LynX-10 Legacy Protocol Specification
Version 1.01

Marrick Limited LynX-10™ Legacy Protocol Specification
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2.1. INTRODUCTION TO A LynX-10™ SESSION

The computer interface uses ASCII commands to carry out its functions. These commands are outlined below. The basic structure is a letter command such as 'N' for ON, followed by data to determine the house code, address, and type of action (all on, one unit, etc.). For example, if you wanted to turn on unit A4, you would send the ASCII string 'N003'. The controller would respond with an asterisk ('*') when completed, or an 'E' if there was an error followed by a number to further explain the error. All return strings are terminated with an optional “Return String Terminator” (RST). The default RST is the carriage return character (ASCII 0x0D). Here is a typical X-10 session...

```
COMPUTER:       N000    ; Turn on unit A1
CONTROLLER:     *       ; Done... (asterisk is followed by the programmed return string)
COMPUTER:       D705    ; Dim unit A6 to level 7 (mode 0)
CONTROLLER:     *       ; Done...
CONTROLLER:     X004    ; Controller reports X-10 Received (HC=A, Unit 5)
CONTROLLER:     X102    ; Controller reports X-10 Received (HC=A, On)
COMPUTER:       F21     ; Turn off all units, house code B.
CONTROLLER:     *       ; Done...
```

Look at the last command from the computer. It instructed the controller to send an X-10 ALL UNITS OFF command to house code B. There was no need to send the address of the unit since the command applies to all addresses on that house code. This is true of all commands that address more than one unit. RESET ('R') for instance does not require any other byte to reset the controller. If the controller needs more data, the green 'BUSY' LED will stay lit until enough bytes have been received to satisfy the command requested. The first byte is the COMMAND byte, the next byte (if required) is the TYPE byte and is used to further define the action. The next byte is the HOUSE CODE byte (ASCII letters for 0-F HEX) and describes house codes A-P. The last byte (if required) is the ADDRESS byte (0-F HEX) that describes the unit address. The exception for the address byte is when sending raw X-10 commands with the 'X' command (also receiving). If byte following the 'X' is '0', then the last byte is the address. If the byte following the 'X' is a '1', then the last byte is an X-10 command code such as ALL UNITS ON. See the above example. Following is an overview of all the commands and their extensions.

2.2. LynX-10™ PROTOCOL

The LynX-10™ Coprocessor uses a condensed method for addressing and reporting unit codes. Since there are exactly 16 house codes (A-P) and 16 unit codes (1-16), it is convenient to use a hexadecimal equivalent mapping. For those not completely familiar with the hexadecimal number system, refer to Appendix C. Each house code is mapped to a hex number to allow only 1 digit per house code and 1 digit for unit code address.

Commands can take several forms, but most follow these simple rules.

1. All characters sent to the LynX-10 Coprocessor are printable ASCII codes. That is, you can send them to a terminal or printer and see the letter or number. The actual value of the code is quite different. For example, the letter “A” is ASCII code 0x41 in hexadecimal or 65 decimal. The letter “A” in our context stands for 10 decimal. One exception is the carriage return character, used in some commands, and the return string characters returned after an X-10 reception. See MODE register for details on return string terminators (RST).
2. The code structure always begins with a command code. These codes are listed in table 3 along with examples of their structure. For example, to turn on a single unit the command is “N0xy” where “xy” are found in table 1 from the house and unit code of the module you desire to turn on. If you wanted to turn on unit C3, the string of characters would be “N022”
3. Some commands use both the house code and unit code (or key code), and some only use the house code. For commands that activate every unit on a particular house code, such as ALL UNITS ON, only the house code is needed. These commands take a form similar to above, but with one less digit. For example, to turn on all units this house code for house code A, the string would be “N10” where the “1” is ALL UNITS this house code, and the “0” is for house code A from table 2.

2.3. MAPPING X-10 UNITS TO LynX-10™ CODES

To make interfacing to computers easier, a special code system is used for addressing specific units and house codes. In table 1, every possible code that can be set on an X-10 module is mapped to its hexadecimal value used with the LynX-10™ protocol. For example, if you want to address unit E10, you would look up the letter “E” along the left axis, and the number “10” on the top axis of table 1. Where the two columns intersect are the two characters used with the LynX-10™ Coprocessor to address that unit. If a command addresses an entire house code, then table 2 is used. This maps the house code to a single character for the LynX-10 protocol.

