SOLAR TRACKERS NETWORK CONNECTION SYSTEM
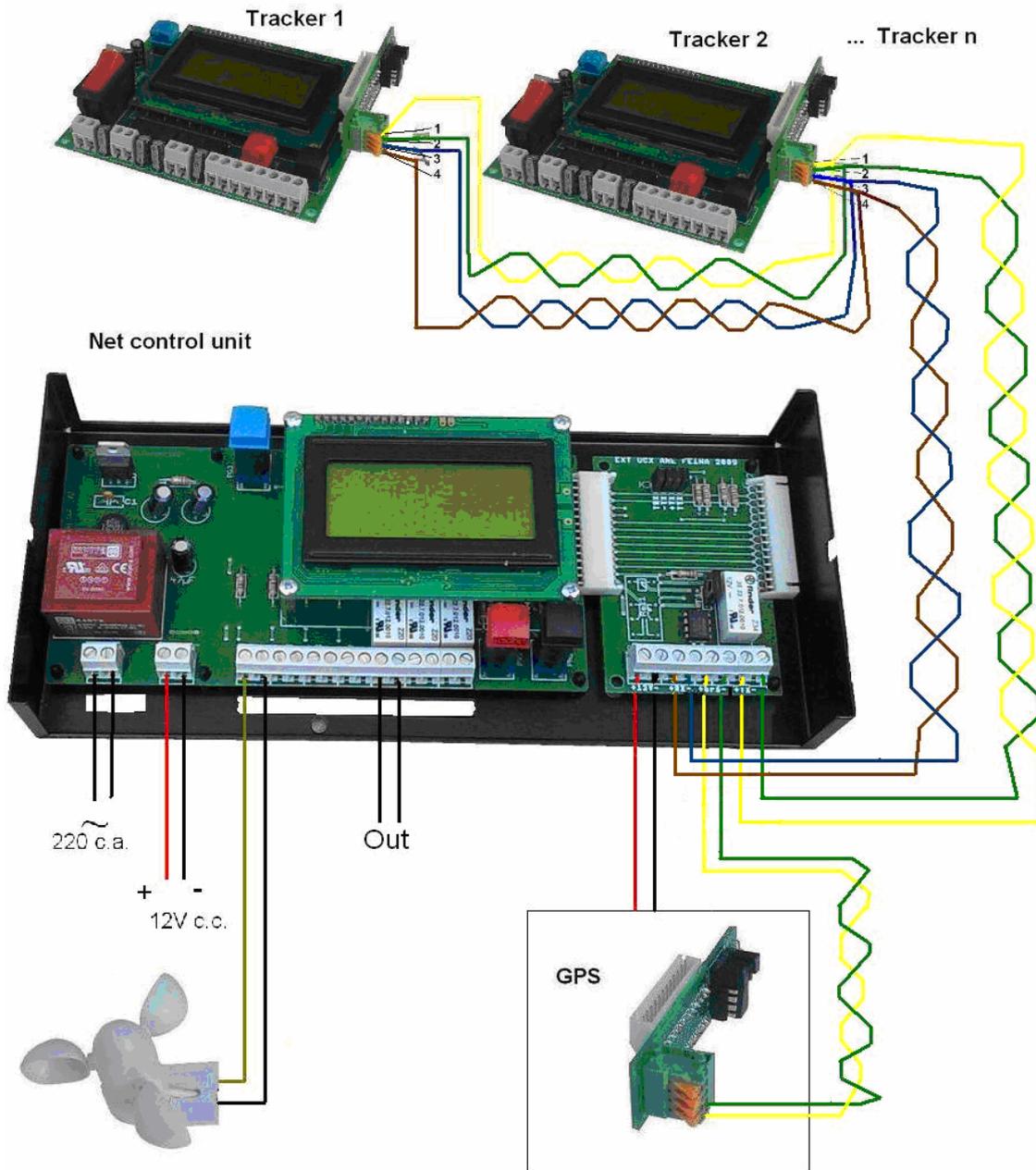
CONNECTION

The network

- The network board must be connected to each tracker's electronic board as shown in the image.
- It must be connected with braided cable and coloured cable, with the same orientation that is shown in the image. In this way all of the network boards for the various trackers are connected.
- The tracker boards must be connected to a 12 V power source. The network control unit can connect to 12 volts of continuous current or 220 V of alternating current.

