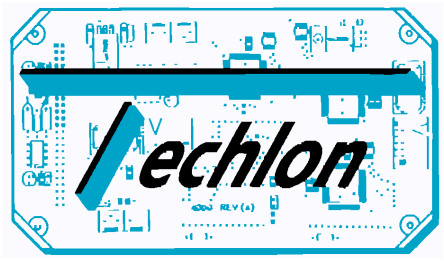

Simple.Sensible.Smart

TELN 1022
2-Channel Output Module
Version 1.0

Users Manual
January 1998

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TELN 1022
2-Channel Output Module

Comment:

TELN 1022
LonWorks™ 2-Channel Output Module

INTRODUCTION

Techlon's 2 Channel FET (field effect transistor) output module (TELN 1022) is designed to supply two separate DC (12 volt) load-monitored source to ground solid state outputs. This FET module is primarily designed to power devices where variable output (PWM) DC control is advantageous, (i.e. light dimming and fans). The module is supported with a reset switch, service switch and service LED, a 15-entry FIFO error array, internal self test, local set-point, and value scaling. (See Figure 1.0) Each output is supported by local load fusing, a manual override button, load state indication, programmable output function, and load current and voltage sensing.

- A number of connector schemes are supported:
- Communication and logic power: dual RJ45 phone or .2" center to center terminal locks.
- Load supply: .3" center to center terminal block, .25" Fastcon spade connection, or AMP INNERGY series PC mount connectors.
- Load output: .3" center to center terminal block, .25" Fastcon spade connector, or AMP INNERGY series PC mount connectors.

The board is mounted on grounding standoffs. There is also a grounding connection to the board, and a chassis ground stud on the outside of the module enclosure.

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.

- 2K Ram
- 512 Byte EEPROM on Neuron Chip for (Network Information).
- 32K EPROM for (application code).
- Voltage: Operating: 8V–18V DC; Max.: 7.5V–33V DC
  Expanded voltage available.
- Two Loads @Max. 10A.
- Max. Power: 120 Watts.
- Operating Temperature: -40° C to +85° C.
- Storage Temperature: -60° C to +100° C.

Dimensions

- Board Dimensions 5.25”w x 3.0” h x 1.2” deep.
- NEMA 1 packaging is supported by a 7.5”w x 4.0” h x 1.75”deep two-part irradiated aluminum chassis, with slots for mounting screws and an external 6-32 stud for chassis grounding.
- Other package and connector configurations available by request.

Transceiver Support

TELN 1022 Provides support for the following types of transceivers:

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

DC Power Supply Information

Module logic power can be drawn from any fused load supply or from the module’s communications cable. ***Note***: Although the communication cable supplies positive and chassis ground voltages for the board logic, you must supply separate load returns (chassis ground) to each load for operation.

Module positive (+)load power is supplied to the node through terminals T0 and T1 (marked +SUP. on the enclosure cover). ***Note***: These two terminals are electrically connected on the board, so that both blocks must be disconnected to remove power from the board.

Equipment

Techlon Provides:

- 1 TELN 1022 2-Channel Output module unmounted or mounted in a NEMA 1 packaging supported by a 7.5”w x 4.0” h x 1.75”deep two-part irradiated aluminum chassis, with slots for mounting screws and an external 6-32 stud for chassis grounding. (Customized mountings are available.).

Must be supplied by customer:

- Power source: 12V DC, 500mA source for logic.
- Power cables.
- Communication cables .

Operation

Safety Warning

HAZARD OF SEVERE ELECTRICAL SHOCK OR BURN.
Remove power to unit before opening the cover.
Replace fuses only with approved automotive types rated for the loads connected to this device.

When the unit is first powered up, Service LED will flash once quickly. After approximately 1 second the board will have completed self tests, and any changes to unit status will be indicated by the module’s LED indicators:

LED	ON	OFF	Flash
Service (yellow) Indicates the state of the module	Application-less (off-line) and unconfigured	On-line and Neuron application and network parameters configured	With application (on-line) but unconfigured. Or, board information is being downloaded to the network
Load (red) Indicates the state of each load	Load is ON	Load is OFF	Load has fault. Fuse may need to be changed.

The Service switch is used to initiate a network management message identifying the module to the network. The Reset switch resets system logic and forces all outputs to their OFF state. There are two manual override switches located behind the load terminals, these switches are used to turn on and off the power to the loads. The switches can be used independent of the Network to verify the working order of the hardware.

