

# Changes from *InstantTrack* 1.00 to 1.50

October 21, 2000 - KB5MU

## 1. Introduction

Version 1.50 is the first new release of *InstantTrack* since the original version 1.00 was released in 1989. It improves on released version 1.00 (or 1.00b or 1.0Vb depending on which patches have been applied) in many ways. These improvements fall into these main categories:

- Even better **compatibility** with past and future
  - More video modes supported
  - Very fast computers supported
  - Year 2000 fixes
  - Configuration items to match your system
- **New Features**
  - Improved accuracy for the Moon
  - More ways to control the real-time screens
  - Visual magnitude display
  - Ground track displays
  - Easier Keplerian elements file input
  - More control over timezones
  - Ephemeris tables output to a file or printer
  - More consistent user interface
  - Configuration items to match your personal preferences
  - Support for automated Keplerian elements updates
- **Bug Fixes**

To obtain *InstantTrack* version 1.50 see <http://www.amsat.org/amsat/instanttrack> or contact AMSAT headquarters as follows:

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The rest of this document describes each of the user-visible changes in some detail.

## 2. New Configuration File

The configuration file NBSCOM.INI that controlled the Update Time (NBS via modem) feature is no longer used. Instead, an overall configuration file named IT.INI contains those parameters, plus other parameters that control various aspects of *InstantTrack* operation. See the documentation file ITINIDOC.TXT for a detailed description of all these parameters and how to set them.

This version of *InstantTrack* comes with a default version of IT.INI to get you started. **Most users will probably not have to touch IT.INI at all.**

In brief, the parameters in IT.INI include the following:

- More control of the COM port configuration for the Update Time feature
- Control of the video mode used for map displays
- Control of the software interrupt numbers used for KCT-compatible rotor drivers and for radio drivers
- Control of how *InstantTrack* reads in Keplerian elements files, including automatically reading in elements files at startup
- Control of how fast fast-forward mode should be
- Control of how *InstantTrack* uses the printer
- Control of your local timezone and its offset from UTC

You *will* want to edit IT.INI if you can't or don't want to set the DOS environment variable "TZ" to match the local timezone your computer's clock uses. You can skip this, but if you do the "Z" command on most *InstantTrack* screens (switch to local timezone) won't work correctly.

### 3. New Command Line Parameters

In addition to the configuration file, a couple of parameters can be controlled on the IT.EXE or ITNCP.EXE command line.

#### 3.1 */M to Disable the Mouse*

If the argument “/M” appears on the command line (upper or lower case, without the quotes), *InstantTrack* will refrain from using the mouse. This can be helpful on systems that have a mouse installed but don’t handle it correctly, such as certain older multitaskers.

#### 3.2 */F FILENAME to Read in Keplerian Elements File Automatically*

If the argument “/F” appears on the command line (upper or lower case, without the quotes), the next thing on the command line is taken to be the name of a Keplerian elements file. Instead of running the normal menus, *InstantTrack* will just read in that file (in Update mode), without waiting for any user input, and then exit. This is intended for automated download-and-update procedures. For example, you might configure a filter in your email program to detect messages sent to the keps@amsat.org mailing list, and automatically run *InstantTrack* to update the database with the new elements.

The filename can contain a full path of any length, but it must be a valid DOS filename, so it may not contain any spaces. The file can be in NASA 2-line format or AMSAT verbose format, or any combination.

Because of this automatic update capability, *InstantTrack* will now warn you on the Update Satellite Elements screen if another copy of *InstantTrack* (or any other program) has modified the database file IT.ORB since the last time it was read or written. When you see this warning, you should think twice about making any manual changes to the database, since they will overwrite the automatic updates.

## 4. Keplerian Elements

### 4.1 Improved AMSAT and NASA 2-Line File Handling

*InstantTrack*'s function for updating the satellite database from a Keplerian elements file in AMSAT and NASA 2-line format is much friendlier now. You no longer have to specify which kind of file you have. *InstantTrack* can find either kind of element set in the file, even both kinds in the same file. It can accept garbage at the beginning and end of the file, and between element sets, so you no longer need to edit the file to clean it up before feeding it to *InstantTrack*.

Since modern computers can read in a file of elements very rapidly, the status information is now presented one screen at a time, with a prompt to type any key to continue. You can also skip these prompts by typing Esc at the first one. The status information is now color-coded to help you find the important information.

### 4.2 Automatic Keplerian File Updating

In addition to the /F command line capability described before, there is also a new parameter in the IT.INI configuration file to help you update Keplerian elements automatically. If you set the auto\_read\_kepsfile parameter to the name of a file (up to 40 characters), *InstantTrack* will read that file as a Keplerian elements file (in Update mode) when it starts up, before displaying the main menu. Depending on exactly how you automate your Keplerian elements downloads, you may find this feature more convenient to use than the command line version. Use whichever is easiest for you.

