M1 COLD START PROCEDURE

The following steps describe the loading procedure for abso-
lutely bare hardware. These steps are written with the
assumption that the hardware is functional.   If they ever
have to be taken in entirety, then this assumption is doubt-
ful. Nevertheless, for the sake of documentation they are
written down here. Of course they are not unique; there are
many other ways to get to the same point. These steps have
been checked out, however, and are "guaranteed" to work.

Accompanying this writeup is a kit of paper and mag-
netic tapes to be used in the procedure. This material must
be kept together. Each item is the kit is numbered.   For
example, this writeup is itself #1. The other items are
referred to below in sequence.

I.   LOAD AND INITIALIZE THE HP2100A

1.   Load HP basic binary loader (BBL) into protected
     memory.

Press HALT.
Press EXTERNAL, INTERNAL PRESET.
Press LOADER ENABLE.
Press M.
Set address 17700B in display register.
Press M data. The contents of 17700 will be dis-
     played.

[By pressing either M INCREMENT or M DEC-
REMENT, the contents of memory in follow-
ing or preceding locations will be dis-
played.   By changing the display register
before going to the next location, the
contents of memory can be altered. The
BBL is as follows:]

```
17700/   107700
17701/   063770
17702/   106501
17703/   004010
17704/   002400
17705/   006020
17706/   063771
```

```
17707/    073736
17710/    006401
17711/    067773
17712/    006006
17713/    027717
17714/    107700
17715/    102077
17716/    027700
17717/    017762
17720/    002003
17721/    027712
17722/    003104
17723/    073774
17724/    017762
17725/    017753
17726/    070001
17727/    073775
17730/    063775
17731/    043772
17732/    002040
17733/    027751
17734/    017753
17735/    044000
17736/    000000
17737/    002101
17740/    102000
17741/    037775
17742/    037774
17743/    027730
17744/    017753
17745/    054000
17746/    027711
17747/    102011
17750/    027700
17751/    102055
17752/    027700
17753/    000000
17754/    017762
17755/    001727
17756/    073776
17757/    017762
17760/    033776
17761/    127753
17762/    000000
17763/    103716    (not 103713)
17764/    102316    (not 102313)
17765/    027764
17766/    102516    (not 102513)
17767/    127762
17770/    173775
17771/    153775
```

```
17772/   160100
17773/   177765
17774/   000000
17775/   000000
17776/   000000
```

2. Load the HP mag tape loader.

   Press HALT.
   Make sure LOADER ENABLE is still on.
   Press EXTERNAL, INTERNAL PRESET.
   Press S and clear display register.
   Press P.
   Set starting address 17700B in display register.
   Place switch inside HP teletype to HP position.
   Place "HP Mag Tape Loader" paper tape (item #2 in
        startup kit) in teletype reader.
   Set reader to RUN position.
   Press RUN on HP. Tape should start reading and stop
        before running out of tape at the end. 102077B
        should be in display register at this time.
   Return switch inside HP teletype to 500 position.

3. Load the HP resident program.

   Press HALT.
   Press EXTERNAL, INTERNAL PRESET.
   Press P.
   Set starting address 17200B in display register.
   Mount "HP Resident" tape (item #3) on mag tape unit.
   Press LOAD/UNLOAD and ONLINE on tape unit.
   Make sure EXTEND light on HP is off.
   Press RUN on HP. Tape should quickly read, rewind and
        unload.   HP should be running resident at this
        time.

4. To restart the HP resident (if it becomes necessary):

   Press HALT.
   Press EXTERNAL, INTERNAL PRESET.
   Press P.
   Set starting address 000200B in display register.
   Press RUN.

II.   INSTALL MAINTENANCE AND CONTROL SOFTWARE.

1.   Load an initial program loader (IPL) into CTP.

Make sure CHIO has an MNODT board in its ROM slot B4.
If necessary, move MNODT board from B4 of MSCH.

Ground points A6-44 (stop on ROM parity) and A6-83
(extended scratchpads) on CHIO.

Connect a teletype to CHIO local teletype board.
Remove any other device which may be connected
to the DB-35 plug on the same board. Set local
terminal bit rate to 110 by placing switch in
extreme low position.

