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ASCII & GPIB CODE CHART

BITS	CONTROL		NUMBERS SYMBOLS		UPPER CASE		LOWER CASE	
B7 B6 B5 / B4 B3 B2 B1	0 0 0	0 0 1	0 1 0	0 1 1	1 0 0	1 0 1	1 1 0	1 1 1
0 0 0 0	NUL `0 0 0`	DLE `20 10 16`	SP `40 20 0`	0 `60 30 48`	@ `100 40 0 64`	P `120 50 16 80`	` `140 60 0 96`	p `160 70 16 112`
0 0 0 1	SOH `1 1 1` GTL	DC1 `21 11 17` LLO	! `41 21 1 33`	1 `61 31 17 49`	A `101 41 1 65`	Q `121 51 17 81`	a `141 61 1 97`	q `161 71 17 113`
0 0 1 0	STX `2 2 2`	DC2 `22 12 18`	" `42 22 2 34`	2 `62 32 18 50`	B `102 42 2 66`	R `122 52 18 82`	b `142 62 2 98`	r `162 72 18 114`
0 0 1 1	ETX `3 3 3`	DC3 `23 13 19`	# `43 23 3 35`	3 `63 33 19 51`	C `103 43 3 67`	S `123 53 19 83`	c `143 63 3 99`	s `163 73 19 115`
0 1 0 0	EOT `4 4 4` SDC	DC4 `24 14 20` DCL	$ `44 24 4 36`	4 `64 34 20 52`	D `104 44 4 68`	T `124 54 20 84`	d `144 64 4 100`	t `164 74 20 116`
0 1 0 1	ENQ `5 5 5` PPC	NAK `25 15 21` PPU	% `45 25 5 37`	5 `65 35 21 53`	E `105 45 5 69`	U `125 55 21 85`	e `145 65 5 101`	u `165 75 21 117`
0 1 1 0	ACK `6 6 6`	SYN `26 16 22`	& `46 26 6 38`	6 `66 36 22 54`	F `106 46 6 70`	V `126 56 22 86`	f `146 66 6 102`	v `166 76 22 118`
0 1 1 1	BEL `7 7 7`	ETB `27 17 23`	' `47 27 7 39`	7 `67 37 23 55`	G `107 47 7 71`	W `127 57 23 87`	g `147 67 7 103`	w `167 77 23 119`
1 0 0 0	BS `10 8 8` GET	CAN `30 18 24` SPE	(`50 28 8 40`	8 `70 38 24 56`	H `110 48 8 72`	X `130 58 24 88`	h `150 68 8 104`	x `170 78 24 120`
1 0 0 1	HT `11 9 9` TCT	EM `31 19 25` SPD	) `51 29 9 41`	9 `71 39 25 57`	I `111 49 9 73`	Y `131 59 25 89`	i `151 69 9 105`	y `171 79 25 121`
1 0 1 0	LF `12 A 10`	SUB `32 1A 26`	* `52 2A 10 42`	: `72 3A 26 58`	J `112 4A 10 74`	Z `132 5A 26 90`	j `152 6A 10 106`	z `172 7A 26 122`
1 0 1 1	VT `13 B 11`	ESC `33 1B 27`	+ `53 2B 11 43`	; `73 3B 27 59`	K `113 4B 11 75`	[`133 5B 27 91`	k `153 6B 11 107`	{ `173 7B 27 123`
1 1 0 0	FF `14 C 12`	FS `34 1C 28`	, `54 2C 12 44`	< `74 3C 28 60`	L `114 4C 12 76`	\ `134 5C 28 92`	l `154 6C 12 108`		`174 7C 28 124`
1 1 0 1	CR `15 D 13`	GS `35 1D 29`	- `55 2D 13 45`	= `75 3D 29 61`	M `115 4D 13 77`	] `135 5D 29 93`	m `155 6D 13 109`	} `175 7D 29 125`
1 1 1 0	SO `16 E 14`	RS `36 1E 30`	. `56 2E 14 46`	> `76 3E 30 62`	N `116 4E 14 78`	^ `136 5E 30 94`	n `156 6E 14 110`	~ `176 7E 30 126`
1 1 1 1	SI `17 F 15`	US `37 1F 31`	/ `57 2F 15 47`	? `77 3F 31 63` UNL	O `117 4F 15 79`	_ `137 5F 31 95` UNT	o `157 6F 15 111`	DEL (RUBOUT) `177 7F 31 127`
	ADDRESSED COMMANDS	UNIVERSAL COMMANDS	LISTEN ADDRESSES		TALK ADDRESSES		SECONDARY ADDRESSES OR COMMANDS (PPE) (PPD)	

