

Software Tools Subsystem
Version 8.1 to Version 9 Conversion Guide

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Introduction

Version 9 of the Subsystem is the last official release of Software Tools. We no longer have the manpower to support such a large amount of software, and will probably not have Prime computers at all for much longer. We apologize for taking so long to get this release out; there have been administrative, hardware and personnel problems (as outlined in the newsletter), and only recently have things been straightened out.

As promised, this release does run under Primos 19.2, and does have commands giving access to the new file system features (ACLs, disk quotas, etc.). There are many new features, and many improvements have been made to the major Subsystem programs. Version 9 of Software Tools is a major release; we're going out with a bang, not a whimper!

This conversion guide is divided into three sections: **Global Changes** discusses the alterations that affect large portions of the user interface; **Status of V8.1 Commands** and **Status of V8.1 Subroutines** describe additions, deletions, and modifications made to individual commands and subroutines.

Global Changes

The Subsystem Common Block

The Subsystem common block has been moved. It now starts at Segment '4040, Word '10000. It has also been somewhat rearranged. Any program which references the Subsystem common should be recompiled. This includes any programs compiled with the Georgia Tech C Compiler (for those of you who have it), since the C run time library, "ciolib" currently references the Subsystem common. This will be fixed in the next release of the C compiler, which is now in preparation.

New Subsystem Libraries

Three new libraries have been added to the Subsystem for Release 9. The first, "vswtmath", is a library of high precision mathematical routines. These routines, along with some interesting facts about Prime's floating point hardware and software, are documented in the SWT Math Library User's Guide. The second library, "vshlib", contains several routines which give the programmer access to the shell, and its variables. The third library, "vrnglb", is used by the 'Ring' set of programs. This library is undocumented, and unsupported.

Deleted Subsystem Libraries

The old, locally supported math library, "vswtml", has been changed slightly (routines which were obsoleted by "vswtmath" were removed), and merged in with "vswtmath"; "vswtml" has been deleted. The Virtual Terminal Handler library, "vthlib", has been merged in with standard Subsystem library, and is therefore no longer needed. Programs which used "vthlib" should have the "-l vthlib" removed from whatever build procedures are used to load them. The Version 8 compatibility libraries, "v8vswtlb", and "nv8vswtlb", are no longer supported, and have been deleted. You should remove them from =lib= and recompile any programs which needed them. Finally, "gtnetlb" has been deleted.

New Subsystem Templates

There are several new Subsystem templates. The first is =new_words=. If this template is defined, the 'spell' program will treat it as the file where it will write out any words that it finds which are not in the dictionary. Currently, this template is commented out, but if you want 'spell' to start keeping a word list, remove the comment symbol. This is particularly useful to help enhance the Subsystem dictionary. See the help on 'spell' for more details.

=ring= is the directory where the 'Ring' programs will write their log files.

=histfile= is the file which the shell will use to save user command sessions. This allows preserving the shell's history across login sessions.

=cldata=: There is a commented out entry which will apply for Revisions 19.4 and later of Primos (once they are released). The current entry is for Revisions 18.3 through 19.3 of Primos.

=crondir= is the directory where 'cron' creates temporary files for the phantoms it creates. =cronfile= is the file containing the directives for 'cron'.

Command Interpreter Enhancements

There have been many enhancements to the shell. In particular, we have added a "history" mechanism, which allows the user to recall previous commands, search for them, and modify them.

The shell can now do continuous checking on the user's mail box, so if mail arrives during a session, the user is notified.

Also, the shell has a looping capability with the repeat-until construct. This greatly increases the shell's power, making it much easier to write shell programs.

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There have been other changes to the shell as well. The details are too numerous to be listed here; we recommend a careful reading of the User's Guide to the Software Tools Command Interpreter.

The enhanced error handling mentioned in the newsletter did not make into the shell; there simply was not enough time to make all the changes. The other features are more useful, anyway.

