

# Caltrans - District 9 Mountain Pass Signs

Rural ITS Forum  
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## The Main Problems

- Unfamiliar drivers don't expect long-term winter highway closures for routes 120, 108, or 89
- Current manually operated signs require Maintenance personnel trips for changes - often after regular hours
- Difficult to provide real-time Pass status

## Before...



## After



## The Considerations

- Current signs are low-impact visually
- Low cost solution needed to make project viable
- Low maintenance solution needed due to Electrical personnel limitations - mechanical systems have been unreliable
- Use off-the-shelf components for ease of replacement, if possible

## Possible Solutions

- Do nothing - no project
- Remove/Modify existing signs - costs too much to provide courtesy information (safety?)
- Have a PDT meeting and develop a few viable alternatives...

## 10 Alternatives

- Flashing beacons - require too much sign text
- LED displays - Low energy, long life, reasonable cost

## The Sub-Systems

- LED DISPLAYS: Convey info to high-speed motorists
- SOLAR POWER: Utility power is not always close
- CELLULAR COMMUNICATIONS: Telephone service - even further
- CONTROL: need three control channels

## Signal-Tech LED Displays

- Replace existing sign panels: low cost
- OPEN/CLOSED: a little more money for lots more info
- Colors: off-the-shelf green/red or semi-custom white/amber (MUTCD)
- Brightness: visibility vs. energy
- Flashing or Non-Flashing: visual impact, LED energy/heat

## Solar POWER

- Solar: all 12VDC for reliability, simplicity, and efficiency
- Sizing: Auto-dimming displays reduce energy requirements
- White LEDs: 3 junctions to produce white light - 2.5 times the power of amber!

## Communications & Control

- Radio - systems too far apart
- Fiber Optic - in District 9?
- Cellular Telephone Modem - checked each location - on several occasions...
- Cellular Pager considered- low cost, but only one output channel for 3 displays

## Cell Modem w/ I/O Card

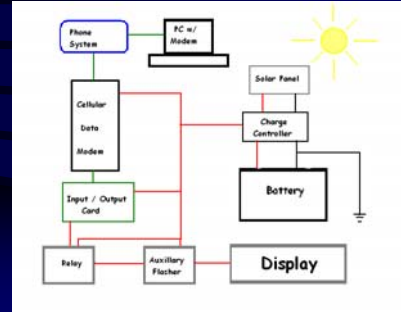
DataRemote CDS-9022A

- Prior experience with Census *data*
- Digital or Analog
- *Optional* 6 channel I/O board: 6 relays - (only) 500mA
- Low power requirements: 1 amp when talking, 50mA std-by, 10mA when sleeping
- Terminal Emulator: Custom user interface

## A "Prototype" Heart



## System Schematic



## The Little Stuff

- Auxiliary Display Relays: 1.5 amps too much for 500mA I/O card relays...
- Auxiliary Flasher: internal flashers are uncoordinated - make displays variable
- Solar Charge Controller: LVD to protect batteries & system (not traffic safety critical)
- Theft-Resistant Hardware: A good idea...

## Lessons Learned

- Get *ALL* the specs in writing
- Talk to experienced *USERS*, not just sales people. Ask users about tech support
- Even 12VDC systems need grounding...
- Innovators must expect failures along the way and keep working toward *eventual success*...

*PERSIST!*

## Frame 1



## Frame 2

