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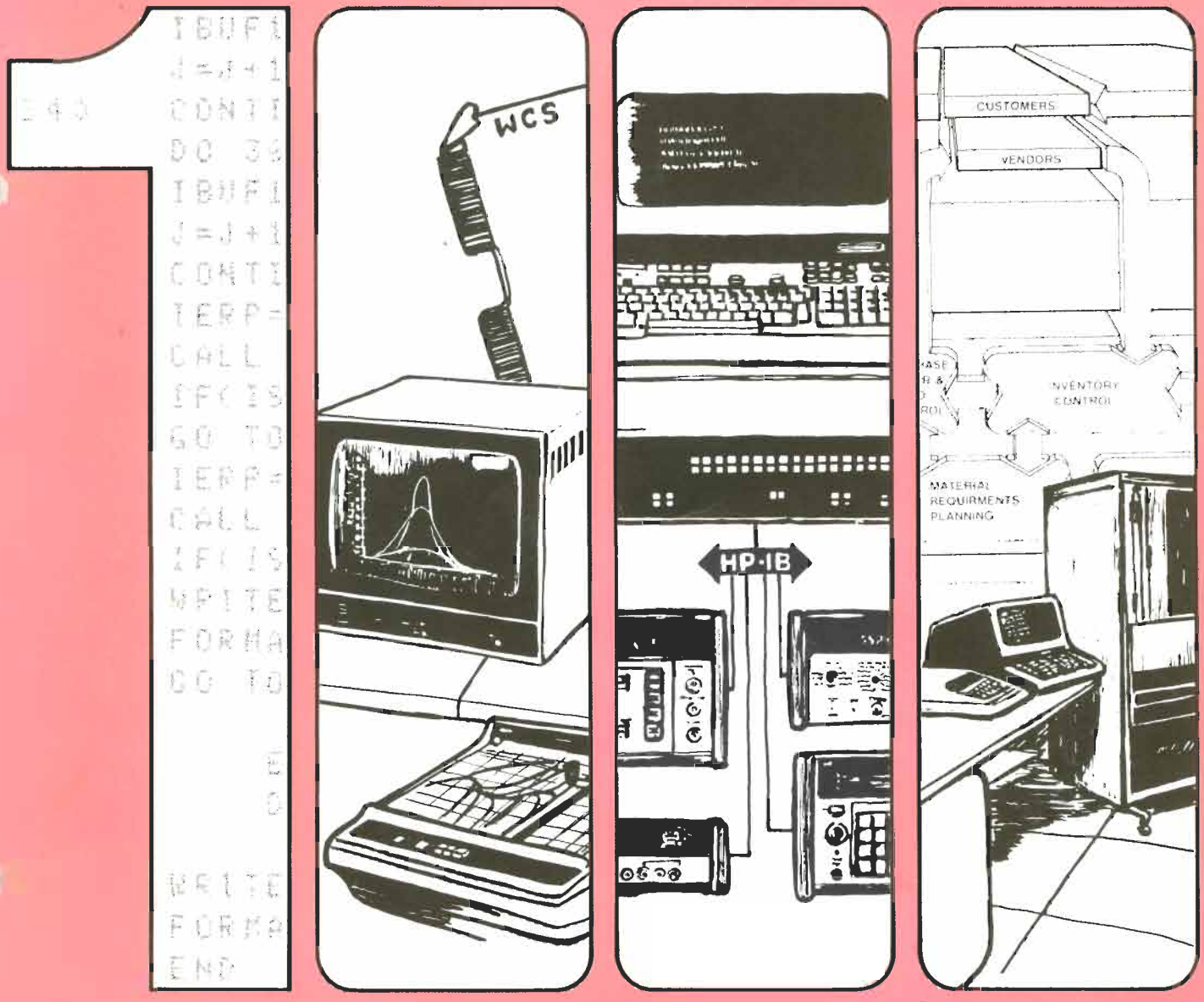
Computer Systems

COMMUNICATOR



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EDITOR'S NOTE

Welcome to the holiday issue of the Communicator 1000. With this issue, we end 1977 and begin preparation for 1978. This year has seen the Computer Systems Communicator give birth to the Communicator 1000. Many informative articles about the HP 1000 have been placed onto the pages of the Communicator. Why . . . because of YOU. Our goal this year was to keep you informed of applications and new innovations for your HP 1000. If you believe 1977 was a good year for the Communicator 1000, 1978 holds even greater expectations for you. With that in mind, we at Hewlett-Packard would like to end this year and begin next year by wishing you a happy and healthy holiday season.

In this issue . . . RTE, 3070A information, a special holiday salute and much more.

Don't forget USER'S QUEUE. This column is YOURS. If you have an interesting program, helpful hints, or techniques, send them to us. Refer to USER'S QUEUE for the address.

If you have comments or questions concerning the Communicator 1000, please send them to:

EDITOR
HP DATA SYSTEMS DIVISION
COMPUTER SYSTEMS/COMMUNICATOR 1000
11000 WOLFE ROAD
CUPERTINO, CALIFORNIA 95014

We at Hewlett-Packard are doing our best to keep you informed about the HP 1000.

CONTENTS

Welcome to USER'S QUEUE, that part of the Communicator 1000 that is written by the user, for the user, and about the user.

In this issue, we have information sent to us from *Dick Martin* of the Naval Ocean Systems Center in San Diego, CA. He writes to us concerning a program, &REFRM, that appeared in issue three.

"Issue 3 of the Communicator contained a program, &REFRM, to allow a system cartridge to be mounted on a peripheral subchannel.

There appear to be two problems with the method suggested. First, the system maintains no Track Assignment Table for peripheral disc so the subroutine should not be necessary and could be troublesome. Second, FMGR will place any new files in the disc areas pointed to by the directory entries in sector 14 which was to contain dummy purged files. After the restore operation, the files created under REFRM will be found to have overwritten good files, and will have the name of the file that was overwritten.

To preserve the health of your files, it is recommended that sector 14 be filled with dummy type 0 files (even all of same name) which cannot be read or written."

```
FTN4,L
      PROGRAM REFRM
C
C
C     PROGRAM TO ALLOW MOUNTING A SYSTEM DISC ON A PERIPHERAL
C     SUBCHANNEL. THIS LETS YOU ACCESS THE FMGR PORTION OF A
C     SYSTEM PLATTER FROM ANOTHER SYSTEM.
C
C     TO RUN THIS PROGRAM TYPE:
C               RU,REFRM,IDSK,LTRK,IFLG
C     WHERE:    IDSK = PERIPHERAL DISC LU
C               LTRK = TRACK NUMBER OF THE DIRECTORY TRACK
C                      (SAME AS REPORTED IN "DC" COMMAND)
C               IFLG = 0 PATCH FOR ACCESS
C                      1 RETURN TO ORIGINAL STATE
C
C     **************************************************
C     CAUTION: WHEN FINISHED, THIS PROGRAM MUST BE CALLED
C              A SECOND TIME WITH IFLG = 1. IF THIS STEP IS
C              NOT DONE, THE FMGR PORTION OF THE DISC WILL
C              NOT BE READABLE BY THE SYSTEM ON THAT PLATTER!
C     **************************************************
C
C     STOP 1 MEANS ONE OR MORE OF THE PARAMETERS ARE BAD.
C     STOP 67 MEANS THE FILE NAMED ) (%$#' CANNOT BE CREATED,
C     STOP 66 MEANS THE FILE NAMED ) (%$00 CANNOT BE CREATED,
C     (ALREADY EXISTS OR NO ROOM) AND THE PROGRAM IS ABORTED
C     BEFORE IT HAS A CHANCE TO DO ANYTHING.
C
C
      DIMENSION IDCB(144),JDCB(144),IBUF(128),JBUF(128)
      DIMENSION IP(5), KBUF(128), IPURG(128)
      DIMENSION INAME(3),JNAME(3)
      EQUIVALENCE (IP(1),IDSK),(IP(2),LTRK),(IP(3),IFLG)
      DATA INAME/2H)(,2H%$,2H#'/
      DATA JNAME/2H)(,2H%$,2H00/
      DATA JBUF/
     $2H)(, 2H%$, 2H00, 0, 0, 0, 0, 0, -1, 0, 0, 0, 0,
     $ 0, 0, 0,
     $2H)(, 2H%$, 2H00, 0, 0, 0, 0, 0, -1, 0, 0, 0, 0,
     $ 0, 0, 0,
     $2H)(, 2H%$, 2H00, 0, 0, 0, 0, 0, -1, 0, 0, 0, 0,
     $ 0, 0, 0,
     $2H)(, 2H%$, 2H00, 0, 0, 0, 0, 0, -1, 0, 0, 0, 0,
     $ 0, 0, 0,
     $2H)(, 2H%$, 2H00, 0, 0, 0, 0, 0, -1, 0, 0, 0, 0,
     $ 0, 0, 0,
     $2H)(, 2H%$, 2H00, 0, 0, 0, 0, 0, -1, 0, 0, 0, 0,
     $ 0, 0, 0,
     $2H)(, 2H%$, 2H00, 0, 0, 0, 0, 0, -1, 0, 0, 0, 0,
     $ 0, 0, 0,
     $2H)(, 2H%$, 2H00, 0, 0, 0, 0, 0, -1, 0, 0, 0, 0,
     $ 0, 0, 0/
C
      DATA IPURG/128*-1/
C
C     PROCESS PARAMETERS
C
      CALL RMPAR (IP)
      IF (LTRK .EQ. 0) LTRK=202
      IF (IDSK .EQ. 0) STOP 1
      IF (IFLG .EQ. 1) GO TO 50
      IF (IFLG .NE. 0) STOP 1
C
C     READ IN CARTRIDGE DIRECTORY AT SECTOR 0
C
      CALL EXEC(1,IDSK,IBUF,128,LTRK,0)
C
C     CREATE FILE TO HOLD CARTRIDGE DIRECTORY
C
      CALL CREAT (IDCB,IERR,INAME,1,1,0,-2)
      IF (IERR .LT. 0) WRITE(1,10)IERR
   10 FORMAT(/"CREATE ERROR:  FMGR",I3,/"DISC IS
     $UNCHANGED",/"REFRM ABORTED"//)
      IF (IERR .LT. 0) STOP 67
C
C     REPLACE CARTRIDGE DIRECTORY WITH
C     LOGICAL DIRECTORY BLOCK 0 FROM SECTOR 14
C
      CALL EXEC(1,IDSK,KBUF,128,LTRK,14)
      CALL EXEC(2,IDSK,KBUF,128,LTRK,0)
C
C     PLACE A BLOCK OF PURGED FILES AT SECTOR 14
C
      CALL EXEC(2,IDSK,IPURG,128,LTRK,14)
C
C     MAKE SURE THERE ARE NO FILES NAMED )(%$00
C     ANYWHERE IN THE SYSTEM
C
      CALL OPEN(JDCB,IERR,JNAME,0)
      IF (IERR .EQ. -6) GO TO 30
C
C     IF FILE OF THIS NAME THEN RESTORE CARTRIDGE
C     DIRECTORY CLOSE THE FILES, PURGE )(%$#', AND ABORT.
C
      CALL EXEC(2,IDSK,IBUF,128,LTRK,0)
      CALL EXEC(2,IDSK,KBUF,128,LTRK,14)
      CALL CLOSE(IDCB,IERR)
      CALL CLOSE(JDCB,IERR)
      CALL PURGE(IDCB,IERR,INAME,0,-2)
      WRITE(1,20)
   20 FORMAT(/"FILENAME OF )(%$00 ALREADY EXISTS,"/
     $"DISC IS UNCHANGED"/"REFRM ABORTED"//)
      STOP 66
C
C     FILE )(%$00 DOES NOT EXIST SO SAVE THE
C     CARTRIDGE DIRECTORY IN THE FILE )(%$#'
C
   30 CALL WRITE (IDCB,IERR,IBUF,128)
C
C     CLOSE THE FILE
C
      CALL CLOSE (IDCB,IERR)
```

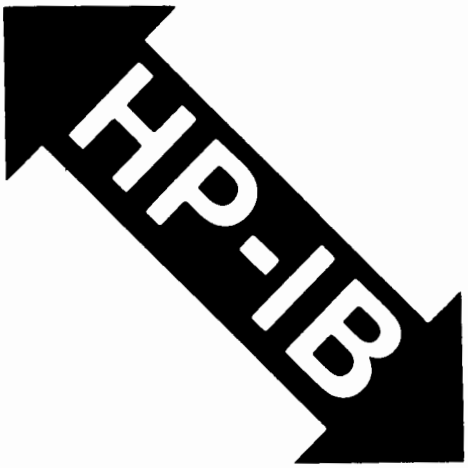
```
C
C     REPLACE THE BLOCK OF DUMMY PURGED FILES WITH
C     A BLOCK OF DUMMY TYPE 0 FILES WHICH CANNOT BE
C     USED FOR READ OR WRITE AND ARE READ AND WRITE
C     PROTECTED BY SECURITY CODE. FMGR WOULD OTHERWISE
C     USE THE PURGED FILE AREA FOR NEW FILES.
C
      CALL EXEC(2,IDSK,JBUF,128,LTRK,14)
C
C     SEND READY MESSAGE
C
      WRITE(1,40)IDSK
   40 FORMAT(/"THE FMGR PORTION OF DISC ON LU ",I2,
     $" MAY NOW BE ACCESSED."/)
      GO TO 70
C
C     COME HERE TO RESTORE DISC TO SYSTEM PLATTER FORMAT
C     OPEN THE FILE
C
   50 CALL OPEN (IDCB,IERR,INAME,0,-2)
C
C     READ IN THE CARTRIDGE DIRECTORY
C
      CALL READF (IDCB,IERR,IBUF,128,LEN)
C
C     READ IN LOGICAL DIRECTORY BLOCK 0
C
      CALL EXEC(1,IDSK,KBUF,128,LTRK,0)
C
C     WRITE CARTRIDGE DIRECTORY BACK TO SECTOR 0
C     THEN CLOSE AND PURGE THE FILE IT WAS IN.
C
      CALL EXEC(2,IDSK,IBUF,128,LTRK,0)
      CALL CLOSE (IDCB,IERR)
      CALL PURGE (IDCB,IERR,INAME,0,-2)
C
C     WRITE LOGICAL DIRECTORY BLOCK 0 BACK TO SECTOR 14
C     THEREBY PURGING THE DUMMY TYPE 0 FILES NAMED )(%$00.
C
      CALL EXEC(2,IDSK,KBUF,128,LTRK,14)
C
C     SEND DONE MESSAGE
C
      WRITE(1,60)IDSK
   60 FORMAT(/"DISC ON LU ",I2," IS RESTORED TO
     C ORIGINAL STATE."/)

C
   70 END

**
```

A big "thank you" goes out to ***Dick Martin*** of Naval Ocean Systems Center for passing this information along to us.

If you have tips, techniques, applications, or other technical information you feel would be beneficial to all our other readers, send it to:

USER'S QUEUE/COMMUNICATOR 1000
HP DATA SYSTEMS DIVISION
11000 WOLFE ROAD
CUPERTINO, CALIFORNIA 95014

Remember, this column depends on your input. If you have done something with your HP 1000, it is very likely that someone else might be trying to do the same thing. Send your ideas to us and let all of our readers see if it's what they are looking for.



3070A AND RTE 3070A UTILITIES SIMPLIFY DATA CAPTURE AND HP-IB OPERATIONS

Mark Beswetherick/DSD

DESCRIPTION OF THE 3070A TERMINAL

The 3070A Real Time Applications Terminal, manufactured by HP's Grenoble Division, is an easy-to-use terminal well suited for factory data collection applications. The terminal has a 14 key numeric key-pad, and an easy to read 16-position display. The 3070A also has 15 prompting lights that can be turned on and off under program control. The lights can be labelled and used to direct an operator to perform particular tasks, such as enter numeric information like part numbers or quantities. In addition, 10 special function keys on the terminals can be programmatically assigned to various conditions. An operator could then use the special function keys to convey information such as category of part, destination of part, error condition, or end of data.

THE HP SERIAL LINK

The 3070A terminal is connected to HP 1000 systems by means of the HP Serial Link. Up to 63 3070A's can be physically connected to one serial link. Each terminal on the link is identified by a unique address which is set on a switch block on the 3070A. Each 3070A to be used in an RTE system must have an equipment table entry. Therefore, the number of terminals that can be used in an RTE system is limited by the number of available equipment table entries. The HP Serial Link itself can be up to 4 km (2.5 miles) long, and any terminal can be as far as 2 km away from the computer. Connection boxes similar to phone jacks are spaced along the length of the link. The 3070A cable can be plugged into, or unplugged from a connector while on line — all without disturbing the link. This feature might prove useful in a warehouse environment where connection boxes could be placed at key points. One 3070A could be carried by an operator, and plugged in and used to take inventory at specified locations.

