Switch Summary by Context 2024-01-02

This document list switches available within REDUCE via the commands *ON* and *OFF*. The switches are presented by context. Section 1 covers switches which are not specific to a package while Section 2 shows package-specific ones. For an alphabetical listing see the online REDUCE Switch Summary from which this document is derived.

See appendix A for instructions on how to rebuild this document.

List of Tables

1.1 Global . . . 2
1.2 Algebra . . . 2
1.3 Arithmetic . . . 3
1.4 Compiling . . . 3
1.5 Equations . . . 3
1.6 Input . . . 3
1.7 Output . . . 4
2.1 ALGINT . . . 5
2.2 ASSERT . . . 5
2.3 ASSIST . . . 5
2.4 CANTENS . . . 6
2.5 CDE . . . 6
2.6 CHANGEVAR . . . 6
2.7 COEFF(N) . . . 6
2.8 COMPACT . . . 6
2.9 DEFINT . . . 6
2.10 DF . . . 6
2.11 EXCALC . . . 6
2.12 FACTORIZE . . . 6
2.13 GROEBNER . . . 7
2.14 INT . . . 7
2.15 LAPLACE . . . 7
2.16 LIE . . . 7
2.17 LINALG . . . 8
2.18 LINALG, SPARSE . . . 8
2.19 NORMFORM . . . 8
2.20 NUMERIC . . . 8
2.21 PHYSOP . . . 8
2.22 PLOT . . . 8
2.23 QSUM . . . 8
2.24 RESULTANT . . . 9
2.25 ROOTS . . . 9
2.26 RSOLVE . . . 9
2.27 RTRACE . . . 9
2.28 SOLVE . . . 9
2.29 SUM . . . 9
2.30 TAYLOR . . . 10
2.31 TPS . . . 10
2.32 WU . . . 10
2.33 ZEILBERG . . . 10

1 Switch summary by context: general switches

Table 1.1: Global

Switch	Default	Effect
ANTICOM	OFF	When on, REDUCE uses only anti-commutators to commute non-commuting variables.

Table 1.2: Algebra

Switch	Default	Effect
COMBINEEXPT	OFF	When on, REDUCE combines exponentiated terms such as $x^{(1/3)} * x^{(1/6)}$ (which are always output as if combined).
COMBINELOGS	OFF	When on, REDUCE combines a sum of logarithms into a logarithm of a product (but see also the PRECISE switch).
EXP	ON	When on, REDUCE expands powers and products of expressions.
EXPANDLOGS	OFF	When on, REDUCE expands a logarithm of a product into a sum of logarithms (but see also the PRECISE switch).
EZGCD	OFF	When on, REDUCE computes GCDs using an alternative algorithm, called the EZGCD Algorithm, which uses modular arithmetic. ON is recommended!
FACTOR	OFF	When on, REDUCE represents expressions in factored form.
GCD	OFF	When on, REDUCE cancels common algebraic factors in the numerators and denominators of expressions.
HEUGCD	OFF	When on with ON GCD, REDUCE uses a heuristic GCD algorithm, available experimentally. EZGCD takes precedence over HEUGCD.
LCM	ON	When on, REDUCE uses the true least common multiple of the denominators as the common denominator of a rational expression at each computational step.
LISTARGS	OFF	When on, REDUCE does not distribute unary operators over list arguments.
MCD	ON	When on, REDUCE produces an expression over a common denominator when rational functions are added. (ON MCD is necessary for reliable simplification!)
PRECISE	ON	When on, REDUCE preserves the positive property of the square root and higher even roots by using the absolute value of any non-numerical factors taken out of surds.
PRECISE_COMPLEX	OFF	When on, REDUCE does not simplify $\sqrt{x^2}$ to $\|x\|$.
RATIONAL	OFF	When on, REDUCE treats a rational number as a polynomial coefficient rather than as the numerator and denominator of a rational expression.
RATIONALIZE	OFF	When on, REDUCE uses complex conjugation to remove complex numbers from denominators (much as with ON COMPLEX).
SAVESTRUCTR	OFF	When on, STRUCTR returns a list representing the expression structure; otherwise, it only displays the structure.
TRFAC	OFF	When on, all calls to the factorizer will generate informative messages reporting on such things as the reduction of multivariate to univariate cases, the choice of a prime and the reconstruction of full factors from their images.

