southern	0803 212957	normal facilities of cashbook including extraction of VAT
	CASH REGISTER	Phipps Associates	01-393 0283	turns HX-20 into pos terminal, front end device for Phipps Assoc. microshop package
	NOMINAL LEDGER	Phipps Associates	01-393 0283	analysis of accounting data over 100+ headings
ACCOUNTS	ACCOUNTS	Kuma	0735 74335	complete accounting system
BARCODES	BARCODE ROM	Epson UK	01-902 8892	decodes input from Epson barcode pen
BARSTOCK	BARSTOCKS	Valldata	0225 705957	incorporates data capture and full stock analysis
	DATACRAFT/ BARSTOCK	Ebor	0904 791595	evaluates wet stock and compares takings
	DESKMASTER 16 BAR STOCK CONTROL	Kuma	0735 74335	mobile stock taking program for multiple number of bars
BUILDING AND QUANTITY SURVEYING	PRICEQ	Forward	0332 49150	uses TAKEQ info and prices the quantities
	TAKEQ	Forward	0332 49150	used in conjunction with traditional measurement procedures
BUSINESS AIDS	CARD INDEX	Epson UK	01-902 8892	stores and retrieves data, 200 character cards
	DESKMASTER 1 OFFICE AID	Kuma	0735 74335	full functions of desktop calculator
	DESKMASTER 6 DECISION MAKER	Kuma	0735 74335	makes decisions through proven scientific theory
	DESKMASTER 8 MAIL LISTER	Kuma	0735 74335	creates mailing list

Technical Support Document number 73a

Category	Package	Purchase	Telephone number	Description
BUSINESS AIDS	DESKMASTER 17	Kuma	0735 74335	used for project analysis and reporting
	PSTIMER	Pracical Software	01-340 0237	records and analyses timekeeping
	TAPSUM	Time and People	01-405 2565	calculation package
COMMUNIC-ATIONS	COMMUNIC-ATIONS ROM	Epson UK	01-902 8892	sends and receives ASCII encoded text blocks
	DESKMASTER 20: HX VIEWDATA	Kuma	0735 74335	
	INTELLIGENT TERMINAL/ EDITOR	Transam	01-404 4554	links to most micro, minis and mainframes
COMMUNIC-ATIONS: ELECTRONIC MAIL	COMTEXT	Talbot Computers	0202 519282	includes fast text editing, search and formatted printed text
	DESKMASTER 4 FRIENDLY TERMINAL	Kuma	0735 74335	transforms HX-20 into intelligent terminal
	DESKMASTER 5 EDITING TERMINAL	Kuma	0735 74335	transforms HX-20 into intelligent terminal
COMMUNIC-ATIONS: REMOTE PRINTING	DIALTEXT	Talbot Computers	0202 519282	uses HX-20 as coordinator in an automatic remote printing system for reports
CURRENCY	CASH EXCHANGE	Kuma	0735 75335	explores trends in currency rates
	CURRENCY CONVERSION	Kuma	0735 74335	selects currency to be bought and calculates conversion rates
	CURRENCY CONVERSION	PDS	0204 493816	selects currency to be bought and calculates conversion rates
DATA CAPTURE /ANALYSIS	DATA CAPTURE	Valldata	0225 705957	user definable data recording system
	DESKDATA	Bits and PCs	0532 458877	includes variable number of lines per record
	DESKMASTER 9 RAM DATABASE	Kuma	0735 74335	suitable for all applications
	MST PORTABLE FILING	MST Consult-ants	0626 832617	allows user to choose card headings
	ROCFILE V42 DATABASE	Rocon Ltd	0235 24206	this is live data program

