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ENGINEERING DEPARTMENT

ITEM NO: **RC DOLPHIN**
MODEL NAME:- **27.145MHZ**
FREQUENCY :- **27.145MHZ**
DATE :- **27-7-2006**
BY: **B.LEE**
REV **ORIG**

(CIRCUIT DESCRIPTION)

**** CIRCUIT DESCRIPTION :-**

IN TRANSMIT MODE.

WHEN THE CONTROL KNOB IS PRESSED, A CW SIGNAL IS TRANSMITTED. THE CRYSTAL CONTROLLED OSCILLATOR Q1 OUTPUT IS COUPLED THROUGH C8 TO THE BASE OF Q2. FROM Q2 THE SIGNAL IS FED THROUGH T-2 . Q2 OUTPUT IS COUPLED THROUGH C13 TO THE BASE OF Q3. FROM Q3 THE SIGNAL IS FED THROUGH T3. THE LOW PASS FILTER MADE UP OF C17, T3, C18, & L6 WHICH ARE CONNECTED TO THE ANTENNA ROD. THE MODULATION IS PROVIDED BY U-1 , THEN THE FV DIODE WILL BE FREQUENCY MODULATED THE CRYSTAL FREQUENCY. THE VARIED FREQUENCY(S) WILL THEN BE SENT TO THE BASE OF Q1 THAT WILL MODULATE THE RF TUNED CIRCUIT DIRECTLY. ENERGY IS SUPPLIED BY A 12.0VDC AA ALKALINE BATTERY.

IN RECEIVE MODE

Q1 IS THE TUNED RF AMPLIFIER,
U1 IS THE SUPERHETEROODYNE IC THAT CONTAINS LOCAL OSCILLATOR , MIXER, AND IF AMPLIFIER, AND SIGNAL DETECTOR. U2 IS THE SIGNAL DECODER AND CHANNELS SEPARATION IC . Q9/Q10/Q11 & Q12 ARE MOSFET TRANSISTORS TO DRIVE THROTTLE MOTOR. Q13/Q14/Q15/Q16/Q17 & Q18 ARE THE STEERING MOTOR 1 ACTION MOTOR Q20/Q21/Q22/Q23/Q24 & Q25 ARE THE STEERING MOTOR 1+2 ACTION MOTOR ENERGY IS SUPPLIED BY EIGHT 1.2VDC 1200MA C TYPE NICAB BATTERY.

**** ANTENNA AND GROUND CIRCUITRY.**

THIS UNIT MAKES USE OF AN EXTERNAL 40 -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 8X1.5VDC AA ALKALINE BATTERY.

**** BACKGROUND**

THE DEVICE DESCRIBED HEREIN IS A WIRELESS (RF) TOY CONTROLLER TRANSMITTER FOR USE WITH THE TOY 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 STREAM 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 TWO RF AMPLIFIER, & FINALLY, AN ANTENNA. THE MAIN CHARACTERISTICS OF THIS CONFIGURATION ARE SHOWN BELOW :-

FREQUENCY RANGES	27.145MHZ	
OCCUPIED BANDWIDTH (-20DB)	<100	KC MAX
FREQUENCY STABILITY	+/- 10 PPM	MAX
MODULATION METHOD	F M	5% DEV. MAX
OUTPUT POWER	80 DBUV / M	MAX

REFERENCE OSCILLATOR

A **27.145MHZ** CRYSTAL OSCILLATOR IS USED TO GENERATE THE REFERENCE FREQUENCY. IT HAS A STABILITY OF +/- 10 PPM.

AMPLIFIER

THE OSCILLATOR IS FOLLOWED BY TWO AMPLIFIERS. THESE ACT MORE AS BUFFER FOR THE OSCILLATOR THAN AS GAIN STAGE. AND ADD VERY LITTLE POWER TO THE SIGNAL. THE FINAL OUTPUT IS **80 DBUV** PER METER MAX

ANTENNA

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

MICROCONTROLLER

- * THE TX SYSTEM IS CONTROLLED BY A SMALL MICROCONTROLLER RUNNING WITH A 4 MHZ +/- 10% OSCILLATOR INTERNALLY.
- * THE RX SYSTEM IS CONTROLLED BY A SMALL MICROCONTROLLER RUNNING WITH A **26.540** MHZ +/- 10PPM FOR FIRST LOCAL OSCILLATOR (MIXER IC) AND A 4MHZ FOR 2ND LOCAL OSCILLATOR INTERNALLY(DECORDER IC)