Table 1.3: Arithmetic

Switch	Default	Effect
BALANCED_MOD	OFF	When on with ON MODULAR, REDUCE uses the symmetric modular representation in the interval [-floor((p-1)/2), ceiling((p-1)/2)], where p is the current modulus.
COMPLEX	OFF	When on, REDUCE uses complex arithmetic; it rationalizes denominators of complex rational numbers, and computes polynomial GCDs and factorizations over the complex rational numbers.
MODULAR	OFF	When on, REDUCE uses modular arithmetic with modulus p (which must be set using the SETMOD command).
NOCONVERT	OFF	When on with ON ROUNDED, REDUCE does not convert the floating-point number 1.0 to the integer 1.
ROUNDALL	ON	When on with ON ROUNDED, REDUCE converts rational numbers to rounded representation; otherwise, they are kept in rational form until used in an operation that returns a real number.
ROUNDBF	OFF	When on, REDUCE uses bigfloat representation for floating-point numbers at all precisions; otherwise, it uses bigfloat only when necessary.
ROUNDED	OFF	When on, REDUCE uses numerical approximation to compute non-integer numerical values (to the accuracy is specified using the operator PRECISION).

Table 1.4: Compiling

Switch	Default	Effect
PGWD	OFF	When on, the REDUCE compiler displays the actual code generated.
PLAP	OFF	When on, the REDUCE compiler displays the portable intermediate code generated.
PWRDS	ON	When on, the REDUCE compiler displays statistics for functions as they are compiled.

Table 1.5: Equations

Switch	Default	Effect
EVALLHSEQP	OFF	When on, REDUCE evaluates the LHS of equations (as well as the RHS).

Table 1.6: Input

Switch	Default	Effect
ADJPREC	OFF	When on, REDUCE increases PRECISION to keep the full accuracy of all numbers input.
COMP	OFF	When on, REDUCE compiles procedures when they are input and replaces their definitions with compiled versions.
CREF	OFF	When on, REDUCE runs the Standard Lisp Cross Reference Program on the input (but does not otherwise process it).
DEFN	OFF	When on, REDUCE outputs the Standard Lisp equivalent of the input (but does not otherwise process it).
DEMO	OFF	When on, REDUCE pauses after each command input from a file (with the exception of comments) until a *Return* is typed on the terminal.
ECHO	ON	Echoing of all or part of an input file can be prevented, even if a semicolon was used, by placing an OFF ECHO command in the input file.
ERRCONT	OFF	When on, REDUCE will continue evaluating input from a file after an error occurs; otherwise, it stops.
INT	→	When on, REDUCE treats input as interactive; the default is ON for terminal input and OFF for file input.
RLISP88	OFF	When on, REDUCE is in symbolic mode with RLISP '88 syntax and extensions.

Table 1.7: Output

Switch	Default	Effect
ALLFAC	ON	When on, REDUCE searches a whole expression, or any sub-expression enclosed in parentheses, for simple multiplicative factors and displays them outside the parentheses.
BFSPACE	ON	When on, REDUCE outputs numbers that are stored internally as bigfloats with a space between every five digits to improve readability.
DIV	OFF	When on, REDUCE searches the denominator of an expression for simple factors that it divides into the numerator, so that rational fractions and negative powers appear in the output.
FORT	OFF	When on, REDUCE outputs expressions using FORTRAN syntax.
FORTUPPER	OFF	When on, REDUCE outputs FORTRAN in upper case; otherwise, it is in lower case.
HORNER	OFF	When on, REDUCE outputs polynomials according to Horner's rule.
INTSTR	OFF	When on, REDUCE outputs operator arguments in the same form they would have as top-level expressions; otherwise, they are normally fully expanded.
LIST	OFF	When on, REDUCE outputs each term in any sum on a separate line. [This may not be reliable for typeset-style output.]
MSG	ON	When off, REDUCE suppresses warning messages.
NAT	ON	When off, REDUCE outputs expressions in linear input-compatible form with each expression terminated by a dollar sign.
NERO	OFF	When on, REDUCE does not output the results of zero assignments (i.e. assignments of the form $expression := 0$).
NOSPLIT	ON	When on, REDUCE does not attempt to break output expressions across lines at natural points.
OUTPUT	ON	When off, REDUCE suppresses the output entirely from any top-level evaluation.
PERIOD	ON	When on with ON FORT, REDUCE automatically inserts a decimal point after each isolated integer coefficient (so that, for example, 4 becomes $4.$).
PRET	OFF	When on, REDUCE "prettyprints" its input in a standard format.
PRI	ON	When on, REDUCE respects the switches that control output; otherwise, it uses a fixed format, which basically reflects the internal form of expressions.
RAT	OFF	When on with a FACTOR declaration in effect, REDUCE output has the overall denominator of an expression divided into each factored sub-expression.
RATPRI	ON	When on, REDUCE attempts to output rational expressions in two-dimensional form.
REVPRI	OFF	When on, REDUCE outputs polynomial terms ordered from lowest to highest power (as is normal for a power series).
TIME	OFF	When on, REDUCE outputs a message after each command giving the elapsed CPU time since the last command, since TIME was last turned off, or since the session began.

