

# Quick Reference Card

MicroLogix™ 1000 with Hand-Programmer (HHP)

1761-HHP-B30

## The HHPs Functional Areas

The six functional areas of your HHP are shown in the boxes below, along with a description of each area.

<b>Home</b>	Provides important program and controller information.	<b>Menu</b>	Allows you to perform many tasks such as accepting edits, clearing the program, and using the memory module.	<b>Mode</b>	Where you change the mode of the controller.
<b>Program Monitor</b>	From within the program monitor, you can edit, view, and troubleshoot your program.	<b>Data Monitor</b>	You can monitor and edit data values from within this functional area.	<b>Multi-Point</b>	Allows you to create and monitor a unique list of data.

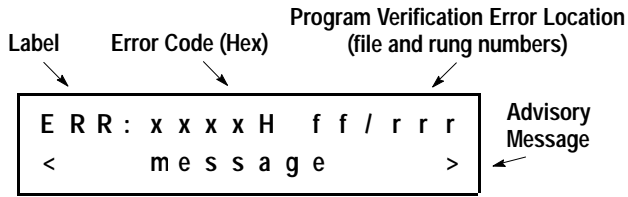
## Moving Between Functional Areas

You can go to this area:	From these areas:	By pressing:
<b>Home</b>	Program Monitor    Data Monitor	<b>ESC</b>
<b>Menu</b>	Home    Program Monitor    Data Monitor    Multi-Point	<b>MENU</b> I
<b>Mode</b>	Home    Program Monitor    Data Monitor    Multi-Point	<b>MODE</b> O
<b>Program Monitor</b>	Home    Program Monitor    Data Monitor    Multi-Point	<b>MON</b> → <b>rung</b> <sup>①</sup> (e.g., 1) → <b>ENT</b>
<b>Data Monitor</b>	Home    Program Monitor    Data Monitor    Multi-Point	<b>MON</b> → <b>address</b> (e.g., I/0) → <b>ENT</b>
<b>Multi-Point</b>	Home    Program Monitor    Data Monitor	<b>MT-PT</b> B
<b>previous functional area</b>	Menu    Mode    Multi-Point	<b>ESC</b>

① To move to a specific rung of a different file, enter the file number first and then the rung number (e.g., 5/1).

# Identifying and Clearing Errors

When the HHP encounters an error in verifying the program or accepting edits, it displays an error message screen as shown here:



If the error code begins with:	then the error type is:	and the recommended action is as follows:
0	Hardware	Disconnect the HHP from the controller, then reconnect it. <sup>①</sup> If the error persists, record the error code and contact your Allen-Bradley office.
1, 5, 6, or F	Communication	
2	Miscellaneous	
3	Program Verification	The recommended actions vary. See the table below.

① For communication codes F00B and F00C, use the HHP to change the controller's mode to RPRG, and try the operation again.

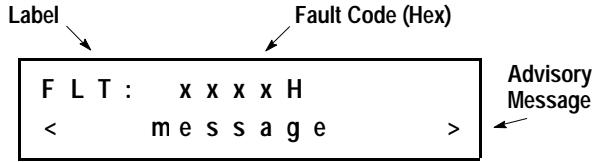
## Program Verification Errors

Code (Hex)	Advisory Message and Recommended Action
3000	MISSING SOR – Add a Start of Rung instruction to the beginning of the rung using the <b>NEW RUNG</b> key.
3001	INVALID INPUT – Change the input instruction immediately after the Start of Rung instruction to a load instruction (e.g., LD, LDI, LD EQU).
3002	MISSING OUTPUT – Add the appropriate output instruction to the end of the rung.
3003	INVALID RUNG – Check that all instructions or instruction blocks have been properly joined to the previous input logic on the rung with ANB or ORB.
3004	INVALID RUNG – An MPP is missing from the rung. Add an MPP at the proper location.
3005	INVALID ORB – Move the ORB to the correct location.
3006	INVALID ANB – Move the ANB to the correct location.
3007	INVALID ORB, OR – Review and rewrite the instruction list logic. Two rungs may be required for this functionality.
3008	INVALID MRD, MPP – Ensure that each MRD and MPP instruction is preceded by an output instruction.
3009	INVALID MRD, MPS – Ensure that the MRD instruction is preceded by an MPS instruction.
300A	INVALID MPP, MPS – Ensure that the MPP instruction is preceded by an MPS instruction.
300B	INVALID LDT – Ensure that the LDT is followed by an OR or ORB instruction on the rung.
300C	INVALID HSC – Change the address of the instruction using the data table address C0 to something other than C0, since an HSC instruction is present in the program.

