

BELTROL

2.4 Ghz Radio Control

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PLANET TWISTER

R/C ELECTRONIC SPEED CONTROLLERS
FOR LOW COST 2.4 Ghz 5 CHANNEL RADIO CONTROL.

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PLEASE NOTE. PDF WIRING DIAGRAMS ARE AVAILABLE HERE.
http://www.beltrol-rc.com/index.php?page_id=1332

INSTRUCTIONS.

Thank you for purchasing this Microprocessor (uP) based R/C Electronic Speed Control (ESC) system.

THIS SYSTEM REQUIRES THE PLANET TWISTER 2.4 GHZ R/C FOR ALL INSTALLATIONS.

USE 7.2v - 18v BATTERIES for the **BELTROL AL-3r** ESC's.

USE 14.4v - 18v BATTERIES for the **BELTROL OM-3** ESC's.

USE 14.4v - 28v BATTERIES for the **BELTROL AL-5r, AL-10r, OM-PnP, OM-3hv, OM-6 & OM-9** ESC's

DO NOT CONNECT TO MAINS POWER (110 - 240V AC).

The **BELTROL ALPHA** ESC's HAVE BEEN DESIGNED TO BE AN ENTRY LEVEL ESC AT THE LOWEST POSSIBLE COST, COMBINED WITH SMOOTH PERFORMANCE & BULLET PROOF RELIABILITY. THEY DO NOT HAVE DIRECTIONAL CONSTANT BRIGHTNESS LIGHTING OR SOUND TRIGGERS.

The **BELTROL OMEGA** ESC's DO HAVE LIGHTS AND SOUND TRIGGERS.

We tested this system three times during manufacture and it was working normally when it left our factory. If damage in transit has occurred please return to place of purchase for attention.

THIS ESC IS GUARANTEED FOR ONE YEAR.

INCLUDED ARE ONE OR THE OTHER OF THE FOLLOWING COMPONENTS:

AL-3r, AL-5r AL-10r, OM-PnP, OM-3, OM-3hv, OM-6 or OM-9 ESC.

They come complete with plug in servo leads.

You will supply the 2.4 Ghz 5 channel Digital Proportional **PLANET TWISTER** R/C.

You will supply a locomotive or trail car, the 7.2 - 24 volt traction batteries (depending on ESC), a fuse, an ON-OFF switch and wires to connect the **ESC** to the battery and motor(s).

Where soldering is necessary, we recommend a low wattage soldering iron and resin core solder.

SPECIAL NOTE ABOUT CHANNEL # 5.

It has been brought to our attention that the **PLANET T5 Ch # 5 OFF - ON** switch is oriented differently in some markets. These instructions refer to "0" as being the **ON** position and "1" as being the **OFF** position. Ch # 5 should always be off unless calibrating or programming the system. If when you turn on the RX and the ESC front & rear lights flash rapidly, **Ch # 5** is turned **ON** and the system is ready for calibrating or programming, not operation. You will not be able to operate the system until **Ch # 5 is OFF**. See also TROUBLESHOOTING on page # 8.

CAUTION

DO NOT ATTEMPT TO ALTER THE TUNING OF THE RADIO EQUIPMENT
DO NOT USE RADIO CONTROL EQUIPMENT IN THUNDERSTORMS

CHILDREN UNDER 12: ADULT SUPERVISION RECOMMENDED DURING USE.

INSTALLING **BELTROL ESC's**.

BELTROL R/C ESC motor drivers use T5 5 channel 2.4 GHz digital proportional R/C with servo outputs. We have conducted development & testing with both Mode # 1 & Mode # 2 systems. These have sprung Elevator & non sprung Throttle controls which are used to control the locomotive. The **ALPHA** series requires the # UPGRADE-A or # UPGRADE-B kit to access lights and sound triggers. Channel # 5 (sometimes called the Landing Gear control switch) is used only for initial speed calibration and making system program changes such as Start/Max voltage, Default direction and system reset. See page # 4 for information as to how the TX sticks are used.

