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TELN 1230
LonWorks™ Circuit Breaker Controller
Version B

Reference Manual
February 1997

Techlon Instruments, Inc.
P.O. Box 127
Topton, PA 19562
(610) 682-9764 (610) 682-9765 FAX
E-mail: techlon@enter.net

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TELN 1230

LonWorks™ Circuit Breaker Controller

INTRODUCTION

Techlon's Lonworks Circuit Breaker Controller (TELN 1230) allows you to manage multiple circuit breakers from a single source.

The Circuit Breaker Controller is designed for use Square D's remote controlled circuit breakers (for example QO (B)-115 PL, D 18x1, Series 2).

When used with Techlon's breaker interface strips (TELN1231), one controller can manage nearly a full panel of breakers (40 out of 44). Each TELN 1230 module controls up to five TELN 1231 modules; each TELN 1231 module in turn operates a bank of up to eight breakers. Additionally, the five TELN 1231 modules may be located either in one panel or in as many as five different panels for economy and flexibility.

The unit contains a reset switch, service switch and LED, array fault LED, as well as 32K of programmable read only memory (EEPROM), which permits network downloading of application code. While all functions are available over the network, an optional hand-held terminal provides remote service and auxiliary control and can perform set/reset operations. A fault indicator reveals failures within any block of eight breakers. Individual breakers are represented on the Lonworks network by means of NV_state_input or NV_state_output variables.

An optional real-time clock TELN 1238 capacitor maintains the time of day for up to 3 hours in case of power outage.

Contacts and Service representatives:

Susan Gabel - President

Warranty Information.

Brian Gabel - VP/Director of Engineering

Hardware Problems.

Kevin Miller - Senior Software Engineer

Software Problems.

Call 1-(610) 682-9764 and ask to be connected to your party.

Specifications.

- 16K to 32K ROM (multiple configurations, jumper-selected)

- 32K EEPROM (permits network downloading of application code)
- 4K RAM
- Reset switch, service switch, and "WINK" LED on unit

Dimensions

- 5.75" w x 4.5"h x 1" deep
(1.5" deep with optional on-board real-time clock)

Parts List

TELN 1230 Circuit Breaker Controller				
ITEM	QTY	PART-NAME	REFERENCE DESIGNATOR	DESCRIPTION
1	4	STAND12	S8 S6 S3 S7	PN=PAN-PHIL-M/S-ZNYEL MAN=PMP V=6-32X1/2
2	3	STAND12	S2 S5 S4	PN=3758-B-256-A MAN=RAF
3	1	STAND12	S1	PN=8415 MAN=KEYSTONE
4	1	JUMP3	J7	PN=TSW-103-07-G-S MAN=SAMTEC
5	1	JUMP3	J4	PN=EXC-EMT102BT MAN=PAN
6	3	SSRWTRM2	T3 T4 T5	PN=17-29-12-8 MAN=PHOENIX
7	2	CC1206C	C7 C6	PN=C1206C104Z5UAC MAN=KEMET V=0.1uf TYPE=como
8	11 7 OPT	1N4004	D19 D22 D28 D18 D21 D27 D25 D30 D17 D23 D29	PN=1N4004 MAN=GI
9	1	1N4004	D16	PN=SR105 MAN=DIODES
10	2	P6SMB22A	D6 D3	PN=P6SMB6.8AT3 MAN=MOT V=6.8V TYPE=COMO

11	2	P6SMB22A	D7 D4	PN=P6SMB6.8AT3 MAN=MOT V=6.8V
12	1	ZNR1500	D24	PN=1.5KE33A MAN=DIODES V=33V
13	1	ZNR1500	D20	PN=1.5KE6.8A MAN=DIODES V=6.8
14	1	TXCO8	XTAL1	PN=SG-531P-5.0000MC MAN=EPSON V=5mhz
15	1	TXCO8	XTAL2	PN=SG-531P-1.8432MC MAN=EPSON V=1.8432mhz
16	2	CC3216C	C29 C28	PN=ECS-H1VY104R MAN=PAN V=.1UF
17	8	CC3528C	C16 C5 C12 C13 C25 C14 C33 C15	PN=ECS-H1A106R MAN=PAN V=10uF
18	2	CASE-AA	C32 C31	PN=ECE-A1JFS220 MAN=PAN. V=22uf TYPE=SP
19	1	FUSMICWV	F3	PN=REX030 MAN=RAYCHEM V=.030A
20	1	FUSMICWV	F8	PN=19374-062-K MAN=WICKMANN V=4A
21	6 4 OPT	FUSMICWV	F4 F5 F6 F1 F2 F7	PN=19374-062-K MAN=WICKMANN V=2A
22	7 5 OPT	FUSHOLD	HF1 HF2 HF4 HF5 HF6 HF8 HF7	SPN=19560 SMAN=WICKMANN
22	1	FUSMICWV	F9	PN=RXE-025 MAN=RAYCHEM V=0.25amp