2.4. LynX-10™ PROTOCOL LOOKUP TABLES

Table 1 - Unit code to LynX-10™ protocol cross reference

UC / HC	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
A	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
B	10	11	12	13	14	15	16	17	18	19	1A	1B	1C	1D	1E	1F
C	20	21	22	23	24	25	26	27	28	29	2A	2B	2C	2D	2E	2F
D	30	31	32	33	34	35	36	37	38	39	3A	3B	3C	3D	3E	3F
E	40	41	42	43	44	45	46	47	48	49	4A	4B	4C	4D	4E	4F
F	50	51	52	53	54	55	56	57	58	59	5A	5B	5C	5D	5E	5F
G	60	61	62	63	64	65	66	67	68	69	6A	6B	6C	6D	6E	6F
H	70	71	72	73	74	75	76	77	78	79	7A	7B	7C	7D	7E	7F
I	80	81	82	83	84	85	86	87	88	89	8A	8B	8C	8D	8E	8F
J	90	91	92	93	94	95	96	97	98	99	9A	9B	9C	9D	9E	9F
K	A0	A1	A2	A3	A4	A5	A6	A7	A8	A9	AA	AB	AC	AD	AE	AF
L	B0	B1	B2	B3	B4	B5	B6	B7	B8	B9	BA	BB	BC	BD	BE	BF
M	C0	C1	C2	C3	C4	C5	C6	C7	C8	C9	CA	CB	CC	CD	CE	CF
N	D0	D1	D2	D3	D4	D5	D6	D7	D8	D9	DA	DB	DC	DD	DE	DF
O	E0	E1	E2	E3	E4	E5	E6	E7	E8	E9	EA	EB	EC	ED	EE	EF
P	F0	F1	F2	F3	F4	F5	F6	F7	F8	F9	FA	FB	FC	FD	FE	FF

(HC = House code, UC = Unit code -> mapping to 2 ASCII printable characters)

Table 2 - X-10 house codes mapped to LynX-10™ protocol

X-10	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**	**M**	**N**	**O**	**P**
LynX	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F

2.4.1 LynX-10™ Protocol Lookup Table Notes

The programmer should use the tables above to determine the actual characters sent to address a unit within a command. For instance, if the command requires a house code and a unit code such as the ON command “N0”, use table 1 to look up the two characters that follow the “N0” to address the unit. Let’s say we want to address unit M15 for the ON command. We would go to table 1 and find the house code M on the left and the unit number or unit code 15 on the top. Tracing the intersection of these two we would find the two characters “CE” which is a character string representing the hexadecimal value of 0xCE. Therefore, the entire ON command string sent to the coprocessor would be represented by “N0CE”. That’s the letter “N” followed by the number “0” (zero), followed by the letter “C” followed by the letter “E”. If only the house code is required as with the “N1” command, table 2 is used. The house code is on the top, and the corresponding code is on the bottom. For house code H, the character would be the number “7”, so the whole command string would be “N17”.

3.0 COMMAND SUMMARIES

3.1. OFF Command Summary

Cmd	Description	Example / Comments Model ->	102	103	104	105	201
F0*xy*	Turn off single unit *xy* (*xy* from table 1)	"F03F" turns off unit D16	X	X	X	X	
F1*x*	Turn off all lights house code *x* (*x* from table 2)	"F12" turns off all lights on house code C	X	X	X	X	
F2*x*	Turn off all units house code *x* (*x* from table 2)	"F29" turns off all units on house code J	X	X	X	X	
F3	Turn off all lights, all house codes	"F3" turns off all lights on every house code	X	X	X	X	
F4	Turn off all units, all house codes	"F4" turns off all units on every house code	X	X	X	X	
F5 - FF	(Reserved)	Returns error E1					

3.1.1 OFF Command Notes

The OFF commands have several flavors. Since there is a distinction between lights and units, there are OFF commands for each. When addressing a single unit, it is immaterial which it is. But when addressing groups of units, there are commands that affect only the light modules, and some that affect all modules. Marrick Limited has done some experimentation and found that some units will only respond to the ALL UNITS OFF code such as appliance modules and some light modules. These can be addressed individually, but when an ALL LIGHTS OFF command is sent, they do not turn off. Only the ALL UNITS OFF command will turn them off. You may want to experiment with your modules to see how they respond.

