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REXX and ISPF Troubleshooting

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Objective

- Introduce several commands to assist in troubleshooting REXX/ISPF programs on the z/OS Mainframe Operating System
- Links are provided to IBM manuals and other documents to assist in learning the commands in more detail
- May need to adjust Adobe Reader zoom value to view text
- Disclaimer
  - Does not cover Dialog Test, option 7
  - Does not cover all IBM REXX and ISPF troubleshooting commands

Agenda

- Locate Module (REXX, Panel, etc.)
  - PANELID, MSGID
  - ISPLIBD, DDLIST (ISRDDN), ISRFIND
- REXX Debugging
  - HILITE
  - SAY, TRACE, SIGNAL, CALL
  - RC, SIGL
  - CONDITION(C|D), ERRORTEXT(RC), SOURCELINE(SIGL)
  - TSO EXECUTIL TS
- ISPF Debugging
  - REXX in panels
  - ISRDTLCV, ISPDPTRC, ISPFTTRC, ISPVCALL
- Other Items
  - Common Problems
  - Manuals

Locate Module

PANELID

- Obtain panel name
  - ➔ PANELID [ON|OFF]
- Places panel name in upper left hand corner, below action bar
- Results

```
Menu  Utilities  Compilers  Options  Status  Help
--------------------------------------------------------------------------------
ISR@PRIM                  ISPF Primary Option Menu
Option ===>
                                              More:     +
 0  Settings      Terminal and user parameters            User ID . : R2221
 1  View          Display source data or listings         Time. . . : 05:10
 2  Edit          Create or change source data            Terminal. : 3278
 3  Utilities     Perform utility functions               Screen. . : 1
 4  Foreground    Interactive language processing         Language. : ENGLISH
 5  Batch         Submit job for language processing      Appl ID . : ISR
 6  Command       Enter TSO or Workstation commands       TSO logon : PANTSOPG
 7  Dialog Test   Perform dialog testing                  TSO prefix: R2221
 10 SCLM          SW Configuration Library Manager        System ID : SPRDC
 11 Workplace     ISPF Object/Action Workplace            MVS acct. : TSOPRD
 D  Developer     Developers Workbench                    Release . : ISPF 6.1
 E  Ezyedit       ISPF Productivity Facility
 S  System        System Support Software
 SD SDSF          System Display and Search Facility
 U  User          Personal or Team Software
 C  Changes       Display changes for this release

Enter X to Terminate or Z to Terminate/Logoff
```

MSGID

- Obtain message number
  - ➔ MSGID [ON|OFF]
- Places message number to the left of long message
- Results

```
Menu  Utilities  Compilers  Options  Status  Help
--------------------------------------------------------------------------------
                          ISPF Primary Option Menu             Invalid option
Option ===> TEST11
                                              More:     +
0  Settings      Terminal and user parameters            User ID . : R2221
1  View          Display source data or listings         Time. . . : 05:34
2  Edit          Create or change source data            Terminal. : 3278
3  Utilities     Perform utility functions               Screen. . : 1
4  Foreground    Interactive language processing         Language. : ENGLISH
5  Batch         Submit job for language processing      Appl ID . : ISR
6  Command       Enter TSO or Workstation commands       TSO logon : PANTSOPG
7  Dialog Test   Perform dialog testing                  TSO prefix: R2221
10 SCLM          SW Configuration Library Manager        System ID : SPRDC
11 Workplace     ISPF Object/Action Workplace            MVS acct. : TSOPRD
D  Developer     Developers Workbench                    Release . : ISPF 6.1
E  Ezyedit       ISPF Productivity Facility
S  System        System Support Software
SD SDSF          System Display and Search Facility
U  User     ------------------------------------------------------
C  Changes | ISPD241 The option that was entered was not valid. |
            ------------------------------------------------------
Enter X to Terminate or Z to Terminate/Logoff
```

ISPLIBD

- Obtain a list of LIBDEF datasets
  - Invoke application (ex: Endevor, FileAid/MVS, etc) and type in
    - ➔ ISPLIBD [ddname]
- Examples
    - ➔ ISPLIBD
    - ➔ ISPLIBD ISPPLIB
- Results

```
 --------------------------- LIBDEF Utility --------------------------
|                        ISPF LIBDEF Display          Row 1 to 9 of 9  |
| Command ===>                                      Scroll ===> CSR    |
|                                                                      |
|   Library  Type     USR Identifier                                   |
|   ISPFILE               ** LIBDEF not active **                      |
|   ISPILIB               ** LIBDEF not active **                      |
|   ISPLLIB  LIBRARY      FALLIB                                       |
|                         SYSES.PRD.CWFA.V93051.LOAD                   |
|   ISPMLIB  DATASET      SYSES.PRD.CWFA.V93051.ISPMLIB                |
|   ISPPLIB  DATASET      SYSES.PRD.CWFA.V93051.ISPPLIB                |
|   ISPSLIB  DATASET      SYSES.PRD.CWFA.V93051.ISPSLIB                |
|   ISPTABL               ** LIBDEF not active **                      |
|   ISPTLIB  DATASET      SYSES.PRD.CWFA.V93051.ISPTLIB                |
| **End**                                                              |
|                                                                      |
```

ISPLIBD – Pros and Cons

- Pros
  - Displays all or a specific LIBDEF dataset
  - Can locate DD name

- Cons
  - Does not display ALTLIB datasets
    - Display ALTLIBs datasets, type in
      ➔ DDLIST - or - ➔ TSO ISRDDN
    - Display ALTLIB search order, type in
      ➔ TSO ALTLIB DISPLAY
  - Can not use Find
  - Can not Browse, Edit, or View datasets
  - Can not search for a member
  - Does not display dataset attributes (RECFM, LRECL, etc.)

