



**Program Directory for
IBM Enterprise PL/I for z/OS**

V3.6.0

Program Number 5655-H31

FMIDs H270360, J270361, HAC2710, JAC271J

for Use with
z/OS V1.6.0 or later

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GI10-8426-10

Note!

Before using this information and the product it supports, be sure to read the general information under 7.0, "Notices" on page 30.

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1.0 Introduction

This Program Directory is intended for the system programmer responsible for program installation and maintenance. It contains information concerning the material and procedures associated with the installation of IBM Enterprise PL/I for z/OS. This publication refers to IBM Enterprise PL/I for z/OS as Enterprise PL/I.

The Program Directory contains the following sections:

- 2.0, “Program Materials” on page 8 identifies the basic and optional program materials and documentation for Enterprise PL/I.
- 3.0, “Program Support” on page 12 describes the IBM support available for Enterprise PL/I.
- 4.0, “Program and Service Level Information” on page 14 lists the APARs (program level) and PTFs (service level) incorporated into Enterprise PL/I.
- 5.0, “Installation Requirements and Considerations” on page 15 identifies the resources and considerations required for installing and using Enterprise PL/I.
- 6.0, “Installation Instructions” on page 22 provides detailed installation instructions for Enterprise PL/I. It also describes the procedures for activating the functions of Enterprise PL/I, or refers to appropriate publications.

Before installing Enterprise PL/I, read the *CBPDO Memo To Users* and the *CBPDO Memo To Users Extension* that were supplied with this program in softcopy form as well as this Program Directory and then keep them for future reference. Section 3.2, “Preventive Service Planning” on page 12 tells you how to find any updates to the information and procedures in this Program Directory.

Enterprise PL/I is supplied in a Custom-Built Product Delivery Offering (CBPDO, 5751-CS3). The Program Directory is provided in softcopy form on the CBPDO tape which is identical to the hardcopy form provided with your order. Your CBPDO contains a softcopy preventive service planning (PSP) upgrade for this product. All service and HOLDDATA for Enterprise PL/I are included on the CBPDO tape.

Do not use this Program Directory if you are installing Enterprise PL/I with a SystemPac or ServerPac. When using these offerings, use the jobs and documentation supplied with the offering. This documentation may point you to specific sections of the Program Directory as required.

1.1 Enterprise PL/I Description

With IBM Enterprise PL/I for z/OS V3.6.0, you can leverage more than 30 years of IBM experience in application development to facilitate your new On Demand Business endeavors, helping you to integrate PL/I and Web-based business processes in Web services, XML, Java and PL/I applications. This compiler's interoperability lets you capitalize on existing IT investment while smoothly incorporating new, Web-based applications as part of your organizations infrastructure.

Enterprise PL/I is a leading-edge IBM z/OS-based compiler that helps you create and maintain mission-critical, line-of-business PL/I applications that you want to execute on your z/OS systems. It gives you access to IBM DB2, IBM CICS, and IBM IMS systems, and other data and transaction systems.

1.1.1 DB2 V9 Support

- Support for STDSQL(YES/NO)
- Support for CREATE TRIGGER (also known as multiple SQL statements)
- Support for FETCH CONTINUE
- Support for SQL style comments ('--') embedded in SQL statements
- Support for Additional SQL TYPES including:
 - BLOB_FILE
 - CLOB_FILE
 - DBCLOB_FILE
 - XML AS
 - BIGINT
 - BINARY
 - VARBINARY
- Listing the DB2 Coprocessor runtime options
- Special handling of EXEC SQL DECLARE VARIABLE statements
- Special handling of EXEC SQL xxx SQL TYPE IS xxx statements

1.1.2 Improved Performance

IBM Enterprise PL/I for z/OS V3.6.0 contains a number of improvements designed to improve the compile time or run time of your application, including:

- Extended-immediate instructions
 - The compiler now supports, under the ARCH(7) option, the extended-immediate facility in z/OS.
 - The extended-immediate facility provides 32-bit immediate operand versions of the following instructions:
 - ADD IMMEDIATE
 - ADD LOGICAL IMMEDIATE
 - AND IMMEDIATE
 - COMPARE IMMEDIATE
 - COMPARE LOGICAL IMMEDIATE

- EXCLUSIVE OR IMMEDIATE
 - INSERT IMMEDIATE
 - LOAD IMMEDIATE
 - LOAD LOGICAL IMMEDIATE
 - OR IMMEDIATE
 - SUBTRACT LOGICAL IMMEDIATE
- These instructions all allow the compiler to produce shorter and faster code sequences
 - Extended-translation facility 2 instructions
 - The compiler now generates, under the ARCH(6) option, some of the instructions from the extended-translation facility 2 in z/OS. In particular, the compiler will generate the CLCLU, MVCLU, PKA, TP and UNPKA instructions under ARCH(6) (or higher). More specifically,
 - CLCLU will be used to compare WIDECHAR expressions.
 - MVCLU will be used for assignments to WIDECHAR NONVARYING variables.
 - TP will be used in code generated for the VALID built-in.
 - PKA will be used in some conversions of PIC to FIXED DEC.
 - UNPKA will be used in some conversions of FIXED DEC to PIC.
 - Exploit CVBG and CVDG

Under ARCH(5), the compiler will use CVBG and CVDG to convert between FIXED BIN and FIXED DEC (and some PICTURE) when the precisions are too large for the conversion to be done with CVB or CVD.
 - Expanded use of CLCLE

In V3.5, the CLCLE instruction was used in the code generated for some CHAR comparisons. Now, the CLCLE instruction will be used in the code generated for all CHAR comparisons except when the 2 lengths are known and equal, in which case better, special code has always been generated. CLCLE will now also be used for compares of GRAPHIC strings (except again when the 2 lengths are known and equal).
 - MVCLE exploited
 - MVCLE will be used for assignments to CHAR NONVARYING when lengths are unknown.
 - MVCLE will be used for assignments to GRAPHIC NONVARYING when lengths are unknown.
 - Better code for packed decimal
 - Conversions from FIXED DEC(p,q) to FIXED DEC(r,s) will now be done entirely inline if r+q-s is greater than 31.
 - Conditional code is eliminated from assignments to PIC'(n)Z'.
 - In DO loops where the TO value is specified by a PICTURE variable, the code has been improved (by converting the PIC to FIXED DEC once before the loop begins).