The HP Serial Link is interfaced to the computer by the 40280A Serial Link Controller, which occupies one I/O slot. The 40280A automatically polls all 3070A terminals connected to the link, which greatly reduces software overhead. The 40280A also handles errors using a cyclical redundancy check, and automatically asks for retransmission if an error occurs.

HP-IB OPERATION

Another important feature of the 3070A is that up to 13 HP-IB devices can be connected to, and programmed through the 3070A. One advantage provided by this capability is that the 3070A and its associated HP-IB instrument cluster can be disconnected from the HP Serial Link, moved to a different point on the link, then reconnected, thus providing a portable testing capability. Additionally, HP-IB devices connected to a 3070A can be as far as 2 km away from the computer. A word of caution here — due to the structure of the HP Serial Link and the operations performed by the Serial Link Controller, HP-IB operations are fairly slow. A general rule of thumb that can be used is that if operations are manually paced, the link will be fast enough to provide satisfactory response. However, an instrument cluster connected to a 3070A may not operate with sufficient speed to satisfy automatic testing requirements. An alternative in this case would be to buffer the data using an HP 2240A Measurement and Control Processor or an HP 9825A Calculator.

THE HP 3070A TERMINAL UTILITY SUBROUTINES FOR RTE AND HP-IB DEVICES

The features previously described make the 3070A easy to use. Now the 3070A is also easy to program, thanks to the HP 3070A Terminal Utility Subroutines for RTE and HP-IB Devices. The 3070 Utilities have just been added to Data Systems Division's Library of Contributed User Software (LOCUS). The routines provide simple function and subroutine calls that allow terminal data entry operations such as:

- select normal or transparent mode of operation
- turn prompting lights on and off
- enable special function keys as terminators
- recognize special function keys or service requests

The 3070A is used in normal mode when no HP-IB operations are being performed. In normal mode, the Serial Link Controller Driver (DVA47) automatically configures the terminal keypad as a talker (sending device), and the terminal display as a listener (receiving device). When HP-IB devices are connected to the 3070A, transparent mode is used. This allows talk and listen addresses of other HP-IB devices to be specified.

EXAMPLE DATA ENTRY PROGRAM

The following program shows the use of the 3070A as a data entry device. The 3070A is cleared in line 11, and set to normal mode in line 15. Special Function Key (SFK) #2 is enabled as an input terminator in line 19. SFK #2 is used by an operator at the 3070A to indicate end-of-data. The next part of the program is the data entry loop itself. First, prompting light #1 is turned on in line 28. This directs an operator to enter a part number, or to terminate the data entry by hitting SFK #2. Prompting light #1 would be labelled "PART #/END" on the terminal. Next, a read is issued to the 3070A. In this program it is assumed that part numbers are in integer format, hence the free-field input in line 32 is sufficient to read the number. Lines 36 and 37 check to see whether the input was completed by SFK #2 or the enter key. If SFK #2 was pressed by an operator indicating end-of-data, the function SRKEY would put a 2 in the variable ISFK. In this case, we would jump to statement 100, where the data would be stored and the program terminated. If the READ in line 32 was completed by the ENTER key on the 3070A, SRKEY would return a value of 0 in ISFK. The program would then fall down to line 41, where prompting light #1 is turned off and prompting light #2 is turned on. This directs an operator to enter a quantity number. The quantity is read from the terminal in line 45. This completes the loop. The process continues until 100 pairs of data have been entered, or until the operator hits SFK #2, indicating end-of-data.

Figure 1. 3070A Data Entry Program

```
FTN4,L
      PROGRAM DATA
      INTEGER PARTNO(100),QUAN(100),SFK,CLR,SRKEY
C
C  DEFINE 3070A LU #
C
      LU=25
C
C  CLEAR 3070A AND GET 3070A STATUS. IF NEGATIVE, ERROR!
C
      IF(CLR(LU) .LT. 0) GO TO 999
C
C  SET NORMAL MODE. IF FUNCTION RETURN IS NEGATIVE, ERROR!
C
      IF(NTMOD(LU,1) .LT. 0) GO TO 999
C
C  ENABLE SPECIAL FUNCTION KEY (SFK)
C
      ISTAT=SFK(LU,2)
C
C  DATA ENTRY LOOP
C
      DO 100 I=1,100
C
C  TURN ON PROMPTING LIGHT #1,AND TURN OFF
C  PROMPTING LIGHT #2, IF ON
C
      ISTAT=LIT(LU,1,-2,0)
C
C  READ FROM 3070A
C
      READ (LU,*) PARTNO(I)
C
C  CHECK FOR TERMINATION BY SFK #2. IF SO, NO MORE DATA
C
      ISTAT=SRKEY(LU,ISFK)
      IF(ISFK .EQ. 2) GO TO 100
C
C  TURN OFF PROMPTING LIGHT #1 AND TURN ON PROMPTING LIGHT #2
C
      ISTAT=LIT(LU,-1,2,0)
C
C  READ QUANTITY
C
      READ(LU,*) QUAN(I)
100   CONTINUE
C  .
C  .
C  STEPS TO PROCESS AND STORE DATA
C  .
C  .
      GO TO 900
C
C  ERROR MESSAGE
C
999   WRITE (1,1000)
1000  FORMAT ("3070 ERROR OCCURED!")
C
C  NORMAL TERMINATION
C
900   ISTAT=CLR(LU)
      END
```

The calls CLR, NTMOD, SFK, LIT, and SRKEY are provided as part of the 3070A Utilities. These utilities simplify matters greatly, as operations shown in the example program would previously have been implemented as combinations of input, output, and control EXEC requests.

3070A UTILITIES USED TO CONTROL HP-IB OPERATIONS

In addition to providing high-level calls for data entry applications, the 3070A Utilities also allow control of HP-IB activity through the 3070A. The 3070A Utilities provide straightforward calls to accomplish the following tasks:

- clear the bus
- control the REN line
- address talkers and listeners
- pass/take control to or from other controllers
- recognize service requests from devices
- perform serial polls
- gain complete control of bus traffic, if desired

The result is that an entire instrument cluster connected to a 3070A can be easily programmed with the 3070A Utilities and simple BASIC or FORTRAN I/O calls.

EXAMPLE HP-IB CONTROL PROGRAM

The program in Figure 2 controls an HP 3455A digital voltmeter connected to a 3070A terminal. The program sends a programming string to the DVM, receives a measurement from the DVM, then outputs that measurement to the system console. This program shows the use of some of the HP-IB related 3070A Utilities. In line 14, the call to CLR asserts the HP-IB Interface Clear line, which clears the 3070A and the bus. The call to REN in line 18 asserts the HP-IB Remote Enable line, which causes the DVM to respond to the computer instead of its own front panel controls. The call to TWRIT in line 24 addresses the DVM as a listener, so that the DVM responds to the subsequent WRITE statement. The call to TREAD in line 30 addresses the DVM as a talker, and the DVM outputs a measurement in response to the subsequent READ statement.

CONCLUSION

Data capture applications and remote low-speed HP-IB testing applications can be easily implemented using the 3070A terminal and 3070A Terminal Utilities. The first example program showed the simplicity of controlling terminal features, such as special function keys and prompting lights. The second example demonstrates the ease of HP-IB/3070A operations. The 3070A Terminal Utilities are available now. Order information is available through your local sales office, as is additional information concerning the 3070A terminal.

Figure 2. 3070A/HP-IB Program

```
FTN4,L
      PROGRAM DVM
      INTEGER CLR,REN
C
C  PROGRAM TO DIRECT AN HP 3455A DIGITAL VOLTMETER
C  TO MAKE A DC MEASUREMENT
C
C  DEFINE 3070A LU
C
      LU=25
C
C  CLEAR THE 3070A AND THE HPIB CLUSTER
C
      ISTAT=CLR(LU)
C
C  SET THE CLUSTER IN REMOTE ENABLE MODE
C
      ISTAT = REN(LU,1)
C
C  ADDRESS THE DVM AS A LISTENER (DVM HP-IB ADDRESS = 3)
C  SEND PROGRAMMING STRING TO SET 1 VOLT DC RANGE, MATH FUNC-
C  TION OFF, INTERNAL TRIGGER, HIGH RESOLUTION AND AUTO CAL ON
C
      CALL TWRIT(LU,3)
      WRITE(LU,100)
100   FORMAT("F1R3M3T1H1A1D0")
C
C  ADDRESS THE DVM AS A TALKER AND READ THE VOLTAGE
C
      CALL TREAD(LU,3)
      READ(LU,101) V
101   FORMAT(E13.6)
C
C  OUTPUT MEASUREMENT TO SYSTEM CONSOLE
C
      WRITE(1,102) V
102   FORMAT(E13.6)
C
C  CLEAR CLUSTER AND TERMINATE
C
      ISTAT=CLR(LU)
      END
```

UNDERSTANDING THE RELATIONSHIP BETWEEN THE DISC DRIVER AND THE USERS BUFFER

Larry W. Smith/Technical Center, NSC

Have you ever wondered about all the events that take place during a disc input or output request? Well, I often get calls from concerned (and sometimes bewildered) users with throughput problems, wanting to know the specifics of an I/O disc transfer. For most applications, this information is not all that useful and is usually hidden to avoid needless confusion. But, on the other hand, in some Real-Time applications, an extra disc access could prove disasterous and result in loss of data from the real world. This article will explore the mechanics of disc transfers by examining the two most commonly used buffers:

1. USERS BUFFER
2. SYSTEM DISC DRIVER BUFFER

By understanding how the system driver and FMP handle these buffers, it will become clear how to optimize your programs.

THE DISC: IT'S REALLY A HIGH-SPEED ASYNCHRONOUS DEVICE

Due to the hardware design of the disc (7900, 7905, 7920 and most other mass storage devices), each data transfer must be at least 128 words long but never more than one track (6144 words). This is one reason why DMA must be used. But, from the RTE systems point of view, this restriction is too costly as it creates too much disc waste. Therefore, RTE logically divides the disc into 64 word sectors so that waste occurring at the end of logical sectors (by such routines as the system generator, RT3GN or RT2GN and the LOADR) is minimized. If the user also adopts this smaller division, an increased overhead must be paid for this convention. To better visualize this, let's look at the disc from a physical and logical level:

PHYSICAL vs LOGICAL DISC DIMENSIONS

DISC TYPE	7900		7905		7920	
	PHY	LOG	PHY	LOG	PHY	LOG
#SURFACES	2	2	3	3	5	5
#TRACKS/SURFACE	203	203	411	411	411	411
#SECTORS/TRACK	48	96	48	96	48	96
#WORDS/SECTOR	128	64	128	64	128	64

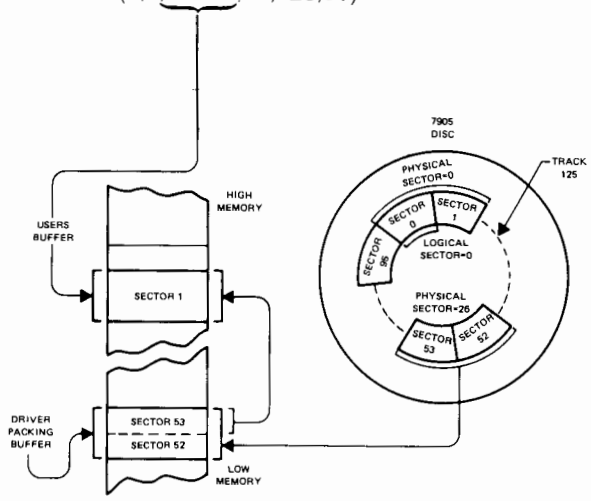
THE PROBLEM: MAINTAINING COMPATABILITY BETWEEN LOGICAL & PHYSICAL

Since the driver must operate according to the physical characteristics of the disc (48 sectors/track with 128 words/sector), it must transform a user request that does not start on an even sector (0,2,4, etc.) into the appropriate number of required physical accesses to retrieve the data. Furthermore, if the requested number of words to be transferred is not an even multiple of 128 words, the driver must also adjust for this by using an internal packing buffer of 128 words. This buffer is local to the driver and will be called the Driver Packing Buffer (DPB). To illustrate some situations that can happen, let's examine some case studies.

CASE 1: User read request not on an even sector.

Users request: Input 64 words from track 125, sector 53.

CALL EXEC(1,2,INBUF,64,125,53)



Sequence of events:

1. Driver inputs physical sector 26 (logical sectors 52 & 53) into driver packing buffer (DPB).

2. Driver then transfers sector 53 (logical) from DPB into users buffer beginning at INBUF(1).

Since the user's requested logical sector was odd, the driver must first input one physical sector into its DPB to obtain logical sector 53. It then must move the upper 64 words of the DPB into the user's buffer. If you have a 21MX series computer, this move is accomplished with the hardware move words instruction (MVW). Otherwise, on previous computers it is simulated by a software subroutine.

As a second example, let's change the request length from 64 words to 128 such that we overlap two physical sectors and see what the driver must do:

Sequence of events:

1. Same as above.
2. Same as above.
3. Driver inputs physical sector 27 (logical sectors 54 & 55) into DPB.
4. Driver finally transfers sector 55 (logical) from DPB into users buffer.

This forces the driver to make an extra access and two memory-to-memory transfers of 64 words each. Typical overhead time to do this on a 21MX-E computer would be as follows:

Disc access time	67.3600 ms *	(256 words)
Memory transfer time	0.2296 ms **	(128 words)
Total =	67.5896 ms	

As you can see, this situation costs you an average of 0.2631 ms per word. This is very expensive and does not include any RTE system overhead to initiate the request before the driver is envoked. As far as the user is concerned, the 64 word request costs slightly more than a millisecond.

REMEDY: Your request should always start on an even sector and the request length an even multiple of 128 words.

CASE 2: User read request length not an even multiple of 128 words.

This case is similar to the one above. The only difference is that the driver must always use its packing buffer regardless of the requested sector. As an example, let's suppose the request length was 127 words from an even sector, say sector 10:

CALL EXEC(1,2,INBUF,127,31,10)

Sequence of events:

1. Driver inputs physical sector 5 (logical sectors 10 & 11) into its DPB.
2. Driver then moves the first 127 words from logical sector 10 of the DPB into the users buffer.

CASE 3: User's write request not on an even sector.

This situation will produce similar results as the above two cases, causing an unwarranted disc access. If the user's request is as follows:

CALL EXEC(2,7,INBUF,64,125,1)

The sequence of events would be:

1. Driver inputs physical sector 0 into DPB.
2. Driver transfers logical sector 1 in users buffer to last 64 words of DPB.
3. Driver finally outputs the DPB to physical sector 0.

The result was another disc access. Similar things can also happen when odd sectors or non-multiples of 128 word request lengths are supplied to the driver.

HOW DOES FMP HANDLE DISC TRANSFERS?

Fortunately, File Manager never accesses the disc until it has rounded up enough words to fill an even multiple of 128, which is a function of the user DCB length in the CREAT or OPEN CALL.

CONCLUSION

The main thing to be concerned when communicating to any device is to

KNOW YOUR DEVICE

---

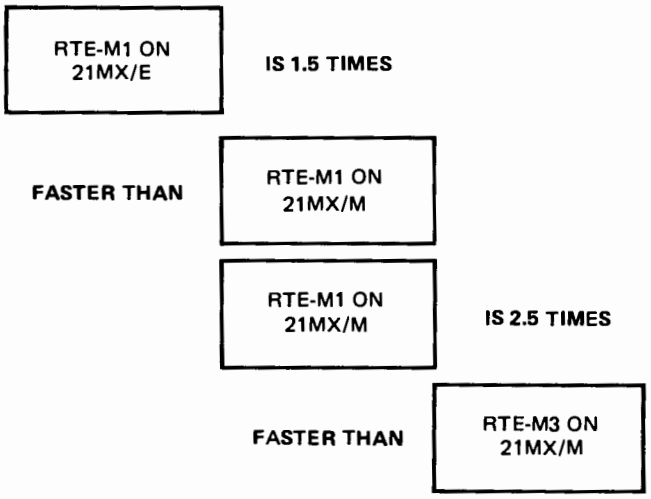
* Typical time required to randomly seek to and read or write a 256 byte record is 33.68 msec.

** Computed by taking the average of high-performance memory, low-performance memory, DMS, and non-DMS.

PERFORMANCE EVALUATIONS ON RTE-M AND 21MX COMBINATIONS

Al Liu/DSD

The bench-mark test was originally performed to measure the response time between the 21MX CPU's and the 2313 Subsystem. However, the results have implications which could be of general interests to our RTE-M users. They indicate significant I/O speed improvements in the following order:



All CPU's had standard performance memories.

The tests basically involved a sequence of analog-to-digital readings followed by digital-to-analog outputs. The sequence was programmatically set up and initiated by a single EXEC call. The actual I/O's were done by DMA. The program was I/O suspended until the last I/O was complete. The last I/O in the sequence was an output to the second channel on the "Dual DAC" card in the 2313 Subsystem. The program repeated the EXEC call in an infinite loop so that visual observations could be made on a scope.

