

***Ouranos* Interface**

User's guide

September 1997

Foreword

Welcome in the world of the ***Ouranos*** interface! *Ouranos*, which means "starry sky", is the oldest god of the Greek mythology. The goal of the ***Ouranos*** interface is to give astronomers a reasonably priced and efficient tool that will let them using their telescope linked to one of these great astronomical planetarium program. Every movement of your telescope can now be represented against a realistic star field on the screen of your personal computer. The program will also help you find thousand of objects very easily and much more!

Enjoy your trip in the ***Ouranos*** world and clear skies!

Patrick Dufour
Ouranos designer

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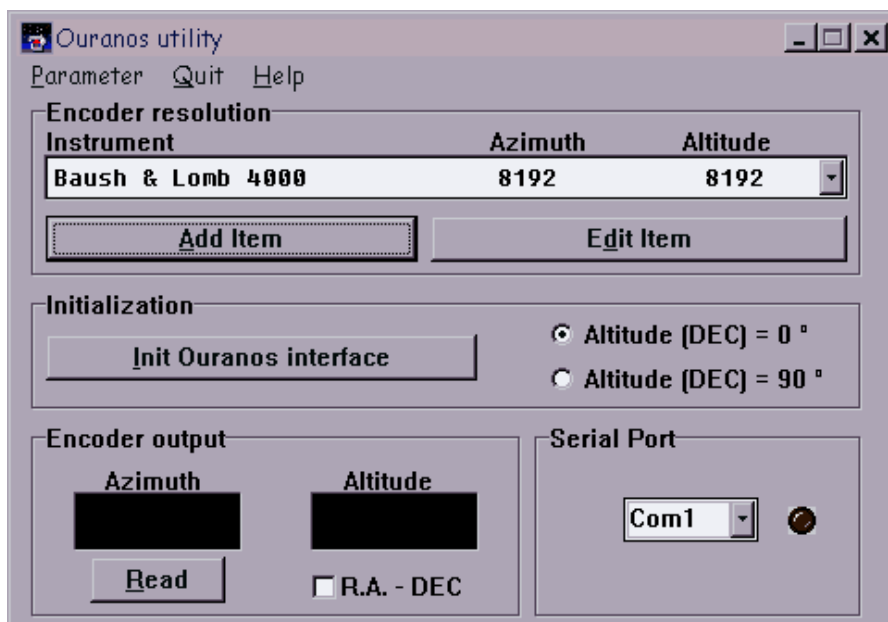
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1. Ouranos utility software V1.3.X



1.1 A useful tool

The purpose of the Ouranos interface utility software v1.3.X is to:

- Simulate the use of a digital setting circle system with goto mode for an equatorial mount;
- Check the interface and encoders;
- Initialize the Ouranos interface encoder resolutions and counters

(Based on your encoder mounting hardware, enter the total encoder resolution for each axis only once)

The software will let you use the interface with all planetarium programs that only offer the NGC-MAX mode;

- Help to find the encoder resolutions on homemade encoder mounting hardware.

If the planetarium program is compatible with the Micro Guider III™ (MGIII), you will be free to start the utility by initializing **Ouranos**. By selecting this protocol, the program will take full advantage of the **Ouranos** features.

1.2 Installation

The installation program (« install.exe ») reside on the floppy disk. Run the program and follow the instructions.

1.3 Using the software

1.3.1 Encoder resolution

This section let you select the encoder resolution for each axis of your telescope. The list contain some encoder resolutions available on the market. If you can't find your particular setup in the list, you can add your own by using the "Add Item" button. A new window will let you enter your values for each axis and a short description.

Many encoders are connected to an axis through a toothed drive belt, drive wheel and an encoder wheel. Often the drive and encoder wheels are sized to provide a ratio of 2:1 or greater to favor a higher resolution for a given distance traveled. If you should have this type of encoder set up multiply the encoder value by the ratio factor. A ratio of 2:1 means the drive wheel is two times the diameter of the encoder wheel and thus the encoder resolution should be doubled, i.e. a 1000 resolution encoder will be a 2000 resolution encoder.

If you want to change anything to the current selected item in the list, use the "Edit Item" button for this purpose

1.3.2 Ouranos initialization

To initialize your **Ouranos** interface with the current values, use the "Init Ouranos interface" button. The radiobuttons Altitude (DEC) = 0° or = 90° let you define the state of your telescope when initializing **Ouranos** (ref. 2.2.2). Before doing this, make sure that the interface is already connected.

Note: When you use the utility program in coordinate mode (see next section), you don't have to be worry about the initial state of your telescope.

1.3.3 Encoder output

This will let you see the raw values of both encoder. To enable the encoder query, use the "Read" button. To end the communication, press the "End" button.

By checking the "R.A. - DEC" box, the software will let you see the encoder output as equatorial coordinates. To use this mode successfully, you must configure all the parameters (section 1.3.6). Also, you should have initialized **Ouranos** before.

In this mode, when you press the "Read" button, a new window will let you select one object in the lists which will be used as an alignment object. You can also enter coordinates instead. When it's done, all you have to do is centering the object in the telescope and then press the "Ok" button or "Enter".

