4753 to ICSF Migration

Considerations, opportunities and suggestions

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Introduction

With the rising prevalence of the availability of ICSF and imbedded cryptography that is now easily available on CMOS S/390 processors, consideration must be given to the migration effort involved in moving from outboard 4753 processors to the Integrated Cryptographic Service Facility. Although both products use the underlying Common Cryptographic Architecture (CCA), there are still some implementation differences. Some of these are minor with no noticeable differences and some of these are of a more serious difference, such that some functions may not be available across these product lines. In some cases, the major differences are of no significant consequence, especially if those differences result from requiring certain facilities, parameters, or key types inherent in one function on one platform, with the same end result being offered in another manner or function on the other platform (e.g.. Control Vector Translate on 4753 versus NOCV keys on ICSF).

This document will explore these differences and also similarities in such a manner as to facilitate a well planned migration.

In the following pages are listed all the API function calls, in alphabetical order, used by the 4753 system along with cautions, recommendations, and suggested steps in a migration effort.

4753 to ICSF Migration Considerations

CSNAEGN

I. ANSI X9.17 EDC Generate

A. Considerations

1. This function is compatible with ICSF and requires no changes.

CSNAKEX

II. ANSI X9.17 KEY Export

A. Considerations

1. The value of RULE ARRAY COUNT may be an issue.

   4753 allows "CKT" to be specified, seemingly as one of three RULE ARRAY options while ICSF provides "CKT" as a fourth RULE ARRAY option.

   The values of RULE ARRAY COUNT and RULE ARRAY need to be checked and possibly adjusted.

CSNAKIM

III. ANSI X9.17 KEY Import

A. Considerations

1. The content of RULE ARRAY has one additional value for the 4753, "ADJUST".

   ICSF does not provide for the "ADJUST" parameter.

   RULE ARRAY COUNT and RULE ARRAY will need to be adjusted accordingly.

2. ICSF adds two RULE ARRAY parameters, "CCA-IMP" and "CCA-EXP" which allow ANSI Key Encrypting Keys to be converted into "NOCV" IMPORTER and EXPORTER keys for subsequent key management functions.

CSNAKTR

IV. ANSI X9.17 KEY Translate

A. Considerations

1. The content of RULE ARRAY has one additional value for the 4753, "ADJUST".

   ICSF does not provide for the "ADJUST" parameter.

   RULE ARRAY COUNT and RULE ARRAY will need to be adjusted accordingly.

CSNATKN

V. ANSI X9.17 Transport Key Partial Notarize

A. Considerations

1. This function is compatible with ICSF and requires no changes.

4753 to ICSF Migration Considerations

CSNBCKI

VI. Clear Key Import

A. Considerations

1. This function is compatible with ICSF and requires no changes.

CSNBCPA

VII.Clear PIN Generate Alternate

A. Considerations

1. ICSF does not support generating PIN offsets from an encrypted PIN block.

   Subsequently, 4753 allows a RULE ARRAY COUNT of one or two, ICSF allows only one.

   If a PIN offset is being built, then the ICSF function can not be used.

   If a VISA PVV is being processed, then RULE ARRAY COUNT may require adjusting (ICSF allows only one). ICSF gets its PIN extraction method from the PIN BLOCK FORMAT value of the INPUT PIN PROFILE array while 4753 allows this to be specified as also a second value in RULE ARRAY as the PIN EXTRACTION METHOD

2. The 4753 DATA ARRAY value can be either relevant to IBM-PINO or GBP-PINO values or to the values required for VISA PVV generation. ICSF supports only the VISA PVV generation DATA ARRAY values.

3. ICSF does not support the OEM-1 PIN format, but it closely resembles the VISA-3 format, which may serve as an alternative.

CSNBCPE

VIII.Clear PIN Encrypt

A. Considerations

1. ICSF does not support the Clear PIN Encrypt function.

   If required, the same end result can be provided by using application code to convert the clear PIN into the desired format (padded; XOR with PAN; etc.) and then using the ENCIPHER function with an appropriate DATA key or, for PINs encrypted with a double length key (IPINENC/OPINENC), using the ENCIPHER/DECIPHER/ENCIPHER functions with two appropriate DATA keys.

   As an alternative, to prevent deciphering, the 8 byte value can be MACGENed with either a MAC key (single length) or a MACD key (double length). The resulting 8 byte MAC is equivalent to an 8 byte encipher.

CSNBCPV

IX. Clear PIN Verify

A. Considerations

1. ICSF does not support the Clear PIN Verify function.

   If required, the same end result can be provided by using application code to convert the clear PIN into the desired format (padded; XOR with PAN; etc.) and then using the ENCIPHER function with an appropriate DATA key. That DATA key value can be defined also as an IPINENC key type, and the resulting encrypted PIN can now be validated using the CSNBPVR function call.

   As an alternative, to prevent deciphering, the 8 byte value can be MACGENed with either a MAC key (single length) or a MACD key (double length). The resulting 8 byte MAC is equivalent to an 8 byte encipher.

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CSNBCSG

X. CVV Generate

A. Considerations

1. This function is compatible with ICSF and requires no changes.

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CSNBCSV

XI. CVV Verify

A. Considerations

1. This function is compatible with ICSF and requires no changes.

CSNBCTT

XII.Cipher Text Translate

A. Considerations

1. ICSF does not support the use of DATA or CIPHER class keys with this function. Only DATAXLAT keys can be used.

   If required, the DATA or CIPHER class keys need to be changed to DATAXLAT.

   Additionally, it is also possible to DECIPHER then ENCIPHER the text using the CSNBDEC and CSNBENC function calls.

CSNBCVD

XIII. Cryptographic Variable Decipher

A. Considerations

1. ICSF does not support this function call.

   If required, a DECIPHER using CSNBDEC and a DATA key can be used to achieve the same result.

2. This function is typically associated with the CSNBEPA function on 4753 and is used to decipher the output.

3. When used on 4753, a key of type CVARDEC is required.

4. Neither CVARDEC keys nor the CSNBEPA function call are supported by ICSF.

CSNBCVE

XIV.Cryptographic Variable Encipher

A. Considerations

1. ICSF does not support this function call.

   If required, an ENCIPHER using CSNBENC and a DATA key can be used to achieve the same result.

2. This function is typically used on 4753 to encipher the MASK ARRAYS that are used with the Control Vector Translate CSNBCVT function call.

3. ICSF does not support the Control Vector Translate function call so CSNBCVE may also not be required.

CSNBCVG

XV.Control Vector Generate

A. Considerations

1. ICSF does not support this function.
2. This function is usually followed by a Key Token Build CSNBKTB call on the 4753.
3. ICSF only supports default Control Vectors in a Key Token so if this function is being used, it must be replaced moving a default Control Vector into the target Key Token.

CSNBCVT

XVI.Control Vector Translate

A. Considerations

1. ICSF does not support this function, but does provide an alternative.

   Control Vector Translate is typically used on the 4753 to communicate key values to and from non Control Vector based systems. Associated with this function are also the CSNBCVE, CSNBCVD functions and the IKEYXLAT, OKEYXLAT, CVARXCVL and CVARXCVR key types.