DDLIST

- Obtain a list of allocated datasets
  - Invoke application (ex: Endevor, FileAid/MVS, etc) and type in
    - ➔ DDLIST [primary command] - or - ➔ TSO ISRDDN [primary command]

- Results

```
Current Data Set Allocations              Row 1 of 77
Command ===>                                          Scroll ===> PAGE

 Volume   Disposition Act DDname   Data Set Name   Actions: B E V M F C I Q
 SYS614   SHR,KEEP    >    FALLIB   SYSES.PRD.CWFA.V93051.LOAD
 PSU320   SHR,KEEP    >    ISPLLIB  PRDSS.R2221.ISPLLIB
 SYS641   SHR,KEEP    >             SYSSS.ISPF.ISPLLIB
 SYS609   SHR,KEEP    >             SYSES.PRD.COMMON.LOADLIB
 PSU312   SHR,KEEP    >             PRDES.#CSF.LOADLIB
 SYS624   SHR,KEEP    >             SYSES.PRD.EXAMINE.CAILIB
 SYS648   SHR,KEEP    >             SYSMJ.#ISPF.VUSR.SCSQAUTH.MNPRDGP2.VERB
 SYS627   SHR,KEEP    >             SYSDZ.SDSNLOAD
 PWK012   NEW,DEL     >    ISPLST1  SYS12150.T051051.RA000.R2221.R0192678
 PWK183   NEW,DEL     >    ISPLST2  SYS12150.T051051.RA000.R2221.R0192679
 PSU331   SHR,KEEP    >    ISPMLIB  PRDSS.R2221.ISPMLIB
 SYS623   SHR,KEEP    >             SYSSS.ISPF.ISPMLIB
 SPRSY2   SHR,KEEP    >             SYS1.ISPF.MLIB
 SYS619   SHR,KEEP    >             SYSAX.OP.WFP.OPSMLIB
 SYS634   SHR,KEEP    >             SYSAX.OP.SPRDC.OPSMLIB
 SYS629   SHR,KEEP    >             SYSES.PRD.COMMON.MSGS
 PSU305   SHR,KEEP    >    ISPPLIB  PRDSS.R2221.ISPPLIB
```

DDLIST – Primary Commands

DDLIST Primary Commands	
Command	**Description**
APFLIB	Display APF datasets
CLIST or SAVE	Create CLIST to allocate datasets
CON	Display existing ENQ contentions
COUNT	Count and display number of members
CUSTOM	Display ISPF settings
DUPLICATES	Scan and display duplicate members
ENQ	Display ENQs
EXCLUDE [ddname]	Exclude DD name
FIND [string]	Find text string
LONG	Separate datasets from DD name
LNK	Display Linklist datasets
LOCATE [ddname]	Locate DD name

DDLIST – Primary Commands

DDLIST Primary Commands	
Command	**Description**
MEMBER [name|*] [ddname]	Find member
MLIST	Display ISPF modules release / PTF
SHORT	Connect datasets to DD name
ONLY [ddname]	Display only DD names
PARMLIB	Display parmlib datasets
RESET	Display all DD names

- [ddname] can be a partial name, for example
  ➔ M TEST010 ISP - or - ➔ O ISP
- Above primary commands can be passed as a parameter to DDLIST
  ➔ DDLIST ENQ
- Once in DDLIST, press PF1 (HELP) and ENTER to display all commands

DDLIST – M TEST*

- Invoke DDLIST (ISRDDN) and search for member using wild card (*)
  - ➔ DDLIST - or - ➔ DDLIST M TEST*
  - ➔ M TEST*

- Results

```
Current Data Set Allocations            Row 31 of 71
Command ===>                                          Scroll ===> CSR

  Message             Act DDname   Data Set Name   Actions: B E V M F C I Q
 Member: TEST*         >    ISPSLIB  SYSAX.OP.WFP.OPSSLIB
                       >             SYSAX.OP.SDV26.OPSSLIB
 Member: TEST*         >             SYSES.PRD.COMMON.SKELS
                       >    ISPTABL  PRDSS.R2221.ISPTLIB
                       >    ISPTLIB  PRDSS.R2221.ISPTLIB
                       >             SYSSS.ISPF.MENU.ISPTLIB
                       >             SYSSS.ISPF.ISPTLIB
                       >             SYS1.ISPF.TLIB
                       >             SYSAX.OP.WFP.OPSTLIB
                       >             SYSAX.OP.SDV26.OPSTLIB
                       >             SYSAX.SV.SCSYISPF
                       >    ISP08427 SYSSS.ISPF.$STATS.Y2011
                       >    ISP08428 SYSSS.ISPF.$STATS.Y2010
                       >    ISP08431 SYSSS.ISPF.$STATS.Y2011
                       >    ISP08432 SYSSS.ISPF.$STATS.Y2010
                       >    OPSCOMP  SYSAX.OP.WFP.OPSEXEC
                       >    OPSEXEC  SYSAX.OP.WFP.OPSEXEC
```

DDLIST – Pros and Cons

- Pros
  - Easily locate member
    - Member name can contain an asterisks (*) to signify wild card characters
    - Displays members found, not entire directory
    - Browses, edits or views specific member
    - Search a particular DD name
  - Large selection of line commands
    - Browse, Edit, View, Member List, Free, Compress, Info, enQue
  - Find and display duplicate members
  - Counts the number of members in each PDS dataset
  - Displays dataset attributes (RECFM, LRECL, etc.)
  - Display APF, LINK, LPA, PARMLIB, ENQ, etc.
  - Tutorial is outstanding, no need for manual

- Cons
  - LIBEDEF datasets are displayed as ISP#####
  - ALTLIB dataset are displayed as SYS#####
  - Can not use percent sign (%) as wild card character in member name

ISRFIND

- Search a particular DD name for member
  - ➔ ISRFIND
- Insert DD name and member name

```
ISRFIND--ISPF/PDF LEVEL2 DIAGNOSTIC AID                    APPLID   - ISR
                                                            ISPF LVL - ISPF 6.1
                                                            PDF  LVL - PDF 6.1
                                                            TIME     - 19:44
 COMMAND ===>

   DD Name         ==>SYSPROC   DD to search (blank for all)

   Dataset info    ==>          (blank) for no dataset info required
                                B for BASIC info (DSORG RECFM LRECL BLKSIZE
                                F for FULL info  (BASIC+ALLOC/USAGE+DIRECTORY

   Member Name     ==>TEST010   Member to search for (not required)
   LOADMOD         ==>          Y if the member a LOADMOD.
                                (adds search of the LPA, LPALIST and LINKLIST)

   Save Data       ==>          (blank) do not save ISRFIND output
                                S Save data in new dataset
                                  'R2221.ISRFIND.SAVE'
                                A Append data to existing
                                  'R2221.ISRFIND.SAVE'
```

ISRFIND – Results

- If found, member will be displayed to the right of the dataset name
- Can browse or edit PDS dataset

```
COMMAND INPUT ===>                                            Row 1 to 15 of 15
ENTER   B TO BROWSE    E TO EDIT
S DD/DATASET                                          MEMBER
================================================================================

   >> SYSPROC <<
_  PRDSS.R2221.ISPREXX
_  SYSSS.ISPF.MENU.ISPREXX
_  SYSSS.ISPF.ISPREXX                                 TEST010
_  SYSSS.ISPF.EDIT.MACROS.ISPREXX
_  SYS1.ISRCLIB
_  SYS1.CMDPROC
_  SYSAX.OP.SPRDC.VBCLIST
_  SYSAX.CMDPROC.CLIST
_  SYSES.PRD.JCLPREP.CLIST
_  SYSES.PRD.COMMON.REXX
_  SYSES.PRD.COMMON.CLIST
_  SYSPL.REXX
_  SYSPL.CLIST
****************************** Bottom of data ********************************
```