Place memory switch on A4 into "local core only" po-
sition (center).

ZAP entire system and force CHIO into MNODT.   (Ground
B4 pin 2 momentarily.)

Place mylar tape labeled "M1 CTP BOOTSTRAP" (#4) into
optical paper tape reader and turn reader full
on (switch full up).

Mount magnetic tape "IPL DUMP -- CTP DDT" (#5) on mag
tape unit.

Initiate self-fill sequence by typing "2325G" on the
CTP teletype.   Mylar tape should read in and
stop at end of tape.   Mag tape should
immediately start reading in and stop as the CTP
teletype types "DDT". At this point a stand-
alone DDT is loaded into the local core of the
CTP. Also in this coreload is a copy of MT
(memory test), which can be used to check out
central memory.

Turn off optical tape reader.

2.   Load SYSDDT and IPL into MSCH.

Momentarily halt CHIO by selecting it on the O-regis-
ter display panel and turning on the micro-
processor halt switch. Make sure the instruc-
tion executing does not contain a FETCH.

Place memory access switch on CHIO (on A4) back to
normal (full left). Then allow CTP to continue
running. Verify that it is still functional and
that it will access central memory (run MT for a
moment).

Modify MT to clear central memory by inserting a CLA
instruction in place of the LDA PTR instruction
near the start of the store loop. Also place a
BRU 300 instruction after the store loop in
place of the fetch loop. Then clear the central
memory.

Mount "IPL LIBRARY" tape (item #6) on tape unit. Use
    IPL on CTP to read in 8D25 coreload into lower
    half and DDE into upper half of central memory
    as follows:

IPL;U
GO$GO

#INIT.

        [If IPL refuses to INIT properly, try a
        ZAP on the CHIO multiplexer. If all else
        fails, turn off the CHIO and then back
        on. Restart CTP as indicated below.]

#DIRECTORY.

#READ.
 FILENAME: 8D25.
LA: 40000000B
WC: 200000B
SA: 3B

#READ.
 FILENAME: HDDT.
LA: 40200000B
WC: 200000B
SA: 3B

If it was necessary to borrow the MSCH MNODT board,
    follow the next few instructions. Otherwise,
    skip down to the line marked "2A" below.

Turn OFF CHIO and MSCH.
Move MNODT board back to MSCH (B4 in both processors).
Turn ON both processors and place MSCH into MNODT.
Restart CTP as follows:

```
      3/   4100004
      4/   0100004
     22/   1642
     27/   12343210
    306/   0P
    307/   40000
   3133/   4
   3134/   77777777
   3135/   0
   3136/   0P
   3137/   40000
   306P/   0
```

```
307P/   40000
540G
```

[This causes ITP to strobe CHIO, causing it to jump from its "1610" loop to its "1167" loop.]

Put MSCH into MNODT again.

```
540G
```

[This causes ITP to strobe CHIO a second time, restarting CTP.]

2A. ZAP entire system.
Remove grounds on pins A6-44 and A6-83 of CHIO.
Press MNODT button and type the following to ITP:

```
306P/   0
307P/   40000
  3/   124000
540G
```

[At this point ITP should type out "8D25".]

3. Load DDE/DDT into ITP and write on drum.

Use IPL on ITP to read DDE into low half of central memory. As on the CTP do the following:

```
IPL;U
GO$GO

#INIT.

#DIRECTORY.

#READ.
 FILENAME: DDTE.
LA: 40000000B
WC: 200000B
SA: 3B

#GO TO 10001.

8D25
```

Type to SYSDDT the following:

```
3%/  BRU 10001
4%/  BRU 10001
%Z
0;1
377777;2
0%*
0%$
0*#
```

Press MNODT button.
Type to MNODT the following:

```
306P/ 0
307P/ 40000
    3/ 124000
540G
```

[This causes DDE to be loaded into ITP, saving
8D25 in central memory at 40000B through 77777B.
DDE can now be used to write away both the upper
half of central memory (also DDE) on drum as
well as the saved 8D25.]

