Radio sub-system (Radio partner to provide)

The wireless sub-system will be designed by a 3rd party radio partner and supplied to Apollo fully tested ready for installation into the product.

The Radio sub-system will include the aerial and radio transmitter such that it complies with the PCB outline below.

The radio sub-system will also include the radio signalling protocol compatible with the partner's wireless residential security system. The status of the detector will be read from the interface at regular intervals to ensure that transmissions to the panel comply with the required response times.

To minimise the possibility of an interconnect failure going unmonitored the input side should endeavour to use switched pull-ups from time to time to confirm that the active pin state is being read.

Specifications

Voltage	2.0V to 3.6V
Ripple voltage	200mV
Maximum standby current	1µA
Maximum average current	20 µA
Maximum transmit current	50mA
Power-up delay	1s maximum before 1st transmission
Power-up sequence	Header allowed to be in any state
Alarm signalling delay	1s maximum
Manufacturing testing	Low power mode for test equipment
Manufacturing label printing	PC based RF unit to read the ID number
Signalling rules	Single (prioritised) state signalled
Disable Radio Command	Radio comms disabled for Apollo soak
Radio range	> 450ft
Pin 7 synchronisation	4 second heartbeat in quiescent state

Header connections

Pin No.	Connection	Direction	Signal	
1	0V	Apollo to Radio PCB	Battery negative terminal	
2	3V	Apollo to Radio PCB	Battery positive terminal	
3	Alarm	Apollo to Radio PCB	0=good, 1=alarm decode	If Alarm and fault are both high then radio

4	Fault	Apollo to Radio PCB	0=good, 1=fault decode		comms are disabled until one or both pin(s) go low	
5	Alarm and Fault Decode 0	Apollo to Radio PCB	**AFD 0** 0 0 1 1	**AFD 1** 0 1 0 1	**Alarm** Smoke Heat Freeze Test	**Fault** General Battery Tamper Sens'vity
6	Alarm and Fault Decode 1	Apollo to Radio PCB				
7	Device Active	Apollo to Radio PCB	0=no activity 1=sounder or smoke sampling active			
8	Activate Sounder	Radio PCB to Apollo	0=normal operation 1=activate sounder/LED			

The detector status is signalled through an 8 wire interface, power (2) and status flags (4). This will be in the form of an 8 way in line header.

The device active pin can be used to monitor the detector PCB. During normal operation the detector will be sampling every 4 seconds. It is important that the radio system does not draw more than the average quiescent current during the device active periods because the source impedance of the batteries will cause a significant voltage drop. The 3V supply will be running from storage during the sounder active periods and excessive current draw will collapse the supply.

If the detector status is fire, fault or activate sounder the sounder activations must be avoided. I the case of fire/CO alarm or sounder on the active sounder signalling will commence after one full temporal synchronisation cycle. For this cycle the fire pin will be low, the decode pins will indicate the event and the device active pin will be low during the sounder activation periods but the sounder will be off. The second cycle of the temporal pattern the sounder will be on during the sounder activation periods. This gives the radio system 4 seconds warning of the impending lockout which allows it to re-sync itself to avoid any clashes.

If the detector status is fault the single fault chirp warning will be given 4 seconds before the fault chirping commences.

Truth table for the header pin decode

Pin 3	Pin 4	Pin 5	Pin 6	Status	Priority
0	0	0	0	Normal	10
0	0	?	?	Pin 5 and pin 6 must be low if pin 3 and pin 4 are low	
1	0	0	0	Smoke alarm	2
1	0	0	1	Heat alarm	3

1	0	1	0	Freeze alarm	4
1	0	1	1	Test button active	1
0	1	0	0	General fault	5
0	1	0	1	Battery low	6
0	1	1	0	Tamper fault	8
0	1	1	1	Dirty detector	7
1	1	X	X	Radio signalling off	9

Radio sub-system PCB outline

The outer edge of the PCB (the 47.50mm radius) has a 2mm no-go area for components around the complete arc.

The pins should be a standard 0.1” pitch 0.5” long square pin gold flash finish header.

The PCB has 5mm clearance on the top side and 10mm clearance on the far side (as shown below).

The RF power reduction pad should reduce the radiated signalling power of the radio PCB to allow Manufacturing to check the alarm signalling at final test without corrupting other test stations.

All areas shown hatched are to be free of components.

Tracking is permitted on both sides.