



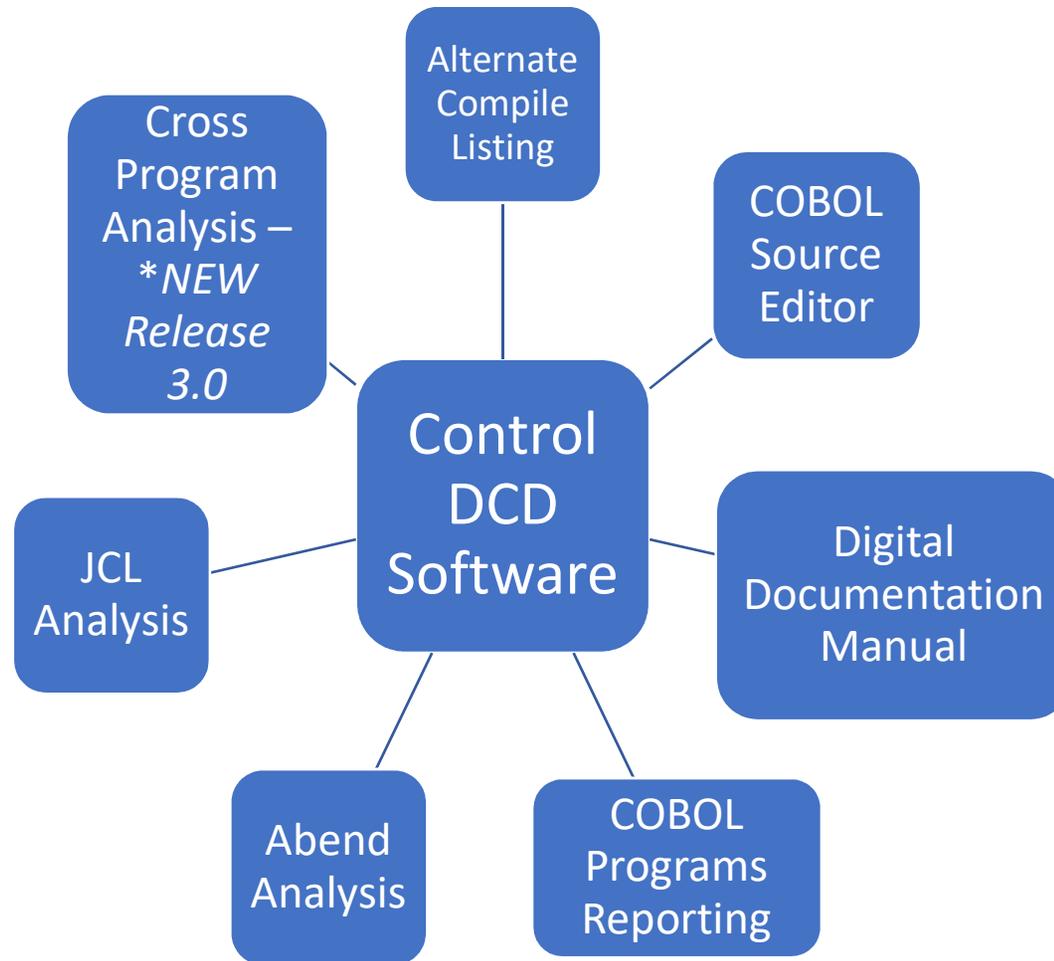
**Marble**  
*Enterprise Software*

# Control/DCD Training Manual

Release 2.3  
Updated September 1, 2018  
Marble Computer, Inc.

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# Control/DCD Components



# ISPF Panels

and the continued use of Alternate Compile Listing

- Control/DCD is now entirely run from **ISPF** panels
- In the 'Alternate Compile Listing', there is no more **Compile Mode** as Enterprise COBOL uses too much execution time
- Use Option 1 on the main panel also for 'Alternate Compile Listing' (ACL) - A very brief description of this long time existing feature will be shown later.
- In Summary, use ISPF, not JCL to create all reports!

The next panels show the use and initial set up of panels for **Control/DCD**

From the Control DCD main menu, Enter 1

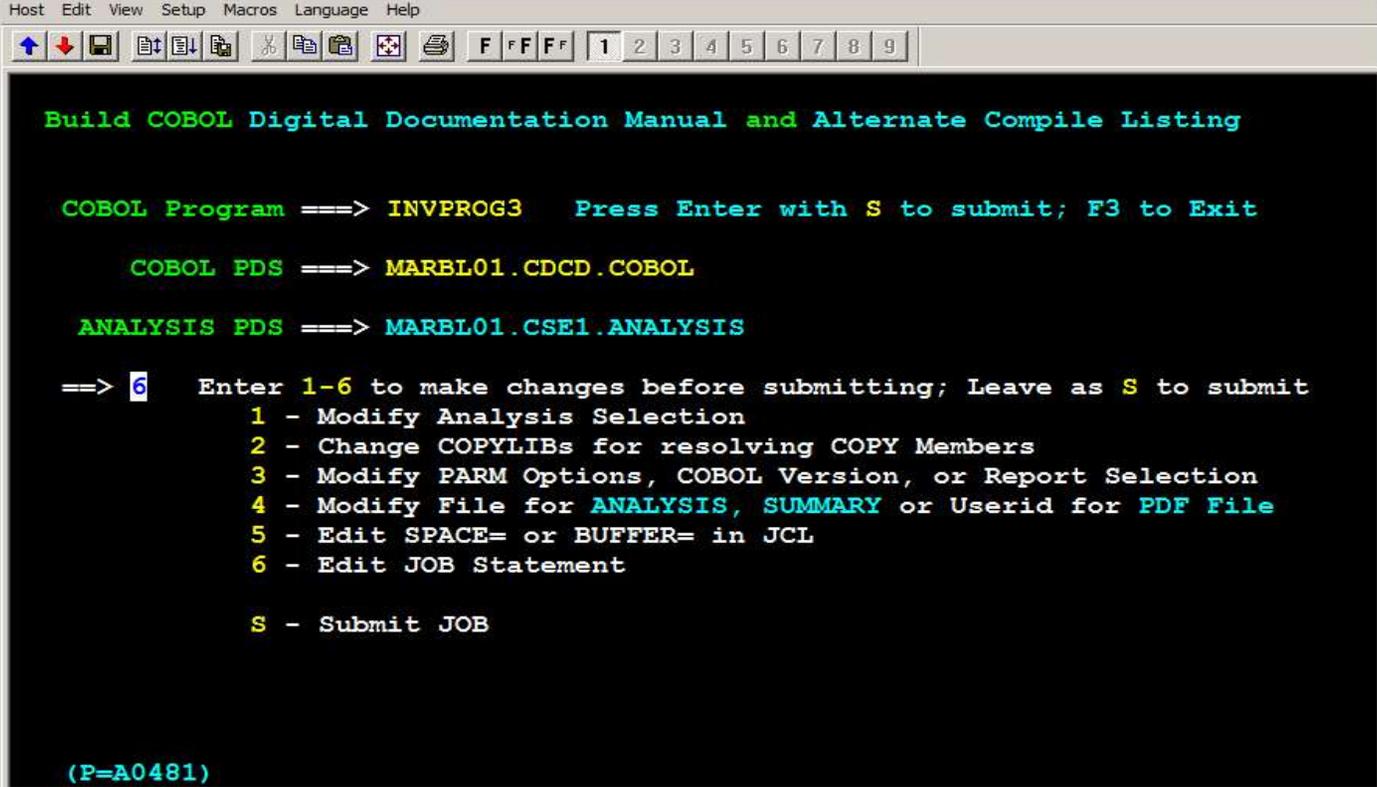
```
Host Edit View Setup Macros Language Help
Control/DCD The Ultimate COBOL Program and Application Analysis Tool
Option ==> 1 Enter 1-6, H or use F3 to exit)

1 Build a Digital Documentation Manual & Alterate Compile Listing
2 Build COBOL Program with F &operand Analysis for editing or browsing
3 Save COBOL Program without F &operand Analysis after ISPF editing
4 Analyze a Cobol Application
5 Abend Analysis for Data Field Errors
6 Verify JCL Accuracy within an Application
H HELP

Control/DCD Release 2.2
(P=DCD)
```

Press enter

## Use Option 6, to initially set up JOB Statement



```
Host Edit View Setup Macros Language Help
Build COBOL Digital Documentation Manual and Alternate Compile Listing

COBOL Program ==> INVPROG3 Press Enter with S to submit; F3 to Exit

COBOL PDS ==> MARBL01.CDCD.COBOL

ANALYSIS PDS ==> MARBL01.CSE1.ANALYSIS

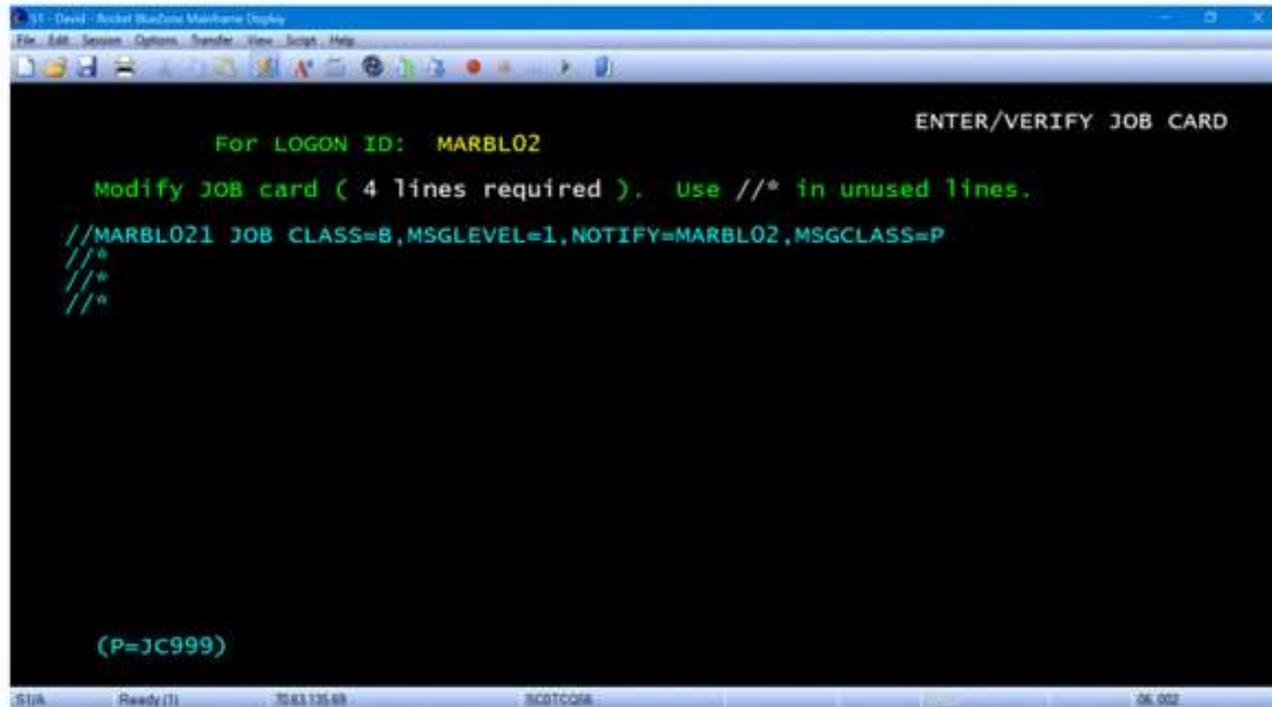
==> 6 Enter 1-6 to make changes before submitting; Leave as S to submit
    1 - Modify Analysis Selection
    2 - Change COPYLIBs for resolving COPY Members
    3 - Modify PARM Options, COBOL Version, or Report Selection
    4 - Modify File for ANALYSIS, SUMMARY or Userid for PDF File
    5 - Edit SPACE= or BUFFER= in JCL
    6 - Edit JOB Statement

    S - Submit JOB

(P=A0481)
```

Enter the JOB statement values according to Z/OS requirements and your installation standards. Use all 4 lines.

Here is an Example



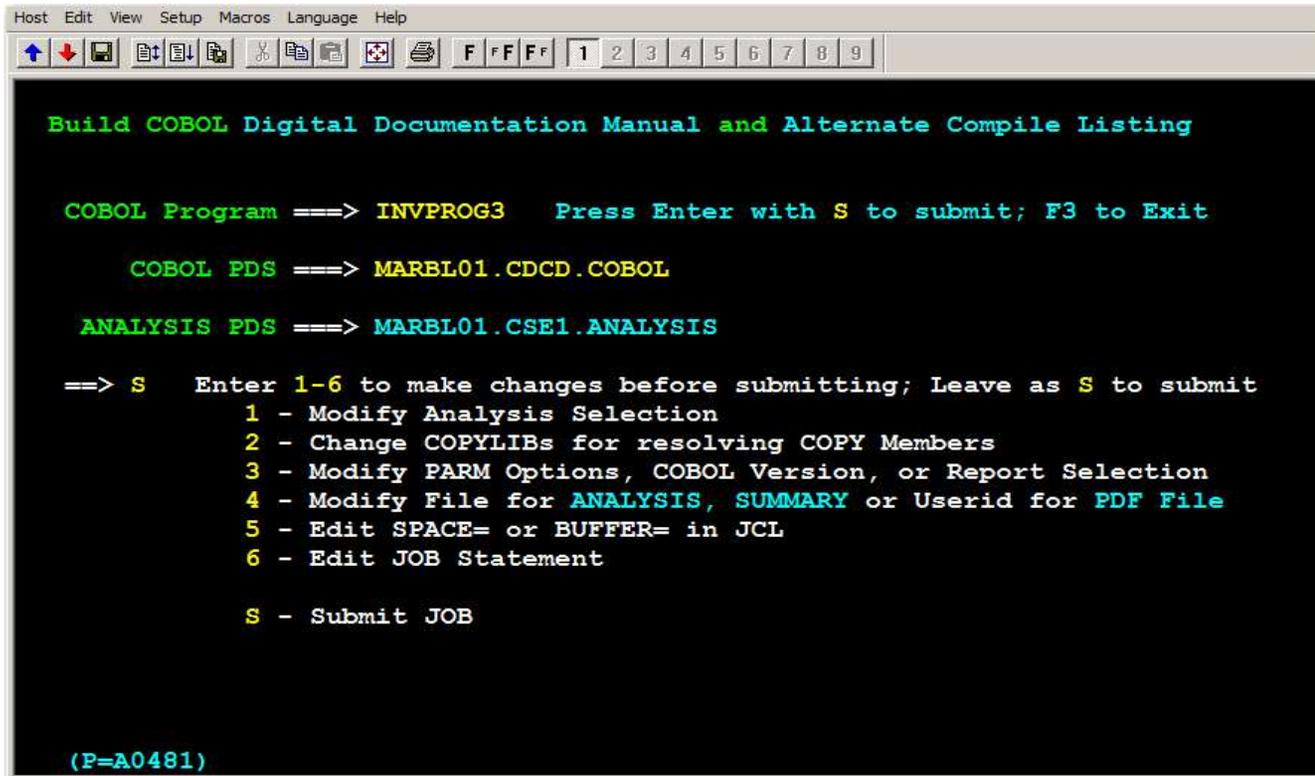
The screenshot shows a terminal window titled "ST - Dev1 - Acct BlueZone Mainframe Display". The window contains the following text:

```
ENTER/VERIFY JOB CARD  
  
For LOGON ID: MARBL02  
Modify JOB card ( 4 lines required ). Use /* in unused lines.  
//MARBLO21 JOB CLASS=B,MSGLEVEL=1,NOTIFY=MARBL02,MSGCLASS=P  
//  
//  
//  
//  
  
(P=JC999)
```

At the bottom of the terminal window, there is a status bar with the following information: "BTR", "Ready (1)", "08/11/2018", "SCOTCOLE", and "06:00Z".

Press enter to return to the menu.

1. Replace (or keep last used) Program Name
2. Verify or change input COBOL PDS
3. Use 'S' option to submit job



The screenshot shows a terminal window with a menu for submitting a COBOL job. The menu is titled "Build COBOL Digital Documentation Manual and Alternate Compile Listing". It lists the following options:

```
Build COBOL Digital Documentation Manual and Alternate Compile Listing

COBOL Program ==> INVPROG3   Press Enter with S to submit; F3 to Exit
COBOL PDS ==> MARBL01.CDCD.COBOL
ANALYSIS PDS ==> MARBL01.CSE1.ANALYSIS

==> S   Enter 1-6 to make changes before submitting; Leave as S to submit
      1 - Modify Analysis Selection
      2 - Change COPYLIBs for resolving COPY Members
      3 - Modify PARM Options, COBOL Version, or Report Selection
      4 - Modify File for ANALYSIS, SUMMARY or Userid for PDF File
      5 - Edit SPACE= or BUFFER= in JCL
      6 - Edit JOB Statement

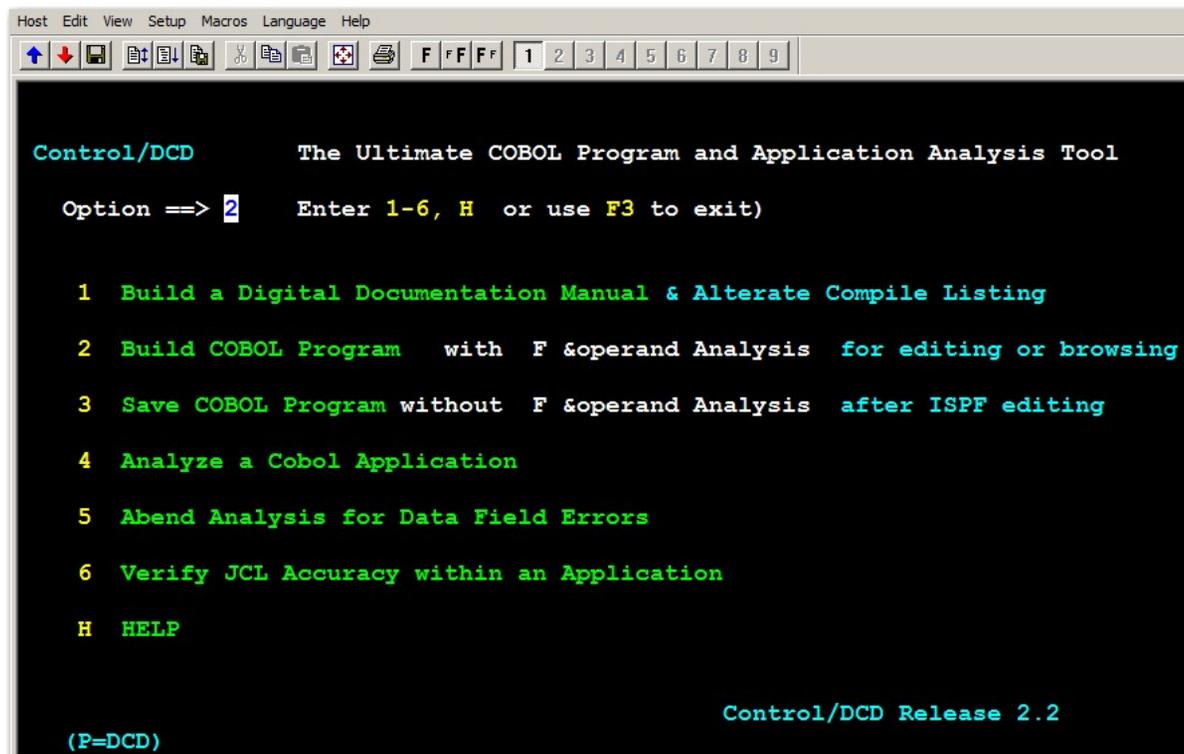
      S - Submit JOB

(P=A0481)
```

Press enter to submit job

# COBOL Source Editor in ISPF

A Control/DCD analytical PDS report is produced as a member on the EDITFILE PDS that can be browsed or edited using ISPF **using option 2**. In this feature, ALL code, analytics, and reports remain on the mainframe



The screenshot shows the Control/DCD ISPF menu interface. The window title is "Host Edit View Setup Macros Language Help". The menu text is as follows:

```
Control/DCD          The Ultimate COBOL Program and Application Analysis Tool
Option ==> 2        Enter 1-6, H or use F3 to exit)

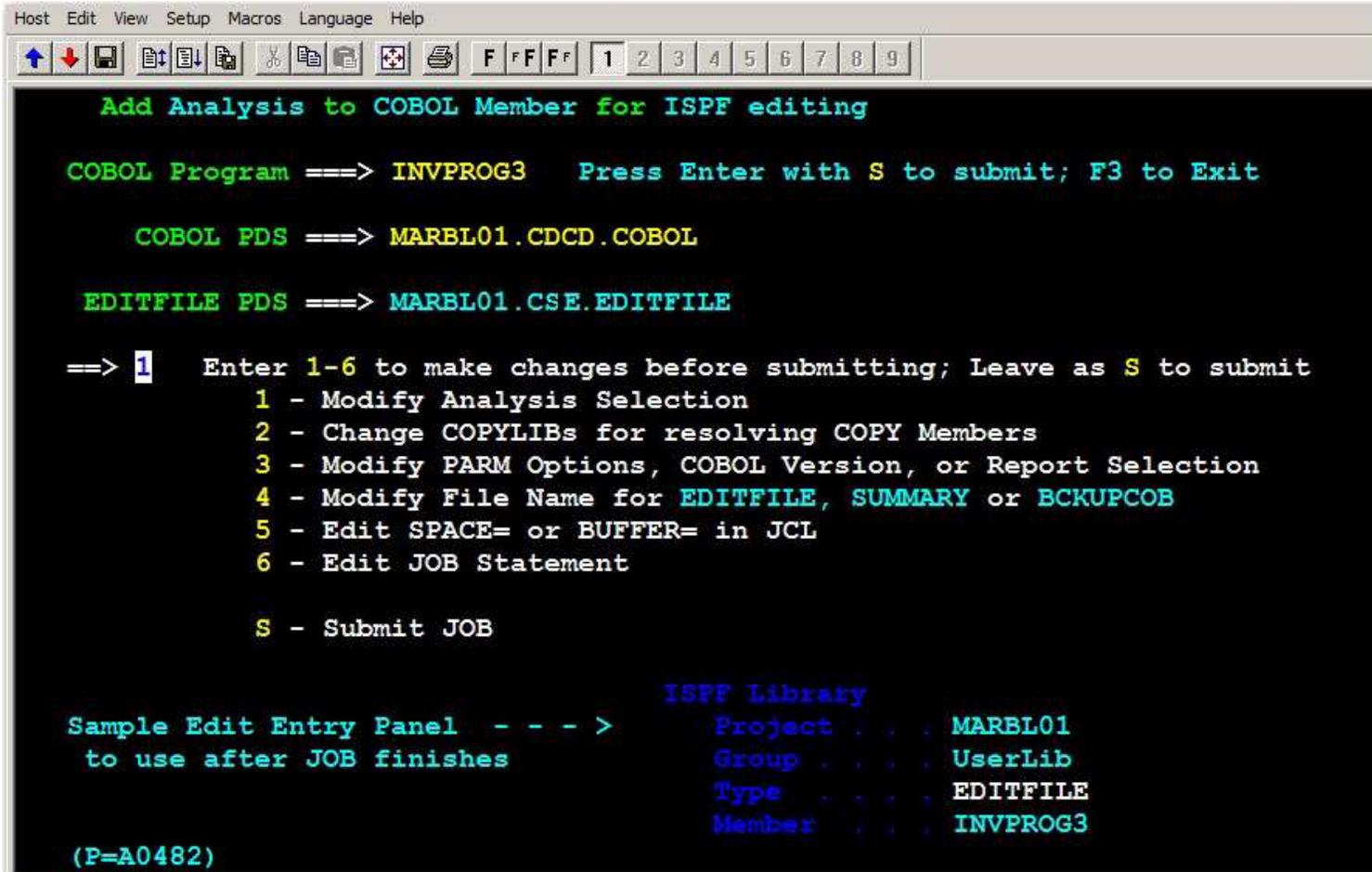
 1 Build a Digital Documentation Manual & Alterate Compile Listing
 2 Build COBOL Program with F &operand Analysis for editing or browsing
 3 Save COBOL Program without F &operand Analysis after ISPF editing
 4 Analyze a Cobol Application
 5 Abend Analysis for Data Field Errors
 6 Verify JCL Accuracy within an Application
 H HELP

Control/DCD Release 2.2
(P=DCD)
```

Select 2, then press enter

Option 1 used to Modify Analysis Selection

Option 2 used to Change COPYLIBs for resolving COPYs



```
Host Edit View Setup Macros Language Help
↑ ↓ [Icons] F F F F 1 2 3 4 5 6 7 8 9

Add Analysis to COBOL Member for ISPF editing

COBOL Program ==> INVPROG3 Press Enter with S to submit; F3 to Exit

COBOL PDS ==> MARBL01.CDCD.COBO

EDITFILE PDS ==> MARBL01.CSE.EDITFILE

==> 1 Enter 1-6 to make changes before submitting; Leave as S to submit
    1 - Modify Analysis Selection
    2 - Change COPYLIBs for resolving COPY Members
    3 - Modify PARM Options, COBOL Version, or Report Selection
    4 - Modify File Name for EDITFILE, SUMMARY or BCKUPCOB
    5 - Edit SPACE= or BUFFER= in JCL
    6 - Edit JOB Statement

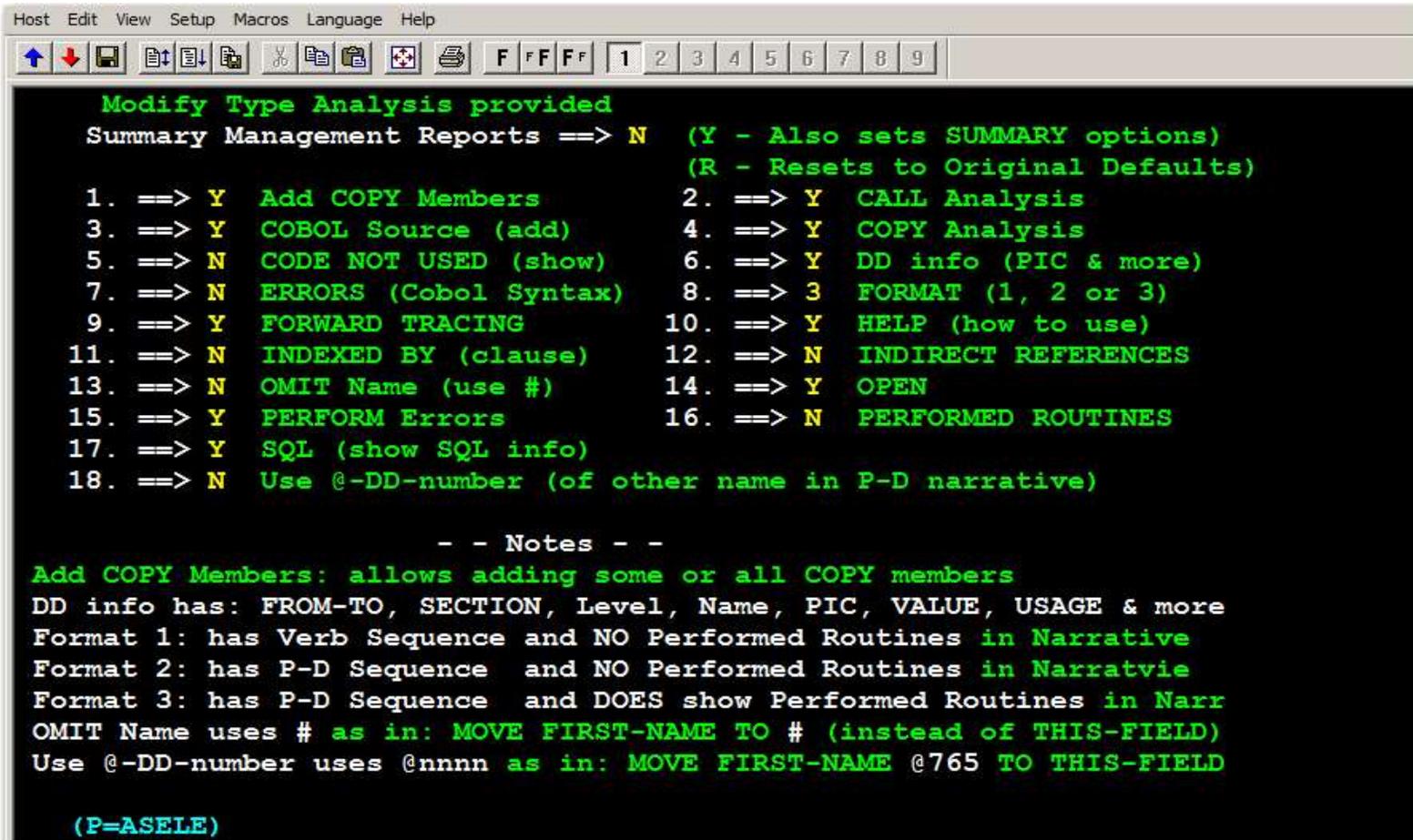
    S - Submit JOB

Sample Edit Entry Panel - - - >
to use after JOB finishes

ISPF Library
Project : MARBL01
Group : UserLib
Type : EDITFILE
Member : INVPROG3

(P=A0482)
```