ISRFIND – Pros and Cons

- Pros
  - Easily locate member in specific DD name
  - Displays dataset attributes (RECFM, LRECL, etc.)
  - Can search LPA and LINK LIST for module
  - Can save output to sequential file

- Cons
  - Can not use the asterisk (*) or percent sign (%) as wild card character
  - No View, only Edit and Browse
  - Browsing or Editing displays PDS directory, not member
  - Invalid data causes an error message and the utility will terminate
  - No tutorial

Links

- ISPLIBD
  - LIBDEF Display Utility
    - ISPF – V1R13 – Services Guide
- DDLIST (ISRDDN)
  - Appendix G, ISRDDN diagnostic utility
    - ISPF – V1R13 – Users Guide – Vol 1
  - Doug Nadel, 31 Oct 99, Draft V4.0
    - The ISRDDN Diagnostic Utility
- ISRFIND
  - Appendix C, Diagnostic Tools and Information
    - ISPF – V1R13 – Dialog Developer's Guide
  - Chapter 7, Diagnostic Tools and Information
    - ISPF – V1R13 – Messages and Codes

REXX Debugging

Debugging

- ISPF Editor
  - HILITE
- REXX Commands
  - SAY
  - TRACE [##] [?|!] [N|A|C|E|F|I|L|O|R|S]
  - SIGNAL ON [condition] NAME [label]
  - CALL ON [condition] NAME [trapname]
- REXX Variables
  - RC
  - SIGL
- REXX Functions
  - CONDITION(C|D)
  - ERRORTEXT(RC)
  - SOURCELINE(SIGL)
- TSO Command
  - TSO EXECUTIL TS

HILITE

- Turn on enhanced color and language-sensitive editing features
- Edit member and type in HILITE
  ➔ HILITE - or - ➔ HI
- Type in Language 14, Coloring 3 and select options (/)

```
                              Edit Color Settings
Command ===>


                                                                More:     +
Language: 14   1. Automatic        Coloring: 3   1. Do not color program
               2. Assembler                      2. Color program
               3. BookMaster                     3. Both IF and DO logic
               4. C                              4. DO logic only
               5. COBOL                          5. IF logic only
               6. HTML
               7. IDL              Enter "/" to select option
               8. ISPF DTL         /  Parentheses matching
               9. ISPF Panel       /  Highlight FIND strings
              10. ISPF Skeleton    /  Highlight cursor phrase
              11. JCL
              12. Pascal           Note: Information from this panel is
              13. PL/I             saved in the edit profile.
              14. REXX
              15. SuperC
```

HILITE – Results

- Host commands, DO-END, IF-ELSE, parenthesis and literals will be highlighted

```
000001 /*-------------------------------* REXX *-------------------------------*/
000002 /*  PURPOSE:  Demonstrate HILITE Command                                 */
000003 /*---------------------------------------------------------------------*/
000004 X = MSG(“OFF’)
000005 A = 1
000006
000004 IF (A = 1) THEN DO
000005    SAY "A is equal to 1"
000006    SAY "A is equal to 1"
000007 END
000008 ELSE
000009    SAY "A is not equal to 1"
000010
000011 DO J = 1 TO 10
000012    SAY "J = "J
000013 END
000014
000015 ADDRESS TSO
000016   "ALLOC FI(TEST010) SHR DA('TSTSS.R2221.HELP')"
000017 ADDRESS ISPEXEC
000018    SELECT CMD(%TEST020) NEWAPPL(TEST)"
```

Commands – Pros and Cons

- SAY
  - Most useful, but underutilized
  - Fastest way to debug
- TRACE
  - Great way to learn REXX or how a program is coded
  - Use TRACE L to quickly find subroutine causing issue
  - Place TRACE R and TRACE O around problem code
  - Coding TRACE in a procedure will only trace the subroutine
- SIGNAL and CALL
  - Be aware ERROR takes control when RC is positive number, other than zero
  - SIGNAL the label must be in main REXX, where CALL can be external
- TSO EXECUTIL TS
  - Turn on interactive tracing without having to edit the program
  - Downside is it traces all lines
  - Use TRACE - ## or TRACE ## to advance through program

TRACE – Options

TRACE [!|?] [N|A|C|E|F|I|L|O|R|S]	
Prefix	**Description**
!	Simulates execution of commands
?	Interactive debugging
Char	**Description**
All	All clauses
Command	All commands and non-zero RC's displayed
Error	Any executed command resulting in an error or failure
Failure	Any executed command resulting in failure (same as 'N')
Intermediate	All commands and intermediate results
Labels	Only executed labels
Normal	Only commands resulting in a negative RC (default)
Off	Turn tracing off (or no argument)
Results	All commands and (no intermediate) results
Scan	Trace remaining clauses without executing

TRACE – ?

Interactive Debugging Commands	
Action	**Description**
ENTER	Execute next statement
=	Re-execute last statement
[REXX cmd]	Execute REXX command - For DO-END loops use semicolon (;)
TRACE ##	Execute and display specified number of statements, without pausing - Positive number. - TRACE 10 will execute and display the next 10 lines of code
TRACE - ##	Execute specified number of statements, without displaying or pausing - Negative number - TRACE -10 will execute and not display the next 10 lines of code
TRACE [option]	Change tracing - TRACE O will turn off tracing
EXIT	End REXX program

TRACE – Output

TRACE Output	
Format	**Description**
-	Actual command
+++	Trace message (non zero RC, prompt message, etc.)
>>>	Results from expression, parsed value or value returned from subroutine
>.>	Value “assigned” to a placeholder during parsing
>C>	Name of a compound variable
>F>	Result of a function call
>L>	Literal (string, uninitialized variable, or constant symbol)
>O>	Result of an operation on two terms
>P>	Result of a prefix operation
>V>	Contents of a variable

TRACE – Example

Code

```
/*------------------------------* REXX *------------------------------*/
/*  Purpose:  Trace all clauses, intermediate and evaluations        */
/*-------------------------------------------------------------------*/
TRACE I

A = RANDOM()

IF (A < 100) THEN
   SAY "A is less than 100"
ELSE
   SAY "A is greater than 99"
```

