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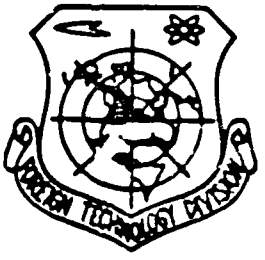
FOREIGN TECHNOLOGY DIVISION

THE "ENERGY SOURCE" ROCKET OF THE SOVIET UNION



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THE "ENERGY SOURCE" ROCKET OF THE SOVIET UNION

Translated by Chen Guangao

A rocket soared into the sky from the Chulatan launching site in the Kazakh plains of the Soviet Union on May 15 of last year and thus started a new era in space exploration.

The "Energy Source" rocket has a nucleus body surrounded by four to eight rocket boosters (generally known as "clustered type rocket boosters"). The core portion is equipped with four powerful liquid hydrogen/liquid oxygen engines. Each clustered type rocket booster is equipped with a giant engine which burns kerosene and liquid oxygen, and this type of engine is the most powerful liquid fuel rocket engine ever built by mankind thus far.

These engines ignite simultaneously upon launching. After reaching an altitude of 64 kilometers, the rocket boosters begin to disengage and are jettisoned one pair at a time, and the rocket continues to be propelled by the nucleus body engine into a low orbit at 174 kilometers. Subsequently the effective payload is separated from the rocket and continues to climb up using its own engine.

The "Energy Source" rocket was only partially filled with fuel in its first

test flight in order to reduce risk and as a result the effective payload it carried was only 100 tons.

Although the effective payload rocket engine for boosting the payload into the orbit failed during the last leg of the flight, the "Energy Source" itself (including the central portion and rocket boosters) was operating quite satisfactorily. It is believed that the retrieval devices are hidden inside the streamlined container structure (each one is big enough to hold one London bus) carried by the rocket boosters. After the rocket boosters fall back into the atmosphere, parachutes will gradually reduce their speed in order for the inflatable wings to open smoothly and then they will glide under the control of automatic pilot instruments until they land.

The An-124 is the largest transport aircraft in the world, and it is capable of quick and economic retrieval of the clustered type rocket boosters for reuse. From the fact that it was deployed at the exact time it was needed and that the rocket booster fits perfectly in its cargo bay, allowing one to be carried each time, it is believed that this aircraft was built as part of the said project all along.

After its fuel is used up, the nucleus portion of the "Energy Source" in the orbit will pass over the launching site after a 5-hour flight and then re-enter the atmosphere for a soft landing through remote control. Since there is no fuel, the nucleus portion which resembles a soft plastic bottle filled with drink can easily withstand the pressure during the re-entry.

The "Energy Source" carrying four rocket boosters is capable of launching a space shuttle. This kind of space shuttle is almost identical to the American space shuttle in both size and shape, except that it need not carry the main engine itself; rather, the "Energy Source" does that for it, and thus at least doubling its effective payload. It is believed that this kind of space shuttle

is also equipped with small jet engines allowing it to fly to far off airfield after the re-entry.

The "Energy Source" carrying six or eight rocket boosters is even more powerful. Between the two, the cost effectiveness ratio of the one with six boosters is better whereas the one with eight boosters is primarily used in transporting large single components such as laboratory module or orbital factory over 250 tons.

The clustered type rocket booster, judged from its own capability, can be used as a powerful launching device for a kind of small space shuttle. According to reports, the research and production of this kind of space shuttle has already begun, and its maximum capacity is six crew members for trips to and from the earth and the orbital bases. Its one-third scale model has already been tested during 1982 and 1985.