- The input network variables are used for controlling the TELN 1022.
- The output network variables are used for status from the TELN 1022.
- The Configuration network variables are used for the configuration of the TELN 1022

The Network Variables can be found in the following appendices.

- Appendix A: has a list of Input Network Variables.
- Appendix B: has a list of Output Network Variables.
- Appendix C: has a list of the Configuration Network Variables.

Board Layout

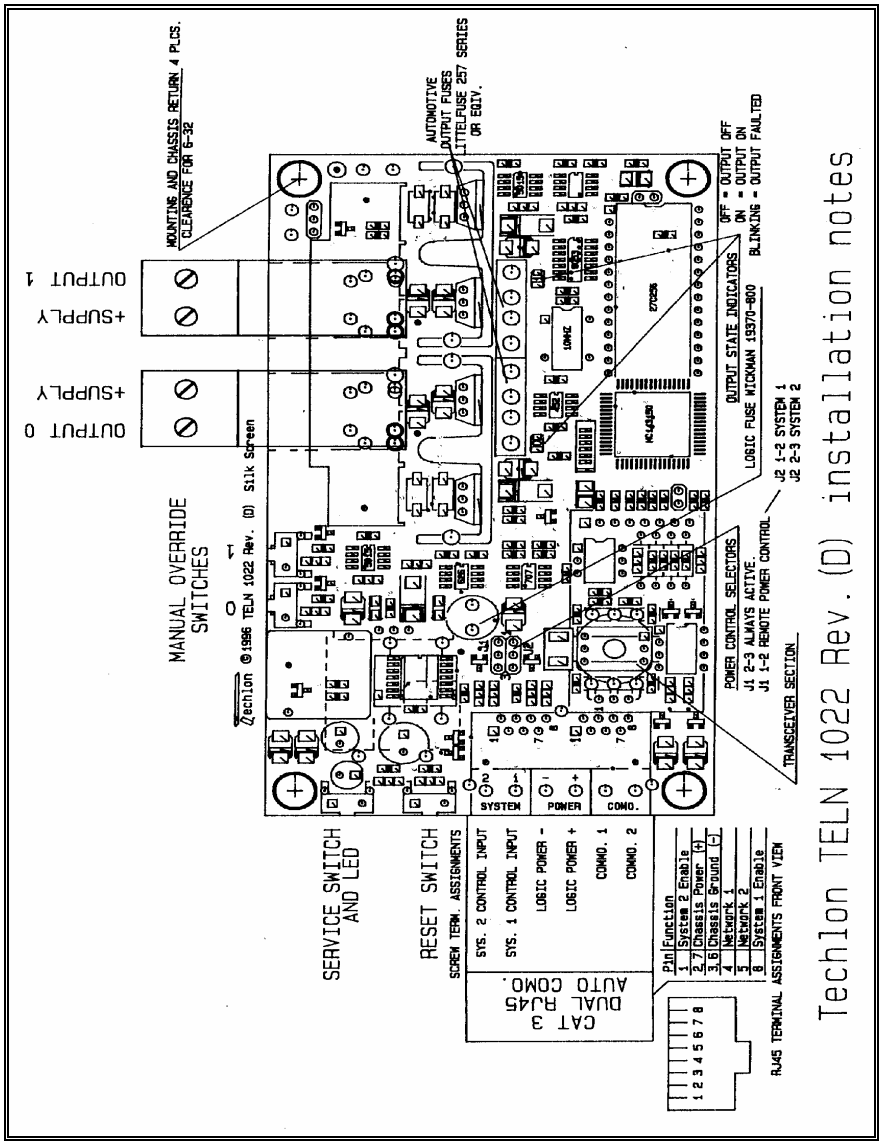

