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SHARE PROGRAM LIBRARY SUBMITTAL FORM

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SPLA CONTROL NUMBER: 00243

This form should be completed and submitted with the program package to the SHARE Program Library Agency at the address shown above. Standards and instructions for submitting programs are in the SHARE Reference Manual, Section 6.

(1) Program Number (to be filled by SPLA) 370D-05.2.018

(2) Title of Program . . . . . MVS JOB SCHEDULER/DATA SET NAME ENQ CONFLICT MANAGER

(3) System Type(s) (Machine) . . . . . IBM 370/303X

(4) Search Key(s) . . . . . (SMF EXITS) (MVS) (JES2)
(JOB SCHEDULING) (STEP-TERM STATISTICS)
(RESOURCE CONTROL)
(REQUEUER)

(5) Programming Systems/Languages . . . . ASSEMBLER (F)

(6) Primary Subject Code . . . . . (SMF EXITS)

(7) Minimum System Requirements MVS/JES2

(8) New (N) or Revision (R) (if revision, show prior Program Number in Item 1) R

(9) Date of Submittal 7/7/81

(10) Documentation (number of original pages submitted) 26

(11) Author's Name and Address . . . . . DAVID HALBIG
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WASHINGTON, D.C. 20510

(12) Direct Technical Inquiries to Name & Address (if different than Author) (SAME AS ABOVE)

(13) Submitter's Installation Membership Code . . . . . UCO

(14) Abstract (should contain sufficient information for a reader to determine the value of the program). Listed on the reverse side of this form are subjects which may serve as a guide for a descriptive abstract.

SHARE PROGRAM LIBRARY SUBMITTAL FORM

Subject Guide:

a. Purpose
b. Programming Language used
c. Version and modification level or release number
d. Field of application
e. Type of routine (main program, subroutine, etc.)
f. Specific description of machine requirements

PURPOSE: To identify resource estimates of a batch job by scanning JCL and then place job into a JES job class based on an associated site-defined resource limit table. Additionally, requeues and holds batch jobs found to be in DSNAME conflict. Once the conflict is relieved, the victim (requeued) job is automatically released. Also provides comprehensive statistics on CPU, storage, and I/O use (by DDNAME) at batch step termination.

PROGRAMMING LANGUAGE: Assembler(F); APPLICABILITY: MVS/JES2 3.7 NON-SE; TYPE OF ROUTINE: SMF EXITS (IEFUJV, IEFUJI, IEFU83, IEFUTL, IEFUSO, EIFACTRT) - The System Requires No Modifications to MVS or JES.

(Please attach additional pages if necessary) . . . . . Total pages attached _____

An "Acknowledgement of Assistance" statement must be attached to this Submittal Form.

Permission to Publish

"I hereby give the SHARE Program Library Agency permission to reprint, reproduce, and distribute this program"

(15) Signature of Submitter and Date _____

(15) Signature of Installation Addressee _____

TAPESCAN 3.3 - GSFC TAPE ANALYSIS AND COPYING PROGRAM 12/09/80 17:19:26.8 INPUT VOL=SENATE (LAST MOD-04/05/78)

VOLUME TABLE OF CONTENTS FOR SENATE 9 TRACK SPLA

SEQ.	DATA SET NAME	RECFM	LRECL	BLKSIZE	DEN	TRTCH	MAX BLK	MIN BLK	AVG BLK	BLK COUNT	CREATED	JOB NAME	STEP	EXPIRES
0001	CP.JSC10LOD	FB	00080	06160	1600		02400	02400	02400	000001	11/14/80	CPUNLOAD	IEBGENER	00/00/98
0002	CP.JSC10JCL	VS	06176	06180	1600		06180	00060	02748	000019	11/14/80	CPUNLOAD	IEBCOPY	00/00/98
0003	CP.JSC10MAC	VS	06176	06180	1600		06180	00060	04133	000058	11/14/80	CPUNLOAD	IEBCOPY	00/00/98
0004	CP.JSC10SRC	VS	06176	06180	1600		06180	00060	05781	000128	11/14/80	CPUNLOAD	IEBCOPY	00/00/98