KEY

octal `25` PPU   GPIB code
NAK   ASCII character
hex `15`   `21`   decimal

* on some keyboards or systems

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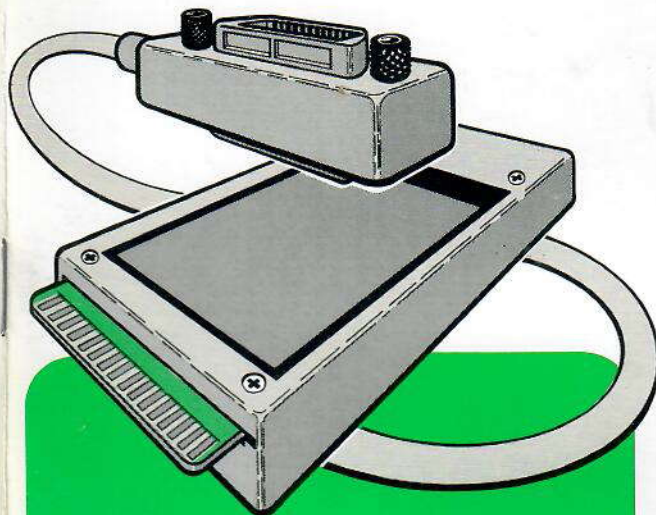
4050R14

GPIB ENHANCEMENT ROM PACK

REFERENCE GUIDE

ABOUT THIS GUIDE

This reference guide summarizes the extensions to 4050 Series BASIC provided by the 4051R14, 4052R14, and 4052R14 Option 1A GPIB Enhancement ROM Packs.

A cross-reference listing of routines by functional groups is provided.

The Routine Summary contains user information for each routine:

- The descriptive form of the routine and any parameters (omitted if same as example)

- The purpose of the routine

- A brief example of the routine

The routines are arranged in alphabetical order in this summary.

Refer to the Instruction Manual for complete information on the routines.

NOTE

Some routines have two versions. Version 1 routines are found in 4051R14 and 4052R14 ROM Packs. Version 2 routines are found in 4052R14 Option 1A ROM Packs only.

Refer to the Instruction Manual for syntax symbols and rules for address arrays, address lists, and error lists.

FUNCTIONAL CROSS-REFERENCE OF ROUTINES

GPIB Polling Routines

These routines enhance the 4050 Series GPIB polling capabilities.

SRQ Interrupts
SRQOFF
SRQON

Serial Poll
CONFIG
POLL

Parallel Poll
PPD
PPE
PPOLL
PPU

Standard Instrument Error Message Decoding
ERRHLP
STBHLP

Arrays
ARSIZE
UNDEF

GPIB Mnemonics Routines

These routines allow the use of "CALL" statements for standard GPIB interface messages.

DCL
GET
GTL
IFC
LISTEN
LLO

LOCS
RWLS
SDC
TALK
UNL
UNT

General Purpose Routines

The routines allow the user additional GPIB programming capabilities.

BININ
BINOUT
DECHEX
HEXDEC
LAST
MTPACK[1]
NEWTAP
PRISTR
RBIN

THEADER
TNAME
VARCLR
VARSET
VARTST
VLIST
WAIT[1]
WBIN

[1] 4051 ROM Pack only. These routines are internally implemented in the 4052 and 4054.

Error Handling

The following four 4052R14 Option 1A routines enhance error handling in 4052A/4054A Graphic Computing Systems:

ERRLIST
ASKERR
CLRREP
RETRY

String Input

The following three 4052R14 Option 1A routines aid in the duplication of ASCII data or program files on 4052A/4054A Graphic Computing System's internal mag tape units:

TAPEIN
TAPEAPP
TRIM

ROUTINE SUMMARY

CALL "ARSIZE",variable name,target for row dimension,target for column dimension

Returns the currently dimensioned size of an array.

100 CALL "ARSIZE",A,B,C

CALL "ASKERR",error index,repetition count
or
CALL "ASKERR",target for error message

4052R14 Option 1A ROM Pack only. Supplies information on which error caused a trap and the number of times the error has occurred on a consecutive basis.

100 CALL "ASKERR",Err,Rep
110 CALL "ASKERR",A$

CALL "BININ",input mode,target for data,target for error code;talk address

Inputs binary block data from a device on the bus.