Figure 1.0 TELN 1022 2-Channel Output Module

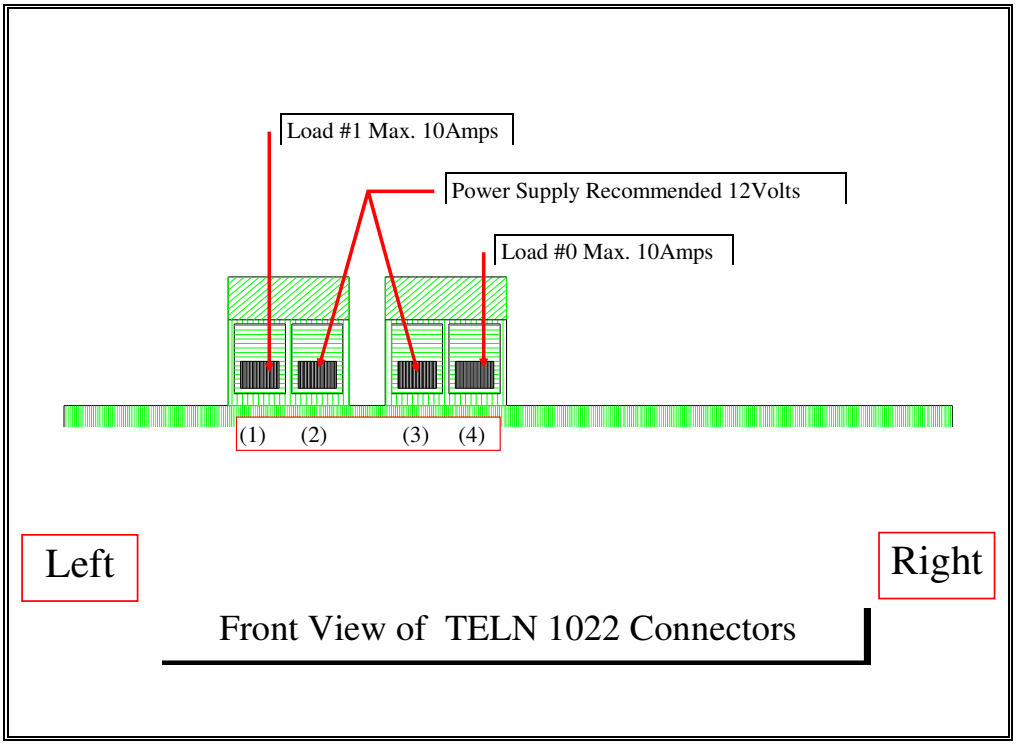

Figure 2.0 TELN 1022 2-Channel Output Module

The TELN 1022 may be connected to 2 loads Warning the MAXIMUM LOAD must not exceed 12V with a 10A draw. If over loaded, the FETs could be damaged. The wire gauge and fuse size should be chosen accordingly to the current draw for each load.

To wire the TELN 1022 2-Channel Output Module, Refer to figure 2.0 for connector locations. Connect wires into connectors as needed following location and descriptions from figure 2.0.