Shell Variables

The format of the shell variables save file has changed for this release. To ease the burden of conversion, we have provided a command 'csv' (Convert Shell Variables) which reads a list of user names on its first standard input, and reformats the corresponding variables files. Do a 'help csv' for details and instructions.

Command Interpreter Source Code Location

Since the shell is now callable as a subroutine, with a library of associated routines, its source code has been moved from =src=/spc/sh.u/?* to =src=/lib/sh/?*. This should not affect the operation of the Subsystem; but it is a change worth noting.

The =userlist= File

The format of =userlist= has changed. Since Primos 19.2 now allows 32 character login id's, the entries in =userlist= look slightly different. The Software Tools Subsystem Manager's Guide discusses this in further detail, including some advice on converting the old format file into the new one.

Update to SWTSEG

The Subsystem segmented loader has been updated to Primos version 19.2. It still only understands eight character names. Oh well.

Enhanced Editors

Both the 'ed' line editor, and the 'se' screen editor have been greatly enhanced. Since the editors are probably the most used programs in the Subsystem, the changes are described here as a 'global change', even though only two actual commands have been changed.

The guide and help pages have been updated to reflect the changes made to the editors. The following list applies to both editors:

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- . Trailing delimiters are not needed in pattern searches, or for the 's', 't', and 'j' commands.
- . The 'j' commands defaults to 'j/ /p', and the 's' command defaults to 's//&p'.
- . Global commands can be set to continue, even if the command fails for a given line.
- . You may escape to the Software Tools shell from within the editor. (See the help on the 'shell' subroutine for more discussion of this feature.)
- . The saved replacement pattern can be empty. I.e., if you deleted a pattern in the last substitute, you may do so again with 's//&/', or simply 's'.
- . A new command, "l" (for "location") is available. This command prints out the first line of the file =installation=. In other words, you can find out what machine you are using from within the editor. This feature is designed for multiple-machine installations, where a user can switch back and forth between machines, and forget where he is at a given moment.

The following list applies only to the 'se' screen editor.

- . 'Se' now has an auto-indent option. This makes typing in program text considerably easier.
- . 'Se' reads commands from the file =home=/.serc (if it exists) whenever it starts up. This is useful for setting personal options.
- . 'Se' will allow you to use UNIX style pattern characters and command letters. This is useful for new Subsystem users who are already familiar with the UNIX system.
- . The help files in =doc=/se_h/?* have finally been updated and completed. There is now a help file for every command and every option in the screen editor (believe it or not!). The help command will call up help appropriate to either UNIX mode or normal mode, whichever is being used at the time.

Documentation Changes

The Reference Manual macros have been changed to include the section number in the header line of each page, as well as in the footer. This is particularly useful with the 'usage' command; you can see what section of the manual a command or subroutine is in, as well as how to use it.

Dynamic Templates

With Rev 19 of Primos, projects are supported in the operating system. Template handling has been revised to make =home= the initial directory to which you are attached for each project. This is computed dynamically, instead of being in a static file. Since =ubin= is defined as =home=/bin, this allows users to have different private bins for each login project.

Status of Version 8.1 Commands

This section summarizes the user-visible changes that have been made to the Subsystem commands for Version 9. It is divided into several subsections: obsolete commands, superseded commands, modified commands, enhanced commands, and unchanged commands. The final subsection is a summary of commands that are new for the Version 9 release.

Obsolete Commands

The commands in this subsection were part of the Version 8.1 Subsystem, but are not included in the Version 9 release. Most of them were used only by certain shell programs and have outlived their usefulness. In other cases, the commands were relics of past Subsystems, and either were no longer useful, or no longer worked.

memstat

The memory status monitor has been removed due to changes in Primos. It required Georgia Tech modifications to Primos, which haven't been made at Georgia Tech for Rev. 19.2. Since it required Georgia Tech Primos, it was not very useful at other sites anyway.

mkusr

This program was used at Georgia Tech for creating new users. Since it requires Georgia Tech modifications to Primos, and since the production machines at Georgia Tech are not running Rev. 19.2 (only the development machine is), this program has been deleted.

old_ar

The old archiver has been removed since there is no longer any use for it.

rmusr

This program was used at Georgia Tech for removing existing users. See the comments above under 'mkusr'.

