

Monitoring, Remote Reset, and Recovery

Have you tried turning it off and back on again?

NetOps Discussion

November 5, 2019

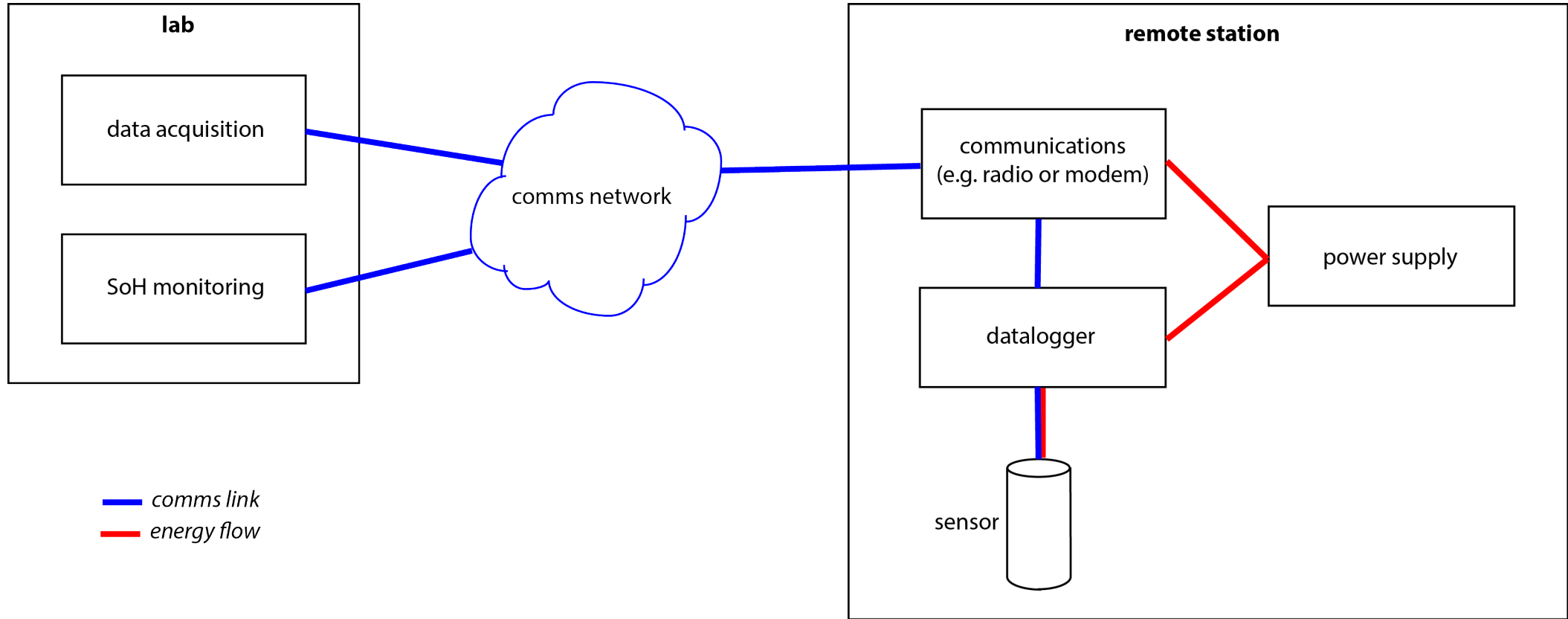
Moderated by Scott Dalton, Alaska Earthquake Center