2. ICSF does not support the IKEYXLAT, OKEYXLAT, CVARXCVL and CVARXCVR key types. ICSF does not support the CSNBCVE or CSNBCVD function calls nor their associated CVARENC and CVARDEC key types..

3. ICSF provides to concept of NOCV keys. NOCV keys (either IMPORTER or EXPORTER) are specially defined keys that will strip Control Vectors from a key (exported with CSNBKEX) or add Control Vectors to a key (imported with CSNBKIM).

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CSNBDCO

XVII.Decode

A. Considerations

1. This function is compatible with ICSF and requires no changes.

CSNBDEC

XVIII.Decipher

A. Considerations

1. ICSF provides an additional (third) option for the Rule Array.
2. The third option allows specification of the encryption algorithm desired, especially when preparing data for another end point that may only support 40 bit DES (CDMF). Usually, the default is sufficient, and in this case, would make the function call compatible between the 4753 and ICSF. If the third option is required, the value of Rule Array Count must be adjusted accordingly.
3. ICSF does not support CIPHER or DECIPHER key types. If used, these will need to be changed to DATA.

CSNBDKM

XIX.Data Key Import

A. Considerations

1. ICSF does not support this function.
2. The Key Import (CSNBKIM) function will provide the same results given the same inputs, that is an IMPORTER key, a source DATA key token and a target DATA key token.
3. CSNBKIM will require specification of a source Key Type of DATA.

CSNBDKX

XX.Data Key Export

A. Considerations

1. ICSF does not support this function.
2. The Key Export (CSNBKEX) function will provide the same results given the same inputs, that is an EXPORTER key, a source DATA key token and a target DATA key token.
3. CSNBKEX will require specification of a source Key Type of DATA.

4753 to ICSF Migration Considerations

CSNBECO

XXI.Encode

A. Considerations

1. This function is compatible with ICSF and requires no changes.

CSNBENC

XXII.Encipher

A. Considerations

1. ICSF provides an additional (third) option for the Rule Array.
2. The third option allows specification of the encryption algorithm desired, especially when receiving data from another end point that may only support 40 bit DES (CDMF). Usually, the default is sufficient, and in this case, would make the function call compatible between the 4753 and ICSF. If the third option is required, the value of Rule Array Count must be adjusted accordingly.
3. ICSF does not support CIPHER or ENCIPHER key types. If used, these will need to be changed to DATA.

CSNBEPA

XXIII. Encrypted PIN Generate Alternate

A. Considerations

1. ICSF does not support this function.
2. If required, the Clear PIN Generate (CSNBPGN) function may be used, the output then formatted accordingly (padded with X'F's) and then enciphered with a DATA key.

CSNBEPG

XXIV. Encrypted PIN Generate

A. Considerations

1. ICSF does not support this function.
2. If required, the Clear PIN Generate (CSNBPGN) function may be used, the output then formatted accordingly (padded; XOR with PAN; etc.) and then enciphered with a DATA key.

CSNBKEX

XXV.Key Export

A. Considerations

1. Although 4753 and ICSF share the same syntax for this function call, there a differences in the values that can be specified for KEY TYPE and the type of source key that can be exported.
2. ICSF does not support key types of CIPHER, CIPHERXI, CIPHERXL, CIPHERXO, CVARDEC, CVARENC, CVARPINE, CVARXCVL, CVARXCVR, DECIPHER, ENCIPHER, IKEYXLAT or OKEYXLAT.
3. Additionally, ICSF does have support for key types of MACD and AKEK.

CSNBKGN

XXVI. Key Generate

A. Considerations

1. Although 4753 and ICSF share the same syntax for this function call, there a differences in the values that can be specified for KEY FORM, KEY LENGTH, KEY TYPE 1 and KEY TYPE 2.
2. ICSF does not support the KEY FORM values of OPOP or IMIM.
3. ICSF does not support KEY LENGTH values of SINGLE-R or DOUBLE-O.

   Although the 4753 requires that SINGLE-R and DOUBLE-O be specified, ICSF can infer the appropriate values based on the target key type and does not require explicit specification of these two parameters. When SINGLE-R is specified, it means that a double length key is to be generated with left and right key values the same (emulating a single length key). If ICSF is to generate a SINGLE key into a double length key field, it will generate the key as if SINGLE-R were specified. Similarly, ICSF always generates unique left and right key halves for DOUBLE length keys, thereby not requiring the specification of this value.
4. ICSF does not support key types of CIPHER, CIPHERXI, CIPHERXL, CIPHERXO, CVARDEC, CVARENC, CVARPINE, CVARXCVL, CVARXCVR, DECIPHER, ENCIPHER, IKEYXLAT or OKEYXLAT.
5. Additionally, ICSF does have support for key type of AKEK.

CSNBKIM

XXVII.Key Import

A. Considerations

1. ICSF does not support key types of CIPHER, CIPHERXI, CIPHERXL, CIPHERXO, CVARDEC, CVARENC, CVARPINE, CVARXCVL, CVARXCVR, DECIPHER, ENCIPHER, IKEYXLAT or OKEYXLAT.
2. Additionally, ICSF does have support for key types of MACD, IMP-PKA and AKEK.

CSNBKPI

XXVIII.Key Part Import

A. Considerations

1. Although ICSF does have this function call, it can only be used in conjunction with the Key Token Build (CSNBKTB) function and only for AKEK key types.

CSNBKRC

XXIX.Key Record Create

A. Considerations

1. This function is compatible with ICSF and requires no changes.

CSNBKRD

XXX.Key Record Delete

A. Considerations

1. This function is compatible with ICSF if the RULE ARRAY specifies LABEL-DL.
2. If the 4753 TOKEN-DL function is required, first a Key Record Delete can be issued followed by a Key Record Create (CSNBKRC) to achieve the same result.

CSNBKRL

XXXI. Key Record List

A. Considerations

1. ICSF does not support the CSNBKRL function.
2. Alternatively, the user may wish to print the ICSF VSAM file using the IDCAMS utilities, or code a program that reads and formats the CKDS entries into a format compatible with the 4753 key record listing.

   See "ICSFKRL" at the end of this document for a sample batch application source S/390 ASM code.

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CSNBKRR

XXXII.Key Record Read

A. Considerations

1. This function is compatible with ICSF and requires no changes.

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CSNBKRW

XXXIII.Key Record Write

A. Considerations

1. This function is compatible with ICSF and requires no changes.

CSNBKTB

XXXIV.Key Token Build

A. Considerations

1. Although this function is present in ICSF, it can only be used to build TOKEN skeletons using default Control Vectors.
2. ICSF does not support key types of ACIPHER, ADATA, AMAC, CIPHER, CIPHERXI, CIPHERXL, CIPHERXO, CVARDEC, CVARENC, CVARPINE, CVARXCVL, CVARXCVR, DECIPHER, ENCIPHER, IKEYXLAT, OKEYXLAT, UKPTBASE, or USE-CV.

CSNBKTC

XXXV.Key Token Change

A. Considerations

1. ICSF does not support the Key Token Change function.

   If the Rule Array is specified as “LABEL-DL”, then this same function can be processed by the CSNBKRD function.

