

POSITIONAL AND PHOTOELECTRIC OBSERVATIONS OF CA SIMILAR TO THE OBJECTS SUGGESTED FOR LAUNCHING ACCORDING TO THE "GLOBAL STAR" PROGRAM

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ABSTRACT The given work deals with results of observations of AES being analogues of CA "Global Star" carried out to study capabilities of interdisposition of satellites suggested for launching according to the "Global Star" in the zone of their closest approach.

Key words: Artificial satellites

Introduction

The fixation of interdisposition of CA "Global Star" in the zone of their closest approach is a new problem for the Astronomical observatory OSU, when analysis is to be done of capabilities of available facilities, proposals for their refinement should be developed as well as possibilities estimated of putting into operation these new optical tracking instruments which have been purchased and ready for mounting in the nearly accomplished constructions (by 80 and more per cent).

The work has been carried out in the following directions:

- choice of analogues of CA "Global Star";
- calculation of elemental orbits and ephemerides for CA data;
- making test positional and photometric observations with optical observing facilities available in Odessa, Lvov and Uzhgorod;
- carrying out test photographic and phototelevision observations with optical observing facilities available in Odessa, Lvov and Uzhgorod;
- development of an algorithm for "windows" determination of launching PH (carrier-rockets) according to the "Global Star" pro-

gram.

- modernization of available instruments and producing new optical observing facilities to realize the "Global Star" program;
- development of technical proposals according to the "Global Star" program in the hardware part.

Description of objects.

Motion dynamics

According to the preliminary project of work representing a preliminary research stage on the "Global Star" program, at the Space Research Department of Astronomical Observatory, Odessa University (OKI AO OGU) in February 1997 observations were made of cosmic objects analogues suggested for launching in 1998-1999.

Objects-analogues were chosen by Kharkov Military University (KhMU), Elemental orbits of these objects were submitted by them as well.

From the elemental orbits presented, according to our program, ephemerides were calculated for the above objects for Odessa, Lvov and Uzhgorod for all the visibility period (up to 19 th February).

These objects were observed in February 1997. The objects were discovered on 7, 9, 11, 15 and 17 February 1997 in the points corresponding to ephemerides calculated in DCI AO OSU.

The above objects were observed as a compact moving group ("Bundles") consisting of

three objects with constant light marked by us through "const.", of 6th - 9th stellar magnitude depending upon observational conditions. One of these three objects, at the discovery moment, at the onset transit, moving ahead of all the rest and designated as the "first" (1st) is commonly brighter than the other two by 0.5 - 1.0, that is magnitude 6-6.5.

Throughout the transit the objects were considerably moving relative to each other and by the end of observations the objects had even changed their places along route 2 and 3 on 17.02.1997. Object 1 was commonly much ahead of the others so that the whole figure looked like an acute triangle extended towards the bundle motion.

A minimum angular distance between objects during observations constituted nearly 11 arc/min whereas maximum approximated 2 degrees, that corresponds to the distance between them in a picture plane of 6 and 66 km respectively for heights of 60 degrees.

The given angular travels indicate, evidently, not only variations in objects visibility aspect but also real displacements of these objects relative to each other in space.

Method of observations and the obtained material description

At DCI AO OSU, observations of analogous groups of objects ("bundles") were carried out in observing seasons 1992-1993. Those were 83-056-7; 84-012-1,2,3,4,5; 86-014-1,3,4; 90-050-1,2,3,4; 91-076-1,2,3,4,5 mainly active functioning American reconnaissance spacecrafts, and as a result, rich experience has been gained in making such observations. According

to the specificity of the given objects, the procedure of their observations is developed involving the successive placing into major optical axis (MOA) a tracking system (carrying in the photometer diaphragm) of each object.

In the process of observational reduction, a coordinate information is given in the form of graphs representing piece functions. By using parallel obtained photometric information it is possible to filter false coordinate points registered by coordinate-time system KT-50 when changing over the instrument from one object to the other. At this time the photometer is recording the sky background.

In addition to observations carried out on KT-50, the given objects were observed from ephemerides calculated in DCI AO OSU in the settlement Mayaky by a television group. Photos of objects were obtained from the screen of a videocontrol equipment.

In the conclusion, it should be noted that test observations of CA data testify to the possibility of detection and control of behaviour of orbital cosmic objects suggested for launching according to the "Global Star" program if the analogues submitted to us by KhMU correspond to the suggested ones. Unfortunately, the data on shape, sizes and coating of objects were not presented by Kharkov Military University, therefore we could not carry out the mathematical modelling of CA data and judge the adequate correspondence.

At present DCI AO OSU is busy with carrying out modernization of observational complex KOD-1 to obtain alongside with coordinate and photometric information that of phototelevision, too during KA transit in the visibility zone of the observing station.