Superseded Commands

The commands in this subsection are not part of the Version 9 Subsystem; their functionality has been subsumed by other commands. Each entry describes the command and options you can use to get the same results.

No commands are superseded at Version 9.

Modified Commands

The commands listed in this subsection have been modified for the Version 9 release and are no longer completely compatible with their Version 8.1 counterparts. Each entry gives a brief description of the changes, but before using any of these commands, please check the corresponding Reference Manual entry to be sure of the command's exact behavior.

cat

Has been changed to loudly complain when it can't open a file. For those who want it to be meek and quiet, there is a new "-s" (for "silent") option.

history

Is now used exclusively for making entries in the Subsystem history file. It no longer takes any options and does not call 'phist'.

lf

By default, does not list files whose names begin with a '.'. To see "dot files", use the "-a" option.

pwd

Changes the user's login passwords. Password checking with no echoing and more than six characters on login is now a standard feature of Primos. Because of this, 'pwd' has been moved from the "locally supported" section to the "standard commands" section.

sema

Has a new option "-i" for initializing named semaphores. Also now uses the standard Subsystem argument notation.

Enhanced Commands

Commands in this subsection have been functionally enhanced for the Version 9 release, but remain compatible with their Version 8.1 counterparts.

del

Fixed to handle new file ACL's.

dprint

Has a new "-x" option which prevents the initial page eject.

ed

See the "Global Changes" section above, and the Reference Manual entry on 'ed', as well as the Introduction to the Software Tools Subsystem Text Editor for details.

find

Has a new "-i" option to ignore case in comparisons.

fmt

Has been greatly enhanced. There are more special characters, more commands, and more function calls. Particularly useful is the condition handling mechanism -- .if.

help

Uses the 'page' subroutine, with the VTH option. A new option, "-d", indicates that the user has a "dumb" terminal, and therefore 'help' should not use VTH. Fixed a bug whereby an EOF status did not tell 'help' to stop, if it was showing multiple help items.

ld

Has a new option, "-w" (short for "wierd"), for loading programs compiled with Prime's C compiler. The "-b" option has changed slightly to handle the next release of the Georgia Tech C compiler. This change should not affect those of you who are using the current release of the C compiler.

pg

Uses the VTH option of the 'page' subroutine for paging. See the Reference Manual entry for both the 'pg' command and the 'page' subroutine for more information.

se

Handles more terminal types, as well as the changes outlined under "Global Changes" above.

sep

Changed to use "cat -s", which effectively keeps its behavior identical to earlier versions.

sh

Vary many enhancements. See the User's Guide for details.

source

Fixed to handle archives correctly. 'Source' will find the source for more than one command and/or subroutine.

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spell

Has been made slightly smarter about suffixes, in particular, it will strip a trailing "'s" before checking a word in the dictionary. Also, if =new_words= is defined, 'spell' will write any unknown words there.

stacc

Supports three new languages; Pascal, PL/1, and Plp, in addition to Ratfor and C.

who

Has two new options; "-l" for user locations, and "-p" for user projects. These two options are mutually exclusive.

Unchanged Commands

This subsection lists the commands that have no user-visible changes made for Version 9.

