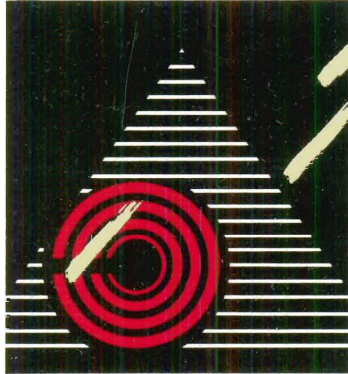

Developer Quick Reference Guide
HP ALLBASE/4GL



HP Computer Museum
www.hpmuseum.net

For research and education purposes only.

HP ALLBASE/4GL Developer Quick Reference Guide

This guide is a quick reference for application developers who are familiar with HP ALLBASE/4GL. This guide provides a summary of the following:

- The syntax for HP ALLBASE/4GL logic commands and SQL commands.
- HP ALLBASE/4GL internal routines.
- HP ALLBASE/4GL screen processing logic.
- HP ALLBASE/4GL report line group processing logic, report line printing logic, and report line types.
- Action and item referencing prefixes, and substring and subscript referencing rules.
- Communication area fields and switches.
- HP ALLBASE/4GL edit codes.
- File error return codes.

Logic Commands

This guide uses the following conventions in syntax statements.

Notation	Description
COMMAND	Command names are shown in bold UPPERCASE letters.
*ARGUMENT	Command arguments are prefixed with the symbol * and are shown in UPPERCASE letters.
<i>Slanted text</i>	Slanted text denotes a parameter that you must replace with a suitable name.
[]	Square brackets enclose elements that are optional. Several elements stacked inside square brackets means that you may select any one element.
{ }	Braces enclose elements that you must include in the command. Several elements stacked inside braces means that you must select one element.
...	An ellipsis indicates that the preceding element is repeated one or more times

BACKGRND { *process_name*
 data_ref }

CALC *operand operator operand* [*operator operand ...*]
 = *result_data_ref* [; *command*]

CHECK *data_ref* { *TABLE=*table*
 file_ref [*INDEX=*index_name*]*KEY=*key* [*entries_field_name*] }

CLEAR { *S [*from_data_ref* [*to_data_ref*]]
 *P [*from_data_ref* [*to_data_ref*]]
 *MAP *from_data_ref* [*to_data_ref*] }

DATE *date_field_1* *DIFF *date_field_2* = *no_days*

DATE *date_field_1* { + *days*
 - *days* } = *result_date* [; *command*]

DATE *date_field_1* *DAY = *day_field*

DECISION { *decision_table_name*
 data_ref }

DEFINE %*definition_name*% *expression*

DISPLAY { *RESET = *line_number*
 *RESET = S } [*n*] *data_ref* [*n*] ...

DM IMAGE *CLOSE :*D-database* ... [; *command*]

DM IMAGE *LOCK :*D-database* [*descriptor*] ... [; *command*]

DM IMAGE *MODE { *MODEXCL
 *MODLOCK
 *MODREAD
 *READEXCL
 *READLOCK
 *READMOD
 *READSHAR
 *UPDSHAR } :*D-database* ... [; *command*]

DM IMAGE *UNLOCK :D-database ... [; command]

ENTER { *step-number*
 data-ref }

EXIT [*COMMIT]

EXTERNAL { [*REFRESH] { *program-name*
 data-ref } [*parm-1* ... *parm-n*] }
 { *program-name*
 data-ref } *COMMS }

FIELD { [*DEFAULT] [*INPUT] [*REQUIRED] [*ECHO]
 [*DISPLAY] [*OPTIONAL] [*NOECHO] [[*attribute*] ...] }
 [*from-data-ref* [*to-data-ref*]]

ISAM/KSAM File Command

FILE { *BUFFER
 *CLOSE
 *MODIFY
 *UNLOCK } *file-ref* [;command]

FILE { *FIRST
 *LAST
 *NEXT
 *PREVIOUS } [*NOLOCK] *file-ref* [*INDEX=*index-name*] [;command]

