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TELN 1039
Automotive 5 Switch Node
Version 1.0

Users Manual
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TELN 1039

LonWorks™ Automotive 5 Switch Node

INTRODUCTION

Techlon's Automotive 5 Switch Node (TELN 1039) is designed to monitor and indicate 5 Switch status's. This TELN 1039 module supports a 5 key digital keypad. The Automotive 5 Switch Node is particular advantageous in interfacing with other TELN Lonworks devices to provide switching control in (i.e. light dimming, fans, and other lighting control). The module is supported with a reset switch, service switch and service LED, internal self test, local set-point, switch state indication and programmable output function.

A number of connector schemes are supported:

- Communication and logic power: a RJ45 phone or .2" center to center terminal locks.

The board is mounted on grounding standoffs.

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
- 2K EEPROM on Neuron Chip
- Voltage: Operating: 8V–18V DC; Max.: 7.5V–33V DC; Expanded voltage available.
- 5 Switch outputs.
- 5 Switch inputs with status indicators.
- Max. Power: 2 Watt.
- Operating Temperature: -40° C to +85° C
- Storage Temperature: -60° C to +100° C

Dimensions

- Board Dimensions 4.25”w x 2” h x 1.25” deep
- TELN 1039 has a 7.25”w x 3.75” h irradiated aluminum plate, Other package and connector configurations available by request

Transceiver Support

TELN 1039 Provides support for the following types of transceivers:

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

DC Power Supply Information

Module logic power is supplied through the communication cable the supply provides positive and chassis ground voltages for the board logic and additional switch indicator LEDs.

Equipment

Techlon Provides:

- 1 TELN 1039 Automotive 5 Switch node mounted in a 6.75”w x 2.5” h irradiated aluminum plate, (Customized mountings are available.).

Must be supplied by customer:

- Power source: 12V DC, 500mA source for node logic.
- 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 (Two outside indicator LEDs on keypad will light up, Green, for 2 seconds then turn Off.) 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

The Service switch is used to initiate a network management message identifying the module to the network. The input network variables are used for controlling the TELN 1039

- The output network variables are used for status from the TELN 1039
- The Configuration network variables are used for the configuration of the TELN 1039.

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

Installation

To Connect the system to the network:

1. Connect the network and +12V power cable to the Automotive 5 Switch node.
2. Using the provided software 'MetraVision' Enter into test setup for TELN1039.
 - A. DBL Click on Icon TELN1039.
 - B. DBL Click on "REPLACE"
 - C. When the network is ready to receive data press the Service switch.
The Service LED flashes as data is downloaded to the neuron chip. The LED goes out when the transfer is complete.
 - D. DBL Click on "WINK" it will indicate the location of the node.
 - E. DBL Click on "TEST" if transmission errors are more than 200 see "APPENDIX_E". If all is OK then your TELN1039 is installed and ready.

Communications Cable RJ45 Installation.