The user may chose what type of **ANALYSIS** information will be included in the ISPF EDITFILE



```
Host Edit View Setup Macros Language Help
↑ ↓ [Icons] F F F F 1 2 3 4 5 6 7 8 9

Modify Type Analysis provided
Summary Management Reports ==> N (Y - Also sets SUMMARY options)
(R - Resets to Original Defaults)

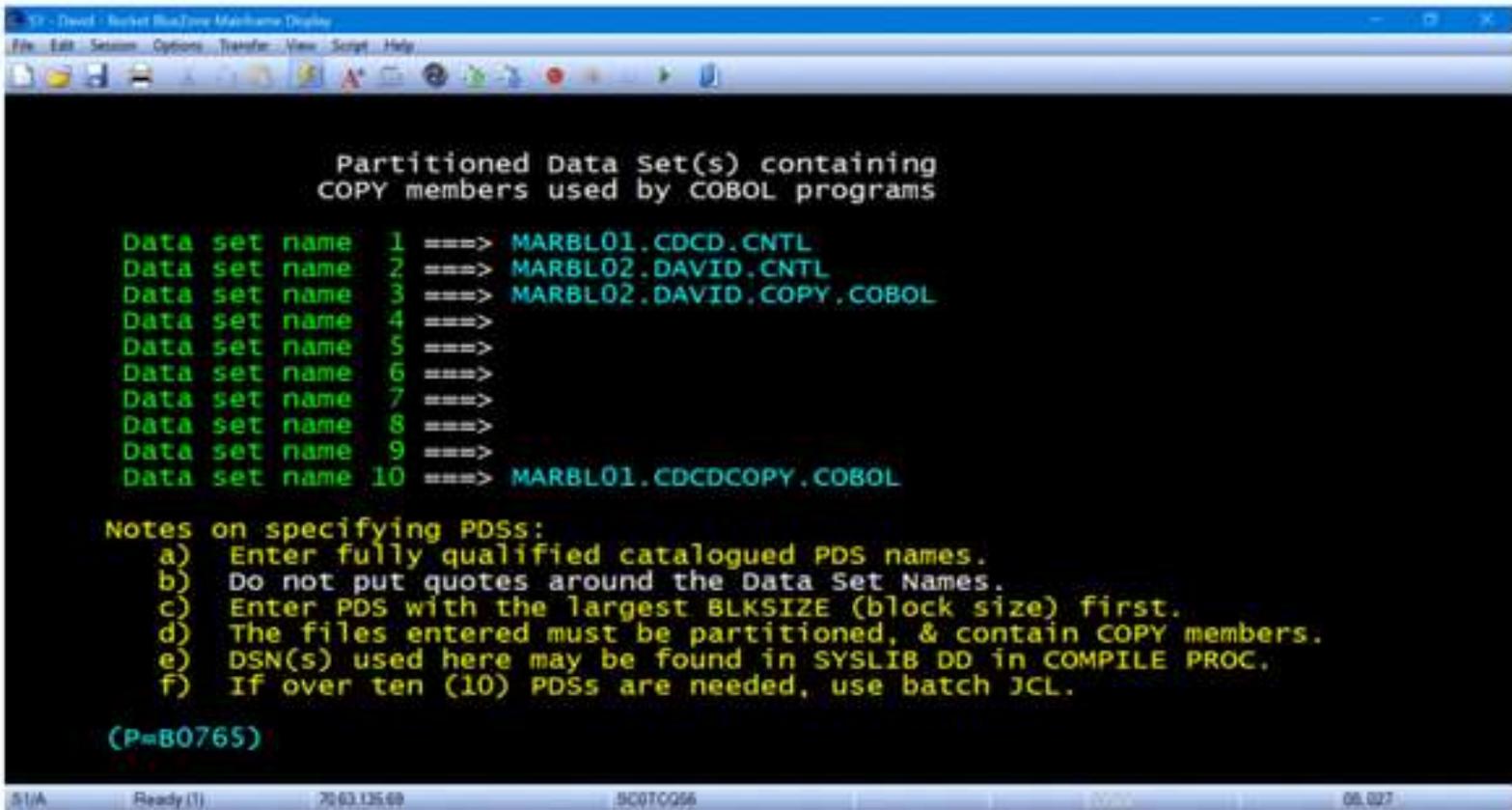
1. ==> Y Add COPY Members 2. ==> Y CALL Analysis
3. ==> Y COBOL Source (add) 4. ==> Y COPY Analysis
5. ==> N CODE NOT USED (show) 6. ==> Y DD info (PIC & more)
7. ==> N ERRORS (Cobol Syntax) 8. ==> 3 FORMAT (1, 2 or 3)
9. ==> Y FORWARD TRACING 10. ==> Y HELP (how to use)
11. ==> N INDEXED BY (clause) 12. ==> N INDIRECT REFERENCES
13. ==> N OMIT Name (use #) 14. ==> Y OPEN
15. ==> Y PERFORM Errors 16. ==> N PERFORMED ROUTINES
17. ==> Y SQL (show SQL info)
18. ==> N Use @-DD-number (of other name in P-D narrative)

- - Notes - -
Add COPY Members: allows adding some or all COPY members
DD info has: FROM-TO, SECTION, Level, Name, PIC, VALUE, USAGE & more
Format 1: has Verb Sequence and NO Performed Routines in Narrative
Format 2: has P-D Sequence and NO Performed Routines in Narratvie
Format 3: has P-D Sequence and DOES show Performed Routines in Narr
OMIT Name uses # as in: MOVE FIRST-NAME TO # (instead of THIS-FIELD)
Use @-DD-number uses @nnnn as in: MOVE FIRST-NAME @765 TO THIS-FIELD

(P=ASELE)
```

Examples for each type of ANALYSIS follow

Option 2 allows one time entering the correct COPYLIBs



```
David - Socket BlueZone Mainframe Display
File Edit Session Options Transfer View Script Help

Partitioned Data Set(s) containing
COPY members used by COBOL programs

Data set name 1 ==> MARBL01.CDCD.CNTL
Data set name 2 ==> MARBL02.DAVID.CNTL
Data set name 3 ==> MARBL02.DAVID.COPY.COBO
Data set name 4 ==>
Data set name 5 ==>
Data set name 6 ==>
Data set name 7 ==>
Data set name 8 ==>
Data set name 9 ==>
Data set name 10 ==> MARBL01.CDCDCOPY.COBO

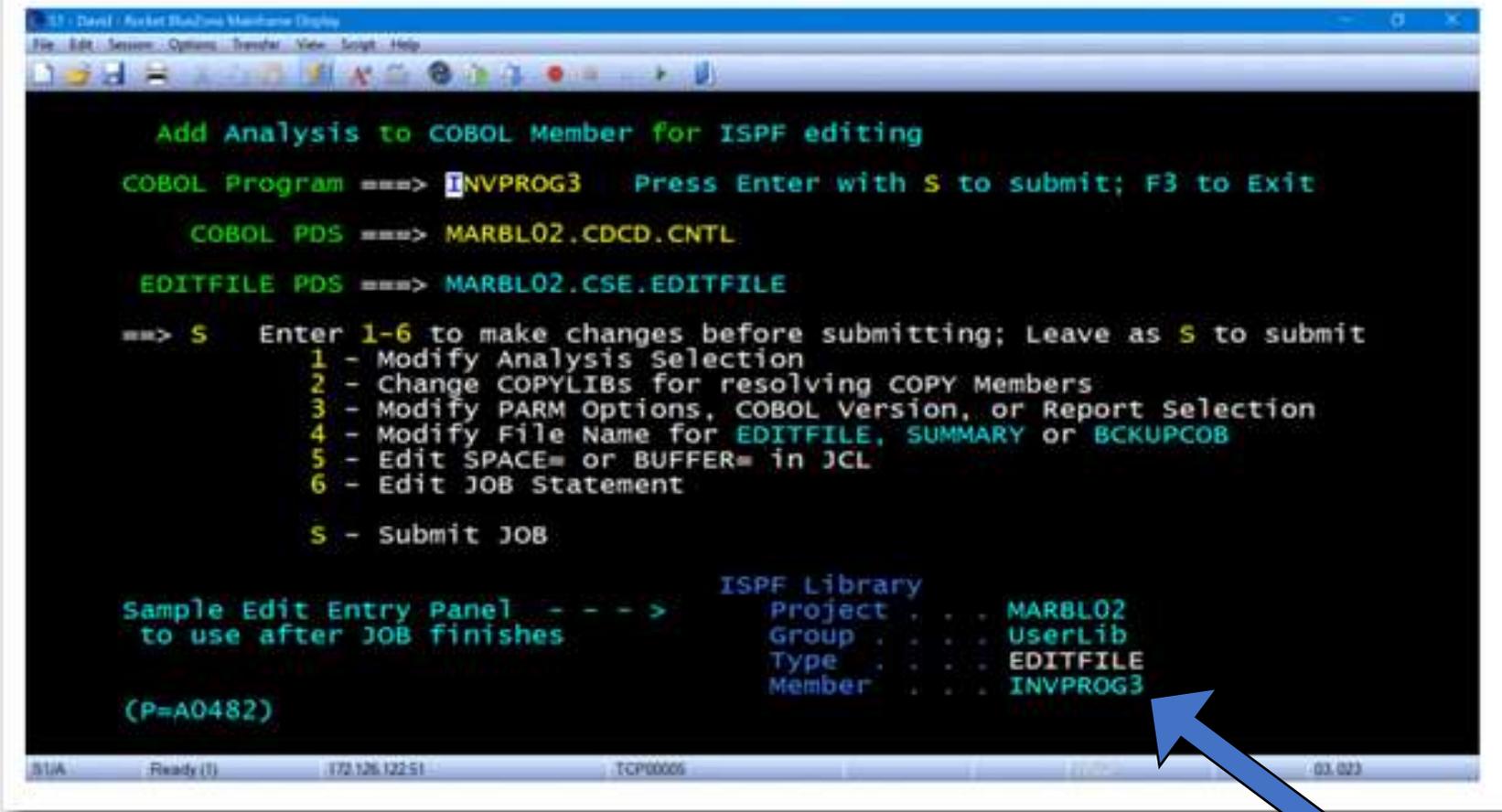
Notes on specifying PDSs:
a) Enter fully qualified catalogued PDS names.
b) Do not put quotes around the Data Set Names.
c) Enter PDS with the largest BLKSIZE (block size) first.
d) The files entered must be partitioned, & contain COPY members.
e) DSN(s) used here may be found in SYSLIB DD in COMPILE PROC.
f) If over ten (10) PDSs are needed, use batch JCL.

(P=B0765)

31/A Ready (1) 2003.125.09 SC07C056 08.027
```

Press enter to return to the menu.

This returns you to the Add Analysis to Cobol Member for ISPF editing sub menu.

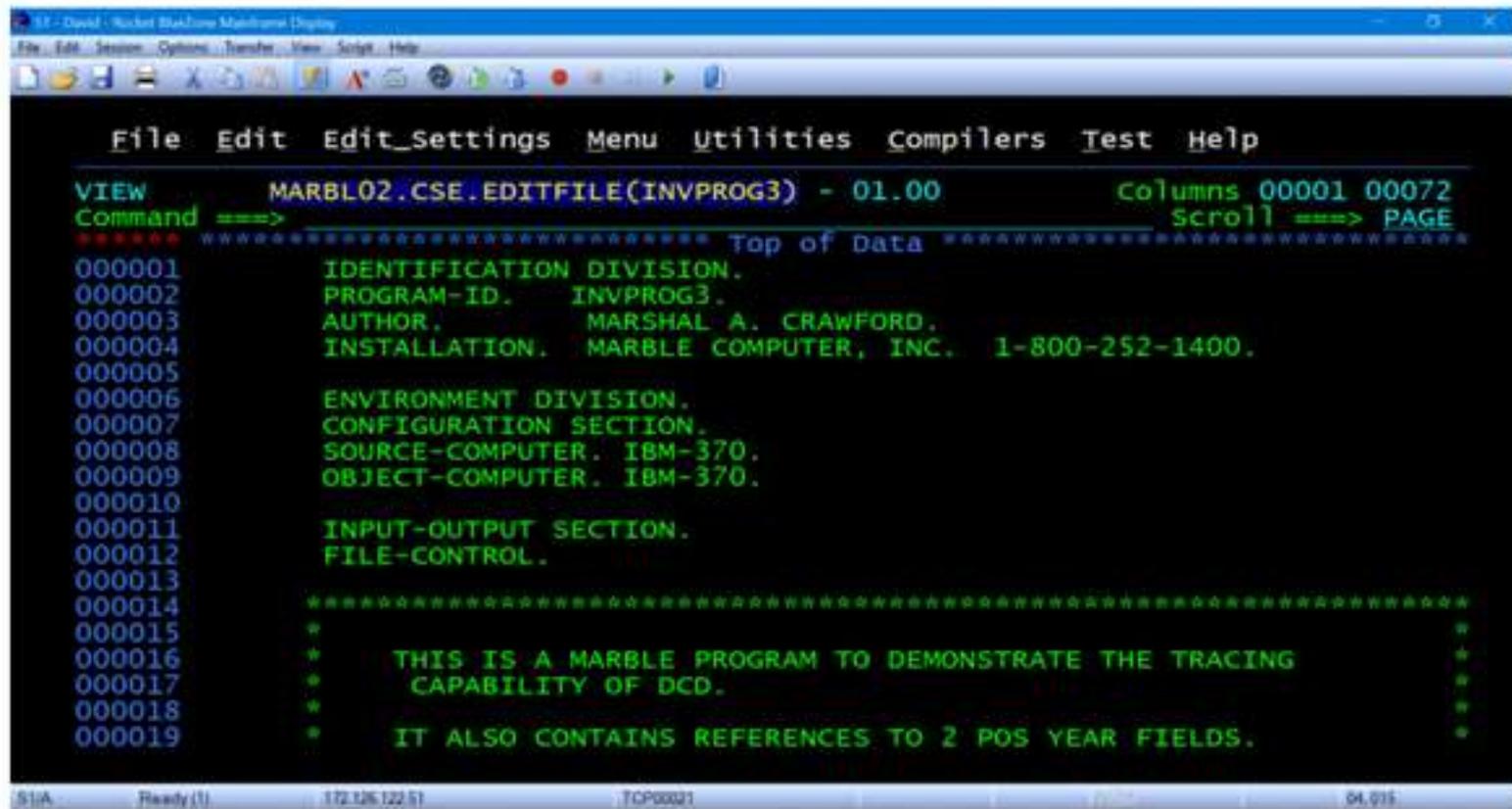


Use **S** option to **submit** job, then check return code.  
Then go to the Member built in **EDITFILE** to browse or edit.

Go to EDIT or BROWSE panel to see evaluation.  
*Use EDIT panel if user wants to edit source code for later saving.*

In this example;

MARBL02.CSE.EDITFILE(INVPROG3)



```
David - Rocket Blastfire Mainframe Display
File Edit Sessions Options Transfer View Script Help
VIEW MARBL02.CSE.EDITFILE(INVPROG3) - 01.00 Columns 00001 00072
Command =====> Scroll =====> PAGE
***** Top of Data *****
000001 IDENTIFICATION DIVISION.
000002 PROGRAM-ID. INVPROG3.
000003 AUTHOR. MARSHAL A. CRAWFORD.
000004 INSTALLATION. MARBLE COMPUTER, INC. 1-800-252-1400.
000005
000006 ENVIRONMENT DIVISION.
000007 CONFIGURATION SECTION.
000008 SOURCE-COMPUTER. IBM-370.
000009 OBJECT-COMPUTER. IBM-370.
000010
000011 INPUT-OUTPUT SECTION.
000012 FILE-CONTROL.
000013
000014 *****
000015 *
000016 * THIS IS A MARBLE PROGRAM TO DEMONSTRATE THE TRACING
000017 * CAPABILITY OF DCD.
000018 *
000019 * IT ALSO CONTAINS REFERENCES TO 2 POS YEAR FIELDS.
000019
510A Ready(1) 172.125.122.51 TOP00021 04.015
```

# Using **FIND** command to get documentation

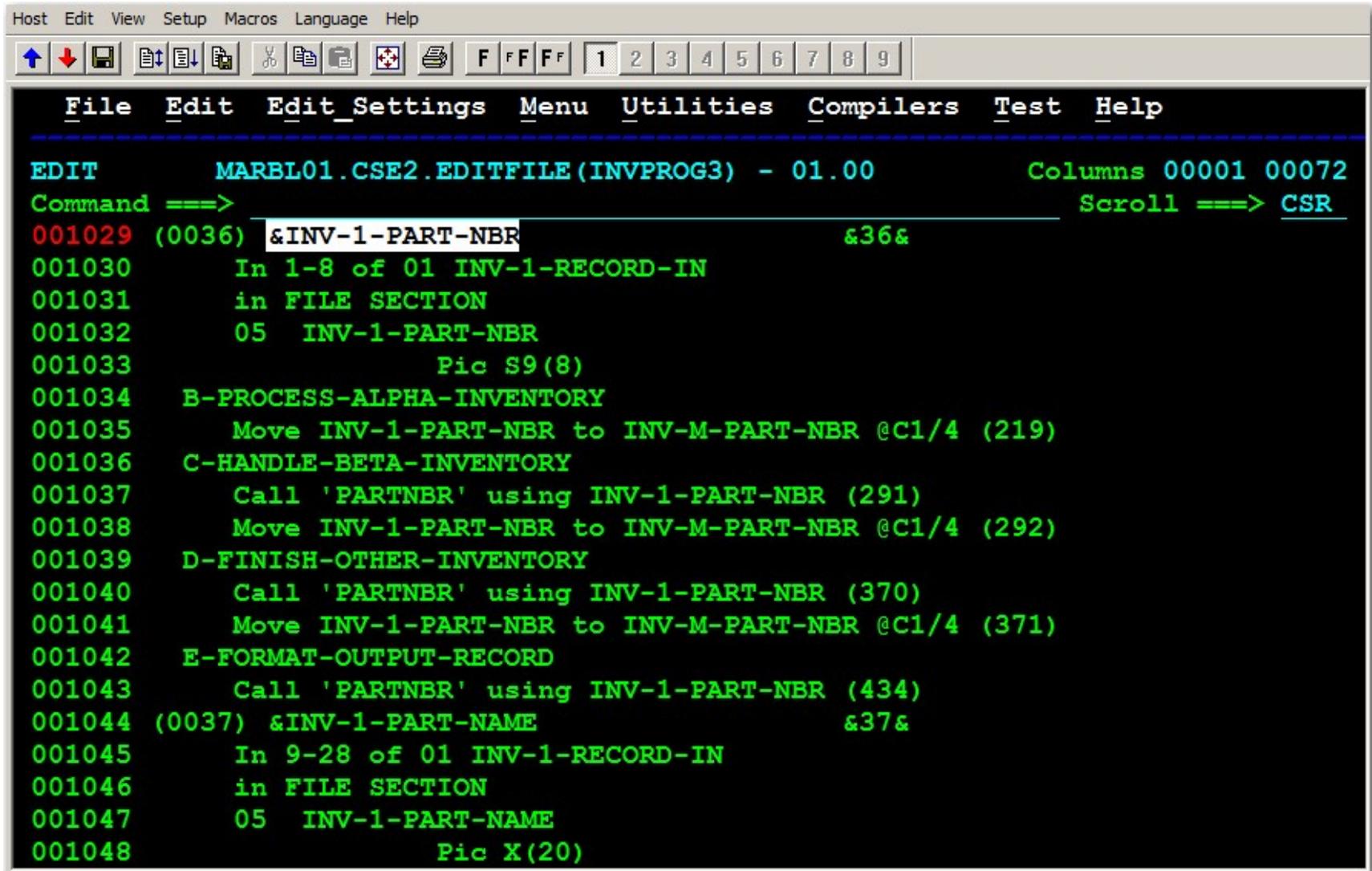
Unique **analysis** is available – Leading **&** is required.

Example of a simple FIND:      **FIND &COPY**

List of operands available using a leading **&**.

<b>Field Name</b>	<b>INDEX</b>
<b>Performed Routine</b>	<b>OPEN</b>
<b>CALL</b>	<b>PERFORM-ERRORS</b>
<b>COPY</b>	<b>PERFORMED-ROUTINES</b>
<b>CODE-NOT-USED</b>	<b>SQL</b>
<b>ERRORS</b>	<b>Cn/</b>
<b>FORWARD-TRACING</b>	<b>n FIRST</b>
<b>HELP</b>	<b>Copy-Member-Name</b>

# FIND &Data-Name Example – F &INV-1-PART-NBR



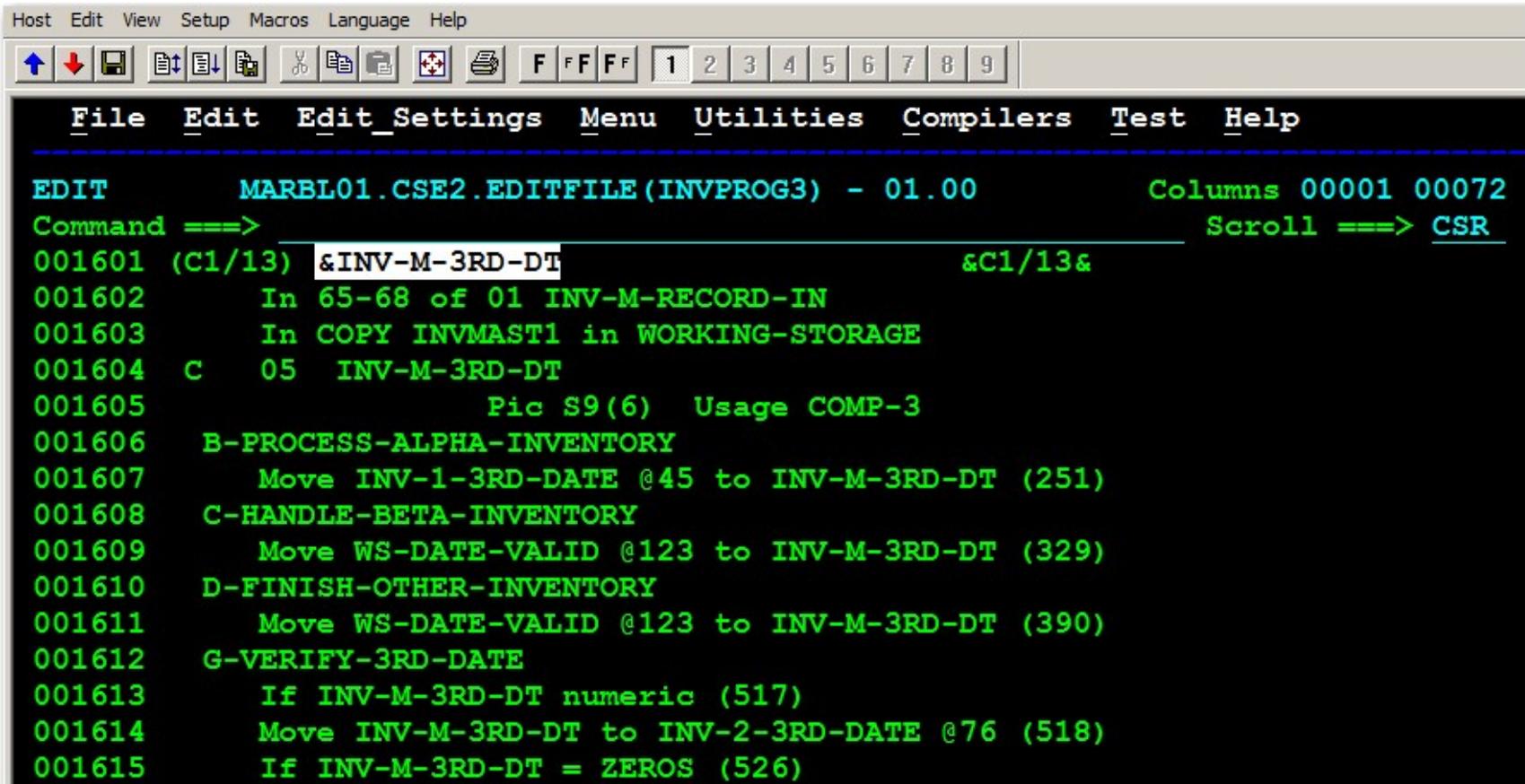
The screenshot shows a text editor window with a menu bar (Host, Edit, View, Setup, Macros, Language, Help) and a toolbar. The editor displays a COBOL program with the following code:

```
EDIT          MARBL01.CSE2.EDITFILE (INVPROG3) - 01.00          Columns 00001 00072
Command ==>                                          Scroll ==> CSR
001029 (0036) &INV-1-PART-NBR                                &36&
001030          In 1-8 of 01 INV-1-RECORD-IN
001031          in FILE SECTION
001032          05  INV-1-PART-NBR
001033                  Pic S9(8)
001034  B-PROCESS-ALPHA-INVENTORY
001035          Move INV-1-PART-NBR to INV-M-PART-NBR @C1/4 (219)
001036  C-HANDLE-BETA-INVENTORY
001037          Call 'PARTNBR' using INV-1-PART-NBR (291)
001038          Move INV-1-PART-NBR to INV-M-PART-NBR @C1/4 (292)
001039  D-FINISH-OTHER-INVENTORY
001040          Call 'PARTNBR' using INV-1-PART-NBR (370)
001041          Move INV-1-PART-NBR to INV-M-PART-NBR @C1/4 (371)
001042  E-FORMAT-OUTPUT-RECORD
001043          Call 'PARTNBR' using INV-1-PART-NBR (434)
001044 (0037) &INV-1-PART-NAME                                &37&
001045          In 9-28 of 01 INV-1-RECORD-IN
001046          in FILE SECTION
001047          05  INV-1-PART-NAME
001048                  Pic X(20)
```

# FIND &Data-Name Example - F &INV-M-3RD-DT

The first 5 lines show DATA DIVISION information.

The next 10 lines here show PROCEDURE DIVISION activity.



The screenshot shows a COBOL editor window with the following content:

```
Host Edit View Setup Macros Language Help
[Icons] F F F F 1 2 3 4 5 6 7 8 9
File Edit Edit Settings Menu Utilities Compilers Test Help
-----
EDIT      MARBL01.CSE2.EDITFILE(INVPROG3) - 01.00      Columns 00001 00072
Command ==>                                     Scroll ==> CSR
001601 (C1/13)  &INV-M-3RD-DT                          &C1/13&
001602      In 65-68 of 01 INV-M-RECORD-IN
001603      In COPY INVMAS1 in WORKING-STORAGE
001604 C      05  INV-M-3RD-DT
001605          Pic S9(6)  Usage COMP-3
001606 B-PROCESS-ALPHA-INVENTORY
001607      Move INV-1-3RD-DATE @45 to INV-M-3RD-DT (251)
001608 C-HANDLE-BETA-INVENTORY
001609      Move WS-DATE-VALID @123 to INV-M-3RD-DT (329)
001610 D-FINISH-OTHER-INVENTORY
001611      Move WS-DATE-VALID @123 to INV-M-3RD-DT (390)
001612 G-VERIFY-3RD-DATE
001613      If INV-M-3RD-DT numeric (517)
001614      Move INV-M-3RD-DT to INV-2-3RD-DATE @76 (518)
001615      If INV-M-3RD-DT = ZEROS (526)
```

# Example of F & FORWARD-TRACING

A hierarchy chart of Performed Routines  
Indented appropriately is shown

```
02 - David - Rocket BlueZone Mainframe Display
File Edit System Options Transfer View Script Help
File Edit Edit_Settings Menu Utilities Compilers Test Help
VIEW MARBL02.DAVID.EDITFILE(INVPROG3) - 01.00 CHARS 'FORWARD' found
Command ==>> Scroll ==> PAGE
000610 SQ-NBR MSG-NBR DESCRIPTION
000611 #FORWARD TRACING &FORWARD-TRACING
000612 1 155 &PROGRAM-ENTRY
000613 2 531 &P-TEST-PARM-FIELD
000614 3 187 &A-PROCESS-ALL-RECORDS --> (Perform/UNTIL)
000615 4 214 &B-PROCESS-ALPHA-INVENTORY
000616 5 422 &E-FORMAT-OUTPUT-RECORD
000617 6 514 &G-VERIFY-3RD-DATE
000618 7 286 &C-HANDLE-BETA-INVENTORY
000619 8 469 &F-DO-DATE-CHECK --> (3 Performs)
000620 (See #5) E-FORMAT-OUTPUT-RECORD
000621 9 363 &D-FINISH-OTHER-INVENTORY
000622 (See #8) F-DO-DATE-CHECK
000623 (See #5) E-FORMAT-OUTPUT-RECORD
000624 #INDEX &INDEX
000625 #COBOL PROGRAM HAS 546 RECORDS
000626 #ENDSOURCE HAS 1 RECORDS
000627 #HELP HAS 1 RECORDS OMITTED
000628 #HELP----- HAS 267 RECORDS
000629 #CALL REPORT HAS 6 RECORDS
```

## Example of FIND to Performed Routine – F &A-PROCESS-ALL

```
Host Edit View Setup Macros Language Help
↑ ↓ [Icons] F F F F 1 2 3 4 5 6 7 8 9
File Edit Edit_Settings Menu Utilities Compilers Test Help
-----
EDIT      MARBL01.CSE2.EDITFILE (INVPROG3) - 01.00      Columns 00001 00072
Command ==>                                     Scroll ==> CSR
000614 3   187      &A-PROCESS-ALL-RECORDS      --> (Perform/UNTIL)
000615 4   214      &B-PROCESS-ALPHA-INVENTORY
000616 5   422      &E-FORMAT-OUTPUT-RECORD
000617 6   514      &G-VERIFY-3RD-DATE
000618 7   286      &C-HANDLE-BETA-INVENTORY
000619 8   469      &F-DO-DATE-CHECK      --> (3 Performs)
000620 (See #5)      E-FORMAT-OUTPUT-RECORD
000621 9   363      &D-FINISH-OTHER-INVENTORY
000622 (See #8)      F-DO-DATE-CHECK
000623 (See #5)      E-FORMAT-OUTPUT-RECORD
000624 #HELP          &HELP
000625 --#HELP-----&HELP----- ( USER HELP INCLUDED )-----
000626                      HELP for Control/SE
000627      Control/SE is software for COBOL programs. It has three parts:
000628
000629      1.  An Editable Source File with viable ANALYSIS info added to it.
000630      2.  An 'Alternate Compile Listing' with special added ANALYSIS.
000631      3.  A Summary Management System maintains Analysis Info by program.
000632
000633 Editable Source File:
```

# Example of F & PERFORM-ERRORS

Every type of PERFORM-ERROR possible is found!