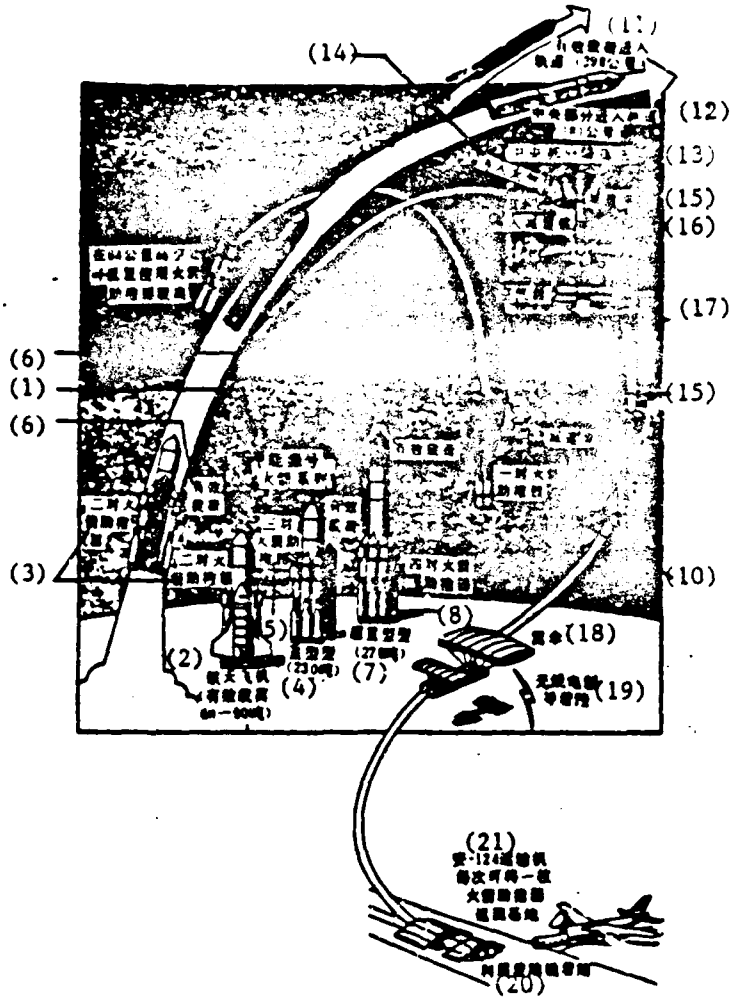
According to designs, the "Energy Source" payload rocket can not only deliver an effective payload nine times the weight of that of the American space shuttle into the orbit but can also reduce the launching cost by 90%. Conclusions were drawn after experts analyzed the pictures of this kind of net rocket that the cost effectiveness of only the European "Hortl" (horizontal take-off and landing) aircraft and the American aircraft to be built 30 years from now can match it. The "Hortl" is expected to take off in 1998 and its effective payload is only eight tons. Compared with it, the payload of the "Energy Source" can reach as high as 270 tons.

The cost effectiveness of these three aircrafts is achieved through the implementation of the reuse principle. The space shuttle had been praised for being the pioneer of repeated use and yet in fact only a portion is being reused, since components worth millions of British pounds have to be scrapped after each launch. The design of the "Energy Source", however, concentrated primarily on the conservation of all parts, quick recovery and reuse.

The studies of a major British consulting firm---Commercial Space Technology, Inc. (CST) indicate that even though the flight for the "Energy Source" was its first, its launching cost had already been able to keep abreast of that of the American space shuttle with an unit launching cost of two thousand British pounds per pound. Twenty years from now, the launching cost for the "Energy Source" can be reduced to 120 British pounds per pound.

The excellent adaptability of the "Energy Source" rocket systems has resulted in quite extensive applications. It is the key link in various Soviet Union hardware. For example, it is capable of launching the "Peace" space station into a high altitude of 36,000 kilometers (at this altitude in the geosynchronized orbit, the satellite appears to be stationary relative to the earth) where it can serve as an ideal surveillance monitor.

The "Energy Source" also makes it possible for the Soviet Union to utilize the equipment manufactured for the aborted moon landing project of the 1960s and allows them to complete a series of Apollo style moon landing or to deliver the "Peace" space station into the lunar orbit. They are already in possession of the "space tugboat" which can take up the duty of daily deliveries between orbits.



Key: (1) "Energy Source" rocket series; (2) Space shuttle effective payload 60-90 tons; (3) Two pairs of rocket boosters; (4) Heavy weight model (230 tons); (5) Three pairs of rocket boosters; (6) Effective payload; (7) Super heavy weight model (270 tons); (8) Four pairs of rocket boosters; (9) Rocket boosters disengagement can be repeatedly used at an altitude of 64 kilometers; (10) One pair of rocket boosters; (11) Effective payload enters orbit (298 kilometers); (12) Center portion enters orbit (181 kilometers); (13) Center portion landing method; (14) Re-entry into the atmosphere; (15) Speed-reducing parachutes; (16) Re-entry vibration reduction cone; (17) Air bag; (18) Wing parachutes; (19) Radio controlled and guided landing; (20) Utilize landing sleighs to land; (21) An-124 transport can ship one rocket booster at a time back to base.

The mission of manned flight passover Mars or its satellites the Marsat I and Marsat II is scheduled to be implemented in the mid-1990s at the earliest. Deploying the "Peace" space station in the martian orbit as an advance base can not only serve as a backup station for the flight crew but can also accumulate experiences for Mars landing which is expected to happen in 2005 at the earliest. Manned flights to small planets or even the Jupiter satellites and Saturn satellites will also be realized eventually.

The task of top priority for the "Energy Source", however, is not space exploration but to develop the economic potentials of space. The fact that the Russians spent an estimated developmental capital of 20 billion British pounds to add this "treasure" to their possession is, by itself, the strongest signal. While the strong interest of the West in finding substitute energy sources arisen in the early 1970s has declined drastically, the Soviet Union, however, has repeatedly accelerated her movement to industrialize space ever since. After decades of effort, they not only announced the outline of the entire solar energy utilization project at the United International Astronomy Conference at Stockholm in 1985 but also used the successful launch of the "Energy Source" as the first step. They are progressing steadily in the effort to make this project workable.

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