Remote Control Systems
2.4 Ghz RADIO CONTROL

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PROFESSIONAL
SERIES ESC's
FOR SPEKTRUM R/C

ELECTRONIC SPEED CONTROLLER. (ESC)
SPEKTRUM R/C IS AN "A" GROUP R/C & MUST USE THE PRO GROUP "A" OPERATING PROGRAM.

TABLE OF CONTENTS PROVIDED IN INSTRUCTIONS.

PLEASE NOTE. PDF WIRING INSTRUCTIONS ARE HERE:
http://www.rcs-rc.com/pages/instructions

INSTRUCTIONS.

Thank you for purchasing this Microprocessor based Electronic Speed Control (ESC) system.

Ch # 5 IS NO LONGER USED FOR PROGRAMMING.

THIS NEW SYSTEM CAN USE ANY SPEKTRUM R/C WITH 4 OR MORE CHANNELS.
THESE INSTRUCTIONS REFER TO THE SPEKTRUM DX5e 2.4 GHz R/C.

EVERY *RCS-PRO* SYSTEM IS IN TWO PARTS CONNECTED BY A PLUG IN 4 X WAY CABLE.
1. THE POWER IN – MOTOR CONTROL OUT, PCB &
2. THE DECODER PCB, INTO WHICH THE SPEKTRUM RX IS SIMPLY PLUGGED IN UPSIDE DOWN.
SERVO LEADS ARE NOT NEEDED.

USE ONLY OPERATING PROGRAM PRO-AV1.

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

***RCS-PRO* # PRO-3a & # PRO-6a** ESC's ARE DESIGNED TO RUN ON BATTERIES.
THE # **PRO-PnPa** CAN BE USED WITH TRACK AND BATTERY POWER.
THE HAVE CONSTANT BRIGHTNESS DIRECTIONAL LIGHTS & 4 SOUND TRIGERS.

THE FOLLOWING MAXIMUM VOLTAGES MENTIONED ARE THE **NOMINAL** VOLTAGE & TAKE INTO ACCOUNT THE FACT FULLY CHARGED BATTERIES CAN & DO EXCEED THE **NOMINAL** VOLTAGE.
USE 7.2v – 24 v FOR THE ***RCS-PRO* # PRO-3a, # PRO-6a OR # PRO-PnPA ECS's.**

We tested this system three times during manufacture. 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:
 # PRO-3a, # PRO-6a OR # PRO-PnPa ECS's PLUS ONE PLUG IN PUSHBUTTON CABLE.

You will supply the 2.4 Ghz 4 channel (or more) digital Proportional SPEKTRUM R/C.
You will also supply a locomotive or trail car, the 7.2 – 24 volt traction batteries (depending on ESC), a fuse, an ON-OFF switch and wires where necessary 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.

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 *RCS-PRO* ESC's.

SPEKTRUM IS A GROUP "A" R/C & THIS ESC MUST USE THE PRO-Av1 OPERATING PROGRAM.

RCS-PRO **ESC's** can use most **SPEKTRUM** 2.4 GHz digital proportional R/C's with four (4) or more servo outputs.
Be advised some RX's have wider spaced servo pins such as the AR6210 will not fit into the **# DEC-U.**
We have conducted development & testing with both Mode # 1 & Mode # 2 systems. See page # 4.
These have sprung Elevator & non sprung Throttle controls which are used to control the locomotive.
The L to R Aileron & Rudder sticks are used to trigger 4 x sound effects or control accessories.
A supplied pushbutton is used for initial speed calibration and making system program changes such as Start/Max voltage, default direction start, system reset & sound trigger outputs from momentary to latch ON - OFF
See page # 7 for information as to how the TX sticks are used. Ch # 5 is no longer used for Calibrating & Programming.
The **# DEC-ADAPT** kit is needed if you want to use the Channel # 5 output for a mechanical servo function. (See below).

LOCOMOTIVE SEPARATION.

It is not necessary to separate 2.4 GHz R/C R/C systems with crystals. They are all legal for air & ground use. Every TX has a unique identifier code. Most SPEKTRUM RX's (and DSM2 clones) can be **"BOUND"** to DX5e, DX6i & DX7 TX's.