CSNBKTP

XXXVI.Key Token Parse

A. Considerations

1. ICSF does not support the CSNBKTP function.

CSNBKTR

XXXVII.Key Translate

A. Considerations

1. ICSF does not support the CSNBKTR function.

   If required, this function can be achieved by use of an IMPORTER and EXPORTER key and the CSNBKIM and CSNBKEX function calls.

2. And so on

CSNBKYT

XXXVIII.Key Test

A. Considerations

1. This function is compatible with ICSF and requires no changes.

   ICSF additionally offers the Key Test Extended (CSNBKYTX) function which allows testing verification patterns of keys encrypted with a Key Encrypting Key.

   ICSF also offers a third Rule Array option, ADJUST or NOADJUST specifying whether the parity of the tested key is to be parity adjusted first before testing.

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CSNBMDG

XXXIX.MDC Generate

A. Considerations

1. This function is compatible with ICSF but requires one change. ICSF requires that RULE ARRAY COUNT be set to 2 and that RULE ARRAY be set to the appropriate values. ICSF, unlike the 4753, does not offer a default.

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CSNBMGN

XL.MAC Generate

A. Considerations

1. This function is compatible with ICSF but requires one change. ICSF requires that RULE ARRAY COUNT be set to 2 and that RULE ARRAY be set to the appropriate values. ICSF, unlike the 4753, does not offer a default.

   Additionally, ICSF allows the RULE ARRAY values of EMVMAC, EMVMACD and X9.19OPT.

CSNBMVR

XLI.MAC Verify

A. Considerations

1. This function is compatible with ICSF but requires one change. ICSF requires that RULE ARRAY COUNT be set to 2 and that RULE ARRAY be set to the appropriate values. ICSF, unlike the 4753, does not offer a default.

   Additionally, ICSF allows the RULE ARRAY values of EMVMAC, EMVMACD and X9.19OPT.

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CSNBOWH

XLII.One Way Hash

A. Considerations

1. This function is compatible with ICSF and requires no changes.

CSNBPEX

XLIII.Prohibit Export

A. Considerations

1. ICSF does not support this function.

   ICSF does provide a PROHIBIT EXPORT EXTENDED (CSNBPEXX) function which allows a key that is in an EXPORTED key token to be flagged such that once imported at the target system, it can no longer then be exported from that system.

CSNBPGN

XLIV. Clear PIN Generate

A. Considerations

1. This function is compatible with ICSF and requires no changes.

CSNBPTR

XLV.Encrypted PIN Translate

A. Considerations

1. This function is compatible with ICSF but requires one change. ICSF requires that RULE ARRAY COUNT be set to 1 and that RULE ARRAY be set to either TRANSLAT or REFORMAT.

CSNBPVR

XLVI.Encrypted PIN Verify

A. Considerations

1. This function is compatible with ICSF but requires one change. ICSF requires that RULE ARRAY COUNT be set to 1 and that RULE ARRAY be set to the PIN verification algorithm type

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CSNBRNG

XLVII.Random Number Generate

A. Considerations

1. This function is compatible with ICSF and requires no changes.

CSNBSKI

XLVIII.Secure Key Import

A. Considerations

1. ICSF does not support key types of CIPHER, CIPHERXI, CIPHERXL, CIPHERXO, CVARDEC, CVARENC, CVARPINE, CVARXCVL, CVARXCVR, DECIPHER, ENCIPHER, IKEYXLAT, OKEYXLAT or TOKEN.
2. Additionally, ICSF does have support for key types of IMP-PKA.

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CSNBSKM

XLIX. Session Key Import

A. Considerations

1. ICSF does not support this function.

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CSNDDSG

L. Digital Signature Generate

A. Considerations

1. This function is compatible with ICSF and requires no changes.

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CSNDDSV

LI. Digital Signature Verify

A. Considerations

1. This function is compatible with ICSF and requires no changes.

4753 to ICSF Migration Considerations

CSNDKTC

LII.PKA Key Token Change

A. Considerations

1. ICSF does not support this function.

CSNDPKB

LIII.PKA Key Token Build

A. Considerations

1. ICSF does not support a RULE ARRAY value of RSA-OPT.

CSNDPKG

LIV.PKA Key Generate

A. Considerations

1. ICSF does not support the generation of RSA key pairs. ICSF RSA key pairs may be generated and imported on the option Trusted Key Entry (TKE) work station.

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CSNDSYI

LV.PKA Symmetric Key Import

A. Considerations

1. This function is compatible with ICSF and requires no changes.

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CSNDSYX

LVI.PKA Symmetric Key Export

A. Considerations

1. This function is compatible with ICSF and requires no changes.

4753 to ICSF Migration Considerations

CSUA9ED

LVII.X9.9-4 Data Editing

A. Considerations

1. ICSF has added the X9.9-4 Data Editing function as CSNB9ED when used in an ICSF system.

CSUADSR

LVIII. Data Set Retrieve

A. Considerations

1. CSUADSR is used in conjunction with the 4753 CSNBKRL function to retrieve the CSNBKRL generated dataset from the 4753. Since ICSF does not have the CSNBKRL function, the CSUADSR function is also not supported.

CSUAMOB

LIX.Manage Objects

A. Considerations

1. The Manage Objects function is used to control registering, loading and running 4753 User Defined Function (UDF) and User Defined Program (UDP) modules within the 4755 cryptographic adapter.

   ICSF does not support UDF or UDP functions.

CSUAXAE

LX.ASCII to EBCDIC Code Conversion

A. Considerations

1. ICSF has added the ASCII to EBCDIC Code Conversion function as CSNBXAE when used in an ICSF system.

CSUAXBC

LXI.Nibble to Character Conversion

A. Considerations

1. ICSF has added the Nibble to Character Conversion function as CSNBXBC when used in an ICSF system.

CSUAXCB

LXII.Character to Nibble Conversion

A. Considerations

1. ICSF has added the Character to Nibble Conversion function as CSNBXCB when used in an ICSF system.

RETURN/REASON CODES

LXIII.Return Codes and Reason Codes

A. Considerations

1. Although both the 4753 and ICSF provide a Return Code and Reason Code of zero for successful functions, other values are not common to the two.
2. If calling applications are sensitive to the values returned, then either those application should be changed or ICSF Callable Services Installation Exits can be user coded to translate these to values acceptable to the calling applications.

KEY Labels as Targets

LXIV.KEY Labels

A. Considerations

1. ICSF does not support key labels as targets for any function.

   The 4753 can create a key record (CSNBKRC) then use that record as the target for some functions (CSNBDKM, CSNBKIM).

   ICSF requires that labels be created (CSNBKRC) and that the subsequent target be an internal token. That token can then be written to the CKDS (CSNBKRW).

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UDF, UDP and non-ICSF Supported Functions

LXV.UDF, UDP etc.

A. Considerations

1. ICSF does not support the UDF or UDP types of functions.

   ICSF does allow for the coding of Installation-Defined Callable Services. These routines run within the ICSF address space, and as such, may pose some security related issues.