23	2	CC0805C	R16 C8	PN=0805CXXXM5UAC MAN=PAN TYPE=COMO
24	13	CC0805C	C24 C4 C9 C20 C23 C26 C22 C17 C18 C10 C34 C3 C19	PN=0805C104M5UAC MAN=MALLORY V=0.1uf
25	2	CC0805C	C1 C2	PN=0805C101M5UAC MAN=MALLORY V=100pf
26	1	CC0805C	C27	PN=C0805C103M5UAC MAN=MALLORY V=.01uf
27	2	CHOKE1	L1 L2	PN=DD-10.0 MAN=NYTRONICS TYPE=COMO
28	9	SOT23-11	D8 D10 D2 D5 D26 D13 D14 D15 D12	PN=BAV99LT1 MAN=MOT
29	2	SOT23-11	D9 D11	PN=BAV99LT1 MAN=MOT TYPE=COMO
30	5	SOT23-11	D35 D34 D31 D32 D33	PN=BAW56LT1 MAN=MOT
31	2	RSIP08	RP3 RP2	PN=750-81-R150K MAN=CTS V=150K
32	2	MMAD1103	U20 U22	PN=MMAD1103 MAN=MOT
33	1	LED-SMC	D1	PN=LN1451C MAN=PAN
34	1	LED-SMC	D40	PN=LN1251C MAN=PAN
35	1	LED-SMC	D37	PN=LN1351C MAN=PAN
36	2	NC7S32	U14 U13	PN=NC7SZ32M5 MAN=FAIRCHILD
37	2	JUMP2	J2 J5	PN=TSW-102-07-G-S MAN=SAMTEC
38	2	RC07	R19 R8	PN=R25XJ

				MAN=ROHM TYPE=COMO
39	2	SW_KSA_V	SW2 SW1	PN=KSA0V211 MAN=ITT/S
40	2	RC1206C	R11 R9	PN=ERJ-8GEY101 MAN=PAN V=100 TYPE=COMO
41	2	RC1206C	R4 R3	PN=ERJ-8GEYJ220 MAN=ECG V=22
42	4	RC1206C	R22 R23 R24 R25	PN=ERJ-8GEY101 MAN=PAN V=100
43	3	NC7S14	U10 U11 U12	PN=NC7SZ14M5 MAN=FAIRCHILD
44	10	RC0805C	R17 R10 R14 R15 R12 R20 R21 R18 R7 R13	PN=ERJ-6GEYJXXX MAN=ECG TYPE=como
45	1	RC0805C	R6	PN=ERJ-6GEYJ202 MAN=ECG V=2K
46	4	RC0805C	L6 L3 L5 L4	PN=BLM21A121SPB MAN=MURATA TYPE=COMO
47	3	RC0805C	R5 R29 R31	PN=ERJ-6GEYJ152 MAN=ECG V=1.5K
48	1	RC0805C	R26	PN=ERJ-6GEYJ711 MAN=ECG V=710 TYPE=como
49	5	RC0805C	R28 R1 R27 R2 R30	PN=ERJ-6GEYJ473 MAN=ECG V=47K
50	1	RC0805C	R32	PN=ERJ-6GEYJ472 MAN=ECG
				V=4.7k
51	14	RC0805C	R33 R41 R46 R39 R40 R34 R38 R36 R37 R42 R45 R43	PN=ERJ-6GEY105 MAN=PAN V=1M

