Quick Start Guide

Dec. 8, 2013

Understanding the Controls, Display Screens and Setup Menus

"*Welcome to Taranis.*" You've likely already powered up your Taranis and probably are a little bit overwhelmed by all the screens and programming features. This quick start guide is meant to provide new users of the Taranis, like yourself, with an introduction to the display screen views and methods for navigating them using the menu buttons.

For each display screen graphic presented, this guide provides a brief description of the view's features and function. Also associated with each graphic is a menu button key which describes the button presses required to access the screens and to change parameter settings for radio and model setups.

To supplement the brief screen descriptions, a glossary of terms, functions, and parameter labels is provided. There's also a flow chart that maps out how to navigate between the various screens.

Finally, as a foundation for model programming, a few flowcharts are provide to show programmatically how inputs like gimbal sticks, switches, weights and limits are applied to functions and mixes, and in which order, to compute the receiver channel outputs. Let's get started!

Credits:

I want to offer profound appreciation to all that volunteered to bring this project to fruition

Despite the best efforts the people that have reviewed the document there are certainly errors and ambiguities,. Please send corrections to Pages.Flying.Circus@gmail.com for incorporation in future editions.

Appreciation to Alofthobbies.com for hosting this document on their server.

Introduction

This document provides a broad overview of Taranis's control hardware and firmware features. Background information on the transmitters controls, battery charging, and receiver binding is discussed. More detailed information may be provided in the Taranis X9D Manual by FrSKY or by the openTx web page for Taranis.

One especially nice feature of Taranis is its USB port and the ability to connect to a PC for firmware updates, transferring data files, and model programming. A mini-B USB cable and the openTx open source software *Companion9x* provide this capability. However, *Companion9x* is not necessary for model setup and programming. For some, model programming will be easier when done directly on the Taranis, while for others not. Regardless, in the field, it may not be practical make adjustments by a PC, so learning the screens and menus directly from Taranis is essential. This document does not discuss setting up or using *Companion9x* on a PC.

This document is based on the latest firmware at the time of the writing, so screens presented may be slightly different on your radio due to the firmware version installed. The intent is to update this guide periodically or when reasonable. The user should also update their own firmware as the releases become available to take advantage of the new features and firmware fixes.

Familiarity with the Transmitter Layout and Controls

There are eight programmable toggle switches and four potentiometers. Toggle switches are either three-position, two-position, or momentary. The momentary switch feature is either two-way or just one-way. The H switch is a one way momentary switch; however the gimbal sticks each have a pair of two-way momentary switches used as centering trims. Two of the potentiometers are called sliders and have limited degree of movement, while the other two knobs rotate almost full circle.

Switches, Sliders, & Potentiometers			
Identifier/Label	**Type**	**Number of Positions**	**Input Value by Position**
S1, S2, RS, LS	Knob/Slider (potentiometer)	Proportional	-100% thru +100%
SA, SB, SC, SD, SE, SG	Toggle	3	-100%, 0%, +100%
SF	Toggle	2	-100%, +100%
SH	Toggle(momentary)	2	-100%, +100%(momentary)
TrmR, TrmE, TrmT, TrmA	Trimmer (momentary)	3	Incremental between -100% and +100%
Power Switch	Slider (ON-OFF)	2	None

The power switch is also a slider switch, but not programmable. All other switches, sliders and knobs are fully programmable and can be used for a variety of tasks.   A typical use of switches is for changing flight modes which alter the model's control surfaces for a variety of performance characteristics, such as for taking off, cruising, or landing.   Switches can also be used to start and stop timers, trigger playback of audio recordings, and to announce telemetry values sent back as data from the model's sensors.

Each switch is labeled at its base with a unique identifier that's used in programming. These identifiers must be used when setting up any functionality in the radio setup and model programming menus. The photo below shows the typical labeling of identifiers for each switch, knob, and slider.

On the sides of the LCD screen are six display control buttons which are used to navigate information screens, menu settings, and to adjust radio and model setup parameters. The **MENU** and **EXIT** buttons are used to access or return from radio and model setup menus, while the **PAGE** button is used to switch between various menus and information screens. The other three buttons (**ENT**, **+, -**) are for editing parameter settings or resetting timers. **ENT** is an abbreviation for Enter. Once the radio and model are setup, these buttons are rarely used, except for making model selections, pre-flight, or post-flight fine adjustments.

Charging the Battery for the First Time

Taranis is supplied with an external wall adapter for 6-cell NiMH battery charging.   The adapter only supplies DC power, so a charging circuit internal to the transmitter regulates the battery charging profile and automatic cutoff to prevent overcharging.   When the adapter is first plugged in, the green LED charge status light will blink for a few seconds (or longer depending on the state of charge) and then turn steady green to indicate fast charging is initiated.

Depending on the batteries state of charge, charging may take up to 2 ½ hours for the 6-cell NiMH 800mAh capacity battery (6 hours for the 6-cell NiMH 2000mAh). Upon fast charge completion, the green LED will turn off and the charger circuit switches to pulsed trickle charging.   Pulse trickle charging simply maintains the full charge level indefinitely without any risk of overcharging.

The **RADIO SETUP** menu provides for setting a low battery alarm warning. For the 6-cell NiMH battery, the alarm level should not be set lower than 7.0v, as at that level, the battery charge is almost fully depleted.

Continuous run times on a full charge are typically up to 3 hours for the 800mAh battery (7 hours with the 2000mAH battery).

Basic Setup and Receiver Binding

Before binding the transmitter with the model's receiver, the transmitter's Internal RF mode must be set in accordance with the receiver's protocol specification (modes D8, D16, or LR12).   The RF mode is set for the preselected model, using the transmitter's **MODEL SETUP** menu.

RF Mode	Compatible Receiver Series	Channel Range	Telemetry
D8	D, V8-II, X	1-8	✓
D16	X	1-8 or 9-16	✓
		1-16	
LR12	L	1-12	

After setting the transmitter for the receiver's RF mode, binding is accomplished by placing both the transmitter and receiver in binding mode. Consult with the receiver's manual to learn how to place it in binding mode. Usually, this requires (1) pressing and holding the receiver's F/S button while it is being powered up, then (2) releasing the F/S button when the LED status light flashes to indicate bind mode. As long as receiver power is maintained, the receiver's LED status light will flash indicating it's ready for binding.

The transmitter is placed in binding mode using the **MODEL SETUP** menu where you'll find the **[Bind]** function parameter shown next to the **Receiver No.** identifier.   With the cursor moved to the **[Bind]** function so it becomes highlighted, pressing the **ENT** (enter) button causes the **[Bind]** selection to flash, indicating the transmitter is in bind mode.

Binding should be almost immediate and will typically be confirmed with the receiver's status LED, but the receiver's servos will not track with the transmitter in bind mode.   After the successful bind, disable the transmitter from bind mode and repower the receiver to test servo action from the transmitter controls.

Display Screen Views and Menus Mapping Structure

Navigating the menus is easy once you learn how they've been laid out and which buttons are used to access them.   When powering up the transmitter, the first screen to be displayed is the splash screen. You'll also hear the welcome greeting.   This screen is followed by any warning screens for throttle or switch position that requires user action to correct before the main view screen is displayed. After this, it's necessary to use the display control buttons to navigate and access all other screens.

The following illustration shows the screen mapping arrangement.

Screens Navigation Mapping
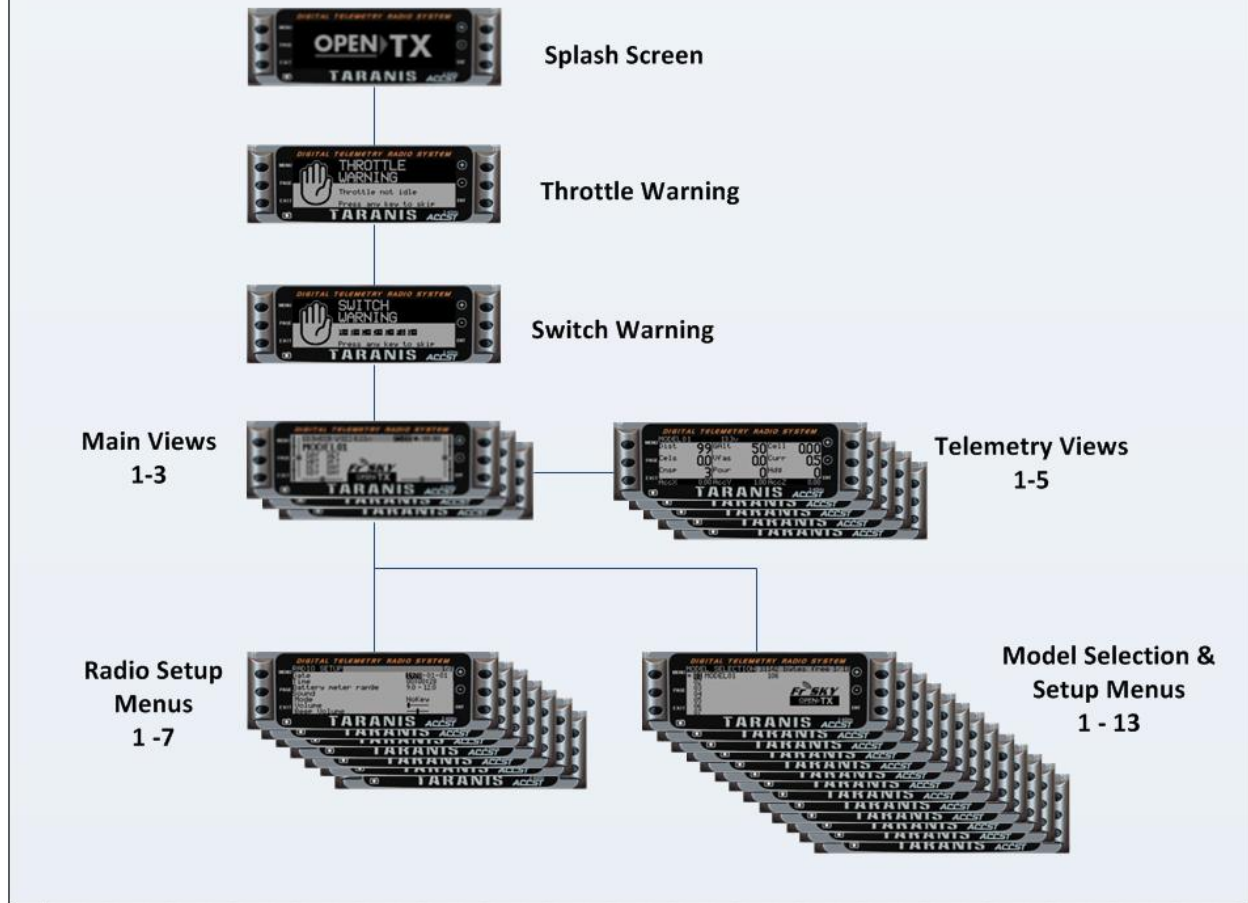
The most basic button presses are listed here. More detailed button functions are listed later for specific screens.

Basic Button functions:

- [Short-Press **(+)** or **(-)** *- to move up or down between editable fields or lines*]
- [Long-Press **(+)** or **(-)** *- to scroll up or down between editable fields or lines*]
- [Short-Press **PAGE** *- to flip down to next page or view*]
- [Long-Press **PAGE** *- to flip up to previous page or view*]
- [Long-Press **MENU** *- from any main views to flip to **RADIO SETUP** menu*]

- [Long-Press **MENU** *- from any **MODEL SELECTION & SETUP** menu view to flip to **CHANNEL MONITOR** view*]
- [Short-Press **EXIT** *- from **CHANNEL MONITOR** view to jump back to previous **MODEL SELECTION & SETUP** menu page*]

Two-key combination Shortcuts:

- [**(+)** + **(-)**   - *to invert value (from 30 to -30)*]
- [**(-)** + **ENT** - *to set value to 100*]
- [**PAGE** + **EXIT** - *to set a value to -100*]
- [**PAGE** + **MENU** - *to set a value to 0*]

Toggle Switch/Knob/Slider Parameter Selection Shortcut:

- Physically move the desired toggle switch, knob, or slider instead of selecting it from any menu switch pick list.

