

GE TLC Data Sheet

Product: RCC4-d -Four Point Lighting Automation Panel With Dimmer and Logging

Product Description

RCC4-d Lighting Automation Panel (LAP) is designed to control four lights with dimmers while collaborating with GE Total Lighting Automation System (TLC) version 2.00. The TLC program runs on Personal Computer and communicates with the controller board via RLINK Gateway and Dataline local area network, monitoring board status, sending requests, as well as downloading Schedules and Programmable System Switches (PSS) information.

The panel controls individual lights through attached relays. Luminosity of lights can be controlled through dimmer outputs. The board controls group of four lights simultaneously in two-state mode – 75-100%. Board with enhanced dimmer option allows gradual dimmer control either for the group of board's four dimmers or for each individual channel. RCC4-d panel also supports manual ON/OFF override for each relay and manual adjustment of dimmer output levels (0-100%) through potentiometers.

As part of TLC system the RCC4-d controller supports up to four System Schedules (marked M, N, O or P) and up to three Programmable System Switches per each light point. The board is also equipped with one local LAP Programmable Master Switch (PMS) input able to switch any group of relays controlled by the Lighting Automation Panels connected to the network.

LAP programs are stored in non-volatile memory thus assuring continuous controller operation after control power interruption to the board. Indicator LEDs constantly display status of power circuitry, voltage of Data Line communications link, and ON/OFF/FAILED status of each individual relay.

Hardware/Software Requirements

a) RLINK Gateway

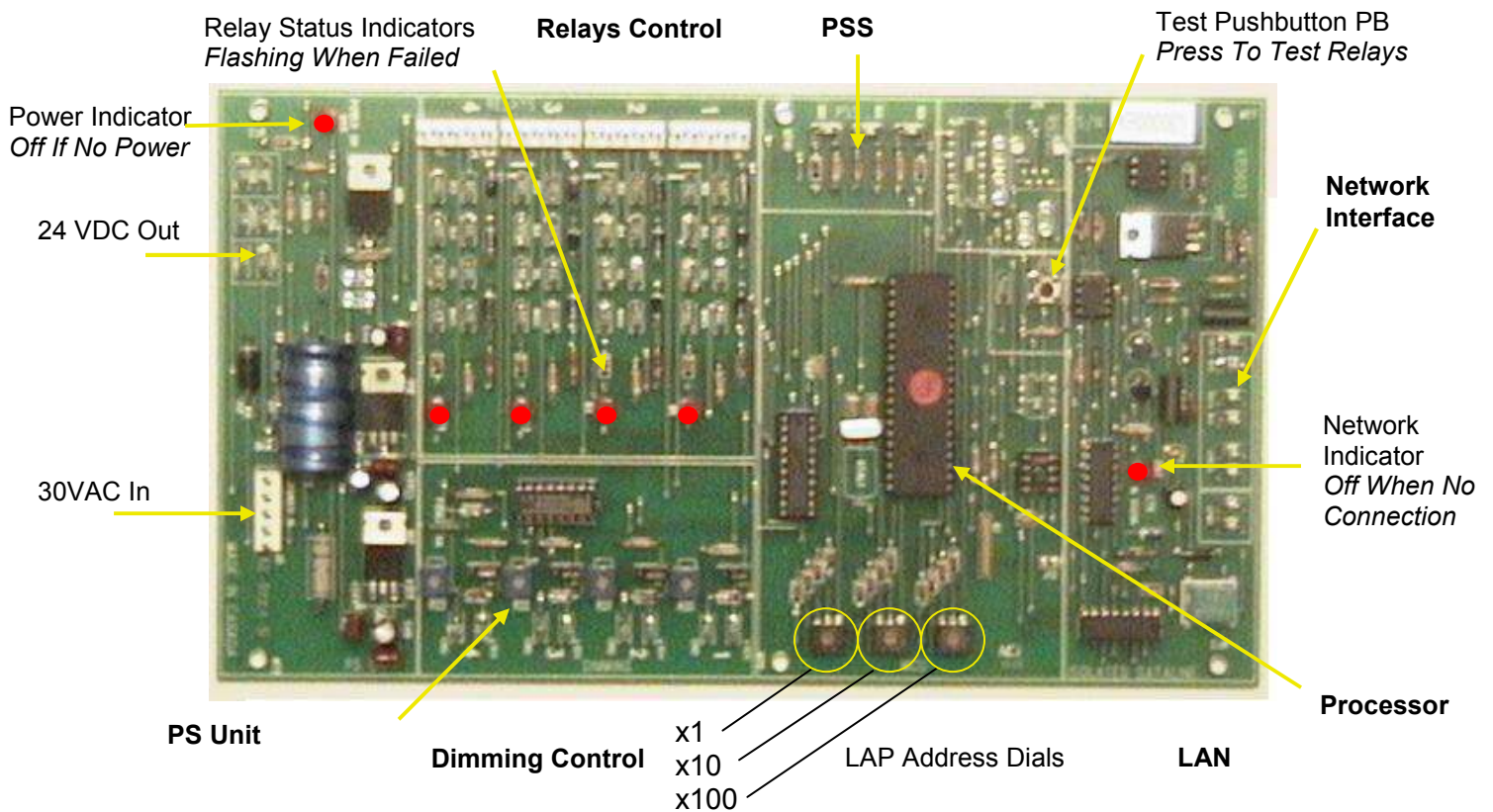
RLINK Gateway provides protocol conversion from serial RS-232 to TLC Dataline local area network, thus allowing access from Personal Computer to the network.