Code (Hex)	Advisory Message and Recommended Action
300D	INVALID SBR, INT – Move the SBR or INT instruction so it is the first instruction on the first rung of the program file.
300E	INVALID LBL – Move the LBL instruction so it is the first instruction on the rung.
300F	INVALID FOR FILE – Move the SBR, INT, or RET instruction from file 2 to the correct file.
3010	INVALID OSR – Move the OSR instruction to a correct position.
3011	INVALID COMPARE – Change the first operand of the comparison instruction so it is not a constant value.
3012	INVALID ADDRESS – Ensure that the operands for each instruction are within the micro controller's data file space.
3013	INVALID ADDRESS – Ensure that the status file operands for each instruction are within the micro controller's data file space.
3014	BRANCH NEST ERR – Ensure that the program contains no more than 4 nested MPS instructions at a time, as each MPS counts toward a nested branch.
3015	BRANCH LEVEL ERR – Ensure that for each MPS/MPP pair, there are no more than 73 MRDs within them.
3016	TOO MANY INST – Redesign the program file so there are no more than 128 instructions on each rung.
3017	TOO MANY HSC'S – Remove the extra HSC instructions so only one exists in the program, or divide the program so that each HSC instruction is in a separate program.
3018	UNMATCHED MCR'S – Ensure that the program has a starting and an ending MCR instruction.
3019	INVALID MCR – Rearrange the logic so the ending MCR instruction is the only instruction on a rung.
301A	INVALID FILE – The file number specified by a JSR instruction must be changed to specify a program file between 3 and 15.
301B	INVALID RES – An RES instruction resets a timer address previously used by a TOF instructions. Change the RES or TOF address.
301C	INVALID TOF – A TOF instruction specifies a timer address previously reset by an RES instruction. Change the TOF or RES address.
301D	INVALID LBL – The same label number is specified by more than one LBL instruction. Give the LBL instruction a unique label number.
301E	INVALID JMP – Ensure that a valid LBL instruction and label number exist in the program for the JMP instruction.
301F	INVALID ADDRESS – Ensure that the address of the file plus the length does not go beyond the data file for the address specified.
3023	INVALID W/O HSC – The program does not contain an HSC instruction, yet has an OUT instruction with the address of C0/UA. Either change the address of the OUT instruction or add an HSC instruction.
3024	INVALID ADDRESS – Make sure that the bits specific to the HSC operation are from data file address C0. Also, if any other instructions have bit references from data file address C0, change those to a different data file.
3Fxx	INTERNAL ERROR – Contact your Allen-Bradley office.

# Identifying and Clearing Faults

While the controller is running, a fault may occur within the operating system or your program. You can identify a fault by accessing the fault display. Press this key:



To clear a fault you are viewing, press this key:



## Controller Fault Messages

Code (Hex)	Advisory Message and Recommended Action
0001	DEFAULT LOADED 1. Re-save or re-load the program and enter RRUN, RCSN, or RSSN. 2. Contact your Allen-Bradley office if the error persists.
0002	UNEXPECTED RESET 1. Refer to proper grounding guidelines in chapter 2 of publication number 1761-6.2. 2. Contact your Allen-Bradley office if the error persists.
0003	PROG CORRUPTED 1. Try cycling power again. Your program may be valid, but retentive data will be lost. 2. Re-save or re-load the program. 3. Contact your Allen-Bradley office if the error persists.
0004 0005 0008 0009	PROGRAM CHANGED RETENT DATA LOST INTERNAL ERROR INTERNAL ERROR 1. Cycle power on your unit. 2. Re-save or re-load your program and re-initialize any necessary data. 3. Start up your system. 4. Contact your Allen-Bradley office if the error persists.
0010	WRONG PROC REV – If you want to use a micro controller with the program, reconfigure your controller using programming software, or clear the program in the controller with the HHP.
0016	START AFTER P.F. – Either reset bit S1/9 if this is consistent with your application requirements, and change the mode back to RRUN, or clear S1/13, the major fault bit.
0018	INCOMPAT PROGRAM – If you want to use a micro controller with the program, reconfigure your controller using programming software, or clear the program in the controller with the HHP.

