1 SUMMARY

This module does not directly provide an algorithm, but rather the definitions of *symbols* that are used througout GALAHAD. A symbol is a publicly available predefined string which can be used as an integer value. The purpose of symbols to is allow meaningful names to be given to these integers, thus allowing a more natural expression of algorithmic or storage options, otherwise represented by integer values that may not be illuminating or mnemonic.

In order to avoid conflicts with other user variable names , all symbols are of the form GALAHAD_NAME, where we refer to NAME as the name of this symbol.

ATTRIBUTES — Versions: GALAHAD_SYMBOLS.

Date: March 2002. **Origin:** N. I. M. Gould, Rutherford Appleton Laboratory, and Ph. L. Toint, The University of Namur, Belgium. **Language:** Fortran 95 + TR 15581 or Fortran 2003.

2 HOW TO USE THE PACKAGE

Access to the package requires a USE statement such as

        USE GALAHAD_SYMBOLS

Note that the symbol's name may be redefined in the use statement, as in

        USE GALAHAD_SYMBOLS, DENSE => GALAHAD_DENSE

allowing the use of the shorter DENSE symbol within the code that uses the module. It is then good policy to make the DENSE symbol private to the code.

2.1 The GALAHAD symbols

The symbols provided by the SYMBOLS module are listed in Tables 2.1 and 2.2 with their associated integer value and by broad categories.

3 GENERAL INFORMATION

Use of common: None.

Workspace: None.

Other routines called directly: None.

Portability: ISO Fortran 95 + TR 15581 or Fortran 2003. The package is thread-safe.

Symbol	Value
GALAHAD_DIAGONAL	-3
GALAHAD_DENSE	-2
GALAHAD_SPARSE_by_ROWS	-1
GALAHAD_COORDINATE	0
GALAHAD_INACTIVE	-2
GALAHAD_STRUCTURAL	-1
GALAHAD_ELIMINATED	0
GALAHAD_ACTIVE	1
GALAHAD_RANGE	2
GALAHAD_UPPER	3
GALAHAD_LOWER	4
GALAHAD_FREE	5
GALAHAD_POSITIVE	1
GALAHAD_NEGATIVE	-1
GALAHAD_ALL_ZEROS	0
GALAHAD_ALL_ONES	1
GALAHAD_SILENT	0
GALAHAD_TRACE	1
GALAHAD_ACTION	2
GALAHAD_DETAILS	3
GALAHAD_DEBUG	4
GALAHAD_CRAZY	5
GALAHAD_NONE	0
GALAHAD_BASIC	1
GALAHAD_SEVERE	2
GALAHAD_UNDEFINED	-100
GALAHAD_NONE	0
GALAHAD_USER_DEFINED	2
GALAHAD_AUTOMATIC	10
GALAHAD_NEVER	3
GALAHAD_INITIAL	4
GALAHAD_ALWAYS	5
GALAHAD_UNCONSTRAINED	0
GALAHAD_CONSTRAINED	1
GALAHAD_SUCCESS	0
GALAHAD_MEMORY_FULL	-1
GALAHAD_FILE_NOT_OPENED	-2
GALAHAD_COULD_NOT_WRITE	-3
GALAHAD_TOO_FEW_BITS_PER_BYTE	-4
GALAHAD_FURTHER_PROGRESS_IMPOSSIBLE	-5
GALAHAD_MAX_ITERATIONS_REACHED	-6
GALAHAD_NOT_INITIALIZE	-7
GALAHAD_WRONG_N	-8
GALAHAD_WRONG_M	-9
GALAHAD_SORT_TOO_LONG	-10
GALAHAD_NOT_DIAGONAL	-11
GALAHAD_REDUCE_SIZE	1
GALAHAD_FULL_PRESOLVE	2