SHORT CIRCUIT & OVERLOAD PROTECTION.

All **BELTROL** series **ESC's** are self protecting.

Although there is output overload and short circuit protection built into them it is essential you fuse the battery supply for overall system protection. See the wiring diagram pages.

BELTROL series **ESC's** provide a 5 volt BEC supply for the R6M 6 channel receiver via the supplied JR[®] (or Hi-Tec[®]) servo leads which are compatible with T5 2.4 GHz R/C.

You do not need batteries. Extra servos can be powered from the receiver.

It is not necessary to separate 2.4 GHz R/C systems with crystals. They are all legal for air & ground use. Every TX has a unique identifier code and any receiver R6M RX can be "**BOUND**" to any T5 TX.

You can mount the PCB with double stick tape or non conductive silicone. Do not allow metal objects to touch the rear of the PCB. Damage to the PCB may result.

Keep the RX well away (2" - 3") from the throttle, motor(s), batteries and any speakers.

Other than with brass locos, it does not matter where you place the antenna.

We have 200' + range with the system in plastic locos. There is **NO** "glitching" or "Rusty Bolt Effect".

N.B. With metal locos the antenna **MUST** be vented externally otherwise range will be reduced.

We can turn the T5 2.4 GHz TX OFF to save the batteries & the loco will "Cruise" along until the TX is turned ON again & manual control resumed. The **BELTROL** program ignores the TWISTER T5 Fail safe.

Please read the following with the diagram page for your particular ESC.

E. For the direction control insert the pre-wired 3 x wire servo plug into the **Elevator** channel. (Ch # 3).

T. For the speed control insert the pre-wired 1 x wire servo plug into the **Throttle** channel. (Ch # 1).

G. For the speed calibration insert the pre-wired 1 x wire servo plug into the **Gear** channel. (Ch # 5).

A. For the sound trigger functions insert the pre-wired 1 x wire servo plug into the **Aileron** channel. (Ch # 2).

This is the L – R stick on the Throttle control. It may suit you better to use L – R Rudder control (Ch # 4).

Siting & Polarity of each plug is important. The **ORANGE** signal wire goes towards the middle of the RX.

IT IS MOST IMPORTANT THAT THE "SERVO" LEADS COMING FROM THE ESC ARE PLUGGED INTO THE CORRECT SOCKETS ON THE RX. THE SYSTEM WILL NOT FUNCTION CORRECTLY IF THEY ARE MISPLUGGED.

INSTALLING THE **BELTROL ESC**.

Connect the traction battery, which **MUST BE FUSED**, as per the wiring diagram.

BELTROL R/C offers a variety of installation kits for on board use such as the # **BIK-U3/6** which has screw terminals to simplify installations. For trail car installations we also have the # **BIK-TC5**.

Make sure the battery pack is fully charged before using the system.

Connect the motor(s) as per the wiring diagrams. There is usually no need to suppress the motor(s).

In most installations the system will function perfectly well without motor "Noise" suppression.

BELTROL ALPHA ESC's do not have directional lighting or sound triggers. (# **UPGRADE-A** or **B** required).

BELTROL OMEGA ESC's have directional lighting plus 2 x manual & 1x automatic sound triggers.

Use the # **RELAY-v5** if you want to control the regular loco wiring by reversing the traction battery voltage. This can save a lot of wiring in many locos. It is especially useful in USA Trains[®] locos to control incandescent bulbs or LED's up to 5 amp & smoke features.

IT IS MOST IMPORTANT THAT THE LIGHT BULBS BE COMPLETELY ISOLATED FROM ANY OTHER WIRING.

Please note: If the # **RELAY-v5** has been used the lights will flash alternately, not together.

The following instructions assume the operator has used the available front & rear transistor lighting outputs.

SETTING UP THE **BELTROL** ESC's.