To DDT type:

```
Z+40306[  2B6
Z+40307[  204B4
```

Set bit 22 of switch register and ZAP system.
Set switch register to 17600B.
Type the following to DDE:

```
R;U
FORN+1\  STA FORNT
DDEA\  NOP
BAD\  200
BAD+1\  200
NW\  1
NR\  0
NP\  40
BAND\  16
SECT\  0
WBPN\  40
E;U
```

[This writes DDE onto drum 0 save area 3   (bands
16 and 17).]

4.   Write SYSDDT onto drum.

Continue typing to DDE the following:

```
37000\   LDX =-40000
37001\   LDA* 37020
37002\   STA* 37021
37003\   BRX 37001
37004\   BRU 300
37020\   60100000
37021\   60300000
37000;G
```

[This moves the saved copy of 8D25 to upper half
of central memory, from where it will also be
written on drum.]

```
BAND\   2
SECT\   0
E;U
```

[Now both coreloads are on drum.   8D25   is   on
drum 0 save area 0 (bands 2 and 3).]

5.   Write copies of DDE and SYSDDT onto disk.

Continue typing to DDE:

```
NW\   0
NR\   1
BAND\   16
SECT\   0
RBPN\   40
E;U
NW\   1
NR\   0
TSU\   2
UNIT\   1
MAXS\   4
```

Additionally turn on switch 4B7.

```
BAND\   7
SECT\   0
WBPN   40
e;u
```

Repeat the next two steps a couple of times.

```
SECT\   0
E;U
```

Turn off switch 4B7 and repeat last 5 steps above,
except use disk band 17.

[DDE is now written on disk.]

Repeat all the steps above beginning at 5., using drum
band 2 and disk unit 0. At this point, 8D25 can
be obtained by a ZAP-GO specifying 102B5 or
112B5.   DDE can be obtained by a ZAP-GO with
122B5 or 132B5.

III. LOAD THE SYSTEM FROM MAG TAPE AND DO A SAVD.

   1. Load the system from tape and get operational.

      Attach a teletype to CHIO multiplexer line Ø (KDF
          teletype).
      Disconnect all terminals from CHIO multiplexer which
          might be typed on during this portion of the
          procedure. Such events can lead to anomolous
          behavior of the system.
      For this portion of the procedure the script given
          below should be followed on the SYSDDT teletype:

```
8D25                        (fresh SYSDDT)
%Z
Ø;1
377777;2
Ø<;1,;2;Z                   (clear central memory)

;#

Ø;#                         (verify)
Ø
;#                          (clean out SWRs)

CPU%Z--OK.                  (ZAP CPUØ)
1%$                         (step mode)
1%X
Ø%*                         (scheduler off)
Ø*#                         (CPUØ)
IPL;U

GO$GO
#INIT.

#DIRECTORY.
8D25
DDTE
HDDT
ICL1

#READ.
  FILENAME: ICL1.           (read initial core load)
LA: 40000000B
WC: 200000B
TA: 1215B
#GO TO 10001.
8D25
```

ZAP system with bit 22 set in switch register.

```
    ?>>12722   2650255
    3%/  BRU 15505  BRU 10001
    %Z
    4100005;U                    (start CHIO & AMC)
    $
    306%[   2000000
```
Load real-time clock bias (of Prog's Log).
12 [(value)
13 [(value)
If unknown due to clock being off, leave 0 & do step 5 of part IV.

Press MNODT.

```
    3/ 0                      —33/4
    16G8D25
   (3514%R
    ;L(
    613371/  SLOK              (CPU is OK)
    Z+5[   0   444B4           (designate save area 1)
    ;L+2!
    0%$
    1%*
    ;#
     D 40

    ;P                         (initialize MONITOR)
    613373:  BLLN D:5640  A= 1  B= 676710  X= 665572
    ;L+1!
    1%$
    ;P                         (write system on save area 1)
    613374:  BLLN D:5706  A= 40  B= 0  X= 2
```

Get a fresh copy of SYSDDT.
ZAP-GO with 104B5 in switch register.

```
    8D25
    (3514%R
    ;L(
    613371/  SLOK              (CPU is OK)
    0%$
    1%*
    ;#
```

Mount "IDL" tape (item #7) on mag tape unit.

```
    ;P                         (starts reading IDL tape)
```

[Tape reads in for several minutes. When it is
finished, "@" is typed on the KDF teletype.]