Display Screens Overview

The following table provides brief descriptions of the various information screens and setup menus by topic.   The description for each screen tries to explain the most cryptic parts, but not every parameter is discussed.   Immediately following this table, you'll find a glossary of terms, functions and parameters that may explain details not mentioned.

Startup Screens
When turning on the power switch, Taranis only takes a few seconds to start up.   While starting up, the radio system displays a brief splash screen and checks the throttle and toggle switch positions. If no out-of-position warnings are needed, the transmitter will then be ready to use.

Splash Screen –this is the first screen displayed when **Taranis** is powered on. The screen can be disabled from the **RADIO SETUP** menu or even replaced with a user's preferred substitute graphic image file (212x64 pixel, 4 bit, bmp format); replacement must be done using the *Companion9x* PC software.	

Startup Warnings – when enabled and triggered, warning screens successively appear immediately prompting user action and must be cleared by taking action or skipped by the press of any menu function key.

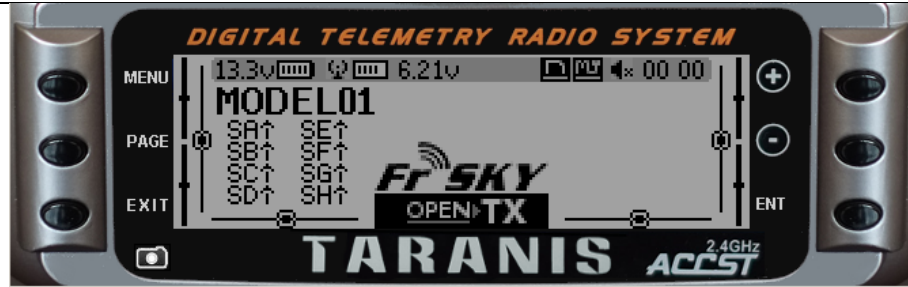|	
THROTTLE WARNING - this is a safety warning of high throttle condition on power up. Warning can skipped by taking appropriate action or pressing any button. These warnings can be disabled in the **MODEL SETUP** menu.	
SWITCH WARNING - this warning is for one or more toggle switches not in an assigned position. The default assigned position is ↑ but may be changed in *Companion9x*. Warning only concerns toggle switches labeled **A** through **G**. Warning can be globally disabled in the **MODEL SETUP** menu, but not individually.	

Main Views

After the startup completes, the screen displays the selected model name and FrSKY logo graphic or model's graphic (if configured). This screen is the first of four main view screen pages used when operating the radio with a RC model.

The four main view screens consist of three basic information screen pages, and one receiver channel monitoring screen page. In common with the first three views are the selected model's names, the title bar along the top, and the current slider, knob and stick trimmer relative positions.

Title bar displays vital data which may include: transmitter battery voltage (w/graphic), graphic receiver signal strength and operating voltage, SD-card present icon, USB connected icon, audio volume icon (w/graphic tick marks indicating volume level), and time of day.

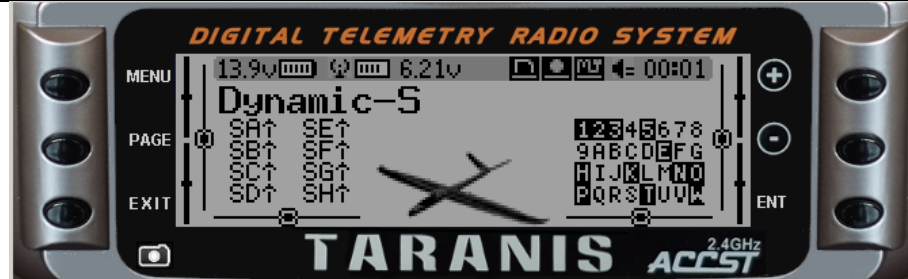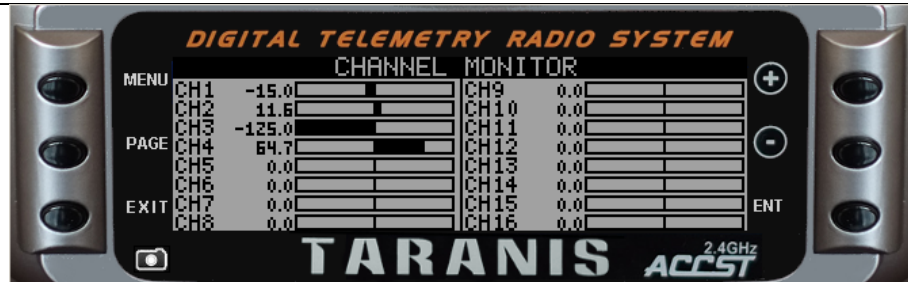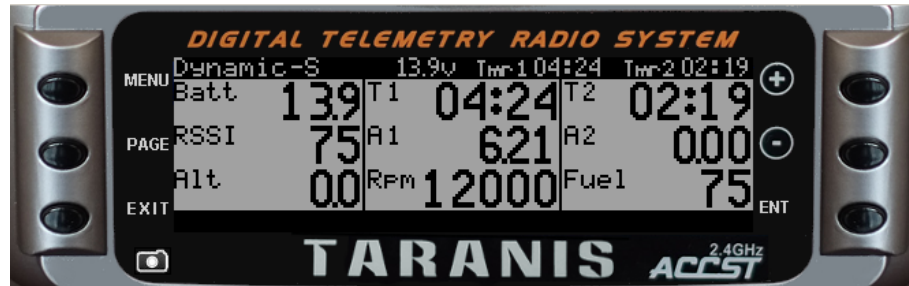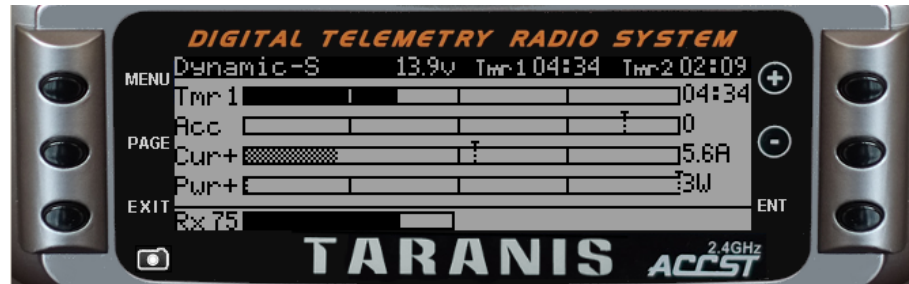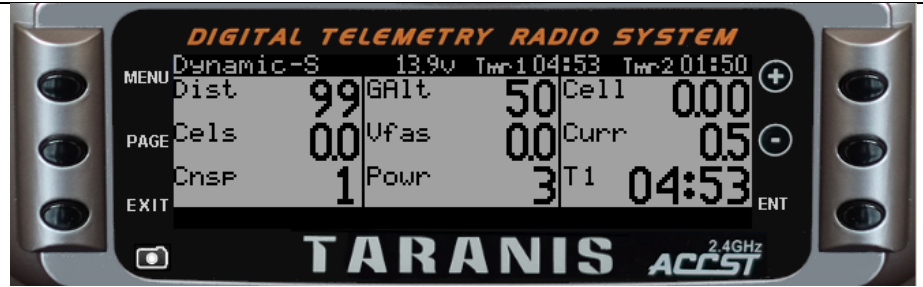|	
Main View #1, Physical States and Timers – this screen shows the physical states for toggle switches. Stick trims are show graphically along the sides and bottom. Knob and slider positions are depicted graphically along both side outer edges. When enabled by **MODEL SETUP** menu, clock timer(s) and associated value(s) are also displayed.	• [Short-Press **PAGE** button - *to page forward through the 4 Main Views*] • [Long-Press **PAGE** button - *to page back through the 4 Main Views*]
Main View #2, Gimbal and Switch Positions – these screens both show physical position of gimbal sticks and toggle switches.	
Main View #3, Physical and Custom Switches - these screens show physical positions of Toggle Switches (left center) and Custom Switches (right center). Custom Switches are logic switches, and if evaluated logically as TRUE, are shown highlighted here.	
Main View #4, Channel Monitor - shows receiver channel outputs for all 32 channels and reflects any signal modifiers, including mixes, expos, and limits. The Monitor is useful for testing programmed functionality and for diagnostic purposes. If	• [Short-Press **MINUS (-)** or **PLUS (+)** buttons - *to page down or up between CH1-CH16 and CH17-CH32 channel lineups*]

channel numbers are named (e.g., Thr, Ail, Ele) in the model's **SERVOS** menu, those names will be shown here. Virtual channels assigned in mixes will appear as well.	
Main Views, Popup Menu – shows a popup menu to reset values or display information timer statistics or OpenTx developer information.	

- [Long-Press **ENT** button – *from any main view page, to bring up a popup menu of reset options or to display information*]

Telemetry Views

When selected from the main views screens, the telemetry screens show the most recent receiver telemetry data with up to three configurable screens. Configuration is setup in the model's **TELEMETRY** menu and may include value display of power, variometer altitude, GPS data, motor RPM, or temperature.

- [Long-Press **PAGE** button - *to display **Telemetry Views** from any **Main View** screen*]
- [Short-Press **PAGE** button - *within any **Telemetry View** screen, to cycle through other **Telemetry View** screens*]
- Short-Press **EXIT** button - *to leave **Telemetry Views** and return to **Main View** screen*]

Telemetry Views, Page #1 - shows GPS position coordinates and minimum RSSI value.	
Telemetry Views, Page #2 - shows A1 and A2 values and alarm criteria settings.	

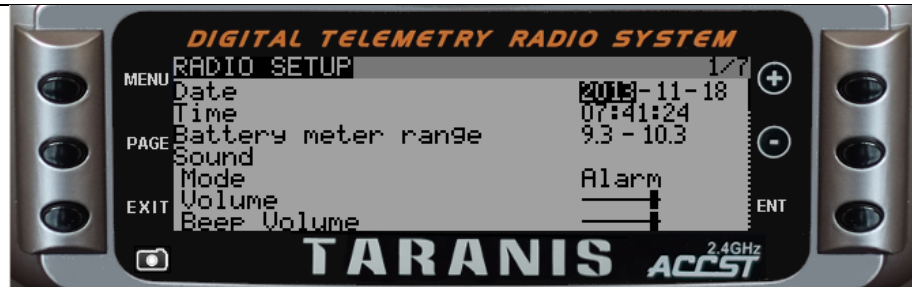| Telemetry Views, Pages #3 through 5 - shows three possible customized telemetry data screens table and graphical bar formats. Customized Pages are optional, so only appear on screen if configured for the selected model.	
	• [Long-Press **ENT** button – *from any Telemetry Views page, to bring up a popup menu of useful Telemetry reset options*]

Radio Settings

The radio setup menu allows configuring the radio system's hardware, regardless of which model is selected.   The **RADIO SETUP** menu is accessed using the Menu button.

