Crow-aware Adaptive Trim v3.x

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URL: https://rc-soar.com/opentx/lua/adaptivetrim/

Description

This script enables repurposing of elevator trim to *bend the crow compensation curve*. This allows the pilot to optimise the trim across the full range of crow, all in a single flight, using the regular trim lever. The process is completely transparent.

A custom telemetry screen displays the curve and crow value (for info only, it is not needed during flight).

This document describes how to integrate the script into an existing setup.
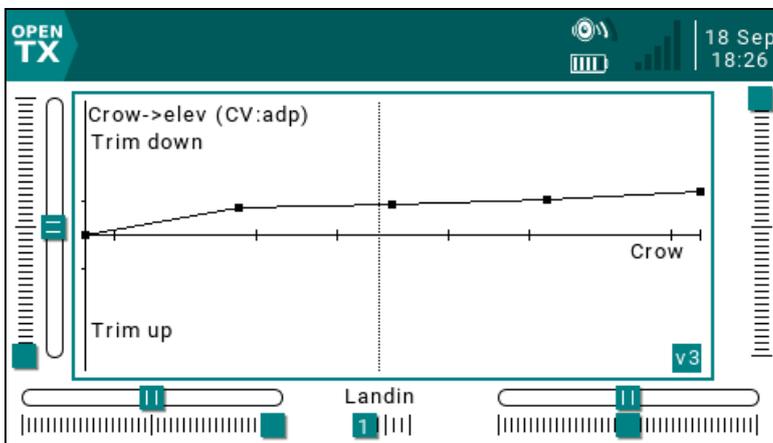
Requirements

- Any OpenTX transmitter (X9-Lite, X9D, X10/12S, RM TX16S, J T16 etc.)
- OpenTx 2.2.2 or above
- Existing sailplane setup with crow brakes.

The script is installed either as a telemetry script or a widget depending on the transmitter.

How it works

1. The elevator trim is disabled so it behaves as a dumb two-sided momentary switch. Clicks are captured via two logical switches.
2. The Lua script monitors the logical switches. When a click is detected, the script reads the crow value, and moves the nearest point(s) on the compensation curve.
3. The elevator correction is obtained by applying the curve to a regular crow->elevator mix.

Integration instructions

This section shows how to integrate the script in your setup. Remember to backup your setup first. The screenshots are from a colour screen transmitter, however the procedure for is the same for mono screens.

1. Assign a crow-trim curve

In the CURVES menu, find an unused curve for the crow-trim curve. (You can also re-use any existing compensation curve but note that the point values will not be the same.)

Set the curve options as follows:

- name = 'adp' (*exact spelling!*)
- 5 points
- standard (fixed) X
- 'smooth'

Initial y values are not critical.

2. Suppress normal trim behaviour

In this step, you'll alter the behaviour of the trim, so it functions as a dumb two-way momentary switch.

1. Go to the FLIGHT MODES menu.
2. Highlight the flight mode where crow brakes are active ('Landing' mode on the author's templates).
3. Set elevator trim mode to '--' or 'Trim disabled'

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3. Capture trim clicks

In this step, you'll capture the trim state.

Go to the LOGICAL SWITCHES menu and define two logical switches L(n) and L(n+1):

- L(n) = AND, Ed (trim down)
- L(n+1) = AND, Eu (trim up)

The LS's must be adjacent, and the order is important. Make a note of 'n', as you will need this in step 5.

In this example, n=35:

4. Add adaptive trim

In this step, you will create the new crow compensation mix.

1. Open the MIXER menu and scroll to the 'Ele' channel, or, if using the author's V-tail setups, the 'VeeCm' channel.
2. Delete any existing compensation mix (in the author's templates, the mix is called 'CrComp' or 'SpComp'.)
3. Create new mix 'AdpTrm'. The new mix must be inserted *above* the CAL mix (if present):

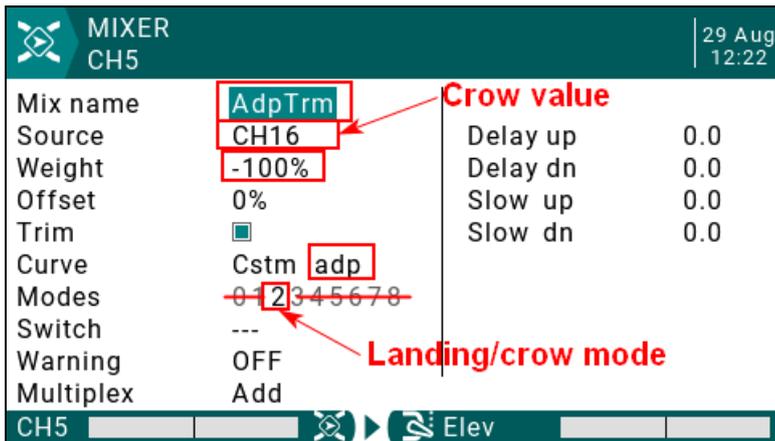Set the options for the new mix as follows:

Name='AdpTrm'
Source = Channel supplying crow value, with –100 = full crow, +100 = zero crow. On the author's templates, this is usually CH16.
Weight= –100% (note minus sign)
Modes = Tick the crow flight mode. All other flight modes must be *un*ticked.
Curve = 'adp' (*not* '!adp')

5. Pass information to the script

In this step, you'll define curve 'prm' for passing information to the script. The script will look for this curve during startup.