The distribution tape contains four partitioned data sets unloaded by IEBCOPY. These four pages show the output generated by the programs that created the tape.

```
SYSTEM SUPPORT UTILITIES        IEHINITT                                            PAGE

TAPE INITT SER=SENATE,OWNER='SPLA',DISP=REWIND                           00015000
VOL1SENATE0                             SPLA
```

```
DATA SET UTILITY - GENERATE                                                          PAGE

IEB352I WARNING : OUTPUT RECFM/LRECL/BLKSIZE COPIED FROM INPUT

PROCESSING ENDED AT EOD
```

```
                         IEBCOPY MESSAGES AND CONTROL STATEMENTS                          PAGE 0001

              C O=TAPEJCL,I=DISKJCL                                            00040000
IEB167I  FOLLOWING MEMBER(S) UNLOADED FROM INPUT DATA SET REFERENCED BY DISKJCL
IEB154I  ASSEMBLE HAS BEEN SUCCESSFULLY UNLOADED
IEB154I  DOCUMENT HAS BEEN SUCCESSFULLY UNLOADED
IEB154I  FORMAT   HAS BEEN SUCCESSFULLY UNLOADED
IEB154I  IEALPAJ1 HAS BEEN SUCCESSFULLY UNLOADED
IEB154I  IEALPAJ2 HAS BEEN SUCCESSFULLY UNLOADED
IEB154I  IEALPAJ3 HAS BEEN SUCCESSFULLY UNLOADED
IEB154I  INIT     HAS BEEN SUCCESSFULLY UNLOADED
IEB154I  JES2     HAS BEEN SUCCESSFULLY UNLOADED
IEB154I  LINKEDIT HAS BEEN SUCCESSFULLY UNLOADED
IEB154I  LINKSE2  HAS BEEN SUCCESSFULLY UNLOADED
IEB154I  LNKLST01 HAS BEEN SUCCESSFULLY UNLOADED
IEB154I  LOAD     HAS BEEN SUCCESSFULLY UNLOADED
IEB154I  REQUEUER HAS BEEN SUCCESSFULLY UNLOADED
IEB154I  SMP      HAS BEEN SUCCESSFULLY UNLOADED
IEB154I  UNLOAD   HAS BEEN SUCCESSFULLY UNLOADED
```

```
                C O=TEMPMAC,I=COPYLIB                                   00041000
                S M=ACTRTMAP                                            00042000
                S M=COMMEXIT                                            00043000
                S M=CPENQ                                               00044000
                S M=CROSSMEM                                            00045000
                S M=ECFOLLOW                                            00046000
                S M=EXITCORE                                            00047000
                S M=HASHDSN                                             00048000
                S M=JESCKENC                                            00049000
                S M=JESRLENC                                            00050000
                S M=RCRECORD                                            00051000
                S M=REGEQU                                              00052000
                S M=RNMANCHR                                            00053000
                S M=SMFIOTAB                                            00054000
                S M=SMF239                                              00055000
                S M=TABLE                                               00056000
                S M=TBINSRCH                                            00057000
                S M=TDELETE                                             00058000
                S M=TPRTSRCH                                            00058100
                S M=TSEQSRCH                                            00059000
                S M=UJIMAP                                              00060000
                S M=UJVMAP                                              00061000
                S M=USIPARM                                             00062000
                S M=USOMAP                                              00063000
                S M=USOCORE                                             00063010
                S M=UTLCORE                                             00063020
                S M=U83CORE                                             00063030
IEB167I  FOLLOWING MEMBER(S) COPIED FROM INPUT DATA SET REFERENCED BY COPYLIB
IEB154I  ACTRTMAP HAS BEEN SUCCESSFULLY COPIED
IEB154I  COMMEXIT HAS BEEN SUCCESSFULLY COPIED
IEB154I  CPENQ    HAS BEEN SUCCESSFULLY COPIED
IEB154I  CROSSMEM HAS BEEN SUCCESSFULLY COPIED
IEB154I  ECFOLLOW HAS BEEN SUCCESSFULLY COPIED
IEB154I  EXITCORE HAS BEEN SUCCESSFULLY COPIED
IEB154I  HASHDSN  HAS BEEN SUCCESSFULLY COPIED
IEB154I  JESCKENC HAS BEEN SUCCESSFULLY COPIED
IEB154I  JESRLENC HAS BEEN SUCCESSFULLY COPIED
IEB154I  RCRECORD HAS BEEN SUCCESSFULLY COPIED
IEB154I  REGEQU   HAS BEEN SUCCESSFULLY COPIED
IEB154I  RNMANCHR HAS BEEN SUCCESSFULLY COPIED
IEB154I  SMFIOTAB HAS BEEN SUCCESSFULLY COPIED
IEB154I  SMF239   HAS BEEN SUCCESSFULLY COPIED
IEB154I  TABLE    HAS BEEN SUCCESSFULLY COPIED
IEB154I  TBINSRCH HAS BEEN SUCCESSFULLY COPIED
IEB154I  TDELETE  HAS BEEN SUCCESSFULLY COPIED
IEB154I  TPRTSRCH HAS BEEN SUCCESSFULLY COPIED
IEB154I  TSEQSRCH HAS BEEN SUCCESSFULLY COPIED
IEB154I  UJIMAP   HAS BEEN SUCCESSFULLY COPIED
IEB154I  UJVMAP   HAS BEEN SUCCESSFULLY COPIED
IEB154I  USIPARM  HAS BEEN SUCCESSFULLY COPIED
IEB154I  USOCORE  HAS BEEN SUCCESSFULLY COPIED
IEB154I  USOMAP   HAS BEEN SUCCESSFULLY COPIED
IEB154I  UTLCORE  HAS BEEN SUCCESSFULLY COPIED
```

```
IEB154I  U83CORE HAS BEEN SUCCESSFULLY COPIED
IEB144I  THERE ARE 0000005 UNUSED TRACKS IN OUTPUT DATA SET REFERENCED BY TEMPMAC
IEB149I  THERE ARE 0000008  UNUSED DIRECTORY BLOCKS IN OUTPUT DIRECTORY
```



```
                C O=TEMPMAC,I=SC1PVMAC                                  00064000
                S M=IHADECB                                             00065000
                S M=IEFCVRWA                                            00066000
IEB167I  FOLLOWING MEMBER(S) COPIED FROM INPUT DATA SET REFERENCED BY SC1PVMAC -
IEB154I  IEFCVRWA HAS BEEN SUCCESSFULLY COPIED
IEB154I  IHADECB  HAS BEEN SUCCESSFULLY COPIED
IEB144I  THERE ARE 0000003 UNUSED TRACKS IN OUTPUT DATA SET REFERENCED BY TEMPMAC
IEB149I  THERE ARE 0000008  UNUSED DIRECTORY BLOCKS IN OUTPUT DIRECTORY
```



```
                C O=TAPEMAC,I=TEMPMAC                                   00067000
IEB167I  FOLLOWING MEMBER(S) UNLOADED FROM INPUT DATA SET REFERENCED BY TEMPMAC -
IEB154I  ACTRTMAP HAS BEEN SUCCESSFULLY UNLOADED
IEB154I  COMMEXIT HAS BEEN SUCCESSFULLY UNLOADED
IEB154I  CPENQ    HAS BEEN SUCCESSFULLY UNLOADED
IEB154I  CROSSMEM HAS BEEN SUCCESSFULLY UNLOADED
IEB154I  ECFOLLOW HAS BEEN SUCCESSFULLY UNLOADED
IEB154I  EXITCORE HAS BEEN SUCCESSFULLY UNLOADED
IEB154I  HASHDSN  HAS BEEN SUCCESSFULLY UNLOADED
IEB154I  IEFCVRWA HAS BEEN SUCCESSFULLY UNLOADED
IEB154I  IHADECB  HAS BEEN SUCCESSFULLY UNLOADED
IEB154I  JESCKENC HAS BEEN SUCCESSFULLY UNLOADED
IEB154I  JESRLENC HAS BEEN SUCCESSFULLY UNLOADED
IEB154I  RCRECORD HAS BEEN SUCCESSFULLY UNLOADED
IEB154I  REGEQU   HAS BEEN SUCCESSFULLY UNLOADED
IEB154I  RNMANCHR HAS BEEN SUCCESSFULLY UNLOADED
IEB154I  SMFIOTAB HAS BEEN SUCCESSFULLY UNLOADED
IEB154I  SMF239   HAS BEEN SUCCESSFULLY UNLOADED
IEB154I  TABLE    HAS BEEN SUCCESSFULLY UNLOADED
IEB154I  TBINSRCH HAS BEEN SUCCESSFULLY UNLOADED
IEB154I  TDELETE  HAS BEEN SUCCESSFULLY UNLOADED
IEB154I  TPRTSRCH HAS BEEN SUCCESSFULLY UNLOADED
IEB154I  TSEQSRCH HAS BEEN SUCCESSFULLY UNLOADED
IEB154I  UJIMAP   HAS BEEN SUCCESSFULLY UNLOADED
IEB154I  UJVMAP   HAS BEEN SUCCESSFULLY UNLOADED
IEB154I  USIPARM  HAS BEEN SUCCESSFULLY UNLOADED
IEB154I  USOCORE  HAS BEEN SUCCESSFULLY UNLOADED
IEB154I  USOMAP   HAS BEEN SUCCESSFULLY UNLOADED
IEB154I  UTLCORE  HAS BEEN SUCCESSFULLY UNLOADED
IEB154I  U83CORE  HAS BEEN SUCCESSFULLY UNLOADED
```

```
                C O=TAPESRC,I=JSC30SRC                                  00068000
                S M=DOCUMENT                                            00068100
                S M=IEFUJV                                              00069000
                S M=IEFUJI                                              00070000
                S M=IEFUSI                                              00071000
                S M=IEFU83                                              00072000
                S M=IEFUTL                                              00073000
                S M=IEFUSO                                              00074000
                S M=IEFACTRT                                            00075000
                S M=REQUEUER                                            00076000
                S M=RQUEINIT                                            00077000
                S M=RQUETEST                                            00078000
IEB167I  FOLLOWING MEMBER(S) UNLOADED FROM INPUT DATA SET REFERENCED BY JSC30SRC
IEB154I  DOCUMENT HAS BEEN SUCCESSFULLY UNLOADED
IEB154I  IEFACTRT HAS BEEN SUCCESSFULLY UNLOADED
IEB154I  IEFUJI   HAS BEEN SUCCESSFULLY UNLOADED
IEB154I  IEFUJV   HAS BEEN SUCCESSFULLY UNLOADED
IEB154I  IEFUSI   HAS BEEN SUCCESSFULLY UNLOADED
IEB154I  IEFUSO   HAS BEEN SUCCESSFULLY UNLOADED
IEB154I  IEFUTL   HAS BEEN SUCCESSFULLY UNLOADED
IEB154I  IEFU83   HAS BEEN SUCCESSFULLY UNLOADED
IEB154I  REQUEUER HAS BEEN SUCCESSFULLY UNLOADED
IEB154I  RQUEINIT HAS BEEN SUCCESSFULLY UNLOADED
IEB154I  RQUETEST HAS BEEN SUCCESSFULLY UNLOADED
IEB147I  END OF JOB -00 WAS HIGHEST SEVERITY CODE
```

November 13, 1980

MVS JOB SCHEDULER

Both throughput optimization and turnaround guarantees require accurate and enforceable resource estimates. To accomplish this, a system has been developed which relies exclusively on user JCL to determine the resource estimate. JCL inherently defines such things as:

- o JOB CPU time limit
- o max # of tape drives used per step
- o max amount of temporary DASD space used per step
- o max amount of virtual storage

For throughput optimization, these estimates are used to schedule a system-wide workload which uses each resource (memory, CPU, I/O path and devices) to its fullest, without over-committing that resource.

Likewise, in making a turnaround time guarantee, the system elicits a promise, in terms of an upper limit on resource use, from the job.

For example, if a batch job exceeds its estimate of DASD space, it will be ABENDED with a D37 or B37. Likewise, if a job exceeds its CPU time estimate, it will be ABENDED with a 322:

The discussion which follows describes what characteristics of a job are interrogated by the scheduler and how these characteristics are to be understood.

CPU time - the CPU time is obtained from one of two places: the TIME= keyword on the JOB card or the TIME= keyword (or its default) on each EXEC statement. If the CPU time is specified via the TIME= keyword on the JOB card, it takes precedence over the SUM of CPU time from all the EXEC statements. In cases where no TIME= keyword is on the JOB card, an estimate of CPU time is made by adding all STEP-LEVEL CPU times. The default STEP-LEVEL CPU time is 8 hours, at our site so specify the TIME= keyword on your job card.

Virtual Storage - the estimated virtual storage use is found in one of two places: the REGION= keyword on the JOB card or the highest REGION= value found on any step. If no value is specified, the default is 640K at our site.

If a REGION= value is specified on the JOB card, it establishes an upper limit on the virtual storage any STEP may use, even if a step specifies a higher value.

Print Lines - the estimated number of output print lines is obtained from the /*JOBPARM L= keyword. The value specified, such as L=10, represents the number of 1,000's of lines, or 10,000 lines in this case. If no value is specified, the default is L=70 or 70,000 lines.

Tape drive usage - the maximum number of drives used in any step is obtained from JCL DD statements. The maximum number of drives is broken into two categories:

6250/1600 (UNIT = TAPE)
1600/800 (UNIT = DUALDEN)

The routine which obtains this number will correctly identify the following tape-use cases:

- tapes passed from one step to another (tape will be correctly counted in the receiving step)
- cataloged tape data set (OS catalog will be searched to identify the device type of the file)
- multiple devices per DD statement, such as UNIT=(TAPE,2)
- UNIT=AFF unit affinity use of drives is not counted against the total drive use for that step
- VOL=REF= backward references permit identification of the device type of the referred - to file
- explicit use of UNIT=TAPE, UNIT=DUALDEN, and all compatible esoteric and generic names

DASD Space - the maximum allocation of DASD space in a step is obtained from the JCL DD statements. Each SPACE= request in a job's JCL stream is converted from the unit of allocation (i.e. CYL, TRK, ABSTR, aveblk) into an equivalent number of 1,000-byte blocks. This normalizing operation permits easy comparison of space requests regardless of device type (3330-11, 3350) and type of allocation (CYL, TRK, ABSTR, aveblk). The routines which obtain the space estimate correctly identify the following space-use cases:

- DASD space passed from one step to another - the space passed into the step is counted against the space use for that step.

- Secondary allocations - the value given as the secondary allocation quantity is doubled and added to the primary - this mechanism accounts for the potential use of extents by the DASD file.

- Explicit use of UNIT=SYSWK, UNIT=SYSDA, and all compatible esoteric and generic names

VIO space - the maximum allocation of VIO space in a step is obtained from the JCL DD statements. The handling of SPACE= requests is identical to that for real DASD, given above.