Technical Support Document number 73a

Category	Package	Purchase	Telephone number	Description
ENTERTAIN-MENT/LEISURE	ADVENTURE	Transam	01-404 4554	DAS HAUS is a version of ADVENTURE
	AIRLINE	Kuma	0735 74335	make enough capital to take over British Airways
	ASTRONOMY 1	Kuma	0735 74335	geocentric planetary ephemeris for HX-20 with expansion unit
	ASTRONOMY 2	Kuma	0735 74335	heliocentric planetary ephemeris for HX-20 with expansion unit
	BIG BANG	Time and People	01-405 2565	involves skill in extinguishing sticks of dynamite
	DIARY	Epson UK	01-902 8892	easy to use 3 month rolling diary
	ENTERTAIN-MENT PACK 1	Kuma	0735 74335	includes moonlander, biorhythm, blackjack 39 steps, etc
	EPSON GAMES 1	Epson UK	01-902 8892	contains bomber, lightcycle, blackjack
	EPSON GAMES 2	Epson UK	01-902 8892	contains cavern, hangman and sketchit
	GAMES	Pocket Computers	0932 57808	contains little brick out, animals, hangman, 3D graph
	GAMES COMPENDIUM	Kuma	0735 74335	contains bandit, hangman and dice
	GAMES PACK 1	Transam	01-404 4554	contains maze and 3D noughts and crosses
	GAMES PACK 2	Transam	01-404 4554	contains frogs, spots, tower, doctor
	GAMES PACK 3	Transam	01-404 4554	contains anagram and hangman, connect 4
	HOME BUDGET	Kuma	0735 74335	keeps track of domestic costs and overheads
	HORSERACE FORECASTING	Kuma	0735 74335	provides odds and recommends a runner
	STAMPOUT	Kuma	0735 74335	avoid hazards in an expanding pattern
FINANCIAL PLANNING/ BUDGETING	COMPUTAX	Kuma	0735 74335	calculates personal tax liability
	DESKMASTER 3 SPREADSHEET	Kuma	0735 74335	uses 15 X 15 matrix
	DESKMASTER 3.5 SPREADSHEET	Kuma	0735 74335	offers extended facilities to above spreadsheet
	DESKMASTER 14- EXPENSES	Kuma	0735 74335	enables build up and service of personal data files

Technical Support Document number 73a

Category	Package	Purchase	Telephone number	Description
FINANCIAL PLANNING/ BUDGETING	ECALC SPREADSHEET SYSTEM	Epson UK	01-902 8892	simple to use, powerful spreadsheet
	EPCALC	Healey Management Services	0268 416155	financial modelling package
	HOME BUDGET	Kuma	0735 74335	keeps track of domestic costs and overheads
	PSINVESTOR	Practical Software	01-340 0237	tool for tracking and analysing an investment portfolio
GOLF HANDICAPPING	GOLF HANDICAPPING	Ebor	0904 791595	accommodates up to 200 members records
	GOLF HANDICAPPING	P & M Data Services Limited	0942 497123	handles 250 members records expanding to 950 handicap records
INSURANCE	COMPUTAX	Kuma	0735 74335	calculates personal tax liability
	INSURANCE MANAGER	LSD Software Limited	01-731 5100	suite of modules showing arithmetic relating to real life situations
	PQS	BPA Computer Systems	0763 73056	personal quotation system
INVOICING	ORDERMASTER	Micro Business Centre	0902 29907	produces order acknowledgements and invoices
LANGUAGES	FORTH	HCCS Ltd	0632 821924	available on an internal ROM
	TINY PASCAL COMPILER	Kuma	0735 74335	standard compiler for HX-20
MAILING LIST	APWRITER (MAILMERGE)	AP Systems Limited	01-399 1257	can create, edit and file both text and names and addresses
	DESKMASTER & LABELLER	Kuma	0735 74335	general purpose label maker
	DESKMASTER 10 MAIL LISTER	Kuma	0735 74335	can maintain name and address file
	MLIST	Epson UK	01-902 8892	can design label size, up to 200 characters per label
MAINTENANCE PLANNING: MAINTENANCE OPTIMISATION	MINI-MAINOPT	CM Mainopt Limited	0793 850222	evaluates financial impact of management decisions
MISCELLANEOUS APPLICATIONS/ SYS	BITWEIGH PORTABLE WEIGHING SYSTEM	BIT Computer Services Limited	0606 888782	portable production measurement and reporting tool