RJ45 Communication Wire Schematic

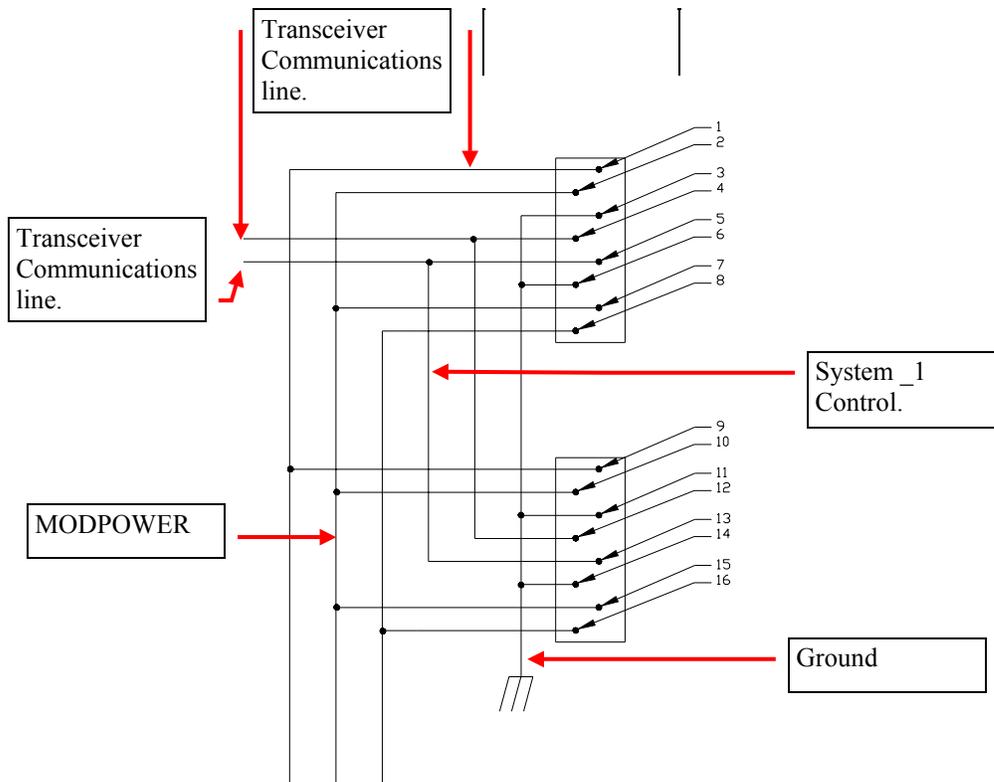


Figure 4.0 RJ45 Com. Connectors

- 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]

Though the TELN 1039 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, 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 telephone type cable [RJ45] from the Network. This will be your network interface and power supply.
4. 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 1039 board. At this time the network will be downloading application information to the node 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 2 indicator LEDs on the keypad provided for TELN 1039 to blink for 10 seconds. Do a TEST of the TELN 1039 node (See table 1.0 for more information).
5. This board can now be used for its intended Network application.

Table 1.0 Test Results

Node TELN 1039 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 1039.
Software Version:	The software version number.	This gives a version number for the application code.
Last Error logged:	This gives an Error Condition Code found in Appendix E:	The Last Error logged.
Last Reset Caused:	Either a Network or Hardware reset. A. Power Up. B. Watchdog Time-out. C. Reset switch. 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.

Network Variables

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

Delay Time for the time delay of a switch action.

Led determines the led state.

Switch Type for various possible switching actions.

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

Status of module.

Switch Status On/Off.

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_led[] Type: Level Continuous, SNVT_LEV_CON	Determines the state of each led. The possible led states. 0.0 = Off – The load is not energized. 0.5 = Green – The load is energized and no load errors indicated. 1.0 = Flash Green – The load is not energized and either the load voltage or the fuse voltage was too high. 1.5 = Flash Green – 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 Green – The load is not energized, and the current was too high. 3.0 = Blink Green – The load is energized, but the current was too low. 3.5 = Flash Green – The load is energized using either the on-board push-button or the manual switch. 4.0 = Flash Green – The load is not energized and there was a high voltage error. 4.5 = Flash Green – The load is energized, but there is an a/d error. Offset 0 is associated with led 1. Offset 1 is associated with led 2. Offset 2 is associated with led 3. Offset 3 is associated with led 4. Offset 4 is associated with led 5.

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_status Type: Level Continuous, SNVT_LEV_CON		Indicates the board status. Module Status States. 0.0 = Off - Board not energized. 0.5 = Green - Board is energized and no errors indicated.
NO_Switch Type: Level Continuous, SNVT_LEV_CON		Indicates the state of each switch's status. 0.0 = 0% Switch off. 100.0= 100% Switch on. Offset 0 is associated with switch 1. Offset 1 is associated with switch 2. Offset 2 is associated with switch 3. Offset 3 is associated with switch 4. Offset 4 is associated with switch 5.