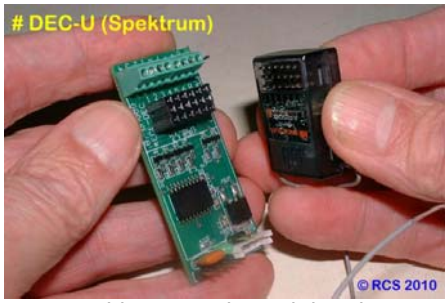
"BINDING" must be done before the system can be used. Ideally it should be done before the RX is plugged into the **# DEC-U** pcb. Use any regular RX battery supply.

However, if this is not possible, we offer, at extra cost, a 3 way cable to temporarily join the RX to the **# DEC-U** before final installation. This will allow access to the "BINDING" socket on the RX for the "BINDING" plug supplied with the DX5e RX.

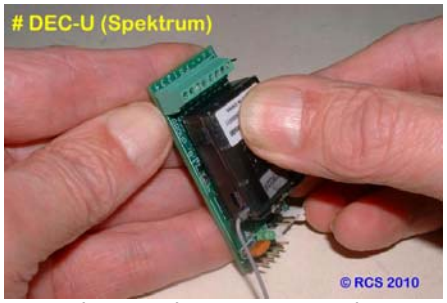
Insert "BINDING" plug into RX. Then place **# EX-LD** into any RX & DEC sockets. Orange wire to centre of pcb.
Remove the **# EX-LD** & binding plug before installing the RX into the **# DEC-U**. **# DEC-U** & AR500 RX shown.
See page # 4 for the **"BINDING"** procedure.

INSERTING THE AR500 RX.

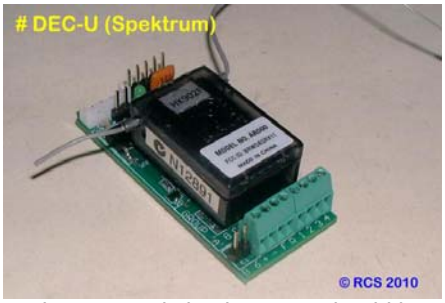
The AR500 2.4 GHz RX, for example, simply plugs into the **# DEC-U** upside down & eliminates all servo leads. Be careful locating the pins into the pcb sockets. You must accurately align the RX pins to the numbers shows. 1 – 6.
It will be a stiff push fit, but do not force the RX home. Alternately, you can remove the RX plastic case.
The **# DEC-U** provides a 5 volt BEC supply for the 6 channel AR500 2.4 GHz RX. The RX does not need batteries



Hold one part in each hand.
Carefully line up pins # 1 – 6.



Then gently press onto socket.
The fit will be tight. Do not force.
The BATTERY – BIND terminals must NOT be connected.

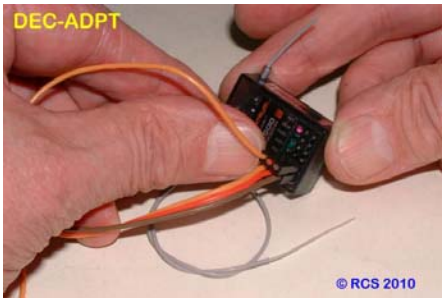


When correctly in place you should be able to clearly see the wording "GROUP 'A' on the edge so marked.

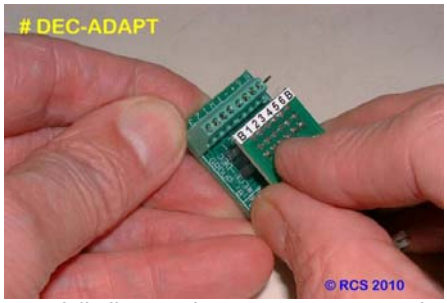
You can mount the **# DEC-U** PCB with double stick tape or non conductive silicone. Do not allow metal objects to touch the rear of the PCB. Damage to the PCB may result.

Alternately, the separately sold **# DEC-ADAPT"** kit permits the RX to be mounted anywhere you wish.

The **# DEC-ADPT** kit.



Insert the 1 x 3 way servo cable & four single wire cables into the TR6a RX. The 3 x wire cable goes to # 1 servo output.



Carefully line up the **# DEC-ADAPT** pcb with pin #'s 1 - 6 on the **# ECL-DEC** & gently press it home onto the sockets.

PLACING RX ANTENNA.
Other than with brass locos, it does not matter where you place the antenna(s).
We have at least 200' + range with the system in plastic locos. There is **NO** "glitching" or "Rusty Bolt Effect".
N.B. With metal locos the antenna **may** need to be vented externally to maximise range. Although there is evidence that 2.4 GHz RX's have been successfully used with the **RX & antenna** inside a dummy water tank of a live steam loco,.
Turn the 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 operating program ignores the SPEKTRUM DX5e Fail safe.