- [Long-Press **MENU** button – *from any **Main View** screen, to display **RADIO SETUP 1/7** screen*]
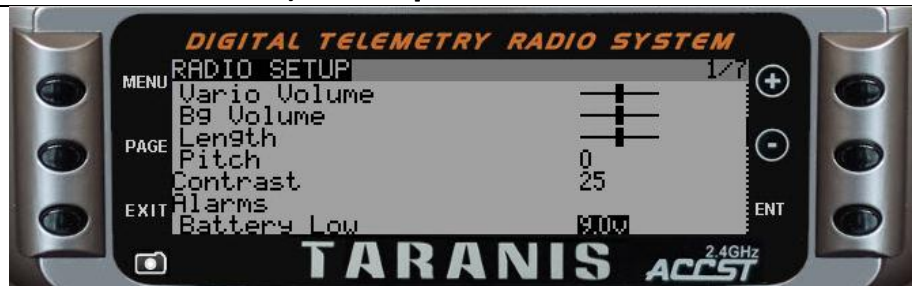
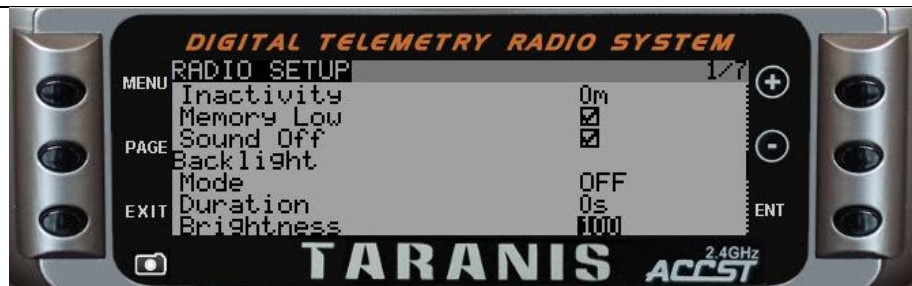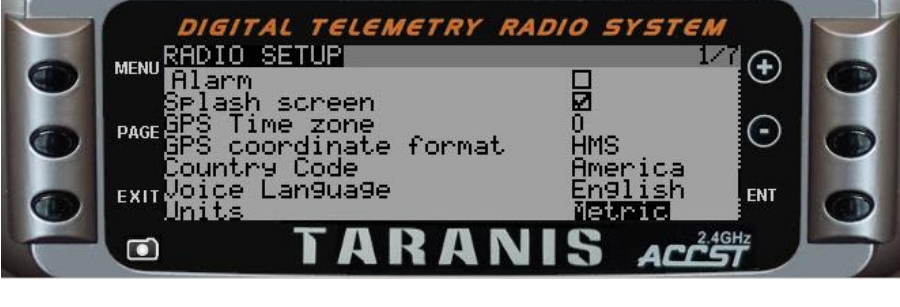|	
RADIO SETUP 1/7 - this page shows a long list of the transmitter's radio configuration settings. Screen shows only the first seven rows of configuration settings, so viewing the complete list requires scrolling the down the page.	 - [Short-Press **PLUS (+)** or **MINUS (-)** buttons - *to scroll up or down the list of transmitter configuration settings*] - [Short-Press **PAGE** button - *to page down view screens from any of RADIO SETUP 1/7 screens*] - [Long-Press **PAGE** button - *to page up view screens from any of the RADIO SETUP 1/7 screens*]
RADIO SETUP 1/7 – shows configuration settings, rows 8 through 14. **Bg** refers to background music playback.	
RADIO SETUP 1/7 – shows configuration settings, rows 15 through 21.	
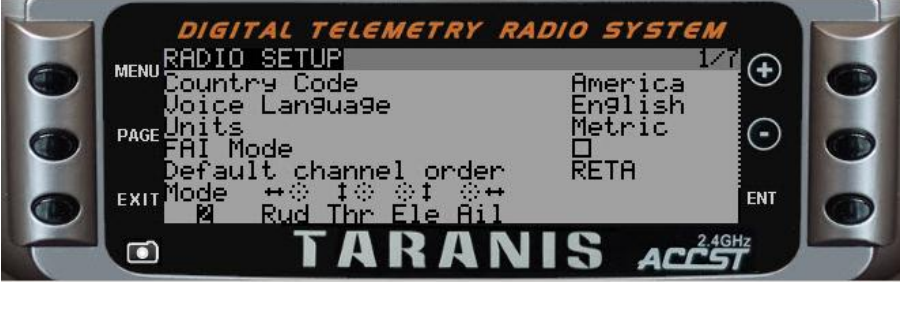
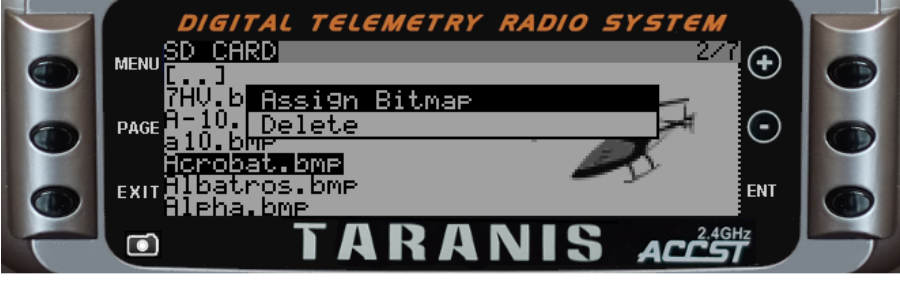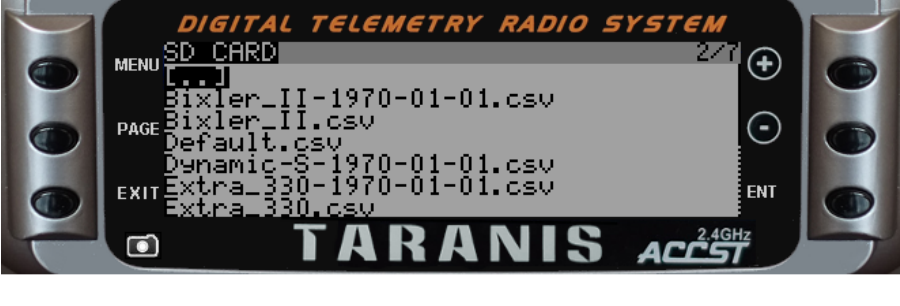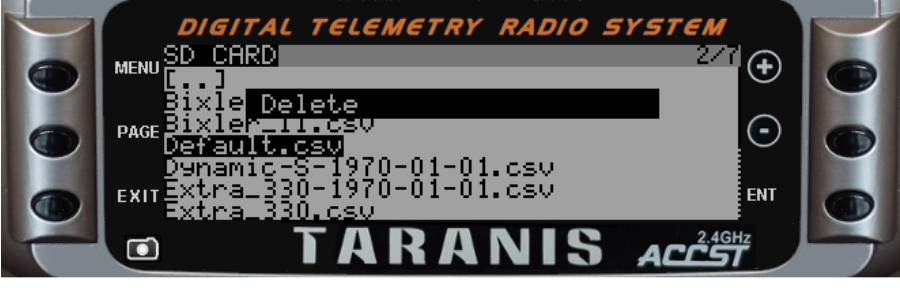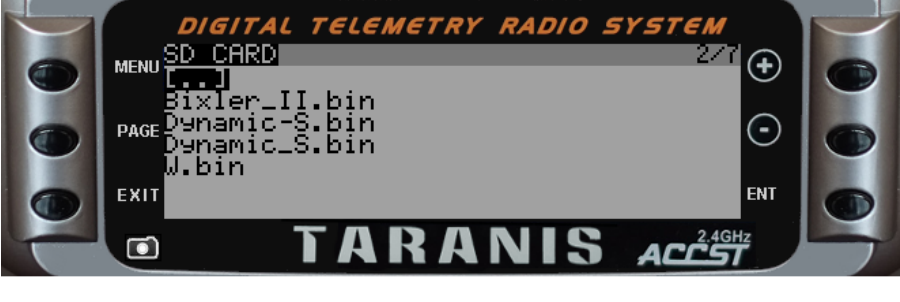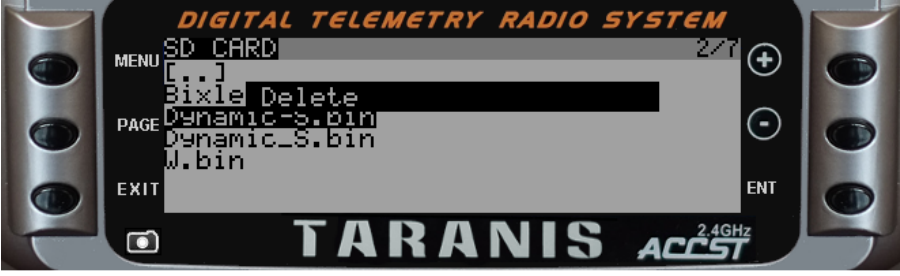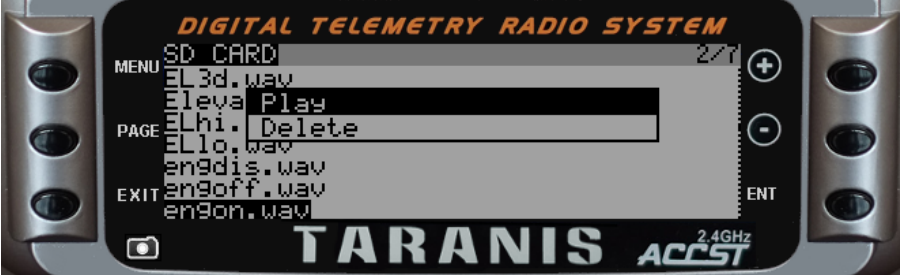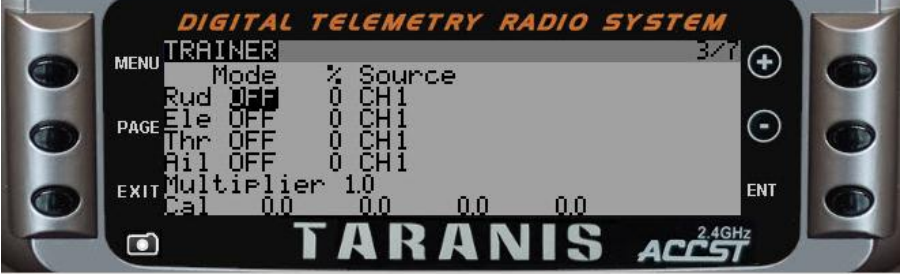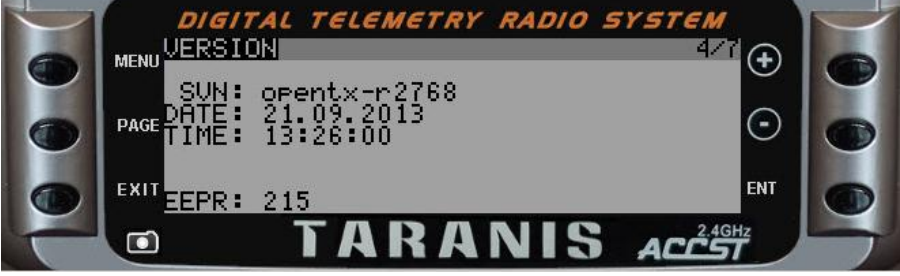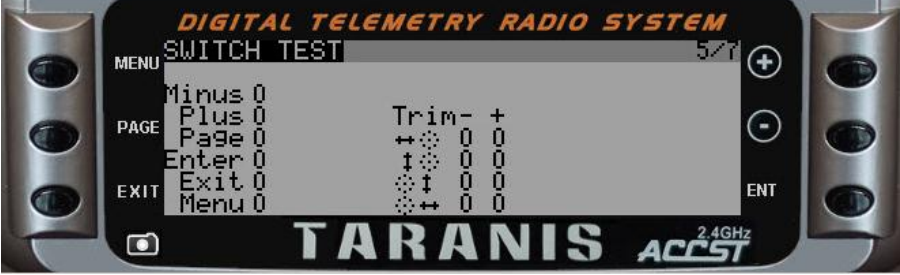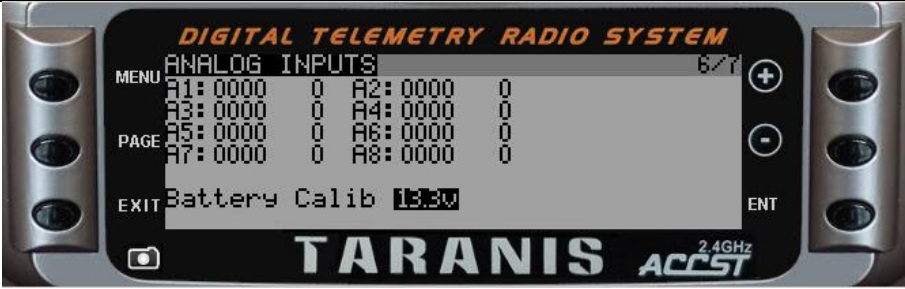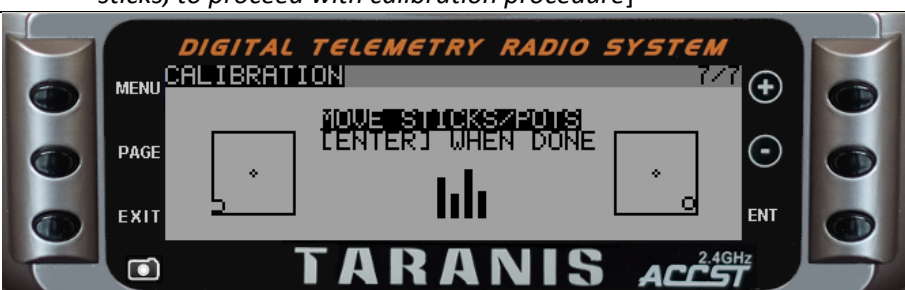|	
RADIO SETUP 1/7 – shows configuration settings, rows 22 through 28.	
RADIO SETUP 1/7 – shows configuration settings, rows 26 through 32. Enabling **FAI Mode** disables all telemetry displays other than RSSI and voltage to comply with **FAI** regulations.	
SD CARD 2/7 **View #1** – shows the **SD CARD** file/folder browser.	 • [Short-Press **PLUS (+)** or **MINUS (-)** buttons - *to scroll highlighted selection item up or down the list of file/folders*] • [Short-Press **ENT** button - *to select highlighted Folder/File*] • [Long-Press **ENT** button - *to display **DELETE** function popup*] • [Long-Press **MENU** button - *to display SD-Card **FORMAT** function popup*]
SD CARD 2/7 **View #2** – shows a **Delete** popup menu for **MODELS** folder.	 • [Long-Press **ENT** – *brings up a popup menu to **Delete** models from the **MODELS** folder*] • [Short-Press **ENT** – *after bringing up popup menu, to **Delete** and receive brief confirmation dialog*]

