

JOB CONTROL LANGUAGE AND OS NAMING CONVENTIONS

December 2003

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1 INTRODUCTION

The IBM MVS (Multiple Virtual Systems) Job Control Language is commonly referred to as JCL, MVS/JCL, or MVS JCL. The JCL statements are used by the computer operating system to control the computer resources and facilities needed for the execution of programs or job streams. For details, see the IBM "MVS JCL User's Guide." Any job that is submitted to the computer operating system must have JCL statements.

This document discusses the coding rules associated with the IBM mainframes at the Information and Communication Services Division (ICSD).

JCL is a very flexible language with coding rules presented in this document. Non-compliance with the rules in this document could result in error messages or unpredictable results.

1.1 Purpose

The purpose for this document is to establish coding rules for JCL that will standardize usage of the State's IBM mainframe.

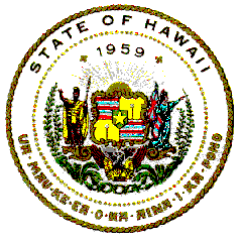
JCL coding rules and conventions are published by the Department of Accounting and General Services, ICSD, to assure that jobs submitted to the Production Services Branch (PSB) are acceptable.

1.2 Scope

The scope of this document is limited to defining procedures, conventions, and guidelines for computer programmers and systems analysts to follow when they must set up job control statements for programs or job streams during the program development, logic debug testing, conversion, production, test/production phases of an application system's life cycle, and to stipulate the forms and procedures for transferring program modules to and from the production environment. All forms and instructions are available via the Internet at State of Hawaii Forms Central, under Information and Communication Services. The URL is: <http://www.hawaii.gov/forms/>

1.3 Applicability

The standards, procedures, conventions, and guidelines presented in this document must be followed by State computer programmers and systems



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analysts and any contractor or consultant hired by the State who use the State's mainframe computing resources at the ICSD central site.

1.4 Environment

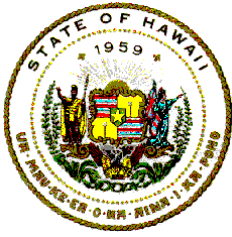
The ICSD has two general purpose IBM mainframe computer system environments for system application development, testing, and implementation:

- a. Host-A, which is primarily used for production CICS, ADABAS, and batch jobs.
- b. Host-B, which is primarily used for TSO (Time Sharing Option), test CICS and ADABAS, and production and test batch jobs.

1.5 Comments and Recommendations

Comments, recommendations, proposals, or suggestions regarding the contents of this document may be sent either via email to icsd.admin.ppmo@hawaii.gov or in writing to:

Information and Communication Services Division
Project Planning and Management Office
1151 Punchbowl Street, B10
Honolulu, Hawaii 96813-3024



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2 JOB STATEMENT

The JOB statement defines the beginning of a job stream and initiates a job or series of jobs (job stream) to the Operating System.

The sub-parameters are positional, to omit one sub-parameter, the positional comma after that sub-parameter must be coded.

To omit all sub-parameters to the right of the last selected sub-parameter, the closing right parenthesis must follow this last coded sub-parameter.

If the computer operating system determines that either the time or lines estimates will be exceeded, it will abend the job with a system completion code.

```
//jobname JOB (id,pms,time,lines,cards,forms,copies,log,linecnt),  
//          'programmer-name',MSGLEVEL=(x,y),  
//          MSGCLASS=output-class,CLASS=class,  
//          NOTIFY=userid
```

jobname - Identification of job stream; format is in Chapter 8, "MVS NAMING CONVENTIONS." Parameter is required.

id - A required sub-parameter; must have four (4) characters. For all jobs initiated by departments (whether Test or Production) "999" may be entered as id. Only ICSD personnel are required to request a programmer id.

- For test jobs, this is the programmer/analyst's identification number.
- For production jobs, the fourth and fifth characters of the jobname are the first and second characters of the id sub-parameter and the third and fourth characters are zeros.
- For short term test/production jobs, the first three characters of the id sub-parameter are the Project Management System (PMS) code and the fourth character is a "T".



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- pms - PMS code is 3 characters. Parameter is required.
- time - Estimated execution time in minutes. If omitted, default is 10 minutes. Maximum is 4 digits, see Section 2.1, Input/Output Queue Job Priority for impact of time on execution priority.
- lines - Estimated lines to be printed, stated in thousands of lines, for example "3" = 3,000 lines. If omitted, default is 2,000 lines. Maximum is 4 digits, see Section 2.1, Input/Output Queue Job Priority for impact of lines on print priority.
- cards - Estimated number of cards to be punched by the computer stated in hundreds of cards, for example "5" = 500 cards. Default is 100 cards. Maximum is 4 digits.
- forms - Code for special paper form used for entire job. Maximum is 4 digits. Default is standard forms.
- copies - Number of times entire job is to be printed. Maximum is 2 digits. Default is one copy.
- log - JES2 System Log option. If character is "N" the JES2 System Log will not be printed. If sub-parameter is omitted or any other character is in this position the System Log will be printed. Maximum is 1 character.
- linecnt - Number of lines to be printed on each printed page. Default is 60 lines per page. Maximum is 2 digits. If "0" (zero) is coded, no automatic page eject will be produced, printing will be continuous.
- programmer-name - Parameter is required. It may have up to 20 alphanumeric characters enclosed with single apostrophe (') marks.

For test jobs, the "programmer-name" parameter must follow one of the following formats:

Programmer-Name	Destination
NAME.TAX.SPO	(Send to Dept of Taxation)
NAME.RJE	(ICSD Programmer's Cubby Hole)



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TSO.LILI.DOE.NAME (Send to Dept of Education)
NAME.DEPT.RJE (ICSD User Cubby Hole)
NAME (Return Output to user in pouch)

The code "RJE" or "TSO" must not appear in the JOB statement for jobs submitted in a pouch.

For production jobs, the programmer-name must have the code word, "PRODUCTION."

For test/production jobs, the programmer-name must be "CONTROL" and the project manager systems analyst must also send a letter to the ICSD Scheduler to specify the changes or reason for a test/production designation with the job's ICSD C-133, "Work Request Sheet."

MSGLEVEL=(x,y) -Default is MSGLEVEL=(1,1)

Valid entries for x (to control statement reporting)

- 0 The system prints only the JOB statement.
- 1 The system prints all JCL statements, JES2, or JES3 control statements, the procedure statements, and IEF653I messages which show the values assigned to symbolic parameters in procedure statements.
- 2 The system prints only JCL statements and JES2 and JES3 control statements.