The system is now in a state where the first snap-
shot should be taken.

2.   Perform the SAVD procedure on the system.

Do a RESET on KDF teletype.
On SYSDDT teletype hit RUBOUT and type:

    %Z
    0%*

Check process table to make sure all processes are
       blocked. There should be only two: the LISTENER
       (INITIAL-PROCESS) at 3324 and M30-COM at 3340
       (.+14).

    3524[53704000
    . 14[46204000
    . 14[0
    . 14[0

Set up the correct area parameters.

    SW%\   100B5
    SA%\   SY0   (or other area)

Save states of CHIO, AMC, and CPU.

    S1;U

Press MNODT.

    / 017G   (save state of MSCH)

Press MNODT again.

    / 0540G   (reactivate ITP)

Write out central memory contents and all of drum onto
       save area.

    S2;U
    8D25

       [At this point, the system can be restarted
       totally from disk.   The remainder of the cold
       start requires only files to be loaded onto the
       disk and some setup of MIBs, etc.]

IV.   LOAD SUBSYSTEMS AND INITIALIZE MIB´S.

(If the PFS area of the disk is intact, skip to step 3
below.)

1.   Restart saved version of system.

Obtain fresh copy of SYSDDT.
Type on SYSDDT teletype:

```
SW%/   100B5
SA%/   SY0              (or whatever)
R1;U                    (reloads the drum)
```

[It is important to read the lights register at
the end of this step. None of the lights in a
field of six or so ending in Bit 11 should be
on. This field is a count of hard errors during
the restore operation.]

Place 100B5 (contents of SW) into switch register and
do a ZAP-GO. This restores the contents of central
memory.
Start all processors and release the CPU to run.

```
R2;U                    (starts processors)
8D25
R3;U                    (expands drum bands)
8D25
0%$                     (step mode OFF)
1%*                     (scheduler ON)
;#                      (clear SWR)
```

Hit CR on KDF terminal.

```
;P                      (release CPU)
```

2.   Load disk PFS space with subsystems.

Create a large file using FILE-MAINTENANCE.
Load "Subsystems" KDF tape (item #8) on mag tape unit.
Using KDF, read PF001 into large file.
Using DDUMP (maintenance PFS), initialize index blocks
1 through 137. Load PFS user 1 from large file.
Repeat this procedure, moving PF002 from mag tape to
PFS user 2 and PF004 to PFS user 4.

3.   Restart system from save area.

Follow procedure of step 1 above, but do NOT do R3;U.
Leave that step out so that the drum band alloca-
tion remains small.

4. Create and initialize MIBs.

Follow the following script on the KDF terminal:

```
@REC DDUMP

START;G

&$ASSUME.
USER 1.
&$UNLOCK DIRECTORY FOR USER 1.
&$UNLOCK DIRECTORY FOR USER 2.
&$UNLOCK DIRECTORY FOR USER 14.
&READ DISK FILE PROFILE-MAINT.
TO "PROFILE-MAINT:TCMD".
14336 WORDS.
&FINISHED.
%F

@P-M
PROFILE-MAINT 9.16.77
>C-U =128   (NO. OF MIBS)
>E-P-P
>S-I FSL 7 2
>S-I CSL 7 2
>FIN
@#1:DELETE #1:PROFILE-MAINT
@#1:REC #1:DDUMP

START;G

$ASSUME.
USER 1.
&READ DISK FILE MAKE-LINKS;
2025 WORDS.
&READ DISK FILE COPY-SUBSYS;
367 WORDS.
$ASSUME.
USER 2.
&READ DISK FILE DDT:9SUB;
10240 WORDS.
&READ DISK FILE FILE-MAINT.
TO "FILE-MAINTENANCE:TCMD".
14336 WORDS.
&READ DISK FILE EMULATOR:PIF;
18432 WORDS.
```

```
$ASSUME.
USER 14.
&READ DISK FILE DDUMP;
12289 WORDS.
&FINISHED.
%F

@#1:RESET
@F-M
>COM-FROM MAKE-LINKS
    (There's a lot of action here   while
    links are being set up.)
>FIN
@REC DDUMP

START;G

&$COMMANDS.
FROM FILE COPY-SUBSYS.
    (At this point, the  subsystems  are
    brought in automatically from disk.)
&FINISHED.

@D-F MAKE-LINKS
@D-F COPY-SUBSYS
@D-F DDUMP
```