3.2 ON Command Summary

Cmd	Description	Example / Comments	102	103	104	105	201
N0*xy*	Turn on single unit *xy* *(light or appliance)* (*xy* from table 1)	"N0F0" turns on unit P1	X	X	X	X	
N1*x*	Turn on all lights this house code (*x* from table 2)	"N15" turns on all lights on house code F	X	X	X	X	
N2	Turn on all lights, all house codes	"N2" turns on all lights on every house code	X	X	X	X	
N3 - NF	(Reserved)	Returns error E1					

3.2.1 ON Command Notes

The "N2" command is very useful for PANIC button implementations. With one command to the LynX-10™ Coprocessor, every unit on every house code in the house (or your neighbor's house!) will turn on. This is a great way to scare an intruder, since it carries this out in about 6 seconds. Light is a great deterrent to intruders, since they usually try hard to avoid identification.

3.3. DIM Commands

3.3.1 DIM Command Summary (MODE 0)

Cmd	Description	Example / Comments Model ->	102	103	104	105	201
D*nxy*	Dims unit *xy* to level *n* (*xy* from table 1, *n* from table 3)	"DB00" Dims unit A1 to level 11	**X**	**X**	**X**	**X**	

3.3.2 DIM Command Summary (MODE 1)

Cmd	Description	Example / Comments Model ->	102	103	104	105	201
D0*xn*	Sends *n* number of DIMs to house code *x* (*x* from table 2, *n* from table 4)	"D035" sends 6 DIMs to house code D	**X**	**X**	**X**	**X**	
D1*xn*	Sends n number of BRIGHTs to house code x (*x* from table 2, *n* from table 4)	"D124" sends 5 BRIGHTs to house code C	**X**	**X**	**X**	**X**	
D2 - DF	(Reserved)	Returns error E1					

	Low								Med							Hi
Level	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
n	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F

Table 3 - Dim levels for DIM command (n for MODE 0 DIM command)

Count	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
n	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F

Table 4 - Number of DIMs or BRIGHTs (n for MODE 1 DIM command)

(Note: In DIM MODE 1, sending a count of 0 sends 1 DIM or BRIGHT command)

3.3.3 DIM Command Notes

The DIM command can run in either of two modes defined by BIT 1 of the MODE register. MODE 0 is the legacy or original mode where an absolute level is specified. MODE 1 sends up to 16 DIMs or BRIGHTs in a row. This is useful for BRIGHT up from DIM.

3.4. X-10 STATUS Command Summary

Cmd	Description	Example / Comments Model ->	102	103	104	105	201
S0*x*	Sends a status OFF command for the unit requested (*x* from table 2) ***note: see text***	"S0F" sends OFF status for house code P unit	**X**	**X**	**X**	**X**	
S1*x*	Sends a status ON command for the unit requested (*x* from table 2) ***note: see text***	"S11" sends ON status for house code B unit	**X**	**X**	**X**	**X**	
S2*xy*	Requests status of unit *xy* (*xy* from table 1) ***note: see text***	"S2CA" requests current status for unit M11	**X**	**X**	**X**	**X**	
S3	Returns internal status of coprocessor	"S3" returns S=xx where xx is the hex status byte	**X**	**X**	**X**	**X**	**X**
S4 – SF	(Reserved)	Returns error E1					

3.4.1 X-10 STATUS Command Notes

These codes were defined by Power House to check the status of individual units. There is only one known unit from them that uses it. This is the model number PR511 outdoor floodlight. This unit will respond with a STATUS OFF or STATUS ON code when addressed and its status requested. Other Marrick Limited products such as our LynX-PORT™ X-10 compatible input/output board uses these status commands.

The S3 command returns the internal status of the LynX-10 Coprocessor. The assignment of the bits for the status byte are shown in the tabke below. The return value is made up of 2 ASCII characters representing the actual byte value of the status byte. For instance, after issuing an "S3", the LynX-10 may return "S=02". The "02" characters represent the binary value of 00000010 which indicates that the line frequency is 50 Hz.

