Load Modules and Csects

The LIST and INFORMATION displays of PDS load modules are different from those of other PDS members in that they show load module attributes. Additionally, all zaps applied to a load module, and all external references of the load module can be displayed. CSECTs of a load module can also be listed, browsed or edited.

Natural ISPF provides commands to generate a zap in the user workpool and apply the zap to a load module. With Natural ISPF's DOWNLOAD and UPLOAD commands, you can transfer OS/390 load modules to and from a PC via Entire Connection.

Example: LIST load modules

The following list is the result of the command:

```
LIST P JWO.COMN.LOAD(*)
```

where the specified library is a load library:

```
LIST-PDS:JWO.COMN.LOAD(*) ----------------------- Row 0 of 15 - Columns 010 076
   COMMAND===>                                                  SCROLL===> CSR
     MEMBER            ATTRIBUTES
  ** ******************************** top of list ******************************
     ADASCR
     EDITBPA
     EDRBPMM
     EDRPHSE           RENT REUS
     EDRWFMT           AUTH RENT REUS
     NATCOM21
     NATIDBOK
     NATIDB07
     NATPARM
     NATTEXT
     NATTSO22
     NATTXT2           RENT REUS
     NRMCMP            RENT REUS
     TEST1             RENT REUS
     TTEST
  ** ****************************** bottom of list ******************************


  Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
        Help  Split End   Suspe Rfind Rchan Up    Down  Swap  Left  Right :s
```

Meaning of the possible attributes:

Attribute	Meaning
ALIAS	Member name is an alias name.
AUTH	APF-authorized
LOADONLY	Only loadable
NOTEXEC	Not executable
OVLY	Overlay
REFR	Refreshable
RENT	Reentrant
REUS	Reusable
SCTR	Scatter
TEST	Test option (TSO)

Load modules can be selected from the list using the same line commands as described for PDS members, except that the EDIT and BROWSE commands apply to CSECTs and there are some more commands available. The functions specific to load modules and CSECTs are:

Line Command	Corresponding Function Command and Meaning
B	BROWSE a CSECT (select from prompt window).
E	EDIT a CSECT (select from prompt window).
I	INFORMATION on the load module.
L	LIST CSECTs for the module.
XT	EXTERNS. Display external references to the load module.
ZP	ZAPS. Display all zaps applied to the load module.

For complete function command syntax, see the subsection Function Commands.

Example: INFORMATION

The following display is the result of the command:

```
INFO P PPEX.NATURAL.LOAD(IUPD)
```

where the specified member is a load module:

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```
-------------------------- PDS MEMBER INFORMATION ----------------------------
  COMMAND ===>


      Data set name :  PPEX.NATURAL.LOAD

        Volume Serial  :  SYSF10
        Device Type    :  3390
        Organization   :  PO
        Record format  :  U
        Record length  :
        Block size     :  32760

     Module         :  IUPD

        Length         :  112        00000070
        Attributes     :
        Entry point    :  OSCOPY
        Linkage date   :  93/04/21
        Linkage editor :  566528408 V 2   R 4
        ZAPS           :  NONE
        Unresolved     :  NONE
  Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
        Help  Split End   Suspe Rfind Rchan Up    Down  Swap  Left  Right Curso
```

The information fields speak for themselves. Note, however, that the module length is given both in numeric and hexadecimal format and that the number of unresolved references is also given.

Example: EXTERNS

The following display is the result of the command:

```
EXTERNS P JWO.COMN.LOAD(NATPARM)
```

where the specified member is a load module. The display shows a list of all external references made to load module NATPARM:

```
EXTERNS-PDS:JWO.COMN.LOAD(NATPARM) -------------- Row 0 of 62 - Columns 001 031
   COMMAND===>                                                  SCROLL===> CSR
     ADDRESS REFERENCE TYPE IN-CSECT
  ** ********* top of list *********
     000024  SYSPRM    ER   ACMPARM
     000064  ADATBLE   SD   ACMPARM
     0002AC  ACMUDEB   WX   ACMPARM
     0002B8  ACMLIST   WX   ACMPARM
     0002C4  CMRSP     WX   ACMPARM
     0002D0  ACMUB     WX   ACMPARM
     0002DC  ACMKEY    WX   ACMPARM
     0002E8  ACMZUL    WX   ACMPARM
     0002F4  CMDDP     WX   ACMPARM
     000300  CMMPP     WX   ACMPARM
     00030C  CMMA2     WX   ACMPARM
     000318  CMMA3     WX   ACMPARM
     000324  CMGLB     WX   ACMPARM
     000330  CMADA     WX   ACMPARM
     00033C  CMZAP     WX   ACMPARM
     000348  CMDIX     WX   ACMPARM
     000354  CMMASH    WX   ACMPARM
     000360  CMRADAR   WX   ACMPARM
  Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
        Help  Split End   Suspe Rfind Rchan Up    Down  Swap  Left  Right :s
```

The display shows the external references to load module NATPARM.

Meaning of the column headings:

Column	Meaning
ADDRESS	Address of the external symbol.
REFERENCE	Name of the external symbol.
TYPE	External symbol type. Possible options: **CM** Common **ER** External symbol is unresolved. **LR** Label reference **PC** Private code **PS** Pseudo register **SD** External symbol is resolved. **WX** Weak external symbol is unresolved.
IN-CSECT	Name of the CSECT in which the reference to the external symbol appears.

Example: ZAPS

The following display is the result of the command:

```
ZAPS P JWO.COMN.LOAD(NATPARM)
```

where the specified member is a load module.

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```
ZAPS-PDS:JWO.COMN.LOAD(NATPARM) ------------------ Row 0 of 1 - Columns 001 026
   COMMAND===>                                                  SCROLL===> CSR
     CSECT    DATE     IDR-DATA
  ** ******* top of list ******
     ACMPARM  93/02/08 NO IDENT
     ACMPARM  93/08/12 NO IDENT
  ** ***** bottom of list *****









  Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
        Help  Split End   Suspe Rfind Rchan Up    Down  Swap  Left  Right :s
```

The display shows the zaps applied to the load module NATPARM. Meaning of the column headings:

Column	Meaning
CSECT	Name of zap CSECT.
DATE	Date the zap was generated.
IDR-DATA	Information on the zap.

Example LIST

The following display is the result of the command:

```
LIST P JWO.COMN.LOAD(NATPARM)
```

where the specified member is a load module. The display shows all CSECTs for the specified load module:

```
LIST-CST:JWO.COMN.LOAD(NATPARM)-/* --------------- Row 0 of 6 - Columns 001 055
   COMMAND===>                                                  SCROLL===> CSR
     CSECT             OFFSET LENGTH AMODE RMODE ID    LR-ID
  ** ******************** top of list ********************
     ACMPARM           000000 000709 ANY   24    00001 00000
     ADATBLE           000730 0000F4 ANY   24    00004 00000
     NSTATIC           000710 00001C ANY   24    00064 00000
     CMDBID            000828 0000FF ANY   24    00067 00000
     CMTRF             000928 000002 ANY   24    00068 00000
     ADBSYS            000930 000058 ANY   24    00069 00000
  ** ******************* bottom of list ********************





  Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
        Help  Split End   Suspe Rfind Rchan Up    Down  Swap  Left  Right :s
```

Meaning of the column headings:

Column	Meaning
CSECT	Name of CSECT.
OFFSET	Offset of CSECT in physical block.
LENGTH	Length of CSECT in hex.
AMODE	AMODE assigned to CSECT.
RMODE	RMODE assigned to CSECT.
ID	ID of external symbol.
LR-ID	ID of label reference (LR) symbol.

You can select a CSECT for further maintenance from the list using one of the following line commands:

Line Command	Corresponding Function Command and Meaning
B	BROWSE the CSECT.
E	EDIT the CSECT.
XT	EXTERNS. Display external references of the CSECT
ZP	ZAPS. Display all zaps applied to the CSECT.

CSECTs are a separate object type in Natural ISPF. When requesting a function for a CSECT using function command syntax from any system screen, you must therefore use the object code CST.

Example: BROWSE

the command:

```
BROWSE CST JWO.COMN.LOAD(NATPARM)
```

opens a prompt window in which you can specify the name of the required CSECT. The following display shows the result for CSECT ACMPARM:

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```
BROWSE-CST:JWO.COMN.LOAD(NATPARM)-/ACMPARM -------------------- Columns 044 076
   COMMAND===>                                                   SCROLL===> CSR
     OFFSET DATA                                   TEXT             DISASSEMBLY
  ** ********************************* top of list ********************************
     000000 00007FF8 00007800 00010000 00050000 ??"8?? ????????     SU      LE
     000010 000002A4 00006C00 40404040 40404040 ???u??%?                    MD
     000020 80000008 00000000 F0F0F0F7 000002A4  ???????0007???u SSM
     000030 00000000 003A000A 07D0040A C80A0606 ?????????§??H???
     000040 32010000 00000018 E2D6D9E3 40404040 ????????SORT     LTER
     000050 00000000 0000001E 000A00F9 00000000 ???????????9????
     000060 0000055C 00000730 40404040 40404040 ???*????             BALR    BCR
     000070 00000000 00000000 00000000 00000000 ???????????????
     000080 00000000 00000000 00000000 00000563 ??????????????
     000090 000A0000 00000000 00380028 00000000 ???????????????
     0000A0 00000000 00000684 00000006 00000703 ???????d????????             BCTR
     0000B0 40404040 40404040 0000FF00 00000928         ?? ????? STH STH STH STH
     0000C0 00000000 00000000 00010048 F140044B ?????????? 1 ?.
     0000D0 6B84427E 010301F1 B06F0000 00000000 ,d =???1 ??????? SD  STC
     0000E0 00001770 00000000 05F5E0FF 05F5E0FF ??? ?????5§ ?5§      XR
     0000F0 D900006C 643203F8 00851214 05F5E0FF R??% ??8?e???5§
     000100 00000011 8E60C1C0 10800009 00000000 ???? -A§? ??????         SRDA
     000110 00000000 00000000 00000000 00000000 ???????????????
  Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
        Help  Split End   Suspe Rfind Rchan Up    Down  Swap  Left  Right :s
```

If you enter the local command LINE 2, the Assembler commands in the column DISASSEMBLY are ordered in a separate line under the hexadecimal representation:

```
BROWSE-CST:JWO.COMN.LOAD(NATPARM)-/ACMPARM -------------------- Columns 044 059
   COMMAND===>                                                   SCROLL===> CSR
     OFFSET DATA                                   TEXT
  ** ************************ top of list ************************
     000000 00007FF8 00007800 00010000 00050000 ??"8?? ????????
                SU       LE
     000010 000002A4 00006C00 40404040 40404040 ???u??%?
                         MD   STH STH  STH STH
     000020 80000008 00000000 F0F0F0F7 000002A4  ???????0007???u
            SSM               SRP SRP
     000030 00000000 003A000A 07D0040A C80A0606 ?????????§??H???
                              BCR SPM      BCTR
     000040 32010000 00000018 E2D6D9E3 40404040 ????????SORT
            LTER                      STH STH
     000050 00000000 0000001E 000A00F9 00000000 ???????????9????

     000060 0000055C 00000730 40404040 40404040 ???*????
                BALR     BCR  STH STH  STH STH
     000070 00000000 00000000 00000000 00000000 ???????????????

     000080 00000000 00000000 00000000 00000563 ??????????????
                                          BALR
  Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
        Help  Split End   Suspe Rfind Rchan Up    Down  Swap  Left  Right :s
```

To revert to the default display, issue the LINE 1 local command.

Example: EDIT

The command:

```
EDIT CST JWO.COMN.LOAD(NATPARM)
```

opens a prompt window in which you can specify the name of the required CSECT. The resulting display is the same as for BROWSE (see above), but the hexadecimal characters are modifiable. Modifications can subsequently be evaluated in order to generate or apply zaps to the edited CSECT of the module (see the description of local commands GENERATE and SAVE below).

Local Commands

If you display a CSECT in Editor format in EDIT or BROWSE mode, you can issue local commands from the Editor command line in addition to Editor commands.

The following local commands are available:

In BROWSE mode:

Command	Meaning
LINE 2	Displays CSECT in 2 line format: the Assembler commands appear directly under the corresponding hexadecimal representation (see example above).
LINE 1	Issued after LINE 2, redisplays CSECT in default format.

In EDIT mode:

Command	Meaning
GENERATE	Generates a zap in the user workpool based on the modifications made to the CSECT.
SAVE	Generates a zap in the user workpool based on the modifications made to the CSECT, and applies the zap using AMASPZAP to the load module.

You can display or edit the zap generated in the user workpool by addressing object type OUT. For example, when you have edited CSECT ACMPARM and issued the command GENERATE, the following command opens an edit session with the zap in the user workpool:

```
SPLIT;EDIT OUT ACMPARM TYPE=ZAP
```

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```
EDIT-CST:JWO.COMN.LOAD(NATPARM)-/ACMPARM ---------------------- Columns 044 076
   COMMAND===>                                                   SCROLL===> CSR
     OFFSET DATA                                 TEXT             DISASSEMBLY
  ** ********************************* top of list ******************************
     000000 00007FF8 00007800 00010000 00050000 ??"8?? ?????????     SU      LE
  EDIT-OUT:ACMPARM/TYPE=ZAP ------------------------------------- Columns 001 072
   COMMAND===>                                                   SCROLL===> CSR
  ****** ****************************** top of data ****************************
  000001 NAME NATPARM ACMPARM
  000002 VER 000070 00000000
  000003 REP 000070 40404040
  ****** *************************** bottom of data ***************************





  Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
        Help  Split End   Suspe Rfind Rchan Up    Down  Swap  Left  Right :s
```

The output in the workpool shows the name of the load module and CSECT, and offset and the change made.