

Fujitsu Technology Solutions

UDS/SQL V2.5A / UDS-D (BS2000/OSD)
Version 2.5A
April 2009

Release Notice

All rights reserved, including intellectual property rights. Technical data subject to modifications and delivery subject to availability. Any liability that the data and illustrations are complete, actual or correct is excluded. Designations may be trademarks and/or copyrights of the respective manufacturer, the use of which by third parties for their own purposes may infringe the rights of such owner. For further information see http://ts.fujitsu.com/terms_of_use.html

Copyright © Fujitsu Technology Solutions 2009

Release Notice UDS/SQL V2. 5A / UDS-D V2. 5A

1	General	2
1.1	Ordering	2
1.2	Delivery	3
1.3	Documentation	4
2	Software extensions	6
2.1	Restriction of the pubset environment	6
2.2	SM-Pubsets for logging files	6
2.3	New database / extended session job variable	6
2.4	Renaming meta data in the database	6
2.5	Automatic REALM extension via utilities	6
2.6	UNICODE support via UDS	6
2.7	BALTER and tables	7
2.8	Improvement in filling rate when restructuring	7
2.9	Additional innovations	7
2.10	Implemented change requests (CR)	7
3	Technical information	7
3.1	Software configuration	7
3.2	Product installation	9
3.2.1	Installing with IMON parallel to operation	9
3.2.2	Special requirements	9
3.3	Product use	10
3.3.1	Information about converting to UDS/SQL V2. 5	10
3.3.1.1	Using databases from UDS/SQL V2. 4	10
3.3.1.2	Downgrade to UDS/SQL V2. 4	10
3.3.2	Operating batch applications that have not been relinked	11
3.3.3	Applications in AMODE 24	11
3.3.4	UDS/SQL V2. 5A tools	11
3.3.4.1	BINIPARAM	11
3.3.4.2	BPRI VACYPARAM	11
3.3.4.3	CHECKPARAM	12
3.3.4.4	BCORR	12
3.3.4.5	RLOGPASS	12
3.3.4.6	UDSTRACE	12
3.3.4.7	DBSTRUKT	13
3.3.4.8	UDSSTAT	13
3.3.4.9	CSV tools	13
3.4	Functions no longer applicable or cancelled	13
3.5	Incompatibilities	13
3.5.1	openUTM applications	13
3.5.2	CODASYL and SQL interface	13
3.5.3	KDBS interface	14
3.5.4	Correction in the DAL command DROP DB	14
3.6	Procedure in the event of errors	14
4	Hardware support	15

1 General

UDS/SQL (BS2000/OSD) V2.5A is the follow-up version of the existing database system UDS/SQL V2.4A (*). UDS-D (BS2000/OSD) V2.5A is the follow-up version of UDS-D V2.4A.

This Release Notice is a summary of the major extensions, requirements and operating information with regard to the following delivery units:

UDS/SQL (BS2000/OSD) V2.5A
UDS-D (BS2000/OSD) V2.5A

The contents of the Release Notice correspond to the release level of the correction delivery V2.5A40 of April 2009.

*1 Changes to the correction delivery V2.5A40 are marked with '*1'
*1 in the left margin. The release level is that of April 2008

The Release Notice is also supplied as a file in uppercase and lowercase. Customers will receive an updated version of this file should any subsequent changes be made.

To print this file (English version), use
/PRINT-DOCU FROM-FILE=SYSFGM.UDS-SQL.025.E, -
/ DOCU-FORM=*TEXT(LINE-SPACING=*BY-EBCDIC-CONTR)

If one or more previous versions are skipped when this product version is used, the information from the Release Notices (and README files) of the previous versions must be noted.

UDS/SQL is based on the design concept of CODASYL but contains many more options and also features coexistence with the relational model for the same data.

UDS-D is a supplement to the UDS/SQL database system and enables transaction-secured access to UDS databases across multiple computers. UDS-D eliminates the strict assignment of databases and UDS applications to the same computer. The data can be maintained on the computer where it is mainly needed. UDS applications on remote computers can query and modify this data if necessary.

UDS-D monitors distributed transaction processing with network-wide deadlock detection and resolution and corresponding deadlock analysis. If an error occurs during a UDS transaction, UDS-D makes sure that during a warm reboot the data consistency of all databases is maintained on the computers involved.

1.1 Ordering

UDS/SQL V2.5 and UDS-D V2.5 can be ordered from your local distributors and are subject to the general terms and conditions of the software product use and service agreement.