SD CARD 2/7 **View #3** – shows folder listing bit mapped image files (**BMP**). Image of any highlighted file name is shown on right side of screen.	
SD CARD 2/7 **View #4** – shows popup menu functions to **Assign Bitmap** or **Delete** bitmap assignment from the current selected model.	 • [Short-Press **ENT** – *after highlighting bmp file, to bring up popup menu function to **Assign Bitmap** to, or **Delete** from, the current selected model*]
SD CARD 2/7 **View #5** – shows contents of the **LOGS** folder where telemetry data logs are stored in csv file format, with file naming using model name and date. Telemetry data logging feature is enabled with **CUSTOM FUNCTIONS** menu, using the **Start Logs** function.	
SD CARD 2/7 **View #6** – shows **LOGS** folder **Delete** file function popup menu.	 • [Short-Press **ENT** – *after highlighting selected file name, to **Delete** log file from SD-card and receive brief confirmation dialog*]

SD CARD 2/7 **View #7** – shows **MODELS** folder binary model backup files that have been archived with the **MODEL SELECTION** menu, using its **Backup Model** function.	
SD CARD 2/7 **View #8** – shows **Delete** popup menu in **MODELS** folder.	

- [Short-Press **ENT** - *after highlighting file name, to bring up Delete popup menu*]
- [Short-Press **ENT** – *after Delete popup menu presented, to Delete model binary file and receive brief confirmation dialog*]

SD CARD 2/7 **View #9** – shows **SOUNDS**' folder contents, which is the English (**en**) language recordings sub-folder. **Language options**: • English – en • French - fr • Italian - it • German - de • Swedish - se • Czech - cz • Slovak - sk • Portuguese - pt • Spanish -es	
SD CARD 2/7 **View #10** – shows **\SOUNDS\en** folder Waveform Audio File Format (**wav**) file contents.	

SD CARD 2/7 **View #11** – shows **\SOUNDS\en** folder popup menu to playback (**Play)** or **Delete** a **wav** file sound recording.	 • [Short-Press **ENT** – *after highlighting a named **wav** file, to present popup menu to **Play** or **Delete** the file*]
TRAINER 3/7 – shows Trainer mode settings for Master. Trainer Mode is only active when in **MODEL SETUP** menu, **Trainer Mode** is set to **Master**.	
VERSION 4/7 – shows source code Subversion Number, release date and time, and the firmware version number stored in the transmitter's EEPROM memory. This information should be included with any Open Source (OpenTx) firmware bug reporting and feature requests.	
SWITCH TEST 5/7 – shows a menu button and stick trimmer interactive testing feature. After button names, a '**1'** is displayed for each switch when pressed down (closed circuit), and '**0'** when not being pressed (open circuit). Similar with stick trimmers, which are momentary two-way switches.	

ANALOG INPUTS 6/7 - shows raw data from pots in gimbals, knobs, and sliders. Current battery voltage is displayed as a parameter and parameter may be set (calibrated) here using multi-meter (Volt-Ohm Meter).	DIGITAL TELEMETRY RADIO SYSTEM ANALOG INPUTS 6/7 A1:0000 0 A2:0000 0 A3:0000 0 A4:0000 0 A5:0000 0 A6:0000 0 A7:0000 0 A8:0000 0 Battery Calib **13.3V** TARANIS ACCST 2.4GHz • [Short-Press **PLUS (+)** or **MINUS (-)** buttons - *to increase or decrease Battery Calib voltage parameter*]
CALIBRATION 7/7, Views #1- shows the gimbal sticks calibration procedure **START** prompt.	DIGITAL TELEMETRY RADIO SYSTEM CALIBRATION 7/7 **CENTER STICKS/SLIDERS** [ENTER] WHEN DONE ⊗ IIII ⊗ TARANIS ACCST 2.4GHz • [Short-Press **ENT** button – *to start gimbal sticks calibration procedure*]
CALIBRATION 7/7 Views #2- shows transmitter gimbal stick positions and prompts to center sticks and sliders.	DIGITAL TELEMETRY RADIO SYSTEM CALIBRATION 7/7 [ENTER] TO START ⊗ IIII ⊗ TARANIS ACCST 2.4GHz • [Short-Press **ENT** button – *after centering both transmitter gimbal sticks, to proceed with calibration procedure*]
CALIBRATION 7/7 Views #3 – shows prompt to move transmitter gimbal sticks and knob potentiometers.	DIGITAL TELEMETRY RADIO SYSTEM CALIBRATION 7/7 **MOVE STICKS/POTS** [ENTER] WHEN DONE ◇ IiIl ◇ TARANIS ACCST 2.4GHz • [Short-Press **ENT** button – *after moving transmitter gimbal sticks and knobs fully in both x and y axis*]

Model Selection and Setup

The Model Selection menu shows a pick list of up to 60 user created models available in the EEPROM memory. In the **MODEL SETUP** menu the user can load or save models from the SD-card memory, thus allowing virtually infinite models.   View allows changing the active model. New models are also be created and named in this view.

- [Short-Press **MENU** button – *from any Mains View, to see MODEL SELECTION menu*]

MODEL SELECTION 1/13 Views #1 – shows pick list of up to 60 available user defined models. The selected model will be marked with an asterisk (*). This is also where new models are created.	
	- [Long-Press **ENT** button – *with highlight on listing number , brings up popup menu with options as appropriate, to Select Model, Backup Model, Copy Model, Move Model, Create Model, Restore Model, or Delete Model*] - [Short-Press **ENT** button – *to Select a highlighted model number for a move to another model number position*] - [Double-Short-Press **ENT** button – *a selected model to Copy model, to another model number position*] - [Long-Press **ENT** button – *to bring up popup menu to Backup, Copy, or Move selected model*]
MODEL SELECTION 1/13 Views #2 – shows popup function to **Select**, **Backup**, **Copy**, **Move**, or **Delete** a model. **Backup Model** function can be used to archive models for possible restoration at a later date.	
	- [Short-Press **PLUS (+)** or **MINUS (-) Buttons** - *to scroll highlighted selection item up or down the list*] - [Short-Press **ENT** button – *after highlighting selected model number, to bring up a popup menu for Select Model, Backup Model, Copy Model, Move Model, and Delete Model functions*]
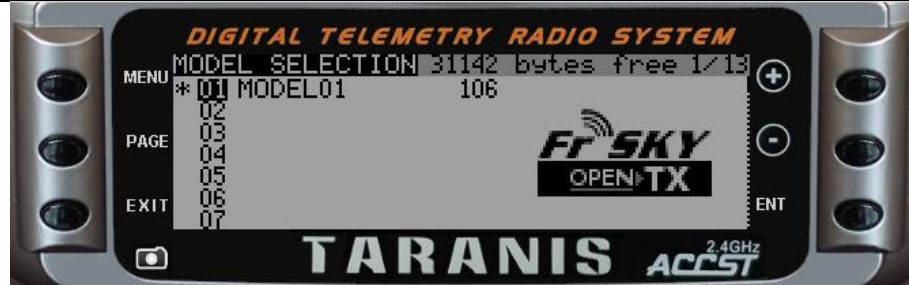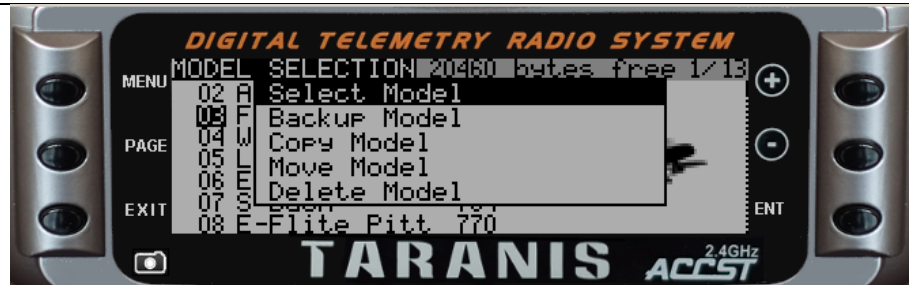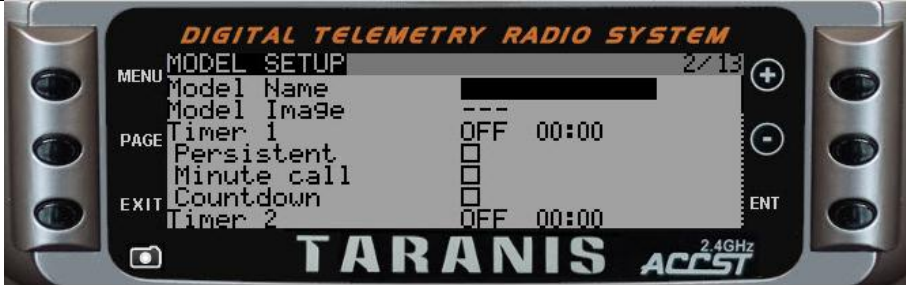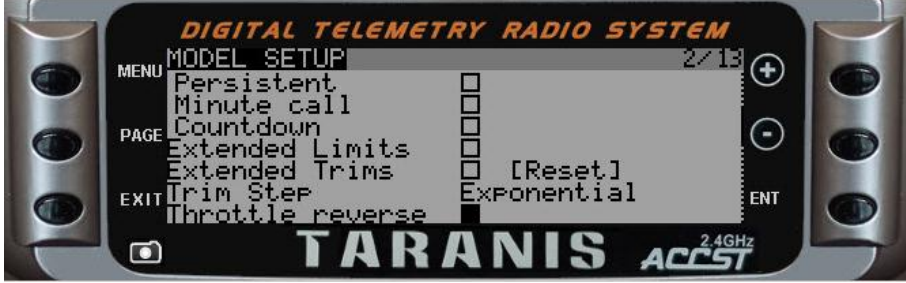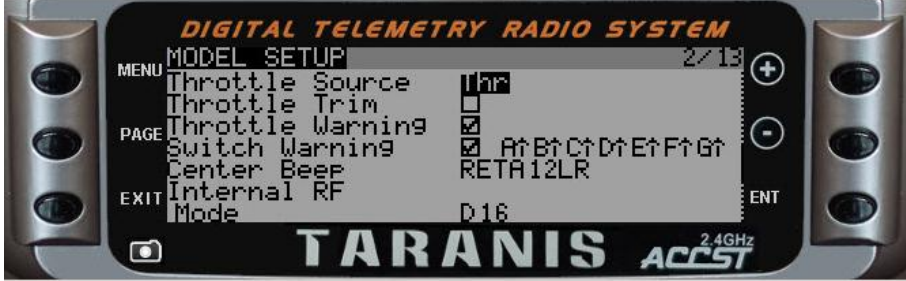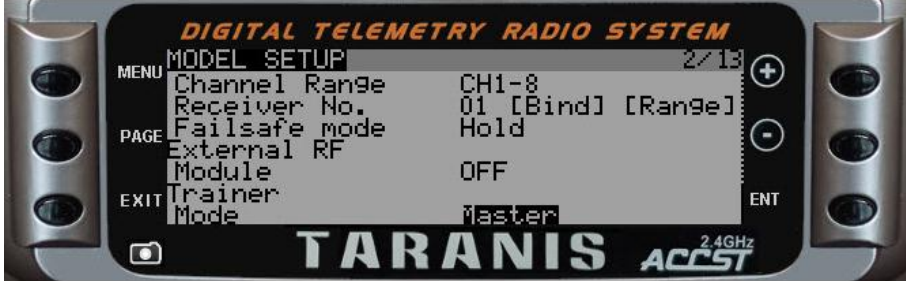
MODEL SETUP 2/13 – shows configuration settings, rows 1-6.	
MODEL SETUP 2/13 – shows configuration settings, rows 7-13.	
MODEL SETUP 2/13 – shows configuration settings, rows 14-20.	
MODEL SETUP 2/13 – shows configuration settings, rows 21-27. Failsafe assigns predetermined channel settings in the event of signal loss. Failsafe mode allows choosing between simple holding last received positions (**Hold**), turning off pulses (**No pulses**) , or moving servos to predefined positions (**Custom**).	