You will then see the object R.A. - DEC. coordinates and two new buttons. The "Guide" button let you select a new object to be used as the next target. Once selected, the program will show how far you are from the object in encoder steps and which direction you should take to reach it. The "Sync" button will also be enabled. This button let you synchronize the program with the target coordinates when the object is well centered in the telescope but the program still indicate you an offset. Most of the time, this is because your telescope mounting is not well aligned on the pole or has some mechanical errors. To quit this mode, press the "Ok" button.

Note: The object selection window let you also select your own list (other). In fact, as for the NGC and IC list, this is a text file (.TXT) that can be generated with any text editor. You must use the same format as in the other lists. You can use the "MESSIER.TXT" file as a template.

1.3.4 Determining resolution

If you don't know the resolution of your encoder setup, select the item "FIND RESOLUTION" in the list. To find the resolution of both encoder setup, you will have to use a fixed object that can be pointed with your telescope, or use mechanical stops or indicators such as a line or pointer affixed to a stationary part of the telescope that will align with a mark or pointer on the movable axis. This could be done in daylight. All you have to do is following these instructions:

- Precisely point and center the object with your scope;
- Initialize **Ouranos** ;
- Press the "Read" button to see raw encoder values (you should see 0,0 at first);
- Make a full 360° turn with your scope, if you can with both axis, until the object is well centered again (if numbers passed from 0 to 65535, turn in the opposite direction);
- You can now read the encoder resolution of the axis;
- Repeat this to confirm the values and add them to the list for future use.

Some mounting (ex. : Dobson) will not let you make full 360° turn with both axis. If this is the case for the altitude axis, you may use a spirit level to initialize the interface while the scope is in its horizontal position. Make sure that the base of the mount has been leveled. You then will have to place the tube in its vertical position. Multiply the altitude value by 4 and this will give you a close value for the altitude encoder resolution. For all these uncertain cases, only trial run on the sky with the planetarium program will let you find the right encoder resolution. Try using a close encoder resolution value and change it as necessary depending of the results in pointing the telescope with the planetarium program. A small encoder resolution error is acceptable since most telescope mount aren't perfect.

1.3.5 Port selection

This will let you select the serial port which is used by **Ouranos**. A small red "LED" let you see the port state. It goes bright when the port is opened. Don't forget that an opened port can't be used at the same time by more than one program.

1.3.6 Parameters menu

Parameters...

This let you define the initial state of the **Ouranos** counters after initializing the interface. By default, these values are automatically adjusted by the program for a NGC-MAX simulation purpose. Unless you want to make a specific trial run on the **Ouranos**, you shouldn't have to change anything here.

Inv. Azimuth and Inv. Altitude

These parameters serve in coordinate mode. These let you reverse the encoder direction to fit your particular encoder setup.

Sidereal Clock

This parameter serve in coordinate mode. This parameter enable the internal sidereal clock so that the program can update the right ascension coordinate on the screen when the telescope is not motorized or if the encoder still send pulses when the telescope is tracking. Most of the time, the sidereal clock must be enabled.

Language

This let you choose another language.

2. Ouranos Interface

Housing	DB25 - RJ45 package
Supply	8 to 15VDC
Consumption	~15mA (without encoder)
Serial parameters	9600 baud (8N1)
Read frequency	>50 000 Hz
Max. resolution	65 536 codes
Interface setting	By software via serial port

2.1 Plugging-in the interface

Ouranos use a standard DB25 which is compatible with most PC serial port connector. To connect the interface into your PC, all you need is a free serial port. If your PC allows only DB9 type connector, you can use an DB25 to DB9 adaptor. This adaptor can be found at your local computer retailer.

Power hook up is through a standard 2.1mm connector and any 8V to 15VDC supply. Don't worry about polarity, **Ouranos** will take care of it. The interface "POWER" light will light when power has been properly applied.

Note : For best performance, connect the interface directly into the PC without the use of an extension cable.

2.2 Using **Ouranos** with planetarium programs

In every planetarium programs, there is a setup section for the encoders. This information is required so the program will be able to show you as accurate as possible where your scope is pointing to. If you want more information about the use of encoders with your planetarium program, please refer to its instruction manual.

2.1.1 Encoder setting

As it is with the Ouranos utility program, it is important that you enter an "accurate" value of the encoder resolution for both axis. The program will also want you to provide the rotation direction of both encoders, which is dependent of how your encoders are installed on your telescope. You can use the Ouranos utility to check it. For the altitude or DEC axis to be clockwise - when you move the tube of your scope starting at the bottom, or counterclockwise, you should read incrementing numbers. The same for the azimuth or RA axis, when starting from South and moving to East, or counterclockwise.

2.2.2 Selecting a compatible device and initializing **Ouranos**

If the Micro Guider IIItm (MGIII) protocol figure in the planetarium program, you should select it. By selecting this protocol, the program will take full advantage of the **Ouranos** features and you won't have to use the Ouranos utility software anymore for normal operation. When the program is linked to the interface, it will initialize **Ouranos** as well at the beginning.