THESE INSTRUCTIONS REFER TO THE **TWISTER T5** 2.4 GHz 5 CHANNEL R/C.
LAYOUT OF THE T5 TRANSMITTER.



Shown above is a Mode # 1 TX.
The Elevator & Rudder stick is on the left.
The Throttle & Aileron stick is on the right.
The Ch # 5 switch is in top left corner.



Shown above is a Mode # 2 TX.
The Elevator & Rudder stick is on the right.
The Throttle & Aileron stick is on the left.
The Ch # 5 switch is in top left corner.

Prior to using this system there are two procedures that must be carried out by the operator.

1. "BINDING".

The 1st procedure is to "BIND" the R6M Receiver (RX) to the T5 Transmitter (TX).

"BINDING" is accomplished by following a few simple steps that are outlined in the R/C system instructions. In case you don't have those instructions here is how we go about it.

Although the **BELTROL** program ignores the RX Fail Safe commands, before "BINDING" the operator should nevertheless set up the failsafe as TWISTER intended.

The operator must have the spring loaded TX stick positions in neutral & the throttle stick to zero. Stick down. All the servo reversing switches must be set to normal.

Firstly set up the TX trim tabs on all four control sticks. These MUST be in the middle.

The TWISTER T5 has regular slide type trim tabs.

Once the trim tabs are in neutral you can proceed with the "BINDING" process.

There is no trim switch on Ch # 5 which must be set to the "1" position. This is opposite to SPEKTRUM DX5e.

The TRIM tabs are easy to accidentally move. Re-center them occasionally. No need to rebind.

HOW TO "BIND".

1.1 The Twister uses a tiny pushbutton on the R6M RX & does not have a removable plug. This makes rebinding the loco to a different TX impossible when the RX is mounted inside a loco.

Turn the loco power ON. Then press the small "pushbutton" on the side of the R6M RX.

1.2 .The RX LED will repeatedly blink 3 x times rapidly to indicate it is ready to be bound.

Please note the green LED on the **ESC** pcb & the front and rear lights (if fitted) will stay OFF.

The loco will always give a very slight jerk at switch ON.

1.3 Turn the TX power switch to ON. Almost immediately the RX LED on the will blink very rapidly three times and then go solid ON to indicate "BINDING" is complete. The **ESC** LED & both loco lights will immediately blink three times & then go to solid ON.

Binding is complete.

2. CALIBRATION.

The 2nd step in system preparation is to calibrate the direction & throttle sticks. Even though this step is only needed once when first setting up a new ESC, from time to time it is advisable to run through the procedure.

2.1 Turn ON power to the loco which will give a slight jerk. The RX LED will blink slowly. Other lights OFF.



2.2 Set the Mode # 1 T5 channel # 5 switch on the TX to "0" ON, i.e. push switch away from you.

2.3 Turn the TX ON. Screen will show TX voltage. Make sure Throttle stick is down. Zero output.

After 2 - 3 seconds the RX & TX will recognise each other & the RX blinking LED will go to solid ON. The **ESC** LED & both front & rear lights will flash rapidly.



2.4 From zero (down position), gently stroke the Throttle stick backwards & forwards full travel a couple of times. Pause briefly (less than 1 second) at end of each stroke. Then return stick to zero (down position).



2.5 Gently stroke the Elevator stick backwards & forwards full travel a couple of times & let stick go.

2.6 Turn the Channel # 5 switch to "1" OFF. i.e. pull the switch towards you.

The **ESC** LED & loco lights will immediately blink three times at a slower rate & both lights will go to solid ON. The system is in neutral and ready to operate.

2.7 Either turn the loco and TX OFF for later use, or proceed to page # 5.

3. PROGRAMMING.

Operating features of the **BELTROL** system can be programmed from the TX by turning on CH # 5. Channel # 5 is turned ON by pushing the switch away from you to “0”. This is backwards to other R/C's.

Programming can only take place when the system is in neutral.

