



CMA Testing and Certification Laboratories

廠商會檢定中心

TEST REPORT

Report No. : AP0035437(0)

Date : 04 Jul 2012

Application No. : LP017611(5)

Applicant : ET Tech Limited
Room 2912, Tower 2,
Times Sq, 1 Matheson Street,
Causeway Bay, Hong Kong

Sample Description : One(1) item of submitted sample stated to be Twin Turbine
of Model No. 600761

Radio Frequency : 27.145MHz Transmitter
Rating : 6 x 1.5V AA size batteries
Sample registration No. : RP014854-002
No. of submitted sample : One (1) Piece (s)

Date Received : 04 Jun 2012.

Test Period : 14 Jun 2012 to 25 Jun 2012.

Test Requested : FCC Part 15 Certification.

Test Method : 47 CFR Part 15 (10-1-11 Edition)
ANSI C63.4 – 2009

Test Engineer : Mr. WONG Chi-sum, Sam

Test Result : See attached sheet(s) from page 2 to 26.

Conclusion : The submitted sample was found to comply with requirement of FCC Part 15
Subpart C.

Remark : There are two channels (A, B) and Channel B was tested. The two Channels are
used to change coding to prevent interference.

For and on behalf of
CMA Industrial Development Foundation Limited

Authorized Signature : 

Mr. WONG Lap-pong, Andrew
Assistant Manager
Electrical Division

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FCC ID: JSH-RA1001

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1 General Information

1.1 General Description

The equipment under test (EUT) is a transmitter for Twin Turbine. It operates at 27.145MHz and the oscillation of radio control is generated by a crystal. The EUT is powered by 6 x 1.5V AA size batteries. There are two control sticks, two steering trimmer buttons, one channel (A, B) switch and one ON / OFF / Charging switch on the EUT. The channel switch is used to change coding to prevent interference. The EUT can be provide battery change function during the EUT connected with the receiver and set the ON / OFF / Charging switch to charging position. When the EUT switched "ON", channel selected and control sticks are triggered, it will transmit different radio control signal to receiver.

The antenna is using unique connector and the radio output power is unable to adjust.

The brief circuit description is listed as follows:

- Q1, Q2, Q3, U1 and its associated circuit act as a battery charger.
- U2 and its associated circuit act as an encoder.
- Y1, Q4 and its associated circuit act as an oscillator
- Q5 and its associated circuit act as an amplifier.

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1.2 Location of the test site

Radiated emissions measurements are investigated and taken pursuant to the procedures of ANSI C63.4 – 2009. A Semi-Anechoic Chamber Testing Site is set up for investigation and located at:

Ground Floor, Yan Hing Centre,
9 – 13 Wong Chuk Yeung Street,
Fo Tan, Shatin,
New Territories,
Hong Kong.

Conducted emissions measurements are investigated and also taken pursuant to the procedures of ANSI C63.4 – 2009. A shielded room is located at :

Ground Floor, Yan Hing Centre,
9 – 13 Wong Chuk Yeung Street,
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1.3 List of measuring equipment

| Equipment | Manufacturer | Model No. | Serial No. | Calibration Due Date |
|-------------------|--------------|-----------|------------|----------------------|
| EMI Test Receiver | R&S | ESCI | 100152 | 08 May 2013 |
| Broadband Antenna | Schaffner | CBL6112B | 2718 | 31 Oct 2012 |
| Loop Antenna | EMCO | 6502 | 00056620 | 15 Sep 2013 |
| Coaxial Cable | Schaffner | RG 213/U | N/A | 03 Aug 2012 |
| Coaxial Cable | Suhner | RG 214/U | N/A | 03 Aug 2012 |

1.4 Measurement Uncertainty

The reported uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%.

Radiated emissions

| Frequency | Uncertainty (U _{lab}) |
|------------------------------|---------------------------------|
| 30MHz ~ 200MHz (Horizontal) | 4.79dB |
| 30MHz ~ 200MHz (Vertical) | 4.80dB |
| 200MHz ~1000MHz (Horizontal) | 4.76dB |
| 200MHz ~1000MHz (Vertical) | 4.75dB |

Conducted emissions

| Frequency | Uncertainty (U _{lab}) |
|----------------|---------------------------------|
| 150kHz ~ 30MHz | 3.16dB |



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2 Description of the radiated emission test

2.1 Test Procedure

Radiated emissions measurements are investigated and taken pursuant to the procedures of ANSI C63.4 – 2009.

The equipment under test (EUT) was placed on a non-conductive turntable with dimensions of 1.5m x 1m and 0.8m high above the ground. 3m from the EUT, a broadband antenna mounting on the mast received the signal strength. The turntable was rotated to maximize the emission level. The antenna was then moving along the mast from 1m up to 4m until no more higher value was found. Both horizontal and vertical polarization of the antenna were placed and investigated.

For below 30MHz, a loop antenna with its vertical plane is placed 3m from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. And the centre of the loop shall be 1 m above the ground.

The device was rotated through three orthogonal axes to determine which attitude and configuration produce the highest emission during measurement for Radiated Emission measurement.

2.2 Test Result

Peak Detector data was measured unless otherwise stated.

“#” means emissions appearing within the restricted bands shall follow the requirement of section 15.205.