- Conversions with a drifting \$ will now be inlined.
- Conversions from FIXED BIN to a PICTURE that specifies a scale factor will now be inlined.
- Conversions involving DB2 date-time patterns inlined
 - Conversions between dates using any of the three supported DB2 date-time patterns or the corresponding date-time patterns without any punctuation will now be done inline.
 - Code for REPATTERN will be inlined if the target date has a DB2 date-time pattern and the source has either a DB2 date-time pattern or a date-time pattern that starts with YYYYMMDD.
- Miscellaneous
 - The assignment of ' ' to WIDECHAR is improved.
 - The ALLOCATION built-in function is now inlined.
 - Assignments to BIT variables that have inherited dimensions but which have strides that are divisible by eight will now be inlined.
- Compiler performance
 - The compiler itself is compiled with ARCH(5).
 - The generation of the XREF listing has been significantly speeded up.

1.1.3 Improved Serviceability

- Automatic storage mapping

The MAP output has previously included a list in order of storage offset of the STATIC storage in the compilation. It will now also include a list in order of storage offset (per block) of the AUTOMATIC storage used by the block.

1.1.4 Improved Usability

- More and better messages
 - Under CMPAT, when an aggregate is too large.
 - When a KEYED DIRECT file without a KEY/KEYFROM clause is used, message IBM2180 will be issued.
 - In message IBM1435, the assumed precision will be 15.
 - The message flagging a semicolon in a comment will now include the line number of the line where the semicolon appears.
 - Assignments of FIXED DEC variables to FIXED DEC will be flagged if SIZE could be raised.
 - Message inserts are now passed to the compiler user exit.
 - IBM1387 will now indicate that the NODESCRIPTOR attribute will be ignored when it is invalid.
 - Assignments that can change a REFER object will now be flagged (as they were under the old compiler with message IEL0653I).

- ENV attribute in attributes listing

The ENV attribute if specified on the declare of a file will now be included in the attributes listing.

- Control of CEESTART csect order

Under the new CEESTART option, the user can choose whether the compiler places the CEESTART csect at the beginning or the end of the generated object deck. Those users who want to use linker CHANGE cards must choose to have the compiler place CEESTART at the end of the object deck.

- Flagged unused INCLUDE files

If the XREF option is in effect, then the compiler will issue a warning message for any INCLUDE file that contains no cross-referenced variables.

- Ability to change the preprocessor default options

Via the new PPCICS, PPINCLUDE, PPMACRO and PPSQL options, the user may now change the default options for the corresponding preprocessor. In particular, using the PPSQL option, for example, in the IBMZIOP module would allow the user to specify the SQL preprocessor options that should be used whenever the PP(SQL) option is specified.

- Ability to cast character to picture

With the new PICSPEC built-in function, the user can quickly cast CHARACTER data to PICTURE.

- Enabled THREADID

The THREADID built-in function will now be enabled for z/OS.

- NOREDUCE expanded

In an assignment of one structure to another, if the structures map, the assignment would normally be done as an aggregate move. But if the structure contained any POINTER fields, then the old compiler would have done the assignment field by field. Under the NOREDUCE option, the new compiler will also.

- Listing allots more columns for line numbers

Previously, the Enterprise PL/I compiler allotted room for only five digits to hold the line number for the source in a compilation. With V3.6, the compiler will allot 7 columns to hold the line number.

- More control over generated DEF files

The attribute DLLINTERNAL will be accepted in the OPTIONS attribute on PROCEDURE and ENTRY statements. This attribute will specify that the compiler should not put the named PROC or ENTRY in the generated DEF file.

1.1.5 Improved Quality

- Extended conformance checking

Under the CHECK(CONFORMANCE) option, structures will now also be checked to see that they match.

1.1.6 New/Changed Compiler Options

- ARCH

7 is now accepted as a suboption. The default is now ARCH(5).

- CEESTART

This new option controls where the compiler places the CEESTART csect in the generated object code. Under CEESTART(FIRST), the compiler places it at the beginning of the generated object code. Under CEESTART(LAST), the compiler places it at the end.

- PPxx

The PPCICS, PPINCLUDE, PPMACRO and PPSQL options are now accepted. Each of these allows the user to specify the options to be passed to the corresponding preprocessor.

- REDUCE

Under NOREDUCE, the compiler will not reduce an assignment of matching structures to a simple move if the structures contain any POINTER fields.

- TEST

The (NO)SEPNAME option is now supported. Under TEST(SEPARATE,NOSEPNAME) the name of the side file will not be placed in the object deck.

- TUNE

7 is now accepted as a suboption. The default is now TUNE(5).

1.1.7 Full Function versus Alternate Function Offerings

The mainframe interactive Debug Tool is offered with the Enterprise PL/I compiler in what is called the Full Function Offering. This debug tool is a common facility that supports:

- Enterprise COBOL for z/OS
- Enterprise PL/I for z/OS
- COBOL for OS/390 & VM
- COBOL for MVS & VM
- VisualAge PL/I for OS/390
- PL/I for MVS & VM
- z/OS C/C++ optional feature
- OS/390 C/C++ optional feature

Only one Full Function Offering is required for debugging applications written in any of these programming languages. An Alternate Function Offering is available for customers who want to receive the Enterprise PL/I for z/OS compiler but not the Debug Tool.

IBM Debug Tool for z/OS V7.1.0 is also offered as a separate product. For more information about the function offered in the Debug Tool, refer to Software Announcement 206-222, dated September 12, 2006.