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alarm	ap	ar	arg
args	argsto	asll	as6800
as8080	banner	basename	basys
batch	block	bmerge	bnames
brefs	bs	bsl	bug
bugfm	bugn	bye	cal
case	cd	cdmlc	cdmlcl
change	chat	chown	clear
clock	cmp	cn	cobc
cobcl	col	common	como
copy	copyout	cp	crypt
csubc	ctime	cto	date
day	dbg	ddlc	declare
declared	define	des	detab
diff	dmach	dnum	drop
dump	e	echo	ek
elif	else	entab	error
esac	eval	exit	f77c
f77cl	fc	fcl	fdmlc
fdmlcl	fdmp	fi	field
file	files	fixp	focld
forget	fos	fsize	fsubc
goto	guess	guide	hd
hp	if	imi	include
index	installation	intel	iota
isph	join	kill	kwic
lam	last	length	lib
line	link	lk	locate
log	login_name	lorder	lps
macro	mail	memo	mkcl
mkclist	mkdir	mklib	mktree
mon	moot	mot	mt
mv	nargs	news	nodes
ns	os	out	p4c
p4cl	passwd	pause	pc
pcl	ph	phist	phone
plgc	plgcl	plpc	plpcl
pmac	pmacl	pr	primos
print	profile	publish	pwd
quote	radix	raid	rcl
rdcat	rdextr	rdjoin	rdmake
rdprint	rdproj	rdsel	rdsort
rduniq	retract	rf	rfl
rnd	rot	rp	rsa
rtime	save	scroll	set
show	shtrace	size	slice
sol	sort	sp	speling
splc	splcl	sprint	ssr
st_profile	stats	stop	subscribe
substr	symbols	systat	tail
take	tc	tee	template
term	term_type	then	time
tip	tlit	to	translang
ts	tsort	uniq	unoct
unrot	us	usage	vars
vpsd	when	whereis	whois

x	xref	yesno
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New Commands

This subsection lists commands that are new for Version 9.

bind

This is the Subsystem interface to the (currently unsupported) Primos EPF loader.

broadcast

Send a Primos message to a user on all machines. This is part of the 'Ring' group of programs. (Do a 'guide ring' for more information.)

compile

General purpose compiler interlude. This program is only available to customers who have also licensed the C compiler package. It is part of the upcoming second release of the C compiler.

cron

Time driven command processor. This command can be used by the system administrator to periodically run programs (e.g. disc fixers, accounting, etc.).

cset

Tells you everything you ever wanted to know about your character set.

csv

Convert shell variables. The format of the shell variables save file has changed for Version 9. This program helps convert the old format files into the new format. This program should only be used by the system administrator.

cvusr

Convert =userlist= to the new format. This is a very simple shell file for converting the six character login name =userlist= into the 32 character login name =userlist= format. This program should only be used by the system administrator.

execute

Execute a SWT command on another system. Part of the 'Ring' group of programs.

ffind

Knuth-Morris-Pratt very fast simple string finding program.

group
Tests or lists a user's group identities.

gtod
Prints the time of day together with the date, month, and year; in a format which is pleasing to humans.

hist
Controls the shell's history mechanism.

lacl
Lists ACL information about a file system object.

lfo
List files opened for a specified user. This command requires Georgia Tech modified Primos.

lz
Post process 'fmt' output for the Georgia Tech Office of Computing Services Xerox 9700 laser printer.

otd
Object text dumper. This program reads relocatable binary files, and prints their contents in a human-readable form. It is useful for analyzing the output of compilers for Prime systems.

ptar
Read Unix 'tar' format tapes. Useful for moving files from Unix systems to SWT.

quota
Reads and sets disk record quota limits.

rdatt
Lists the attributes of a relation. This is an addition to the toy relational database system, 'RDB'.

rdavg
Computes the average value of an attribute. This is an addition to the toy relational database system, 'RDB'.

rdcount
Count the number of rows in a relation. This is an addition to the toy relational database system, 'RDB'.

rddiff
Takes the difference of two relations. This is an addition to the toy relational database system, 'RDB'.

rddiv
Performs the division of two relations. This is an addition to the toy relational database system, 'RDB'.

rdint
Intersects two relations. This is an addition to the toy relational database system, 'RDB'.

rdmax
Finds the maximum value of a specified attribute. This is an addition to the toy relational database system, 'RDB'.

rdmin
Finds the minimum value of a specified attribute. This is an addition to the toy relational database system, 'RDB'.

rdnat
Performs the natural join of two relations. This is an addition to the toy relational database system, 'RDB'.

rdsum
Sums the values of an attribute. This is an addition to the toy relational database system, 'RDB'.