FILE { *DELETE
 *FIND
 *INSERT
 *READ
 *WRITE } [*NOLOCK] *file-ref*
 [*INDEX=*index-name*] [*KEY=*key*] [;command]

Serial File Command

FILE { *BUFFER
 *CLOSE
 *FIRST
 *LAST
 *MODIFY
 *NEXT
 *PREVIOUS
 *REMOVE } *file-ref* [;command]

FILE $\left\{ \begin{array}{l} *INSERT \\ *READ \\ *WRITE \end{array} \right\} file_ref [*REC=record_number] [;command]$

SQL File Command

FILE $\left\{ \begin{array}{l} *BUFFER \\ *CLOSE \\ *DELETE \\ *INSERT \\ *NEXT \end{array} \right\} file_ref [;command]$

HP TurboIMAGE/XL File Command

FILE $\left\{ \begin{array}{l} *BUFFER \\ *CLOSE \\ *MODIFY \\ *UNLOCK \end{array} \right\} file_ref [;command]$

FILE $\left\{ \begin{array}{l} *NEXT \\ *PREVIOUS \end{array} \right\} [*NOLOCK] file_ref \\ [*INDEX=index_name] [;command]$

FILE $\left\{ \begin{array}{l} *DELETE \\ *FIND \\ *FIRST \\ *INSERT \\ *LAST \\ *WRITE \end{array} \right\} [*NOLOCK] file_ref \\ [*INDEX=index_name] \\ [*KEY=key] [;command]$

FILE *READ $\left\{ \begin{array}{l} [*REC = recno] \\ [*KEY = key] [*INDEX = index_name] \end{array} \right\} [*NOLOCK] file_ref$

IF *condition-1* $\left[\left\{ \begin{array}{l} \& \\ | \end{array} \right\} condition-2 \right]$ **THEN** *command(s)* [**ELSE** *command(s)*]

IFLOOP *loop-count* *condition* **THEN** *command(s)* [**ELSE** *command(s)*]

KEYS $\left\{ \begin{array}{l} keys_name \\ data_ref \end{array} \right\}$

LENGTH *data_ref result_data_ref*

LINK [**JOINER=joiner*] *link_count link_data_ref ... result_data_ref*

LINKLOOP [**JOINER=joiner*] *loop_count link_data_ref step_factor result_data_ref*

MATH *operand_1 operator operand_2 = result_data_ref* [*;command*]

MATHLOOP *loop_count operand_1 step_factor_1 operator operand_2 step_factor_2*
= result_data_ref step_factor_3 [*;command*]

MESSAGE *message_name*

MODE $\left\{ \begin{array}{l} *READ \\ *WRITE \\ *LOCK \\ *UNLOCK \end{array} \right\}$ *file_ref ...*

MOVE $\left\{ \begin{array}{l} from_data_ref \\ *NULL \end{array} \right\}$ *to_data_ref*

MOVELOOP *loop_count* $\left\{ \begin{array}{l} from_data_ref\ step_factor_1 \\ *NULL\ 0 \end{array} \right\}$ *to_data_ref step_factor_2*

NOTE *comment*

OFF $\left\{ \begin{array}{l} switch_number \\ *ALL \\ *BYPASS \\ *ENDLINE \end{array} \right\}$

ON $\left\{ \begin{array}{l} switch_number \\ *ALL \\ *BYPASS \\ *ENDFIELD \\ *ENDLINE \end{array} \right\}$

PRINT *line_group*

PROCEED $\left\{ \begin{array}{l} process_name \\ data_ref \end{array} \right\}$

REPORT { *report_name* }
 { *data_ref* }

SCREEN { *screen_name* }
 { *data_ref* }

SCROLL [*data_ref*] ...

SELECT *command*; *command*; ...

