

Remote Control Systems

2.4 Ghz RADIO CONTROL

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PnP-3

Electronic Speed Controller

FULL INSTRUCTION MANUAL FOR
SPEKTRUM & PLANET R/C

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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)** R/C system.

THIS SYSTEM CAN USE ANY SPEKTRUM R/C WITH 4 OR MORE CHANNELS.

THESE INSTRUCTIONS REFER TO THE SPEKTRUM DX5e 2.4 GHz R/C. THEY APPLY TO THE DX4e DX6i.
WE SUGGEST YOU ASSIGN JUST ONE DX6i MEMORY SLOT FOR ALL BATTERY R/C LOCOS.

EVERY # PnP-3 SYSTEM IS IN TWO PARTS CONNECTED BY A PLUG IN GREY 4 X WIRE 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 **Av1**.

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

THE # PnP-3 CAN BE USED WITH TRACK AND/OR BATTERY POWER.

THE SYSTEM AUTOMATICALLY CHOOSES THE HIGHEST VOLTAGE.

THEY HAVE CONSTANT BRIGHTNESS DIRECTIONAL LIGHTS & 4 SOUND TRIGGERS.

THE FOLLOWING MAXIMUM VOLTAGES MENTIONED ARE THE **NOMINAL** VOLTAGE & TAKE INTO ACCOUNT THE FACT FULLY CHARGED BATTERIES CAN & DO EXCEED THE **NOMINAL** VOLTAGE.

USE 14.4 - 24v FOR THE # PnP-3 ESC.

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 IS ONE TWO PART # PnP-3 ESC Plus 1 x plug in pushbutton cable.

You will supply the 2.4 Ghz 4 channel (or more) Digital Proportional SPEKTRUM R/C.

NB: To use a 4 ch RX it may be necessary to remove the 4 x ch RX from its case to fit the pcb.

You will also supply a locomotive or trail car, the 14 - 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.

THIS BRAND OF R/C HAS BECOME VERY POPULAR. TO AVOID CONFUSION WITH OTHER OPERATORS, WE SUGGEST YOU MARK THE TX TO SHOW WHICH LOCO IT OPERATES.

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 THE # *PnP-3* ESC.

PnP-3 ESC's can use most **SPEKTRUM** 2.4 GHz digital proportional R/C's with four (4) or more servo outputs. We are now using an 8 position RX socket. This requires that most RX's will need to be removed from their casing to fit the # **DEC-v3.2** 8 way socket. We recommend a dab of silicone adhesive is applied to the antenna wire(s) for strength. Be advised some RX's have wider spaced servo pins such as the AR6210 will not fit into the # **DEC-v3.2**. 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.

USING EXTRA SERVOS.

This latest # **DEC-v3.2** permits the operation of regular servos using Ch #'s 5 & 6. Simply plug the servo leads the right way around into the # **DEC-v3.2** in the 3 pin servo headers so marked. See the ESC diagram.

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. See page # 4 for the "BINDING" procedure. When the RX is plugged into the # **DEC-v3.2** pcb simply insert the binding plug in the 3 way set of header pins on the # **DEC-v3.2** pcb. It is possible to bind the RX's inside a loco from the outside. Simply plug in our # **BINDER** switch assembly.

You can mount the # **DEC-v3.2** 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.

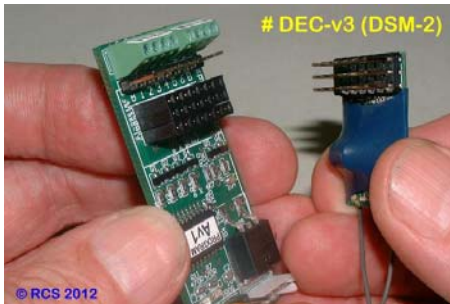
You can mount the # **DEC-v3.2** PCB with double stick tape or non conductive silicone. Do not allow metal objects to touch the rear of the PCB. Damage to the PCB may result.

INSERTING THE SPEKTRUM or DSM2 COMPATIBLE RX.

The 2.4 GHz RX must be removed from the plastic case so that it can plug into the 8 way socket. It then simply plugs into the 8 way socket upside down & eliminates all servo leads.

Be very careful locating the pins into the 8 pin pcb socket. Accurately align the RX pins to the numbers shown. B - 6. It will be a stiff push fit, but do not force the RX home.