If this protocol is not available, you may select the NGC-MAXtm instead. To use **Ouranos** in this mode, follow these instructions:

- 1- Prior to enabling the encoder interface, you must first connect it to your PC and to the encoders. Then turn it on.
- 2- Run the Ouranos utility software.
- 3- Activate the serial port which will be used by **Ouranos**. Be sure that the selected encoder resolutions are the correct ones.

4- If you are performing a two-star align, place the tube of your scope in either its horizontal (0° - tube should be perpendicular to the azimuth axis) or vertical position (90° - tube should be parallel to the azimuth axis). This corresponds to the "ZERO" which the program needs as a reference position of the scope. For an equatorial mount, the telescope should point to the celestial Equator or to the North/South Pole.

5- initialize **Ouranos** . If you receive a "Device already open" message from the Ouranos utility, this is because the planetarium program or another application already uses the serial port. You must then close the port and try again.

6- Now you can perform the star alignment with your planetarium program.

2.3 Encoders

2.3.1 Using commercial encoder mounting hardware

Ouranos is hardware compatible with most encoder mounting hardware available on the market. It can be also easily adapted to homemade encoder mounting hardware.

Although you can use the cable provided with JMI's mounting hardware and the like, you should get a RJ45 modular extension cable and coupler to let use the computer at a reasonable distance. You will find these items at your local computer retailer.

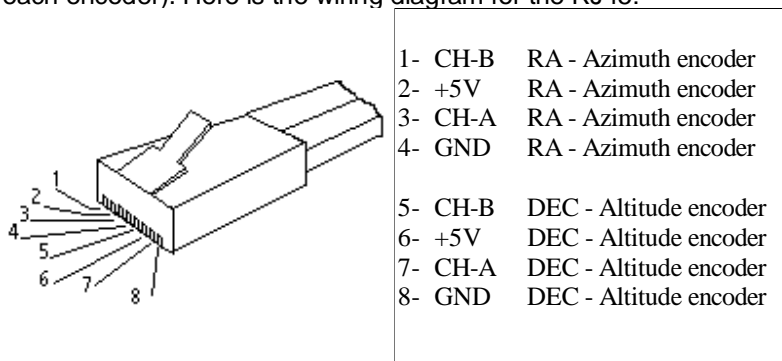
Note : For best performance, keep the encoders-interface cable as short as possible. Long cable (>20') in a hard electromagnetic environment (near antenna or big electrical motor) can affect the interface performance.

2.3.2 Incremental encoders

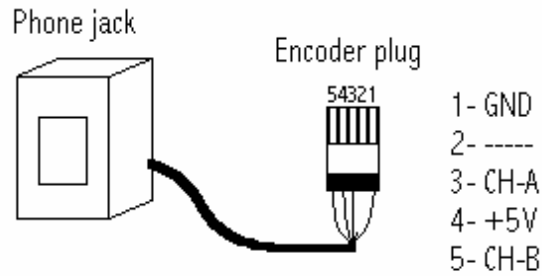
An optical incremental encoder is made up of 2 major parts, the disk and the sensor. The disk of an optical incremental encoder is patterned with a single track of lines near the outside edge of the disk. The disk count is defined as the number of dark/light linepairs that occur per revolution. The sensor, made by Hewlett Packard, sends two signals which give the information to determine the direction of the rotation. To be compatible with **Ouranos** , an encoder should be TTL (0 - 5VDC) compatible.

2.3.3 How to connect the encoders

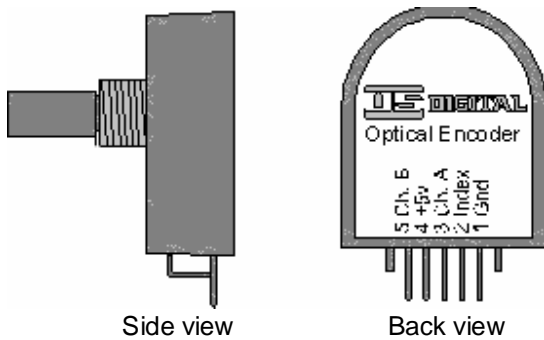
One end of the encoders-interface cable is a RJ45 modular plug while the other use 2 RJ11 modular plugs (one for each encoder). Here is the wiring diagram for the RJ45:



An optional encoder connexion kit with 12' long cable is also available. To let you connect the cable to the encoders, a special cable which use at one end a phone jack is provided. The following wiring diagram show you how to use it with HP or UsDigital encoders:



Encoder



3. Troubleshooting

My interface doesn't respond or I can't get any encoder output !

Solution:

Make sure that you selected the correct serial port, and that **Ouranos** is properly connected to the computer and powered with at least 8VDC. The red light will be activated even if the voltage is under 8VDC.

It seems that one encoder doesn't work !

Solution:

To assure yourself it is not the encoder, remove the connector from the good encoder and plug it in to the encoder that appears not to be working. Move the telescope in the appropriate axis and look for the numbers to change or for the cursor to change location if in a planetarium program.

If the encoder work properly, bad contact between cables and connectors should be suspected. Unplugging and plugging again the cable may be just all you need to do. If it still doesn't work, look at the small leads of the encoder plug for bad connexion.