HP3000 Operations Guide

Table of Contents

HP3000 Operating Procedures

This document describes the various system operation procedures. It describes how to shut the system down, start it back up, how to handle system hangs and system halts, how to take a memory dump, and how to configure terminals and printers. All of the normal HP3000 operational procedures should be documented in this manual.

General Notes

1. Reference is often made to procedures in HP's manuals. This is useful for possibly clarifying a problem, but you should follow the particular procedure in this manual since the HP manual does not take into account our software or our environment.

2. If you are going through one of these procedures for the first time, I would suggest two things:

    1. Read the whole procedure before you begin.

    2. Do the procedure Mon - Fri between 8AM and 5PM PST (or make sure someone is around during off hours) so that someone in the DP department can help you if you get stuck.

3. Many of the procedures listed in this document **MUST NOT** be interrupted. If any of the starts or a condense is interrupted before completion, there is a very good chance you will have to go through a long and painful reload. Do not attempt any of these procedures when there is a chance of a power interruption such as a thunderstorm.

4. To make sure that the DP staff is current in these procedures, appendix A includes a list of the procedures that each member of the staff should be able to perform.

5. Any reference to the console in this manual means LDEV 20. If you are in the habit of moving the console around, move it back to LDEV 20 before beginning.

6. When the operating system is not running, you will get the CMP prompt on the console. This prompt is different depending on the model of CPU:

`H for help ->`	37/Micro/3000/Micro/XE
`->`	39/40/42/52/33/48/58
`M>`	64/68/70

    In this manual, this prompt will simply be called the **CMP** prompt.

7. The following table characterizes each of the various start procedures found in this manual.

General Troubleshooting Procedures

This section discusses how you should react to a computer problem. We generally ask the same questions for every problem, so it is well advised to be prepared to answer these questions:

1. Is the problem in the HP3000 hardware, terminal hardware, printer hardware, PC hardware, the Import software, Export software, or accounting software. Knowing this will help us direct your call to the correct person in the DP department quickly.

SHUTDOWN

Before you can restart the operating system (eg. a WARMSTART or a COOLSTART), you must first shut it down. It is very important that the operating system be shutdown properly so that as many files and processes, as possible, are removed correctly minimizing damage from files being left open.

HP's documentation for this procedure is in the MPEV System Operation and Resource Management Manual, in the Quick Reference Appendix under the topic System Shutdown.

1. Shutdown PECAN Job

Logon as an Import user, and type the ENDPECAN command:

```
:HELLO MGR.xxx                    {Where xxx is the Import Account}
:ENDPECAN
```

2. Logon

Log onto the system **AT THE CONSOLE.**

```
:HELLO OPERATOR.SYS
:CONSOLE 20
```

3. Purge Spoolfiles

If you will be doing any start besides a WARMSTART, you must purge the current spoolfiles.

Typically, the spoolfiles do not need to be saved. If you do need to save spoolfiles, please see the procedure Storing Spoolfiles.

To purge spoolfiles, do the following:

```
:X FLUSHER5
->PURGE
Preparing to purge files matching the following:
All AVAILABLE spoolfiles
Respond 'OK' to continue
OK?OK
->EXIT

END OF PROGRAM
:
```

4. Log off all Jobs

Get a list of the currently executing jobs (repeat this command as necessary):

```
:SHOWJOB JOB=@J
```

6. Shut the System Down

You are ready to shut the system down. At the console type a ctrl-A. The computer will print an "=" sign on the terminal. You may then type in the word SHUTDOWN:

```
ctrl-A
=SHUTDOWN
```

NOTE: One of the most common problems encountered at this point is holding the ctrl-A down too long. After the Equal sign prints, another ctrl-A is sent which causes you to get the message *INVALID* when you try the SHUTDOWN. If this happens to you, simply do the ctrl-A again to get another "=" prompt.

The system should print a shutdown message and then halt.

After the shutdown is accepted, you will see approximately the following:

```
SESSION ABORTED BY SYSTEM MANAGEMENT
CPU=5. CONNECT=2. TUE, DEC  4, 1990, 5:12PM
17:12/#S9/16/LOGOFF ON LDEV #20
17:12/1/ALL JOBS LOGGED OFF
17:12/14/SP#25/STOPPED
SHUT
```

Occasionally a pending I/O operation prevents an orderly halt, making it necessary for you to manually halt the computer. If the system continues to run for more than two minutes do the following:

For Micro systems, move the key switch to position 2 and press control-B.