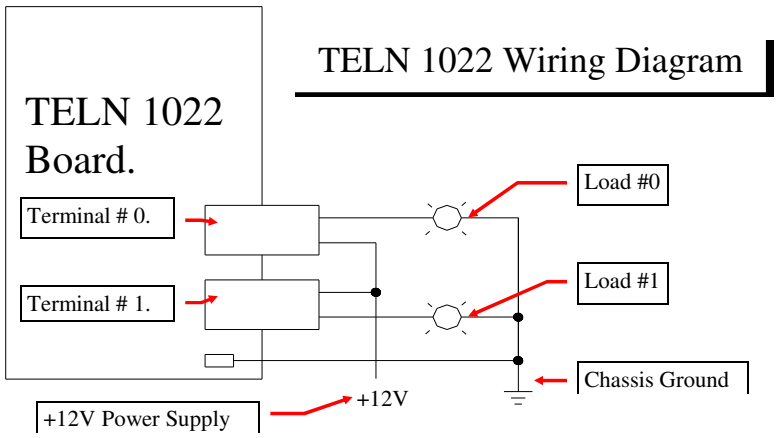

Figure 3.0 TELN 1022 Wiring Diagram

RJ45 Communication Wire Schematic

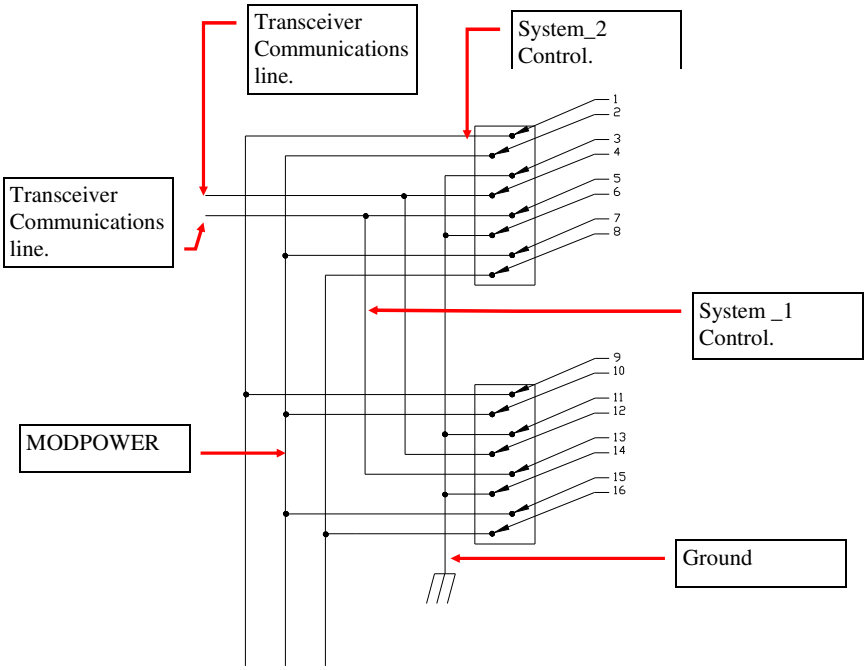

Figure 4.0 RJ45 Com. Connectors

MODPOWER- Secondary Power supply.[Pins 2,7,10,15]
System _1 Control.- Control for alternate power supply of System_1.[Pins 16,8]
System_2 Control.- Control for alternate power supply of System_2. [Pins 9,1]
Ground-System Ground [Pins 11,5,3,7]
Transceiver Communications line(1) -Twisted pair [Pins for TP1 are 12,4]
Transceiver Communications line(2) -Twisted pair [Pins for TP2 are 13,5]

Network

Though the TELN 1022 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 control outputs, read the status, check error tables, calibrate and scale analog values, 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 1022 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 the 2 small load LEDs on the TELN 1022 board to blink for 10 seconds. Do a TEST of the TELN 1022 node (See table 1.0 for more information).

6. Manual override test. Press each manual override button [small push buttons located next to the 2 plug connectors]. The corresponding load will turn on, as well as its load LED [the small LED located behind the heatsink of each load terminal].

7. This board can now be used for its intended Network application.

Table 1.0 Test Results
Node TELN 1022 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 1022.
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 theNode is OK but it does not belong to a network. 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 maybe due to a bad communications cable connection or some other nose.
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.

Input variables are for the following (see Appendix A for functional Input Network Variables and Appendix C for configuration Input Network Variables):

Load level for each channel
Load level for both channels combined
Control sequence of each channel
Various presets for each load
Module “MASTER” input
Module “DISABLE” input
Module “SYNC” input
Configuration and scaling

Output variables are for the following (see Appendix B for Output Network Variables):

Status of each load
Status of both loads combined
Status of module
Sequence pass-through of each load
Supply voltage of module
Applied current and voltage of each load
Error log for module
Diagnostic information for module

Appendix A: Input Network Variables

The module uses the following input network variables. The network variables are ordered alphabetically by variable name, i.e., NI_*name*.

Input Network Variables	Variable Description and Content
NI_dim_all Type: Level Continuous, SNVT_LEV_CON	Determines the dim level for both loads. 0 = Off 100.0 = 100% full On. The dim percentage for both loads 0 and 1. This will be the load level percentage output. If a load receives a full on (100%) condition, it will not affect the present load level.
NI_dim_level[] Type: Level Continuous, SNVT_LEV_CON	Determines the dim level for each load. 0 = Off 100.0 = 100% = full On. The dim percentage for each of the loads. This will be the load level percentage output. If a load receives a full on (100%) condition, it will not affect the present load level. Offset 0 is associated with load 0. Offset 1 is associated with load 1.
NI_disable_ctrl Type: Level Continuous, SNVT_LEV_CON	Disable control input Controls access of all the outputs at once. NI_diable_ctrl is associated with Disable_Control (See network variable NI_control_type). 0= Disable off. Any other value disable On.
NI_dummy[] Type: Level Continuous, SNVT_LEV_CON	Dummy input variable to help in binding.
NI_error_clear Type: Count, Event SNVT_COUNT	Clears the stored error list. Any non-zero value will clear all entries in the error list, including the new error flag (first byte of string).
NI_load_all Type: Level Continuous, SNVT_LEV_CON	Directly sets both outputs. 0 = Off 100.0 = 100% = full On. Condition for both loads 0 and 1. Zero will turn both loads off. any other value will turn both loads on to the percentage indicated.