INSTALLING THE *RCS*-*PRO* ESC.
Wiring diagrams for your specific ESC must be downloaded in pdf format from the ***RCS*** website.

http://www.rcs-rc.com/pages/instructions

POWER SOURCES.
You can use battery power. OR: Constant track voltage depending on the **ESC**. See below.
Maximum voltages for a particular ESC are shown on page # 1.
PnP TRACK POWER.
The # **PRO-PnPa** is a Plug'n'Play pcb designed to be used with AristoCraft® and Bachmann® locos equipped with the standard PnP socket. It will collect constant track voltage which is fused & connects to any BELTROL ESC w/screw terminals. Filtered DC is recommended. You may be able to use a non DC supply such as DCC.
Battery back up of the track power is available via an optional extra plug in cable with a suitable steering diode fitted.
Make sure the battery pack is fully charged before using the system.
BATTERY POWER.
Both the # **PRO-3a** and # **PRO-6a** are designed specifically for battery Power only.
Connect the traction battery, which **MUST BE FUSED,** as per the wiring diagram.
RCS **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**.
When used with the Bachmann® K-27, we have a special kit, # **BIK-K27** to simplify installation.
NON PnP TRACK POWER.
Contact ***RCS*** for detailed information on how to set up a circuit with a bridge rectifier and filtering capacitors that will enable the # **PRO-3a** & # **PRO-6a** battery only ESC's to be used with constant voltage track power.

MOTOR CONNECTION.
With # **PRO-3a** & # **PRO-6a** connect the motor(s) as per the wiring diagrams to **M** & **M**. The **M +** motor output is positive (+) in a forward direction.
Our extensive testing without any motor "Noise" suppression has shown the system doesn't any.

The # **PRO-PnPa** is a simple plug in installation. No extra re-wiring to the motors or lights is needed.
AristoCraft® locos. We supply the # **PRO-PnPa** programmed with the default pre-set to suit AristoCraft® locos.
Bachmann® Spectrum® Fn3 locos. You can easily reset the # **PRO-PnPa** default direction to suit the Bachmann® Spectrum® Fn3 locos that have a PnP socket. See page # 6, **3.4 Default Direction**.

SHORT CIRCUIT & OVERLOAD PROTECTION.
All ***RCS*-*PRO*** **ESC's** are self protecting.
Although there is output overload and short circuit protection built into them, it is essential the track power and battery supply be fused for overall system protection. See the wiring diagram pages.

RCS*-*PRO **ESC's** have transistor controlled directional lighting. Please note: Maximum current is 100 ma per terminal.
Please do not try and run multiple incandescent bulbs with the outputs. 2 – 3 LED's will be just fine.

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

Instead of rewiring some locos, sometimes it is much simpler to control the regular loco wiring by simply reversing the traction battery voltage. You can use the # **RELAY-1a** to do this as it 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 1 amp & smoke features.
Please note: If the # **RELAY-1a** has been used, the lights will flash alternately, not together as with transistor outputs.
When the system is in neutral only one set of lights will be lit.

The instructions assume the operator has used the available front & rear transistor lighting outputs or # **RELAY-1a.**
If you do not have any lighting outputs connected you MUST be able to observe the LED on the ESC.

DEFAULT START UP DIRECTION.
When using the # **PnP-ADAPT**, the # **PRO-3a, # PRO-6a (& # PRO-PnPa)** ESC's are programmed to be the same as the AristoCraft® on board TE. As such, the default motor direction & lights for Bachmann® PnP socket equipped locos will need to be reset. See page # 6 section **3.4**.
Also, on some AristoCraft® locos the PnP socket and lights are also wired backwards. In this case the default direction will also need to be reset. See page # 6 section **3.4**. OR:
You can simply swap over the MM & F Light and R Light wires from the # **PnP-ADAPT** at the appropriate terminals on the ESC.

SETTING UP THE *RCS-PRO* ESC's.

THESE INSTRUCTIONS REFER TO THE SPEKTRUM DX5e 2.4 GHz 5 CHANNEL R/C.
LAYOUT OF THE DX5e TRANSMITTER.