The GPS

- Only the network board transmission cables must be connected to the GPS board, in outputs 3 or 4.
- The 12 V GPS power cables must be connected to the terminal strip of the network control unit that is shown in the image. Be aware of polarity.

The anemometer

- The anemometer must be connected to the terminal strip as shown in the image.
- When the speed of the wind surpasses the speed programmed to send the wind command, likewise, it closes the "Out" terminal strip contact in the image.

Tracker cable connections, using the RS458 communications protocol.

Tracker1 antenna

Tracker2 antenna

220 c.a.

+ −

12V c.c.

Out

+ −

Antenna master

GPS

Antenna GPS
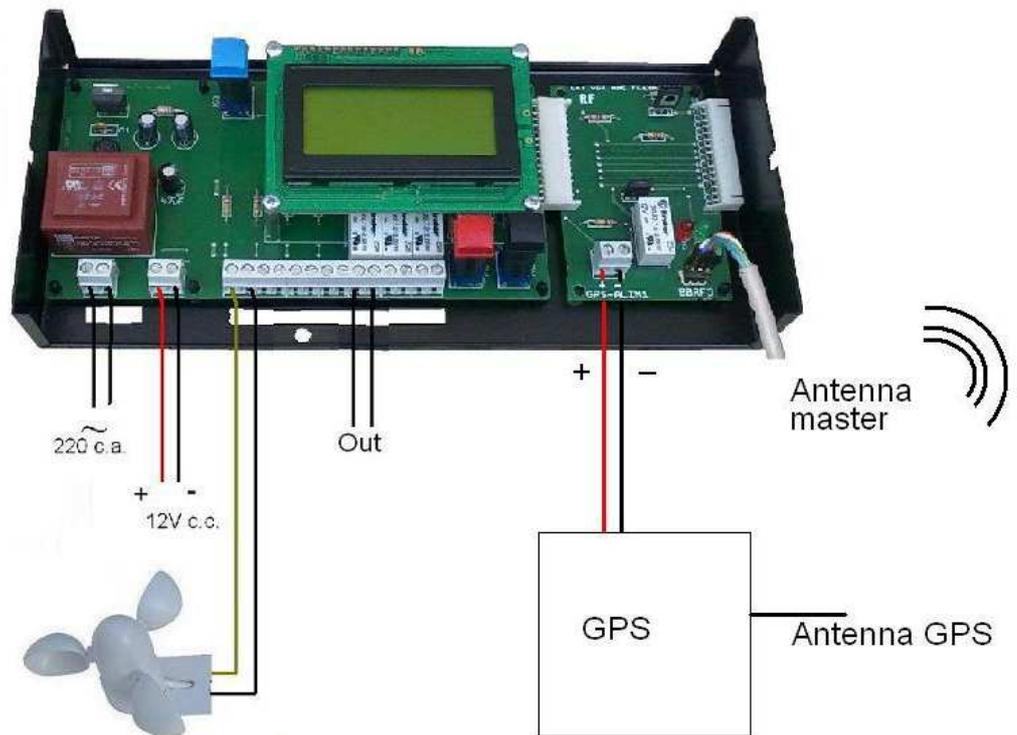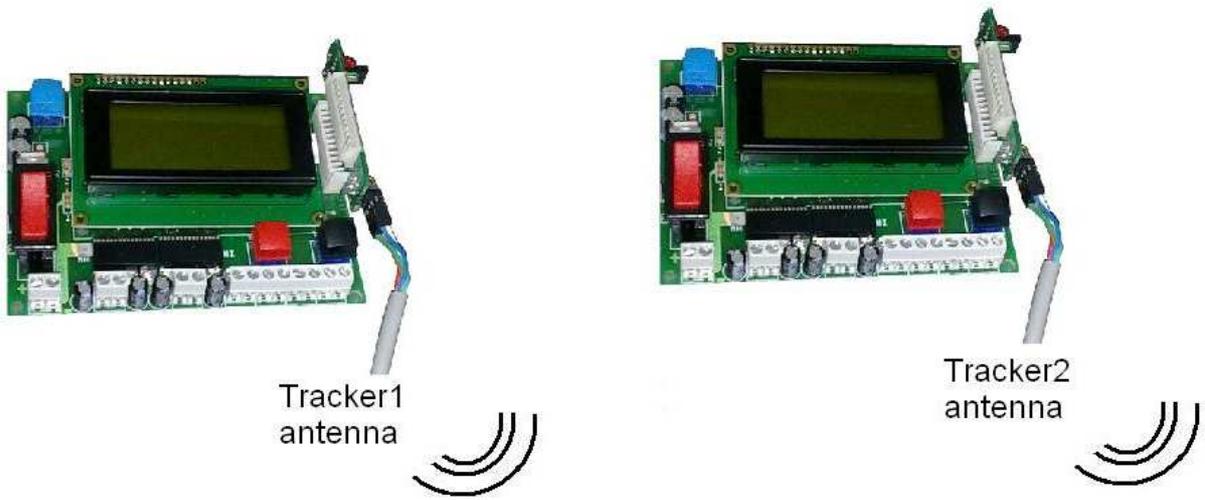
Tracker connections with radio communication