Control Vectors

LXVI. Control Vectors other than “default”

A. Considerations

1. ICSF supports only the DEFAULT set of Control Vectors. No user defined bits or extensions are allowed.
2. Any keys that need to be processed within an ICSF system, must be converted such that they appear with only those default Control Vectors. The easiest way to achieve this is through the 4753 Control Vector Translate (CSNBCVT) function.

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PKA 92 Functions

LXVII.PKA92

A. Considerations

1. ICSF does not support any of the so called PKA92 functions:

   CSNCASG, CSNCASV, CSNCCKI, CSNCCVB, CSNCCVG, CSNCDEP, CSNCDKG, CSNCDKI, CSNCENA, CSNCENR, CSNCKTB, CSNCKTM, CSNCKUB, CSNCMKP, CSNCMKS, CSNCPKE, CSNCPKG, CSNCPKI, CSNCPVB, CSNCPVL.

ICSFKRL

LXVIII.Sample ICSF Key Record List Application

```
         TITLE 'CKDS KEY RECORD LIST'                                   00010000
         PRINT GEN                                                      00020000
********************************************************************** 00030000
*                                                                      * 00040000
* FUNCTION :  ICSF CKDS KEY RECORD LIST                                * 00050000
*                                                                      * 00060000
* DESCRIPTIVE NAME : ICSF CKDS FILE LIST                               * 00070000
*                                                                      * 00080000
* VERSION : RELEASE  1  LEVEL 000                                      * 00090000
*                                                                      * 00100000
* OBJECTIVE :                                                          * 00110000
*                                                                      * 00120000
* CKDS FILE LIST UTILITY :                                             * 00130000
*                                                                      * 00140000
*   THIS PROGRAM READS AN ICSF CKDS FILE.                              * 00150000
*                                                                      * 00160000
*   THE OUTPUT IS A FORMATTED LISTING OF EACH PROCESSED ENTRY.         * 00170000
*                                                                      * 00180000
*   CONTROL CARDS CAN SPECIFY:                                         * 00190000
*     START=N                                                          * 00200000
*      ONE TO 64 CHARACTERS                                            * 00210000
*                                                                      * 00220000
*     END=N                                                            * 00230000
*      ONE TO 64 CHARACTERS                                            * 00240000
*                                                                      * 00250000
*     LINECOUNT=N                                                      * 00260000
*      20 TO 99                                                        * 00270000
*      DEFAULT 60                                                      * 00280000
*                                                                      * 00290000
*     TITLE=KEY RECORD LIST                                            * 00300000
*      ONE TO 40 CHARACTERS                                            * 00310000
*                                                                      * 00320000
*     SYSIN DD      FOR CONTROL CARD INPUT (OPTIONAL DD)               * 00330000
*     SYSPRINT DD   FOR LISTING                                        * 00340000
*     CKDSFILE DD   POINTS TO THE CKDS                                 * 00350000
*                                                                      * 00360000
*   AT PROGRAM INITIATION TIME, ANY CONTROL CARDS ARE READ.            * 00370000
*     START=, END=, LINECOUNT= VALUES, AND                             * 00380000
*     TITLE=    IF PRESENT, ARE USED                                   * 00390000
*       TO UPDATE THE DEFAULTS.                                        * 00400000
*                                                                      * 00410000
* DEPENDENCIES :                                                       * 00420000
*                                                                      * 00430000
*       1. UNDER OS/390 OPERATING SYSTEM                               * 00440000
*       2. UNDER IBM S/390                                             * 00450000
*       3. LANGUAGE : IBM S/390 ASSEMBLER                              * 00460000
*                                                                      * 00470000
* ENTRY POINT :  ICSFKRL                                               * 00480000
*                                                                      * 00490000
* INPUT ARGUMENTS :                                                    * 00500000
*                                                                      * 00510000
*     NONE                                                             * 00520000
*                                                                      * 00530000
* OUTPUT ARGUMENTS :                                                   * 00540000
*                                                                      * 00550000
*     NONE                                                             * 00560000
*                                                                      * 00570000
```

```
* FUNCTION INPUT ARGUMENTS :                                           * 00580000
*                                                                      * 00590000
*     NONE                                                             * 00600000
*                                                                      * 00610000
* FUNCTION OUTPUT (RETURNS) :                                          * 00620000
*                                                                      * 00630000
*     RETCODE      RETURN_CODE                    (FULLWORD)           * 00640000
*                                                                      * 00650000
* EXIT-NORMAL RETURN CODE : 0                                          * 00660000
*                                                                      * 00670000
* EXIT-ERROR RETURN CODE : VALID RANGE 1 - 255                         * 00680000
*                                                                      * 00690000
* EXTERNAL-REFERENCES : NONE                                           * 00700000
*                                                                      * 00710000
* CHANGE ACTIVITY : NONE                                               * 00720000
*                                                                      * 00730000
********************************************************************** 00740000
*                                                                      * 00750000
*     REGISTER USAGE :                                                 * 00760000
*        LINKAGE = R1  CONTAINS THE ADDRESS OF THE PARAMETER LIST      * 00770000
*                  R13 CONTAINS THE ADDRESS OF A SAVE AREA             * 00780000
*                  R14 CONTAINS THE ADDRESS OF THE RETURN ADDRESS      * 00790000
*                  R15 CONTAINS THE ADDRESS OF THE ENTRY POINT         * 00800000
*        OTHERS  = -->                                                 * 00810000
* REG 2  - WORK REGISTER           REG 3  - WORK REGISTER              * 00820000
* REG 4  - WORK REGISTER           REG 5  - WORK REGISTER              * 00830000
* REG 6  - SUBROUTINE RETURN       REG 7  - WORK REGISTER              * 00840000
* REG 8  - WORK REGISTER           REG 9  - WORK REGISTER              * 00850000
* REG 10 - WORK REGISTER           REG 11 - BASE REGISTER              * 00860000
* REG 12 - BASE REGISTER                                               * 00870000
*                                                                      * 00880000
********************************************************************** 00890000
ICSFKRL  CSECT                                                         00900000
         STM   R14,R12,12(R13)           SAVE CALLER'S REGISTERS       00910000
         LR    R12,R15                   SET UP BASE REGISTER          00920000
         USING ICSFKRL,R12,R11                                        00930000
         LA    R2,4095                       SET INCREMENT 4K        00940000
         LA    R2,1(R2)                                              00950000
         LA    R11,0(R2,R12)                 SET BASE                00960000
         B     START                                                   00970000
         DC    C'** ICSFKRL  **'         DEBUG IDENTIFY              00980000
         DC    C'** &SYSDATE **'                                     00990000
         DC    C'** &SYSTIME **'                                     01000000
         DC C'ICSFKRL : ICSF CKDS FILE LIST ROUTINE'                  01010000
START    DS    0H                                                      01020000
         LA    R2,SAVE                                               01030000
         ST    R13,4(R2)                                             01040000
         LR    R13,R2                                                01050000
         OPEN  (PRINTER,(OUTPUT))        OPEN MESSAGE FILE            01060000
         OPEN  INPUT                     OPEN INPUT PARM FILE         01070000
         LTR   R15,R15                                                01080000
         BNZ   NOSYSIN                   NOT PRESENT                  01090000
         TITLE 'READ ANY CONTROL CARDS'                               01100000
SYSINLOP DS    0H                                                     01110000