For the 42, move the key switch to CNTL-B (it should already be there), and press control-B.

For the 6x/70, simply press control-B.

Once you have the CMP prompt, type HALT and press RETURN.

Power Down

It is rather rare that the power has to be turned off. If equipment is going to be moved, if it is known that building power is about to be removed, or after a power failure that has lasted long enough to kill the battery backup (the BATT light is no longer on), the system should be turned off. This is documented in the MPEV System Operation and Resource Management Manual, in the Quick Reference Appendix under the topic Power Down.

1. Shut the Operating System Down

Follow the SHUTDOWN procedure. If the system is down due to an extend power failure (the BATT light is out), omit this step.

2. Turn off All Peripherals

Turn off the disk drives, the tape drive, and the system printer.

NOTE: Some peripherals may not use ON/OFF, but instead use 0/1. 0 means off and 1 means on.

3. Turn off the CPU

For Micro type systems, there is a key switch on the front. This should be turned counterclockwise to the 0 (zero) position.

For 42 systems, turn off the power switch located on the front door, about 1 foot off of the floor.

For 6x/70 systems, turn off the MAIN Power switch located in the back close to the floor.

4. Turn off the Power Conditioner

Normally, you would not do this, but if conditions warrant removing power from the power conditioner, this is the time to do it. For the large power conditioners (on the 6x/70 systems), the standard method of removing power from a power conditioner is to turn off each small breaker connected to each individual circuit, and then the main power breaker. The small systems' power conditioners have typically have only a single on/off switch, if any switches at all.

Power Up

If the power had to be removed, this procedure is used to return power to the HP3000. This is documented in the MPEV System Operation and Resource Management Manual, in the Quick Reference Appendix under the topic Power Up.

1. Turn on the Power Conditioner

If the power conditioner had to be turned off, turn it back on by first engaging the main breaker, and then engaging each individual circuit breaker. Small power conditioners have, at most, a single on/off switch.

2. Turn on the CPU

For the Micro systems, turn the key clockwise from position 0 to position 1.

For the 42, turn the power switch on the front door to ON.

For the 6x/70 systems, turn on the main power switch located on the back close to the floor.

3. Turn on the Peripheral Devices

Turn on all of the disk drives and tape drives. Do not proceed to the next step until the disk drives are full operational. Either a solid green light is on for the newer drives, or message "DRIVE n" shows up in the LED display for older drives.

NOTE: Some peripherals may not use ON/OFF, but instead use 0/1. 0 means off and 1 means on.

4. Execute the Required Start Up Procedure

In just about every case I can imagine after having the powered down, you will want to restart with a WARMSTART. If new equipment has been installed and configurations are required, then a COOLSTART will be used.

WARMSTART

The WARMSTART procedure is used to restart the system, keeping many of the system tables intact. This means that any spoolfiles and jobs on the system before it was shut down will be there when the system is WARMSTARTed. **Unless you have a specific reason for executing another start, you should use the WARMSTART**. This is documented in the MPEV System Operation and Resource Management Manual, in the Quick Reference Appendix under the topic WARMSTART (there is a separate WARMSTART listed for each type of system in that manual).

1. Initiate the WARMSTART

Note: the system must have previously been shutdown before you can restart it.

At the CMP prompt, type **START**. The system will access the disk drive (LDEV 1). If you are executing this on a 6x/70 system, several hardware level messages will print before those listed below. After 10-30 seconds come up with the following:

```
USER VERSION: HP32033G.A3.X8
WHICH OPTION <WARMSTART/COOLSTART>?WARM
```

You simply request WARM and press RETURN to begin. The following will print:

```
**WARNING** AFTER THIS POINT DO NO INTERRUPT THE STARTUP
PROCESS UNTIL AFTER THE MESSAGE " *WELCOME* " APPEARS.

DIRECTORY MAINTENANCE COMPLETED
PART 1 OF 6 COMPLETED - MEMORY RESIDENT TABLES SET UP
PART 2 OF 6 COMPLETED - SL BINDING
PART 3 OF 6 COMPLETED - SYSTEM I/O PROCESS CREATION
PART 4 OF 6 COMPLETED - DRIVER LOADING
PART 5 OF 6 COMPLETED - DISC RESIDENT TABLES SET UP
PART 6 OF 6 COMPLETED - SYSTEM PROCESS CREATION
BANK 0 DEPENDENT MEMORY USED - nnnnn
```

2. Enter the Date and Time

It is important that you validate the date and time. An incorrect date or time can cause many problems with the application software.

