

Remote Control Systems

2.4 Ghz RADIO CONTROL

P.O Box 578 Casino, NSW, 2470 Australia

Phone: International ++614 2902 9083

Australia (04) 2902 9083

Website: <http://rcs-rc.com>

E mail: Info@rcs-rc.com

PnP

Electronic Speed Controller

FULL INSTRUCTION MANUAL FOR

RCS TX20



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

USE ONLY RCS ESC's with OPERATING PROGRAM Av1. or EVO ESC's

THE #PnP-3 HAS BEEN CALIBRATED AT THE FACTORY. USE AS IS, ONCE THE RX IS "BOUND" TO THE TX. THERE ARE MANY FEATURES WITHIN THE SYSTEM WHICH CAN BE PROGRAMMED. YOU WILL NEED TO DOWNLOAD THE FULL INSTRUCTION MANUAL FROM THE RCS WEBSITE. THE PUSHBUTTON ON THE ESC PCB IS ONLY USED FOR PROGRAMMING. DO NOT PRESS THE ESC BUTTON DURING OPERATION.

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

THE # PnP-3 CAN BE USED WITH TRACK AND/OR BATTERY POWER. THE HIGHEST VOLTAGE IS AUTOMATICALLY CHOSEN 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.

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.

THE TX20 & THE ESC ARE GUARANTEED FOR ONE YEAR.

The solid state motor driver output IC is guaranteed for life.

You will supply a locomotive or trail car, the 14 – 20 volt traction batteries (depending on ESC), a fuse, 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.

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.

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PLEASE NOTE. PDF WIRING INSTRUCTIONS ARE HERE:

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

INSTRUCTIONS.

THESE INSTRUCTIONS REFER SPECIFICALLY FOR USE WITH THE RCS R/C TX20 HANDPIECE. THERE ARE SEPARATE INSTRUCTIONS FOR USE WITH ANY 2.4 GHz R/C WITH 4 OR MORE CHANNELS.

THOSE OTHER INSTRUCTIONS REFER SPECIFICALLY TO THE SPEKTRUM DX5e 2.4 GHz R/C.

THEY ALSO APPLY TO THE DX4e, DX6i & PLANET T5.

N.B. YOU CANNOT MIX BRANDS OF R/C.

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.

OR; USE ANY BRAND OF R/C WITH THE ADDITION OF FOUR SERVO LEADS CONNECTED TO THE 6 WAY SCREW TERMINAL ON THE ESC AND PLUGGED INTO THE APPROPRIATE CONNECTIONS ON THE RX.

INSTALLING THE # **PnP-3** ESC.

PnP-3 ESC's uses DSM2 6 x Channel RX's including **SPEKTRUM** & the **ORANGE** brand from Hobby King. 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

USING EXTRA SERVOS.

This latest # **DEC-v3.2** permits the operation of regular servos using Ch # 5. 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 (& DSM2 clones) can be "BOUND" to TX20, DX5e, DX6 etc 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.

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.

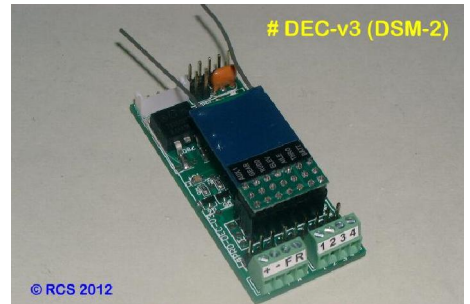
The # **DEC-v3.2** provides a 5 volt BEC supply for the RX. The RX does not need batteries.



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



Then gently press onto socket.

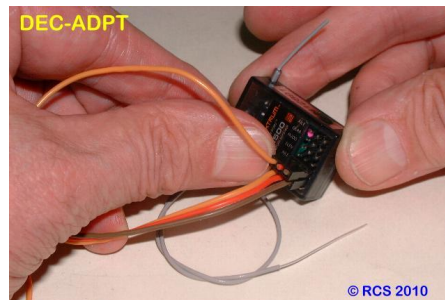


The fit will be tight. Do not force. **The BATTERY - BIND terminals must NOT be connected.**

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.

It does not matter where you place the RX and antenna(s). We have at least 100' + range with the system in plastic locos. There is **NO** "glitching" or "Rusty Bolt Effect". 2.4 GHz RX's have been successfully used for some years with the RX & antenna inside a dummy water tank of a live steam loco and inside expensive brass electric locos.

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.