1.2 Enterprise PL/I FMIDs

Enterprise PL/I Alternate Function Offering consists of the following FMIDs:

H270360
J270361

Enterprise PL/I Full Function Offering consists of the following FMIDs:

H270360
J270361
HAC2710
JAC271J

This program directory describes the installation procedure for H270360 and J270361 only. To install HAC2710 and JAC271J, see the Debug Tool program directory (GI10-8726-01).

2.0 Program Materials

An IBM program is identified by a program number and feature numbers. The program number for Enterprise PL/I is 5655-H31 and the feature numbers are 5812, 5802, 5832, and 5822.

Basic Machine-Readable Materials are materials that are supplied under the base license and feature numbers, and are required for the use of the product. Optional Machine-Readable Materials are orderable under separate feature numbers, and are not required for the product to function.

The program announcement material describes the features supported by Enterprise PL/I. Ask your IBM representative for this information if you have not already received a copy.

2.1 Basic Machine-Readable Material

The distribution medium for this program is magnetic tape or downloadable files. It is installed using SMP/E, and is in SMP/E RELFILE format. See 6.0, "Installation Instructions" on page 22 for more information about how to install the program.

Figure 1 through Figure 3 on page 9 describe the physical tapes.

NOTE!

If Enterprise PL/I was shipped to you in a CBPDO, you will need to reference the CBPDO Memo To Users Extension for the physical tape layout of the Basic Machine-Readable Materials.

Figure 5 on page 9 describes the file content.

Figure 1. Basic Material: Program Tape Full Function - US English

Medium	Feature Number	Physical Volume	External Label	VOLSER
3480 tape	5812	1 of 2	Enterprise PL/I	270360
		2 of 2	Debug Tool Base (see Note below)	AC2710

Note: You will also receive this cartridge with your order. The Program Directory for IBM Debug Tool for z/OS contains the installation instructions for the Debug Tool base feature.

Figure 2. Basic Material: Program Tape Full Function - Japanese

Medium	Feature Number	Physical Volume	External Label	VOLSER
3480 tape	5802	1 of 2	Enterprise PL/I	270360
		2 of 2	Debug Tool Base (see Note below)	AC2710
		3 of 3	Debug Tool JPN (see Note below)	AC2711

Note: You will also receive this cartridge with your order. The Program Directory for IBM Debug Tool for z/OS contains both the Debug Tool base and Japanese features.

Figure 3. Basic Material: Program Tape Alternate Function - US English

Medium	Feature Number	Physical Volume	External Label	VOLSER
3480 tape	5832	1 of 1	Enterprise PL/I	270360

Figure 4. Basic Material: Program Tape Alternate Function - Japanese

Medium	Feature Number	Physical Volume	External Label	VOLSER
3480 tape	5822	1 of 1	Enterprise PL/I	270360

Figure 5 describes the program file content for Enterprise PL/I. You can refer to the *CBPDO Memo To Users Extension* to see where the files reside on the tape.

Notes:

1. The data set attributes in this table should be used in the JCL of jobs reading the data sets, but since the data sets are in IEBCOPY unloaded format, their actual attributes may be different.
2. If any RELFILEs are identified as PDSEs, ensure that SMPTLIB data sets are allocated as PDSEs.

Figure 5. Program File Content

Name	O R G	R E C F M	L R E C L	BLK SIZE
SMPMCS	SEQ	FB	80	6400
IBM.H270360.F1	PDS	FB	80	8800
IBM.H270360.F2	PDS	U	0	6144
IBM.J270361.F1	PDS	VB	255	27998

2.2 Optional Machine-Readable Material

No optional machine-readable materials are provided for Enterprise PL/I.

2.3 Program Publications

The following sections identify the basic and optional publications for Enterprise PL/I.

2.3.1 Basic Program Publications

Figure 6 identifies the basic unlicensed program publications for Enterprise PL/I. One copy of each of these publications is included when you order the basic materials for Enterprise PL/I. For additional copies, contact your IBM representative.

<i>Figure 6. Basic Material: Unlicensed Publications</i>	
Publication Title	Form Number
Licensed Program Specifications	GC27-1455

2.3.2 Optional Program Publications

Figure 7 identifies the optional unlicensed program publications for Enterprise PL/I. These publications are available free of charge in displayable softcopy format (BookManager and PDF) from the Enterprise PL/I Web site at <http://www.ibm.com/software/awdtools/pli/plizos/>

<i>Figure 7. Optional Material: Unlicensed Publications</i>	
Publication Title	Form Number
Programming Guide	SC27-1457
Migration Guide	GC27-1458
Language Reference	SC27-1460
Messages and Codes	SC27-1461
Data Sheet	G224-7284

Figure 8 identifies optional unlicensed program publications for Debug Tool. These publications are available free of charge in displayable softcopy format (BookManager and PDF) from the Debug Tool Web site at <http://www.ibm.com/software/awdtools/debugtool/library/>.

Figure 8. Optional Material: Unlicensed Publications - Debug Tool

Publication Title	Form Number
Debug Tool Summary of Commands and Built-in Functions	SC19-1074
Debug Tool User's Guide	SC19-1071
Debug Tool Reference and Messages	GC19-1073
Debug Tool Customization Guide	SC19-1075

2.4 Program Source Materials

No program source materials or viewable program listings are provided for Enterprise PL/I.

2.5 Publications Useful During Installation

The publications listed in Figure 9 may be useful during the installation of Enterprise PL/I. To order copies, contact your IBM representative or visit the IBM Publications Center on the World Wide Web at: <http://www.ibm.com/shop/publications/order>

Figure 9. Publications Useful During Installation

Publication Title	Form Number
<i>IBM SMP/E for z/OS User's Guide</i>	SA22-7773
<i>IBM SMP/E for z/OS Commands</i>	SA22-7771
<i>IBM SMP/E for z/OS Reference</i>	SA22-7772
<i>IBM SMP/E for z/OS Messages, Codes, and Diagnosis</i>	GA22-7770
<i>z/OS UNIX System Services Planning</i>	GA22-7800
<i>z/OS UNIX System Services Messages and Codes</i>	SA22-7807

3.0 Program Support

This section describes the IBM support available for Enterprise PL/I.