SERIES { *begin_step_number* } { *end_step_number* }
 { *begin_data_ref* } { *end_data_ref* }

SHOW [*REFRESH] [*from_data_ref* [*to_data_ref*]]

SQL { *block_name* }
 { *data_ref* } [; *command*]

TIE *data_ref*

TOP

TRANSACTION { *BEGIN }
 { *END } [message]
 { *UNDO }
 { *MEMO }

UPDATE

VALIDATE *file_field_ref* [*INDEX=*index_name*]*KEY=*key* { *PRESENT }
 { *ABSENT }
 [*message_ref*] [; *command*]

VISIT { *function_name* }
 { *data_ref* }

WINDOW { *window_name* }
 { *data_ref* }

ZIP

SQL Commands

The following list shows some of the SQL commands that you are permitted to use in HP ALLBASE/4GL SQL logic blocks. These SQL commands allow you to access and update data in HP ALLBASE/SQL tables.

```
SELECT { :table_name } FROM clauses [ other clauses ]
      { :select_list }
      [FOR UPDATE OF column_name [, column_name ... ]];
```

```
UPDATE table_name SET column_name = value [, ... ]
      WHERE { CURRENT OF cursor_name }
            { search_condition }
```

```
INSERT INTO table_name [ (column_name ...) ] VALUES (SingleRowValues)
```

This command is equivalent to the **FILE *INSERT** command in an HP ALLBASE/4GL logic block.

```
DELETE FROM table_name WHERE CURRENT OF cursor_name
```

This command is equivalent to the **FILE *DELETE** command in an HP ALLBASE/4GL logic block.

```
DELETE FROM table_name [WHERE search_condition]
```

SQLEXPLAIN

This command retrieves the text of HP ALLBASE/SQL error messages into the HP ALLBASE/4GL communication area field *ERROR. You cannot use a host variable reference with the SQLEXPLAIN command.

SQL Command Limitations

You cannot use the following commands in an HP ALLBASE/4GL SQL logic block:

- BEGIN DECLARE SECTION and END DECLARE SECTION
- BULK
- CLOSE *cursorname*
- CONNECT TO *DBEnvironmentname*
- DECLARE *cursorname*
- DESCRIBE *commandname* INTO *areaname*
- EXECUTE IMMEDIATE
- FETCH
- INCLUDE SQLCA or SQLDA
- INTO (clause with SELECT command)
- OPEN *cursorname*
- PREPARE
- RELEASE
- START DBE and STOP DBE
- WHENEVER

If an SQL logic block contains a SELECT command, this must be the only command in the SQL logic block.

HP ALLBASE/4GL Internal Routines

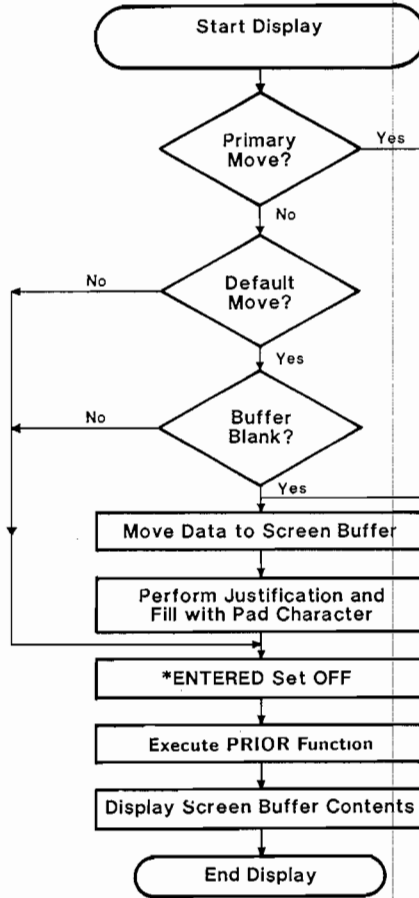
You can use function keys in an application to initiate any of the HP ALLBASE/4GL internal routines. To assign an internal routine to an application screen function key, enter I- followed by the internal routine name, in the action field, on the function keys definition screen.

I-BACKTAB	This routine moves the cursor to the previous field on the screen.
I-CLEAR	This routine clears all input and display only fields on the current screen.
I-COMMIT	This routine terminates all current screen processing.