MODEL SETUP 2/13 **Failsafe Settings** – shows the **FAILSAFE SETTINGS** screen used for setting individual channels in **Custom Failsafe Mode** (RF Modes D16/ LR12 only). Not all receivers support this custom failsafe setup. Consult the receiver's manual to see which failsafe modes are supported.	 • [Long-Press **ENT** button – *from the custom **FAILSAFE SETTINGS** screen, to save channel values*]
HELI SETUP 3/13 – shows helicopter CCPM head mixer page. Normal inputs are **Ail** and **Ele** sticks, plus virtual channel selected in **Collective source** and added to the **MIXER** menu page. Outputs of this head mixer page are **CYC1**, **CYC2**, and **CYC3** which need to be assigned to receiver servo channels on the **MIXER** menu page.	 *Note: Setting up this screen page is not to be used for multirotor or flybarless heli models with onboard computers/mixers.*
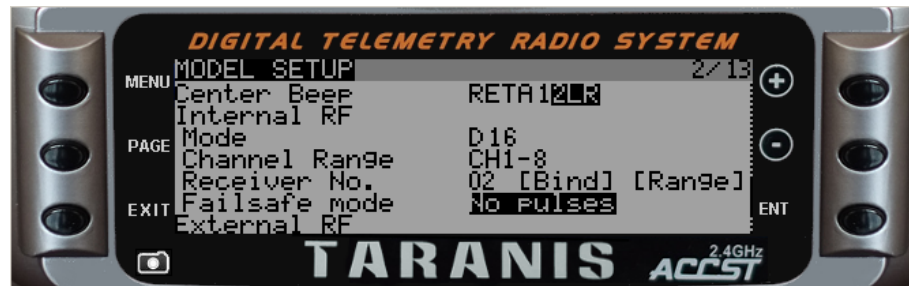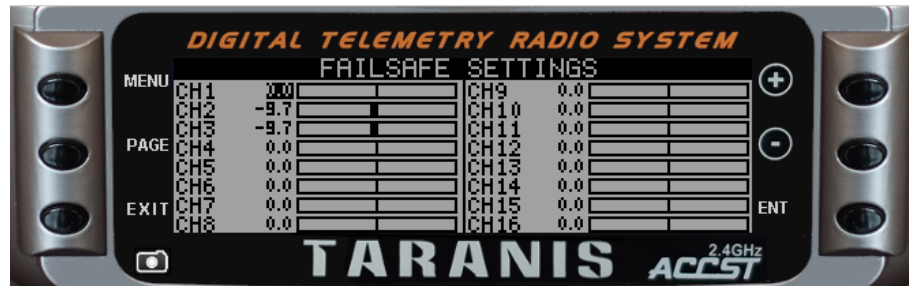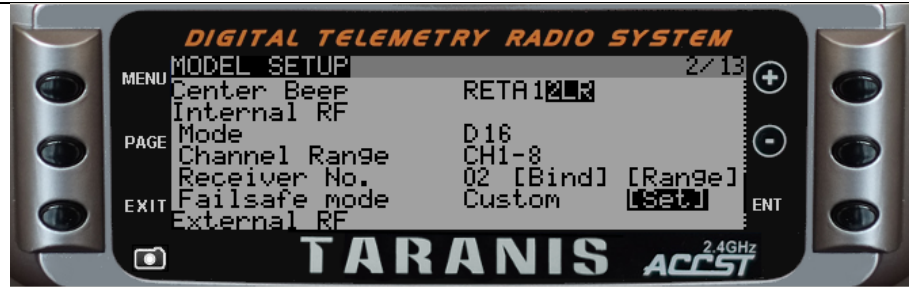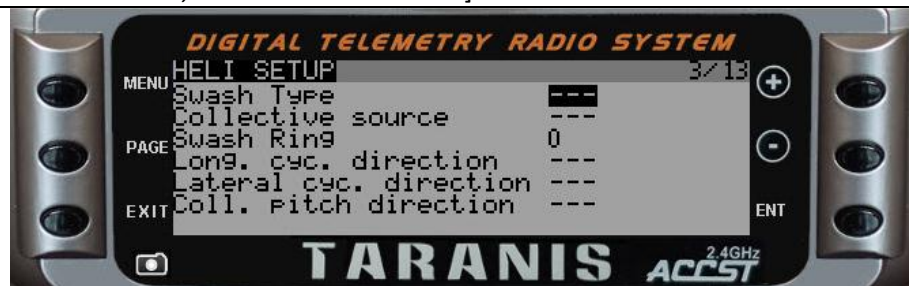
FLIGHT MODES 4/13 – shows Flight Modes FM0-FM6. Must scroll down to see FM7 setup. Each flight mode can be named, assigned an activation switch (except **FM0**), track stick trim positions unique to each flight mode (**RETA**), and assign up and down speed parameters for smooth transitions between flight modes. **RETA** stick trims can also be individually assigned to other flight modes.	
STICKS 5/13 **Sticks View** represents the input from the gimbals. The order is fixed and independent of the output channel order. **View #1** – shows a pre-configuration profile settings for both gimbal stick X and Y axes.	
STICKS 5/13 **View #2** – shows a configured sticks weighting profiles. Configuration options includes weighting/gains in %, curve option (exponential weighting in %, Custom Curve, or Curve Pattern Criteria), Switch Assignments, Flight Mode options, and profile name. *Note: These settings are usually referred to as Dual Rates/Exponential programmable radios; Taranis however, provides enhanced capability.*	 • [Long-Press **ENT** – *after scrolling to appropriate stick name or Weight, select edit from popup to view weighting profile configuration menu*]
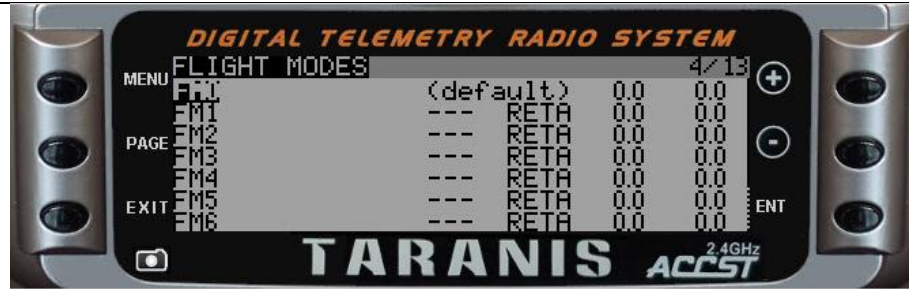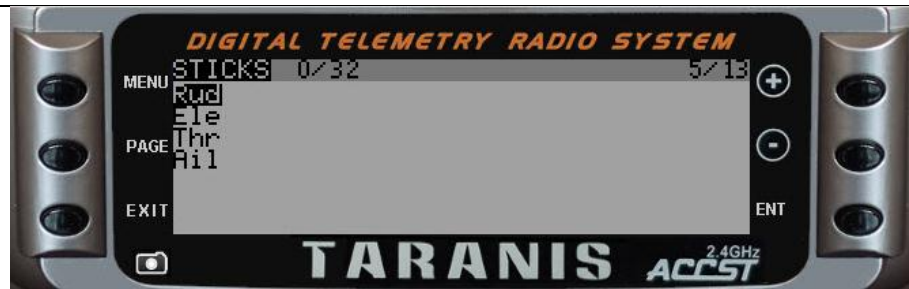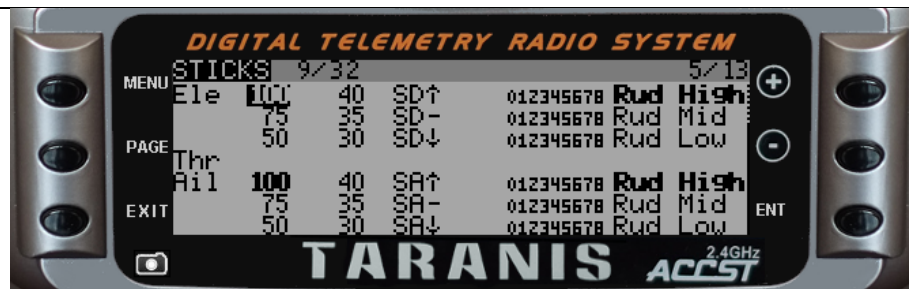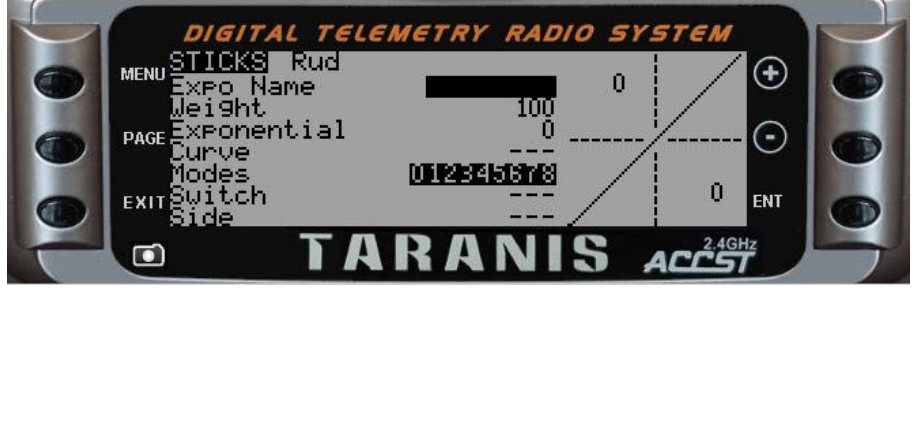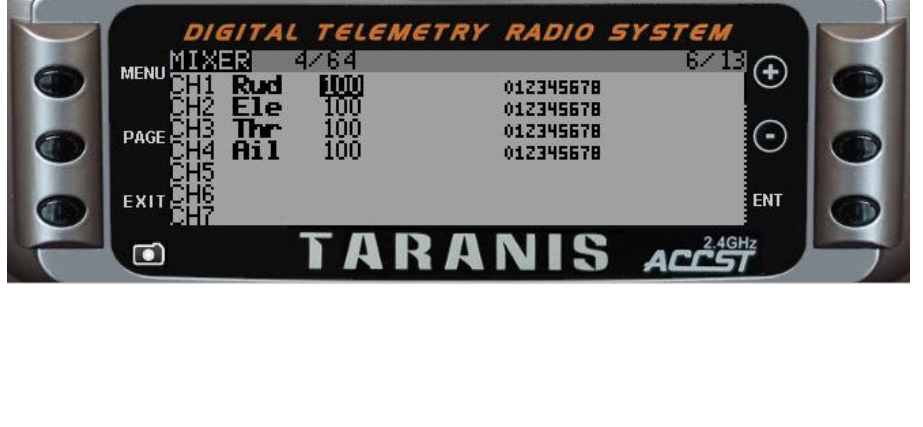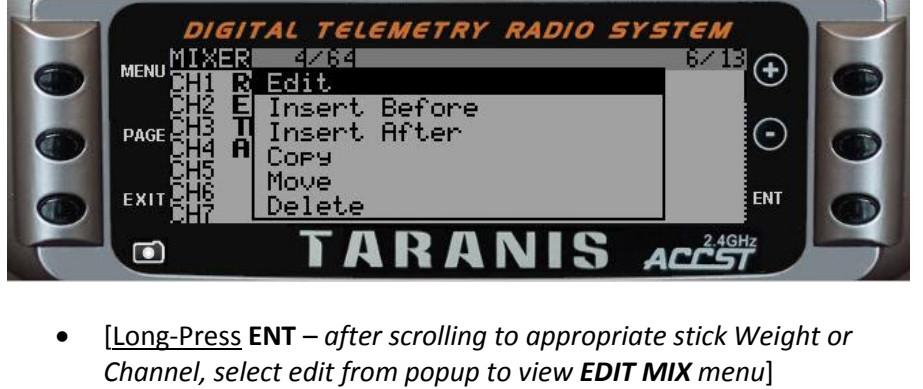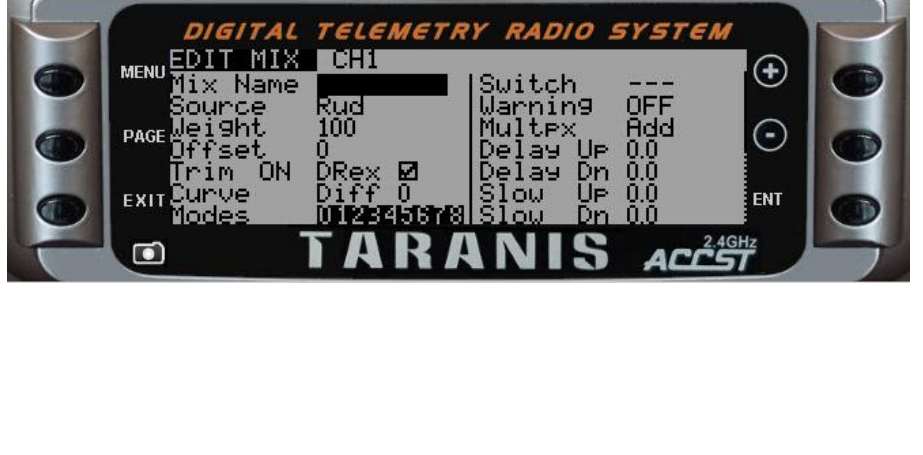
STICKS 5/13 **View #3** – shows **Rud** weighting profile configuration settings. **Modes** refers to flight modes 0-8, where profile is only enabled for highlighted numbers. **Side** refers to which side of the x-axis, the modified curve profile is enabled.	
MIXER 6/13 **Mixer** represents the channel order output to the receiver. Each channels can be set to any control function. – shows **MIXER** configuration settings with configured sticks weighting profile. Not shown are optional multi-line channel mixes.	
MIXER 6/13 – shows **MIXER** function popup menu.	 • [Long-Press **ENT** – *after scrolling to appropriate stick Weight or Channel, select edit from popup to view **EDIT MIX** menu*]
MIXER 6/13 – shows channel 01 **EDIT MIX** configuration settings. **Modes** refers to which flight modes for which the mix is activated. Multpx refers to multi-line channel mix multiplexing, or how the lines interact from top to bottom. Multpx options: **Add**, **Multiply**, **Replace**.	