         GET   INPUT,INBUF                                            01120000
         CLC   INBUF(1),=CL1'*'           COMMENT CARD?               01130000
         BE    SYSINLOP                                               01140000
         CLC   INBUF(1),=CL1' '           COMMENT CARD?               01150000
```

```
         BE    SYSINLOP                                                  01160000
         CLC   INBUF(6),=CL6'START='      START SPECIFIED                01170000
         BE    NEWSTART                                                  01180000
         CLC   INBUF(4),=CL4'END='        END SPECIFIED                  01190000
         BE    NEWEND                                                    01200000
         CLC   INBUF(10),=CL10'LINECOUNT=' DESIRED LINECOUNT             01230000
         BE    NEWLCT                                                    01240000
         CLC   INBUF(6),=CL6'TITLE='      TITLE SPECIFIED                01250000
         BE    NEWTITLE                                                  01260000
         PUT   PRINTER,CTLCDERR           UNDEFINED KEYWORD              01270000
         LA    R15,4                                                     01280000
         ST    R15,RETCODE                SET ERROR RETURN CODE          01290000
         B     SYSINLOP                   LOOK FOR MORE                  01300000
NEWSTART DS    0H                                                        01310000
         MVC   STRTCARD(64),INBUF+6       SET DESIRED START              01320000
         B     SYSINLOP                                                  01330000
NEWEND   DS    0H                                                        01340000
         MVC   ENDCARD(64),INBUF+4        SET DESIRED END                01350000
         B     SYSINLOP                                                  01360000
NEWLCT   DS    0H                                                        01400000
         CLC   INBUF+11(1),=CL1' '        IS SECOND DIGIT BLANK?         01410000
         BNE   NEWLCT2                                                   01420000
         MVC   INPUTLCT+1(1),INBUF+10     ONE DIGIT LINECOUNT            01430000
         B     SETLCT                                                    01440000
NEWLCT2  DS    0H                                                        01450000
         MVC   INPUTLCT(2),INBUF+10       TWO DIGIT LINECOUNT            01460000
SETLCT   DS    0H                                                        01470000
         PACK  DBWD,INPUTLCT              CONVERT TO BINARY              01480000
         CVB   R5,DBWD                                                   01490000
         ST    R5,LINCOUNT                SAVE FOR LATER USE             01500000
         B     SYSINLOP                                                  01510000
NEWTITLE DS    0H                                                        01520000
         MVC   HDR1TITL(40),INBUF+6       SET DESIRED TITLE              01530000
         B     SYSINLOP                                                  01540000
EOFSYSIN DS    0H                                                        01550000
         CLOSE INPUT                                                     01560000
         TITLE 'OPEN CKDS FILE'                                          01570000
NOSYSIN  DS    0H                                                        01580000
         TIME  DEC                        TIME STAMP LISTING             01590000
         ST    R0,TIMEHEX                                                01600000
         ST    R1,DATEHEX                                                01610000
         BAL   R6,FORMDATE                                               01620000
         MVC   HDR1DATE(4),DATECCYY                                      01630000
         MVC   HDR1DATE+5(2),DATE8MM                                     01640000
         MVC   HDR1DATE+8(2),DATE8DD                                     01650000
         MVC   HDR1TIME(2),TIME8HH                                       01660000
         MVC   HDR1TIME+3(2),TIME8MM                                     01670000
         MVC   HDR1TIME+6(2),TIME8SS                                     01680000
CKDSOPEN DS    0H                                                        01690000
         OPEN  CKDSACB                    OPEN THE CKDS FILE             01700000
         LTR   R15,R15                    SUCCESSFUL?                    01710000
         BNZ   OPENERR                    NO, NO INPUT FILES             01720000
CKDSPROC DS    0H                                                        01730000
         EJECT                                                           01740000
         SHOWCB RPL=CKDSRPL,                                            X01750000
               AREA=SHOWAREA,                                           X01760000
               LENGTH=100,                                              X01770000
               FIELDS=(ACB,AIXPC,AREA,AREALEN,ARG,ECB,FDBK,FTNCD,       X01780000
```

```
               KEYLEN,MSGAREA,MSGLEN,NXTRPL,RBA,RECLEN,RPLLEN,TRANSID)  01790000
          SPACE 3                                                       01800000
          POINT RPL=CKDSRPL                 POINT TO START=             01810000
          LTR   R15,R15                     ERROR?                      01820000
          BNZ   GETERR                                                  01830000
          BAL   R6,GETENTRY                 GET A RECORD                01840000
          TITLE 'PROCESS COMPLETE FILE'                                 01850000
PROCLOOP  DS    0H                                                      01860000
          CLC   KEYLABEL(64),ENDCARD        PAST END?                   01870000
          BH    GETHIGH                                                 01880000
          L     R5,INPCOUNT                 INCREMENT READ COUNTER      01890000
          LA    R5,1(R5)                                                01900000
          ST    R5,INPCOUNT                                             01910000
*                                                                       01920000
          EJECT                                                         01930000
          MVC   RPTKEY(64),KEYLABEL         INSERT CURRENT KEY LABEL NAME 01940000
          MVC   RPTKTYPE(8),KEYTYPE         INSERT KEY TYPE             01950000
          MVC   RPTTYPE(7),=CL7'DEFAULT'    SET CONTROL VECTOR TYPE     01960000
TSTFLAG1  DS    0H                                                      01970000
          TM    CKDSFLAG,X'80'              PARTIAL KEY?                01980000
          BZ    TSTFLAG2                                                01990000
          MVC   RPTTYPE(7),=CL7'PARTIAL'                                02000000
          B     TSTDONE                                                 02010000
TSTFLAG2  DS    0H                                                      02020000
          TM    TOKNFLAG,X'80'              KEY VALUE PRESENT?          02030000
          BO    TST3                                                    02040000
          MVC   RPTTYPE(7),=CL7'NO-KEY '                                02050000
          B     TSTDONE                                                 02060000
TST3      DS    0H                                                      02070000
          TM    TOKNFLAG,X'20'              NOCV TRANSPORT KEY?         02080000
          BZ    TSTDONE                                                 02090000
          MVC   RPTTYPE(7),=CL7'NOCV   '                                02100000
TSTDONE   DS    0H                                                      02110000
          MVC   RPTDEFDT(8),DATECREA        INSERT CREATION DATE        02120000
          MVC   RPTDEFTM(8),TIMECREA                  TIME              02130000
          MVC   RPTUPDDT(8),DATEUPDT              UPDATE DATE           02140000
          MVC   RPTUPDTM(8),TIMEUPDT                  TIME              02150000
*                                                                       02160000
PRTREC    DS    0H                                                      02170000
          BAL   R6,PRTENTRY                 PRINT THIS ENTRY            02180000
          BAL   R6,GETENTRY                 GET NEXT ENTRY              02190000
          B     PROCLOOP                                                02200000
*                                                                       02210000
          TITLE 'CONVERT DATE AND TIME'                                 02220000
LEAPYEAR  DC    XL12'1F1D1F1E1F1E1F1F1E1F1E1F'                           02230000
NONLEAP   DC    XL12'1F1C1F1E1F1E1F1F1E1F1E1F'                           02240000
FORMDATE  DS    0H                                                      02250000
          MVC   WORK5(4),TIMEHEX            FORMAT REUQESTED TIME       02260000
          UNPK  DBWD(9),WORK5(5)            UNPACK, IGNORE LAST BYTE    02270000
          MVC   TIME8(8),DBWD                                           02280000
*                                                                       02290000
          SR    R5,R5                       GET CENTURIES PAST 20TH     02300000
          ICM   R5,1,DATEHEX                                            02310000
          A     R5,=F'19'                   ADD 20TH CENTURY            02320000
          CVD   R5,DBWD                     RESULTING CENTURY           02330000
          UNPK  WORK5(5),DBWD+6(3)                                      02340000
          MVC   DATECCYY(2),WORK5+1         SET CENTURY                 02350000
          UNPK  WORK5(5),DATEHEX+1(3)       GET YEAR OF CENTURY         02360000
```