BIT	Description
0	Lost power at TW523 / PSC05 (0=Power OK, 1=Lost power)
1	Power line frequency (0=60Hz, 1=50Hz)
2	EEPROM (0=Missing / not working, 1=Present and working)
3	XOFF Character (0=Not sent, 1=Sent)
4	XON Character (0=Not sent, 1=Sent)
5	(Reserved)
6	(Reserved)
7	(Reserved)

Table 5 – Status byte description

3.5. DIRECT X-10 ACCESS Command Summary

Cmd	Description	Example / Comments Model ->	102	103	104	105	201
X0*xy*	Addresses unit *xy* for next command	"X067" address X-10 unit G8 (*xy* from table 1)	X	X	X	X	X
X1*x***0**	Sends an ALL UNITS OFF	"X1F0" sends ALL UNITS OFF to house code P. (House code *x* from table 2)	X	X	X	X	X
X1*x***1**	Sends ALL LIGHTS ON	"X141" sends ALL LIGHTS ON to house code E. (House code *x* from table 2)	X	X	X	X	X
X1*x***2**	Sends an ON command	"X102" sends ON to house code A (House code *x* from table 2)	X	X	X	X	X
X1*x***3**	Sends an OFF command	"X113" sends OFF to house code B (House code *x* from table 2)	X	X	X	X	X
X1*x***4**	Sends a single DIM command	"X154" sends a DIM to house code F (House code *x* from table 2)	X	X	X	X	X
X1*x***5**	Sends a single BRIGHT command	"X155" sends a BRIGHT to house code F (House code *x* from table 2)	X	X	X	X	X
X1*x***6**	Sends ALL LIGHTS OFF command	"X106" sends ALL LIGHTS OFF to house code A. (House code *x* from table 2)	X	X	X	X	X
X1*x***7**	Sends EXTENDED CODE. ***See text***	"X127" sends EXTENDED CODE to house code C. (House code *x* from table 2)	X	X	X	X	X
X1*x***8**	Sends HAIL REQUEST. ***See text***	"X1B8" sends HAIL REQ to house code L (House code *x* from table 2)	X	X	X	X	X
X1*x***9**	Sends HAIL ACK. ***See text***	"X1B9" sends HAIL ACK from house code L (House code *x* from table 2)	X	X	X	X	X
X1*n***A**	Sends PRESET DIM with MSB of 0 and *n* level (*n* from table 3)	See application note AN-004 for details ***(see text)***	X	X	X	X	X
X1*n***B**	Sends PRESET DIM with MSB of 1 and *n* level (*n* from table 3)	See application note AN-004 for details ***(see text)***	X	X	X	X	X
X1*x***C**	Sends EXTENDED DATA. ***See text***	"X10C" sends EXTENDED DATA to house code A. (House code *x* from table 2)	X	X	X	X	X
X1*x***D**	Sends STATUS ON Cmd. ***See text***	"X15D" sends STATUS ON to house code F (House code *x* from table 2)	X	X	X	X	X
X1*x***E**	Sends STATUS OFF Cmd. ***See text***	"X15E" sends STATUS OFF to house code F (House code *x* from table 2)	X	X	X	X	X
X1*x***F**	Sends STATUS REQUEST. ***See text***	"X12F" requests status from last addressed unit on house code C. (x from table 2)	X	X	X	X	X
X2hu ccdd	Sends extended packet 1. ***See text***	"X2003700" Requests current light level of unit A1 (A1 must support extended coding)				X	
X3hu ccdd	Sends extended packet 2. ***See text***					X	
X4hu ccdd	Sends extended packet 3. ***See text***					X	
X5hu ccdd	Sends extended packet 4. ***See text***					X	
X6-XF	(Reserved)						

3.5.1 Direct X-10 Access Command Notes

The direct access commands allow the programmer to have direct control over X-10 modules and subsystems. This provides the most flexibility, but also requires more attention to detail. Code X0 is used to address units, and can be used to several times in a row on the same house code to address a group of units. The X1 command along with its subcommand is used to tell the unit or units what to do, or to request information from advanced X-10 units. If a group is addressed, only a single command is needed to cause all the units to respond. This is useful when turning on or off several units together. It is also quicker to do so in that the individual commands are not sent. So if seven units are addressed and then a single on command is sent, there will be a net savings of 6 commands or over 2 seconds.

Certain X-10 codes such as HAIL REQUEST or STATUS REQUEST require advanced X-10 modules to operate. Not all modules will respond to these commands. Ask the manufacturer for details on what commands are supported and how they are implemented. There are two commands called EXTENDED CODE and EXTENDED DATA. These commands can be transmitted with the LynX-10 Coprocessor board, but their documented implementation cannot do to the limits of the TW-523 interface module. These codes require a continuous data stream without the normal 3 power line cycle idle periods between them. The TW-523 will not receive these codes. Therefore, only the command itself without the data can be sent. This still can be utilized to activate remote equipment, or to tell a unit the next address it receives is data, not address. This would allow a “nibble” mode of data transfer between LynX-10 subsystems.