(*) UDS/SQL and BS2000/OSD (R) are trademarks of Fujitsu Technology Solutions. Other designations used in this Release Notice may be trademarks and their use by third parties for their own purposes may infringe on the rights of the owners of the said trademarks/designations.

1.2 Delivery

The UDS/SQL V2.5 and UDS-D V2.5 files are supplied via SOLIS. The current file and volume characteristics and descriptions are listed in the SOLIS2 delivery cover letter.

The table below lists the release units that are supplied with a particular delivery unit.

Delivery unit	Release unit
-----	-----
UDS/SQL V2.5A (UDS/SQL)	UDS-SQL UDS-SQL-T ODBC-DEMO-UDS V3.7 (*)
-----	-----
UDS-D V2.5A (UDS-D)	UDS-D

The release unit marked with '*' is shipped with UDS/SQL, but is not a UDS component. It comprises a demo version of the ODBC driver, ODBC Rocket from gfs (client and server parts). This provides transparent access to UDS databases from a PC via the ODBC interface. Refer to the ODBC-DEMO-UDS Release Notice for detailed information.

The delivery includes the following files:

Release unit UDS-SQL

SYSLNK. UDS-SQL. 025	Module library containing the modules for UDS/SQL
SYSLIB. UDS-SQL. 025	Macro library for UDS/SQL
SYSSDF. UDS-SQL. 025	SDF system syntax file for UDS/SQL and UDS-D
SYSSDF. UDS-SQL. 025. USER	SDF USER syntax file for UDS/SQL and UDS-D
SYSSSC. UDS-SQL. 025	Subsystem definition for UDS/SQL
SYSMES. UDS-SQL. 025	Message file for UDS/SQL and UDS-D (MSGMAKER format)
SYSSII. UDS-SQL. 025	File for installation of the release unit UDS-SQL with IMON
SYFSGM UDS-SQL. 025. D	UDS/SQL V2.5A release notice (German)
SYFSGM UDS-SQL. 025. E	UDS/SQL V2.5A release notice (English)

Release unit UDS-SQL-T

SIPPRG. UDS-SQL-T. 025	Library for class B tools (e. g. BCORR, UDSSTAT, ...)
SIPLIB. UDS-SQL-T. 025	Library with procedures for class B tools (e. g. P. BINIPARAM, P. BPRI VACYPARAM, ...)
SIPDAT. UDS-SQL-T. 025. D	Library with tool information in German (e. g. INFO. BCORR, ...)
SIPDAT. UDS-SQL-T. 025. E	Library with tool information in English
SYSSII. UDS-SQL-T. 025	File for installation of the release unit UDS-SQL-T with IMON

Release unit UDS-D

SYSLNK. UDS-D. 025	Module library containing the modules for UDS-D
SYSSSC. UDS-D. 025	Subsystem definition for UDS-D
SYSSII. UDS-D. 025	File for installation of the release unit UDS-D with IMON

A CD-ROM with the following contents is delivered with the Release Unit UDS-SQL (the relevant directory names are in parentheses):

- Demo version of ODBC-Rocket from gfs, Gesellschaft für Informationssysteme mbH & Co. KG, Hamburg with client software (ODBC-Demo\client), documentation (ODBC-Demo\doc) and Release Notice (ODBC-Demo\fgm)
- Release Notices in pdf format (Produktinfo)
- Tools for processing the output of utility programs in csv format (csv), e. g. EXCEL macros (Tools\csv\EXCEL) and Perl scripts (Tools\csv\CSV2XML) and a description of UDSSTAT Tools\UDSSTAT) including an EXCEL macro for processing the output from UDSSTAT.
- Frequently asked questions in HTML format (FAQ).

1.3 Documentation

The manuals were republished for UDS/SQL V2.5. The manuals are not part of the delivery scope of UDS/SQL and UDS-D and must be ordered separately.

