OBSERVING PROGRAMS, XII *Continued from page 4*

As always, if you have any questions, or require some help, please ask me! If you start a program and are not sure if you are completing it correctly, contact me.

There will be one more observing program overview article next month. I hope to see you all out at the Dark Sky Site observing field!



# THE KIWI-OSD

*By Walt "Rob" Robinson*

What is a KIWI-OSD? Some new type of tropical greenish-brown fuzzy fruit? Well, not exactly. The KIWI is a video time inserter, used to resolve astronomical events to millisecond accuracy. But first, let's discuss a little background on timing astronomical events such as occultations, mutual events between the satellites of Jupiter and lunar meteor impacts.

Forty years ago, when the International Occultation Timing Association was formed, their main purpose was to time the occultation of stars by the moon. Observing these events led to our knowledge of the long term motion of the moon (used to study gravity); expand our knowledge of the motion and position of stars (used to define stellar reference frames); discover new binary stars to close to be observed visually; and increase our knowledge of the lunar profile (which in turn was used to determine solar diameter changes). The method used to determine the time of the event, involved using a stopwatch, a short-wave radio receiving time signals from WWV and a tape recorder. Accuracy of timing these events was limited to one-tenth of a second.

About ten years ago, with the advent of inexpensive security video cameras, one was able to video an occultation or mutual Jovian satellite event, along with the WWV time signal. The video tape was then sent to one of several individuals, who would time stamp the video with one of several time stamping units on the commercial market. These units were expensive, starting at about $500, so not everyone could have one. Once the video was time stamped and sent back to the observer, a single-frame stepping of the video would reveal the time of the event to an accuracy of around one-thirtyth of a second.

While all of these different types of timing methods were being used, there were individuals around the world that were working on affordable time-stamping devices. Europeans had a device, but it only worked with the PAL video standard. The Japanese had a device, but it worked with a GPS unit that could only be purchased in Japan. There was two units in the United States, but both were home-brew kits. Unless someone had the electronic expertise to build it, they too were out of reach of many.

Two years ago, Geoff Hitchcox of New Zealand started experimenting, using common parts and a readily available GPS unit. The idea was to make it affordable and available to everyone who wanted to time stamp their own observations. With several other individuals, he tested the unit over weeks at a time for reliablility and accuracy. About six months ago, the first units were available, both in build-your-own kit form and as a

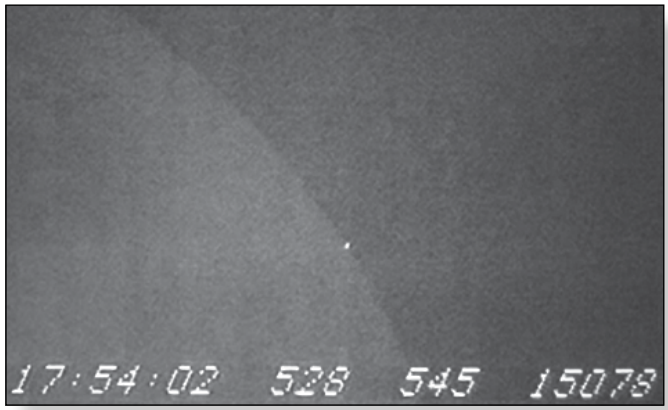
The KIWI-OSD is simple to hook up and use.

completed unit. It was discovered that amateurs trying to build their own to save a few dollars were experiencing problems. The unit is now sold only as a completed unit — programmed and ready to go.

The KIWI-OSD is a VTI that displays a highly accurate time superimposed on a video source. It works in conjunction with a GPS to provide extraordinary time accuracy as well as longitude, latitude and altitude. The basic purchase price, along with the required GPS unit, is $250. This is less than half the cost of competing units. It can be purchased through PFD Systems of Bethesda, Md. Geoff Hitchcox has contracted with that company to produce the units to his specifications. Some of additional features include automatic loading of GPS satellite information, usable with either the PAL or NTSC video systems, accuracy to 1 millisecond of UTC, operable between 9–12VDC, alerts when GPS timing signals are in error and it is lightweight and requires no calibration.

Connecting the KIWI-OSD is straight forward. The Garmin 18 LVC GPS plugs into the unit. A regular RCA phono plug cord runs from the camera to the CAM plug on the KIWI. A regular RCA phono plug then runs from the KIWI to the recording device. The user can determine what type of source will power the unit (either 9V battery, 12V battery or 12V ac/dc transformer). When turned on, the unit shows on the video screen power-up tests, acquisition of the GPS satellites, the date and time and other information. A reset button on the back of the unit allows restart of the system initialization, allowing information for each event timed. The reset button is useful when there are multiple events during one observing run, and can be reset a minute or so before each event.

**A GPS unit and a phono cord complete the system. The GPS can also be used to find the observing location.**




**An imaged captured from the KIWI showing UT and other information.**

Interpretation of the numbers on the screen are somewhat mysterious at first, but well explained in the documentation that comes with the unit along with additional information online. If one spends the time to determine the camera frame rate at various temperatures from the 22 deg C standard, the accuracy can be found to parts per million! This procedure is also found in the manual.

It should be noted that the KIWI can also be used with a laptop running your popular mapping software that has GPS interface capabilities. Simply attach the magnet-based GPS antenna to the top of your vehicle, power up the KIWI with the supplied RS232 cable to the laptop, and you have an instant GPS system for your car, truck or camper.

Whether you use the KIWI for astronomical or leisure time activities, it is a device that is well worth the money. I should note that technical support from PFD Systems is outstanding, so any problems you may encounter — or if you have a particular application you would like to use the KIWI for — they are very friendly and responsive.

There are many sites on the Internet explaining more about the unit, its use and technical information. The main starting point can be found at: www.pfdsystems.com/kiwiosd.html

*Walt joined the International Occultation Timing Association in 1998. He is in his third, three-year term as Vice President of Occultation Services and has served as their Webmaster since 1995. Through IOTA, he distributes the "Occult" software written by David Herald. He provides predictions for those that request them. He has observed over 1,000 total occultations and numerous grazing occultations. Walt has helped recover missing data for almost 100 observations made as far back as the 1970s. Through his efforts, grazes of unknown stars have been recovered along with data to support errors or unknowns found in the prediction and reporting process. In 2006 he published his first book entitled* The Occultation Observer's Handbook, *published by BlueNote Publishers. Hal Povenmire, a long-time friend and retired NASA engineer/research astronomer, co-authored the book.*