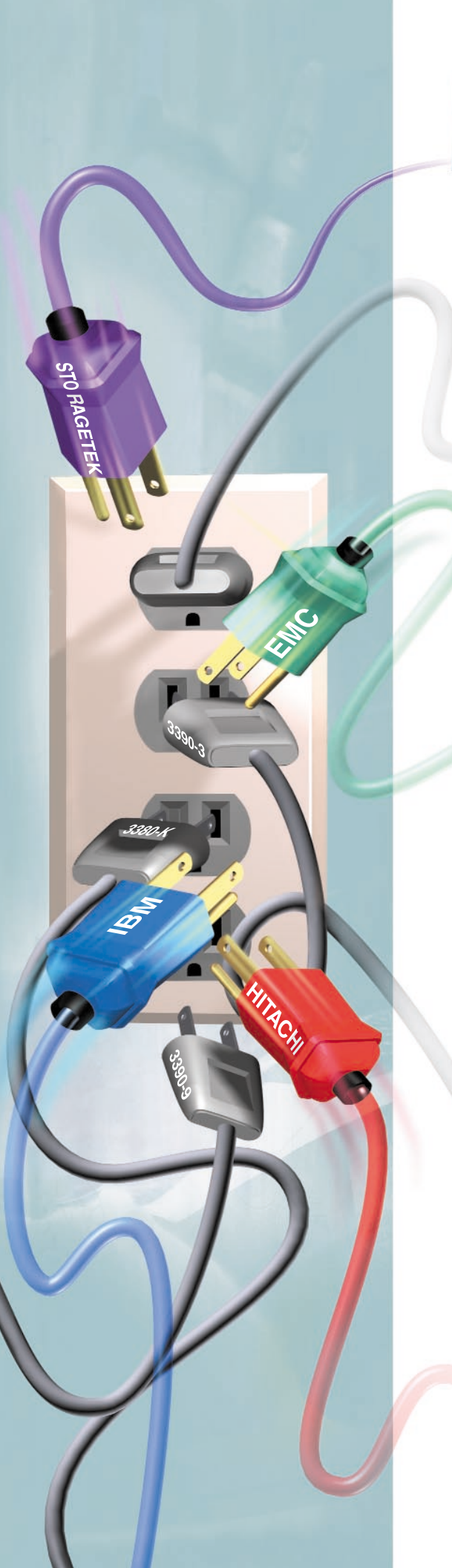


FDR® Plug and Swap

Innovation Data Processing, Little Falls, NJ, announces FDRPAS™ ("FDR Plug and Swap") for the non-disruptive movement of OS/390 disk volumes from one disk device to another.

FDRPAS Allows an OS/390 or z/OS Installation to:

- Swap disk volumes from their current locations to new disk hardware
- Move disk volumes within the installation for load balancing
- Do this volume movement without interrupting any system activity
- Do this volume movement during normal system operations
- Swap shared DASD on all sharing systems simultaneously

FDRPAS Benefits:

Non-Disruptive—the operating system, application jobs, online systems, and users will be unaware that FDRPAS is swapping disk volumes to new disk devices. When FDRPAS completes the swap of a disk, the volume resides completely on the new device, and the original device is no longer required. When all volumes on an old disk subsystem are moved to new locations with FDRPAS, the old subsystem can be powered off and disconnected.

24 x 7 Installations—have no window for major re-configurations and hardware changes. OS/390 hardware and software allows you to attach new disk subsystems (hardware) to your system and dynamically activate an updated I/O configuration to make them available. FDRPAS complements that capability by allowing you to move the data from existing volumes to this new hardware while those volumes are still in use.

Move Terabytes of Data—even installations with maintenance windows do not have the time to move the terabytes residing in large shops. FDRPAS allows you to swap large number of volumes during normal business hours.

Versatility—FDRPAS can swap volumes in use on a single system image, as well as those attached to multiple systems or LPARs in a shared-DASD complex or sysplex, whether locally or remotely attached. *Multiple* volumes can be swapped concurrently.