### 4.3 Schedules

The satellite schedule is still based on Phase (that is, each orbit divided into 256 equal periods of time, sometimes erroneously called "MA"), but it now supports up to 12 transitions instead of six. This was useful for AO-13. Maybe it will be useful again on some spacecraft.

### 4.4 Spacecraft Attitude

The Bahn attitude of the spacecraft (for inertially oriented, spin-stabilized spacecraft such as AO-10, AO-13, and Phase 3D in its initial orbit) can be entered with a decimal point for extra precision, and antenna offpointing or "squint" angle is now displayed to one-tenth of a degree.

In addition, *InstantTrack* now supports spacecraft that are always oriented to local vertical, including gravity-gradient spacecraft such as the Fuji and UoSAT-based satellites. This attitude type is displayed as "Local Vert." You can enter just "L" or anything that starts with "L" to specify this type of attitude control. You can go back to the default value of "None Set" by entering "N".

### 4.5 Year 2000 Fixes

Most of the known Year 2000 ("Y2K") problems in *InstantTrack* 1.00 are in the area of Keplerian elements handling. The following changes cover all known Year 2000 concerns:

- On the Manual Edit Satellite Elements screen, you can now enter year "0", "00" or "2000"; or "1", "01" or "2001", etc. One-digit years will be interpreted as 2000 - 2009. Two-digit years will be interpreted as 1950 - 2049.
- When reading NASA-2-line format Keplerian elements from a file, year values of "00" to "49" are interpreted to mean years 2000 to 2049.
- When reading NASA 2-line format Keplerian elements from a file, the leading zeroes on the run-together year and day number may be omitted, and *InstantTrack* will fill them in.

- When reading AMSAT verbose format Keplerian elements from a file, the year may be entered as four digits. If entered as four digits, it must be in the range 1901 - 2099.
- When reading AMSAT verbose format Keplerian elements from a file, the year may be entered as two digits. If entered as two digits, it will be mapped into the range 1950 - 2049.
- When reading AMSAT verbose format Keplerian elements from a file, the year may be entered as one digit. If entered as one digit, it will be mapped into the range 2000 - 2009.
- When reading AMSAT verbose format Keplerian elements from a file, the year may be entered as zero digits. If entered as zero digits, it will be mapped to 2000.
- When reading AMSAT verbose format Keplerian elements from a file, the year may be run together with the day number or spaced apart.
- The “Update Time (NIST via modem)” feature now works with years 2000 and later.

#### **4.6 Element Set Checksums**

If a checksum appears in an AMSAT verbose format Keplerian element set, it will be checked. I am not aware of any formal specification document for this checksum. As implemented in *InstantTrack* and all other places I checked, this checksum includes all digits anywhere in the text, including the “2” in “rev/day<sup>2</sup>” and any digits in the spacecraft’s name. If you don’t want it to be checked, you can turn it off using the `check_amsat_checksum` parameter in the configuration file `IT.INI`. See `ITINIDOC.TXT` for details.

Line checksums on each line of a NASA 2-line format Keplerian element set can be checked in one of four ways:

1. Plus signs have value 0. Used by NASA before 1989 and since 1991.
2. Plus signs have value 2. Used by NASA from 1989 - 1991 and still sometimes seen. *InstantTrack* 1.00 (without the patch) used this method.
3. Checksums are not checked at all. Use this as a last resort, for hand-built elements that don’t have a reliable checksum.
4. Plus signs can have value 0 or 2, either checksum is accepted. Any other checksum is still an error. Like *InstantTrack* 1.00b (ITPATCH2).

The checksum algorithm used is controlled by the `nasa_checksum_type` value in the configuration file `IT.INI`. See `ITINIDOC.TXT` for details.

#### **4.7 Element Set Number**

The element set number is now saved in the database and displayed on the Manual Edit Satellite Element screen for reference.

#### **4.8 Epoch Rev Number**

The Epoch Rev orbit number can now be entered manually or from either format of Keplerian elements file, and *InstantTrack* displays the Rev number on the real-time tracking screens. Beware that the rev number is often wrong, and there are sometimes disagreements on exactly what the rev number should be.

#### **4.9 NASA Object Designators**

NASA designators found in NASA 2-line Keplerian element files are now stored and displayed for your reference on the Manual Edit Satellite Elements screen. They are still not used for anything by *InstantTrack*.

## 4.10 New Derived Elements

On the Manual Edit Satellite Elements screen, in the Derived Values pane, three new values are displayed:

Longitude Increment	How many degrees of longitude the satellite appears to move (on the Earth's surface) per orbit.
Sun to Orbitplane angle	Angle of the sun's rays to the plane of the spacecraft's orbit. For spacecraft that take pictures of the Earth, this tells you what kind of shadows to expect from terrain features. By definition, this value is nearly constant for a sun-synchronous orbit.
Sun to Spinplane angle	Angle of the sun's rays to the plane perpendicular to the antenna axis. Many spacecraft spin around this axis and have solar cells facing in every direction along this plane. In that case, an angle of 0° indicates that the sun is shining directly on those panels.