3.1 Program Services

Contact your IBM representative for specific information about available program services.

3.2 Preventive Service Planning

Before installing Enterprise PL/I, you should review the current Preventive Service Planning (PSP) information. If you obtained Enterprise PL/I as part of a CBPDO, there is HOLDDATA and PSP information included on the CBPDO.

If the CBPDO for Enterprise PL/I is more than two weeks old when you install it, you should contact the IBM Support Center or use S/390 SoftwareXcel to obtain the current "PSP Bucket".

For program support, access the Software Support web site at <http://www-3.ibm.com/software/support/>

PSP Buckets are identified by UPGRADEs, which specify product levels, and SUBSETs, which specify the FMIDs for a product level. The UPGRADE and SUBSET values for Enterprise PL/I are:

<i>Figure 10. PSP Upgrade and Subset ID</i>		
UPGRADE	SUBSET	Description
PLIENT360	H270360	Enterprise PL/I Base
	J270361	Enterprise PL/I HFS
DEBUG710	HAC2710	Debug Tool Base
	JAC271J	Debug Tool JPN

3.3 Statement of Support Procedures

Report any difficulties you have using this program to your IBM Support Center. If an APAR is required, the Support Center will provide the address to which any needed documentation can be sent.

Figure 11 identifies the component IDs (COMPID) for Enterprise PL/I.

Figure 11. Component IDs

FMID	COMPID	Component Name	RETAIN Release
H270360	5655H3100	Enterprise PL/I Base	360
J270361	5655H3100	Enterprise PL/I HFS	361
HAC2710	5655R4400	Debug Tool Base	710
JAC271J	5655R4400	Debug Tool JPN	71J

4.0 Program and Service Level Information

This section identifies the program and any relevant service levels of Enterprise PL/I. The program level refers to the APAR fixes incorporated into the program. The service level refers to the PTFs incorporated into the program.

4.1 Program Level Information

The following APAR fixes against previous releases of Enterprise PL/I have been incorporated into this release. They are listed by FMID.

- FMID H270350

UK09156	UK11144	UK12790	UK15236
UK09319	UK11193	UK12867	UK15237
UK09503	UK11210	UK12998	UK15238
UK09583	UK11287	UK13086	UK15698
UK09672	UK11305	UK13158	UK15970
UK09739	UK11347	UK13278	UK16109
UK09896	UK11409	UK13357	UK16166
UK10020	UK11459	UK13398	UK16190
UK10048	UK11493	UK13400	UK16247
UK10099	UK11590	UK13727	UK16255
UK10182	UK11736	UK13919	UK16665
UK10586	UK11892	UK14153	UK17154
UK10682	UK12119	UK14258	UK17487
UK10776	UK12202	UK14499	UK17667
UK10916	UK12559	UK14688	UK17756
UK10983	UK12621	UK14836	UK18119
UK11009	UK12726	UK14845	UK18120
UK11055			

4.2 Service Level Information

No PTFs against this release of Enterprise PL/I have been incorporated into the product tape.

5.0 Installation Requirements and Considerations

The following sections identify the system requirements for installing and activating Enterprise PL/I. The following terminology is used:

- *Driving system*: the system used to install the program.
- *Target system*: the system on which the program is installed.

In many cases, the same system can be used as both a driving system and a target system. However, you may want to set up a clone of your system to use as a target system by making a separate IPL-able copy of the running system. The clone should include copies of all system libraries that SMP/E updates, copies of the SMP/E CSI data sets that describe the system libraries, and your PARMLIB and PROCLIB.

Some cases where two systems should be used include the following:

- When installing a new level of a product that is already installed, the new product will delete the old one. By installing onto a separate target system, you can test the new product while still keeping the old one in production.
- When installing a product that shares libraries or load modules with other products, the installation can disrupt the other products. Installing onto a test system or clone will allow you to assess these impacts without disrupting your production system.

5.1 Driving System Requirements

This section describes the environment of the driving system required to install Enterprise PL/I.

5.1.1 Machine Requirements

The driving system can run in any hardware environment that supports the required software.

5.1.2 Programming Requirements

Figure 12. Driving System Software Requirements

Program Number	Product Name and Minimum VRM/Service Level
5655-G44	IBM SMP/E for z/OS V3.3.0 or later
5694-A01	z/OS V1.6.0 or later

5.2 Target System Requirements

This section describes the environment of the target system required to install and use Enterprise PL/I.

Enterprise PL/I installs in the z/OS (Z038) SREL.

5.2.1 Machine Requirements

The target system can run in any hardware environment that supports the required software.

5.2.2 Programming Requirements

5.2.2.1 Installation Requisites: An installation requisite is defined as a product that is required and **must** be present or one that is not required but **should** be present on the system for the successful installation of this product.

A mandatory installation requisite identifies products that are required, without exception, or this product **will not install** on your system. This includes products specified as PREs or REQs.

Figure 13. Mandatory Installation Requisites

Program Number	Product Name and Minimum VRM/Service Level
5694-A01	z/OS V1.6.0 or later

A conditional installation requisite identifies products that are **not** required for successful install but may resolve such things as certain warning messages at installation time. They include products that are specified as IF REQs.

Enterprise PL/I has no conditional installation requisites.

5.2.2.2 Operational Requisites: An operational requisite is defined as a product that is required and **must** be present or a product that is not required but **should** be present on the system in order for this product to operate all or some of its functions.

A mandatory operational requisite identifies products that are required, without exception, or this product **will not operate** its basic function unless the requisite is met. This includes products specified as PREs or REQs.

Enterprise PL/I has no mandatory operational requisites.