3.1 START VOLTAGE. This feature is designed to equalise the starting voltage of dissimilar locos.

3.2 TOP SPEED VOLTAGE. This can limit the top speed available. Either for speed matching locos or, for limiting the top speed of one loco, say for when the system is being operated by children.

3.3 MOMENTUM. Toggle momentum control ON or OFF.

3.4 DEFAULT DIRECTION. Re-set the direction of a loco when it is to run back to back with another loco.

3.5 SYSTEM RESET. This takes # 1 & # 2 back to the factory default if incorrectly set.

HOW TO USE THE PROGRAMMING FEATURE.

Turn ON the loco power. The loco will give a slight jerk & the RX and loco lights will stay OFF.

After switch ON, the system will be, & must stay, in neutral. If running, return to neutral before programming.

Only turn the Ch # 5 switch ON **AFTER** the TX has been turned on. **Do not turn the Ch # 5 switch on first.**

SPEED MATCHING.

If you have two or more locos that have dissimilar starting and top speeds, you can adjust those voltages so the locos will be fairly accurately speed matched across the speed range. It has been our experience that absolutely accurate matching is not really needed for smooth performance. The trade off is the top speed of a consist of locos controlled by one TX will be limited to the top speed of the slowest loco.

3.1 START VOLTAGE. We suggest you test the locos you wish to match one at a time to find out the stick setting at which the **slowest** starting locos begin to move. Count the number of clicks from OFF.

Then, with the slowest loco stopped and the direction set to neutral:

Move the throttle stick to the loco start speed desired. i.e. to the stick position where the loco started moving.

Then push the direction (elevator) stick forwards once only. The lights will blink **ONCE** with the push.

Wait a couple of seconds for the lights to blink **ONCE** again indicating the new start voltage setting has been stored in the system memory. Then move the throttle stick back to zero (OFF) position. i.e. stick down.

Then turn channel # 5 OFF. The lights will blink three times and then go to all solid ON. i.e. Neutral.

Repeat the procedure if the setting is incorrect.

3.2 TOP SPEED VOLTAGE. If speed matching, we suggest you test the locos you wish to match one at a time to find out the stick setting at which the **fastest** loco matches the top speed of the slowest loco.

Then, with the fastest loco stopped and the direction set to neutral:

Move the throttle stick to the lower top speed desired for the loco. i.e. to the stick position where the fastest loco matched the top speed of the slowest loco.

Then push the direction (elevator) stick forwards **TWICE** only. The lights will blink once with each push.

Wait a couple of seconds for the lights to blink **TWICE** again indicating the new start voltage setting has been stored in the system memory. Then move the throttle stick back to zero (OFF) position. i.e. stick down.

Then turn channel # 5 OFF. The lights will blink three times and then go to all solid ON. i.e. Neutral.

Repeat the procedure if the setting is incorrect.

OR: Follow the same steps to limit the top speed of any loco when children are using the loco.

3.3 MOMENTUM. Toggle momentum control ON or OFF.

Press the elevator stick forwards three times only. The lights will blink once with each push.

Wait a couple of seconds for the lights to blink **THREE** times again indicating the default direction setting has been stored in the system memory.

Then turn channel # 5 OFF. The lights will blink three times and then go to all solid ON. i.e. Neutral.

3.4 DEFAULT DIRECTION. To re-set the default direction of a loco to run back to back with another loco:

Push the direction (elevator) stick forwards four times only. The lights will blink once with each push.

Wait a couple of seconds for the lights to blink **FOUR** times again indicating the default direction setting has been stored in the system memory.

Then turn channel # 5 OFF. The lights will blink three times and then go to all solid ON. i.e. Neutral.

3.5 SYSTEM RESET. To take # 3.1 & # 3.2 back to the factory default if incorrectly set:

Push the direction (elevator) stick forwards **FIVE** times only. The lights will blink once with each push.

Wait a couple of seconds for the lights to blink **FIVE** times again indicating the voltage settings have been returned to default in the system memory.