Valid entries for y (to control message reporting)

- 0 The system prints only JCL messages. It prints JES and operator messages only if the job abnormally terminates.
- 1 The system prints JCL messages and any JES and operator messages.

MSGCLASS=output-class

Valid entries for "output-class" are:

- "A" For normal system printing and all output listings sent to the default system printer.
 - "0" To hold output in the queue and allow job output to be viewed on-line through the TSO outlist facility.
-



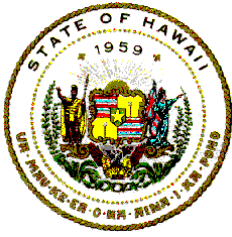
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CLASS=JOB-class

Default is CLASS=A. Most test jobs should run in CLASS=C.
Select job class code according to this table:

Class Assigned For	Frequency
A Default	When class not specified
B	
C Test, no mounts	24 hours daily
D FAMIS Production	Night, when ready
E Judiciary Non-ADABAS	24 hours daily
F Education	As needed (sequential)
G Test with mounts	24 hours daily
H DOT test and production	24 hours daily
I DB1 test job	24 hours daily
J Test with ACS mounts	24 hours daily
K DHS test and production	24 hours (sequential)
L Priority rush job	24 hours daily
M Payroll production	Pay period/as needed
N Labor Benefits production	Night, when ready
O Retirement	As needed
P Labor Contributions (PROD)	Night, when ready
R ICSD batch production	24 hours daily
S DB1 production job	24 hours daily
T SAS	Test day; PROD night daily
U	
V Banks/Bill Payments (PROD)	Night, when ready
W Mental Health Production	Night, when ready
X Mental Health Test	Night, when ready
Y LRB	Day
Z Reserved	
0	
1 System "IPL"	At "IPL" time
2 ADABAS	Daily
3 System Maintenance	Daily
4	
5	
6 CICS	Daily
7 CICS	Daily
8 CICS	Daily



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NOTIFY=userid - Parameter is required for jobs submitted through TSO terminals. Identifies the TSO user. The system should notify when the background job completes processing. Must be a userid assigned by the ICSD Systems Services Branch.

2.1 Input/Output Queue Job Priority

The execution priority of a job is determined by the expected execution time and the expected number of lines to be printed.

Execution Priority-Input Print Priority-Output

	Est. Time in Minutes	Priority	Est. Lines	Priority
Default	10	9	600	9
	20	8	1,200	8
	40	7	2,400	7
	80	6	4,800	6
	160	5	9,600	5
	300	4	20,000	4
	600	3	40,000	3
	1200	2	80,000	2
	4800 (Max.)	1		



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3 EXEC STATEMENT

The EXEC (Execute) statement marks the beginning of a step within a job stream or a procedure. The EXEC statement defines the program within a cataloged or in-stream procedure that the job step should process (execute).

A unique stepname that follows the conventions specified in Chapter 8, "MVS Naming Conventions" must begin in position three of the EXEC statement.

The format for the EXEC statement is one of the following:

```
//stepname      EXEC PGM=program-name,COND=condition  
//stepname      EXEC PROC=procedure-name,COND=condition  
//stepname      EXEC procedure-name,COND=condition
```

3.1 Cond=Even/Cond=Only

When using the COND=EVEN or COND=ONLY parameter to control the execution of a job step after a previous step abnormally terminates (ABENDs), the programmer is cautioned that for certain types of ABENDs, the entire JOB may ABEND instead of just one job step. For these special ABENDs, a subsequent job step with COND=EVEN or COND=ONLY will **NOT** be executed.

These ABEND codes are:

- a. 122 Operator cancel with Dump option.
- b. 222 Operator cancel without Dump option. (Exceeded number of lines or punched cards value on the JOB statement. JES2 simulates this ABEND when it cancels the JOB.)
- c. 322 Exceeded the CPU execution time limit. (TIME=9999 parameter on either the JOB or EXEC statement.)
- d. 522 JOB in a WAIT state for over 30 minutes.

3.2 Cataloged Procedures

The vendor, IBM, provides cataloged procedures (PROCs) to be used to process programs. ICSD has customized cataloged PROCs to optimize the functions of



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compilation, load, and execution. The ICSD PROCs will store any generated load module to library EDPD.LINKLIBT or EDPD.TESTLIB instead of a scratch partitioned data set (PDS).

ICSD has catalogued procedures that use a COBOL efficiency software named CA-Optimizer. For more information on this optimizer product, see State of Hawaii Information Technology Standards Number 11.04.06 COBOL/VS CA-Optimizer.

3.2.1 Batch Procedure Names

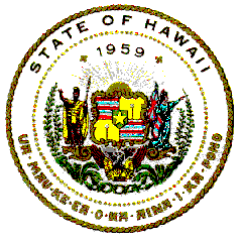
ICSD PROCs	Functions
XASMAC	Assembler Compile
XASMACLX	Assembler Compile and Load
XASMACLG	Assembler Compile, Load, and Execute
XCOLEC	VS COBOL Compile
XCOLECL	VS COBOL Compile and Load EDPD.TESTLIB
XCOLECLX	VS COBOL Compile and Load to EDPD.LINKLIBT
XCOLECLG	VS COBOL Compile, Load, and Execute
XCOBWC	COBOL for MVS Compile
XCOBWCL	COBOL for MVS Compile and Load to DPD.TESTLIB
XCOBWCLX	COBOL for MVS Compile and Load to EDPD.LINKLIBT
XCOBWCLG	COBOL for MVS Compile, Load, and Execute
XC2LEC	COBOL II Compile
XC2LECL	COBOL II Compile and Load to EDPD.TESTLIB
XC2LECLX	COBOL II Compile and Load to EDPD>LINKLIBT
XC2LECLG	COBOL II Compile, Load, and Execute

3.2.2 Online Procedure Names

The procedure names (PROCs) to compile and assemble programs, maps, and DSECTS under CICS are listed as follows:

a. Command Level Procs

1. CICOBWC - COBOL for MVS Compile
2. CICOBWCL - COBOL for MVS Compile and Link-edit
3. CILECOBL - VS COBOL Compile and Link-edit
4. CILEC2CL - COBOL II Compile and Link-edit



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b. Maps/DSECT PROCs

1. CIVBMSUP Assemble, Load BMS Maps; Assemble DSECTS
(Source in PANVALET)
2. CIVBMAPU Assemble, Load BMS Maps
(Source in User Library)
3. CIVBMSU Assemble, Load BMS Maps, Assemble DSECTS
(Source in User Library)
4. CMBMSMPR Convert Maps from BMS to CICS/MAPR format
5. CMBMSMMS Convert Maps from CICS/MAPR to BMS
Format
6. CMSFUBMS Convert Maps from SFU to BMS



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4 DD STATEMENT

The DD (Data Definition) statement is used to describe a data set to the computer operating system and to specify the input and output resources and facilities needed for the data set.

