

SPACE OPERATIONS SYMPOSIUM (B6)
Human Spaceflight Operations (1)

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THE COMBINED SYSTEM OF RAPPROCHEMENT AND JOINING.

Abstract

Enterprises "ELMIZ" and "RPC" Course" are leaders in Ukraine in the field of creation of equipment of rapprochement and joining of space objects. The equipment "Needle" in 1967 has provided first automatic joining space craft (SC) "Vostok" and subsequently building of orbital station the "Mir". The equipment "Course" with 1986 on present time is used for building and maintenance of ability to live of space station ISS. It is carried out more than 160 successful automatic joinings. Generally realisation of search of the purpose and its capture consists of following stages: a site of distant prompting; rapprochements after search and purpose capture by onboard means; the near approach and purpose flight; moorings; capture of the purpose by means of the manipulator in a zone of radio visibility of land stations of tracking. The site of distant prompting and rapprochement is realised according to system GPS and radar station. Radio engineering means are effective from distances from hundreds kilometres to tens metres. On a site of the near approach and purpose flight, from distances about 100-300 m information radar station or optical means is used. On a mooring site, since distance of 20-30 m, control system SC uses the information from TV-chamber and a laser range finder, combining a direction of longitudinal axis SC with a direction of a line of vising and providing longitudinal speed of an order of 0,02 0,03 km/s. Realisation of mission of rapprochement and capture nooperation space object demands working off of algorithms of rapprochement and hardware. The offered system of search and rapprochement with not co-operated object includes: radar; TV-chamber and a laser range finder on a site about 20 m. Technical characteristics: range of detection of the purpose: 3 km (can be increased to 50 km); an error of measurement of range: 3 m; a cone of detection of the purpose: 30°; a range of measurement of radial speed: 20 km/s; an error of measurement of radial speed: 0,003 km/s; limits of measurement of corners at the rate and : 30°; an error of measurement of corners: 0,2°; deduction in a capture zone (20,05) m. The rapprochement equipment is developed within the limits of the contract from SDO "Yuzhnoye" on creation of the interorbital transport device, and also offered S for use in project I on research of asteroids.