The first four MIBs should now look as follows:

MIB #1:


```
A-FRIEND:KEY <KEY> F(NO) O(NO)
ACCTNG-BACKUP:PCMD LEN= 33777B
ACTIVE-USERS:BIN LEN= 7777B
AMC-ITP:BIN LEN= 13777B F(NO) O(15)
AUTO-PFS:9SUB LEN= 13777B
AUTO-PFS:TCMD <LINKS TO> #2:EMULATOR:PIF
CONTINUE:TCMD <BSCMD> P(PX) F(NO) O(NO)
ENTER:PCMD LEN= 47777B
FINISHED:TCMD <BSCMD> P(PX) F(NO) O(NO)
G-FRIEND:KEY <KEY> F(NO) O(NO)
INITIAL-PROCESS:PROC <PROC> F(NO) O(15)
LINK-UTILITIES:PIF LEN= 47777B
LISTENER:BIN LEN= 33777B F(NO) O(15)
LOCKS-PFS:9BIN LEN= 7777B
M30COM:PROC <PROC>          [renamed from JUDY:PROC]
MONITOR:BIN LEN= 57777B F(NO) O(15)
OWNER:KEY <KEY> F(NO) O(10)
```

```
QUIT:TCMD <BSCMD> P(PX) F(NO) O(NO)
REAL-CORE:BIN LEN= 27777B F(NO) O(15)
RELEASE:TCMD <BSCMD> P(PX) F(NO) O(NO)
RESET:TCMD <BSCMD> P(PX) F(NO) O(NO)
SAVE-CURRENT:TCMD <BSCMD> P(PX) F(NO) O(NO)
USER-PROFILE:BIN LEN= 7777B
UTILITY:PIF LEN= 74000B
```

MIB #2:

