IPACO expert report

Expert name	*Report date*	*Last update*
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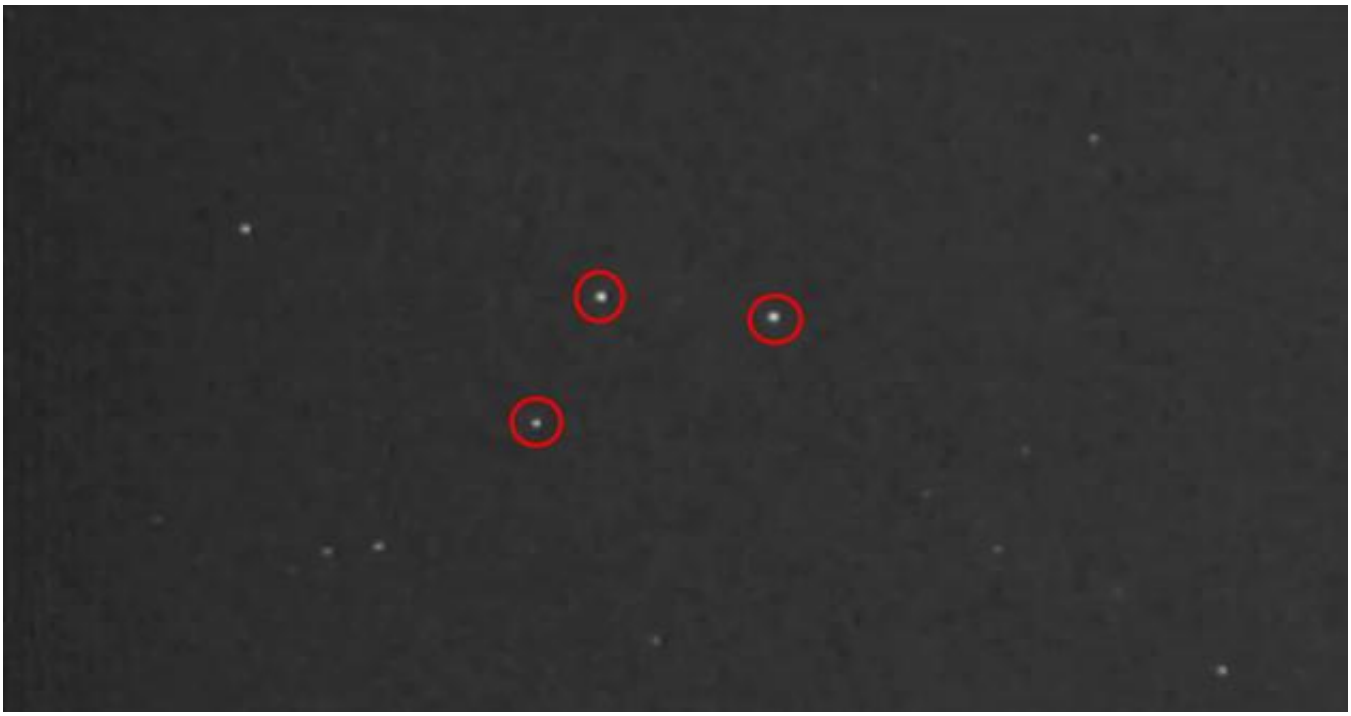
Type	*Class*	*Explanation*	*Complement*
IFO	**B**	*NOSS triplet satellites*	

Document	*Imaging location*	*Imaging date*
Video	Southeast Michigan, USA	



Extracted frame from the video

I. Imaging circumstances

This video was posted on Youtube under the following title: "***Triangle UFO - Captured with my Yukon 5x42 Night Vision (Infrared) Camera*".**

II. Camera settings

The "Yukon 5x42" is not a camera, but rather a night vision binocular device. The video out enables you to broadcast the image to the display and, if necessary, record by means of the Yukon Mobile Player/Recorder (included) or other recording devices.
Technical specifications can be read here.

III. Data examination

The three lights circled in red in the image taken from the video visible on the front page, retain throughout their displacement an apparent constant speed as well as respective positions and distances relative to each other.

The stars are visible intermittently through the triangle formed by these three lights, which excludes the possibility of a "solid" object and supports the theory of three independent objects.

Moreover, from the 2'37'' mark, the objects are gradually fading one by one until completely.