## 4.11 Editable Sun and Moon

The working frequency (still labeled as "Beacon Frq") and the Group flags can now be edited for the Sun and Moon. Setting the working frequency enables the sky temperature (Tsky) calculations to be performed, which is useful for EME operators.

## 4.12 Non-DOS Filenames and Paths

If you run *InstantTrack* under Windows 95, Windows 98, Windows NT, Windows 2000, or OS/2, the names and path names of your Keplerian elements files might not comply with the old-fashioned DOS filename conventions. *InstantTrack*, being a DOS program, can't readily cope with such filenames.

In one common case, where the filename or the directory path contains a space, *InstantTrack* will now give you an explanatory error message, instead of just using the part before the space.

Long filenames are still not diagnosed or handled in any way. *InstantTrack* will simply fail to open the file. The total amount of space allowed for typing in the path and filename is still limited to the length of one line; *InstantTrack* will beep if you try to type in anything longer.

Note that if you're too stubborn to rename your files and move them to a directory with a DOS-compatible path and name, you can type in the crunched-down filename manually. For example, under Windows NT the file "C:\Downloaded Stuff\My Keps File.txt" can be referred to as

"C:\DOWNLO~1\MYKEPS~1.TXT", if there are no older files around that start with the same letters.

This crunched-down path works fine with *InstantTrack*. You can find out the crunched-down filename by looking at the Properties dialog for the file. (Except under OS/2, where files with incompatible names are just invisible to DOS programs.)

## 4.13 Manual Edit Screen

The manual edit screen is a little bit smarter about how many characters it lets you type. If you're typing into a fixed width field, it won't let you type more characters than will fit.

## **5. Sun and Moon**

### **5.1 Improved Moon Orbit Model**

The position of the Moon is now computed using a more sophisticated mathematical model. The maximum error is now 0.05 degrees, instead of 0.8 degrees. The accuracy of the old model wasn't good enough for big-gun EME stations.

### **5.2 AOS/LOS Finder**

The AOS/LOS finder now works for the Sun and the Moon. Before, the features that rely on this calculation were disabled for those objects.

### **5.3 EME Path Loss**

When the moon is being tracked in real time, the path loss for EME is displayed. This only works if a "beacon" frequency has been entered for the Moon.

## **6. Video Modes**

### **6.1 CGA Mode Support**

The oldest graphics standard from the original IBM PC is now supported. The CGA (Color Graphics Adapter, or compatible) is operated in its "high resolution black and white" mode, 640x200 pixels. If a CGA adapter is detected, this mode will be used automatically on the maps. CGA mode cannot be invoked on a more advanced graphics adapter.

Depending on your display, you may find black-on-white maps easier to read than white-on-black maps, or vice versa. You can use the `cga_mapcolors` setting in the `IT.INI` configuration file and a keystroke (V) on the map screens to switch between the two modes.

Map colors are not shown in CGA mode.

### **6.2 Hercules Graphics Mode Support**

The second-oldest PC graphics standard is also supported. The Hercules Graphics Card (or compatible) is operated in its 720x348 pixel mode. If a HGC adapter is detected (and no EGA or VGA is detected), this mode will be used automatically on the maps.

Depending on your display, you may find black-on-white maps easier to read than white-on-black maps, or vice versa. You can use the `hgc_mapcolors` setting in the `IT.INI` configuration file and a keystroke (V) on the map screens to switch between the two modes.

Reverse-video text is not supported in Hercules mode.

### **6.3 EGA Mode Support**

The EGA mode, 640x350 non-square pixels in 16 colors, is still supported. This was the only mode supported by *InstantTrack* 1.00. If an EGA or compatible video adapter is detected, this mode will be used automatically on the maps. This mode can also be used with a VGA video adapter; see the next section.

## 6.4 VGA Mode Support

Today's industry gold standard for video compatibility is now supported. Any video adapter from a plain VGA on up to the fanciest super-VGA can be operated in 640x400 pixel, 16-color mode.

Most VGA-compatible video cards are also compatible with the older EGA standard (640x350, 16 colors) that was the only graphics mode supported by *InstantTrack* 1.00. You can control which mode is used on your VGA by setting the `vga_resolution` parameter in the IT.INI configuration file. Using EGA mode is a bit faster (if your computer is slow enough for that to matter) and requires about 32K less free memory. Using VGA mode is probably more compatible nowadays, and produces nicer-looking maps.

## 6.5 Grayscale VGA Mode Support

If you have a single-color monitor or LCD display connected to your VGA-compatible video adapter, the default colors won't look right in normal VGA mode. In that case, you can tell *InstantTrack* to display shades of gray instead, by setting the `force_greyscale` parameter in the IT.INI configuration file. You can even control which exact shades of gray are used, for best effect on your particular display, by setting the `greyscale` parameter in the IT.INI file.