Shown above is a Mode # 1 TX.
The Elevator & Rudder stick is on the left.
The Throttle & Aileron stick is on the right

Shown above is a Mode # 2 TX.
The Elevator & Rudder stick is on the right.
The Throttle & Aileron stick is on the left

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 receiver (RX) to the Transmitter (TX).
"BINDING" is accomplished by following a few simple steps that are outlined in the R/C system instructions.

The operating program ignores the RX Fail Safe commands. Nevertheless, the operator should set up the failsafe as SPEKTRUM intended before "BINDING". Set the servo reversing switches to normal.
The operator must have the spring loaded TX stick positions in neutral & the throttle stick to zero. Stick down.

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

The **SPEKTRUM DX5e** has spring loaded digital trim switches. These have 40 positions from one extreme to the other & beep every time they are moved. To accurately determine the neutral position of the trim switches, hold each switch in one direction until it stops beeping. Then press and hold it again to make sure it has reached the extreme. To get back to the middle of the range (neutral) press & hold the switch the opposite way until the fast but quiet beeps stop & the beeps once again are loud. Let the switch go. This is neutral.
Once the digital trim switches are in neutral you can proceed with the **"BINDING"** process.
Be careful. The TRIM switches can be accidentally moved. Re-center them occasionally. No need to rebind.

HOW TO "BIND".
Binding is ideally accomplished before plugging the RX into the **# DEC-U** pcb. This requires a servo battery harness to supply power to the RX. These are not usually supplied with RX systems nowadays. So, if you don't have a battery harness we sell the **# EX-LD** that uses the ESC to power the RX. Plug this in as shown in the **# EX-LD** instructions.
Then:

1.1 Insert the "BINDING" plug supplied with the R/C system into the "BINDING" socket on the SPEKTRUM RX.
See pages # 2 & # 3 for information about gaining access to the "BINDING" socket.

1.2 Turn the loco power ON. The RX LED will start blinking very 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. See Page # 9.

1.3 Pull the long spring loaded TRAINER switch on the TX towards you and **hold it in position**.

1.4 Turn the TX power switch to ON. Almost immediately the four LED's on the TX will start blinking.

1.5 Release TRAINER stick. The RX LED will blink more slowly indicating the binding process has started.
When "BINDING" is complete the RX LED will change to solid ON. If the system has been calibrated the **ESC** LED & both loco lights will immediately blink three times & then go to solid ON. We recommend re-calibration anyway.
N.B. The "BINDING" plug MUST be removed BEFORE the RX is turned OFF.
1.6 The "BINDING" plug is removed & stored safely. Then remove the 3 x wire extension lead. Then replace the RX in the sockets provided on the **# DEC-U**. Only Pin #'s 1 – 6 are used & must be lined up accurately. There is no connection to the Battery/Bind terminals.
The R/C system is now ready for speed calibration.

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.
A pushbutton is supplied for both Calibration and system Programming. This must be mounted for external access.
We have shown the Mode # 2 TX below. Mode # 1 is exactly the same except the sticks are on opposite sides.

2.1 Turn the TX ON.
Make sure Throttle stick is down. Zero speed set.

2.2 Press and HOLD the push-button down & turn the ESC/Rx ON. Then release the pushbutton.

Reaction; The **ESC** LED & both front & rear lights will turn solid ON & stay ON for 6 seconds waiting for the TX and RX to link up. Once linked the **ESC** LED & both front & rear lights will flash rapidly.

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

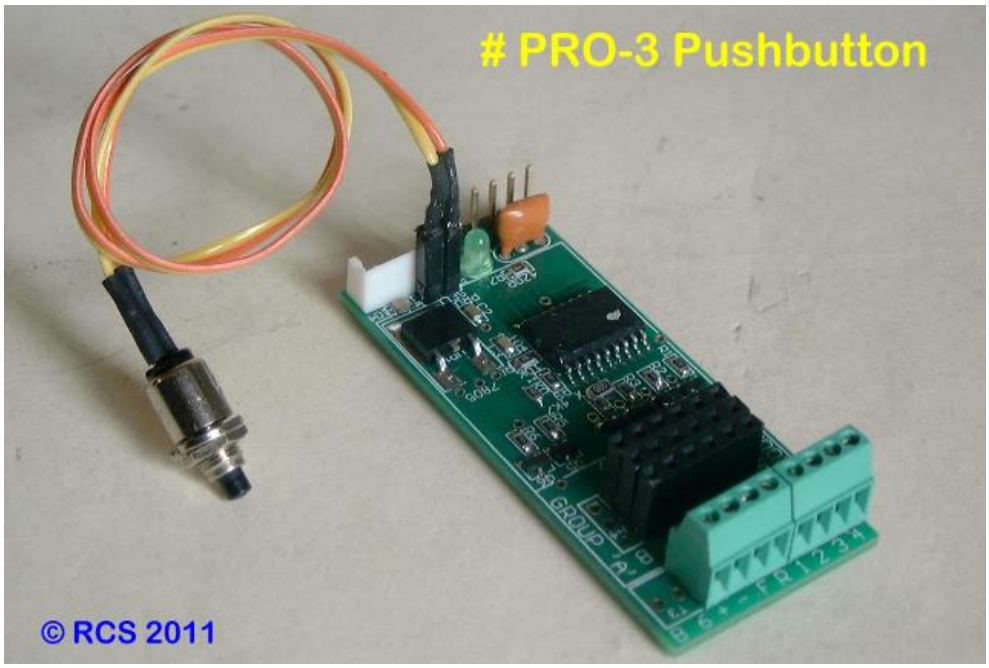
2.4 Gently stroke the Elevator stick backwards & forwards full travel a couple of times then let the stick go.