Teleprocessing devices - the maximum number of teleprocessing devices used in any one step is obtained by scanning all DD statements in a step. The routines look for the esoteric names UNIT=TELE2 and UNIT=BSC3 and compatible esoteric and generic names

Direct unit assignment - the maximum number of direct unit assignments (e.g. UNIT = 381) made in any one step is obtained by scanning all DD statements in a step.

Unit Record Device assignment - the maximum number of unit record devices assigned in any one step is obtained by scanning all DD statements, e.g. UNIT=SYSRDR

Job Priority - the job selection priority of a job is obtained from the PRTY= keyword on the job card. If no value is specified, the priority is Ø.

Performance Group - In MVS, all work is assigned a performance group, dictating how that job is to receive resources once the job is initiated. The performance group specification is given as a number 1 thru 9. There is no correlation between a high number and high performance. The numbering system is site-defined. The performance group specification is obtained from the PERFORM= keyword on the JOB card, or from the highest PERFORM= value found on any step.

After the Scheduler identifies all the resources to be used by a job, it then places the job into an appropriate job class (see the job class limit table example in exhibit # 3). This capability for placing jobs into job classes means the scheduler can be implemented and the class structure changed at any time without changes to user JCL. As impertant as the class limits is the initiator setup: by careful selection of classes in the initiator strings, tape drive use and turnaround guarantees can be very successfully managed. Exhibit # 4 shows our current initiator setup. Note the initiator strings change twice during the day (8:ØØ A.M. and 5:ØØ P.M.) these changes occur without operator intervention. This is made possible by the use of JES automatic commands. The IPO documentation from IBM describes how to automatically re-initiate such automatic commands at midnight.

After some experience was gained with the Scheduler, it was found the SRM was superfluous as a batch job control mechanism. We have therefore designed our IPS to make swapping very unlikely in our batch performance groups. (high ISV values; minimum MPL set equal to # of initiators).

Other observations:

Before the Scheduler was turned on, seminars were held for applications programmers on how to 'beat' the scheduler. Techniques such as use of UNIT=AFF on tape drives, how to compute DASD SPACE requirements, and how to reduce CPU consumption by reblocking files were described.

The Scheduler identification process was then described in detail, so individuals understood how they could qualify for the more desiriable classes (short turnaround). The results, after a months use of the Scheduler, were remarkable:

- Significant numbers of programmers modified their JCL and programs on their own in order to qualify for better turnaround and concurrently reduce the total system workload.

- Tape drives allocation recovery, which accounted for 10% of all job's elapsed time, virtually disappeared.

- Turnaround, especially on low - resource non - setup jobs, improved dramatically.

- Turnaround in general became much more consistent.

The job class 'Z' is a catch-all class to trap jobs which fit in no other catagory. One initiator is always set aside for such jobs, since predictably crises will occur which require circumvention of the Scheduler. (Jobs are most easily forced into 'Z' by use of PRTY = 3 on the job card). Make sure, however, that you keep close track of jobs running in 'Z': Since class 'Z' jobs are usually high - resource users outside normal schedulling control, they will wreak havoc with jobs in the other initiators.

Don't be afraid to experiment with various class limit values and initiator setups; since such changes require no user JCL changes, their only impact is on turnaround time.

JOB RESOURCE ESTIMATE SUMMARY

The resource identification made by the scheduler is summarized on the JES JOB LOG of every job. A description of the resource summary is given below: (SEE EXHIBIT #1).

1.	Programmer name	Programmer name, as given on the job card.
2.	Jobname	Jobname, as given on the job card.
3.	Job class	Job class as assigned by the scheduler. Based on the resource estimate, the scheduler assigns a job class.
4.	Performance group number-	performance group number, as given on the PERFORM= keyword.
5.	CPU time	CPU time estimate, given in hours, minutes, and seconds. The above example shows 10 minutes, 0 seconds.
6.	K - CORE	The limit on the virtual storage to be used by the job given in K.
7.	KLNES	The estimate of print lines given in 1,000's of lines.
8.	6250	The maximum number of 6250 - bpi tape drives to be used by any one step.
9.	1600	The maximum number of 1600/800 bpi tape drives to be used by any one step.
10.	1K-DASD	The maximum amount of DASD space allocated in any one step, given in 1K - block equivalents.
11.	1K-VIO	The maximum amount of VIO space allocated in any one step, given 1K-block equivalents.
12.	TP	The maximum number of teleprocessing devices assigned in any one step.
13.	DU	The maximum number of direct unit assignments made in any one step.

14.	UR	The maximum number of unit record assignments made in any one step.
15.	PRTY	The job selection priority for the job, as given on the PRTY= keyword.

STEP TERMINATION STATISTICS

In the earlier seminars on the Scheduler, it was very apparent the application staff needed a readily accessible and comprehensive summary of I/O, CPU, and Storage Activity within each batch job step. Such a summary was necessary to target or direct tuning efforts. With such a need in mind, an SMF exit (IEFACTRT) was greatly expanded and such statistics were produced as part of the deallocation messages in each batch job's JCL. See exhibit # 1 for on example of these statistics.

FIELD	MEANING
USED	The maximum amount of virtual storage actually used by the step; if running V=R, the field will be labelled "REQUESTED', and will reflect the amount of real storage requested (may not actually be used).
LSQA+SWA	LSQA = Local System Queue Area SWA = Scheduler Work Area. The LSQA contains tables and queues associated with your address space. It includes; o page tables o region control task tables o timer queue elements The LSQA is normally about 20K in length. It is always 'fixed', which is significant if a system is real-storage constrained. The area is fixed for the duration of the job step/task. The SWA contains control blocks that exist from task initiation to task termination. It includes control blocks and tables created during JCL interpretation and used by the initiator during job step scheduling.
AVE W/S SIZE	Average Working Set Size is the average size of the group of pages in real storage.
SWAP CNT	The number of times the task was swapped out to external storage. Swapping is the mechanism used by the SRM (System Resource Manager) to break bottlenecks. Each swap

can be expensive: 60,000 instructions or about 51 msecs on a i58-3.

PAGE-INS

The number of pages moved into page frames in real storage. This count reflects physical I/O to move the page from auxiliary storage to real storage.

PAGE RECLAIMS

The count of page frames which are disconnected (stolen) from an address space, but are retrieved for re-use before being re-allocated to another address space. Although no physical I/O is reflected in this count, the 'cost' in CPU resources is about the same as a page-in operation.

PRV, CSA, VIO

PRV - user private area - the region in which your program executes.

CSA - Common Service Area - CSA contains pageable data areas that are addressable by all active virtual storage address spaces. It contains LOG, SMF, and reply buffers, to name a few.

VIO - Virtual I/O is a mechanism used to simulate real I/O that might otherwise have been required for a temporary file (e.g. compiler work file). The data 'written' by the program (e.g. compiler) is merely transferred within virtual storage, and when the data is 'read' back in, is again transferred within virtual storage back to the program's buffer areas. The auxiliary storage manager (ASM) reduces the impact of VIO by paging out long-term unreferenced VIO pages when under real storage stress.

SWAP

The number of pages involved in all swapping operations during step executions. In a non-MVS/SE environment, reclaim of pages of a swapped-out address space cannot occur.

TCB TIME

Task Control Block Time - includes all CPU time spent in

- executing instructions in the problem program

- executing instructions in the 'front end' of SVC's (supervisor call).

(SVC's, which perform pre - defined system tasks, such as GETMAIN or ENQ, are of two types: single stage and two - stage. In single stage SVC's, such as GETMAIN, 'front-end' refers to the entire SVC; in two-stage SVC's, such as EXCP, 'front-end' refers the first stage, which is initiation of an action, such as issuance of a SIO instruction. The second stage involves processing the interrupt when the action is complete, such as when an I/O interrupt occurs).

SRB TIME

System Request Block Time. SRB time includes time spent in:

- Page Resolution/Swap Control
- I/O interrupt processing (see 'two-stage SVC's above);
- Timer queue element processing;
- Interregion communication;

As a rule of thumb, most SRB time is accumulated in I/O interrupt processing.

RES TIME

Transaction Residency Time - Under MVS a transaction represents the level at which the SRM monitors and controls cumulative service consumption by an address space. For batch jobs, a transaction corresponds to a cluster of contiguous job steps under one performance group. The transaction residency time is the amount of transaction elapsed time spent in a non-swapped state, minus allocation and deallocation elapsed time.

ALLOC TIME

Allocation Time - elapsed time between step initiation time and when the problem program receives control. The time is spent by DADSM in locating and assigning DASD space and by job management in assigning exclusive-use UCB's, such as tape drives.

UNRC'D TIME

Un-recorded time - the time reported here is a computed value and is an estimate of non-TCB time. The elements which make it up include time spent in:

- o I/O interrupt processing;
- o swapping;
- o paging.

TCB/SRB

This ratio is helpful in determining if a significant amount of step CPU time is spend in I/O processing.

RES/TCB

This ratio is helpful in determining if the step, while swapped in, is being given adequate access to the CPU.

ATV/RES

This ratio is helpful in determining if a step is suffering long elapsed times primarily because of swap - outs.

PFM GRP

Performance Group. Each job or job step requests a specific (or is assigned a default) performance group number. At the SCC, default performance group numbers are assigned by job class. The performance group characteristics are assigned by the IPS (Installation Performance Standard). The IPS dictates the amount of access each performance group is to be given to the CPU, under varying workload conditions, and under varying amounts of total service requested by the job or job step.

PRTY

Dispatching Priority - when a task is permitted to be dispatched by the SRM, this value states the relative priority of this task over all others currently dispatched. The value in this field may have one of four values:

MTW(nn) - MTW is the mean-time-to-wait group, which corresponds to the old (VS/1) definition of DDG.