repeat
Begin a shell repeat-until loop. This command, and the corresponding 'until' are built into the shell.

rfc
This is a command file to 'rp' and 'fc' a Ratfor program, without running 'ld'.

sac1
Sets ACL attributes on an object.

setime
Sets the time of day and/or the date on all systems running 'Ring'. Very useful for keeping clocks synchronized.

shar
Creates "shell archives"; an alternate self-extracting method for storing files.

snplnk
Snap shared library dynamic links. This program is executed from Primos when initializing the Subsystem. It snaps all dynamic links in a segment, allowing the segment to then be shared as non-writable. This can considerably improve system security.

sph
System phantom processor. This command allows the system administrator to create phantoms that belong to other users.

terminate

Terminates the currently executing 'ring' process.

touch

Sets file date/time modification fields.

until

Used to terminate and state the condition part of a shell repeat-until loop.

wallclock

Tells the time in a BIG way on CRT terminal.

which

Searches the user's "_search_rule" shell variable to find where a given command resides.

xcc

Compile a C program with the Prime C compiler.

xccl

Compile and load a C program with the Prime C compiler.

Status of Version 8.1 Subroutines

This section summarizes the user-visible changes to the Subsystem library routines. It is divided into several subsections: obsolete routines, superseded routines, modified routines, enhanced routines, unchanged routines and new routines.

Obsolete Routines

The routines listed here were only used by other library routines. Since their services are no longer required, they have been deleted.

No routines were obsoleted at Version 9.

Superseded Routines

The following routines have been subsumed by other more powerful routines. Each entry names the Version 9 routine that performs the same function.

dacos

Use 'dac\$m' in "vswtmath".

dasin

Use 'dasn\$m' in "vswtmath".

dbexp
Use 'dexp\$m' in "vswtmath".

dsqrt
Use 'dsqt\$m' in "vswtmath".

dflot
Use 'dble\$m' in "vswtmath".

drand
Use 'rand\$m' in "vswtmath".

Modified Routines

The routines listed in this subsection have been modified so that they are no longer compatible with their Version 8.1 counterparts. Although each entry briefly describes the changes that have been made, you should examine the corresponding Reference Manual entries to determine the exact behavior of the routines.

init
Prints an error message and then exits to the Subsystem. It remains only to help users find programs which need recompiling.

tcook\$
Has been greatly enhanced. The calling sequence has changed. See the 'help' documentation for more information.

Enhanced Routines

The routines listed in this subsection have additional functionality in the Version 9 release, but remain compatible with their Version 8.1 counterparts.

call\$\$
Now knows about EPF format files. Therefore programs loaded with 'bind' can be run from the Subsystem. Remember that EPFs are currently unsupported.

edit
This is the routine which actually does all the work for the 'ed' line editor. See the discussion above.

gcd
Merged in with the new high precision math library, "vswtmath".

invmod
Merged in with the new high precision math library, "vswtmath".

lutemp

Now treats =home= as a dynamic template. The value is gotten from the file system, based on the current login project.

page

Has an option to use the VTH library when paging to the terminal. In concert with the editors, the trailing slash or backslash is no longer needed for a pattern search.

prime

Merged in with the new high precision math library, "vswtmath".

pwrmod

Merged in with the new high precision math library, "vswtmath".

set_copy

Merged in with the new high precision math library, "vswtmath".

set_create

Merged in with the new high precision math library, "vswtmath".

set_delete

Merged in with the new high precision math library, "vswtmath".

set_element

Merged in with the new high precision math library, "vswtmath".

set_equal

Merged in with the new high precision math library, "vswtmath".

set_init

Merged in with the new high precision math library, "vswtmath".

set_insert

Merged in with the new high precision math library, "vswtmath".

set_intersect

Merged in with the new high precision math library, "vswtmath".

set_remove

Merged in with the new high precision math library, "vswtmath".

set_subset
Merged in with the new high precision math library,
"vswtmath".