			R44 R35	
52	1	ELONXFM3	TR1	PN=PE-65948 MAN=PULSE TYPE=COMO
53	1	28256LCC	U7	PN=X28C256J-20 MAN=XICOR
54	2	MURS160T	D38 D36	PN=MURS160P3 MAN=MOT
55	2	CS298	U23 U24	PN=CS-298MV15 MAN=Cherry
56	1	MAX707S	U1	PN=MAX707CSA MAN=MAXIM
57	10 6	RELYTF2E OPT	BL5' BL5 BL4' BL4 BL3' BL3 BL2' BL2 BL1 BL1'	PN=G6H-2FDC24 MAN=OMRON
58	1	PPL15-10	T2	PN=18-03-65-9 MAN=PHOENIX
59	1	SOCK-10	ST2	SPN=18-03-33-8 SMAN=PHOENIX
60	1	09DS_318	J3	PN=09P1 MAN=NORCOMP
61	1	PIN10ST	J1	PN=103308-1 MAN=AMP
62	1	RS402L	BRG1	PN=RS402L MAN=DIODES
63	2	MOV14	M1 M2	PN=ERZ-V14D470 MAN=GE
64	1	PSD312NU	U6	PN=PSD312-A-70V MAN=WSI
65	1	PLCC28	U8	PN=73M255-IH MAN=TDK
66	1	MAX232	U5	PN=MAX232CPE MAN=MAXIM
67	1	IC-SOCK16	SU5	SPN=2-640358-4 SMAN=AMP OPTIONAL

68	1	UCN6810S	U18	PN=A6810SLW MAN=ALLEGRO
69	1	MMAD1109	U21	PN=MMAD1109 MAN=MOT
70	1	MC145051	U17	PN=MC145051DW MAN=MOT
71	1	LTC485	U3	PN=LTC485CN8 MAN=LT TYPE=como
72	1	ICSOCK-08	SU3	SPN=2-640463-3 SMAN=AMP TYPE=como
73	1	156X02ST	J6	JUMPER
74	1	100X14ST	J9	PN=1-640456-4 MAN=AMP
75	1	PLUG14	PJ9	SPN=1-640441-4 SMAN=AMP TYPE=OPTCON
76	1	RSIP08S	RP1	PN=752081473JB MAN=CTS V=47k
77	1	C4094BS	U19	PN=HEF4094BT MAN=PHILLIPS
78	1	LM2675	U16	PN=LM2675M-5.0 MAN=NAT
79	1	ELN5001B	MOD1	PN=50010 MAN=ECHELON TYPE=COMO
80	1	LH1517AT	U4	PN=LH1517AT MAN=ATT TYPE=COMO
81	1	ELONXFM1	TR2	PN=0505-0542 MAN=PRECISION TYPE=COMO
82	1	MC143150	U2	PN=MC143150FU
				MAN=MOT
83	1	78SR105H	U15	PN=PT5101A MAN=POWER TRDS

84	1	IND3316	L7	PN=DO3316P-683 MAN=COILCRAFT
85	1	RSIP10	RP4	PN=750-101-R220K MAN=CTS V=220K
86	1	CAPD7X18	C30	PN=ECEB1HU222 MAN=PAN V=2200uf
87	1	CASE-BB	C35	PN=ECE-A1JGE470 MAN=PAN V=47uf
88	1	CC1812C	C11	PN=O8O5C103M5UAC MAN=MALLORY V=100pf TYPE=COMO
89	1	CC7343C	C21	PN=TPSD107M010R0100 MAN=AVX V=100uf TYPE=SP
90	1	100X12RA	J8	PN=1-640457-2 MAN=AMP SPN=1-640441-2 SMAN=AMP
91	1	PPL15-08	T1	PN=18-03-63-3 MAN=PHOENIX
92	1	SOCK-08	ST1	SPN=18-03-33-2 SMAN=PHOENIX TYPE=OPTCON

AC/DC Power Supply Information

A 24-volt AC or DC, 2-ampere source, can power the system. A source of 20V-28V is required to run the breakers. The logic only requires a 7V source, but the breakers will not switch below 20V.

At idle, the system pulls about 100ma with the clock installed. During breaker function, the system pulls about 1.25 A

In case of power outage, the optional clock will last 3 hours to run the real time clock.

Test Equipment

Techlon Provides:

- TELN 1230 circuit breaker controller module mounted in a NEMA 1 or an optional NEMA 4 enclosure. (Customized mountings are available.)
- On-board real-time clock (TELN1238 - optional)
- Hand-held terminal for remote service and auxiliary control (optional)
- Two Banks of Square-D remote controlled circuit breakers.
- TEST program on MetraVision.

You must supply:

- Power source - 24V AC or DC, 2-ampere source. For example, Square D's 24V AC power supply (occupies 2 breaker slots in the breaker box) or equivalent.