The pacer card in the 2313 Subsystem was set up such that the start of the I/O sequence was triggered by the external START/STOP pulse from a pulse generator. Each subsequent I/O was initiated by the "System Pacer" pulse. The cycle time on the pacer was set programmatically to 30 microseconds (which was arbitrary for the test). Therefore, each I/O was 30 microseconds apart.

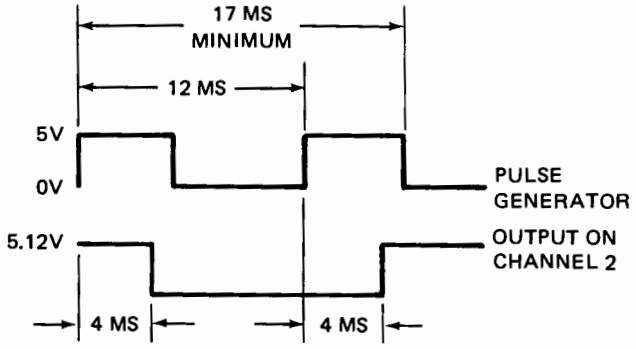
A dual-trace scope was used, one probe attached to the output of the pulse generator and the other to the output of the second channel on the "Dual DAC" card in the 2313 Subsystem. Programmatically, the output to this second channel alternated from 0 to +5.12 volts with each EXEC call so that each sequence could be visually distinguished.

When the pulse generator's output was positive or "on", the "external start" gate on the pacer card was enabled. The "AND" of this gate and the pacer pulse would enable an actual I/O. The width and the frequency of the pulse generated could be manually controlled. This implied that the time span the "external start" gate remained "enabled" and the frequency of it being "enabled" were likewise controlled.

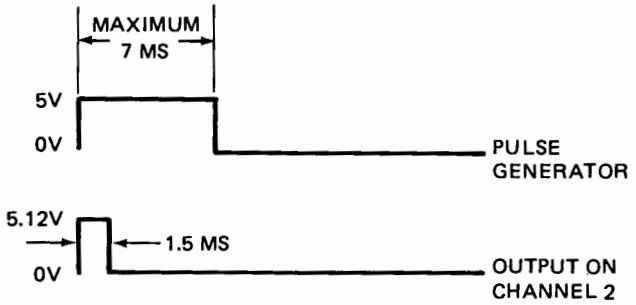
The objective of the test was to determine the time limit at which the system could barely keep up its I/O sequence with the pulse from the generator on a one-to-one basis (i.e., 1 completed I/O sequence for every generated pulse).

The following are the summaries of the observations.

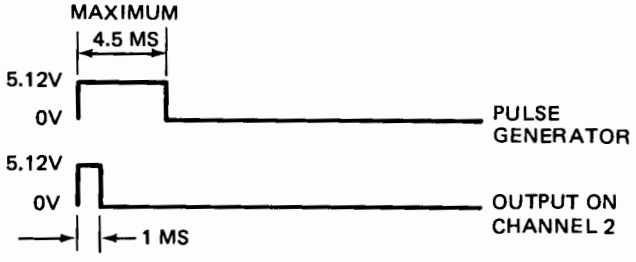
RTE-M3 ON 21MX/M :



RTE-M1 ON 21MX/M :



RTE-M1 ON 21MX/XE



On RTE-M3/21MX-M system, 17 milliseconds must be allowed between the first generated pulse being "on" and the second one being "off" at less than 17 msecs. The system could not initiate its I/O sequence before the "external start" gate was disabled by the second generated pulse going "off". Therefore, the I/O sequence was executed for every other generator's pulse. This means for that system, the overhead and I/O execution took approximately 17 milliseconds.

The RTE-M1/21MX-M system responded so fast that it was not a matter of "keeping up" with the generator's pulse, but of triggering more than one test sequence within the same generator's pulse. In fact, the width of the generator's pulse must not be greater than 7 msecs. In other words, within 7 msecs, the system had completed the EXEC call. This is a reduction factor of approximately 2.5 times faster from 17 msecs. to 7 msecs.

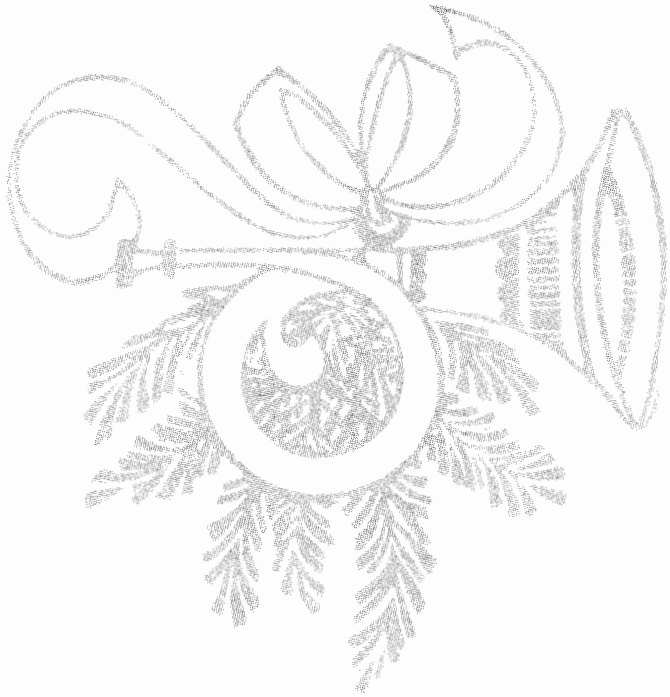
On RTE-M1/21MX-E system, the width of the generator's pulse must be less than 4.5 msecs. before another test sequence being triggered by the same generator's pulse. This is a reduction factor of approximately 1.5 times faster from 7 msecs. to 4.5 msecs.

These results are also consistent with the measurements of actual I/O under the three systems. The time between the start of the generator's pulse and the point when the output on channel 2 changed its state (alternating between 0 and +5.12 volts), is the time elapsed for the I/O sequence to be initiated and completed. For the three systems, they are 4, 1.5, and 1 msec. respectively.

CONCLUSION:

The reduction factor of 2.5 due to a change in the operating system (from RTE-M3 to RTE-M1) far exceeds that (1.5) due to a change in the CPU hardware (from M to E). Although the degree of variance between the two reduction factors depends much on the design of a driver (e.g., privileged vs. non-priveleged), the effects of an operating system on the type of performance expected are significant.

The extra capabilities on a general purpose system like RTE-M3 have a trade-off against the speed performance of an optimized, but more restrictive, system like RTE-M1. The purposes that each system serves and, therefore, their respective performance criteria, are so different that it is important to know the user's purposes and then tailor and measure the system for those specific purposes and appropriate criteria.



REDUCING BASE PAGE LINKS IN RTE-M VIA SXL

Jim Bridges/DSD

The base page space for program links is frequently a more critical resource than main memory in an RTE-M1 or RTE-M2 system because all programs must share the same base page. The RTE-M generator (RTMGN) and the RTE-M loader (RTMLD) both permit current page linking, but current page links are limited to forward links only.

This article will illustrate how to use the System Cross Loader (SXL, 29103-60001) to relocate a program for the RTE-M APLDR. SXL uses both forward and backward current page links. In a test case, relocating MBASIC with SXL saved 350 (octal) base page links when compared with the RTE-M loader or generator. In addition, the load required 100 (octal) fewer words of main memory!

There are minor problems to be overcome to use SXL successfully for an RTE-M system. These problems and solutions will be described in this article.

Current page linking works as follows:

1. Current page linking can only be applied to a module which crosses a single page boundary. If it crosses two or more page boundaries, current page links cannot be used at all. (A module begins with a NAM record and ends with an END record: an actual program may include several modules.)

2. Prior to the start of the module, the loader (i.e. any loader which uses current page linking) allocates an area to be used for forward links: this area will hold links for instructions on the starting page which make references to memory locations on the next page. The size of the linkage area is computed or "guessed at" since the number of links cannot be actually known without scanning the relocatable.

3. Backward links (if they are made) are placed in a reserved area at the end of the module. The backward linkage area is for references to the previous page. Note that the size of the module appears in the NAM record, which is the first record in the modules. Therefore the start of the backward links area can be established before scanning the module and it is not necessary to know the size of the backward links area to begin loading.

Implementing backward links is more effort than implementing just forward links. SXL is the only general purpose loader which does backward and forward current page linking. In addition, SXL is a two pass loader. On the second pass, the linkage area not used is returned and the module relocated again. Since the process of loading is done twice, this results in slower operation. It is the second pass of SXL which results in the savings of main memory (see above) in relocating MBASIC.

It is assumed that the reader will have access to SXL manual 29103-93002 to aid in understanding the procedure below. Here, for example, is a sample command file for SXL to relocate MBASIC:

```
-MAP MODULES ON 6
-LINKS IN CURRENT
-OUTPUT ABS ON BASIC
-BOUNDS FWAM=36147,LWAM=76000
-BOUNDS FWAC=36000,LWAC=36146
-BOUNDS FWABP=264,LWABP=1235
-SET EXEC TO 4544
-SET $LIBR TO 5001
-SET $LIBX TO 5137
-SET $CVT1 TO 3763
-SET $CON TO 1736
-SET $OPSY TO 6677
-REL %RPLS     (RPL MODULE FOR .MPY, ETC)
-REL %MBASC
-REL %ACFIL
-REL %MESGA
-REL %DTRAP
-REL %B.M        (BRANCH & MNEMONIC TABLE)
-SEARCH %FMPF
-SEARCH %MSYLB
-SEARCH %RLIB1
-SEARCH %RLIB2
-END
```

Several points require clarification:

1. The BOUNDS and SET statements are taken from the RTE-M snapshot produced by RTMGN. Only the entry points required are described in the SET statements. This list of required entry points may be determined by running through once with just the BOUNDS: SXL will print out the list of undefined externals. The alternative is to load the entire snapshot, but this may produce an overflow of the internal links table used by SXL. SXL requires a minimum of a 13 page partition in RTE III.

2. The file %RPLS is a user-assembled module using the RPL pseudo operator of the RTE II/III assembler. The module used in the test case is:

```
ASMB,R,L
      NAM RPLS,7
.MPY  RPL 100200B
.DIV  RPL 100400B
.DST  RPL 104400B
.DLD  RPL 104200B
.ZRNT RPL 2001B
.ZPRV RPL 2001B
$SECM RPL 0B
      END
      END$
```

3. The file %ACFIL is a special version of the standard file handler which comes with RTE-M BASIC. The standard version uses byte-handling instructions (DBR, DBL in this case) which cause one of two problems with SXL:

   a. The following error message may be printed by SXL:

      ILL.EXT.
      FILE NAME%ACFIL

   b. No error message may be produced but a linkage may be incorrect in the output file (BASIC).

   SXL was written before byte-processing instructions were implemented in HP computers and does not check for the relocation indicator "6" in the DBL record produced by the assembler.

   To overcome this difficulty, a utility program was written to scan the relocatable files to look for the relocation indicator 6 and report occurrences: this would be a signal to rewrite the module to omit byte-reference instructions. (This is generally a simple task. In the case of ACFIL, less than 10 locations were changed.) The utility program (called "BYTES") is listed at the end of this article.

4. A special "Relocation Definition Record" must be prefixed to the absolute output file produced by SXL in order that it may be loaded by the RTE-M APLDR. The format of this (absolute) record is:

WORD	CONTENTS
1	BIT # 15 14 . . . . . 10 9 8 7 0
2	LOGICAL LOAD ADDRESS

   The meaning of the bits in word 1 are:

   Bit 15 = 0 for memory resident load
   = for partition load

   Bits 9 to 0 = memory protect fence index
   0 = partition resident, no common
   1 = memory resident, no common
   2 = RT partition with common
   3 = undefined
   4 = SSGA

   Bits 14 to 10 are not used.

The formats of the various types of binary records are given in the Appendix of the RTE II/III reference manuals or in the pocket guide for RTE-M (92064-90007). An easy way to produce a Relocatable Definition Record for the example above is to assemble the following absolute program.

```
ASMB,A,B,L
      ORG 2
      OCT 1      SET MP FENCE INDEX TO 1, MEM RES PROG
      OCT 36000 LOAD ADDRESS
      END
```

The output will be a single record of five words as follows:

(count)	(load addr)	(abs val)	(abs val)	(checksum)
001000	000002	000001	036000	036003

The load address (in this case 2) is a signal that this is a "special record" to APLDR. It does not result in an actual load into memory. The load address of 2 is a tag that indicates information for APLDR.

Nine additional special records follow the output produced by SXL and are required by APLDR. The special records which SXL produces as "trailer" are correct for APLDR in an M1 or M2 system. Some of these trailer records would have to be modified for RTE-M3. This has not been investigated by the author because base page links are not as critical a resource in an RTE-M3 system since each partition has its own base page. The format of these special trailer records is:

```
Record  Word 1          Word 2
  1      PR               OG     (PROGA = PROGRAM NAME)
  2      A/<TYPE>         SPARE  (TYPE IS FROM NAM RECORD)
  3      RESOL/MULT       SPARE  (FOR PROG IN TIME LIST)
  4      HI BITS TIME LO BITS TIME
  5      SPARE            SPARE
  6      LO MAIN          HI MAIN
  7      LO BASE          HI BASE
  8      FWA COMMON       SIZE COMMON
  9      JMP 3,I          XFER ADDRESS
```

This completes the information needed to use SXL successfully to relocate an RTE-M program for the RTE-M APLDR. Below is the listing of the program used to determine if the relocatable binary files contain any byte reference instructions:

```
FTN4,L
      PROGRAM BYTES(3,50),REPORT ON BYTE REF REL INDIC
C
C  *ON BYTES,<TERMINAL LU>,<FILE NAMR>
C
      INTEGER DCB(144),FNAME(3),STAT,TLOG,TERM,
     *WORDS(2),REC,CHARS,POSN,SC1,CR1,PBUF(10),TYPE,
     *BUFR(80),K,ERR,CODE
      EQUIVALENCE (PBUF(4),TYPE)
      DATA POSN/1/
      DATA REC/0/
      DATA K/1/
      CALL GETST (DCB,144,TLOG)
      CHARS = TLOG * 2
      IF (NAMR (PBUF,DCB,CHARS,POSN)) 700,20
```

```
20      TYPE = IAND (TYPE,3) + 1
        TERM = 1
        GO TO (30,28,700,700) TYPE
28      TERM = PBUF(1)
30      IF (NAMR (PBUF,DCB,CHARS,POSN)) 700,40
40      TYPE = IAND (TYPE,3) + 1
        GO TO (700,700,700,45) TYPE
45      FNAME (1) = PBUF (1)
        FNAME (2) = PBUF (2)
        FNAME (3) = PBUF (3)
        SC1 = PBUF (5)
        CR1 = PBUF (6)
        CALL OPEN (DCB,ERR,FNAME,0,SC1,CR1)
        IF (ERR) 600,100,100
100     REC = REC + 1
        CALL READF (DCB,ERR,BUFR,80,LEN)
        IF (LEN) 800,100,102
102     IF (ERR) 600,105,105
105     CALL GETID (BUFR,LEN,CODE,WORDS)
        IF (CODE.GT.6) GO TO 100
        IF (CODE.NE.6) GO TO 105
        WRITE (TERM,3000) WORDS(1),WORDS(2),REC
3000    FORMAT ("BYTE REF WORDS = "2@7" AT RECORD "I5)
        GO TO 105
600     WRITE (TERM,1030) ERR
1030    FORMAT (" FMP ERROR "I6)
800     CALL CLOSE (DCB,ERR)
        WRITE (TERM,1000)
1000    FORMAT (" BYTES FINISHED!")
        GO TO 999
700     WRITE (TERM,710)
710     FORMAT (" PARAMETER ERROR")
        GO TO 999
950     WRITE (TERM,1010)
1010    FORMAT (" BYTES ABORTED!")
        GO TO 800
999     END
        END$
```