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

SNVT	Variable Description and Content
NI_delay_time[] Type: Count, SNVT_COUNT	Variable delay timers are used for switch types: Delay_off (18-19.5). Four programmable times (seconds) that are used for the key types. Time 1 is used for key types 18. Time 2 is used for key types 18.5. Time 3 is used for key types 19. Time 4 is used for key types 19.5. Range is from 0 to 65535 seconds. Offset 0 is associated with time 1. Offset 1 is associated with time 2. Offset 2 is associated with time 3. Offset 3 is associated with time 4.

<p>NI_switch_type[]</p> <p>Type: Character</p> <p>SNVT_CHAR_ASCII</p>	<p>Switch types configuration declarations:</p> <p>Values in HEX</p> <p>00 = MOMENTARY</p> <p>01 = ALTERNATE</p> <p>05 = STEP_UP</p> <p>06 = STEP_DOWN</p> <p>07 = ALT_CONTROL</p> <p>0C = MOM_TOGGLE</p> <p>1E to 27 = MIN_DELAY_OFF</p> <p>Offset 0 is associated with switch 1.</p> <p>Offset 1 is associated with switch 2.</p> <p>Offset 2 is associated with switch 3.</p> <p>Offset 3 is associated with switch 4.</p> <p>Offset 4 is associated with switch 5.</p> <p>***SWITCH DEFINITIONS***</p> <ol style="list-style-type: none"> 1. MOMENTARY turns on only if switch is held. 2. ALTERNATE turns on when key is pressed and resleased and off when key is pressed and release a second time. Has NETWORK FEDBACK. 3. STEP_UP steps up a load level to 100% by 5% incriments when key is pressed and held pressed. When the key is released the load_level will remain and this will be the stored load_level. If the key is pressed and released a second time the load_level will go to 0 or OFF. When pressed and released a third time the load_level will got to the stored load_level but if pressed and held the load_level will go to 0 or OFF and start to step up again. 4. STEP_DOWN steps down a load_level from 100% by 5% incriments when key is pressed and held pressed. When key is released the load_level will remain and this will be the stored load_level. If the key is pressed and released a second time the load_level will go to 0 or OFF. When pressed and released a third time the load_level will got to the stored load_level but if pressed and held the load_level will go to 100% or FULL_ON and start to step up again. 5. ALT_CONTROL turns on when key is pressed and resleased and off when key is pressed and release a second time. Dose not have NETWORK FEDBACK. 6. MOM_TOGGLE turns on or off a switch if it is held.
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	<p>7. MIN_DELAY_OFF This key type turns off the load after a delay times out. The operation, when the key is pressed and released the load turns on and remains on. When the key is pressed and released a second time the delay timer starts and the key led starts to BLINK when the timer times out the load and key led turn off.</p> <p>A. NI_switch_type[15..17.5] = {1,5,10,30,60,300seconds}</p> <p>B. NI_switch_type[18-19.5] = {prgramable from 0 to 65535 seconds; programable delay setting implemented though NI_delay_time }</p>
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Appendix D: Master SNVT List

The following is a list of SNVT types used with TELN 1039. SNVT types can be bound only with like SNVT types.

Name	Measurement	Range (Resolution)
SNVT LEV CONT	LEVEL, CONTINUOUS	0..100% (0.5%)
SNVT CHAR ASCII	CHARACTER	0..255
SNVT_CONT_INC	COUNT	-32,768..32,767 COUNT (1 COUNT)

Appendix E: Network Maintenance Neuron Error Codes

no error	0
bad_event	129
nv_length_mismatch	130
nv_msg_too_short	131
eeeprom_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_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 F: Trouble Shooting

Problem:	Suggested Solution:
Keypad does not light during self test. Keys do not light when pressed.	1. FUSE blown. See figure. 1.0 and check for shorts to the keypad. The Fuse may need to be replaced
	2. No Power to system. B. Power not on; verify with volt meter. C. Power supply insufficient: verify with volt meter.
	3.*** Neuron Unconfigured. Load Configuration.
	4.* Neuron chip applicationless. Replace Node.
Key pressed but no return status other than a Flashing GREEN.	1. This indicates that the key has been pressed but no return status given. Check to see if bound.
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 configuration.
	4. Compare communication cables to figure 4.0 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.