A conditional operational requisite identifies products that are **not required** for the basic function but are needed at run time for this product to utilize specific functions. They may include products specified as IF REQs.

Figure 14. Conditional Operational Requisites

Program Number	Product Name and Minimum VRM/Service Level	Function
5655-147	CICS Transaction Server for OS/390, V1	CICS applications
5697-E93	CICS Transaction Server for z/OS, V2	CICS applications
5655-M15	CICS Transaction Server for z/OS, V3	CICS applications
5688-197	COBOL for MVS & VM V1.2.0	Interlanguage communication with COBOL
5648-A25	COBOL for OS/390 & VM V2.1.0	Interlanguage communication with COBOL
5655-G53	Enterprise COBOL for z/OS V3 and OS/390	Interlanguage communication with COBOL
5675-DB2	DB2 Universal Database for z/OS and OS/390, V7	DB2 integrated coprocessor
5625-DB2	DB2 Universal Database for z/OS, V8	DB2 integrated coprocessor
5655-M18	Debug Tool for z/OS V5.1.0	Application debugging support
5655-M19	Debug Tool Utilities and Advanced Functions for z/OS V5.1.0	Advanced application debugging support
5655-P14	Debug Tool for z/OS V6.1.0	Application debugging support
5655-P15	Debug Tool Utilities and Advanced Functions for z/OS V6.1.0	Advanced application debugging support
5655-R44	Debug Tool for z/OS V7.1.0	Application debugging support
5655-R45	Debug Tool Utilities and Advanced Functions for z/OS V7.1.0	Advanced application debugging support
5694-A01	DFSORT element of z/OS	Sort support
5647-A01	DFSORT element of OS/390	Sort support
5696-234	High Level Assembler for MVS & VM & VSE	Interlanguage communication with assembler
5655-B01	IMS V7	IMS applications
5655-C56	IMS V8	IMS applications
5655-J38	IMS V9	IMS applications
5688-235	PL/I for MVS & VM V1.1.1	Interlanguage communication with PL/I
5668-909, 5668-910, 5668-911	OS PL/I V2.3	PL/I source programs (for interlanguage communication)
5668-806, 5688-087	VS Fortran V2.1.0	Interlanguage communication with Fortran

5.2.2.3 Toleration/Coexistence Requisites: A toleration/coexistence requisite is defined as a product which must be present on a sharing system. These systems can be other systems in a multisystem environment (not necessarily sysplex), a shared DASD environment (such as test and production), or systems that reuse the same DASD at different time intervals.

Enterprise PL/I has no toleration/coexistence requisites.

5.2.2.4 Incompatibility (Negative) Requisites: A negative requisite identifies products which must *not* be installed on the same system as this product.

Enterprise PL/I has no negative requisites.

5.2.3 DASD Storage Requirements

Enterprise PL/I libraries can reside on all supported DASD types. The values below are for 3390 DASD.

Figure 15 lists the total space required for each type of library.

<i>Figure 15. Total DASD Space Required by Enterprise PL/I Full Function Offering</i>	
Library Type	Total Space Required
Target	1154 Tracks
Distribution	1309 Tracks
HFS	10 Tracks

<i>Figure 16. Total DASD Space Required by Enterprise PL/I Alternate Function Offering</i>	
Library Type	Total Space Required
Target	588 Tracks
Distribution	722 Tracks
HFS	10 Tracks

Notes:

1. IBM recommends use of system determined block sizes for efficient DASD utilization for all non-RECFM U data sets. For RECFM U data sets, IBM recommends a block size of 32760, which is the most efficient from a performance and DASD utilization perspective.
2. Abbreviations used for the data set type are:
 - U** Unique data set, allocated by this product and used only by this product. To determine the correct storage needed for this data set, this table provides all required information; no other tables (or Program Directories) need to be referenced for the data set size.

- S** Shared data set, allocated by this product and used by this product and others. To determine the correct storage needed for this data set, the storage size given in this table needs to be added to other tables (perhaps in other Program Directories). If the data set already exists, it must have enough free space to accommodate the storage size given in this table.
- E** Existing shared data set, used by this product and others. This data set is NOT allocated by this product. To determine the correct storage needed for this data set, the storage size given in this table needs to be added to other tables (perhaps in other program directories). This existing data set must have enough free space to accommodate the storage size given in this table.

If you currently have a previous release of this product installed in these libraries, the installation of this release will delete the old one and reclaim the space used by the old release and any service that had been installed. You can determine whether or not these libraries have enough space by deleting the old release with a dummy function, compressing the libraries, and comparing the space requirements with the free space in the libraries.

For more information on the names and sizes of the required data sets, please refer to 6.1.7, "Allocate SMP/E Target and Distribution Libraries" on page 25.

3. Abbreviations used for the HFS Path type are:

- N** New path, created by this product.
X Path created by this product, but may already exist from a previous release.
P Previously existing path, created by another product.

4. All target and distribution libraries listed have the following attributes:

- The default name of the data set may be changed.
- The default block size of the data set may be changed.
- The data set may be merged with another data set that has equivalent characteristics.
- The data set may be either a PDS or a PDSE.

5. All target libraries listed have the following attributes:

- The data set may be SMS-managed.
- It is not required for the data set to be SMS-managed.
- It is not required for the data set to reside on the IPL volume.
- The values in the "Member Type" column are not necessarily the actual SMP/E element types identified in the SMPMCS.

6. All target libraries listed which contain load modules have the following attributes:

- The data set may be in the LPA.
- It is not required for the data set to be in the LPA.
- The data set may be in the LNKLST.
- It is not required for the data set to be APF-authorized.

The following figures describe the target and distribution libraries and HFS paths required to install Enterprise PL/I. The storage requirements of Enterprise PL/I must be added to the storage required by other programs having data in the same library or path.

Note: The data in these tables should be used when determining which libraries can be merged into common data sets. In addition, since some ALIAS names may not be unique, ensure that no naming conflicts will be introduced before merging libraries.