$NOBOL:9SUB LEN= 43777B
?:9SUB <LINKS TO> #2:HELP:9SUB
?:TCMD <LINKS TO> #2:EMULATOR:PIF
ALLOW-LINKS:TCMD <LINKS TO> #1:LINK-UTILITIES:PIF
BASIC:9SUB LEN= 37777B
BASIC:PCMD <LINKS TO> #2:EMULATOR:PIF
BREAK-LINKS:TCMD <LINKS TO> #1:LINK-UTILITIES:PIF
CAL:9SUB LEN= 37777B
CAL:PCMD <LINKS TO> #2:EMULATOR:PIF
CONTINUE:TCMD <LINKS TO> #1:CONTINUE:TCMD
COPY:TCMD LEN= 43777B
DATE:TCMD LEN= 27777B
DDT:9SUB LEN= 33777B
DDT:PCMD <LINKS TO> #2:EMULATOR:PIF
DECTYPE:9SUB LEN= 7777B
DECTYPE:TCMD <LINKS TO> #2:EMULATOR:PIF
DELETE-FILES:TCMD <LINKS TO> #2:FILE-MAINTENANCE:TCMD
DELETE-OBJECTS:TCMD <LINKS TO> #2:FILE-MAINTENANCE:TCMD
DRUM-SPACE:TCMD LEN= 37777B
DUMP-940:TCMD <LINKS TO> #1:CONTINUE:TCMD
EMULATOR:PIF LEN= 57777B
EMULATOR-VERSION:PCMD <LINKS TO> #2:EMULATOR:PIF
EXAMINE-FILE:TCMD <LINKS TO> #2:FILE-MAINTENANCE:TCMD
FILE-MAINTENANCE:TCMD LEN= 43777B
FLIBE:9BIN LEN= 13106B
FOS:9SUB LEN= 23777B
FOS:PCMD <LINKS TO> #2:EMULATOR:PIF
FRIEND:SPCL <FRL> F(10)
FTC:9SUB LEN= 27777B
FTC:PCMD <LINKS TO> #2:EMULATOR:PIF
HELP:9SUB LEN= 13777B
HELP:TCMD <LINKS TO> #2:EMULATOR:PIF
HELP-940:9SUB LEN= 33777B
HELP-940:TCMD <LINKS TO> #2:EMULATOR:PIF
HELP-TEXT:9SYM LEN= 32444B
KDF-BACKUP:TCMD LEN= 117777B
LINE:TCMD <LINKS TO> #1:LINK-UTILITIES:PIF
LINK-TO:TCMD <LINKS TO> #1:LINK-UTILITIES:PIF
LISP:9SUB LEN= 27777B
LISP:PCMD <LINKS TO> #2:EMULATOR:PIF
LIST-FILES:TCMD <LINKS TO> #2:FILE-MAINTENANCE:TCMD
LIST-OBJECTS:TCMD <LINKS TO> #2:FILE-MAINTENANCE:TCMD
LOGOUT:PCMD <LINKS TO> #1:ENTER:PCMD
NARP:9SUB LEN= 37777B
NARP:PCMD <LINKS TO> #2:EMULATOR:PIF
NRH-940:TCMD <LINKS TO> #1:CONTINUE:TCMD
OWNER:KEY <KEY> F(10)
OWNER:SPCL <OWL> F(10)

```
PAPER-TAPE-READ:TCMD LEN= 43777B
PATCH:9SYM LEN= 4026B
PFS:9SUB LEN= 13777B
PFS:TCMD <LINKS TO> #2:EMULATOR:PIF
PRINT:TCMD LEN= 53777B
QED:9SUB LEN= 17777B
QED:PCMD <LINKS TO> #2:EMULATOR:PIF
QRUN:9SUB LEN= 37777B
QRUN:PCMD <LINKS TO> #2:EMULATOR:PIF
QSPL:9SUB LEN= 43777B
QSPL:PCMD <LINKS TO> #2:EMULATOR:PIF
RECOVER-940:PCMD <LINKS TO> #2:EMULATOR:PIF
REFUSE-LINKS:TCMD <LINKS TO> #1:LINK-UTILITIES:PIF
RELEASE:TCMD <LINKS TO> #1:RELEASE:TCMD
RENAME-FILE:TCMD <LINKS TO> #2:FILE-MAINTENANCE:TCMD
RESET:TCMD <LINKS TO> #1:RESET:TCMD
RUNOFF:9SUB LEN= 47777B
RUNOFF:TCMD <LINKS TO> #2:EMULATOR:PIF
SAVE-CURRENT:TCMD <LINKS TO> #1:SAVE-CURRENT:TCMD
SCHEDULE:9SUB LEN= 7777B
SCHEDULE:TCMD <LINKS TO> #2:EMULATOR:PIF
SNOBOL:9SUB LEN= 27777B
SNOBOL:PCMD <LINKS TO> #2:EMULATOR:PIF
TLOGOUT:PCMD <LINKS TO> #1:ENTER:PCMD
TYPE:9SUB LEN= 7777B
TYPE:TCMD <LINKS TO> #2:EMULATOR:PIF
WHERE-IS:TCMD <LINKS TO> #1:LINK-UTILITIES:PIF
WHO-IS-ON:TCMD <LINKS TO> #1:LINK-UTILITIES:PIF
```