List of publications in English:

Manual	Order number
UDS/SQL V2.5 (BS2000/OSD) Design and Definition	U929-J-Z125-9-76
UDS/SQL V2.5 (BS2000/OSD) Application Programming	U930-J-Z125-11-76
UDS/SQL V2.5 (BS2000/OSD) Creation and Restructuring	U931-J-Z125-13-76
UDS/SQL V2.5 (BS2000/OSD) Database Operation (incl. UDS-D)	U20010-J-Z125-6-76
UDS/SQL V2.5 (BS2000/OSD) Recovery, Information and Reorganization	U20011-J-Z125-6-76
UDS/SQL V2.5 (BS2000/OSD) Messages	U1811-J-Z125-13-76
UDS/SQL V2.5 (BS2000/OSD) Ready Reference	U934-J-Z125-14-76

There is no dedicated manual for UDS-D. The functions of UDS-D are described in the 'UDS/SQL V2.5 - Database Operation' manual.

The documentation is available as online manuals under:

- *1 <http://manuals.ts.fujitsu.com/mainframes.html>
or can be ordered in printed form at extra cost in the Internet under:
- *1 <http://manualshop.ts.fujitsu.com>

The BS2000/OSD documentation (including these manuals) is also available in German and English on CD-ROM under the title BS2000/OSD Softbooks.

In the future, there may be README files to these manuals that contain changes and additions for the respective product. The files have the following name structure:

SYSRME.UDS-SQL.025.D (file with German text)
SYSRME.UDS-SQL.025.E (file with English text)

The files should be printed in the same way as the Release Notice, with the following command:

```
/PRINT- DOCU FROM- FILE=SYSRME.UDS-SQL.025.E, -  
/ DOCU- FORM=*TEXT(LINE- SPACING=*BY- EBCDIC- CONTR)
```

2 Software extensions

With UDS/SQL V2.5 and UDS-D V2.5, a new UDS database version is being released whose new features and extensions are summarized below. For detailed information, please consult the relevant UDS/SQL manuals.

2.1 Restriction of the pubset environment

As of UDS/SQL V2.5A there is an option to restrict of Pubsets (PVS) to be searched.

With DBH and the utilities, a job variable with the link name UDSPS01 can be allocated which contains the names of the Pubsets to be considered. With the COBOL compiler the COSSD file can be assigned to the PVS directly via the link name UDS-COSSD.

2.2 SM-Pubsets for logging files

As of UDS/SQL V2.5A you can specify on which volumes or volume sets of a SM Pubset the RLOG and ALOG files are to be created.

2.3 New database / extended session job variable

In UDS/SQL V2.5 a job variable is created per database in which the processing status of the database and information about online copy facility as well as the ALOG file can be created.

Furthermore, more information will be provided in the session job variable than before.

2.4 Renaming meta data in the database

This new function enables a fast rename of meta data (fields, record types, sets and areas) and a combination and splitting of fields in the database without any restructuring and data loss.

2.5 Automatic REALM extension via utilities

Since UDS/SQL V2.3 it is possible to extend realms during the DBH operation online. This improvement in availability and simplification of administration has been extended in UDS/SQL V2.5 so that selected utilities (DDL compiler, SSL compiler, BPRIVACY, BGSIA, BGSSIA, BCREATE, BCHANGE, BRENAME, BALTER and BREORG) can extend the Realms if necessary. The utilities which use the Inlinked-DBH (DDL-Compiler, SSL-Compiler, BPRIVACY, BGSIA and BGSSIA) also automatically extend the DBTTs of the meta data record types if this is required.

2.6 UNICODE support via UDS

In UDS/SQL V2.5 NATIONAL data (UNICODE) are supported in the character set UTF-16 as in COBOL.

2.7 BALTER and tables

In UDS/SQL V2.5 ATTACHED tables (specification MODE IS POINTER ARRAY or MODE IS LIST in the SET entry of the SSL) are treated as DETACHED. In the case of ATTACHED there is no longer an attempt to store the table near the owner, but small tables are packaged page for page if possible.

In UDS/SQL V2.5 BALTER attempts, if possible, to package small lists so that a set occurrence no longer needs at least one page.

2.8 Improvement in filling rate when restructuring

The BALTER interface now has an additional format for the FILLING instruction. A minimum size for new tables is thus defined.

2.9 Additional innovations

- Changes in the monitor output:

In the file output of the monitor the bytes previously kept free for a processor 5 to 8 are now also supplied with the corresponding CPUID as processor 1 to 4.

- Comments in load parameter inputs:

When analyzing the DBH load parameters all input records beginning with "*" or "#" are interpreted as comment.

- More exact distinction in BPSIA:

When outputting a list BPSIA distinguishes whether LOCATION MODE IS DIRECT or DIRECT LONG has been specified.