Technical Support Document number 73a

Category	Package	Purchase	Telephone number	Description
MISCELLANEOUS APPLICATIONS/ SYS.	VIEWSCAN TEXT SYSTEM	Wormald Int. Sensory Aids Ltd	0602 820600	portable information handling system
NAVIGATION	NAVIGATIONAL ALMANAC	Kuma	0735 74335	provides information for celestial navigation
	THE NAVIGATOR	Microtek Limited	0473 50152	complete navigation package for small craft
NUMERICAL CONTROL SYSTEMS	CNC	Objex Ltd	0235 24301	portable programming system for CNC machine tools
	NC AND CNC MACHINE TAPE PROG.	Healey Management Services	0268 416155	works at high speed, expanded version copes with 17k program tapes
PAYROLL	PAYE	Pocket Computers	0932 57808	provides filing and calculation system for maintenance of the PAYE tax scheme
	PAYROLL	Kuma	0735 74335	converts user from manual payroll to computerised payroll
	PAYROLL	Southern	0803 212957	deals with up to 50 members of staff including all common tax codes
PHARMACEUTIC-AL LABELLING	CHEMLABEL	Kuma	0735 74335	label printout, can select from 400 drugs already in system, 700 may be stored
	CHEMLABEL	PDS	0204 493816	label printout, can select from 400 drugs already in system, 700 may be stored
	ORALABEL	Orange Computers	0565 53417	holds up to 1000 drug descriptions and approximately 120 dosages. Written in machine code for extra speed
	PHARMACEUTIC-AL LABELLING PACKAGE	Independ-ent Retail Computer Systems	042 1282452	almost entirely written in assembler holds 800 drug records
	PHARMACEUTIC-AL LABELLING PACKAGE	P and M Data Services Limited	0942 497123	holds 410 drug descriptions on the 16k machine and 1200 with the expansion unit

Technical Support Document number 73a

Category	Package	Purchase	Telephone number	Description
PHARMACEUTICAL LABELLING	PHARMASSIST	BPA Computer Systems	0763 73056	drug file of 1000 descriptions stored
POINT OF SALE	MICROSHOP	Phipps Associates	01-393 0283	designed for retailer, used together with QX-10
PRODUCTION/ PROCESS OPTIMISATION	MINI-MAINOPT	CM Mainopt Limited	0793 850222	evaluates financial impact of management decisions
RETAIL	MICROSHOP	Phipps Associates	01-393 0283	designed for retailer, used together with QX-10
	RECEIPT	AP Systems Limited	01-399 1257	for small businesses with under 500 transactions per day produces totals at end of day
	RESTAURANT	AP Systems Limited	01-399 1257	gives itemised receipts for customers in a restaurant with under 500 transactions
SALES ORDER PROCESSING	ORDER/STOCK CONTROL SYSTEM	Measurement Control and Displays	0483 574659	complete processing of orders received through to customer delivery
	SALES ORDER ENTRY	Kuma	0735 74335	stores up to 400 sales/orders
	SALES ORDER ENTRY SYSTEM	Epson UK	01-902 8892	system for remote capture of the order
STOCK CONTROL	DESKMASTER 11 MOBILE STOCK REC	Kuma	0735 74335	can store up to 100 items (425 on 32k)
	DESKMASTER 15 - STOCK CONTROL	Kuma	0735 74335	can store up to 101 records on a 16k machine, or 525 on 32k machine
	STOCK CONTROL	Healey Management Services	0268 416155	can deal with 400 items on the 16k machine and 900 with the expansion unit
	STOCK CONTROL	MST Consultants	0626 832617	can handle 800 items and produces stock lists
	STOCK/SPARES	CM Mainopt Limited	0793 850222	evaluates optimum number of spares to be held
SURVEYING	SURVEY SUITE	Longdin and Browning (Surveys) Limited	055 42357401	carries out all normal survey processing, plotting and computation