Figure 17. Storage Requirements for Enterprise PL/I Target Libraries

Library DDNAME	Member Type	Target Volume	T Y P E	O R G	R E C F M	L R E C L	No. of 3390 Trks	No. of DIR Blks
SIBMZCMP	LMOD	ANY	U	PDS	U	0	563	6
SIBMZPRC	PROC	ANY	U	PDS	FB	80	8	5
SIBMZSAM	SAMP	ANY	U	PDS	FB	80	17	5

Figure 18. Enterprise PL/I HFS Paths

DDNAME	T Y P E	Path Name
SIBMZHFS	X	/usr/lpp/pli/IBM/

Figure 19. Storage Requirements for Enterprise PL/I Distribution Libraries

Library DDNAME	T Y P E	O R G	R E C F M	L R E C L	No. of 3390 Trks	No. of DIR Blks
AIBMZHFS	U	PDS	VB	255	8	5
AIBMZMOD	U	PDS	U	0	688	6
AIBMZSRC	U	PDS	FB	80	26	5

5.3 FMIDs Deleted

Installing Enterprise PL/I may result in the deletion of other FMIDs. To see what FMIDs will be deleted, examine the ++VER statement in the product's SMPMCS.

If you do not wish to delete these FMIDs at this time, you must install Enterprise PL/I into separate SMP/E target and distribution zones.

Note: These FMIDs will not automatically be deleted from the Global Zone. Consult the SMP/E manuals for instructions on how to do this.

5.4 Special Considerations

Enterprise PL/I has no special considerations for the target system.

6.0 Installation Instructions

This chapter describes the installation method and the step-by-step procedures to install and to activate the functions of Enterprise PL/I.

Please note the following:

- If you want to install Enterprise PL/I into its own SMP/E environment, consult the SMP/E manuals for instructions on creating and initializing the SMP/CSI and the SMP/E control data sets.
- Sample jobs have been provided to help perform some or all of the installation tasks. The SMP/E jobs assume that all DDDEF entries required for SMP/E execution have been defined in the appropriate zones.
- The SMP/E dialogs may be used instead of the sample jobs to accomplish the SMP/E installation steps.

6.1 Installing Enterprise PL/I

6.1.1 SMP/E Considerations for Installing Enterprise PL/I

This release of Enterprise PL/I is installed using the SMP/E RECEIVE, APPLY, and ACCEPT commands. The SMP/E dialogs may be used to accomplish the SMP/E installation steps.

6.1.2 SMP/E Options Subentry Values

The recommended values for some SMP/E CSI subentries are shown in Figure 20. Use of values lower than these may result in failures in the installation process. DSSPACE is a subentry in the GLOBAL options entry. PEMAX is a subentry of the GENERAL entry in the GLOBAL options entry. Refer to the SMP/E manuals for instructions on updating the global zone.

Figure 20. SMP/E Options Subentry Values

SUB-ENTRY	Value	Comment
DSSPACE	300,150,250	Space allocation for SMPTLIB data sets
PEMAX	SMP/E Default	IBM recommends using the SMP/E default for PEMAX.

6.1.3 Sample Jobs

The following sample installation jobs are provided as part of the product to help you install Enterprise PL/I:

Figure 21. Sample Installation Jobs

Job Name	Job Type	Description	RELFILE
IBMZWEDT	MACRO	ISPF Editor macro to aid users in making changes to the sample jobs (optional)	IBM.H270360.F1
IBMZWSMP	SMP/E	Sample job to define and prime a new SMP/E CSI (optional)	IBM.H270360.F1
IBMWRCV	RECEIVE	Sample RECEIVE job for Enterprise PL/I	IBM.H270360.F1
IBMWALO	ALLOCATE	Sample job to allocate target and distribution libraries	IBM.H270360.F1
IBMISMKD	MKDIR	Sample job to invoke the supplied IBMMKDIR EXEC to allocate HFS paths	IBM.H270360.F1
IBMWDDF	DDDEF	Sample job to define SMP/E DDDEFs	IBM.H270360.F1
IBMWAPL	APPLY	Sample APPLY job	IBM.H270360.F1
IBMWIVP	IVP	Sample job to verify installation has been successful	IBM.H270360.F1
IBMWIOP	IOP	Sample job to change default compiler options (optional)	IBM.H270360.F1
IBMWACP	ACCEPT	Sample ACCEPT job	IBM.H270360.F1

You can access the sample installation jobs by performing an SMP/E RECEIVE and then copying the jobs from the relfiles to a work data set for editing and submission. See Figure 21 on page 22 to find the appropriate relfile data set.

You may also choose to copy the jobs from the tape or product files by submitting the job below. Use either the //TAPEIN or the //FILEIN DD statement, depending on your distribution medium, and comment out or delete the other statement. Add a job card and change the lowercase parameters to uppercase values to meet your site's requirements before submitting.

```
//STEP1 EXEC PGM=IEBCOPY
//SYSPRINT DD SYSOUT=*
//TAPEIN DD DSN=IBM.H270360.F1,UNIT=tunit,
// VOL=SER=volser,LABEL=(x,SL),
// DISP=(OLD,KEEP)
//FILEIN DD DSN=IBM.H270360.F1,UNIT=SYSALLDA,DISP=SHR,
// VOL=SER=filevol
//OUT DD DSNAME=jc1-library-name,
// DISP=(NEW,CATLG,DELETE),
// VOL=SER=dasdvol,UNIT=SYSALLDA,
// SPACE=(TRK,(10,2,5))
//SYSUT3 DD UNIT=SYSALLDA,SPACE=(CYL,(1,1))
//SYSIN DD *
COPY INDD=xxxxIN,OUTDD=OUT
SELECT MEMBER=(IBMZWSMP,IBMWRCV,IBMWEDT)
SELECT MEMBER=(IBMWALO,IBMWDDF,IBMWACP)
```

```
SELECT MEMBER=(IBMISMKD, IBMZWAPL, IBMZWIVP)
SELECT MEMBER=(IBMZWIOP)
/*
```

In the sample above, update the statements as noted below:

If using TAPEIN:

tunit is the unit value matching the product tape.

volser is the volume serial matching the product tape.

x is the tape file number where the data set name is on the tape.