Testing and Operation

Safety Warning

HAZARD OF SEVERE ELECTRICAL SHOCK OR BURN.

Remove power to unit before opening the cover.

Follow the steps as indicated:

Outline

1. The TELN 1230 Circuit Breaker Controller board must be checked both with the hand-held input controller and through MetraVision test program
2. Each breaker must be turned to the ON and Off position.
3. At least one Breaker should be tested for discontinuity feedback.
4. Testing the clock board TELN 1238

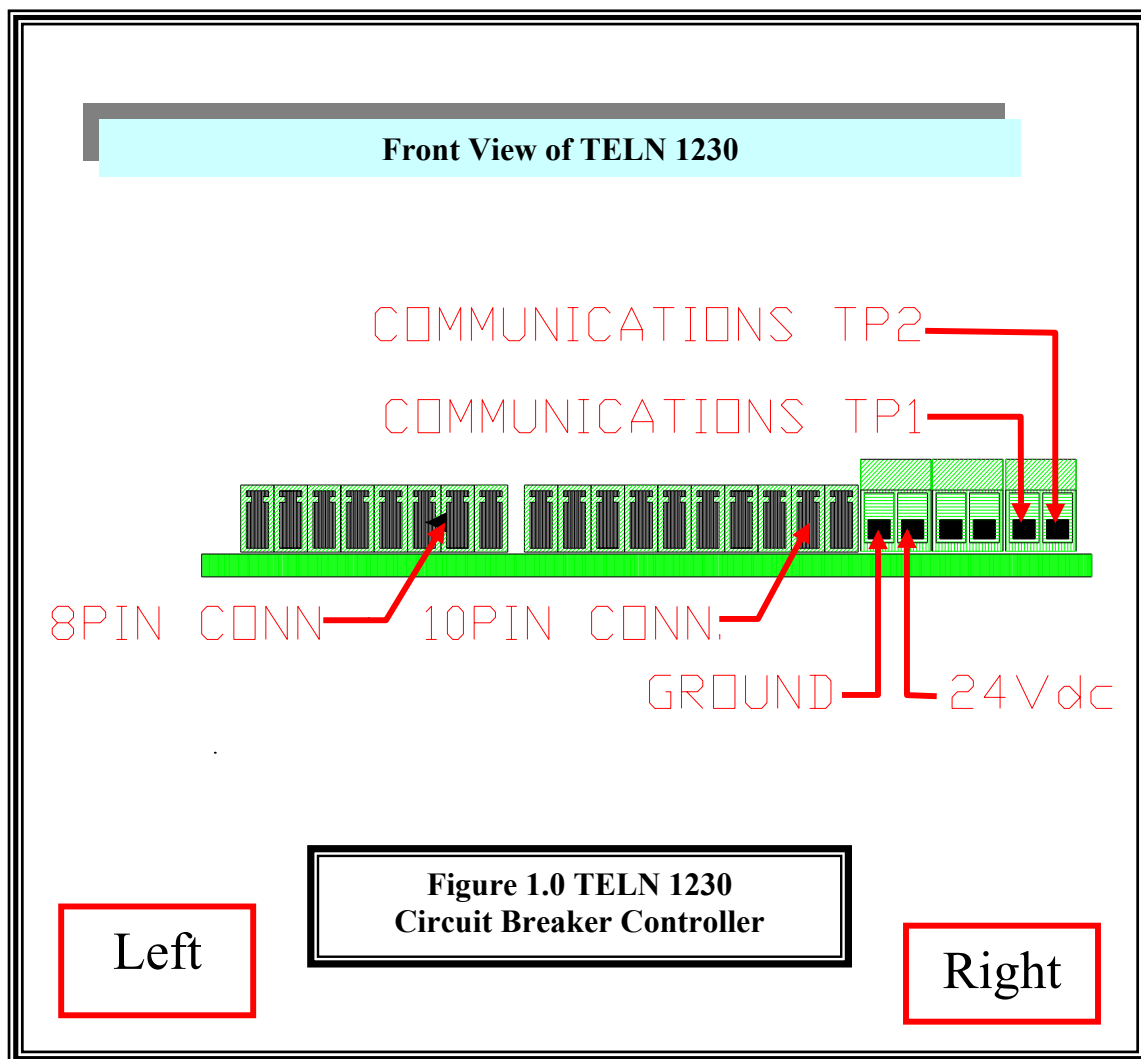
Test Procedure TELN 1230

1. Test for continuity between power and ground. See diagram figure 1.0 for connector locations. If there is continuity then go to trouble shooting.
2. Install TELN 1230 board into tester enclosure. See diagram figure 1.0 for connector locations.
3. Connect cable from Circuit Breaker bakes to tester.
4. Plug in hand-held input controller.

