

The accuracy of Leonardo's atomic clocks also on Galileo Second Generation

- The European Commission and ESA have entrusted Leonardo to build hydrogen atomic clocks, the most accurate clocks for in-orbit operation in the world, also for Galileo Second Generation
- Leonardo's PHM is the technological heart of the European navigation system: the accuracy of the clocks in space is essential for a precise location on the ground
- Leonardo is a key partner in Galileo, the European programme which is essential for the development of technologies such as intelligent mobility, drones, and the Internet of Things, with benefits to people's daily life and for the competitiveness of Europe

Rome, 1 July 2021 – The European Commission and the European Space Agency (ESA) have selected Leonardo's hydrogen atomic clocks for Galileo Second Generation, the EU's satellite navigation system, which has been developed by ESA and the European industry. The Company has signed a contract with ESA for the direct supply of the PHM (*Passive Hydrogen Maser*) for the new 12 satellites.

Leonardo's PHM is the most accurate atomic clock ever made for space applications: it accumulates an error of one second every three million years, and is a crucial contributor to Galileo's superior ground accuracy of about 30 cm. Further to the development of more than 70 clocks for the first generation of Galileo, Leonardo will provide two masers for each new satellite. The first twelve units will be delivered in 2023.

The Company will also make available its skills for in orbit support: a highly qualified team will be able to provide assistance and advice to the EU Agency for the Space Programme (EUSPA), the exploitation manager of Galileo in analysing the instruments operation, thus improving customer support services for European partners.

"We thank the European Commission and ESA for the trust they have renewed in our Company, as they chose us also for the Second Generation of such a fundamental programme for Europe. Proud of this success, we are constantly working to develop more and more compact, accurate and high performing clocks for satellite navigation on our planet and, one day, on the Moon or on Mars", stated Giovanni Fuggetta, Head of the Business Space Area in Leonardo Electronics Division.

For the construction of the new atomic clocks, produced in the Nerviano plant (Milan), Leonardo will increase the production capacity of the area dedicated to their development: it will expand the space with two shielded areas, two external thermo-vacuums, an area for clocks' ground storage, and one dedicated to the testing and integration of electronic boards, to guarantee the production of two clocks every six weeks. This is based on the "*lean manufacturing*" approach, therefore on waste minimisation in favour of the efficiency and sustainability of production. This is in line with the strategic plan "*Be Tomorrow - Leonardo 2030*", which has among its objectives the development of an industry 4.0 ready to face the challenges of the future, also through the digitization of systems and the use of artificial intelligence.

Note to editors

Over 2 billion users worldwide already use Galileo data to rely on accurate positioning and navigation. The data is accessible to all free of charge and is useful for services such as air, sea and rail transport safety, as well as sectors like banking, energy, insurance, telecommunications, tourism, and agriculture. Galileo will also make it possible to improve search and rescue (SAR) services, reducing the time needed to locate those in need of help to less than 10 minutes at sea, in the mountains or in the desert. Finally, Galileo will have two encrypted signals with controlled access for government agencies and security operators.

Created with the aim of guaranteeing Europe's independence from other satellite navigation systems, Galileo will also promote the competitiveness of European industry by fostering the development of technologies such as artificial intelligence, drones, intelligent mobility and the Internet of Things.

Leonardo is a key partner of Galileo and, in addition to realising the hydrogen atomic clocks, provides a decisive contribution to the space and ground segments of the programme: six of the 12 Second Generation satellites will be built by Thales Alenia Space (a joint venture between Thales 67 % and Leonardo 33%), while Telespazio (a joint venture between Leonardo 67% and Thales 33%) hosts one of the Control Centers of the entire system at the Fucino Space Center (Italy).

"The Full Operational Capability phase of the Galileo programme is managed and fully funded by the European Union. The Commission and ESA have signed a delegation agreement by which ESA acts as design and procurement agent on behalf of the Commission. The views expressed in this Press Release can in no way be taken to reflect the opinion of the European Union and/or ESA. "Galileo" is a trademark subject to OHIM application number 002742237 by EU and ESA."