Below is the assembly language subroutine used by the program BYTES to pick up the relocation indicators from the DBL records:

```
ASMB,R,L
      NAM GETID,7 PICK UP ENTRY TYPES - SKIP OTHER RECS
      ENT GETID
      EXT .ENTR
A     EQU 0       A REGISTER
B     EQU 1         B REGISTER
*
*  CALL GETID (IBUF,LEN,ICODE,WORDS)
*
*   ON RETURN:
*      ICODE = 0 THROUGH 7 (VALUE OF R IN WORD 5 OF DBL)
*   OR ICODE = 7 > GET NEXT RECORD (NON DBL OR DONE)
*   WORDS = 2 WORD ARRAY TO STORE BOTH WORDS OF BYTE
*           REFERENCE INSTRUCTION FROM DBL RECORD
*
*
BUF   BSS 1
LEN   BSS 1
CODE  BSS 1
WORDS BSS 1       BYTE RELOCATABLE WORDS FROM INDIC = 6
GETID NOP
      JSB .ENTR
      DEF BUF
      JMP NEXT,I  GO TO CONTINUATION POINT
NEXT  DEF STRT
STRT  LDA .4
      STA ADV     CNT TO MOVE AFTER PRO RELO INDIC
      LDB BUF
      INB
      LDA B,I     GET WORD 2 OF RECORD
      ALF,RAR
      AND .7      GET ID
      CPA .3      LOOK FOR DBL RECORD
      JMP RESET   FOUND ONE
      LDA .8
      STA CODE,I  NOT FOUND
      LDA .STRT
      STA NEXT
      JMP EXIT
EREC  LDA .7
      STA CODE,I  SET CODE TO MEAN GET NEXT RECORD
      LDA .STRT
      STA NEXT    SET CONTINUATION POINT
      JMP EXIT
RESET LDA .5N     NEG 5
      STA CTR
      LDB ADV
      ADB BUF
      LDA B,I     GET RELOCATION INDICATORS
      STA RCODE
      ISZ ADV
      LDA .CONT
      STA NEXT    SET CONTINUATION POINT
CONT  LDA LEN,I
      CMA,INA
      ADA ADV
      SSA,RSS     END OF RECORD?
      JMP EREC    YES
      LDA RCODE   GET WORD WITH RELOCATION INDICATORS
      ALF,RAR
      STA RCODE   SET UP FOR NEXT LOOK
      AND .7      GET RELOCATION INDICATOR
      STA CODE,I  GIVE IT TO CALLER
      CPA .5      MEMORY REFERENCE - TWO WORDS
      ISZ ADV
      CPA .6      BYTE REFERENCE - TWO WORDS
      RSS         FOUND BYTE RELO INDIC GIVE BACK WORDS
      JMP IGNOR
      LDB WORDS
      STB ADDR
      LDB ADV
      ADB BUF
      LDA B,I
      STA ADDR,I
      ISZ ADDR
      INB
      LDA B,I
      STA ADDR,I
      ISZ ADV     BUMP FOR TWO WORD INSTRUCTION
IGNOR ISZ ADV
      ISZ CTR     BUMP TO NEXT RELOCATION INDICATOR
      JMP EXIT    RETURN
      LDA .RSET   START WITH THESE FIVE NEXT TIME
      STA NEXT
      JMP EXIT
EXIT  JMP GETID,I
.4    DEC 4
.3    DEC 3
.7    DEC 7
.8    DEC 8
.5    DEC 5
.6    DEC 6
.5N   DEC -5
ADV   NOP
CTR   NOP
.STRT DEF STRT
.CONT DEF CONT
.RSET DEF RESET
RCODE NOP
ADDR  NOP
      END
      END$
```

LOCUS HISTORY MASTER VOLUME I

Melanie Van Vliet/DSD

The Data Systems LOCUS has been collecting user contributed software since 1966. This comprehensive collection of 649 programs, consisting of subroutines, utility packages, compilers, assemblers, and drivers, reflects the progression of operating systems and peripherals that have been developed for the HP 2100/21MX product line.

We have noted that, irrespective of operating system or peripherals, the bulk of the LOCUS can serve as an invaluable reference for developing special and general purpose software. The thousands of hours of analysis, design, and programming remain as exemplary guidelines for future applications.

For the first time, LOCUS will be offered in its entirety as a complete historical reference library, called the LOCUS HISTORY MASTER, Volume I. (See contents list below for details.) The availability of the LOCUS HISTORY MASTER is a prelude to the future as it preserves the past, and paves the way for the upcoming direction of the LOCUS. Until the next publication of the program catalog, all programs in the LOCUS will remain available on an individual basis and on this basis all programs will be revised and updated as usual. THE LOCUS HISTORY MASTER WILL NOT BE UPDATED. . . . The publication of the next LOCUS Program Catalog will include only software that can be used on the HP/1000. Software on the HISTORY MASTERS that is not HP/1000 oriented will be obsoleted, and withdrawn from individual sale.

The LOCUS Master Tapes are accessible only with the SDLS4 Access Program which will run only in RTE-II/III.

LOCUS HISTORY MASTER VOLUME I. Contents:

- Complete Documentation for 22002 thru 22682-***70 (includes 95 Microfiche in Porta Fiche II Carrying Case)
- 1 Binary Relocatable Access Program (SDLS4) on Paper Tape
- 1 Binary Relocatable Access Program (SDLS4) on Mini-cartidge
- 1 LOCUS HISTORY MASTER USERS GUIDE
- 2 2400 foot reels of Sources (22002 thru 22682-***70)

ORDERING INFORMATION:

The LOCUS HISTORY MASTER has part numbers 22000-14050 (800 BPI) and 22000-14051 (1600 BPI). Each version is available to customers for $550.00. To order, please contact your local HP sales office.

NEW CONTRIBUTED PROGRAMS

Melanie Van Vliet/DSD

This article serves as an update for the Data Systems LOCUS Program Catalog (22000-90099).

The new contributed programs listed below are now available. Contact your local HP Sales Office to order Contributed Library material, or (if you are in the U.S.) you can use the Direct Mail Order form at the back of the COMMUNICATOR 1000.

22682-10970 **SDLS4 —**

"SDLS4" is a routine which will read information from LOCUS History Master tapes (SDLS or MTLS format) directly into RTE FMP files. It will accept absolute, relocatable, or source programs, but a not yet implemented change is required to read "DATA" files from the MTLS tapes. The routine otherwise accepts all tape formats. SDLS4 consists of two parts, a main program written in Fortran IV to interact with the operator, and a subroutine "GETRC" written in assembly language which controls and reads the mag tape, passing information records back to the program for processing. The program currently requires an 8K background area in order to operate. "SDLS4" is scheduled with P1 = LU of interactive terminal. It requests the LU of the mag tape, locks it, and rewinds the tape. The terminal LU is also set up as the log device for recording SDLS4 operations. "SDLS4" runs in an RTE environment.

22682-10970	800 BPI MT	$40.00
22682-11970	1600 BPI MT	$40.00
22682-13370	mini-cartridge	$50.00

22682-18971 **UPIT — RTE DEVICE LU UP ROUTINE**

This program allows the RTE user to ensure that a range of device LU's are always up. It can be time scheduled or scheduled once. UPIT could be called a line monitor. The routine is optimized for Real-Time and requires little resources of RTE. This routine is a must if you cannot afford operator intervention simply to make a device available.

22682-18971	PT	$10.00
22682-13371	mini-cartridge	$35.00

22682-10972 GCOPY — RTE 7900/7905 TO MULTIPLE FLEXIBLE DISCS

GCOPY copies one 7900/7905, 96 sector/track, disc LU, to multiple flexible discs (60 sectors/tracks) in File Manager format. In other words, one 7900/7905 disc logical unit maps to multiple flexible disc cartridges. GCOPY starts at the top of the 7900/7905 directory and copies as many files as it can to the first flexible disc. It then asks for the next disc. This continues until all discs are copied. The user also has the option of skipping a disc or number of discs. By skipping through all the discs the first time the user may determine the number of flexible discs needed for the copy. A directory list may be obtained for each flexible disc. NOTE: only one 7900/7905 directory track is allowed. No extents are allowed on the source disc.

22682-10972	800 BPI MT	$40.00
22682-11972	1600 BPI MT	$40.00
22682-13372	mini-cartridge	$35.00

22682-18973 IDLE — RTE SYSTEM ACTIVITY VISUALIZER

This program runs with the lowest priority for purposes of visually indicating how busy the system is. The switch register is used for giving a rocking effect of activity. The program is only 26 decimal words and can be put memory resident into the system.

22682-18973	PT	$10.00
22682-13373	mini-cartridge	$35.00

22682-18974 RTE READABLE PUNCH ROUTINE WITH SYSTEM DATE & TIME

RDBLP does a look-up table conversion of an ASCII input buffer to a binary output buffer. The words in the output buffer are readable characters when punched on paper tape. Converts 64 character ASCII subset of upper case, numerals, and included. Each returns the time in a differ-included each returns the time in a different format. The day of the month is returned in the A-register and the month in the B-register. TITLE puts a readable title, optionally containing the time/date, on a paper tape. The input is either from the run string in the schedule call, or interactively from a terminal.

22682-18974	PT	$10.00
22682-13374	mini-cartridge	$35.00

22682-10975 12555B D-TO-A RTE DRIVER

DVR55 is a RTE-I, II, III, and M driver for the 12555B Digital-to-Analog Converter Interface Card. DVR55 processes four write requests and two control requests as listed below.

Write Requests:

1. Write to subchannel 0 — subfunction bit 6 set. First word in buffer is used as I * 10MS delay for outputting arrays in future write requests. "I" is the integer value of the first word in the buffer.
   i.e., CALL EXEC (2,LU+100B,I,1)
2. Write to subchannel 0 — no subfunction bits on. Output low half (1st 8 bits) to channel 1 of 12555B. Output high half (2nd 8 bits) to channel 2 of 12555B.
3. Write to subchannel 1. Output low half of buffer word to channel 1 of 12555B. Channel 2 remains as previously programmed.
4. Write to subchannel 2. Output low half of buffer word to channel 2 of 12555B. Channel 1 remains as previously programmed.

Control Requests:

1. Control 0 — set both channels to 0 volts and clear the buffer rate output (EQT WD 14 to 0).
2. Control subfunction bit 6 set — perform erase function and set both channels to 0 volts and clear buffer rate output.

DVR55 does not perform the refresh function and is not intended for graphics on a non-storage type scope. DVR55 is intended for D to A operations (including stair step in 10MS increments), driving X-Y plotters or for graphics on storage type scopes.

22682-10975	800 BPI MT	$40.00
22682-11975	1600 BPI MT	$40.00
22682-13375	mini-cartridge	$40.00

22682-10976 RTE 3070A TERMINAL UTILITIES SUBROUTINE HP-IB

These subroutines provide an easy method to perform input/output operations on the 3070A terminal and on any HP-IB devices attached to it. These subroutines are FORTRAN and BASIC callable. The 3070A terminal is essentially composed of two HP-IB stations: the keyboard/display and the communication module. As such, it is fully compatible with the current HP-IB instruments and controllers. The communications module, by a serialization of HP-IB protocol, allows long distance communications (up to 2KM) with a remote computer. Consequently, any HP-IB cluster can be connected to the HP-IB connector of the HP 3070A and then remotely controlled by the computer through the serial link and 3070A communication module. A serial link with several 3070A's offers capability of having a centralized control of distributed HP-IB setups. Since the HP-IB cluster is referred by the LU number of the local 3070A, it can be connected to or disconnected from the terminal on line, while the RTE system is running without any system shutdown or reconfiguration. The result is a system accessibility to everyone. The subroutines provide an easy method to program input and output operations on the 3070A terminal and/or any HP-IB devices attached to it through the use of a BASIC, FORTRAN, or Assembler program.

22682-10976	800 BPI MT	$50.00
22682-11976	1600 BPI MT	$50.00
22682-13376	mini-cartridges	$80.00

22682-10977 COMPILING FROM A FILE WITHOUT LS AND LG TRACKS

This program permits compiling from a file, bypassing the LS and LG areas. The listing and the relocatable elements are directed to output files or to logical units.

22682-10977	800 BPI MT	$35.00
22682-11977	1600 BPI MT	$35.00
22682-13377	mini cartridges	$35.00

22682-18978 MICROCODED SQRT AND BIT/WORD MICROCODE FOR 21MX-M

This package consists of thirteen microcoded routines that contain a square root subroutine for floating point numbers (independent from the presence of the floating point firmware package), and various subroutines to move words and to test, clear, and set any bit in a 16 bit word. An RTE operating system with WCS capability is required.

22682-18978	PT	$10.00
22682-13378	mini-cartridge	$35.00

22682-10979 21MX-E MICROCODED SIN-COS-TAN

This is the 22681-***90 Microcoded SIN-COS-TAN program converted to run on the 21MX-E. The SIN and COS are about 1.5 times faster and the TAN about 2.5 times faster than the standard FORTRAN Library routines.

The execution times are:
SIN — about 200-220 micro-seconds
COS — about 200-220 micro-seconds
TAN — about 450 micro-seconds

The routines are callable from Assembly, FORTRAN, or ALGOL.

22682-10979	800 BPI	$35.00
22682-11979	1600 BPI	$35.00
22682-13379	mini-cartridge	$35.00

22682-18980 DBLST — IMAGE DATA BASE INFORMATION LISTER

This short program allows the IMAGE user to list information about all data sets of any given data base. The output consists of a nice compact table indicating the set, entry, FMP blocks, name, type, capacity, record length, and total number of FMP blocks required. The output listing can be directed to any output device.

22682-18980	PT	$10.00
22682-13380	mini-cartridge	$35.00

22682-18981 **FAIRCHILD F-8 ASSEMBLER FOR HP 2100/21MX**

This program runs on an HP 2100 series computer and assembles Fairchild F-8 microprocessor source code. It is a two-pass assembler which will run in a DOS, RTE, or BCS environment. An 8K computer is required for BCS, and 16K for DOS. The input to F-8 is a paper tape source containing symbolic language instructions. The output is a line printer (or TTY) listing of the symbol table, the code generated by the assembler and the source code. The tape punch output (formatted output), is ready for FAIR-BUG LOADER. This is a modified version of the contributed assembler for the INTEL 8080 microprocessor.

22682-18981	PT	$35.00
22682-13381	mini-cartridge	$35.00

22682-10982 **RTE-II/III PROM WRITER CONTROL PROGRAM**

This program allows you to burn PROM on the HP 12909B Prom Writer under RTE-II/III Operating System. The PROM mask tape must be in a FMGR File (ASCII), one file per mask tape, or on paper tape. In the case of paper tape, the user must create a type 0 file for the paper tape reader.

22682-10982	800 BPI MT	$40.00
22682-11982	1600 BPI MT	$40.00
22682-13382	mini-cartridges	$70.00

22682-18983 **MEMAL — RTE-II MEMORY ALLOCATION DIAGRAM**

This program prints out a diagram of the CPU memory allocations in a configured RTE-II system. The octal starting address of each portion of memory (e.g., foreground common, foreground disc resident, etc.), is given.

22682-18983	Paper Tape	$10.00
22682-13383	mini-cartridge	$35.00

22682-18984 **ISPY — AN ON-LINE DEBUGGING PACKAGE FOR THE HP 2100**

ISPY is an absolute assembler program which allows a programmer to test and debug any assembler program written for an HP 2100 computer, including those running under the control of an operating system.

22682-18984	Paper Tape	$ 40.00
22682-13384	mini-cartridges	$105.00
22682-10984	800 BPI MT	$ 70.00
22682-11984	1600 BPI MT	$ 70.00

22682-18985 **DFIL — ALPHABETIC FMGR DIRECTORY LISTER**

This program lists the file directories for one or more disc cartridges. The list is ordered alphabetically by file name. The format of the list is the same as that of the "long list" produced by the FMGR :DL command. The program is set up for the RTE-II operating system with HP 7900 disc drive(s).

22682-18985	Paper Tape	$10.00
22682-13385	mini-cartridge	$35.00

22682-10986 **UTERM — CDC 200 USER TERMINAL SIMULATOR FOR HP 2100/21MX — RTE-II & RTE-III PACKAGE**

The UTERM program emulates CDC 200 UT protocol on HP 2100/21MX computers, running either RTE-II or RTE-III. UTERM will communicate at speeds up to 4800 bps in half duplex mode. Hardware required to run UTERM is a HP 2100 or 21MX computer, the 12618A synchronous interface kit, a synchronous modem, and any desired RTE — supported peripherals. Special drivers are not needed to use UTERM, as it contains its own driver, which it patches into RTE at run time. The program will run in non-privileged mode, or in privileged mode. Throughput will be affected if UTERM is run non-privileged at speeds higher than 2400 bps, and it is recommended that privileged mode be used above this speed. This package includes UTERM Version 2.2C which runs under RTE-II and UTERM Version 3.0B which runs under RTE-III. General purpose copy and tape manipulation utility routines are included in this package.

22682-10986	800 BPI MT	$150.00
22682-11986	1600 BPI MT	$150.00

DOCUMENTATION

The following tables list currently available customer manuals for Data Systems Division products. This list supersedes the list in the last issue of the **COMMUNICATOR** 1000.

The most recent changes to the tables are indicated with an asterisk for easy reference. Prices are subject to change without notice.

Copies of manuals and updates can be ordered from your local Sales and Service office. The address and telephone number of the office nearest to you are listed in the back of all customer manuals.

Update packages are free of charge. If you require an update package only, send your request to:

Software/Publications Distribution
974 E. Arques
Sunnyvale, CA 94086

Customers in the U.S. may also order directly by mail. Simply list the name and part number of the manual(s) you need on the Corporate Parts Center form supplied at the back of the **COMMUNICATOR** 1000.

A few words about documentation terms:

New — A new manual refers only to the first printing of a manual. When first printed, a manual is assigned a part number.