You can do this on a color monitor too, if you just prefer gray.

## 6.6 BIOS Character Generation

If you're using EGA or VGA mode and you can't get the text on the map screens to look right by using any of the video modes above, you are fighting with some incompatibility in the video adapter. Sometimes this can be solved by loading a TSR program provided by the video manufacturer, such as FNT8X14.COM from Matrox. If all else fails, you can tell *InstantTrack* to use the computer's BIOS routines to display graphics characters by setting the `force_bios_chargen_g` parameter in the IT.INI configuration file. This is slow, and may cause flicker, and may be partly incompatible with your mouse, but it may be useful as a last resort. This is similar to *InstantTrack* 1.0Vb (ITPATCH4).

This setting doesn't do anything unless you have an EGA or VGA adapter. *InstantTrack* always uses the BIOS on the CGA and HGC.

## 7. Update Time (via modem) Feature

The Update Time function (now in the Housekeeping submenu instead of on the main menu) is more flexible than before. NBS (National Bureau of Standards) is now called NIST (National Institute of Standards and Technologies), so the name of this feature and the names of its configuration parameters have also changed.

### 7.1 Configuration Now in IT.INI

The configuration items for the Update Time feature are now in IT.INI instead of NBSCOM.INI. They have also been renamed and extended.

### 7.2 Non-Standard COM Ports Supported

If your modem is connected to a port that doesn't use the standard I/O address and/or interrupt (IRQ) for COM1, COM2, COM3, or COM4, you can now configure *InstantTrack* to use it. Set the values `nist_port_address` and/or `nist_port_irq` to the corresponding values.

The COM port used **does** have to be standard hardware, or virtual standard hardware, since *InstantTrack* writes directly to the UART registers and does not use the BIOS or operating system calls.

### **7.3 More Baud Rates Supported**

You can now specify a baud rate (between your computer and your modem) of 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600, or 115200. Before you could only specify 300 or 1200, the actual connection rates supported by the NIST dial-in. This caused problems with some more modern modems that expected to talk to the computer at a higher minimum baud rate. The connection to NIST will still be at 300 or 1200 baud.

## **8. Location Control Features**

### **8.1 Phonetic City Name Matching**

When you are entering a city name, you can put a “%” in front of the name and *InstantTrack* will try to match your city name with similar-sounding city names, based on simple phonetics. This may help you if you’re not sure how to spell the city name. Enter “%hewstin” and it finds “Houston”, for example.

### **8.2 Latitude “N” or “S”, Longitude “E” or “W”**

When entering a latitude, instead of positive numbers for North and negative numbers for South, you can enter a number followed by “N” for North or “S” for South. Likewise, when entering a longitude, instead of positive numbers for West and negative numbers for East (which is the opposite of the convention everybody else uses), you can enter a number followed by “W” for West or “E” for East.

## **9. Time Control Features**

On the real-time screens (both text and map based) you can hit T to get a prompt to enter the time, just as in *InstantTrack* 1.00. With this release, you can enter other things besides, as described in the following sections.

When the real-time screen is displaying information outside of real time (frozen or fast-forward), the time is now displayed (in the upper left corner of the screen) in reverse video (if supported by the video mode).

Time is now displayed with a four-digit year number.

### **9.1 Jump Time to AOS or LOS**

If you type “aos” or “rise”, the time will jump forward to the next point in time when the currently selected satellite rises from below the horizon (negative elevation) to above the horizon (positive elevation). Likewise, if you type “los” or “set”, the time will jump forward to the next point in time when the currently selected satellite drops from above the horizon to below the horizon.

These are always computed with respect to station #1, your station, the default observer.

## 9.2 Jump Time to AOS or LOS at a Station

If you add “@ xyz” to the “aos”, “rise”, “los”, or “set” command, you change it to specify the rise or set time at a particular location. “xyz” can specify the location in any of the same ways you can specify the visiting observer using the “O” keystroke on the real-time screens: the name of a station in the station database, the name of a city in the city database (partial string match or phonetic match), the designator for a grid square (4 or 6 digits), latitude and longitude (in degrees, separated by a slash), “s” to choose from the station database, or “c” to choose from the city database.

Some examples may help:

```
aos @ kb5mu
rise @ san diego
los @ DM12
set @ 32N/117W
aos @ s [ then pick from the station menu ]
aos @ c [ then pick from the city menu ]
```

## 9.3 Jump Time to a Phase Value

If you enter the word “phase” or “phs” followed by a number, the time will jump forward to the next point in time when the currently selected satellite’s “phase” is equal to the number. The number must be greater than or equal to 0, and strictly less than 256. Decimal values are OK.