The frequencies from fundamental up to the tenth harmonics were investigated, and emissions more 20dB below limit were not reported. Thus, those highest emissions were presented in next page (section 2.3).

The emissions meeting the requirement of section 15.209 are based on measurements employing the CISPR quasi-peak detector below 1000MHz and average detector for frequencies above 1000MHz.

It was found that the EUT meet the FCC requirement.



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2.3 Radiated Emission Measurement Data

Radiated emission

pursuant to

the requirement of FCC Part 15 subpart C

Environmental conditions:

| Parameter | Recorded value |
|----------------------|----------------|
| Ambient temperature: | 24 °C |
| Relative humidity: | 55 % |

| Frequency (MHz) | Polarity (H/V) | Reading at 3m (dB μ V) | Antenna Factor and Cable Loss (dB/m) | Average Factor (dB) | Field Strength at 3m (dB μ V/m) | Limit at 3m (dB μ V/m) | Margin (dB) |
|-----------------|----------------|----------------------------|--------------------------------------|---------------------|-------------------------------------|----------------------------|-------------|
| 27.145 | V | 68.7 | 8.8 | -23.0 | 54.5 | 80.0 | -25.5 |
| 54.295 | V | 12.6 | 10.4 | - | 23.0 | 40.0 | -17.0 |
| 81.435 | H | 7.1 | 7.9 | - | 15.0 | 40.0 | -25.0 |
| # 108.580 | H | 8.0 | 11.8 | - | 19.8 | 43.5 | -23.7 |
| # 135.725 | H | 6.4 | 13.7 | - | 20.1 | 43.5 | -23.4 |
| # 162.870 | H | 6.9 | 11.6 | - | 18.5 | 43.5 | -25.0 |
| 190.015 | H | 6.5 | 11.5 | - | 18.0 | 43.5 | -25.5 |
| 217.160 | H | 8.0 | 11.0 | - | 19.0 | 46.0 | -27.0 |
| # 244.305 | H | 10.2 | 11.0 | - | 21.2 | 46.0 | -24.8 |
| # 271.450 | H | 7.3 | 14.9 | - | 22.2 | 46.0 | -23.8 |

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3 Description of the Line-conducted Test

3.1 Test Procedure

Conducted emissions measurements are investigated and also taken pursuant to the procedures of ANSI C63.4 – 2009. The EUT was setup as described in the procedures, and both lines were measured.

3.2 Test Result

No measurement is required as the EUT is a battery-operated product.

3.3 Graph and Table of Conducted Emission Measurement Data

Not Applicable



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4 Photograph

4.1 Photographs of the Test Setup for Radiated Emission and Conducted Emission

For electronic filing, the photos are saved with filename TSup1.jpg to TSup2.jpg.

4.2 Photographs of the External and Internal Configurations of the EUT

For electronic filing, the photos are saved with filename ExPho1.jpg to ExPho2.jpg and InPho1.jpg to InPho2.jpg.



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5 Supplementary document

The following document were submitted by applicant, and for electronic filing, the document are saved with the following filenames:

| Document | Filename |
|-------------------------|--------------|
| ID Label/Location | LabelSmp.jpg |
| Block Diagram | BlkDia.pdf |
| Schematic Diagram | Schem.pdf |
| Users Manual | UserMan.pdf |
| Operational Description | OpDes.pdf |

5.1 Bandwidth

Appendices A5. shows the fundamental emission is confined in the specified band. It also shows that the band edge met the 15.209 requirement at 26.9599 and 27.2801 MHz.

5.2 Duty cycle

The plots saved in Appendices A6.

The duty cycle is simply the on-time divided by the period:

The duration of one cycle = 98.8ms

Effective period of the cycle = $(2 \times 600\mu\text{s}) + (7 \times 400\mu\text{s}) + (4 \times 300\mu\text{s}) + (9 \times 200\mu\text{s})$
= 7ms

Duty Cycle = 7 / 98.8
= 0.07

Therefore, the average factor is found by $20 \log_{10} 0.07 = -23.0\text{dB}$

5.3 Transmission time

Not Applicable



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6 Appendices

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| A2. | Photos of External Configurations | 1 | page |
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| A4. | ID Label/Location | 1 | page |
| A5. | Bandwidth Plot | 1 | page |
| A6. | Average Factor | 3 | pages |
| A7. | Block Diagram | 1 | page |
| A8. | Schematics Diagram | 1 | page |
| A9. | User Manual | 4 | pages |
| A10. | Operation Description | 1 | page |

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A1. Photos of the set-up of Radiated Emissions



Test Setup 1 (<30MHz)



Test Setup 2 (>30MHz)

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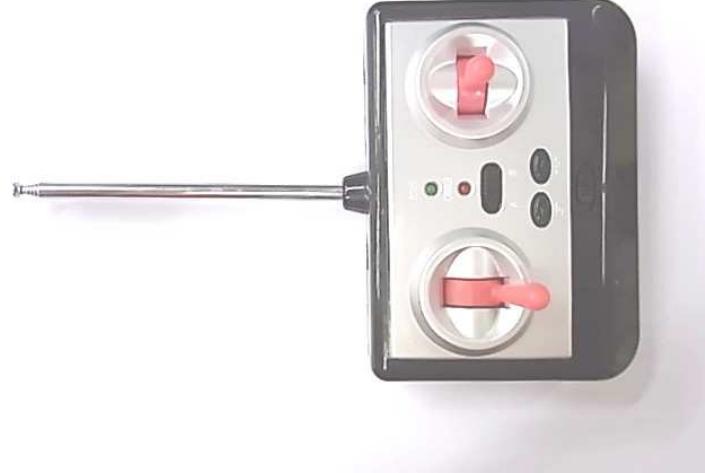
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A2. Photos of External Configurations



