



DTMF Based backup recovery system

Rev. 2008/03/30

Author : Craig Strudwicke

Background

After some discussion between SSTS Avionics team members, it was agreed that the addition of an independent wireless recovery system would be a very useful addition to the Minishot and subsequent SugarShot flights.

Such a system had been developed by members of a group in Australia known as ERG, with the bulk of the development work being done by Paul Kelly. This system had been flown many (> 20) times with great success, meaning that the design was mature and hence low risk and high value addition for the Minishot project.

The system consists of a DTMF decoding device coupled to a microcontroller and a number of power mosfets. A sequence of DTMF codes are used to arm, disarm and fire the channels. When connected to a radio transceiver, the system may be used as part of a recovery system and adds an additional level of confidence to any rocket launch.

The Hardware

The following block diagram describes the system architecture :

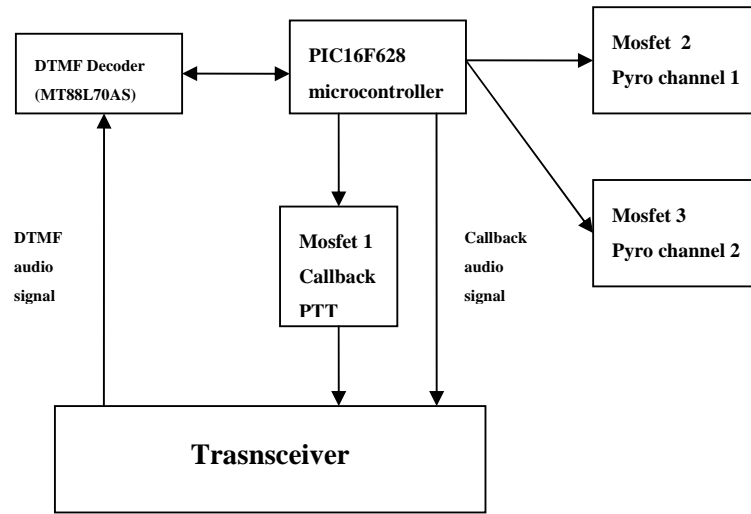


Fig 1 - system block diagram

The following annotated photos describe the real hardware as supplied to the SSTS project :