3.6 X-10 HAIL Command Summary

Cmd	Description	Example / Comments	102	103	104	105	201
H0	Requests if any other controller is using house code A. ***note: see text***	"H0" requests control of house code A	X	X	X		X
H1	Requests if any other controller is using house code B. ***note: see text***	"H0" requests control of house code B	X	X	X		X
H2	Requests if any other controller is using house code C. ***note: see text***	"H0" requests control of house code C	X	X	X		X
H3	Requests if any other controller is using house code D. ***note: see text***	"H0" requests control of house code D	X	X	X		X
H4	Requests if any other controller is using house code E. ***note: see text***	"H0" requests control of house code E	X	X	X		X
H5	Requests if any other controller is using house code F. ***note: see text***	"H0" requests control of house code F	X	X	X		X
H6	Requests if any other controller is using house code G. ***note: see text***	"H0" requests control of house code G	X	X	X		X
H7	Requests if any other controller is using house code H. ***note: see text***	"H0" requests control of house code H	X	X	X		X
H8	Requests if any other controller is using house code I. ***note: see text***	"H0" requests control of house code I	X	X	X		X
H9	Requests if any other controller is using house code J. ***note: see text***	"H0" requests control of house code J	X	X	X		X
HA	Requests if any other controller is using house code K. ***note: see text***	"H0" requests control of house code K	X	X	X		X
HB	Requests if any other controller is using house code L. ***note: see text***	"H0" requests control of house code L	X	X	X		X
HC	Requests if any other controller is using house code M. ***note: see text***	"H0" requests control of house code M	X	X	X		X
HD	Requests if any other controller is using house code N. ***note: see text***	"H0" requests control of house code N	X	X	X		X
HE	Requests if any other controller is using house code O. ***note: see text***	"H0" requests control of house code O	X	X	X		X
HF	Requests if any other controller is using house code P. ***note: see text***	"H0" requests control of house code P	X	X	X		X

3.6.1 X-10 HAIL Command Notes

The HAIL command was devised by Power House to enable automatic switching of house codes on simple, low module count systems. It was only implemented on a few systems and in general can be used for anything the programmer decides. The intent of the command was to send out a HAIL REQUEST on a house code to see if anyone else (like a neighbor) was using it. If another intelligent controller received the HAIL REQUEST on its house code, it would respond with a HAIL ACKNOWLEDGE. The initiating controller would then try another house code until an unused one could be isolated.

3.7 RESET Command Summary

Cmd	Description	Example / Comments model ->	102	103	104	105	201
R	Resets LynX-10™ Coprocessor	"R" Clears "SINCE RESET" timer (see below). Reloads settings from EEPROM	**X**	**X**	**X**	**X**	**X**

3.8 TIMER REQUEST Command Summary

Cmd	Description	Example / Comments	102	103	104	105	201
T	Request time since LynX-10™ Coprocessor reset. Returned as **DD:HH:MM:SS** where DD is number of days 00-99, HH is hours 00-23, MM is minutes 00-59, and SS is seconds 00-59.	"T" reports time since power line carrier present or reset.	**X**	**X**	**X**		**X**

3.8.1 TIMER REQUEST Command Notes

The timer can be used to determine if the carrier has returned after an E7 (carrier lost) error is received at the host. The timer will always remain at 00:00:00:00 until the power at the TW-523 returns. The programmer can check every several seconds or so to see if this timer has started incrementing again. This would indicate the return of the power at the TW-523 module. Since this is the only command that returns a number first, it can be easily parsed by checking for either a colon (":") or a number without a command identifier such as "X" or "E".

3.9 LynX-10™ MICROCODE VERSION REQUEST Command Summary

Cmd	Description	Example / Comments	102	103	104	105	201
V0	Returns current version number of LynX-10™ Coprocessor's microcode to host in the form Vxxx-xxx where xxx-xxx is the version.	"V0" returns current version to host.	**X**	**X**	**X**	**X**	**X**
V1	Returns copyright of LynX-10™ microcode to host. This is always "Copyright (c) xxxx Marrick Limited, Inc." where xxxx is the year of release.	"V1" returns current date of copyright to host.	**X**	**X**	**X**	**X**	**X**
V2 – VF	(Reserved)	Returns error E1					

Note: Sending carriage return after the "V" returns both the copyright and the version number.