## 9.4 Jump Time to a Mode Change

If you enter the word “mode” followed by a mode letter, and the current satellite has a mode schedule in the database, the time will jump forward to the next point in time when the current satellite switches into that mode. If it’s already in that mode, time will jump forward to the beginning of the next session in that mode.

## 9.5 Errors in Entering Time

If you enter something invalid at the time prompt, *InstantTrack* will beep and let you try again, instead of immediately returning to the real-time mode.

## 9.6 Fast Forward on the Text Screen

Fast Forward operation (keystroke “F”) is now available on the real-time text screen, as well as the real-time map screens.

## 9.7 Fast Forward Rate Control

Running *InstantTrack* 1.00 on modern computers, the fast-forward mode was too fast to use. Now you can take control of the fast-forward update rate. Set the parameter `fast_forward_delay` in the `IT.INI` configuration file to the number of extra milliseconds you’d like *InstantTrack* to wait between updates. Note that this is largely independent of exactly how fast your computer is, so once you find a value you like you shouldn’t have to change it next time you upgrade to an even faster CPU.

## 10. File or Printer Output Capture Features

By overwhelming popular demand, *InstantTrack* can now send its Satellite Position Table (Ephemeris) to a file or a printer.

### 10.1 Invoking the Feature

You start by invoking the Satellite Position Table (Ephemeris) option from the main menu, just as before. Enter the parameters for the screen, and the first screen of data will appear. At this point, or on any subsequent screen of ephemeris data, you can type “F” (for “File”) or “P” (for “Paginated file” or for “Printer”). When you do, *InstantTrack* prompts you for the name of the output file you want to create. Enter whatever name you like, and hit Enter. *InstantTrack* returns you to the same screen of data. Now as you page through the ephemeris data, everything is being captured to the file you specified.

When the capture feature is active, the name of the output file appears in the upper left corner of the screen (but not in the captured output). If you specified a path, only the last part of the filename is shown. If the disk fills up during the capture operation, the filename is replaced by the message “Disk Full!”. If some other error occurs, the filename is replaced by the message “Error!”.

### 10.2 Choosing a Filename

#### 10.2.1 Creating a Disk File

You can make up a filename to suit yourself. If you enter just a plain filename like “OUTPUT.TXT”, it will be created in the default directory where you started *InstantTrack*, probably the same directory where *InstantTrack* is installed. You can also enter a full path, like “C:\IT\PLANNING\VACATION.TXT”, and *InstantTrack* will put the file where you specify. The path length is limited by the width of the screen, so you may not be able to use a deeply-nested directory.

Remember, *InstantTrack* is a DOS program, so you have to stick with the old-fashioned file name conventions. That’s one to eight characters, optionally followed by a dot and one to three characters of extension. Spaces and certain other special characters are not allowed.

As an exception to that rule, if you are running under Windows on a local area network, you should be able to use “UNC” filenames like \\hostname\dir1\dir2\filename, even if the component names are longer than 8+3 characters.

#### 10.2.2 Sending Output Directly to a Local Printer

You can enter one of the special filenames that DOS recognizes to send the output directly to a port. Some of these special filenames are:

PRN	sends output to the default system printer
LPT1	sends output to the printer connected to port LPT1
LPT2	sends output to the printer connected to port LPT2, and so on.
COM1	sends output to a serial printer (or other device) connected to port COM1

It’s common to put a colon after these names, like “PRN:” or “LPT1:”. You can do that, but you don’t have to. The names are special to DOS whether or not you add a colon.

Note that under Windows 95/98/NT/2000 you can assign LPTx numbers to your printers. When you install the printer, answer “yes” when it asks you if you print from DOS programs, and it will allow you to give the new printer an LPTx name. This works even if the printer isn’t connected to a parallel port on your computer, and even if the printer is on the network.

### 10.2.3 Entering a Blank Filename

If you just hit Enter at the filename prompt, the operation is aborted and you're returned to the Ephemeris screen without enabling data capture.

### 10.2.4 Avoid "CON" and "NUL"

If you enter the special file name "CON", DOS sends your output to the CONsole. That is, to the screen. Since *InstantTrack* is writing all over the screen, this doesn't do much good. So avoid that special filename.

If you enter the special file name "NUL", DOS sends your output to the null device. That is, it throws your output away. That's not very useful either.

## 10.3 Changing Screen Parameters

There are various settings you can change on the Ephemeris screens. If you do that while the output capture feature of *InstantTrack* is enabled, it tries to guess what you'd want to happen.

If you change satellites while capture is enabled, *InstantTrack* saves the old screen of data to the output file or printer, and then displays the information for the new satellite. You could go through the entire satellite database one by one, and *InstantTrack* would capture a screenful of ephemeris data for each one.

If you hit "C" to change the information displayed on each line, your output file will use the new setting for that screen and subsequent screens until you change it again. *InstantTrack* does NOT save the old data on the screen. You may have to cycle through the different settings several times before you settle on one, and you can do that without cluttering up your output file.