2 Switch summary by context: package-specific switches

Table 2.1: ALGINT

Switch	Default	Effect
TRA	OFF	When on, ALGINT outputs tracing information about the specific functioning of the algebraic integrator.

Table 2.2: ASSERT

Switch	Default	Effect
ASSERT	OFF	When on, REDUCE checks assertions at translation time.
ASSERTBREAK	OFF	When on, not only are warnings issued for assertion violations but the computation is interrupted with a corresponding error.
ASSERTSTATISTICS	ON	When on, enables the statistical counting of procedure calls and assertion violations.

Table 2.3: ASSIST

Switch	Default	Effect
DISTRIBUTE	OFF	When on, ASSIST puts polynomials in distributed form.

Table 2.4: CANTENS

Switch	Default	Effect
ONESPACE	ON	When on, CANTENS works in a single space environment, which is Euclidean and has a symbolic dimension equal to dim.

Table 2.5: CDE

Switch	Default	Effect
CHECKORD	ON	When on, the function $check_letop$ checks an expression for the presence of $letop$.

Table 2.6: CHANGEVAR

Switch	Default	Effect
DISPJACOBIAN	OFF	When on, CHANGEVAR displays the entries of the inverse Jacobian.

Table 2.7: COEFF(N)

Switch	Default	Effect
RATARG	OFF	When on, COEFF and COEFFN do not check denominators for dependence and always treat them as part of the coefficients.

Table 2.8: COMPACT

Switch	Default	Effect
TRCOMPACT	OFF	When on, COMPACT outputs tracing information.

Table 2.9: DEFINT

Switch	Default	Effect
TRDEFINT	OFF	When on, DEFINT outputs information about intermediate steps of the calculation.

Table 2.10: DF

Switch	Default	Effect
ALLOWDFINT	OFF	When on, DF applies "differentiation under the integral sign", i.e. $DF(INT(Y,X),V) \rightarrow INT(DF(Y,V),X)$ *if this results in a simplification*.
COMMUTEDF	OFF	When on, DF commutes the order of differentiation in $df(u,x,...,u,y,...)$ assuming u depends on $x,...,y,...$ in some way and hence simplifies it to 0.
DFINT	OFF	When on with ON ALLOWDFINT, DF applies "differentiation under the integral sign", i.e. $DF(INT(Y,X),V) \rightarrow INT(DF(Y,V),X)$ *whether or not this results in a simplification*.
EXPANDDF	OFF	When on, REDUCE uses the chain rule to expand symbolic derivatives of indirectly dependent variables (provided the result is unambiguous).
NOCOMMUTEDF	OFF	When on, DF does not commute the order of differentiation.
SIMPNONCOMDF	OFF	When on with OFF COMMUTEDF, $DF(U,X,U)$ simplifies to $DF(U,X,2)/DF(U,X)$ etc., provided U depends only on the one variable X.

Table 2.11: EXCALC

Switch	Default	Effect
NOSUM	OFF	When on, EXCALC does not perform any summation.

Table 2.12: FACTORIZE

Switch	Default	Effect
IFACTOR	OFF	When on, FACTORIZE finds the prime factors of the overall integer factor (content) of a polynomial, using a probabilistic algorithm.

Table 2.13: GROEBNER

Switch	Default	Effect
GLTBASIS	OFF	When on, GROEBNER collects the leading terms of the result basis, which is available as the value of the global variable $gltb$.
GROEBFULLREDUCTION	ON	When off, GROEBNER limits its reduction steps to pure head-term reduction; otherwise, subsequent terms are also reduced.
GROEBOPT	OFF	When on, GROEBNER selects the variable ordering to optimize execution speed; the optimized variable list is available in $gvarslast$.
GROEBPROT	OFF	When on, GROEBNER, GREDUCE and PREDUCE produce as a side effect a trace of their work as a REDUCE list of equations in the shared variable $groebprotfile$.
GROEBSTAT	OFF	When on, GROEBNER outputs a summary of the computation including the computing time, the number of intermediate *h*-polynomials and the counters for the hits of the criteria.
TRGROEB	OFF	When on, GROEBNER tracing includes GROEBSTAT and intermediate *h*-polynomials.
TRGROEB1	OFF	When on, GROEBNER tracing includes the internal pairlist when modified.
TRGROEBR	OFF	When on, GROEBNER tracing includes all intermediate partial bases when detected.
TRGROEBS	OFF	When on, GROEBNER tracing includes TRGROEB and the printing of intermediate *s*-polynomials.