3.10 LynX-10™ STATISTICS COUNTER REQUEST Command Summary

Cmd	Description	Example / Comments	102	103	104	105	201
C00 ↵	Returns value of statistics counter 00 in form C00=xxxx where xxxx is character string representing the HEX value of the count. This counter is for error E0 - X-10 RECEPTION ERRORS. ***NOTE: This counter can be cleared by sending the string "C00=0" to the LynX-10 board***.	"C00" followed by a carriage returns to the host "C00=0045" which would indicate that 0x0045 X-10 reception errors have occurred since the counter was cleared.	**X**	**X**	**X**		**X**
C01↵	Same as above for errors E1 - BAD COMMAND FROM HOST.	(see above example)	**X**	**X**	**X**		**X**
C02↵	Same as above for errors E2 - BAD DATA FROM HOST.	(see above example)	**X**	**X**	**X**		**X**
C03↵	Same as above for errors E3 - X10 COLLISIONS DETECTED.	(see above example)	**X**	**X**	**X**		**X**
C04↵	Same as above for errors E4 - X10 TRANSMISSION FAILURE.	(see above example)	**X**	**X**	**X**		**X**
C05↵	Same as above for errors E5 - X10 LOST RECEPTION.	(see above example)	**X**	**X**	**X**		**X**
C06↵	Same as above for errors E6 - SERIAL RECEIVE BUFFER OVER-RUN.	(see above example)	**X**	**X**	**X**		**X**
C07↵	Same as above for errors E7 - LOST CARRIER (no power at TW-523)	(see above example)	**X**	**X**	**X**		**X**
C08-CFF	(Reserved)	Returns error E2					

3.10.1 STATISTICS COUNTER REQUEST Command Notes

The symbol ↵ represents a carriage return or ASCII 0x0D. Also, all counters can be cleared in the same fashion as C00 shown above. For example, to clear C07, send "C07=0" to the LynX-10™ Coprocessor. Counters C08 through CFF are reserved for future revisions of the microcode and will return an error E2.

3.11 LynX-10™ REGISTER ACCESS Command Summary

Cmd	Description	Example / Comments	102	103	104	105	201
M00↵ or M00=*xx*	MODE REGISTER M00 followed by a carriage return will return to the host the current value of the MODE register. M00=*xx* will set the MODE register to the hexadecimal value represented by the character string *xx*. ***NOTE: See MODE register for details***	The MODE register is used to set the operation of the LynX-10™ Coprocessor. Example: "M00=01" will enable DEBUG mode by setting bit 0 of the MODE register.	**X**	**X**	**X**	**X[1]**	**X**
M01↵ or M01=xx	SERIAL FIFO THRESHOLD M01 followed by a carriage return will return to the host the current value of the SERIAL FIFO THRESHOLD register. M01=*xx* will set the register to the hexadecimal value represented by the character string *xx*. This value can be anything between 01 and 1C.	The threshold is set from the factory at hexadecimal 10 or decimal 16. This puts it at the half way point of the FIFO for best results with 16550 UARTS. "M01=1A" would set it to decimal 26.	**X**	**X**	**X**	**X[1]**	**X**
M02↵ or M02=xx	X-10 RETRANSMISSION ATTEMPTS M02 followed by a carriage return will return to the host the current value of the X-10 RETRANSMISSION ATTEMPT register. M02=*xx* will set the register to the hexadecimal value represented by the character string xx. This value can be anything between 01 and 1C. If an attempt is made to load any other value, the register is automatically adjusted up or down to keep it within these boundaries.	The X-10 retransmission attempt register is used to adjust the number of tries for the X-10 transmission routine after collisions occur. This is set to hexadecimal 10 or decimal 16 from the factory. It can be set anywhere from 00 (no attempts after collision) to FE (254 attempts).	**X**	**X**	**X**	**X[1]**	**X**
M03↵ or M03=xx	COMMAND RECEIVE TIMEOUT M03 followed by a carriage return will return to the host the current value of the TIMEOUT register. M03=xx will set the register to the desired timeout value in seconds. Setting this register to zero (M03=00) will disable this feature. Valid values of xx are 00-FF (0-255).	This function is used to prevent dead locking between a device and the LynX-10. If a command is not completely received by the end of timeout period, the LynX-10 is reset.	**X**	**X**	**X**	**X[1]**	**X**
M04-MFF	(Reserved)	Returns error E2				**X[1]**	

Notes: 1) The LynX-10 PLC uses different locations for these features. Please refer to the LynX-10 PLC model 105 Register Assignment document.