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         MVC   DATECCYY+2(2),WORK5       SET YEAR                      02370000
         PACK  DBWD,WORK5(2)                                           02380000
         CVB   R3,DBWD                                                 02390000
         SR    R4,R4                     DETERMINE LEAP YEAR           02400000
         M     R4,=F'100'                SET CENTURY                   02410000
         AR    R5,R3                     ADD YEARS                     02420000
         LA    R2,4                      DIVIDE BY 4                   02430000
         DR    R4,R2                                                   02440000
         LTR   R4,R4                     REMAINDER?                    02450000
         BZ    INALEAP                   NO, IN A LEAP YEAR            02460000
         LA    R4,NONLEAP                NOT A LEAP YEAR               02470000
         B     CALMONTH                  CALCULATE MMDD                02480000
INALEAP  DS    0H                                                      02490000
         LA    R4,LEAPYEAR               LEAP YEAR                     02500000
CALMONTH DS    0H                                                      02510000
*   R3 JULIAN DAYS LEFT                                               02520000
*   R5 MONTH                                                          02530000
*   R4 TABLE POINTER                                                  02540000
*   R2 DAYS IN THIS MONTH                                             02550000
         XC    DBWD(8),DBWD              CLEAR WORK AREA               02560000
         MVC   DBWD+6(2),DATEHEX+2       MOVE JULIAN DDDC              02570000
         CVB   R3,DBWD                   GET JULIAN DDDC               02580000
         LA    R5,1                      START AT JANUARY              02590000
         SR    R2,R2                     PREPARE WORK REGISTER         02600000
CALCLOOP DS    0H                                                      02610000
         ICM   R2,1,0(R4)                GET DAYS PER THIS MONTH       02620000
         SR    R3,R2                     SUBTRACT FROM JULIAN          02630000
         LTR   R3,R3                     MORE?                         02640000
         BP    NEXTMON                   YES                           02650000
         AR    R3,R2                     NO, RESET AS DAY OF MONTH     02660000
*                                                                      02670000
         CVD   R5,DBWD                   MAKE MONTH PRINTABLE          02680000
         UNPK  WORK4(4),DBWD+6(3)        UNPACK, IGNORE LAST BYTE      02690000
         MVC   DATE8MM(2),WORK4          SET MM                        02700000
         CVD   R3,DBWD                   MAKE DAY PRINTABLE            02710000
         UNPK  WORK4(4),DBWD+6(3)                                      02720000
         MVC   DATE8DD(2),WORK4          SET DD                        02730000
         B     FORMDONE                                                02740000
NEXTMON  DS    0H                                                      02750000
         LA    R4,1(R4)                  POINT TO NEXT MONTH           02760000
         LA    R5,1(R5)                  ADD TO MONTH COUNT            02770000
         B     CALCLOOP                                                02780000
FORMDONE DS    0H                                                      02790000
         BR    R6                        RETURN TO CALLER              02800000
         TITLE 'GET ENTRY FROM INPUT'                                  02810000
GETENTRY DS    0H                                                      02820000
         GET   RPL=CKDSRPL               GET AN ENTRY                  02830000
         LTR   R15,R15                   ERROR?                        02840000
         BNZ   GETERR                                                  02850000
GETRETRN DS    0H                                                      02860000
         BR    R6                        RETURN TO CALLER              02870000
*                                                                      02880000
         TITLE 'PUT DETAIL REPORT LINE'                                02890000
PRTENTRY DS    0H                                                      02900000
         L     R5,LINSLEFT               ADJUST LINECOUNT              02910000
         BCTR  R5,0                                                    02920000
         LTR   R5,R5                     MORE ROOM?                    02930000
         BP    PRINTIT                   YES, JUST PRINT DATA          02940000
```

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         L     R5,PAGCOUNT               ADJUST PAGE COUNT            02950000
         LA    R5,1(R5)                                               02960000
         ST    R5,PAGCOUNT                                            02970000
         MVC   HDR1PAGE(8),MASK                                       02980000
         CVD   R5,DBWD                                                02990000
         ED    HDR1PAGE(8),DBWD+4        PRINT NEW HEADING            03000000
         PUT   PRINTER,HDR1                                           03010000
         MVC   HDR1(1),=CL1'+'           DOUBLE PRINT LINE            03020000
         PUT   PRINTER,HDR1                                           03030000
         MVC   HDR1(1),=CL1'1'           RESTORE                      03040000
         PUT   PRINTER,HDR2                                           03050000
         MVC   HDR2(1),=CL1'+'           DOUBLE PRINT LINE            03060000
         PUT   PRINTER,HDR2                                           03070000
         MVC   HDR2(1),=CL1'0'           RESTORE                      03080000
         PUT   PRINTER,HDR3                                           03090000
         MVC   HDR3(1),=CL1'+'           DOUBLE PRINT LINE            03100000
         PUT   PRINTER,HDR3                                           03110000
         MVC   HDR3(1),=CL1'-'           RESTORE                      03120000
         L     R5,LINCOUNT                                            03130000
         S     R5,=F'6'                  ADJUST LINECOUNT             03140000
PRINTIT  DS    0H                                                     03150000
         PUT   PRINTER,RPTLINE1          PRINT DATA LINE              03160000
         PUT   PRINTER,RPTLINE2          PRINT DATA LINE              03170000
         BCTR  R5,0                                                   03180000
         ST    R5,LINSLEFT               SET LINES AVAILABLE          03190000
         BR    R6                        RETURN TO CALLER             03200000
*                                                                     03210000
         TITLE 'VSAM ERROR ON CKDS FILE'                              03220000
OPENERR  DS    0H                                                     03230000
VSMIFAIL DS    0H                                                     03240000
         LR    R5,R15                                                 03250000
         SHOWCB RPL=CKDSRPL,                                         X03260000
               AREA=SHOWAREA,                                        X03270000
               LENGTH=100,                                           X03280000
               FIELDS=(ACB,AIXPC,AREA,AREALEN,ARG,ECB,FDBK,FTNCD,    X03290000
               KEYLEN,MSGAREA,MSGLEN,NXTRPL,RBA,RECLEN,RPLLEN,TRANSID) 03300000
         TITLE 'FORMAT VSAM ERROR MESSAGE'                            03310000
VSAMFRMT DS    0H                                                     03320000
         ST    R5,RETCODE                                             03330000
         MVC   WORK8(8),MASK             PREPARE DISPLAY AREA         03340000
         CVD   R5,DBWD                                                03350000
         ED    WORK8(8),DBWD+4                                        03360000
         MVC   VERMRTCD(2),WORK8+6                                    03370000
         L     R5,SHOFDBK                                             03380000
         MVC   WORK8(8),MASK             PREPARE DISPLAY AREA         03390000
         CVD   R5,DBWD                                                03400000
         ED    WORK8(8),DBWD+4                                        03410000
         MVC   VERMFBCD(4),WORK8+4                                    03420000
         PUT   PRINTER,VSAMERRM                                       03430000
         B     RETURN                                                 03440000
         TITLE 'VSAM GET ERROR ON CKDS FILE'                          03450000
GETERR   DS    0H                                                     03460000
         LR    R5,R15                                                 03470000
         TESTCB RPL=CKDSRPL,                                         X03480000
               FDBK=4                    END-OF-FILE ON INPUT??       03490000
         LTR   R15,R15                                                03500000
         BNZ   VSMIFAIL                                               03510000
         TITLE 'END OF FILE PROCESSING'                               03520000
```