2.5 Press & release the pushbutton to exit Calibration mode.

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

2.6 Either turn the loco and TX OFF for later use, or proceed to page # 6.

THE PIC BELOW SHOWS WHERE THE PUSHBUTTON IS PLUGGED INTO THE # DEC-U PCB FOR SPEED CALIBRATION & PROGRAMMING.



3. PROGRAMMING.

Operating features of the ***RCS-PRO*** system can be programmed from the TX using the supplied pushbutton.
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, 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.
3.6/7/8/9 SET SOUND TRIGGERS 1, 2, 3 & 4 from MOM (Default) to Latch ON - OFF.

HOW TO USE THE PROGRAMMING FEATURE.
Turn the TX & Loco ON. The RX & loco lights will stay OFF until the TX & RX are linked. Then blink 3 x times & go solid ON. The system will then be, & must stay, in neutral. Or, if you have been running, return to neutral before programming. Then press the supplied pushbutton once & the lights will go out. The system is now in Programming Mode.

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 on the throttle stick from OFF (down).
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 press and release the pushbutton. 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 top speed voltage setting has been stored in the system memory. Then move the throttle stick back to zero (OFF) position. i.e. stick down.
Then press and release the pushbutton. 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: When children are using the loco, you can follow the same steps to limit the top speed of any 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 momentum ON – OFF setting has been stored in the system memory.
Then press and release the pushbutton. 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 press and release the pushbutton. 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 start & top speed voltage settings have been returned to default in the system memory.
Then press and release the pushbutton. The lights will blink three times and then go to all solid ON. i.e. Neutral.

3. 6/7/8/9 SET SOUND TRIGGERS F1, F2, F3 & F4 from MOM (Default) to Latch ON - OFF.
For trigger **# 1** Push the direction (elevator) stick forwards **SIX** times only. The lights will blink once with each push.
Wait a couple of seconds for the lights to blink **SIX** times again, indicating the trigger has toggled to latch ON-OFF.
Then press and release the pushbutton. The lights will blink three times and then go to all solid ON. i.e. Neutral.

Repeat procedure for trigger **# 2** (**SEVEN** pushes), trigger **# 3** (**EIGHT** pushes) & trigger **# 4** (**NINE** pushes).

Repeat procedure to change any of these 3 x triggers back to MOMENTARY from Latch ON – OFF.

OPERATING THE *RCS-PRO* ESC's.

4. HOW TO OPERATE AFTER COMPLETING CALIBRATION & PROGRAMMING.

N.B. If fitted, the TX RATE switch must be set HI.

THE THROTTLE STICK MUST BE ALL THE WAY DOWN BEFORE TURNING SYSTEM ON.

Always turn the TX on first. Then turn the loco ON. The loco will give a slight jerk (See page # 8) & the **ESC** & loco the lights will stay OFF. After between 2 - 8 seconds the TX & RX will recognise each other. The RX LED will come ON & not blink. The **ESC** LED & both front & rear loco lights (if fitted) will blink three times & then all lights will go to solid ON.

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.
If the ***RCS-PRO*** **ESC** default motor & lights direction is incorrect please see TROUBLESHOOTING on page # 8.

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. Zero - Max speed takes 2 x seconds.
Turn the TX OFF to save the batteries & the loco will "Cruise" along until the TX is turned ON again & manual control resumed. The operating program ignores the SPEKTRUM DX5e Fail safe.