The same applies if you hit "Z" to change the timezone between UTC and local. *InstantTrack* doesn't save the old data, but it does capture the current screen using the new setting.

When you change any parameter that shows up on the top two lines of the screen, a new set of header lines will be added to your output file to help you understand what is being shown.

## 10.4 Running Continuously

You can combine the capture feature with the existing "S" for "Scroll" command. As always, typing "S" when on the Ephemeris screen will tell *InstantTrack* to run predictions as fast as it can display them to the screen. If you invoke this feature while capture is enabled, the scrolling output will be captured to the file or printer just as if you had pressed Enter on every screen. Pressing "S" again will stop the scrolling. Capture remains enabled, and starts capturing screen-by-screen again, seamlessly. Quitting the screen with "Q" will also stop the scrolling, and close the file.

On a modern computer, the scroll mode is very fast. Capture slows it down some, but not much. You will find it difficult to stop the scrolling data at a particular time. (See the next section for a solution.)

Also note that scroll mode with capture enabled is perfectly capable of filling up your disk drive if you leave it running for long. Nothing much bad happens, except that you won't have any room left. However, running with zero free space (or very little free space) is not recommended. Some programs behave badly when the disk gets full.

## 10.5 Running Until an End Time

If you want to run more than a few screens of output, but you don't want to race with scroll mode (see previous section), you can type "U" for "Until" on the Ephemeris screen. *InstantTrack* prompts you for an end time. When you have entered a valid time, *InstantTrack* will return to the Ephemeris screen and

automatically enable scroll mode for just long enough to reach the time you specified (plus one line of output to show that it finished).

This is not very useful interactively, but it works great together with the capture feature. You should enable capture mode before invoking the “Until” mode.

## **10.6 Ending the File or Printer Job**

There are two ways to end the capture session. First, you can just exit the whole Ephemeric screen. As soon as you do, InstantTrack will finish up the file you were capturing. Second, you can hit “F” or “P” again to toggle the capture off.

Either way, InstantTrack closes the file. And, depending on the printer settings, it may send a formfeed (new page eject) to the printer to force the last partial page to come out. See the next section.

If you’re running under Windows or OS/2 and printing directly to a printer, closing the file should be enough to let the system know you’re finished. Depending on your system settings, the printer may not do anything until *after* you close the file.

## **10.7 Setting Printer Parameters**

There are two settings in the IT.INI configuration file that control how InstantTrack formats output for the printer.

### **10.7.1 Number of Lines per Page**

The setting *printer\_lines\_per\_page* controls how many lines of text InstantTrack will put on a page. When it runs out of room on a page, InstantTrack will send a formfeed (new page eject) and a new set of column headers. Then it will resume capturing lines of screen output.

The default value is 59. That many lines will fit on a single page on most printers. If this leaves too much blank space at the bottom of each page, you can increase the value in IT.INI.

If you set this parameter to “0”, you’ll only get page breaks when some setting changes and forces a new set of headers. Otherwise, the lines of data will just spill over from one page to the next.

This setting only applies if you invoke the capture using the “P” key for printer formatting. If you use the “F” key instead, you get no page breaks at all.

### **10.7.2 Formfeed at End of Job**

The setting *printer\_formfeed\_at\_end* controls whether InstantTrack sends one last formfeed (new page eject) to the printer at the end of each job. You probably need to set this to “1” under DOS, because most printers will hold onto the last partial page of output until the computer sends a formfeed. If you’re running under Windows or OS/2, you probably want to set it to “0”. Just closing the file is enough to force the last page out of the printer under those environments.

If you find you’re getting a blank sheet at the end of every job, change this setting from “1” to “0”. If you find you’re not getting the last partial page of output until you print something else, change this setting from “0” to “1”.

This setting applies whether you use “F” or “P” to invoke capture.

## 11. Visual Magnitude

*InstantTrack* now provides support for visual observation of satellites. To enable this feature, you must enter a diameter (in meters) on the Manual Edit Satellite Elements screen. This should be a rough estimate of how much area on the satellite will reflect light from the sun to you. This is a single number, not a full description of the size and shape of the satellite, so you will have to experiment to find a number that's representative.

Once you've entered a diameter, *InstantTrack*'s real-time screens will have a new field, "Magn", which contains a letter and possibly a number. The meaning of the letters is as follows:

H	Satellite is below the Horizon (and thus not visible)
E	The satellite is in Eclipse (in the Earth's shadow, and thus not visible)
S	The sun is up or nearly up (and it's too bright to see satellites)
V	The satellite might be visible!