- I-EXIT** This routine terminates execution of HP ALLBASE/4GL and returns to the operating system.
- I-HELP** This routine displays the help screen associated with the current message, field, or screen.
- I-hpqm_call** This routine suspends HP ALLBASE/4GL and starts HP ALLBASE/QUERY. The welcome screen is bypassed, and the user is connected to the application's HP ALLBASE/SQL database. HP ALLBASE/4GL processing resumes when the user exits from HP ALLBASE/QUERY.
- I-image_dbchg_call** This routine suspends HP ALLBASE/4GL processing and invokes the HP TurboIMAGE DBchange/XL program. Processing of HP ALLBASE/4GL resumes when the user exits HP TurboIMAGE DBchange/XL.
- I-image_dbutil_call** This routine suspends HP ALLBASE/4GL processing and invokes the HP TurboIMAGE DBUTIL program. HP ALLBASE/4GL processing resumes when the user exits HP TurboIMAGE DBUTIL.
- I-image_query_call** This routine suspends HP ALLBASE/4GL processing and invokes HP QUERY/XL, if it is on your system. HP ALLBASE/4GL processing resumes when the user exits HP QUERY/XL.
- I-isql_call** This routine suspends execution of HP ALLBASE/4GL, and starts ISQL, if this program is installed on your system. Normal HP ALLBASE/4GL processing resumes when the user exits ISQL.
- I-logon** This routine immediately terminates the current application and displays the HP ALLBASE/4GL sign-on screen. (Note that this routine name is in lower-case letters.)
- I-MAINMENU** This routine displays the application's main menu. This is either the initial action specified for the application or the first menu displayed by the application if the application's initial action is a process. If no menu has been displayed, the application terminates.

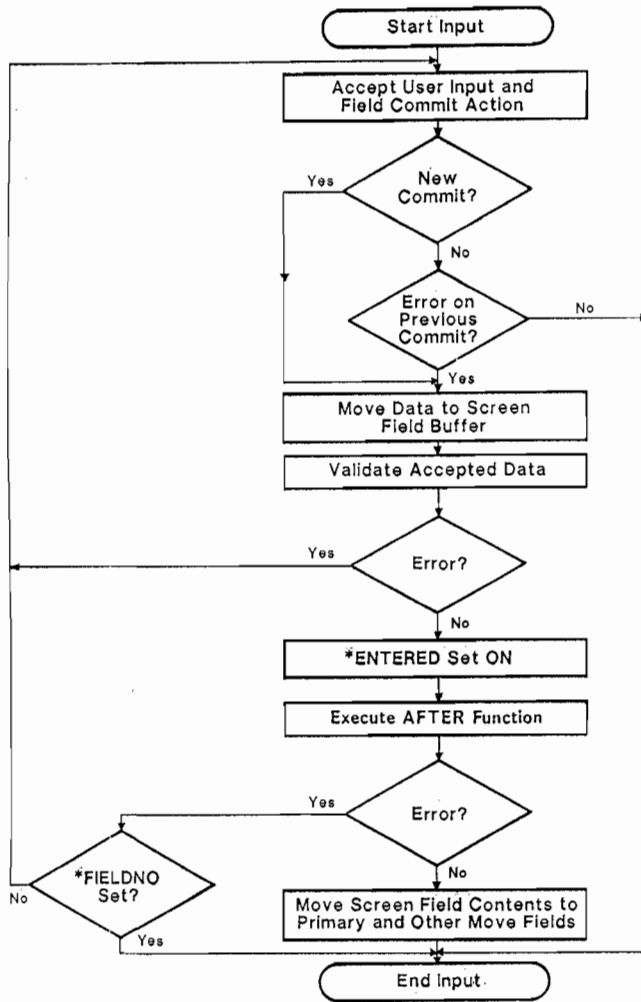
- I-PREVKEYS** This routine immediately replaces the function keys on the application screen with the previous set of function keys.
- I-PREVMENU** This routine returns control to the previous menu.
- I-PRINT** This routine prints the screen and the contents of all fields. You (and end users) can also print an image of the current screen by pressing **CTRL** + **P**.
- I-REFRESH** This routine repaints the screen and the contents of all fields. You (and end users) can also repaint the screen by pressing **CTRL** + **L**.
- I-RESET** This routine performs a terminal soft reset sequence.
- I-SHELL** This routine suspends HP ALLBASE/4GL processing and returns to the operating system. When the user exits from the operating system, HP ALLBASE/4GL processing resumes where the SHELL command was issued.
- I-SLAVE_PRINT** This routine prints an image of the current screen on a slave printer attached to the user's terminal.
- I-TAB** This routine moves the cursor to the next field on the screen.
- I-TRACEMODE** This routine toggles logic tracing mode on or off.
- I-TRAIN** This routine toggles training mode on or off.

