

Highlight Article

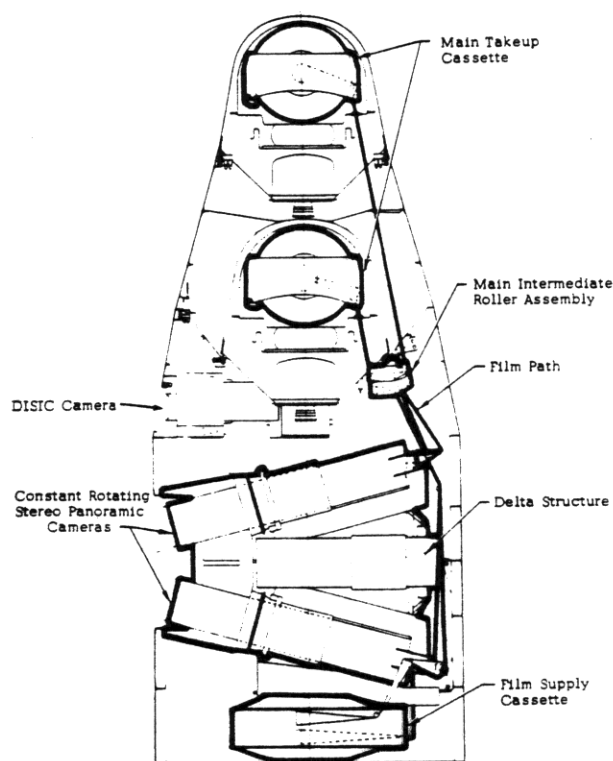


Figure 6a. LINE DRAWING OF MAJOR COMPONENTS OF THE KH-4B CAMERA.

that are noticeable to those who use the film. The width of the format was changed from 2.10 inches to 2.25 inches, and the timing pulses (to determine the scan velocities and image motion compensation velocities for a frame) are marked in the "image area," rather than in the border area of the format.

With Mission 9031, CORONA began to fly its dual KH-4 camera system (the Mural or "M" camera). It was the first camera system to provide stereoscopic imagery. This was an opportunity for the Intelligence Community to increase the information content by a factor of 2 1/2 times. The KH-4 system consisted of two KH-3 cameras on a common mount, one looking 15 degrees aft from the vertical and the other 15 de-

grees forward. This provided for a 30 degree convergent angle for stereo photography that permitted measuring vertical as

well as horizontal dimensions on the Earth's surface. The cameras were mounted back-to-back and scanned in opposite directions. This tended to offset any operating imbalances and improve the overall system dynamic balance. The KH-4 also expanded mission life from three or four days to six or seven days.

The KH-4A camera was essentially the same system as the KH-4; however, it increased the film load and added a second film recovery bucket. This increased film load permitted missions of longer duration, which meant greater frequency of access to foreign targets and a higher probability of success in imaging targets without the impediment of cloud cover. As a result, the earlier mission capability of acquiring about 4,500,000 square miles of mono coverage was now expanded to some 18,000,000 square miles of stereo coverage.

The film load for earlier cameras was constrained by boost capacity. It wasn't until after the launch system was redesigned by adding three solid propellant rockets to the first-stage THOR that CORONA was able to substantially increase its boost capacity, thereby permitting a larger and heavier film load. The mission length for the KH-4A could be expanded to over 15 days, and—with the two buckets—the first could be recovered after half the film load had been exposed.

The reliability of the KH-4A camera was phenomenal. Out of 52 missions, only four involved some degree of significant camera malfunction. The KH-4A routinely acquired 10 foot resolution imagery and even acquired resolution as good as seven feet. (The KH-4A camera also was known as the "J" or "J-1" camera.)

The KH-4B camera was developed to further



Figure 6b. ARTIST CONCEPT OF THE KH-4B CAMERA IN FLIGHT.