Refer to the documentation provided by CBPDO to see where IBM.H270360.F1 is on the tape.

If using FILEIN

filevol is the volume serial of the DASD device where the downloaded files reside.

OUT

jcl-library-name is the name of the output data set where the sample jobs will be stored.

dasdvol is the volume serial of the DASD device where the output data set will reside.

SYSIN

xxxxIN is either TAPEIN or FILEIN depending on your input DD statement.

6.1.4 Set up ISPF Editor Macro (Optional)

To aid you in making changes to the SMP/E installation jobs (IBMISMKD, IBMZWACP, IBMZWALO, IBMZWAPL, IBMZWDDF, IBMZWIOP, IBMZWIVP, IBMZWRECV and IBMZWSMP), an ISPF editor macro called IBMZWEDT which is copied to your output data set **jcl-library-name** above. (See Figure 21 on page 22).

This macro lets you substitute proper values for all of the required variables in those jobs instead of having you make the changes repeatedly by hand.

Edit macro IBMZWEDT and provide the proper values. After making the changes, either copy IBMZWEDT to any data set in your TSO logon procedure SYSEXEC concatenation, or issue the commands below to make IBMZWEDT immediately accessible to your current ISPF session:

From ISPF option 6, issue:

```
ALLOCATE FI(SYSEXEC) DA('jcl-library-name') SHR REU
ATLIB ACTIVATE USER(EXEC)
```

Then edit your installation jobs from this ISPF session.

Consult the instructions in the macro for more information.

6.1.5 Allocate and Initialize the SMP/E Data Sets (Optional)

You can install Enterprise PL/I in the same SMP/E zone as z/OS V1.6.0 (or later), or in a different zone.

- If you install into existing SMP/E data sets, make sure that you have enough space.
- If you plan to install into an existing zone, the cluster should have already been allocated and primed. You can go on to the next step to perform an SMP/E RECEIVE.
- To install into a new zone, edit and submit the IBMZWSMP sample job to allocate and prime the SMP/CSI cluster. Consult the instructions in the sample job for more information.

Expected Return Codes and Messages: You will get a return code of 0 if the job runs correctly.

6.1.6 Perform SMP/E RECEIVE

Having obtained Enterprise PL/I as part of a CBPDO, use the RCVPDO job found in the CBPDO RIMLIB data set to RECEIVE the Enterprise PL/I FMIDs as well as any service, HOLDDATA, or preventive service planning (PSP) information included on the CBPDO tape. For more information, refer to the documentation included with the CBPDO.

Edit and submit sample job IBMZWRCV to perform the SMP/E RECEIVE for Enterprise PL/I. Consult the instructions in the sample job for more information.

Expected Return Codes and Messages: You will get a return code of 0 if the job runs correctly.

6.1.7 Allocate SMP/E Target and Distribution Libraries

Edit and submit sample job IBMZWALO to allocate the SMP/E target and distribution libraries for Enterprise PL/I. Consult the instructions in the sample job for more information.

Expected Return Codes and Messages: You will get a return code of 0 if the job runs correctly.

6.1.8 Allocate HFS Paths

Edit and submit sample job IBMISMKD to allocate the HFS paths for Enterprise PL/I. Consult the instructions in the sample job for more information.

If you plan to create a new HFS for this product, you should consider updating the BPXPRMxx PARMLIB member to mount the new HFS at IPL time. This may be helpful if an IPL occurs before the installation is complete.

Expected Return Codes and Messages: You will get a return code of 0 if the job runs correctly.

6.1.9 Create DDDEF Entries

Edit and submit sample job IBMZWDDF to create DDDEF entries for the SMP/E target and distribution libraries for Enterprise PL/I. Consult the instructions in the sample job for more information.

Expected Return Codes and Messages: You will get a return code of 0 if the job runs correctly.

6.1.10 Perform SMP/E APPLY

Edit and submit sample job IBMZWAPL to perform an SMP/E APPLY CHECK for Enterprise PL/I. Consult the instructions in the sample job for more information.

To receive the full benefit of the SMP/E Causer SYSMOD Summary Report, do *not* bypass the following on the APPLY CHECK: PRE, ID, REQ, and IFREQ. This is because the SMP/E root cause analysis identifies the cause only of **ERRORS** and not of **WARNINGS** (SYSMODs that are bypassed are treated as warnings, not errors, by SMP/E).

Enhanced HOLDDATA introduced ERROR HOLDS against FMIDs for HIPER APARs. Prior to installing, you should ensure you have the latest Enhanced HOLDDATA (available at url <http://service.software.ibm.com/holdata/390holddata.html>). The FMID(s) should be installed regardless of the status of unresolved HIPERs, however, the software should not be deployed until the unresolved HIPERs have been analyzed to determine applicability.

There are two methods to complete an FMID installation where ++HOLDS for HIPERs exist for the FMID(s) being installed:

1. To ensure that all recommended and critical service is installed with the FMID(s), add the SOURCEIDs of PRP, HIPER, and RSU* to the APPLY command. There may be PE or HIPER APARs that do not have resolving PTFs available yet. You need to analyze the symptom flags to determine if you want to BYPASS the specific ERROR HOLDS and continue the FMID installation.

```
APPLY S(fmid,fmid,...)
FORFMID(fmid,fmid,...)
SOURCEID(PRP,HIPER,...)
GROUPEXTEND .
```

This method requires more initial research, but will provide resolution for all HIPERs that have fixes available and are not in a PE chain. There may still be unresolved PEs or HIPERs which will require the use of BYPASS.

