

HCS-II Firmware Operand ByteCodes

Last Updated 6/15/00

Current to Firmware version 4.01

Green indicates proposed bytecodes for the Statlink in v4.1. The Flexible command section may be moved from 0xA0 to 0xC0 to give the fixed commands some breathing room. We currently have 5 fixed action bytecodes left.

The list below outlines the bytecodes used to control the HCS-II system board. Any compiler written for the HCS-II must use these bytecodes in the order and length specified. This document may not be 100% complete and will be updated as I dive further into how the compiler and XPRESS work. If you have suggestions or updates/corrections, send them to me at baptiste@cc-concepts.com

XPRESS Programs are made up of a variety of command types. The main types are Condition Checks (IF/THEN) and actions which are the commands executed after a THEN or ELSE. There are three types of actions outlined below

Command Type	Bytecode
X-10 Commands	< 0x80
	>= 0x80
Fixed Action	< 0xA0
	>= 0xA0
Flexible Action	< 0xAC

Byte Code	XPRESS Routine	Associated XPRESS Command	Behavior
Program Markers			
These codes outline the structure of the XPRESS Bytecodes			
0x0f0	ifa		IF Always
0x0f1	ifn		IF
0x0f2	elseop		ELSE (if present - goes before 0xFE END)
0x0fc	stopm		End of Math Equation (to right of action assignment)
0x0fd	stop		End of IF Condition Evaluation
0x0fe	last		End of actions in THEN/ELSE
			End of Continuous Section
0x0ef	endcont		Start of Sequential Section
0x0ee	endpgm		End of Program
0x0ff	endtbl		End of Events Offset Table
N/A	domath		Evaluate math expression in an assignment statement

Evaluation Parameters in IF conditions

An IF THEN statement in XPRESS is translated into a number of bytecodes. These bytecodes represent things like math operators, comparison operands, system values (ie ADCs, time, etc), parentheses, etc.

AN IF starts with 0xF1 with eval bytecodes in between, ending with 0xFD and 3 0x00s. The then starts after that with action bytecodes and ends with 0xFE. If an else is encountered, a 0xF2 is inserted with the ELSE action codes BEFORE the 0xFE. AN IF offset table is compiled to point to each IF statement's actions.

0x30	var
0x31	adc
0x32	tmr
0x33	irc
0x34	c8
0x35	c16
0x36	tru
0x37	fls
0x38	rnd
0x39	month
0x3A	day
0x3B	year
0x3C	week
0x3D	hour
0x3E	min
0x3F	sec
0x40	getdig
0x41	getnum
0x42	rings

0x42	img		
0x43	d tone		
0x44	cprog		
0x45	cid new		
0x46	cid mon		
0x47	cid day		
0x48	cid hour		
0x49	cid min		
0x4A	cid area		
0x4B	cid exch		
0x4C	cid num		
0x4D	log size		
0x4E	net byte		
0x4F	acp		
0x50	acf		
0x51	freq		
0x52	total		
0x53	getkey		
0x54	getknum		
0x55		HVACSetPoint(xx)	Current Thermostat Set Point
0x56		HVACFan(xx)	Current Fan Switch Mode
0x57		HVACMode(xx)	Current Thermostat Mode
0x58		HVACStatus(xx)	Current HVAC Operating Status
0x59		HVACTemp(xx)	Current Thermostat Temp Reading

Generic Math and Logic Operators

0x00	noop	Evaluate single operand for True/False
0x01	eq	Check if Operand 1 = Operand 2
0x02	ne	Check if Operand 1 != Operand 2
0x03	gt	Check if Operand 1 > Operand 2
0x04	lt	Check if Operand 1 < Operand 2
0x05	ge	Check if Operand 1 >= Operand 2
0x06	le	Check if Operand 1 <= Operand 2
0x70	oparen	Open Paren
0x71	cparen	Close Paren
0x72	andf	AND Operator
0x73	orf	OR Operator
0x74	notf	NOT Operator
0x75	addf	ADD Operator
0x76	subf	Subtract Operator
0x77	mulf	Multiply Operator
0x78	divf	Divide Operator