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 nominally be 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 **DELTANG TX20 R/C** 2.4 GHz 5 CHANNEL R/C. LAYOUT OF THE TX20 TRANSMITTER. (See pics on page # 5).

The Direction switch is in the front top centre of the case. The speed control knob sits just below the direction switch. Top left front is the ON –OFF switch. Behind that is the Ch # 5 pushbutton for binding and servo output. Top right front is the pushbutton for function # 2 trigger. Behind that is the pushbutton for function # 4 trigger.

Prior to using this system there are two procedures that must be carried out by the operator, unless the TX and RX have already been bound and the system calibrated;

1. "BINDING".

The 1st procedure is to "BIND" the receiver (RX) to the Transmitter (TX). "BINDING" is accomplished by following a few simple steps below.

The operating program will ignore the RX Fail Safe commands.

The operator must have the spring loaded TX knob positions in neutral & the throttle knob to zero. i.e. Fully CCW.

HOW TO "BIND".

Plug the RX upside down into the # **OMEGA-3v3**. 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 # **OMEGA-3v3**.

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 LED's on the **ESC** pcb & the front and rear lights (if fitted) will stay OFF until "BINDING" is completed.

The loco will always give a very slight jerk at switch ON. This is normal. See Page # 9.



1.3 Press and hold the top right pushbutton on the handpiece.

1.4 Then press the ON – OFF button to ON. Button will illuminate. Then release both buttons.

1.5 The LED on the RX (not the ESC) will blink slowly and then;

1.6 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.

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

1.7 The "BINDING" plug is removed & stored safely. The R/C system is now ready for speed calibration. Not necessary if already done.

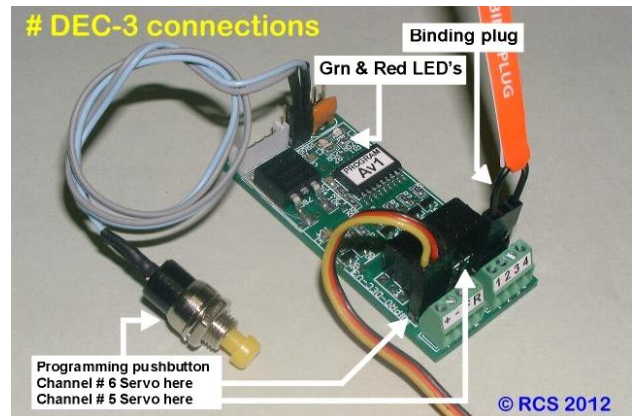
RCS offers an optional extra # **BINDER** cable and switch. When fitted this will enable any loco to be bound to any TX without requiring access to the insides of the loco. This will enable any loco to be swapped between any other DSM2 TX's. You will be able to "hand off" speed matched locos for MU'ing into a consist.

2. CALIBRATION.

The 2nd step in system preparation is to calibrate the direction switch & throttle knob. 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. An ESC pushbutton is supplied for both Calibration & system Programming. This must be mounted for external access.



2.1 Turn the TX20 ON.
Make sure Throttle knob is set to Min. (i.e. fully CCW).



2.2 Press and HOLD ESC push-button down & turn the ESC/Rx ON. Release the pushbutton when LED's light.

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 Move the spring loaded direction switch backwards & forwards full travel a couple of times. Pause briefly each way then let switch go.



2.4 Rotate Throttle knob from Min to Max & back a couple of times. Pause briefly at each extreme.

2.5 Press & release the ESC 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.

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.
- 3.7/9 SET SOUND TRIGGERS 2 & 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 pcb 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 and note the knob setting at which the **slowest** starting locos begin to move.

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

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

Then push the direction (elevator) switch 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 knob back to zero (OFF) position. i.e. knob is fully CCW.

Then press and release the pushbutton on ESC. 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 knob 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 knob to the lower top speed desired for the loco. i.e. to the knob position where the fastest loco matched the top speed of the slowest loco.

Then push the direction switch 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 knob back to zero (OFF) position. i.e. knob is fully CCW.

Then press and release the pushbutton on ESC. 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 switch 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 on ESC. 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 switch 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 on ESC. 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 switch 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 on ESC. The lights will blink three times and then go to all solid ON. i.e. Neutral.

- 3. 7/9 SET SOUND TRIGGERS F2, & F4 from MOM (Default) to Latch ON - OFF.**

For trigger # **F2** Push the direction, switch forwards **SEVEN** times only. The lights will blink once with each push.

Wait a couple of seconds for the lights to blink **SEVEN** times again, indicating the trigger has toggled to latch ON-OFF.