ROTATE - a group where all member tasks are given service on a round - robin basis.

FIXED(nn) - a group with a fixed priority relative to all other groups.

DISP(nn) - if a task is outside control of the SRM, its dispatching priority is shown; all other field values shown above refer to dispatching priorities controlled by the SRM.

STEP NO

Self - defining

STEP NAME — Self defining

COND CODE — Self - defining - if a step abends or is not executed, the field may have the format:

- o ABEND Uxxx - user abend
- o ABEND Sxxx - system abend
- o NOT EXEC (BYP)

BYP means the step was not executed because a condition code test or step restart.

SERVICE UNITS — Self - defining

I/O COUNTS

The I/O counts, and unit and device type assignments are in the same order as the DD statements for the step. Read them one column at a time. Since the system is generated with alternate channels, '25i' and '15i' in the UCB field refer to the same physical device.

Below the I/O statistics area are two (2) additional sections, one for VSAM statistics by DDNAME, the other for NON - VSAM statistics by DDNAME. The header line in each case contains three (3) strings of numbers, given as (XXX/YYY/ZZZ) where

XXX - total number of slots available for storing this DDNAME data.

YYY - total number of slots used by this step.

ZZZ - total number of additional slots required (if any) if available slots are not adequate.

For NON - VSAM file statistics the following items are provided:

DDNAME - DDNAME as it appears in the JCL. The DDNAME entries are ordered alphabetically; no entry is present if the associated file was never opened.

DEVICE - the device type (interpreted) on which the associated file resides.

VOLSER - VOLSER of the associated file.

OPNTYP - type of OPEN (e.g. INPUT, OUTPUT, OUTIN, etc).

OPNCNT - number of times the associated file was opened via the DDNAME.

BUFNO - DSORG,OPTCD,RECFM,LRECL,BLKSIZE, - DCB characteristics of the associated file. Because of shortcomings of the SMF data on

which these numbers are based, the BUFNO value is often invalid.

BLOCK-CNT - total number of blocks transferred via the DD statement regardless of the number of OPEN's.

EXTS - number of extents, if a DASD - based file.

TRKALC - number of tracks allocated, if a DASD - based file.

TRKUSD - number of tracks used if a DASD - based file. Because of shortcomings of the SMF data on which this number is based, this value is sometimes not available or is invalid.

TRKRLS - number of tracks released from file, if a DASD - based file.

For VSAM file statistics, the following items are provided:

DDNAME - DDNAME as it appears in the JCL. The DDNAME entries are ordered alphabetically; no entry is provided if the associated file is never OPENed.

CPNT - Component type - DATA or INDEX component. If the VSAM KSDS is OPENed at the CLUSTER level, there will be one entry <u>each</u> for the DATA and INDEX components.

STAT - Component status - the data on which the VSAM statistics display is based provides two (2) items of information for each OPENed component:

CURR - cumulative information to - date, but <u>not</u> including the current OPEN.

CHNG - information on the current OPEN <u>only</u>.

LEVELS - number of levels in the index component.

EXTENTS - number of extents in the associated component.

RECORDS - total number of records in the associated component.

DELETES - total number of records deleted from this component.

INSERTS - total number of records added to this component.

UPDATES -	total number of records modified in this component.
GETS -	total number of records retrieved from the component.
UNUS-CI -	total number of unused Control Intervals in this component.
SPLT - CI -	total number of CI - splits which have occurred in this component.
SPLT - CA -	total number of CA - splits which have occurred in this component.
BLKCNT -	total number of EXCP's issued against this component.

Normal MVS handling of DSN conflicts blocks JES initiators until the conflict is relieved. To prevent this blockage, the REQUEUER was developed. The REQUEUER detects DSN conflicts before MVS does and requeues and holds jobs which otherwise would wait for data sets.

The facility works two (2) different ways, depending on whether the DSNAME holder (conflictor) is a batch job or a TSO session.

1) Resource holder (conflictor) is a TSO session:

The resource requestor (victim) is requeued and put on HOLD. Messages are sent to the TSO user:

```
JOB xxxxxxxx HAS BEEN REQUEUED AND HELD
PLEASE FREE yyy_____yy
```

In addition, messages are sent to the console operator:

```
IEFUJI-Ø8-I xxxxxxxx REQUEUED BECAUSE
zzzzzzzz HOLDS DSN yyy_____yy

IEFUJI-Ø9-I xxxxxxxx NOT ELIGIBLE
FOR AUTO-RELEASE
```

As noted in the console message, a batch job requeued because of a DSNAME conflict with a TSO user is not automatically released when the conflict is removed. The console operator must release the batch job.

2) Resource holder (conflictor) is a batch job:

The resource requestor (victim) is requeued and put on HOLD. A message is sent to the console operator:

```
IEFUJI-Ø8-I xxxxxxxx REQUEUED
BECAUSE zzzzzzzz HOLDS DSN yy_____yy
```

When the conflict is removed (conflictor job ends) the requestor (victim) job is AUTOMATICALLY released.

To implement this requeue facility it was necessary to provide a continuously - running system task, called REQUEUER. Normally REQUEUER will require no attention by the operators or system programmers, but there are features both groups should be aware of:

When the REQUEUER task is started at IPL, it verifies the CURRENT status of all jobs previously involved in resource conflicts before the system went down. The exceptions to this are all jobs requeued because of conflicts with TSO sessions. During this verification process, jobs which qualify may be automatically released.

If it is desired to repeat this verification process at any time, the following command should be issued:

```
F REQUEUER,VERIFY
```

If the REQUEUER task is suspected of having difficulty, the following command should be entered:

```
F REQUEUER,DUMP
```

This command formats and dumps relevant control blocks to the printer. It does NOT terminate the REQUEUER task.

To stop the REQUEUER for any reason, enter:

```
P REQUEUER
```

If the REQUEUER is stopped, MVS reverts back to its former way of handling DSNAME conflicts.

Message: IEFUJI-Ø1-W-FATAL ERROR-CALL SYSTEMS PROGRAMMING
Cause: The Requeuer system has detected an error which has caused an individual job to be failed.
Action: Notify Systems Programming immediately.
Record the name and JES Job # of the failing job.

Message: IEFUJI-Ø2-I-OPEN FAILED FOR SNAPDUMP DD STATEMENT
Cause: The SNAPDUMP DD statement is missing from the initiator procedure.
Action: Notify Systems Programming immediately.

Message: IEFUJI-Ø3-I-SNAP OF DIAGNOSTIC AREAS FAILED
Cause: Logic error is SNAP routine.
Action: Notify Systems Programming immediately.

Message: IEFUJI-Ø4-I REQUEUER SYSTEM SUSPENDED IN LONG-TERM WAIT
Cause: Logic error or difficulty with disk pack containing REQUEUER Resource Control file.
Action: Contact Systems Programming immediately.
Note Jobname and JES Job # of failing job.

Message: IEFUJI-Ø5-I-ERROR IN REQUEUER TASK
Cause: Probable logic error in REQUEUER system task.
Action: Notify Systems Programming immediately.
Note Jobname and JES Job # of failing job.

Message: IEFUJI-Ø6-I-ERROR WHILE ATTEMPTING TO REQUEUE JOB
Cause: Error detected in the JES IEFSSREQ interface.
Action: Contact Systems Programming immediately.

Message: IEFUJI-Ø8-I-xxxxxxxx REQUEUED
BECAUSE zzzzzzzz HOLDS DSN yyy_____yyy
Cause: Requeuer system has detected a DSNAME conflict and has requeued the DSNAME requestor.
Action: None

Message: IEFUJI-Ø9-I-xxxxxxxx NOT ELIGIBLE FOR AUTO-RELEASE
Cause: The resource holder (conflictor) is a TSO session.
Action: After the TSO user has released the DSNAME causing the conflict, release this job.

Message: REQUEUER-Ø4-I-W-FATAL ERROR - CALL SYSTEMS PROGRAMMING
Cause: Logic error in REQUEUER task.
Action: Call Systems Programming immediately.

Message: REQUEUER-Ø1-I-OPEN DAILED FOR SNAPDUMP DD STATEMENT
Cause: The SNAPDUMP DD statement is missing. from the REQUEUER procedure.
Action: Call Systems Programming immediately.

Message: REQUEUER-Ø2-I-SNAP FAILED
Cause: Logic error in SNAP dump routine.
Action: Call Systems Programming immediately.

Message: REQUEUER-Ø3-I-OPEN FAILED FOR RESFILE DD STATEMENT
Cause: RESFILE DD statement is missing from the REQUEUER procedure.
Action: Call Systems Programming immediately.

INSTALLATION INSTRUCTIONS

- Punch/list first data set on tape:

```
//SI EXEC PGM=IEBPTPCH
//SYSPRINT DD SYSOUT=A
//SYSUT1 DD UNIT=TAPE,DISP=SHR,LABEL=(1,SL,EXPDT=98000
// DSN=CP.JSC10LOD,VOL=SER=SENATE
//SYSUT2 DD SYSOUT=B,DCB=FUNC=I
//SYSIN DD *
     PUNCH TYPORG=PS,MAXFLDS=10
     RECORD FIELD=(80)
```

- After customizing JCL for local use, load files 2 thru 4 from tape to disk.

- Using member ASSEMBLE from library CP.JSC10JCL, perform assemblies of all source.

- Customize source as necessary:

  IEFUJV -

  - Update resource limit table if desired - lines 851000 thru 899000

  - Update device name lookup table lines 914000 thru 951000. For esoteric names (e.g. SLOWTAPE, DSOBTAPE,SYSWK, etc) you must first get a hex dump of your local device name table.