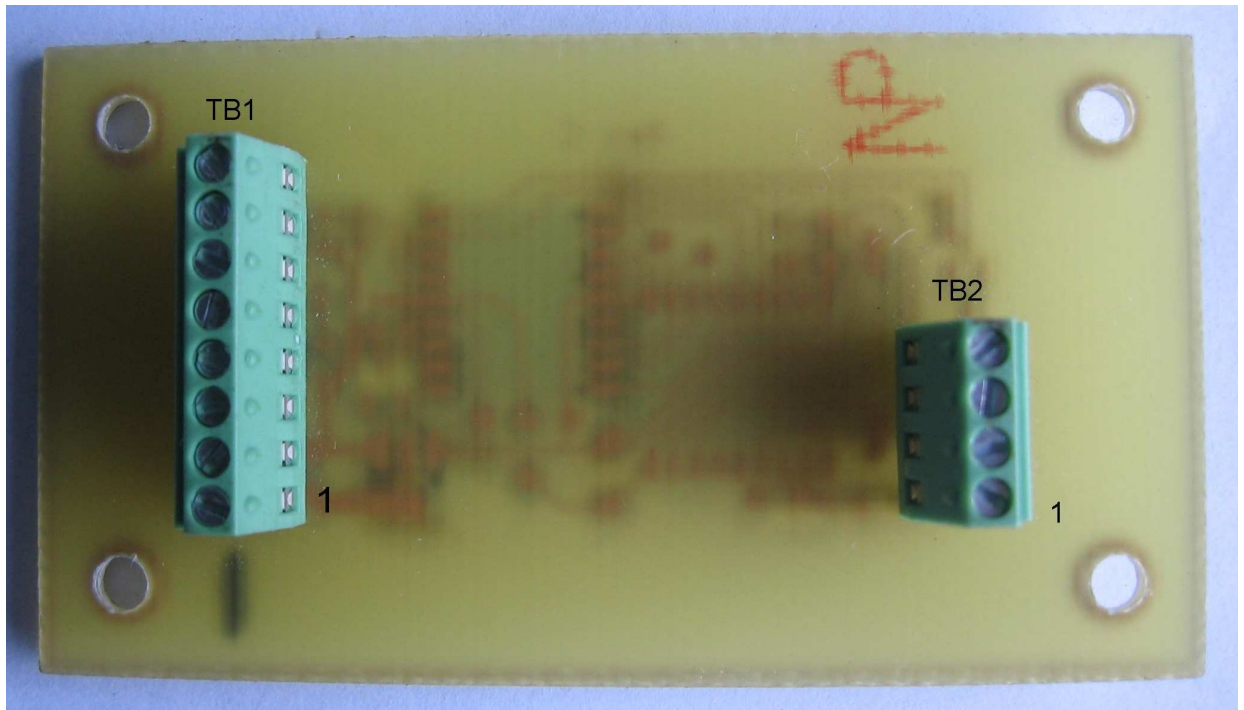


Figure 2 - Top side of PCB

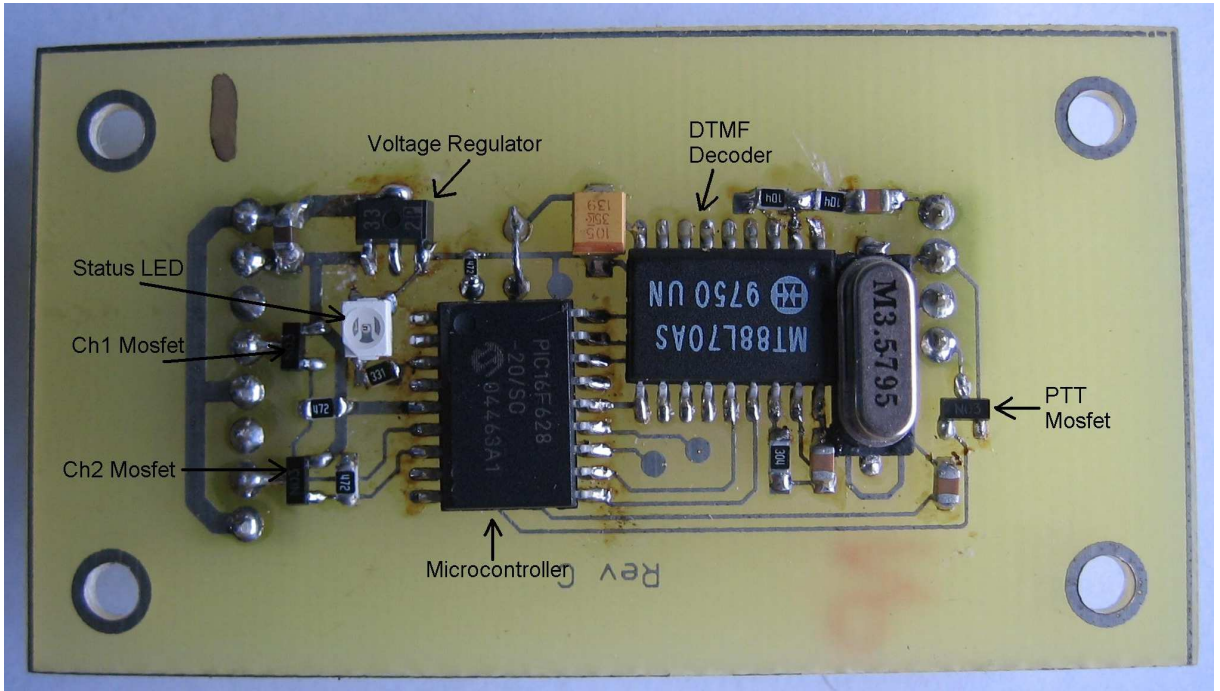


Figure 3 - Component side of PCB



Figure 4 - Example connection to small transceiver

The following table is a listing of each terminal, their function and ratings.

Terminal Block	Terminal #	Name	Description	rating
TB1	1	Vsupp	+ve supply	4.5 to 9V, Load dependant current
	2	Gnd	Gnd	NA
	3	NC		
	4	Ch1	Channel 1, sinking output	1.5A, 1s
	5	Vsupp	+ve supply common	
	6	NC		
	7	Ch2	Channel 2, sinking output	1.5A, 1s
	8	Vsupp	+ve supply common	
TB2	1	Signal In	Audio signal input	
	2	Gnd	Gnd common	
	3	Signal Out	Audio signal out for callback tone	
	4	PTT	Transmit command, pulls low to Gnd	

Table 1 – Terminal and signal descriptions

Operation

The following table contains a list of DTMF commands and their function :

DTMF Number	Command name
1	Drive Channel 1
2	Drive Channel 2
3	Callback
4	Arm
5	Disarm

Table 2 – DTMF Commands

Operating Sequence

The following State Transition Diagram depicts the method of operation :

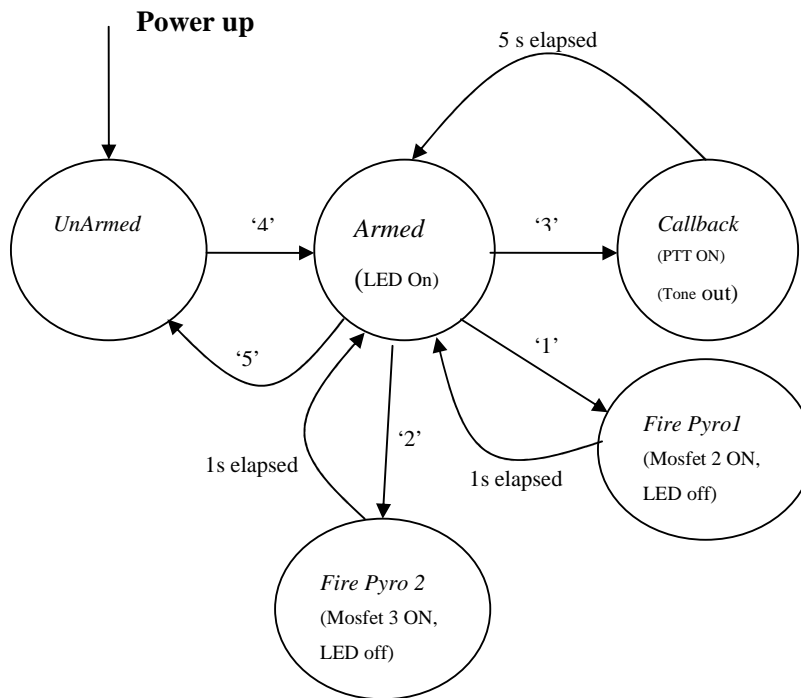


Figure 5 – State transition diagram - Sequence of operation

Revision record

Rev.

Author

2008-3-31

C.Strudwicke