TRACKER CONFIGURATION

The trackers have to be able to be identified by the network control unit as well as by the user. Therefore, each tracker has to be numbered between 1 and 250.
To do this, each tracker has to be on, and the red button pressed when the word "start" appears on the screen.
A screen with many parameters will appear, from A to H. The black button changes the screen. When you reach parameter P, enter the tracker number with the red button. Once the black button is pressed, you can turn off, as the number will be saved in the memory.
You can also make groups of trackers so that certain trackers obey with a number. Parameter T is for this.
For example, in a plant with 80 trackers, you can number P from 1 to 80.
If you want to make groups of 10 trackers, you can set T=81 in 10 trackers, T=82 in another 10 trackers.... until 88.
When you send an order to tracker no. 81, the 10 trackers whose T is 81 will obey.

NETWORK UNIT OPERATION

Once the network unit is on, the following will appear on the screen for one second:

```
                <START>
```
Then:

```
            XARXA-FEiNA
```


Once "XARXA-FEiNA" is on the screen, you must press the blue button if you want to give a tracker or all the trackers instructions. Then the following appears:

```
            SEGUIDOR: 000
            FUNCIO:   000
```

Press the red button to enter the tracker number that you want to operate. Press the black button to move the cursor above the operation number. Press the red button to enter the operation you want the tracker to perform.

If the number you set the tracker to is 252, the trackers will all carry out the operation simultaneously.

The operations are as follows:

002: anemometer. It will do the same as if it indicated wind. That is to say, the tracker will position itself horizontally for a set time.
003: reset. The tracker will be reset, and after 3 minutes, it will go start up, taking the references and data from the GPS.
004: move the hour axis to the east.
005: move the hour axis to the west.
006: move the tilt axis to make the tracker more vertical.

007: move the tilt axis to make the tracker more horizontal.

008: request the tracker to send the value of some variables. The following will appear on the screen:

ANGHOR2º	ANGINCº	NHORL	PHORARIL
NINCLIL	PINCLIL		
UPDOWN	EASTWEST	LIGHT	ERRO
DAY/	MONTH	TIME:	MINUTE

ANGHOR2: hour angle that the tracker calculates.