NI_load_level[] Type: Level Continuous, SNVT_LEV_CON	Directly sets each output. 0 = Off 100.0 = 100% = full On. Condition for each of the loads. Zero will turn the load off. Any other value will turn the load on to the percentage indicated. Offset 0 is associated with load 0. Offset 1 is associated with load 1.
NI_master_ctrl Type: Level Continuous, SNVT_LEV_CON	Master Control Input controls all the outputs at once. NI_master_ctrl is associated with Master_ Control (See network variables NI_control_type). 0= Off. Any other value load On.
NI_seq_in[] Type: Level Continuous, SNVT_LEV_CON	Sets the state of a load for a sequence action. 0 = Off. 100.0 = 100% = full On. For each load's input sequence level. A value of zero will turn off the associated load and start the sequence timer to turn off the next node connection. A non-zero value will turn the associated load on and start the sequence timer to send the sequence level to the next node connection. Offset 0 is associated with load 0. Offset 1 is associated with load 1.
NI_sync Type: Level Continuous, SNVT_LEV_CON	Synchronizes the load outputs of flash controlled loads. The sync signal for the timer used by the flash controlled loads.

Appendix B: Output Network Variables

The module uses the following output network variables they are ordered alphabetically by variable name, i.e., NO_*name*.

Output Network Variables	Subdivisions	Variable Description and Content
NO_ad_reading Type: Int'l char set, SNVT_STR_INT		Shows each a/d reading in raw counts. Each analog's raw reading (a/d counts). These are displayed as word strings. The string contains (starting at word zero). The load current readings. The load voltage readings. The supply voltage. The internal a/d test readings. The offsets 11, 12 and 13.
	wide_char[0]	Channel 0 raw current readings.
	wide_char[1]	Channel 1 raw current readings.
	wide_char[2]	Channel 0 raw voltage readings.
	wide_char[3]	Channel 1 raw voltage readings.
	wide_char[4]	Module raw voltage readings.
	wide_char[11]	A/d half scale reading(512).
	wide_char[12]	A/d zero reading (0).
	wide_char[13]	A/d full scale reading(1024).

NO_all_status Type: Level Continuous, SNVT_LEV_CON		The combination of both loads' status's. Faults take precedents. Status States: 0.0 = **Off** - The load is not energized. 0.5 = **Green** - The load is energized and no load errors indicated. 1.0 = **Red** - The load is not energized and either the load voltage or the fuse voltage was too high. 1.5 = **Yellow** -The load is energized, but either the load voltage or the fuse voltage is low. 2.0 = **Blink Green** - The load is energized with a remote switch and the network. 2.5 = **Blink Red** - The load is not energized, and the current was too high. 3.0 = **Blink Yellow** - The load is energized, but the current was too low. 3.5 = **Flash Green** - The load is energized using either the on-board pushbutton or the manual switch. 4.0 = **Flash Red** - The load is not energized and there was a high voltage error. 4.5 = **Flash Yellow** - The load is energized, but there is an a/d error.
NO_current[] Type: count, SNVT_COUNT_INC		Each load's current reading displayed in engineering units. Offset 0 is associated with load 0. Offset 1 is associated with load 1.
NO_dummy[] Type: Level Continuous, SNVT_LEV_CON		Dummy output variable to help in binding.
NO_error Type: Int'l char set, SNVT_STR_INT		The most recent 15 errors. Offset 0 contains the newest and offset 14 contains the oldest. As an error occurs, the oldest error is dropped, all the rest move down one offset, and the new error is loaded in offset 0. The error values are bit mapped. See Appendix E.
	wide_char[0]	Most recent errors.
	" "	Errors {1} though {13}.
	wide_char[14]	Oldest error.

NO_load_status[] Type: Level Continuous, SNVT_LEV_CON		Determines the status of each load. The state of each of the node's loads is given by the load status states listed in “no_all_status”. Offset 0 is associated with load 0. Offset 1 is associated with load 1.
NO_seq_out[] Type: Level Continuous, SNVT_LEV_CON		Sets the state of the next sequenced output by module. Sends cascade to the next module (~1/4 sec.) of each load’s output sequence level. 0 = Off. 100.0 = 100% full On. After the load's sequence timer expires, the received sequence in level associated with that load, will be sent to the next node connection to control one of that node's loads. Offset 0 is associated with load 0. Offset 1 is associated with load 1.
NO_status Type: Level Continuous, SNVT_LEV_CON		Indicates the board status. combination of each load’s status plus on-board self test. The node's status. this indicates the state of the node. Module Status States. 0.0 = **Off** - Board not energized. 0.5 = **Green** - Board is energized and no errors indicated. 1.0 = **Red** - Any supply voltage error, any high voltage or current error. 1.5 = **Yellow** - An a/d error.
NO_voltage[] Type: count, SNVT_COUNT_INC		Each load's voltage reading displayed in engineering units. Offset 0 is associated with load 0. Offset 1 is associated with load 1.