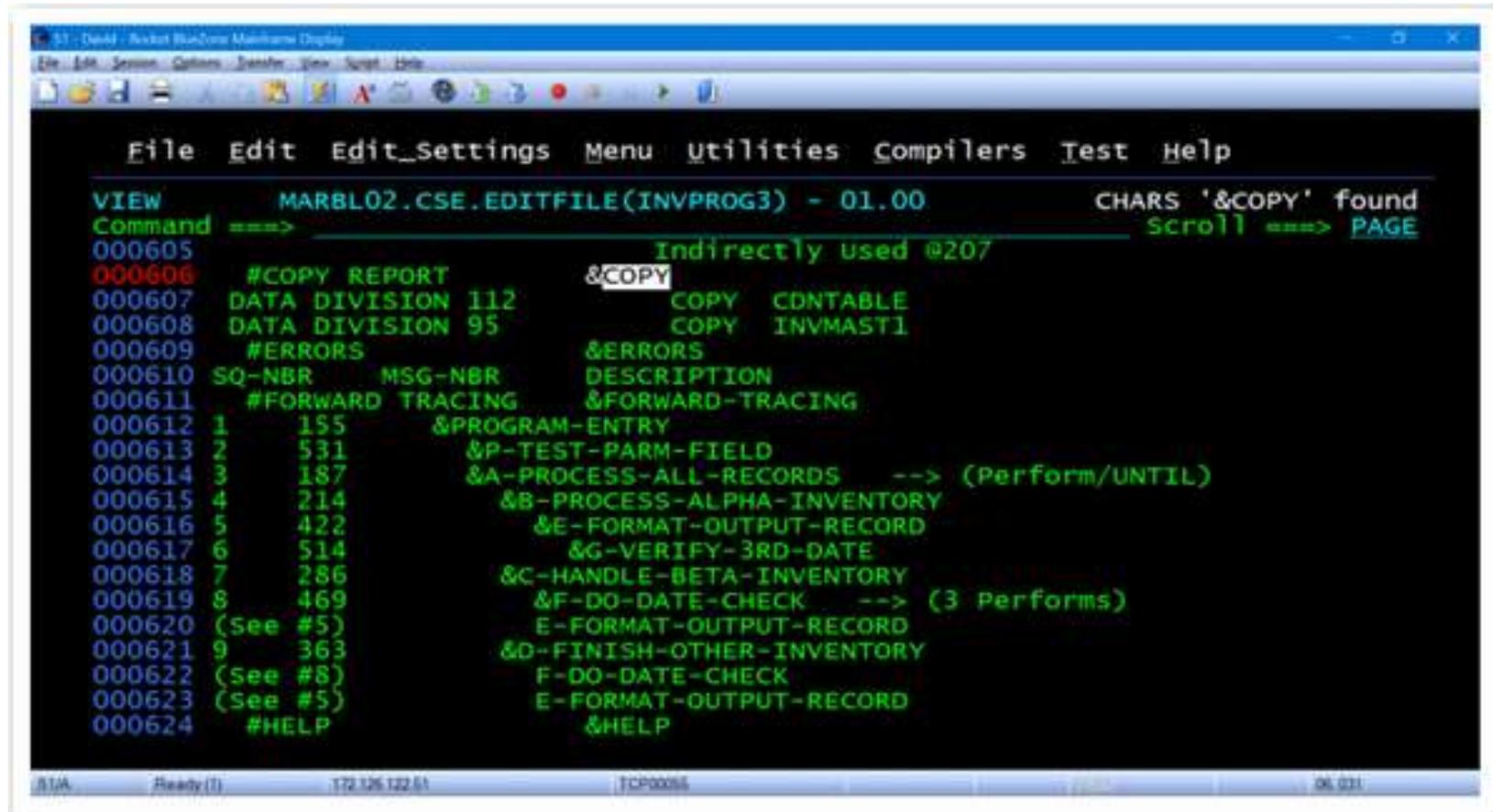
1. Major Errors include GO TOs leaving the PERFORM range
2. Moderate and Minor errors are also included

```
File Edit Edit_Settings Menu Utilities Compilers Test Help
VIEW      MARBL02.DAVID.EDITFILE(INVPROG3) - 01.00      CHARS 'Error' found
Command ==>                                     Scroll ==> PAGE
000745    ISPF Find on PERFORM-ANALYSIS
000746    SHOWS all Major, Moderate and Minor PERFORM Errors
000747    and Normal PERFORM and GO TO activity
000748
000749    EDIT      USERL03.EDITFILE(IPTPROG) - 01.00
000750    Command ==>      F & PERFORM-ANALYSIS (space after & to BYPASS FIND)
000751    002657 PERFORM warnings & Major Errors
000752    002658 Count   Type & Seq Nbr(s)
000753    002659
000754    002660 02   GO TOs leaving range of PERFORM   MAJOR PERFORM ERROR
000755    002661 477   589
000756    002662
000757    002663 03   Backward GO TO's               MINOR PERFORM WARNING
000758    002664 753   833   912
000759    002665
000760    002666 PERFORM & GO TO activity
000761    002667 Count   Type & Seq Nbr(s)
000762    002668
000763    002669 12   PERFORM SECTIONS
000764    002670 242   248   258   304   306   310

S1A Ready (1) 7063.135.69 SCOTCP29 06.072
```

# Example of **F** &COPY

Two Copy Members used in this program.



The screenshot shows a mainframe terminal window with a menu bar (File, Edit, Edit\_Settings, Menu, utilities, Compilers, Test, Help) and a command prompt. The program listing includes the following lines:

```
VIEW          MARBL02.CSE.EDITFILE(INVPROG3) - 01.00          CHARS '&COPY' found
Command =====>                                          scroll =====> PAGE
000605          Indirectly used @207
000606          #COPY REPORT          &COPY
000607          DATA DIVISION 112          COPY CDNTABLE
000608          DATA DIVISION 95          COPY INVMAS1
000609          #ERRORS          &ERRORS
000610          SQ-NBR          MSG-NBR          DESCRIPTION
000611          #FORWARD TRACING          &FORWARD-TRACING
000612          1          155          &PROGRAM-ENTRY
000613          2          531          &P-TEST-PARM-FIELD
000614          3          187          &A-PROCESS-ALL-RECORDS --> (Perform/UNTIL)
000615          4          214          &B-PROCESS-ALPHA-INVENTORY
000616          5          422          &E-FORMAT-OUTPUT-RECORD
000617          6          514          &G-VERIFY-3RD-DATE
000618          7          286          &C-HANDLE-BETA-INVENTORY
000619          8          469          &F-DO-DATE-CHECK --> (3 Performs)
000620          (See #5)          E-FORMAT-OUTPUT-RECORD
000621          9          363          &D-FINISH-OTHER-INVENTORY
000622          (See #8)          F-DO-DATE-CHECK
000623          (See #5)          E-FORMAT-OUTPUT-RECORD
000624          #HELP          &HELP
```

# Example of F &CALL

One ENTRY and four CALLs are found.

```

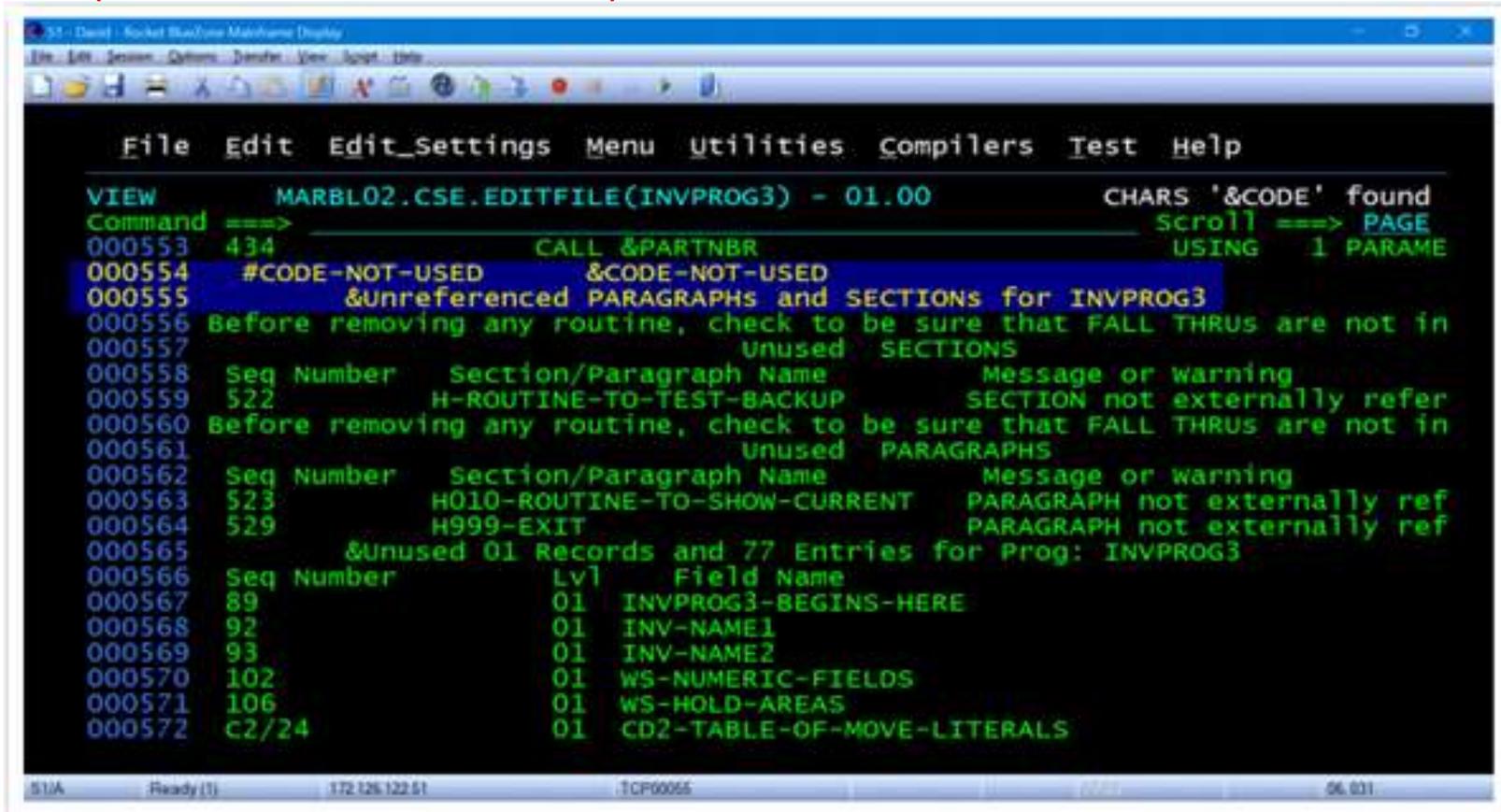
VIEW      MARBL02.CSE.EDITFILE(INVPROG3) - 01.00      CHARS '&CALL' found
Command ==>                                           Scroll ==> PAGE
000547 #ENDSOURCE          &ENDSOURCE
000548 #CALL REPORT        &CALL
000549 155          PROG ENTRY &INVPROG3          USING 1 PARAME
000550 158          CALL &CHECKPRM              USING 1 PARAME
000551 291          CALL &PARTNBR              USING 1 PARAME
000552 370          CALL &PARTNBR              USING 1 PARAME
000553 434          CALL &PARTNBR              USING 1 PARAME
000554 #CODE-NOT-USED      &CODE-NOT-USED
000555      &Unreferenced PARAGRAPHS and SECTIONS for INVPROG3
000556 Before removing any routine, check to be sure that FALL THRU's are not in
000557 Unused SECTIONS
000558 Seq Number  Section/Paragraph Name  Message or warning
000559 522        H-ROUTINE-TO-TEST-BACKUP  SECTION not externally refer
000560 Before removing any routine, check to be sure that FALL THRU's are not in
000561 Unused PARAGRAPHS
000562 Seq Number  Section/Paragraph Name  Message or warning
000563 523        H010-ROUTINE-TO-SHOW-CURRENT  PARAGRAPH not externally ref
000564 529        H999-EXIT                PARAGRAPH not externally ref
000565      &Unused 01 Records and 77 Entries for Prog: INVPROG3
000566 Seq Number  Lvl   Field Name

```

# Example of F &CODE-NOT-USED

CODE-NOT-USED brings in 3 type of reporting

1. DEAD PROCEDURE DIVISION CODE
2. Unused 01 records
3. (For non COPY records) Unused Data Names



```
File Edit Edit_Settings Menu utilities Compilers Test Help
VIEW MARBL02.CSE.EDITFILE(INVPROG3) - 01.00 CHARS '&CODE' found
Command ==> scroll ==> PAGE
000553 434 CALL &PARTNBR USING 1 PARAME
000554 #CODE-NOT-USED &CODE-NOT-USED
000555 &Unreferenced PARAGRAPHS and SECTIONS for INVPROG3
000556 Before removing any routine, check to be sure that FALL THRUS are not in
000557 Unused SECTIONS
000558 Seq Number Section/Paragraph Name Message or warning
000559 522 H-ROUTINE-TO-TEST-BACKUP SECTION not externally refer
000560 Before removing any routine, check to be sure that FALL THRUS are not in
000561 Unused PARAGRAPHS
000562 Seq Number Section/Paragraph Name Message or warning
000563 523 H010-ROUTINE-TO-SHOW-CURRENT PARAGRAPH not externally ref
000564 529 H999-EXIT PARAGRAPH not externally ref
000565 &Unused 01 Records and 77 Entries for Prog: INVPROG3
000566 Seq Number Lvl Field Name
000567 89 01 INVPROG3-BEGINS-HERE
000568 92 01 INV-NAME1
000569 93 01 INV-NAME2
000570 102 01 WS-NUMERIC-FIELDS
000571 106 01 WS-HOLD-AREAS
000572 C2/24 01 CD2-TABLE-OF-MOVE-LITERALS
S10A Ready (1) 172.126.122.51 TCP00055 06.031
```

# F &ERRORS Example

```
Host Edit View Setup Macros Language Help
↑ ↓ [Icons] F F F F 1 2 3 4 5 6 7 8 9
File Edit Edit Settings Menu Utilities Compilers Test Help
EDIT MARBL01.CSE2.EDITFILE (TSTENTRY) - 01.00 Columns 00001 00072
Command ==> Scroll ==> CSR
000641 #ERRORS &ERRORS
000642 SQ-NBR MSG-NBR DESCRIPTION
000643 162 CSEM5J01-W THE NAME ( NAME-NOT-FOUND ) DOES NOT MATCH TO A DATA
000644 DIVISION NAME
000645 TOTAL NUMBER OF W LEVEL MESSAGES = 1
000646 TOTAL NUMBER OF MESSAGES = 1
000647 #FORWARD TRACING &FORWARD-TRACING
000648 1 508 &ENTRY 'ENTRY001'
000649 1 530 &ENTRY 'ENTRY002'
000650 1 154 &PROGRAM-ENTRY
000651 2 562 &P-TEST-PARM-FIELD
000652 3 187 &A-PROCESS-ALL-RECORDS --> (Perform/UNTIL)
000653 4 212 &B-PROCESS-ALPHA-INVENTORY
000654 5 415 &E-FORMAT-OUTPUT-RECORD
000655 6 506 &G-VERIFY-3RD-DATE
000656 7 537 &J-TEST-NEW-ROUTINE
000657 (See #2) P-TEST-PARM-FIELD
000658 8 284 &C-HANDLE-BETA-INVENTORY
000659 9 459 &F-DO-DATE-CHECK --> (3 Performs)
000660 (See #5) E-FORMAT-OUTPUT-RECORD
```

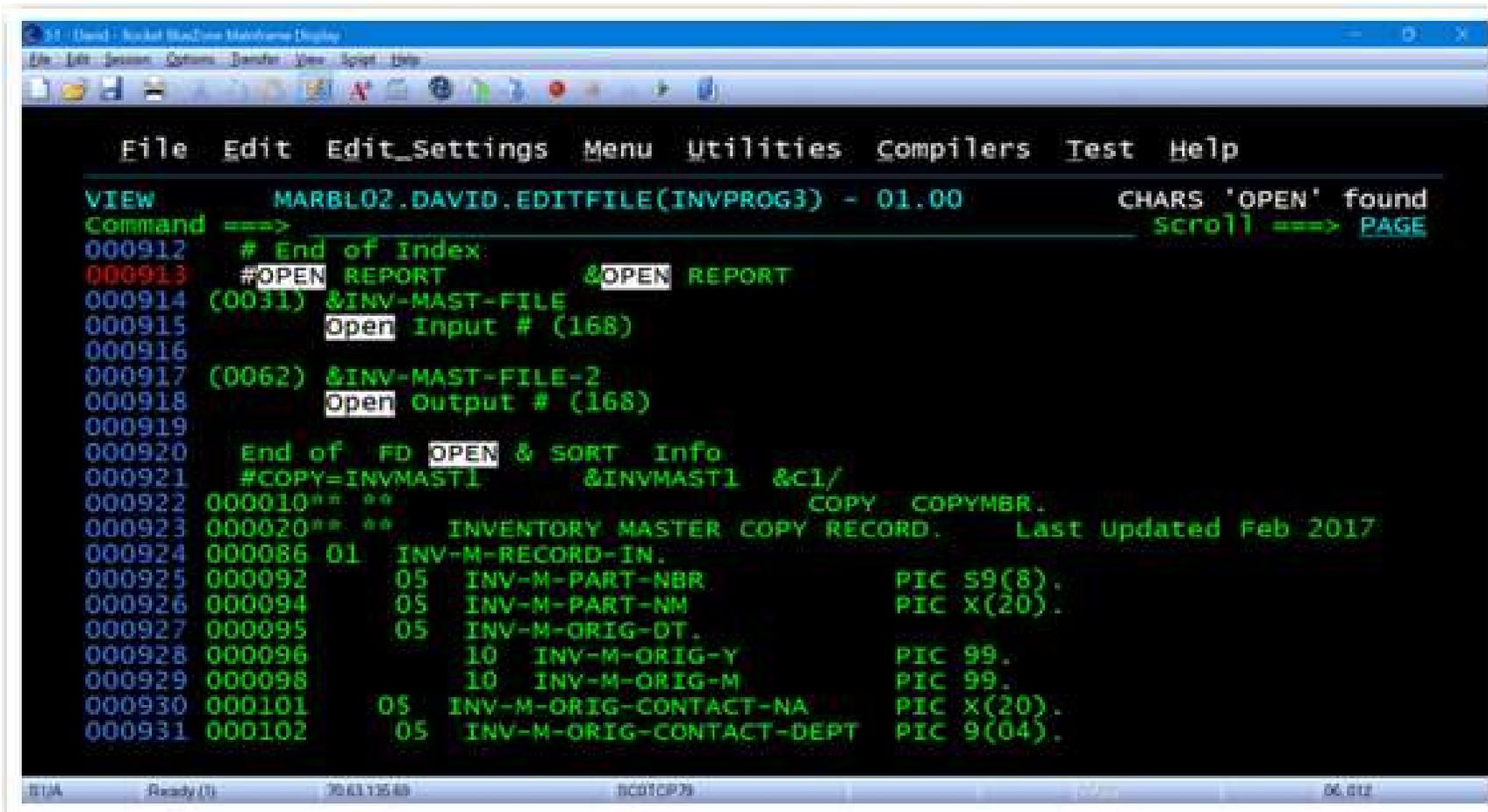
# Example of F &INDEX

Shows an INDEX of everything available

```
VIEW      MARBL02.DAVID.EDITFILE(INVPROG3) - 01.00      CHARS '&ERRORS' found
Command  ==>>>                                         Scroll ==>> PAGE
000608   DATA DIVISION 95                               COPY INVMAST1
000609   #ERRORS                                         &ERRORS
000610   SQ-NBR      MSG-NBR      DESCRIPTION
000611   #INDEX                                           &INDEX
000612   #COBOL PROGRAM      HAS          546 RECORDS
000613   #ENDSOURCE          HAS           1 RECORDS
000614   #HELP               HAS           1 RECORDS      OMITTED
000615   #HELP-----HAS          267 RECORDS
000616   #CALL REPORT        HAS           6 RECORDS
000617   #COPY REPORT        HAS           3 RECORDS
000618   #PERFORM-ANALYSIS    HAS          19 RECORDS      OMITTED
000619   #COPY=INVMAST1       HAS          29 RECORDS      C1/..
000620   #COPY=CDNTABLE      HAS          31 RECORDS      C2/..
000621   #OPEN REPORT        HAS           8 RECORDS      OMITTED
000622   #SQL REPORT         HAS           2 RECORDS
000623   #NARRATIVE REPORT    HAS          861 RECORDS      FORMAT 1
000624   NOTES - WITH FORMAT 1 USE ( OMIT DD-ATTRIBUTES ) FOR LESS RECDS
000625   USE ( FORMAT 3 ) TO ADD PERFORMED-NAMES TO NARRATIVE
000626   #FORWARD TRACING      HAS          13 RECORDS      OMITTED
000627   #CODE-NOT-USED        HAS          52 RECORDS
```

# Example of F & OPEN

This FIND shows all COBOL OPENs in a program



```
File Edit Edit_Settings Menu Utilities Compilers Test Help
VIEW MARBL02.DAVID.EDITFILE(INVPROG3) - 01.00 CHARS 'OPEN' found
Command ==> scroll ==> PAGE
000912 # End of Index:
000913 #OPEN REPORT &OPEN REPORT
000914 (0031) &INV-MAST-FILE
000915 open Input # (168)
000916
000917 (0062) &INV-MAST-FILE-2
000918 open Output # (168)
000919
000920 End of FD OPEN & SORT Info
000921 #COPY=INVMAST1 &INVMAST1 &C1/
000922 000010** ** COPY COPYMBR.
000923 000020** ** INVENTORY MASTER COPY RECORD. Last Updated Feb 2017
000924 000086 01 INV-M-RECORD-IN.
000925 000092 05 INV-M-PART-NBR PIC S9(8).
000926 000094 05 INV-M-PART-NM PIC X(20).
000927 000095 05 INV-M-ORIG-DT.
000928 000096 10 INV-M-ORIG-Y PIC 99.
000929 000098 10 INV-M-ORIG-M PIC 99.
000930 000101 05 INV-M-ORIG-CONTACT-NA PIC X(20).
000931 000102 05 INV-M-ORIG-CONTACT-DEPT PIC 9(04).
```

# Example of F & PERFORMED-ROUTINES

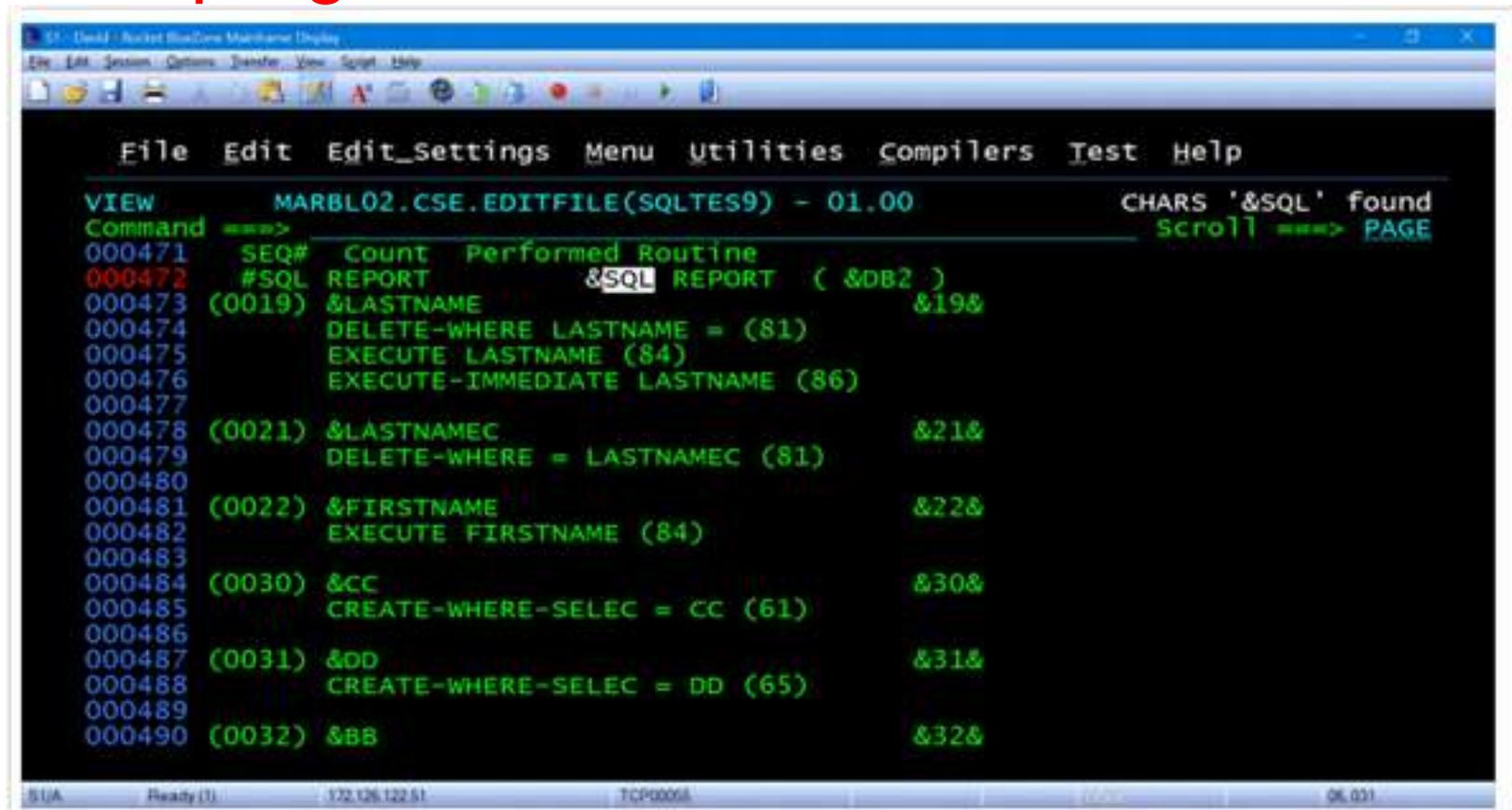
This shows all PERFORMs with count and type



```
File Edit Edit_Settings Menu Utilities Compilers Test Help
VIEW MARBL02.DAVID.EDITFILE(INVPROG3) - 01.00 Columns 00001 00072
Command ==> Scroll ==> PAGE
000938 07 GO TO Paragraphs
000939 474 481 485 495 504 527 544
000940 #PERFORMED-ROUTINES &PERFORMED-ROUTINES
000941 SEQ# Count Performed Routine
000942 155 1 PROGRAM-ENTRY PROGRAM-ENTRY
000943 187 1 PERFORM A-PROCESS-ALL-RECORDS UNTIL=1
000944 214 1 PERFORM B-PROCESS-ALPHA-INVENTORY
000945 286 1 PERFORM C-HANDLE-BETA-INVENTORY
000946 363 1 PERFORM D-FINISH-OTHER-INVENTORY
000947 422 3 PERFORM E-FORMAT-OUTPUT-RECORD
000948 469 4 PERFORM F-DO-DATE-CHECK
000949 514 1 PERFORM G-VERIFY-3RD-DATE
000950 #COPY=INVMAS1 &INVMAS1 &C1/
000951 000010** ** COPY COPYMBR.
000952 000020** ** INVENTORY MASTER COPY RECORD. Last Updated Feb 2017
000953 000086 01 INV-M-RECORD-IN.
000954 000092 05 INV-M-PART-NBR PIC S9(8).
000955 000094 05 INV-M-PART-NM PIC X(20).
000956 000095 05 INV-M-ORIG-DT.
000957 000096 10 INV-M-ORIG-Y PIC 99.
```

## Example of F &SQL

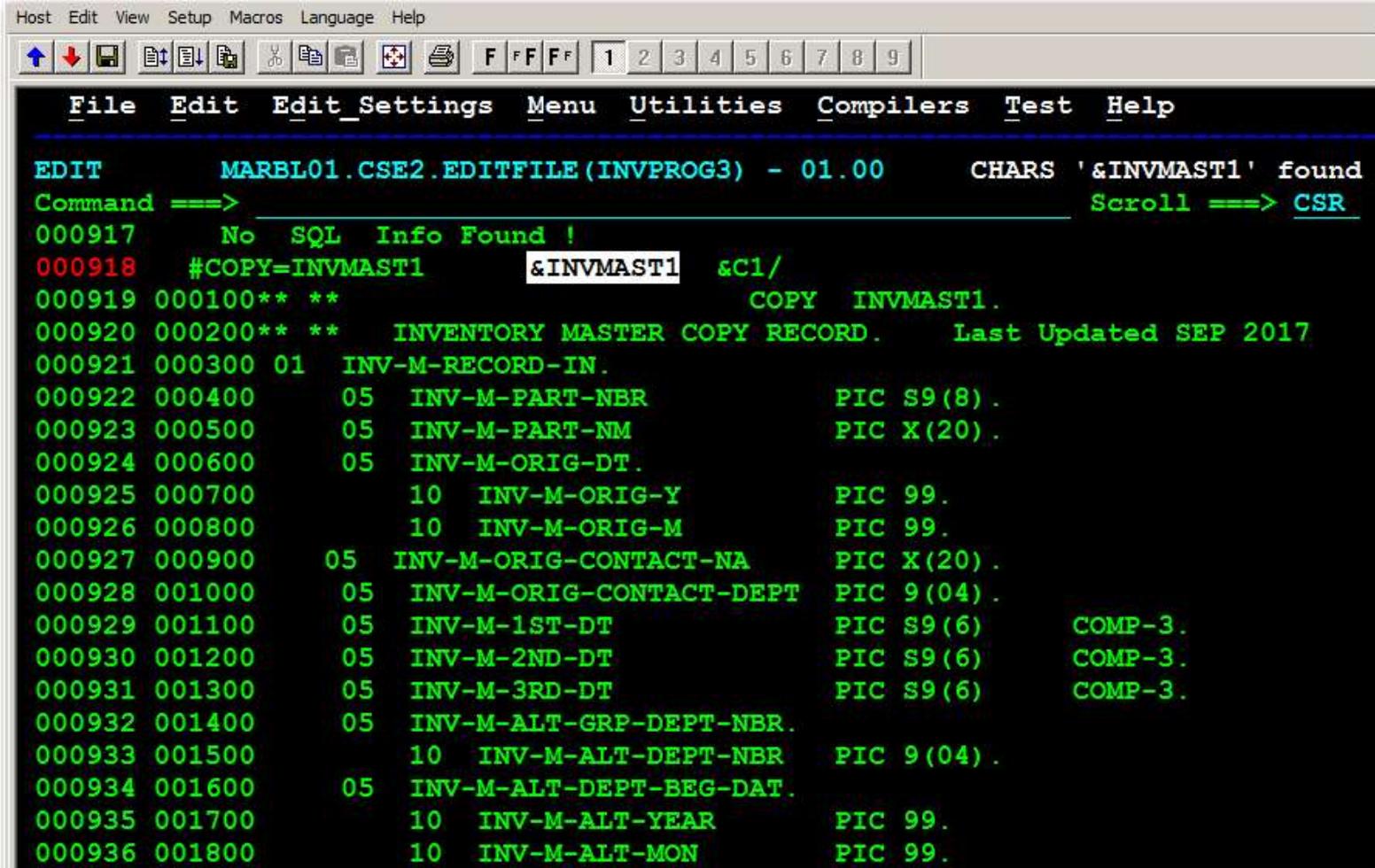
SQL code is shown at one glance for the entire program.