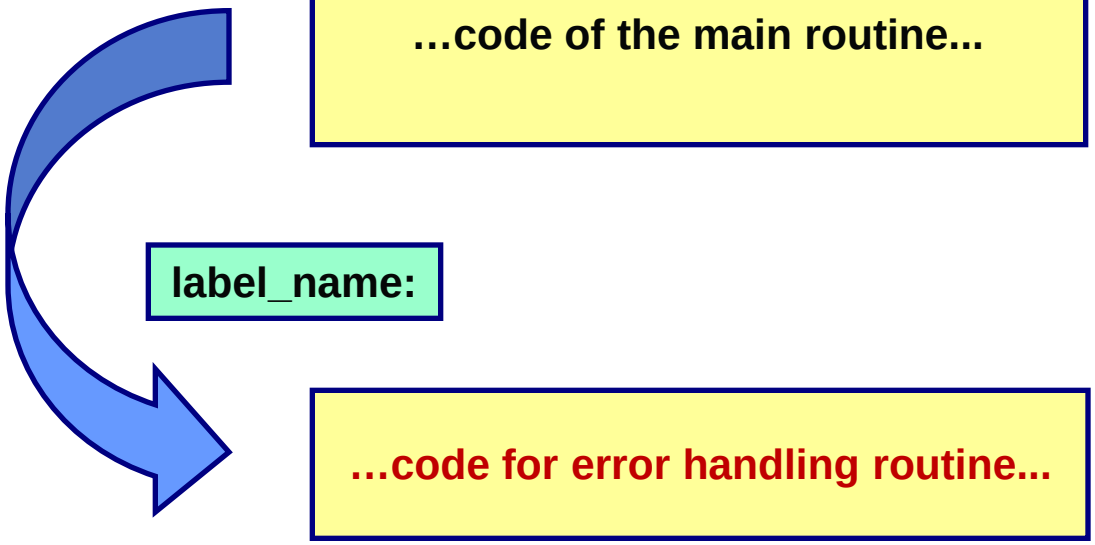
Results

```
      6 *-* A = RANDOM()
        >F>   "603"
      8 *-* IF (A < 100)
        >V>   "603"
        >L>   "100"
        >O>   "0"
     10 *-* ELSE
     11 *-*  SAY "A is greater than 99"
        >L>    "A is greater than 99"

 A is greater than 99
```

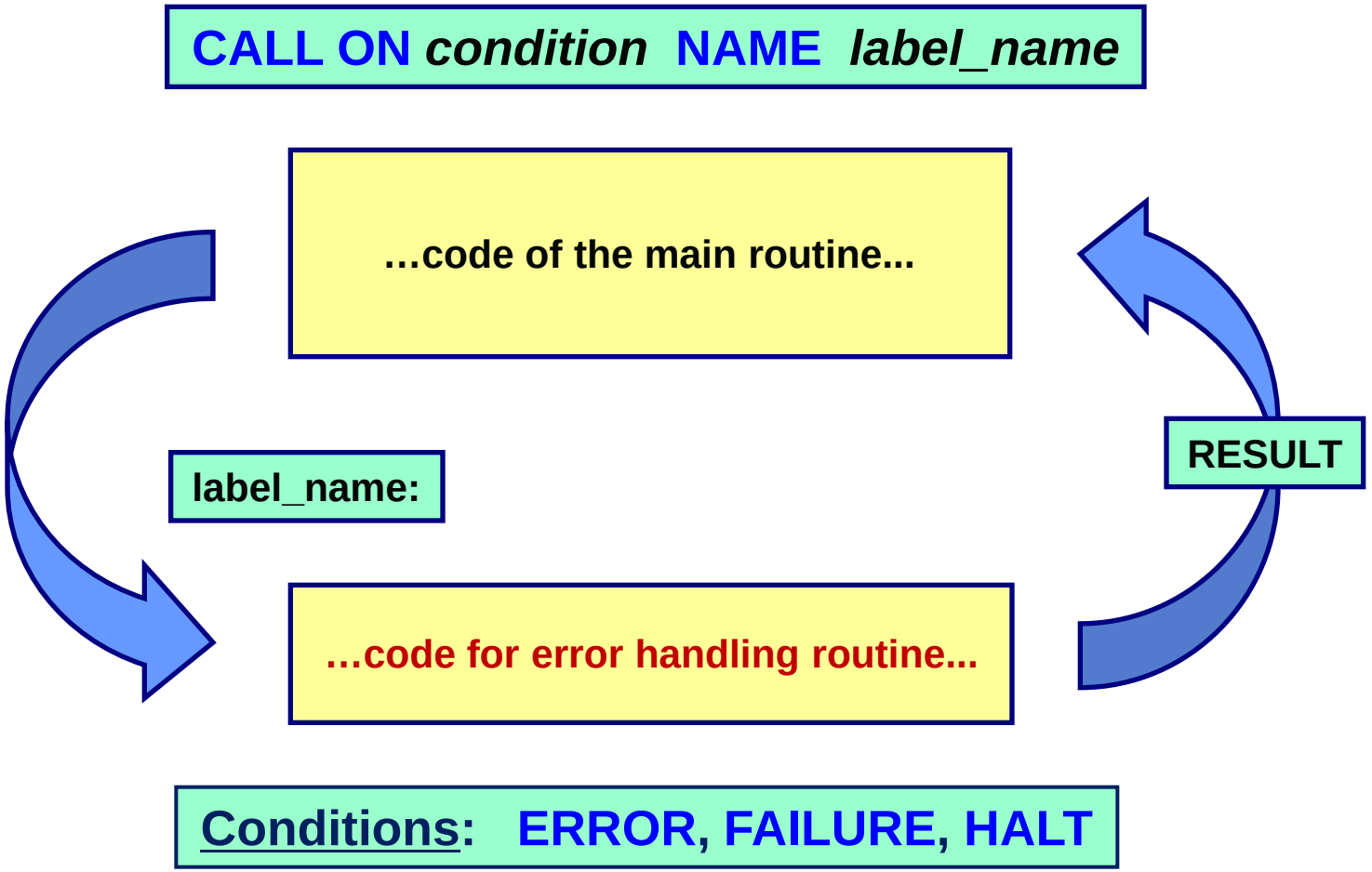
SIGNAL

SIGNAL ON *condition* NAME *label_name*



Conditions: ERROR, FAILURE, HALT, NOVALUE, SYNTAX

CALL



SIGNAL and CALL

SIGNAL ON [condition] NAME [label]	
Condition	**Description**
ERROR	Error upon return (positive return code)
FAILURE	Failure upon return (negative return code)
HALT	An external attempt was made to interrupt and end execution
NOVALUE	Attempt was made to use an uninitialized variable
SYNTAX	Language processing error found during execution
CALL ON [condition] NAME [trapname]	
Condition	**Description**
ERROR	Error upon return (positive return code)
FAILURE	Failure upon return (negative return code)
HALT	An external attempt was made to interrupt and end execution