Screen Field Display Logic



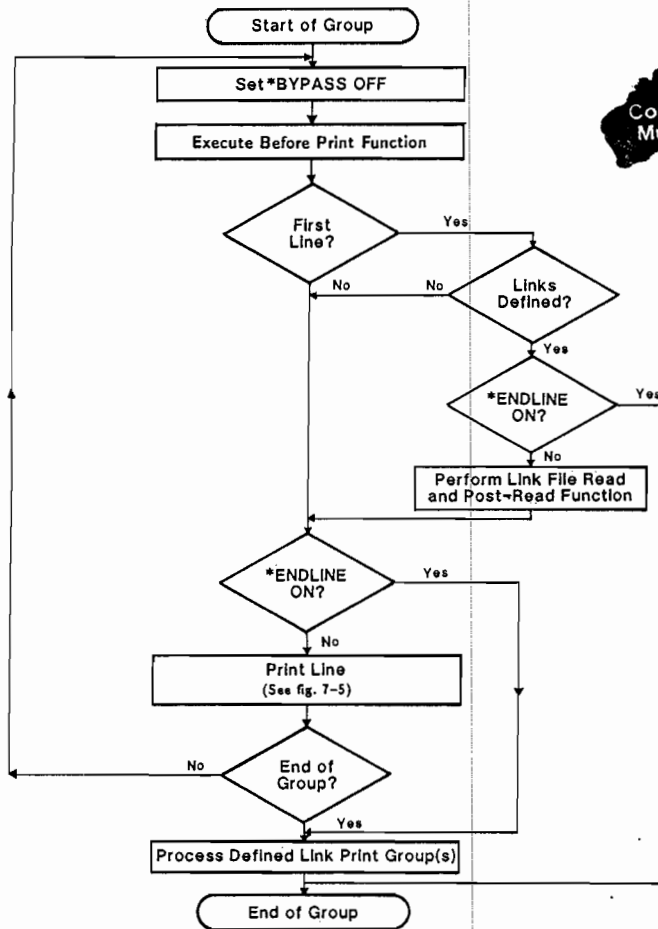
HP ALLBASE/4GL executes this field display logic for display-only fields and for the display of input fields.

Screen Input Field Logic



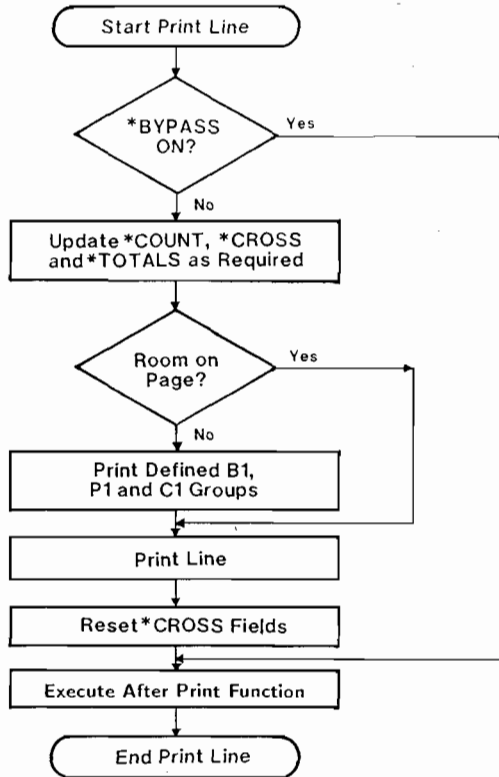
A field commit action is a new commit if the data in the field has changed since the last commit action for the field, or a different numbered field has been processed since the last commit action for this field.