4.3 SLOWING DOWN. Pull the Throttle stick back to the desired speed. Max - Zero speed takes 2 x seconds.

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 ***RCS-PRO*** **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 # 6 - # **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.
Let the direction stick go & the loco will accelerate at the fastest rate (2 secs 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 (2 x seconds from full speed to zero).

SOUND SYSTEM TRIGGERS.
RCS-PRO **ESC's** have 4 x four manual sound triggers controlled by the sprung left to right Aileron & Rudder stick controls. Outlets are marked 1 – 4 on the row of 8 x screw terminals on the **# DEC-U** pcb. Max current is 100 ma.
You can activate any sound with any trigger depending on which TX stick you want to operate the sound with.

Mode # 1 & Mode # 2 sound triggers are both the same.

RH stick to the left is **F 1**. **RH** stick to the right is **F 2**. **LH** stick to the left is **F 3**. **LH** stick to the right is **F 4**.
The default for each is Momentary. **F2, F3 & F4** are programmable for latch ON – OFF instead. See page # 6. **3.6/7/8/9**.

If you prefer the trigger outputs the other way around, it is OK to reverse the Aileron & Rudder reversing switches.

Do not reverse the THROTTLE & ELEVATOR switches.

When using with Momentary function, press the stick until the sound is activated. Release stick to turn sound OFF.
When using with a Latch ON – OFF function, press and hold the stick for one second until the sound is activated. Then release the stick and the sound will stay ON. Press the same stick for one second & release to turn the sound OFF.
They can be used as is with most sound systems such as Sierra®, Phoenix®, Dallee® & MyLocosound®.

Sierra will require the additional purchase of one **# SSI-12v5** so that Sierra can function correctly.

RCS-PRO ESC MU'ing LOCO CONSISTS.

MULTIPLE LOCOS IN A CONSIST.
The ***RCS-PRO* 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 # 4.
If the loco to be added has already been speed calibrated, there is no need to repeat the calibration step.
The operating 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 # 6. **3.1/2/4.**

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 # 4.

RCS-PRO ESC TROUBLESHOOTING.

IF NOTHING WORKS AT ALL:

IT IS MOST IMPORTANT THAT YOU ARE USING THE CORRECT OPERATING PROGRAM.

SPEKTRUM & PLANET MUST USE PRO-Av1. E-SKY & HOBBY KING MUST USE PRO-Bv1.

WHAT TO EXPECT WHEN FIRST TURNING THE SYSTEM ON.

WHEN THE LOCO IS SWITCHED ON THE LOCO MAY JERK SLIGHTLY.
This is normal. The slight jerk indicates power is connected to the system and the IC has powered up.

WHEN THE LOCO IS SWITCHED ON, THE ACCESSORY OUTPUT # 1 MAY TRIGGER BRIEFLY.
This is also normal. A sound system function connected to output # 1 may trigger. Our testing shows no sign of this actually happening with Phoenix and Sierra. But, it is possible.

NEVER PRESS THE PUSHBUTTON WITH THE LOCO TURNED ON

UNLESS YOU INTEND TO CALIBRATE OR PROGRAM THE SYSTEM

PROBLEM. You pressed the pushbutton to exit Calibration mode but the lights keep on flashing.
You may have mis-plugged the RX into the channel sockets on the **# DEC-U**.
SOLUTION. Turn system OFF. Remove & replace the RX into the correct channel # sockets. See page # 2.
As odd things can happen if this occurs, we strongly suggest you reset the system. See page # 6. 3.5.
Then re-calibrate the speed and direction settings. See page # 5.

WHEN THE SYSTEM IS FIRST TURNED ON, THE LIGHTS UNEXPECTEDLY BLINK RAPIDLY.
This is because you actually pressed the pushbutton & the system has entered calibration mode.
CAUTION: DO NOT PRESS THE PUSHBUTTON . You will lose any previous calibration settings.
You can proceed with Calibrating the system. (See page # 5 of the instructions). **OR:**
SOLUTION Turn RX OFF & ON again. Normal system control will be restored.

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 then 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.
Then, if the speed is backwards to the lighting direction, you must reverse the wiring to the motor(s).

WEIRD ESC BEHAVIOUR FOR NO APPARENT REASON, DURING OPERATION.

If the lights start flashing during operation, stop the loco. Turn it **OFF** and then **ON** again to resume normal operation.

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