Then turn channel # 5 OFF. The lights will blink three times and then go to all solid ON. i.e. Neutral.

OPERATING THE **BELTROL ESC's**.

Please note. If you are using either # **RELAY** option one or the other lights will be ON. Never both.

4. HOW TO OPERATE.

N.B. The TX Ch # 5 switch must be set towards you, "1" OFF

Turn power ON to the loco which will give a slight jerk. The RX will blink & ESC + loco the lights will stay OFF. Then turn the TX ON. After a few seconds (between 2 - 8 seconds) the TX & RX will recognise each other. The RX LED will come ON solid and not blink. The **ESC** LED & both front and rear loco lights (if fitted) will blink three times & then all lights will go to solid ON.

Ensure all three switches on the three way DIP switch on the pcb are set to OFF.

N.B. In order to select a direction the throttle stick must be OFF and the system must be in neutral.

4.1 FORWARDS. To select forwards direction push the Elevator stick fully forwards once & then release it. The rear light will go out. The green LED on the **ESC** pcb & the front light will stay ON.

4.2 SPEEDING UP. Gently push the Throttle stick forwards. The loco will accelerate away after 3 - 4 clicks. The speed is proportional to the stick position with a small amount of momentum built in to prevent sudden jerky movements. Let the stick go once the desired speed has been reached. The speed will stay the same until the Throttle stick is moved either up or down.

In most operating conditions you can turn the TX off to save TX batteries if you wish. The loco will remember the setting and stay there until the TX is switched back on and the Throttle stick moved.

4.3 SLOWING DOWN. Pull the Throttle stick back to the desired speed.

4.4 STOPPING. Pull the Throttle stick back all the way back to stop. The **ESC** LED & front light will be ON.

4.5 REVERSE. You must completely stop the loco first. The Throttle stick must be all the way down.

Then pull the Elevator stick fully back once & release it to return the system to neutral from forwards. The **ESC** LED plus both front and rear lights will be ON.

Then pull the stick back again & release it. The **ESC** LED & front light will go out. The rear light will stay ON. To speed up, slow down & stop in reverse see **SPEEDING UP, SLOWING DOWN & STOPPING** above.

CONTROLLING MOMENTUM & SOUND TRIGGERS.

The **BELTROL ESC's** feature controllable momentum. An operator can control precisely how much or how little momentum effect is applied whilst accelerating and braking. The default is Momentum enabled. Momentum can either be ignored or switched off. See page # 5, # **3.3** for how to switch momentum OFF.

BRAKE RELEASE.

Once direction has been set (see **4.1** above) pull the direction stick back (down) fully & **HOLD** stick in place. Then use the Throttle stick to set the speed you wish to attain.

If you hold the direction stick down the loco will start to accelerate up to the set speed at the slowest rate of acceleration (30 seconds from zero to top speed).

The acceleration rate is proportional to the stick position. Fully down = 30 seconds, half down = 15 seconds.

If you let the direction stick go, the loco will accelerate at the fastest rate (10 seconds from zero to full speed) up to the set speed.

BRAKE APPLY.

Whilst the loco is running pull the direction stick all the way back (down) fully and **HOLD** stick in place.

Then use the Throttle stick to set the speed to zero.

If you hold the direction stick down the loco will start to decelerate to the set speed at the slowest rate of braking (30 seconds from top speed to zero).

The braking rate is proportional to the stick position. Fully down = 30 seconds, half down = 15 seconds.

If you let the stick go the loco will decelerate at the fastest rate (10 seconds from full speed to zero).

SOUND SYSTEM TRIGGERS.

The **BELTROL AL ESC's** have no provision for sound triggers. # **UPGRADE-A** or **B** is required.

The **BELTROL OM ESC's** have three sound triggers. The sprung left to right Aileron stick controls 2 x manual triggers for Whistle/Horn & Bell via ESC output terminals # 1 & # 2. They can be used as is with all sound systems such as Sierra, Phoenix, Dallee & MyLocosound.