Report Line Group Logic



HP ALLBASE/4GL executes the report line group logic for every line group printed, regardless of the line group type. HP ALLBASE/4GL prints a type D1 line group for every record selected for reporting. Type T1 to T8 subtotal lines, and type H1 to H8 subheading lines are printed at control breaks only.

Report Line Printing Logic



HP ALLBASE/4GL executes the line printing logic for each physical report line printed on the report page.

Report Line Types

The various line types and groups for HP ALLBASE/4GL reports are:

Line Type	Group Numbers	Number of Lines	Description
P	1	1 to 99	Top of page headings.
C	1	1 to 3	Column headings.
B	1	1 to 9	Bottom of page lines.
D	1	1 to 99	Detail lines.
D	2 to 9	1 to 99	Link detail lines.
E	1 to 9	1 to 99	Extra lines.
H	1 to 8	1 to 99	Subheading lines.
T	1 to 8	1 to 99	Subtotal lines.
TF	1	1 to 99	Final total lines.

All report lines except for the type C column heading line can contain the following data types:

- Literals.
- Application titles.
- Master titles.
- Numeric or alphanumeric constants.
- Variables or calculated items.
- Screen field references.
- Scratch-pad field references.
- File record field references.
- Work area field references.
- Communication area fields.

Item Referencing Prefixes

The HP ALLBASE/4GL item referencing prefixes are:

Prefix	Description
A-	Application title.
B-	Work area buffer.
C-	Alphanumeric constant.
D-	HP TurboIMAGE/XL database name.
F-	File record field.
M-	Master title.
N-	Numeric constant.
P-	Scratch-pad field.
R-	File record buffer.
S-	Screen field.
U-	Calculated item.
V-	Variable.
W-	Work area field.
*	The asterisk (*) prefixes system item names including: <ul style="list-style-type: none"> - communication area fields. - switches. - command arguments. - the current screen field or a range of screen fields.

Subscript References

F-data_reference(subscript).qualifier

W-data_reference(subscript).qualifier

Subscript references only apply to dictionary fields defined as having more than one occurrence. The subscript reference must appear before any substring reference.

Parameters

You can represent the subscript with one of the following.

- A number.
- A numeric constant.
- A numeric variable or calculated item.
- A screen field reference.
- A scratch-pad field reference.
- A file record field reference.
- A work area field reference.

Substring Referencing

data_ref[*starting_position*, *number_of_characters*]
data_ref[*starting_position*, *number_of_characters*].*qualifier*

Substring references must occur after the normal field reference (including subscript), but before any qualifier.

You can represent both the *starting_position* and the *number_of_characters* entries with one of the following items containing the required values:

- A number ≤ 255 .
- A numeric constant.
- A numeric variable or calculated item.
- A screen field reference.
- A scratch-pad field reference.
- A file record field reference.
- A work area field reference.

Always use the screen name, work area name, or file and record layout name as a qualifier for S-, W-, or F- references.

Action Prefixes

Code	Action Type
B-	Background process.
F-	Function logic block.
H-	Help screen.
I-	Internal action.
K-	Call another function key set.
P-	Process logic block.
R-	Report.
D-	Screen.
X-	External program.

Communication Area Fields

This table summarizes the communication area fields available in HP ALLBASE/4GL.