External Configuration 1



External Configuration 2

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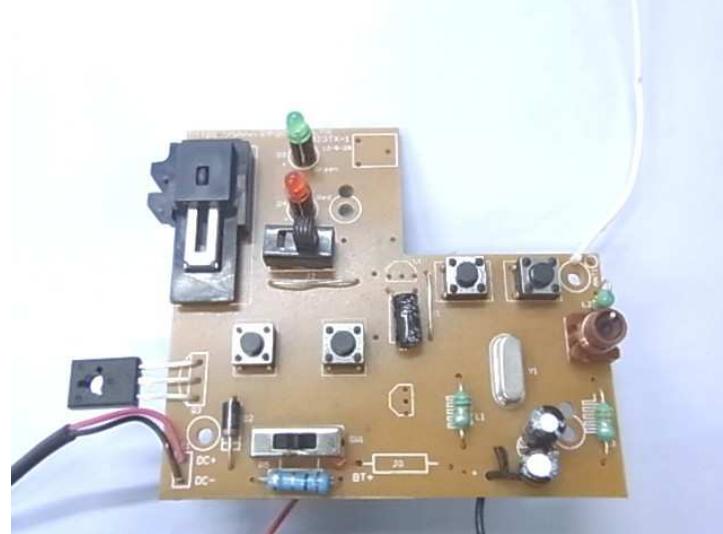
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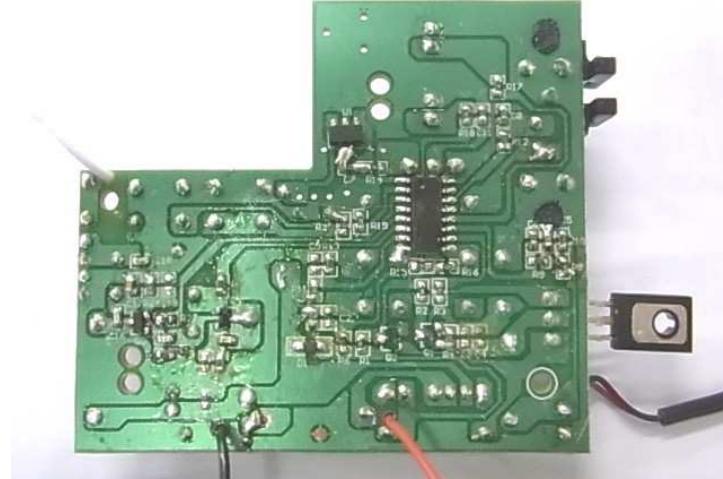
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A3. Photos of Internal Configurations



Internal Configurations 1



Internal Configurations 2

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A4. ID Label/Location

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This device complies with Part 15 of the FCC Rules.

Operation is Subject to the following two conditions:

- (1) this device may not Cause harmful interference, and
- (2) this device must accept any Interference received, including interference that may cause Undesired operation

ID Label 1



ID Label 2

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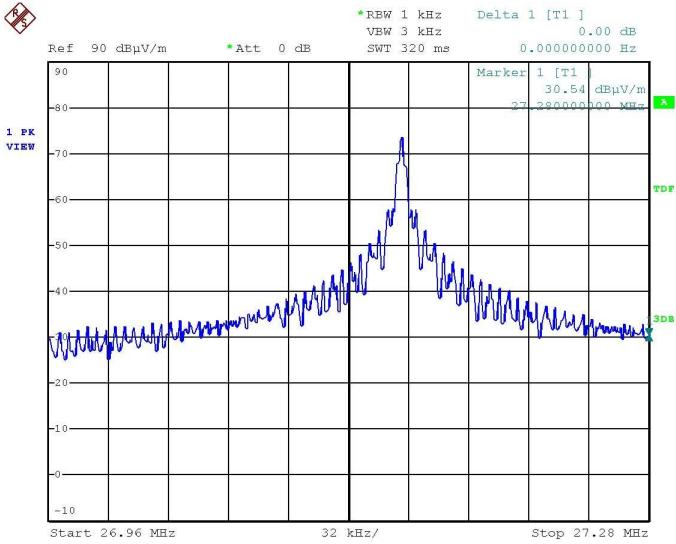
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A5. Bandwidth Plot