5. Apply power.
6. Go to MetraVision test project called “TELN1230” and choose page “TELN 1230 LOAD”.
7. Follow the instructions to load the TELN 1230 board. If it dose not load please go to trouble shooting.
8. Go to MetraVision test project called “TELN1230” and choose “TELN 1230”.
9. First click on the “Instructions” Button and follow the listed steps.
10. Using the Hand-held input controller test TELN 1230.
11. Press the center key to switch the breakers and the keys to the left and the right to move the breaker number locator. If the breakers do not switch please go to trouble shooting.

Test Procedure TELN 1238

1. To Test the TELN 1238 clock board, plug it into a known good unpowered TELN 1230.
2. Apply power to TELN 1230. The TELN 1238 should light up and flash. If the clock dose not light up please see trouble shooting.
3. With the Hand-held plugged into the TELN 1230 press the “T” key.
4. The Hand-held input controller will display a clock set up. Enter in the hour of 24 hours and press “Enter”. Enter in the minuets using the number keys and then press the key “Enter”.
5. Using the Hand-held input controller Switch the breaker as indicated in the Test Procedure TELN 1230 watching for the corresponding LEDs to light on the clock board. If there is a problem go to trouble shooting.



Note: The Hand-held input controller is plugged into the 9 pin D-sub labeled **Terminal** with a reference designator of “**J3**”

Board Layout

**Please refer to insert Figure 2.0, 2.1 and 2.2
at end of manual.**

Schematic

**Please refer to insert Figure 3.0, 3.1 and 3.2
at end of manual.**

Data Sheets

**Please refer to insert Figure 4.0
at end of manual.**

Test Results

**Please refer to insert Figure 5.0
at end of manual.**

Communication Cable RJ45.

**Please refer to insert Figure 6.0
at end of manual.**

TELN 1402 Test Devices

**Please refer to insert Figure 7.0
at the end of the manual.**

Trouble Shooting

TELN 1230 Circuit Breaker Controller	
Problem:	Suggested Solution:
For all problems concerning the TELN 1230.	<ul style="list-style-type: none"> A. Make sure that all leads are soldered B. Make sure that all caps are in the right direction. C. Make sure the ICs are correct and are on in the right direction.
LED's do not light.	<ul style="list-style-type: none"> 1. No Power to system. A. Cable not in correct place; compare with figure 1.0 for cable placement. B. Power not on; verify with volt meter. C. Power supply insufficient: verify with voltmeter. D. Missing resistors or parts are in backward review sample and schematic. E. Faulty soldering
Breakers do not Switch	<ul style="list-style-type: none"> 1. Neuron unconfigured. Load application. See Testing and Operation for details. 2. Neuron chip applicationless. Load application. See Testing and Operation for details. 3. No power, verify that 24Vdc is going to the TELN 1230 board.
TELN 1238 Clock Board dose not set	<ul style="list-style-type: none"> 1. Wait for 2-3 min. 2. Make sure that the TELN 1238 is properly mounted to the TELN 1230. 3. Missing resistors or parts are in backward review sample and schematic. 4. Faulty soldering.

Figure 2.0

Board Layout

Figure 3.0

Schematic

Figure 4.0

Data Sheets

Figure 5.0

Test Results

Figure 6.0
Communications Cable RJ45

Figure 7.0

TELN 1230 Tester

Network

Though the TELN 1402 may be used as a standalone device, connecting it as a member of an integrated peer to peer network, it will permit all the board's functions to

be used and configured to their maximum benefit. This allows you to read status, check error tables and rebind control devices.