3.11.1 REGISTER ACCESS Command Notes

The symbol ↵ represents a carriage return or ASCII 0x0D. See section 6.1 regarding the functions of each bit in the MODE register. ***Also, be careful when setting the retransmission counter to "FF" (255) which will continue to transmit FOREVER or until the transmission is successful. This will prevent any other command from getting in front of it including the RESET command.***

3.12 LynX-10™ OUTPUT TO PORT Command Summary

Cmd	Description	Example / Comments	102	103	104	105	201
O*nn*=*xx*	Returns the value the of the output port on the LynX-10 device in the form O*nn*=*xx* where *nn* is the character string representing the HEX value of the port number and *xx* is the character string representing the HEX value of the port. **Port FF is reserved for the onboard LEDs (LED6-8). These LEDs are accessed via bits 0-2 respectively. Example: OFF=01 turns on LED6.**	**Note: The user must add additional circuitry in order to decode and use the I/O information from the processor.** See section 5 for more information.	**X**[2]				

3.13 LynX-10™ INPUT FROM PORT Command Summary

Cmd	Description	Example / Comments	102	103	104	105	201
I*nn*	Returns value of the input port *nn* on the LynX-10 device in the form Inn=*xx* where *xx* is character string representing the HEX value of the port pins and nn is the character string representing the HEX value of the port number.	**Note: The user must add additional circuitry in order to decode and use the I/O information from the processor**. See section 5 for more information	**X**[2]				

3.14 LynX-10™ WRITE TO EEPROM Command Summary

Cmd	Description	Example / Comments	102	103	104	105	201
W0	Saves current settings into the EEPROM. This includes the MODE register, the SERIAL FIFO THRESHOLD register, and the X-10 RETRANSMISSION ATTEMPTS register.	"W0" will save all setting for next reset or power-on.	**X**	**X**	**X**		**X**
WF	Restores all factory settings to the LynX-10™ Coprocessor board. This will set the MODE register to 00, and set both the FIFO threshold and the X-10 retransmission attempts to 16 (10 hexadecimal). ***It also will clear ALL statistics counters to 0 and reset the run timer to 0.***	"WF" restores all factory settings and resets the board.	**X**	**X**	**X**		**X**

NOTE: During power-up or reset, all settings are read from the EEPROM (if present) and restored into memory. If a temporary change is made and it is not desired to remain after reset, do not save the settings to the EEPROM.

Notes: 2) Only LynX-10 Model 102A has the I/O (Input / Output) features on the prototype area of the printed circuit board. The original model 102 does not support these commands.

4.0 ERROR CODES

4.1 LynX-10™ COPROCESSOR ERROR CODES : (LEDS)

NOTE: ALL LEDS TURN ON FOR TEST, ALL GO OFF IF HEALTHY, ELSE...

1. ERROR LED ONLY : BAD ACCUMULATOR (FATAL)

2. ERROR & RX LED : BAD REGISTER (FATAL)

3. ERROR & TX LED : BAD MEMORY LOCATION (FATAL)

4.2 LynX-10™ COPROCESSOR HOST ERROR CODES:

NOTE: SENT TO HOST FROM COPROCESSOR

E0 : RECEPTION ERROR (X10)

E1 : BAD COMMAND RECEIVED FROM HOST

E2 : BAD DATA RECEIVED FROM HOST

E3 : X10 COLLISION DETECTED DURING TRANSMISSION

E4 : X10 TRANSMISSION FAILURE (TIME OUT)

E5 : X10 LOST RECEPTION (LOST TX ECHOES FROM TW-523)

E6 : SERIAL COMMUNICATION RX FIFO OVER-RUN

E7 : CARRIER LOST (50/60Hz POWER FAILURE AT TW-523)

NOTE: All error codes map to statistics counters one to one. Example: if an E4 error is received by the host, the statistics counter 04 (C04) will be incremented