The screenshot shows a mainframe terminal window with a menu bar (File, Edit, Edit\_Settings, Menu, Utilities, Compilers, Test, Help) and a title bar (MARBLO2.CSE.EDITFILE(SQLTES9) - 01.00). The main display area contains a table of SQL code segments. The table has columns for Command, SEQ#, Count, Performed Routine, and CHARS. The code segments are listed as follows:

Command	SEQ#	Count	Performed Routine	CHARS
				'&SQL' found
				Scroll ==> PAGE
000471			SEQ# Count Performed Routine	
000472			#SQL REPORT &SQL REPORT ( &DB2 )	
000473	(0019)		&LASTNAME	&19&
000474			DELETE-WHERE LASTNAME = (81)	
000475			EXECUTE LASTNAME (84)	
000476			EXECUTE-IMMEDIATE LASTNAME (86)	
000477				
000478	(0021)		&LASTNAMEC	&21&
000479			DELETE-WHERE = LASTNAMEC (81)	
000480				
000481	(0022)		&FIRSTNAME	&22&
000482			EXECUTE FIRSTNAME (84)	
000483				
000484	(0030)		&CC	&30&
000485			CREATE-WHERE-SELEC = CC (61)	
000486				
000487	(0031)		&DD	&31&
000488			CREATE-WHERE-SELEC = DD (65)	
000489				
000490	(0032)		&BB	&32&

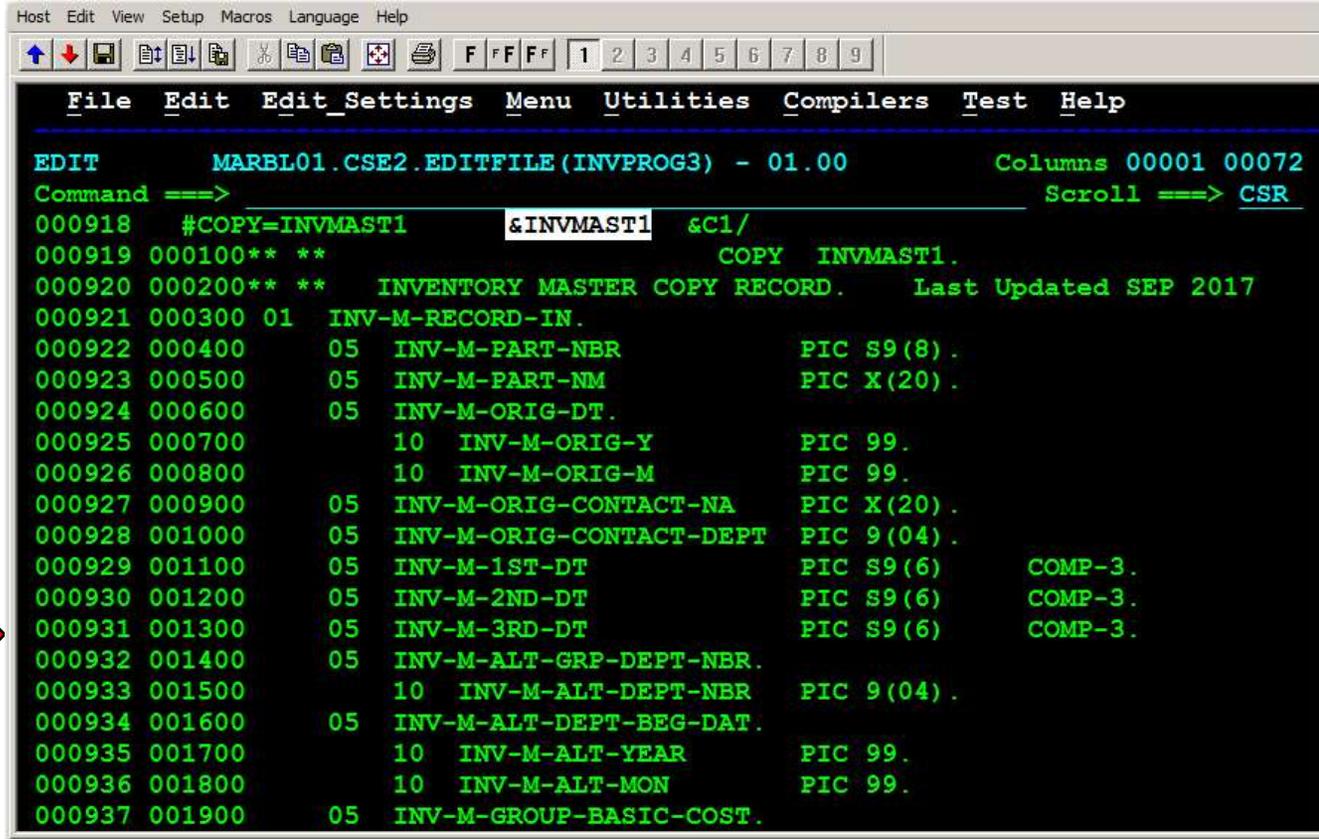
# FIND &Copy-Member-Name example – F &INVMAS1



The screenshot shows a COBOL editor window with the following content:

```
Host Edit View Setup Macros Language Help
File Edit Edit_Settings Menu Utilities Compilers Test Help
EDIT      MARBL01.CSE2.EDITFILE (INVPROG3) - 01.00      CHARS '&INVMAS1' found
Command ==>                                         Scroll ==> CSR
000917      No SQL Info Found !
000918      #COPY=INVMAS1      &INVMAS1      &C1/
000919 000100** **                                COPY INVMAS1.
000920 000200** **      INVENTORY MASTER COPY RECORD.      Last Updated SEP 2017
000921 000300 01      INV-M-RECORD-IN.
000922 000400      05      INV-M-PART-NBR      PIC S9(8) .
000923 000500      05      INV-M-PART-NM      PIC X(20) .
000924 000600      05      INV-M-ORIG-DT.
000925 000700      10      INV-M-ORIG-Y      PIC 99 .
000926 000800      10      INV-M-ORIG-M      PIC 99 .
000927 000900      05      INV-M-ORIG-CONTACT-NA      PIC X(20) .
000928 001000      05      INV-M-ORIG-CONTACT-DEPT      PIC 9(04) .
000929 001100      05      INV-M-1ST-DT      PIC S9(6)      COMP-3 .
000930 001200      05      INV-M-2ND-DT      PIC S9(6)      COMP-3 .
000931 001300      05      INV-M-3RD-DT      PIC S9(6)      COMP-3 .
000932 001400      05      INV-M-ALT-GRP-DEPT-NBR.
000933 001500      10      INV-M-ALT-DEPT-NBR      PIC 9(04) .
000934 001600      05      INV-M-ALT-DEPT-BEG-DAT.
000935 001700      10      INV-M-ALT-YEAR      PIC 99 .
000936 001800      10      INV-M-ALT-MON      PIC 99 .
```

COPY members sequence numbers are always preceded by the letter C and a number and slash.



```
Host Edit View Setup Macros Language Help
File Edit Edit_Settings Menu Utilities Compilers Test Help
EDIT      MARBL01.CSE2.EDITFILE (INVPROG3) - 01.00      Columns 00001 00072
Command ==>                                         Scroll ==> CSR
000918  #COPY=INVMAS1      &INVMAS1      &C1/
000919  000100** **              COPY  INVMAS1.
000920  000200** **      INVENTORY MASTER COPY RECORD.      Last Updated SEP 2017
000921  000300 01  INV-M-RECORD-IN.
000922  000400      05  INV-M-PART-NBR              PIC S9(8) .
000923  000500      05  INV-M-PART-NM              PIC X(20) .
000924  000600      05  INV-M-ORIG-DT.
000925  000700      10  INV-M-ORIG-Y              PIC 99 .
000926  000800      10  INV-M-ORIG-M              PIC 99 .
000927  000900      05  INV-M-ORIG-CONTACT-NA      PIC X(20) .
000928  001000      05  INV-M-ORIG-CONTACT-DEPT    PIC 9(04) .
000929  001100      05  INV-M-1ST-DT              PIC S9(6)      COMP-3 .
000930  001200      05  INV-M-2ND-DT              PIC S9(6)      COMP-3 .
000931  001300      05  INV-M-3RD-DT              PIC S9(6)      COMP-3 .
000932  001400      05  INV-M-ALT-GRP-DEPT-NBR.
000933  001500      10  INV-M-ALT-DEPT-NBR          PIC 9(04) .
000934  001600      05  INV-M-ALT-DEPT-BEG-DAT.
000935  001700      10  INV-M-ALT-YEAR              PIC 99 .
000936  001800      10  INV-M-ALT-MON              PIC 99 .
000937  001900      05  INV-M-GROUP-BASIC-COST.
```

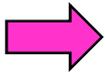
@C1/13



MOVE INV-M-3RD-DT @C1/13... refers to 13<sup>th</sup> line in 1<sup>st</sup> COPY Member

For the next 2 examples, option **18** below must be ON!

```
Modify Type Analysis provided
Summary Management Reports ==> N (Y - Also sets SUMMARY options)
                                (R - Resets to Original Defaults)
1. ==> 8 Add COPY Members          2. ==> Y CALL Analysis
3. ==> Y COBOL Source (add)        4. ==> Y COPY Analysis
5. ==> N CODE NOT USED (show)     6. ==> Y DD info (PIC & more)
7. ==> N ERRORS (Cobol Syntax)    8. ==> 3 FORMAT (1, 2 or 3)
9. ==> Y FORWARD TRACING         10. ==> Y HELP (how to use)
11. ==> N INDEXED BY (clause)     12. ==> N INDIRECT REFERENCES
13. ==> N OMIT Name (use #)       14. ==> Y OPEN
15. ==> Y PERFORM Errors          16. ==> N PERFORMED ROUTINES
17. ==> Y SQL (show SQL info)
18. ==> Y Use @-DD-number (of other name in P-D narrative)
```



- - Notes - -

Add COPY Members: allows adding some or all COPY members

DD info has: FROM-TO, SECTION, Level, Name, PIC, VALUE, USAGE & more

Format 1: has Verb Sequence and NO Performed Routines in Narrative

Format 2: has P-D Sequence and NO Performed Routines in Narratvie

Format 3: has P-D Sequence and DOES show Performed Routines in Narr

OMIT Name uses # as in: MOVE FIRST-NAME TO # (instead of THIS-FIELD)

Use @-DD-number uses @nnnn as in: MOVE FIRST-NAME @765 TO THIS-FIELD

(P=ASELE)

## MOVE WS-WORKING-DEPT-NBR @135 allows

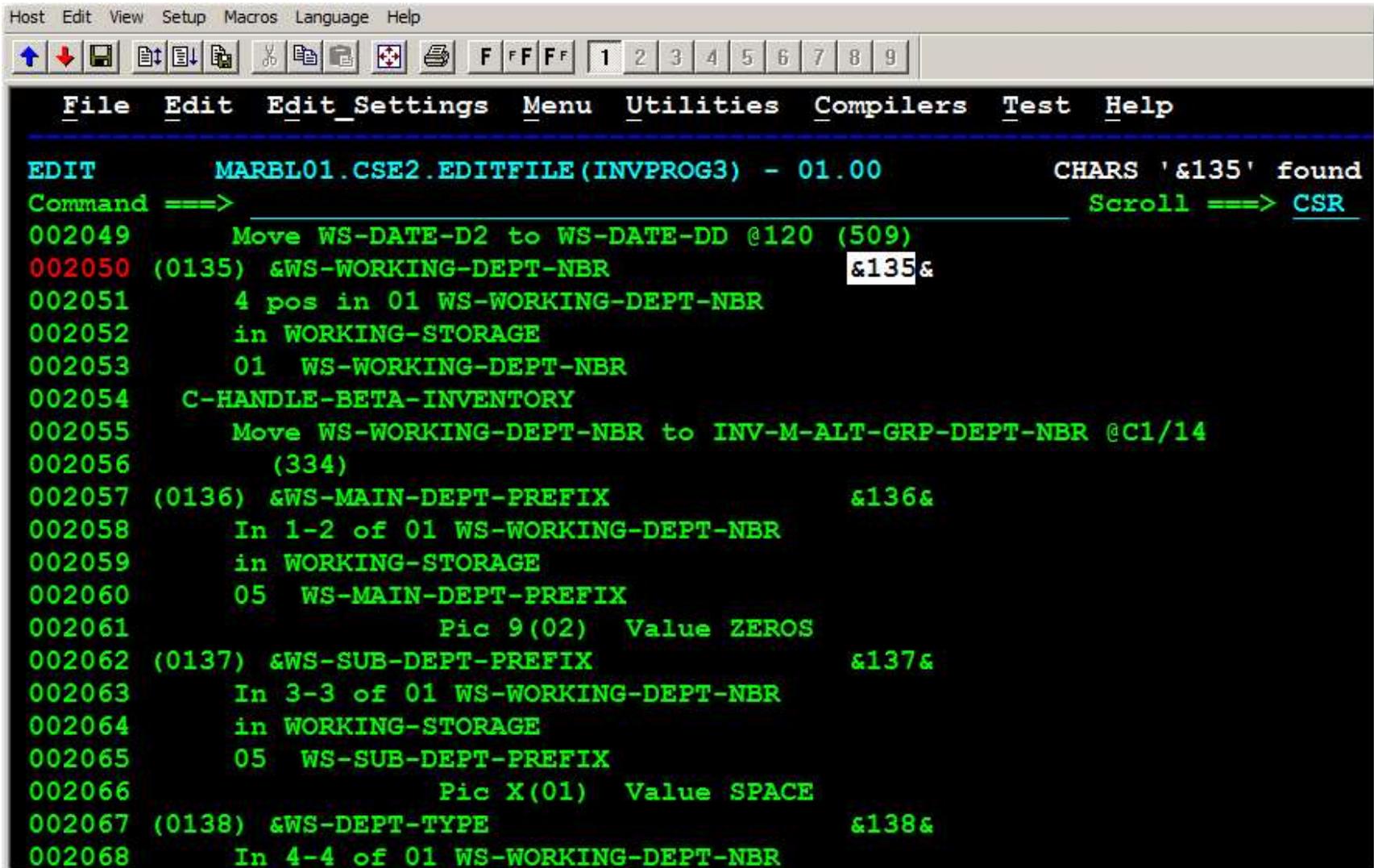
F &135 shown on next slide

see  
@135



```
1: 172.126.122.51 - TN3270 Plus 3.6.6
Host Edit View Setup Macros Language Help
File Edit Edit Settings Menu Utilities Compilers Test Help
EDIT MARBL01.CSE2.EDITFILE (INVPROG3) - 01.00 Columns 00001 00072
Command ==> Scroll ==> CSR
001580 If INV-M-3RD-DT = ZEROS (526)
001581 (C1/14) &INV-M-ALT-GRP-DEPT-NBR &C1/14&
001582 In 69-72 of 01 INV-M-RECORD-IN
001583 In COPY INVMAS1 in WORKING-STORAGE
001584 C 05 INV-M-ALT-GRP-DEPT-NBR
001585 Data field is a GROUP item
001586 C-HANDLE-BETA-INVENTORY
001587 Move WS-WORKING-DEPT-NBR @135 to INV-M-ALT-GRP-DEPT-NBR (334)
001588 (C1/15) &INV-M-ALT-DEPT-NBR &C1/15&
001589 In 69-72 of 01 INV-M-RECORD-IN
001590 In COPY INVMAS1 in WORKING-STORAGE
001591 C 10 INV-M-ALT-DEPT-NBR
001592 Pic 9(04)
001593 B-PROCESS-ALPHA-INVENTORY
001594 Move INV-1-ALT-DEPT-NBR @46 to INV-M-ALT-DEPT-NBR (253)
001595 C-HANDLE-BETA-INVENTORY
001596 Move INV-1-ALT-DEPT-NBR @46 to INV-M-ALT-DEPT-NBR (331)
001597 D-FINISH-OTHER-INVENTORY
001598 Move INV-1-ALT-DEPT-NBR @46 to INV-M-ALT-DEPT-NBR (392)
001599 (C1/16) &INV-M-ALT-DEPT-BEG-DAT &C1/16&
```

# F &sequence-number used to find other names



The screenshot shows a text editor window titled "MARBL01.CSE2.EDITFILE (INVPROG3) - 01.00". The menu bar includes "File", "Edit", "Edit Settings", "Menu", "Utilities", "Compilers", "Test", and "Help". The toolbar contains various icons for navigation and editing. The main text area displays the following code:

```
EDIT          MARBL01.CSE2.EDITFILE (INVPROG3) - 01.00          CHARS '&135' found
Command ==>          Scroll ==> CSR
002049      Move WS-DATE-D2 to WS-DATE-DD @120 (509)
002050 (0135) &WS-WORKING-DEPT-NBR          &135&
002051      4 pos in 01 WS-WORKING-DEPT-NBR
002052      in WORKING-STORAGE
002053      01 WS-WORKING-DEPT-NBR
002054      C-HANDLE-BETA-INVENTORY
002055      Move WS-WORKING-DEPT-NBR to INV-M-ALT-GRP-DEPT-NBR @C1/14
002056      (334)
002057 (0136) &WS-MAIN-DEPT-PREFIX          &136&
002058      In 1-2 of 01 WS-WORKING-DEPT-NBR
002059      in WORKING-STORAGE
002060      05 WS-MAIN-DEPT-PREFIX
002061      Pic 9(02) Value ZEROS
002062 (0137) &WS-SUB-DEPT-PREFIX          &137&
002063      In 3-3 of 01 WS-WORKING-DEPT-NBR
002064      in WORKING-STORAGE
002065      05 WS-SUB-DEPT-PREFIX
002066      Pic X(01) Value SPACE
002067 (0138) &WS-DEPT-TYPE          &138&
002068      In 4-4 of 01 WS-WORKING-DEPT-NBR
```

# Editing the COBOL Program

## *Various ways*

1. Use the COBOL source editor just described in ISPF **Edit** mode and edit on the program which resides first.
  - When done **ISOLATE** out just the COBOL source\*
2. Use the COBOL source editor in ISPF **Browse** mode and then edit the COBOL program separately in ISPF or other.
3. Use Control/DCD's DDM in **PDF format** (shown later) and then edit the COBOL program separately in ISPF or other.

# If Editing the Analysis file that also contains the COBOL Program

Consider modifying\* the **CHANGE** command to limit changes to just the actual source code.

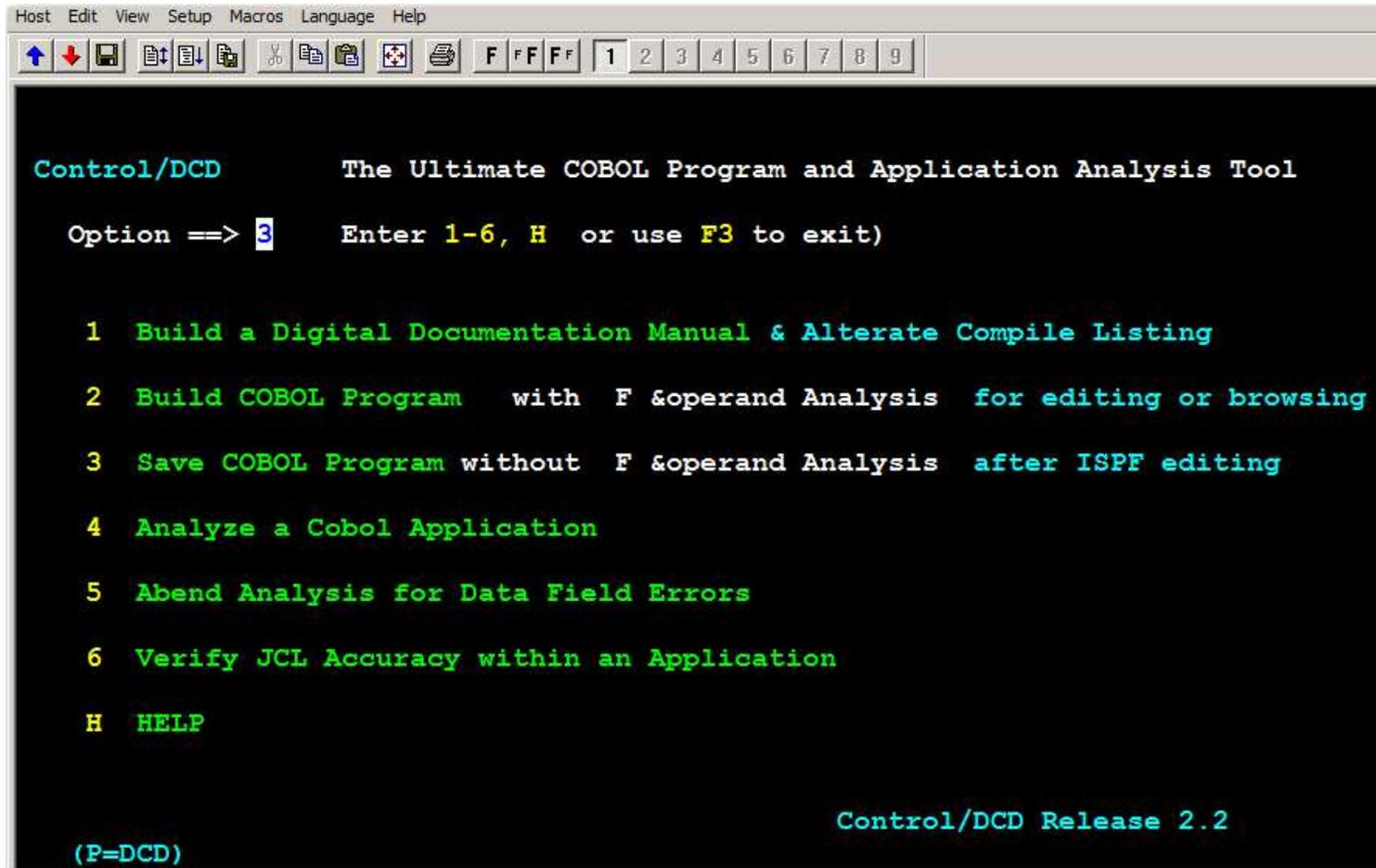
This will prevent making changes to the Control/DCD Analysis that the user is currently viewing.

\*How to modify the **CHANGE** command shown next

# How to modify the **CHANGE** command

- Normal use of a **CHANGE** command with **ALL** in COBOL Source Editor will change occurrences in program and in Analysis which is later removed.
- To prevent this, do the following 1 time, when entering editor:
  - Do **F &ENDSOURCE**
  - Put **.E** anywhere in columns 1-6 as shown below:
    - ✓ **0 .E078 #ENDSOURCE &ENDSOURCE**
  - Using **C operand-1 operand-2 .ZF .E ALL**  
will limit the changes to just the COBOL program.

Use **Option 3** to save program after editing  
*If editing (not browsing) was done!*

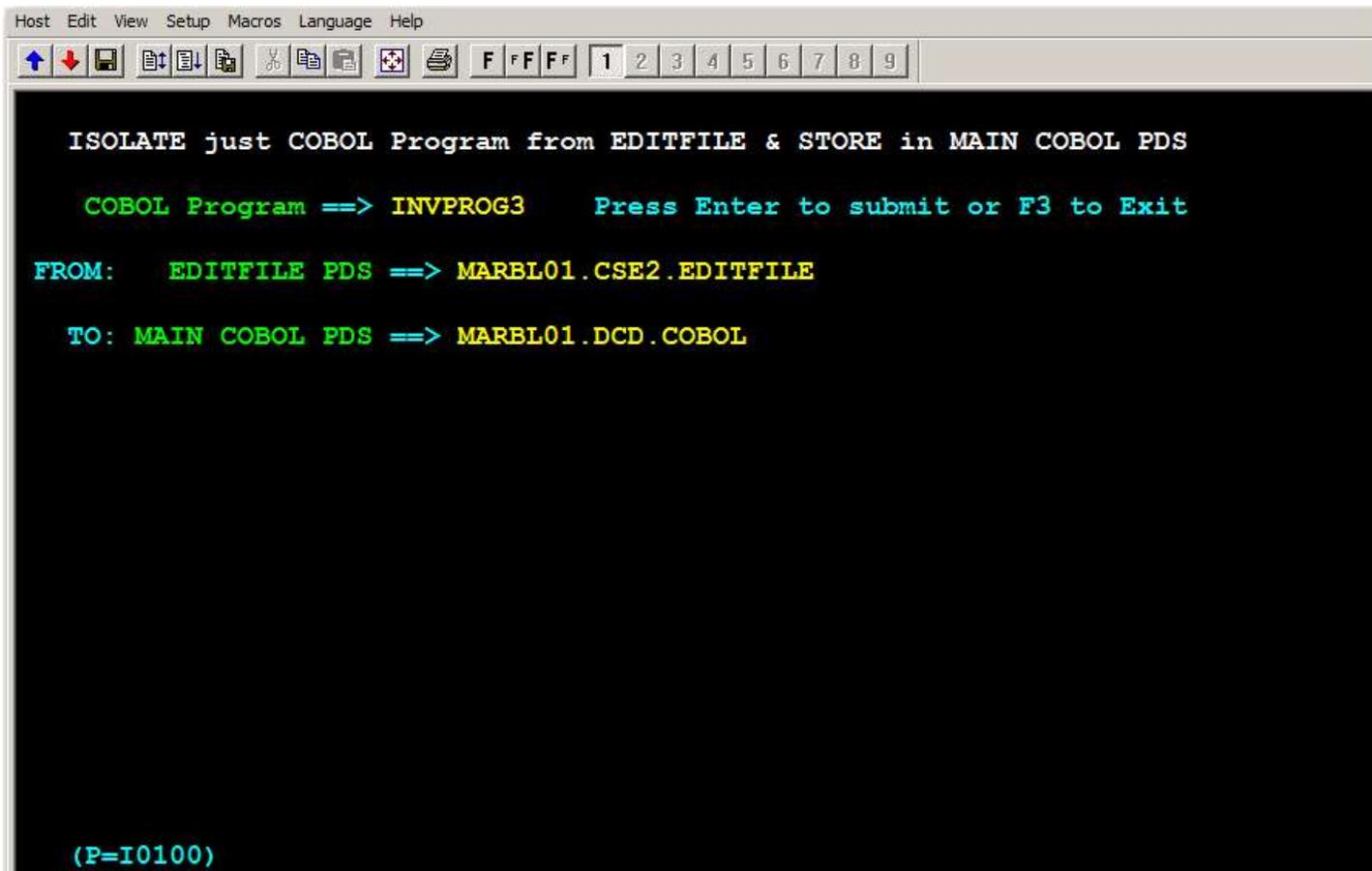


```
Host Edit View Setup Macros Language Help
Control/DCD The Ultimate COBOL Program and Application Analysis Tool
Option ==> 3 Enter 1-6, H or use F3 to exit)

1 Build a Digital Documentation Manual & Alterate Compile Listing
2 Build COBOL Program with F &operand Analysis for editing or browsing
3 Save COBOL Program without F &operand Analysis after ISPF editing
4 Analyze a Cobol Application
5 Abend Analysis for Data Field Errors
6 Verify JCL Accuracy within an Application
H HELP

Control/DCD Release 2.2
(P=DCD)
```

Verify program and file, then press **enter** to run job to **ISOLATE** just COBOL Program



The screenshot shows a terminal window with a menu bar (Host, Edit, View, Setup, Macros, Language, Help) and a toolbar with various icons and function keys (F1-F9). The terminal content is as follows:

```
ISOLATE just COBOL Program from EDITFILE & STORE in MAIN COBOL PDS  
COBOL Program ==> INVPROG3      Press Enter to submit or F3 to Exit  
FROM:  EDITFILE PDS ==> MARBL01.CSE2.EDITFILE  
TO:  MAIN COBOL PDS ==> MARBL01.DCD.COBOL  
  
(P=I0100)
```

This completes the COBOL  
Source Editor Module...

