1 Scope

This specification covers the design requirements for the New Universal Transmitter (New UTX) function to be incorporated in the Battery Power Smoke Detector product (ref part number) and the Replaceable Battery UTX (ref PN). The New UTX is envisaged as a single subassembly that can be used in either application.

2 Applicable documents

FCC
IC

3 Requirements

3.1 Description

The New UTX subassembly provides a wireless alarm transmission compatible with the Elcombe MainStreet Messenger 3.0 and 2.0 receivers. The alarm may be triggered by an input either from a contact closure or as a parallel word. It is intended that the input be received from a battery-powered smoke detector or as a stand-alone UTX. A defining characteristic of either application is a field replaceable battery.

A block diagram is shown in figure -
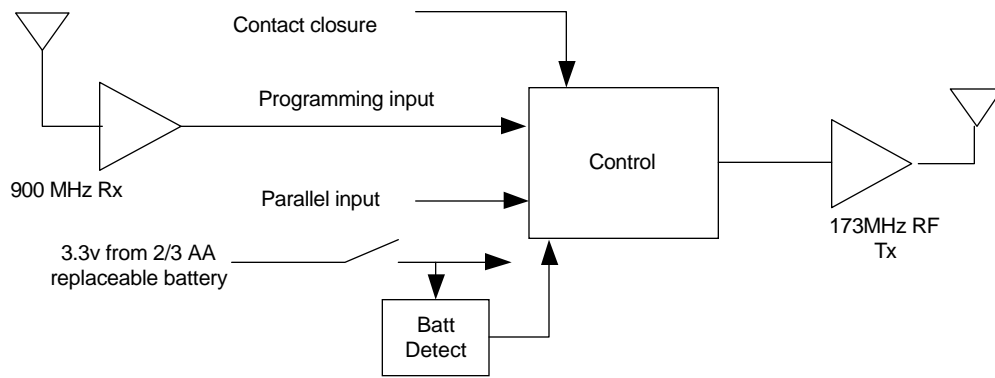
Figure 3.1.1-1 Block Diagram

The relationship to other proposed new peripherals is given in Table 3.1.2-1. This specification covers items 2 and 3 in the table.

Table 3.1.2-1

	Hard-wired smoke & Low use UTX	Battery smoke	Door (high use) UTX	Wireless Pull cord	Motion
	1	2	3	4	**5**
Technology	Dual tech	Dual tech	Dual tech	Dual tech	
Packaging	UTX box with terminal block for wire termination	internal to smoke	UTX box with terminal block for wire termination	internal to pullcord - mounted in gang box	
UP	Oki	PIC	PIC	Oki	
Input	contact closure	parallel	Contact closure	contact closure	
Output	1 code on	1 code on	Different	1 code on	

	closure; repeated if contact remains closed	receipt of input; Repeat programmable	codes on contact open and closure; Repeat programmable	closure; repeated if contact remains closed	
Programming	900 Meg	900 Meg	900 Meg	900 Meg	
Power	Elcombe lithium battery	Smoke's lithium battery	Replaceable lithium battery	Elcombe lithium battery	

3.1.1 Backward/forward compatibility

The New UTX subassembly shall be backward compatible with the '12 bit' alarm transmission of Elcombe's MainStreet Messenger 2.0 receiver and forward compatible with the MainStreet Messenger 3.0 20 bit alarm format.

3.1.2 Operation

3.1.2.1 Operating states and modes

The subassembly shall have the following operating modes
   a) Smoke detector mode. In this mode the subassembly shall be configured to operate embedded within a smoke detector.
   b) UTX mode. In this mode the subassembly shall be configured to operate as a UTX.

Within the above modes the subassembly may operate in the following independent modes:
   i.   12 bit/20 bit.
   ii. Tuning mode on/off.

3.1.2.2 Contact closure alarm (UTX mode)

The subassembly shall transmit an alarm via the RF interface when the contact closure changes state according to Table 3.1.3.2-1.

Table 3.1.3.2-1

Contact state	"off" to "on" transition*	"on" to "off" transition	Permanently "on" and "armed"	Permanently "on" and not "armed"
UTX Action	Transmit ID code with LSB '1'	Transmit ID code with LSB '0'	Transmit ID code with LSB '1' once per minute while contact is in "on" state.	None

Smoke Action	Transmit ID code as programmed.	None	Transmit ID code as programmed once per minute while contact is in "on" state.	None

*Note: "on" and "off" with respect to contact open and closed is programmable. With respect to Smoke Detector, "on" means receipt of a smoke alarm state from the detector and "off" means lack of smoke alarm state.

The contact closure input shall be 'debounced' such that the change of state of the contact closure must be stable for 20ms +/- 20% before causing any change in the alarm transmission activity.

3.1.2.3 Parallel input alarm (Smoke mode)

The subassembly shall transmit an alarm via the RF interface when it is in Smoke mode and a smoke detector input alarm is received from the parallel input. The smoke detector input alarm is defined in appendix A.