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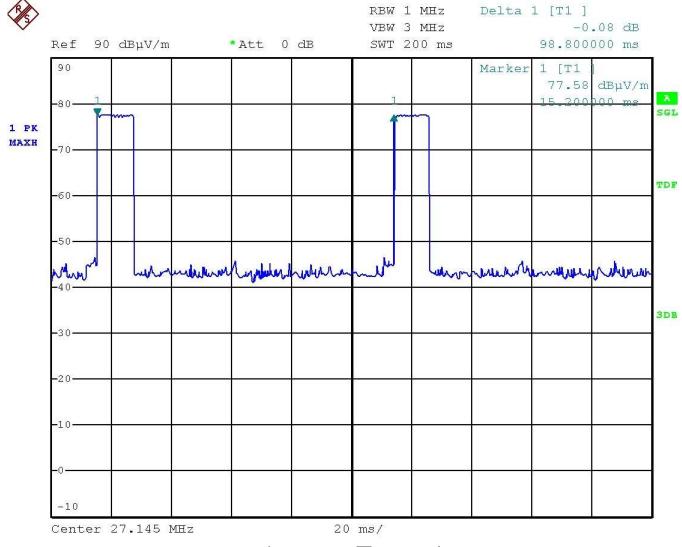
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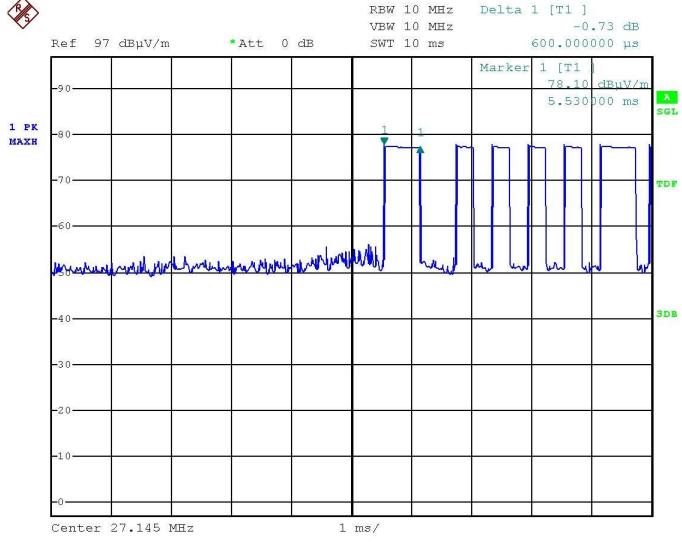
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A6. Average Factor



Average Factor 1



Average Factor 2

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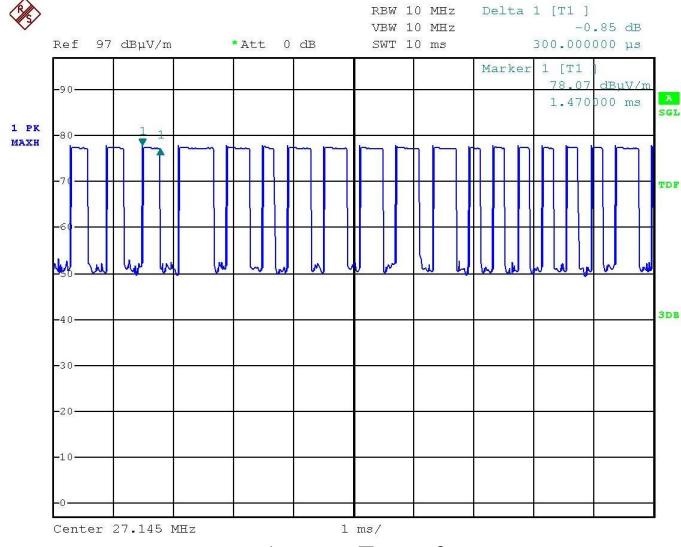
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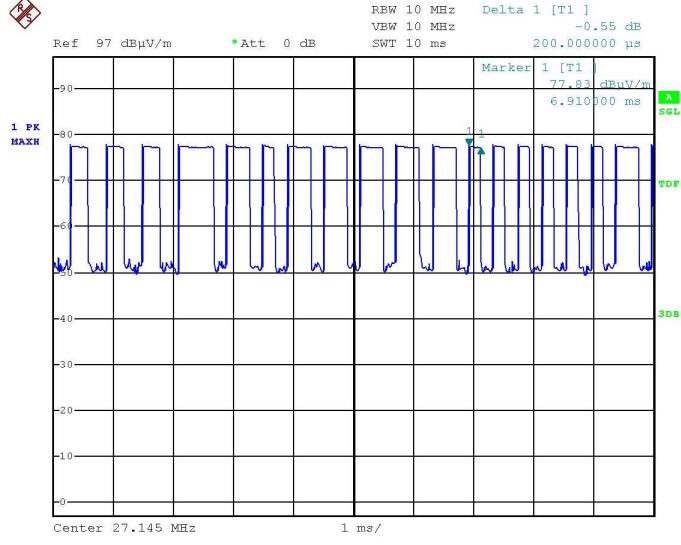
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A6. Average Factor