Jobs that use the IDCAMS DEFINE command to create a data set must **not** use the CATALOG operand. The high-level qualifier identifies the user catalog in which the data set will be catalogued, so no special coding is needed to identify the data set.

The following discussion on the "UNIT=" parameter lists ICSD's conventions for valid assignments for the parameter.

4.1 Unit Parameter

The UNIT names for the I/O magnetic storage media at ICSD are:

- a. UNIT=3390,VOL=SER=XNZ001

Allows data to be retained on Direct Access Storage Device (DASD) disk units designated for the temporary storage of data for a short duration. ICSD has a housekeeping routine that will purge a data set on the TEMPSTOR device if the data set has not been referenced for three consecutive weeks.

- b. UNIT=SCRATCH
=DISK
=SORTW
=SYSDA
=SYSSQ

Allows data to be temporarily stored on DASD and passed around job steps during the execution of a job. The data will be deleted after the entire job terminates from the computer system. Should only be used with temporary data sets.

- c. UNIT=DASD Type
3390 3390



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Allows data to be permanently stored on reserved non-temporary and non-scratch storage DASD media.

d. UNIT=Tape Media Type

ACS	Internal cartridge
3480	External cartridge
3400-5	6250/1600
3400-3	1600/800
TAP6250	6250
TAPE	1600, 1600/6250
TAPMOD8	1600/6250

Allows data to be permanently stored on reserved non-temporary and non-scratch storage magnetic tape media.

4.2 DD Parameters

IBM's MVS JCL Reference Manual describes the format of valid parameters and sub-parameters that may appear in the DD Statement and lists the possible values that may be assigned for each parameter within the DD Statement.

To improve readability and enhance productivity, there should be only one parameter defined on one line for each DD Statement.

It is strongly recommended that the person who sets up the JCL statements establish a set order for listing parameters and sub-parameters. This will make it easier and quicker to find errors or omissions in JCL statements. An example of organizing DD parameters follows:

```
//DDNAME DD DSN=data-set-name,  
// DISP=disposition,  
// UNIT=unit-identifier,  
// VOL=SER=serial-number,  
// SPACE=space-sub-parameters,  
// other-dd-parameters,  
// DCB=data-set-control-block-parameters
```



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5 DD STATEMENT

Jobs that store data on magnetic tape media should use the services of the Tape Library Management System (TLMS). TLMS is a mainframe based software product from Computer Associates International, Inc. ICSD acquired it to automate, track, and manage the magnetic reel and cartridge tape media that are used in the State's central site computer center. For more information on TLMS, refer to the State of Hawaii IT Standards 07.06.01, Tape Library Management Systems.

5.1 Automated Cartridge System

The State has an automated storage and retrieval facility for tape cartridges to automate the loading of magnetic tape media. The Automated Cartridge System (ACS) uses robotic technology to automatically mount tape cartridges without human intervention. For more information on the ACS, refer to the State of Hawaii IT Standards 07.06.01, Tape Library Management Systems.

5.2 Tape Density

If no DEN sub-parameter is specified in the DCB parameter on the DD statement for a tape data set, the operating system will write the data at the maximum BPI capable on the tape drive unit.

The operating system's tape density default standard does not affect tape cartridge devices.

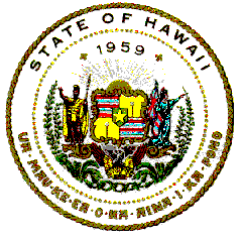
The effect on users who use the IBM 3420 dual density tape devices (1600/6250 BPI) will be that if the DEN sub-parameter on the DCB parameter on the DD statement is not specified, the tape will be written at the default density of 6250 BPI.

If tape data sets should be written at 1600 bpi on a 3420 dual density device, the DEN sub-parameter in the DCB parameter of the DD Statement is:

DCB=(DEN=3,.....),

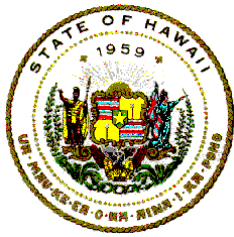
The following are valid values that may be used for the DEN sub-parameter:

DEN=3	1600-BPI
DEN=4	6250-BPI



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The capacity of a tape cartridge is greater than a tape reel, but the degree of data storage optimization onto the cartridge is dependent on the coded blocksize value.



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6 STORE PROGRAMS IN PANVALET

Source programs and modules should be stored in either the PANVALET Test Library or the PANVALET Production Library. For information on the features and functions available to programmers refer to the State of Hawaii Information Technology Standards 11.04.01, PANVALET Users Guide.



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7 TEST PROGRAM CONTROLS

The following are guidelines to be followed to structure and control the testing of programs and job streams.

7.1 Temporary Storage

Temporary storage unit, VOL=SER=XNZ001 is a 3390 DASD unit that is designated for the short term storage of test or interim data. This device is on-line at all times.

Data sets on this temporary storage unit should be deleted and their assigned disk space should be released as soon as they are no longer needed.

Data sets on this temporary storage unit that are not referenced for three consecutive weeks may be deleted from the system. The following are recommended limits for temporary data files:

- a. SPACE=
 - 4 cylinders for non-ISAM files
 - 5 cylinders or ISAM files

- b. File Size

No more than 50 test records.

7.2 Compile, Load, and Go

Cataloged procedures (PROCs) defined for "compile, load, and go" processes will do the following:

- a. Compile the source program and check its syntax.
- b. Load the object program into temporary (Scratch) PDS.
- c. Test the program logic using a temporary load module.

"Compile, load, and go" is the recommended method for testing new or modified programs for the first few test cycles.



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The temporary libraries "EDPD.TESTLIB" and "EDPD.LINKLIBT" should be used to debug and test source program logic, features, functions, and linkages.

The permanent library "EDPD.LINKLIBP" should be used to store tested and clean-compiled program load modules.

7.3 Time

"TIME=" is a keyword parameter used to specify the maximum amount of processing time that a job step may run in the central processing unit (CPU).

The default time limit is 10 minutes of CPU time. It is recommended that programmers override this default and set the time limit to 2 (two) minutes for test jobs. This minimizes wasted CPU time caused by an erroneous program loop. Refer to the vendor's MVS JCL Reference Manual for details on the usage of the TIME parameter.

