Futaba®

3PK

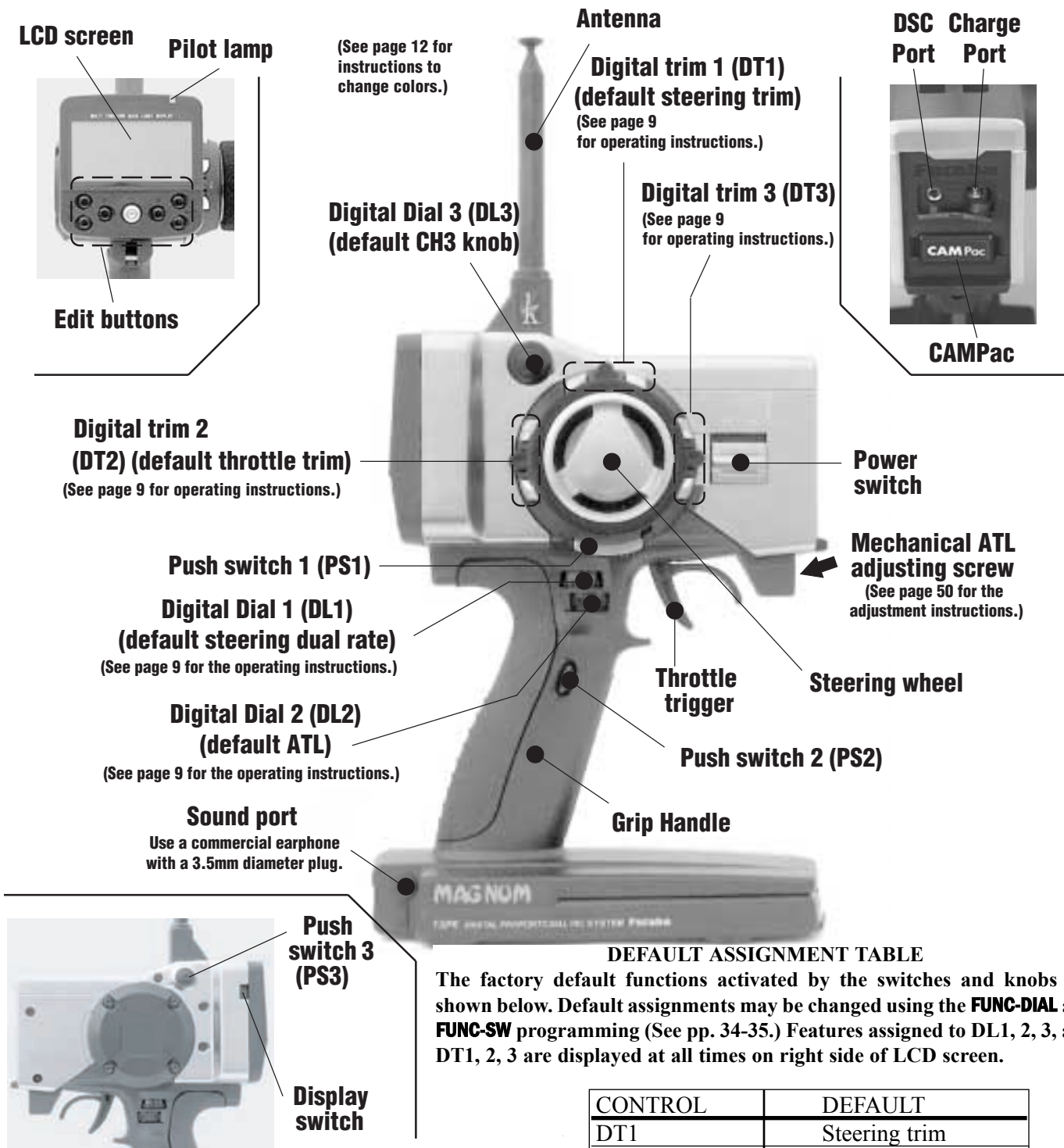## 3-CHANNEL RADIO CONTROL SYSTEM INSTRUCTION MANUAL

3PK with Optional Accessory Offset Adapter Installed

Futaba© Digital Proportional R/C System

Technical updates and additional programming examples available at: **http://www.futaba-rc.com/faq/faq-3pk.html**

FUTZ8533 for FUTJ32**/33** V1.0

Transmitter Controls

*The switches, knobs and trimmers may all be reassigned. (see pp. 34-35)

LCD screen

Pilot lamp

(See page 12 for instructions to change colors.)

Antenna

DSC Port **Charge Port**

Edit buttons

Digital trim 1 (DT1) (default steering trim)
(See page 9 for operating instructions.)

Digital Dial 3 (DL3) (default CH3 knob)

Digital trim 3 (DT3)
(See page 9 for operating instructions.)

CAMPac

Digital trim 2 (DT2) (default throttle trim)
(See page 9 for operating instructions.)

Power switch

Push switch 1 (PS1)

Mechanical ATL adjusting screw
(See page 50 for the adjustment instructions.)

Digital Dial 1 (DL1) (default steering dual rate)
(See page 9 for the operating instructions.)

Throttle trigger

Steering wheel

Digital Dial 2 (DL2) (default ATL)
(See page 9 for the operating instructions.)

Push switch 2 (PS2)

Sound port
Use a commercial earphone with a 3.5mm diameter plug.

Grip Handle

Push switch 3 (PS3)

Display switch

DEFAULT ASSIGNMENT TABLE

The factory default functions activated by the switches and knobs are shown below. Default assignments may be changed using the **FUNC-DIAL** and **FUNC-SW** programming (See pp. 34-35.) Features assigned to DL1, 2, 3, and DT1, 2, 3 are displayed at all times on right side of LCD screen.

Precautions when turning the power switch on and off.

When the data is changed using the edit keys or trim levers, wait at least two seconds before turning off the power. If the power is turned off within two seconds after the data was changed, the new data will not be written to memory.

CONTROL	DEFAULT
DT1	Steering trim
DT2	Throttle trim
DT3	NONE
DL1	Steering dual rate
DL2	ATL
DL3	Channel 3
PS1	NONE
PS2	NONE
PS3	NONE

TABLE OF CONTENTS

Note that in the text of this manual any time we are using a feature's specialized name or abbreviation as seen on the screen of the 3PK, that name, feature, or abbreviation will be exactly as seen on the radio's screen, including capitalization, and shown in a **DIFFERENT TYPE STYLE** *for clarity.*

INTRODUCTION

Thank you for purchasing a Futaba® digital proportional R/C system. In order for you to make the best use of your system and to use it safely, please read this manual carefully. If you have any difficulties while using your system, please consult the manual, our online Frequently Asked Questions (on the web pages referenced below), your hobby dealer, or the Futaba Service Center.

Owner's Manual and Additional Technical Help

This manual has been carefully written to be as helpful to you, the new owner, as possible. There are many pages of setup procedures and examples. However, it need not be your sole resource of setup guidelines. For example, the back cover includes a quick-start set of instructions and the Frequently Asked Questions web page referenced below includes this type of step-by-step setup instructions for a variety of other model types.

Due to potential unforeseen changes in production procedures, the information contained in this manual is subject to change without notice. No part of this manual may be reproduced in any form, at any time, without prior permission.

Support and Service: It is recommended to have your Futaba equipment serviced annually during your hobby's "off season" to ensure safe operation.

IN NORTH AMERICA

Please feel free to contact the Futaba Service Center for assistance in operation, use and programming. Please be sure to regularly visit the Frequently Asked Questions web site referenced below. This page includes extensive programming, use, set up and safety information on your radio system and is updated regularly. Any technical updates and US manual corrections will be available on this web page. If you do not find the answers to your questions there, please see the end of our F.A.Q. area for information on contacting us via email for the most rapid and convenient response.

Don't have Internet access? Internet access is available at no charge at most public libraries, schools, and other public resources. We find internet support to be a fabulous reference for many modelers as items can be printed and saved for future reference, and can be accessed at any hour of the day, night, weekend or holiday. If you do not wish to access the internet for information, however, don't worry. Our support teams are available Monday through Friday 8-5 Central time to assist you.

FOR SERVICE ONLY:
Futaba Service Center
1610 Interstate Drive
Champaign IL 61822
www.hobbyservices.com

FOR SUPPORT:
(PROGRAMMING AND USER QUESTIONS)
Please start here for answers to most questions:
www.futaba-rc.com\faq\faq-3pk.html
FACSIMILE: 217-398-7721
PHONE: 217-398-8970 option 4

HOW TO SEND FOR SERVICE:
www.hobbyservices.com\techsupport\service-form-futaba.pdf
www.hobbyservices.com\techsupport\service-form-futaba.html

OUTSIDE NORTH AMERICA

Please contact your Futaba importer in your region of the world to assist you with any questions, problems or service needs.

Please recognize that all information in this manual, and all support availability, is based upon the systems sold in North America only. Products purchased elsewhere may vary. Always contact your region's support center for assistance.

CONTENTS AND TECHNICAL SPECIFICATIONS
(Specifications and ratings are subject to change without notice.)

Your system includes the following components:

- Transmitter, including RF module* (PK) and NiCd battery pack NT8F700B (FUTM1462)
- Receiver (R113iP or R203HRF)
- 110V wall charger FBC19B (USA)
- Frequency Flag/Number set
- Wheel position offset adapter (APA)

Transmitter T3PK (Pistol, 3 channels)
Operating system: FM/PCM1024/HRS
Transmitting frequency: 27, 75 MHz bands*
Modulation: FM/PPM, HRS-FM or PCM1024, switchable
Power supply: 9.6V NT8F700B NiCd battery
Current drain: 250 mA or less

Receiver R113iP (PCM Single conversion, 3 channels)
Receiving frequency: 27, 75 MHz bands *‡
Intermediate freq.: 455 kHz
Power requirement: 4.8V or 6.0V NiCd battery or
                      4.8V (4 cells) alkaline
Current drain: 18 mA
Size: 1.69" x 1.13" x 0.63" [42.7 x 28.7 x 16.0mm]
Weight: 0.74oz [21g]

Receiver R203HF (3 channels, HRS single conversion)
Receiving frequency: 27, 75 MHz bands *‡
Intermediate frequency: 455kHz
Power requirement: 6.0V only (shared with servos)
Current drain: 14mA
Size: 1" x 1-1/2" x 9/16" [25.6 x 37.7 x 14.3mm]
Weight: .6oz [17g]
Always use only: "HRS" mode on transmitter
               6V Digital Servo, including throttle
               6V NiCd battery

* Transmitter band may only be changed by changing the module. Receiver band cannot be changed. Band *cannot* be changed by simply changing crystals.

‡ Only 27, 75MHz bands are legal for R/C ground use in the North America.
Other bands are sold and used in other countries only.

The following additional accessories are available from your dealer. Refer to a Futaba catalog for more information:

- **CAM**Pac Memory module — the optional DP-16K **CAM**Pac increases your model storage capability (to 20 models from 10) and allows you to transfer programs to another 3PK transmitter. Note that data may not be transferred to/from any other model of transmitter (3PJ, etc).
  ⚠ **CAUTION - Insertion of a CAM**Pac **containing data of a different transmitter type (ex: 3PJ) will result in a complete CAM**Pac **data reset and loss of all data.**
- Transmitter battery pack — the NT8F700B (700mAh) transmitter NiCd battery pack may be easily exchanged with a fresh one to provide enough capacity for extended sessions.
- Y-harnesses, servo extensions, etc – Genuine Futaba extensions and y-harnesses, including a Heavy-Duty version with heavier gauge wire, are available to aid in your larger model and other installations.
- 5-cell (6.0V) receiver battery packs. All Futaba equipment (except that which is specifically labeled otherwise) is designed to work with 4.8V (NiCd 4 cells) or 6.0V (NiCd 5 cells or alkaline 4 cells). Using a 6.0V pack increases the current flow to the servos, which accelerates their rate of response and their torque. However, because of this faster current draw, a 5-cell battery pack of the same mAh rating will last approximately ¾ the time of a 4-cell pack.
  ⚠ **CAUTION - NOTE that HRS receivers require 6.0 volts and will not operate with 4.8V 4-cell packs.**
- Gyros – a variety of genuine Futaba gyros are available for your specialized model needs.
- FailSafe: the FS1 FailSafe may be used with standard PPM/FM receivers to return throttle to idle in case of a loss of signal, similar to the FailSafe function of PCM/HRS receivers. **NOTE that HRS receivers can not operate with the FS1.**
- Battery Holder (Transmitter)**:** This battery holder is necessary when using the transmitter with dry cell batteries. For a description of how to install the battery holder to the transmitter, see "NiCd Replacement" on page 54.
- DSC cord – allows setup and testing without transmitting. Requires DSC compatible receiver and DSC cord. With transmitter and receiver off, plug cord into transmitter and then into receiver battery slot. Turn on receiver power. All programming and setup may be done in this matter without transmitting. See glossary for a list of DSC-compatible receivers.