set_subtract
Merged in with the new high precision math library,
"vswtmath".

set_union
Merged in with the new high precision math library,
"vswtmath".

vt\$alc
Merged in with the standard Subsystem library.

vt\$clr
Merged in with the standard Subsystem library.

vt\$db
Merged in with the standard Subsystem library.

vt\$db1
Merged in with the standard Subsystem library.

vt\$db2
Merged in with the standard Subsystem library.

vt\$db3
Merged in with the standard Subsystem library.

vt\$def
Merged in with the standard Subsystem library.

vt\$del
Merged in with the standard Subsystem library.

vt\$dsw
Merged in with the standard Subsystem library.

vt\$err
Merged in with the standard Subsystem library.

vt\$get
Merged in with the standard Subsystem library.

vt\$gsq
Merged in with the standard Subsystem library.

vt\$idf
Merged in with the standard Subsystem library.

vt\$ier
Merged in with the standard Subsystem library.

vt\$ndf
Merged in with the standard Subsystem library.

vt\$out
Merged in with the standard Subsystem library.

vt\$pos
Merged in with the standard Subsystem library.

vt\$put
Merged in with the standard Subsystem library.

vt\$rdf
Merged in with the standard Subsystem library.

vtclr
Merged in with the standard Subsystem library.

vtlenb
Merged in with the standard Subsystem library.

vtgetl
Merged in with the standard Subsystem library.

vtinfo
Merged in with the standard Subsystem library.

vtinit
Merged in with the standard Subsystem library.

vtmove
Merged in with the standard Subsystem library.

vtmsg
Merged in with the standard Subsystem library.

vtopt
Merged in with the standard Subsystem library.

vtpad
Merged in with the standard Subsystem library.

vtprt
Merged in with the standard Subsystem library.

vtputl
Merged in with the standard Subsystem library.

vtread
Merged in with the standard Subsystem library.

vtstop
Merged in with the standard Subsystem library.

vtterm

Merged in with the standard Subsystem library.

vtupd

Merged in with the standard Subsystem library.

Unchanged Routines

No user-visible changes have been made to the routines listed in this subsection.

abq\$xs	addset	amatch	at\$swt
atoc	atq\$xs	bponu\$	c\$end
c\$incr	c\$init	cant	catsub
chkarg	chkinp	chkstr	chunk\$
close	cof\$	cpfil\$	cpseg\$
create	ctoa	ctoc	ctod
ctoi	ctol	ctomn	ctop
ctor	ctov	date	decode
delarg	delete	dgetl\$	dmark\$
dmpcm\$	dmpfd\$	dodash	dopen\$
dputl\$	dread\$	dsdbiu	dsdump
dseek\$	dsfree	dsget	dsinit
dtoc	dwrit\$	encode	enter
equal	error	esc	exec
execn	expand	fcopy	filcpy
file\$p	filset	filtst	findf\$
finfo\$	first\$	flush\$	follow
gkdir\$	gcifu\$	gctoi	gctol
get\$xs	geta\$f	geta\$p	geta\$plg
getarg	getccl	getch	getfd\$
getkwd	getlin	getto	getvdn
getwrđ	gfnam\$	gfnarg	gitoc
gklarg	gky\$xs	gltoç	gtattr
gtemp	gttype	gvlarg	icomn\$
index	init\$f	init\$p	init\$plg
input	iofl\$	ioinit	isadsk
isatty	isnull	itoc	jdate
ldseg\$	ldtmp\$	length	locate
lookup	lopen\$	lsallo	lscmpk
lscomp	lscopy	lscut	lsdel
lsdrop	lsdump	lsextr	lsfree
lsgetc	lsgetf	lsinit	lsins
lsjoin	lslen	lsmake	lspos
lsputc	lsputf	lssubs	lstake
ltoc	makpat	maksub	mapdn
mapfd	mapstr	mapsu	mapup
markf	match	mkdir\$	mkfd\$
mkpa\$	mkq\$xs	mktabl	mktemp
mktr\$	mntoc	move\$	omatch
open	parscl	parsdt	parstm
patsiz	pek\$xs	pok\$xs	print
ptoc	put\$xs	putch	putdec
putlin	putlit	rbq\$xs	rdy\$xs
readf	remark	remove	reonu\$