# Overview of Digital Documentation Manual PDF

(Many benefits)

Output is in PDF format available to any PDF reader

(PC, Adobe, MAC or any media)

Ideal for Analysis from anywhere

Doing a search with &operand is extended from Cobol Source Editor to the DDM (Digital Documentation Manual)

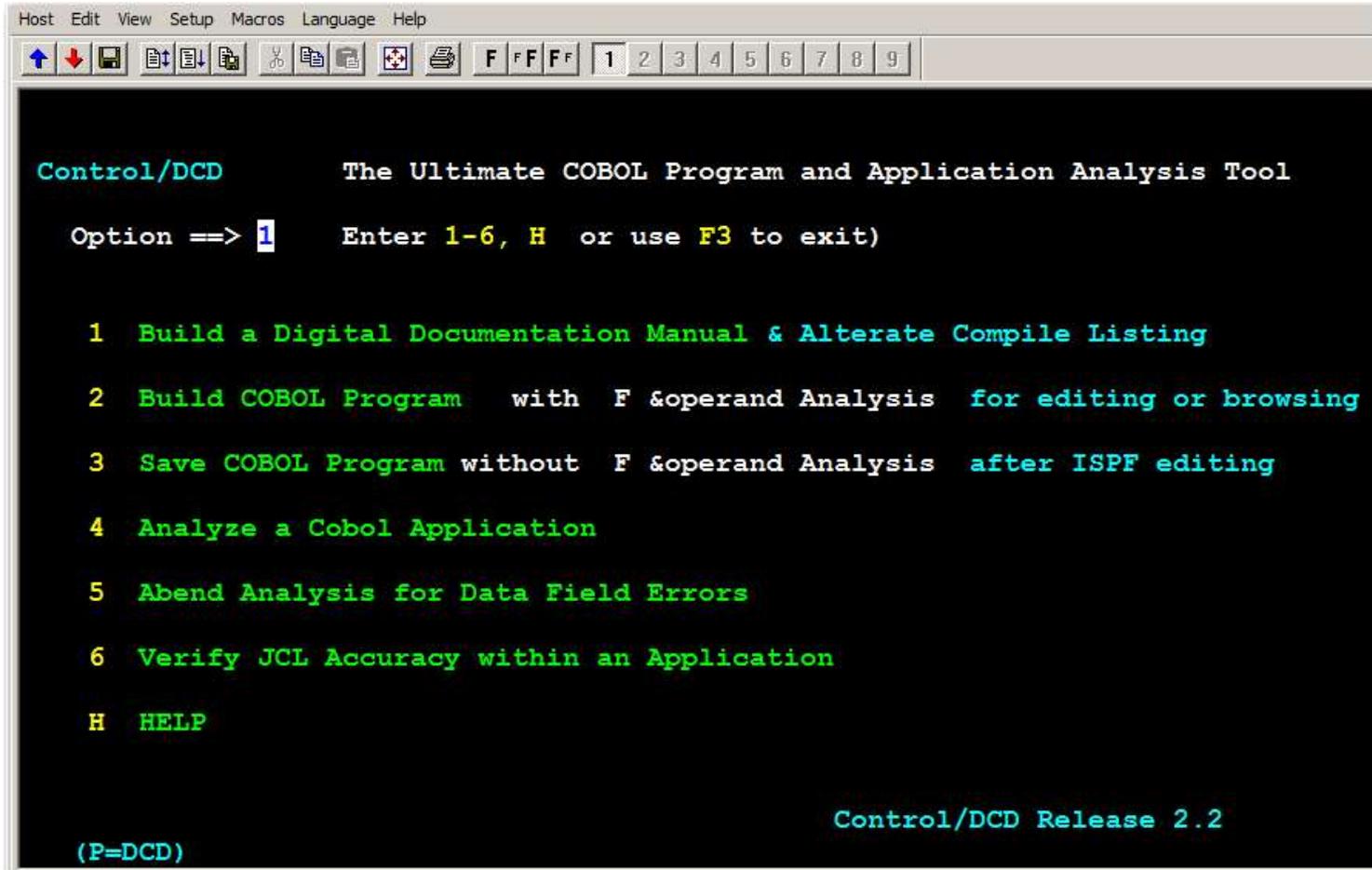
Only in DDM, **each data name** has its own reduced Forward-Tracing chart

80 chars of Cobol Source Editor converted to 100 chars

The DDM is created on the mainframe in PDF format and immediately transferred off the mainframe **via a BINARY transfer**

Documentation is now available off the mainframe

# Creating a Digital Documentation Manual in PDF format

A screenshot of a terminal window showing the Control/DCD menu. The window has a menu bar with 'Host Edit View Setup Macros Language Help' and a toolbar with various icons and function keys (F1-F9). The main area is black with white and green text. The title is 'Control/DCD The Ultimate COBOL Program and Application Analysis Tool'. Below it, it says 'Option ==> 1 Enter 1-6, H or use F3 to exit)'. A list of options follows: 1 Build a Digital Documentation Manual & Alterate Compile Listing, 2 Build COBOL Program with F &operand Analysis for editing or browsing, 3 Save COBOL Program without F &operand Analysis after ISPF editing, 4 Analyze a Cobol Application, 5 Abend Analysis for Data Field Errors, 6 Verify JCL Accuracy within an Application, and H HELP. At the bottom right, it says 'Control/DCD Release 2.2' and at the bottom left '(P=DCD)'.

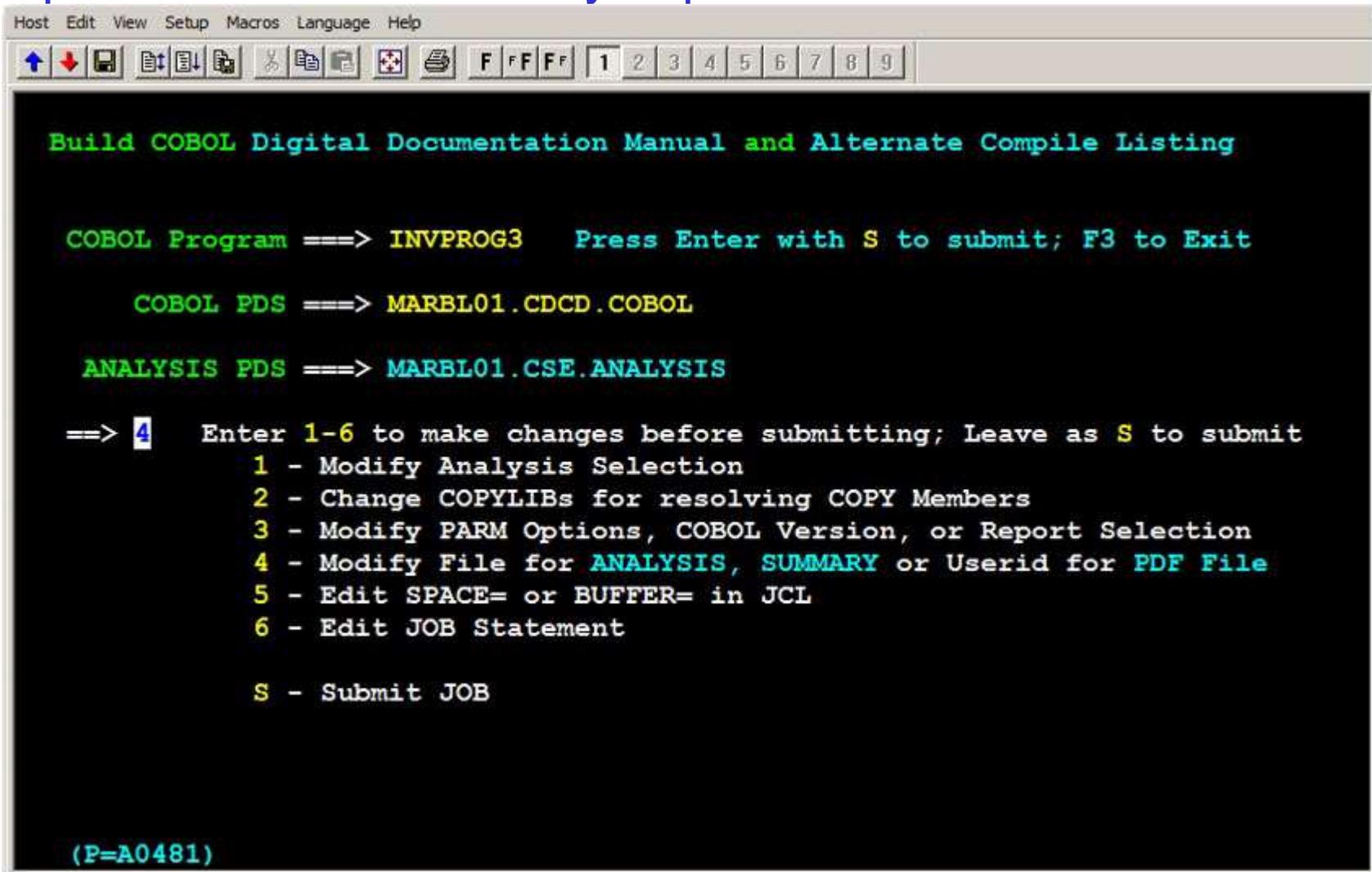
```
Host Edit View Setup Macros Language Help
↑ ↓ ↵ ↶ ↷ ⌂ ✂ 📄 📄 📄 📄 📄 📄 📄 📄 📄 📄
Control/DCD The Ultimate COBOL Program and Application Analysis Tool
Option ==> 1 Enter 1-6, H or use F3 to exit)

1 Build a Digital Documentation Manual & Alterate Compile Listing
2 Build COBOL Program with F &operand Analysis for editing or browsing
3 Save COBOL Program without F &operand Analysis after ISPF editing
4 Analyze a Cobol Application
5 Abend Analysis for Data Field Errors
6 Verify JCL Accuracy within an Application
H HELP

Control/DCD Release 2.2
(P=DCD)
```

Select 1 and press enter

## Option 4 is needed initially to provide USERID



The screenshot shows a terminal window with a menu for building COBOL digital documentation. The menu items are:

- Build COBOL Digital Documentation Manual and Alternate Compile Listing
- COBOL Program ==> INVPROG3 Press Enter with S to submit; F3 to Exit
- COBOL PDS ==> MARBL01.CDCD.COBOL
- ANALYSIS PDS ==> MARBL01.CSE.ANALYSIS

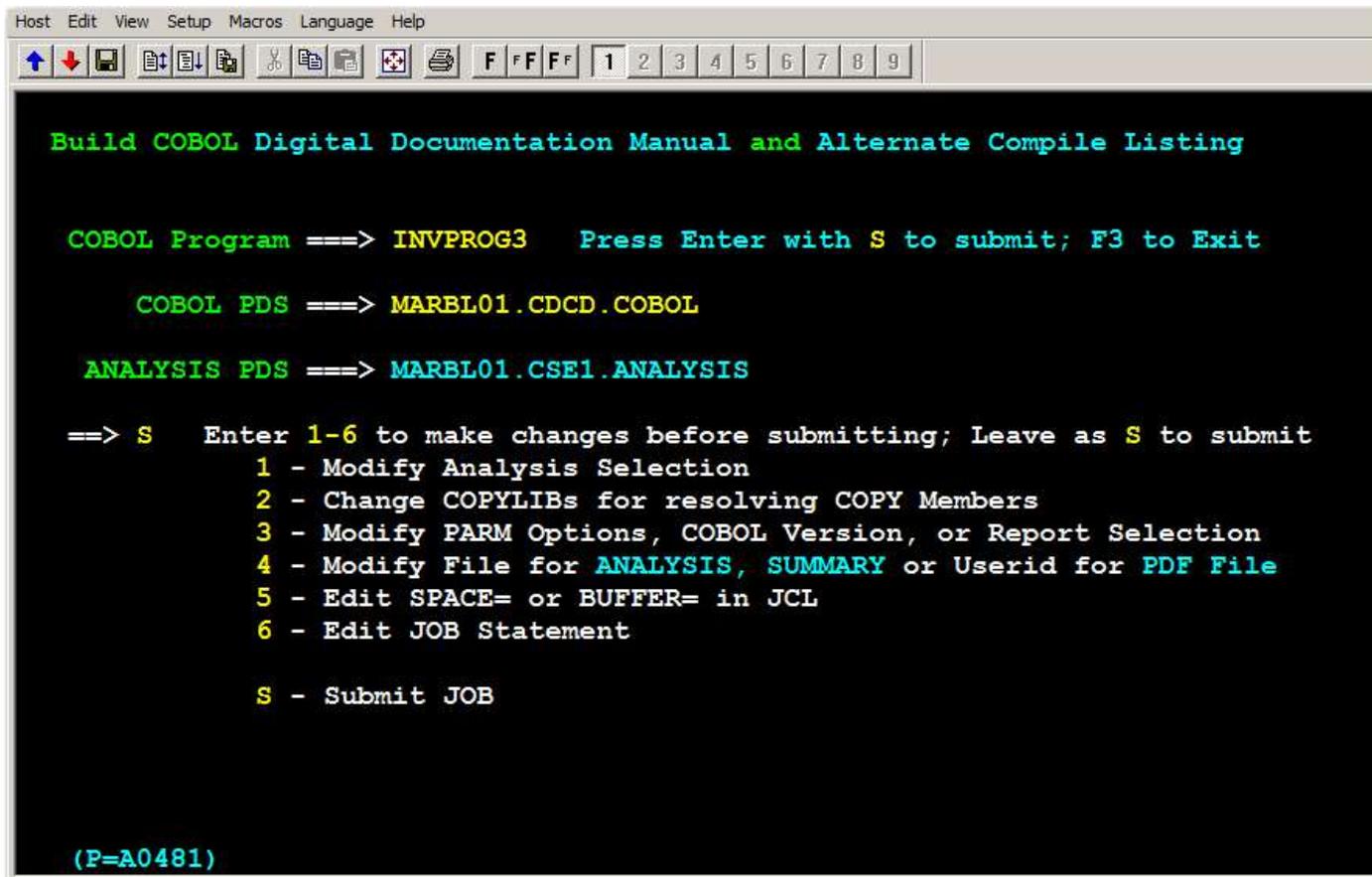
Option 4 is highlighted, and its description is shown below:

- 4 Enter 1-6 to make changes before submitting; Leave as S to submit
  - 1 - Modify Analysis Selection
  - 2 - Change COPYLIBs for resolving COPY Members
  - 3 - Modify PARM Options, COBOL Version, or Report Selection
  - 4 - Modify File for ANALYSIS, SUMMARY or Userid for PDF File
  - 5 - Edit SPACE= or BUFFER= in JCL
  - 6 - Edit JOB Statement
- S - Submit JOB

(P=A0481)

Modifying Install file for .ANALYSIS & .SUMMARY is possible here!

1. Replace (or keep last used) Program Name
2. Verify or change input COBOL PDS
3. Use 'S' option to submit job



The screenshot shows a terminal window with a menu for submitting a COBOL job. The menu is displayed in a monospaced font on a black background. The window title bar includes menu items: Host, Edit, View, Setup, Macros, Language, Help. The menu text is as follows:

```
Build COBOL Digital Documentation Manual and Alternate Compile Listing

COBOL Program ==> INVPROG3   Press Enter with S to submit; F3 to Exit

COBOL PDS ==> MARBL01.CDCD.COBOL

ANALYSIS PDS ==> MARBL01.CSE1.ANALYSIS

==> S   Enter 1-6 to make changes before submitting; Leave as S to submit
      1 - Modify Analysis Selection
      2 - Change COPYLIBs for resolving COPY Members
      3 - Modify PARM Options, COBOL Version, or Report Selection
      4 - Modify File for ANALYSIS, SUMMARY or Userid for PDF File
      5 - Edit SPACE= or BUFFER= in JCL
      6 - Edit JOB Statement

      S - Submit JOB

(P=A0481)
```

Press enter to submit job

Check the **return code** after JOB finishes for return code of **0000, 0004, 0008, 0012** or **0016** similar to return codes from a COBOL compile.

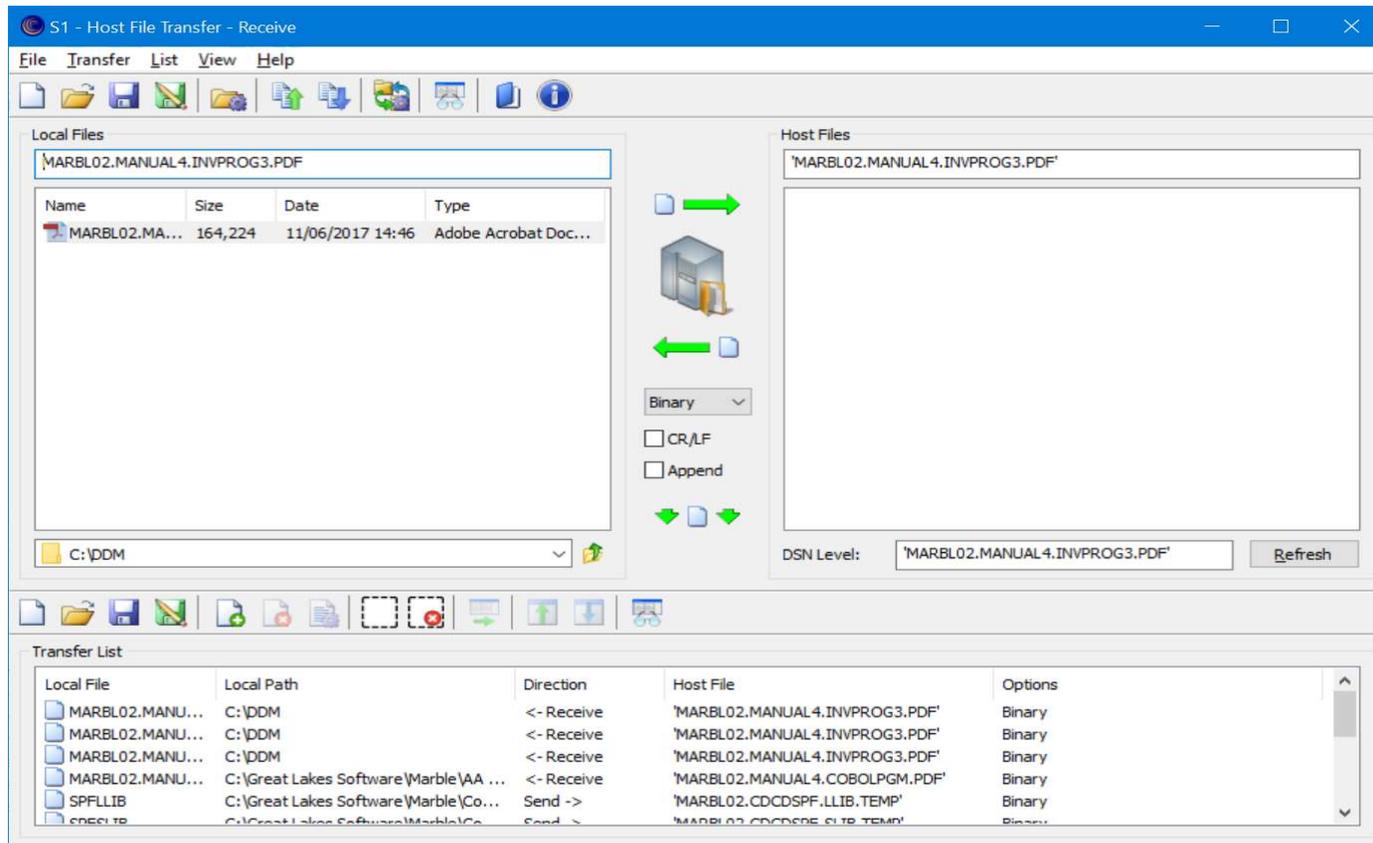
Also check for two additional Return codes of **0000** used to create file '**userid.MANUAL4.progname.PDF**'

Do a binary transfer of file:

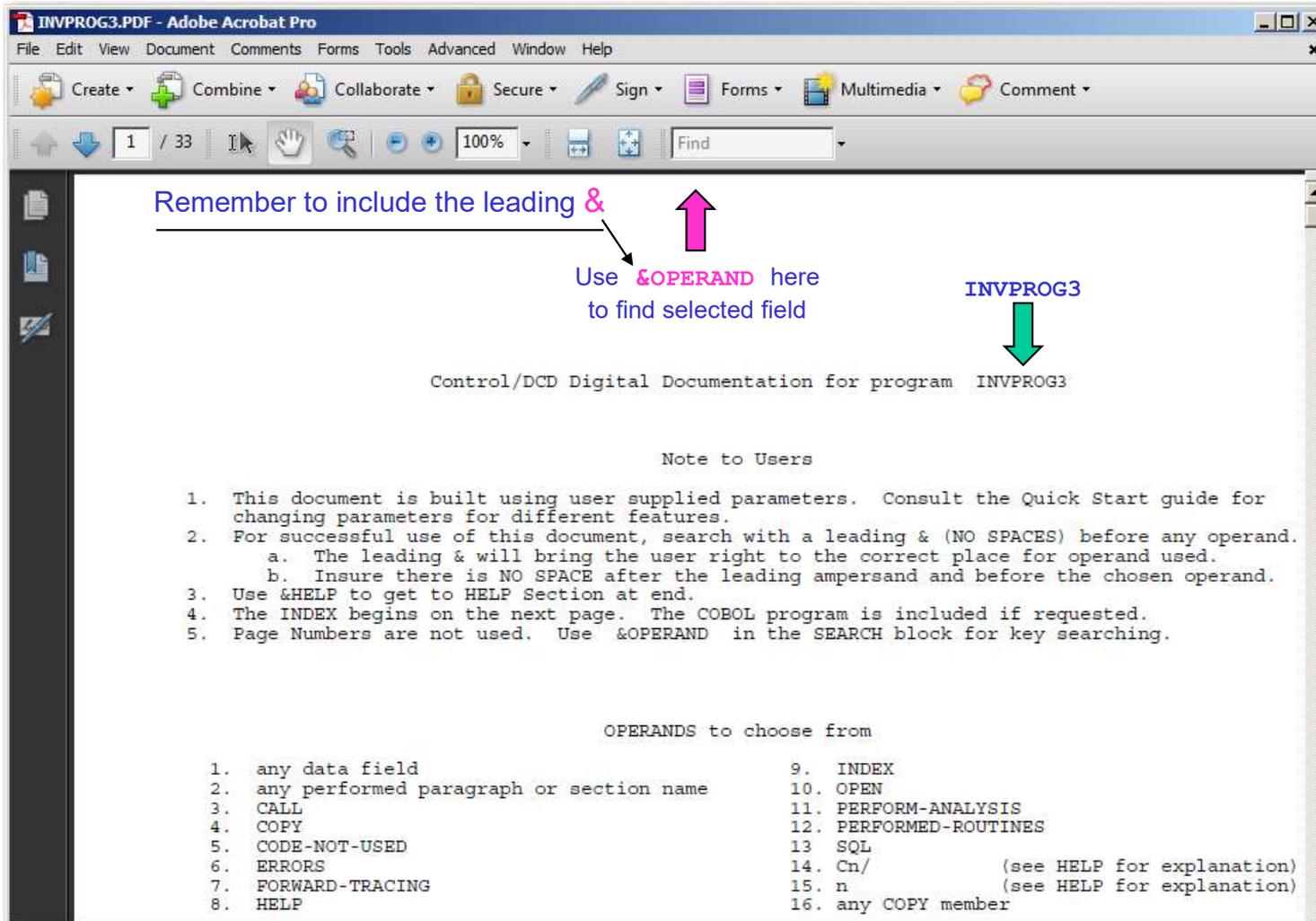
**'userid.MANUAL4.progname.PDF'**

from the mainframe to the PC or other platform.

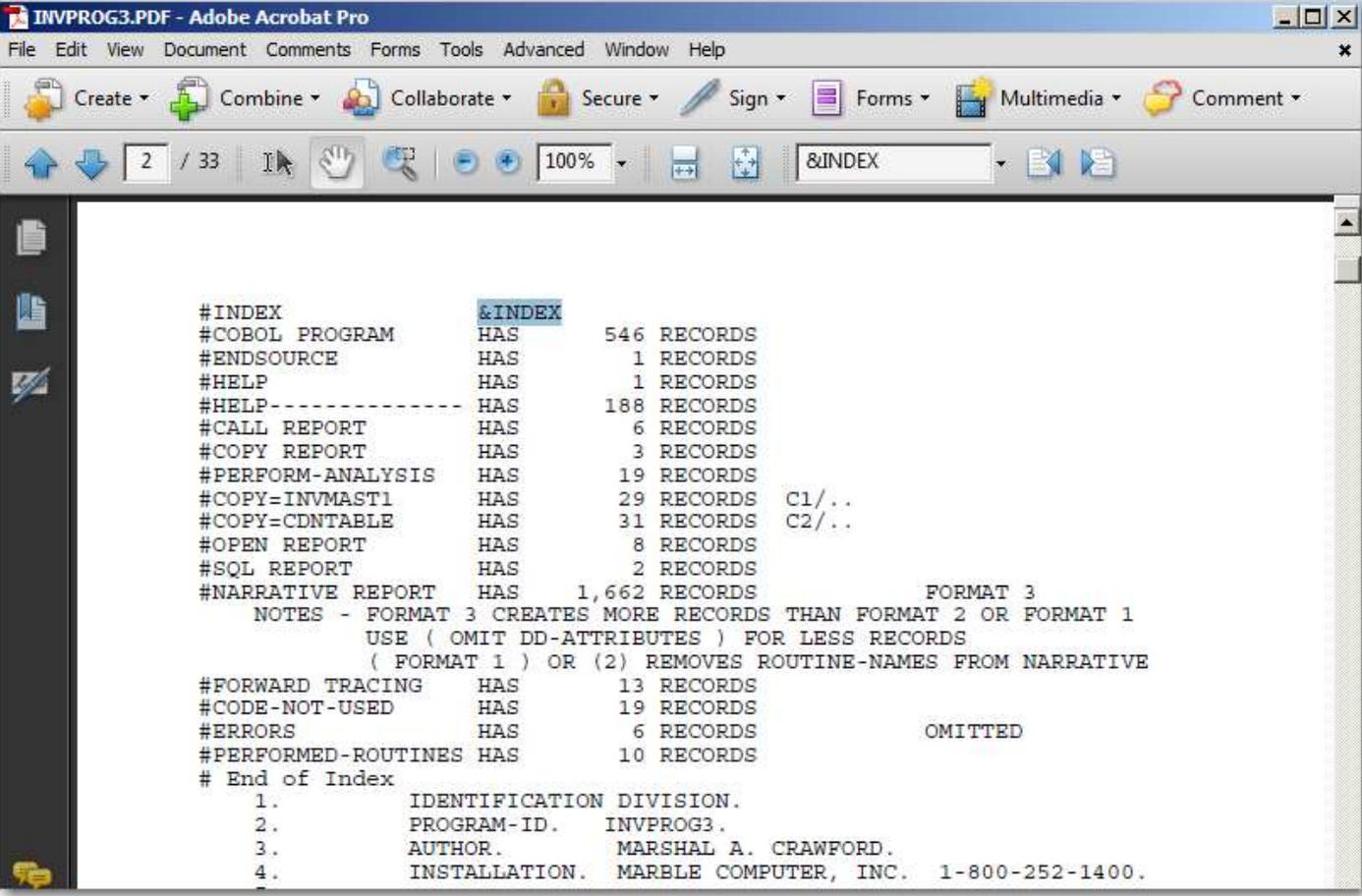
A PDF file prefixed with your USERID and a final suffix of PDF has been created on the mainframe and it is ready to download to the workstation. Use your installation's FTP product to transfer the file to the workstation. **The download type must be set to BINARY!**



# First look at PDF output example in sample reader



# &INDEX points to DDM Index



```
#INDEX
#COBOL PROGRAM HAS 546 RECORDS
#ENDSOURCE HAS 1 RECORDS
#HELP HAS 1 RECORDS
#HELP----- HAS 188 RECORDS
#CALL REPORT HAS 6 RECORDS
#COPY REPORT HAS 3 RECORDS
#PERFORM-ANALYSIS HAS 19 RECORDS
#COPY=INVMAS1 HAS 29 RECORDS C1/..
#COPY=CDNTABLE HAS 31 RECORDS C2/..
#OPEN REPORT HAS 8 RECORDS
#SQL REPORT HAS 2 RECORDS
#NARRATIVE REPORT HAS 1,662 RECORDS FORMAT 3
  NOTES - FORMAT 3 CREATES MORE RECORDS THAN FORMAT 2 OR FORMAT 1
         USE ( OMIT DD-ATTRIBUTES ) FOR LESS RECORDS
         ( FORMAT 1 ) OR (2) REMOVES ROUTINE-NAMES FROM NARRATIVE
#FORWARD TRACING HAS 13 RECORDS
#CODE-NOT-USED HAS 19 RECORDS
#ERRORS HAS 6 RECORDS OMITTED
#PERFORMED-ROUTINES HAS 10 RECORDS
# End of Index
1. IDENTIFICATION DIVISION.
2. PROGRAM-ID. INVPROG3.
3. AUTHOR. MARSHAL A. CRAWFORD.
4. INSTALLATION. MARBLE COMPUTER, INC. 1-800-252-1400.
```

# &PERFORM-ERRORS shows a major Perform Error

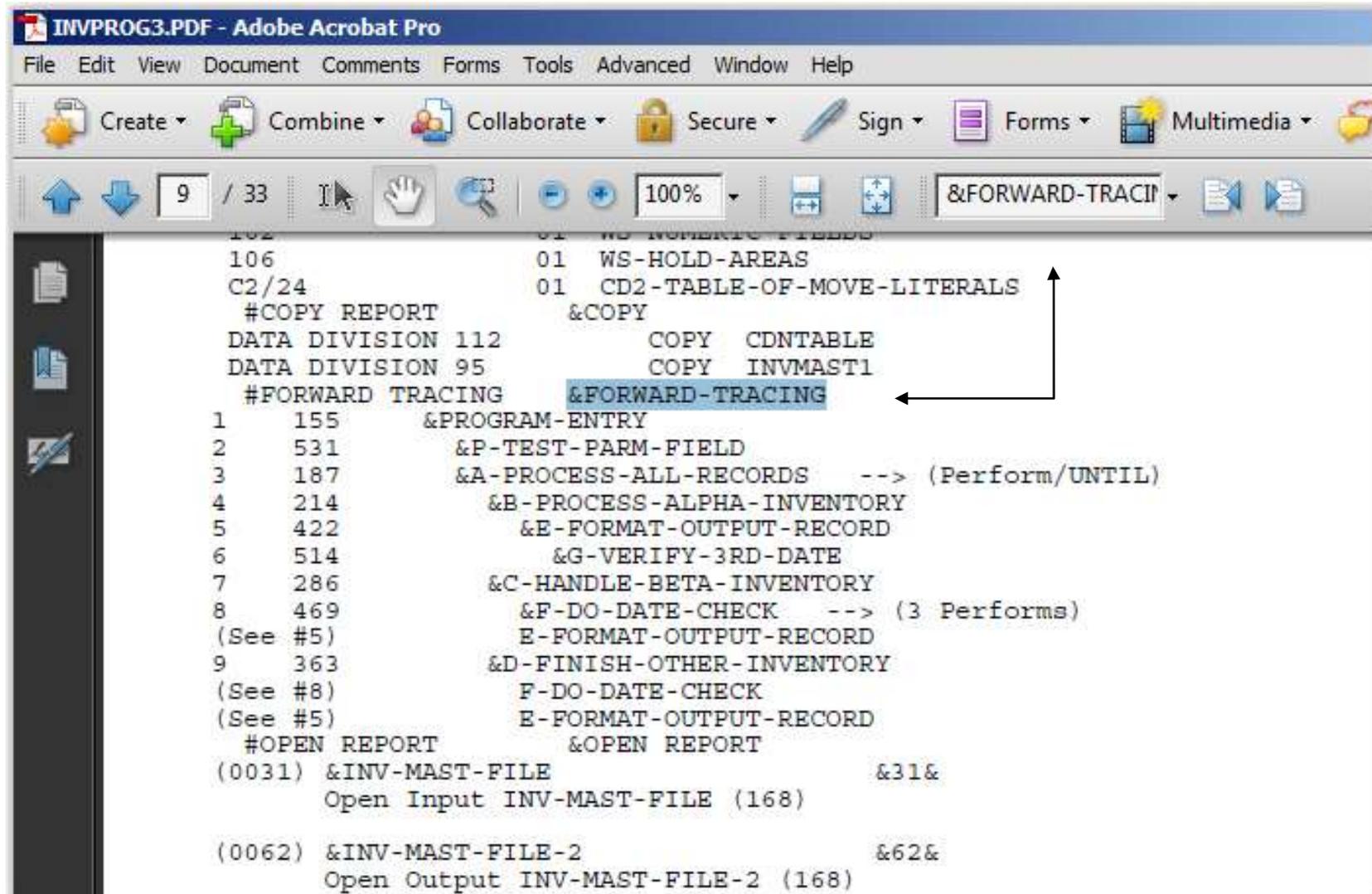
Open Output INV-MAST-FILE-2 (168)