SIGNAL – Example

Code

```
/*-----------------------------* REXX *-----------------------------*/
/*    PURPOSE:  Demonstrate SIGNAL command                          */
/*------------------------------------------------------------------*/
SIGNAL ON ERROR   NAME ERROR          /* RC is positive              */
SIGNAL ON FAILURE NAME ERROR          /* RC is negative              */
SIGNAL ON HALT    NAME ERROR          /* External interrupt          */
SIGNAL ON NOVALUE NAME ERROR          /* Uninitialized variable      */
SIGNAL ON SYNTAX  NAME ERROR          /* Syntax error                */

VAR10 = VAR20 + 1                     /* VAR20 not initialized       */

EXIT
/*------------------------------------------------------------------*/
/*                    Display Error Information                     */
/*------------------------------------------------------------------*/
ERROR:
  SAY "*"COPIES("-",70)"*"
  SAY "*  Condition   :" CONDITION('C') CONDITION('D')  /* Cond/Desc */
  SAY "*  Line Number :" SIGL                          /* Line No.  */
  SAY "*  Code        :" STRIP(SOURCELINE(SIGL))       /* Src code  */
  SAY "*"COPIES("-",70)"*"
EXIT
```

Results

```
*------------------------------------------------------------------*
*  Condition   : NOVALUE VAR20
*  Line Number : 10
*  Code        : VAR10 = VAR20 + 1     /* VAR20 not initialized */
*------------------------------------------------------------------*
```

Functions and Variables

- Functions
  - CONDITION(C|D)
    - Returns the trapped error condition (C) or description (D)
  - ERRORTEXT(RC)
    - Returns the error message associated with return code
  - SOURCELINE(SIGL)
    - Returns source code in error

- Variables
  - RC
    - Contains the return code from host command
  - SIGL
    - Contains line number of instruction when SIGNAL or CALL is executed

EXECUTIL

- Provides capability to turn tracing on without having to edit program
- Turn interactive trace on
  - ➔ TSO EXECUTIL TS
- Execute REXX program
  - ➔ TSO [rexx program] [parms]
- Terminate tracing and
  - Continue executing program
    - ➔ TE
  - Or terminate program
    - ➔ EXIT

Links

- TRACE
  - Chapter 3, Keyword instructions
    - REXX – V1R13 – Reference
  - Chapter 9, Diagnosing Problems Within an Exec
    - REXX – V1R2 – User's Guide
- SIGNAL and CALL
  - Chapter 3, Keyword instructions, and Chapter 7, Conditions and traps
    - REXX – V1R13 – Reference
- RC and SIGL
  - Chapter 7, Conditions and condition traps
    - REXX – V1R13 – Reference
- EXECUTIL
  - Chapter 10, TSO/E REXX commands, and Chapter 11, Debug aids
    - REXX – V1R13 – Reference

ISPF
Debugging

ISPF – Debugging

- Panel
  - Edit macro to convert non-displayable characters
    - ➔ ISRDTLCV
  - Add REXX code containing SAYs

- IBM Trace Utilities
  - Panels
    - ➔ ISPDPTRC
  - File Tailoring
    - ➔ ISPFTTRC
  - ISPF
    - ➔ ISPVCALL

ISRDTLCV

- Edit macro converts panel non-displayable chars to viewable chars
- Edit panel and type in
  - ➔ ISRDTLCV

Before

```
000182 )BODY  CMD(ZCMD)
000183    Menu  Utilities  Compilers  Options  Status  Help
000184  ------------------------------------------------------------
000185                            ISPF Primary Option Menu
000186  Option ===> Z
000187  SAREA39                                              GRPBOX1
000188                                                       TMPROWS,
000189
000190
000191
000192
000193
000194
000195
000196
000197
000198
000199
000200
000201  ZEXI
000202       Enter Z to Terminate using log/list defaults
000203 )AREA SAREA39
000204  0  Settings      Terminal and user parameters
000205  1  View          Display source data or listings
000206  2  Edit          Create or change source data
000207  3  Utilities     Perform utility functions
000208  4  Foreground    Interactive language processing
000209  5  Batch         Submit job for language processing
000210  6  Command       Enter TSO or Workstation commands
000211  7  Dialog Test   Perform dialog testing
000212  9  IBM Products  IBM program development products
000213  10 SCLM          SW Configuration Library Manager
000214  11 Workplace     ISPF Object/Action Workplace
```

After

```
.BODY  )BODY  CMD(ZCMD)
 ==CHG> #~ Menu~ Utilities~ Compilers~ Options~ Status~ Help#
 ==CHG> `------------------------------------------------------------
 ==CHG> #                            !ISPF Primary Option Menu#
 ==CHG> @Option ===>:Z
 ==CHG> \SAREA39                                              \$GRPBOX1
 ==CHG> \                                                     \#'TMPROWS
 ==CHG> \                                                     \#'
 ==CHG> \                                                     \#'
 ==CHG> \                                                     \#'
 ==CHG> \                                                     \#'
 ==CHG> \                                                     \#'
 ==CHG> \                                                     \#'
 ==CHG> \                                                     \#'
 ==CHG> \                                                     \#'
 ==CHG> \                                                     \#'
 ==CHG> \                                                     \#'
 ==CHG> \                                                     \#¬¬ #
 ==CHG> \                                                     \
 ==CHG> {ZEXI¬¬ #
 ==CHG> #    @Enter{Z}to Terminate using log/list defaults#
 000203 )AREA SAREA39
 ==CHG> *0 ?Settings     #Terminal and user parameters         #
 ==CHG> *1 ?View         #Display source data or listings      #
 ==CHG> *2 ?Edit         #Create or change source data         #
 ==CHG> *3 ?Utilities    #Perform utility functions            #
 ==CHG> *4 ?Foreground   #Interactive language processing      #
 ==CHG> *5 ?Batch        #Submit job for language processing   #
 ==CHG> *6 ?Command      #Enter TSO or Workstation commands    #
 ==CHG> *7 ?Dialog Test  #Perform dialog testing               #
 ==CHG> *9 ?IBM Products #IBM program development products     #
 ==CHG> *10?SCLM         #SW Configuration Library Manager     #
 ==CHG> *11?Workplace    #ISPF Object/Action Workplace         #
```

PANEL – REXX Code

- In the)BODY or)INIT section code REXX to display variables

- Example

```
)PROC
     *REXX(*)                    /* Pass all variables  */
        SAY 'DSN = 'DSN          /* Display variable    */
     *ENDREXX                    /* Terminate REXX code */
)END
```

- Note
  - Do not prefix “&” in front of variable names

ISPDPTRC

- Traces the processing of Dialog Manager panel
  - Execution of panel service calls
    - DISPLAY, TBDISPL, and TBQUERY
  - Processing that occurs within the panels
    -)ABCINIT,)ABCPROC,)INIT,)REINIT, and)PROC sections
- Can be invoked from any ISPF panel
- Dynamically allocates ISPDPTRC (RECFM=VB,LRECL=255)
- Execution

➔ ISPDPTRC — Turn trace on

Loading Panel trace. To end, reinvoke this command

***

➔ TSO [rexx program] [parms] — Execute REXX

➔ ISPDPTRC — Turn trace off

Unloading Panel trace...