Code (Hex)	Advisory Message and Recommended Action
0020	MINOR ERR AT END – Correct the condition that caused the error, then clear the fault using the <b>FAULT - DEL</b> keys and enter RRUN, RCSN, or RSSN.
0022	WATCHDOG TIMEOUT – Verify if the program is caught in a loop and correct the problem, or increase the watchdog timeout value using the program configuration menu selection.
0024	INVALID STI TIME – Set the STI interval between the values of 0 and 255 using the program configuration menu selection.
0025 0027	TOO MANY JSR'S – Correct the user program to meet the requirements and restrictions for the JSR instruction, then re-enter RRUN, RCSN, or RSSN.
002A	INDEX TOO LARGE – Correct the user program to not index beyond file boundaries.
002B	TOO MANY JSR'S – Correct the user program to meet the requirements and restrictions for the JSR instruction, then re-enter RRUN, RCSN, or RSSN.
0030	SUB NEST DEPTH – Correct the user program to meet the requirements and restrictions for the main program file, then re-enter RRUN, RCSN, or RSSN.
0031	UNSUPPORTED INST – Modify the program so that all instructions are supported by the controller, then reload the program and enter RRUN, RCSN, or RSSN.
0032	INVALID SQx LEN – Correct the program to ensure that the length and position parameters do not point past the data file. Then re-enter RRUN, RCSN, or RSSN.
0033	INVALID BSx LEN – Correct the program to ensure that the length parameter does not point past the data file. Reload the program and enter RRUN, RCSN, or RSSN.
0034	INVALID TIMER – If the program is moving values to the accumulator or preset word of a timer, make certain these values are not negative. Correct the program and re-enter RRUN, RCSN, or RSSN.
0035	INVALID FOR FILE – A TND was detected in an interrupt subroutine. Correct the program and re-enter RRUN, RCSN, or RSSN.
0037	INVALID HSC PRE 1. Check to make sure the presets are valid for the HSC. 2. Correct the program and re-enter RRUN, RCSN, or RSSN.
0038	RET IN FILE 2 – Remove the RET instruction in file 2 and re-enter RRUN, RCSN, or RSSN.
0040	OUTPUT VERIFY WR 1. Refer to proper grounding guidelines in chapter 2 of publication number 1761-6.2. 2. Start up your system. 3. Contact your Allen-Bradley office if the error persists.
0041	EXTRA OUTPUT SET 1. Set the Extend I/O Configuration bit using the program configuration menu option, or change your application to <i>prevent</i> these bits from being turned on. 2. Correct the program and re-enter RRUN, RCSN, or RSSN.

# Function Codes

The function codes for the instructions are listed below in alphabetical order.

Mnemonic	HHP Display	FUN Code	Name
ADD	①	80	Add
ANB	①	13	And Block
AND (bit input)	$\neg \uparrow$	22	And
AND (word output)	①	108	And
ANI	$\neg \uparrow \neg$	23	And Inverted
BSL	①	150	Bit Shift Left
BSR	①	151	Bit Shift Right
CLR	①	85	Clear
COP	①	104	File Copy
CTD	①	6	Count Down
CTU	①	5	Count Up
DCD	①	102	Decode 4 to 1 of 16
DDV	①	84	Double Divide
DIV	①	83	Divide
ENC	①	103	Encode 1 of 16 to 4
EQU	AND EQU $\neg$ EQU $\neg$	51	Equal
	LD EQU $\uparrow$ EQU $\neg$	50	
	OR EQU $\downarrow$ EQU $\downarrow$	52	
FFL	①	113	FIFO Load
FFU	①	114	FIFO Unload
FLL	①	105	Fill File
FRD	①	101	Convert from BCD
GEQ	AND GEQ $\neg$ GEQ $\neg$	66	Greater Than or Equal
	LD GEQ $\uparrow$ GEQ $\neg$	65	
	OR GEQ $\downarrow$ GEQ $\downarrow$	67	
GRT	AND GRT $\neg$ GRT $\neg$	63	Greater Than
	LD GRT $\uparrow$ GRT $\neg$	62	
	OR GRT $\downarrow$ GRT $\downarrow$	64	
HSC	①	170	High-Speed Counter
HSD	①	174	High-Speed Counter Interrupt Disable
HSE	①	173	High-Speed Counter Interrupt Enable
HSL	①	171	High-Speed Counter Load
IIM	①	138	Immediate Input with Mask
IIM LD INT	$\uparrow$ INT $\neg$	158	Interrupt Subroutine