100 CALL "BININ","UNPK",Q,E;5

CALL"BINOUT",output mode,source of data for block,target for error code; listen addresses

Sends data in binary block format from the 4050 Series System to devices on the bus.

100 CALL "BINOUT","UNPK",Q,E;5,3;11;24

CALL "CLRREP"

4052R14 Option 1A ROM Pack only. Sets the error or timeout repetition counter to zero (0).

100 CALL "CLRREP"

CALL "CONFIG",timeout,target for error code;target for device addresses

Determines the active devices on the bus and returns these addresses in the array specified as an argument.

100 DIM A(15)
110 REM CONFIGURE FOR PRIMARY ADDRESS ONLY
120 CALL "CONFIG",5,E;A
130 IF E THEN 500

CAL "DCL"

Clears all devices on the bus.

100 CALL "DCL"

CALL "DECHEX",decimal value,target for HEX representation

Converts the decimal value of an expression to its equivalent in ASCII HEX.

100 CALL "DECHEX",278,H$

CALL "ERRHLP",numeric expression,string variable

Returns information about the Tektronix Codes and Formats error codes.

200 CALL "ERRHLP",E,E$
210 IF E$< >" "THEN 250
220 REM EVENT NOT FOUND IN TABLE
250 PRINT E$

Refer to the Instruction Manual for error codes and ASCII information.

CALL "ERRLIST",error list

4052R14 Option 1A ROM Pack only. Enables specified errors or timeouts to be trapped and handled by a user's ON SIZE or ON TIMEOUT trap handling routines.

100 CALL "ERRLIST",3,5,Elist,18;23

CALL "GET";address(es)

Sends Group Execute Trigger to devices at addresses listed.

100 CALL "GET";2;8;13,4

CALL "GTL";address(es)

Returns devices specified in the address list to either Local State (LOCS) or Local With Lockout State (LWLS).

100 REM DEVICES AT ADDRESSES 3,5,7 ARE SET
110 REM TO LOCAL.
120 CALL "GTL";3;5;7

CALL "HEXDEC",HEX representation,target for decimal value

Converts an ASCII HEX number representation to decimal.

100 CALL "HEXDEC","F078",T

CALL "IFC"

Pulses the GPIB IFC line to clear the GPIB interface.

100 CALL "IFC"

CALL "LAST",target for file number or header

Finds and returns the file number or header of the last file on the tape.

100 CALL "LAST",X
200 CALL "LAST",H$
300 CALL "LAST"

CALL "LISTEN";address(es)

Makes the devices specified in the address list into listeners.

100 CALL "LISTEN";5;27

CALL "LLO"

Puts all instruments on the bus into either Local With Lockout State (LWLS) or Remote With Lockout State (RWLS).

100 CALL "LLO"

CALL "LOCS"

Puts all devices in the LOCAL state.

100 CALL "LOCS"

CALL "MTPACK"

Winds and rewinds the tape to correct poor tape spooling that may occur.

100 CALL "MTPACK"

CALL "NEWTAP",target for cartridge status

Version 1. Finds the present file location and returns the tape cartridge status in a numeric code.

100 CALL "NEWTAP",A

CALL "NEWTAP",target for cartridge status,target for write protect status

Version 2. Positions the tape at the beginning of the present file (current position) and returns the tape cartridge status and write protect status as numeric codes.

Cartridge Status

0 — no tape inserted
1 — tape inserted, not first tape operation
2 — tape inserted, first tape operation

Write Protect Status

0 — enabled for writing
1 — write protected

100 CALL "NEWTAP",C,W

CALL "POLL",timeout,target for device identifier,target for status byte;address(es)

Used to serial poll the devices specified in the address list.

100 DIM A(15)
110 CALL "CONFIG",E;A
120 ON SRQ THEN 500
130 CALL "SRQON"
200 REM MAIN PROGRAM
500 REM SRQ INTERRUPT HANDLER
510 CALL "POLL",5,I,S;A
520 REM SERVICE INTERRUPT
700 RETURN

CALL "PPD";address(es)

Unconfigures selected devices.

200 CALL "PPD";3;7

CALL "PPE",sense of parallel poll response,line on which device responds;address(es)

Configures the devices that are to respond to a parallel poll.

200 CALL "PPE",1,7;3;16;23

CALL "PPOLL",target variable for parallel poll response

Performs a parallel poll of the devices previously configured.

100 CALL "PPOLL",A

CALL "PPU"

Unconfigures all devices.

100 CALL "PPU"

CALL "PRISTR",string to be output;address(es)

Outputs a string to the GPIB interface without EOI being transmitted with the last byte.