SERVOS 7/13 **View #1** – shows servo absolute limits configuration settings for Channels 1-7. Shows highlighted channel's current pulse width in micro-seconds. For each channel, settings are available for **Subtrim** or neutral offset, **Min Max** channel limits (-100 to 100) in percentages, normal or inverse travel **Direction**, servo pulse width center position in micro-seconds, and **Subtrim** mode symmetry with zero point. Servo mode options: **^** - symmetrical, **=** - asymmetrical (no clipping).	
SERVOS 7/13 **View #2** – shows servo limits configuration settings for Channels 27-32.	
CURVES 8/13 **View #1** – shows **CURVES** configuration settings for curves **CV1** through **CV7**. Curves can be used in gimbal stick profiles in the **STICKS** menu and for channel mixing with the **MIXER** menu.	 • [Short-Press **ENT** – *after highlighting curve to edit, to bring up curve editing menu*]
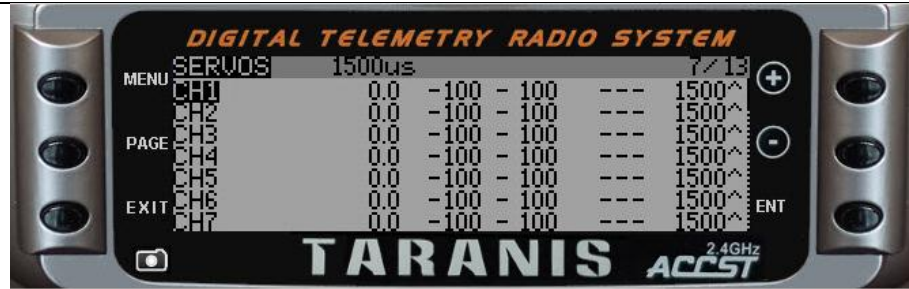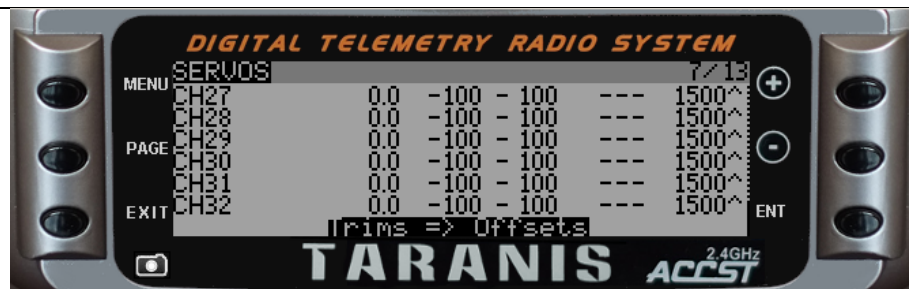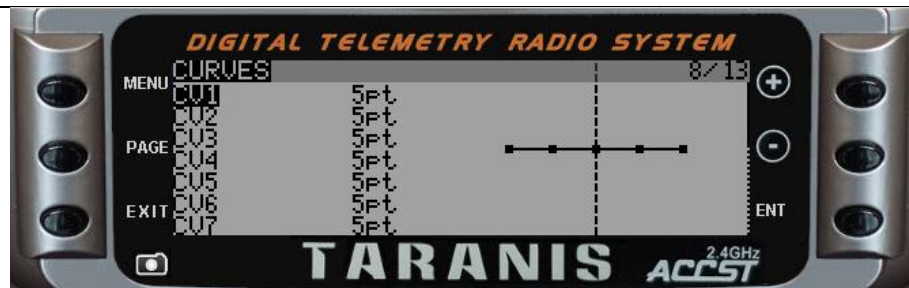
CURVES 8/13 **View #2** – shows **CURVE1** configuration settings for **CV1** only.	
GLOBAL VARIABLES 9/13 – shows **GLOBAL VARIABLES** configuration settings for initializing variables **GV1**-**GV5** values by flight mode. Global variable values can be set as constant integer values. Their flight mode initial values can be modified with **CUSTOM FUNCTIONS**. **GLOBAL VARIABLES** can be used as replacements for constant values in weights, offsets, differentials, and exponential settings in **STICKS**, **MIXER**, and **CUSTOM SWITCHES** menus.	
CUSTOM SWITCHES 10/13 **View #1** – shows pre-configuration setup for custom switches **CS1** through **CS7** (Scroll down to see custom switches **CS8** through **CSW)**. Custom Switches evaluate to TRUE or FALSE by comparing two values, and can optionally combine conditions with the **AND** Boolean logic operator. They are used as logic inputs in **STICKS, MIXER,** and **CUSTOM FUNCTIONS** menus.	 • [Long-Press **ENT** – *after highlighting Custom Switch label, for popup menu, to **Copy** or **Delete** configuration settings*]
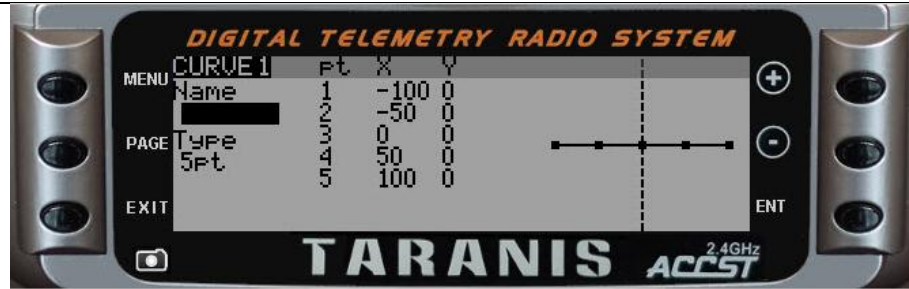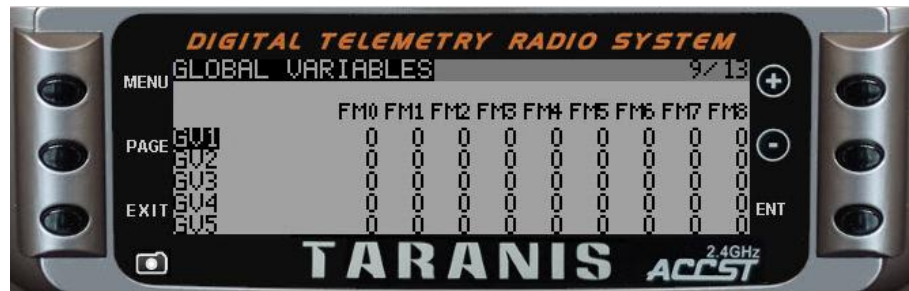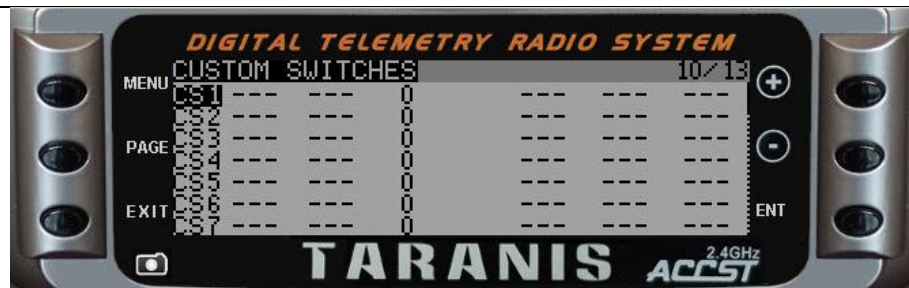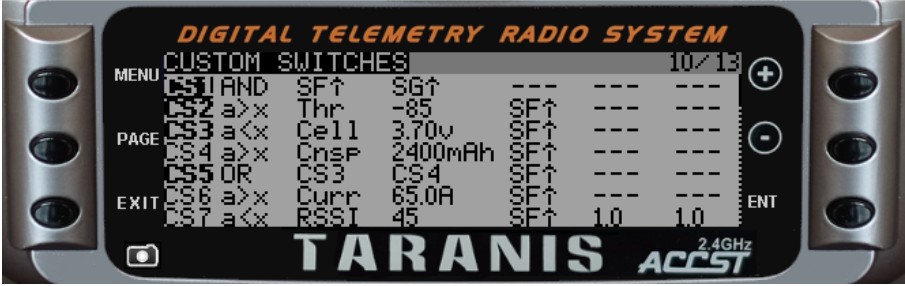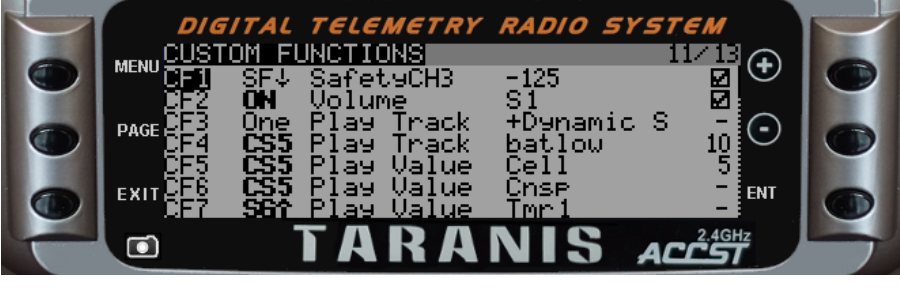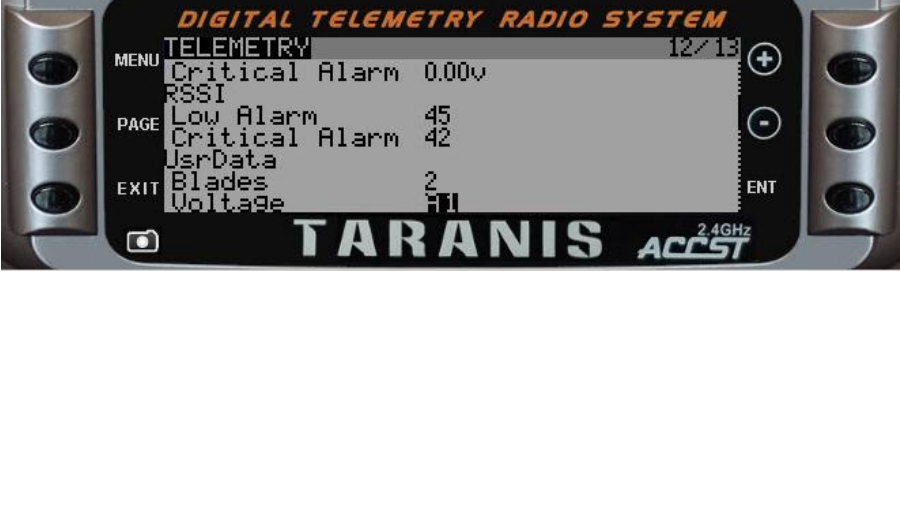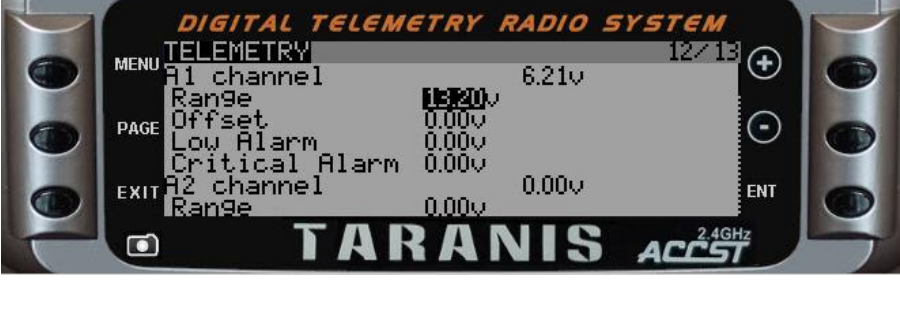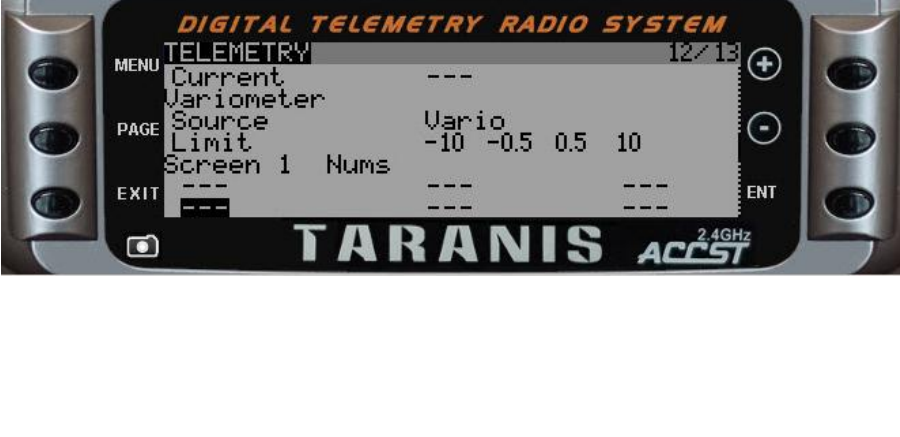
Duration and **Delay** parameters are provided to add time dependent logic results. A timer function (**TIM**) can be used to provide timed cycling pulse logic. More complex logic function can be configured by linking one or more custom switches.	
CUSTOM SWITCHES 10/13 **View #2** - shows a configured screen with several custom switches.	
CUSTOM FUNCTIONS 11/13 **View #1** – shows pre-configuration setup of custom functions **CF1** through **CF7** (scroll down to see custom functions **CF8** through **CF32**). Custom Functions are used to assign global variables, toggle switches, sliders, knobs, and custom switches to transmitter hardware features (like starting or stopping a timer, a sound track, or adjust speaker volume). Custom Functions can also be used to adjust global variables.	 - [Long-Press **ENT** – *when editing switch selection column, to enable/disable toggle mode*] - [Long-Press **ENT** – *on a highlighted label for a configured custom function, brings up a popup menu to **Copy/Paste/Delete***]