Example:

```
//STEP1 EXEC PGM=TESTJOB,TIME=2
```

7.4 Region

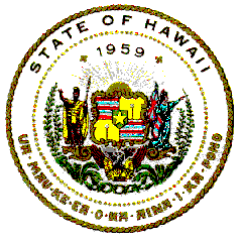
"REGION=" is a keyword parameter that is used to specify the maximum number of contiguous 1024-byte areas of real main storage that should be allocated for a job step. The default is REGION=1024K.

7.5 Cond

"COND=" is a keyword parameter that is used to determine if a job step should be bypassed or executed. Unnecessary use of computing time can be eliminated by determining the execution of a job step based on the successful completion of one or more preceding steps.

Refer to the vendor's MVS JCL Reference Manual for further details. The following condition codes are normally issued by compilers, assemblers, linkage editors and other system software:

- 0 - Successful completion
- 4 - (W) Warning - error will not hinder execution



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- 8 - (C) Conditional - compiler corrects error; test is possible
- 12 - (E) Error - serious error detected; do not execute program
- 16 - (D) Disaster - unsuccessful completion

7.6 Procs

"PROCs" are cataloged or in-stream procedures that have one or more EXEC statements followed by associated DD statements.

When a job is considered to be ready for "production status," it is recommended that a PROC of the job stream be developed, tested, and cataloged. Consult the project manager systems analyst for project standards or guidelines in this area.

Helpful hints in developing PROCs:

- a. Use symbolic parameters for:
 - program names
 - region size
 - data set names for data files
 - volume serial numbers
 - data set names on STEPLIB statements
- b. Use the COND parameter. Control job step executions with the EVEN and ONLY conditions; or use the test sub-parameters COND=(x,y) where "x" is a return-code value and "y" is a conditional operand.

Example:

```
//STEP1 EXEC PGM=TESTJOB,COND=(4,LT)
```

7.7 Msglevel =

The "MSGLEVEL=" parameter specifies which job control statements are to be printed from the job stream.

If the JCL statements need to be printed, use MSGLEVEL=(1,1). See Section 2.1, "Job Statement Parameters" for the various message level options available.

IMPORTANT: For production jobs use MSGLEVEL=1.



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8 MVS NAMING CONVENTIONS

ICSD has adopted the following central computer site IBM MVS naming conventions. These naming conventions were adopted:

- a. To insure uniqueness (non-duplication) of MVS names.
- b. To facilitate meaningful recognition of MVS names.
- c. To provide consistency in defining relationships between MVS names.
- d. To simplify coding and keying of MVS names.
- e. To speed the operating system catalog search for data sets.
- f. To facilitate the analysis of system performance through the logical grouping of MVS names.

8.1 Jobname

JOBNAME
JOBNAME

S Y S T E M I d J a
P M S J a J n

JOBNAME is the jobname parameter on the MVS JCL JOB statement. JOBNAME is a user assigned name that the operating system uses to identify a particular job.

8.1.1 TSO JOBNAME

JOBNAME usually has eight (8) alphanumeric characters as illustrated above in the first line. The seven characters ("SYSTEMID") are the TSO (time sharing option) system user identifier (SYSUID). The SYSUID code is controlled by ICSD, Systems Services Branch, Systems Security Section.

The last character ("Ja") is a job identifier. The job identifier ("Ja") is a single user assigned alphanumeric character starting with the letters "A" through "Z" and followed by the numbers 1 through 9.

8.1.2 NON TSO JOBNAME

JOBNAME must have five (5) alphanumeric characters as illustrated above in the second line.

The first three (3) characters ("PMS") are the system project management



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system (PMS) code. The PMS codes are controlled by ICSD Planning and Project Management Office (PPMO) and assigned to a user application Project Manager.

P: Must be alphabetic (A - Z). It identifies a department or agency (see Appendix A).

M: Must be alphabetic (A - Z) or numeric (1 - 9). It identifies a division or a system in a department.

S: Must be alphabetic (A - Z). It identifies a system within a division or within a larger system.

The last two characters ("JaJn") are the job number used to uniquely identify jobs. The assignment of job numbers will be coordinated by the Project Manager.

Ja: Must be alphabetic (A - Z).

Jn: Must be numeric (1 - 9). Zero will not be used.

8.2 Stepname

STEPNAME

P M S Ja Jn S

STEPNAME is the stepname parameter on the MVS JCL EXEC statement. STEPNAME is a user selected name that the operating system uses to identify a particular step within a job stream.

STEPNAME has six (6) alphanumeric characters as illustrated above.

The first three (3) alphabetic characters ("PMS") are the agency or system project management system (PMS) identification code.

The next two (2) characters ("JaJn") are the job numbers used to uniquely identify jobs for a PMS code. The assignment of job numbers will be coordinated by the Project Manager in charge of the project.

The sixth (6th) character ("S") identifies a particular step within a job stream. It is a user assigned alphanumeric character starting with the letters "A" through "Z" and followed by the numbers 1 through 9.

8.3 Data-Set-Name



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DATA-SET-NAME

Prefix.Ja Jn S N X

A data set or data file is a collection of closely related records organized for a specific purpose. The DATA-SET-NAME is the data set name parameter on the MVS/JCL DD statement. It is the programmer defined name used by the operating system to identify a unique data file. The DATA-SET-NAME must have two major components separated by a period:

- a. A prefix high level qualifier.
- b. A suffix unique qualifier five (5) alphanumeric name.

8.3.1 HIGH LEVEL QUALIFIER

- a. For **tape** data sets, the high level qualifier must have two components separated by a period. The high level qualifier must follow the format "TMS.PMS."
 - The component ("TMS") are the letters "TMS".
 - The component ("PMS") is the project's three character PMS code.
- b. For **disk** data sets, the high level qualifier must be the three character PMS code for the project.

8.3.2 UNIQUE QUALIFIER

The first three (3) characters of the unique qualifier component of the DATA-SET-NAME are the fourth through sixth characters of the STEPNAME of the job step that the programmer wishes to associate with the data file. This is usually the job step where the data file is set up as an output file or initially created.

The fourth (4th) character ("N") is the File Number that identifies multiple data files within a job stream. File Numbers are assigned consecutive to data files. For example, if a job stream has five data files (2 tape files and 3 disk files), the File Numbers are "1", "2", "3", "4", and "5" respectively. "N" is a single sequentially assigned character starting with the numbers "1" to "9" and followed by the alphabets "A" to "Z".