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rewind	rmfil\$	rmseg\$	rmtabl
rmtemp	rtn\$\$	rtoc	rtq\$xs
slc\$xs	s2c\$xs	scopy	sctabl
sdrop	seekf	seterr	sky\$xs
sprot\$	st\$lu	stake	stclos
stk\$xs	strbsr	strcmp	strim
strlsr	substr	swt	sys\$\$
t\$clup	t\$entr	t\$exit	t\$init
t\$time	t\$trac	tgetl\$	tmark\$
tputl\$	tquit\$	tread\$	trunc
tscan\$	tseek\$	tsq\$xs	ttyp\$f
ttyp\$l	ttyp\$q	ttyp\$r	ttyp\$v
twrit\$	type	upkfn\$	vfyusr
vtoc	wind	wkday	writef
zmem\$			

New Routines

The routines listed in this section are new for the Version 9 release.

acos\$m
calculate inverse cosine.

asin\$m
calculate inverse sine.

atan\$m
calculate inverse tangent.

cos\$m
calculate cosine.

cosh\$m
calculate hyperbolic cosine.

cot\$m
calculate cotangent.

dacs\$m
calculate double precision inverse cosine.

dasn\$m
calculate double precision inverse sine.

datn\$m
calculate double precision inverse tangent.

dble\$m
create a longreal from a longint.

dcos\$m
calculate double precision cosine.

dcot\$m
calculate double precision cotangent.

dcsh\$m
calculate double precision hyperbolic cosine.

dexp\$m
calculate double precision exponential to the base e.

dint\$m
get integer part of an longreal.

dint\$p
get integer part of a longreal (PMA only).

dln\$m
calculate double precision logarithm to the base e.

dlog\$m
calculate double precision logarithm to the base 10.

dsin\$m
calculate double precision sine.

dsnh\$m
calculate double precision hyperbolic sine.

dsqt\$m
calculate double precision square root.

dtan\$m
calculate double precision tangent.

dtnh\$m
calculate double precision hyperbolic tangent.

err\$m
common error condition handler for math routines.

exp\$m
calculate exponential to the base e.

gfdata
get information about file characteristics.

gtac1\$
get acl protection into ACL common block.

isph\$
determine if the caller is a phantom.

ln\$m
calculate logarithm to the base e.

log\$m
calculate logarithm to the base 10.

lookac
look up a name in the ACL common block.

mkpac1
encode ACL information into a Primos structure.

mksacl
encode ACL information into a SWT structure.

parsa\$
parse ACL changes in the common block.

pg\$brk
catch a break for the page subroutine.

powr\$m
calculate a longreal raised to a longreal power.

ptov
convert packed string to PL/I varying string.

rand\$m
generate a random number.

seed\$m
set the seed for the rand\$m random number generator.

sfdata
set information about file characteristics.

shell
run the Subsystem command interpreter.

sin\$m
calculate sine.

sinh\$m
calculate hyperbolic sine.

sqrt\$m
calculate square root.

subsys
call the Subsystem command interpreter.

svdel
delete a shell variable at the current level.

svdump
dump the contents of the shell variable common.

svget
return the value of a shell variable.

svlevl
return the current shell variable lexic level.

svmake
create a shell variable at the current lexic level.

svput
set the value of a shell variable.

svrest
restore shell variables from a file.

svsave
save shell variables in a file.

svscan
scan a user's list of shell variables.

szfil\$
size an open Primos file descriptor.

szseg\$
size an open Primos segment directory.

tan\$m
calculate tangent.

tanh\$m
calculate hyperbolic tangent.

vtdlin
delete lines on the user's terminal screen.

vtilin
insert lines on the user's terminal screen.

vtop
convert PL/I varying string to packed string.