Appendix C: Configuration Input Network Variables

The module uses the following Configuration network variables. The network variables are ordered alphabetically by variable name, i.e., NI_*name*.

SNVT	Subdivisions	Variable Description and Content
NI_control_type[] Type: Level Continuous, SNVT_LEV_CON		This sets three control functions. A. Master_Control. B. Disable_Control. C. Flash_Control.
	master_control	Controls all Outputs at once. The Master_Control function works in conjunction with NI_master_ctrl. It has three states. 0.0= No effect to NI_master_ctrl. 0.5= Off unconditionally. 1.0= Toggle present effect of NI_master_ctrl.
	Disable_control	Controls disable input effect for each load. The Disable_ Control function works in conjunction with NI_disable_ctrl and NI_load_lev. It has three states. 0.0=No effect. 2.0=Disable Off. 4.0=Disable On.
	Frequance_control	Set frequancy for fet control. Used for emf nose control. 0.0 = 152Hz. 8.0= 305Hz. 16.0= 612Hz 24.0= 1200Hz
	Flash_control	Give Load ability to Flash on and off. It has four states. 0.0 = No effect. 32.0 = 0.5 second on/off continous flash. 64.0 = 1 second on/off continous flash. 96.0 = 2 second on/off continous flash.

The NI_control_type[ ] sets three control variable types as mentioned above.
A. Master_Control
B. Disable_Control
C. Frequency_Control
D. Flash_Control
The Master_Control controls the functions of loads. It controls their ON/OFF state.

The Disable_Control controls the functions of loads. The Disable_Control functions works in conjunction with NI_load_lev and NI_disable_crtl. Disable_Control can disable or enable NI_load_lev functions in conjunction with NI_disable_ctrl and control loads ability to change from an ON/OFF state.
The Frequancy_Control allows output frequancy nose regulation.
The Flash_control allows for a continuous ON?OFF power polsation of 0.5s, 1.0s, and 2.0s when the load is on.
These Control types can be combined. The following is an example of a combination:
1.0= Master_Control ON.
4.0= Disable_Control ON.
16.0= Frequancy_Control for a 305Hz output resonation.
32.0= Flash_control for a 0.5 second ON/OFF continuous flash.
Thus 53.0 is the variable that sets the load to the above mentioned states.

NI_high_setpt Type: Int'l char Set, SNVT_STR_INT		Sets the high set points for each analog channel. Also sets load ramping speeds. This will ramp the load up when turning ON to its stored load_level and ramp the load down when turning OFF. The ramping speeds are in seconds {0,1,2,3,4,5}. The variable is a string. It is used to set the high set points for current and voltage readings. The settings are as follows. 0= disabled. Greater than 0= enabled. 0 to Max. voltage for device by 1/100th of a V. 0 to Max.Current for device by 1/100th of a A. **If these settings are exceeded, the device will shutdown, give an error code and status of Red or Blink Red.**
	wide_char[0]	Set point for current reading on load 0.
	wide_char[1]	Set point for current reading on load 1.
	wide_char[2]	Set point for voltage reading on load 0.
	wide_char[3]	Set point for voltage reading on load 1.
	wide_char[4]	Set point for voltage reading on supply.
	wide_char[13]	Set point of (0,1,2,3,4,5) for ramping offset 0.
	wide_char[14]	Set point of (0,1,2,3,4,5) for ramping offset 1.

NI_low_setpt Type: Int'l char set, SNVT_STR_INT		Sets the low set points for each analog channel. The variable is a string. It is use to set the low set points for current and voltage readings. The setting are as follows. 0= Alarm disabled. Greater than 0= Alarm enabled. 0 to Max. voltage for device by 1/100th of a V. 0 to Max.Current for device by 1/100th of a A. If Voltage lower than set point, a steady yellow status will be indicated. If Current lower than set point, a flashing yellow status will be indicated. **(The output will remain energized.)**
	wide_char[0]	Set point for current reading on load 0.
	wide_char[1]	Set point for current reading on load 1.
	wide_char[2]	Set point for voltage reading on load 0.
	wide_char[3]	Set point for voltage reading on load 1.
	wide_char[4]	Set point for voltage reading on supply.
NI_lock_enable Type:Count,event SNVT_COUNT		This Enables or Disables the ERROR LOAD LOCKING. 0=Lock Disabled. 1=Lock Enabled. If the load is Lock Enabled and a "RED Code" error occurs, then the load will automatically shut off. Default: Lock Enable.
NI_max_on Type: Level Continuous, SNVT_LEV_CON		Sets the maximum PWM level for both of the loads. The range is from 0 to 200, but it is defined as a percent from 0% to 100%. DEFAULT{90%} This is a primary control for PWM. All other variables used to define PWM level will be set to the NI_max_on value if their value exceeds the NI_max_on value.