If the satellite might be visible, a number is displayed. This number is an estimate of the apparent astronomical magnitude of the satellite. Smaller numbers are brighter. Here's a brief guide to interpretation of visual magnitudes:

-4	Wow!
0	As bright as the brightest star in the sky
4	Barely visible to the naked eye on a clear night in the city
6	Barely visible to the naked eye on a clear night in the country, where the sky is dark enough to see the Milky Way clearly
9	Barely visible with good binoculars in dark sky

A new mode has been added to the Satellite Position Table (Ephemeris) display. Hitting the "C" key cycles through three modes: the default radio-oriented display, a display of distance and direction to the nearest city, and now an astronomical display with visual magnitude. In the astronomical mode, the satellite's position is also shown in right ascension ("R. A.") and declination, a coordinate system familiar to astronomers.

## 12. Ground Tracks

### 12.1 Single Ground Tracks

Press the "G" key on the cylindrical or orthographic map screen, and a light-gray line (a "ground track" will appear showing the path of the satellite (projected onto the Earth's surface) for the next orbit. Press "G" again and the ground track will disappear.

### 12.2 Multiple Ground Tracks

Press a digit (1 to 9) then the "G" key on the cylindrical or orthographic map screen, and a ground track will appear showing that number of orbits. Press "G" again or "0" then "G" and the ground track will disappear.

You can also type a two-digit number from 10 to 60 before the "G" key to get lots of orbits worth of ground track. Try typing "60G" on a few different kinds of satellites. The results can be quite educational. (The value 60 is an implementation limit in *InstantTrack*. If you don't have enough free memory, the limit on your system may be lower.)

### **12.3 Sky Tracks**

Press “G” or a number plus “G” on the Sky View screen, and a light gray line (a “sky track”) will appear showing the path of the satellite projected against the fixed stars.

### **12.4 Mouse Pick Time from Ground/Sky Track**

With a ground track or sky track showing, press “T” and click the mouse on or near the track to set the displayed time to the moment when the satellite will pass through that place on the track.

## **13. Database Updates**

### **13.1 Map Database Updates**

Several corrections and updates to the maps have been made, besides adding maps for the new display modes. For instance, Germany is now one country.

However, the map updates have not been updated within the borders of the former USSR, due to the lack of a suitable map database.

### **13.2 City Database Updates**

Some errors in spelling or position have been corrected in the city database. Also, some cities have been added in the western U.S. and some deleted in the eastern U.S. to provide more even coverage across the U.S.

Cities within the former USSR have been updated to show the names of the new nations. Several cities in the former USSR and in Germany have been restored to their traditional pre-Soviet names.

Cities in Canada have been updated to show the province abbreviation, much as U.S. cities have always shown the state abbreviation.

Memory for the city database is now allocated dynamically, so it is now possible for the city database to fail to load when memory is scarce. The program can still be used, just without city displays.

### **13.3 Star Database**

The star database has been corrected to include all 920 stars of magnitude 4.5 or brighter.

## **14. Map Screen Updates**

### **14.1 City Dots**

You can press “C” on the cylindrical or orthographic map screen and yellow dots representing the locations of the cities in the city database will appear. Press “C” again and they will disappear.

This feature halfway existed in *InstantTrack* 1.00. The dots would appear and disappear, but they would also disappear whenever the screen was redrawn. For that reason the function was not documented in version 1.00.

### **14.2 Bigger Satellite Dot**

The satellite is now represented on the map screens by a bigger dot.

### **14.3 Moon Shown on Sky View**

The Moon is now shown on the Sky View of other objects if it is in view.

### **14.4 Latitude/Longitude Lines Optional**

If you find the orthographic projection map display too busy, you can turn off the latitude and longitude lines using the `orthographic_latlon` setting in the `IT.INI` configuration file. See `ITINIDOC.TXT` for details. This feature is mainly intended for use with a CGA display screen, where the lower resolution and single color make the map harder to read, but you can use it with any type of display if you like.

## **15. User Interface Consistency Changes**

### **15.1 Single-Keystroke Menus**

All short menus now respond to a single keypress, instead of requiring you to press Enter after making the single-character entry. In *InstantTrack* 1.00, some menus responded to a single keypress and some did not.

Note, however, that text entry prompts that allow multiple-character entries (including long menus such as the City menu or the Satellite menu) still require you to press Enter.

### **15.2 Run-on Scrolling Screens**

Some less important functions in *InstantTrack* 1.00 would present prompts and output text at the bottom of the previous screen, scrolling that screen up as necessary. Now all screens start fresh, and usually will not scroll under normal usage.

Some screens do still scroll sometimes. Screens that have an indeterminate (but usually small) amount of information to present are allowed to scroll when there is an unusually large amount of information.

### **15.3 Type Enter to Continue**

All instances of the “Type Enter to continue” prompt have been replaced with “Type any key to continue” prompts, so that all such acknowledgment prompts are consistent throughout *InstantTrack*.