A QUICK INTRODUCTION TO THE 3PK SYSTEM

TRANSMITTER: 3PK

- Large graphic liquid-crystal display panel with 7 buttons for quick, easy set up.
  - 128x64 dot large graphic LCD/with adjustable backlighting and graph displays for exponential, etc.
- Includes 3 levels of flexibility to simplify programming for new users while still providing the most flexible system in the world to those who wish to use it.
  - **LV1: (Learning the system; quick setups, a single menu with enough for most models, including):**
    - **MDL-NAME** 10-character model name
    - **USR-NAME** 10-character user name
    - **MOD-MODE** FM/PCM/HRS selection to match each model's receiver
    - **EPA** End point adjustment for all servos
    - **SYSTEM** Adjust back light, contrast, volume, and items displayed on home screen
    - **LEVEL-SEL** Level Selection: Change programming complexity.
    - **MDL-SEL** Model Selection: Choose from the 10 models in memory or in optional CAMPac
    - **MDL-RES** Model Reset: Erase model memory for this model only
    - **MOD-MODE** Modulation: Transmission mode (PPM/PCM/HRS)
    - **FAILSAFE** Failsafe and Battery Failsafe: Program receiver's response in case of lost signal.
    - **CH-REV** Servo Reversing
    - **EXP** Exponential: Set exponential for braking and steering, and pick from 3 curve types for forward throttle,
  - **LV2:   ("Let's Race!" Exploring 2 menus, with all of LV1, plus racer-focused features, including):**
    - **ABS** Simulates antilock brakes with fully adjustable pulsing effect
    - **SPEED** Adjustable throttle/steering servo response on input and release
    - **ACCEL** Throttle acceleration minimizes delay in nitro engine/braking response
    - **LAP** Record lap times, set training target times, display 99 recorded times
    - **AT-START/ENGINE CUT** Avoid wheel spins or shut boat engines off safely
    - **Idle-up** Increased throttle setting for easy starts
    - **FUNC** Assigns features to any of the 6 dials/trims and 3 switches
    - Direct selection menu options Customize the Direct Selection Menu
    - **MDL-COPY** Copy one model memory into another for experimenting and more
  - **LV3:   (For the expert driver, boat or complex modeler, adds specialized features, including):**
    - **PRG-MIX 1,2** Programmable mixes in a car radio for your own special effects!
    - **BRAKE-MIX** Set up independently adjustable front and rear brakes.
    - **BOAT-MODE** Includes tilt steering (outboard/rudder mixing), ability to disable brake function
    - **ST-D/R** Two steering dual rates
    - **SERVO** Displays servo position to ease setup, test mixes prior to installation.
    - **TH-ATL** Adjust the brake's total travel
    - **CH-3** Adjust channel 3's midpoint
    - **MC SETUP** Setup ESCs with HRS receivers
    - **ADJUSTER** Re-calibrate the radio for perfect performance every time
- Supports Futaba's new High Response System (H.R.S. system) receivers, as well as FM and PCM1024.
  - H.R.S. provides response times **approximately 1/3** of that of an equivalent FM system.
- **CAM**Pac offers unlimited data storage.
- User-defined home screen data display and quick-access Direct Call menu for Level 2 and 3 users.
- Full function assignability for dials, digital trims, switches.
- Adjustable wheel height and angle for perfect fit, as well as left-handed support.
- Display switch allows programming setup without transmission.
- Permanent memory storage via EEPROM with no backup battery to service or have fail.

MODULE: 75PK-FM

- Module may be easily removed and a module on a different channel (or even band) reinserted to change the transmission frequency or band.
- Module transmits FM (**PPM**), HRS-FM (**HRS**) and **PCM**. No need for a second module.
- Module is protected under the RF module cover on the top of the radio.
- All transmission circuitry is included in the module, so no retuning is needed when changing channels or even bands.
- Frequency band is changed by inserting a module on the proper band, including for international use.
- *In North America* it is against FCC regulation to change the crystal within the transmitter module to a different channel. All such transmitter crystal changes must be performed by a certified radio technician. Failure to properly tune a system to its new channel may result in decreased range and may also result in interference to other types of frequency users on adjoining channels.
- The FSS synthesized module for the 9Z family of radios is *NOT* compatible with the 3PK.
- **DISP** displays instead of **RF** when main power is on and module is not installed.
- It is normal for the module to get slightly warm during use.
- Non-Futaba brand modules are not FCC certified for use with this radio and therefore are against FCC regulation to use.
- Do not use other modules in the 3PK or the PK module in other radios.
- Do not operate transmitter with module in and power switch on, while antenna is collapsed. Always extend antenna if transmitting.

RECEIVER: R203HF or R113iP

- The receiver included with your system is a high-sensitivity narrow-band single-conversion receiver.
- Any Futaba narrow band PPM(FM) receiver (all produced after 1991) on the correct band and frequency may be used.
- Any Futaba PCM 1024 receiver on the right band and frequency may be used. (all 1024 receivers say PCM1024; receivers which say PCM but not 1024 are 512 resolution and not compatible).
- Any Futaba HRS-FM receiver on the right band and frequency may be used. At the time of this writing, only the R203HF is available. **HRS receivers require 6.0V batteries and digital servos, including for throttle.**
- *In North America* the receiver included with this system may have its frequency changed by simply changing the crystal, as long as it remains in the same band. You may change anywhere from channel 61 through 90 in the 75MHz band or A1 through A6 in the 27MHz band without requiring retuning.
- 🚫 **NEVER** attempt to change a receiver's **band** by simply changing crystal (IE removing a 27MHz crystal and inserting a 75MHz crystal). A receiver that has a crystal installed from a different frequency band without retuning will NOT receive properly and will have dramatically decreased range if it responds at all.

SERVOS:
- All Futaba PPM(FM) and PCM1024 receivers are compatible with all J-plug Futaba servos, including retract, winch, standard and digital servos.

🚫 **NEVER** use non-digital servos with HRS receivers. Severe damage to all electronics may result, including the possibility of a fire. Only digital servos may be used with HRS receivers, including for throttle.

Display switch

- If the display switch is turned on without turning on the power switch, programming is possible without emitting radio waves.

❗ If power switch is turned on while display switch is on, transmitter will transmit, which will interfere with other users operating on the same frequency. Always be sure you have control of your frequency prior to turning on the primary power switch.

- LCD screen contrast can be adjusted (See **SYSTEM**, p. 13.)
- LCD may be difficult to read due to temperature change when exposed to direct sunlight for more than a few minutes at a time, extreme heat, cold, or humidity.
- Always use only the display switch unless you want to transmit to your receiver and you have control of the frequency.
- Transmitting with the antenna collapsed may damage the module.

Power switch turned on: Beep confirmation sound is generated and the initial screen shown below appears.

BLHT (if backlit)
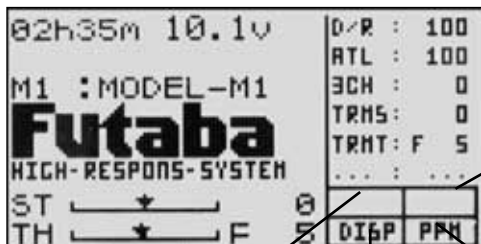
PCM, PPM or HRS

DPAC (if CAMPac installed)

RF (if transmitting)
DISP (if not transmitting)

- Total timer display (H:M) (see **TIMER** p. 30) and battery voltage display
- Model name (10 characters) Futaba name can be changed to display servo view or timers. (See **SYSTEM**, p. 13.)
- Steering trim display
- Throttle trim display
- Function names and rate assigned to dials/trims DL1-DL3 and DT1-DT3 respectively.
- CAMPac, transmission, backlight and modulation status.

User name display: When the **END** button is held down for 1 second or longer at the initial screen, the Futaba logo and user name are displayed for about 2 seconds.

Digital trim operation
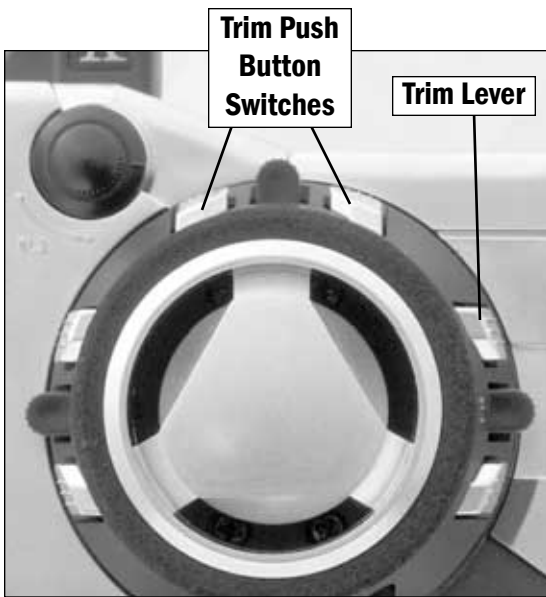
Trim Push Button Switches

Trim Lever

- Default assignments may be changed in **FUNC-DIAL** (pp. 34-35). Features assigned to DL1, 2, 3, and DT1, 2, 3 are displayed at all times on right side of LCD screen.
- Digital trims can be used in 2 ways:
  - Operating by the lever: Push the lever to the left or right (up or down).
  - Operating by push button switch: Press the push button switch in the desired direction.
- The current position is displayed on the LCD screen in the bottom three rows of the list.
- Each step is indicated by a tone.
- When the trim exceeds the maximum trim adjustment range, the beep will change and the servo will not move any farther. Return to the neutral position (center) by pressing both the push button switches simultaneously for about one second.
- Trim lever adjustments have no effect on the maximum servo travel. This prevents the linkages from binding when adjustments are made.

Digital grip dial operation
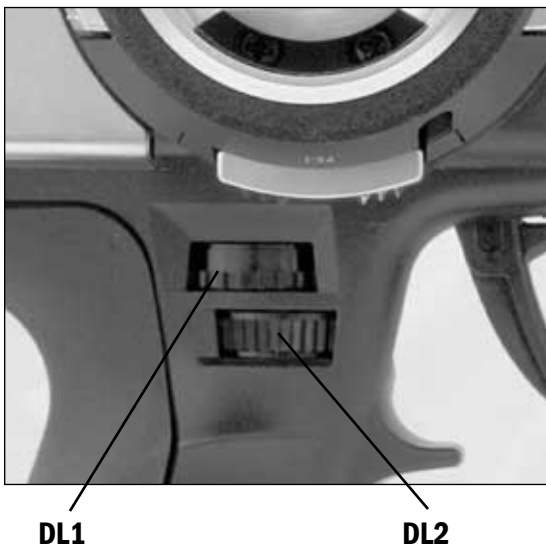
DL1

DL2

- Default assignments may be changed in **FUNC-DIAL** (pp. 34-35). Features assigned to DL1, 2, 3, and DT1, 2, 3 are displayed at all times on right side of LCD screen.
- Initial settings: DL1=Steering Dual Rate, DL2=ATL
- Operate the dials by turning them. The current set value is displayed on the LCD screen.
- A beep is made at each step.
- When the maximum position is reached at each side, the length of the beep changes. Thereafter, the set value does not change.
- Remember, the dials are digital so the position of each dial is remembered for each model separately.

Transmitter Checks Prior to Each Use

1. Turn on transmitter power.
2. Check the display screen for model name/number to ensure you are working with the correct model.
3. Check the display screen for "RF".
   a. If RF is not displayed, check crystal/module installation. Be sure module is clipped firmly into transmitter.
   b. If RF is intermittent or non-existent, send for service immediately.
4. Check the display screen for proper modulation to match the receiver in this model.
   a. FM receivers, such as R123F, must be set to PPM.
   b. PCM1024 receivers, such as R113iP, must be set to PCM.
   c. HRS-FM receivers, such as the R203HF, must be set to HRS.

5. Confirm function assignment. Notice the 6 features listed in the box on the right of the screen, which shows you the features assigned to the digital dials and digital trims respectively, and their current settings.
6. Check trim, dual rate and ATL operation/positioning.
   a. Steering trim is defaulted to the DT1 trim lever above the steering wheel. Operate the lever and make sure the marker moves on the ST graph. If default has been changed, test steering trim in its new location.
   b. Repeat test for throttle trim, defaulted to DT2.
   c. Repeat test for steering dual rate, defaulted to DL1, at the grip of the transmitter.
   d. Repeat test for ATL, defaulted to DL2, below DL1.
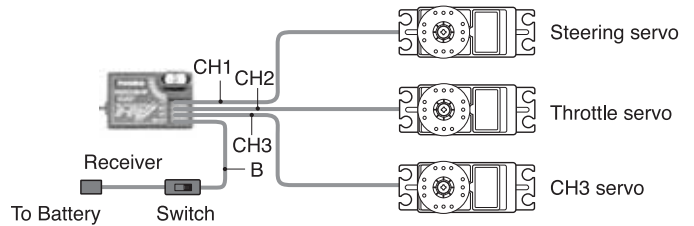
INSTALLATION

Receiver and Servo Connections

When connecting and installing the receiver and servos, read all safety precautions in the appendix.