    Note that the 4-byte UCB type field value is unlike the values for generic names. Remove/replace all of the original esoteric names from the device name lookup table. Add entries for each esoteric name defined in your local DEVNAMET.

  - Update the esoteric name masks, lines 988000 thru 1005030. The mask entries are ordered according to the index number found in each esoteric name entry in the DEVNAMET. The mask value is 'exclusive OR' ed' against the value from the device name lookup table; the result is a valid UCBTYP field value. An example will clear up this a little bit:

    'SYSWK' is an esoteric name defined at our site. The table entry for their esoteric name, line 934000, gives a UCBTYPE value of X'00032000'. This UCBTYPE value is copied directly out of our DEVNAMET. The third byte (hex value X'20') gives the device class of the esoteric name - DASD in this case. The second byte (hex value X'03') is an index value. It means this esoteric name is the third esoteric name defined in the I/O GEN.

This index value is used by the job scheduler to locate a valid UCBTYPE field. In the case of SYSWK, its associated UCBTYPE mask is in the esoteric name mask table at line 990000. Note that this mask value must be 'exclusive OR'ed' against the UCBTYPE field value gotton from the device name lookup table

X'00032000' line 934000
(exclusive OR)
X'3053000D' line 990000
X'30502000D'

VIO entries are a special case: the result of the 'exclusive OR' operation must result in a valid UCBTYPE value for bytes 3 and 4, but bytes 1 and 2 must be X'FFFF'. (The author recognizes this procedure is cumbersome and will clean it up considerably in later releases).

- Update the DASD attribute table lines 1020000 thru 1025000 as necessary.

- Build your own acct # validation system, if desired after line # 1722000. Note one of the bits in the JMR (mapped by macro COMMEXIT), CEPIDF01, is used by subsequent exits (IEFUTL and IEFUSO) to distinguish between a production and test job. If the bit is off, the associated job is considered production and SYSOUT and TIME = limits will not be enforced (extension will be granted and warning message issued).

- Modify routing codes used for picking ticket - line 3389000. Jobs which are placed on "HOLD' by the exit (see job resource table lines 851000 thru 899000) or by the programmers (TYPRUN=HOLD) will cause the scheduler to produce a 'picking ticket' using route code = 15. The picking ticket size is the same as continuous form tractor feed card stock available from your IBM representative. This picking ticket facility will require a dedicated output - only console. In addition to listing a resource summary for the job, it lists the:

  - # of scratch tapes the job will need.

  - the volsers of specific tape volumes the job will need.

- Disable the 'HOLD' and class - assignment feature, if desired - lines 3582000 and 3578000. Initially you will want to disable these features to permit programmers to get accustomed to the new resource summaries provided on the JES2 job log. As soon as you wish to use the scheduler to assign job classes, re-enable these instructions.

IEFACTRT

- Modify the UCBTYP name lookup table, as necessary - lines 475000 thru 501000.
- Modify LOGO - lines 1571000 and 1582000.

- Reassemble any exits, as required.
- Using member FORMAT of PDS CP.JSCIOJCL, initialize the REQUEUER resource control file. If you have a shared DASD system with MSI from Allen Services installed, you will need only 1 resource control file. If you do not have MSI and are running a multi - CPU environment, you will need 1 resource control file per CPU. Read the notes in the JCL carefully.
- Update your JES2 and INIT procs using members JES2 and INIT of PDS CP.JSC10JCL as guides.
- Install member REQUEUER from PDS CP.JSC10JCL in SYS1.PROCLIB
- Run member SMP in PDS CP.JSC10JCL to install exits into your operating system.
- Install member IEALPAJ2 of PDS CP.JSC10JCL into SYS1.PARMLIB.
- Place library CP.JSC10LNK in the authorized library list (IEAAPF00).
- Re - ipl with MLPA = (J2)

If you wish to <u>not</u> contaminate your system LPA, perform all of the above EXCEPT the SMP run, then

- Run member LINKEDIT of PDS CP.JSC10JCL.
- Install member IEALPAJ1 of PDS CP.JSC10JCL into SYS1.PARMLIB
- Put library CP.JSC10LNK in your link list.
- Re - ipl with MLPA = (J1).

DGH:ek

EXHIBIT #1

```
07.58.34 JOB  527  IEF196I IEF237I 105  ALLOCATED TO SYS00002
07.58.38 JOB  527  IEF196I IEF237I 142  ALLOCATED TO SYS00003
07.58.45 JOB  527  IEF196I IEF237I 142  ALLOCATED TO SYS00004
07.59.51 JOB  527                      ONLINE-VS           868-DA-TP-P            PRTY=00
                   JOBNAME  *  PG# CPU-TIME KCORE KLNES 6250 1600 1K-DASD 1K-VIO TP DU UR
                   DATPSYSM S    4  P:00:00   640    70    1    0       0      0  0 73  0
07.59.54 JOB  527  IEF577I WARNING MESSAGE(S) FOR JOB DATPSYSM ISSUED
07.59.55 JOB  527  $HASP373 DATPSYSM STARTED - INIT  3 - CLASS S - SYS 4158
07.59.56 JOB  527  IEF403I DATPSYSM - STARTED - TIME=07.59.56
08.05.42 JOB  527  DFH1500 - CICS START-UP IS IN PROGRESS
08.05.44 JOB  527  DFH1501 - DFHSITIO IS BEING LOADED
08.05.46 JOB  527  DFH1500 - LOADING CICS NUCLEUS
08.06.24 JOB  527  +DFH1500 - RELOCATABLE PROGRAM LIBRARY IS BEING OPENED
08.08.55 JOB  527  +DFH1556A - INVALID APPLICATION MODULE DEFINED IN PPT
08.08.55 JOB  527  +LMLE300C
08.08.55 JOB  527 @08 DFH1505 - REPLY GO OR CANCEL
08.10.06 JOB  527  R 08,GO
08.10.06 JOB  527  +DFH1510 - FOLLOWING TRANSACTION CODES NOW DISABLED
08.10.06 JOB  527  +.MAF
08.10.06 JOB  527  +CURE
08.10.06 JOB  527  +FILE
08.10.07 JOB  527  +LB01
08.10.07 JOB  527  +LB02
08.10.07 JOB  527  +LB03
08.10.07 JOB  527  +LB04
08.10.07 JOB  527  +LB05
08.10.07 JOB  527  +LB06
08.10.07 JOB  527  +LB07
08.10.07 JOB  527  +LB08
08.10.07 JOB  527  +LB10
08.10.07 JOB  527  +LB11
08.10.07 JOB  527  +LB12
08.10.07 JOB  527  +LB13
08.10.07 JOB  527  +LB20
08.10.07 JOB  527  +LB30
08.10.07 JOB  527  +ADYN
08.10.07 JOB  527  +CSCY
08.10.07 JOB  527  +LGRP
08.10.09 JOB  527  +DFH1500 - TRANSIENT DATA SETS ARE BEING OPENED
08.10.10 JOB  527  +DFH1500 - INITIALIZING INTRAPARTITION STORAGE
08.10.22 JOB  527  +DFH1500 - DATABASE DATASETS ARE BEING OPENED
08.10.22 JOB  527  IEC130I MCSXADF2 DD STATEMENT MISSING
08.10.22 JOB  527  IEC130I MCSXADF1 DD STATEMENT MISSING
08.10.22 JOB  527  IEC130I MCSXADF0 DD STATEMENT MISSING
08.11.02 JOB  527  +DFH1500 - TERMINAL DATA SETS ARE BEING OPENED
08.11.02 JOB  527  IEC130I SCXENER1 DD STATEMENT MISSING
08.11.43 JOB  527  +DFH1500 - DUMP DATA SET IS BEING OPENED
08.11.43 JOB  527  +DFH1500 - INITIALIZING TEMPORARY STORAGE
08.11.46 JOB  527  IEC070I 104-203,DATPSYSM,PRODCICS,DFHTEMP,1D4,TPVLL1,
08.11.47 JOB  527  IEC070I SCV.ONLINE.PROD.TPSYSTEM.TEMPSTOR,,VSAM.MASTCAT
08.11.54 JOB  527  +DFH1500 - LOADING RESIDENT APPLICATION MODULES
08.12.47 JOB  527  +DFH1500 - JOURNAL CONTROL SUBTASK IS BEING ATTACHED
08.12.49 JOB  527  +DFH1500 - SUPPOOL SIZE FOR THIS START-UP IS 0162K
08.12.54 JOB  527  +DFH1500 - SPIE AND ESTAE MACROS ARE BEING ISSUED
08.12.54 JOB  527  +DFH1500 - OPENING JOURNAL FILES
08.12.54 JOB  527  +PC302,  08:12:54  PA II DATA SET DDNAME SCPA2DS  NOW RECORDING; BLKSIZE=  5920; LRECL=   146; DS STATUS 10000000
08.12.56 JOB  527  +DFH4506 - CICS SYSTEM LOG, PRIMARY  EXTENT NOW RECEIVING OUTPUT ON 14P
08.12.56 JOB  527  +DFH4500 - 01 OF 01 JOURNALS SUCCESSFULLY OPENED
08.12.56 JOB  527  +DFH1500 - FORMATTING RESTART DATASET
08.13.12 JOB  527 @09 SFINITO1-51-A-REPLY 'Y' FOR AUTO START, OR REPLY 'N' FOR NO AUTO START
08.13.17 JOB  527  R 09,Y
```