The fifth (5th) character ("X") is the Type Code that identifies the data file as follows:



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- a. X = "C", Input card data file
- b. X = "D", Disk data file
- c. X = "G", Generation data group tape data file
- d. X = "P", Punched card data file
- e. X = "R", Printed report data file on stock paper
- f. X = "T", Non-generation data group tape data file
- g. X = "X", Printed report data file on special form
- h. X = "M", Model DSCB (data set control block) to be shared by more than one generation data group (GDG) file.

8.4 DDname

DDNAME

P M S Ja Jn S N

DDNAME is the Data Definition Name parameter on the MVS/JCL DD statement.

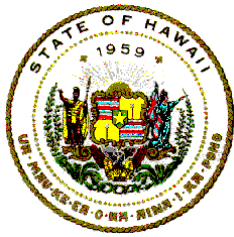
For each data file, the EXTERNAL name must be the same as the DDNAME on the MVS/JCL DD statement used to define the file's data set name, attributes, and characteristics.

The EXTERNAL name of the ASSIGN clause in COBOL is used to connect the data files needed by a program to their corresponding MVS/JCL DD statements.

The EXTERNAL name has seven (7) alphanumeric characters as illustrated above.

The first six (6) characters are the first six (6) characters that make up the STEPNAM of the job step that the programmer wishes to associate with the data file.

The seventh (7th) character ("N") is the File Number that identifies multiple data files within a job stream. File Numbers are assigned consecutively to data files. For example, if a JCL job stream has five data files (2 tape files



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and 3 disk files), the File Numbers are "1", "2", "3", "4", and "5", respectively. "N" is a single sequentially assigned character starting with the numbers "1" to "9" and followed by the alphabets "A" to "Z".

8.5 Source Module Name

SOURCE MODULE NAME P M S Ja Jn S N "S" Va Vn

SOURCE MODULE NAME is the programmer assigned name for a program, sub-program, or group of programming statements. It is the name that must be used to identify these source modules when they are stored in the PANVALET libraries.

The SOURCE MODULE NAME has ten (10) alphanumeric characters as illustrated above.

The first six (6) characters ("PMSJaJnS") are the first six (6) characters of the job STEPNAME that the programmer wishes to associate with the source module.

The seventh (7th) character ("N") is the Module Number used to identify multiple modules within a job step. Module Numbers should be numbered consecutively within each job step. For example, if there are three modules in a job step (1 program module and 2 INCLUDE modules), the module numbers are "1", "2", and "3", respectively. "N" is a single sequentially assigned character starting with the numbers "1" to "9" and followed by the alphabets "A" to "Z".

The eighth (8th) character is the letter "S" that identifies this module as a SOURCE Module.

The ninth (9th) and tenth (10th) characters ("VaVn") are the two-character version code used to identify a specific version of a SOURCE Module.

- a. Va: Must be alphabetic, A - Z.
- b. Vn: Must be numeric, 1 - 9. Zero will not be used.

8.6 Include Module Name

INCLUDE MODULE NAME P M S Ja Jn S N "H" Va Vn



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The INCLUDE MODULE NAME is used within the PANVALET ++INCLUDE Command (see the vendor's "PANVALET User Reference Manual OS").

The INCLUDE MODULE NAME is the programmer selected name used to identify the INCLUDE Module in the PANVALET system.

The INCLUDE MODULE NAME has ten (10) alphanumeric characters as illustrated above.

The first three (3) characters ("PMS") are the PMS code assigned to the project for which the INCLUDE module was developed.

The next three (3) characters identify a job and step as follows:

- a. If the INCLUDE Module is a "data set description," then the job identifiers and job step number ("JaJnS") are the job and step in which the data set described by the INCLUDE module was created.
- b. If the INCLUDE Module has processing statements, then the job identifiers and job step number ("JaJnS") are the job and step in which the module was originally coded.

The seventh (7th) character ("N") is the Module Number that identifies multiple modules within a job step. Module Numbers should be numbered consecutively within each job step. For example, if there are three modules in a job step (1 SOURCE and 2 INCLUDE Modules), the Module Numbers are "1", "2", and "3", respectively. "N" is a single sequentially assigned character starting with the numbers "1" to "9" and followed by the alphabets "A" to "Z".

The eighth (8th) character is the letter "H" which identifies the module as an INCLUDE Module.

The ninth (9th) and tenth (10th) characters ("VaVn") are the two-digit version number used to identify a specific version of an INCLUDE Module.

- a. Va: Must be alphabetic, A - Z.
- b. Vn: Must be numeric, 1 - 9. Zero will not be used.



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8.7 Load Module Name

LOAD MODULE NAME P M S Ja Jn S N "L"

The LOAD MODULE NAME is the name assigned to the object module loaded to a partitioned data set library by the operating system. It is the operating system or programmer selected name used to identify a loaded object module.

The LOAD MODULE NAME has eight (8) alphanumeric characters as above.

The first six (6) characters ("PMSJaJnS") are the first six (6) characters of the job STEPNAME that the programmer wishes to associate with the load module.

The seventh (7th) character ("N") is the Module Number that identifies multiple modules within a job step. Module Numbers should be numbered consecutively within each job step.

For example, if there are three modules in a job step (1 SOURCE and 2 INCLUDE Modules), the Module Numbers are "1", "2", and "3", respectively. "N" is a single sequentially assigned character starting with the numbers "1" to "9" and followed by the alphabets "A" to "Z".

The eighth (8th) character is the letter ("L") to identify the module as a LOAD Module.

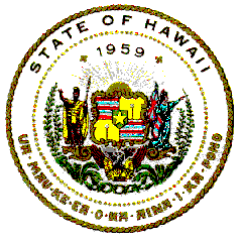
8.8 Load Module Library Name

LOAD MODULE LIBRARY NAME P M S . N "LIB" "P"

LOAD MODULE LIBRARY NAME is the name selected to identify a partitioned data set load module library to the operating system.

The LOAD MODULE LIBRARY NAME as illustrated above has two components separated by a period. The first component is a three character prefix, and the second component is an eight (8) character suffix that identifies the type of load module.

The three (3) character ("PMS") prefix is the agency, project, or system PMS identification code.



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The first four characters of the suffix (represented by the code "M") identifies the type of load modules that should be stored in the partitioned data set library. It is one of the following:

- a. "LINK"
- b. "PARM"
- c. "PROC"

The fifth, sixth, and seventh characters are the letters "LIB" to indicate that this is a library partitioned data set.

The eighth (8th) character is the letter "P" to identify this library as a production load module library.