b) PC with Total Control Panel Software (TLC) version 2.0 or later

The TLC software allows defining and storing relay and dimmers attributes as well as lighting schedules in a database. The TLC program can download database to the panels, as well as monitor and diagnose LAPs attached to the network.

Technical Data:

Power In - Voltage	20-30 VAC
Power Consumption	60-90 mA
Output Power	24 VDC
Allowed Output Power Consumption	500 mA
Number of Controlled Lights	4
Number of Dimmer Channels	4
Single Dimmer Control Signal	0.1 – 10 VDC
Maximum Current Consumption for Single Dimmer Control Signal	5 mA
One local LAP Programmable System Switch Point	1
Number of PSS points that can be programmed for one relay	3
Number of System Schedules That Can Be Programmed	4 (M, N, O, P)
Address range	0 - 999



Hardware Design

a) Relay Status Indicators

RCC4-d has 4 Relay Status Indicator LEDs D1-D4 serving different functions depending on controller status.

- At power-up relay status LEDs flash in sequence to indicate that startup procedures have been completed. If after cycling power LEDs don't flash it means that power was turned down for a short period to discharge main capacitor and processor never shut down. If power was interrupted for a minute or longer and LEDs still did not flash after it recovered, the processor may be damaged
- During controller normal operation LEDs display relays' status, corresponding to relays pilot contact (YEL signal). Controller verifies whether relay status agrees with control action and flashes a corresponding LED if relay fails to operate

b) Dimmers

- 2 contacts for each individual dimmer output
- Manual/Automatic Mode:
Each dimmer output can be individually set to Manual or Automatic mode using jumpers J7-J10
 - a. Manual (permanent adjustment):
In Manual mode output signal is controlled by adjusting relevant channel potentiometer
 - b. Automatic (adjustment controlled in real time from Dataline network):
In Automatic mode each dimmer output is controlled from the controller board via D/A converter in the range from 0.1 to 10 VDC

c) Local LAP Programmable System Switch (PSS)

Local PSS can be programmed with TLC software to control any group of lighting points accessible through the network

- RED – control signal ON
- BLK – control signal OFF
- WHITE – signal ground

d) LAP Address Dials

Address dials allow setting LAP address of the board in the range from 000 to 999.

- x1 – units
- x10 – tenths
- x100 – hundreds

e) TEST Pushbutton PB

Test pushbutton initializes hardware test modes for the relays. In the test mode controller sequentially sends ON and OFF commands to the relays and checks if the relay pilot signal changes accordingly. If relay failure is detected the corresponding LED starts flashing.

f) GE DataLine Connectors

- DATA RED – Data Line +
- DATA BLK – Data Line -
- SHIELD – Data Line shield
- DPR – 24VDC power output provided for other devices such as Intelligent Switches

RCC4-d Dataline Network Functions

a) LAP Status

When requested by TLC program RCC4-d responds with LAP relevant status messages indicating error status, date and time, as well as whether database is up-to-date.

b) Relay Status

After status change RCC4-d controller broadcasts out relay status notification to the network.

The board is programmed in TLC database as 24 relays LAP allowing access and monitoring of 4 relays and 4 dimmers. When monitoring LAP with TLC program displays current relay status on relay indicators 1-4. Relays 12-24 status information is used to display dimmer bar graph.

Relay status notification message has a built in delay of about 2s to avoid overflow message traffic in the network. Thus, in order to send a status message LAP status must remain unchanged for at least 2s.

c) Individual Override

Each relay can be individually controlled by using Individual Override request issued by another device in the network. Issuing individual override messages from the TLC software is possible by pointing at a corresponding relay indicator field with cursor and depressing F5 or F6 function keys.

d) Dimmer Group Override

All four dimmers can be controlled simultaneously via Individual Override request issued for relay number 5. Sending an ON override causes all four dimmers to be set to 100% while OFF override message changes dimmers status to 75%.

e) Gradual Dimmer Group Override

In RCC4-d all four dimmers can be controlled simultaneously in the range from 0% to 100% via Individual Relay override request issued for relay number 6. Sending an ON override causes all four dimmers output value to be increased by 8.4% while OFF override message decreases dimmers output by 8.4%.

f) Individual Dimmer Override

In RCC4-d each dimmer can be controlled individually in the range from 0% to 100% via Individual Relay override request issued for relays number 7-10. Sending an ON override causes a dimmer output value to increase by 8.4% while OFF override message decreases dimmer output value by 8.4%. Dimmer status is reported in a bar graph format on relays 13-24, while number of dimmer currently displayed is encoded on relays 11 and 12.