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         MVC   IPCNTMSG(8),MASK           PREPARE RECORD COUNTS         03530000
         L     R5,INPCOUNT                INPUT CKDS RECORDS            03540000
         CVD   R5,DBWD                                                  03550000
         ED    IPCNTMSG(8),DBWD+4                                       03560000
         PUT   PRINTER,TOTALMSG                                         03570000
         B     RETURN                                                   03580000
GETHIGH  DS    0H                                                       03590000
GETEOF   DS    0H                                                       03600000
         MVC   IPCNTMSG(8),MASK           PREPARE RECORD COUNTS         03610000
         L     R5,INPCOUNT                INPUT CKDS RECORDS            03620000
         CVD   R5,DBWD                                                  03630000
         ED    IPCNTMSG(8),DBWD+4                                       03640000
         PUT   PRINTER,TOTALMSG                                         03650000
         B     RETURN                                                   03660000
*                                                                       03670000
         TITLE 'RETURN TO CALLER'                                       03680000
RETURN   DS    0H                                                       03690000
         CLOSE INPUT                      CLOSE FILES                   03700000
         CLOSE CKDSACB                                                  03710000
         CLOSE PRINTER                                                  03720000
TOCALLER DS    0H                                                       03730000
         L     R15,RETCODE                RETURN                        03740000
         L     R13,SAVE+4                 LOAD ORIGINAL VALUE OF R13    03750000
         L     R14,12(,R13)               RESTORE R14                   03760000
         LM    R0,R12,20(R13)             RESTORE R0 - R12              03770000
         BR    R14                        RETURN TO THE CALLER          03780000
*                                                                       03790000
         TITLE 'GLOBAL CONSTANT SECTION DEFINITION'                     03800000
*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=* 03810000
*                                                                     * 03820000
*       THE FOLLOWING ARE STORAGE & CONSTANT DEFINITIONS              * 03830000
*                                                                     * 03840000
*---------------------------------------------------------------------* 03850000
         LTORG                                                          03860000
*---------------------------------------------------------------------* 03870000
R0       EQU   0                                                       03880000
R1       EQU   1                                                       03890000
R2       EQU   2                                                       03900000
R3       EQU   3                                                       03910000
R4       EQU   4                                                       03920000
R5       EQU   5                                                       03930000
R6       EQU   6                                                       03940000
R7       EQU   7                                                       03950000
R8       EQU   8                                                       03960000
R9       EQU   9                                                       03970000
R10      EQU   10                                                      03980000
R11      EQU   11                                                      03990000
R12      EQU   12                                                      04000000
R13      EQU   13                                                      04010000
R14      EQU   14                                                      04020000
R15      EQU   15                                                      04030000
*                                                                      04040000
         EJECT                                                         04050000
********************************************************************** 04060000
*        WORKING STORAGE AREA                                        * 04070000
********************************************************************** 04080000
WORKAREA DS    0F                       DUMMY SECTION FOR WORKING AREA 04090000
********************************************************************** 04100000
```