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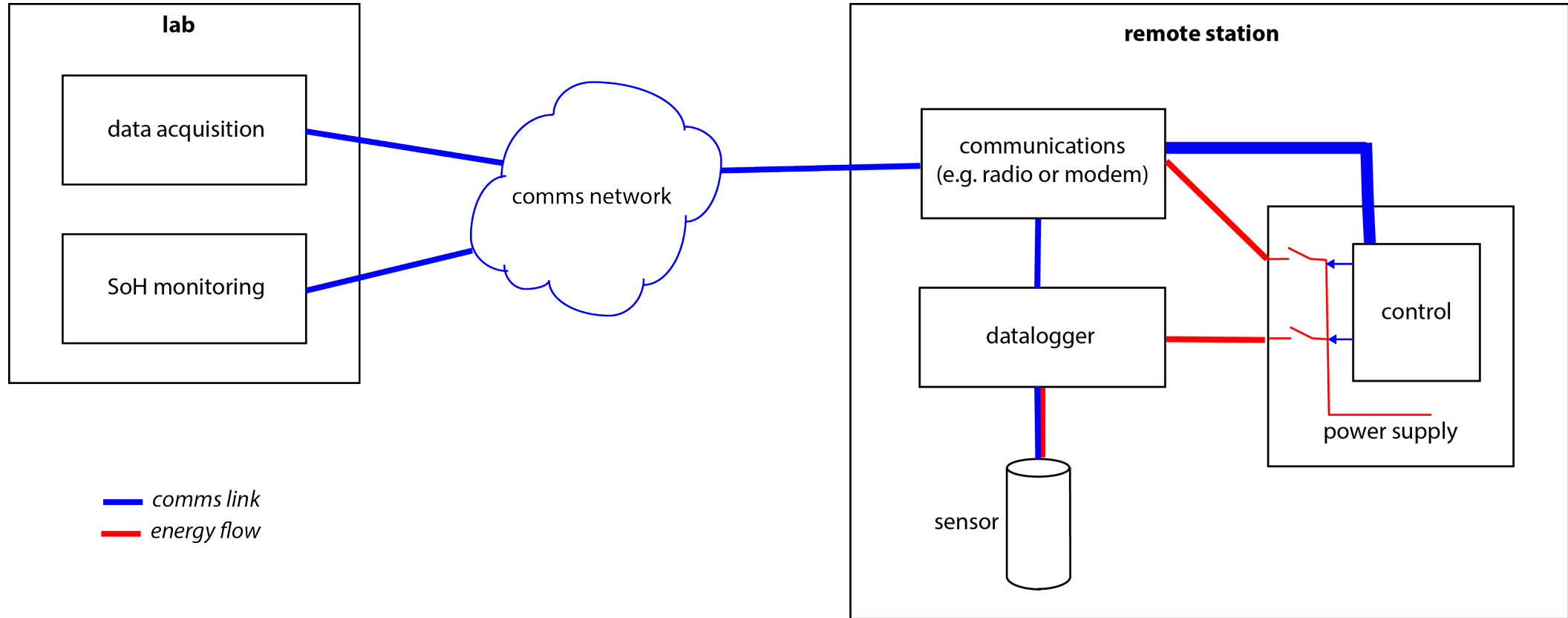
How do you reset (reboot) unresponsive devices at a remote station?



A Simple Case



Remote Control of the Power System



Remote Control of the Power System

- PDU

- Used in data centers
- Usually rack mounted
- Robust solution for sites where power consumption is not a concern
- DC units available, or convert to DC downstream



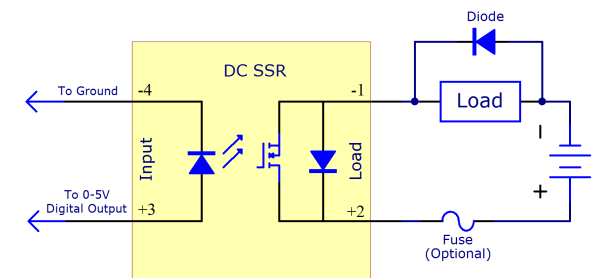
- Web Relay

- Remote control relays on DC power lines
- Suited for small scale, low power
- Less expensive, more portable



- Custom

- GPIO control of SSR
- Simple, easy, & cheap if you have the GPIOs available and are only switching one or two lines
- Does not scale