2.10 Implemented change requests (CR)

The following change requests have been implemented in this version:

CR Nr.	Contents
A0239570	DB Verfügbarkeitsmeldung
A0239974	Typkonvertierung bei BALTER
A0239990	Feldnamenänderung
A0240100	Realm-Erweiterung während des Umstrukturierungslaufes
A0240668	Session-Informationen in JV zur Verfügung stellen
A0322042	Formatierung von neuen Feldern
A0410846	BALTER Modifying data fields

3 Technical information

3.1 Software configuration

UDS/SQL V2.5 is compatible with the listed versions of the following software products:

Operating system version required:

BS2000/OSD-BC	as of V5.0A	or
OSD/XC	as of V1.0A	

Other software required for production operation:

CRTE	as of V2.3C	(when using UNICODE:
V2.6A)		
SORT	as of V7.8A	
ONETSERV	as of V2.0A	

Software recommended for backups on tapes:

ARCHIVE	as of V6.0A
HSMS	as of V6.0A

Optional software products for specific functions:

UDS-D	only V2.5A	(own configuration)
UDS-D	as of V2.3A	(external configuration)
UDS-KDBS	V2.2A	(see *1 below)
UDS-IQS	as of V4.0A	

ODBC-Rocket	as of V3.7A	(see *2 below)
ADILOS	as of V6.4A	
INFPLAN	as of V5.3C	

JV	as of V13.0D
SDF-P	as of V2.2A

COBOL85	as of V2.3A	
COBOL2000	as of V1.0B	(when using UNICODE:
V1.4A)		
DRIVE/WINDOWS	only V2.1B40	(see *3 below)
openUTM	as of V5.1A	

(*1) UDS-KDBS:

KDBS users must run UDS/SQL V2.5 with UDS-KDBS V2.2. Subschemas addressed with KDBS must still be compiled with 'FORM IS OLD'.

(*2) ODBC-Rocket is a product from our partner company gfs.

(*3) Follow-up versions of DRIVE, such as V2.2 or V3.1 may not be used since they no longer offer UDS support.

3.2 Product installation

UDS/SQL V2.5 must be completely reinstalled.

Installation of the product UDS/SQL V2.5 with the installation monitor IMON is mandatory. The information concerning installation in the delivery cover letter and in the product documentation must be followed as well as the information given in this Release Notice.

The necessary inputs and the sequence of the installation are described in the IMON documentation. IMON installs the UDS system in fully executable form. All delivery units can be installed under any desired default installation user ID.

3.2.1 Installing with IMON parallel to operation

UDS/SQL V2.5 can also be installed with IMON while current operation is in progress.

However, in order to be able to continue working correctly with a UDS session and other applications that are currently running, all running DBH and user processes must have their version selected with the SELECT-PRODUCT-VERSION command. (cf. 'UDS/SQL V2.5 - Database Operation' manual)

3.2.2 Special requirements

The following special requirements are to be borne in mind after the IMON installation and before using the new version:

After IMON installation:

1. If the user still uses the call via START-EXECUTABLE-PROGRAM instead of the UDS-START commands, the following file names must be matched to the new names in the procedures used:

the UDS message file (SYSMES.)
the UDS-SDF syntax file (SYSSDF.)
the UDS module library (SYSLNK.)

2. If the UDS subsystem is to be used, it must be reactivated after installation (/START-SUBSYSTEM).

3. The file SYSMES.UDS-SQL.025 is taken over into BS2000-MIP during installation with IMON. If different UDS versions are run in parallel, a version-specific message file can also be assigned via a LOGON-USER procedure as follows:

```
/BEGIN-PROCEDURE  
/MODIFY-MSG-FILE-ASSIGNMENT -  
/ ADD-FILE = $<user-id>.SYSMES.UDS-SQL.<version>  
/END-PROCEDURE
```

where <user-id> = storage ID of the UDS message file

<version> = Version 'nnn' of the product

Example:

```
/BEGIN-PROCEDURE
/MODIFY-MSG-FILE-ASSIGNMENT -
/  ADD-FILE = $.SYSMES.UDS-SQL.025
/END-PROCEDURE
```

4. A SDF-USER file called SYSSDF.UDS-SQL.025.USER is supplied for user-specific use. Use this file if system-wide use is not desired. Assign the file as follows:

```
/MODIFY-SDF-OPTIONS -
/  SYNTAX-FILE = *ADD ( -
/    ADD-NAME = $<user-id>.SYSSDF.UDS-SQL.025.USER )
```

However, the USER syntax file does not support the UDS-START commands.