MIB #3:

```
?:9SUB <LINKS TO> #2:HELP:9SUB
?:TCMD <LINKS TO> #2:EMULATOR:PIF
ALLOW-LINKS:TCMD <LINKS TO> #1:LINK-UTILITIES:PIF
BASIC:9SUB <LINKS TO> #2:BASIC:9SUB
BASIC:PCMD <LINKS TO> #2:EMULATOR:PIF
BREAK-LINKS:TCMD <LINKS TO> #1:LINK-UTILITIES:PIF
CAL:9SUB <LINKS TO> #2:CAL:9SUB
CAL:PCMD <LINKS TO> #2:EMULATOR:PIF
CONTINUE:TCMD <LINKS TO> #1:CONTINUE:TCMD
COPY:TCMD <LINKS TO> #2:COPY:TCMD
DATE:TCMD <LINKS TO> #2:DATE:TCMD
DDT:9SUB <LINKS TO> #2:DDT:9SUB
DDT:PCMD <LINKS TO> #2:EMULATOR:PIF
DECTYPE:9SUB <LINKS TO> #2:DECTYPE:9SUB
DECTYPE:TCMD <LINKS TO> #2:EMULATOR:PIF
DELETE-FILES:TCMD <LINKS TO> #2:FILE-MAINTENANCE:TCMD
```

```
DRUM-SPACE:TCMD <LINKS TO> #2:DRUM-SPACE:TCMD
DUMP-940:TCMD <LINKS TO> #1:CONTINUE:TCMD
EXAMINE-FILE:TCMD <LINKS TO> #2:FILE-MAINTENANCE:TCMD
FILE-MAINTENANCE:TCMD <LINKS TO> #2:FILE-MAINTENANCE:TCMD
FOS:9SUB <LINKS TO> #2:FOS:9SUB
FOS:PCMD <LINKS TO> #2:EMULATOR:PIF
FRIEND:SPCL <FRL> F(10)
FTC:9SUB <LINKS TO> #2:FTC:9SUB
FTC:PCMD <LINKS TO> #2:EMULATOR:PIF
HELP:9SUB <LINKS TO> #2:HELP:9SUB
HELP:TCMD <LINKS TO> #2:EMULATOR:PIF
HELP-940:9SUB <LINKS TO> #2:HELP-940:9SUB
HELP-940:TCMD <LINKS TO> #2:EMULATOR:PIF
LINE:TCMD <LINKS TO> #1:LINK-UTILITIES:PIF
LINK-TO:TCMD <LINKS TO> #1:LINK-UTILITIES:PIF
LISP:9SUB <LINKS TO> #2:LISP:9SUB
LISP:PCMD <LINKS TO> #2:EMULATOR:PIF
LIST-FILES:TCMD <LINKS TO> #2:FILE-MAINTENANCE:TCMD
LOGOUT:PCMD <LINKS TO> #1:ENTER:PCMD
NARP:9SUB <LINKS TO> #2:NARP:9SUB
NARP:PCMD <LINKS TO> #2:EMULATOR:PIF
OWNER:KEY <KEY> F(10)
OWNER:SPCL <OWL> F(10)
PFS:9SUB <LINKS TO> #2:PFS:9SUB
PFS:TCMD <LINKS TO> #2:EMULATOR:PIF
PRINT:TCMD <LINKS TO> #2:PRINT:TCMD
QED:9SUB <LINKS TO> #2:QED:9SUB
QED:PCMD <LINKS TO> #2:EMULATOR:PIF
QRUN:9SUB <LINKS TO> #2:QRUN:9SUB
QRUN:PCMD <LINKS TO> #2:EMULATOR:PIF
QSPL:9SUB <LINKS TO> #2:QSPL:9SUB
QSPL:PCMD <LINKS TO> #2:EMULATOR:PIF
RECOVER-940:PCMD <LINKS TO> #2:EMULATOR:PIF
REFUSE-LINKS:TCMD <LINKS TO> #1:LINK-UTILITIES:PIF
RELEASE:TCMD <LINKS TO> #1:RELEASE:TCMD
RENAME-FILE:TCMD <LINKS TO> #2:FILE-MAINTENANCE:TCMD
RESET:TCMD <LINKS TO> #1:RESET:TCMD
RUNOFF:9SUB <LINKS TO> #2:RUNOFF:9SUB
RUNOFF:TCMD <LINKS TO> #2:EMULATOR:PIF
SAVE-CURRENT:TCMD <LINKS TO> #1:SAVE-CURRENT:TCMD
SCHEDULE:9SUB <LINKS TO> #2:SCHEDULE:9SUB
SCHEDULE:TCMD <LINKS TO> #2:EMULATOR:PIF
SNOBOL:9SUB <LINKS TO> #2:SNOBOL:9SUB
SNOBOL:PCMD <LINKS TO> #2:EMULATOR:PIF
SPL:PCMD <LINKS TO> #2:SPL:PCMD
STATUS:TCMD <LINKS TO> #2:STATUS:TCMD
TLOGOUT:PCMD <LINKS TO> #1:ENTER:PCMD
TYPE:9SUB <LINKS TO> #2:TYPE:9SUB
TYPE:TCMD <LINKS TO> #2:EMULATOR:PIF
WHERE-IS:TCMD <LINKS TO> #1:LINK-UTILITIES:PIF
WHO-IS-ON:TCMD <LINKS TO> #1:LINK-UTILITIES:PIF
```