Technical Support Document number 73a

Category	Package	Purchase	Telephone number	Description
SURVEYING: BUILDING/ QUANTITY SURVEYING	QUANTAK PRICE Q	Forward	0332 49150	uses info generated and on tape in TAKEQ program and provides for pricing
	QUANTAK TAKE Q	Forward	0332 49150	used together with traditional measurement procedures providing direct input of 'taking off'
TEXT EDITOR	INTEXT	Talbot Computers	0202 519282	includes fast text editing and search facilities
	CORRESPONDENT 20	Epson UK	01-902 8892	can create up to 7 pages, 60 lines by 60 characters on each side of the tape
UTILITIES	CHARACTER GENERATION	Transam	01-404 4554	can generate the 32 user definable graphic characters
	COMTEXT	Talbot Computers	0202 519282	includes fast text editing, search and formatted printed text
	CROSS ASSEMBLY/ DOWN LOAD LINE	Ffoss Ltd	0753 820277	enhances the p system 6800 cross assembler for developing HX-20 software
	DESKMASTER 7 ASSEMBLER/ EDITOR	Kuma	0735 74335	can write and assemble a program in 6301 code on the HX-20
	DISASSEMBLER	Transam	01-404 4554	can disassemble 6801 mnemonics. A 6801 assembler is now under development
	DISASSEMBLER - PROLOG	Kuma	0735 74335	can follow branches in code as they occur
	GRAPH PLOTTER	CM Mainopt Limited	0793 850222	2 basic subroutines which generate graphical representations of tabular information
	HX-20 DEVELOPMENT SYSTEM	Transam	01-404 4554	cross-assembler running on CP/M computers. The assembled code may then be downloaded into the HX-20

Technical Support Document number 73a

Category	Package	Purchase	Telephone number	Description
UTILITIES	LO-RAX	Ffoss	0753 820277	for the software developer who needs totally reliable random access management of the microcassette
	RAXUTILS	Ffoss	0753 820277	for applications which use the RAX random access microcassette system
	THE HOUSEKEEPER	AP Systems Limited	01-399 1257	nine utility programs to aid the user
	USER DEFINABLE GRAPHICS	Kuma	0735 74335	quick and easy way to set up special characters
WORD PROCESSING	APWRITER	AP Systems Limited	01-399 1257	can create, edit and file both text, names and addresses
	DESKMASTER 2 V1.10	Kuma	0735 74335	includes character string search, cursor position markers, etc
	DESKMASTER 2/D	Kuma	0735 74335	to be used with the HX-20 and TF-20 disk drive
	FFOSSWRITER	Ffoss	0753 820277	full featured word processor for the HX-20 with true random access to tape
	FFOSSWRITER	Kuma	0735 74335	features include menu driven commands quick reference card dedicated function keys, etc
	INTEXT	Talbot Computers	0202 519282	includes fast text editing and search facilities
	SM UNITEX	SM Software (UK) Ltd	0453 46065	full screen editing, audio return, remote transmission and text blocks
WORK STUDY	COMTIME	Healey Management Services	0268 416155	allows engineer to carry out his study, input RA and CA, element frequency and all the necessary editing

Technical Support Document number 74a

HX-20: version two barcode software

General information

Many companies are now using, or considering the use of, barcode reading systems to replace manual input via a keyboard. The main advantages of a barcode reading system are ease of use, accuracy of data and speed of operation.

The Epson HX-20 Barcode Reading Package is a small set of assembly code routines which may be integrated into an application program written in either BASIC or assembly language.

The BCR Package supports a comprehensive set of facilities which make it suitable for most barcode reading applications:

1)decoding of all popular barcode types:
  code 39
  interleaved 2 out of 5
  EAN 8 and EAN 13
  UPC A and UPC E
  modified plessey
  monarch codabar;

2)bidirectional reading with false start detection and debounce logic;
3)wide tolerance in speed of operation and wide to narrow print ratio;
4)automatic support for check digit verification;
5)support for alternative keyboard input if a label cannot be read.

Included in the BCR Package is a BASIC demonstration/configuration program. This assists in the tailoring of the BCR Package for the particular barcode label which your system uses.

For the majority of labels a minimal configuration may be performed, whilst those with unusual barcode label print formats may have to resort to the many additional features described in section 5 of the manual.

The BCR Package requires an Epson H00BR wand and will run on either a 16k or an expanded 32k Epson HX-20.

Technical Support Document number 75a

HX-20: barcode printing hardware and software

General information

There are currently four firms which produce barcode printing software and hardware. Each firm uses a different system as explained below and this is consequently reflected in the prices of each printing program.