CUSTOM FUNCTIONS 11/13 View #2 – shows a configured screen of custom functions.	
TELEMETRY 12/13 View #1 – shows telemetry configuration settings, lines 1 through 7. **Critical Alarm**'s trigger audible warnings when measured value drops below setting value. RSSI refers to telemetry receiver's measured transmitter signal strength. **Blades** count parameter is used to scale RPM sensor count.	
TELEMETRY 12/13 View #2 – shows telemetry configuration settings, lines 8 through 14. **A1 channel** and **A2 channel** refers to telemetry receivers which provide analog inputs.	
TELEMETRY 12/13 View #3 – shows telemetry configuration settings, lines 15 through 21. **Screen 1 Nums** refers to customization parameters for **Telemetry Views, Page 1**. Scroll down to see **Screen 2** and **Screen 3** customization parameters for	

Telemetry Views Page #3 thru **Telemetry Views page #5**. **Variometer Source** refers to sensor type installed at the receiver.	
TEMPLATES 13/13 – shows available model templates pick list.	
	• [Short-Press **ENT** – *after highlighting a listed template, a up popup menu allows replacing the current model's mixer settings*]

Glossary of Acronyms, Functions, and Parameter Labels

RADIO SETUP

Sound Mode	specifies which sounds are activated. Choice of: **All**, **NoKey** (all except button press beeps), **Alarm** (alarm only), and **Quiet** (no sound).
Bg Volume	Background music Volume.
Backlight Mode	specifies LCD display backlighting wakeup activity. Choice of: **OFF**, **Keys** (detect button press), **Controls** (gimbal stick/slider/knob/switch), **Both** (**Keys** or **Controls**), or **ON** (always on).
Vario Volume	Variometer beep volume used to judge changes in altitude.
GPS	Global Positioning System a satellite navigation system used to provide location and time information anywhere on earth.
GPS Timezone	specifies Universal Time Coordinated (UTC) Offset for local longitudinal time zone (-12 through +12).
GPS coordinate format	specifies HMS or NMEA (National Marine Electronics Association).
FAI	disables all telemetry displays, other than **RSSI** and voltage, to comply with Federation Aeronautique Internationale (FAI) regulations for contests, championships, and record setting activities.

SD Card

SD Card	flash memory card, SD micro format, typically 2GB capacity is included with Taranis.
BMP	Bitmap (BMP) image files in raster image file format (64x32 pixels, 4-bit grayscale) used to store bitmap digital images
LOGS	telemetry data log file(s) stored in comma separated values (csv) file format.
MODELS	binary model backup files that have been archived in MODEL SELECTION menu.
SOUNDS	mono sound track recordings sampled at up to 32kHz and saved as Waveform Audio File Format (wav) file format.

TRAINER

Multiplier	a value used to align gimbal stick movements of the student's transmitter (Slave) with that of the training instructor's transmitter (Master).

VERSION

SVN   Subversion Number, a record keeping process for source code used in software development, to keep track of multiple code revisions over time.

EEPR   specifies the firmware version number stored in transmitter's EEPROM non-volatile memory.

MODEL SETUP

Timer 1, 2

THs, **TH%**, **THt**   timer functions with **Throttle Source** as trigger. **s** - timer runs when off idle, **%** - same as **s** except count rate is based on % throttle, **t** - starts timer with first throttle advance.

Persistent   allows timer count to be saved when power is switched **OFF** and resumed when powered back **ON**.

Extended Limits increases servo absolute limits to 125% from the default of 100%. Actual limits will depend on servo internal mechanical design, servo linkage setup and control surface throws.

Extended Trim increases gimbal stick trims to 100% of range instead of default of 25%.

Throttle Trim restricts trim to idle portion of stick throw (Combustion Engine Mode).

Minute call a timed voice enunciation of the timer count, broadcast over loud speaker or audio jack.

RF Radio Frequency transmission circuit used to send signals over the air between transmitter and receiver.

Failsafe mode allows options for setting servo positions should receiver lose transmitter's transmission signal.

PPM frame when RF module is PPM, allows setting the frame and pulse lengths and polarity in order to match the settings of the module.

HELI SETUP

Swash Type specifies the model's swash-plate design configuration in degrees. Choice of: 90, 120, 120X (same as 120, but w/swash plate turned 90 degrees), and 140.

Collective source specifies the virtual channel to be used on MIXER page for pitch curve(s).

Swash Ring specifies limits to swash ring travel.

Long cyc. direction specifies the direction, Normal (**---**) or Inverse (**INV**).

Lateral cyc. direction specifies the direction, Normal (**---**) or Inverse (**INV**).

Coll. Pitch direction specifies the direction, Normal (**---**) or Inverse (**INV**).

FLIGHT MODES

FM0   default flight mode can be named. Speed parameters are provided for smooth transitions to other flight modes.

FM1-FM7   seven flight modes can be named and assigned to unique switch positions. Speed parameters are provided for smooth transitions.

STICKS

Rud, **Ele**, **Thr**, **Ail**   the four gimbal stick axes which can independently be assigned: Weighting (gain/rate), Exponential (or Custom Curves), and flight modes. Ultimately, these are assigned to output channels in the **Mixer** menu.

Weight   assigns % gain weighting or rates used to compute amount of servo throw.

Exponential assigns a mathematical exponential function to both sides of stick center position. A positive value lessens the of the stick sensitivity near its neutral position.

Phases   option to specify which flight modes stick assignment is active.

Side   option to specify restricting stick assignments to one side of stick center position.

MIXES

Source   an input to be used in the mix line calculation. A pick list of possible inputs is provided.

Weight   the **Source** value multiplier, in %, that's applied before calculating the mix line output value.

Offset   a value added to the **Source** value before calculating the mix line output value.

Trim   option to apply stick Trim values in line mix. Always **OFF** when **Source** is not assigned to stick.

MAX   a constant value equal to +100.

Multpx   Multiplexing specifies, if active by Flight Mode and/or switch position, a mathematical relationship with line above. Options are **Add** (e.g., 10% + 50% = 60%), **Multiply** (e.g., 10% * 50% = 5%), or **Replace**.

+=, *=, :=   shown on **MIXES** screen to denote **Multpx** parameter of **Add**, **Multiply**, or **Replace** with line above.

Curve   option to apply conditional logic or a custom curve (**CURVE**) with the **Source** in computing the mix line output value.

Modes   option to disable mix line in specific flight modes.

Delay   time in seconds the mix line output should be delayed.

Slow   specifies a transition speed, using a time parameter in seconds the mix line output takes to cover range -100 to +100. Not a duration setting, so transitioning of values is at speed set, regardless of how far traveled.

CYC1, **CYC2**, **CYC3**   Heli mixer outputs

PPM1, **PPM2**, ….. , **PPM7**, **PPM8**   trainer port input channels

SERVOS

Subtrim   specifies how far off the gimbal stick neutral position to move the servo travel center point.

Min, Max   specifies the Low and High absolute travel limits in % to avoid overdriving servos.

Direction   choice of servo travel direction. Options: Normal (**---**) or Inverse (**INV**).

PPM Center   servo's Neutral or Center position set by servo manufacturer, expressed as a Pulse Position Modulation (**PPM**) signal or Pulse Width Modulation (PWM) signal, rate measured in units of microseconds.

Subtrim mode   specifies whether curve is symmetrical or asymmetrical about the servo travel neutral point. Options: **^** - symmetrical, **=** - asymmetrical (no clipping).