To install the device onto a network:

Module Installation Into The Network

1. Check to make sure that the module's transceiver type is supported by the general network arrangement (i.e., TP/XF-78). If not, a router module may be required.
2. Connect the ground wire to the lug on the board or the stud on the enclosure.
3. Connect the Power and Output wires as depicted in figure. 2.0. This will power the board and connect the loads to the Outputs.
4. Connect the telephone type cable [RJ45] from the Network.
5. With the Network Management tool attached to the Network, INSTALL the node. Click on INSTALL; then, when prompted press the service button [next to the yellow LED] on the TELN 1402 board. At this time the network will be downloading application information to the node and the Yellow service LED will blink for the duration indicating the download is taking place. When the download is completed the LED will turn off. When the process is completed, click the WINK button. This will cause a small LED on the TELN 1402 board to blink for 10 seconds. Do a TEST of the TELN 1402 node (See table 1.0 for more information).
6. This board can now be used for its intended Network application.

Transceiver Support

TELN 1230 Provides support for the following types of transceivers:

- TPT
- 78K TPT
- RS-485
- 78K Free Topology (FTT-10)
- Direct-Connect (up to 90 feet)

When the unit is operational, it checks whether or not a breaker is installed and its ON/OFF State. To monitor the system's status and set breakers the system must either be connected to a network or be equipped with the hand-held terminal.

Refer to Figure 1 for the location of the following switches and LEDs.

1. The Service Switch is used to indicate a network management message identifying the node (the system) to the network.
2. The yellow Service LED indicates the state of the node:
 - ON Application-less (off-line) and unconfigured
 - Flash With application (on-line) but unconfigured, or when board

Information is being downloaded to the network.

OFF On-line and configured

3. The red Fault LED indicates the state of the block voltages:

OFF Block is good

Flash Block has fault. The number of blinks indicates which
Block fuse is bad. Fuse may need to be changed.

4. The Reset switch resets system logic if the board components are out of synch.
5. If the optional real time clock is installed, the 4-digit clock displays the Time of a day. The clock also contains an array of LEDs that show the Error code array block and breaker array that was last selected by the Circuit breaker controller.

Table 1.0 Test Results
Node TELN 1402 Test Results

Name:	Result:	Explanation:
General Information		
Neuron Chip Model:	The model number.	This returns the model number of the neuron chip used on the TELN 1402.
Software Version:	The firmware version number.	This gives a version number for the Neuron firmware code.
Last Error logged:	This gives an Error Condition Code found in Appendix F:	The last error that occurred.
Last Reset Caused:	Either a Network or Hardware reset. A. Power Up. B. Watchdog Time-out. C. External. D. Software.	The reasons that the node reset.
Bypass:	Either: Yes or NO	This refers to the nodes ability to repetitively pass on network messages.
State:	Status of Node. A: On-line B: Off-line C: Unconfigured. D: Applicationless.	The states are defined as. A: On-line means all Normal and activated. B: Off-line means all Normal but not activated. C: Unconfigured means all Normal but configuration variables not set. D. Applicationless could be either a normal or abnormal condition. This means that there is no Application code for the node or the application code is corrupted.
Lost messages:		
Network Layer:	The result will be a number of errors.	The node received a message that it was forced to discard before it was acted upon. The Network buffer was full.
Application layer:	The result will be a number of errors.	The node received a message but was forced to discard before it was acted upon. If the error occurs, the reason could be that there is either inadequate Application buffer space or the node is too busy.
Communications Problem:		
Transmission Errors	The result will be a number of errors.	These errors are due to a bad communications cable connection.
Receive trans. full error:	The result will be a number of errors.	The receive message buffer is full. All messages cannot be received and are consequently lost.
Transaction Time-outs:	The result will be a number of errors.	The time limit set (time needed for a message to be sent and received by the node) has expired.

Appendix F: Trouble Shooting

Problem:	Suggested Solution:
Display dose not come up but network connection is established.	1. The video cable is not plugged in.
	4. The single board computer dose not work. Return TELN 1402 for repairs.
	2. The Flash on the TELN 1402's SBC needs to be reloaded See Appendix E: for service instructions.
Display comes up but the does not talk to the Network	SEE NEXT PROBLEM (Does not talk to Network).
Does not talk to Network.	1. Look to see if communication cables are connected. Connect unconnected cables.
	2. Check to see if board is powered. Power unpowered board.
	3.* Unconfigured. Load application.
	4. Compare communication cables to figure 3.0 if cables are not the same, redo according to schematic.
Board has Power but does not work.	An internal fuse may be blown. You may have an over voltage or too large of a current draw. Verify with a meter.
For all other problem please consult your warranty contract or call the service representatives as listed.	

* Note *

* Using a third party Network management tool to load your Application to Configure the Neuron parameters.