```
ICSFKRL  CSECT                                                          04110000
SAVE     DS    18F                    SAVE AREA                       04120000
DATE8    DS    CL8                    FORMATED DATE                   04130000
         ORG   DATE8                                                   04140000
DATECCYY DS    CL4                    CENTURY AND YEAR                04150000
DATE8MM  DS    CL2                    MONTH                           04160000
DATE8DD  DS    CL2                    DAY                             04170000
         ORG   ,                                                       04180000
TIME8    DS    CL8                    FORMATED TIME                   04190000
         ORG   TIME8                                                   04200000
TIME8HH  DS    CL2                    HOURS                           04210000
TIME8MM  DS    CL2                    MINUTES                         04220000
TIME8SS  DS    CL2                    SECONDS                         04230000
TIME8TH  DS    CL2                    TENTHS, HUNDREDTHS              04240000
DATIMHEX DS    CL8                    DATE/TIME TO FORMAT             04250000
         ORG   DATIMHEX                                                04260000
DATEHEX  DS    CL4                                                    04270000
TIMEHEX  DS    CL4                                                    04280000
         ORG   ,                                                       04290000
LINCOUNT DC    F'60'                  LINES PER REPORT PAGE           04300000
LINSLEFT DC    F'0'                   LINE LEFT BEFORE NEW PAGE       04310000
PAGCOUNT DC    F'0'                   PAGES PRINTED                   04320000
INPCOUNT DC    F'0'                   RECORDS PROCESSED               04330000
         SPACE 3                                                       04340000
DBWD     DS    D                      WORK AREA                       04350000
WORK8    DS    D                                                      04360000
WORK4    DS    F                                                      04370000
         ORG   WORK4                                                   04380000
WORK2    DS    H                                                      04390000
         ORG   ,                                                       04400000
WORK5    DS    CL5                                                    04410000
INPUTLCT DC    CL2'00'                LINECOUNT= VALUE                04420000
RETCODE  DC    F'0'                   SAVED RETURN CODE               04430000
STRTCARD DC    XL1'41'                START= VALUE                    04440000
         DC    XL71'00'                                               04450000
LOWKEY   DC    XL72'00'                                               04460000
ENDCARD  DS    XL72                                                   04470000
         ORG   ENDCARD                                                04480000
         DC    XL16'FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF'                  04490000
         DC    XL16'FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF'                  04500000
         DC    XL16'FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF'                  04510000
         DC    XL16'FFFFFFFFFFFFFFFFFFFFFFFFFFFFFF00'                  04520000
         DC    XL8'FFFFFFFFFFFFFF00'                                   04530000
         ORG   ,                                                       04540000
MASK     DC    X'4020202020202120'    EDIT MASK                       04550000
         SPACE 3                                                       04560000
SHOWAREA DS    25F                    SHOWCB AREA                     04570000
         ORG   SHOWAREA                                                04580000
SHOACB   DS    F                                                      04590000
SHOAIXPC DS    F                                                      04600000
SHOAREA  DS    F                                                      04610000
SHOARLEN DS    F                                                      04620000
SHOARG   DS    F                                                      04630000
SHOECB   DS    F                                                      04640000
SHOFDBK  DS    F                                                      04650000
SHOFTNCD DS    F                                                      04660000
SHOKEYLN DS    F                                                      04670000
SHOMSGA  DS    F                                                      04680000
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SHOMSGLN DS    F                                                        04690000
SHONXTRP DS    F                                                        04700000
SHORBA   DS    F                                                        04710000
SHORECLN DS    F                                                        04720000
SHORPLLN DS    F                                                        04730000
SHOTRANS DS    F                                                        04740000
         ORG   ,                                                        04750000
         SPACE 3                                                        04760000
         DS    0F                                                       04770000
KEYREC   DS    CL252                  RECORD IS 252 BYTES               04780000
         ORG   KEYREC                                                   04790000
KEYLABEL DS    CL64                   KEY LABEL                         04800000
KEYTYPE  DS    CL8                        TYPE                          04810000
DATECREA DS    CL8                                                      04820000
TIMECREA DS    CL8                                                      04830000
DATEUPDT DS    CL8                                                      04840000
TIMEUPDT DS    CL8                                                      04850000
TOKEN    DS    CL64                                                     04860000
         ORG   TOKEN                                                    04870000
         DS    XL1                                                      04880000
         DS    XL3                                                      04890000
         DS    XL1                                                      04900000
         DS    XL1                                                      04910000
TOKNFLAG DS    XL1                                                      04920000
         DS    XL1                                                      04930000
MKVP     DS    XL8                                                      04940000
         ORG   ,                                                        04950000
CKDSFLAG DS    XL2                                                      04960000
CKDSRES  DS    XL26                                                     04970000
INSTDATA DS    XL52                                                     04980000
AUTHCODE DS    XL4                                                      04990000
         ORG ,                                RESTORE POSITION          05000000
         SPACE 3                                                        05010000
CTLCDERR DS    CL133                                                    05020000
         ORG   CTLCDERR                                                 05030000
         DC    CL1'-'                                                   05040000
         DC    CL21' CONTROL CARD ERROR: '                              05050000
INBUF    DS    CL80                                                     05060000
         DC    CL31' '                                                  05070000
         ORG   ,                                                        05080000
         SPACE 3                                                        05090000
TOTALMSG DS    CL121                                                    05100000
         ORG   TOTALMSG                                                 05110000
         DC    CL1'1'                                                   05120000
         DC    CL18' '                                                  05130000
         DC    CL20' CKDS ENTRIES READ: '                               05140000
IPCNTMSG DS    CL8                                                      05150000
         DC    CL86' '                                                  05160000
         ORG   ,                                                        05170000
         SPACE 3                                                        05180000
VSAMERRM DS    CL133                                                    05190000
         ORG   VSAMERRM                                                 05200000
         DC    CL1'-'                                                   05210000
         DC    CL25' VSAM ERROR. RETURN CODE='                          05220000
VERMRTCD DS    CL2                                                      05230000
         DC    CL15' FEEDBACK CODE='                                    05240000
VERMFBCD DS    CL4                                                      05250000
         DC    CL86' '                                                  05260000
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         ORG   ,                                                      05270000
         SPACE 3                                                      05280000
HDR1     DC    CL1'1'                                                 05290000
         DC    CL20' '                                                05300000
HDR1TITL DC    CL40'KEY RECORD LIST      '                            05310000
         DC    CL4' '                                                 05320000
HDR1DATE DC    CL10'CCYY/MM/DD'                                       05330000
         DC    CL2' '                                                 05340000
HDR1TIME DC    CL8'HH:MM:SS'                                          05350000
         DC    CL11'      PAGE '                                      05360000
HDR1PAGE DC    CL8' '                                                 05370000
         DC    CL29' '                                                05380000
         SPACE 3                                                      05390000
HDR2     DC    CL1'0'                                                 05400000
         DC    CL132' '                                               05410000
         SPACE 3                                                      05420000
HDR3     DC    CL1'-'                                                 05430000
         DC    CL5' '                                                 05440000
         DC    CL8'CV TYPE '                                          05450000
         DC    CL2' '                                                 05460000
         DC    CL8'DEF DATE'                                          05470000
         DC    CL3' '                                                 05480000
         DC    CL8'DEF TIME'                                          05490000
         DC    CL3' '                                                 05500000
         DC    CL8'UPD DATE'                                          05510000
         DC    CL3' '                                                 05520000
         DC    CL8'UPD TIME'                                          05530000
         DC    CL12' '                                                05540000
         DC    CL8'KEY TYPE'                                          05550000
         DC    CL56' '                                                05560000
         SPACE 3                                                      05570000
RPTLINE1 DC    CL1' '                                                 05580000
RPTFILL1 DC    CL3' '                                                 05590000
RPTKEY   DC    CL64' '                                                05600000
RPTFILL2 DC    CL1' '                                                 05610000
RPTKTYPE DC    CL8' '                                                 05620000
RPTFILL3 DC    CL56' '                                                05630000
         SPACE 3                                                      05640000
RPTLINE2 DC    CL1' '                                                 05650000
RPTFILL4 DC    CL5' '                                                 05660000
RPTTYPE  DC    CL7' '                                                 05670000
RPTFILL5 DC    CL3' '                                                 05680000
RPTDEFDT DC    CL11' '                                                05690000
RPTDEFTM DC    CL11' '                                                05700000
RPTUPDDT DC    CL11' '                                                05710000
RPTUPDTM DC    CL11' '                                                05720000
RPTFILL6 DC    CL73' '                                                05730000
         SPACE 3                                                      05740000
WORKLEN  EQU   *-WORKAREA                                            05750000
*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=* 05760000
****************************************************************** 05770000
         TITLE 'VSAM CKDS FILE ACB DEFINITION'                        05780000
CKDSACB  ACB   DDNAME=CKDSFILE,                                     X05790000
               MACRF=(KEY,SEQ,IN)                                    05800000
         TITLE 'VSAM CKDS FILE RPL DEFINITION'                        05810000
CKDSRPL  RPL   ACB=CKDSACB,                                         X05820000
               AREA=KEYLABEL,                                       X05830000
               AREALEN=252,                                         X05840000
```

```
              ARG=STRTCARD,                                              X05850000
              OPTCD=(KEY,SEQ,SYN,KGE,FKS,NUP,MVE)                         05860000
         TITLE 'MESSAGE FILE DCB DEFINITION'                              05870000
PRINTER  DCB   DSORG=PS,MACRF=PM,RECFM=FBA,LRECL=133,DDNAME=SYSPRINT,     X05880000
              BLKSIZE=6118                                                05890000
         TITLE 'INPUT CONTROL FILE'                                       05900000
INPUT    DCB   DSORG=PS,MACRF=GM,RECFM=FB,LRECL=80,DDNAME=SYSIN,         X05910000
              EODAD=EOFSYSIN                                              05920000
         END   ICSFKRL                                                    05930000
```

4753 to ICSF Migration Considerations

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