8.9 User Procedure Name

USER PROCEDURE NAME P M S Ja Jn S N "P"

The USER PROCEDURE NAME is the name of a cataloged procedure used for a specific application. It is the selected program name used to identify the procedure to the operating system.

The USER PROCEDURE NAME has eight (8) alphanumeric characters as illustrated above.

The first six (6) characters ("PMSJaJnS") are the first six (6) characters of the job STEPNAME that the programmer wishes to associate with the Procedure (PROC). This is one of the steps in which the User Procedure is invoked in a MVS/JCL EXEC (execution) statement.

The seventh (7th) character ("N") is a code that indicates whether the Procedure is executed in only one job stream (N=1), or is executed in more than one job stream (N=2).

The eighth (8th) character ("P") is the letter "P" to identify this name as a Procedure Name.

8.10 Parameter Definition



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PARAMETER Definition

P M S Ja Jn S N "M"

The PARAMETER DEFINITION name (or Control Statement name) is the name used to identify a job parameter statement or a set of job parameter statements to the operating system. These parameter control statements reside in the EDPD.PARMLIB library and are referred to by options or features in a cataloged procedure.

The PARAMETER DEFINITION name has eight (8) alphanumeric characters as illustrated above.

The first seven (7) characters ("PMSJaJnSN") are the first seven (7) characters of the USER PROCEDURE NAME that has references to the PARAMETER DEFINITION control statements.

The eighth (8th) character ("M") is the letter "M" to identify this as a PARAMETER DEFINITION name.



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9 ICSD PRODUCTION JOB STREAM GUIDELINES

The following are conventions and guidelines for the creation of production job streams. The objectives of these guidelines are:

- a. To standardize production job streams processed in the State's central site mainframe computer.
- b. To improve the efficiency, dependability, readability, controlled flexibility, and maintainability of production job streams.
- c. To minimize the need for project team member's intervention.
- d. To provide some structure and order for the creation of production job streams.

9.1 Guidelines For Dependability

- a. Production jobs must execute CATALOGED procedures.
- b. Production job streams must **not** contain the JOBCAT statement nor the STEPCAT statement.

9.2 Guidelines For Readability

- a. Comment statements, that briefly describe the purpose or functions of the job stream, must be placed before the PROC statement of the cataloged procedure, for example:

```
/*----- Purpose for the job stream -----  
/*----- Functions accomplished by the job -----  
//XLDA1 EXEC PROC=proc-name
```

- b. Comment statements, that meaningfully describe the function or purpose for each execute step, must be placed immediately before the job step EXEC statement, for example:

```
/*----- Purpose for second job step -----  
/*----- Functions accomplished in the step -----  
//XLDA1B EXEC PGM=pgm-name
```



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- c. Comments should be placed after each range description in the sort control statement to define the sorting sequence. A continuation code ("X") must be in position 72, and the continuation statements must begin in position 16.

```
SORT FIELDS=(09,05,CH,A, ACCOUNT CODE      X
              11,09,CH,A,  ACCOUNT IDENTIFIER X
              21,06,CH,A)  TRANSACTION DATE
```

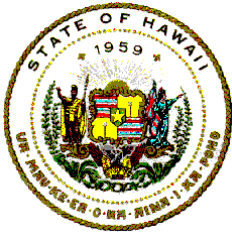
9.3 JCL Statement Format

- a. For MVS/JCL DD statements, limit each statement definition line to only one parameter.
- b. The first line of each DD statement should have a narrative descriptive name of the input/output file (or report) in positions 48 to 71.
- c. Continuation of parameter description control statements should begin in position 16.
- d. Symbolic parameter value assignments should begin in position 16.
- e. Each symbolic parameter name should have a descriptive comment in positions 48 to 71.

9.4 Guidelines to Control Flexibility

Symbolic parameters should be used in the following situations:

- a. For application Program Library (STEPLIB) - use symbolic parameter "&LIBx".
- b. For application Program Names (PGM=) - use symbolic parameter "&PGMx".
- c. For the Data-Set-Name of application files (DSN=) - use symbolic parameter "&DATAn", where "n" is an integer, or use an acronym descriptive symbolic name.
- d. When the Volume Serial Number of a data set or data file is specified use a descriptive symbolic parameter with the parameter;



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e.g.."VOL=SER=&VOLNUMn", where "n" is an integer.

- e. For user reports (SYSOUT=) - use symbolic parameter "RPTxn". The symbolic parameter for user reports may be specified as:

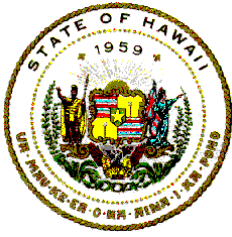
RPTxn=(C,,9003)' or
RPTxn='9003'.

NOTE: For the above symbolic parameter examples:

n = numeric (1 - 9).
x = alphabetic (A - Z).

9.5 Guidelines to Minimize Project Management Intervention

- a. Provide job step restart capabilities. Should a job abend, Production Services can restart the job at a place after the last completed segment. Restart procedures will minimize lost time and ensure timely completion of jobs. More importantly, restart capabilities will minimize the need for project team member's intervention.
- b. For GDG tape data sets, let TLMS handle the rotation of the catalog references. See the State of Hawaii IT Standards 07.06.01, Tape Library Management Systems for information on how to define a GDG to TLMS and how to "DEGEN" a GDG.
- c. Have only one entry point for input data on parameter control statements. If different types of input controls are needed, design the program to split the input parameter definition control statement into separate segments, such as for date information, transaction controls, or parameter options.
- d. Do not use leased products that ICSD must repeatedly renew as a permanent feature of a production job stream. Call ICSD, Systems Services Branch, Systems Software Support Section at 586-1940, or the ICSD Client Services Branch at 586-1850, to find out if a software product is owned or leased by the State.
- e. Use the condition code "COND=(7,LT)" test on each execute step to prevent subsequent steps from executing when a previous step abnormally terminates.



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NOTE: FAMIS jobs may use "COND=(8,LT)" because IDCAMS may return a condition code of 8 which may be acceptable.

- f. Send user reports to "SYSOUT=(C,,form-number)" to separate the user reports from the JCL listing that use the default "SYSOUT=A"; or to "SYSOUT=(I,,form-number),FCB=6", where "I" is an "X," "G," or "H", to separate the user reports from the JCL listing that use the default "SYSOUT=E" or "SYSOUT=Q."
- g. After the successful completion of each production job, a graphic message (message-in-a-box) must be displayed on the operator console and on the JES2 Job Log that clearly indicates the job's end (use program XLSA1A2I). The following JCL must be inserted in the last step of the JCL:

```
//STEPX   Exec PGM=XLSA1A2L, COND=(7.LT). PARM="JOBNAME'
//STEPLIB DD DSN=EDPD,LINKLIBP,DISP=SHR
```

NOTE: The steplib DD statement is not needed for jobs that run on the HAWI/KEIKI mainframe.