100 CALL "PRISTR","LLST";5
110 CALL "BINOUT",Q,E;5

CALL "RBIN",output mode,target for data,target for error code;talk address

Inputs binary data from a device on the bus.

300 CALL "RBIN","PACK,UNSI",Q,E;1

CALL "RETRY"

4052R14 Option 1A ROM Pack only. Returns program control from an error handler back to the line in which the error occurred.

100 CALL "RETRY"

CALL "RWLS";address(es)

Puts the devices specified in the address list into the Remote With Lockout State (RWLS).

200 CALL "RWLS";1;4

CALL "SDC";address(es)

Clears the devices specified in the address list.

100 CALL "SDC";2;16;25

CALL "SRQOFF"

Disables 4050 Series System Controller response to SRQ interrupts. See Instruction Manual for differences between Versions 1 and 2.

100 CALL "SRQOFF"

CALL "SRQON"

Enables recognition of SRQ interrupts by the 4050 Series System. See Instruction Manual for differences between Versions 1 and 2.

100 ON SRQ THEN 200
110 CALL "SRQON"

CALL "STBHLP",status byte,target for ASCII information

Returns ASCII information about the Codes and Formats standard status bytes obtained from a serial poll.

100 CALL "STBHLP",97,S$

Refer to the Instruction Manual for status byte and ASCII information.

CALL "TALK";talk address

Makes a talker of the device at the specified address.

200 CALL "TALK";5

CALL "TAPEAPP",target for mag tape file

4052R14 Option 1A ROM Pack only. Inputs and appends an entire ASCII file, using the internal mag tape, to the string in the specified string variable.

100 FIND 1
110 CALL "TAPEAPP",A$

CALL "TAPEIN",target for mag tape file

4052R14 Option 1A ROM Pack only. Inputs an entire ASCII file into a character string using the internal mag tape unit.

100 FIND 1
110 CALL "TAPEIN",A$

CALL "THEADER",target for header or file number

Finds and opens the file where the tape head is currently positioned and returns the file header or number.

100 CALL "THEADER"
200 CALL "THEADER",T$
300 CALL "THEADER",F

CALL "TNAME",file name

Assigns a name to a mag tape file.

100 CALL "TNAME","ROMS"

Refer to the Instruction Manual for error messages.

CALL "TRIM",string to be altered,new length

4052R14 Option 1A ROM Pack only. Changes the current logical length of a string variable without altering or deleting any of the data within the string variable.

100 CALL "TRIM",A$,5

CALL "UNDEF",variable to be tested,target for the result

Determines whether a variable is defined.

91 CALL "UNDEF",A,B
92 IF NOT(B) THEN 200
93 GOTO 100
100 REM INITIALIZING CODE
200 REM MAIN PROGRAM

CALL "UNL"

Unlistens all devices on the bus.

100 CALL "UNL"

CALL "UNT"

Untalks all devices on the bus.

100 CALL "UNT"

CALL "VARCLR",variable to be cleared,bits to clear

Clears the bits specified by the binary value of the second argument in the variable or array specified as the first argument.

100 CALL "VARCLR",A,16

CALL "VARSET",variable to be set,bits to set

Sets the bits specified by the second argument in the variable or array specified as the first argument.

100 REM SET BIT 3 IN THE BINARY VALUE OF A
110 CALL "VARSET",A,8

CALL "VARTST",variable to be tested,bits to be tested,target for test result

Tests the bits specified by the second argument in the value of the first argument.

100 CALL "VARTST",A(7),4,Z
110 IF Z THEN 200

200 REM ROUTINE FOR COMPARISON
500 CALL "VARTST",A,3,Z
510 IF Z = 3 THEN 630
600 J = 693
610 B = 17
620 CALL "VARTST",J,B,M
630 PRINT M

CALL "VLIST"

Version 1. Lists all current BASIC variables and their values on the screen.

100 CALL "VLIST"

CALL "VLIST",target to receive information

Version 2. Lists all the current BASIC variables and their values on the screen or stores them in the string variable.

100 CALL "VLIST" ! list to screen.
110 CALL "VLIST",A$! store in A$.

CALL "WAIT",delay time

Delays the execution of the program by the specified number of seconds.

100 CALL "WAIT",100

CALL "WBIN",output mode,source of data,target for error code;listen address(es)

Sends binary data from the 4050 Series System Controller to devices on the bus.

200 CALL "WBIN","NEOI",A$,E;3;7;14