CURVES

Type   sixteen multi-point plot curve type options available. Select from: **3pt**, **5pt**, **9pt**, **17pt** (fixed **X**, user defined **Y** points) or **3pt'**, **5pt'**, **9pt'**, **17pt'** (user defined both **X** and **Y** points).

GLOBAL VARIABLES

GV1, **GV2**, **GV3**, **GV4**, **GV5**   flight mode specific variable values optionally assigned to any weight, offset, differential, or exponential setting used in **STICKS**, **CUSTOM FUNCTIONS**, **CUSTOM SWITCHES**, and **MIXES** menus.

CUSTOM SWITCHES

CS1 – CSW   32 logic switches, programmable to compare values as true or false, active when true, inactive when false.

TIM   a timed pulse trigger function which takes two time parameters (active, inactive) in seconds.

Comparison Functions:

a~x, a>x, a<x, |a|>x, |a|<x, AND, OR, XOR, a=b, a!=b, a>b, a<b, a>=b, a<=b, d>=x, |d|>=x, TIM.

Function Variables: **a**, **b**, and **d**   use: assignable to control hardware.

Function Constants: **x**   use: decimal or integer parameter values.

Comparison Operators:

Arithmetic

~   approximately equal to (means value is within plus or minus 1)

>   greater than

<   less than

>=   greater than or equal to

<=   less than or equal to

| | absolute value of

=   equal to

!=   not equal to

Boolean Logic

AND   both true

OR   either one is true

XOR   either one is true, but not both

Assignable as Variables:

Stick Inputs: **Rud**, **Ele**, **Thr**, **Ail**

Knobs: **S1**, **S2**

Sliders: **LS**, **RS**

Stick Trimmers: **TrmR**, **TrmE**, **TrmT**, **TrmA**

MAX   special case variable, always has value +100

Toggle switches: **SA – SH**

Custom Switches: **CS1 – CSW**

Timers: **Timer 1, Timer 2**

Telemetry: **Batt**, **SWR**, **RSSI**, **A1**, **A2**, **Alt**, **Rpm Fuel**,

T1, **Speed**, **Dist**, **GPS Alt**, **Cell**, **Cells**,

Vfas, **Curr**, **Cnsp**, **Powr**, **AccX**, **AccY**, **AccZ**

Global Variables: **GV1 – GV5**

CUSTOM FUNCTIONS

    CFN1 – **CFN32**   32 functions that may be programmed to trigger by toggle switches or **CUSTOM SWITCHES**.

Triggers:

    One   trigger one-time with power-on startup or with selecting new model

    ON   triggering always active

    OFF   triggering always inactive

Toggle Switches:

    SA↓, SA-, SA↑, SB↓, SB-, SB↑, …. SG↓, SG-, SG↑, SH↓, SH↑   denotes switch in up(↑), down(↓), or middle(-)

    SH↓s   momentary Short-Press

    SH↓l   momentary Long-Press

CUSTOM SWITCHES:

    CS1, **CS2**, **CS3**, …., **CS8**, **CS9**, **CSA**, **CSB**, **CSC**,…. , **CSV**, **CSW**

Inverse Triggers: ("**!**" prefix denotes "not", e.g., triggered when not the case)

    !One   not triggered initially with power-on startup or with selecting new model, but triggers subsequently.

Toggle Switches:

    !SA↓, !SA-, !SA↑, !SB↓, !SB-, !SB↑, …. !SG↓, !SG-, !SG↑, !SH↓, !SH↑

CUSTOM SWITCHES:

    !CS1, !CS2, !CS3, …., !CS8, !CS9, !CSA, !CSB, !CSC,….!CSV, !CSW,

Toggle mode Triggers: (t Suffix, stays triggered until re-trigger, cycles with every other trigger)

Toggle Switches:

    SA↓t, SA-t, SA↑t, SB↓t, SB-t, SB↑t, …. SG↓t, SG-t, SG↑t, SH↓t, SH↑t

    !SA↓t, !SA-t, !SA↑t, !SB↓t, !SB-t, !SB↑t, …. !SG↓t, !SG-t, !SG↑t, !SH↓t, !SH↑t

CUSTOM SWITCHES:

    !CS1t, !CS2t, !CS3t, …., !CS8t, !CS9t, !CSAt, !CSBt, !CSCt,….!CSVt, !CSWt,

Functions

Channel Safety: (forces specific channel output to a specified value)

Safety CH01, **Safety CH02**,… **Safety CH15**, **Safety CH16**

Trainer   enables Trainer Mode for RUD, ELE, THR, and AIL globally.

Trainer RUD, **Trainer ELE**, **Trainer THR**, **Trainer AIL**   enables Trainer Mode individually.

Instant Trim   adds current stick positions to respective stick trims.

Play Sound   plays a tone from available list.

Reset   resets the selected item. Options: Timer 1, Timer 2, Telemetry, All (Both Timers & Telemetry).

Vario   turns on variometer sounds to speaker or audio jack.

Play Track   plays a sound recording file located on the micro SD card.

Play Value   speaks the current selected value over the speaker or audio jack.

Start Logs   starts recording Telemetry data to micro SD card.

Volume   adjusts audio volume using selected source parameter.

Backlight   enables LCD backlight lighting.

BgMusic, **BgMusic ||**   enables and pauses background music playback.

Adjust GV1, **Adjust GV2**, ….., **Adjust GV5**   sets value of specified global variable to a fixed value, source value, increments value, or to that of another global variable.

TELEMETRY

Tmr1,Tmr2   two timers with functions set in **MODEL SETUP** menu.

A1, **A2**   analog input channels on compatible telemetry receivers.

Batt   displays the transmitter's operating voltage.

SWR   measure of transmitter antenna quality. Reading below 51 is normal.

RSSI   Received Signal Strength Indication (**RSSI**) value used to monitor acceptable signal strength or distance.

Alt   variometer altitude reading above ground level.

Rpm   RPM reading.

Fuel   fuel level.

T1, **T2**   temperature sensor readings.

Spd, **Dist**   GPS ground velocity, GPS distance from starting point.

GPS Alt, **HDG**   GPS altitude above sea level and GPS heading.

Cell, **Cells**   lowest cell reading, sum of all cell readings.

Vfas, **Curr**, **Cnsp**, **Powr**   pack voltage, current, mAh, and watts measurements.

AccX, **AccY**, **AccZ**   acceleration values in G's for axis X,Y, and Z

Screen Mapping Diagram

This chart shows a detailed layout of the various information screens and menus.

Display Screens Navigation Mapping

Power On Startup
- Splash Screen
- Throttle Warning
- Switch Warning

Main Views
- Switch & Gimbal Positions
- Physical & Custom Switch Positions
- Channel Monitor

Telemetry Views
- Telemetry GPS Position and Min RSSI
- Telemetry A1 A2 Alarms
- Telemetry Values Bars/Nums Custom Screens (3)

General Radio Settings
- RADIO SETUP 1/7
- SD CARD 2/7
- TRAINER 3/7
- VERSION 4/7
- SWITCH TEST 5/7
- ANALOG INPUTS 6/7
- CALIBRATION 7/7

Model Selection & Setup
- MODEL SELECTION 1/13
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Programmatic Flowcharts

The following flowcharts show the path of the various inputs, functions, and outputs.

FrSKY Taranis X9D
Programmatic Flowchart

This is a simplified version of the previous chart. Advanced functions are removed to reduce complexity.

FrSKY Taranis X9D
Programmatic Flowchart

Basic – Less Heli Mixer, Timers, Warnings, Telemetry, Audio, LCD Display, & SD Card

Sticks

Stick Calibration

Calibrated Sticks

Trimmers

Trimmer Settings

Switches

Sliders

Slider Calibration

Calibrated Sliders

Knobs

Knob Calibration

Calibrated Knobs

Thr Rud Ele Ail Stick Assignments

Custom Switches

Flight Modes

Global Variables Current Value

Custom Functions

Sticks Weighting Profiles

Curves

PPM1-PPM8

Mixer & Channel Assignments

Servo Limits/ Invert

Safety Switches

FailSafe Override Setup

Trainer Mode/ PPM Decoder

PPM Trainer Output/Input Port

Channel Outputs

The following chart is a flow path for the multi-line mixer. Upper lines are calculated first using the input sources, then mixed with line immediately below according to the **Multpx** parameter (**Add**, **Multiply**, or **Replace**) from the lower line. Finally, the mix result is assigned to a channel delivered as channel output.

The Mixer Line 1 **Multpx** parameter has no computational value but should be left at default (**Add**). Care should be taken when using the **Multiply** parameter and then moving the line to a position where lines above are inactive, in order to avoid multiplying with a null value (e.g., 0% * mix value % = 0%).

Individual mixer lines are **Flight Mode** and switch position dependent, so depending on if those conditions exist, individual lines may be bypassed instead of being combined with the line per the user specified **Multpx** function.

Programmatic Flowchart of
Single Channel Multi-Line Mixer
(Three Line Example, Active Line Beep Warning Option not shown)

Null Value = 0%

Add, Multiply, Replace, or Bypass

| Input Source | Mixer Line 1 | Weighting /Offset | Curve/ Differential | Trim | Multipx | Flight Modes | Switch | Delay/ Speed |

Add, Multiply, Replace, or Bypass

| Input Source | Mixer Line 2 | Weighting /Offset | Curve/ Differential | Trim | Multipx | Flight Modes | Switch | Delay/ Speed |

Add, Multiply, Replace, or Bypass

| Input Source | Mixer Line 3 | Weighting /Offset | Curve/ Differential | Trim | Multipx | Flight Modes | Switch | Delay/ Speed |

Channel Assignment → Channel Output

Receiver Compatibility Chart

This chart shows compatibility, features, and requirements of current and planned FrSky receivers.

Series	Bind Mode	Model	# of Channels	Servo (PWM) outputs	Telemetry	CPPM	S.Bus	RSSI	RSSI for OSD	Hub Data Port	Smart Port	Notes
V8	V8	V8R7-SP	8	7		X						1
V8-II	D8	VD5M	5	5								2
		V8R4-II	4	4								3
		V8R7-II	8	8								
		V8FR-II	8	8								
		Delta-8	8	8		X			X			4
D	D8	D4R-II	8	4	X	X		X	X	X		5
		D6FR	6	6	X			X				6
		D8R-II plus	8	8	X			X		X		
		D8R-XP	8	8	X	X		X	X	X		
X	D8 or D16	X8R	16	8	X		X	X	X		X	7
		X6R	16	6	X		X	X	X		X	8
		X4R	16	4	X		X	X	X		X	8
LR	LR12	LR12	12	8			X		X			8

Notes
1. Requires the use of a DJT module in V8 mode plugged into the external port of the Taranis. Consult DJT manual for details.
2. Micro receiver with micro connectors. Intended for indoor use. Lacks failsafe functions.
3. The FrSky park flyer receiver is best suited for small foamy planes. Small and affordable.
4. The Delta-8 also supports Hitec A-FHSS, Futaba S-FHSS & Futaba FHSS protocols. Note, binding may take over a minute as the Delta attempts all to bind to the different protocols it supports.
5. You will need to use CPPM if you require more than 4 channels. CPPM carries all 8 channels in a single servo output on channel 1.
6. Telemetry is limited to RSSI feedback and A1 and A2 voltages. Do not connect anything but the FBVS external voltage sensor to the A2 port. No other sensors are supported. This is the park flyer of telemetry receivers, compact and affordable.
7. X series receivers can be bound in D8 or D16 mode. You will have better performance when bound in D16 mode and full Smart Port support. Smart Port is FrSky's new hub less sensor serial port. An older style hub can be added with the use of the FrSky vario, this will allow the use of many of the older sensors. See vario instructions for more details. To use all 16 channels you will need to use S.Bus. S.Bus is similar to CPPM, but it carries all 16 channels in a digital format. S.Bus to CPPM converters and S.Bus decoders are available from FrSky. FrSky will also have S.Bus servos very soon. Another option is to bind 2 X8R receivers to the Taranis at the same time. One will support channels 1-8, and the other will support 9-16. Consult instructions on how to do this properly as the telemetry must be turned off on one of the receivers.
8. The LR12 is a long range receiver capable of operating at extended range. It's not released at time of publication, however specifications listed should be correct once in production.