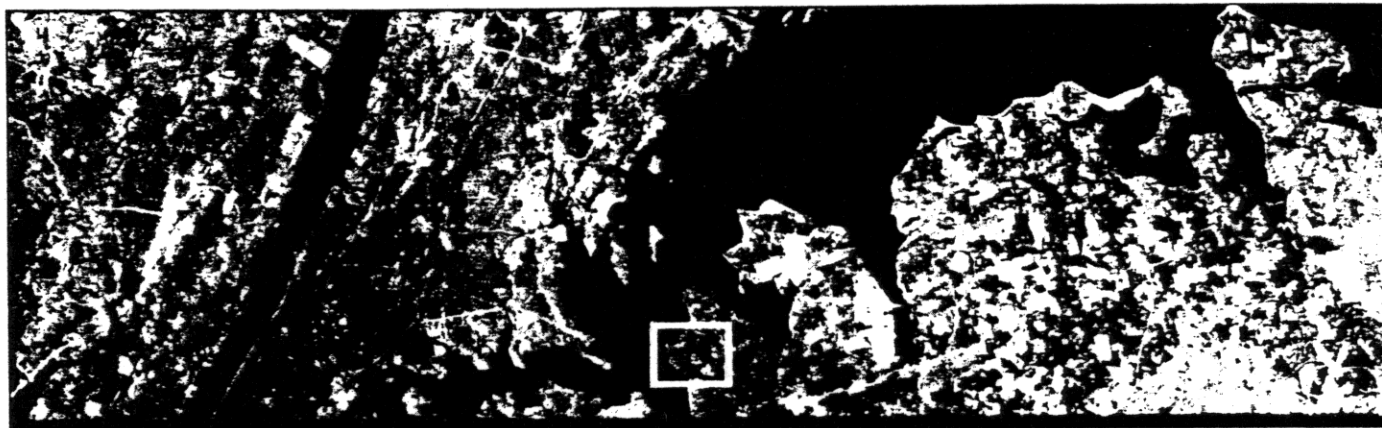


Figure 7a. PORTION OF A KH-4B FRAME AT CONTACT SCALE SHOWING THE AREA AROUND THE US MERCHANT MARINE ACADEMY ON LONG ISLAND (MISSION 1109, MARCH 11, 1970).

improve resolution, as well as the flexibility of the camera system. Its primary purpose was to acquire extensive stereoscopic coverage with sufficient detail to permit intelligence analysts to monitor and evaluate intelligence targets. A secondary purpose was to provide photogrammetric control data with the required geometric accuracy to assist cartographers in constructing accurate terrain maps from the imagery collected by CORONA.

The KH-4B camera (also known as the "J-3" system) was a dual, 24-inch focal length, f/3.5 panoramic camera system. The system was oriented so that the forward camera in the vehicle was aft looking, and the aft camera was forwarding looking. With its increased photographic flexibility, the KH-4B could accommodate a variety of film types and operate more effectively under varying exposure conditions. Refinements in its camera cycle rate command controls allowed it to operate in orbits as low as 80 nautical miles, and it had a mission life of up to 19 days long. (See Figure 6 for illustrations of CORONA's KH-4B camera.)