NI_min_on Type: Level Continuous, SNVT_LEV_CON		Set the minimum PWM level for both of the loads. The range is from 0 to 200. but it is defined as a percent from 0% to 100%. DEFAULT {10%} This is a primary control for PWM All other variables used to define PWM level will be set to the NI_min_on value if their value is less-than the NI-min_on value.
NI_seq_level[] Type:Level Continuous, SNVT_LEV_CON		Determines the level of each sequenced output. This is the load level that will be sequenced out and sent to the next node connection. 0= is associated with load 0. 1= is associated with load 1.
NI_span Type: Int'l char set, SNVT_STR_INT		Sets the maximum setting for each A/D channel (Engineering Units). The span is calculated with the following formula. (RAW A/D count + Present offset)*span/1023 RAW is the digital reading for the A/D. span for Current is 0 to 16.15A. span for Voltage is 0 to 24.00V.
	wide_char[0]	Load 0's current span setting. Default value set at 1615 = 16.15A.
	wide_char[1]	Load 1's current span setting Default value set at 1615 = 16.15A.
	wide_char[2]	Load 0's voltage span setting. Default value set at 2400 = 24.00V.
	wide_char[3]	Load 1's voltage span setting. Default value set at 2400 = 24.00V.
	wide_char[4]	Supply voltage span setting. Default value set at 2400 = 24.00V.
NI_offset Type: Int'l char set, SNVT_STR_INT		Set the offsets for each A/D channel (RAW COUNTS) 0 to 1 for current readings, and 2 to 3 for voltage readings. All self adjusting.
	wide_char[0]	Raw current counts for Load 0.
	wide_char[1]	Raw current counts for Load 1.
	wide_char[2]	Raw voltage counts for Load 0.
	wide_char[3]	Raw voltage counts for Load 1.
	wide_char[4]	Raw voltage counts for Supply.

Appendix D: Master SNVT List

The following is a list of SNVT types used with TELN 1022. SNVT types can be bound only with like SNVT types.

Name	Measurement	Range (Resolution)
SNVT_LEV_CONT	LEVEL, CONTINUOUS	0..100% (0.5%)
SNVT_COUNT	COUNT, EVENT	0..65,535 COUNTS (1 COUNT)
SNVT_CONT_INC	COUNT	-32,768..32,767 COUNT (1 COUNT)
SNVT_STR_INT	INT'L CHAR SET. CHAR SET CODE. 16 BIT CHARS. TERMINATOR.	14 WIDE CHARTERS. 0..255 14 CHAR. 0x0000.

Appendix E: Error Condition Codes

ERROR CONDITION	LOAD 0	LOAD 1
LOW FUSE VOLTAGE	257	513
HIGH FUSE VOLTAGE	258	514
LOW LOAD VOLTAGE	260	516
LOW LOAD AND LOW FUSE VOLTAGE	261	517
LOW LOAD AND HIGH FUSE VOLTAGE	262	518
HIGH LOAD VOLTAGE	264	520
HIGH LOAD AND LOW FUSE VOLTAGE	265	521
HIGH LOAD AND HIGH FUSE VOLTAGE	266	522
LOW CURRENT	272	528
LOW CURRENT AND LOW FUSE VOLTAGE	273	529
LOW CURRENT AND HIGH FUSE VOLTAGE	274	530
LOW CURRENT AND LOW LOAD VOLTAGE	276	532
LOW CURRENT, LOW LOAD AND LOW FUSE VOLTAGE	277	533
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HIGH CURRENT, HIGH LOAD AND LOW FUSE VOLTAGE	297	553
HIGH CURRENT, HIGH LOAD AND HIGH FUSE VOLTAGE	298	554
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STUCK RELAY AND LOW FUSE VOLTAGE	321	577
STUCK RELAY AND HIGH FUSE VOLTAGE	322	578
STUCK RELAY AND LOW LOAD VOLTAGE	324	580
STUCK RELAY, LOW LOAD AND LOW FUSE VOLTAGE	325	581