The # **DEC-v3.2** provides a 5 volt BEC supply for the RX. The RX does not need batteries.



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



Then gently press onto socket.

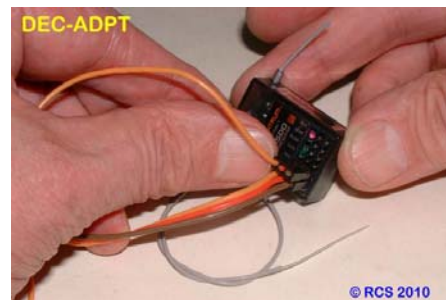


The fit will be tight. Do not force. **The BATTERY - BIND terminals must NOT be connected.**

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



The # **DEC-ADAPT** kit.



Insert the 1 x 3 way servo cable into the # AR600 RX # 1 servo output. The 3 x single wire cables into the Ch #'s 2, 3 & 4.



Carefully line up the # **DEC-ADAPT** pcb with pin #'s 1 - 6 on the # **DEC-v3.2** & 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 # PnP-3 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 Constant track voltage **AND/OR** battery power. See below.

Maximum voltages for a particular ESC are shown on page # 1.

PnP TRACK POWER.

The # **PnP-3** 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. Filtered DC is recommended. You may be able to use a non DC supply such as DCC. Battery power is available via the end of loco sockets fitted to AristoCraft® locos.

On board battery back up of the track power is available via the fitted screw terminals on the # **PnP-3**. The system automatically selects the highest available voltage. Make sure the battery pack is fully charged before using the system.

BATTERY POWER.

There are two ways of powering the system with batteries.

1. Using the regular battery connection through the loco wiring. Absolute minimum voltage will 14.4 volts.
2. Using the battery input terminals on the ESC itself. 12 volts is useable.

For your particular ESC 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-TC2/3** and # **BIK-TC5**.

When used with the Bachmann® K-27, we have a special kit, # **BIK-K27** to simplify installation.

MOTOR CONNECTION.

The # **PnP-3** is a simple plug in installation. No extra re-wiring to the motors or lights in the loco is needed.

AristoCraft® locos. We supply the # # **PnP-3** programmed with the default pre-set to suit AristoCraft® locos.

Bachmann® Spectrum® Fn3 locos. You can easily reset the # # **PnP-3** 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 # **PnP-3** 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.

LOCOMOTIVE LIGHTING.

PnP-3 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.

The # # **PnP-3** White (F) - Yellow (R) 2 wire cable needs to be connected to the ESC part. See the wiring diagram.

DEFAULT START UP DIRECTION.

The # **PnP-3** ESC's are programmed to be the same as the AristoCraft® on board TE & REVOLUTION.

As such, the default motor direction & lights for Bachmann® PnP socket equipped locos will need to be reset. See page # 6 section **3.4**. You may also need to reverse the **F & R** lighting.

On some AristoCraft® locos the PnP socket & lights are wired backwards. In this case the default direction will also need to be reset. See page # 6 section **3.4**. You may also need to reverse the **F & R** lighting wires.

SETTING UP THE # *PnP-3* 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 should ignore the RX Fail Safe commands. However it may not. 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".

Plug the RX upside down into the # **DEC-v3.2**. Make absolutely certain the pins are correctly lined up.
Pin #'s B, 1, 2, 3, 4, 5, & 6 are used & must be lined up accurately.

1.1 Insert the "BINDING" plug supplied with the R/C system into the "BINDING" pins on the # **DEC-v3.2**.

1.2 You can also use the # BINDER switch assembly if you do not wish to get inside the loco.

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 Then hold the TRAINER stick (or button on DX4e) so that the AR600 does not "learn" a failsafe position unless you want it to. Our testing indicates the RX will learn the failsafe anyway, so, if you wish to turn the TX off during operation you must set the throttle failsafe position. 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. Then let the Trainer stick go. If the system has been calibrated the **ESC** LED & both loco lights will immediately blink three times & then go to solid ON.

N.B. The "BINDING" plug MUST be removed BEFORE the SYSTEM is turned OFF.

1.6 The "BINDING" plug is removed & stored safely. The R/C system is now ready for speed calibration.

RCS offers an optional extra # **BINDER** cable and switch. When fitted this will enable any loco to be bound to any TX without requiring access to the insides of the loco. This will enable any loco to be swapped between any other SPEKTRUM TX's. You will be able to "hand off" speed matched locos for MU'ing into a consist.