2. To install the FMID(s) as it would have been installed prior to Enhanced HOLDDATA, you can add a BYPASS(HOLDCLASS(HIPER)) operand to the APPLY command. This will allow the FMID to be installed even though there are HIPER ERROR HOLDS against it. Note that not all ERROR HOLDS were bypassed, only the HIPER ERROR HOLDS. After the FMID(s) are installed, the SMP/E REPORT ERRSYSMODS command should be run to identify any missing HIPER maintenance.

```
APPLY S(fmid,fmid,...)
BYPASS(HOLDCLASS(HIPER)).
```

This method is the quicker of the two, but requires subsequent review of the REPORT ERRSYSMODS to investigate any HIPERs.

If you bypass any HOLDs during the installation of the FMID(s) because fixing PTFs were not yet available you can use the APAR Status Tracking (AST) function of ServiceLink or the APAR Tracking function of ResourceLink to be notified when the fixing PTF is available.

Once you have taken any actions indicated by the APPLY CHECK, remove the CHECK operand and run the job again to perform the APPLY.

Note: The GROUPEXTEND operand indicates that SMP/E apply all requisite SYSMODs. The requisite SYSMODS might be applicable to other functions.

Expected Return Codes and Messages from APPLY CHECK: You will get a return code of 0 if the job runs correctly.

Expected Return Codes and Messages from APPLY: You will get a return code of 0 if the job runs correctly.

6.1.11 Enable/Register the Debug Tool feature of Enterprise PL/I (Full Function Offering only)

Before running any applications with Debug Tool or the Installation Verification Program below, ensure that you enable/register the Debug Tool feature of Enterprise PL/I. To do this, include an entry for the Debug Tool feature of Enterprise PL/I in the IFAPRDxx parmlib member as follows:

```
PRODUCT OWNER('IBM CORP')
NAME('IBM ENT PL/I')
ID(5655-H31)
VERSION(*) RELEASE(*) MOD(*)
FEATURENAME('PL/I-DEBUG')
STATE(ENABLED)
```

Once you have updated IFAPRDxx, issue the SET PROD=xx operator command. Debug Tool will then be enabled in the z/OS environment.

6.1.12 Run the Installation Verification Program

Edit and submit sample job IBMZWIVP to verify that you have installed Enterprise PL/I correctly. Consult the instructions in the sample job for more information.

Consult the instructions in the sample job for the expected output from the GO step.

Expected Return Codes and Messages: You will get a return code of 0 if the job runs correctly.

6.1.13 Change the defaults for the compiler options (Optional)

If you want to change the supplied default compiler options, then edit and submit sample job IBMZWIOP. This job will let you specify options that will be applied before any other options, thus effectively changing the default options. This job will also let you specify options that will be applied after all other options, thus effectively changing the default options and preventing them from being overridden. Consult the instructions in the sample job for more information.

6.1.14 Perform SMP/E ACCEPT

Edit and submit sample job IBMZWACP to perform an SMP/E ACCEPT CHECK for Enterprise PL/I. Consult the instructions in the sample job for more information.

To receive the full benefit of the SMP/E Causer SYSMOD Summary Report, do *not* bypass the following on the ACCEPT CHECK: PRE, ID, REQ, and IFREQ. This is because the SMP/E root cause analysis identifies the cause only of **ERRORS** and not of **WARNINGS** (SYSMODs that are bypassed are treated as warnings, not errors, by SMP/E).

Before using SMP/E to load new distribution libraries, it is recommended that you set the ACCJCLIN indicator in the distribution zone. This will cause entries produced from JCLIN to be saved in the distribution zone whenever a SYSMOD containing inline JCLIN is ACCEPTed. For more information on the ACCJCLIN indicator, see the description of inline JCLIN in the SMP/E manuals.

Once you have taken any actions indicated by the ACCEPT CHECK, remove the CHECK operand and run the job again to perform the ACCEPT.

Note: The GROUPEXTEND operand indicates that SMP/E accept all requisite SYSMODs. The requisite SYSMODS might be applicable to other functions.

Expected Return Codes and Messages from ACCEPT CHECK: You will get a return code of 0 if the job runs correctly.

Expected Return Codes and Messages from ACCEPT: You will get a return code of 0 if the job runs correctly.

6.1.15 Install IBM Debug Tool for z/OS

See the Debug Tool program directory (GI10-8726-01) for further instructions on how to install and activate IBM Debug Tool for z/OS. The installation of Debug Tool is only applicable to the Full Function Offering.

This concludes the installation for Enterprise PL/I.

6.1.16 Run REPORT CROSSZONE

The SMP/E REPORT CROSSZONE command will identify requisites define for products that have been installed in separate zones. This command will also create APPLY and ACCEPT commands in the SMPPUNCH data set which you can use to install those cross-zone requisites it identifies.

After you have installed Enterprise PL/I, it is recommended that you run REPORT CROSSZONE against the new or updated target and distribution zones. REPORT CROSSZONE requires a global zone with ZONEINDEX entries describing all the target and distribution libraries to be reported on.

For more information on REPORT CROSSZONE, see the SMP/E manuals.

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Program Directory for IBM Enterprise PL/I for z/OS, October 2006

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	Satisfaction					
Ease of product installation	1	2	3	4	5	N
Contents of Program Directory	1	2	3	4	5	N
Installation Verification Programs	1	2	3	4	5	N
Time to install the product	1	2	3	4	5	N
Readability and organization of Program Directory tasks	1	2	3	4	5	N
Necessity of all installation tasks	1	2	3	4	5	N
Accuracy of the definition of the installation tasks	1	2	3	4	5	N
Technical level of the installation tasks	1	2	3	4	5	N
Ease of getting the system into production after installation	1	2	3	4	5	N

How did you order this product?

- CBPDO
- CustomPac
- ServerPac
- Independent
- Other

Is this the first time your organization has installed this product?

- Yes
- No

Were the people who did the installation experienced with the installation of z/OS products?

- Yes



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