***

ISPDPTRC – Results

```
TLD# Type  Panel    Section Cd  RC  Data
---- ---- -------- ------- -- ---  ------------------------------------------------------------------------------
-->
TLD1 Svc                           TBDISPL CICS1942 PANEL(CICSXRE1)
TLD1 Read CICSXRE1 --------------- DD=ISPPLIB+2
TLD1 Read CICSXRE1              0  Total Records=45
TLD1 PrcR CICSXRE1 INIT         0    .ZVARS='(ZSCROLLD ID PI SD MCT SRT TCT)'
TLD1 PrcR CICSXRE1 INIT         0    .HELP='#CICSXRE'
TLD1 DspO                        0----+----1----+----2----+----3----+----4----+----5----+----6----+----7----+----8
TLD1 DspO CICSXRE1               |+-------------------------(%CICS - Cross Reference+)-------------------------
TLD1 DspO CICSXRE1               |%Command ==>&                                                %Scr =>&CSR +
TLD1 DspO CICSXRE1               |+                          ~                                   @PF11 ==>
TLD1 DspO CICSXRE1               |+Command: %F xxx+- Find text   %L xxx+- Locate text   %S xxx+- Sort column
TLD1 DspO CICSXRE1               ++         %O xxx+- Only text   %R    +- Reset display %H    +- Hide header
TLD1 DspO CICSXRE1               |+         %D    +- Save to DSN %P    +- Print         %T    +- Totals
TLD1 DspO CICSXRE1               |+
TLD1 DspO CICSXRE1               |+Line:    %S+- Display parms   %M+- Dump M0 journals%                  M  S  T
TLD1 DspO CICSXRE1               |%                                                          P  S  C  R  C
TLD1 DspO CICSXRE1               1%S    Stc      Proc    A Lpar  L  Ver   Applid   Sysid    Id     I  D  T  T  T
TLD1 DspO CICSXRE1               |%-  -------- --------  - ----- -  ---  --------  -----  -------  -- -- -- -- --
TLD1 DspO CICSXRE1               |_ +.CICMS09 .C$CMAS   .Y.SDV22.9 .420 .CICMS09  .CP09  .CIX#TST .NO.NO.NO.S2.NO
TLD1 DspO CICSXRE1               |_ +.CICSCTMP.C$CMAS   .Y.SDV21.2 .420 .CICMS02  .CP02  .CIX#TST .NO.NO.NO.S2.NO
TLD1 DspO CICSXRE1               |_ +.CICSCVCM.C$CMAS   .Y.SDV25.V .420 .CICSCVCM .CVCM  .CIX#TST .NO.NO.NO.S2.NO
TLD1 DspO CICSXRE1               +_ +.CICSC2CM.C$CMAS   .Y.SDV21.2 .420 .CICSC2CM .C2CM  .CIX#TST .NO.NO.NO.S2.NO
TLD1 DspO CICSXRE1               |_ +.CICSC2CW.C$CMAS   .Y.SDV21.2 .420 .CICSC2CW .C2CW  .CIX#TST .NO.NO.CA.S2.NO
TLD1 DspO CICSXRE1               |_ +.CICSC9CW.C$CMAS   .N.SDV22.9 .420 .CICSC9CW .C9CW  .         .NO.NO.CA.S2.NO
TLD1 DspO CICSXRE1               |_ +.CICSEVP7.CICSEVP7 .Y.SDV25.V .420 .CICSEVP7 .EVP7  .CIC#TST .YO.61.CF.E@.CC
TLD1 DspO CICSXRE1               |_ +.CICSE2A2.CICSE2A2 .Y.SDV21.2 .420 .CICSE2A2 .E2A2  .CIC#TST .YA.Y1.CA.E@.CC
TLD1 DspO CICSXRE1               2_ +.CICSE2A3.CICSE2A3 .Y.SDV21.2 .420 .CICSE2A3 .E2A3  .CIC#TST .YV.Y1.CA.E@.CC
TLD1 DspO CICSXRE1               |_ +.CICSE2A4.CICSE2A4 .Y.SDV21.2 .420 .CICSE2A4 .E2A4  .CIC#TST .YK.Y1.CA.E@.CC
TLD1 DspO CICSXRE1               |_ +.CICSE2A5.CICSE2A5 .Y.SDV21.2 .420 .QAAOR2   .AOR2  .CIC#0AI .8A.61.CA.E@.CC
TLD1 DspO CICSXRE1               |_ +.CICSE2A6.CICSE2A6 .Y.SDV21.2 .420 .QAAOR3   .AOR3  .CIC#0AI .9A.92.CA.E@.CC
TLD1 DspO CICSXRE1               |_ +.CICSE2A7.CICSE2A7 .Y.SDV21.2 .420 .QAAOR5   .AOR5  .CIC#0AI .FA.61.CA.E@.CC
TLD1 DspI CICSXRE1               | SDV26---------------------(%CICS - Cross Reference+)------ Row 1 to 12 of 364
TLD1 DspI CICSXRE1               |%Command ==>&                                                %Scr =>&CSR +
TLD1 DspI CICSXRE1               |+                          ~                                   @PF11 ==>
TLD1 DspI CICSXRE1               |+Command: %F xxx+- Find text   %L xxx+- Locate text   %S xxx+- Sort column
TLD1 DspI CICSXRE1               ++         %O xxx+- Only text   %R    +- Reset display %H    +- Hide header
```

ISPDPTRC – Options

ISPDPTRC [options]	
Option	**Description**
END	Terminates trace and does not edit trace data set
VIEW	Terminates trace and views the trace data set
LIST	Invokes Data Set List Utility to display trace data sets
QUIET	Does not display initialization / termination messages
DISPLAY	Controls tracing the panel as displayed on terminal
	NONE — No trace during panel display processing
	IN — Trace showing panel, including data entered
	OUT — Trace showing panel as is on screen w/ attributes
	BOTH — Trace both the In and Out display (default)
PANEL	Controls tracing based on panel name
	* — Trace all panels (default)
	panel_name — Trace only for the panel
	panel_mask — Trace panels matching panel_mask (% and *)
READ	Controls tracing when panel is read into memory
	NONE — No trace during read processing
	SUMMARY — Summary info and where panel was loaded from (default)
	DETAIL — Same as Summary and panel source