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. Release the pushbutton when LED lights.

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

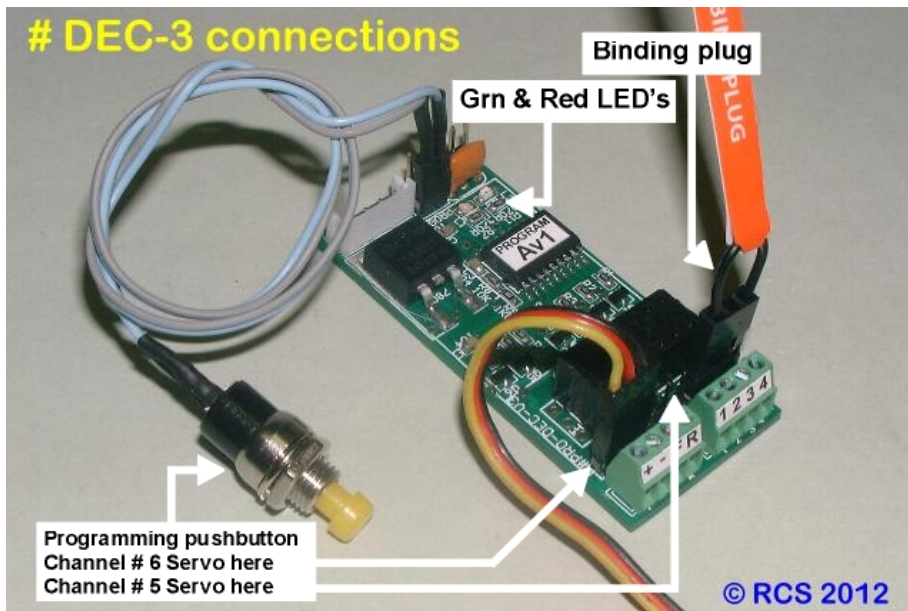
2.4 Gently stroke the Elevator stick backwards & forwards full travel a couple of times then let the stick go.

2.5 Press & release the pushbutton to exit Calibration mode.

Reaction; Both **ESC LED's** & both 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. Either turn the loco and TX OFF for later use, or proceed to page # 6.

THE PIC BELOW SHOWS:

1. Where the pushbutton is plugged into the # DEC-v3.2 PCB for speed calibration and programming.
2. Where the Binding plug can be plugged in when RX is fitted.
3. Where extra servos can be plugged in. (Ensure signal wire is correct polarity).
4. Where the controlled lighting outputs and function triggers are connected.



3. PROGRAMMING.

Operating features of the # *PnP-3* 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 # *PnP-3* ESC.

4. HOW TO OPERATE AFTER COMPLETING CALIBRATION & PROGRAMMING.

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

THE THROTTLE STICK MUST BE ALL THE WAY DOWN BEFORE TURNING THE 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 lights will stay OFF. After between 2 - 8 seconds the TX & RX will recognise each other. The RX LED will come ON & not blink. Both **ESC** LED's & 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 Red LED on ESC & rear light will go out. The green LED on the **ESC** pcb & the front light will stay ON. If the # *PnP-3* **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. Both **ESC** LED's & both front & rear loco lights (if fitted) will go to solid ON. Then pull the stick back again & release it. The Green LED on ESC & front light will go out. The Red LED on the **ESC** pcb & 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 # *PnP-3* **ESC** features 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.

The # *PnP-3* **ESC** has 4 x four manual sound triggers controlled by the sprung L – R Aileron & Rudder stick controls.

Outlets are a 4 x screw terminal. F 1= **GREEN**, F 2 = **PURPLE**, F 3 = **BROWN**, F 4 = **GREY**. 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.

PnP-3 ESC - MU'ing LOCO CONSISTS.

MULTIPLE LOCOS IN A CONSIST.

The # PnP-3 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.

PnP-3 ESC TROUBLESHOOTING.

IF NOTHING WORKS AT ALL:

WHAT TO EXPECT WHEN FIRST TURNING THE SYSTEM ON.

WHEN THE LOCO IS SWITCHED ON, THE PCB LED DOES NOT LIGHT OR BLINK.

This is most likely caused by the throttle stick not being all the way down. Move the stick all the way down.

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-v3.2.

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 system Calibration. (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.