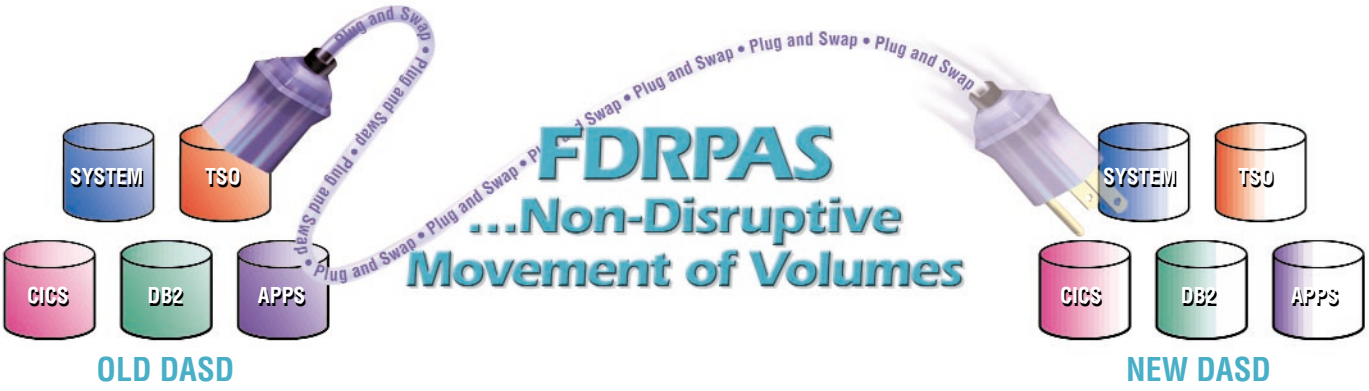
I/O Load Balancing—When the I/O load in one or more disk subsystems is excessive, while other subsystems are underutilized, you can use FDRPAS to rearrange your disk volumes to equitably distribute the I/O load and improve performance.

Backup—Create a point-in-time backup for FDRINSTANT™.

Monitoring—The progress of swapping can be monitored locally or remotely.

FDRPAS Supported Disk Hardware

FDRPAS supports a wide variety of disk devices from hardware vendors including *IBM, EMC, StorageTek, Amdahl* and *Hitachi*. It can swap disk volumes between disks of the same type from the same hardware vendor or different hardware vendors without any special software or hardware modifications.



FDRPAS Technical Description

Swap of a disk volume is very simple. An FDRPAS monitor job or task is started on each system that has access to the volumes to be swapped. Then a simple FDRPAS job or console command is issued to request that an online volume be swapped to an offline disk device. The swap of a volume can be initiated on any system in the complex, and the other systems will automatically join in the swap operation. FDRPAS will verify that the target device is offline to all sharing systems, to insure that an active volume cannot be accidentally overlaid.

For each requested volume, FDRPAS will copy all allocated tracks on the volume to the new disk device (for inactive data sets, only used tracks are copied), while simultaneously detecting all updates to the original device; updated tracks will be re-copied if necessary. The new device remains offline during the copy, so that the copied data is protected until the swap is complete.

Once the copy is completed, FDRPAS will swap the devices so that all I/O is now directed to the new device and the old device is no longer in use. The new device is placed online and the old device is offline. The old device will be modified so that OS/390 will no longer be able to vary it online. When the system is re-IPLed, the new device will automatically come online.

Only the source and target devices are accessed by FDRPAS. It does ***not*** use any additional communication between systems. It ***does not require*** TCP/IP, VTAM, a dataset on a third disk volume or a coupling facility.

Swapping of a volume can be ***terminated at any time*** before the final swap without affecting the original device or any applications using it.

After a successful swap, the now-offline original device can be used as a point-in-time backup of the volume, at the point of the final swap. When all volumes in an old disk subsystem have been swapped to new disks, the old subsystem can be disconnected and removed.

FDRPAS can swap any OS/390 or z/OS volume including the SYSRES volume, other system volumes, open catalog volumes, application data volumes, CICS volumes, database volumes, TSO volumes, SMS-managed volumes and work volumes. The only exceptions are volumes containing active page or swap datasets or active coupling facility datasets.

Smaller to Larger Disk Device Support

FDRPAS can swap a smaller device to a larger device of the same type (ex: 3390-3 to 3390-9), automatically updating the VTOC and Indexed VTOC on all sharing systems.

FDRPAS Performance

The swap is accomplished with minimal impact on the performance of applications using the volumes being swapped. Applications continue to execute, unaware that the data movement is occurring or has completed. FDRPAS will dynamically manage the copy process in response to system activity (e.g., copying inactive datasets before active datasets and pacing the copy I/O), to minimize its effect on the system.

By default, FDRPAS copies 15 tracks from the source to the target in each I/O. An FDRPAS SWAP will take about the same elapsed time as a normal full-volume disk-to-disk copy, unless there is a great deal of update activity on the volume being swapped.

Point-in-Time Backups

FDRPAS can also be used to create non-disruptive point-in-time backups of disk volumes. The FDRPAS SWAPDUMP command can be used to start constantly updated images of one or more disk volumes, at some time before the backups are required. A single command to FDRPAS is then used to terminate the SWAPDUMP operation and create the offline point-in-time images of those volumes. FDRINSTANT, a feature of the FDR family of disk management software products, can be used to backup those offline images.