For Micro systems, you will be asked to simply validate the time the system thinks that it is:

```
WED, MAY 20, 1988, 7:22 PM (Y/N)
```

If the Time is right, simply press return; otherwise, enter "N" and you will prompted for the correct date and time as below:

For other systems, you must respond with the correct date and time. The time must be MILITARY:

```
DATE(m/d/y)?
TIME(h:m)?
```

COOLSTART

The COOLSTART procedure is used to restart the system typically when a reconfiguration is required, or when you want to reset the job/sessions #'s, or if you are having hardware problems and the operating system is suspect. Because the COOLSTART rebuilds internal tables, all spoolfiles are lost. The disk space being used by the spoolfiles is also lost. Unless you have a specific reason for executing another Start, you should use the WARMSTART. The COOLSTART is documented in the MPEV System Operation and Resource Management Manual, in the Quick Reference Appendix under the topic COOLSTART.

1. Initiate the COOLSTART

Note: the system must have previously been shutdown before you can restart it.

At the CMP prompt, type **START**. The system will access the disk drive (LDEV 1). If you are executing this on a 6x/70 system, several hardware level messages will print before those listed below. After 10-30 seconds come up with the following:

```
USER VERSION: HP32033G.A3.X8
WHICH OPTION <WARMSTART/COOLSTART>?COOL
```

You simply request COOL and press RETURN to begin. The following will print:

```
ANY CHANGES?N
```

Assuming you do not need any changes, use "N".

```
**WARNING** AFTER THIS POINT DO NO INTERRUPT THE STARTUP
PROCESS UNTIL AFTER THE MESSAGE " *WELCOME* " APPEARS.

DIRECTORY MAINTENANCE COMPLETED
PART 1 OF 6 COMPLETED - MEMORY RESIDENT TABLES SET UP
PART 2 OF 6 COMPLETED - SL BINDING
PART 3 OF 6 COMPLETED - SYSTEM I/O PROCESS CREATION
PART 4 OF 6 COMPLETED - DRIVER LOADING
PART 5 OF 6 COMPLETED - DISC RESIDENT TABLES SET UP
PART 6 OF 6 COMPLETED - SYSTEM PROCESS CREATION
BANK 0 DEPENDENT MEMORY USED - nnnnn
```

2. Enter the Date and Time

It is important that you validate the date and time. An incorrect date or time can cause many problems with the application software.

For Micro systems, you will be asked to simply validate the time the system thinks that it is:

```
WED, MAY 20, 1988, 7:22 PM (Y/N)
```

If the Time is right, simply press return; otherwise, enter "N" and you will prompted for the correct date and time as below:

COLDSTART

The purpose for using the COLDSTART procedure is almost always to load in configuration changes from a tape created by SYSDUMP. The COLDSTART copies the Configuration from the tape and then does what is essentially a COOLSTART. Because the COLDSTART, like the COOLSTART, rebuilds internal tables, all spoolfiles are lost. The disk space being used by the spoolfiles is also lost. Unless you have a specific reason for executing another Start, you should use the WARMSTART. The COLDSTART is documented in the MPEV System Operation and Resource Management Manual, in the Quick Reference Appendix under the topic COLDSTART.

1. Initiate the COLDSTART

Note: the system must have previously been shutdown before you can restart it.

Make sure the COLDLOAD tape is mounted and online (the busy light is off for cartridge tapes). At the CMP prompt, type **LOAD**. The system will access the tape drive, copying the configuration and operating system from the tape drive. If you are executing this on a 6x/70 system, several hardware level messages will print before those listed below.

```
USER VERSION: HP32033G.A3.X8
WHICH OPTION <COLDSTART/UPDATE/RELOAD>?COLD
```

You simply request COLD and press RETURN to begin. The following will print:

```
ANY CHANGES?N
```

