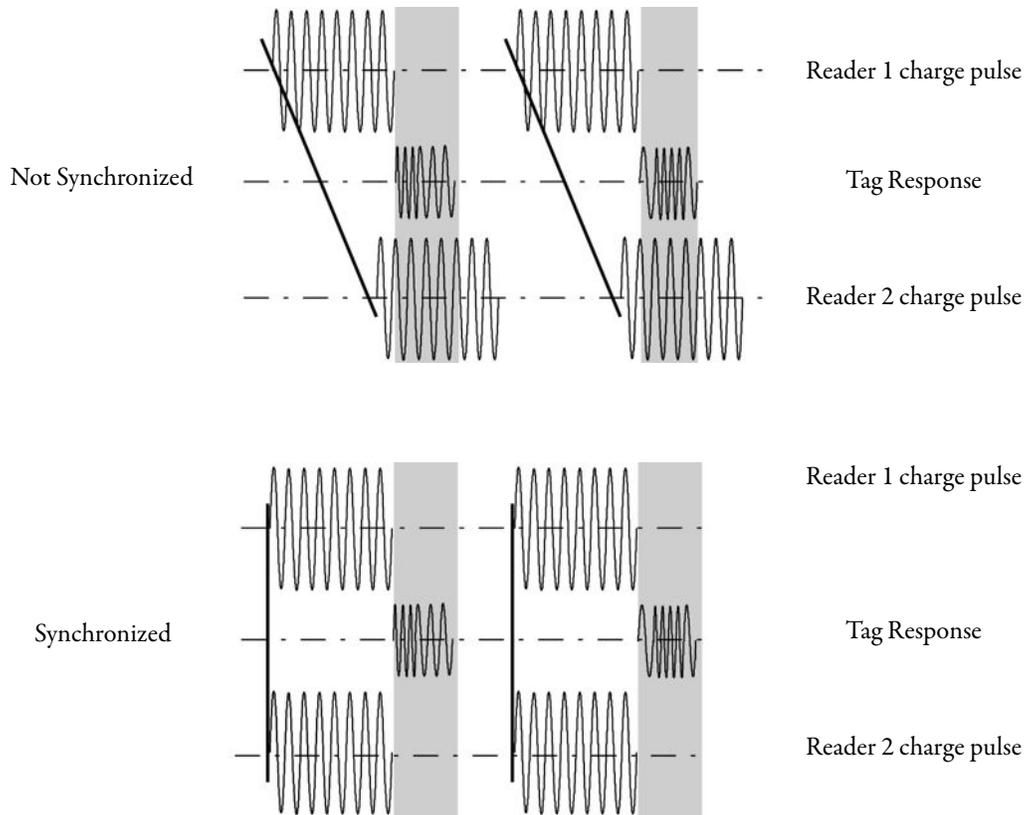


Synchronizing Multiple Readers



Synchronizing Readers

Multiple RFID readers operating in close proximity can interfere with each other. Without synchronization one reader can be transmitting while another is listening, which will block the tag's signal. Readers are synchronized so they will transmit and receive at the same time.



One way to determine if synchronization is needed is to first measure the read range at a reader while the others are turned off. After that, turn on the other readers and see if the distance is the same. If the read range drops or tags cannot be detected at all, the problem is probably reader interference and is solved by synchronizing them.

Wireless Synchronization

The simplest form of reader synchronization is wireless, where one reader listens for signals from another reader and automatically adjusts its own timing to match it. This extends the length of the listening cycle and decreases the read rate.

Wireless synchronization is used by mobile readers to operate in the vicinity of stationary readers. The mobile reader listens for transmit pulses and adjusts its timing to match.

One of the readers should not have synchronization enabled so that it becomes the master. This reader needs to be within listening range of all the other readers in the group.

Wireless synchronization is often not a good solution with stationary readers. One of the wired modes is more reliable for long duration operation.

The signal threshold level sets a minimum strength for a received signal from another reader. If it is too low the reader will not be synchronized. If it is too high then static or other low frequency noise can cause a reader to trigger.



The level is adjusted using a screwdriver to turn the screw in the blue potentiometer while monitoring the level using the Antenna Tuning Indicator with the switch set to "SYNCH LEVEL".

Start with the screw all the way in (clockwise), then turn the screw counterclockwise to the point where then RXSS LED turns off.