The subassembly shall transmit one alarm for each smoke detector input word received unless the smoke detector word is received before the subassembly has completed transmitting its alarm in which case the second smoke detector word shall be ignored. The subassembly shall transmit the ID in the alarm word.

3.1.2.4 Trouble Alarm

The subassembly shall transmit a Trouble alarm in either of the following conditions:
   a) When it is in UTX mode and the on-board detector circuit detects a Low Battery condition;
   b) When it is in Smoke mode and a Low Battery condition is signaled by the smoke detector;
   c) When it is in Smoke mode and either a 'clean me' or 'invalid' condition is signaled by the smoke detector and the Combined Trouble function is true.

3.1.2.4.1 12 bit mode reporting

In 12 bit mode the subassembly shall report trouble status only when an alarm is transmitted. Low battery status shall be indicated by extending the transmission by repeating alarm words to TBD words.

3.1.2.4.2 20 bit mode reporting

In 20 bit mode the subassembly shall transmit trouble status by transmitting an alarm with the Low battery status bit set in the alarm word sent from the subassembly. The alarm shall be repeated every 8 hours +/-20%.

3.1.2.5 Alarm word

3.1.2.5.1 12 bit mode alarm word

3.1.2.5.2 20bit mode alarm word

3.1.2.6 Test mode

3.1.2.6.1 Tuning mode

When set in this state the subassembly shall continually transmit for 1 minute +/- 20% or until a contact closure input is received. It shall transmit an alarm if it is in 12 bit mode, or status word if it is in 20 bit mode At the termination of this mode the subassembly shall revert to its prior state.

The protocol for entry to this state shall be sufficiently robust to prevent accidental setting it on when programming other functions. Exit from the state may be similar to other programmable functions.

Note: The purpose of this state is to provide a continuous broadcast during rf testing in production or qualification.

3.1.2.6.2 Smoke detector test mode (Smoke mode)

The subassembly shall enter this state when it is in Smoke mode and a "Test" signal is received from the parallel input. When in this state the subassembly shall transmit an alarm if it is in 12 bit mode, or a status alarm if it is in 20 bit mode.

3.1.3 Power supply

3.1.3.1 Battery

The subassembly shall be powered from an off-board, replaceable battery. Type Two thirds AA 3volt will be used in the UTX application.

3.1.3.2 Power switch

The subassembly shall provide for an off-board switch to disable the power.

3.1.4 Programming function

Programming of the subassembly shall be achieved via the 900 MHz receiver.

The following shall be programmable in the subassembly:
  a) Mode Smoke/UTX.
  b) Mode 12 bit/20 bit.
  c) ID code.
  d) Test mode on/off .
  e) Contact closure polarity.
  f) Armed/Not Armed.
  g) Low battery alarm/combined alarm.

3.1.4.1 Non-volatile memory

All programmed modes, states and functionality shall be stored in non-volatile memory such that battery replacement does not require reprogramming of the unit.

3.2 Smoke detector

The subassembly shall be mechanically and electrically compatible with the Sentrol ESL 560 smoke detector. A data sheet is included in Appendix A.

3.3 Interface characteristics

3.3.1 Electrical

Parameter	Value	Notes
RF Transmission		
Frequency	173.225MHz +/- ?Hz	
Deviation	+/- 3kHz	
Level	x dBm	Into antenna
Power Requirements		
Voltage	3.0v typ. 3.3v max	
Current	5uA quiescent. ? max	
Low Battery detect level	2.5v min. 2.7v max	
Contact closure		
High	>?v. ? max.	
Low	<?v. ? min.	
Parallel input		
Logical '1'		
Logical '0'		
Programming		

3.3.2 Mechanical

3.3.2.1 Connectors.

The subassembly shall have the following connectors:
   a) The parallel interface and power shall be on a 6 pin header or direct wire soldered to the PCB. When used in the UTX application only the power inputs will be used.
   b) The Contact closure connection shall be via a screw terminals mounted on the PCB or, direct wire soldered to the board. This allows the UTX to have screw terminals or a box-mounted connector (jack/plug type) directly wired to the board.

3.3.2.2   Mounting constraints.

The subassembly shall be capable of being mounted in the Smoke detector in the space allowed. Additionally, the subassembly shall have at least one hole for fixing the PCB in a TBD case. (It is expected that the case will have provision to press fit the subassembly and will be custom designed. The mounting hole is for insurance.)

3.4 Environmental

Parameter	Value	Notes
Temperature operating	0 – 40 deg C	
Temperature storage	-10 – 60 deg C	
EMI/EMC	FCC part 15 para? Industry Canada RS 210 para?	

3.5 Quality

3.6 Cost

The subassembly shall have a target factory cost of $15US excluding battery and case based on quantity 5000 units.