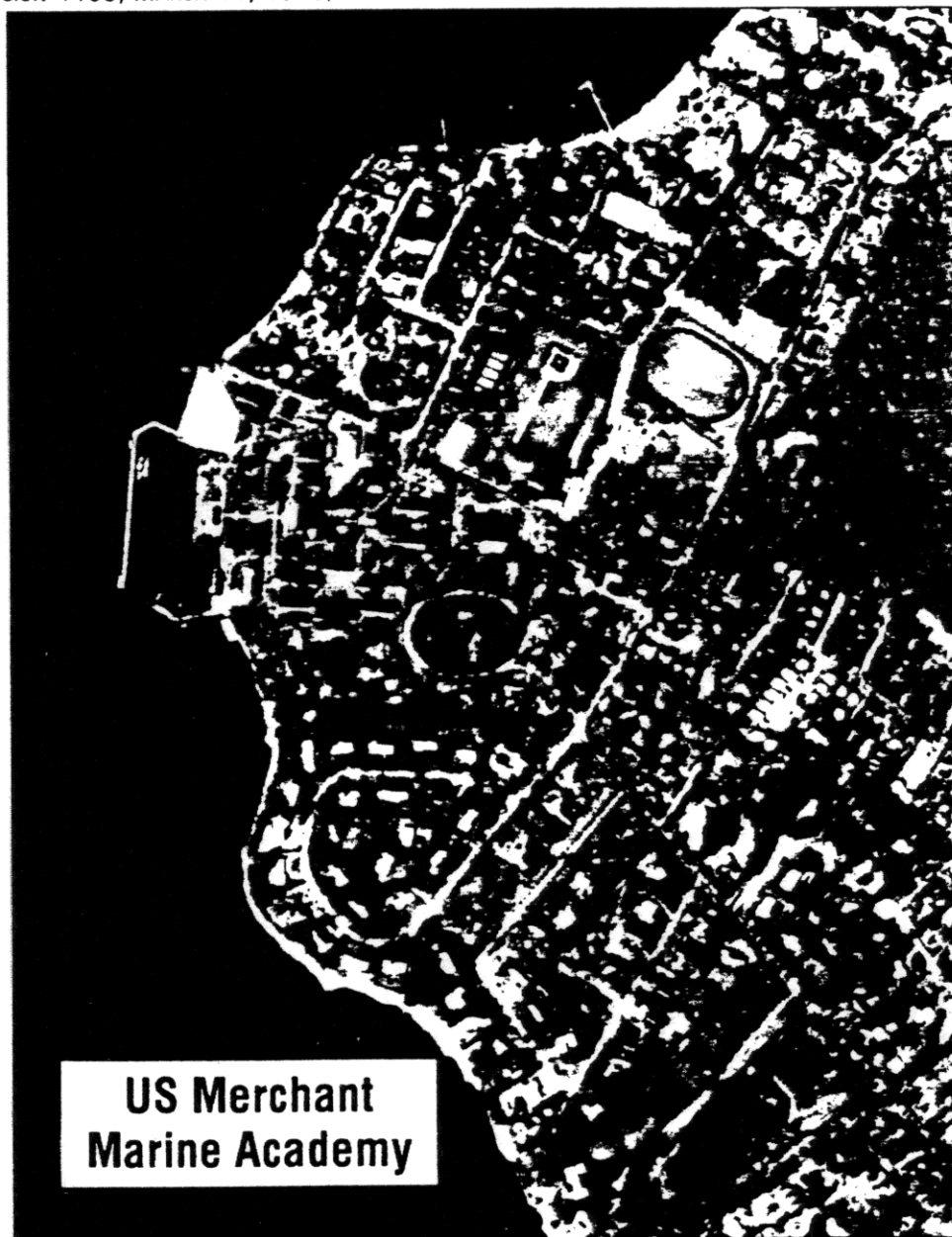