Terminal # 3 has 1 x automatic trigger. This is only available when the simulated braking is being used.

Notch 8 (or working) is turned ON when speed ramps up. Notch 8 is OFF when set speed is attained.

Currently this feature can only be used with DALLEE diesel sound systems.

BELTROL ESC MU'ing LOCO CONSISTS.

MULTIPLE LOCOS IN A CONSIST.

The **BELTROL ESC's** are capable of MU'ing multiple locos in one consist of locos.

You can add as many speed matched locos to the loco consist, as you like. Each loco must be bound to the controlling TX. Follow the "BINDING" procedure described above on page # 3.

If the loco to be added has already been speed calibrated, there is no need to repeat the calibration step.

The **BELTROL** program permits reversing default direction & speed matching of locos. Settings for these features are stored in the ESC so that any loco can be acquired by any TX. See page # 5.

HOW TO ADD LOCOS TO A CONSIST.

Turn the first loco OFF. Turn the second loco ON and drive it into position. Turn the first loco back ON.

The lock in feature of the system ensures the direction is set positively. Just make sure both locos are at zero output before changing direction. To make sure the direction is set correctly for all locos in a consist, press the direction stick twice from neutral. Once the direction is set it cannot accidentally change back to neutral.

DELETING LOCOS FROM A CONSIST.

Turn OFF the "to be retained" loco. Leave the "to be deleted" loco ON & drive it away, or, **rebind** it to a different TX for use by another operator. See page # 3.

BELTROL ESC used with the current model QSI® sound.

DO NOT use the PWM ESC's. Only the **ALPHA AL-10r BELTROL ESC** can be used with a QSI® sound system fitted to a PnP socket inside an AristoCraft® loco. The **AL-10r** controls QSI® sound correctly with outstandingly smooth slow speed acceleration & braking. The only practical way to use it is in a trail car with the batteries etc. We recommend a minimum of 18 volts nominal. You can safely use up to 24 volts nominal.

Simply connect the output of the **BELTROL ESC** to the pigtailed on the back of the AristoCraft® loco.

For other brands of locos refer to the QSI® instructions. The track pick ups **MUST** be disabled.

You can use the QSI® as delivered with default "REGULATED THROTTLE CONTROL". We recommend resetting to "STANDARD THROTTLE CONTROL" with level 2 load **BEFORE** setting an idle voltage⁽¹⁾.

The QSI® sound system needs to have an idle voltage applied so that when the loco has stopped the sound system is kept alive. The **BELTROL** system can be programmed to do this. Here is how to do it.

Once the TX & RX have been bound together you need to calibrate the loco speed as described on page # 4.

Once calibrated you now need to set the idle voltage which in effect is the same as setting the start speed.

With the loco switched on, gradually apply throttle until the sound system comes ON⁽¹⁾. Note TX stick position.

Continue to carefully apply throttle until the loco just begins to move. Once again note the stick position.

You need to decide at which point it is that best suits your application. We suggest the idle (i.e. start) voltage should be set midway between the two stick positions you have just determined. Once you have determined what the start voltage is to be, take the throttle stick back down to zero and set the direction to neutral.

Now go into **BELTROL** programming mode (see page # 5 section 3.1.).

After entering programming mode, set the throttle stick position as recommended above.

Then push the direction (elevator) stick forwards once only. The lights will blink **ONCE** with the push.

Wait a couple of seconds for the lights to blink **ONCE** again indicating the new start voltage setting has been stored in the system memory. Then move the throttle stick back to zero (OFF) position. i.e. Stick down.

Then turn channel # 5 OFF. The lights will blink three times and then go to all solid ON. i.e. Neutral.

The QSI® sound system will come on and you are now ready to operate.

CONTROLLING THE SPEED OF A QSI® EQUIPPED LOCO.