Revised — A revised manual is a printing of an existing manual which incorporates new and/or changed information in its contents. For example, a manual is revised when an update package is incorporated into the manual: the manual gets a new print date and the update package disappears. Note that a revision to a manual effectively obsoletes the previous version of the manual.

Update — An update package is a supplement to an existing manual which contains new and/or changed information. Updates are issued when information must get to customers, yet it is inappropriate to issue a revised manual. An update has no part number; it is automatically included when you order the manual with which it is associated.

1000 SYSTEM MANUALS

PART NUMBER	MANUAL TITLE	PRICE	DATE	UPDATE
02170-90006	HP 1000 Computer System Installation and Service	$ 2.50	7/77	
02172-90005	Getting Started with Your HP 1000 Disc Based Computer System (for A computers)	4.00	6/77	
02172-90010	Getting Started with Your HP 1000 Disc Based Computer System (for B computers)	2.50	8/77	
02173-90007	Getting Started with Your HP 1000 System: Models 20 and 21	7.00	8/77	
91740-90002	DS 1000 Programmer's Reference Manual	12.00	10/77	
91740-90003	DS 1000 Network Manager's Manual	21.50	10/77	
91780-93001	RJE/1000 Programming Manual	9.50	11/76	10/77

RTE SYSTEMS MANUALS

PART NUMBER	MANUAL TITLE	PRICE	DATE	UPDATE
02313-93002	RTE 2313B Analog-Digital Interface Subsystem Operating and Service Manual	$30.00	8/76	
02320-93002	RTE System Driver DVR76 for HP 2320A Low Speed Data Acquisition Subsystem Programming and Operating Manual	1.00	8/74	
02321-93001	RTE System Driver DVR 74 for HP 2321A Low Speed Data Acquisition Subsystem Programming and Operating Manual	2.00	8/74	
09600-93010	RTE System DVR11 for HP 2892A Card Reader Programming and Operating Manual	1.00	8/74	
09600-93015	91200B TV Interface Kit; Programming and Operating Manual	4.50	7/75	1/76
09601-93007	RTE Device Subroutine for HP 5327A/B-H48 Counter	2.50	12/74	
09601-93009	RTE Device Subroutine for HP 5326A-H18 Counter	2.50	12/74	

RTE SYSTEMS MANUALS (Continued)

PART NUMBER	MANUAL TITLE	PRICE	DATE	UPDATE
09601-93015	RTE for 40-bit Output Register # 12556B	1.00	10/74	
09603-93001	9603A/9604A Control System and Scientific Measurement Operating and Service Manual	7.50	5/76	
09610-93003	ISA FORTRAN Extension Package Reference Manual	4.50	8/77*N	
09611-90009	9611A Operating 406 Industrial Measurement and Control System	.25	4/75	
09611-90010	HP 6940A/B Multiprogrammer Verification Manual	4.50	8/75	
12604-93002	RTE DVR40 for 12604B Data Source Interface	1.00	8/74	
12665-93001	RTE System Driver DVR65 for HP 12771A Computer Serial Interface Kit	1.00	8/74	
12732-90001	RTE Driver DVR33 Programming Manual	2.00	2/77	
13197-90001	RTE Driver DVR36 Programming and Operating Manual	3.00	9/76	
24998-90001	DOS/RTE Relocatable Library Reference Manual	10.00	10/77	
25117-93003	RTE System Driver DVR24 for HP 7970 Series Digital Magnetic Tape Unit	1.00	8/74	
29003-93001	RTE System Driver DVR66 for HP 12772A Coupler Modem Interface Kit Programming and Operating Manual	1.00	8/74	
29003-93003	RTE System Driver DVR66 for HP 12770A Coupler Serial Interface Kit Programming and Operating Manual	1.00	8/74	
29009-93001	RTE System Driver DVR62 for HP 2313B Subsystem	2.50	8/74	
29028-95001	RTE HP 2610A/2614A Line Printer Driver	1.50	8/73	
29029-95001	Real-Time Executive System Driver DVR00 for Multiple Device System Control Small Programs Manual	1.50	10/77	
29100-93001	RTE System Driver DVR40 (29100-60041) for HP 12604B Data Source Interface Programming and Operating Manual	1.00	8/76	
29101-93001	RTE Core-Based Software System Users Manual	10.00	1/76	
29102-93001	RTE BASIC Software System Programming and Operating Manual	10.00	3/74	8/75
29103-93001	RTE System Cross Loader; Programming and Operating Manual	2.50	12/76	5/77
59310-90063	DVR37 Manual	3.50	6/77	
59310-90064	HP-IB Interface Bus I/O Kit Users Guide	8.50	4/77	6/77
91060-93005	RTE Driver for X-Y Display Storage Subsystem (HP Model 1331C-016) Programming and Operating Manual	1.00	8/74	
91062-93003	Real-Time Executive System Driver for DVM/Scanner Subsystem	9.00	8/74	
91700-93001	Distributed System CCE Operating Manual	20.00	5/77	9/77
91705-93001	Distributed System SCE/5 Operating Manual	15.00	12/76	10/77
91200-90005	RTE Driver DVA13 for TV Interface (HP 91200B)	1.50	5/77	
92001-90015	RTE DVR05 for 264X Terminals	2.00	9/77	
92001-93001	RTE-II Software System Programming and Operating Manual	10.00	7/77	10/77
92060-90004	RTE-III Software System Programming and Operating Manual	12.00	7/77	10/77
92060-90005	RTE Assembler Reference Manual	7.00	12/76	
92060-90009	RTE-III General Information Manual	4.00	2/76	
92060-90010	RTE Batch/Spool Monitor and Operating System Pocket Guide	4.50	4/77	
92060-90012	RTE: A Guide for New Users	6.50	7/76	
92060-90013	Batch-Spool Monitor Reference Manual	13.00	10/77	
92060-90014	RTE Interactive Editor Reference Manual	6.00	5/77	
92060-90017	RTE Utility Programs	3.00	3/77	10/77
92060-90020	RTE On-Line Generator	15.00	7/77	
92064-90002	RTE-M Programmer's Reference Manual	14.00	3/77	10/77
92064-90003	RTE-M System Generation Reference Manual	7.50	3/77	10/77
92064-90004	RTE-M Editor Reference Manual	6.00	1/77	
92064-90007	RTE-M Pocket Guide	4.50	8/77	
92200-93001	RTE System Driver DVR12 for HP 2607A Line Printer Programming and Operating Manual	1.00	8/74	
92200-93005	Real-Time Executive Operating System Drivers and Device Subroutine Manual	5.00	10/77	
92202-93001	RTE System Driver DVR23 for HP 7970 Series Digital Mag Tape Units Programming and Operating Manual	1.00	8/74	
92400-93001	92400A Utility Library Subroutine for Sensor-Based Diagnostics	7.50	11/76	
93005-93005	Thermal Line Printer Subsystem for Driver DVR00 (RTE)	2.50	12/74	

HARDWARE MANUALS

PART NUMBER	MANUAL TITLE	PRICE	DATE	UPDATE
02108-90002	HP 21MX M-Series Computer Reference Manual	$ 5.50	6/76	7/76
02108-90006	HP 21MX M-Series Computer Installation and Service Manual	10.00	7/76	
02108-90004	HP 21MX M-Series Computer Operators Manual	5.00	7/76	
02108-90017	21MX M-Series Computer Engineering and Reference Documentation	125.00	5/77*R	
02108-90027	21MX K-Series Computer Engineering and Reference Documentation	100.00	5/77*R	
02109-90001	HP 21MX E-Series Computer Operating and Reference Manual	8.00	7/77*R	
02109-90002	HP 21MX E-Series Computer Installation and Service Manual	15.00	8/76	10/77
02109-90006	HP 21MX M- and E-Series Computer I/O Interfacing Guide	7.00	7/77*R	
02109-90014	21MX E-Series Computer HP 2109B and HP 2113B Operating and Reference Manual	8.00	8/77*N	
02109-90015	21MX E-Series Computer HP 2109B and HP 2113B Installation and Service Manual	15.00	8/77*N	9/77
12732-90005	HP 12732A/12733A Flexible Disc Subsystem Operating and Service Manual	5.50	8/77*R	
12979-90006	HP 12979A I/O Extender Installation and Service Manual	15.00	6/77*R	10/77
12979-90007	HP 12979A I/O Extender Operating and Reference Manual	5.00	12/75	9/77
12979-90014	HP 12979B Input/Output Extender Operating and Reference Manual	2.00	8/77*N	
12979-90016	HP 12979B Input/Output Extender Installation and Service Manual	12.00	8/77*N	8/77
12990-90003	HP 12990A Memory Extender Installation and Service Manual	5.50	4/76	8/76
5950-3765	21MX E-Series Computer Technical Reference Manual	3.50	6/77*N	

LANGUAGE MANUALS

PART NUMBER	MANUAL TITLE	PRICE	DATE	UPDATE
02100-90140	Decimal String Arithmetic Routines	$ 6.50	2/77	
02108-90032	HP 21MX M-Series Computer RTE Microprogramming Reference Manual	15.00	10/76	9/77
02108-90034	HP 21MX M-Series Computer RTE Microprogramming Pocket Guide	2.75	1/77	
02109-90004	21MX E-Series Computer RTE Microprogramming Reference Manual	20.00	3/77	
02109-90008	21MX E-Series Computer RTE Microprogramming Pocket Guide	2.50	11/76	
02116-9014	HP Assembler Manual	6.50	8/75	
02116-9015	HP FORTRAN Manual	6.00	9/77*R	
02116-9016	Symbolic Editor	4.50	2/74	
02116-9072	ALGOL Reference Manual	10.00	11/76	
12907-90010	Implementing the HP 2100 Fast FORTRAN Processor	1.00	7/76	
24307-90014	DOS-III Assembler Reference Manual	8.00	7/74	11/75
92060-90005	RTE Assembler Reference Manual	7.00	12/76	
92060-90016	Multi-User Real-Time BASIC Reference Manual	12.00	2/77	4/77
92060-90023	RTE FORTRAN IV Reference Manual	10.00	7/77	
92063-90001	IMAGE/1000 Data Base Management System Reference Manual	9.00	10/77	10/77
92063-90004	IMAGE/1000 Data Base Management System Pocket Guide	4.00	6/77*N	
92065-90001	RTE-M Real-Time BASIC Language Reference Manual	8.50	2/77	7/77

We invited you
Just so you co
The 'Trekie' ser
Ending at six a

A collection of RTE articles fine,
Were published in series from one unto nine.
Workings of RTE now in the show,
For those who were asking, 'What makes it go?'
Written in hope to end any confusion,
And clear users' minds of any illusions.

'was the week before Christmas,
deadlines were past.
The year, it was ending, work finished at last!
In the season of giving, one thought became true;
What holiday wish could we give unto you?
In searching our minds, an answer appeared;
Our presents to you, we gave this past year:

Microprogramming techniques and tips were explained,
To assist and solve problems that might have remained,
Had we not received exemplifications
Of articles dealing with those situations.

to come aboard HP's bus,
'd be enlightened by us.
'es, in sequence, was run,
nd beginning at one.

Software Samantha (sometimes Software Sam),
Would solve all your problems, if caught in a jam.
The answers to questions that are the most inner,
Would be expedited to all software 'sinners',

For those of you wanting to know what to do
With software and hardware, unfamiliar to you;
We printed the schedules of training class dates,
So your thirst for knowledge, you could satiate.

We kept you abreast of the latest updates
(Software revised makes your system first rate).
Hardware and software updates for your vision;
Documentation maintained to precision.
Software for users, that you sent to us,
Were listed in columns that dealt with LOCUS.
We kept you informed of our hardware advancements;
Memory, volt supplies, any enhancements.

On BASIC, on ALGOL, on FORTRAN, on Query,
On so many topics, and still we're not weary.
If you think this past year has been good to you,
We promise this next one and after will, too.
Oh, one last thing said, while we have the 'ball',
'A happy and healthy season to all!'

SOFTWARE UPDATES

Following are cross-reference lists of the available 92001B, 92060B, 92062A, and 92064A (options 20 & 40) software modules, the media on which the software modules are distributed, and the date code or revision of each module up to, and including level 1740.

NOTE:

For each module, interdependencies with other modules may exist (i.e., any updated module may require other updated modules to function properly).

SOFTWARE MODULE NUMBERS: 92001B LEVEL 1740 (RTE II)

The following modules are also available on a 7900 RTE Master Software Disc (#92001-13001), or a 7905 RTE Master Software Disc (#92001-13101).

PAPER TAPE	MODULE	DESCRIPTION	CARTRIDGE	DATE CODE
92067-16004	!S4LP7	24K SIO LINE PRINTER DRIVER	92001-13305	1538
29621-16021	%DVR15	RTE 7261A DRIVER	92062-13304	A
12732-16001	%DVR33	FLEXIBLE DISC DRIVER	92062-13304	1726
12970-16004	!S4MT1	24K SIO MAG.TAPE DRIVER	92001-13305	1550
20747-60001	%DVR30	RTE FIXED HEAD DISC DRIVER	92062-13305	C
20808-60001	%CAL10	CAL. PLOTTER DRIVER	92062-13302	B
20810-60001	%CALIB	CAL. PLOTTER LIBRARY	92062-13302	C
20875-60001	%1FTN	FORTRAN MAIN CONTROL	92060-13308	E
20875-60002	%2FTN	FORTRAN PASS 1	92060-13308	E
20875-60003	%3FTN	FORTRAN PASS 2	92060-13308	E
20875-60004	%4FTN	FORTRAN PASS 3	92060-13308	E
20875-60005	%5FTN	FORTRAN PASS 4	92060-13308	E
24129-60001	%ALGOL	RTE/DOS ALGOL PART 1	92060-13305	1643
24129-60002	%ALGL1	RTE/DOS ALGOL PART 2	92060-13305	C
24153-60001	%FF.N	RTE/DOS FORMATTER	92060-13303	C
24306-60001	%DECAR	DOSN ST ARITH PK	92060-13303	A
24998-16001	%RLIB1	RTE/DOS LIBRARY PART 1	92060-13302	1740
24998-16001	%RLIB2	RTE/DOS LIBRARY PART 2	92060-13302	1740
24998-16002	%FF4.N	FORTRAN IV FORMATTER	92060-13303	1726
25117-60459	%DVR24	RTE 7970 7T MAG. TAPE DRIVER	92062-13305	D
29013-60001	%DVR31	RTE 7900A DISC DRIVER	92062-13305	1710
29028-60002	%DVR12	RTE 2767A DRIVER	92062-13303	A
29029-60001	%DVR00	RTE TTY/PUNCH/PHOTO READER	92062-13302	1740
29030-60001	%DVR11	RTE 2892A CARD READER DRIVER	92062-13303	1710
29100-60017	!S4LP	24K SIO LINE PRINTER	92001-13305	A
29100-60018	!S4SYD	24K SIO SYSTEM DUMP	92001-13305	A
29100-60019	!S4PHR	24K SIO PHOTO READER	92001-13305	A
29100-60020	!S4PUN	24K SIO TAPE PUNCH	92001-13305	A
29100-60022	!S4L67	24K SIO 2767 LINE PRINTER	92001-13305	A
29100-60023	!S4MT2	24K SIO 7970 MAG. TAPE	92001-13305	A
29100-60049	!S4MT3	24K SIO MAG. TAPE	92001-13305	A
29100-60050	!S4TER	24K SIO TERMINAL PRINTER	92001-13305	A
59310-16002	%1DV37	RTE HP-IB WITHOUT SRQ	92062-13304	1726
59310-16003	%2DV37	RTE HP-IB WITH SRQ	92062-13304	1726
59310-16004	%HPIB	HP-IB DEVICE SUBROUTINE	92062-13304	1710
59310-16005	%SRQ.P	SRQ.P TRAP UTILITY	92062-13304	1710
72008-60001	%1DV10	COMP. 7210A PLOTTER DRIVER	92062-13302	A
72009-60001	%2DV10	MIN. 7210A PLOTTER DRIVER	92062-13302	A
91200-16001	%DVA13	91200A DRIVER	92062-13303	1648
91200-16002	%TVLIB	91200A VIDEO MONITOR LIBRARY	92062-13303	1648
91200-16004	%TVVER	91200A TV INTERFACE VERIFIER	92062-13303	1648
92001-16003	%MTM	MULT. TERMINAL MONITOR	92060-13301	B
92001-16005	%SYLIB	RTE SYSTEM LIBRARY	92060-13301	1740
92001-16014	%AUTOR	AUTO RESTART PROGRAM	92060-13310	1631
92001-16020	%DVA12	2607/10/13/14/17/18 DRIVER	92062-13303	1534
92001-16027	%4DV05	RTE 2644/45 DRIVER	92062-13302	1740

(Continued)

SOFTWARE MODULE NUMBERS: 92001B LEVEL 1740 (RTE II)