Mnemonic	HHP Display	FUN Code	Name
IOM	①	139	Immediate Output with Mask
JMP	①	130	Jump to Label
JSR	①	132	Jump to Subroutine
LBL LD LBL	$\uparrow$ LBL $\neg$	131	Label
LD	$\uparrow$ $\neg$	20	Load
LDI	$\uparrow \neg \neg$	21	Load Inverted
LDT	$\uparrow$ LDT $\neg$	26	Load True
LEQ	AND LEQ $\neg$ LEQ $\neg$	60	Less Than or Equal
	LD LEQ $\uparrow$ LEQ $\neg$	59	
	OR LEQ $\downarrow$ LEQ $\downarrow$	61	
LES	AND LES $\neg$ LES $\neg$	57	Less Than
	LD LES $\uparrow$ LES $\neg$	56	
	OR LES $\downarrow$ LES $\downarrow$	58	
LIM	AND LIM $\neg$ LIM $\neg$	72	Limit Test
	LD LIM $\uparrow$ LIM $\neg$	71	
	OR LIM $\downarrow$ LIM $\downarrow$	73	
LFL	①	115	LIFO Load
LFU	①	116	LIFO Unload
MCR	①	135	Master Control Reset
MEQ	AND MEQ $\neg$ MEQ $\neg$	69	Masked Comparison for Equal
	LD MEQ $\uparrow$ MEQ $\neg$	68	
	OR MEQ $\downarrow$ MEQ $\downarrow$	70	
MOV	①	106	Move
MPP	①	12	Memory Pop
MPS	①	10	Memory Push
MRD	①	11	Memory Read
MSG	①	200	Message
MUL	①	82	Multiply
MVM	①	107	Masked Move
NEG	①	112	Negate
NEQ	AND NEQ $\neg$ NEQ $\neg$	54	Not Equal
	LD NEQ $\uparrow$ NEQ $\neg$	53	
	OR NEQ $\downarrow$ NEQ $\downarrow$	55	

Mnemonic	HHP Display	FUN Code	Name
NOT	①	111	Not
OR (bit input)	$\downarrow \downarrow$	24	Or
OR (word output)	①	109	Or
ORB	①	14	Or Block
ORI	$\downarrow \uparrow \downarrow$	25	Or Inverted
ORT	$\downarrow$ ORT $\downarrow$	27	Or True
OSR	AND OSR $\neg$ OSR $\neg$	29	One-Shot Rising
	LD OSR $\uparrow$ OSR $\neg$	28	
OUT (basic)	$\neg$ ( ) $\neg$	40	Output
OUT (high-speed counter)	①	40	Update High-Speed Counter Accumulator
RAC	①	172	High-Speed Counter Reset Accumulator
RES (timer/counter)	①	7	Reset
RES (high-speed counter)	①	7	High-Speed Counter Reset
RET	①	134	Return from Subroutine
RST	$\neg$ (U) $\neg$	42	Reset
RTO	①	2	Retentive Timer
SBR LD SBR	$\uparrow$ SBR $\neg$	133	Subroutine
SCL	①	87	Scale Data
SET	$\neg$ (L) $\neg$	41	Set
SQC	①	153	Sequencer Compare
SQL	①	154	Sequencer Load
SQO	①	152	Sequencer Output
SQR	①	86	Square Root
STD	①	155	Selectable Timer Interrupt Disable
STE	①	156	Selectable Timer Interrupt Enable
STS	①	157	Selectable Timer Interrupt Start
SUB	①	81	Subtract
SUS	①	137	Suspend
TND	①	136	Temporary End
TOD	①	100	Convert to BCD
TOF	①	1	Timer Off-Delay
TON	①	0	Timer On-Delay
XOR	①	110	Exclusive Or

① Multiple displays.