The message and format are shown below, as it would appear on the operator console and JES2 Job Log.

Sample:

```
*****
*
*      JOB JOBNAME COMPLETED SUCCESSFULLY      *
*
*
*
*****
```

This message will help the Production Services Branch to determine the status of a job without having to scan through the entire JCL listing.

9.6 Guideline for Maintainability

- a. Permanent files must have their DCB information coded in the DD statements of the cataloged procedures.



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- b. When possible, use the "refer back" options.



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10 INSTREAM CATALOGED PROCEDURES

Both Instream and Cataloged Procedures provide an excellent means for setting up a production job stream.

Normally, an Instream Procedure is used to set up and test a proposed job stream. Once the Instream Procedure has been thoroughly tested, an ICSD-190 PROC/PARM Request must be completed and submitted to Production Services. The form and instructions are available via the Internet at State of Hawaii Forms Central, under Information and Communication Services. The URL is: <http://www.hawaii.gov/forms/>. ICSD-190 requests that a copy of the tested Instream Procedure be loaded into the application procedure library, EDPD.PROCLIBA or into the agency's or project's production library. Once loaded in a production library, the job stream is called a "Cataloged Procedure." Production jobs should execute this Cataloged Procedure to run the production job stream.

For a more detailed explanation or to find out about other more sophisticated capabilities which are available via cataloged procedures, refer to the vendor's MVS JCL Language Reference Manual.

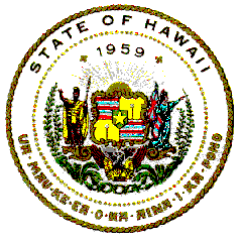
The advantages are as follows:

- a. Reduces the size of the JCL member required to run a job.
- b. Provides considerable flexibility in running a job. Permits quick changes to a job stream whether the change is temporary or permanent.
- c. Permits several jobs to execute the same PROC differently with appropriate modifications.

10.1 Instream Procedure Guidelines

Instream Procedure Guidelines provide a means for testing a PROC prior to moving it to the application procedure library EDPD.PROCLIBA, or the agency's or project's production library.

The only difference between an Instream PROC and a Cataloged PROC is that the Instream PROC is part of the job stream while the Cataloged PROC is in a PROC library and the job stream is executed from JCL statements stored in the PROC library.



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JOB SET-UP

EXAMPLE:

```
//OBBA1 JOB (1234,OBB,,99)...
//OBBA1A1P PROC PGM=OBBA1A1L, (
//      BUDFILE='OBB.OBBA1A1D' ( PROC STATEMENTS
//OBBA1A EXEC PGM=&PGM1      (
:
:
//      PEND
//STEP1 EXEC OBBA1A1P      ( STATEMENT TO
:      ( EXECUTE PROC
:
//
```

10.2 Catalogued Procedure Guidelines

Catalogued Procedures provide a means of storing a job stream for later execution.

The major strength of a cataloged PROC is its flexibility through the use of symbolic parameters. A symbolic parameter is a variable name that can take on various assigned values. A symbolic parameter can be assigned anywhere within the PROC.

10.2.1 ADD PROC TO PRODUCTION LIBRARY

Use Form ICSD-190, PROC/PARM Request to move a copy of a tested procedure into the EDPD.PROCLIBA application procedure library, project library, or department library.

10.2.2 MODIFY EXISTING PROC IN PRODUCTION LIBRARY

- a. Use Form ICSD-190, PROC/PARM Request form to move the JCL procedure statements from the operation's library to the designated user TEST library.
- b. Modify the PROC statements.
- c. Use Form ICSD-190, PROC/PARM Request to move the updated production PROC into the EDPD.PROCLIBA application procedure



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library, project library, or department library.

10.2.3 PROCEDURE SET-UP CONSIDERATIONS

- a. A symbolic parameter name must not exceed seven (7) characters in length.
- b. Each symbolic parameter used in the PROC must be defined in the PROC statement.
- c. Each symbolic parameter defined in the PROC statement must be used at least once in the PROC.
- d. PROCs cannot have a JOB statement, delimiter statements (such as “/*” in positions 1 and 2), or null statements (such as “//” in positions 1 and 2).
- e. DD statements within a cataloged PROC must not have a DDNAME of JOBLIB.
- f. An asterisk , “*”, or the keyword “DATA” as an operand field on DD statements is not valid.
- g. If there are any symbolic parameters in the PROC, at least one of the symbolic parameters must be coded on the same line as the PROC statement.

EXAMPLE:

```
INVALID: //OBBA1A1P PROC
          // PGM1=OBBA1A1L,
          // PGM2=OBBA1B1L
          //OBBA1A EXEC PGM=&PGM1
```

```
VALID:   //OBBA1A1P PROC PGM1=OBBA1A1L,
          // PGM2=OBBA1B1L
          //OBBA1A EXEC PGM=&PGM1
```

- h. Symbolic parameters in the PROC are identified by the presence of an ampersand “&” symbol as a prefix to a symbolic parameter



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name.

EXAMPLE:

```
//STEPS EXEC PGM=&PGM1
```

NOTE: "PGM1" is the symbolic parameter name.

- i. The symbolic parameter name must start with an alphabetic character with the remainder of the name being alphanumeric characters (A to Z and 1 to 9).
- j. The value assigned to a symbolic parameter on a PROC statement is overridden when that symbolic parameter is assigned a value on the EXEC statement that calls the procedure, or on a SET JCL DD statement.
- k. Symbolic parameters can be coded in any order on PROC or EXEC statements.
- l. The following keywords cannot be used as symbolic parameters:

PGM
DPRTY
PROC
COND
PARM
ACCT
RD
TIME
REGION
ROLL

- m. Symbolic parameters are highly recommended for the following operands:

Data-set-name
PGM=
REGION=
STEPLIB DD DSN=

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VOLUME=SERIAL=

- n. Passing parameter values to programs via PROCs also enhances flexibility, though it is not recommended that ICSD Control Clerks or Operators be required to modify the parameter values.

A date may be used to control factors in extractions, computations, report writing, etc. To provide this information to a program via a PROC, do the following:

First, code a symbolic parameter for the field on the EXEC program statement for the appropriate step.

Second, assign a value to the symbolic parameter on the EXEC procedure statement.