Make sure the transmit and listening times are the same on all readers.

Wired Synchronization

Wired Synchronization uses a cable with timing signals to interconnect readers. There are three forms available.

Wired

All readers transmit their signals to each other over a cable. Readers adjust their rates the same way as wireless mode.

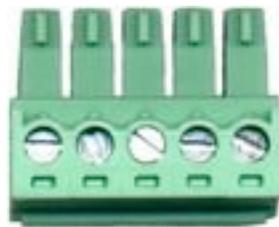
Master/Slave

One reader is designated the master and it generates a control pulse that causes all slaves to transmit. All readers will run at the same rate as the master.

Master/Slave with Acknowledgement

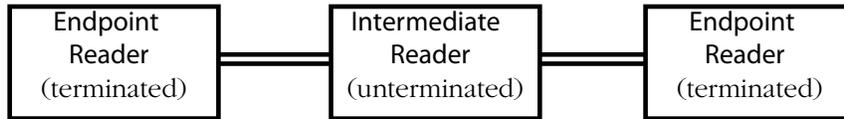
A second pair of wires is used allow readers to indicate when they have completed the read cycle. It is needed if the readers have different charge/listen timings.

The synch connector is a Phoenix #1803604 or Digikey 277-1164-ND.

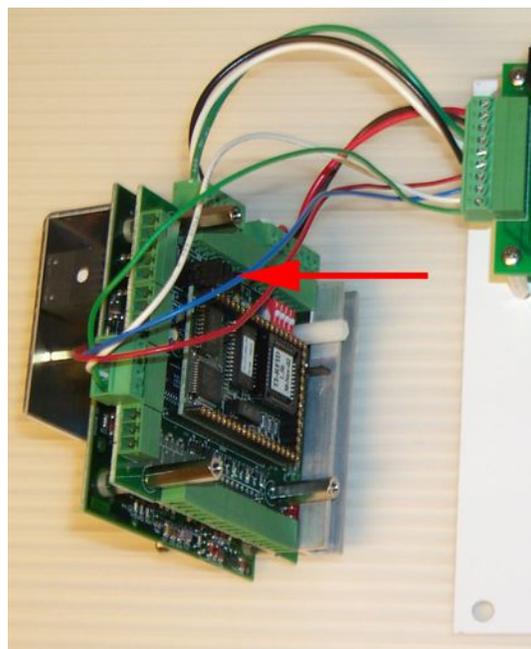


Reader Disassembly

A synchronization cable connects all of the readers together. The readers at the two ends of the cable need to have jumpers moved on the reader circuit board. The readers must be disassembled to access these jumpers.



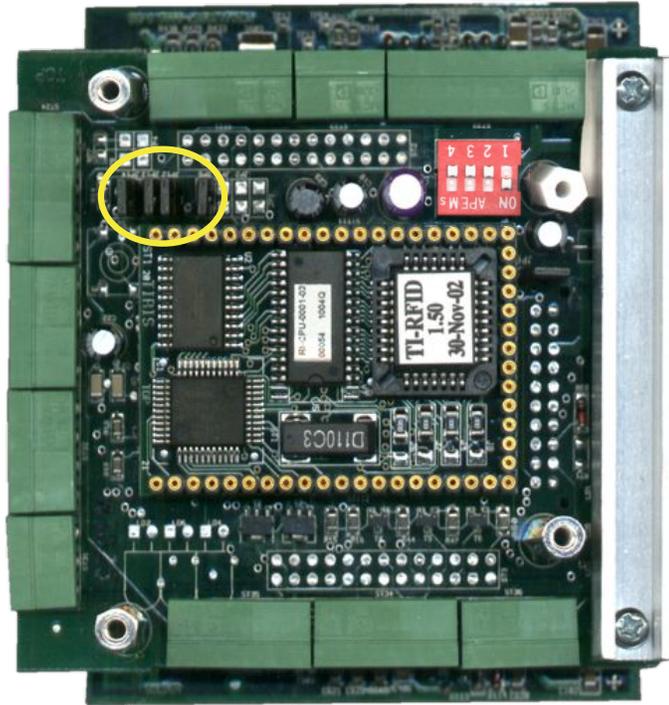
Remove the four screws that hold the white backplate in the enclosure



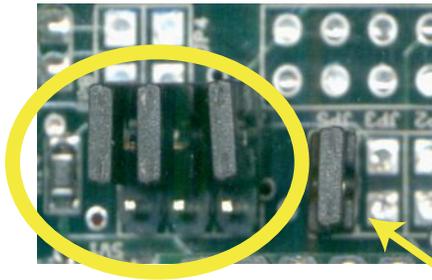
Remove the four screws that hold the reader to the backplate. Locate the black jumpers.