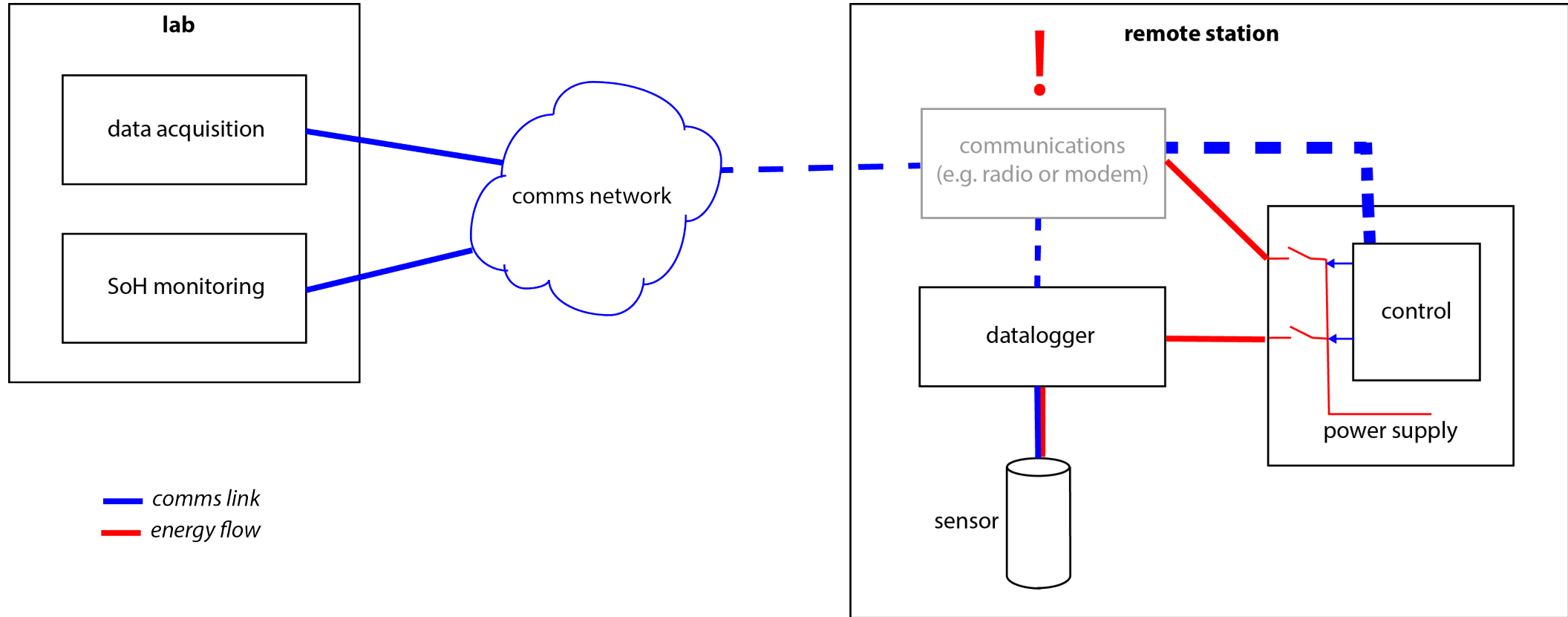
decreasing cost & power consumption



Remote Control of the Power System

...is great, but it's not enough

Comms Outage Removes Your Control



Reboot on Timeout

...or “network watchdog”

Configuring the power system to reboot a device when communication has been cut off.

How are network operators approaching this?

