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ENGINEERING DEPARTMENT

**ITEM NO:**  
**MODEL NAME:- SUPER B2 AEROPLANE**  
**FREQUENCY :- 49.860 MHZ**  
**DATE :- 20/6/2005**  
**BY: B.LEE**  
**REV 0**

## **\*\* (CIRCUIT DESCRIPTION )**

### **\*\* IN TRANSMIT MODE.**

WHEN THE CONTROL KNOB IS PRESSED, A CW SIGNAL IS TRANSMITTED. THE CRYSTAL CONTROLLED OSCILLATOR Q2 OUTPUT IS COUPLED THROUGH C6 TO THE BASE OF Q3. FROM Q3 THE SIGNAL IS FED THROUGH T-1 . THE LOW PASS FILTER MADE UP OF C10 & T-1 & C12/C13 L-2/L3 & C14 WHICH ARE CONNECTED TO THE ANTENNA. THE MODULATION IS PROVIDED BY U-1 . WHEN SWITCH IS PUSHED, THE MODULATION SIGNAL WILL BE SENT TO THE BASE OF Q1 THAT WILL MODULATE THE RF WAVE DIRECTLY. A 3 MINUTES AUTOCUT OFF TIMER IS PROVIDED IN THROTTLE WHEN B+ IS ON. A RESET SWITCH S1 IS PROVIDED TOO. ENERGY IS SUPPLIED BY 8X1.5V= 12.0 VDC ALKALINE BATTERY.

### **\*\* IN RECEIVE MODE**

Q1 IS THE SUPERREGENERATOR & DETECTOR. U2 IS THE SIGNAL PRE-AMPLIFIER & DECODER. U7 & U5-C/D ARE THE PULSED B+ WIDTHS( SPEED CONTROL) PROVIDER FOR Q2/Q7 & U5-A/B U6-A/B/C/D ARE THE NAND GATE FOR Q3 & Q4 WHICH ARE THE MOTOE DRIVERS Q5 & Q6 ARE THE MOTOR PHASE INVERTER U3-A/B & U4-A/B ARE THE MOTORS CURRENT DRIVERS ENERGY IS SUPPLIED BY EIGHT X1.2V AAA TYPE NICAB BATTERY.

### **\*\* ANTENNA AND GROUND CIRCUITRY.**

THIS UNIT MAKES USE OF AN EXTENAL 39 -INCH ANTENNA. THE ANTENNA IS INDUCTIVELY COUPLED. THE UNIT RELIES ON THE GROUND TRACE OF THE PRINTED CIRCUIT BOARD. NO EXTERNAL GROUND IS PROVIDED. ENERGY IS SUPPLIED BY 8X1.5V= 12.VDC ALKALINE BATTERY.

### **\*\* BACKGROUND**

THE DEVICE DESCRIBED HEREIN IS A WIRELES (RF) TOY GAME AEROPLANE CONTROLLER TRANSMITTER FOR USE WITH THE TOY GAME AEROPLANE CONTROLLED RECEIVER. IT HAS ONLY ONE CHANNEL OF OPERATION WHICH THE USER MAY CHOOSE ONLY , AND IS USED TO SEND BUTTON-STATE DATA FROM THE CONTROLLER TO A WIRELESS RECEIVER CONNECTED WITH MOTORS

### **\*\* TYPICAL OPERATION**

TYPICAL OPERATION WOULD INVOLVE THE USER TURNING ON THE UNIT TO THE TOY GAME. WHEN TURNED ON, THE UNIT COMES UP ON THE DEFAULT CHANNEL AND TRANSMITS A CONTINUOUSLY STEAM DATA. THE USER CAN NOT, AT WILL, CHANGE TO ANY OTHER OF THE PREDEFINED CHANNEL.

### **\*\* CONFIGURATION**

THE TRANSMITTED RF CIRCUITRY CONSISTS OF A CRYSTAL CONTROLLED OSCILLATOR, FOLLOWED BY ONE POWER AMPLIFIER, & FINALLY, AN ANTENNA. THE MAIN CHARACTERISTICS OF THIS CONFIGURATION ARE SHOWN BELOW :-

|                          |                    |
|--------------------------|--------------------|
| ** FREQUENCY RANGES      | <b>49.860 MHZ</b>  |
| OCCUPIED BANDWIDTH (3DB) | <b>+./- 2KHZ</b>   |
| FREQUENCY STABILITY      | <b>+./- 20 PPM</b> |
| MODULATION METHOD        | <b>A M</b>         |
| OUTPUT POWER             | <b>80DBUV / M</b>  |

### **\*\* REFERENCE OSCILLATOR**

A **49.860 MHZ** CRYSTAL OSCILLATOR IS USED TO GENERATE THE REFERENCE FREQUENCY. IT HAS A STABILITY OF **+/ - 20 PPM**.

### **\*\* AMPLIFIER**

THE OSCILLATOR IS FOLLOWED BY ONE AMPLIFIER. THIS ACTS MORE AS BUFFER FOR THE OSCILLATOR THAN AS GAIN STAGE. AND ADD VERY LITTLE POWER TO THE SIGNAL. THE FINAL OUTPUT IS 80DBUV PER METER MAX

### **\*\* ANTENNA**

THE SYSTEM ANTENNA IS A ANTENNA ROD LINKED TO PCB . ANTENNA CAN BE TURNED OUT OR IN PENDING USER'S WISH.

### **\*\* MICROCONTROLLER**

- \* THE TX SYSTEM IS CONTROLLED BY A SMALL MICROCONTROLLER RUNNING WITH A 128KHZ **+./- 20%** OSCILLATOR
- \* THE RX SYSTEM IS CONTROLLED BY A SMALL MICROCONTROLLER RUNNING WITH A 128KHZ **+./- 20%** OSCILLATOR