The first company is:

Actel Computers Ltd
The Computer Centre
Bugbrooke Road
Gayton
Northampton
NN7 3EU

Tel: 0604 858011

This is purely software and consists of a BASIC program which reads code 39, plessey and codabar barcodes.

The second company is:

Altek Instruments
1 Green Lane
Walton on Thames
Surrey

Tel: 09322 44110

The basic off the shelf program costs £25 and prints code 39 only using the bit image mode printer control codes on an Epson printer. It is purely a software program. Custom barcode software is available on request.

The third company is:

Ecupan Ltd
PO Box 40
Hertford
SG13 7HE

Tel: 0992 552426

This company has constructed a sophisticated barcode printing kit, which is capable of producing all the common types of barcode. Currently they are charging £2741 for the flexiprinter unit, £495 for the format program and £520 for an HX-20 containing a special EPROM and special BASIC program. Alternatively, the EPROM and the BASIC program can be purchased separately for £165. There is also a data collection program which costs £400.

Technical Support Document number 75a

The fourth company is:

SB Electronic Systems Ltd
Arden House
Arden Grove
Harpenden
Hertfordshire
AL5 4SL

Tel: 05827 69991

This firm produces solely Telepen barcode, which is their registered trademark. They produce both a parallel and a serial interface board, which are mounted inside an Epson printer in the same position as an RS-232C board would normally be mounted. The boards cost £198. Special printer control codes exist for printing different modes of Telepen barcode.

Technical Support Document number 76a

HX-20 communications

General information

This is a list of companies which provide communication services for the HX-20. The list is split into various categories.

HX-20 to QX-10

Company	Telephone number
Actel	0604 858011
AP Systems	01-399 1257
Berisford	0606 888782
Southern Computers	0803 212957
Talbot Offset	01-907 1992
Transam	01-404 4554

Intelligent terminals to mainframe

Company	Mainframes	Telephone number
IMI Computing	Honeywell, IBM, ICL	021 3564848
STC	DEC, Honeywell	0279 26777
Technology for business	Honeywell, IBM, ICL	01-837 1271

HX-20 for telex / Telecom gold / electronic mail

Company	Telephone number
BL Systems	01-486 6000
Norbain	0734 752201
Talbot Offset	0202 519282
Wilder and Company	04862 21554

Technical Support Document number 77a

HX-20 applications software: CARD INDEX

CARD INDEX forms part of the Epson personal office suite of programs. It enables you to devise and structure a personal card index system for use on the portable HX-20. Thus wherever you are you will be able to summon selected information on the screen and when required print it on either the internal or on an external printer.

The program gives you maximum flexibility in operating the index. You can create cards, edit and change them, store them for future use and update or remove them as required. At any time, the HX-20 will list all the cards or a particular card which you specify or select from the index according to criteria which you have defined.

The applications are legion so that anyone who needs to keep personal files for quick reference can benefit from operating CARD INDEX. Thus a salesman can keep a record of his customers and equipment purchased, a manager can keep a list of his employees and personal details and an engineer can keep a record of spare parts.

The package includes the RAX ROM which allows pseudo random access on cassette tapes.

The software provides prompts throughout the program and error messages if you make a mistake. The commands have been kept simple and as near to English as is possible.

Technical Support Document number 78a

HX-20 applications software: CORRESPONDENT 20

CORRESPONDENT 20 is a word processor program which provides a fast and flexible means of writing and storing pages of text in the HX-20. This is ideal for lengthy documents as well as short memos and letters.

Working on a page size of 60 characters across by 60 lines down, the HX-20 display screen acts as a window which is moved across the page when typing or editing text. Editing commands are provided both by HX-20 BASIC and by the more powerful CORRESPONDENT 20 set of screen edit functions, accessed by the programmable function keys.

A directory file at the beginning of the microcassette provides a very useful reference when storing or retrieving pages of text, providing filename and page dimension information.

CORRESPONDENT 20 text pages can be printed out either on the internal printer or on an external printer via the RS-232C interface.