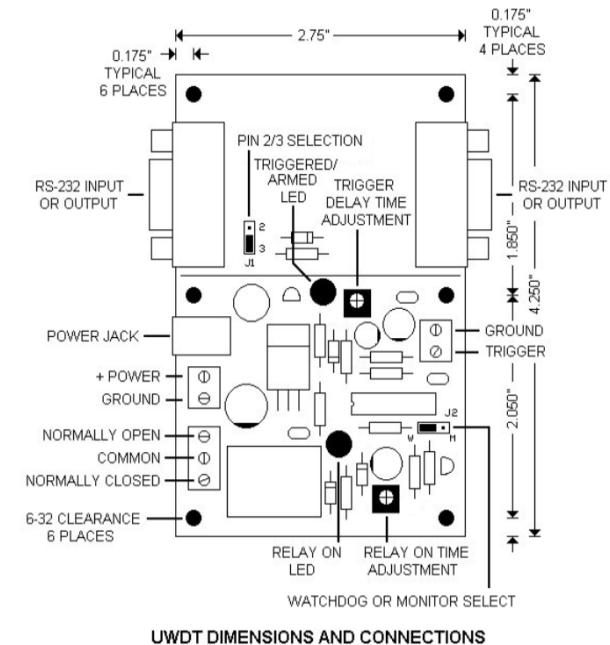
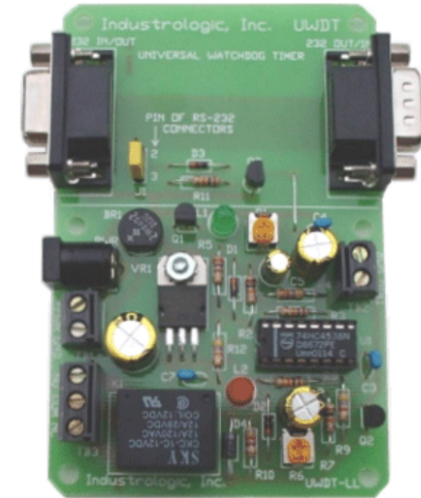
- CVO
 - migrating from the ControlByWeb X-310 to the X-410
 - GPS receivers can't be pinged once they choke so a local ping followed by automated reset works well
 - We haven't been able to demo the capability or isolate an instance with our 900MHz radios that sometimes hang
 - There's a lot of debate about whether to ping the local radio or a remote device before deciding to reset
 - interested in hearing about low-power Ethernet switches since the relays take up yet another Ethernet port

more from CVO

Serial Stream Watchdog

<https://www.industrologic.com/uwdtdesc.htm>

- **Power supply requirements-**
Power supply voltage: 11 to 14 volts AC, 10 to 16 volts DC, regulated or unregulated
Power supply current: 8 ma at 12VDC with relay and LED's not activated
Relay current: approximately 40 ma
LED current: approximately 20 ma
Power supply connector: 5.5 mm outside diameter, 2.1 mm inside diameter
- **Operating environment:**
Temperature: 0-50 degrees Celsius (32-122 Fahrenheit)
Humidity: 30 to 80 percent, non-condensing
- **RS-232 signals-**
All nine signals passed through from DB9F to DB9M
Pin 2 or 3 connected through 10K series resistor
Circuit can be triggered by any baud rate
- **Trigger input-**
10K pull-up resistor to +5 volts, .1uf to ground
Active low, trigger pulse must sink 0.5 ma to ground
- **Form "C" Relay Contacts-**
Maximum voltage: 30 volts, AC or DC
Maximum current: 10 amps
Manufacturer's type: Omron G5LE-14 series or equivalent



AVO has slides

Some devices have inherent watchdog capability

For example, the **RV50** cell modem

Network Watchdog	
Network Watchdog Timer	<div>Network Watchdog Timer</div> <div>If there is no WAN connection for the time configured in this field, the gateway reboots.</div> <div>Options are:</div> <ul style="list-style-type: none">• Disable—When this field and the Accelerated Interface Scan field are set to Disable, the gateway never reboots as a result of lack of network connectivity.• 5 Minutes• 10 Minutes• 15 Minutes (Default)• 30 Minutes• 45 Minutes• 1 Hour