*COUNT(n)	Five numeric work variables used primarily by the report generator for line groups.
*CROSS(n)	Five numeric work variables used primarily by the report generator for holding <i>across the page</i> totals.
*DATE	A read-only alphanumeric field containing the current system date.
*DBENAME	A read-only alphanumeric field containing the name of the DBECon file for the current application's database.
*ERROR	An alphanumeric field used to receive the text of error messages returned from HP ALLBASE/4GL, KSAM, and HP ALLBASE/SQL.
*ERRORDM	An alphanumeric field used to receive the text of error messages returned from HP TurboIMAGE/XL.
*FIELDNO	A numeric field containing the current screen field number or set to the next screen field number to process.
*FILENAME	An alphanumeric field containing the external name of the ISAM/KSAM data file, serial file, or HP TurboIMAGE/XL data set currently being accessed, or most recently accessed.

*FUNCTION	An alphanumeric field containing the name of the current function logic block.
*IMSTAT	A field containing the HP TurboIMAGE/XL status array.
*INDEXNO	A numeric field containing the number of the current file index.
*IOSTATDM	A numeric field containing the error number returned by the most recent call to the HP TurboIMAGE/XL data manager.
*IOSTATUS	A numeric field containing the HP ALLBASE/4GL data manager file return code.
*KEYS	An alphanumeric field containing the name of the current function key set.
*LOCKWAIT	A numeric field containing a number equal to the number of seconds that HP ALLBASE/4GL waits while trying to access an ISAM/KSAM file record or an HP TurboIMAGE/XL data set record that is locked by another user.
*NEWTIE	A numeric field containing the next screen field number to process.
*PAGELINE	A numeric field containing the current report line number of the current report page.
*PAGENO	A numeric field containing the current page number of the current report.
*PASS	A general purpose alphanumeric field for passing arguments and results.
*PREVFLD	A read-only numeric field that contains the number of the last field successfully committed.
*PROCESS	An alphanumeric field containing the name of the current process logic block.
*RECNO	A numeric field containing the number of the file record just read or written for a fixed length record serial data file or an HP TurboIMAGE/XL data set.
*REPORT	An alphanumeric field containing the name of the current report.
*ROUTINE	An alphanumeric field containing the name of the current or last called external routine.
*ROWCOUNT	A numeric field indicating the number of rows in an HP ALLBASE/SQL table that are changed as the result of a command that modifies a table.
*SCREEN	An alphanumeric field containing the name of the current screen.

- *SUITE** A read-only alphanumeric field containing the name of the current application.
 - *TIME** A read-only alphanumeric field containing the current system time.
 - *TOTALS(n)** Sixteen numeric work variables used primarily by the report generator for numeric field totals.
 - *USER** A read-only alphanumeric field containing the current user's name.
 - *VERSION** A read-only alphanumeric field containing the name of the current application if it is a version of a base application.
-

Fixed Function Switches

This table summarizes the fixed function switches available in HP ALLBASE/4GL. You can use the logic ON command to change the status of the *BYPASS, *ENDFIELD, and *ENDLINE switches. You can also use the logic OFF command to reset the *BYPASS, and *ENDLINE switches.

- *BYPASS** A switch used by the report generator to indicate that a file record is, or is not selected for sorting.
- *ENDFIELD** A switch used by the screen processing logic to determine whether input processing for a field should continue.
- *ENDLINE** A switch used by the report generator to indicate that printing of lines in the current report line group is, or is not, to continue.
- *ENTERED** A switch used by the screen processing logic to indicate the status of a data entry field on a data screen. You cannot set this switch with the logic ON or OFF commands.
- *MOREREC** A switch used by the data manager when reading records from variable length record serial data files. You cannot set this switch with the logic ON or OFF commands.
- *SHOWING** A switch used by the screen processing logic to indicate if the contents of screen fields are being displayed under the control of the logic SHOW command. You cannot set this switch with the logic ON or OFF commands.