Technical Support Document number 79a

HX-20 applications software: DIARY

DIARY forms part of the Epson personal office suite of programs. It enables you to record morning and afternoon appointments and by scrolling through the calendar, note at a glance whether appointments have been booked on a particular day. You can devise your own system of recording special events by using any character on the keyboard which appears alongside the required date on the diary.

DIARY on the HX-20 also records recurrent events so that once you have specified the frequency of any event, it will be registered on the relevant DIARY page automatically. Thus even if you forget an important event, you can rely on the HX-20 to remind you.

A 24 hour clock enables you to check the date and time and you can reset the clock if necessary.

The package includes the RAX ROM which allows pseudo random access on cassette tapes.

The software provides prompts throughout the program and error messages if you make a mistake. The commands have been kept simple and as near to English as is possible.

Technical Support Document number 80a

HX-20 applications software: DIY

Consider the benefits of being able to create and run your own data entry program without any knowledge of computer languages and computer programming. With the Epson DIY system, this becomes not only possible but practicable using your HX-20 portable computer. The system enables you to create your own program using the full keyboard facilities (that is, both alpha and numeric characters), giving you maximum flexibility in designing the formats for gathering and storing information. You can now tailor a data entry system to your own requirements and ensure that all those who enter data into the HX-20 will follow the instructions and formats which you have laid down.

The DIY system is in two parts:
1)DIYGEN which generates the program according to your instructions;
2)DIYRUN which runs the program according to the instructions given in DIYGEN.

Thus, for example, managers creating a program for capturing data in DIYGEN can set out the formats and instructions which must be used by their staff when entering data using DIYRUN. Armed with a powerful program in your portable computer, the applications are widespread; for example, the person responsible for stock records can take his HX-20 with him as he examines stock and record information on products, quantities, prices etc which will be stored in the HX-20 according to a prescribed procedure. A salesman can use the DIY system to take orders on a customer's premises. A shopkeeper can devise a program for keeping records of goods ordered and in stock and enter relevant data into the HX-20 as he moves around the shelves in his shop. An engineer can use the system for taking readings on testbeds. A manager can use the DIY system for keeping records about employees and their work performance.

The applications are legion, wherever there is a requirement to store and handle data.

Technical Support Document number 81a

HX-20 applications software: ECALC

ECALC is a 'spreadsheet calculator' program designed for the entry, storage, retrieval and analysis of data using a two dimensional work area organised into rows and columns.

Although ECALC is able to produce extremely complex financial models and forecasts, the inexperienced user will find it very easy to achieve simple and rapid transformations of data within the matrix. For example, the price of a range of products dependent on currency exchange rates may very quickly and accurately be recalculated in one step by simply changing the value of the conversion rate.

ECALC is a specially written version of the more popular calculator programs on the market today, incorporating all the most useful commands and allowing flexible and rapid manipulation of data in a form easily tailored to the user's own needs.

Technical Support Document number 82a

HX-20 applications software: INTEXT

INTEXT is a stand alone 'mini word processor' with communications especially designed for use on the HX-20 computer. It capitalises on the unique features of the HX-20 to provide a text editor which can be used anywhere without complicated setting up procedures and without inconvenient add ons or bulky external equipment. Nevertheless, the documents produced by INTEXT are fully formatted for easy downloading into non portable office terminal equipment, rapid print out through external printers, easy transmission in ready to use format to typesetting and publishing establishments. Using the communications section of the program, access over the telephone system using a modem or acoustic coupler to almost any remote database can be achieved.

As INTEXT is written in machine code, high speed operation is standard and a file length of just over 12500 characters is available before there is any need to save to tape, print out on an internal or on an external printer, or output through the RS-232C interface. Text is retained in non volatile RAM memory whether the HX-20 power is on or off for as long as is deemed necessary.

Inevitably, any word processing package has a complex array of key functions and procedures to deal with the full range of basic editing routines and the facilities for loading, saving, printing and transmission to peripheral devices. Control of the program is simple once the control sequences have been mastered.

Technical Support Document number 83a

HX-20 applications software: MAILING LIST (MLIST)

MAILING LIST forms part of the Epson personal office suite of programs. It enables you to devise and structure a personal mailing list for use on the portable HX-20. Thus wherever you are you will be able to summon selected information on the screen and when required print it onto labels on either the internal printer or on an external printer.