Installation When an ESC is used (MC800C)

FET amp

Switch

Steering servo

CH1

CH2

Receiver

Motor

Nicd battery
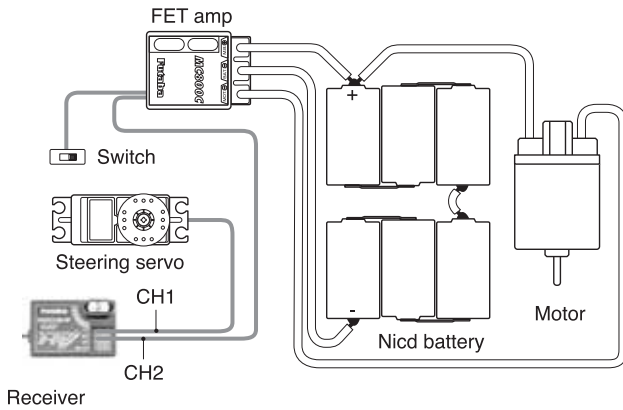
Installation For Gas Powered Models

CH1 CH2

Receiver

CH3
B

To Battery   Switch

Steering servo

Throttle servo

CH3 servo

B/C port is for the receiver battery or a DSC cord. For information on DSC cord, see p 5.

Receiver Notes

⚠ **DO NOT cut or fold the receiver antenna wire back on itself** — cutting or folding changes the electrical length of the antenna and may reduce range. Secure the antenna as instructed in your model's manual. You may run the antenna inside of a *non-metallic* housing within the model, but range may suffer if the antenna is located near metal or carbon fiber parts. Be sure to perform a range check before using.

When you insert Futaba servos, ESC, switch or battery connectors into the receiver, note that each plastic housing has an alignment tab. Be sure the alignment tab is oriented properly before inserting the connector. To remove a connector from the receiver, pull on the connector housing rather than the wires.

If your servos are too far away to plug into the receiver, use an extension cord to extend the length of the servo lead. Additional Futaba extension cords of varying lengths are available from your hobby dealer. Always use an extension of the proper length. Avoid plugging multiple extensions together to attain your desired length. If distance is greater than 18" or multiple or high current draw servos are being used, Futaba Heavy-Duty servo extensions are recommended.

Receiver Vibration and Waterproofing

The receiver contains precision electronic parts. Be sure to avoid vibration, shock, and temperature extremes.

⚠ **For protection, wrapping the receiver in foam rubber or other vibration-absorbing materials is ideal. Mounting with double-sided tape is the next best option:** It is also a good idea to waterproof the receiver by placing it in a plastic bag and securing the open end of the bag with a rubber band. If you accidentally get moisture or fuel inside the receiver, you may experience intermittent operation or a crash. If in doubt, send the receiver for service.
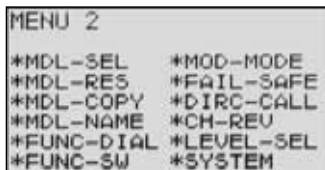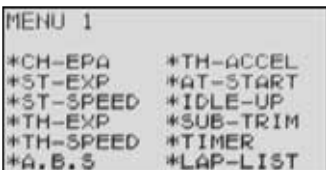
Using the 3PK's Functions:

The 3PK offers not only the most comprehensive menu of features available to provide optimum performance, but also quick-access to utilize your favorite features. 3PK offers "Menu Selection" for onscreen lists of available features, and a specialized, fully customizable version of "hot keys" called "Direct Selection." (Don't worry if terms seem overwhelming. Check the glossary and read on to get more familiar with new terms.)
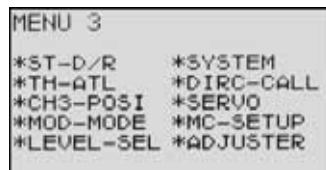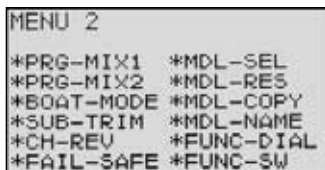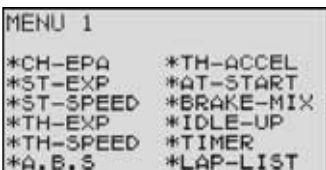
Menu Selection
- Each function is easily selected from the function menu displayed on the LCD screen with the select key.
- Three sets of function menus are available to match the level of use. To select the level for each model, use the Level Select function (page 12). Note that functions are in different locations depending on the level selected. This is done to keep level 1 simple, and keep related functions together on the higher levels.

```
MENU 1

*CH-REV      *MOD-MODE
*SUB-TRIM    *FAIL-SAFE
*CH-EPA      *MDL-NAME
*ST-EXP      *MDL-RES
*TH-EXP      *LEVEL-SEL
*MDL-SEL     *SYSTEM
```

- Level 1 (**LV1**): For the new user, basic functions only.

```
MENU 1

*CH-EPA      *TH-ACCEL
*ST-EXP      *AT-START
*ST-SPEED    *IDLE-UP
*TH-EXP      *SUB-TRIM
*TH-SPEED    *TIMER
*A.B.S       *LAP-LIST
```
```
MENU 2

*MDL-SEL     *MOD-MODE
*MDL-RES     *FAIL-SAFE
*MDL-COPY    *DIRC-CALL
*MDL-NAME    *CH-REV
*FUNC-DIAL   *LEVEL-SEL
*FUNC-SW     *SYSTEM
```

- Level 2 (**LV2**): Race-ready, including most popular racing setup features.

```
MENU 1

*CH-EPA      *TH-ACCEL
*ST-EXP      *AT-START
*ST-SPEED    *BRAKE-MIX
*TH-EXP      *IDLE-UP
*TH-SPEED    *TIMER
*A.B.S       *LAP-LIST
```
```
MENU 2

*PRG-MIX1    *MDL-SEL
*PRG-MIX2    *MDL-RES
*BOAT-MODE   *MDL-COPY
*SUB-TRIM    *MDL-NAME
*CH-REV      *FUNC-DIAL
*FAIL-SAFE   *FUNC-SW
```
```
MENU 3

*ST-D/R      *SYSTEM
*TH-ATL      *DIRC-CALL
*CH3-POSI    *SERVO
*MOD-MODE    *MC-SETUP
*LEVEL-SEL   *ADJUSTER
```

- Level 3 (**LV3**): All functions can be selected. (For expert driver)

Direct Selection
- The Direct Selection screen allows quick access to 6 user-selectable functions with just 2 keystrokes:
  - Press the **DIR** key to open the Direct Selection Screen.
  - Press the button which corresponds to the feature's number as shown on the on-screen diagram of the keys to open that feature.

Initial Settings

```
DIRECT SEL

         1:TH-EXP
⊙    ⑤   2:ST-EXP
②③④     3:CH-EPA
①      ⑥ 4:SUB-TRIM
         5:MDL-SEL
         6:MDL-NAME
```

DIR	to Open
END	Throttle Exponential
UP	Steering Exponential
SEL	End Point Adjustment (EPA)
DN	Sub-trim
+	Model Select
−	Model Name
DIR	to Close
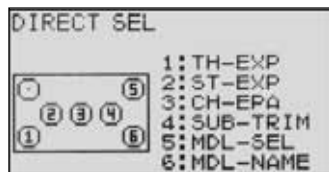
- Direct Selection choices can be edited using the **DIRC-CALL** function (see p. 36).
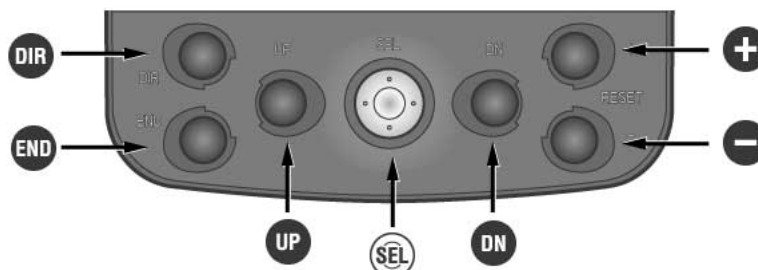
A Look at the Radio's Functions, Step by Step

LV1 FUNCTIONS for the New 3PK User and the Racers and Experts Alike

Level Selection **LEVEL-SEL** Levels **LV1, LV2, LV3**

DEFINITION: Selects the complexity of functions displayed on the menu screens. Includes 3 levels of flexibility to simplify programming for new users and the most flexible system in the world to those who wish to use it.

AVAILABLE FOR EACH INDIVIDUAL MODEL:
- Selection of a lower level simply hides the higher level features from the menu; however, setups in the higher level menus remain intact and as set prior to changing the level.
- Model reset clears all functions including those not visible in the displayed menus.

ADJUSTABILITY:
- Level 1 (Learning the system; quick setups, a single menu with enough features for most models.) **LV1**
- Level 2 (Expands upon Level 1 menu, with many race-ready features.) **LV2**
- Level 3 (For the Expert driver, boat modeler, or other complex setups.) **LV3**
    - *To view features available on each menu, see page 11.*

DEFAULT: **LV3**

INTERACTION: NONE. Changing the complexity of what menu is visible has no effect on the programming whatsoever. To adjust features set in a higher level and not currently visible, simply change the level back to the higher level and edit.

DESIRED END RESULT: Provide only as much information/access as needed without overwhelming the user with features not currently desired.

⚠ *CAUTION:* Just because you change to a lesser level does NOT reset hidden functions to their defaults or to inhibited. Be sure to inhibit any undesired functions and check settings which interact with other functions. (Example: throttle ATL.)

GOAL:	STEPS:	INPUTS:
Change setting from the default of Expert Driver (**LV3**) to New User (**LV1**) to simplify getting to know the basics of the radio. (If on **LV1** or **LV2**, scroll through menus, then select **LEVEL-SEL**.)	Open menu and display menu 3.	**UP**
	Select menu 3 & then select level selection.	**SEL** **DN** **DN** **DN** **DN** to **LEVEL-SEL**. **SEL**
	Select level 1.	**DN**
	Confirm your change.	together for 1 second. Screen displays **LEVEL = LV1**
	Close.	**END** **END** **END**
Where next?	Name the model (**MDL-NAME**): See p. 15. Select modulation (FM/PCM/HRS) (**MOD-MODE**): See p. 16. Channel reversing (**CH-REV**): See p. 18. End point adjustment (ATV) (**EPA**): See p. 18.

DEFINITIONS:
- **SYSTEM**   Adjusts system-wide settings. Settings are **not** model specific.
- **LHT-MODE**   LCD backlighting mode
- **LHT-TIME**   LCD backlighting time period
- **CONTRAST**   LCD screen contrast
- **BUZ-TONE**   Buzzer tone
- **LED-MODE**   LED pilot lamp
- **DISPL-SEL**   Home screen display settings
- **KEY-ON**   Back-lights whenever a programming key is pressed. Length of time is adjustable with **LHT-TIME**.
- **ACT**   Activated.
- **SRV-VIEW**   Servo display shown on home screen.

AVAILABLE FOR: System-wide only. Not channel or model specific.

ADJUSTABILITY:
- LCD backlight: **OFF**, **KEY-ON**, **ON** (constantly).
- Backlight time period: **OFF**, **ACT** (when **KEY-ON** is selected in **LHT-MODE**).
  - 1-30 seconds, length of time can be adjusted for backlight to stay on when a button (key) is pressed.
- Screen contrast: **-10** to **+10**.
- Buzzer tone adjustment: **OFF**, **0-100**.
- Pilot lamp color: **OFF**, **LIGHT BLUE**, **PURPLE**, **WHITE**, **GREEN**, **ORANGE**, **YELLOW**, **BLUE**.
- Home screen display: **FUTABA**, **SRV-VIEW**, **TIMER**.

INTERACTION:
- When **LHT-MODE** is set to **KEY-ON**, backlight comes on automatically if any programming button is pressed, and time period is automatically made **ACT** (active).
- Pilot lamp blinks when key functions, such as ABS and speed limiter, are active.

DESIRED END RESULT: Custom setup to best meet user's needs and style.

⚠ *CAUTION:* Adjusting display so dark/bright that it cannot be read and then turning transmitter off may require factory service to reset.