## **16. Miscellaneous Feature Changes**

### **16.1 Ctrl-Arrow for Next Satellite in Group**

On the real-time text and graphics screens and on the Satellite Position Table screen, press “Ctrl-Right” to move to the next satellite in the currently selected group, or “Ctrl-Left” to move to the previous satellite in the currently selected group.

The currently selected group is the one you last used to select a satellite from the satellite menu by typing “G” plus the mode letter at the satellite number prompt. If you have not done that, the currently selected group is “\*”, the group of all satellites.

### **16.2 Delete Station**

On the Edit Station Elements screen, you can now hit “D” to delete that station.

### **16.3 Real-Time Tuning**

If OrbitDRV is not installed, *InstantTrack* will send range-rate (Doppler shift) information to a RadioDRV (radio control TSR driver) while real-time tracking. It uses the same interface as OrbitDRV.

If OrbitDRV *is* installed, then OrbitDRV sends range-rate information, and *InstantTrack* doesn't. That's the same way it has always worked for azimuth and elevation information.

### **16.4 OrbitDRV Tuning Turned On**

*InstantTrack* now sends a Tune On command to OrbitDRV when background tracking is enabled.

### **16.5 OrbitDRV Status Expanded**

The Option Status screen now displays more status information for OrbitDRV, including the last update time and the current azimuth and elevation.

### **16.6 OrbitDRV Version Displayed**

The Option Status screen now displays the version string provided by OrbitDRV.

### **16.7 RadioDRV Status Displayed**

The Option Status screen now includes the status of RadioDRV, an optional radio tuning program.

### **16.8 Filenames Changed for Windows Friendliness**

Microsoft Windows systems encourage you to open files by double-clicking on them. When you do, it picks the application to run by the last few letters of the filename (the file's "extension"). The names of the documentation files that came with *InstantTrack* 1.00 ended with ".DOC", which Windows usually assumes denotes a Microsoft Word document file. Since these files were plain text, some Windows users were not able to open them by double-clicking. To make life easier for them, all the ".DOC" files have been renamed to ".TXT" files. The all-important IT.DOC file is now called ITMANUAL.TXT.

For similar reasons, the revision history file IT.UPD has been renamed ITUPDATE.TXT.

### **16.9 Online Help Improvements**

The online help screens have been somewhat improved.

### **16.10 Unusual Screen Lengths**

*InstantTrack* still only uses 25 rows of 80 columns of text, but if you run *InstantTrack* from a screen (or in a text window under Windows or OS/2) with more lines than that, *InstantTrack* will at least clear off the garbage on the rest of the screen. It then uses just the top 25 rows (for most screens).

### **16.11 Filenames Echoed**

When you give *InstantTrack* a filename, it now repeats it back to you, so you can see what it's trying to do.

## 17. Bug Fixes

- Rev number, Phase, and Mode are no longer displayed for Sun and Moon.
- Fixed some rare bugs in the AOS finder.
- If there is no space between the year and day number on the satellite elements entry screen, *InstantTrack* beeps instead of crashing
- Long satellite names no longer cause overwrites on the bottom row display or the satellite menu.
- The Satellite Schedule screen no longer dies on deleted satellite records in the “\*” group.
- The Earth is no longer clipped on the Orbit View screen for Phase 3 orbits.
- Horizon line on Sky View now always touches both sides of the screen.
- “TLOSS” (total loss of precision) error on multi-observer schedule should no longer occur.
- Fixed occasional stack dump when editing the element set number.
- Fixed “acos: domain error” when squint angle is exactly 0.
- Sky view behaves better when IT.STR (the stars database) is not available.
- If you run IT.EXE on a machine with no coprocessor, it now gives an intelligible error message instead of the default Microsoft message.
- Out-of-memory errors are now reported consistently.
- Screen handling should be more consistent about colors and cursor position.
- If you enter a blank line at the “ONE satellite to be updated” prompt, the update is now aborted instead of proceeding as an update of “ALL” satellites.
- If you enter garbage at the “threshold age” prompt for deleting old satellites or the “time increment” prompt for ephemeris tables, *InstantTrack* will prompt you to re-enter the value instead of proceeding silently with the default value. Entering a blank line (that is, just hitting Enter) still takes the default value.
- Pressing a special key (such as a function key or cursor key) at a “Type any key to continue” prompt is now safe, and will not send an extra keystroke to the next screen in any case.
- Typing "q" no longer does anything special at the Active Observer List edit screen within Satellite Visibility Schedule parameter entry. Before, a lowercase "q" (but not an uppercase "Q") would be treated as a blank line.
- The bottom row display no longer freezes for a while under certain circumstances.
- A problem that could hang *InstantTrack* at midnight has been eliminated.
- There is now a workaround in IT.INI (see ITINIDOC.TXT) for a compatibility problem with Windows 98 that would lead to long pauses on the orthographic projection map screen.

That's the end of this document. Enjoy the new release of *InstantTrack*!