ISPF Monitoring Panels

FDRPAS ISPF panels allow you to initiate FDRPAS swaps, monitor their progress, change pacing values dynamically, and (if required) terminate swaps.

```
──────────────────────────── FDRPAS Plug & Swap ──────────────────────────── Row 1 to 1 of 1
COMMAND ===>                                                  SCROLL ===> PAGE
Valid commands are: Active, COnfirm, SWap, DUmp, ABort, OPtions, HIstory
Command  Volume  Unit  Swap to                                    REfresh 0
          Serial  Addr  Offline
           Mask   Mask   Unit      Status
_______  ______  ____  _______   ____________________________________________________________

         TSO001  07C1   2C31     ACTIVE                                              (MAIN)
         Pass: 1     45 % Tracks to copy: 17120   Copied: 7704   Updated: 15
         Source - Reserve:    0 Level:    1 Pace: 0
         Target - Reserve:    1 Level:    1 Pace: 10

         TSO002  2C3A             SWAPPED
         Pass:          % Tracks to copy:         Copied:         Updated:
```

ISPF History Reports

From the monitoring panel, you can request a display of the history of FDRPAS swap operations.

```
Command     Volume  Unit  Swapped     System       Date        Time
_______     Serial  Addr  to Unit     ______     _________   _______
            PROD01  08A0  17A0        CPUA       01/06/2001  07:11:37
            PROD52  08A4  17A4        CPUA       01/06/2001  06:12:11
            SYSRES  0885  1785        CPUA       01/06/2001  00:44:32
            SYSLB1  0888  1788        CPUB       01/06/2001  00:45:05
            TSO010  2221  226F        CPUA       01/04/2001  10:24:20
            TSO544  2226  2260        CPUC       01/04/2001  14:45:06
```

FDRPAS is Easy-to-Use

Swapping a disk volume to a new device or creating a point-in-time backup is very simple.

On a single system, issue a console command such as:

```
S PASPROC.PROD01,PARM='SWAP TYPE=FULL/MOUNT VOL=PROD01,SWAPUNIT=25C0'
```

This can also be issued as a batch job or initiated from a FDRPAS ISPF panel. For example,

```
//SWAP      EXEC   PGM=FDRPAS,REGION=0M
//SYSPRINT   DD    SYSOUT=*
//SYSIN      DD    *
  SWAP TYPE=FULL,PACEDELAY=10
  MOUNT VOL=PROD01,SWAPUNIT=25C0
```

On multiple systems, you simply start a FDRPAS monitor task for the potential FDRPAS target devices on each system with a console command, then issue the SWAP command on any system.

```
S PASPROC.MON1,PARM='MONITOR TYPE=SWAP/MOUNT SWAPUNIT=(25C*,3*)'
```