To control the loco see page # 6 section 5.1. etc. The loco will **NOT** jerk when power is switched ON.

If the direction is wrong, simply swap over the two wires coming from MM on the **BELTROL ESC**.

When stopped the sound will remain in idle.

CAUTION. DO NOT CONNECT THE OUTPUT OF THE ESC TO ANY NON QSI® EQUIPPED LOCOS.

TRIGGERING THE QSI® SOUND SYSTEM WHISTLE/HORN & BELL.

You will need to fit the **BELTROL # FLIPPER** in series in the MM leads and connect the trigger to the appropriate terminal on the **BELTROL ESC**. See the special **# FLIPPER** wiring diagram.

One or the other of the sideways sticks will trigger the output functions. Only one half of the stick is used.

The stick should be moved one way very briefly to turn the Bell ON & very briefly again to turn the Bell OFF.

Move the same stick the same way & hold it to play the Whistle/Horn. Let the stick go & the play will cease.

BELTROL ESC TROUBLESHOOTING.

No matter how carefully we think we have explained how to do things, we do acknowledge we might have made mistakes or omissions. Here are some possible problem situations to look out for.

WHEN THE LOCO IS SWITCHED ON, ALL LIGHTS COME ON WITHOUT BLINKING & NOTHING WORKS.

This can occur when the TX is switched ON after the loco, with the throttle stick not fully OFF (down).

SOLUTION. Ensure the throttle stick is completely OFF. The lights will blink to indicate linking.

THE LOCO DIRECTION SET STICK & OR SPEED CONTROL IS BACKWARDS.

It is most important to ensure that the servo reversing switches are ALL set to normal.

When the direction is set to forwards the front light must come ON. If it doesn't, reverse the elevator switch.

If the lighting direction is correct but speed is backwards, you must reverse the wiring to the motor(s).

WEIRD ESC BEHAVIOUR FOR NO APPARENT REASON.

The most likely problems you meet will be when the **Ch # 5** switch has been left ON or accidentally turned ON.

SITUATION # 1. If, when the TX is first turned on & the lights blink rapidly, it is because the Ch # 5 switch is **ON** & the system has entered calibration mode.

SOLUTION. Turn the TX OFF. Select the OFF position for the Ch # 5 switch & then turn TX back ON again.

SITUATION # 2. You have been running, & for no apparent reason the lights all went out when you selected neutral, & you have no control. This means the Ch # 5 switch was turned **ON** during running and has entered programming mode. **CAUTION!!** Do not move any control sticks as you may make a program change.

SOLUTION. Before you do anything else, simply turn Ch # 5 switch to OFF & the system will revert to normal operation.

SITUATION # 3. The system was working and for some reason you had a panic situation. You stopped the loco and switched TX off. When you switched back on the loco lights were flashing and you moved the sticks to try and move the loco and now nothing works. You have accidentally turned the Ch # 5 switch **ON** at some stage and altered the original speed and direction calibration.

SOLUTION. Recalibrate the system. See page # 4.

PLEASE ADVISE US OF ANY OTHER PROBLEMS ENCOUNTERED & WE WILL INCLUDE THEM HERE.

CARE & FEEDING OF THE PLANET TWISTER TX.

The PLANET TWISTER transmitter uses 4 x AA size batteries. Either Alkaline dry cells or rechargeables.

We use Sanyo ENELoop rechargeable AA cells which are guaranteed to hold 85% of their charge for 12 months if not being used. Always recharge them after the TX has been used for any length of time.

It is most important to ensure the batteries always have plenty of charge in them when using the TX.

If the voltmeter is less than 4 volts, the batteries are getting low. This may result in loss of control. If you have chosen to use Alkalines, we advise you to replace them immediately.

Official PLANET TWISTER system instructions are available here:

[http://attachments.modelengines.com.au/products/files/7710202\[460\].pdf?r=1256277491](http://attachments.modelengines.com.au/products/files/7710202[460].pdf?r=1256277491)