g) Setting Date And Time

Date and Time is maintained on the RCC4-d. It can be monitored and modified from the TLC software. When control power is interrupted to the board current date and time values are saved to

the non-volatile memory and they are “frozen” until power comes back. Thus short power outages typically remain unnoticeable to the system.

h) Schedules

RCC4-d supports four basic 2-event system schedules labeled M, N, O, or P. The schedules are programmed on the PC using the GE TLC software and transferred to controller over local area network. The schedules are stored in non-volatile memory on the module, thus re-programming after power failure is not necessary.

i) Relay Attributes

- Schedule
- Flick Function
- Flick Time Delay

Each relay can function according to assigned to it system schedule marked as M, N, O or P. The schedule events (ON or OFF) determine whether the relay turns ON or OFF.

Relays can operate in Standard mode or in Flick mode. If Standard mode of operation is selected relay simply turns on and off according to its event schedule.

In Flick mode the relay uses special turn off algorithm. If the relay is programmed as Flick it will turn off for one second at five minutes before its scheduled turn off time. If no action is taken before the relay is turned off completely, the scheduled OFF event will be executed and the light will turn off. However, if the user would like to extend time the light is ON an ON override or PSS ON command can be issued, which will start Flick Delay Timer for the relay. The Flick Delay Timer will be loaded with a pre-programmed Flick Time Delay parameter. The relay will now continue ON until timer expires. At 5 minutes before Flick Delay Timer expires RCC4-d controller will issue another one second flick warning, giving user next opportunity to override approaching OFF event. The flick/override cycle can continue until 3:01 AM when all overridden lights with Flick attribute will be finally turned off.

j) Programmable System Switch (PSS) Function

- Master - 4 PSS commands per relay
- Flick Warn - (not implemented)
- Clean - (not implemented)
- Shed - (not implemented)

The relay programmed for PSS Master broadcast command issued to the network will simply follow the command ON/OFF parameter turning immediately on or off, regardless of any additional attributes assigned earlier to the relay.

k) Programmable System Switch (PSS) Function for Dimming

Relay 5 and 6 programmed for PSS Master control dimming functions on the LAP.

All four dimmers can be controlled simultaneously via PSS Master broadcast issued for programmed relay number 5. Sending an ON broadcast causes all four dimmers to be set to 100% while OFF broadcast message changes dimmers status to 75%.

All four dimmers can be controlled simultaneously in the range from 0% to 100% via PSS Master broadcast issued for a programmed relay number 6. Sending an ON broadcast causes all four dimmers output value to be increased by 8.4% while OFF broadcast message decreases dimmers output by 8.4%.

l) LAP Programmable System Switch (LAP PSS) Function

When on-board LAP PSS is programmed then shorting RED or BLK contact to WHT causes pre-programmed LAP relays to turn ON or OFF respectively. At the same time controller broadcasts PSS message, so that other LAPs in the network programmed to this PSS command can properly react.

m) Program Download

The schedules, PSS codes, relays attributes that are programmed with TLC software can be downloaded through RLINK and Dataline LAN to the RCC4-d controller. The TLC software verifies correctness of download operation by checking controller CRC sums response at the end of the download session. If any of the CRC sums are incorrect the download process is repeated. Database information and relevant CRC sums are stored on RCC4-d in non-volatile memory so that if power failure occurs database is preserved and re-download is not necessary.

n) Changing LAP Address

LAP address of RCC4-d is read during power-up and stored in non-volatile memory. Changing positions of address dials during controller operation does not change its current LAP address until power is cycled to the board. If during power-up modified address is detected controller considers its schedule and PSS database invalid and in next status message to TLC it will show program loss, thus notifying the operator that the database needs to be re-loaded to the board.

o) Relay Failure

RCC4-d is able to detect relay failure and report its status over network

p) Time Delay

Time delays can be enabled and disabled via TLC. If time delays are enabled then relays will automatically turn off after 1) the time delay time after a flick warning or 2) the time delay time after a flick override into the ON position from OFF status. Furthermore at 3:01AM all delays are cancelled and any relays with time delay timers running are turned off. After the nightly cancellation time a relay has to be reset (turned on and off) in order for the time delays to be enabled again.

q) Relay Total Runtime and ON/OFF Cycle Count

The LAP monitors and keeps track of total runtime and relay cycle count. This information can also be reset from within TLC.

r) Activity Logging and Trend (Optional TLC Trend Software required)

A log is maintained for relay activities on the LAP, and can be uploaded to the PC and analyzed using the optional *Trend Software*. Upon upload to the PC, from the *TLC Main Menu -> Transfer Programs -> Activity Log Data from LAP to PC* menu option the log data on the LAP log information is cleared. The LAP logs up to a maximum of 4000 events, after which new events will overwrite older ones.