Edit Codes

The HP ALLBASE/4GL edit codes and their meanings are:

Code	Meaning
X	Any printable character.
A	Alphabetic characters only (A to z, extended characters, or space).
U	Forced uppercase. Same as X edit code, but shifts all lowercase alphabetic characters to uppercase.
K	Alphanumeric characters only (A to z, 0 to 9, extended characters, and underscore).
N	Unsigned number (0 to 9 . or ,).
S	Signed number. Same as N edit code, but may include + or -.
Q	Question. Y, y, N, or n only. Any characters beyond the first character in the field are ignored.
D	Date field. Must be eight characters long. The date may be either MM/DD/YY or DD/MM/YY (depending on the system-wide date format) where MM, DD, and YY represent the month, day, and year respectively.
T	Date field, defaulting to the current date.

File Error Returns

The data manager returns the following values to *IOSTATUS if a file error occurs. If no error occurs, the data manager returns the value 00000 to *IOSTATUS.

Indexed and Serial Data File Errors and Data Set Errors

Value	Condition
19000	Operating system file access error detected by the data file manager.
19001	Operating system error. The user is not the owner of the file, or does not have access permission for the file.
19013	Operating system error. Access permission denied to file.

- 19045 MPE XL error - deadlock detected or locking table full.
- 19100 Duplicate primary key error. The file only allows unique primary key values, and a record with the same primary key value already exists.
- 19107 Record locked error. Another user or process has locked the record you are attempting to access.
- 19110 The beginning or end of file reached during a *NEXT or *PREVIOUS file operation.
- 19111 Record not found. No record has a key value matching the value specified for *KEY=key.
- 19112 Record not read. No record has been read for the file.
- 19113 Exclusive locking error. Another user or process has opened the file under MODE *LOCK.
- 19130 File locking error. The current process cannot lock the file because the file or a record in the file is already locked by another process.

HP ALLBASE/SQL Errors

(Subtract 100 000 from the HP ALLBASE/4GL error message number to determine the HP ALLBASE/SQL error message number.)

- 60000 No SQL database has been defined for the application.
- 60010 HP ALLBASE/4GL is unable to open the HP ALLBASE/SQL message catalog.
- 60011 You have an SQL transaction open, continue(y/n)[n]?
- 60012 Do you want to perform an SQL COMMIT WORK)(y/n)[y]
- 60110 Beginning or end of file encountered by a FILE *NEXT command (SQL).
- 60112 A record has not been read for the file. You cannot update or delete a record with the HP ALLBASE/4GL FILE command, or use the WHERE CURRENT OF clause in an SQL logic block unless you read a record to position the cursor.
- 60150 The requested file operation cannot be performed on an SQL select list. You cannot insert a new record into a select list.
- 60151 The requested FILE *DELETE operation is out of sequence. You must use a SELECT command in an SQL logic block to open a cursor, and a FILE *NEXT command to position the cursor before you can delete a record.

- 60153 The requested FILE *NEXT operation is out of sequence. You must use a SELECT command in an SQL logic block to open a cursor before you can use the FILE *NEXT command to read a record.
- 102509 Index uniqueness violation. You are attempting to insert a new record that causes duplicate values in a column defined as a unique index.

HP TurboIMAGE/XL Data Set Errors

- 19115 The beginning or end of detail data set chain reached during a *NEXT or *PREVIOUS file operation.
- 19131 Database cannot be locked because another user has locked all or part of the database.
- 19500 Database access has been disabled from within HP TurboIMAGE DBUTIL.
- 19505 The value in the *LOCKWAIT communication field is invalid.
- 19520 to 19532 The named HP TurboIMAGE/XL library procedure (intrinsic) failed.
- 19540 The record listed has no HP TurboIMAGE/XL attributes set for it. Regenerate the record so that HP ALLBASE/4GL can set these attributes.
- 19550 The HP TurboIMAGE/XL attributes set for a field specification in the named data set are invalid.
- 19551 Field specifications do not match the HP TurboIMAGE/XL attributes for a field in the named data set.
- 19552 Field specifications do not match the HP TurboIMAGE/XL attributes for a field in the named data set.
- 19553 Field specifications do not match the HP TurboIMAGE/XL attributes for a field in the named data set.
- 45073 You cannot close an HP TurboIMAGE/XL data set while a transaction is still in progress.

Intentionally Blank