Action Command Bytecodes

These are bytecodes included in THEN and ELSE sections of an XPRESS program

X-10 Commands

0x00 - 0x7F

1st Bytecode is the Housecode in ASCII ('A' to 'P' which is 0x41 - 0x50)
 2nd Bytecode is the Module Number in hex (1 - 16 which is 0x01 - 0x10)
 3rd Bytecode is the Function

0x01	All OFF
0x02	All ON
0x03	On
0x04	Off
0x05	Dim
0x06	Bright
0x83	ONA

4th Bytecode is the Repeat Count for Dim & Bright. No range checking means you can send 0-255 (0x00 to 0xFF)

FIXED ACTIONS

0x80 - 0x9E

These routines are fixed in nature. A constant value or resource is assigned. No math equation can be to the right of the =

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0x80	incvar	Inc(variable_id)	Increment a variable
0x81	decvar	Dec(variable_id)	Decrement a variable
0x82	onout		Turn a local output on
0x83	offout	Output(output_num)=	Turn a local output off
0x84	ontmr		Reset and activate a timer
0x85	offtmr	Timer(timer_id)	Turn a timer off
0x86	onnetb		Turn on a network output
0x87	offnetb	NetBit(netbit_id)=	Turn off a network output
0x88	lcdmsg	LCD(net_addr)=""	Send a message/string to LCD-Link
0x89	dio msg	LPT(net_addr)=""	Send a message/string via a DIO-Link like to a printer
0x8A	tvmsg	TV(net_addr)=""	Send a message/string to a TV-Link (NOT a PIC-TV!)
0X8B	rstio	ResetIO	Clear local I/O bits
0X8C	clrvar	ClearVariables	Clear all variables
0X8D	clrtmr	ClearTimers	Clear all timers
0X8E	clrlogm	ClearLog	Clear LOG memory
0X8F	wait	Wait	
0X90	offhk	OffHook	Take phonenumber offhook via HCS-DTMF
0X91	onhk	OnHook	Put phonenumber onhook via HCS-DTMF (hangup)
0X92	dials	DialString("")	Dial digits in string
0X93	diald	DialDigit(variable_id)	Dial single digit stored in a variable. Variable must be between 0-15 correspondign to a given digit
0X94	dialn	DialNumber(variable_id)	Dial 1-4 digits based on variable value of 0-9999
0X95	say	Say=""	Send string to Voice board
0X96	sayw	SayW=""	Send string to Voice board and wait for board to finish speaking string.
0X97	conmsg	Console=""	Send message to HOST console
0X98	setinit	ModemInit=""	Store new init string for modem
0X99	netmsg	Network=""	Send raw network message with checksum
0X9A	clrtot	ClearTotal(aman_addr)	Clear totalizer on an AMAN-Link network module
0x9B	hvacled	HVACLed(stat,led_number)=	Turn a Statnet LED on or Off
0x9C	hvacfan	HVACFan(stat)=AUTO/ON	Set the fan mode of a thermostat to AUTO (0) or ON (1)
0x9D	hvacnet	HVACNet = ""	Send RAW string to HVAC network
0x9E	hvacmode	HVACMode(stat)=	Set the mode of a thermostat to OFF, Heat, Cooling, or Auto (0-3)

FLEXIBLE ACTIONS

0xA0 - 0xAC

These actions are commands which take a byte value and assign them to a given resource. They can have math equations to the right, unlike fixed commands

0xA0	setvr	Variable=	Set a variable to a given value
0xA1	setdaco		Set DAC Output on AMAN-Link
0xA2	setref		Set PL-Link refresh level
0xA3	setmcir		Send IR code via MCIR-Link
0xA4	logdat		Store Log Value to Log memory
0xA5	rcrings		Set number of rings before answering modem
0xA6	cidenb		Turn CID feature On/Off
0xA7	setnetb		Set NetByte on DIO-Link
0xA8	pwm tot		Set PWM Total Period on AMAN-Link
0xA9	pwm hi		Set PWM Hi Period on AMAN-Link
0xAA	bitdir		Set I/O bit direction on AMAN-Link
0xAB	keypto		Set keypad timeout value on AMAN-Link
0xAC	hvacssp	HVACSetPoint(stat) = byte	Set the setpoint of the specified thermostat to a given value