← RESOURCE SUMMARY ✓

EXHIBIT #2
PAGE L

```
[illegible]
IEF285I   JES2.J0000641.SO0114                         SYSOUT
IEF285I   JES2.J0000641.SO0115                         SYSOUT
IEF285I   SYS1.DEMFLOG                                 KEPT
IEF285I   VOL SER NOS= SYSRES.
IEF373I STEP /CICSTEST/ START 80294.0306
IEF374I STEP /CICSTEST/ STOP  80294.0314 CPU    1MIN 13.97SEC SRB    0MIN 15.97SEC VIRT  3000K SYS   526K
******************************************************************************************************
* USED        (V) 3,000K * ...PAGE-INS RECLAIMS * TCB TIME          1:13.97 * TCB/SRB    4.6:1  * STEP NO        3      *
* LSQA+SWA (V)     528K * FEV         61     317 * SRB TIME            15.97 * RES/TCB    5.0:1  * STEP NAME  CICSTEST  *
* AVE W/S SIZE     922K * CSA         56      10 * RES TIME          6:14.24 * ATV/RES    1.0:1  * COND CODE  0000      *
* SWAP CNT           5  * VIO          0       0 * ALLOC TIME        2:07.53 * PGM GEP        3  * PGM=       DFHSIP    *
*                       * SWAP       189     N/A * UNRC'D TIME          9.32 * PRTY     MIN(06) * S/O'S      125,547   *
**UCB.DEVICE....EXCP'S***UCB.DEVICE....EXCP'S***UCB.DEVICE....EXCP'S***UCB.DEVICE....EXCP'S***UCB.DEVICE....EXCP'S**
* 142 3330-1         0 * 143 3330-1          0 * 140 3330-1            0 * 1E3 3350             0 * 1E3 3350            0 *
* 142 3330-1         0 * 143 3330-1          0 * 1C3 3350              0 * 1E3 3350             0 * 1E3 3350            0 *
* 142 3330-1     3,641 * 143 3330-1          0 * 140 3330-1            0 * 1E3 3350             0 * 103 3330-1          0 *
* 142 3330-1         0 * 143 3330-1          0 * 1C3 3350              0 * 1E3 3350             0 * 103 3330-1          0 *
* 142 3330-1         0 * 143 3330-1          0 * 140 3330-1            0 * 104 3330-1           0 * 143 3330-1          0 *
* 143 3330-1       292 * JES/DUMMY         N/A * 1C3 3350              0 * 104 3330-1           0 * 143 3330-1          0 *
* 149 3330-1     1,139 * JES/DUMMY         N/A * 140 3330-1            0 * 1E3 3350             0 * 1C0 3350            0 *
* 149 3330-1         0 * 140 3330-1          0 * 144 3330-1            0 * 104 3330-1           0 * 1C0 3350            0 *
* 143 3330-1         0 * 103 3330-1          0 * 140 3330-1            0 * 104 3330-1           0 * 1C0 3350            0 *
* 143 3330-1         0 * 140 3330-1          0 * 144 3330-1            0 * 1E3 3350             0 * 1C0 3350            0 *
* 142 3330-1         0 * 146 3330-1          0 * 140 3330-1            0 * 1E3 3350             0 * 143 3330-1          0 *
* 142 3330-1         0 * 144 3330-1          0 * 144 3330-1            0 * JES/DUMMY          N/A * 143 3330-1          0 *
* 14F 3330-1     1,532 * 144 3330-1          0 * 1E3 3350              0 * 1E3 3350             0 * 143 3330-1          0 *
* 14C 3330-1       208 * 144 3330-1          0 * 1C3 3350              0 * 1E3 3350             0 * 1E3 3350            5 *
* 144 3330-1         2 * 144 3330-1          0 * 140 3330-1            0 * 1C3 3350             0 * JES/DUMMY         N/A *
* 142 3330-1         0 * 144 3330-1          0 * 144 3330-1            0 * 146 3330-1           0 * 2A0 1009            2 *
* 142 3330-1         0 * 144 3330-1          0 * JES/DUMMY           N/A * 103 3330-1           0 * 2A1 100B            2 *
* 142 3330-1         0 * 144 3330-1          0 * 1E3 3350              0 * 102 3330-1           0 * 2A2 1009            2 *
* 142 3330-1         0 * 1E3 3350            0 * 1E3 3350              0 * 105 3330-1           0 * 2A3 1006            3 *
* JES/DUMMY        N/A * 144 3330-1          0 * 1E3 3350              0 * 142 3330-1           1 * 042 BSCA           10 *
* 1E3 3350           0 * 1E3 3350            0 * JES/DUMMY           N/A * 1E3 3350            38 * 0EB BSCA            3 *
* 142 3330-1         0 * 144 3330-1          0 * 1C3 3350              0 * 1E3 3350            65 * 0E1 BSCA            3 *
* 1E3 3350           0 * 1E3 3350            0 * 1C3 3350              0 * 1E3 3350             2 * 0E3 BSCA            3 *
* 1E3 3350           0 * 14F 3330-1          0 * 1C3 3350              0 * 1E3 3350             0 * 0E9 BSCA            3 *
* 14F 3330-1         0 * 1E3 3350            0 * 1C3 3350              0 * 1E3 3350             2 * 0EC BSCA            3 *
* 14F 3330-1         0 * 144 3330-1          0 * 1C3 3350              0 * 1E3 3350             0 * 0F1 BSCA            3 *
* 14F 3330-1         0 * 1C3 3350            0 * 1C3 3350              0 * 1E3 3350             1 * 05B 1BM1            3 *
* 1E3 3350           0 * 1C3 3350            0 * 1C3 3350              0 * JES/DUMMY          N/A * 069 1BM1            3 *
* 1E3 3350           0 * 144 3330-1          0 * 1C3 3350              0 * 142 3330-1           1 * 06B 1BM1            3 *
* 1E3 3350           0 * 1C3 3350            0 * 100 3330-1            0 * 142 3330-1           0 * 06C 1BM1            3 *
* 142 3330-1         0 * 144 3330-1          0 * 148 3330-1            0 * 142 3330-1           0 * 092 TELE2           3 *
* 143 3330-1         0 * 1C3 3350            0 * 101 3330-1            0 * 142 3330-1           0 * 093 TELE2           3 *
* 143 3330-1         0 * 140 3330-1          0 * 100 3330-1            0 * 142 3330-1           0 * 0AE TELE2           3 *
* 143 3330-1         0 * 1C3 3350            0 * JES/DUMMY           N/A * 142 3330-1           0 * 0AF TELE2           3 *
* 143 3330-1         0 * 140 3330-1          0 * 14E 3330-1            4 * 1E3 3350             0 * JES/DUMMY         N/A *
* 143 3330-1         0 * 1C3 3350            0 * 14E 3330-1           23 * 1E3 3350             0 * JES/DUMMY         N/A *
* 143 3330-1         0 * 140 3330-1          0 * 14F 3330-1            0 * 1E3 3350             0 * JES/DUMMY         N/A *
* 143 3330-1         0 * 1C3 3350            0 * 1E3 3350              0 * 1E3 3350             0 * 140 3330-1          0 *
********************************************NON-VSAM(126/126/695)*************************************************
* DDNAME   DEVICE VOLSER UPNTYP OPNCNT DSORG OPTCD RECFM LRECL BLKSIZE BUFNO BLOCK-CNT EXTS TRKALL TRKUSD TRKRLS *
* CSDOK200 3330-1 PAGE01 UPDAT    1    DA    EA    U        0   6,160    0       4      1    38    N/A      0    *
* DFHOMPA  3350   TSTVL1 OUTPUT   1    PS          VB   19010  19,020    0       9      1   150      1      0    *
* DFHJ01A  3350   TSTVL1 OUTPUT   2    PS          U        0   2,419    0      38      1    60     46      0    *
* DFHRPL   3330-1 CTYZIP INPUT    2    PO    J     U        0  13,030    0   1,741      1    38    N/A      0    *
* DFHRSD   3350   TSTVL1 OUTPUT   3    DA          U        0   4,096    0      65      1    20      1      0    *
* DISK67   3330-1 WORK02 UPDAT    1    DA    F     F      512     512    0       0      1   450    N/A      0    *
* DISK66   3330-1 WORK02 UPDAT    1    DA    F     F      512     512    [illegible]
[illegible]
[illegible]
```