PAPER TAPE	MODULE	DESCRIPTION	CARTRIDGE	DATE CODE
92001-16013	!2GN00	RTE-II 7900 OFF-LINE GEN.	92001-13303	1631
92001-16014	%AUTOR	AUTO RESTART PROGRAM	92001-13302	1631
92001-16018	!2GNFH	RTE-II FIXED HEAD DISC GEN.	92001-13306	1631
92001-16020	%DVA12	2607/10/13/14/17/18 DRIVER	92062-13303	1534
92001-16026	!2GN05	RTE-II 7905 OFF-LINE GEN.	92001-13303	1631
92001-16027	%4DV05	RTE 2644/45 DRIVER	92062-13302	1740
92001-16028	%0DV05	RTE 2640A DRIVER	92062-13302	1740
92001-16029	%SCMD2	RTE-II COMMAND PROGRAM	92001-13301	1710
92001-16030	%WHZT2	RTE-II WHZAT PROGRAM	92001-13302	1726
92001-16031	%RT2G1	RTE-II ON-LINE GENERATOR PT. 1	92001-13304	1704
92001-16031	%RT2G2	RTE-II ON-LINE GENERATOR PT. 1	92001-13304	1704
92001-16035	%DVA05	RTE DRIVER 264X MODEM	92062-13302	1740
92001-16014	&AUTOR	AUTO RESTART SOURCE	92001-13302	1631
92001-18033	&AN2F0	RTE-II 7900 GFATHER ANSW FILE	92001-13307	1631
92001-18034	&AN2F5	RTE-II 7905 GFATHER ANSW FILE	92001-13307	1631
92002-12001	%BMPG1	BATCH MONITOR PROGRAM PART 1	92002-13301	1631
92002-12001	%BMPG2	BATCH MONITOR PROGRAM PART 2	92002-13301	1631
92002-12001	%BMPG3	BATCH MONITOR PROGRAM PART 3	92002-13301	1631
92002-12002	%2SP01	RTE-II SPOOL MONITOR PART 1	92002-13303	1631
92002-12002	%2SP02	RTE-II SPOOL MONITOR PART 2	92002-13303	1631
92002-16006	%BMLIB	BATCH LIBRARY	92002-13302	1631
92002-16010	%EDITR	RTE EDITOR	92002-13302	C
92060-12004	%ASMB	RTE ASSEMBLER	92060-13304	1634
92060-12005	%CLIB	RTE COMPILER LIBRARY	92060-13315	1726
92060-16028	%XREF	CROSS REFERENCE	92060-13304	A
92060-16031	&DVR32	RTE 7905A DISC DRIVER	92062-13305	A
92060-16038	%SWTCH	RTE-II SWITCH PROGRAM	92001-13304	1710
92060-16039	%SAVE	SAVE PROGRAM	92060-13309	1704
92060-16040	%RESTR	RESTORE PROGRAM	92060-13309	1704
92060-16041	%VERFY	DISC VERIFY PROGRAM	92060-13309	1704
92060-16042	%COPY	DISC COPY PROGRAM	92060-13309	1704
92060-16043	%DBKLB	DISC BACK UP LIBRARY	92060-13309	1704
92060-16044	!DSKUP	OFF LINE DISC BACK UP	92060-13309	1704
92060-16045	%RDNAM	READ NAME PROGRAM	92001-13302	1631
92060-16052	%KEYS	SOFT KEY UTILITY	92001-13002	1707
92060-16053	%KYDMP	SOFT KEY DUMP UTILITY	92001-13002	1707
92060-16092	%FTN4	RTE FORTRAN IV MAIN	92060-13316	1726
92060-16093	%FFTN4	RTE FORTRAN IV SEG F	92060-13316	1726
92060-16094	%0FTN4	RTE FORTRAN IV SEG 0	92060-13316	1726
92060-16095	%1FTN4	RTE FORTRAN IV SEG 1	92060-13316	1726
92060-16096	%2FTN4	RTE FORTRAN IV SEG 2	92060-13316	1726
92060-16097	%3FTN4	RTE FORTRAN IV SEG 3	92060-13316	1726
92060-16098	%4FTN4	RTE FORTRAN IV SEG 4	92060-13316	1726
92060-18046	&UPDAT	UPDATE TRANSFER FILE	92001-13302	1740
92060-18047	&PKDIS	PACK DISC TRANSFER FILE	92001-13302	1631
92064-16086	%MSAFD	FLEXIBLE DISC BACKUP UTILITY	92060-13309	1740
92202-16001	&DVR23	RTE 7970 9T. MAG. TAPE DRIVER	92062-13304	A
92900-16002	%2DV47	RTE 92900A DRIVER WITHOUT DMS	92062-13302	1643
92900-16003	%3DV47	RTE 92900A DRIVER WITH DMS	92062-13302	1631

SOFTWARE MODULE NUMBERS: 92060B LEVEL 1740 (RTE III)

The following modules are also available on a 7900 RTE Master Software Disc (#92060-13001), or a 7905 RTE Master Software Disc (#92060-13101), or a 7920 RTE Master Software Disc (#92060-13201).

PAPER TAPE	MODULE	DESCRIPTION	CARTRIDGE	DATE CODE
92607-16004	!S4LP7	24K SIO LINE PRINTER DRIVER	92001-13305	1538
29601-16021	%DVR15	RTE 7261A DRIVER	92062-13304	A
12732-16001	%DVR33	FLEXIBLE DISC DRIVER	92062-13304	1726
1297?-16004	!S4MT1	24K SIO MAG. TAPE DRIVER	92001-13305	1550
20747-60001	%DVR30	RTE FIXED HEAD DISC DRIVER	92062-13305	C
20808-60001	%CAL16	CAL. PLOTTER DRIVER	92062-13302	B
20510-60001	%CALIB	CAL. PLOTTER LIBRARY	92062-13302	C
20875-60001	%1FTN	FORTRAN MAIN CONTROL	92060-13308	E
20875-60002	%2FTN	FORTRAN PASS 1	92060-13308	E
20875-60003	%3FTN	FORTRAN PASS 2	92060-13308	E
20875-60004	%4FTN	FORTRAN PASS 3	92060-13308	E
20875-60005	%5FTN	FORTRAN PASS 4	92060-13308	E
24129-60001	%ALGOL	RTE/DOS ALGOL PART 1	92060-13305	1643
24129-60002	%ALGL1	RTE/DOS ALGOL PART 2	92060-13305	C
24153-60001	%FF.N	RTE/DOS FORMATTER	92060-13303	C
24316-60001	%DSCAR	DOSM ST AKITH PK	92060-13303	A
24998-16001	%RLIB1	RTE/DOS LIBRARY PART 1	92062-13302	1740
24998-16001	%RLIB2	RTE/DOS LIBRARY PART 2	92060-13302	1740
24998-16002	%FF4.N	FORTRAN IV FORMATTER	92060-13303	1726
25117-60499	%DVR24	RTE 7970 7T MAG. TAPE DRIVER	92062-13305	D
29013-60001	%DVR31	RTE 7900A DISC DRIVER	92062-13305	1710
29028-60002	%DVR12	RTE 2767A DRIVER	92062-13303	A
29029-60001	%DVR00	RTE TTY/PUNCH/PHOTO READER	92062-13302	1740
29030-60001	%DVR11	RTE 2892A CARD READER DRIVER	92062-13303	1710
29100-60017	!S4LP	24K SIO LINE PRINTER	92001-13305	A
29100-60018	!S4SYD	24K SIO SYSTEM DUMP	92001-13305	A
29100-60019	!S4PHR	24K SIO PHOTO READER	92001-13305	A
29100-60020	!S4PUN	24K SIO TAPE PUNCH	92001-13305	A
29100-60022	!S4L67	24K SIO 2767 LINE PRINTER	92001-13305	A
29100-60023	!S4MT2	24K SIO 7970 MAG.TAPE	92001-13305	A
29100-60049	!S4MT3	24K SIO MAG. TAPE	92001-13305	A
29100-60050	!S4TER	24K SIO TERMINAL PRINTER	92001-13305	A
59310-16002	%1DV37	RTE HP-IB WITHOUT SRQ	92062-13304	1726
59310-16003	%2DV37	RTE HP-IB WITH SRQ	92062-13304	1726
59310-16004	%HPIB	HP-IB DEVICE SUBROUTINE	92062-13304	1710
59310-16005	%SRQ.P	SRQ.P TRAP UTILITY	92062-13304	1710
72008-60001	%1DV10	COMP. 7210A PLOTTER DRIVER	92062-13302	A
72009-60001	%2DV10	MIN. 7210A PLOTTER DRIVER	92062-13302	A
91200-16001	%DVA13	91200A DRIVER	92062-13303	1648
91200-16002	%TVLIB	91200A VIDEO MONITOR LIBRARY	92062-13303	1648
91200-16004	%TVVER	91200A TV INTERFACE VERIFIER	92062-13303	1648
92001-16002	%LDR2	RTE LOADER	92001-13301	1726
92001-16003	%MTM	MULT. TERMINAL MONITOR	92001-13301	B
92001-16004	%2DP43	POWER FAILURE DRIVER	92001-13301	1633
92001-16005	%SYLIB	RTE SYSTEM LIBRARY	92001-13301	1740
92001-16012	%CR2SY	CORE RESIDENT OPERATING SYS.	92001-13301	1740

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SOFTWARE MODULE NUMBERS: 92060B LEVEL 1740 (RTE III)

PAPER TAPE	MODULE	DESCRIPTION	CARTRIDGE	DATE CODE
92001-16028	%DV05	RTE 2640A DRIVER	92062-13302	1740
92001-16035	%DVA05	RTE DRIVER 264X MODEM	92062-13302	1740
92001-18014	&AUTOR	AUTO RESTART PROGRAM SOURCE	92060-13310	1631
92002-12001	%BMPG1	BATCH MONITOR PROGRAM PART 1	92002-13301	1631
92002-12001	%BMPG2	BATCH MONITOR PROGRAM PART 2	92002-13301	1631
92002-12001	%BMPG3	BATCH MONITOR PROGRAM PART 3	92002-13301	1631
92002-16006	%BMLIB	BATCH LIBRARY	92002-13302	1631
92002-16010	%EDITR	RTE EDITOR	92002-13302	C
92060-12001	%3SPO1	RTE-III SPOOL MONITOR PART 1	92060-13313	1631
92060-12001	%3SPO2	RTE-III SPOOL MONITOR PART 2	92060-13313	1631
92060-12003	%CR3SY	MEMORY RESIDENT SYSTEM	92060-13301	1740
92060-12004	%ASMB	RTE ASSEMBLER	92060-13304	1639
92060-12005	%CLIB	RTE COMPILER LIBRARY	92060-13315	1726
92060-16001	%3UP43	POWER FAILURE DRIVER	92060-13301	1633
92060-16004	%LDR3	RTE-III LOADER	92060-13301	1726
92060-16006	%WHZ73	RTE-III WHZAT PROGRAM	92060-13310	1726
92060-16028	%XREF	CROSS REFERENCE	92060-13304	A
92060-16029	!3GN00	7900 RTE-III GENERATOR	92060-13311	1631
92060-16031	%DVR32	RTE 7905A DISC DRIVER	92062-13305	A
92060-16032	!3GN05	7905 RTE-III GENERATOR	92060-13311	1631
92060-16035	%SPVMP	SPVMP	92060-13301	A
92060-16036	%$CMD3	RTE-III COMMAND PROGRAM	92060-13301	1710
92060-16037	%RT3G1	RTE-III ON-LINE GENERATOR PT.1	92060-13312	1704
92060-16037	%RT3G2	RTE-III ON-LINE GENERATOR PT.2	92060-13312	1704
92060-16038	%SWTCH	RTE-III SWITCH PROGRAM	92060-13312	1710
92060-16039	%SAVE	SAVE PROGRAM	92060-13309	1704
92060-16040	%RESTR	RESTORE PROGRAM (RSTOR)	92060-13309	1704
92060-16041	%VERFY	DISC VERIFY PROGRAM	92060-13309	1704
92060-16042	%COPY	DISC COPY PROGRAM	92060-13309	1704
92060-16043	%DBKLB	DISK BACK UP LIBRARY	92060-13309	1704
92060-16044	!DSKUP	OFF LINE DISK BACK-UP	92060-13309	1704
92060-16045	%RDNAM	READ NAMR PROGRAM	92060-13310	1631
92060-16052	%KEYS	SOFT KEY UTILITY	92062-13310	1707
92060-16053	%KYDMP	SOFT KEY DUMP UTILITY	92060-13310	1707
92060-16092	%FTN4	RTE FORTRAN IV MAIN	92060-13316	1726
92060-16093	%FFTN4	FORTRAN IV SEGMENT F	92060-13316	1726
92060-16094	%0FTN4	FORTRAN IV SEGMENT 0	92060-13316	1726
92060-16095	%1FTN4	FORTRAN IV SEGMENT 1	92060-13316	1726
92060-16096	%2FTN4	FORTRAN IV SEGMENT 2	92060-13316	1726
92060-16097	%3FTN4	FORTRAN IV SEGMENT 3	92069-13316	1726
92060-16098	%4FTN4	FORTRAN IV SEGMENT 4	92060-13316	1726
92060-16046	&UPDAT	UPDATE TRANSFER FILE	92060-13310	1740
92060-16047	&PKDIS	PACK DISK TRANSFER FILE	92060-13310	1631
92060-16050	&AN3F0	RTE-III 7900 GFATHER ANSW FILE	92060-13314	1726
92060-16051	&AN3F5	RTE-III 05/20 GFATHER ANS FILE	92060-13314	1726
92060-16086	%MSAFD	FLEXIBLE DISC BACKUP UTILITY	92060-13309	1740
92002-16001	%DVR23	RTE 7970 9T. MAG. TAPE DRIVER	92062-13304	A
92002-16002	%2DV47	RTE 9295A DRIVER WITHOUT DMS	92062-13302	1726
92002-16003	%3DV47	RTE 9295A DRIVER WITH DMS	92062-13302	1643

SOFTWARE MODULE NUMBERS: 92062A LEVEL 1740 (RTE III)

PAPER TAPE	MODULE	DESCRIPTION	CARTRIDGE	DATE CODE
09601-16021	%DVR15	RTE 7261A DRIVER	92062-13304	A
12732-16001	%DVR33	FLEXIBLE DISC DRIVER	92062-13304	1726
20747-60001	%DVR30	RTE FIXED HEAD DISC DRIVER	92062-13305	C
20808-60001	%CAL10	CAL, PLOTTER DRIVER	92062-13302	B
20810-60001	%CALIB	CAL, PLOTTER LIBRARY	92062-13302	C
25117-60499	%DVR24	RTE 7970 7T MAG, TAPE DRIVER	92062-13305	D
29013-60001	%DVR31	RTE 7900A DISC DRIVER	92062-13305	1710
29026-60002	%DVR12	RTE 2767A DRIVER	92062-13303	A
29029-60001	%DVR00	RTE TTY/PUNCH/PHOTO READER	92062-13302	1740
29030-60001	%DVR11	RTE 2892A CARD READER DRIVER	92062-13303	1710
59310-16002	%1DV37	RTE HP-IB WITHOUT SRQ	92062-13304	1726
59310-16003	%2DV37	RTE HP-IB WITH SRQ	92062-13304	1726
59310-16004	%HPIB	HP-IB DEVICE SUBROUTINE	92062-13304	1710
59310-16005	%SRQ,P	SRQ,P TRAP UTILITY	92062-13304	1710
72008-60001	%1DV10	COMP, 7210A PLOTTER DRIVER	92062-13302	A
72009-60001	%2DV10	MIN, COMP, 7910A PLOTER DRIVE	92062-13302	A
91200-16001	%DVA13	91200A DRIVER	92062-13303	1648
91200-16002	%TVLIB	91200A VIDEO MONITOR LIBRARY	92062-13303	1648
91200-16004	%TVVER	91200A TV INTERFACE VERIFIER	92062-13303	1648
92001-16020	%DVA12	2607/10/13/14/17/18 DRIVER	92062-13303	1534
92001-16027	%4DV05	RTE 2644/45 DRIVER	92062-13302	1740
92001-16028	%0DV05	RTE 2640A DRIVER	92062-13302	1740
92001-16035	%DVA05	RTE DRIVER 264X MODEM	92062-13302	1740
92060-16031	%DVR32	RTE 7905A DISC DRIVER	92062-13305	A
92202-16001	%DVR23	RTE 7970 9T, MAG, TAPE DRIVER	92062-13304	A
92900-16002	%2DV47	RTE 92900A DRIVER WITHOUT DMS	92062-13302	1643
92900-16003	%3DV47	RTE 92900A DRIVER WITH DMS	92062-13302	1643

SOFTWARE MODULE NUMBERS: 92064A OPTIONS 20 & 40 LEVEL 1740 (RTE-M)

The following modules are unique in that they are available on Flexible disc as well as Paper Tape and Mini-Cartridge.