End of FD OPEN & SORT Info  
#PERFORM-ANALYSIS &PERFORM-ANALYSIS &PERFORM-ERRORS  
PERFORM Warnings & Major Errors  
Count Type & Sequence Number(s)

01	GO TOs leaving the range of a PERFORM							MAJOR PERFORM ERROR
544								
02	Backward GO TO's							MODERATE PERFORM ERROR
527	544							
PERFORM & GO TO activity								
	Count	Type	Sequence Number(s)					
13	PERFORM SECTIONS							
159	178	195	198	200	282	318		
323	328	359	389	418	457			
07	GO TO Paragraphs							
474	481	485	495	504	527	544		
#PERFORMED-ROUTINES &PERFORMED-ROUTINES								
SEQ#	Count	Performed Routine						
5	1	PROGRAM-ENTRY PROGRAM-ENTRY						
7	1	PERFORM	A-PROCESS-ALL-RECORDS				UNTIL=1	

# Forward Tracing of Performed Routines

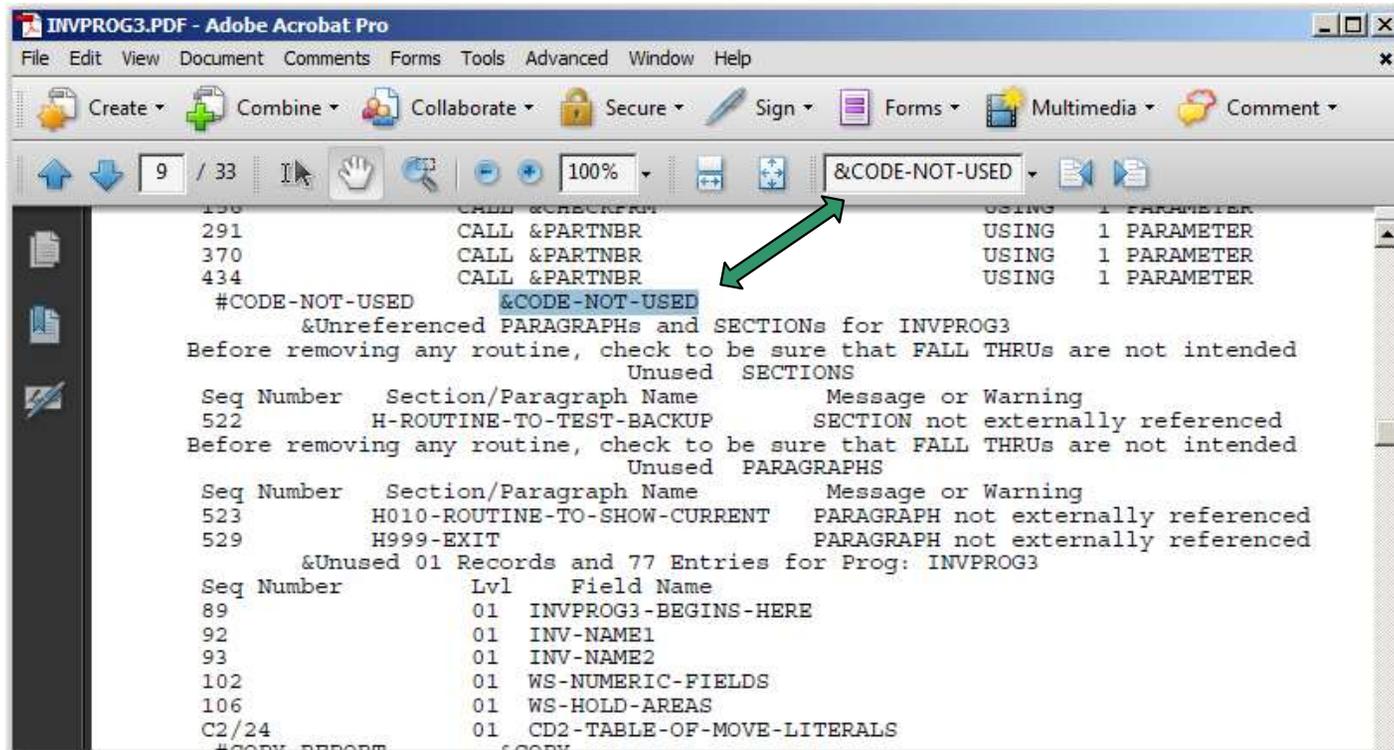
*(allows maintaining structured code!)*



```
INVPROG3.PDF - Adobe Acrobat Pro
File Edit View Document Comments Forms Tools Advanced Window Help
Create Combine Collaborate Secure Sign Forms Multimedia
9 / 33 100% &FORWARD-TRACING
106 01 WS-HOLD-AREAS
C2/24 01 CD2-TABLE-OF-MOVE-LITERALS
#COPY REPORT &COPY
DATA DIVISION 112 COPY CDNTABLE
DATA DIVISION 95 COPY INVMAST1
#FORWARD TRACING &FORWARD-TRACING
1 155 &PROGRAM-ENTRY
2 531 &P-TEST-PARM-FIELD
3 187 &A-PROCESS-ALL-RECORDS --> (Perform/UNTIL)
4 214 &B-PROCESS-ALPHA-INVENTORY
5 422 &E-FORMAT-OUTPUT-RECORD
6 514 &G-VERIFY-3RD-DATE
7 286 &C-HANDLE-BETA-INVENTORY
8 469 &F-DO-DATE-CHECK --> (3 Performs)
(See #5) E-FORMAT-OUTPUT-RECORD
9 363 &D-FINISH-OTHER-INVENTORY
(See #8) F-DO-DATE-CHECK
(See #5) E-FORMAT-OUTPUT-RECORD
#OPEN REPORT &OPEN REPORT
(0031) &INV-MAST-FILE &31&
Open Input INV-MAST-FILE (168)
(0062) &INV-MAST-FILE-2 &62&
Open Output INV-MAST-FILE-2 (168)
```

## CODE NOT USED example shows:

- A. Procedure Division DEAD CODE
- B. Unused 01 records
- C. Unused (non-COPY-member) data fields

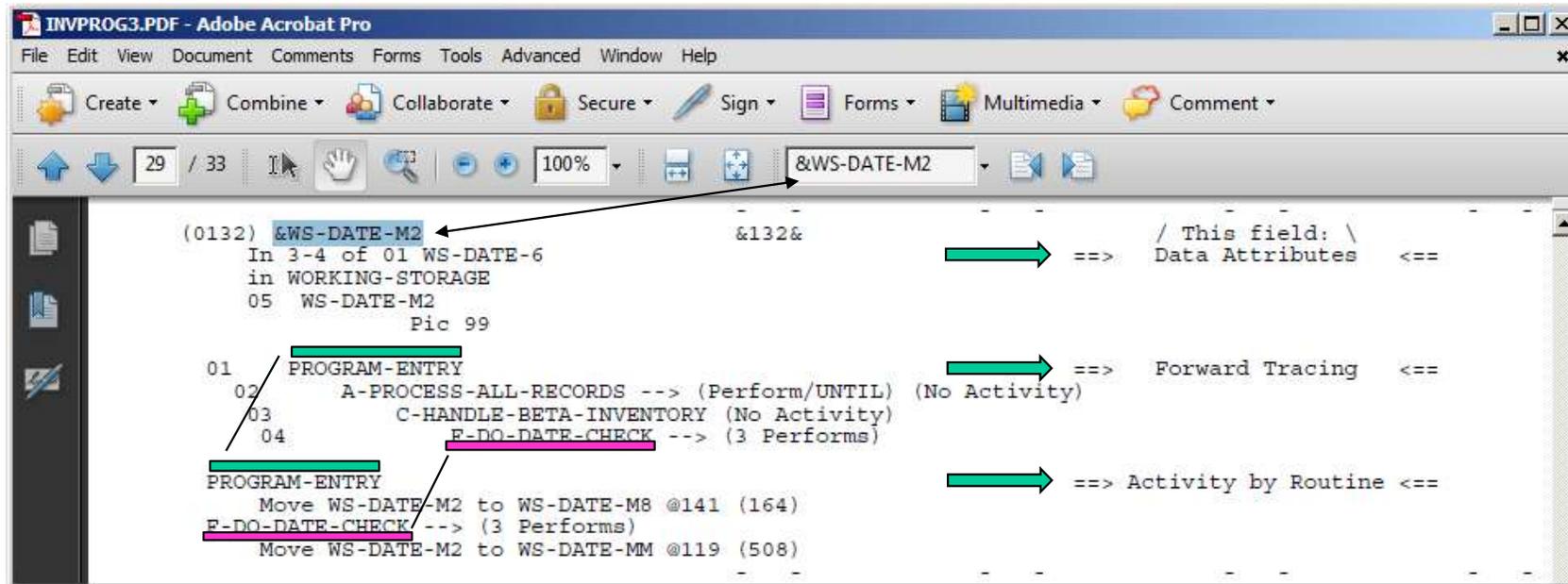


The screenshot shows the Adobe Acrobat Pro interface with a search for '&CODE-NOT-USED'. The search results are displayed in the top right corner, showing four matches for '&CODE-NOT-USED' in the document. A green arrow points from the search results to the '&CODE-NOT-USED' text in the document content.

```
150 CALL &CHECKPAM USING 1 PARAMETER
291 CALL &PARTNBR USING 1 PARAMETER
370 CALL &PARTNBR USING 1 PARAMETER
434 CALL &PARTNBR USING 1 PARAMETER
#CODE-NOT-USED &CODE-NOT-USED
&Unreferenced PARAGRAPHS and SECTIONS for INVPROG3
Before removing any routine, check to be sure that FALL THRU's are not intended
Unused SECTIONS
Seq Number Section/Paragraph Name Message or Warning
522 H-ROUTINE-TO-TEST-BACKUP SECTION not externally referenced
Before removing any routine, check to be sure that FALL THRU's are not intended
Unused PARAGRAPHS
Seq Number Section/Paragraph Name Message or Warning
523 H010-ROUTINE-TO-SHOW-CURRENT PARAGRAPH not externally referenced
529 H999-EXIT PARAGRAPH not externally referenced
&Unused 01 Records and 77 Entries for Prog: INVPROG3
Seq Number Lvl Field Name
89 01 INVPROG3-BEGINS-HERE
92 01 INV-NAME1
93 01 INV-NAME2
102 01 WS-NUMERIC-FIELDS
106 01 WS-HOLD-AREAS
C2/24 01 CD2-TABLE-OF-MOVE-LITERALS
#COPY REPORT COPY
```

## Find a selected **data field** example:

1. Shows **Data Attributes**
2. Shows **Forward Tracing** relevant to this field use
3. Shows **Procedure Division** activity within Performed Routine



The screenshot shows the Adobe Acrobat Pro interface with a PDF document titled 'INVPROG3.PDF'. The document content is COBOL code. A search bar at the top right contains the text '&WS-DATE-M2'. The code is displayed with several annotations:

- A green arrow points from the search bar to the line '(0132) &WS-DATE-M2 &132&'. To the right of this line is the text '/ This field: \ Data Attributes <=='. A green arrow points from this text to the right.
- A green arrow points from the search bar to the line '01 PROGRAM-ENTRY'. To the right of this line is the text 'Forward Tracing <=='. A green arrow points from this text to the right.
- A green arrow points from the search bar to the line '04 PROGRAM-ENTRY'. To the right of this line is the text 'Activity by Routine <=='. A green arrow points from this text to the right.

The COBOL code includes the following lines:

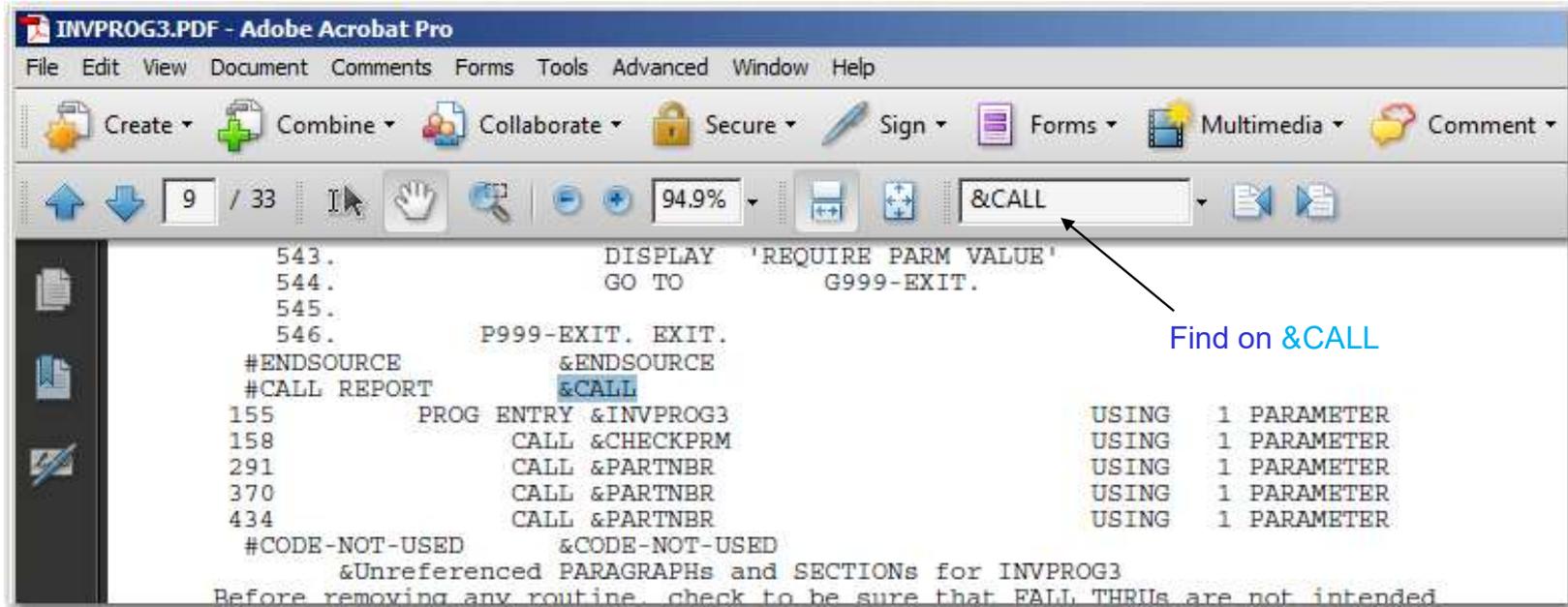
```
(0132) &WS-DATE-M2 &132&
      In 3-4 of 01 WS-DATE-6
      in WORKING-STORAGE
      05 WS-DATE-M2
         Pic 99

01 PROGRAM-ENTRY
02 A-PROCESS-ALL-RECORDS --> (Perform/UNTIL) (No Activity)
03 C-HANDLE-BETA-INVENTORY (No Activity)
04 E-DO-DATE-CHECK --> (3 Performs)

PROGRAM-ENTRY
      Move WS-DATE-M2 to WS-DATE-M8 @141 (164)
E-DO-DATE-CHECK --> (3 Performs)
      Move WS-DATE-M2 to WS-DATE-MM @119 (508)
```

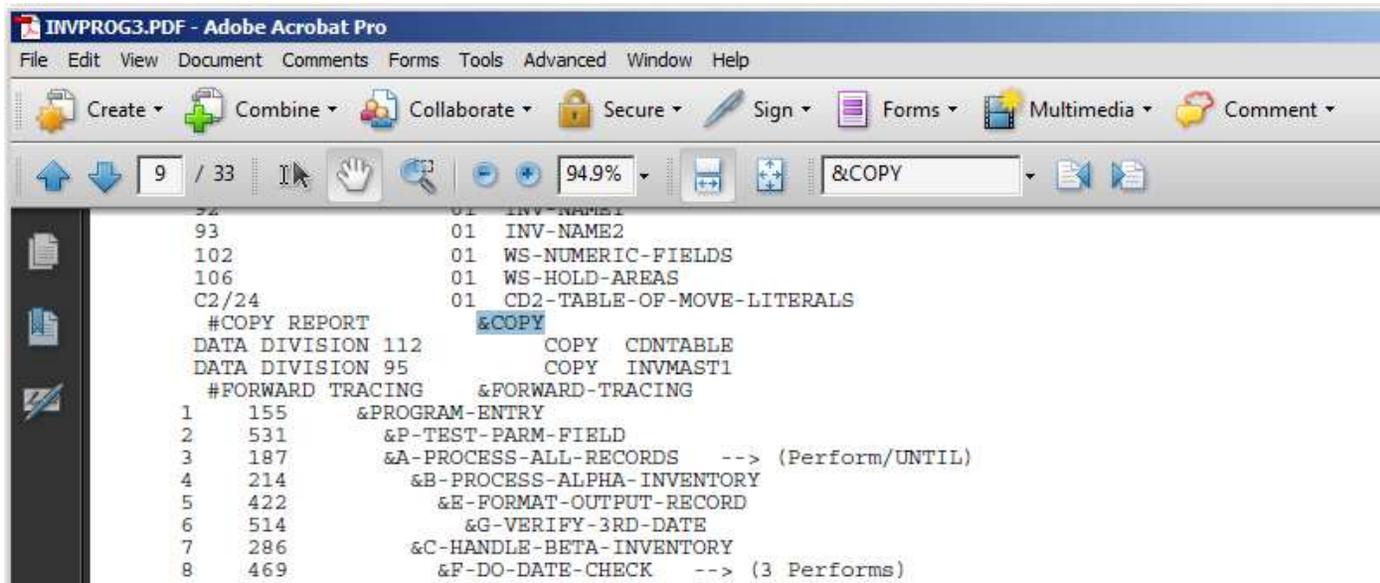
Activity by Routine within Forward Tracing  
tells a very complete story of this data usage

# Find CALL info example



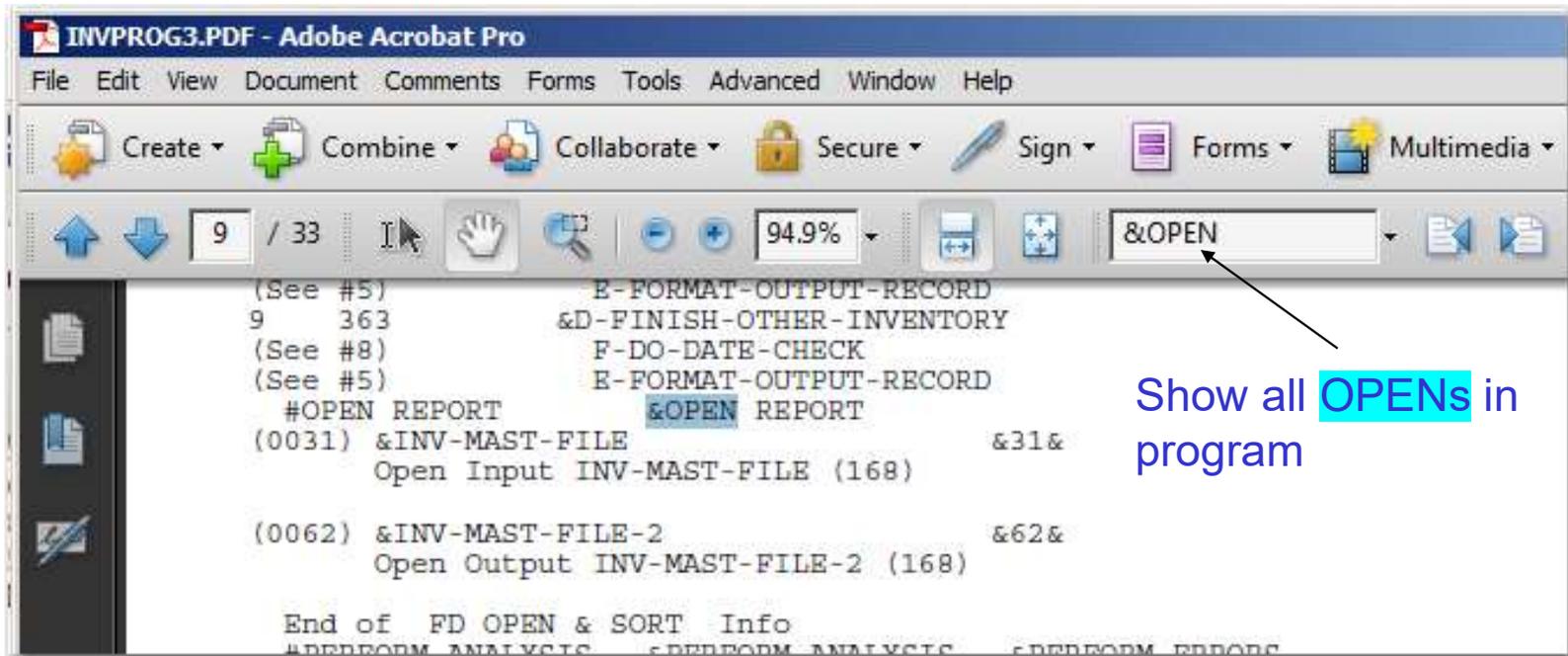
Program-ENTRY and CALL information is provided at one glance

# Find COPY information



All COPY members along with supporting information is given.

# Get OPEN verb activity



Every **OPEN** statement is shown along with **OPEN INPUT**, **OUTPUT** or other type shown.

This completes the Digital  
Documentation Manual in PDF  
format Module...

# Alternate Compile Listing

- **Main** source listing with **Narrative**
- many small supporting reports
- **Condensed Data Division** cross reference
- Alternate Compile Listing is still available and can be useful, though newer features are highly recommended!

# Condensed Procedure Division Lines

put **NARRATIVE** on the 133 character source listing

DCD Narrative on right:

70 01 **INV-2-RECORD-IN.** > Move SPACES to # **(444,555)**

indicates PROCEDURE DIVISION lines:

**444** MOVE SPACES TO **INV-2-RECORD-IN.**

**555** MOVE SPACES TO **INV-2-RECORD-IN.**

# DCD Narrative Description

## Part II

DCD Narrative:

71            **05**    **INV-2-PART-NBR**            > **Move INV-M-PART @103 to # (447)**

indicates the presence of:

**103**            **05**    **INV-M-PART**

and indicates PROCEDURE DIVISION line:

**447**            **MOVE INV-M-PART TO INV-2-PART-NBR.**

# DCD Narrative Description

## Part III

### Data Division Line:

**302 05 DATA-NAME** > **IF # = 3 (942,965), 4 (948,971)**

indicates PROCEDURE DIVISION lines:

<b>942</b>	<b>IF DATA-NAME IS EQUAL TO 3</b>	<b>302</b>
..		
<b>948</b>	<b>IF DATA-NAME IS EQUAL TO 4</b>	<b>302</b>
..		
<b>965</b>	<b>IF DATA-NAME IS EQUAL TO 3</b>	<b>302</b>
..		
<b>971</b>	<b>IF DATA-NAME IS EQUAL TO 4</b>	<b>302</b>

# Alternate Compile Listing

## DATA DIVISION

SQ-NBR 1--6 PROGRAM-ID YEAR2POS mm/dd/yyyy ... 73—80 # REFERS TO DATA-NAME AT THIS LINE

66	FD INV-MAST-FILE-2		> Close # (214) Open Output # (197)
67	RECORD CONTAINS	94 CHARACTERS	
68	BLOCK CONTAINS	0 RECORDS	
69	LABEL RECORDS ARE STANDARD.		
<b>70</b>	01 <b>INV-2-RECORD-IN.</b>		> <b>Move SPACES to # (444)</b> Write # (231)
71	05 INV-2-PART-NBR	PIC S9(8).	> Move INV-M-PART-NBR @103 to # (447)
72	05 INV-2-PART-NAME	PIC X(20).	> If 'NON-UNIFORM-PART' = # (450) Move 'MARK-TO-REMOVE' to # (451) INV-M-PART-NM @104 to # (448)
73	05 INV-2-ORIG-DATE.		> Move INV-M-ORIG-DT @105 to # (453)
74	10 INV-2-ORIG-YEAR	PIC 99.	
75	10 INV-2-ORIG-MONTH	PIC 99.	
76	05 INV-2-ORIG-CONTACT-NAM	PIC X(20).	> Move INV-M-ORIG-NAM @108 to # (455)



# TIME SAVINGS

## Without Alternate Compile Listing

- Look at one line of the Procedure Division
- Find wanted name in Cross Reference Map
- Make a list of all REFERENCES for this name
- Visit all references except the line just done
- Remember or write down what happens

**Approximate Time: 5-10 minutes**

## With Alternate Compile Listing

- Look at one line of the Procedure Division
- Use number on right to find Data-name with Narrative

**Approximate Time: 10 seconds**

# Alternate Compile Listing

## PROCEDURE DIVISION

SQ-NBR 1—6	PROGRAM-ID YEAR2POS mm/dd/yyyy ...	73—80	SQ-NBRS	LOGIC FLOW
442	E-FORMAT-OUTPUT-RECORD	SECTION.		PERFORMED BY 300 373
443	E010-CLEAR-OUTPUT-RECORD.			
<b>444</b>	MOVE SPACES	TO INV-2-RECORD-IN.	<b>70</b>	
445				
446	E020-FORMAT-RECORD.			
447	MOVE INV-M-PART-NBR	TO INV-2-PART-NBR.	103 71	
448	MOVE INV-M-PART-NM	TO INV-2-PART-NAME.	104 <b>72</b>	
449				
450	IF 'NON-UNIFORM-PART' =	INV-2-PART-NAME	<b>72</b>	
451	MOVE 'MRK-REM'	TO INV-2-PART-NAME.	<b>72</b>	
452	PERFORM	P-TEST-PARM-FIELD.		PERFORM 523 THRU 538
453				
454	E999-EXIT. EXIT.			RETURN TO PERFORM AT 300 373

This completes the Alternate Compile  
Listing facility

# Analysis on Multiple Programs

- Member Fetch PROC available for selecting just COBOL programs
- Results on any number of programs brought into one Application analysis
- READPDS & WRITPDS options available
- Reporting includes the following reports:
  - **CALL**
  - **CALL PARAMETER**
  - **COPY**
  - **DATA ANALYSIS**
  - **LAYOUTS**
  - **PARAGRAPHS**
  - **SPECIAL REGISTERS**
  - **SYSTEM RECORD ANALYSIS**

Enter **4** to bring up 'Analyze a COBOL Application'

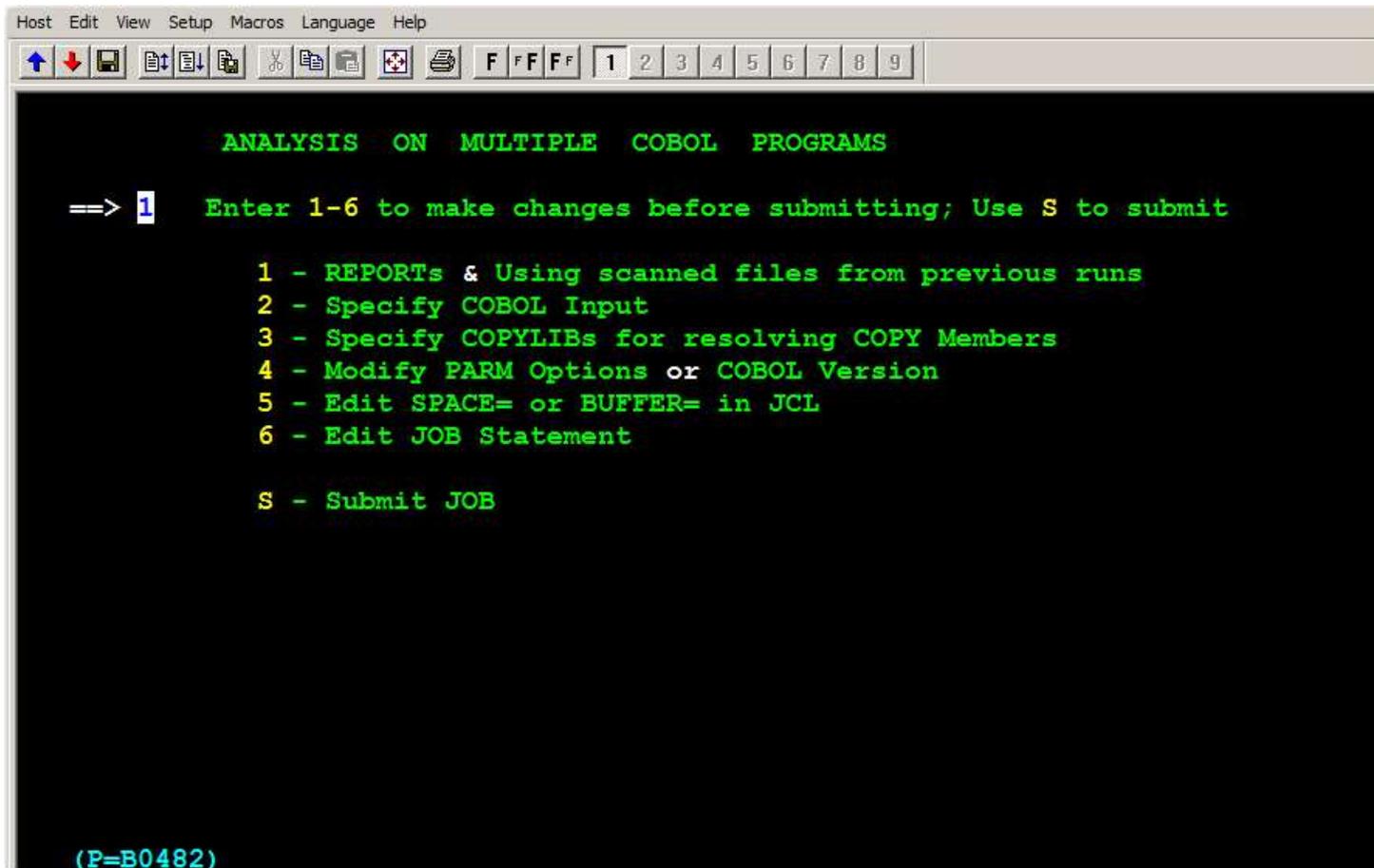
```
Host Edit View Setup Macros Language Help
Control/DCD The Ultimate COBOL Program and Application Analysis Tool
Option ==> 4 Enter 1-6, H or use F3 to exit)

1 Build a Digital Documentation Manual & Alterate Compile Listing
2 Build COBOL Program with F &operand Analysis for editing or browsing
3 Save COBOL Program without F &operand Analysis after ISPF editing
4 Analyze a Cobol Application
5 Abend Analysis for Data Field Errors
6 Verify JCL Accuracy within an Application
H HELP

Control/DCD Release 2.2
(P=DCD)
```

Press enter to continue

Option 1 selects the reports wanted. Option 2 selects input.



```
Host Edit View Setup Macros Language Help
↑ ↓ [Icons] F F F F 1 2 3 4 5 6 7 8 9

      ANALYSIS ON MULTIPLE COBOL PROGRAMS

==> 1  Enter 1-6 to make changes before submitting; Use S to submit

      1 - REPORTs & Using scanned files from previous runs
      2 - Specify COBOL Input
      3 - Specify COPYLIBs for resolving COPY Members
      4 - Modify PARM Options or COBOL Version
      5 - Edit SPACE= or BUFFER= in JCL
      6 - Edit JOB Statement

      S - Submit JOB

(P=B0482)
```

Enter 1 for options, the press enter

# Enter **Y** to select one or more reports

```
Host Edit View Setup Macros Language Help
↑ ↓ [Icons] F F F F 1 2 3 4 5 6 7 8 9

Analysis on Multiple COBOL Programs - REPORTS

Selection by reports      Enter Y or N

1. 01 Records           - N      8. Literal              - N
2. CALL Analysis       - Y      9. Paragraph            - N
3. CALL Hierarchy      - N     10. Special Registers   - N
4. COPY Analysis       - Y     11. System Record Analysis - N
5. DATA Analysis      - Y     12. Verb Analysis       - N
6. Fig. Constants     - N     13. CALL Parameter Analysis - N
7. LAYOUTs            - N      ( Verify PARAMETER field sizes &
                                order in CALLs across programs )

WRITE (save) information for later reading - (Enter Y or N)
Write to condensed files - N
READ from saved information for reporting - (Enter Y or N)
Read from condensed files - N

(P=B0301)
```

Note - It is possible to **save scanned information** for later reporting. Press enter to return.