Average Factor 3



Average Factor 4

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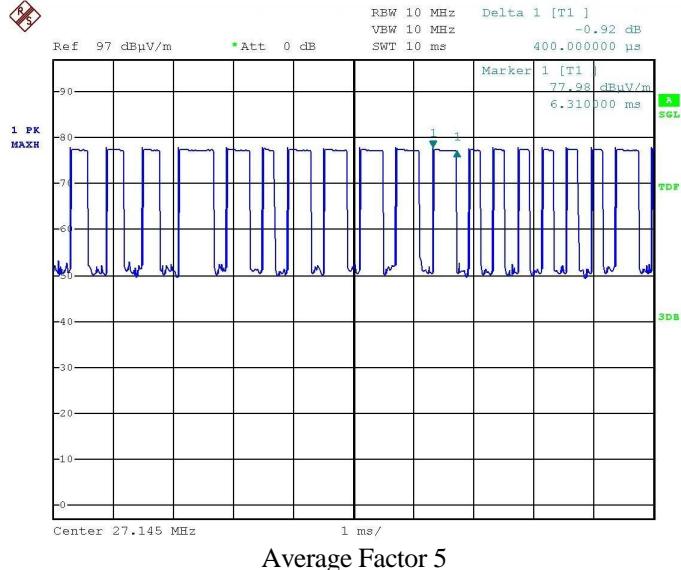
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A6. Average Factor



Average Factor 5

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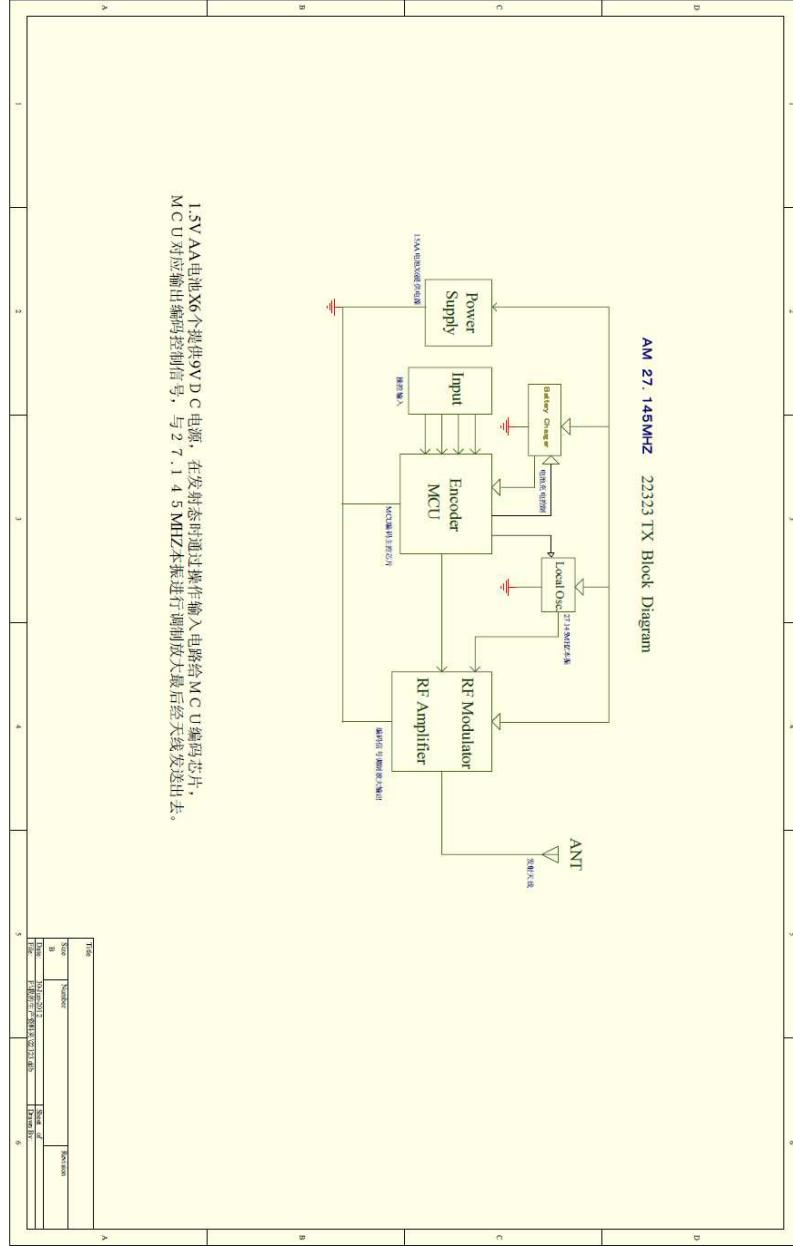
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A7. Block Diagram



1.5V AA 电池 X6 个提供 9V DC 电源，在发射态时通过操作输入电路给 MCU 编码芯片，MCU 对应输出编码控制信号，与 27.145 MHz 本振进行调制放大最后经天线发送出去。