EXAMPLE:

```
//OBBA1 JOB (1234,OBB,,99)...  
//OBBA1A1P PROC  
//OBBA1A EXEC PGM=OBBA1A1L,PARM=&DATE  
  
// PENDING  
//STEP1 EXEC OBBA1A1P,DATE='063093'  
  
//
```

Parameters can also be passed to programs via PROCs in the following manner. IF PARM is omitted, no values are passed.

EXAMPLE:

```
//OBBA1 JOB (1234,OBB,,99)...  
OBBA1A1P PROC  
//OBBA1A EXEC PGM=OBBA1A1L  
  
// PENDING  
//STEP1 EXEC OBBA1A1P,PARM.OBBA1A='1993  
HAWAII'
```




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11 STEP RESTART TECHNIQUES

The following are recommended techniques, hints, or tips to consider when designing and developing effective Step Restart procedures for production job streams.

Step Restart procedures should be developed and documented to allow a production job under the control of ICSD Production Services Branch to resume its processing after certain abnormal job termination situations occur instead of requiring that the entire job stream be resubmitted for processing at the beginning of the job stream.

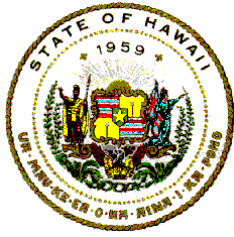
In most cases, properly planned Step Restart procedures will make the job easier for Production Services to process; reduce the rerun time; help to insure timely completion for the user; and minimize the need for project team member's intervention.

A "Restart Segment" is a series of one or more steps within a job stream that can be executed as a separate job.

Data sets that are passed from one "Restart Segment" to another must be permanent data sets. Innovative planning and sometimes additional input/output steps may be required to comply with the ICSD three tape drive assignment limitation.

The following Step Restart Techniques are designed to work in conjunction with the parameter "RESTART" on the JOB control statement.

- a. Determine where to begin a "Restart Segment." The following are situations where a "Restart Segment" could be set up:
 - After a step or series of steps that is expected to exceed 30 minutes of execution time.
 - After a GDG data set is cataloged.
 - At a step that reloads data to a file.
- b. For each "Restart Segment," design a separate job stream so that temporary data sets will not be passed outside of the "Restart Segment" and that ICSD Control Clerks or Operators will not have to modify the original job stream before submitting a restart job stream.
- c. Use the standard method of cataloging a GDG at the write step with



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“DISP=(NEW,CATLG,DELETE)” parameter.

- d. Determine if there are any KSDS or DIRECT files that should be reloaded after an ABEND situation. For such reload situations, set up the job with the reload step in the job stream in the following manner:
- First, strategically place a step to execute program OZZ100P in the job stream prior to the reload step. Executing program OZZ100P will send a message to control.
 - Second, make the reload step the first step of a "Restart Segment." Use the condition code option on the EXEC card (in the previous step – OZZ100P).

This method minimizes complicated reload instructions and special reload job streams or project team member's intervention.

- e. Execute Program OZZ100P as the last step of each "Restart Segment." Program XLSA1A1L simply prints a message on the first page of the JCL list to help Production Services determine which "Restart Segment" has been successfully completed and from which point to restart the job.

NOTE: Programs OZZ100P and OZZ102P are aliases of programs XLSA1A1L and XLSA3A1L respectively.



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12 MVS LIBRARY MEMBER TRANSFERS

Physical card input jobs are no longer processed at ICSD. MVS JCL member and PDS member request forms and procedures have been developed to process MVS library member transfer requests.

12.1 MVS Library Request Forms

ICSD has five forms that users may use to ask ICSD Production Services Branch to move or copy MVS library members. These forms are:

- a. ICSD-117, PANVALET Request I
- b. ICSD-146, PANVALET Request II
- c. ICSD-184, JCL Member Request
- d. ICSD-190, PROC/PARM Request
- e. ICSD-198, LOAD Module Request

All forms and instructions are available via the Internet at State of Hawaii Forms Central, under Information and Communication Services.

The URL is: <http://www.hawaii.gov/forms/>

12.2 MVS Library Request Procedures

The agency DP Coordinator is responsible for notifying the ICSD Production Services Branch, Scheduling and Control Unit in writing of any changes, additions, or deletions of names and/or the assigned PMS codes on the MVS Member Request Authorization list.

The agency DP Coordinator is responsible for providing the ICSD Production Services Branch, Scheduling and Control Unit with any changes, additions, or deletions of the authorization signature cards.

- a. The "Authorization Signature" for MVS JCL member and PDS members transfer requests on file at ICSD Production Services Branch must be an original signature. A photocopied or rubber stamped signature will not be

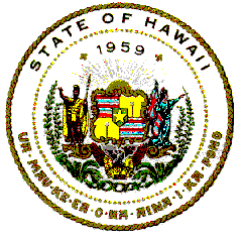


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accepted. Only a person responsible for the Project Management System (PMS) can sign the request. If the request is incomplete or not signed by an authorized person, the request will be returned to the requestor. The only exception to the above occurs when the request is submitted via email. If the form is emailed, it must be emailed to the email address provided in the instructions for the form and emailed from an account that is clearly recognizable as belonging to the “Authorized By” person.

- b. The ICSD Production Services Branch will verify these authorization signatures for the PMS code against a card file of authorized names. The project manager is responsible for sending the signature cards to the ICSD Production Services Branch, Scheduling and Control Unit. Users may call the Control Clerk Supervisor at 586-1887 or 586-1892 to get these cards. For more information, see the State of Hawaii IT Standards 07.05, Production Job Documentation Standards.
- c. All authorization signatures for any production job should be on file at the ICSD Production Services Branch, Scheduling and Control Unit. In addition to the signature cards, the agency DP Coordinator must also submit a list of names of the authorized persons, and all of their respectively assigned PMS codes. For more information, see the State of Hawaii IT Standards 07.05, Production Job Documentation Standards.



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APPENDIX A

AGENCY CODES

Agency	Code
Accounting and General Services	M
Agriculture	A
Attorney General	N
Budget and Finance	O
Commerce and Consumer Affairs	R
Counties	V
Defense	G
Education	E
Governor's Office	Q
Hawaiian Home Lands	I
Health	H
Human Services	K
Information and Communication Services Division	X
Judiciary	J
Labor and Industrial Relations	L
Land and Natural Resources	C
Legislative Reference Bureau	Y
Lt. Governor's Office	S
Office of Hawaiian Affairs	Z
Personnel Services	P
Planning and Economic Development	B
Taxation	T
Transportation	D
University of Hawaii	F