Before using the new version :

The databases must be brought into a consistent state before updating to UDS/SQL V2.5. This is best achieved by stopping all UDS sessions in an orderly manner.

UTM applications linked to UDS/SQL should also be shut down correctly with "KDCSHUT N".

3.3 Product use

3.3.1 Information about converting to UDS/SQL V2.5

The following information applies for converting from UDS/SQL V2.4A. When converting from a version smaller than 2.4A, please note the Release Notices of the original versions must be observed.

3.3.1.1 Using databases from UDS/SQL V2.4

The conversion from UDS/SQL V2.4 to UDS/SQL V2.5 is not linked with a higher DB layout version. Existing databases from UDS/SQL V2.4 can also be used in UDS/SQL V2.5 without any problem. When using older databases, please note the information in the Manual "Creation and Restructuring".

3.3.1.2 Downgrade to UDS/SQL V2.4

As the DB layout version in contrast to UDS/SQL V2.4 has not changed, a downgrade to UDS/SQL V2.4 is possible at any time. However, please note that subschemas which have fields of the type NATIONAL (UTF-16), cannot be processed with UDS/SQL V2.4.

3.3.2 Operating batch applications that have not been re-linked

Batch applications that have been linked with an old, version-independent link module UDSLNKx before UDS/SQL V2.2, require a library UDS.MODLIB for dynamically loading the connecting module. There are three alternatives for this:

1. A UDS.MODLIB library is created in the local ID of the application and the object modules UDSBCCON (for independent DBH) and LCCONCT (for linked-in DBH) from SYSLNK.UDS-SQL.025 are then copied into it.
2. An empty UDS.MODLIB library is created in the local ID of the application. A link to the installed product library SYSLNK.UDS-SQL.025 is created with a TASKLIB assignment.
3. ACS is used to create an alternative catalog entry UDS.MODLIB in the local ID that points to the installed product library SYSLNK.UDS-SQL.025.

3.3.3 Applications in AMODE 24

If UDS/SQL is loaded as a subsystem (above 16MB) and an application is started in AMODE 24, messages may be issued by the linker-loader system because connection to a subsystem loaded above 16 MB is not possible. These messages can be ignored since UDS/SQL subsequently loads the relevant module into the task local address space.

3.3.4 UDS/SQL V2.5A tools

Various tools are supplied with UDS/SQL (libraries SIPPRG.UDS-SQL-T.025 and SIPLIB.UDS-SQL-T.025 or on the UDS/SQL V2.5 CD-ROM). These tools, that are mainly intended for service purposes, are not part of the contract and are not included in the maintenance obligations. The tools are not described in the manuals.

If nothing else is specified in the following overview, detailed descriptions are in the library SIPDAT.UDS-SQL-T.025.D under INFO.<toolname> (German) or SIPDAT.UDS-SQL-T.025.E under INFO.<toolname>.E (English).

3.3.4.1 BINIPARAM

This procedure supplements the BOUTLOAD outputs with SubschemaName and writes for each record type BINILOAD instruction in its own output file.

Call with the command:

```
/CALL-PROCEDURE FROM-FILE = *LIBRARY-ELEMENT ( -  
/  
/ LIBRARY = SIPLIB.UDS-SQL-T.025, -  
/  
/ ELEMENT = P.BINIPARAM )
```

3.3.4.2 BPRI VACYPARAM

The output of a SHOW-USER-GROUP instruction with USER-GROUP-NAME = *ALL of the utility BPRIVACY is converted to BPRIVACY instruction with which these BPRIVACY specifications can be saved.

Call with the command:

```
/CALL-PROCEDURE FROM-FILE = *LIBRARY-ELEMENT ( -  
/  
/          LIBRARY = SIPLIB.UDS-SQL-T.025, -  
/          ELEMENT = P.BPRIVACYPARAM )
```

3.3.4.3 CHECKPARAM

The procedure P.CHECKPARAM generates from the result of a CHECKSUMMING run a procedure which starts a CHECK SORTING run corresponding to the result.

Call with the command:

```
/CALL-PROCEDURE FROM-FILE = *LIBRARY-ELEMENT ( -  
/  
/          LIBRARY = SIPLIB.UDS-SQL-T.025, -  
/          ELEMENT = P.CHECKPARAM )
```

3.3.4.4 BCORR

BCORR is used to check internal UDS administration data, manipulate specifically and/or repair using redundancies. The inconsistencies to be eliminated must be known (e.g. via BCHECK).