EXHIBIT #2
PAGE 2

DDNAME	DEVICE	VOLSER	OPTYP	OPNCNT	DSORG	OPTCD	RECFM	LRECL	BLKSIZE						
CSDBK000	3330-1	PAGE01	UPDAT	1	DA	FA	U	0	6,160	0	4	1	36	N/A	0
DFHDMPA	3350	TSTVL1	OUTPUT	1	PS		VB	19016	19,020	0	9	1	150	1	0
DFHJ01A	3350	TSTVL1	OUTPUT	2	PS		U	0	2,458	0	38	1	60	36	0
DFHRPL	3330-1	CTYZIP	INPUT	2	PO	J	U	0	13,030	0	3,491	1	38	N/A	0
DFHRSD	3350	TSTVL1	OUTPUT	3	DA		U	0	4,096	0	85	1	30	1	0
DISK67	3330-1	WORK02	UPDAT	1	DA	F	F	512	512	0	0	1	550	N/A	0
DISK66	3330-1	WORK02	UPDAT	1	DA	F	F	512	512	0	0	1	400	N/A	0
DISK69	3330-1	WORK02	UPDAT	1	DA	F	F	512	512	0	0	1	60	N/A	0
DLNDBCB	3330-1	TPVOL1	OUTPUT	1	IS	IL	F	1040	1,640	0	0	1	38	N/A	0
DLNFFILE	3330-1	TPVOL1	INPUT	1	IS	IY	F	406	406	0	0	1	36	N/A	0
DLNHELP	3330-1	TPVOL1	INPUT	1	IS	MIYL	F	908	908	0	0	1	135	N/A	0
DLNMSG	3330-1	TPVOL1	INPUT	1	IS	IY	F	156	156	0	0	1	35	N/A	0
DLNQUERY	3350	TSTVL1	OUTPUT	1	IS	MYL	F	258	258	0	0	1	30	N/A	0
DLNUREG	3350	TSTVL1	OUTPUT	1	IS	MYL	F	204	204	0	0	1	30	N/A	0
EMFILE	3330-1	SYSRES	INPUT	1	DA	FR	F	4056	4,096	0	0	1	100	N/A	0
HISTORY	3330-1	WORK02	UPDAT	1	DA	F	F	512	512	0	0	1	76	N/A	0
TIB20120	3350	TSTVL1	INPUT	1	IS	IL	FB	32	3,520	0	0	1	60	N/A	0
LEGIS	3330-1	WORK01	UPDAT	1	DA	F	V	0	4,240	0	0	1	19	N/A	0
LGCUMLIV	3330-1	LEGIS1	INPUT	1	IS	I	FB	48	1,680	0	0	1	95	N/A	0
LGCUMLP3	3330-1	LEGIS1	INPUT	1	DA	FR	F	2058	2,058	0	0	1	228	N/A	0
LGCUMLPV	3330-1	LEGIS1	INPUT	1	IS	I	FB	16	1,248	0	0	1	38	N/A	0
LGCUMIXT	3330-1	LEGIS2	OUTPUT	1	IS	IYLR	FB	2025	2,025	0	0	1	38	N/A	0
LGFRFILE	3330-1	LEGIS2	UPDAT	1	DA	F	V	0	156	0	0	1	10	N/A	0
LG095HIB	3330-1	LEGIS1	INPUT	1	DA	FR	F	2048	2,048	0	0	1	285	N/A	0
LG095HPB	3330-1	LEGIS4	INPUT	1	DA	FR	F	2160	2,160	0	0	1	570	N/A	0
LG095RTB	3330-1	LEGIS1	INPUT	1	DA	FR	F	2496	2,496	0	0	1	285	N/A	0
LG096HIB	3330-1	LEGIS2	INPUT	1	DA	FR	F	2048	2,048	0	0	1	36	N/A	0
LG096HPB	3330-1	LEGIS2	INPUT	1	DA	FR	F	2160	2,160	0	0	1	190	N/A	0
LG0963TB	3330-1	LEGIS2	INPUT	1	DA	FR	F	2496	2,496	0	0	1	38	N/A	0
LG096C10	3330-1	LEGIS2	INPUT	1	DA	FR	F	2048	2,048	0	0	1	38	N/A	0
LG096CPB	3330-1	LEGIS2	INPUT	1	DA	FR	F	2160	2,160	0	0	1	57	N/A	0
LG096CTB	3330-1	LEGIS2	INPUT	1	DA	FR	F	2496	2,496	0	0	1	38	N/A	0
LG096NIB	3330-1	LEGIS1	INPUT	1	DA	FR	F	2048	2,048	0	0	1	38	N/A	0
LG096JPB	3330-1	LEGIS1	INPUT	1	DA	FR	F	2160	2,160	0	0	1	38	N/A	0
LG096NTB	3330-1	LEGIS1	INPUT	1	DA	FR	F	2496	2,496	0	0	1	38	N/A	0
LG0962EJ	3350	TSTVL1	UPDAT	1	DA	FR	F	0	500	0	0	1	30	N/A	0
LG097PIB	3330-1	LEGIS2	INPUT	1	DA	FR	F	2048	2,048	0	0	1	19	N/A	0
LG097PPB	3330-1	LEGIS2	INPUT	1	DA	FR	F	2160	2,160	0	0	1	38	N/A	0
LG097PTB	3330-1	LEGIS2	INPUT	1	DA	FR	F	2496	2,496	0	0	1	19	N/A	0
LOCTAB	3330-1	WORK02	UPDAT	1	DA	F	F	512	512	0	0	1	33	N/A	0
LSTATCTL	3330-1	LEGIS2	OUTPUT	1	IS	IYLR	VB	1000	1,009	0	0	1	229	N/A	0
PAGE	3330-1	WORK02	UPDAT	1	DA	F	F	3290	3,452	0	0	1	170	N/A	0
PSDOK000	3330-1	PAGE01	UPDAT	1	DA	FA	U	0	1,550	0	23	1	455	N/A	0
PT0001	3330-1	CTYZIP	OUTPUT	1	IS	IYLR	VB	959	6,199	0	1	1	19	N/A	0
PT0003	3330-1	CTYZIP	OUTPUT	1	IS	IYLR	VB	123	6,141	0	1	1	19	N/A	0
PT0005	3330-1	CTYZIP	OUTPUT	1	IS	IYLR	VB	67	6,106	0	0	1	19	N/A	0
PT0011	3330-1	CTYZIP	UPDAT	1	DA	F	VB	0	6,233	0	0	2	1000	N/A	0
PT0013	3330-1	CTYZIP	UPDAT	1	DA	F	VB	0	6,233	0	0	1	53	N/A	0
PT0021	3330-1	CTYZIP	UPDAT	1	DA	F	VB	0	6,233	0	0	1	200	N/A	0
PT0025	3330-1	CTYZIP	UPDAT	1	DA	F	VB	0	6,233	0	0	1	20	N/A	0
READER	3350	TSTVL1	INPUT	1	PS		F	80	80	0	5	1	1	1	0
SCPA2DS	3350	TSTVL1	OUTPUT	1	PS		FB	145	5,920	0	1	5	210	1	0
SFPRINTB	3330-1	LEGIS2	UPDAT	1	DA	FR	F	2048	2,048	0	0	1	95	N/A	0
SFSHOWB	3330-1	LEGIS1	INPUT	1	DA	FR	FB	2160	2,160	0	0	2	122	N/A	0
TRSKILL	3330-1	CTYZIP	OUTPUT	1	IS	YL	FB	82	410	0	0	1	19	N/A	0
WSDJK900	3330-1	PAGE01	UPDAT	1	DA	FR	FS	3890	3,840	0	0	1	76	1	0

VSAM(126/126/...)

DDNAME	CINT	STAT	OPCT	LEVELS	EXTENTS	RECORDS	DELETES	INSERTS	UPDATES	GETS	UNUS-CI	SPLT-CI	SPLT-CA	BLKCNT
DFHIHTRA	DATA	CURR	2	0	1	0	0	0	0	0	491,527	0	0	7,010
DFHIHTRA	DATA	CHNG	2	0	0	0	0	0	0	0		0	0	1