Assuming you do not need any changes (they are on the tape), use "N".

```
**WARNING** AFTER THIS POINT DO NO INTERRUPT THE STARTUP
PROCESS UNTIL AFTER THE MESSAGE " *WELCOME* " APPEARS.

DIRECTORY MAINTENANCE COMPLETED
LOADING OF SYSTEM FILES IN PROGRESS
LOADING OF SYSTEM FILES COMPLETED
PART 1 OF 6 COMPLETED - MEMORY RESIDENT TABLES SET UP
PART 2 OF 6 COMPLETED - SL BINDING
PART 3 OF 6 COMPLETED - SYSTEM I/O PROCESS CREATION
PART 4 OF 6 COMPLETED - DRIVER LOADING
PART 5 OF 6 COMPLETED - DISC RESIDENT TABLES SET UP
PART 6 OF 6 COMPLETED - SYSTEM PROCESS CREATION
BANK 0 DEPENDENT MEMORY USED - nnnnn
```

2. Enter the Date and Time

It is important that you validate the date and time. An incorrect date or time can cause many problems with the application software.

For Micro systems, you will be asked to simply validate the time the system thinks that it is:

```
WED, MAY 20, 1988, 7:22 PM (Y/N)
```

If the Time is right, simply press return; otherwise, enter "N" and you will prompted for the

UPDATE

The UPDATE procedure is RARELY used. Its only purpose is to update the operating system to a new version, or to correct an corrupted operating system from the standard COLDLOAD tape that all branches should maintain. The COLDSTART copies only the operating system from tape (unlike a COLDLOAD which copies the operating system and the configuration). Because the UPDATE rebuilds internal tables, all spoolfiles are lost. The disk space being used by the spoolfiles is also lost. Unless you have a specific reason for executing another Start, you should use the WARMSTART. The UPDATE is documented in the MPEV System Operation and Resource Management Manual, in the Quick Reference Appendix under the topic UPDATE.

1. Initiate the UPDATE

Note: the system must have previously been shutdown before you can restart it.

Make sure the new operating system tape or the initial COLDLOAD tape is mounted and online (the busy light is off for cartridge tapes). At the CMP prompt, type **LOAD**. The system will access the tape drive, copying the configuration and operating system from the tape drive. If you are executing this on a 6x/70 system, several hardware level messages will print before those listed below.

```
USER VERSION: HP32033G.A3.X8
WHICH OPTION <COLDSTART/UPDATE/RELOAD>?UPDATE
```

You simply request UPDATE and press RETURN to begin. The following will print:

```
SYSTEM DISC DRT nn (MIN=8, MAX=511)?
```

The correct DRT should be displayed, so press RETURN for this question.

```
ANY CHANGES?N
```

Assuming you do not need any changes, use "N".

```
**WARNING** AFTER THIS POINT DO NO INTERRUPT THE STARTUP
PROCESS UNTIL AFTER THE MESSAGE " *WELCOME* " APPEARS.

DIRECTORY MAINTENANCE COMPLETED
LOADING OF SYSTEM FILES IN PROGRESS
LOADING OF SYSTEM FILES COMPLETE
PART 1 OF 6 COMPLETED - MEMORY RESIDENT TABLES SET UP
PART 2 OF 6 COMPLETED - SL BINDING
PART 3 OF 6 COMPLETED - SYSTEM I/O PROCESS CREATION
PART 4 OF 6 COMPLETED - DRIVER LOADING
PART 5 OF 6 COMPLETED - DISC RESIDENT TABLES SET UP
PART 6 OF 6 COMPLETED - SYSTEM PROCESS CREATION
BANK 0 DEPENDENT MEMORY USED - nnnnn
```

2. Enter the Date and Time

It is important that you validate the date and time. An incorrect date or time can cause many problems with the application software.

Configuring an HP Terminal

Once in a while, you need convert an LDEV from something else (such as a printer) to a terminal. These instructions assume the LDEV already exists. Adding new devices is beyond the scope of this manual.