Table 2.14: INT

Switch	Default	Effect
ALGINT	OFF	When on, INT uses the ALGINT package.
FAILHARD	OFF	When on, INT will terminate with an error if an integral cannot be evaluated in closed terms, rather than returning unevaluated.
NOINTSUBST	OFF	When on, INT does not use heuristic attempts to solve an integral by substitution.
NOLNR	OFF	When on, INT does not use the linear properties of integration in cases where the integral cannot be found in closed form.
TRINT	OFF	When on, INT traces the operation of the algorithm. It produces a great deal of output in a somewhat illegible form, and is not of much interest to the general user.
TRINTSUBST	OFF	When on, INT traces heuristic attempts to evaluate an integral by substitution.

Table 2.15: LAPLACE

Switch	Default	Effect
LHYP	OFF	When on, INVLAP converts exponentials into the hyperbolic functions sinh and cosh.
LMON	OFF	When on, LAPLACE converts trigonometric and hyperbolic functions into exponentials.
LTRIG	OFF	When on, INVLAP converts exponentials into the trigonometric functions sin and cos.

Table 2.16: LIE

Switch	Default	Effect
TR_LIE	OFF	When on, LIENDIMCOM1 outputs tracing information.

Table 2.17: LINALG

Switch	Default	Effect
FASTSIMPLEX	ON	When on, SIMPLEX uses the bounds argument; otherwise, the algorithm assumes that all the variables have non-negative values.
IMAGINARY	OFF	When on, RANDOM_MATRIX generates matrix entries that are complex numbers.
LOWER_MATRIX	OFF	When on, RANDOM_MATRIX creates lower-triangular matrices.
NOT_NEGATIVE	OFF	When on, RANDOM_MATRIX generates matrix entries that are strictly positive numbers.
ONLY_INTEGER	OFF	When on, RANDOM_MATRIX generates matrix entries that are integers (complex integers with ON IMAGINARY).
SYMMETRIC	OFF	When on, RANDOM_MATRIX generates symmetric matrices.
UPPER_MATRIX	OFF	When on, RANDOM_MATRIX generates upper-triangular matrices.

Table 2.18: LINALG, SPARSE

Switch	Default	Effect
FAST_LA	OFF	When on, LINALG and SPARSE use faster but less safe versions of some functions with less error checking.

Table 2.19: NORMFORM

Switch	Default	Effect
LOOKING_GOOD	OFF	When on and using xr, the X interface for REDUCE, NORMFORM improves the appearance of output by converting all lambda to ξ and improves the indexing, e.g., lambda12 $\rightarrow \xi_1 2$.

Table 2.20: NUMERIC

Switch	Default	Effect
TRNUMERIC	OFF	When on, NUMERIC outputs tracing information.

Table 2.21: PHYSOP

Switch	Default	Effect
CONTRACT	OFF	When on, REDUCE contracts over dummy indices, reinserting the DOT operator and reassembling the expanded powers.

Table 2.22: PLOT

Switch	Default	Effect
PLOTKEEP	OFF	When on, REDUCE does not erase GNUPLOT data files.
TRPLOT	OFF	When on, all GNUPLOT commands are written additionally to the actual REDUCE output.

Table 2.23: QSUM

Switch	Default	Effect
QGOSPER_DOWN	ON	When on, QGOSPER returns a downward anti-difference; otherwise, it returns an upward anti-difference.
QGOSPER_SPECIALSOL	ON	When on, QGOSPER returns just one special solution; otherwise, it returns all solutions.
QSUMRECURSION_CERTIFICATE	OFF	When on, QSUMRECURSION provides all necessary information for proving the recurrence equation.
QSUMRECURSION_DOWN	ON	When on, QSUMRECURSION returns a downward recurrence equation; otherwise it returns an upward recurrence equation.
QSUMRECURSION_EXP	OFF	When on, QSUMRECURSION factors the coefficients of the recurrence equation.
QSUM_NULLSPACE	OFF	When on, QSUM uses a modified nullspace-algorithm for solving the set of linear equations, which is generally slower.
QSUM_TRACE	OFF	When on, QSUM outputs some intermediate results.