ANGINC: tilt angle that the tracker calculates.

NHORL: hour theoretical impulses.

PHORARIL: hour real impulses.

NINCLIL: tilt theoretical impulses.

PINCLIL: real impulses.

UPDOWN, EASTWEST, LIGHT: Probe values at any time.

This screen appears for a minute and a half. Press the blue button to exit the screen and return to a normal state.

009: probe calibration. It will give variable B the value of light that the probe has at the moment. Therefore, this has to be done when the sunlight is low (sun semi-covered by fog or sun close to the horizon).

010: value to give to variable D.

011: value to give to variable G.

012: value to give to variable I.

013: value to give to variable J.

014: value to give to variable L.

015: value to give to variable X.

016: value to give to variable Q.

017: value to give to variable C.

018: value to give to variable N.

019: value to give to variable O.

020: it puts the error meter to 0, as well as the time variables among the impulses.

021: it requests to a tracker time variables among impulses and the no. of errors.

022: Returns the trackers to vertical position, after 023 operation.

023: Keep horizontally trackers until 022 operation.

In some of these operations, when you have pressed the black button, another line appears that says "impulses: 000" or "VALUE: 000":

```
SEGUIDOR: 000
FUNCIO:   000
IMPULSOS: 000
```

In this case, you have to enter the number of impulses that you want the tracker to do, or the value of the variable.

As a reference, in tracker SF20: 1 impulse is 0.45º.

In any case, after introducing the values and pressing the blue button, the screen will show:

```
Transmet
```

This screen will appear for 10 seconds. During these 10 seconds, a signal will be sent to the trackers advising them they will receive an order.
Once 10 seconds have passed, all trackers will be ready to receive the order.
When a tracker is receiving a signal, its electronic controller screen shows:

```
                        Rep
```

Once 10 seconds have passed, the network control unit sends the order and the tracker follows the instructions. The other trackers return to their usual program.

Anemometer:

If the anemometer is connected, the instantaneous wind speed in km/hr will appear on the screen.
If you press the red button, the following appears:

```
            WIND SP.: 000 km/h
```

With the red button you put the speed you want the trackers to be horizontal.
If you press the blue button, the following will appear:

```
            0  to 5 :00,00%
            5  to 10:00,00%
            10 to 15:00,00%
            15 to 20:00,00%
```

This indicates the percentage of time there has been wind in each one of the speeds from the last time you put the data to 0, expressed in km/h.
If you press the blue button again, the following screen appears with the speeds 20 to 40 km/h, then 40 to 60 km/h, after that 60 to 80 km/h, then 80 to 100 km/h and finally 100 to >115.
The last screen will be:

```
            Max sp.:000 km/h
            TOTAL 00000 HOURS

                 R&B==> 0
```

This screen informs you of the wind's maximum speed from the last time that it was put to 0, and the total number of hours that have passed from it being at 0.
It also informs you that if you press the red and black buttons simultaneously all wind values will be put to 0.

GPS

If the GPS is connected to the network control unit, this will be connected whenever you are on the main screen. It is not connected when you are sending things.

If you have reset a tracker or you have disconnected it and reconnected it again and you do not touch anything else, after 3 minutes the tracker takes the data from the GPS that is constantly being sent, which are the geographical coordinates and the date and time. Then it looks for the reference and is positioned correspondingly.

At nighttime, when the tracker controller calculates that the sun is 10^0 below the horizon, the tracker records the time and data of the GPS and updates the clock with high precision.

Others

To restart or disconnect the device, press the blue button for two seconds. Press the blue button again for two seconds to start.

The network control is prepared to receive orders from anywhere in the world by means of the Internet.

To be able to receive orders from the Internet, the master has to be identified from 001 to 250. Press the red button to set this value when connecting the master and the "START" screen appears. The no. that can be changed with the buttons appears.

(A15 version)