Use **Option 2** to specify INPUT, then press **enter**

```
Host Edit View Setup Macros Language Help
↑ ↓ ↻ ↵ ⌂ ✂ 📄 📁 ⚙️ 🖨️ F F F F 1 2 3 4 5 6 7 8 9

      ANALYSIS ON MULTIPLE COBOL PROGRAMS

==> 2  Enter 1-6 to make changes before submitting; Use S to submit

      1 - REPORTs & Using scanned files from previous runs
      2 - Specify COBOL Input
      3 - Specify COPYLIBs for resolving COPY Members
      4 - Modify PARM Options or COBOL Version
      5 - Edit SPACE= or BUFFER= in JCL
      6 - Edit JOB Statement

      S - Submit JOB

(P=B0482)
```

## Option M, brings up a Member Fetcher utility

```
Host Edit View Setup Macros Language Help
↑ ↓ [Icons] F F F F 1 2 3 4 5 6 7 8 9

Specify type input for this job

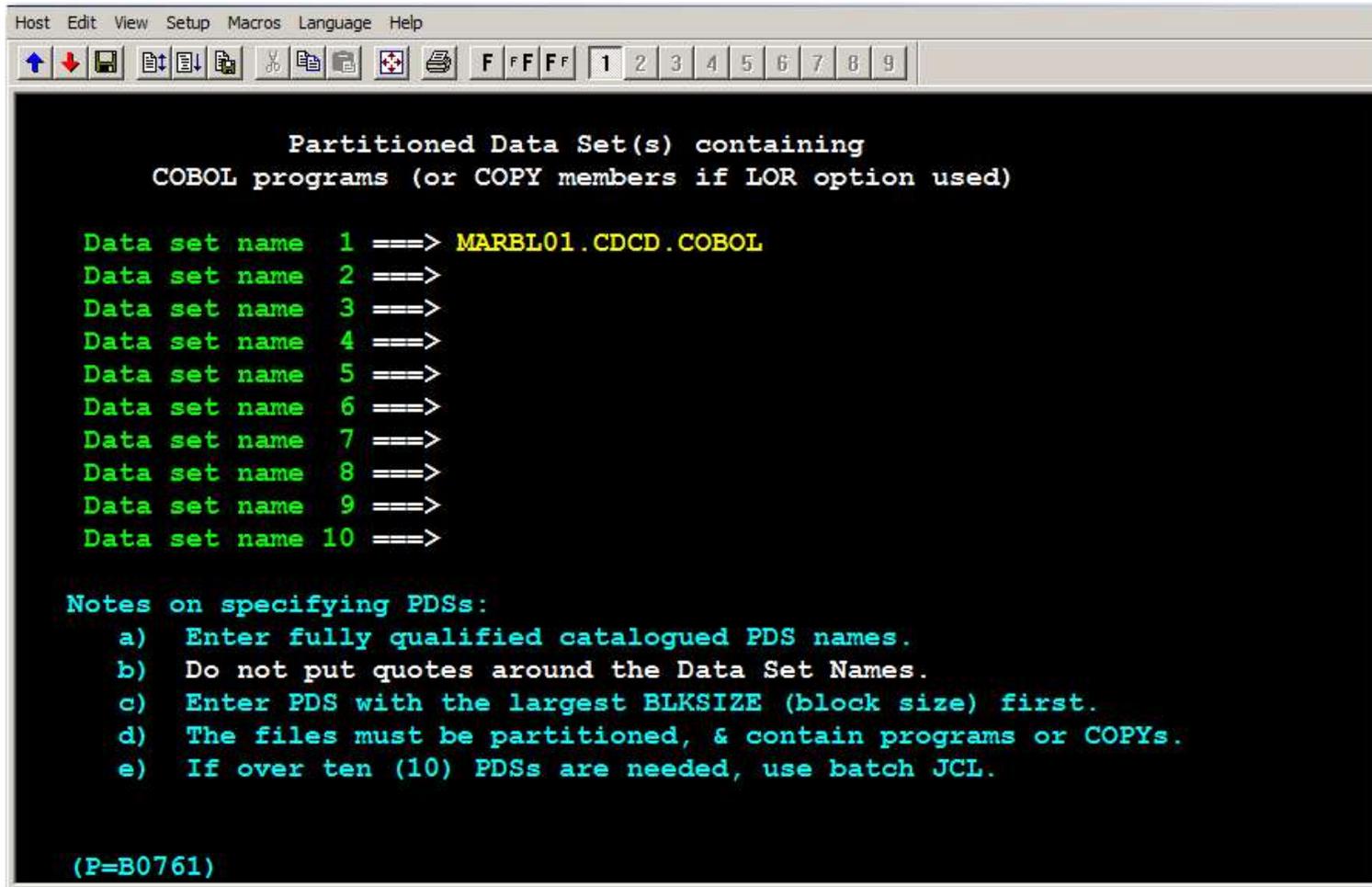
TYPE ==> M

(Enter C, E, L, M, P, or S to indicate type input)
C - Select from Partitioned Data Set(s)
E - Select from Librarian using -EXTRACT
L - Select from Librarian using -SEL
M - Use Member Fetcher utility to select multiple
    programs from 1 or more Partitioned Data Set(s)
P - Select from Panvalet
S - Select from Sequential File

COBOL program(s) (or COPY members if LOR option is used for
LAYOUT records) will be taken from the type input specified

(P=B0721)
```

## Specify 1 or more PDS with COBOL programs



The screenshot shows a terminal window with a menu bar (Host, Edit, View, Setup, Macros, Language, Help) and a toolbar. The main display area has a black background with white and green text. The text is as follows:

```
Partitioned Data Set(s) containing
COBOL programs (or COPY members if LOR option used)

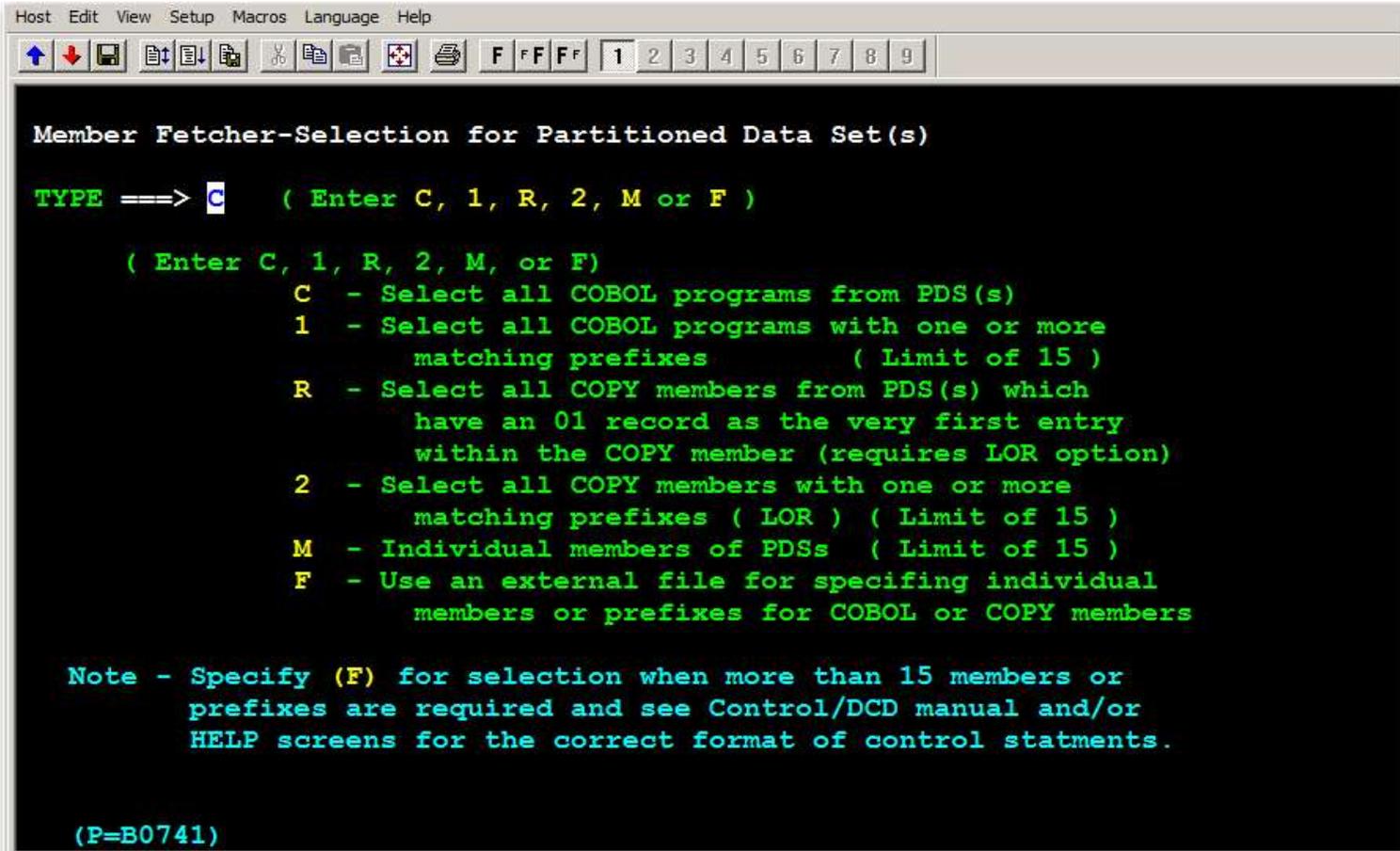
Data set name 1 ==> MARBL01.CDCD.COBOL
Data set name 2 ==>
Data set name 3 ==>
Data set name 4 ==>
Data set name 5 ==>
Data set name 6 ==>
Data set name 7 ==>
Data set name 8 ==>
Data set name 9 ==>
Data set name 10 ==>

Notes on specifying PDSs:
a) Enter fully qualified catalogued PDS names.
b) Do not put quotes around the Data Set Names.
c) Enter PDS with the largest BLKSIZE (block size) first.
d) The files must be partitioned, & contain programs or COPYs.
e) If over ten (10) PDSs are needed, use batch JCL.

(P=B0761)
```

Press Enter to go to select **COBOL** program panel

Option **C** selects just COBOL programs and brings in every one of them.



```
Host Edit View Setup Macros Language Help
↑ ↓ [Icons] F F F F 1 2 3 4 5 6 7 8 9

Member Fetcher-Selection for Partitioned Data Set(s)

TYPE ==> C ( Enter C, 1, R, 2, M or F )

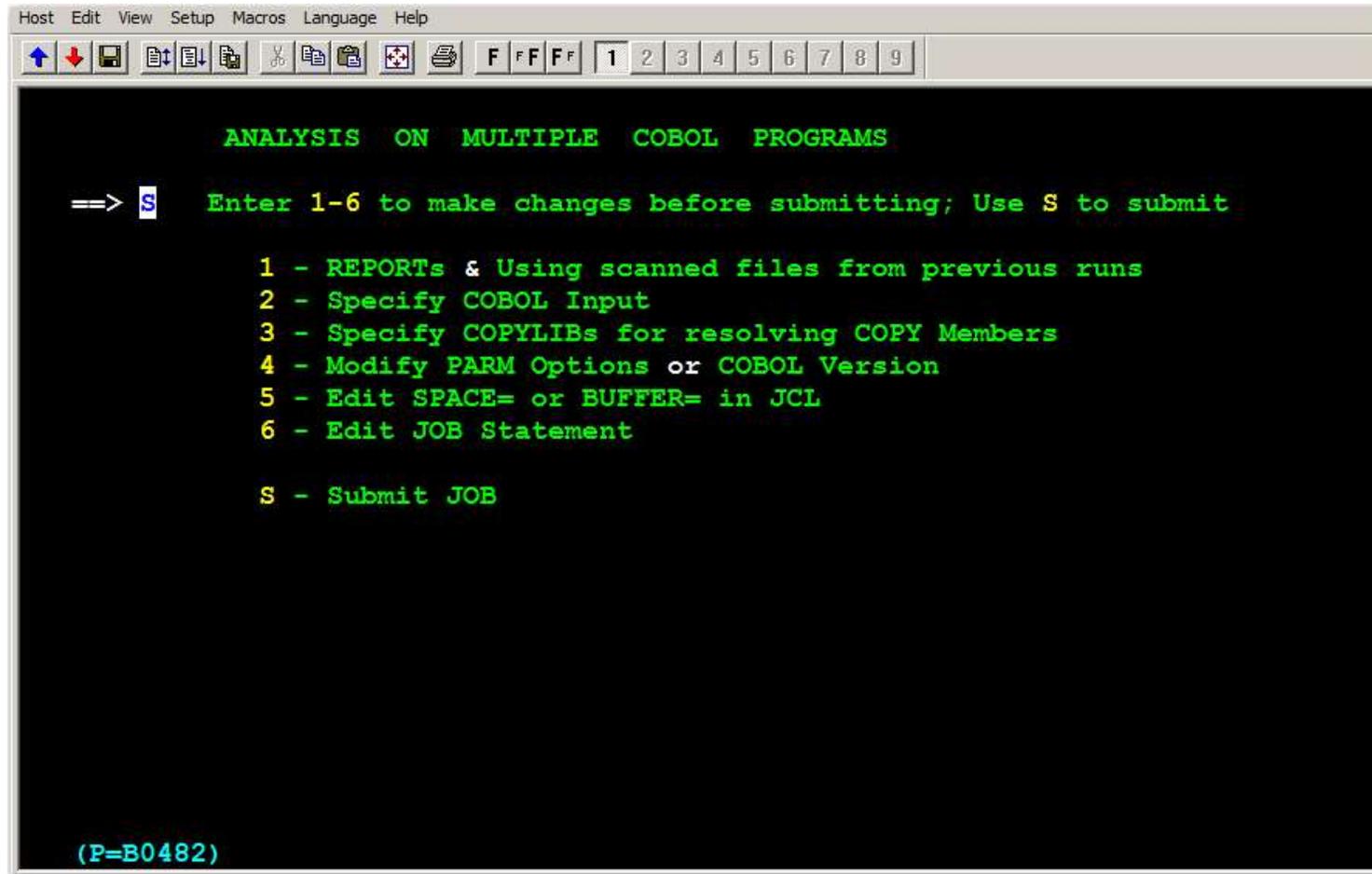
( Enter C, 1, R, 2, M, or F )
C - Select all COBOL programs from PDS(s)
1 - Select all COBOL programs with one or more
   matching prefixes ( Limit of 15 )
R - Select all COPY members from PDS(s) which
   have an 01 record as the very first entry
   within the COPY member (requires LOR option)
2 - Select all COPY members with one or more
   matching prefixes ( LOR ) ( Limit of 15 )
M - Individual members of PDSs ( Limit of 15 )
F - Use an external file for specifying individual
   members or prefixes for COBOL or COPY members

Note - Specify (F) for selection when more than 15 members or
       prefixes are required and see Control/DCD manual and/or
       HELP screens for the correct format of control statements.

(P=B0741)
```

Option **1** allows selecting by PREFIX      Options **R / 2** are for COPY Member LAYOUTs  
Option **M** is for individual members      Option **F** uses external file for CTL Statements  
After selection, press **enter** to return from specifying **INPUT**

Job is ready to be submitted, by choosing **S** option and pressing **ENTER**



The screenshot shows a terminal window with a menu for submitting a job. The menu is titled "ANALYSIS ON MULTIPLE COBOL PROGRAMS" and lists several options. The 'S' option is highlighted, indicating it is the selected option. The terminal window has a menu bar with "Host Edit View Setup Macros Language Help" and a toolbar with various icons and function keys (F1-F9). The text in the terminal is as follows:

```
Host Edit View Setup Macros Language Help
[Toolbar icons]
ANALYSIS ON MULTIPLE COBOL PROGRAMS
==> S Enter 1-6 to make changes before submitting; Use S to submit
      1 - REPORTs & Using scanned files from previous runs
      2 - Specify COBOL Input
      3 - Specify COPYLIBs for resolving COPY Members
      4 - Modify PARM Options or COBOL Version
      5 - Edit SPACE= or BUFFER= in JCL
      6 - Edit JOB Statement
      S - Submit JOB
(P=B0482)
```

The reports produced are available within the  
`//REPORTS DD` in the JCL.

Look for two COND CODEs:

- 0 from Member Fetcher PROC
- 0, 4, 8 or 12 from Control/DCD for Warnings, E-level, etc.

Sample output follows:

# COPY in MEMBER Sequence

COPY ANALYSIS		<b>MEMBER</b> SEQUENCE			01/01/2001	PAGE 1
<b>MEMBER</b>	<b>PROGRAM</b>	<b>SEQ-#</b>	<b>LEVEL</b>	<b>IDENTIFIER</b>	<b>SECTION</b>	
<b>BANRCOPY</b>	DCDLOGIC	0061	01	BC-BANNER-FIELDS	WORKING-STORAGE	SECTION
<b>CORTRAN</b>	DCDLOGIC	0110	01	COB-REC	WORKING-STORAGE	SECTION
<b>CPYREC</b>	DCDLOGIC	0079	<b>01</b>	<b>COB-REC</b>	WORKING-STORAGE	SECTION
<b>HC02IF</b>	DCDLOGIC	0134		<b>030-COPY-HERE</b>	<b>PROCEDURE</b>	<b>DIVISION</b>
<b>INFOTYP7</b>	DCDLOGIC	0012	<b>FD</b>	<b>FILE-1</b>	FILE	SECTION
<b>TRANCPY</b>	PAYMONTH	0024	01	TEST-COPY-REC	WORKING-STORAGE	SECTION
	PAYMONTH	0036	01	TEST-COPY-REC-2	WORKING-STORAGE	SECTION
<b>WTRAST</b>	DCDLOGIC	0008		SOURCE-COMPUTER	ENVIRONMENT	DIVISION

# System Record Analysis

mm/dd/yyyy 11:30

SYSTEM RECORD ANALYSIS - DATA NAME SUMMARY

PAGE 3

FROM-TO	PROGRAM	01 REC NAME	SEQ-#	LV	DATA NAME	PICTURE	DIRECT FLAGS SET/USE/TEST			INDIRECT FLAGS	
91-121	PAYMONTH	PN-RECORD	0087	05	PN-CURRENT-DATA					<b>SI</b>	<b>UI</b>
	PAYMONTH	PT-RECORD	0043	05	PT-CURRENT-DATA					<b>UI</b>	
	PAYROLL	PN-RECORD	0085	05	PN-CURRENT-DATA					<b>SI</b>	<b>UI TI</b>
<b>91-96</b>	PAYMONTH	PN-RECORD	0088	10	PN-CURR-HR-RATE	PIC S9(4)V99	<b>S</b>			<b>SI</b>	<b>UI</b>
	PAYMONTH	PT-RECORD	0044	10	PT-CURR-HR-RATE	PIC S9(4)V99					<b>UI</b>
	PAYROLL	PN-RECORD	0086	10	PN-CURR-HR-RATE	PIC S9(4)V99			<b>T</b>	<b>SI</b>	<b>UI</b>
126-131	PAYMONTH	PN-RECORD	0098	10	PN-WEEKLY-GROSS	PIC S9(4)V99	<b>S</b>	<b>U</b>	<b>T</b>	<b>SI</b>	<b>UI</b>
	PAYMONTH	PT-RECORD	0054	10	PT-WEEKLY-GROSS	PIC S9(4)V99					<b>UI</b>
	PAYROLL	PN-RECORD	0096	10	PN-WEEKLY-GROSS	PIC S9(4)V99	<b>S</b>	<b>U</b>	<b>T</b>	<b>SI</b>	<b>UI</b>
132-137	PAYMONTH	PN-RECORD	0099	10	PN-WEEK-FED-TAX	PIC S9(4)V99	<b>S</b>			<b>SI</b>	<b>UI</b>
	PAYMONTH	PT-RECORD	0055	10	PT-WEEK-FED-TAX	PIC S9(4)V99					<b>UI</b>
	PAYROLL	PN-RECORD	0097	10	PN-WEEK-FED-TAX	PIC S9(4)V99	<b>S</b>	<b>U</b>		<b>SI</b>	<b>UI</b>

# DATA ANALYSIS Report

		SYSTEM DATA-NAME CROSS REFERENCE				
PROGRAM	SECTION	SEQ#	LV	DATA-NAME	NARRATIVE	01/01/2001 PAGE 05
PAYROLL	WORKING-STORAGE	0118	88	WS-EMPLOYEE-NBR-INVALID		VALUE 'X'
					<b>IF # (150)</b>	
PAYROLL	WORKING-STORAGE	0114	88	WS-END-OF-FILE		VALUE 'Y'
					<b>PERFORM-UNTIL # (137)</b>	
PAYMONTH	WORKING-STORAGE	0115	05	WS-END-OF-FILE-SW	PIC X	VALUE SPACE
					MOVE 'Y' TO # (135,202)	
PAYROLL	WORKING-STORAGE	0113	05	WS-END-OF-FILE-SW	PIC X	VALUE SPACE
					MOVE 'Y' TO # (324)	
PAYMONTH	WORKING-STORAGE	0110	05	WS-FICA-AMOUNT	PIC S9(4) COMP-3	VALUE +0
					COMPUTE # = .0715 (173), 3131.70 (179),	
					PN-WEEKLY-GROSS @89 (173),	
					WS-FICA-YTD-TOTAL @109 (179)	
					COMPUTE WS-FICA-YTD-TOTAL @111 = # (160)	
					MOVE # TO PN-WEEKLY-FICA @89 (160)	
PAYROLL	WORKING-STORAGE	0108	05	<b>WS-FICA-AMOUNT</b>	<b>PIC S9(4) COMP-3</b>	<b>VALUE +0</b>
					<b>COMPUTE WS-FICA-YTD-TOTAL @109 = # (175)</b>	
					<b>MOVE # TO PN-WEEKLY-FICA @89 (181)</b>	
					<b>MOVE ZEROS TO # (171)</b>	

# CALL in PROGRAM Sequence

CALL ANALYSIS	<b>PROGRAM-ID</b> / CALL-NAME	SEQUENCE	01/01/2001	PAGE	1
<b>PROGRAM-ID</b>	<b>PARAGRAPH-NAME</b>	<b>SEQ-#</b>	<b>CALL / ENTRY STATEMENT</b>	<b>PARAMETERS</b>	
<b>PAYMONTH</b>	A070-COMPUTE-DEDUCTIONS	0169	CALL ?PAYDEDUC? USING	PN-RECORD PN-WEEKLY-DEDUCTION-1 PN-WEEKLY-DEDUCTION-2	
		0126	PROCEDURE DIVISION ENTRY (PAYMONTH)		
<b>PAYROLL</b>	A010-VERIFY-EMPLOYEE-NBR	0146	CALL ?EMPVERFY? USING	WS-SYSTEM-DATE PT-EMPLOYEE-NBR WS-VERIFY-CODE	
	B010-COMPUTE-FED-TAX	0026	<b>CALL ?FEDTAX? USING</b>	<b>WS-SYSTEM-DATE PN-RECORD</b>	
	A070-COMPUTE-DEDUCTIONS	0184	CALL ?PAYDEDUC? USING	PN-RECORD PN-WEEKLY-DEDUCTION-1 PN-WEEKLY-DEDUCTION-2	
		0124	PROCEDURE DIVISION ENTRY (PAYROLL)		

This completes the *Alternate*  
*Compile Listing* Module...