GOAL:	STEPS:	INPUTS:
Change the home screen display from Futaba to timer while radio is in **LV1** setting. (If set to more complex menus, scroll through menus with Up button until **SYSTEM** is displayed on screen.)	Open and select menu 1.	(UP) (SEL)
	Select **SYSTEM.**	(UP) to **SYSTEM**. (SEL)
	Select **DISP-SEL.**	(UP)
	Change to **TIMER.**	(+)
	Close.	(END) (END) (END)
Where next?	Adjust backlight settings (repeat steps above but edit **LHT**.)	
	Adjust screen contrast (repeat steps above but adjust **CONTRAST**.)	
	Set up timer function (**TIMER**): See p. 30.	
	Reset system timer (from home screen 🔒🔄 for 1 second.)	
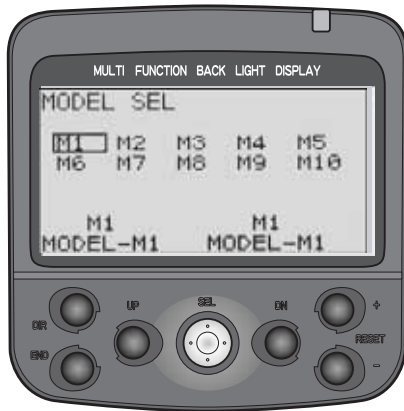
DEFINITION: Selects from the 10 model memories stored within the transmitter, or additional model memories in the optional **CAM**Pac ©.

AVAILABLE FOR:
● 10 models in transmitter memory
● Optional additional memories, 10 per **CAM**Pac © (see p. 5).

ADJUSTABILITY:
● Models M1-M10 within the transmitter, E11-E20 from optional **CAM**Pac ©
● Stores complete model setups with all functions separate per model (except settings within **SYSTEM**).

INTERACTIONS:
● Each model memory is a completely separate setup, and allows adjustment of all functions within each separate model memory (except **SYSTEM** functions).
● Each model memory may be set to a different modulation. If a model memory of a different modulation is selected, the transmitter must be turned off and back on to change the modulation.
    ● Example: Model 1 is HRS with R203HF receiver. Model 2 is FM with R133F receiver. Select model 2 and close the menu. Note that HRS is still displayed on screen. Turn transmitter off and back on. Modulation now shows PPM and will communicate with the R133F or other FM receiver. (If you do not cycle the power on the transmitter, it cannot communicate with the PPM receiver. See **MOD-MODE**, p. 16.)
● Each separate model memory may have a different level selection, so that simple models have only **LV1** menu, with **LV2** and **LV3** for other, more complex models.
● To make a copy of one model memory for setting up another, similar model, or for experimentation, change **LEVEL-SEL** to **LV2** (p. 12), and use **MDL-COPY** (p. 33).

DESIRED END RESULT: Select a specific model's setup within the radio or **CAM**Pac data storage.

⚠ *CAUTIONS:*
    ● Never remove the **CAM**Pac © with the power switch on.
    ● If a **CAM**Pac-stored model (E11-20) is in use when the transmitter is turned off, and then the **CAM**Pac is removed, "**SELECT ERROR**" will be displayed on screen and model M1 will be automatically selected. Use model select to select the desired model.
    ● The transmitter does not recognize one **CAM**Pac as being different from another. Model E11 is the first model in the **CAM**Pac currently in the port, regardless of what **CAM**Pac was last in the port. (Imagine inserting a floppy disk into your PC with a file on it labeled car1.doc. Close the file, remove the floppy, and insert another floppy which also includes a file called car1.doc. Your PC doesn't know or care that they may be different files; it simply opens the file named car1.doc.)

GOAL:	STEPS:	INPUTS:
Select model M3, changing from model M1 and using the **LV1** programming menus. (If set to more complex menus, scroll through menus with Up button until **MDL-SEL** is displayed on screen.)	Open and Select Menu 1.	**UP** **SEL**
	Select **MDL-SEL**.	**DN** **DN** **DN** **DN** **DN** **SEL**
	Choose **M3.**	**DN** **DN** to **M3.**
	Confirm your change.	together for 1 second.
	Close.	**END** **END** **END**
Where next?	Change menu to **LV1** (**LEVEL-SEL**): See p. 12. Name the model (**MDL-NAME**): See p. 15. Copy the model (**MDL-COPY**): See p. 33. Reset the model data (**MDL-RES**): See p. 32. Select modulation (FM/PCM/HRS) (**MOD-MODE**): See p. 16. (Hint: remember to power off and back on to begin transmitting in new modulation.)	
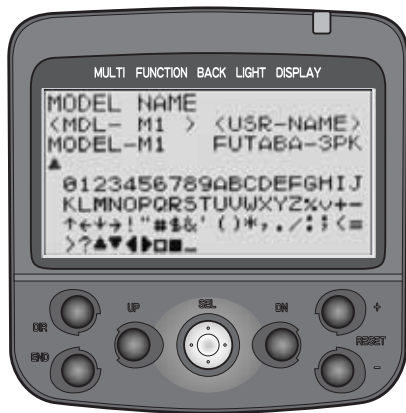
DEFINITION: Provides a 10-character name for each of the model memories in the transmitter to easily select the correct setup for the model currently in use. Also provides a 10-character user name that is constant to all model memories.

AVAILABLE FOR: M1-M10 in transmitter memory, E11-E20 if using optional **CAM**Pac.
ADJUSTABILITY: Includes 0-9, A-Z and numerous symbols.
INTERACTIONS: Model name is reset to factory default with model reset, and copied with model copy.

DESIRED END RESULT:
● Clearly label each model for easy selection.
● User name can be set to display on home screen (see **SYSTEM**, p. 13) for easy confirmation of radio ownership.

⚠ *CAUTIONS:*
  ● User name is constant across all model memories, so changing it changes it system-wide.
  ● Model names may be the same between models; model # will still be displayed and will still be different.

GOAL:	STEPS:	INPUTS:
Rename the current model FUTABA-1, while using the **LV1** programming menus. (If set to more complex menus, scroll through menus with Up button until **MDL-NAME** is displayed on screen.)	Open and select menu 1.	**UP** **SEL**
	Select **MDL-NAME**.	**UP** **UP** **UP** **UP** **SEL**
	Change first character to F.	**−** 7 times to **F.**
	Move to the second letter.	**DN**
	Repeat steps above to change name.	**+** 6 times to **U**. **DN**
		+ 16 times to **T**. **DN** Repeat.
	Close.	**END** **END** **END**
Where next?	Adjust the user name (**USR-NAME**): repeat steps above, but **DN** past model name to user name and edit each character. Copy the model (**MDL-COPY**): See p. 33. Select modulation (FM/PCM/HRS) (**MOD-MODE**): See p. 16. (Hint: remember to power off and back on to begin transmitting in new modulation.) Channel reversing (**CH-REV**): See p. 18.	

DEFINITIONS:
- Modulation select: Chooses the modulation (language) used by the transmitter to give instructions to the receiver.
- PPM: Pulse Position Modulation, commonly called "FM". Transmitted via FM, not encoded.
- PCM: Pulse Code Modulation. Transmitted via FM, but encoded for increased noise resistance. Includes FailSafe programming. (See p. 17.)
- HRS: High Response System. Transmitted via FM at accelerated rate; includes FailSafe programming. (See p. 17.)
- FM: Type of transmission of data. (Similar to FM car radio.) Used for PPM, PCM and HRS.

AVAILABLE FOR: Each individual model memory separately.

ADJUSTABILITY:
- PPM (Pulse Position Modulation, commonly called "FM") for FM receivers such as R133F
- PCM (Pulse Code Modulation, 1,024 step resolution) for PCM receivers such as R113iP
- HRS (High Response System) for HRS receivers such as R203HF

INTERACTIONS:
- Modulation is set separately for each model. One model can be PCM and another HRS, and still another PPM(FM).
- Modulation is not reset when a Model Reset is performed.
- Modulation is stored for each specific model. Turn transmitter off/on if new model is in different modulation.
- Both transmitter switches MUST be turned off and back on for a change to take effect. If transmitter is not turned off after modulation is changed, it continues to transmit in the last modulation. Display shows the current method of transmission under **NOW OPERATION** and the modulation that will be used as soon as the transmitter is turned off and back on under **MEMORY**.

DESIRED END RESULT: Change transmitting "language" so the receiver can understand the transmitter's instructions.

⚠ *CAUTIONS:*
- While there are 3 types of modulation (4 if you include AM, not supported by 3PK), all are transmitted on the same frequency band. NEVER attempt to operate more than one model on the same frequency at the same time.
- Transmitter must be turned off and back on for change to take effect.

GOAL:	STEPS:	INPUTS:
Change Modulation from HRS to PPM to operate with standard Futaba FM receivers such as R133F, while using model M1 and the **LV1** programming menus. (If set to more complex menus, scroll through menus with Up button until **MOD-MODE** displayed on screen.)	Open and select menu 1.	**UP** (SEL)
	Select **MOD-MODE**.	**DN** 6 times. (SEL)
	Choose **PPM.**	**DN**
	Confirm your change.	➕➖ together for 1 second.
	Close.	**END** **END** **END**
	Cycle transmitter power to transmit in new modulation.	Turn both switches off. Turn both switches back on. Confirm screen reads **PPM.**
Where next?	Name the model (**MDL-NAME**): See p. 15.	
	Copy the model (**MDL-COPY**): See p. 33. Channel reversing (**CH-REV**): See p. 18.	
	End point adjustment (**EPA**): See p. 18.	
	Set up FailSafe reactions (**FAILSAFE**): See p. 17.	
	Change menu complexity (**LEVEL-SEL**): See p. 12.	

DEFINITIONS:
- FAILSAFE: Settings stored by the receiver, used only if the receiver fails to receive clean, intelligible signal from a transmitter.
- HOLD: Maintain the last instruction provided by the transmitter before clean signal was lost.
- SET: Position servos are to be moved to if FailSafe activates.
- BATTERY F/S: When "on" the receiver will move the throttle servo to the preset FailSafe position when the receiver battery is low. Release and pull trigger to reactivate throttle for approximately 30 seconds.

AVAILABLE FOR Steering, Throttle, Channel 3, *only with HRS/PCM receivers and HRS/PCM modulation settings* (see **MOD-MODE**, p. 16).

ADJUSTABILITY: Hold or set (to go to a preset position).

INTERACTIONS:
- FailSafe operates only during interference or loss of transmitter signal.
- Modulation is not reset when a model reset is performed, but the FailSafe settings are reset.

DESIRED END RESULT:
- FailSafe: Provide receiver pre-recorded instructions of how to perform in the event it does not receive clean, clear transmission from a transmitter on its channel in Futaba PCM1024 language.
- Battery FailSafe: Warn user the receiver battery is getting so low that safe vehicle operation will soon end.

⚠ *CAUTION:* Settings are sent to the receiver every 2 minutes. Always allow at least 2 minutes' time to pass prior to testing any FailSafe settings.

GOAL:	STEPS:	INPUTS:
Change FailSafe settings for your throttle servo on your PCM receiver from "HOLD" to full brake position, while using the **LV1** programming menus. (If set to more complex menus, scroll through menus with Up button until **FAILSAFE** displayed on screen.)	Open and select menu 1.	**UP** **SEL**
	Select **FAIL-SAFE**.	**UP** 5 times. **SEL**
	Choose throttle channel.	**DN**
	Store desired throttle position.	Hold *THROTTLE TRIGGER* to full brake. ⊕⊟ together for 1 second.
	Close.	**END** **END** **END**
	Cycle transmitter power to test settings.	*Wait at least 2 minutes.* Turn master power switch off. Observe response of throttle servo. It should go to full brake setting.
Where next?	Set battery FailSafe to obey stored FailSafe position in case of low receiver battery voltage (**BATTERY F/S**): Repeat steps above but change **MODE** to **ON**. Channel reversing (**CH-REV**): See p. 18.
	End point adjustment (**EPA**): See p. 18.
	Change menu complexity (**LEVEL-SEL**): See p. 12.
	Set steering exponential (**ST-EXPO**): See p. 20.

Channel Reverse CH-REV Levels **LV1, LV2, LV3**
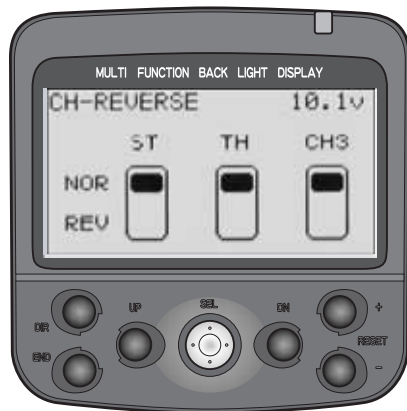
DEFINITION: Reverses the direction the servo moves when given an input. If the vehicle is turning right when wheel is turned left (or vice versa), reverse the setting for the steering. If the engine accelerates when brake is pushed, reverse the setting for the throttle.