Table 2.24: RESULTANT

Switch	Default	Effect
BEZOUT	OFF	When on, RESULTANT uses the Bezout Matrix.

Table 2.25: ROOTS

Switch	Default	Effect
MULTIROOT	ON	When on, ROOTS indicates the multiplicity of a root by outputting it repeatedly, according to its multiplicity.
RATROOT	OFF	When on, ROOTS outputs all root equations in rational form.
ROOTMSG	OFF	When on with ON TRROOT, ROOTS outputs additional messages to aid in following the progress of Laguerre and Newton complex iteration.
TRROOT	OFF	When on, ROOTS outputs tracing messages during the course of root determination, to show the progress of solution.

Table 2.26: RSOLVE

Switch	Default	Effect
TRSOLVE	OFF	When on, RSOLVE outputs tracing information.

Table 2.27: RTRACE

Switch	Default	Effect
RTRACE	ON	When on, traced values are output in algebraic style whenever possible; otherwise, they are output in conventional Lisp style.

Table 2.28: SOLVE

Switch	Default	Effect
ALLBRANCH	ON	When off, SOLVE only selects the principal branches of functions.
ARBVARS	ON	When off, SOLVE does not introduce new indeterminate kernels (i.e. $ARBCOMPLEX(j)$) into the solution of an under-determined multivariate system.
CRAMER	OFF	When on, SOLVE uses Cramer's method to solve linear equations instead of the multi-step elimination method due to Bareiss.
FULLROOTS	OFF	When on, SOLVE outputs roots of cubics and quartics in closed form (which can often be very messy).
MULTIPLICITIES	OFF	When on, SOLVE outputs multiple solutions explicitly as repeated solutions.
SOLVESINGULAR	ON	When on, SOLVE introduces arbitrary constants as appropriate to solve consistent singular equations.
TRIGFORM	ON	When on, SOLVE uses trigonometrical forms for the solutions of cubics and quartics where appropriate.
VAROPT	ON	When on, SOLVE rearranges the variable sequence to reduce the (expected) computing time; otherwise, the supplied variable sequence is used or the system kernel ordering is used if the variable list is omitted.

Table 2.29: SUM

Switch	Default	Effect
TRSUM	OFF	When on, SUM outputs tracing information.

Table 2.30: TAYLOR

Switch	Default	Effect
TAYLORAUTOCOMBINE	ON	When on, Taylor expressions automatically combine during the simplification process (equivalent to applying TAYLORCOMBINE to every expression that contains Taylor kernels).
TAYLORAUTOEXPAND	OFF	When on, Taylor expressions are "contagious" in the sense that TAYLORCOMBINE tries to Taylor expand all non-Taylor sub-expressions and to combine the result with the rest.
TAYLORKEEPORIGINAL	OFF	When on, TAYLOR keeps the original expression, i.e. the expression that was Taylor expanded. All operations performed on the Taylor kernels are also applied to this expression which can be recovered using the operator TAYLORORIGINAL.
TAYLORPRINTORDER	ON	When on, TAYLOR outputs remainders using big-O notation; otherwise, three dots are used.
VERBOSELOAD	OFF	When on, REDUCE prints some information when the Taylor package is loaded.

Table 2.31: TPS

Switch	Default	Effect
PSPRINTORDER	ON	When on, TPS outputs the remainder of the power series in big-O notation; otherwise, three dots are used.

Table 2.32: WU

Switch	Default	Effect
TRWU	OFF	When on, WU outputs tracing information.

Table 2.33: ZEILBERG

Switch	Default	Effect
ZB_FACTOR	ON	When on, ZEILBERG factorizes its output usually producing nicer results.
ZB_PROOF	OFF	When on, ZEILBERG stores several intermediate results in global variables.
ZB_TRACE	OFF	When on, ZEILBERG outputs tracing information.

A Rebuilding this document

This document was created using the source for this vignette, *switches-by-context.Rnw*, which includes all the code necessary for downloading the Switch Summary page and building this vignette. Since the switch summary may change, a new version of this document may be created by saving the Rnw file to a directory of your choice and executing it using *R* CMD Sweave --pdf. The first time this is run it saves the last update date from the Switch Summary to *switches.last.update.RDS* and on subsequent runs only updates if the date in the current Switch Summary is later. To unconditionally update, delete or rename *switches.last.update.RDS* prior to executing *S*weave.

Note that updating the actual vignette in the package requires a new version of the package.