Then press and release the pushbutton on ESC. The lights will blink three times and then go to all solid ON. i.e. Neutral.

Repeat procedure for trigger # **F4** (**NINE** pushes).

Repeat procedure to change either of these 2 x triggers back to MOMENTARY from Latch ON – OFF.

OPERATING THE # **PnP-3** ESC.

4. HOW TO OPERATE AFTER COMPLETING CALIBRATION & PROGRAMMING.

THE THROTTLE KNOB MUST BE AT MIN i.e. ALL THE WAY CCW, 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 and both ESC LED's will come ON & not blink. After another 6 seconds 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 knob must be at MIN and the system must be in neutral.

4.1 FORWARDS. To select forwards direction push the Direction switch fully forwards once & then release it. The Red LED on ESC & rear loco light will go out. The green LED on the **ESC** pcb & the front loco light will stay ON. If the **PnP-3** ESC default motor & lights direction is incorrect please see Page # 6 PROGRAMMING of the full instructions. Use the **3.4 DEFAULT DIRECTION** feature to make changes.

4.2 SPEEDING UP. Gently twist the knob clockwise (CW). The loco will accelerate away after slightly turning the knob. The speed is proportional to the knob position with a small amount of momentum built in to prevent sudden jerky movements. Let the knob go once the desired speed has been reached. The speed will stay the same until the knob is rotated CW or CCW. Min - Max speed takes 2 x seconds.

4.3 SLOWING DOWN. Turn the knob CCW back to the desired speed. Max - Min speed takes 2 x seconds.

4.4 STOPPING. Turn the knob completely CCW back all the way to stop. The **ESC** LED & front light will be ON.

4.5 REVERSE. You must completely stop the loco first. The Throttle knob must be at Min. (i.e. fully CCW). Then pull the direction switch fully back once for a full second & 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. Pull the direction switch 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 **4.2 SPEEDING UP**, **4.3 SLOWING DOWN** & **4.4 STOPPING** above.

CONTROLLING MOMENTUM & SOUND TRIGGERS.

The **#PnPA-3** ESC features switchable momentum. An operator can apply the momentum effect with the direction switch 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 switch back (down) fully & **HOLD** switch in place. Then use the Throttle knob to set the speed you wish to attain.

If you hold the direction switch 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).

Let the direction switch 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 switch all the way back (down) fully and **HOLD** switch in place.

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

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

If you let the switch 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 2 x sound triggers controlled by the two push buttons on the RH side of the TX handpiece.

The two outlets are front pushbutton for terminal F 2 = **PURPLE** and the rear pushbutton operates terminal F 4 = **GREY**. Max current is 100 ma. Do not use F1 and F3.

You can activate any sound with any trigger depending on which pushbutton you want to operate the sound with.

The default for each is Momentary. **F2 & F4** are programmable for latch ON – OFF instead. See page # 6. **3.6/7/8/9**.

When using with Momentary function, press the button until the sound is activated. Release knob to turn sound OFF.

When using with a Latch ON – OFF function, press and hold the knob for one second until the sound is activated. Then release the knob and the sound will stay ON. Press the same knob 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.

Ch # 5 SERVO FUNCTION.

The **#PnP-3** ESC has 1 x output available for a mechanical servo function such as Kadee servo uncoupler.

Simply plug the Kadee into the Ch # 5 terminal on the ESC. Activate with the pushbutton top left at rear on TX. Servo goes from one extreme of travel to the other. Servo goes back to start position when button is released.

With the separate purchase of the **# RC-TRIG** the CH# 5 button can also be used as another sound trigger.

PnP-3 ESC - MU'ing LOCO CONSISTS.

MULTIPLE LOCOS IN A CONSIST.

The #**PnP-3** ESC is capable of MU'ing multiple locos in one consist of locos.

If you intend to do this often we strongly recommend you purchase the separately available # BINDER switch so that you can access the binding socket from outside the loco.

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. Remember the loco lights will be off during binding.

The lights come on once binding has been completed. This is intended as a confirming reference action.

Then, switch off # BINDER or remove the plug.

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 switch 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 knob not being set all the way to MIN. i.e. Fully CCW.

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.

NEVER PRESS THE PUSHBUTTON WITH THE LOCO TURNED ON UNLESS YOU INTEND TO CALIBRATE OR PROGRAM THE SYSTEM

PROBLEM. You pressed the ESC 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 ESC 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 knob not fully OFF (i.e. Fully CCW).

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

When the direction is set to forwards the front light must come ON. 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.