AVAILABLE FOR: Steering, throttle, channel 3
ADJUSTABILITY: Normal, reverse
INTERACTION: Servo reversing affects all other functions, including EPA.
DESIRED END RESULT: Change the servo's direction to exactly the opposite.

⚠ *CAUTION:* Servo reversing affects all functions, including ATL.

GOAL:	STEPS:	INPUTS:
When brake is applied, the engine accelerates. Reverse the throttle servo direction, while using the **LV1** programming menus. (If set to more complex menus, scroll through menus with Up button until **CH-REV** displayed on screen.)	Open and select menu 1.	UP SEL
	Select **CH-REV**.	SEL
	Choose throttle channel.	DN
	Reverse the servo.	−
	Close.	END END END
Where next?	End point adjustment (**EPA**): See p. 18.	
	Change menu complexity (**LEVEL-SEL**): See p. 12.	
	Set throttle exponential (**TH-EXPO**): See p. 20.	
	Set engine cut and smooth start features (**AT-START**): see p. 28.	

End Point Adjustment EPA Levels **LV1, LV2, LV3**

DEFINITION: End point, commonly called EPA or ATV, adjusts (shortens or lengthens) the total travel of the servo. For example, a steering servo travels 60° each way. Decreasing the right EPA to 50% results in a steering servo that will move 60° to the left but only 30° to the right.

AVAILABLE FOR: Steering, throttle, channel 3.

ADJUSTABILITY: 0-120% on all 3 channels. Default: 100%.

INTERACTIONS:
- EPA **is** a primary function. EPA's should be set prior to doing any other programming and not adjusted (except for servo replacement, etc.) once other programming has been set. If EPA is adjusted after features such as dual rates, ATL, mixing, etc, the other functions must be readjusted based upon the new EPA.
- EPA is **not** limiting or absolute. Other programming functions can override the end point set by EPA. Always double check for binding after adjusting:
  - Sub trim (all channels)
  - Program mixing slave side (all channels)
  - Tilt mixing (steering, channel 3)
  - Idle up (throttle)
  - Throttle preset (throttle)
  - ATL trim (set ATL trim dial center prior to adjusting throttle channel EPA.) (**LV3** only.)
- EPA is **not** tied to any mixing. EPA adjusts each individual servo regardless of brake mixing, boat mode mixing, etc. **NOTE:** When EPA is increased to maximum (120%) but more servo travel is needed, the servo's motion can be increased with programmable mixing, up to the servo's physical limits. (See programmable mixes, pp 40-41.)
- Interaction Example:
  - Original setup:
    - Steering servo linkage allows 30° of servo rotation to the left.
    - Steering EPA is adjusted to 90%, creating 27° of left travel.
    - Steering dual rate is adjusted to 50%, or 13.5° of travel.
  - Adjusting EPA to 120% results in 36° of left travel; dual rate now provides 18° of travel, not 13.5°.
- Steering dual rate adjusts the servo's total travel as if EPA was adjusted. ATL adjusts braking travel. Both can be assigned to dials (see FUNC-DIAL, pp. 34-35).

DESIRED END RESULT:
- All channels: Servo is not binding or chattering, trying to move the linkage farther than it is physically able.
- All channels: Servo moves the attached pushrod just enough, creating the desired maximum servo movement.
- All channels: Linkage does not stick, bind, or catch on anything on the vehicle.
- Steering: Full right and full left turns result in the desired turning radius.
- Channel 3: Function moves the desired distance when full up/down, left/right or pressed/unpressed button are applied.

⚠️ *CAUTIONS:*
- Servo binding drains receiver batteries very quickly and may result in a loss of control.
- More is NOT always better! Start with the desired steering throws recommended for your vehicle.
- Always check for binding and servo "chatter" prior to each use.
- Always set dual rates, sub trims, and all other functions to their defaults prior to adjusting EPA.

GOAL:	STEPS:	INPUTS:
Change end point for steering servo so servo arm does not strike chassis in right turns, while using the **LV1** programming menus. (If set to more complex menus, scroll through menus with Up button until **CH-EPA** displayed on screen.)	Open and select menu 1.	(UP) (SEL)
	Select **CH-EPA**.	(DN) (DN) (SEL)
	Go to steering channel right side setting.	(DN)
	Set desired end point (example 98%).	(−) to 98%.
	Close.	(END) (END) (END)
Where next?	Set sub-trim (**SUBTRIM**): See p. 22.	
	Set exponential (**ST-EXP, TH-EXP**): See p. 20.	
	Change menu complexity to access additional features (**LEVEL-SEL**): See p. 12.	
	Set idle-up (**IDLE-UP**): See p. 27.	
	Set anti-lock braking (**ABS**): See p. 24.	

ST-EXP

RATE▶   0%

L ← → R
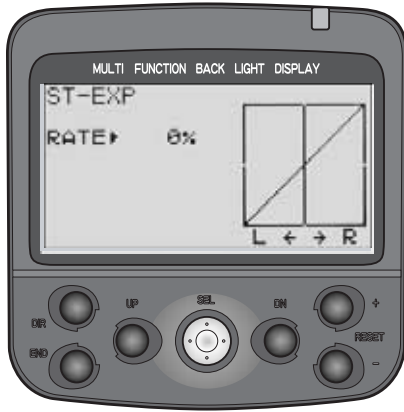
DEFINITIONS:

● Exponential adjusts the sensitivity of the servo around the neutral position. Exponential creates a true curve, not a hard climb to a certain point then a softer climb from there. Negative exponential makes the servo less responsive around center; positive exponential makes the servo significantly more responsive around center. Only exponential is available for steering and braking.

● **TH-EXP** offers far more than just exponential for forward: it also offers a 5-point throttle "curve" and a Variable Trace Rate (VTR) option.

● VTR: Variable Trace Rate is basically a 3-point line, where one point may be raised or lowered, forming two straight lines, and where the user can select the point where the line breaks into two.

● The "curve" function offers 5 points along the range of the servo, and draws straight lines of response between each point. It is not a true curve, as is exponential, and there are noticeable steps in the responsiveness as each rate of response is entered.

Expo Curve	Expo Curve	Throttle Curve (forward throttle only)

(Quick)
Servo travel

+1% ~ +100% (quick)

0% (normal)

Steering wheel travel

(Mild)
Servo travel

-1% ~ -100% (mild)

Steering wheel travel

0% (normal)

Throttle Curve

Initial value (normal curve)

Set value

P1   P2   P3   P4   P5
Trigger point

Example

Initial Values
P1 = 17%
P2 = 33%
P3 = 50%
P4 = 67%
P5 = 83%
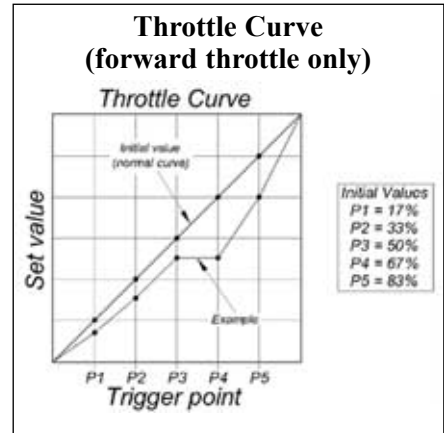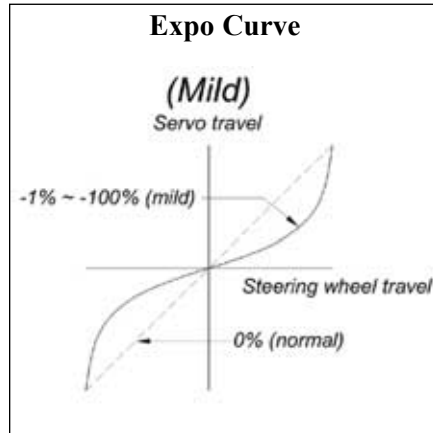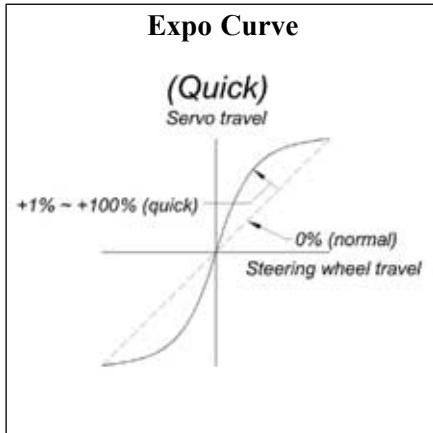
Variable Trace Rate (VTR)
(forward throttle only)

TG.P=50%

100% 50% 0%

50%

TG.P=20%

100% 20% 0%

20%

TG.P=80%

100% 80% 0%

80%
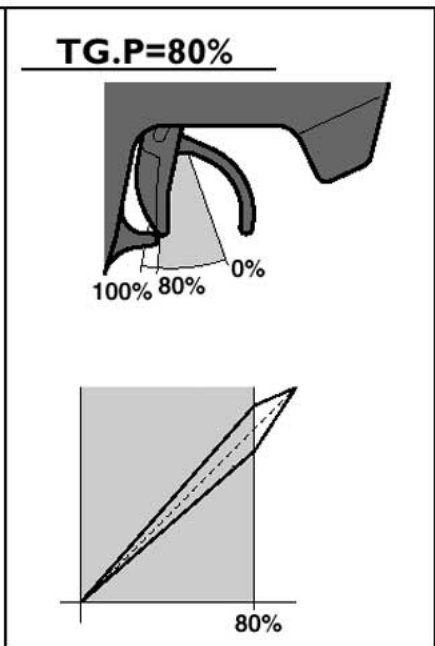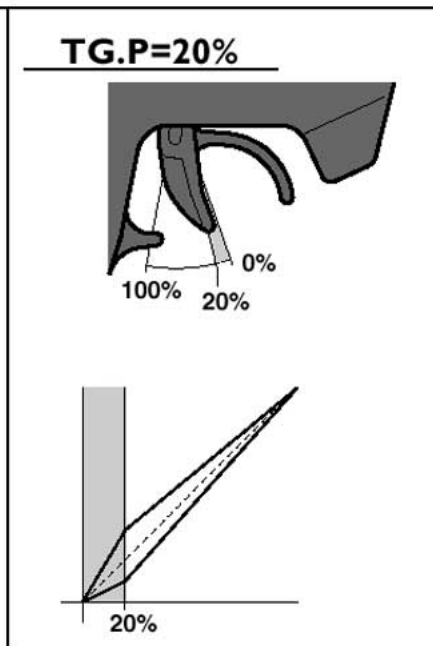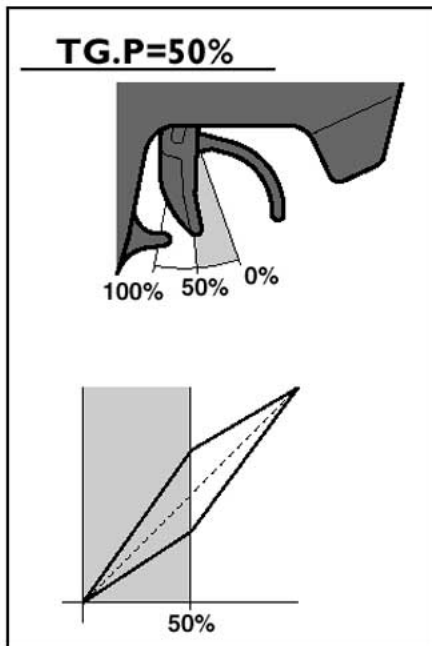
AVAILABLE FOR: Steering (**ST-EXP**), Throttle (**TH-EXP**)

ADJUSTABILITY:
- Range: -100% to +100%
- Throttle: Forward and Braking
- Steering: Left and right
- Types: (**TH-EXP** forward only) Variable trace, curve, or exponential curves.
- May be assigned to a dial for on-the-track adjustability. (See **FUNC-DIAL**, pp. 34-35.)

INTERACTIONS:
- Exponential affects the servo's response around center, and affects all built-in and programmable mixing functions such as throttle acceleration, brake mixing, ABS, etc. All mixing functions respond based upon the position the transmitter is telling the servo to go to, not the amount of trigger being pulled or wheel turned.
- EPA affects the total travel of the servo, and exponential is proportional to and affected by that total travel.
- **AT-START, TH-SPEED, TH-ACCEL** and other features interact with this function. For example, a very high VTR rate will result in rapid acceleration early in the trigger movement. Therefore, the engine reaches wide open at, for example, half throttle trigger. This may make it seem as though Speed Limiter programming is needed when you really should adjust the VTR rate to create a more normal throttle response.

DESIRED END RESULT:
- Positive exponential makes the servo move farther for the same amount of input when around neutral (for sharper steering when small inputs are given, for example).
- Negative exponential makes the servo move less for the same input when around neutral (to make a nitro engine's response to the throttle trigger smoother and more consistent between the first 1/4 of the trigger and the last 1/4 of the trigger.)