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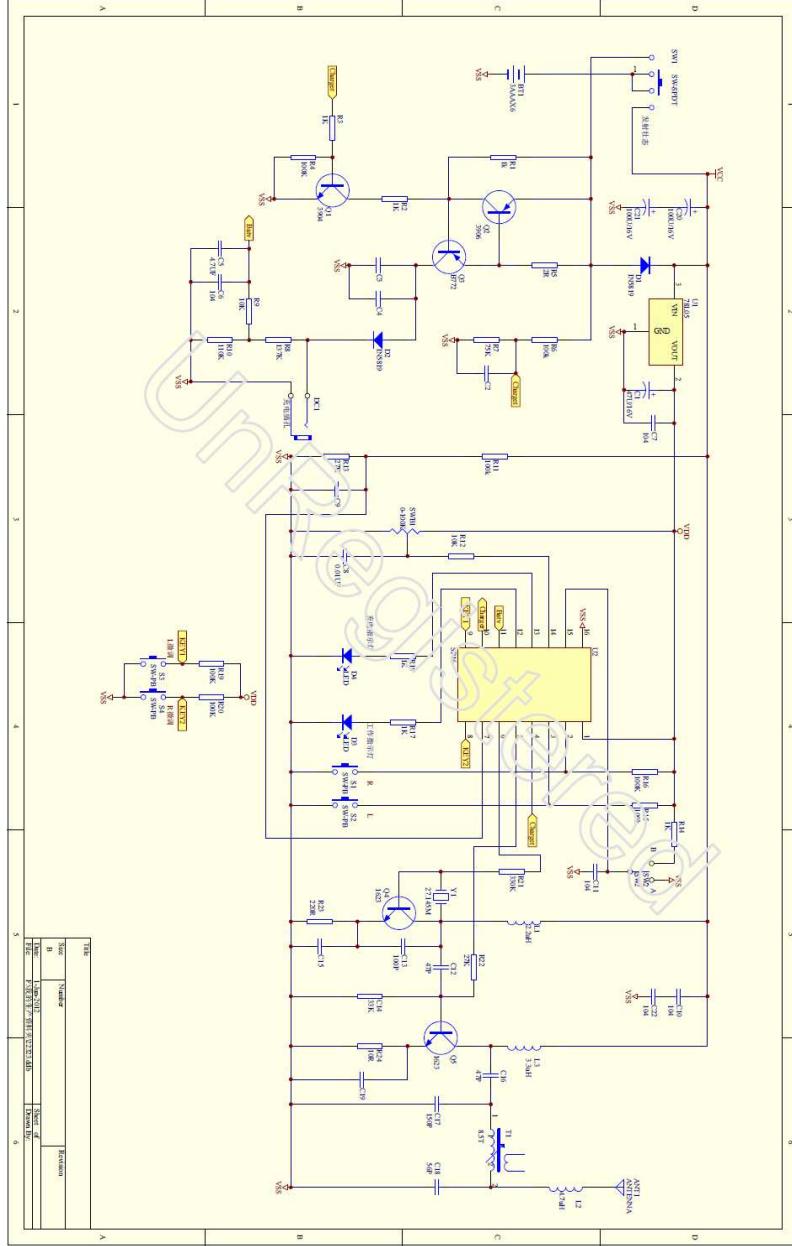
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A8. Schematics Diagram



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A9. User Manual



TURBINE

Key Features:

- Twin Duct Fan.
- Unique material Withstand Crashes.
- Precision Speed Control.
- Lithium Battery For Long Flight Time.
- 2Ch function.

Safety Precautions:

Warning: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
 -Keep hands, hair and loose clothing away from the propeller when power switch is turned on.
 -Turn off transmitter and plane when power switch is turned on.
 -Remove batteries from transmitter when not in use.
 -Parental guidance is recommended when using this toy.
 -Keep your plane in your sight so that you can supervise it all the time.
 -New and alkaline batteries are recommended for use in transmitter to obtain best and maximum performance.
 -You are advised to replace with new batteries as soon as the function becomes impaired.
 -Users should keep the plane away from other electronic devices.
 -Users should keep strict accordance with the instruction manual while operation the product.
 -Your Transmitter charger is tailor-made for the Li-Poly rechargeable battery used in plane. Do not use it to charge any battery other than that in the plane.

FCC Statements

This device complies with part 15 of the FCC rules. Operation is subject to the following conditions:

- 1)This device may not cause harmful interference, and
- 2)This device must accept any interference, including interference that may cause undesired operation.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates use and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Battery Cautions:

- Non-rechargeable batteries are not to be recharged.
- Rechargeable batteries are to be removed from the toy before being charged(Transmitter only).
- Rechargeable batteries are only to be charged by an adult.
- Different types of batteries or new and used batteries are not to be mixed(Transmitter only)
- Only batteries of the same or equivalent type as recommended are to be used.
- Batteries are to be inserted with correct polarity.
- Exhausted batteries are to be removed from the toy(Transmitter only).
- The supply terminals are not to be short-circuited.

Your plane is equipped with a Li-Poly battery,

please also pay attention to the following cautions for safety use:

- Do not dispose the battery in fire or heat.
- Do not use or leave the battery near a heat source such as fire or heater.
- Do not strike or throw the battery against hard surface.
- Do not immerse the battery in water, and keep the battery in a cool dry environment.
- When recharging, only use the battery charger specifically for that purpose.
- Do not over-discharge battery.
- Do not connect the battery to an electrical outlet.
- Do not directly solder the battery and pierce the battery with a nail or other sharp object.
- Do not transport or store the battery together with metal objects such as necklaces, hairpins etc.
- Do not expose the battery to the sun.
- Charge the battery every 6 months.
- Turn off your equipment power switch after use
- As for a used battery, please recycle after covering the battery terminals with insulation tape or inserting it to an individual poly-bag.

Care and Maintenance:

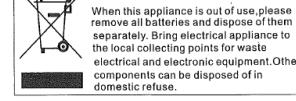
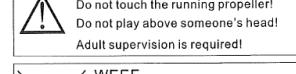
- Always remove batteries from the toy when it is not being used for a long period of time.(For transmitter only)
- Wipe the toy gently with a clean damp cloth.
- Keep the toy away from direct heat.
- Do not submerge the toy into water that can damage the electronic assemblies.