Termination Jumpers

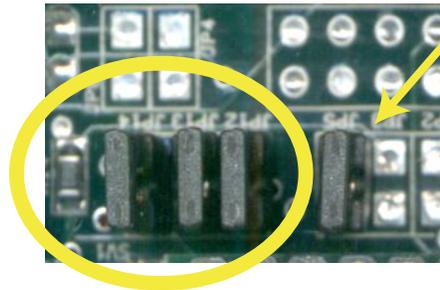
Location of
Jumpers



in-between
readers
unterminated
(J12, J13, J14 Open)



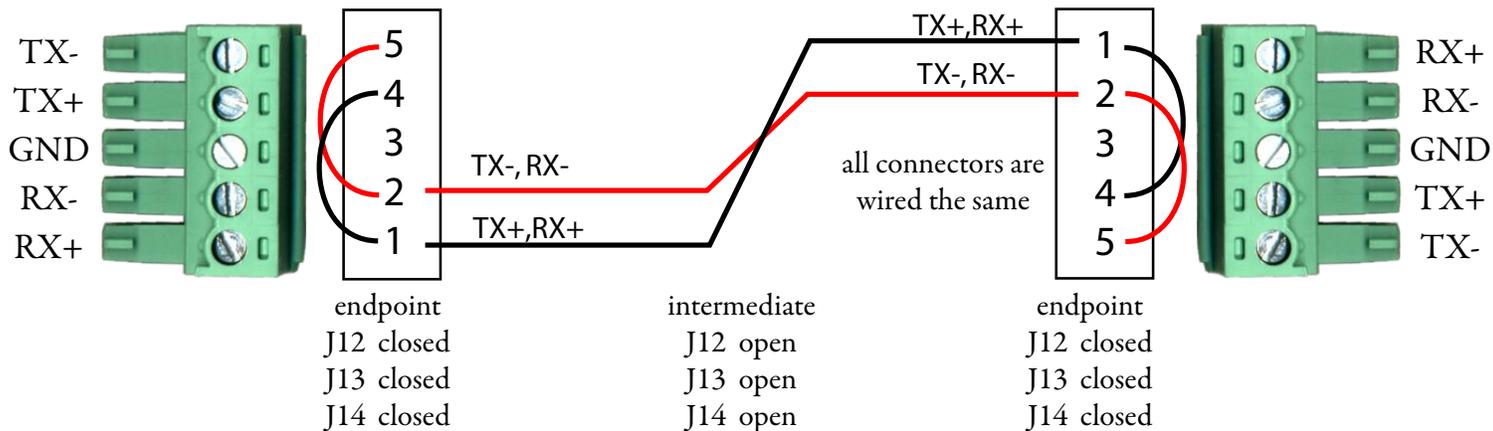
endpoint readers
terminated
(J12, J13, J14 ON)