⚠ *CAUTIONS:*
- Too much positive exponential can make the model so overly sensitive it may be impossible to control.
- Too much negative exponential can make the model so non-responsive, your inputs may be too little too late, resulting in a crash.
- Too high of a rate on a throttle VTR will result in the engine reaching full throttle well before the trigger is at full throttle, which may result in wheel spin, especially upon acceleration.

GOAL:	STEPS:	INPUTS:
Making the steering servo less responsive around center to get rid of oversteering when trying to make corrections at high speeds, while using the **LV1** programming menus. (If set to more complex menus, scroll through menus with Up button until **ST-EXP** displayed on screen.)	Open and select menu 1.	(UP) (SEL)
	Select **ST-EXP** (**TH-EXP** for throttle.)	(DN) (DN) (DN) (SEL)
	Add negative exponential until servo is in desired position.	(–) to –25%.
	Close.	(END) (END) (END)
Where next?	Create a throttle VTR with a rate of 0 and a trigger point of 50%. See how it is just a straight throttle response? Now hold the throttle at 1/2 trigger while adjusting the rate. See how increasing or decreasing the VTR will then cause the throttle servo to open sooner, or slower, on a smoothly linear response?	
	Adjust braking expo for softer response around neutral. Repeat steps above in **TH-EXP**.	
	Set FailSafe (**FAIL-SAFE**): See p. 17.	
	Change menu complexity to access additional features (**LEVEL-SEL**): See p. 12.	
	Set speed of response for steering/throttle (**ST-SPEED, TH-SPEED**): See p. 23.	
	Set acceleration rate to avoid wheel spin (**AT-START**): See p. 28.	
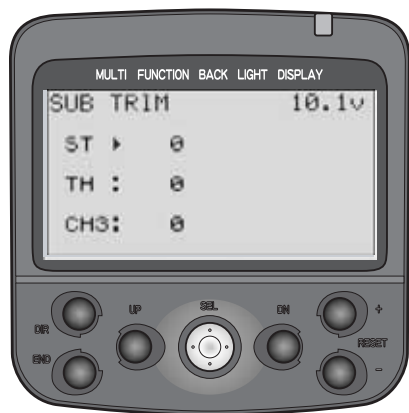
DEFINITION: Fine tuning adjustment for the center point of each servo. Similar to using electronic trims on the radio, but subtrim moves the entire servo's travel rather than just sliding the servo left/right within the total travel. The setting is stored within the programming and the onscreen displays continue to show neutral.

AVAILABLE FOR: Steering, throttle, channel 3

ADJUSTABILITY:
- Steering: left 100 to right 100
- Throttle: brake 100 to throttle 100
- Channel 3: -100 to +100
- May be assigned to a dial/trim. (See **FUNC-DIAL**, pp. 34-35.)

INTERACTIONS:
- **ALWAYS** adjust your digital trims back to neutral prior to adjusting your subtrim. Then adjust the subtrim until the servo is at the desired location without needing any digital trim.
- Subtrim adjusts the entire range of the servo to one side or the other; it does NOT adjust the servo's center point toward one end of the total travel like digital trims.
- Subtrim affects the neutral point for the servo for all other functions.

DESIRED END RESULT: Fine-tune the servo's center point to correct for minor linkage problems.

⚠ *CAUTION:* The range of subtrim is limited. Always adjust linkages to get the servo's center as close to the desired location mechanically and only use trim functions as absolutely necessary.

GOAL:	STEPS:	INPUTS:
Moving the steering servo arm one tooth on the servo results in a slight right turn; moving it back one causes a slight left turn. Adjust the servo's center (example: 5) so that the vehicle travels perfectly straight with no steering input, while using the **LV1** programming menus. (If set to more complex menus, scroll through menus with Up button until **SUB-TRIM** displayed on screen.)	Open and select menu 1.	**UP** **SEL**
	Select **SUB-TRIM**.	**DN** **SEL**
	Cursor down to throttle and up to steering to see the cursor positioning.	**DN** **UP**
	Add trim until servo is in desired position.	**−** to L5.
	Close.	**END** **END** **END**
Where next?	Set end point (**EPA**): See p. 18.	
	Set exponential (**ST-EXP, TH-EXP**): See p. 20.	
	Change menu complexity to access additional features (**LEVEL-SEL**): See p. 12.	
	Set idle-up (**IDLE-UP**): See p. 27.	
	Set throttle acceleration (**TH-ACCEL**): See p. 26.	

DEFINITION: Speed Limiter decreases the maximum speed of the servo. This may be adjusted individually for turning and returning the servo to neutral (steering), and for high and low throttle settings.

A servo which responds too rapidly to a full-wheel input may cause the vehicle to oversteer; to compensate many drivers steer too slowly, resulting in understeer and not completing a clean corner. Others slow down to make the model more controllable, losing valuable seconds. Speed Limiter helps in both these cases.

Similarly, applying throttle too suddenly results in wheel spin and wasted energy. It may also cause a nitro engine to stall.

AVAILABLE FOR: Steering (**ST-SPEED**), Throttle (**TH-SPEED**)

ADJUSTABILITY:
- 1% (slowest possible response) to +100% (normal response)
- On input and return (**ST-SPEED** only); High speed and low speed (**TH-SPEED** only)
- On/off switch may be assigned for **TH-SPEED** only. Switch selection made in **FUNC-SW** (see pp. 34-35).
- Throttle speed and steering turn/return may each be assigned to a dial. See **FUNC-DIAL** (pp. 34-35).

INTERACTIONS/COMPARISONS:
- Increasing EPA decreases the rate at which a servo reaches a given point mechanically; therefore, adjusting EPA will also adjust the actual rate of response of that servo.
- Negative exponential softens how *far* the servo responds to a given input vs. how *fast*. Either is used to settle a "twitchy vehicle", but the driver must first determine if the servo is moving too far, or simply too quickly.
- ABS pulsates the amount of brake given for a certain input to avoid overbraking and skidding the entire time brake is applied. Speed Limiter slows the brake command and decreases skidding only when brakes are first applied.
- Throttle acceleration gives a significant sudden movement of the throttle servo only when the trigger is first moved; Speed Limiter would slow that quick step off idle and diminish the effectiveness of acceleration. Thus, modifying Speed Limiter may require adjustments to acceleration, and vice versa.
- Auto-start moves/holds the servo to a preset position when the throttle is applied the first time, then allows the servo to operate through its normal travel for the rest of the run; Speed Limiter slows the performance of the throttle servo at all times. If the problem is spinning on starts only, then auto-start should be adjusted, NOT Speed Limiter.
- Idle-up increases the throttle idle as if throttle trim were applied, and is used to make starting nitro engines easier. Speed Limiter will only effect how rapidly the engine responds when additional throttle is applied.
- ATL adjusts the end point of the braking side only; Speed Limiter affects how quickly that total distance is traveled. Adjustments to either may require fine adjustments to the other.

DESIRED END RESULTS:
- Servo reaches actual travel commanded by trigger/wheel position, just at a more gradual rate.
- Minimize wheel spin, harsh acceleration out of corners, understeering and spins.

GOAL:	STEPS:	INPUTS:
Decrease throttle rate of response when applying more than 40% throttle, to minimize torque/spinning when accelerating out of turns, while using the **LV2** programming menus. (If set to **LV3**, select **TH-SPEED** from menu 1). (If set to **LV1**, first change level selection. See p. 12.)	Open and select menu 1.	**DN** **SEL**
	Select **TH-SPEED**. (use **ST-SPEED** to adjust steering servo speed.)	**DN** **DN** **DN** **DN** **SEL**
	Make active only above 40% trigger.	**+** to **H40**.
	Decrease response speed to 50%.	**DN** **−** to **50%**.
	Activate the function.	**DN** **+**
	Close.	**END** **END** **END**
Where next?	Assign on/off for throttle speed (**FUNC-SW**): See pp. 34-35.	
	Set ABS braking (**ABS**): See p. 24.	

DEFINITIONS:
- **ABS**: Simulates a full size car's antilock braking by pulsing the brake on and off rapidly.
- **ABP**: Amount of brake return, how far the braking response is decreased during the pulses.
- **DLY**: Delay; determines how long the braking is applied before ABS begins to operate.
- **CYC**: Cycle speed adjustment, sets how rapidly the brakes cycle from full brake to ABP and back.
- **TGP**: Trigger point, sets at what point ABS will be activated. ABS does not respond if less brake is provided than the trigger point setting.
- **DTY**: Cycle duty ratio, sets the proportion of the total cycle spent with brakes applied full vs. ABP.
- **STM**: Steering mix setup, controls when the ABS is triggered based upon amount of steering input. Designed to decrease skidding when vehicle is in a turn, and minimize spin outs.

AVAILABLE FOR: Braking only.

ADJUSTABILITY:
- **ABP**: 0 (no ABS) to 100% [Servo goes to neutral (no brake) during pulse].
- **DLY**: 0 (ABS responds immediately) to 100% (1.7 seconds of full brake before ABS takes over).
- **CYC**: 1 (fastest) to 30 (slowest). Default=10.
- **TGP**: 10-100.
- **DTY**: -3 (longest full brake application — most likely to skid) to + 3 (shortest full brake – least likely to skid).
- **STM**: OFF, N10-N100, E10-E100.
- **MODE**: Inhibited, Active but switch is off, Active and switch is on.
- Switch assignment can be changed in **FUNC-SW** (see pp. 34-35).
- Each ABS variable can be assigned to dials in **FUNC-DIAL** (pp. 34-35) for on-the-course adjustability.

INTERACTIONS:
- EPA, servo reversing, dual rates, Speed Limiter, acceleration, auto-start, and exponential all interact to create the overall braking effect.
- Brake mixing works with ABS as if only one brake servo were used. No second setup for ABS is required.
- Trigger point, steering mix and assigned switch each control ABS. All three must "say OK" for ABS to respond.

DESIRED END RESULT: Model stops as rapidly as possible without skidding.

⚠ *CAUTIONS:*
- Careful analysis of the problem causing skids is required to adjust the proper portion of ABS for best results.
- Adjustments to EPA, auto-start, expo, speed, brake mixing, vehicle's suspension, tire compounds, engine tuning and ATL will all affect the performance of the ABS settings.

GOAL:	STEPS:	INPUTS:
Set up a fairly rapid servo (such as S9402) on a nitro off-road vehicle, while using **LV2**. (If using **LV3**, select **ABS** from menu 1.) (If using **LV1**, first change level selection. See p. 12.)	Open and select menu 1.	(DN) (SEL)
	Select **ABS**.	(DN) (DN) (DN) (DN) (DN) (SEL)
	Make ABS active.	(DN) (DN) (DN) (+)
	Set rate of return to 30% (**ABP**).	(UP) (UP) (UP) (−) to **30**.
Desired settings: Fairly mild return (**ABP**) 30%	Delay ABS coming on to 10% of the maximum available delay (**DLY**).	(DN) (+) to **10.**
Use ABS if brakes are applied for more than approx. 1/4 second (**DLY**): 10%	Decrease the cycle value to increase the cycle rate (**CYCL**).	(DN) (−) to **5**.
Pulse quickly (**CYCL**): 5-7	Set the trigger position where ABS becomes effective to 70% (**TGP**).	(DN) (DN) (+) to **70**.
Use ABS only if braking hard: **TGP**: 70%	Leave the difference in brake-on to brake-off in each cycle to 0 (**DUTY**).	(DN) (Leave at **0**.)
Leave proportion of brake on to brake off even (**DUTY**): 0 Leave steering mix off (**STM**): 0	Allow ABS to work whether vehicle is turning or not (**STM**).	(DN) (Leave at **OFF**.)
View onscreen demonstration of braking and make adjustments as needed.	View ABS working within the function on screen to confirm proper setup. (*Hint*: LV3 users can also view braking activity and all other servo actions on screen using the **SERVO** function.)	Gradually push the throttle trigger to approximately half brake. Screen should still read "**MODE: ACT (OFF)**". Push past 70%. Display now reads "**MODE: ACT (ON)**" and you can see how brake commands will be transmitted to the servo right on the screen.
	Close function and menus.	(END) (END) (END)
Fine tuning:	If brakes still lock during all stops, analyze the problem, then try:	

If brakes still lock during all stops, analyze the problem, then try:

> Increasing **ABP** so less brake is applied during pulses.

> Decreasing **DLY** so that ABS takes effect more rapidly.

> Increasing **CYC** so the brakes pulse more rapidly, each on/off cycle is shorter.

> Decrease the **TGP** so ABS takes over with less brake application.

> Decreasing **DTY** so that brake off time is longer than brake on.

If brakes lock in turns but are not enough on straights:

> Set **STM** so ABS functions only when turning (ex: **E50**).