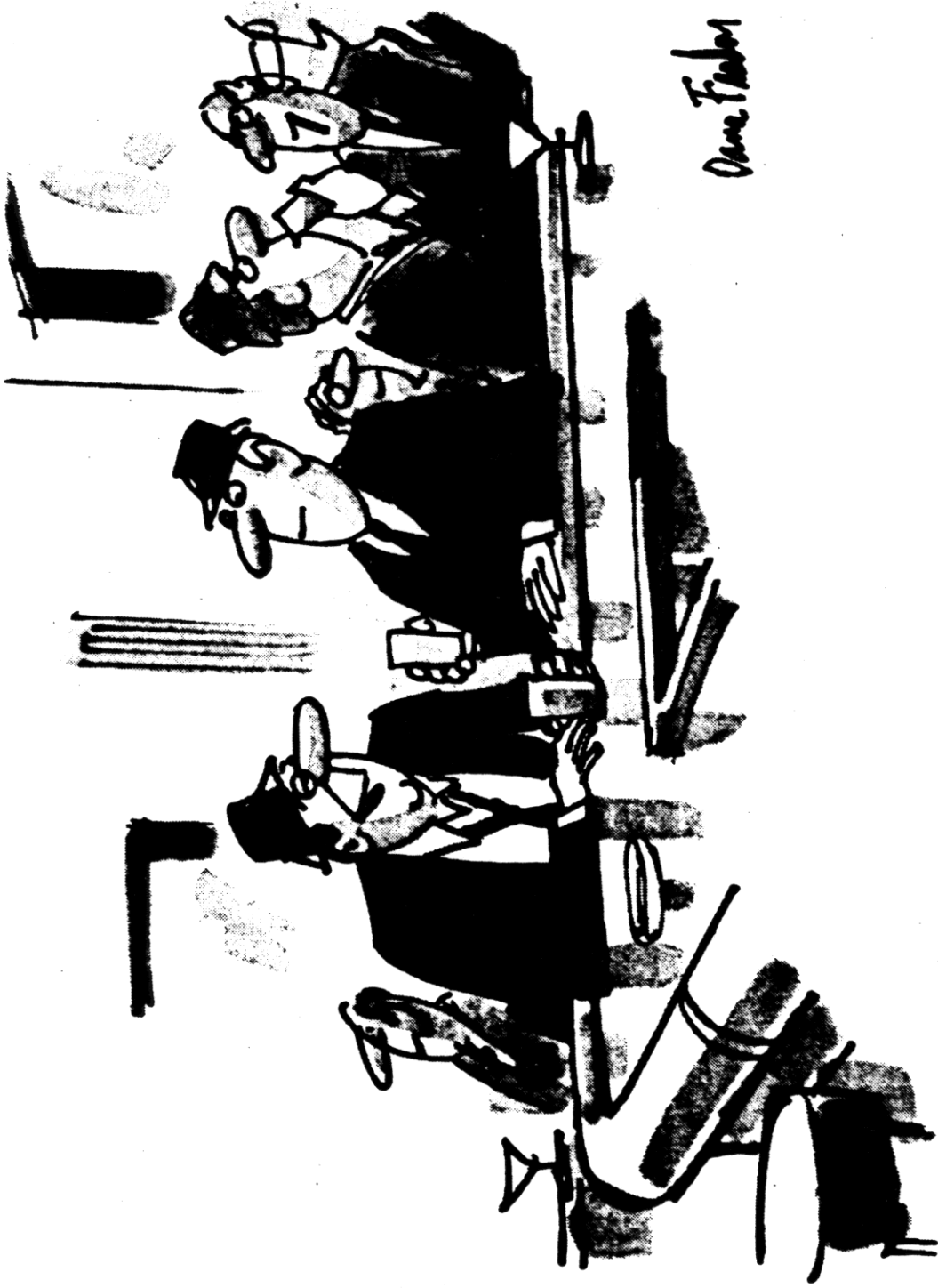