# Abend Analysis

## Deeper Analysis for Data Field use

Two unique aspects; chose either as needed:

1. Identifying all Data Fields with certain characteristics
2. Tracing a Data Field to find full possible reach of that data field and *by elimination* those areas a data field can not reach

## Selecting field with unique characteristics

```
SELECT IF keyword operator selection-field  
        [ OR selection-field ]...  
  [ AND keyword operator selection-field  
    [ OR selection-field ]... ]...
```

**Keyword** 'Keyword list' is shown next for keywords like PICTURE, FIELD-SIZE, USAGE and CLASS

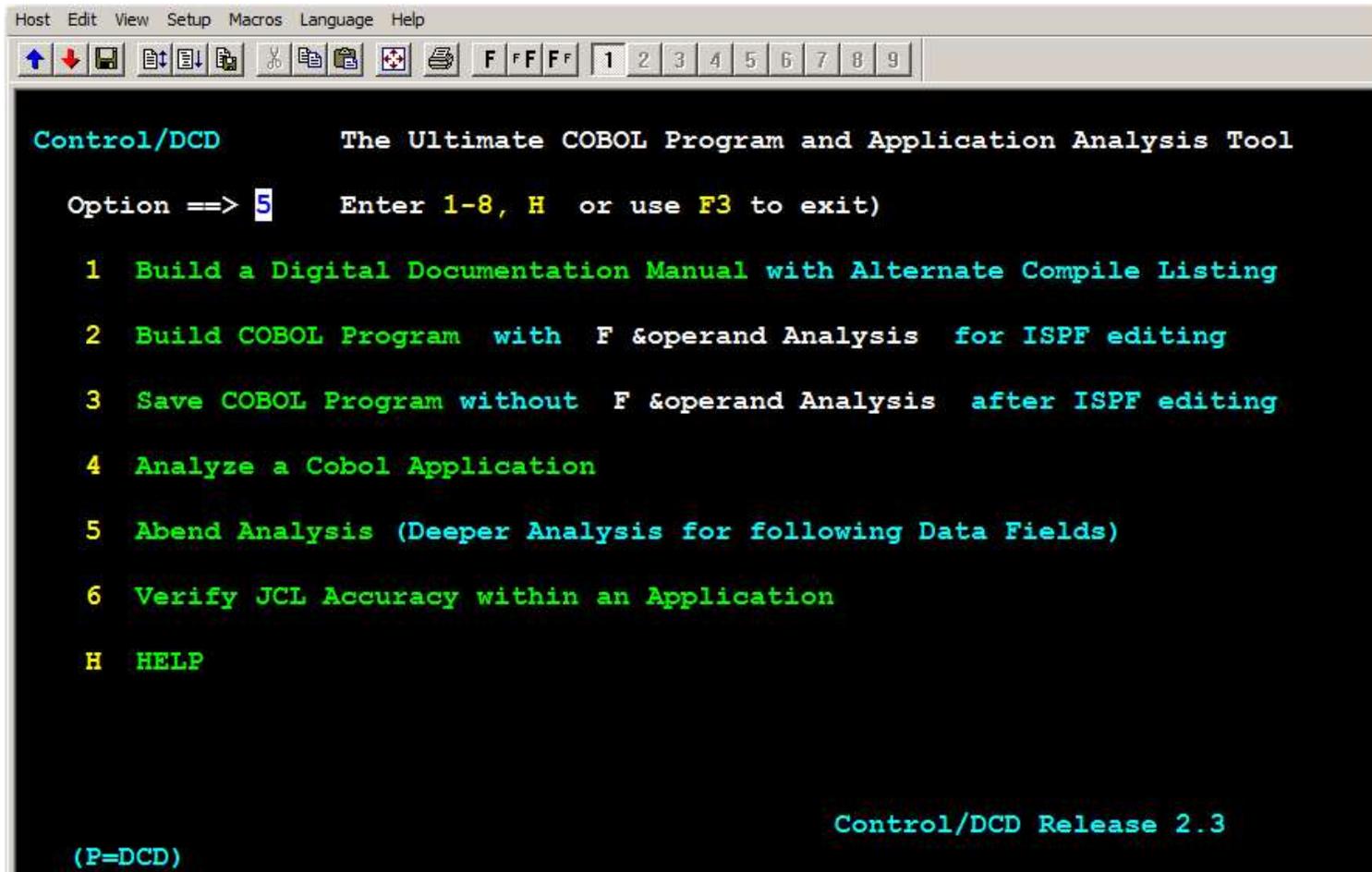
**operator** =, > or <

**selection-field** User defined

## 'Keyword List'

PREFIX	=	Begin of Name
SUFFIX	=	End of Name
BEGIN-NODE	=	Begin of Node ( following a hyphen [ - ] )
END-NODE	=	End of Node ( following a hyphen [ - ] )
NODE-1	=	Wild Strings (see Manual [N*R] for NBR, NUMBER)
NODE-2	=	Wild Strings (see Manual [N*R] for NBR, NUMBER)
PICTURE	=	Use ORs for 99, 9(2), 9(02), etc
LEVEL-NUMBER	=	Use ORs to cover different level numbers
WHOLE-DIGITS	=	Example <b>4</b> for 9( <b>4</b> )V99, S <b>9999</b> V999 or S9( <b>4</b> )
DECIMAL-DIGITS	=	Example <b>2</b> for 9(3)V <b>99</b>
START-POSITION	=,>,<	Use with field position in an 01 record
END-POSITION	=,>,<	
FIELD-SIZE	=,>,<	Size of a field in <u>characters</u> , <b>NOT</b> binary or packed
GROUP-ONLY	=	
ELEMENTARY-ONLY	=	
SECTION	=	F=FILE, W=WORKING-STORAGE, L=LINKAGE
USAGE	=	D, D1, C, C1, C2, C3, C4, or IX, <b>D=DISPLAY</b> , etc
CLASS	=	N=Numeric, X=Alphanumeric and E=Numeric Edited
NAME	=	up to 30 characters of Name

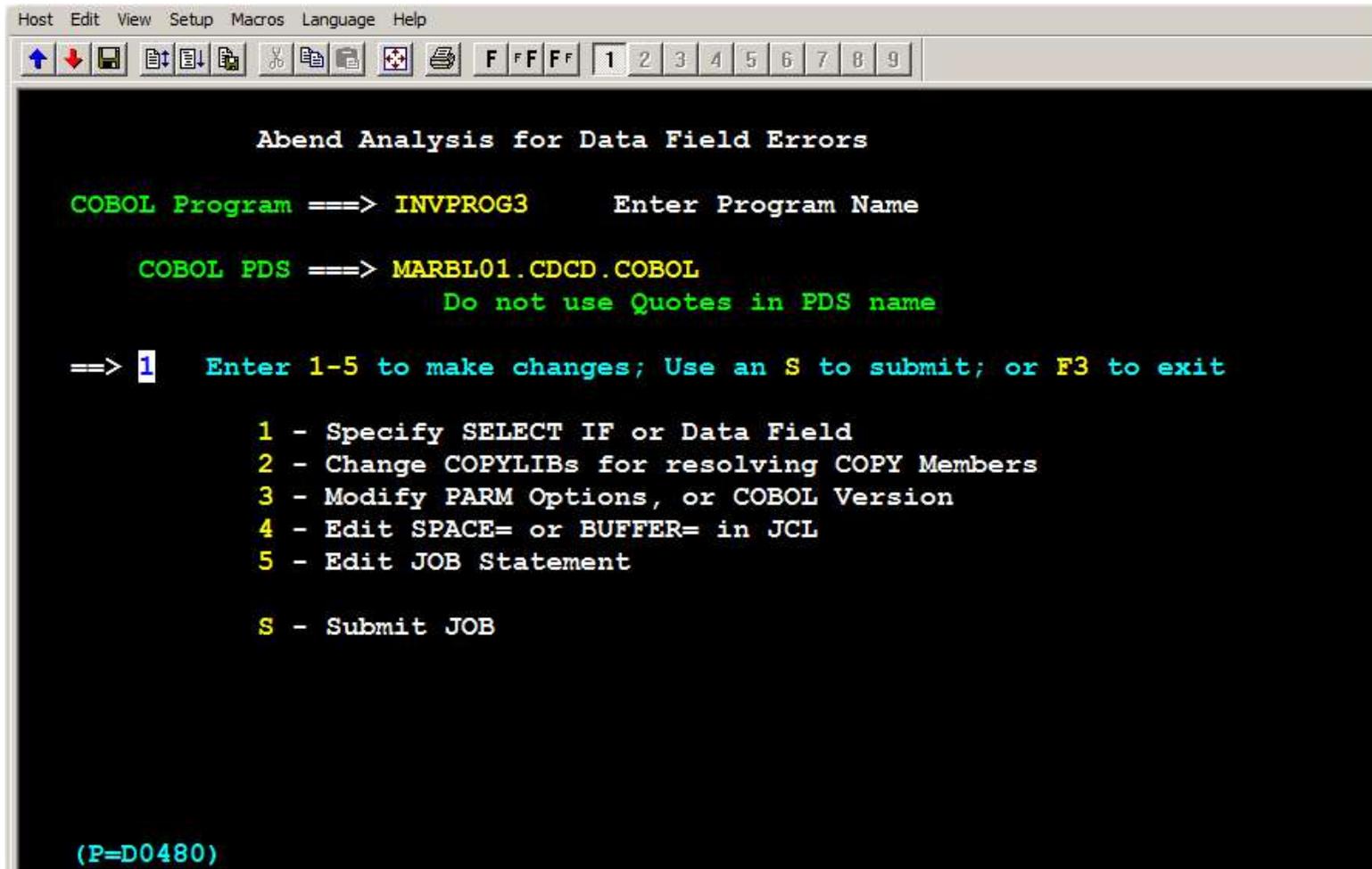
# Use Option 5 for deeper data analysis



The screenshot shows a terminal window with a menu titled "Control/DCD The Ultimate COBOL Program and Application Analysis Tool". The menu lists several options, with "5 Abend Analysis (Deeper Analysis for following Data Fields)" highlighted. The interface includes a menu bar with "Host Edit View Setup Macros Language Help", a toolbar with various icons, and a numeric keypad at the top. The text "(P=DCD)" is visible in the bottom left corner, and "Control/DCD Release 2.3" is in the bottom right corner.

```
Host Edit View Setup Macros Language Help
↑ ↓ ↵ ↶ ↷ ✂ 📄 📁 🏠 🖨️ F F F 1 2 3 4 5 6 7 8 9
Control/DCD The Ultimate COBOL Program and Application Analysis Tool
Option ==> 5 Enter 1-8, H or use F3 to exit)
1 Build a Digital Documentation Manual with Alternate Compile Listing
2 Build COBOL Program with F &operand Analysis for ISPF editing
3 Save COBOL Program without F &operand Analysis after ISPF editing
4 Analyze a Cobol Application
5 Abend Analysis (Deeper Analysis for following Data Fields)
6 Verify JCL Accuracy within an Application
H HELP
Control/DCD Release 2.3
(P=DCD)
```

## Use Option 1 to chose Select IF or Trace Data Field



```
Host Edit View Setup Macros Language Help
↑ ↓ [Icons] F F F F 1 2 3 4 5 6 7 8 9

Abend Analysis for Data Field Errors

COBOL Program ==> INVPROG3      Enter Program Name

COBOL PDS ==> MARBL01.CDCD.COBOL
                Do not use Quotes in PDS name

==> 1  Enter 1-5 to make changes; Use an S to submit; or F3 to exit

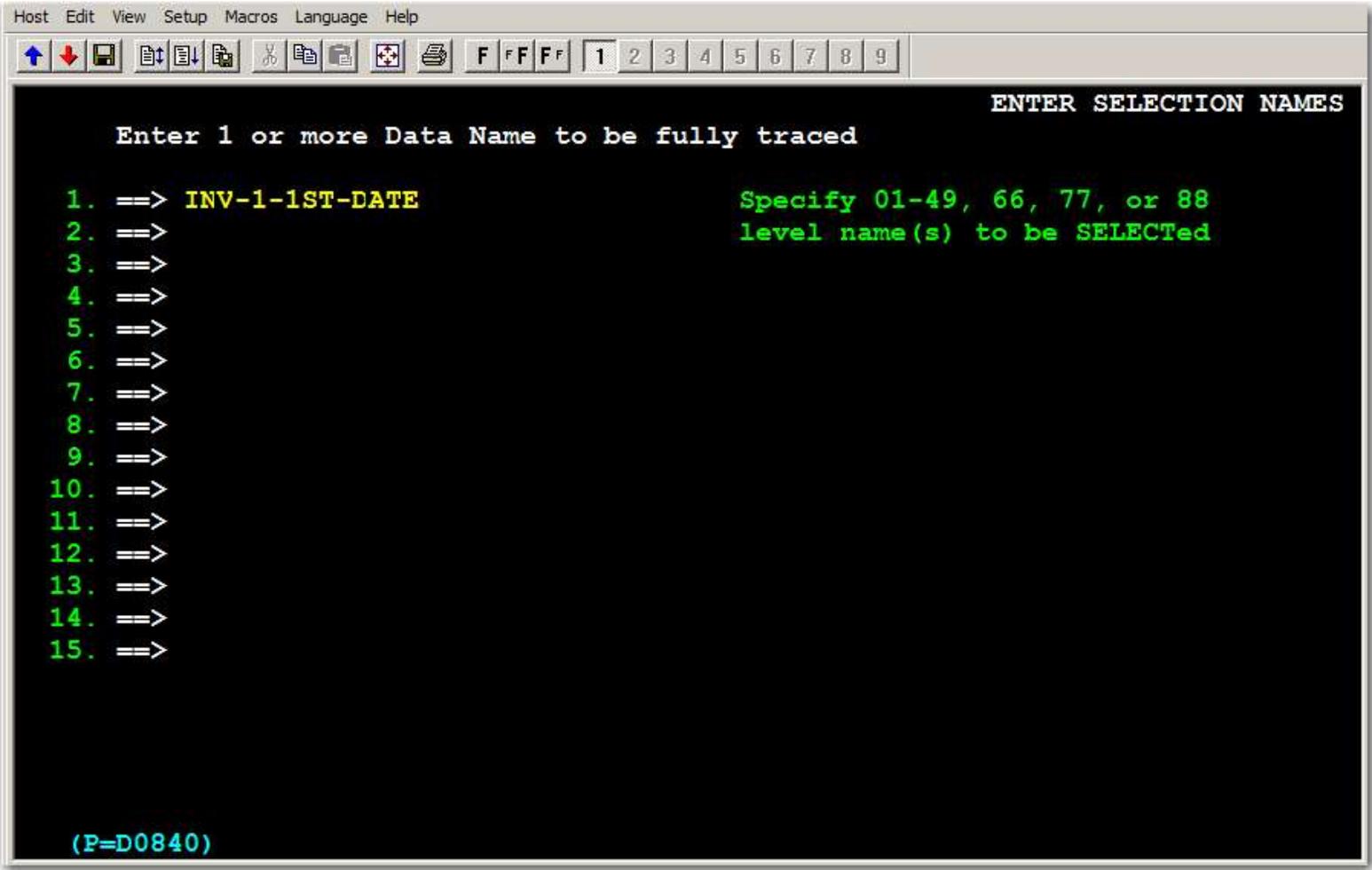
      1 - Specify SELECT IF or Data Field
      2 - Change COPYLIBs for resolving COPY Members
      3 - Modify PARM Options, or COBOL Version
      4 - Edit SPACE= or BUFFER= in JCL
      5 - Edit JOB Statement

      S - Submit JOB

(P=D0480)
```



# Entering a data name to trace and follow thru to **Submit job**



```

R133.TXT - Notepad
le Edit Format View Help
12/23/2017 13:12 TRACING & ANALYSIS SELECT STATEMENTS PAGE 1

# 1 SELECT IF NAME = INV-1-1ST-DATE
Warning - If more options besides TRACE are used, then the Tracing & Analysis report may not immediately follow this page
Page 1 ABEND ANALYSIS REPORT 12/23/2017
Program Seq# Level Data-Name Directly Referenced Narrative Section

redefines 0043 05 INV-1-1ST-DATE PIC S9(6) COMP-3 FILE
resides in positions 57 - 60 in record INV-1-RECORD-IN
*-----> If # > ZEROS (298)
If # numeric (298,374)
Move # to INV-M-1ST-DT @106 (300), WS-DATE-FORMAT-YYMMDD @173 (375)

overlap 0035 01 INV-1-RECORD-IN FILE
uses field positions 1 - 94
*-----> Read # (230,266)

Page 2 Trace # 00001 ABEND ANALYSIS REPORT 12/23/2017
Program Seq# Level Data-Name Directly Referenced Narrative Section

-Traced 0098 01 INV-M-RECORD-IN WORK-ST
uses field positions 1 - 94
Move SPACES to # (274,346,423)

-Traced 0106 05 INV-M-1ST-DT WORK-ST
PIC S9(6) COMP-3
uses field positions 57 - 60
Move # to INV-2-1ST-DATE @74 (504)
Move INV-1-1ST-DATE @43 to # (300), WS-DATE-VALID @181 to # (377,382)

-Traced 0172 01 WS-DATE-FORMAT-YYMMDD-RECORD WORK-ST
uses field positions 1 - 10

-Traced 0173 05 WS-DATE-FORMAT-YYMMDD WORK-ST
PIC S9(6) COMP-3
uses field positions 1 - 4
If # not numeric (530)
Move # to WS-DATE-DISPLAY-YYMMDD @174 (535)
Move INV-1-1ST-DATE @43 to # (375), INV-1-2ND-DATE @44 to # (380), INV-1-3RD-DATE
@45 to # (385,446), WS-DATE-DISPLAY-YYMMDD @174 to # (561,568)

Page 3 Trace # 00002 ABEND ANALYSIS REPORT 12/23/2017
Program Seq# Level Data-Name Directly Referenced Narrative Section

-Traced 0044 05 INV-1-2ND-DATE FILE
PIC S9(6) COMP-3
uses field positions 61 - 64
If # > ZEROS (303)

```

## Sample Tracing Output

## Two aspects to Abend Data Field Analysis

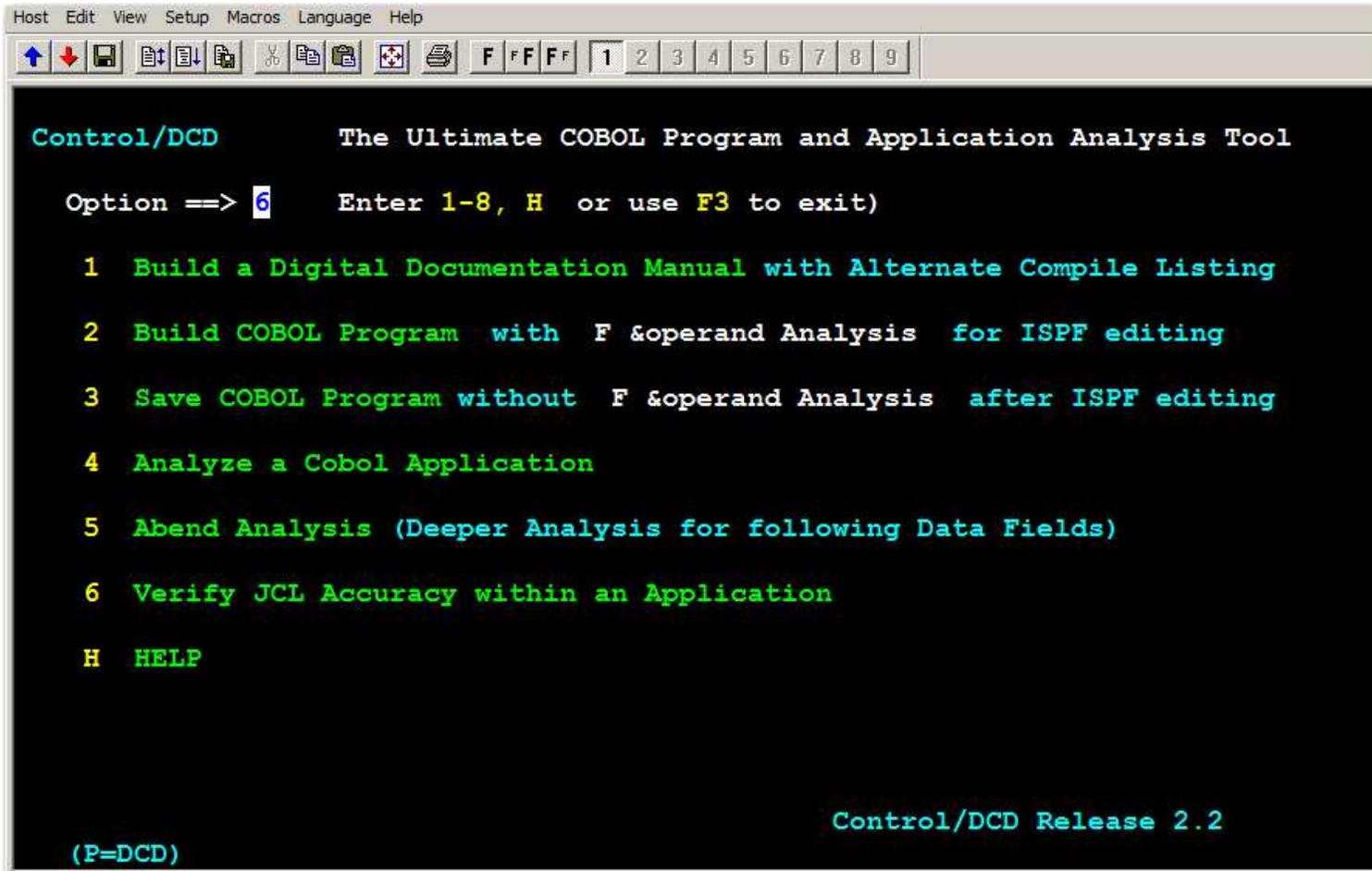
1. **SELECT IF** with COBOL-like keywords
2. **Tracing one field** to find where it can reach

This completes the **Abend**  
**Analysis Module...**

# JCL Analysis

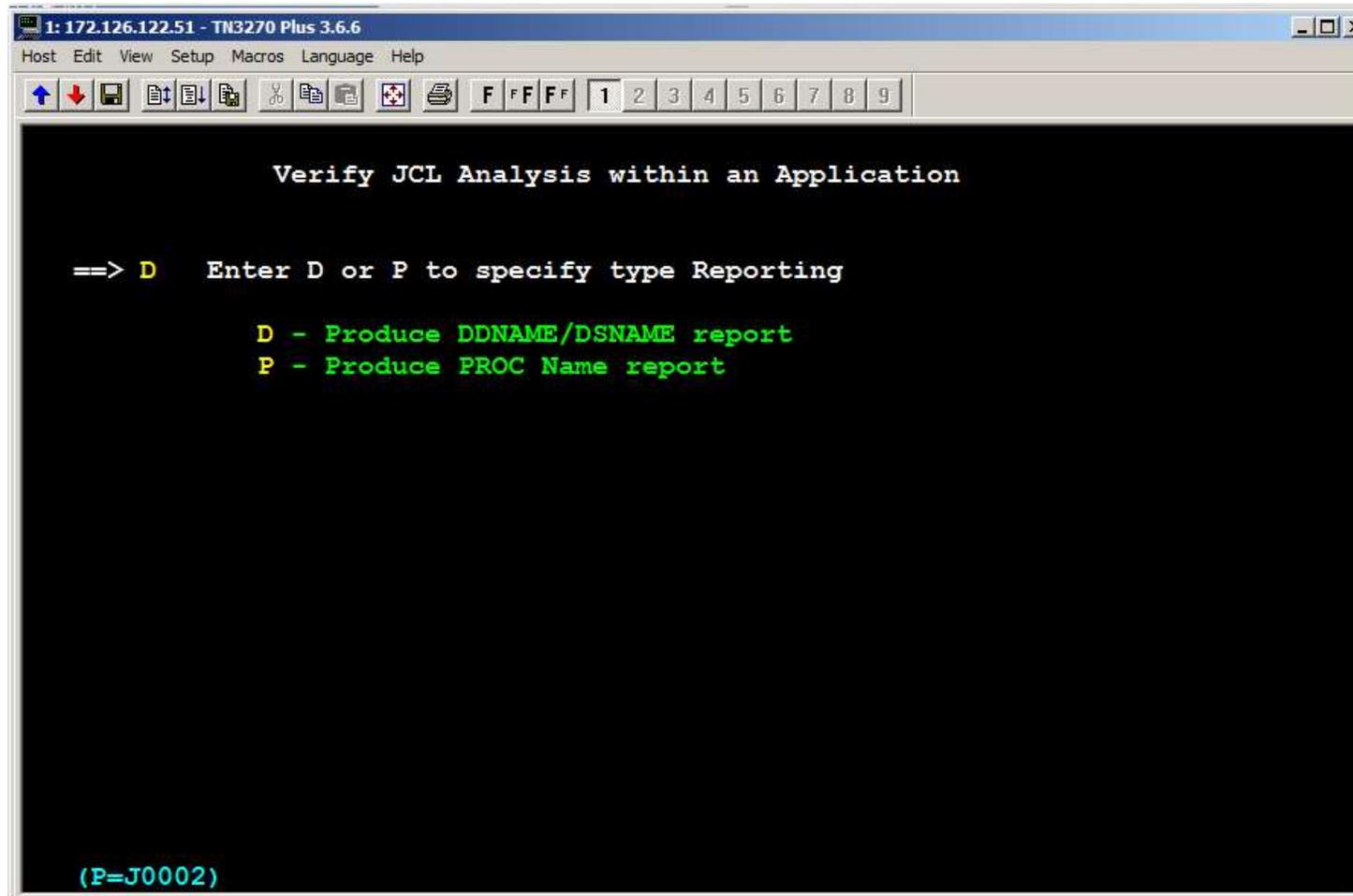
- Control/DCD provides four JCL Reports:
  1. DSNNAME sequence
  2. DDNAME sequence
  3. Unsorted (Input) sequence
  4. Job Name (List of PROCs)

## Enter 6 from main panel to produce JCL Analysis



```
Host Edit View Setup Macros Language Help
↑ ↓ ↵ ↶ ↷ ⏪ ⏩ ⏴ ⏵ ⏶ ⏷ ⏸ ⏹ ⏺ ⏻ ⏼ ⏽ ⏾ ⏿
Control/DCD The Ultimate COBOL Program and Application Analysis Tool
Option ==> 6 Enter 1-8, H or use F3 to exit)
1 Build a Digital Documentation Manual with Alternate Compile Listing
2 Build COBOL Program with F &operand Analysis for ISPF editing
3 Save COBOL Program without F &operand Analysis after ISPF editing
4 Analyze a Cobol Application
5 Abend Analysis (Deeper Analysis for following Data Fields)
6 Verify JCL Accuracy within an Application
H HELP
Control/DCD Release 2.2
(P=DCD)
```

Enter **D** for main JCL Report showing **DSNs** and **DDNAMEs**



The screenshot shows a terminal window titled "1: 172.126.122.51 - TN3270 Plus 3.6.6". The window has a menu bar with "Host", "Edit", "View", "Setup", "Macros", "Language", and "Help". Below the menu bar is a toolbar with various icons and a numeric keypad. The main area of the terminal is black with white and green text. The text displayed is:

```
Verify JCL Analysis within an Application

==> D  Enter D or P to specify type Reporting

      D - Produce DDNAME/DSNAME report
      P - Produce PROC Name report

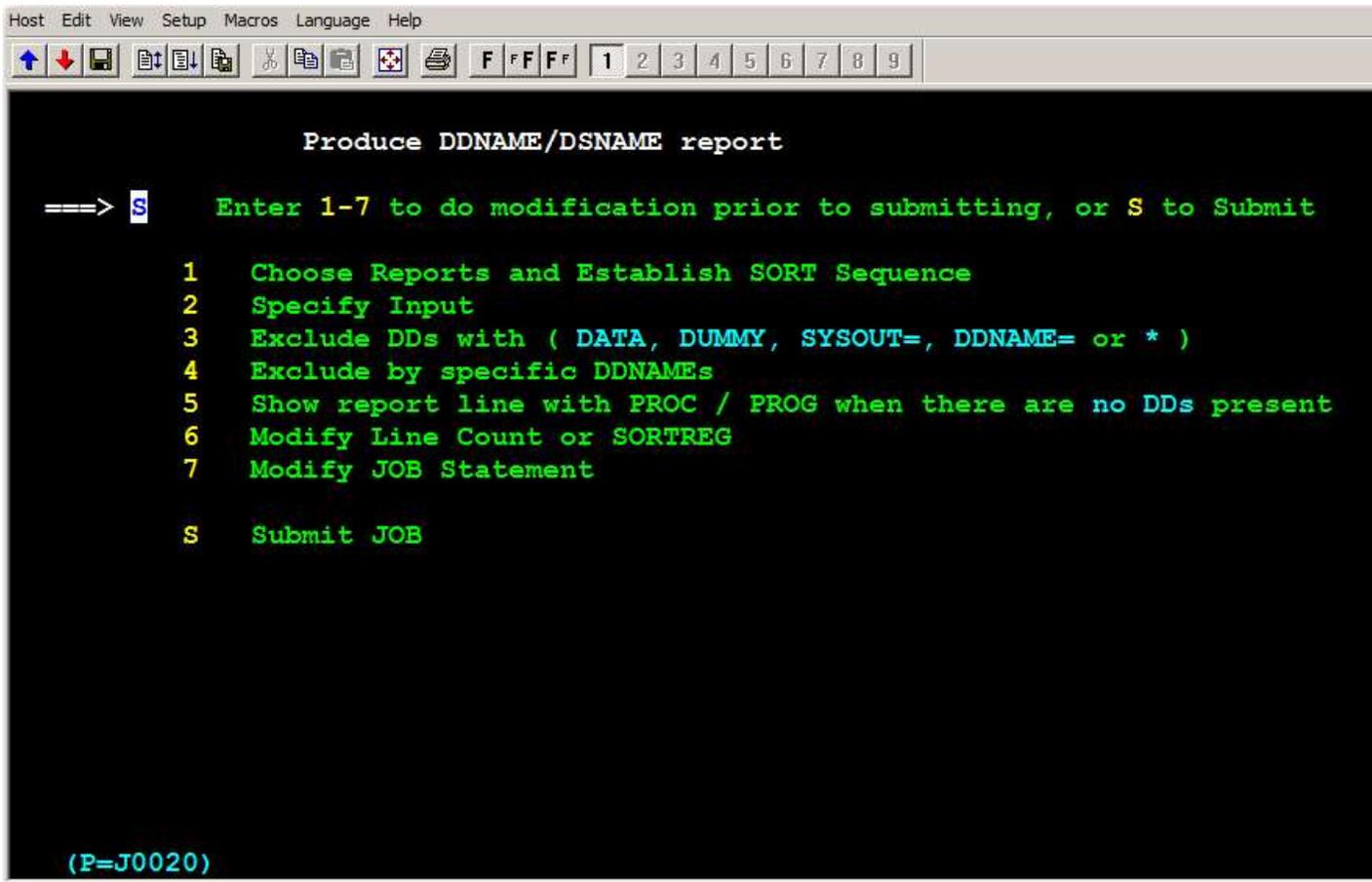
(P=J0002)
```

Option 1 is used for choosing sort sequence

Option 2 specifies JCL input for this report

Options 3-5 allow tailoring the output to limit or expand reporting

When ready, Option S shown below submits the job



The screenshot shows a terminal window with a menu titled "Produce DDNAME/DSNAME report". The menu options are:

```
Host Edit View Setup Macros Language Help
[Icons] F F F F 1 2 3 4 5 6 7 8 9

Produce DDNAME/DSNAME report

==> S Enter 1-7 to do modification prior to submitting, or S to Submit

1 Choose Reports and Establish SORT Sequence
2 Specify Input
3 Exclude DDs with ( DATA, DUMMY, SYSOUT=, DDNAME= or * )
4 Exclude by specific DDNAMEs
5 Show report line with PROC / PROG when there are no DDs present
6 Modify Line Count or SORTREG
7 Modify JOB Statement

S Submit JOB

(P=J0020)
```

# JCL DSNNAME Report

DATA SET ANALYSIS \*\* 01/01/2001 \*\*\*\*\* PAGE 1

DSNAME	PROGRAM	PROC	STEP-NBR	STEP-NAME	DDNAME	DISPOSITION
&&PASSFILE	DCDJCL	DCDJCL	2	JCLRPT	PROFILE	OLD DELETE
	MBRFETCH	DCDJCL	1	MBR	OUTSET	MOD PASS
ALT.DSN.FOR.APPL	DCDMAIN	LIBACL	2	DCD	COBOLIN	OLD DELETE
		PANACL	2	DCD	COBOLIN	OLD DELETE
	LIBRARAN	LIBACL	1	LIB	OSJOB	NEW PASS
	PAN#1	PANACL	1	PAN	PAN002	NEW PASS
CARDIN	DCDJCL	DCDJCL	2	JCLRPT	SYSIN	
DUMMY	DCDJCL	DCDJCL	2	JCLRPT	SORTMESS	
LIBRARAN.SOURCE	LIBRARAN	LIBACL	1	LIB	MASTER	SHR
PANVALET.SOURCE	PAN#1	PANACL	1	PAN	PAN001	SHR
SYSOUT	DCDJCL	DCDJCL	2	JCLRPT	PRINT	
			2	JCLRPT	PRTMSG	
	DCDMAIN	COMACL	1	DCD	PRINT	

This completes the JCL Analysis  
Module...

This completes the **Control/DCD**  
**Basic Course...**

Make sure you obtain your  
Completion Certificate by  
contacting Marble Computer at  
[training@marblecomputer.com](mailto:training@marblecomputer.com)



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