IV. Conclusion

Visual examination of the video suggests that it may be a triplet of NOSS satellites. (Acronym for « *Naval Ocean Surveillance System* »)

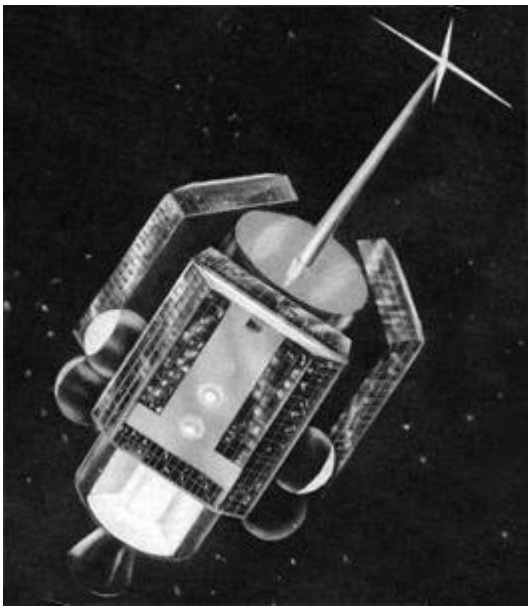
However, given the lack of data about dates, times and exact locations of the video, it is not possible to conclude conclusively.

V. Technical explanation

One of the most interesting sights in the night sky is the Naval Ocean Surveillance System (NOSS) satellite formations, each having two or three satellites in close proximity to one another. Normally these satellites are relatively dim to the unaided eye, but on occasion they brighten sufficiently to be easily seen in a dark sky.

The NOSS satellite formations are very spectacular to see, as they often appeared as a triangle of moving white points, which always kept the same relative distance to each other, thus give the false impression of a big triangular object moving in the sky.

NOSS satellites locate and track ships at sea by detecting their radio transmissions and analyzing them using the TDOA (time-difference-of-arrival) technique.

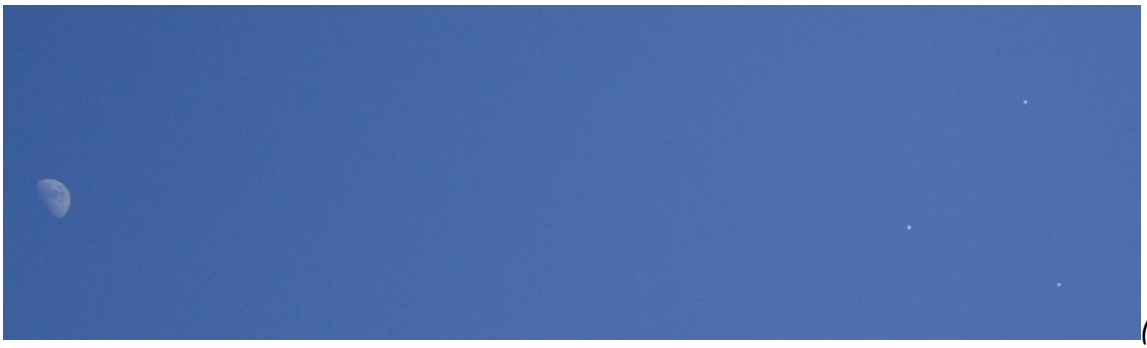


The U.S. Government ceased publishing the orbits of NOSS satellites in June 1983, but they have been tracked ever since by hobbyists, who make thousands of precise positional observations each year, like these by Peter Wakelin, which they use to compute their orbital elements.

Anyone can become a skilled positional observer, with practice. The basic methodology is described here.

The initial operational NOSS orbits are approximately circular, about 1110 km in altitude, and inclined 63.4 degrees. Generally, their orbits become more elliptical over time, due to the perturbing effects of the odd zonal harmonics of Earth's gravity field on orbits inclined near 63.4 deg.

This effect is mitigated somewhat by launching into an initial orbit of argument of perigee near 180 deg, which causes the eccentricity to initially decrease. In the case of the 3rd generation NOSS, their initial 1000 x 1200 km orbit becomes nearly circular at 1100 km, about four years after launch. By that time, the argument of perigee will have processed to about 90 degrees, whereupon the eccentricity begins to increase, such that the initial 1000 x 1200 km orbit is restored about eight years after launch. In this way, the orbit naturally remains within 100 km of circular, for eight years, which presumably is the approximate design life of the satellites.

 *(1)*

Positional observers are also the primary public source of brightness data for all kinds of satellites. Prediction services, such as the Heavens-Above web site, make use of the standard magnitude data produced by amateurs to provide accurate magnitude estimates of satellites.

VI. Sources – Photo credits

- Original video can be seen here, it can also be downloaded in its entirety here.
- Another NOSS satellites triplet's video can be seen here.
- NOSS specifications on Gunter's space page.
- Satobs.
- Observing man-made Earth satellites: Robert Johnston's astro archives.

(1) NOSS Triplet Satellites photographed by John Murphy on May 13, 2008, Dunsink observatory, Dublin, Irland.