

## Fujitsu Software BS2000 ASSERMBH V1.4

The Assembler is a machine language translation program for converting source code of the identically named symbolic programming language into corresponding machine code.



## Topics

### Product characteristic

Assembler programs are general-purpose utilities for deployment in all areas of data processing and can be used in batch mode as well as in interactive mode. Since the Assembler is machine-specific by nature (an Assembler language instruction corresponds to each machine instruction), the technical capabilities of the particular CPU involved can be exploited to the maximum extent.

ASSEMBH is a special Assembler language developed for the instruction set of the business server with /390 architecture.

It supports the following instruction sets:

- XS; eXtended System with 31-bit addressing
- ESA; Enterprise System Architecture for utilizing multiple virtual address spaces for data (data spaces)

As assembler programs can be interfaced with high-level programming languages, these special features can also be accessed from within other languages as and when required.

Use of the operating system interfaces is enabled via the macro library of the respective BS2000 operating system version.

ASSEMBH offers a variety of functions including the following:

Structured programming facilities corresponding to COLUMBUS, with utility routines for generating listings (structure lists, Nassi-Shneidermann diagrams, etc.).

Facility for symbolic debugging using AID

Use of XS address space to achieve faster assembly speeds

Utilization of multiple virtual address space for data (data spaces) on ESA systems under BS2000.

Extended control options via BS2000 SDF interface.

For reasons of compatibility, the ASSEMB \*COMOPT control option is still supported, but the new services are not.

Monitoring job variables supported for automatic job sequencing.

Extensions to the macro language using clear syntactic and semantic rules (which can lead to compatibility problems).

Support for up to 100 macro libraries.

Support for up to 100 COPY libraries.

Processing of symbolic names with up to 64 characters.

Upper- and lower-case characters allowed in source programs (not case-sensitive).

XREF also for COPYs.

Nested macro definitions.

Mixed sequence of positional and keyword operands in macros.

Support for ILCS (Inter-Language Communication Services) in structured programming.

## Functional description

The language elements are:

- Machine instructions (commands)
- Assembler instructions (statements)
- Macro definitions,
- Macro calls and
- Comments.

Machine instructions enable the programmer to symbolically address the instruction set of the CPU from the Assembler. The Assembler language instructions control the internal assembly process at assembly time and perform auxiliary functions which include:

- Sectioning and linking of programs
- Definition of constants
- Control and assignment of memory addresses
- Recognition of different addressing modes.

Macro calls request the Assembler to call prewritten Assembler language subroutines from libraries, modify them in accordance with the parameters specified in the macro call, and insert the generated machine instructions in place of the macro call.

Comments are used to document the developed program and have no effect on the assembled program.

### Macro language

The macro language is part of the Assembler. It enables the programmer to code frequently used Assembler language instruction sequences in the form of macro definitions. Macro definitions consist of:

- Header statement
- Prototype statement
- Model statement and
- Trailer statement.

The model statements are statements that produce the desired code sequence after the assembly.

Appropriate modifications can be made in macros as

well as in Assembler source code by using special macro language elements such as SET and AIF instructions and variable parameters which may only be assigned current values at runtime.

## Macro language

The macro language is part of the assembler. It allows frequently used sequences of assembler instructions to be written in the form of macro definitions. Macro definitions consist of:

- Initial statement,
- pattern statement,
- model statement and
- end statement.

The model instructions are those instructions which, after translation, result in the desired code sequence. In macros as well as in assembler sources, appropriate modifications can be achieved by special macro language elements such as SET and AIF instructions and variable parameters, which may be assigned current values only during execution.

## Program description

Once the Assembler has been loaded, multiple assembly runs can be performed. Only minimal control is required for a standard assembly run, but a number of parameters and options are additionally available to allow explicit control of the assembly process.

The assembler can read source code, macros, and copy elements from BS2000 files or PLAM libraries. Object can be output either in OM (object module) format to a PLAM library or \*EAM file (OMF) or in LLM format (link-and-load modules) to a PLAM library.

Logging information for listings is output with ASSEMBH in a special intermediate format (CIF) which can be processed further using list editing tools. This intermediate format can be permanently stored in a PLAM library for later processing.

Logs may be optionally output to SYSLST, to a file, or to a PLAM library.

Compatibility restrictions:

The strict syntax and semantic rules may result in structural incompatibilities with earlier Assembler source modules and macros, since ASSEMBH wrongly tolerated certain syntax and semantic rule violations.

# Technical Details

## Requirements

<b>Technical Requirements Hardware</b>	BS2000 Business Server
<b>Technical Requirements Software</b>	BS2000 OS DX V1.0
<b>User Requirements</b>	Knowledge of BS2000

## Installation

<b>Operating Mode</b>	Batch and interactive dialog
<b>Implementation Language</b>	SPL4 and Assembler
<b>User Interface</b>	German / English
<b>Installation</b>	Please refer to the relevant release notices.

## Documentation and Training

<b>Documentation</b>	The manuals for ASSEMBH are available on the <a href="#">manual server</a> .
<b>Training</b>	See <a href="#">course offer</a> (German only)

## Purchase and Delivery

<b>Conditions</b>	This software product is provided to customers under the terms and conditions for the use of software products in return for ongoing or one-time payment.
<b>Order and Delivery</b>	This software product may be obtained from your local Fujitsu regional office.

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