ISPDPTRC – Options

ISPDPTRC [options]	
Option	**Description**
SCREEN	Controls tracing based on screen ID
	0 — Trace all logical screens (default)
	* — Trace current screen id
	screen_id — Trace specific screen id
SECTION	Controls tracing different panel logic sections
	* | ALL — Trace all sections
	NONE — Do not trace any sections
	INIT — Trace)ABCINIT and)INIT sections
	REINIT — Trace)REINIT section
	PROC — Trace)ABCPROC and)PROC sections
	NOINIT — Do not trace)ABCINIT and)INIT sections
	NOREINIT — Do not trace)REINIT section
	NOPROC — Do not trace)PROC section
SERVICE	Controls tracing for DISPLAY, TBDISPL and TBQUERY
	NONE — No trace records are produced
	DETAIL — Traces DISPLAY, TBDISPL, and TBQUERY

ISPFTTRC

- Traces the processing of file tailoring (skeletons) services
  - Execution of file tailoring service calls
    - FTOPEN, FTINCL, FTCLOSE, and FTERASE
  - Processing that occurs within the file tailoring code and each statement
- Can be invoked from any ISPF panel
- Dynamically allocates ISPFTTRC (RECFM=VB,LRECL=255)
- Execution

➔ ISPFTTRC — Turn trace on

Loading File Tailoring trace. To end, reinvoke this command

***

➔ TSO [rexx program] [parms] — Execute REXX

➔ ISPFTTRC — Turn trace off

Unloading File Tailoring trace...

***

ISPFTTRC – Results

```
TLD# Type Skeleton  Rec#   IM IF DO TB  Cd RC Data
---- ---- -------- ------  -- -- -- --  -- -- ---------------------------------------->
TLD1 Svc                                     FTOPEN  TEMP
---------------------------------------- DD=ISP07407  DSN=R2221.SDV26.SPFTEMP1.CNTL
TLD1 SvcR                                 0 FTOPEN  TEMP
TLD1 Svc                                    FTINCL  JOBCARD
---------------------------------------- DD=ISPSLIB   DSN=
TLD1 Read JOBCARD       1                   )CM   ************************************************************
TLD1 Read JOBCARD       2                   )CM   *               JOBCARD RETRIEVED FROM ISPF 0.2            *
TLD1 Read JOBCARD       3                   )CM   ************************************************************
TLD1 Read JOBCARD       4                   )SEL &ZLLGJOB1 ¬= &Z
TLD1 Read JOBCARD       5                   &ZLLGJOB1
TLD1 Read JOBCARD       6                   )ENDSEL
TLD1 Read JOBCARD       7                   )SEL &ZLLGJOB2 ¬= &Z
TLD1 Read JOBCARD       8                   &ZLLGJOB2
TLD1 Read JOBCARD       9                   )ENDSEL
TLD1 Read JOBCARD      10                   )SEL &ZLLGJOB3 ¬= &Z
TLD1 Read JOBCARD      11                   &ZLLGJOB3
TLD1 Read JOBCARD      12                   )ENDSEL
TLD1 Read JOBCARD      13                   )SEL &ZLLGJOB4 ¬= &Z
TLD1 Read JOBCARD      14                   &ZLLGJOB4
TLD1 Read JOBCARD      15                   )ENDSEL
TLD1 Read JOBCARD  ------------------------ Total Records=15
TLD1 Src  JOBCARD       1   1               )CM   ************************************************************
TLD1 Src  JOBCARD       2   1               )CM   *               JOBCARD RETRIEVED FROM ISPF 0.2            *
TLD1 Src  JOBCARD       3   1               )CM   ************************************************************
TLD1 Src  JOBCARD       4   1               )SEL &ZLLGJOB1 ¬= &Z
TLD1 CtlR JOBCARD       4   1  1        T   0 )SEL //R2221TST JOB (SST),'KOSS',MSGCLASS=T,CLASS=R,NOTIFY=&SYSUID ¬=
TLD1 Src  JOBCARD       5   1  1             &ZLLGJOB1
TLD1 DatR JOBCARD       1   1  1            0 //R2221TST JOB (SST),'KOSS',MSGCLASS=T,CLASS=R,NOTIFY=&SYSUID
TLD1 Src  JOBCARD       6   1  1             )ENDSEL
TLD1 CtlR JOBCARD       6   1               0 )ENDSEL
TLD1 Src  JOBCARD       7   1               )SEL &ZLLGJOB2 ¬= &Z
TLD1 CtlR JOBCARD       9   1               0 )ENDSEL
TLD1 Src  JOBCARD      10   1               )SEL &ZLLGJOB3 ¬= &Z
TLD1 CtlR JOBCARD      12   1               0 )ENDSEL
TLD1 Src  JOBCARD      13   1               )SEL &ZLLGJOB4 ¬= &Z
TLD1 CtlR JOBCARD      15   1               0 )ENDSEL
```

ISPFTTRC – Options

ISPFTTRC [options]	
Option	**Description**
END	Terminates trace and does not edit trace data set
VIEW	Terminates trace and views the trace data set
LIST	Invokes Data Set List Utility to display trace data sets
QUIET	Does not display initialization / termination messages
READ	Controls tracing when panel is read into memory
	None — No trace during read processing
	Summary — Summary info and where panel was loaded from (default)
	Detail — Same as Summary and panel source
RECORDS	Controls trace records during record processing of skeleton member
	* | ALL — Trace all skeletons records
	NONE — Do not trace any of the skeleton records
	SOURCE — Trace source skeleton record, before any processing is done
	DATA — Trace for data records, after record processing has completed
	CNTL — Trace for control statements, after record processing has completed
	NOSOURCE — Turns off trace for the source skeleton records
	NODATA — Turns off trace records for data records
	NOCNTL — Turns off trace records for control statements

ISPFTTRC – Options

ISPFTTRC [options]	
Option	**Description**
SERVICE	Controls tracing for DISPLAY, TBDISPL and TBQUERY
	NONE — No trace records are produced
	DETAIL — Traces DISPLAY, TBDISPL, and TBQUERY
SKELETON	Controls trace records based on the skeleton name
	* | ALL — Trace all skeletons records (default)
	skel_name — Trace only for skeleton name specified
	skel_mask — Trace for skeletons matching skel_mask (% and *)
TBVARS	For ")DOT", displays variables on each iteration through the table
	NONE — No trace records are produced during)DOT processing
	DETAIL — Trace)DOT , display variables on each iteration (default)