Where next:

NOTE: All of these functions interact with the throttle servo as well and are all inter-related. Adjusting any one may affect the performance of the others, as described in Interactions for each function.

Adjust the throttle servo's overall speed (**TH-SPEED**):

Adjust throttle exponential (**TH-EXP**):

Adjust throttle servo's response only immediately around neutral to correct for nitro engine's lag due to linkage setup (**TH-ACCEL**):

Set up smooth acceleration off of the start or engine cut (**AT-START**):

Set up a high idle for starting/racing, and keep a normal idle to keep the car sitting still on start line (**IDLE-UP**):

Adjust brake mixing for separate front/rear brakes (**BRAKE-MIX**) (**LV3**):

DEFINITION: Due to the shape of some nitro engine linkages, throttle servo movement near neutral results in very little movement of the pushrod. Throttle acceleration simply jumps the servo from neutral to a portion of the total available throw whenever the trigger is moved away from center. It does NOT change the speed of the servo; the servo will jump to the input position at its maximum possible speed. Unlike exponential, which adjusts the whole throttle movement into a curve, throttle acceleration simply "jumps" away from neutral and then leaves the remaining response linear. Accelerate is a pre-programmed VTR throttle exponential (see p. 20).

AVAILABLE FOR: Throttle and braking separately.

ADJUSTABILITY: 0-100%.
- At 100% the throttle servo moves immediately to approximately 40% of the total EPA.
- At 100% the brake servo moves immediately to full brake.
- Each setting may be assigned to a dial or trim for on-the-track adjustability. (See **FUNC-DIAL**, pp. 34-35.)
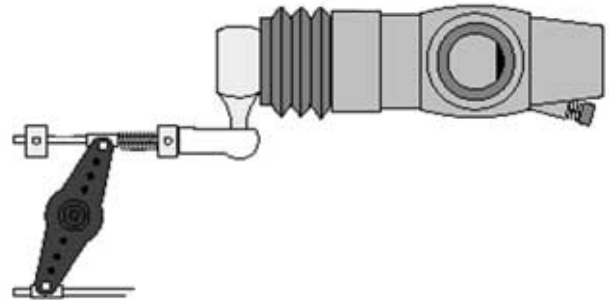
INTERACTIONS:
- EPA will affect how far the servo moves in the jump. Changes in EPA may require adjusting throttle acceleration.
- Brake mixing works with acceleration as if only one brake servo were used. No second setup is required.

DESIRED END RESULT: Model responds to throttle/brake immediately, similar to an electric car.

⚠ *CAUTION:* High brake settings will result in locked brakes. Adjust throttle acceleration only enough to pick up the slack in the linkage; then, utilize ABS to fine tune braking performance.

GOAL:	STEPS:	INPUTS:
Remove throttle and braking "lag" due to linkage in a 4WD nitro powered car, while using **LV2**. (If using **LV3**, select **TH-ACCEL** from Menu 1.) (If using **LV1**, first change the level selection. See p. 12.)	Open and select menu 1.	**DN** **SEL**
	Select **TH-ACCEL**.	**UP** 6 times **SEL**
	With receiver on, adjust forward until the linkage opens the carb with the slightest throttle input.	**DN** **DN** **+** as needed.
	With receiver on, adjust brake until the linkage applies brake with the slightest brake input.	**DN** **+** as needed.
	Close function and menu.	**END** **END** **END**
Where next:	*NOTE: All of these functions interact with the throttle servo as well and are all inter-related. Adjusting any one will affect the performance of the others.*	
	Adjust the throttle servo's overall speed (**TH-SPEED**): See p. 23.	
	Adjust throttle exponential (**TH-EXP**): See p. 20.	
	Setup ABS braking (**ABS**): See p. 24.	
	Set up smooth acceleration off of the start or engine cut (**AT-START**): See p. 28.	
	Set up a high idle for starting/racing, and keep a normal idle to keep the car sitting still on start line (**IDLE-UP**): See p. 27.	
	Adjust brake mixing for separate front/rear brakes (**BRAKE-MIX**) (**LV3**): See p. 42.	

DEFINITION: Adjusts the throttle's idle/neutral point, usually used to create a raised idle, making it easier to start the engine. May adjust either toward higher idle (U) or toward braking (D).

AVAILABLE FOR: Throttle only.

ADJUSTABILITY:
- D50-1, 0, U1-50%. D = brake side. U = throttle side.
- Rate may be assigned to a dial or trim for on-the-track adjustability (see FUNC-DIAL, pp. 34-35).

INTERACTION:
- Requires switch assignment in the **FUNC-SW** screen (see pp. 34-35).
- EPA does _**NOT**_ affect the preset position of idle-up.
- Idle-up could actually exceed your total EPA. Idle-up obeys only the actual total servo travel and servo reversing, and no other programmed changes.

DESIRED END RESULT: Throttle servo moves to a preset position when button is pushed and throttle trigger is at idle. Has no effect at other throttle positions.

⚠ *CAUTION:* If you have to adjust your EPAs after setting up this function, be sure to double check that the pre-set travel is still what is desired.

GOAL:	STEPS:	INPUTS:
Set a high idle of 25% of servo travel to get engine to start easily even when warm from racing, while using **LV2** programming (If **LV3**, select **IDLE-UP** from menu 1). (If using **LV1**, first change the level selection to **LV2**. See p. 12.)	Set desired switch (**FUNC-SW**).	See **FUNC-SW** (pp. 34-35).
	Open and select menu 1.	**UP** **UP** **(SEL)**
	Select **IDLE-UP**.	**UP** **UP** **UP** **UP** **(SEL)**
	Set desired rate to up (increase) 50%.	**+** to **U 50%**.
	Test function on screen.	Press selected switch (ex: PS-1). Note screen now reads "**ON**" and LED blinks. Release switch.
	Close function and menu.	**END** **END** **END**
Where Next:	*NOTE: All of these functions interact with the throttle servo as well and are all inter-related. Adjusting any one will affect the performance of the others.*	
	Adjust throttle EPA (**EPA**): See p. 18.	
	Adjust the throttle servo's overall speed (**TH-SPEED**): See p. 23.	
	Adjust throttle exponential (**TH-EXP**): See p. 20.	
	Setup ABS braking (**ABS**): See p. 24.	
	Set up smooth acceleration off of the start or engine cut (**AT-START**): See p. 28.	
	Adjust brake mixing for separate front/rear brakes (**BRAKE-MIX**) (**LV3**): See p. 42.	

DEFINITIONS:
- *Auto-start*: A pre-set throttle position, less than full throttle, to be used for the initial acceleration off the line without having wheel spin. When the trigger is released, auto-start is turned off and throttle operates normally again.
    - **ATS:** Auto-start status.
- *Engine Cut*: Shuts the engine off without having to adjust the throttle trim. Takes the throttle servo to a preset position when the switch is pressed. (Not available to models using braking/reverse from the throttle servo. Primarily for boats.)
- **TG.P**:   Trigger point at which auto-start is activated.
- **PRST**:   Preset throttle servo position when function is activated. Preset is a "true" preset – it is not a mix or a portion of the EPA. It is truly a command to move the servo to a set position regardless of other inputs, including trigger.
- **MODE**: Which function is being utilized at this time. (Engine cut and auto-start can not be used together).
    - **AT&SW**: Auto-start is activated by throttle trigger or switch. Switch can be assigned in **FUNC-SW** (pp. 34-35) and used to turn on/off the auto-start feature without having to pull or release the throttle trigger to do so.
    - **INH**:   Inhibited. Function is electronically inhibited and will not operate until changed to another setting.
    - **SW**:   Switch operated. Auto-start is inhibited and engine cut is available. (Assigned in **FUNC-SW**, pp. 34-35.)

AVAILABLE FOR: Throttle servo only.

ADJUSTABILITY:
- **MODE:** Inhibited, switch only (engine cut), auto-start with switch override (autostart).
- **ATS**:   Inhibited, off (not available until set), ready (will activate on next trigger pull), active (operating now).
- **TGP**:   Inhibited, 5-95. Default: 5.
- **PRST**:   Brake 100-1, 0, Forward 0-100. Default: 0.
- Auto-start may be assigned to a switch. Engine cut must be assigned to a switch to operate. (See **FUNC-SW**, pp. 34-35.)

INTERACTIONS:
- EPA has *<u>NO</u>* effect on the preset position. The preset position may exceed EPA. Be sure to set auto-start after setting EPA.
- Servo reversing *<u>DOES</u>* change the direction of the preset in this function.
- No other function affects the preset except servo reversing.
- Trigger position has no effect on engine cut. Engine cut will shut engine to the preset position regardless.
- Auto-start must be restarted for each use by going to the auto-start function and pressing the + and – keys together for one second while ATS is selected, or assigning and holding on a switch. (See **FUNC-SW**, p. 34-35.)
- If throttle triggered, auto-start remains active once started until the throttle trigger is returned to neutral.

DESIRED END RESULT: Avoiding wheel spin on starts and shutting engine off safely.

⚠ *CAUTION:* Remember that preset is not relative to EPA, so always check for binding if other changes have been made.

GOAL:	STEPS:	INPUTS:
Set auto-start to avoid wheel spin, while using **LV2**. (If using **LV3**, select **AT-START** from menu 1.) (If using **LV1**, first change the level selection, see p. 12.) Example: Trigger point of 95% so that any acceleration other than wide open off the line will not trigger the auto-start feature. Preset of 54% (determined on the track that this is the maximum acceleration you can have off the line without spinning.)	Open and Select Menu 1.	(DN) (SEL)
	Select **AT-START**.	(UP) (UP) (UP) (UP) (UP) (SEL)
	Select Auto-start mode.	(UP) (−) to **AT&SW**.
	Expert Tip: If you set up a switch in **FUNC-SW** (see pp. 34-35) assigned to auto-start, you can use that switch to turn on/off the Auto-start feature without having to go to the 95% throttle position.	
	Set pre-set position for throttle to go to when auto-start is in use.	(UP) (+) to **F54**.
	Set trigger point to activate auto-start.	(UP) (+) to **95**.
	Activate auto-start to be used on next full acceleration.	(UP) (⚙) to **READY**.
	Test function on screen. Set desired end point (example 98%).	Pull trigger slowly until past 95%. * displays at **TGP**. **ATS** indicates **ACT, MODE** indicates **ON**. Release trigger. **ATS** returns to **OFF**. Press (⚙) to re-activate.
	Close function and menu.	(END) (END) (END)
Where Next:	Set up engine cut: Set mode to **SW**, set preset. You must also set cut switch in **FUNC-SW** (pp. 34-35.) Assign a switch to **AT-START** using **FUNC-SW** (p. 28), then test auto-start using switch instead of trigger. Adjust the throttle's total travel (**EPA**): See p. 18. Adjust the brake's available travel/trim (**TH-ATL**)(**LV3**): See p. 37. Adjust the throttle servo's overall speed (**TH-SPEED**): See p. 23. Adjust throttle exponential (**TH-EXP**): See p. 20. Set up ABS braking (**ABS**): See p. 24. Set up a high idle for easier engines starts (**IDLE-UP**): See p. 27. Adjust brake mixing for separate front/rear brakes (**BRAKE-MIX**) (**LV3**): See p. 42.	

DEFINITIONS:

- **Total Timer:** System timer, does not reset/change with model selection, or when transmitter is turned off, storing total use time until it is reset.
- **Racing Timer**: Model-specific timer; types:
  - **Up Timer:** Regular stop watch timer. Counts up from 0 until stopped. Runs consecutively until reset with model selection or lap reset.
  - **Down Timer:** Count-down timer. Counts negatively once desired time is passed (below 0). Runs consecutively until reset with model selection or lap reset.
  - **Lap Memory Timer:** Acts as a count-up timer, storing each lap and starting a new lap each time button is pressed, while also maintaining a total run time count-up alarm, with a pre-alarm warning time. Stores up to 100 laps, visible on **LAP-LIST** (see p. 31). Has a 3-second safety window where button press does not reset the lap.
  - **Lap Navigate Timer:** Count-up timer which alarms at a set total run time, but also has a navigation alarm which alarms every set interval (desired lap time), and then restarts the navigation alarm countdown on each button press or upon passing each navigation alarm time. (Example: 4 minute track race, desired lap time is 30 seconds. Nav alarm goes off if lap counter is not pressed before 30 seconds, then again after another 30 seconds, and so on until 4 minutes.) Great for practice-runs and working toward a target track time. Does **_NOT_** store individual lap times.
- **LAP START**: Switch assignment required to indicate start/stop, or the end of each lap in lap navigate and lap memory timers.
- **LAP RESET**: Switch assignment required to end timers and reset them to be used again.
- **RUN**: Timer is currently running, and displays total run timer, tracking total race time regardless of individual laps.
- **STP**: Timer is stopped.
- **RST**: Timer reset. Stops running timer, resets run timer, stores last lap to memory.
- **RDY**: Trigger-ready state. If set to ready, timer begins with trigger pull, doesn't require lap start button to be pressed to begin timer; however, lap button still needs to be pressed to store each lap. Trigger activity has no effect after starting the timer.
- **LAP**: Current lap number.
- **No.**: Number of laps stored and ready to display.
- **TIME**: Current running lap time.
- **NVALM**: Number of times the navigation alarm went off, indicating you exceeded your target lap time.
- **ALRM**: Total run time prior to desired alarm.
- **PRAL**: Pre-alarm, warning that desired time is approaching, beeps once every second until alarm time is reached.