STUCK RELAY, LOW LOAD AND HIGH FUSE VOLTAGE	326	582
STUCK RELAY AND HIGH LOAD VOLTAGE	328	584
STUCK RELAY, HIGH LOAD AND LOW FUSE VOLTAGE	329	585
STUCK RELAY, HIGH LOAD AND HIGH FUSE VOLTAGE	330	586
STUCK RELAY AND LOW CURRENT	336	592
STUCK RELAY, LOW CURRENT AND LOW FUSE VOLTAGE	337	593
STUCK RELAY, LOW CURRENT AND HIGH FUSE VOLTAGE	338	594
STUCK RELAY, LOW CURRENT AND LOW LOAD VOLTAGE	340	596
STUCK RELAY, LOW CURRENT, LOW LOAD AND LOW FUSE VOLTAGE	341	597
STUCK RELAY, LOW CURRENT, LOW LOAD AND HIGH FUSE VOLTAGE	342	598
STUCK RELAY, LOW CURRENT AND HIGH LOAD VOLTAGE	344	600
STUCK RELAY, LOW CURRENT, HIGH LOAD AND LOW FUSE VOLTAGE	345	601
STUCK RELAY, LOW CURRENT, HIGH LOAD AND HIGH FUSE VOLTAGE	346	602
STUCK RELAY AND HIGH CURRENT	352	608
STUCK RELAY, HIGH CURRENT AND LOW FUSE VOLTAGE	353	609
STUCK RELAY, HIGH CURRENT AND HIGH FUSE VOLTAGE	354	610
STUCK RELAY, HIGH CURRENT AND LOW LOAD VOLTAGE	356	612
STUCK RELAY, HIGH CURRENT, LOW LOAD AND LOW FUSE VOLTAGE	357	613
STUCK RELAY, HIGH CURRENT, LOW LOAD AND HIGH FUSE VOLTAGE	358	614
STUCK RELAY, HIGH CURRENT AND HIGH LOAD VOLTAGE	360	616
STUCK RELAY, HIGH CURRENT, HIGH LOAD AND LOW FUSE VOLTAGE	361	617
STUCK RELAY, HIGH CURRENT, HIGH LOAD AND HIGH FUSE VOLTAGE	362	618

Appendix F: Network Maintenance Neuron Error Codes

no error	0
bad_event	129
nv_length_mismatch	130
nv_msg_too_short	131
eeprom_write_fail	132
bad_address_type	133
preemption_mode_timeout	134
already_preempted	135
sync_nv_update_lost	136
invalid_resp_alloc	137
invalid_domain	138
read_past_end_of_msg	139
write_past_end_of_msg	140
invalid_addr_table_index	141
incomplete_msg	142
nv_update_on_outupt_nv	143
no_msg_avail	144
illegal_send	145
unknown_PDU	146
invalid_nv_index	147
divide_by_zero	148
invalid_appl_error	149
memory_alloc_failure	150
write_past_end_of_net_buffer	151
appl_cs_error	152
cnfg_cs_error	153
invalid_xcvr_reg_addr	154
xcvr_reg_timeout	155
write_past_end_of_appl_buffer	156
io_ not ready	157
self_test_failed	158
subnet_router	159
authentication_mismatch	160
self_inst_semaphore_set	161
read_write_semaphore_set	162
appl_signature_bad	163
router_firmware_version_mismatch	164
EEPROM recovery occured	166
triac clockedge +- not supported	167
checksum error over system	168
state byte semaphore	192-223

Appendix G: Trouble Shooting

Problem:	Suggested Solution:
Load (0)or (1) will not Turn ON.	1. FUSE blown. See figure. 1.0 and check the load to see if less than 10A. Replace Fuse.
	2. No Power to system. A. Cable not in correct place; compare with figure 2.0 for cable placement. B. Power not on; verify with volt meter. C. Power supply insufficient: verify with volt meter.
	3. Load does not work or is not connected. See figure 2.0 for wire locations.
	4.*** Neuron Unconfigured. Load application.
	5.* Neuron chip applicationless. Load application.
Manual Override Switches turn On and Off the loads , but loads controlled over the network do not turn On and Off.	1. Check network binding. 2. Check communication cables.
Network Voltage and Current Reading incorrect.	1.** Need to Load scaling. Load Scaling. Refer to Appendix C: for Network Variable information on NI_SPAN.
	2.* Neuron Applicationless. Load application.
	3. Supply voltage incorrect. Use voltmeter and compare.
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 to Load a new application.

** Using a third party Network management tool Load scaling values for your application.

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