Note:

- Parental guidance is recommended when installing or replacing batteries.
- Under the environment with electrostatic discharge, the sample may malfunction and require user to reset the sample.

Special Note to Adults:

- Regularly examine for damage to the plug, enclosure and other parts. In the event of any damage, the toy must not be used with the transmitter charger until damage has been repaired
- This toy is not intended for children under 3 years old.
- This toy must only be used with the recommended charger.
- Do not try to charge other batteries with transmitter Charger.





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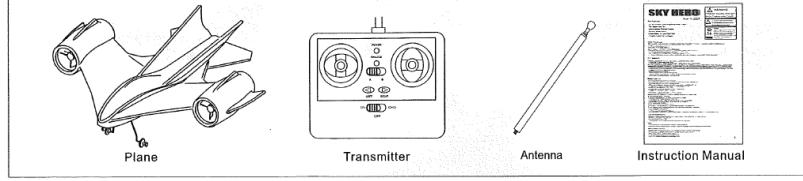
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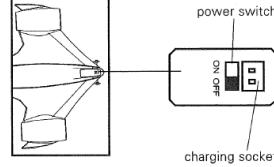
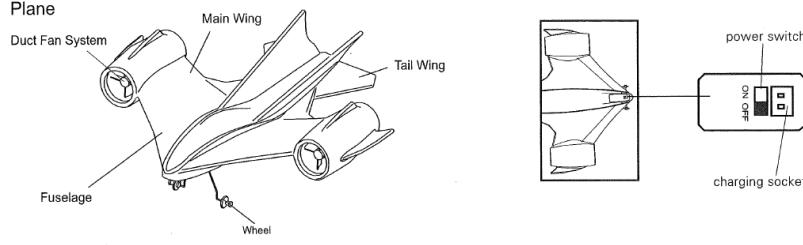
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A9. User Manual

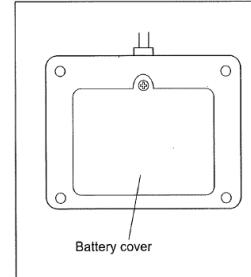
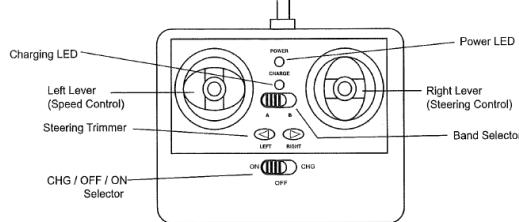
Pack List



Parts Index:



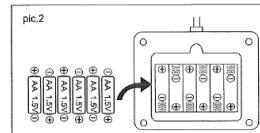
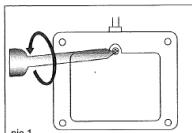
Transmitter



Flying Preparation:

Battery Installation-Transmitter

Make sure the power switch is on "OFF" position.
1. Use a screwdriver to loosen screw on the battery case in counter clockwise. (pic. 1)
2. Put 6 AA size batteries in the battery compartment as per the polarity shown in (pic. 2)
3. Tighten the screw in clockwise.





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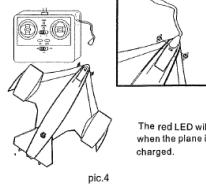
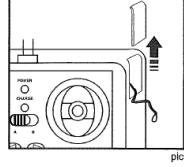
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Battery Charging:

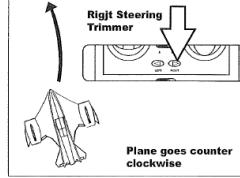
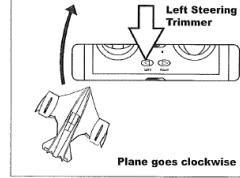
Turn off the power of the plane and transmitter
 1. Connect the charging socket of the plane and transmitter
 2. Set the "CHG/OFF/ON" selector to "CHG" position.(pic.3)
 The red LED will light up (pic.4)
 3. The red LED will turn off when then battery is fully charged
 4. It may take up to 20-30 minutes to fully charge the battery
 and a fully charged battery can serve up to 5 minutes flight.
 The charging times may vary as to the battery status
 because your charger has intelligent charging control.
 5. Lithium Polymer battery is built-in the plane. DO NOT
 DISASSEMBLE THE PLANE which may result in permanent
 damage or dangerous response.



The red LED will light up when the plane is being charged.

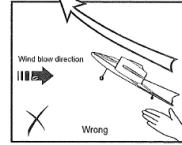
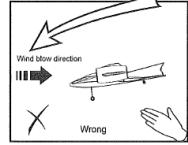
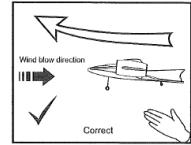
Flying your Plane

1. Screw in the antenna on transmitter.
2. Set the band on transmitter the same to the plane.
3. Set the ON/OFF switch on the plane to ON. **BE SURE THE TRANSMITTER IS "OFF" when turning the plane on.**
4. Set the left lever on transmitter to MINIMUM throttle, then set it to ON.
5. Make sure you have sufficient room to launch and fly.
 Set the right lever on transmitter to its neutral position, then push the throttle to the middle and hand toss the plane. Press the left steering trimmer when the plane tends to turn clockwise or the right steering trimmer if the plane turns counter clockwise. Push the left lever to MINIMUM to stop the plane.
 Repeat the above steps several times to make your plane flies straight.