EXHIBIT #2
PAGE 3

DDNAME	UNIT	STAT	OPCT	LEVELS	EXTENTS	RECORDS	DELETES	INSERTS	UPDATES	GETS	UNUS-CI	SPLT-CI	SPLT-CA	PERCENT
DFHINTRA	DATA	CURR	2	0	1	0	0	0	0	0	491,522	0	0	2,010
DFHINTRA	DATA	CHNG	2	0	0	0	0	0	0	0	0	0	0	1
DFHTEMP	DATA	CURR	3	0	1	0	0	0	0	04147,200	0	0	220,195	
DFHTEMP	DATA	CHNG	3	0	0	0	0	0	0	0	0	0	0	0
LG095BIV	IDX	CURR	1	1	2	1	0	0	0	0	12,288	0	0	133
LG095BIV	IDX	CHNG	1	0	0	0	0	0	0	0	0	0	0	0
LG095BIV	DATA	CURR	1	0	1	2,521	0	0	0	3011312,768	0	0	452	
LG095B1V	DATA	CHNG	1	0	0	0	0	0	0	0	0	0	0	0
LG095BPV	IDX	CURR	1	1	2	1	0	0	0	0	16,432	0	0	3,094
LG095BPV	IDX	CHNG	1	0	0	0	0	0	0	0	0	0	0	0
LG095BPV	DATA	CURR	1	0	1	536	0	0	9	4	68,4412202,624	3	0	3,007
LG095BPV	DATA	CHNG	1	0	0	0	0	0	0	0	0	0	0	0
LG095BIV	IDX	CURR	1	2	2	3	0	0	0	0	8,192	0	0	621
LG095BIV	IDX	CHNG	1	0	0	0	0	0	0	0	0	0	0	0
LG095BIV	DATA	CURR	1	0	1	4,541	0	0	0	01252,352	0	0	454	
LG095BIV	DATA	CHNG	1	0	0	0	0	0	0	0	0	0	0	0
LG096BIV	IDX	CURR	1	1	2	1	0	0	0	0	16,384	0	0	28
LG096BIV	IDX	CHNG	1	0	0	0	0	0	0	0	0	0	0	0
LG096BIV	DATA	CURR	1	0	1	646	0	0	0	2 430,080	0	0	40	
LG096B1V	DATA	CHNG	1	0	0	0	0	0	0	0	0	0	0	0
LG096BPV	IDX	CURR	1	1	2	1	0	0	0	0	16,384	0	0	69
LG096BPV	IDX	CHNG	1	0	0	0	0	0	0	0	0	0	0	0
LG096BPV	DATA	CURR	1	0	1	81	1	0	3	626 471,040	0	0	79	
LG096BPV	DATA	CHNG	1	0	0	0	0	0	0	0	0	0	0	0
LG096BIV	IDX	CURR	1	1	2	1	0	0	0	0	16,384	0	0	26
LG096BIV	IDX	CHNG	1	0	0	0	0	0	0	0	0	0	0	0
LG096BIV	DATA	CURR	1	0	1	1,694	0	0	0	0 434,176	0	0	37	
LG096BIV	DATA	CHNG	1	0	0	0	0	0	0	0	0	0	0	0
LG096CIV	IDX	CURR	1	1	2	1	0	0	0	0	16,384	0	0	48
LG096CIV	IDX	CHNG	1	0	0	0	0	0	0	0	0	0	0	0
LG096CIV	DATA	CURR	1	0	1	128	0	0	0	0 466,944	0	0	31	
LG096CIV	DATA	CHNG	1	0	0	0	0	0	0	0	0	0	0	0
LG096CPV	IDX	CURR	1	1	2	1	0	0	0	0	16,384	0	0	59
LG096CPV	IDX	CHNG	1	0	0	0	0	0	0	0	0	0	0	0
LG096CPV	DATA	CURR	1	0	1	19	0	1	0	78 471,040	0	0	35	
LG096CPV	DATA	CHNG	1	0	0	0	0	0	0	0	0	0	0	0
LG096CIV	IDX	CURR	1	1	2	1	0	0	0	0	16,384	0	0	48
LG096CIV	IDX	CHNG	1	0	0	0	0	0	0	0	0	0	0	0
LG096CIV	DATA	CURR	1	0	1	125	0	0	0	0 466,944	0	0	31	
LG096CIV	DATA	CHNG	1	0	0	0	0	0	0	0	0	0	0	0
LG096NIV	IDX	CURR	1	1	2	1	0	0	0	0	4,096	0	0	52
LG096NIV	IDX	CHNG	1	0	0	0	0	0	0	0	0	0	0	0
LG096NIV	DATA	CURR	1	0	1	203	0	0	0	0 462,848	0	0	32	
LG096NIV	DATA	CHNG	1	0	0	0	0	0	0	0	0	0	0	0
LG096NPV	IDX	CURR	1	1	2	1	0	0	0	0	4,096	0	0	60
LG096NPV	IDX	CHNG	1	0	0	0	0	0	0	0	0	0	0	0
LG096NPV	DATA	CURR	1	0	1	12	0	1	0	17 471,040	0	0	37	
LG096NPV	DATA	CHNG	1	0	0	0	0	0	0	0	0	0	0	0
LG096NIV	IDX	CURR	1	1	2	1	0	0	0	0	4,096	0	0	52
LG096NIV	IDX	CHNG	1	0	0	0	0	0	0	0	0	0	0	0
LG096NIV	DATA	CURR	1	0	1	202	0	0	0	0 462,848	0	0	32	
LG096NIV	DATA	CHNG	1	0	0	0	0	0	0	0	0	0	0	0
LG097PIV	IDX	CURR	1	1	2	1	0	0	0	0	4,096	0	0	56
LG097PIV	IDX	CHNG	1	0	0	0	0	0	0	0	0	0	0	0
LG097PIV	DATA	CURR	1	0	1	1	0	0	0	0 201,728	0	0	19	
LG097PIV	DATA	CHNG	1	0	0	0	0	0	0	0	0	0	0	0
LG097PPV	IDX	CURR	1	1	2	1	0	0	0	0	2,048	0	0	54
LG097PPV	IDX	CHNG	1	0	0	0	0	0	0	0	0	0	0	0
LG097PPV	DATA	CURR	1	0	1	1	0	0	0	0 201,728	0	0	19	
LG097PPV	DATA	CHNG	1	0	0	0	0	0	0	0	0	0	0	0
LG097PIV	DATA	CURR	1	0	1	1	0	0	0	0 201,728	0	0	19	
LG097PIV	DATA	CHNG	1	0	0	0	0	0	0	0	0	0	0	0
SEMSCDAT	DATA	CURR	1	0	1	10	0	0	0	10 424,596	0	0	64	

EXHIBIT #2
PAGE 4

* LG097PPV	IDX	CURR	1	1	2	1	0	0	0	0	2,048	0	0	54 *
* LG097PPV	IDX	CHNG	1	0	0	0	0	0	0	0	0	0	0	0 *
* LG097PPV	DATA	CURR	1	0	1	1	0	0	0	0	201,725	0	0	19 *
* LG097PPV	DATA	CHNG	1	0	0	0	0	0	0	0	0	0	0	0 *
* LG097PTV	DATA	CURR	1	0	1	1	0	0	0	0	201,728	0	0	19 *
* LG097PTV	DATA	CHNG	1	0	0	0	0	0	0	0	0	0	0	0 *
* SFMSGDAT	DATA	CURR	1	0	1	163	0	0	0	10	323,584	0	0	64 *
* SFMSGDAT	DATA	CHNG	1	0	0	0	0	0	0	0	0	0	0	0 *
* SFMSGIND	DATA	CURR	1	1	1	1	0	0	0	0	12,289	0	0	1,072 *
* SFMSGIND	DATA	CHNG	1	0	0	0	0	0	0	0	0	0	0	0 *
* SFSHDNV	IDX	CURR	1	1	2	1	0	0	0	0	29,576	0	0	2,836 *
* SFSHDNV	IDX	CHNG	1	0	0	0	0	0	0	0	0	0	0	0 *
* SFSHDNV	DATA	CURR	1	0	1	19	0	0	0	87	367,616	0	0	955 *
* SFSHDNV	DATA	CHNG	1	0	0	0	0	0	0	0	0	0	0	0 *

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************************************************************************************************************
IEF375I  JOB /DPTESTO1/ START 80294.0304
IEF376I  JOB /DPTESTO1/ STOP  80294.0314 CPU    1MIN 37.35SEC SRB    0MIN 17.43SEC
************************************************************************************************************
* TCB TIME       1:37.35 * START TIME   3:04:28.78 * JOB NAME DPTESTO1 PROGRAMMER TEST-CICSVS          U.S. SENATE  *
* SRB TIME         17.43 * END TIME     3:14:42.52 * RLS LEVL 03.8    ACCT NO    BBB-UU-TF-T        COMPUTER CENTER*
* ACTIV TIME     7:30.38 * LLP*SD TIME   10:13.74 * SYSTEM   B158    JOB LOC    03:03:12.98*10/20/80.294 - 0 -   *
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EXHIBIT #3

Attachment to TN-261

November 6, 1980

CLASS LIMITS	A	B	C	D	E	F	G	H	I	J	K	L	Z	N	O	P	Q	R	S	T	U	V	Z
CPU TIME (MIN)	.5	2	10	60	.5	2	10	60	.5	2	10	60	60	480	480	480	480	480	480	300	300	300	--
6250/1600 BPI	0	0	0	0	1	1	1	1	2	2	2	2	7	1	1	1	1	1	1	0	1	2	--
1600/800 BPI	0	0	0	0	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	0	1	1	--
K-LINES	10	10	100	1000	10	100	1000	1000	10	100	1000	1000	1000	100	100	100	100	100	100	1000	1000	1000	--
REAL*	(50)	(100)	(400)	(1000)	(50)	(400)	(400)	(1000)	(50)	(50)	(800)	(800)	(800)	(50)	(50)	(50)	(50)	(50)	(50)	(1000)	(1000)	(800)	--
DASD	12K	24K	98K	240K	12K	98K	98K	240K	12K	12K	197K	197K	197K	12K	12K	12K	12K	12K	12K	240K	240K	197K	--
VIO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	--
DASD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	--
PERFORM=	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	4	4	4	2	2	2	--
PRTY=	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	--
DUA	0	0	0	0	0	0	0	0	0	0	0	0	0	1	25	30	1	20	99	0	0	0	--
T/P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	10	0	10	10	0	0	0	--
U/R	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	--
REGION=	800K	1500K	1500K	1500K	800K	1500K	1500K	1500K	800K	1500K	1500K	1500K	4000K	4000K	4000K	4000K	4000K	4000K	4000K	1500K	1500K	1500K	--
AUTO-HOLD	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES
TURN-AROUND TARGET**	30 MIN	60 MIN	2 HR	24 HR	30 MIN	60 MIN	2 HR	24 HR	45 MIN	90 MIN	3 HRS	24 HRS	48 HRS	N/A	N/A	N/A	N/A	N/A	N/A	48 HR	48 HR	48 HR	N/A --

* Given as the number of 1K-blocks (e.g. Class A = 12,000 1K-blocks) and parenthetically as the number of equivalent 3330-1 cylinders (e.g. Class A = (50)).

** "Turnaround" is defined as the time between when a job is read in and when the last page of output is printed.

EXHIBIT #4

Initiator setup 8:00 A.M. to 6:00 P.M.

I1	= Q	(drained)
I2	= R	(drained)
I3	= S	(drained)
I4	= N	(started)
I5	= O	(started)
I6	= P	(started)
I7	= ABC	(started)
I8	= ABCEFG	(started)
I9	= AEIFJGKBC	(started)
I10	= AEIFJGKBC	(started)
I11	= AEIFJGKBC	(started)
I12	= ZA	(started)

Initiator Setup 6:00 P.M. to 8:00 A.M.

I1	= Q	(drained)
I2	= R	(drained)
I3	= S	(drained)
I4	= N	(started)
I5	= O	(started)
I6	= P	(started)
I7	= ABCDT	(started)
I8	= ABCDTEFGHU	(started)
I9	= AEIFJGKBCTUV	(started)
I10	= AEIFJGKBCTUV	(started)
I11	= AEIFJGKBCTUV	(started)
I12	= ZA	(started)

DGH:ek