RV50s also have a free I/O

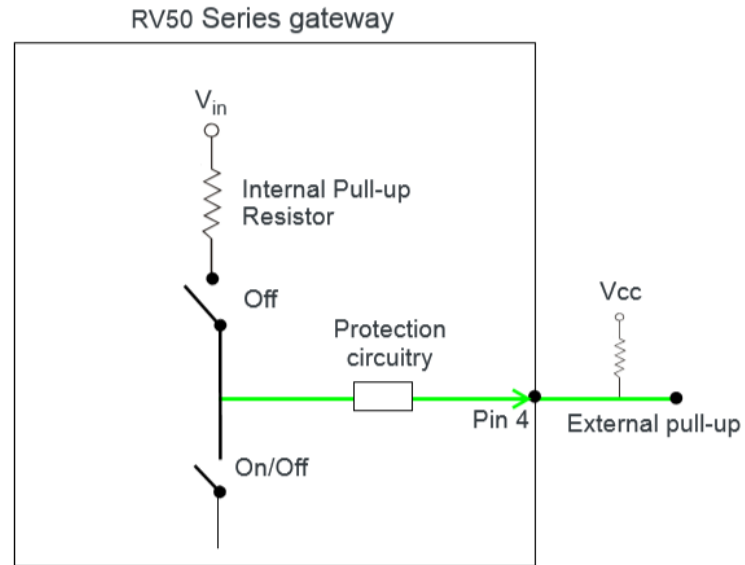


Figure 3-15: Digital Output/Open Drain

Table 3-9: Digital Output / Open Drain

Pull-up	State	Minimum	Typical	Maximum	Units	Comments
Off	Off	Open Circuit	—	—	—	—
	Active Low	—	—	0.5	V	5 mA, ≤ 5 V

Relay Selection

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Series

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2
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23

Part Status

Active
Discontinued at Digi-Key
Last Time Buy
Not For New Designs
Obsolete
Preliminary

Mounting Type

-
Chassis Mount
Chassis Mount, DIN Rail
DIN Rail
Panel Mount
Socketable
Surface Mount
Through Hole

Circuit

-
DPDT (2 Form C)
DPST-NC (2 Form B)
DPST-NO (2 Form A)
DPST-NO (2 Form A) x 2
SPDT (1 Form C)
SPST-NC (1 Form B)
SPST-NC (1 Form B) x 2
SPST-NO (1 Form A)
SPST-NO (1 Form A) x 2

Output Type

-
AC
AC, DC
AC, DC (RF)
AC, Proportional Control
AC, Zero Cross
DC

Voltage - Input

-
0 ~ 10VDC
0 ~ 5VDC
0 ~ 7VDC
1.1VDC
1.13VDC
1.14VDC
1.15VDC
1.16VDC
1.17VDC

Voltage - Load

0V ~ 5V
0V ~ 15V
0V ~ 20V
0V ~ 22V
0V ~ 24V
0V ~ 25V
0V ~ 30V
0V ~ 38V

Load Current

3mA
10mA
20mA
25mA
30mA
40mA
45mA
50mA

On-State Resistance (Max)

3.3 mOhms
4 mOhms
5 mOhms
5.6 mOhms
5.8 mOhms
6 mOhms
7 mOhms
8 mOhms

Termination Style

-
Gull Wing
PC Pin
Plug In
Plug In, 8 Pin (Octal)
Plug In, Quick Connect - 0.187" (4.7mm)
Quick Connect - 0.110"/0.250"
Quick Connect - 0.187" (4.7mm)
Quick Connect - 0.187"/0.250"
Quick Connect - 0.250" (6.3mm)

Package / Case

-
Hockey Puck
Hockey Puck with Heat Sink
i4-Pac™-4, Isolated
ISO Micro
ISOPLUS264™
Module
SSR with Integrated Heat Sink
TO-5 Variant, 8 Leads, Lens Top Metal Can
4-DIP (0.300", 7.62mm)

Supplier Device Package

-
DIP
Hockey Puck
i4-PAC™
ISO Micro
ISOPLUS264™
Module
S-VSON4
S-VSON4T
Thin-Pak

Value V

Min Max mA

Min Max mOhms

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Relay Nomenclature

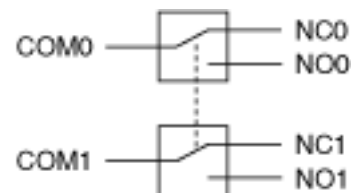
Relays are classified by their number of poles and number of throws. The pole of a relay is the terminal common to every path. Each position where the pole can connect is called a throw. A relay can be made of n poles and m throws. For example, a single-pole single-throw (SPST) relay has one pole and one throw, as illustrated in the following figure.