STRUCTURE

The RTE-M operating system is divided into three groups. Refer to the RTE-M Programmer's Reference Manual (part no. 92064-90002) for a description of the operating systems.

Within this list the modules that correspond with each operating system are described as MI, MII, or MIII.

CARTRIDGE TAPES

There are three cartridge tapes that contain the three operating systems. The part numbers of these cartridge tapes and the corresponding operating systems follow:

92064-13301	RTE-MI
92064-13302	RTE-MII
92064-13303	RTE-MIII

Modules that correspond with two or all three operating systems and are contained on more than one cartridge tape contain (MI), (MII), or (MIII) in their description.

Modules that do not directly relate to the operating systems are contained on the other cartridge tapes.

FLEXIBLE DISCS

There are two flexible discs referred to as GEN DISC and APP DISC. The GEN DISC (92064-13401) contains all the software that can be loaded at generation. The APP DISC (92064-13402) contains all the application software that can be loaded on-line. As with the cartridge tapes, some of the modules can be found on both flexible discs.

The Generation disc contains the following:

- Off-line generator
- All operating system software
- I/O drivers
- Certain HP user programs

The Applications disc contains the following:

- HP applications programs — Assembler
  FORTRAN compiler
  Editor
  Cross reference
  program
- Certain relocatable system software
- Certain user programs

Modules that appear on both flexible discs contain (GEN DISC) or (APP DISC) in their description.

SOFTWARE MODULE NUMBERS: 92064A OPTIONS 20 & 40 LEVEL 1740 (RTE-M)

PAPER TAPE	MODULE	DESCRIPTION	CARTRIDGE	FLEXIBLE DISC	DATE CODE
09601-16021	%DVR15	RTE 7261A CARD READER DRIVER	92062-13304	92064-13401	A
12732-16001	%DVR33	FLEXIBLE DISC DRIVER	92062-13304	92064-13401	1650
20806-60001	%CAL10	RTE PLOTTER DRIVER	92062-13302	92064-13401	B
20810-60001	%CALIB	CAL. PLOTTER LIBRARY	92062-13302	92064-13401	C
24153-60001	%FF.N	RTE/DOS FORTRAN FORMATTER	92060-13303	92064-13402	C
24153-60001	%FF.N	RTE/DOS FORTRAN FORMATTER	92060-13303	92064-13401	C
24306-60001	%DECAR	DOSM STRING ARITH PK	92060-13303		A
24998-16001	%RLIB1	RTE/DOS LIBRARY	92060-13302	92064-13401	1740
24998-16001	%RLIB1	RTE/DOS LIBRARY	92060-13302	92064-13402	1740
24998-16001	%RLIB2	RTE/DOS LIBRARY	92060-13302	92064-13402	1740
24998-16001	%RLIB2	RTE/DOS LIBRARY	92060-13302	92064-13401	1740
24998-16002	%FF4.N	FORTRAN IV FORMATTER	92060-13303	92064-13402	1624
24998-16002	%FF4.N	FORTRAN IV FORMATTER	92060-13303	92064-13401	1624
29028-60002	%DVR12	RTE 2767A DRIVER	92062-13303	92064-13401	A
29029-60001	%DVR00	RTE TTY/PUNCH/PHOTO READER	92062-13302	92064-13401	1740
29030-60001	%DVR11	RTE 2892A CARD READER DRIVER	92062-13303	92064-13401	1710
59310-16002	%1DV37	HP-IB WITHOUT SYSTEM REQUEST	92062-13304	92064-13401	1710
59310-16003	%2DV37	HP-IB WITH SYSTEM REQUEST	92062-13304	92064-13401	1710
59310-16004	%HPIB	HP-IB RTE UTILITY	92062-13304	92064-13401	1710
59310-16005	%SRQ.P	SRQ.P TRAP UTILITY	92062-13304	92064-13401	1710
72008-60001	%1DV10	COMP. 7210A PLOTTER DRIVER	92062-13302	92064-13401	A
72009-60001	%2DV10	MIN. COMP. 7210A PLOTTER DRIVE	92062-13302	92064-13401	A
91200-16001	%DVA13	91200 TV INTERFACE DRIVER	92062-13303	92064-13401	1648
91200-16002	%TVLIB	VIDEO MONITOR LIBRARY	92062-13303	92064-13401	1648
91200-16004	%TVVER	TV INFT VERIF	92062-13303	92064-13401	1648
92001-16020	%DVA12	2607/10/13/14/17/18 DRIVER	92062-13303	92064-13401	1534
92001-16027	%4DV05	RTE 2644/45 DRIVER	92062-13302	92064-13401	1740
92001-16028	%0DV05	RTE 2640A DRIVER	92062-13302	92064-13401	1740
92001-16035	%DVA05	RTE DRIVER 264X MODEM	92062-13302	92064-13401	1740
92060-16052	%KEYS	SOFT KEY UTILITY	92064-13304	92064-13402	1707
92060-16053	%KYDMP	SOFT KEY DUMP UTILITY	92064-13304	92064-13402	1707
92060-16092	%FTN4	FORTRAN IV MAIN		92064-13402	1726
92060-16093	%FFTN4	RTE FORTRAN IV SEG ID SUB		92064-13402	1726
92060-16094	%0FTN4	FORTRAN IV SEGMENT 0		92064-13402	1726
92060-16095	%1FTN4	FORTRAN IV SEGMENT 1		92064-13402	1726
92060-16096	%2FTN4	FORTRAN IV SEGMENT 2		92064-13402	1726
92060-16097	%3FTN4	FORTRAN IV SEGMENT 3		92064-13402	1726
92060-16098	%4FTN4	FORTRAN IV SEGMENT 4		92064-13402	1726
92064-12005	%FMPC	CARTRIDGE FMP/FMPCR (LIB)	92064-13306	92064-13401	1709
92064-12006	%FMPF	FLEX DISC FMGR LIB (GEN DISC)		92064-13401	1726
92064-12006	%FMPF	FLEX DISC FMGR LIB (APP DISC)		92064-13402	1726
92064-12007	%CLIBM	RTE COMPILER LIBRARY		92064-13402	1726
92064-16001	%MSY1	MI OPERATING SYSTEM	92064-13301	92064-13401	1726
92064-16002	%MSY2	MII OPERATING SYSTEM	92064-13302	92064-13401	1726
92064-16003	%MSY3	MIII OPERATING SYSTEM	92064-13303	92064-13401	1726
92064-16005	%MBU	MI BUFFERING	92064-13301	92064-13401	1650

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SOFTWARE MODULE NUMBERS: 92064A OPTIONS 20 & 40 LEVEL 1740 (RTE-M)

PAPER TAPE	MODULE	DESCRIPTION	CARTRIDGE	FLEXIBLE DISC	DATE CODE
92064-16006	%MMP	MI SCHEDULING OPTION	92064-13301	92064-13401	1650
92064-16008	%MTI	TIMER OPTION (MII)	92064-13302	92064-13401	1650
92064-16008	%MTI	TIMER OPTION (MIII)	92064-13303	92064-13401	1650
92064-16008	%MTI	TIMER OPTION (MI)	92064-13301	92064-13401	1650
92064-16009	%MTS	TIME SCHEDULING OPTION (MIII)	92064-13303	92064-13401	1650
92064-16009	%MTS	TIME SCHEDULING OPTION (MII)	92064-13302	92064-13401	1650
92064-16009	%MTS	TIME SCHEDULING OPTION (MI)	92064-13301	92064-13401	1650
92064-16010	%MOP	OPERATOR COMMAND OPTION (MIII)	92064-13303	92064-13401	1650
92064-16010	%MOP	OPERATOR COMMAND OPTION (MII)	92064-13302	92064-13401	1650
92064-16010	%MOP	OPERATOR COMMAND OPTION (MI)	92064-13301	92064-13401	1650
92064-16011	%MCL	CLASS I/O OPTION (MII)	92064-13302	92064-13401	1726
92064-16012	%MAP	MI/II ABSOLUTE PROGRAM LOADER	92064-13305	92064-13401	1726
92064-16013	%MDMLB	DUMMY LIBRARY (MII)	92064-13302	92064-13401	1650
92064-16013	%MDMLB	DUMMY LIBRARY (MI)	92064-13301	92064-13401	1650
92064-16013	%MDMLB	DUMMY LIBRARY (MIII)	92064-13303	92064-13401	1650
92064-16015	%MCL3	CLASS I/O OPTION (MIII)	92064-13303	92064-13401	1726
92064-16016	%MAP3	MIII ABSOLUTE PROGRAM LOADER	92064-13305	92064-13401	1726
92064-16017	%FMGC0	CARTRIDGE FILE MANAGER	92064-13305	92064-13401	1709
92064-16018	%DRC	CARTRIDGE DIR MAN PROGRAM	92064-13304	92064-13401	1650
92064-16019	%TBLCR	CARTRIDGE DIRECTORY TABLES	92064-13304	92064-13401	1650
92064-16021	%DRC1	MI CARTRIDGE DIRECTORY SUBR	92064-13306	92064-13401	1650
92064-16022	%RTMGN	SYSTEM GENERATOR	92064-13305	92064-13401	1726
92064-16023	%RTMLD	RELOCATING LOADER (GEN DISC)	92064-13305	92064-13401	1726
92064-16023	%RTMLD	RELOCATING LOADER (APP DISC)	92064-13305	92064-13402	1726
92064-16024	%RTMSC	LOADER SUB CONTROL (APP DISC)	92064-13305	92064-13402	1726
92064-16024	%RTMSC	LOADER SUB CONTROL (GEN DISC)	92064-13305	92064-13401	1726
92064-16025	%MEDIT	EDITOR		92064-13402	1703
92064-16026	%MASM6	CROSS REFERENCE SEGMENT		92064-13402	1650
92064-16027	%MPF	MI/II POWER FAIL	92064-13304	92064-13401	1650
92064-16029	%MPF3	MIII POWER FAIL	92064-13304	92064-13401	1650
92064-16030	%MAUTO	AUTOR REL	92064-13304	92064-13401	1650
92064-16031	%MRN	RESOURCE NUMBER MNGR (MIII)	92064-13303	92064-13401	1650
92064-16031	%MRN	RESOURCE NUMBER MANAGER (MII)	92064-13302	92064-13401	1650
92064-16032	%ONMTM	MULTI TERMINAL MONITOR (APP D)	92064-13305	92064-13402	1650
92064-16032	%ONMTM	MULTI TERMINAL MONITOR (GEN D)	92064-13305	92064-13401	1650
92064-16033	%MCGEN	ABSOLUTE CARTRIDGE GENERATOR	92064-13307		1726
92064-16034	%SGPRP	SEGMENT PROGRAM PREP		92064-13402	1650
92064-16035	%MPRMP	PROMPT (MTM)	92064-13305	92064-13401	1650
92064-16036	%MRSPN	RESPONSE (MTM)	92064-13305	92064-13401	1650
92064-16040	%MASM0	ASSEMBLER MAIN CONTROL		92064-13402	1650
92064-16041	%MASM1	ASSEMBLER SEGMENT 1		92064-13402	1650
92064-16042	%MASM2	ASSEMBLER SEGMENT 2		92064-13402	1650
92064-16043	%MASM3	ASSEMBLER SEGMENT 3		92064-13402	1650
92064-16044	%MASM4	ASSEMBLER SEGMENT 4		92064-13402	1650
92064-16045	%MFTN0	FORTRAN MAIN CONTROL		92064-13402	1650
92064-16046	%MFTN1	FORTRAN SEGMENT 1		92064-13402	1650

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SOFTWARE MODULE NUMBERS: 92064A OPTIONS 20 & 40 LEVEL 1740 (RTE-M)

PAPER TAPE	MODULE	DESCRIPTION	CARTRIDGE	FLEXIBLE DISC	DATE CODE
92064-16047	%MFNT2	FORTRAN SEGMENT 2		92064-13402	1650
92064-16050	%MASM5	ASSEMBLER SEGMENT 0		92064-13402	1650
92064-16051	%MXRF0	CROSS REFERENCE MAIN		92064-13402	1650
92064-16054	%DIRD	CARTRIDGE DIRECTORY READ	92064-13304	92064-13401	1650
92064-16055	%FMGF0	FLEX DISC FILE MNGR (GEN DISC)		92064-13401	1709
92064-16055	%FMGF0	FLEX DISC FILE MNGR (APP DISC)		92064-13402	1709
92064-16056	%DRF	F DISC DIRECT PROG (APP DISC)		92064-13402	1650
92064-16056	%DRF	F DISC DIRECT PROG (GEN DISC)		92064-13401	1650
92064-16057	%TBLFP	FLEXIBLE DISC DIRECT TABLES		92064-13401	1709
92064-16060	%DRF1	F DISC DIRECTORY SUB (APP D)		92064-13402	1650
92064-16060	%DRF1	F DISC DIRECTORY SUB (GEN D)		92064-13401	1650
92064-16075	IMFGEN	ABSOLUTE FLEXIBLE DISC SYSTEM		92064-13401	1726
92064-16080	%STRTM	RTE-M SYSTEM START-UP	92064-13304	92064-13401	1709
92064-16081	%MSYLB	RTE-M SYSTEM LIBRARY (GEN DISC	92064-13306	92064-13401	1709
92064-16081	%MSYLB	RTE-M SYSTEM LIBRARY (APP DISC	92064-13306	92064-13402	1709
92064-16086	%MSAFD	FLEXIBLE DISC BACKUP UTILITY	92060-13309	92064-13402	1740
92064-18059	&TBLCR	CARTRIDGE DIRECTORY TBLS SOURC	92064-13306	92064-13402	1650
92064-18126	&MHELP	EDITOR HELP FILE SOURCE		92064-13402	1650
92064-18141	&MAUTO	AUTOR SOURCE	92064-13306	92064-13402	1650
92064-18171	&TBLFP	FLEXIBLE DISC DIRECTORY SOURCE		92064-13402	1709
92202-16001	%DVR23	RTE 7970 9T. MAG. TAPE DRIVER	92062-13304	92064-13401	A
92900-16002	%2DV47	RTE 92900A DRIVER WITHOUT DMS	92062-13302	92064-13401	1643
92900-16003	%3DV47	RTE 92900A DRIVER WITH DMS	92062-13302	92064-13401	1643

TRAINING SCHEDULE

The schedule for customer training courses on Data Systems Division products has been expanded to include courses offered at our European training centers. Listed below are courses offered in the U.S. and in Europe during the period May 1977 through August 1977.

You can also obtain a copy of the training schedule from your local HP sales office. A European course schedule is available through the sales offices in Europe; a U.S. schedule through U.S. sales offices.

*Prices quoted are for courses at the two U.S. training centers only. For prices of courses at European training centers please consult your local HP Sales Office.

REGISTRATION

Requests for enrollment in any of the above courses should be made through your local HP representative. He will supply the Training Registrar at the appropriate location with the course number, dates, and requested motel reservations. Enrollments are acknowledged by a written confirmation indicating the Training Course, time of class, location and accommodations reserved.

ACCOMMODATIONS

Students provide their own transportation, meals and lodging. The Training Registrar will be pleased to assist in securing motel reservations at the time of registration.

CANCELLATIONS

In the event you are unable to attend a class for which you are registered please notify the Training Center Registrar immediately in order that we may offer your seat to another student.