MIB #4:

```
?:9SUB <LINKS TO> #2:HELP:9SUB
?:TCMD <LINKS TO> #2:EMULATOR:PIF
BASIC:9SUB <LINKS TO> #2:BASIC:9SUB
BASIC:PCMD <LINKS TO> #2:EMULATOR:PIF
BREAK-LINKS:TCMD <LINKS TO> #1:LINK-UTILITIES:PIF
CAL:9SUB <LINKS TO> #2:CAL:9SUB
CAL:PCMD <LINKS TO> #2:EMULATOR:PIF
CONTINUE:TCMD <LINKS TO> #1:CONTINUE:TCMD
COPY:TCMD <LINKS TO> #2:COPY:TCMD
DATE:TCMD <LINKS TO> #2:DATE:TCMD
DECTYPE:9SUB <LINKS TO> #2:DECTYPE:9SUB
DECTYPE:TCMD <LINKS TO> #2:EMULATOR:PIF
DELETE-FILES:TCMD <LINKS TO> #2:FILE-MAINTENANCE:TCMD
FOS:9SUB <LINKS TO> #2:FOS:9SUB
FOS:PCMD <LINKS TO> #2:EMULATOR:PIF
FRIEND:SPCL <FRL> F(10)
FTC:9SUB <LINKS TO> #2:FTC:9SUB
FTC:PCMD <LINKS TO> #2:EMULATOR:PIF
HELP:9SUB <LINKS TO> #2:HELP:9SUB
HELP:TCMD <LINKS TO> #2:EMULATOR:PIF
LINE:TCMD <LINKS TO> #1:LINK-UTILITIES:PIF
LINK-TO:TCMD <LINKS TO> #1:LINK-UTILITIES:PIF
LIST-FILES:TCMD <LINKS TO> #2:FILE-MAINTENANCE:TCMD
LOGOUT:PCMD <LINKS TO> #1:ENTER:PCMD
OWNER:KEY <KEY> F(10)
OWNER:SPCL <OWL> F(10)
PFS:9SUB <LINKS TO> #2:PFS:9SUB
PFS:TCMD <LINKS TO> #2:EMULATOR:PIF
QED:9SUB <LINKS TO> #2:QED:9SUB
QED:PCMD <LINKS TO> #2:EMULATOR:PIF
RESET:TCMD <LINKS TO> #1:RESET:TCMD
SCHEDULE:9SUB <LINKS TO> #2:SCHEDULE:9SUB
SCHEDULE:TCMD <LINKS TO> #2:EMULATOR:PIF
TYPE:9SUB <LINKS TO> #2:TYPE:9SUB
TYPE:TCMD <LINKS TO> #2:EMULATOR:PIF
WHERE-IS:TCMD <LINKS TO> #1:LINK-UTILITIES:PIF
WHO-IS-ON:TCMD <LINKS TO> #1:LINK-UTILITIES:PIF
```

The above MIBs are complete except for SPL. This was
     not read in intentionally so as not to overflow the
     small amount of available drum space. There should
     now be barely enough room to accommodate SPL. This
     being the case, read it in from PFS user 2.
Do a SAVD.

5. Set real-time clock *(if required).*

Bring up system and use P-M to install a user, if only temporarily.

Login on two terminals.

On one of the terminals, use DDUMP to obtain a copy of REAL-CORE from PFS user 4. Assemble this code and load it with DDT.

Start the program (START;G). When the bell rings, one can use DDT to look at and change central memory.

On the other terminal, do a DATE command. Adjust the contents of locations 12 and 13 in central memory iteratively so as to get the DATE command to type the correct date and exact time.

Note the contents of 12 and 13 so that they can be included in the saved version of the system.

6. Complete the cold start.

Restart the system from save area as in step 3.

Using SYSDDT, insert the correct values for locations 12 and 13 into central memory.

Do a SAVD.

> [At this point there is a valid version of the system saved on disk. This completes the cold-start procedure. The system just assembled will serve as the basis for further versions incorporating various changes.]