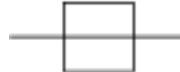

A single-pole double-throw (SPDT) relay has one pole and two throws. Based on the default position of the pole, one throw is considered normally open (NO) while the other is normally closed (NC). The following figure illustrates a SPDT relay.



A double-pole double-throw (DPDT) relay has two poles, each with two simultaneously controlled throws, as illustrated in the following figure.



Relay Nomenclature - Forms

Form	Symbol	Description
Form A		SPST relays with a default state of normally open.
Form B		SPST relays with a default state of normally closed.
Form C		SPDT relays that break the connection with one throw before making contact with the other (break-before-make).

RV50s also have a free I/O

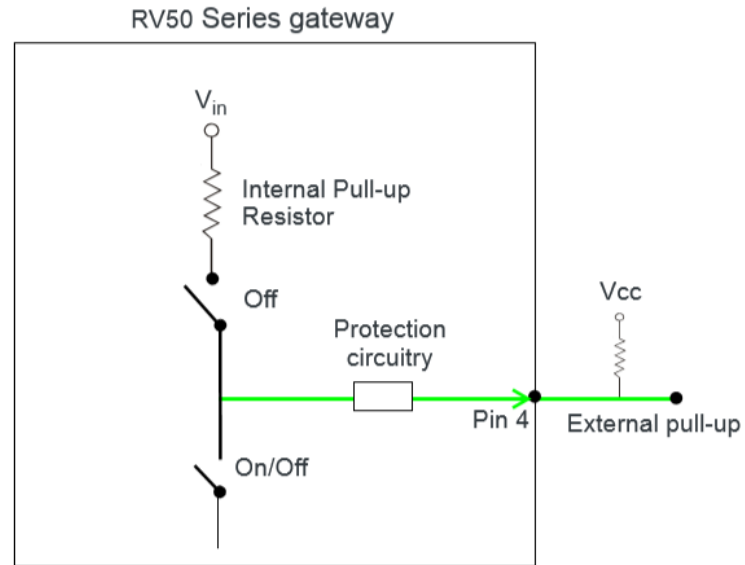


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Using RV50 Digital Output to Drive a Solid State Relay

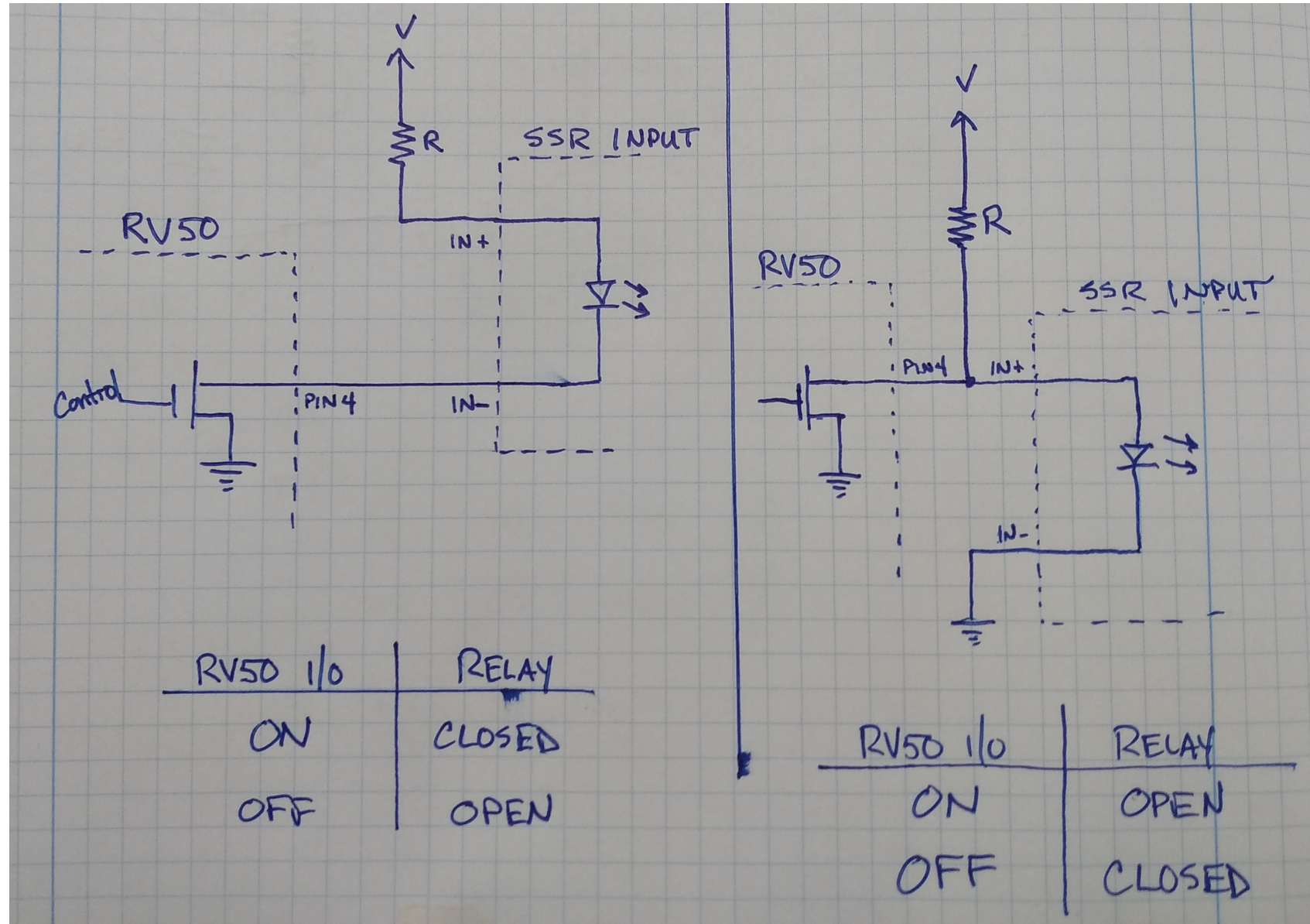
V = station power (12 V)