FDRPAS Sample SWAP Output

The following sample output shows the swap of a TSO volume shared by 10 systems. Users and applications were accessing the volume on all of the systems. The swap takes place simultaneously on all 10 systems and was completed in 6 1/2 minutes.

```
FDR001  FDR PLUG AND SWAP      - FDRPAS  VER. 5.4/01P  - INNOVATION DATA PROCESSING          DATE=2001.004  PAGE    1

FDR303  CARD IMAGE -    SWAP TYPE=FULL                                                  00080004
FDR303  CARD IMAGE -    MOUNT VOL=TSO010,SWAPUNIT=226F                                  00090013          10.17.53

FDR233  SYSA   (SERIAL# 0109419672)    ACKNOWLEDGES THE SWAP OF VOL=TSO010                                10.17.53
FDR233  SYSC   (SERIAL# 0132429672)    ACKNOWLEDGES THE SWAP OF VOL=TSO010 AND HAS JOINED IN SWAP OF UNIT=2121 TO 226F
FDR233  SYSJ   (SERIAL# 0209419672)    ACKNOWLEDGES THE SWAP OF VOL=TSO010 AND HAS JOINED IN SWAP OF UNIT=2121 TO 226F
FDR233  SYSZ   (SERIAL# 0054502064)    ACKNOWLEDGES THE SWAP OF VOL=TSO010 AND
FDR233  SYSE   (SERIAL# 0309419672)    ACKNOWLEDGES THE SWAP OF VOL=TSO010 AND                    121 TO 226F
FDR233  SYSD   (SERIAL# 0146279672)    ACKNOWLEDGES THE SWAP OF VOL=TSO010 AM                     121 TO 226F
FDR233  SYSH   (SERIAL# 0270039672)    ACKNOWLEDGES THE SWAP OF VOL=TSO010 AND
FDR233  SYSI   (SERIAL# 0032429672)    ACKNOWLEDGES THE SWAP OF VOL=TSO010 AND HAS JOINED IN SWAP OF UNIT=2121 TO 226F
FDR233  SYSB   (SERIAL# 0145399672)    ACKNOWLEDGES THE SWAP OF VOL=TSO010 AND HAS JOINED IN SWAP OF UNIT=2121 TO 226F
FDR233  SYSK   (SERIAL# 0432429672)    ACKNOWLEDGES THE SWAP OF VOL=TSO010 AND HAS JOINED IN SWAP OF UNIT=2121 TO 226F
FDRW66  SWAP OF VOL=TSO010 TO UNIT=226F STARTED ON    10 SYSTEMS (SYSA SYSC SYSJ SYSZ SYSE SYSD SYSH SYSI SYSB SYSK)

FDR236  SYSA  ACTIVATED I/O INTERCEPTS ON UNIT=2121                                                      10.17.59
FDR007  STARTING TIME OF FULL VOL SWAP - 10.17.59 - UNIT=3390  ,IN=D#TSO010,OUTPUT=TAPE1                 10.17.59
FDR158  DATA SET IS ACTIVE  DSN=TSO.USER.TEST                                                            10.17.59
FDR239      106 TRACKS UPDATED BY SYSA                                                                   10.24.18
FDR239        8 TRACKS UPDATED BY SYSJ                                                                   10.24.18
FDR239        7 TRACKS UPDATED BY SYSH                                                                   10.24.18
FDR239      109 TOTAL UNIQUE TRACKS UPDATED IN PASS     1 - RE-COPYING UPDATED TRACKS                    10.24.18
FDR236  SYSA  DE-ACTIVATED I/O INTERCEPTS ON UNIT=2121       106 TRACKS UPDATED                          10.24.19

FDR241  FDRPAS SUCCESSFULLY COMPLETED SWAP OF VOL=TSO010 TO UNIT=226F ON SYSA                            10.24.20
FDR241  FDRPAS SUCCESSFULLY COMPLETED SWAP OF VOL=TSO010 TO UNIT=226F ON SYSC                            10.24.23
FDR241  FDRPAS SUCCESSFULLY COMPLETED SWAP OF VOL=TSO010 TO UNIT=226F ON SYSJ                            10.24.23
FDR241  FDRPAS SUCCESSFULLY COMPLETED SWAP OF VOL=TSO010 TO UNIT=226F ON SYSZ                            10.24.23
FDR241  FDRPAS SUCCESSFULLY COMPLETED SWAP OF VOL=TSO010 TO UNIT=226F ON SYSE                            10.24.23
FDR241  FDRPAS SUCCESSFULLY COMPLETED SWAP OF VOL=TSO010 TO UNIT=226F ON SYSD                            10.24.23
FDR241  FDRPAS SUCCESSFULLY COMPLETED SWAP OF VOL=TSO010 TO UNIT=226F ON SYSH                            10.24.23
FDR241  FDRPAS SUCCESSFULLY COMPLETED SWAP OF VOL=TSO010 TO UNIT=226F ON SYSI                            10.24.23
FDR241  FDRPAS SUCCESSFULLY COMPLETED SWAP OF VOL=TSO010 TO UNIT=226F ON SYSB                            10.24.23
FDR241  FDRPAS SUCCESSFULLY COMPLETED SWAP OF VOL=TSO010 TO UNIT=226F ON SYSK                            10.24.23
FDR007  ENDING   TIME OF FULL VOL SWAP - 10.24.24 - UNIT=3390 ,IN=D#TSO010,OUTPUT=TAPE1                 10.24.24
FDR122  OPERATION STATISTICS FOR 3390 VOLUME.....................TSO010                                   10.24.24
FDR122                        CYLINDERS ON VOLUME.............3,339                                      10.24.24
FDR122                        DATASETS PROCESSED..............274                                        10.24.24
FDR122                        BYTES READ FROM DASD.....1,467,108,993                                    10.24.24
FDR122                        DASD TRACKS SWAPPED.............29,098                                     10.24.24
FDR122                        UPDATED TRACKS RECOPIED............109                                     10.24.24
FDR122                        DASD EXCPS.....................1,991                                      10.24.24
FDR122                        TARGET DASD EXCPS..............2,080                                      10.24.24
FDR122                        CPU TIME (SECONDS)..............2.297                                     10.24.24
FDR122                        ELAPSED TIME (MINUTES).............6.5                                    10.24.24
FDR122                        SWAP TIME.........................6.3                                     10.24.24
FDR999   FDR SUCCESSFULLY COMPLETED                                                                    10.24.24
```

Automatically recognized that 10 systems share the volume

Volume was changed during SWAP

SWAPPED simultaneously on 10 systems

SWAPPED a 3390-3 (60% used) in 6.5 minutes

FDRPAS Availability

FDRPAS is now generally available in the USA and will be available Second Half 2001 in other locations. For more information or a FREE 30-Day Trial, call **973-890-7300,** e-mail us at **sales@fdrinnovation.com** or visit **www.innovationdp.fdr.com**

INNOVATION® DATA PROCESSING

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