AVAILABLE FOR: N/A

ADJUSTABILITY:

- **Timer types:** See 5 timer types listed above (including total timer).
- **System Time:** 0 to 99 minutes 59 seconds. Resets to 0 at 100 minutes.
- **Status:** Reset (timer is reset, button will start), ready (throttle trigger or button starts), run, stop.
- **Alarm:** Off, 1-99 minutes. Default = 4 minutes.
- **Pre-Alarm:** Off, 1-30 seconds, warning that alarm is about to sound. Beeps every second. Default = 5 sec.
- **Lap:** Navigate timer only: 3 seconds to 30 minutes, interval counter to nav. alarm. Default = 3 seconds.
- **Switches:** Assign lap start/stop and reset buttons in **FUNC-SW** (see pp. 34-35).

INTERACTION:

- Requires switch assignment in the **FUNC-SW** screen. (See pp. 34-35.)
- Laps stored with a lap memory timer are visible using **LAP-LIST**. (See p. 31.)

DESIRED END RESULT: Provide user accurate time data for tracking laps, practicing, keeping track of fuel and battery usage, etc.

⚠ *CAUTION:* Lap Memory has a 3-second safety. If button is re-pressed within 3 seconds, the timer is not reset a second time.

GOAL:	STEPS:	INPUTS:
Set up a lap memory timer to track lap times throughout a race, while using **LV2** menus. (If using **LV3**, select timer from Menu 1). (If using **LV1**, first change level selection to **LV2**. See p. 12.)	Assign desired lapstart and restart switches.	See **FUNC-SW** pp. 34-35.
	Open and select menu 1.	UP UP SEL
	Select **TIMER**.	UP UP SEL
	Set type to lap memory timer.	UP + + to **LAP MEMORY**.
	Set total race time to 5 minutes.	DN DN to **ALRM**. + to **5m.**
	Set pre-alarm time to warn you race end is nearing at 15 seconds.	DN + to **15s**.
	Set total timer/first lap timer to trigger when throttle is pulled.	UP UP (throttle icon) Screen reads **RDY**.
	Test function on screen.	Pull trigger. Timer starts counting.
		Press selected switch (ex: PS-1) to store first lap.
		Note screen now displays the first lap's time for 3 seconds, then displays current running lap.
		Press selected reset switch to stop timer.
	Close function and menu.	END END END
Where Next:	**System timer:** Reset radio's total timer after recharging to use as a method of tracking on time between charges: from home screen, press and hold (throttle icon) for one second.	
	View stored laps (**LAP-LIST**): See p. 31.	
	Adjust switch assignments (**FUNC-SW**): See pp. 34-35.	
	Place timer setup screen on quick menu for 2-keystroke access (**DIRC-CALL**): See p. 36.	

Levels **LV2, LV3** Only   **Lap Listing LAP-LIST**

DEFINITION: Displays all stored lap times, up to 100, and also stores total race time, including run time after last but before reset/stop.

ADJUSTABILITY:
● *Reset single lap:* Select lap, SEL cursor blinks next to it. Press (throttle icon) together.
● *Reset all laps in memory:* Press (throttle icon) and SEL together for 1 second.

INTERACTION:
● Requires switch assignment for lap counter in the **FUNC-SW** screen (see pp. 34-35).
● Requires set up of timer as Lap Memory Timer (see p. 30).
● Lap Navigation Timer does *__NOT__* store lap times (see p. 30).

DESIRED END RESULT: Store multiple lap times to analyze performance after the race.

GOAL:	STEPS:	INPUTS:
View laps previously run, then reset all laps, while using **LV2**. (If using **LV3**, select **LAP-LIST** from menu 1.) (If using **LV1**, first change level selection to **LV2**, p. 12.)	Open and Select Menu 1.	UP UP SEL
	Select **LAP-LIST**.	UP SEL
	Scroll through laps shown on screen.	UP or DN as needed.
	Reset all laps to prepare for next practice.	(throttle icon) and SEL together for 1 second.
	Close function and menu.	END END END
Where Next:	Change timer type to lap navigate timer (laps will not be stored) (**TIMER**): See p. 30.	
	Adjust timer settings (**TIMER**): See p. 30.	
	Change switch assignment to start/stop lap timer (**FUNC-SW**): See pp. 34-35.	

DEFINITION: Erases all data stored in a specific model memory.

AVAILABLE FOR: Current selected model only. Model # is displayed on screen.

INTERACTIONS:
- Resets settings for the specific model memory currently in use without resetting any settings for any other model in memory.
- Model reset **does not** reset:
  - Modulation;
  - System settings;
  - Adjuster;
  - Lap listings;
  - User name;
  - Direct selection menu setup.
- Model copy may be used prior to model reset to store a copy of this data, including to an optional **CAM**Pac.
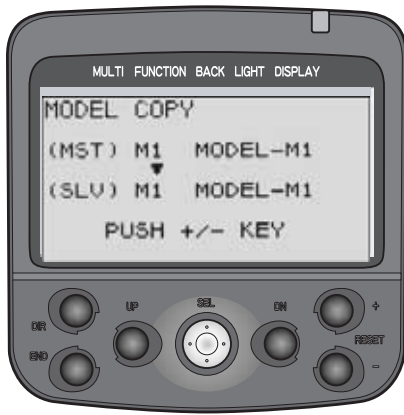
DESIRED END RESULT: Delete all existing programming from this model memory only.

⚠ *CAUTIONS:*
- Deleted data can not be restored.
- See list of functions NOT reset with a model reset under interactions.

GOAL:	STEPS:	INPUTS:
Reset all data in Model #M3, while already in model M3, and using the **LV2** programming menus. (If using **LV3**, select **MDL-RES** from menu 2.) (If using **LV1**, first change level selection. See p. 12.)	Open and select menu 2.	🔘UP ⊙SEL
	Select **MDL-RES**.	🔘DN ⊙SEL
	Confirm your change.	⊕⊖ for 1 second.
	If desired, return to **LV1**.	🔘END 🔘UP 🔘UP 🔘UP ⊙SEL
		🔘UP ⊕⊖
	Close.	🔘END 🔘END 🔘END
Where Next?	Name the model (**MDL-NAME**): See p. 15. Copy the model (**MDL-COPY**): See p. 33. Select a different model (**MDL-SEL**): See p. 14. Select modulation (FM/PCM/HRS) (**MOD-MODE**): See p. 16. (Hint: remember to power off and back on to begin transmitting in new modulation.) Channel reversing (**CH-REV**): See p. 18.	

DEFINITION: Makes an exact copy of the current model, including its name.

AVAILABLE FOR: Current selected model only. Model # is displayed on screen.

ADJUSTABILITY: N/A

*INTERACTION:* Copies all settings, including model name, modulation, etc.

DESIRED END RESULT: Make an exact copy of a model for backup, to copy to **CAM**Pac to use in another radio, etc.

⚠ *CAUTION:* Any existing model data in the model memory copied INTO will be lost.

GOAL:	STEPS:	INPUTS:
Copy model M1 into model M3, while already in model M3 and using the **LV2** programming menus. If using **LV3,** select **MDL-COPY** from menu 2.) (If using **LV1**, first change level selection to **LV2**. See p. 12.)	Open and select menu 2.	**UP** **SEL**
	Select **MDL-COPY**.	**DN** **DN** **SEL**
	Select the model # to copy INTO.	**DN** **DN** to **M3**.
	Confirm your change.	➕➽ for 1 second.
	Close	**END** **END** **END**
Where Next:	Name the model (**MDL-NAME**): See p. 15. Select a different model (**MDL-SEL**): See P. 14. Select modulation (FM/PCM/HRS) (**MOD-MODE**): See p. 16. (Hint: remember to power off and back on to begin transmitting in new modulation.)	

DEFINITIONS:
- **Function:** Assigns functions to the 3 dials, 3 trimmers, and 3 switches on the radio. Upper right on home screen displays assignments to dials 1-3 and trims 1-3.
- **PS**: Push button switch. Also called switch, or SW. PS1 = SW1
  - **ALT**: Push button setting: push once for on, push again for off.
  - **NOR**: Push button setting: hold for on, release for off.
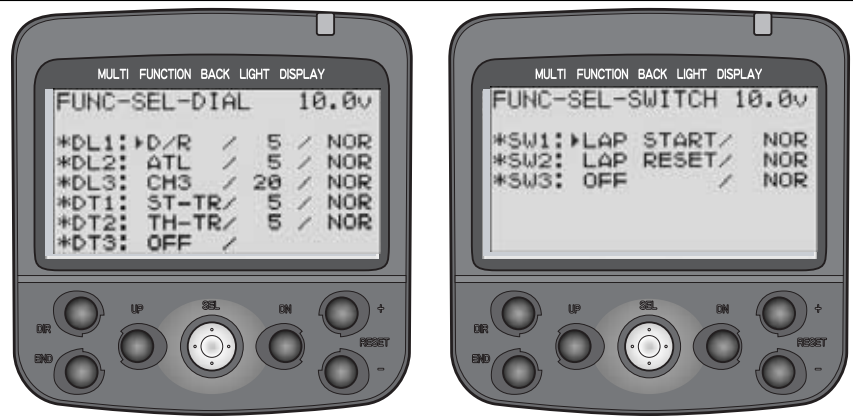
AVAILABLE FOR: Digital Dials 1, 2, 3 (DL 1-3); Switches 1-3 (PS 1-3), Digital Trims 1-3 (DT1-3). See transmitter image (inside front cover) for locations of each dial, switch and trimmer.

ADJUSTABILITY:

Available Functions	Abbreviation on setup screen	Abbreviation on home screen
ALL DIALS/TRIMMERS:		
Dual rate; 2nd dual rate	**D/R; D/R2**	**D/R; D/R2**
ATL	**ATL**	**ATL**
Exponential (steer/forward/brake)	**EXP-S/EXP-F/EXP-B**	**EXPS/EXPF/EXPB**
Speed (steer turn/return; throttle)	**SPDT/SPDR ; THSPD**	**SPDT/SPDR; THSPD**
ABS (return/delay/cycle)	**ABSP/ABSD/CYCLE**	**ABP; ABSD; CYCL**
Acceleration (forward/brake)	**ACC-F/ACC-B**	**ACCF/ACCB**
Trim (steer/throttle)	**ST-TR/TH-TR**	**TRMS/TRMT**
Channel 3	**CH3**	**3CH**
Sub-trim (throttle/steer/ch 3)	**SBT-1/SBT-2/SBT-3**	**SBT1/SBT2/SBT3**
Idle-up	**IDLUP**	**IDLE**
Tilt mix (1>3/3>1)	**TLT13/TLT31**	**TL13/TL31**
Programmable mix (left/fwd/up; right/brk/dwn) (mix 1/2)	**PM1-A/PM1-B; PM2-A/PM2-B**	**PM1A/PM1B; PM2A/PM2B**
Brake mixing (rate/delay/balance)	**BK-RT/BK-DL/BK-BL**	**BKRT/BKDL/BKBL**
No function assigned	**OFF**	**OFF**
ALL SWITCHES:		
Auto-start	**AT-START**	N/A
Throttle speed	**TH-SPEED**	N/A
ABS	**ABS**	N/A
Idle-up	**IDLE-UP**	N/A
2nd dual rate	**D/R 2nd**	N/A
Channel 3	**CH3**	N/A
Programmable mix 1/2	**PROG MIX 1/PROG MIX 2**	N/A
Lap start/reset	**LAP START/LAP RESET**	N/A
No function assigned	**OFF**	N/A

- Step amount can be adjusted for all dials/trimmers.
  - *Trim functions (***ST-TR, TH-TR***)*: Increasing step decreases sensitivity of each click. Setting of 1 = 200 clicks for entire trim range; setting of 10 = 20 clicks for entire trim range. Range = 1-7,10. Default = 1.
  - *Channel 3:* Adjustable to perform like a 2- or 3-position switch, as well as a range of sensitivity. Setting of 1 = 200 clicks; setting of 50 = 4 clicks. Range = 1, 2,5,10,20,50, 3PS (3-position switch), 2PS (2-position switch). Default = 1.
  - *All Other Functions:* Step is the percent of the total value of that function changed by a single click. Range = 1-7,10. Default = 1.