Select R based on the input requirements of the SSR, just as you would to illuminate an LED.

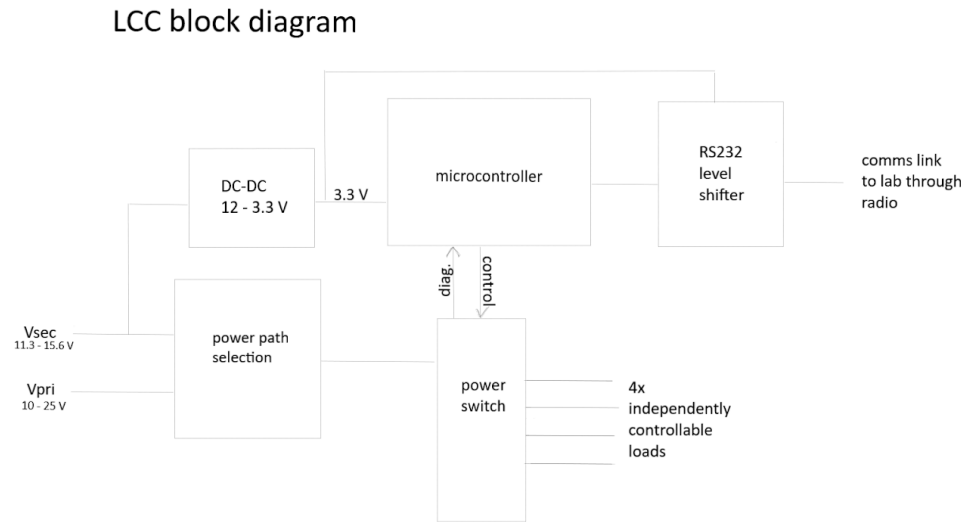
Configure RV50 IO as an open drain output.

RV50 output ON will pull pin 4 to ground

RV50 output OFF will pull pin 4 to V through the pull-up resistor



AEC's Load Control Circuit (LCC)



- Built around TI MSP430 low power microcontroller
- Very low power consumption (mW range)
- Serial communication
- Does not require extra ethernet connection or switch
- Remote control and watchdog on 4 DC power lines