TRAINING CENTER ADDRESSES

Cupertino

11000 Wolfe Road
Cupertino, California 95014
(408) 257-7000

Sunnyvale

974 East Arques
Sunnyvale, California

Rockville

4 Choke Cherry Road
Rockville, Maryland 20850
(301) 948-6370

Boise

P.O. Box 15
15 N. Phillippi Street
Boise, Idaho 83707
(208) 376-6000
TWX: 910-970-5784

Boblingen

Kundenschulung
Herrenbergerstrasse 110
D-7030 Boblingen, Wurttemberg
Tel: (07031) 667-1
Telex: 07265739
Cable: HEPAG

Winnersh

King Street Lane
GB-Winnersh, Wokingham
Berks RG11 5 AR
Tel: Wokingham 784774
Cable: Hewpie London
Telex: 847178 9

Grenoble

5, avenue Raymond-Chanas
38320 Eybens
Tel: (76) 25-81-41
Telex: 980124

Milan

Via Amerigo Vespucci, 2
1-20124 Milan
Tel: (2) 62 51
Cable: HEWPACKIT Milano
Telex: 32046

Madrid

Jerez No 3
E-Madrid 16
Tel: (1) 458 26 00
Telex: 23515 hpe

Stockholm

Enighetsvagen 1-3, Fack
S-161 20 Bromma 20
Tel: (08) 730 05 50
Cable: MEASUREMENTS
Stockholm
Telex: 10721

TITLE

TRAINING COURSE RATES AND CENTER LOCATION

Course Number	Length	Price	Cupertino	Sunnyvale	Rockville	Boise	Boblingen	Winnersh	Grenoble	Milan	*** Madrid	Stockholm	*** Amsterdam/ Brus.
01ETC	RTE II/III Driver Writing Course												
	3 days	$300											
22940A	2100 Maint.			Jan 23 Feb. 27 Apr 3									
	10 days	1000											
22941A	21MX Maint.			Jan 9 Jan 16 Feb 6 Feb 13 Mar 13 Mar 27 Apr 17 Apr 24									
	5 days	500											
22942A	7900 Maint.			Jan 9 Feb 6 Feb 13 Mar 27 Apr 17 Apr 24									
	5 days	500											
22943A	7970B Maint.					Apr 10							
	5 days	600											
22944A	7970E Maint.					Apr 3							
	5 days	600											
22945A	7905 Maint.			Jan 30 Feb 27 Mar 6 Apr 10									
	5 days	500											
22950A	2100 Ser. Assm.		Jan 16 Feb 13 Apr 17		Jan 9 Feb 6 Mar 6 Apr 10		Jan 30			Jan 23			
	5 days	500											
22965B	RTE-II/III		Jan 9 Jan 23 Feb 6 Feb 27 Mar 27 Apr 10 Apr 24		Jan 9 Jan 23 Feb 6 Feb 27 Mar 27 Apr 17		Jan 9		Jan 9				
	10 days	1000											
	(Course includes RTE-II/III operating system, batch spool monitor and file manager.)												
22969A	Distr. Sys.		Jan 30 Apr 24										
	5 days	500											
22977A	Image/DBMS 1000		Jan 9 Feb 6 Mar 13 Apr 10		Feb 13				Jan 16	Jan 9			
	5 days	500											
22980B	HPIB Minicomputer Environment		Jan 23 Mar 13 Apr 24										
	4 days	400											

TRAINING COURSE RATES AND CENTER LOCATION

Course Number	TITLE / Length	Price	Cupertino	Sunnyvale	Rockville	Boise	Boblingen	Winnersh	Grenoble	Milan	*** Madrid	Stockholm	*** Amsterdam/ Brus.
22983A	21MX E-Micro-programming		Jan 9 Mar 6										
	5 days	500											
22984A	7920 Maint.			Jan 23									
	5 days	500											
22985A	RTE-M		Jan 30 Apr 17		Jan 16 Mar 13 Apr 17								
	5 days	500											
22987A	DS 1000 Level 1		Feb 27 Apr 3		Feb 27								
	5 days	500											
22988A	DS 1000 Level 2		Apr 10		Apr 24								
	5 days	500											
22990A	RTE Driver Writing		Feb.27 Apr 3		Feb 22 Mar 20								
	3 days	300											
92780A	ATS-80 Automatic Test System		Jan 16 Feb 6 Mar 27										
	5 days	1000											

*NOTE: Dates within brackets are starting dates for week 1 and week 2 of the RTE course. In some cases there is a break between the two weeks of the class. Course 22977A, IMAGE/DBMS 1000 replaces 22953A (2100 IMAGE); the new class adds additional material and extends the training from 3 to 5 days.

***We have not yet received dates for Madrid or Amsterdam/Brus.

HEWLETT-PACKARD
COMPUTER SYSTEMS COMMUNICATOR ORDER FORM

Please Print:

Name _____ Title _____

Company _____

Street _____

City _____ State _____ Zip Code _____

Country _____

☐ HP Employee Account Number _____ Location Code _____

☐ **DIRECT SUBSCRIPTION**

Part No.	Description	Qty	List Price	Extended Dollars	Total Dollars
5951-6111	COMMUNICATOR 1000	_____	$48.00	_____	
	(if quantity is greater than 1 discount is 40%)			_____	
	TOTAL DOLLARS for 5951-6111				_____
5951-6112	COMMUNICATOR 2000	_____	25.00	_____	
	(if quantity is greater than 1 discount is 40%)			_____	
	TOTAL DOLLARS for 5951-6112				_____
5951-6113	COMMUNICATOR 3000	_____	48.00	_____	
	(if quantity is greater than 1 discount is 40%)			_____	
	TOTAL DOLLARS for 5951-6113				_____

☐ **BACK ISSUE ORDER FORM (cash only in U.S. dollars)**
(subject to availability)

Part No.	Description	Issue No.	Qty	List Price	Extended Dollars	Total Dollars
5951-6111	COMMUNICATOR 1000	_____	_____	$10.00	_____	
		_____	_____	10.00	_____	
		_____	_____	10.00	_____	
	TOTAL DOLLARS					_____
5951-6112	COMMUNICATOR 2000	_____	_____	$ 5.00	_____	
		_____	_____	5.00	_____	
		_____	_____	5.00	_____	
	TOTAL DOLLARS					_____
5951-6113	COMMUNICATOR 3000	_____	_____	$10.00	_____	
		_____	_____	10.00	_____	
		_____	_____	10.00	_____	
	TOTAL DOLLARS					_____
TOTAL ORDER DOLLAR AMOUNT						_____

☐ **SERVICE CONTRACT CUSTOMERS**

You will receive one copy of either COMMUNICATOR 1000, 2000, or 3000 as part of your contract. Indicate additional copies below and have your local office forward. Billing will be included in normal contract invoices.

Number of additional copies _____

FOR HP USE ONLY

CONTRACT KEY

5951-6111 Number of additional copies _____
5951-6112 Number of additional copies _____
5951-6113 Number of additional copies _____

Approved _____

HEWLETT-PACKARD
COMMUNICATOR SUBSCRIPTION AND ORDER INFORMATION

The Computer Systems COMMUNICATORS are bi-monthly systems support publications available from Hewlett-Packard on an annual (6 issues) subscription.

The following instructions are for customers who do not have Software Service Contracts.

1. Complete name and address portion of order form.
2. For new direct subscriptions (see sample below):
   a. Indicate which COMMUNICATOR publication(s) you wish to receive.
   b. Enter number of copies per issue under Qty column.
   c. Extend dollars (quantity x list price) in Extended Dollars column.
   d. Enter discount dollars on line under Extended Dollars. (If quantity is greater than 1 you are entitled to a 40% discount.*)
   e. Enter Total Dollars (subtract discount dollars from Extended List Price dollars).

   **To qualify for discount all copies of publications must be mailed to same name and address and ordered at the same time.*

SAMPLE

☒ **DIRECT SUBSCRIPTION**

Part No.	Description	Qty	List Price	Extended Dollars	Total Dollars
5951-6111	COMMUNICATOR 1000	3	$48.00	$144.00	
	(if quantity is greater than 1 discount is 40%)			57.60	
	TOTAL DOLLARS for 5951-6111				$86.40

3. To order back issues (see sample below):
   a. Indicate which publication you are ordering.
   b. Indicate which issue number you want.
   c. Enter number of copies per issue.
   d. Extend dollars for each issue.
   e. Enter total dollars for back issues ordered.

   All orders for back issues of the COMMUNICATORS are cash only orders (U.S. dollars only) and are subject to availability.

SAMPLE

☒ **BACK ISSUE ORDER FORM (cash only in U.S. dollars)**
(subject to availability)

Part No.	Description	Issue No.	Qty	List Price	Extended Dollars	Total Dollars
5951-6111	COMMUNICATOR 1000	XX	1	$10.00	$10.00	
		XX	2	10.00	20.00	
				10.00		
	TOTAL DOLLARS					$30.00

4. Domestic Customers: Mail the order form with your U.S. Company Purchase Order or check (payable to Hewlett-Packard Co.) to:

   HEWLETT-PACKARD COMPANY
   Computer Systems COMMUNICATOR
   P.O. Box 61809
   Sunnyvale, CA 94088
   U.S.A.

5. International Customers: Order by part number through your local Hewlett-Packard Sales Office.

HEWLETT-PACKARD
COMPUTER SYSTEMS COMMUNICATOR ORDER FORM

Please Print:

Name _____ Title _____

Company _____

Street _____

City _____ State _____ Zip Code _____

Country _____

☐ HP Employee Account Number _____ Location Code _____

☐ **DIRECT SUBSCRIPTION**

Part No.	Description	Qty	List Price	Extended Dollars	Total Dollars
5951-6111	COMMUNICATOR 1000	_____	$48.00	_____	
	(if quantity is greater than 1 discount is 40%)			_____	
	TOTAL DOLLARS for 5951-6111				_____
5951-6112	COMMUNICATOR 2000	_____	25.00	_____	
	(if quantity is greater than 1 discount is 40%)			_____	
	TOTAL DOLLARS for 5951-6112				_____
5951-6113	COMMUNICATOR 3000	_____	48.00	_____	
	(if quantity is greater than 1 discount is 40%)			_____	
	TOTAL DOLLARS for 5951-6113				_____

☐ **BACK ISSUE ORDER FORM (cash only in U.S. dollars)**
(subject to availability)

Part No.	Description	Issue No.	Qty	List Price	Extended Dollars	Total Dollars
5951-6111	COMMUNICATOR 1000	_____	_____	$10.00	_____	
		_____	_____	10.00	_____	
		_____	_____	10.00	_____	
	TOTAL DOLLARS					_____
5951-6112	COMMUNICATOR 2000	_____	_____	$ 5.00	_____	
		_____	_____	5.00	_____	
		_____	_____	5.00	_____	
	TOTAL DOLLARS					_____
5951-6113	COMMUNICATOR 3000	_____	_____	$10.00	_____	
		_____	_____	10.00	_____	
		_____	_____	10.00	_____	
	TOTAL DOLLARS					_____
TOTAL ORDER DOLLAR AMOUNT						_____

☐ **SERVICE CONTRACT CUSTOMERS**

You will receive one copy of either COMMUNICATOR 1000, 2000, or 3000 as part of your contract. Indicate additional copies below and have your local office forward. Billing will be included in normal contract invoices.

Number of additional copies _____

FOR HP USE ONLY

CONTRACT KEY

5951-6111 Number of additional copies _____
5951-6112 Number of additional copies _____
5951-6113 Number of additional copies _____

Approved _____

HEWLETT-PACKARD
COMMUNICATOR SUBSCRIPTION AND ORDER INFORMATION

The Computer Systems COMMUNICATORS are bi-monthly systems support publications available from Hewlett-Packard on an annual (6 issues) subscription.

The following instructions are for customers who do not have Software Service Contracts.

1. Complete name and address portion of order form.
2. For new direct subscriptions (see sample below):
   a. Indicate which COMMUNICATOR publication(s) you wish to receive.
   b. Enter number of copies per issue under Qty column.
   c. Extend dollars (quantity x list price) in Extended Dollars column.
   d. Enter discount dollars on line under Extended Dollars. (If quantity is greater than 1 you are entitled to a 40% discount.*)
   e. Enter Total Dollars (subtract discount dollars from Extended List Price dollars).

   **To qualify for discount all copies of publications must be mailed to same name and address and ordered at the same time.*

SAMPLE

☒ **DIRECT SUBSCRIPTION**

Part No.	Description	Qty	List Price	Extended Dollars	Total Dollars
5951-6111	COMMUNICATOR 1000	3	$48.00	$144.00	
	(if quantity is greater than 1 discount is 40%)			57.60	
	TOTAL DOLLARS for 5951-6111				$86.40

3. To order back issues (see sample below):
   a. Indicate which publication you are ordering.
   b. Indicate which issue number you want.
   c. Enter number of copies per issue.
   d. Extend dollars for each issue.
   e. Enter total dollars for back issues ordered.

   All orders for back issues of the COMMUNICATORS are cash only orders (U.S. dollars only) and are subject to availability.

SAMPLE

☒ **BACK ISSUE ORDER FORM (cash only in U.S. dollars)**
(subject to availability)

Part No.	Description	Issue No.	Qty	List Price	Extended Dollars	Total Dollars
5951-6111	COMMUNICATOR 1000	XX	1	$10.00	$10.00	
		XX	2	10.00	20.00	
				10.00		
	TOTAL DOLLARS					$30.00

4. Domestic Customers: Mail the order form with your U.S. Company Purchase Order or check (payable to Hewlett-Packard Co.) to:

   HEWLETT-PACKARD COMPANY
   Computer Systems COMMUNICATOR
   P.O. Box 61809
   Sunnyvale, CA 94088
   U.S.A.

5. International Customers: Order by part number through your local Hewlett-Packard Sales Office.

Please photocopy this order form if you do not want to cut the page off. You will automatically receive a new order form with your order.

HEWLETT hp PACKARD

CONTRIBUTED SOFTWARE
Direct Mail Order Form

NOTE: No direct mail order can be shipped outside the United States.

Please Print:

Name _____ **Title** _____

Company _____

Street _____

City _____ **State** _____ **Zip Code** _____

Country _____

Item No.	Part No.	Qty.	Description	List Price Each		Extended Total	

Sub-total		
Your State & Local Sales Taxes*		
Handling Charge	1	50
TOTAL		

*Tax is verified by computer according to your ZIP CODE. If no sales tax is added, your state exemption number must be provided: # _____.
If not, your order may have to be returned.

Domestic Customers: Cash required on all orders less than $50.00. Mail the order form with your check or money order (payable to Hewlett-Packard Co.) or your U.S. Company Purchase Order to:

HEWLETT-PACKARD COMPANY
Contributed Software
P.O. Box 61809
Sunnyvale, CA 94088

International Customers: Order through your local Hewlett-Packard Sales office. No direct mail order can be shipped outside the United States.

All prices domestic U.S.A. only. Prices are subject to change without notice.

ORDERING INFORMATION FOR LOCUS CONTRIBUTED SOFTWARE

Programs are available individually in source language on either paper tape, magnetic tape, or cassettes as indicated in the abstracts.

To order a particular program, it is necessary to specify the program identification number, together with an option number which indicates the type of product required. The program identification number with the option number composes the ordering number.

For example:

22113A-K01

The different options are:

K01 — Source paper tape and documentation
K21 — Magnetic tapes and documentation

NOTE

Specify 800 BPI or 1600 BPI Magnetic tape.

D00 — Documentation

Not all options are available for all programs.

Ten-digit numbers do not require additional option numbers such as K01, K21, etc. The 10-digit number automatically indicates the option or media ordered.

For example:

22681-18901 — The digits 189 indicate source paper tape plus documentation.
22681-10901 — The digits 109 indicate source magnetic tape plus documentation (800 BPI magnetic tape)
22681-11901 — The digits 119 indicate source magnetic tape plus documentation (1600 BPI magnetic tape)
22681-13301 — The digits 133 indicate source cassettes plus documentation

Only those options listed in each abstract are available.

Refer to the Price List for prices and correct order numbers.

Hewlett-Packard offers no warranty, expressed or implied and assumes no responsibility in connection with the program material listed.

HEWLETT-PACKARD
LOCUS CONTRIBUTED SOFTWARE CATALOG
DIRECT MAIL ORDER FORM

Please Print:

Name _____ Title _____

Company _____

Street _____

City _____ State _____ Zip Code _____

Country _____

☐ HP Employee Account Number _____ Location Code _____

Part Number	Description	Qty.	List Price Each	Extended Total
22000-90099	Locus Contributed Software Catalog		$15.00	
*If no sales tax is added, your state exemption number must be provided: #_____ If not, your order may have to be returned.			Your State & Local Sales Taxes*	
			Handling Charge	1.50
			TOTAL	

Domestic Customers: Mail the order form with your check or money order (payable to Hewlett-Packard Co.) to:

HEWLETT-PACKARD COMPANY
LOCUS CATALOG
P.O. Box 61809
Sunnyvale, CA 94088

International Customers: Order by part number through your local Hewlett-Packard Sales Office.

NOTE: No direct mail order can be shipped outside the United States. All prices domestic U.S.A. only. Prices are subject to change without notice.

NOT TO BE USED FOR ORDERING COMMUNICATOR SUBSCRIPTIONS

HEWLETT hp PACKARD

CORPORATE PARTS CENTER

Direct Mail
Parts and Supplies Order Form

SHIP TO:

NAME _____

COMPANY _____ CUSTOMER REFERENCE # _____

STREET _____ TAXABLE*? _____

CITY _____ STATE _____ ZIP CODE _____

Item No.	Check Digit	Part No.	Qty.	Description	List Price Each		Extended Total	

Special Instructions

Sub-total		
Your State & Local Sales Taxes*		
Handling Charge	1	50
TOTAL		

*Tax is verified by computer according to your ZIP CODE. If no sales tax is added, your state exemption number must be provided: # _____. If not, your order may have to be returned.

Check or Money Order, made payable to Hewlett-Packard Company, must accompany order.

When completed, please mail this form with payment to:

HEWLETT-PACKARD COMPANY
Mail Order Department
P.O. Drawer #20
Mountain View, CA 94043

Phone: (415) 968-9200

Most orders are shipped within 24 hours of receipt. Shipments to California, Oregon and Washington will be made via UPS. Other shipments will be sent Air Parcel Post, with the exception that shipments over 25 pounds will be made via truck. No Direct Mail Order can be shipped outside the U.S.