1. Get the LDEV DRT NUMBER

Each device has a DRT Number which uniquely identifies the device to the CPU, based on the position of the interface card on the bus. The LDEV number is unique, but does not indicate to the hardware where the device is at. During configuration, you will attach the LDEV number to the DRT number. To determine the DRT number, use SYSINFO. Once in SYSINFO, use the IO command against the LDEV number you wish to reconfigure. For example, to reconfigure LDEV 22, use `IO 22.`

```
:X SYSINFO

------------------------------------------------------------------------
SYSINFO  (A.02.15)                    MPE V - HP3000 System Support Tool
THU, SEP 27, 1990,  4:17 PM       Copyright Hewlett-Packard Co. 1983,1986

SYSINFO is designed for use by Hewlett-Packard Support Personnel only.
     HP IS NOT LIABLE FOR DAMAGES RESULTING FROM UNAUTHORIZED USE
------------------------------------------------------------------------
  System ID:  HP32033G.A3.01  (G.A3.01)     CPU Model:   Series ??????
  Memory size:  ????? kw    (Fixed:   ????? W   Linked: ????????W)

)IO 22
  LDN  DRT  UN CH  TY  ST  TYPE SPEED   RECL  OUTDEV MODE  DRIVER    CLASSES
   22    8   2  0  16   0    10  960     40    22    JAID  HIOTERM1  TERM
)EXIT

END OF PROGRAM
:
```

Once you have the output, you are interested in the DRT and the UNIT number (see highlighted columns in the above examples. In this case the DRT is 8 and the Unit is 2).

2. Shut the System Down

Follow the SHUTDOWN Procedure.

3. Initiate the COOLSTART

At the CMP prompt, type **START**. The system will access the disk drive (LDEV 1). If you are executing this on a 6x/70 system, several hardware level messages will print before those listed below. After 10-30 seconds come up with the following:

```
USER VERSION: HP32033G.A3.X8
WHICH OPTION <WARMSTART/COOLSTART>?COOL
```

You simply request COOL and press RETURN to begin. The following will print:

```
ANY CHANGES?Y
```

Configuring an HP Printer

Recover Lost Disc Space

As time passes, the system will slowly loose track of some of its disk space. This is usually caused by the system crashing, or the system is restarted without first purging all spoolfiles. After several months, the amount of lost disk space can become significant and needs to be recovered.

These instructions are to be followed to recover the lost disk space. The procedure is easy, but somewhat lengthy. It can take as long as an hour on a large system with a lot of files and disk drives.

1. Shut System Down

Follow the System Shutdown Procedure.

2. Restart the System and Request Recover Lost Disk Space

To recover lost disk space, you are essentially doing a COOLSTART and specifying a change:

Note: the system must have previously been shutdown before you can restart it.

At the CMP prompt, type **START**. The system will access the disk drive (LDEV 1). If you are executing this on a 6x/70 system, several hardware level messages will print before those listed below. After 10-30 seconds come up with the following:

```
USER VERSION: HP32033G.A3.X8
WHICH OPTION <WARMSTART/COOLSTART>?COOL
```

You simply request COOL and press RETURN to begin. The following will print:

```
ANY CHANGES?Y
LOAD MAP?
MEMORY SIZE = 512 (MIN=256, MAX=8192)?
I/O CONFIGURATION CHANGES?

**WARNING** AFTER THIS POINT DO NOT INTERRUPT THE STARTUP PROCESS UNTIL
AFTER THE MESSAGE " *WELCOME* " APPEARS

DISC VOLUME CHANGES?
VIRTUAL MEMORY CHANGES?
DISABLE LOGGING?
SYSTEM TABLE CHANGES?
MAX # OF SPOOLFILE KILOSECTORS = 777777 (MIN=0, MAX=777777)?
# OF SECTORS PER SPOOLFILE EXTENT = 1200 (MIN=128, MAX=32767)?
RECOVER LOST DISC SPACE? Y
RECOVER LOST DISC SPACE IN PROGRESS
                The system will now begin recovering disk space. It will take 15 to 60
                minutes to run.
RECOVER LOST DISC SPACE COMPLETED
DIRECTORY MAINTENANCE COMPLETED
PART 1 OF 6 COMPLETED - MEMORY RESIDENT TABLES SET UP
PART 2 OF 6 COMPLETED - SL BINDING
PART 3 OF 6 COMPLETED - SYSTEM I/O PROCESS CREATION
PART 4 OF 6 COMPLETED - DRIVER LOADING
PART 5 OF 6 COMPLETED - DISC RESIDENT TABLES SET UP
PART 6 OF 6 COMPLETED - SYSTEM PROCESS CREATION
BANK 0 DEPENDENT MEMORY USED - 34123
```

Restore Files from Dayend Tape

Memory Dump

NOTE: You must take a memory dump **BEFORE** you execute a start. Once you take a memory dump, the system will automatically do a WARMSTART.