Call with the command:

```
/START-EXECUTABLE-PROGRAM FROM-FILE = *LIBRARY-ELEMENT ( -  
/  
/          LIBRARY = SIPPRG.UDS-SQL-T.025, -  
/          ELEMENT = BCORR )
```

3.3.4.5 RLOGPASS

RLOGPASS is used to issue the password for a RLOG file. The user enters (requested per prompting) the time stamp of the RLOG file. RLOGPASS calculates the password and issues it.

Call with the command:

```
/START-EXECUTABLE-PROGRAM FROM-FILE = *LIBRARY-ELEMENT ( -  
/  
/          LIBRARY = SIPPRG.UDS-SQL-T.025, -  
/          ELEMENT = RLOGPASS )
```

3.3.4.6 UDSTRACE

The UDS trace is used to gather detailed knowledge about the runtime behaviour of the UDS applications. It can always be used if applications are not running satisfactorily, e.g. bad response times, too many disables, deadlocks etc. However, it

can also be used in application development in order to uncover programming weakpoints at an early stage or for documentation purposes.

Start the UDS trace evaluation via the command:

```
/CALL-PROCEDURE FROM-FILE = *LIBRARY-ELEMENT ( -  
/  
/          LIBRARY = SIPLIB.UDS-SQL.T.025, -  
/  
/          ELEMENT = P.UTA )
```

3.3.4.7 DBSTRUKT

This description provides the user with information about technical details which go beyond that provided in the manuals. The parts are copied from the technical description so that there is only a German version. This description does however have parts in English.

3.3.4.8 UDSSTAT

UDSSTAT is used to evaluate UDSMON files.

The description is on the CD-ROM (see Tools/UDSSTAT/udsstat.pdf).

3.3.4.9 CSV tools

Tools are offered which facilitate further processing of the outputs of utilities in CSV format.

A description is on the CD-ROM (see Tools/csv/readme-csv-tools.pdf) and as inline documentation in the procedure P.GEN-FILE-BPGSIZE in the library SIPLIB.UDS-SQL-T.025.

3.4 Functions no longer applicable or cancelled

The library SYSPRG.UDS-SQL-T.025 with the UDS starter phases which were supplied for the last time with UDS/SQL V2.4 are no longer supplied.

3.5 Incompatibilities

UDS/SQL V2.5 has the compatibility behaviour described below:

3.5.1 openUTM applications

UTM-DB applications must only be linked again when the version-dependent connection module UDSCON of a version < V2.5 is integrated (see manual "Program applications", Section "Cooperation with a UDS/SQL-openUTM-application") If they are regenerated e.g. due to integrated version-dependent UDS components, the corresponding KDCDB macro must be used when translating KDCROOT from the UDS macro library SYSLIB.UDS-SQL.025.

3.5.2 CODASYL and SQL interface

The program interfaces are upward-compatible with respect to UDS/SQL V2.4A. Existing applications continue to run after a UDS version change without any modifications.

3.5.3 KDBS interface

UDS-KDBS V2.2A is required to use the KDBS interface.

However, long DB keys and names longer than 8 characters cannot be used with this KDBS version.

Subschemas that UDS-KDBS V2.2 should operate with must have V1.2 structure, i.e. they must either come from UDS/SQL V1.2 or have been compiled with the 'FORM IS OLD' option.

3.5.4 Correction in the DAL command DROP DB

In the DAL command DROP DB (until UDS/SQL V2.4) the specification of a user ID and a suffix of the shadow database was accepted like ADD DB although the description in the manual "Database operations" excluded this. UDS/SQL V2.5 now has the implementation adapted to the description.

3.6 Procedure in the event of errors

UDS/SQL applications should be started with

```
/MODIFY-JOB-OPTIONS LOGGING = *PARAMETERS (LISTING = *YES)
```

for detecting user errors.

To get the diagnostic information needed in case of an error, the applications should as a rule run with

```
/MODIFY-TEST-OPTIONS DUMP = *YES
```

and the DBH session should be logged into a file.

With most errors, a current BPSIA/BPSQLSIA log of the schema and of the subschema used is required as additional error documentation together with the dump.

Errors with high priority can also be diagnosed remotely, provided the technical equipment is available.

4 Hardware support

This section is not relevant for UDS/SQL.