In the CURVES menu, locate an unused curve and set the options as follows:

- Name = 'prm' (exact spelling required)
- 5 points
- Standard (Fixed) X
- Set the points as follows:

  Point 1: Flight mode number in which crow is active ('Landing' mode in author's templates)
  Point 2: Set this to **–n**, where Ln = logical switch for 'Ele trim down' which you set in step 3. *Note negative sign!!*
 **Point 3**: [not used]
  Point 4: Channel number 1-32 containing crow value - use the channel you specified as source in Step 4.
  Point 5: Adaptive trim behaviour at minimum crow:
  - o 0 - emulates normal trim behaviour, +/-25% trim travel, with centre/limit callouts (*recommended*)
  - o 1 - trim is pinned to zero
  - o >=2 – trim is not constrained

Here is an example. Note that the point values may differ with your setup:
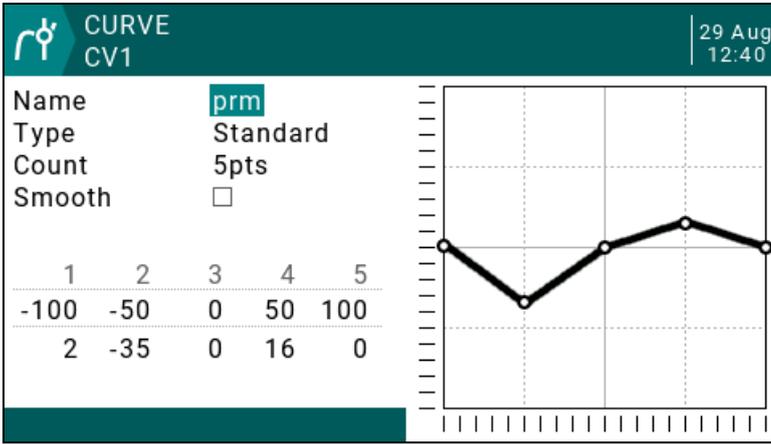
6. Install the files in your transmitter

So now we've prepared the setup, it's time to install the Lua script files:

1. Extract files from the ZIP file, preserving the folder structure
2. Connect your transmitter via USB, and copy the files to the SD card, again preserving the folder structure:
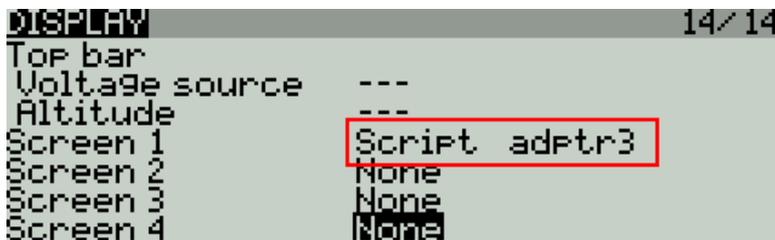
```
SD-card:/SCRIPTS/TELEMETRY/adptr3.lua
          /WIDGETS/adptr3/main.lua
```

7. Activate the script

Important! the script should be activated only after the previous steps have been completed.
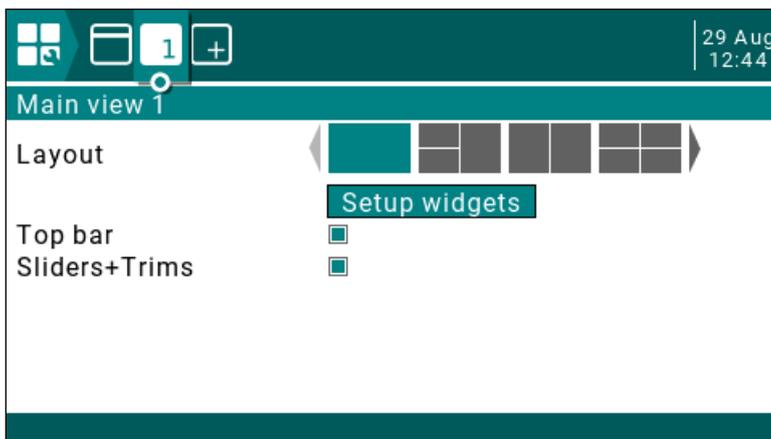
For transmitters with a mono screen

In the TELEMETRY menu, choose a free screen and select the adptr3 script:

For transmitter with colour screen

Press the '**TELE**METRY' button and install the adptr3 widget.

8. Final testing

Go to the custom screen and:

1. Enter crow/landing mode
2. Check that the dotted bar moves with the crow stick
3. Click up and down on the elevator trim and verify that the active points move.

With the model assembled, check mix directions:

- Check elevator trim direction in Landing mode
- Check elevator trim direction in other FMs
- Check elevator *stick* direction

9. How to refresh script parameters

The script must be refreshed after you make changes to curve:'prm'.

For colour screen tx's

From the TELEMETRY button, remove then reselect the widget. Alternatively, power cycle the transmitter.

For mono screen tx's

Press the '+' key, or power cycle the transmitter.

10. Restrictions and failure mode

Only one instance of the script should be run per model. In the event that the script is not loaded or terminates prematurely, the trim curve will remain active but the trim lever will have no effect on the curve.

11. SAFETY

Test carefully before flight!

USE AT YOUR OWN RISK. IF IN DOUBT, DO NOT FLY!!

12. Feedback

Feedback and queries are always welcome, you can contact me by email via:
https://rc-soar.com/email.htm