A memory dump is a snapshot of the CPU's memory so that all of the executing processes can be examined. It is used, primarily by HP, to determine what caused a system failure, loop, or hang.

You should take a memory dump any time the system crashes with a system failure (this message is found on the console). If you recognize the system failure as a known problem (eg. I know System Failure 976 is a misconfigured NS device), you can skip the memory dump before restarting the system.

This procedure documents creating a memory dump tape, and then loading it back in after the system is running again.

Overheating Tips

All of the HP3000 computers generate a good deal of heat, but the 6x/70 series is a virtual furnace. If the air conditioner fails for one of these systems, trouble is certain to follow. On occasion, the air conditioner has failed in some of the branches. This procedure documents what should be done when the air conditioner fails.

A micro system will not generate enough heat to cause problems unless it is in a tiny room; however, external heat sources may be a problem. If your air conditioner goes out in the middle of July and it's 101° outside, you are going to have problems, even on a Micro System.

The system should normally be operated at around 72°F. If you have a 6X/70 system, make sure you have a thermometer in the room.

1. **Alternate Cooling**

   If the air conditioner fails and the temperature begins to rise, the first step, after contacting the A/C repairman, is to try an alternate cooling source. Usually, this means opening a door to the computer room to let cooler office air in.

   You can use a fan to blow air into the computer room. Because the coolest air is near the ground, force air INTO the computer room. The hot air near the ceiling will exit.

2. **Reduce Heat**

   Turn off all peripherals and lights that you do not need.

3. **Shut the system off.**

   If it becomes obvious that you are not going to be able to keep the equipment cool enough, follow the power down procedures.

   The temperature should not exceed 90°F before you shut everything down. If the temperature reaches or exceeds 90°F, perform the Power Down Procedure.

All of the systems have an OVERTEMP shutdown feature. If it gets too hot, they essentially will do a power failure, but keep the internal fans running. Should your system get the OVERTEMP message, HP will have to be contacted before the system can be restarted because damage may have occurred.

Power Conditioner Overload

Occasionally, the main circuit break on large power conditioners may trip. There should be an explanation for it tripping such as an electrical storm, or someone plugging something new into the power conditioner. If you do not know why the power conditioner tripped, watch the power conditioner as you resupply power as it may well trip again. If a load is on the power conditioner, the Main break may be difficult, if not impossible to reset. You need to minimize the load by turning off all of the individual breakers. To reset the power conditioner:

1. **Power Down Equipment**

   Turn off all peripheral devices. This includes the disk drives, tape drive, and the system printer.

2. **Turn off Power Conditioner**

   Turn off the individual circuit breakers. The main has tripped, so you do not have to turn it off.

3. **Turn on the Power Conditioner**

   Follow the Power Up procedure.

Power Failure

Condense

Storing Spoolfiles

Restoring Spoolfiles

Appendix A
DP Staff Procedures

This appendix contains a list of procedures that each member of the DP Staff should be proficient.

Before you begin, make sure you have the passwords for OPERATOR.SYS.

Standard Tasks

I. Power Up and WARMSTART

Follow the documented Power Up procedure and the associated WARMSTART.

II. SHUTDOWN and COOLSTART

Follow the SHUTDOWN procedure. Because you will be doing a COOLSTART, make sure you purge any old spoolfiles.

Follow the COOLSTART procedure.

III. COLDSTART

To do a COLDSTART, you will need a COLDLOAD Tape. Creating this tape is not actually part of the COLDSTART procedure.

To make this tape, insert a writable tape into the tape drive. Once it is online (the busy light is off for cartridge tapes), type the following:

```
:HELLO OPERATOR.SYS
:SYSDUMP *T

ANY CHANGES?N
ENTER DUMP DATE?                {Just press RETURN}

END OF SUBSYSTEM
:
```

It will take 10 to 15 minutes to make this tape.

Follow the SHUTDOWN procedure, then follow the COLDSTART procedure.

IV. UPDATE

Shut the system down again, and, using the tape created in step III, follow the UPDATE procedure.

V. Power Down

Revisions

1.0 Dec 5, 1990: Initial Release.
1.1 Dec 12, 1990: Release to DP staff.