ISPVCALL

- Traces
  - Service calls
  - Messages
  - Enques
- Displays
  - Operating system and product levels
  - ISPF exits installed
  - ISPF configuration table
  - Cached panel names
  - History of typed commands
  - List of allocated DD names and data sets
  - Active LIBDEFs
  - System SVC table
  - ISPF CSECTs

ISPVCALL

- Can be invoked from any ISPF panel
- Dynamically allocates ISPTRACE (RECFM=FB,LRECL=80)
- Execution
  - ➔ ISPVCALL — Turn trace on
    Loading CALL trace. To end, reinvoke this command.
    ***
  - ➔ TSO [rexx program] [parms] — Execute REXX
  - ➔ ISPVCALL — Turn trace off
    Unloading CALL trace...
    ***
- Output lines will begin with >ISP, >ISR, >ENQ, >MSG, >CMD
- To view events in context, type in
  - ➔ X ALL; F ">" 1 ALL

ISPVCALL – Results

```
 - - -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  - 1016 Line(s) not Displayed
 001017 >Msg S:                              TLDMMID=
 001018 >Msg L:
 - - -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -    97 Line(s) not Displayed
 001116 >Msg S:   TSO     - Command  -       TLDMMID=
 001117 >Msg L:%PLPMENU /WFS CICSXREF
 - - -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  - 2 Line(s) not Displayed
 001120 >CMD  %PLPMENU /WFS CICSXREF
 - - -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -    10 Line(s) not Displayed
 001131 >ISPCAT   ISPEXEC Control Errors Return
 001132 >ISPEXEC called from IRXSTAM+A02       05198D6A in PLPA  EPA:05198368
 - - -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -    11 Line(s) not Displayed
 001144 >ISPCAT   ISPEXEC Libdef PLPISPF dataset id('SYSSS.ISPF.MENU.ISPTLIB') STACK
 001145 >ISPEXEC called from IRXSTAM+A02       05198D6A in PLPA  EPA:05198368
 - - -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -    29 Line(s) not Displayed
 001175 >ISPCAT   ISPEXEC TBQuery WFSplp
 001176 >ISPEXEC called from IRXSTAM+A02       05198D6A in PLPA  EPA:05198368
 - - -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -    19 Line(s) not Displayed
 001196 >Msg TLD1- TLDMMID:ISPT034  set in ISPCMG  ->ISPCFI
 - - -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -    38 Line(s) not Displayed
 001235 >Msg S:Table is not open             TLDMMID=ISPT034
001236 >Msg L:TBQUERY issued for table WFSPLP that is not open.
- - -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  162 Line(s) not Displayed
001399 >ISPCAT   ISPEXEC TBOpen WFSplp nowrite library(PLPISPF)
001400 >ISPEXEC called from IRXSTAM+A02       05198D6A in PLPA  EPA:05198368
- - -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -   38 Line(s) not Displayed
001439 >ENQ CNQ(TLD1,'SPFEDIT ',
001440 >ENQ     'SYSSS.ISPF.MENU.ISPTLIB                    WFSPLP  ',
001441 >ENQ     'S', 52,'2','U')
```

ISPVCALL – Options

ISPVCALL [options]		
Keyword	**Eye Catcher**	**Description**
SVC26 or SVC27	>SVC26 >SVC27	Adds unformatted SVC 26 (LOCATE) and SVC 27 (OBTAIN) data to the trace. For example, you can see how option 3.4 builds its list.
DAIR	>DAIR	Adds formatted information about ISPF allocations for data sets, such as the list and log data sets, work data sets, and edit recovery data sets. These allocations use the TSO Dynamic Allocation Interface Routine.
VDEFINE	>VDEF	Shows VDEFINE and VDELETE calls for every variable.
MONITOR VAR(abc)	>VARS	Shows a hexadecimal and EBCDIC dump of variable abc every time it changes. Unfortunately, the initial value of the variable isn't shown.
PARM abc	>PARM	Dumps parameters passed to an ISPF module. If you can figure out what module processes a particular service, you can look at the service parameters. Optionally, takes an L(x) parameter to define the number of parameters to print.
STORAGE	>CS	Traces ISPF's GETMAIN and FREEMAIN calls

ISPVCALL – Options

ISPVCALL [options]		
Keyword	**Eye Catcher**	**Description**
HISTORY		Keeps 50,000 records of trace in storage and doesn't write the trace until ISPVCALL is invoked again. Used to catch intermittent problems. Since ISPVCALL's overhead is so small, you can use the HISTORY keyword to run with it enabled for long periods with no performance degradation.
STATUS		Shows system information, but doesn't start the trace.
VIEW		ISPVCALL must not be active when you specify the VIEW keyword.
END		Ends a running trace without it in the editor.

Links

- PANEL REXX
  - SHARE, Session 11708, August 2012, Peter Van Dyke
    - ISPF Panels – Advanced
  - Chapter 7, Panel definition statement reference
    - ISPF – V1R13 – Dialog Developer's Guide

- ISPDPTRC and ISPFTTRC
  - Appendix C, Diagnostic Tools and Information
    - ISPF – V1R13 – Dialog Developer's Guide
  - Chapter 7, Diagnostic Tools and Information
    - ISPF – V1R13 – Messages and Codes

- ISPVCALL
  - SHARE, Session 2270, Winter 2010, Peter Van Dyke
    - ISPF Behind the Scenes
  - MainframeZone.com, 1 Oct 04, Doug Nadel
    - ISPVCALL: ISPF Debugging on the Bleeding Edge

Other Items

Common Problems

- Uninitialized variables
- Not placing quotes around literals or external commands
- Missing DO or END clauses
- Updated panels and messages not picked up
  - Invoke ISPF in TEST mode
  - Or use ISPF 7.2 to reload modules into memory
- Incorrect environment when executing external commands
  - Resulting in RC=-3
  - Code ADDRESS command
- Missing modules (panels, etc.)
  - When invoking application
    - Add PASSLIB to SELECT statement
  - After exiting application
    - Add STACK to LIBDEF statements
    - And/or make STACK the default using ISPCCONF
      DEFAULT_LIBDEF_PROCESSING_OPTION = STACK

Manuals

- ISPF – V1R13 – Dialog Developer's Guide
- ISPF – V1R13 – Dialog Tag Language Guide
- ISPF – V1R13 – Edit and Edit Macros
- ISPF – V1R13 – Messages and Codes
- ISPF – V1R13 – Planning and Customization
- ISPF – V1R13 – Reference Summary
- ISPF – V1R13 – Services Guide
- ISPF – V1R13 – Users Guide – Vol 1
- ISPF – V1R13 – Users Guide – Vol 2

- REXX – V1R2 – User's Guide
- REXX – V1R13 – Reference
- REXX – V1R13 – UNIX System Services

- SDSF – REXX
- SDSF – V1R13 – Operations and Customization

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