The program gives you maximum flexibility in operating the mailing list. You can create items, edit and change them, store them for future use and update or remove them as required. At any time the HX-20 will list all the names or a particular item which you specify or select from the mailing list according to criteria which you have defined.

The applications are widespread and everyone who needs to keep an updated customer or dealer list as well as a personal list of addresses can benefit from operating MAILING LIST. MAILING LIST can be classified by region, nature of business, product type, credit rating etc. Thus you can keep detailed information on customers and select addresses for direct mail activity.

The package includes the RAX ROM which allows pseudo random access on cassette tapes.

The software provides prompts throughout the program and error messages if you make a mistake. The commands have been kept simple and as near to English as is possible.

Technical Support Document number 84a

HX-20 applications software: SALES ORDER ENTRY

Consider the benefits of salesmen being able to take orders, answer sales enquiries, quote prices and discounts and issue receipts at the touch of a button and on the customer's premises.

All this becomes not only possible but practicable using the Epson HX-20 portable computer and the Epson SALES ORDER ENTRY system.

With this system a salesman can load an updated stock file from the head office computer on to the HX-20 and visit a customer, confident in the knowledge that he will be able to present a recent stock position and take an order which checks against the stock file and either subtracts from the current stock or, if there is no current stock, registers an order for stock which can be delivered as soon as possible.

Prices, VAT charges, line and customer discounts are all calculated by the HX-20 so that within seconds the customer can be given precise information on the true cost of an order and if accepted can be confident that as the order is stored in the computer, it will be processed automatically. The HX-20 also prints out a receipt for the customer's records.

Once the salesman has visited his customers, he can transmit the orders from the HX-20 to the head office computer and the HX-20 automatically prints out the total value of the orders taken, so that the salesman has an immediate record of his activity on which he can calculate his commission.

The HX-20 thus becomes an important sales aid for the salesman and an invaluable asset for the head office accounts department, whose computer is regularly provided with updated information on orders received and the current level of stock.

The package includes the communications ROM which handles the link with the head office computer.

The software provides prompts on the screen at every step of the program and has been designed so that the commands are kept simple and as near to English as is possible.

Technical Support Document number 87a

HX-20: setting the external printer in CARD INDEX, DIYRUN and MAILING LIST

To set the external printer in CARD INDEX, DIYRUN and MAILING LIST, carry out the following procedure:

1)select BASIC from the menu;

2)type: OPEN "O",1,"COM0:(blpsc)":CLOSE 1
where (blpsc) are the parameters detailed on pages 3-46 and 3-47 of the HX-20 Basic Reference Manual;

3)type the following:

for CARD INDEX:	POKE 12495,1:POKE 12496,1:POKE 12497,1
for DIYRUN:	POKE 5993,1:POKE 5994,1:POKE 5995,1
for MAILING LIST:	POKE 12845,1:POKE 12846,1:POKE 12847,1

To alter the parameters in DIYGEN, LIST the program in BASIC and alter line 5002.

Technical Support Document number 88a

HX-20: using C60 tapes with CARD INDEX and MAILING LIST

General explanation

Users of CARD INDEX and MAILING LIST with C60 cassettes who store more than 102 cards or items may have encountered a problem. This does not apply to users with C30 tapes or those with AB ROM machines with serial numbers above 25000. The patch to overcome this problem is as follows:

When initialising a C60 tape:

1)select the Initialise option on the menu;
2)wait for it to finish;
3)switch the HX-20 off and then on again;
4)select the Monitor option on the menu;
5)type: SB4C ⟨RETURN⟩
  The machine shows: SB4C 01
  type: 2 ⟨RETURN⟩
  The machine shows: SB4C 01 2
  type: .(full stop) ⟨RETURN⟩
6)switch the HX-20 off and then on again.

This prevents the problem.

EPSON

EPSON (UK) LIMITED
DORLAND HOUSE, 388 HIGH ROAD WEMBLEY,
MIDDLESEX HA9 6UH 01-902 8892