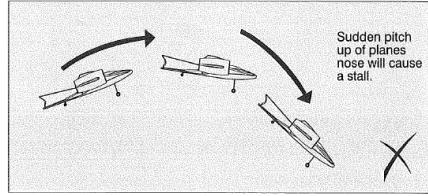
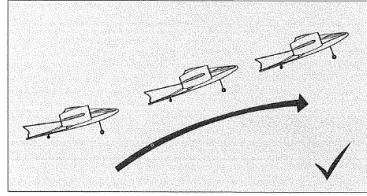


IMPORTANT :
PLANE MUST BE TRIMMED CORRECTLY BEFORE FLYING!

6. Be sure the plane is horizontal and that you are throwing it into the wind.



7. Set the right lever in its neutral position, then push the left lever (throttle) to MAXIMUM and hand throw the plane out for flight.



a) The correct flight pattern would be:

b) If the plane raise its nose very quickly, it may fly near stalling speed and fall.

You should pull the left lever down (throttle down) to let it fly in horizontally.

8. When your plane can fly steadily, you can move the right lever to left or right so that it can turn to clockwise or counter clockwise.
 You may need to tap rather than hold the right lever for
 The "turning" function depends on the running speed variation between left and right duct fan.
 If the plane response slowly to your command, you should throttle up for better performance.

9. Landing: Turn your plane facing the wind, then throttle down.

10. Table 1 on the next page should give you a rough idea of the relation between transmitter operation and the plane response.



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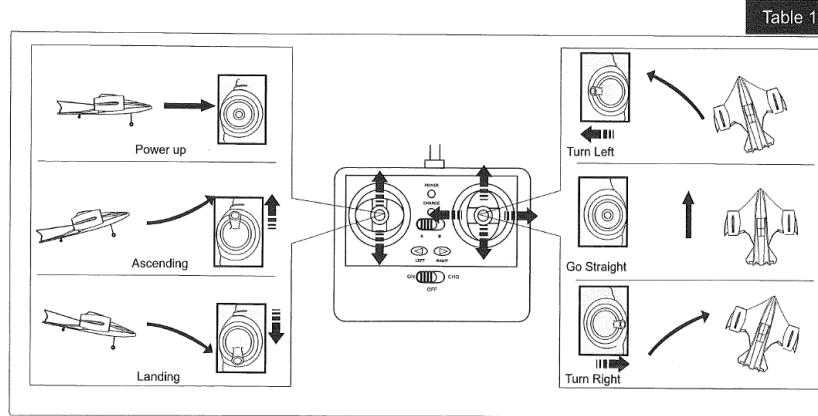
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Playground and Weather selection

- a) Best conditions for flying are sunny, calm or slightly breezy days.
Precaution: Because of its light weight, it may be blown away under strong wind.
- b) We suggest flying over large grassy areas to protect your plane if it impacts the ground.
- c) Do NOT fly when it is raining, snowing or near high power lines.



Trouble Shooting

| Symptom | Cause | Correction |
|---|--|---|
| The plane won't move | -ON/OFF Switch is OFF . -Weak Battery. | -Set switch to ON. -Re-charge the battery pack |
| Plane turns or loses altitude in flight. | -Trimmer is not turned properly. | -Adjust the trimmer. |
| Plane won't take off or tends to crash. | -Plane is not turned into the wind before taking off. -Weak power. -Flying at the wrong elevator angle or speed. | -Toss the plane into the wind on take off. -Re-charge the battery pack -Use the Throttle Trimmer for precise power control or tap (not hold) the left control lever on transmitter. |
| Drop down at the climbing state or before take off | -Weak power. | -Re-charge the battery pack. |
| The Plane does not react, or reacts poorly to operation by transmitter. | -High-frequency interference occurred near to high-voltage lines, transformers and some types of building. | -Avoid these if possible, or choose another place to operate the plane. |
| Loss of control | -Another radio control the plane using the same frequency and channel is operated near your plane. -Out of the control range of distance. | -Move to another place where without radio frequency interference from another device. -Ensure the antenna is fully extended. The plane fly up to 80-100 meters in open space. |
| Plane can not be charged after connected with charging socket | -Connection is not fixed. -“CHG/OFF/ON” button is not set. | -Pull it out and connect again. -Push the “CHG/OFF/ON” button to “OFF” and then “CHG” again. |



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A10. Operation Description

Transmitter Operational Description

Remote controller used 1.5V *6 'AA' batteries, it is designed to operate a single fixed frequency in the 27.145MHz band, Please see attached block diagram and schematic.

Device has two joysticks. One controls receiver forward and the other one control receiver turns left and right. One Encoder MCU is used on transmitter. The MCU receives controlling signal, a encoded serial bit-stream is sent out via RF Modulator, RF amplifier and antenna.

Receiver Operational Description

Receiver is used 3.7V LiPolymer battery to supply power, Antenna receive the modulated signal, the signal is demodulated through Super Regen Motor Demodulator, the demodulating signal is amplified and decoded by MCU, MCU send out driving signal to drive the Motor.

***** End of Report *****

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