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Manual xtrack

1 Needed files

- Earth picture; GIF format, linear longitude (-180 ... +180) and latitude (90 ... -90)
- wget or curl: program to download Kepler files
- Kepler file (NORAD 2 lines format):
 - from menu File->Kepler file
 - enter files to download, left-button select which to download
 - right check button: which file(s) to use

2 Preferences

Under Edit->Preferences

2.1 Observator

- enter position observator
 - a gpx file 'cities.gpx' may be created/used, click on 'Cities' to get a list
 - select from here the location
- Elevation levels:
 - limits for tracking satellites
- Areas shown:
 - show radio horizon (around observator)
 - show radio horizon observator (i.e., depends on 'start tracking at', see Elevation levels)
 - Sat visual area: area from where satellite is above horizon
- Time:
 - used for calc.: Offset UTC: should be normally zero (if internal PC time = UTC)
 - Presented time: time zone, what's shown in the gui, not used for calculations
 - E.g. summer time, Berlin: set to 2.00

2.2 Rotor configuration

- Rotorconfig:
 - Rotortype:
 - Elev-Azim
 - X-Y, X rotates between east and west, Y rotates between north and south
 - Dish at: set to where dish is mounted on: X or Y rotor? (i.e., the other one is fixed to ground)
 - X=0: pointing to east or west
 - Y=0: pointing to north or south
 - DiSEqC rotors: currently supported via satellite decoder, using 2x HH390 rotors
 - deg2step: normally 16, range +/- 80 degrees, rotor can be adapted to range beyond +/- 90 degrees, with half resolution; then set deg2step to 16
 - Flip X, Y: same as X=0/Y=0 at rotorconfig?
 - Limit to: can be set by clicking on button 'Set lim HH390'
- Storm position: position if not tracking
 - for X/Y or E/A rotors
 - Wait X, Wait Y: X/Y rotors may go to storm position one by one
- Compensate rotor delay: go to next position in advance, so time of rotor to reach new position can be compensated (in tenth of seconds)

2.3 Files

- Files
 - Add 1 to 4 Kepler files, select which to use
 - Map file: background file, should be Plate Carree, with width 2x height, may be gif or jpeg
 - Ext. pos: name of external position file, to use instead of kepler file
 - Search: search and show all defined files
- Download program:
 - curl or wget
- Search locations:
 - shows locations where files are searched (cannot be altered)

2.4 Run options

- Run at program start: program runs at start, but not necessarily sends commands to rotor (see 'Rotor control to output')
- send also if under horizon: normally always on, but can be switched off (last sent position is to storm position)
- Rotor control to output:
 - Enable at program start: program starts calculation and drives rotor as soon as program starts executing
 - Choose which output to use:
 - external program, can be used in parallel with one of next outputs: (see [#1.2.4.1.Control rotor using external program|outline](#))
 - serial/com (USB) (send commands one by one) (see [#1.2.4.2.Using USB |outline](#))
 - ethernet (send commands one by one) (see [#1.2.4.3.Using Ethernet, ESP processor as controller|outline](#))
 - Use remote SGP4 calc, ethernet: remote calculation of positions; send tracking parameters to external processor, after that xtrack can be stopped/closed or whatever

2.4.1 Control rotor using external program

This may be selected in parallel with other connection ways.

- tab 'Ext programs': enter program names:
 - *Run always*: runs always each second (after clicking button 'Run')
 - *Run 1x at sat up*: one run if sat comes above horizon
 - *Run 1x at sat down*: one run if sat goes below horizon
 - *Run during sat. up*: runs each second if sat is above horizon
 - Arguments for programs:
 - %n: replaced by name of satellite
 - %e: replaced by elevation
 - %a: replaced by azimuth
 - %x: replaced by X position (XY-rotor)
 - %y: replaced by Y position (XY-rotor)
 - %F: replaced by doppler (ppm)
 - %V: replaced by speed (in km/h)
 - %T: replaced by <YYYY>-<mm>-<dd> <HH>:<MM>:<SS>
 - %d, %m, %Y: replaced by day/month/year
 - %H, %M, %S: replaced by hour/min/sec

Example:

```
Run Always:
./extprog.sh name=%n %e %a
Program ./extprog.sh:
echo "$1 elevation=$2 azimuth=$3"
```

Gives as result:

```
name=NOAA 18 elevation=35.128700 azimuth=37.875229
name=NOAA 18 elevation=48.485432 azimuth=54.376877
....
```

2.4.2 Using USB

- tab UART/Ethernet:
 - set UART portnr to right port
 - baudrate: depends on settings in rotorcontroller
 - command format: depends on rotorcontroller:
 - 2 numbers: azimuth+elevation or x+y
 - 3 numbers: east/westpass+azimuth+elevation

2.4.3 Using Ethernet, ESP processor as controller

2.4.3.1 Normal way, using LAN

- Xtrack, Preferences:
 - tab 'Run options': choose 'Use ethernet'
 - tab UART/Ethernet: set IP to
- ESP module:
 - use in 'no access' mode
- PC:
 - use wired connection (PC via WiFi doesn't work for some reason???)
- Running:
 - click button 'Disabled' -> Enabled

- right-bottom connection port is used, e.g. 192.168.178.33 / 2000
green rectangle if connected

2.4.3.2 Using ESP as access point (isolated WiFi network)

- Xtrack, Preferences:
 - tab 'Run options': choose 'Use ethernet'
 - tab UART/Ethernet: set IP to 192.168.4.1
- ESP module:
 - use in 'access' mode
 - Power-on
- PC:
 - set wifi on SSID of ESP (defined in ESP-code)
 - enter password (defined in ESP-code)
- Running:
 - click button 'Disabled' -> Enabled
 - right-bottom connection port is used, e.g. 192.168.4.1 / 23
green rectangle if connected

2.5 Colours

3 Predict

From main menu->Predict

3.1 Show passes

- Select desired satellites in main window (check box, and/or radio button)
- Choose Start prediction, Prediction range and lowest elevation
- Click **Predict**, a list of passes is shown right
- Select a line to see the pass in the main window
- For a ASCII list of the selected pass: click 'Save track selected'
 - for format see Preferences, tab 'Ext programs', 'Format track'
- For a graphical overview of passes:
 - select in main window satellite using radio button
 - reset daynr
 - select prediction range (months)
 - click 'Save as ps' to get a postscript graphical representation
 - click 'Save as text' to get an overview in text