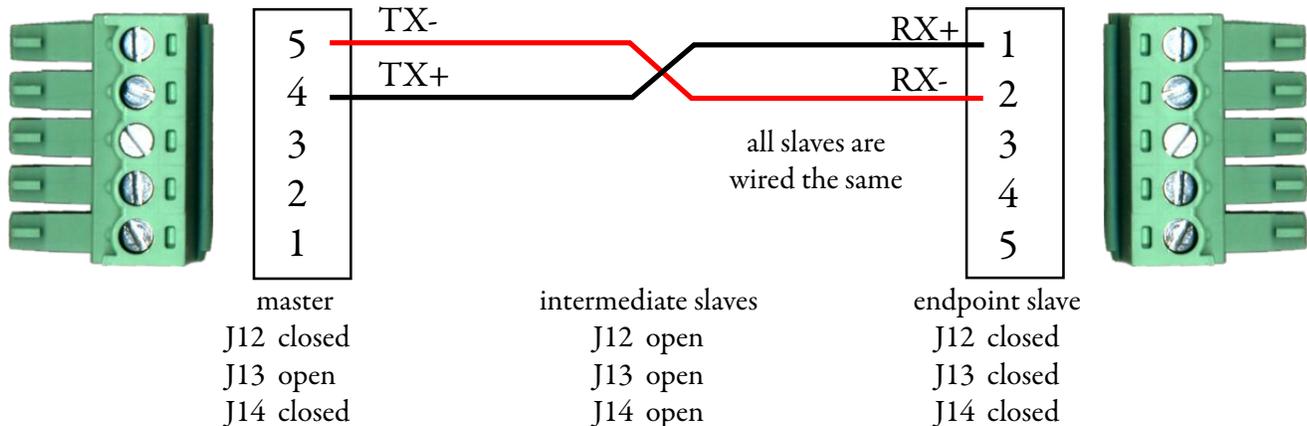
Leave this
jumper in
JP5 RS-232
DTR=DSR

Synchronization Cable Wiring

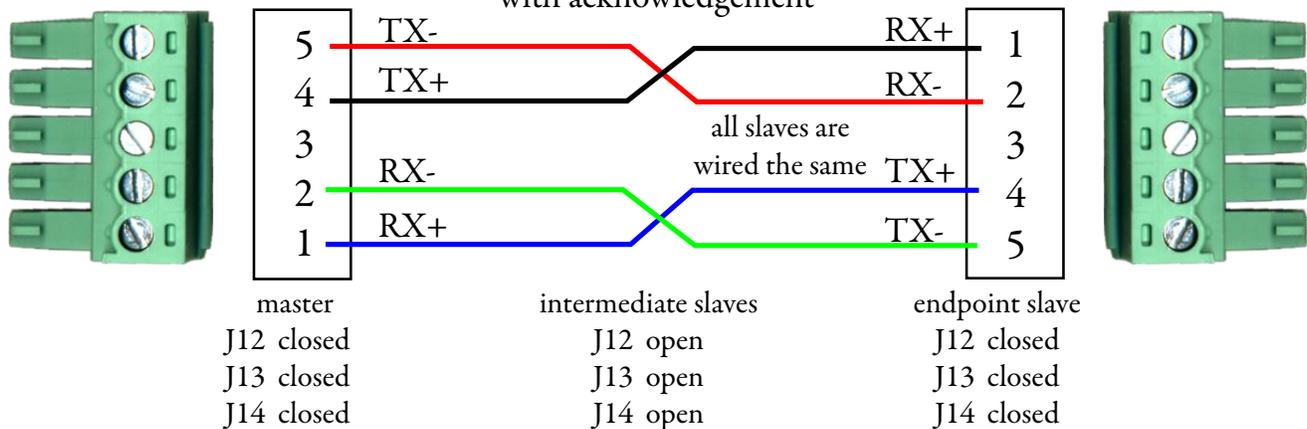
Wired synchronization



Master/Slave synchronization



Master/Slave with acknowledgement



Installing the Synch Cable



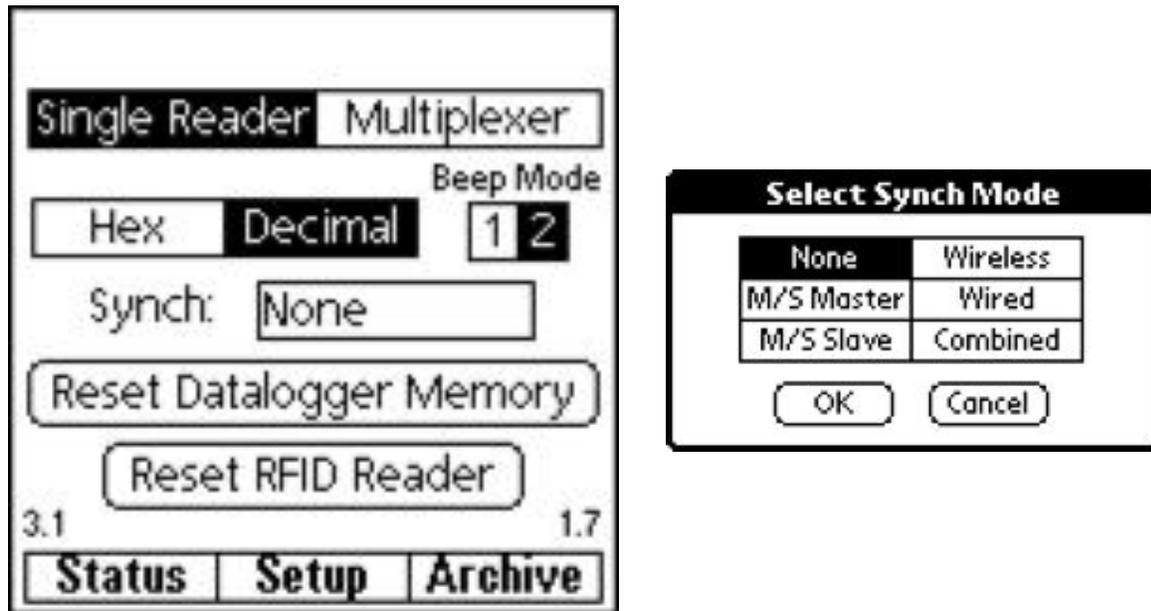
The synch connector plug is under the antenna connector.