Symbol	Value
GALAHAD_TIGHTEST	0
GALAHAD_NON_DEGENERATE	1
GALAHAD_LOOSEST	2
GALAHAD_GAUSS_NEWTON	0
GALAHAD_NEWTON	1
GALAHAD_ADAPTIVE	0
GALAHAD_FULL	1
GALAHAD_CURRENT	0
GALAHAD_SMALLEST	1
GALAHAD_BEST_FIT	0
GALAHAD_BEST_REDUCTION	1
GALAHAD_FORCE_TO_ZERO	0
GALAHAD_LEAVE_AS_IS	1
GALAHAD_KEEP	0
GALAHAD_DELETE	1
GALAHAD_1	1
GALAHAD_2	2
GALAHAD_3	3
GALAHAD_4	4
GALAHAD_5	5
GALAHAD_6	6
GALAHAD_7	7
GALAHAD_8	8
GALAHAD_9	9
GALAHAD_10	10
GALAHAD_11	11
GALAHAD_12	12
GALAHAD_EXACT	0
GALAHAD_FORWARD	1
GALAHAD_CENTRAL	2
GALAHAD_BFGS	1
GALAHAD_DFP	2
GALAHAD_PSB	3
GALAHAD_SR1	4
GALAHAD_CG	1
GALAHAD_DIAGONAL_CG	2
GALAHAD_USERS_CG	3
GALAHAD_EXPANDING_BAND_CG	4
GALAHAD_MUNKSGAARD_CG	5
GALAHAD_SCHNABEL_ESKOW_CG	6
GALAHAD_GMPS_CG	7
GALAHAD_BAND_CG	8
GALAHAD_LIN_MORE_CG	9
GALAHAD_MULTIFRONTAL	11
GALAHAD_MODIFIED_MULTIFRONTAL	12

Figure 2.1: GALAHAD symbols.

Symbol	Value	Symbol	Value
`GALAHAD_ok`	0	`GALAHAD_error_allocate`	- 1
`GALAHAD_error_deallocate`	- 2	`GALAHAD_error_restrictions`	- 3
`GALAHAD_error_bad_bounds`	- 4	`GALAHAD_error_primal_infeasible`	- 5
`GALAHAD_error_dual_infeasible`	- 6	`GALAHAD_error_unbounded`	- 7
`GALAHAD_error_no_center`	- 8	`GALAHAD_error_analysis`	- 9
`GALAHAD_error_factorization`	- 10	`GALAHAD_error_solve`	- 11
`GALAHAD_error_uls_analysis`	- 12	`GALAHAD_error_uls_factorization`	- 13
`GALAHAD_error_uls_solve`	- 14	`GALAHAD_error_preconditioner`	- 15
`GALAHAD_error_ill_conditioned`	- 16	`GALAHAD_error_tiny_step`	- 17
`GALAHAD_error_max_iterations`	- 18	`GALAHAD_error_cpu_limit`	- 19
`GALAHAD_error_inertia`	- 20	`GALAHAD_error_file`	- 21
`GALAHAD_error_io`	- 22	`GALAHAD_error_upper_entry`	- 23
`GALAHAD_error_sort`	- 24	`GALAHAD_error_input_status`	- 25
`GALAHAD_error_unknown_solver`	- 26	`GALAHAD_not_yet_implemented`	- 27
`GALAHAD_error_qp_solve`	- 28	`GALAHAD_unavailable_option`	- 29
`GALAHAD_warning_on_boundary`	- 30	`GALAHAD_error_call_order`	- 31
`GALAHAD_error_integer_ws`	- 32	`GALAHAD_error_real_ws`	- 33
`GALAHAD_error_pardiso`	- 34	`GALAHAD_error_wsmp`	- 35
`GALAHAD_error_mc64`	- 36	`GALAHAD_error_mc77`	- 37
`GALAHAD_error_lapack`	- 38	`GALAHAD_error_permutation`	- 39
`GALAHAD_error_alter_diagonal`	- 40	`GALAHAD_error_access_pivots`	- 41
`GALAHAD_error_access_pert`	- 42	`GALAHAD_error_direct_access`	- 43
`GALAHAD_error_f_min`	- 44	`GALAHAD_error_unknown_precond`	- 45
`GALAHAD_error_schur_complement`	- 46	`GALAHAD_error_technical`	- 50
`GALAHAD_error_reformat`	- 52	`GALAHAD_error_ah_unordered`	- 53
`GALAHAD_error_y_unallocated`	- 54	`GALAHAD_error_z_unallocated`	- 55
`GALAHAD_error_scale`	- 61	`GALAHAD_error_presolve`	- 62
`GALAHAD_error_qpa`	- 63	`GALAHAD_error_qpb`	- 64
`GALAHAD_error_qpc`	- 65	`GALAHAD_error_cqp`	- 66
`GALAHAD_error_dqp`	- 67	`GALAHAD_error_mc61`	- 69
`GALAHAD_error_mc68`	- 70	`GALAHAD_error_metis`	- 71
`GALAHAD_error_spral`	- 72	`GALAHAD_warning_repeated_entry`	- 73

Figure 2.2: GALAHAD symbols: error codes.