Each reader that has had the jumper changes should be marked so there's no confusion.

Reader Assembly

Reattach the reader to the backplate, carefully routing the cabling to not cut or stretch any of the wires. Mount the backplate in the enclosure and plug in the power connector.

Changing Reader EEPROM Settings



Press the Utilities button on the Setup form and select the synchronization mode.

Combined mode is both Wireless and Wired.

Using Terminal Commands

The CGS command selects the synch mode.

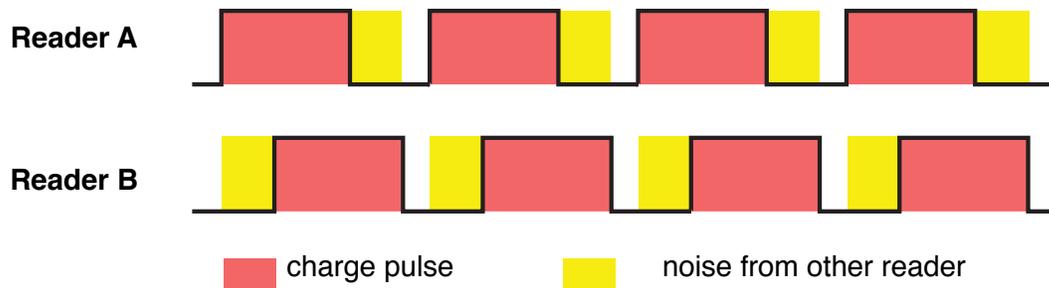
- 0 =None
- 1=Wireless
- 2=Wired
- 3=Wired/wireless
- 4=Master
- 5=Slave

>CGS1 Select wireless mode

Addendum

Do I need to synchronize?

Synchronization is needed if one reader can hear the charge pulse of another. This is often indicated by the bright yellow noise LED flashing, caused by the charge pulse from other nearby antennas. You can verify that synchronization is needed by turning off all readers but one. If the yellow noise LED only flashes when another reader is turned on then you will need to synchronize. Reorientation and/or shielding antennas can sometimes eliminate the need to synchronize.



What type of synchronization should I use?

Wireless Wireless synchronization is best for limited duration use such as a mobile reader passing through a stationary reader's scan zone. The mobile reader is configured to wirelessly synchronize so that it can adjust its charge/listen timings to match the stationary reader's signal.

It is important that the mobile reader use the same charge and listen times as the stationary one. With multiple mobile readers in a group, all readers except one reader should be set for wireless synchronization. One reader has synchronization mode turned off so that the others will match its timing.

Wireless synchronization can try to synch to any signal source (lightning, car ignitions) and so is not reliable for long term use. It is better to use a wired synchronization method with stationary readers.

Master/Slave One reader is designated a master and wired to generate timing signals for the slaves. If the master fails or is turned off all slaves will stop. Any slave can be turned off and the rest will continue. The optional wiring for acknowledgement is not necessary.

Wired Wired synchronization mode uses the same variable timing method as wireless mode except the readers listen to each other over a cable. It has the advantage that if any reader stops the rest will continue. In practice it has not been as reliable as master/slave mode.