Figure 7b. AN APPROXIMATELY 30X ENLARGEMENT OF THE US MERCHANT MARINE ACADEMY AT KINGS POINT ON THE GREAT NECK PENINSULA.





*"Ordinarily, I lean toward a land-based-MX system. But when I have
a few drinks I lean toward those little submarines."*

~~TOP SECRET~~ ~~RUFT~~

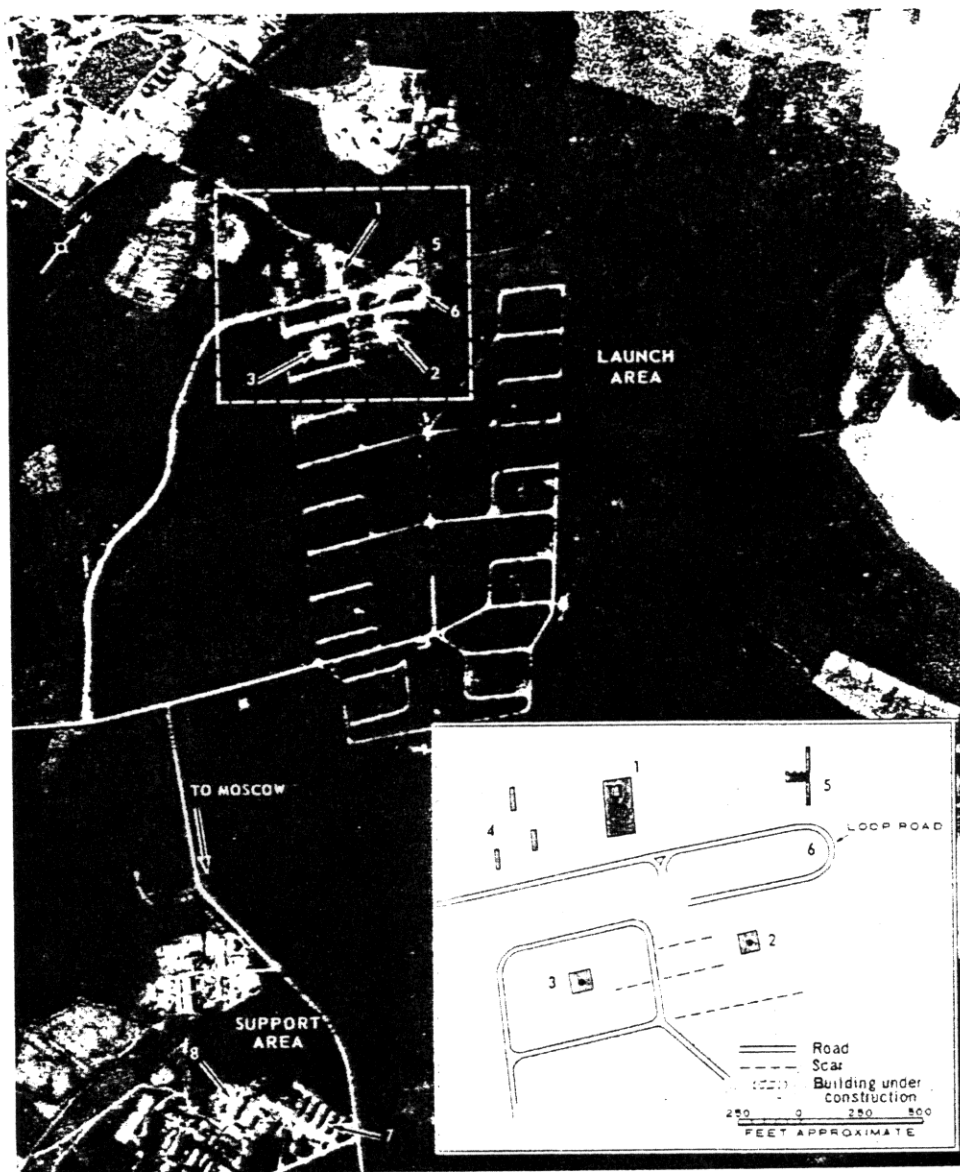


FIGURE 2. POSSIBLE AMM SITE E33-1, MOSCOW, SEPTEMBER 1963.

~~TOP SECRET~~ ~~RUFT~~

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FIGURE 4

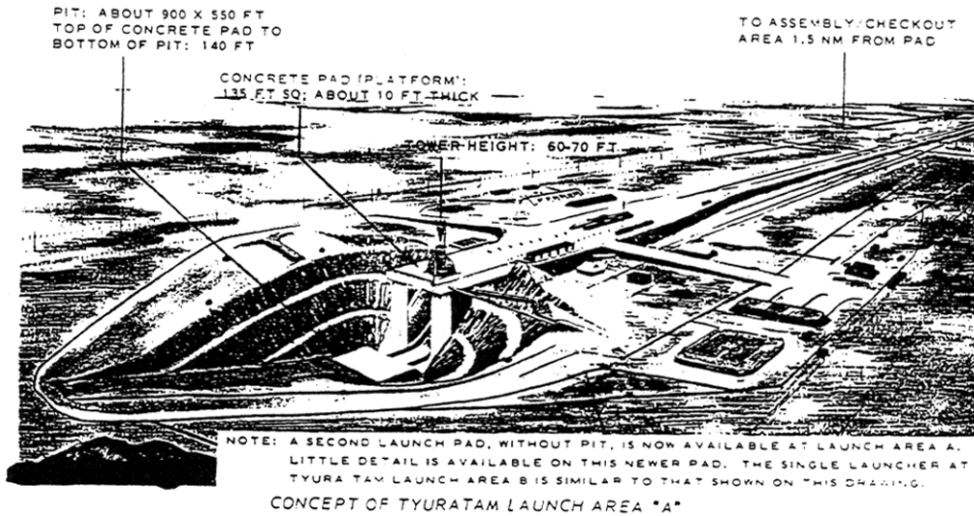
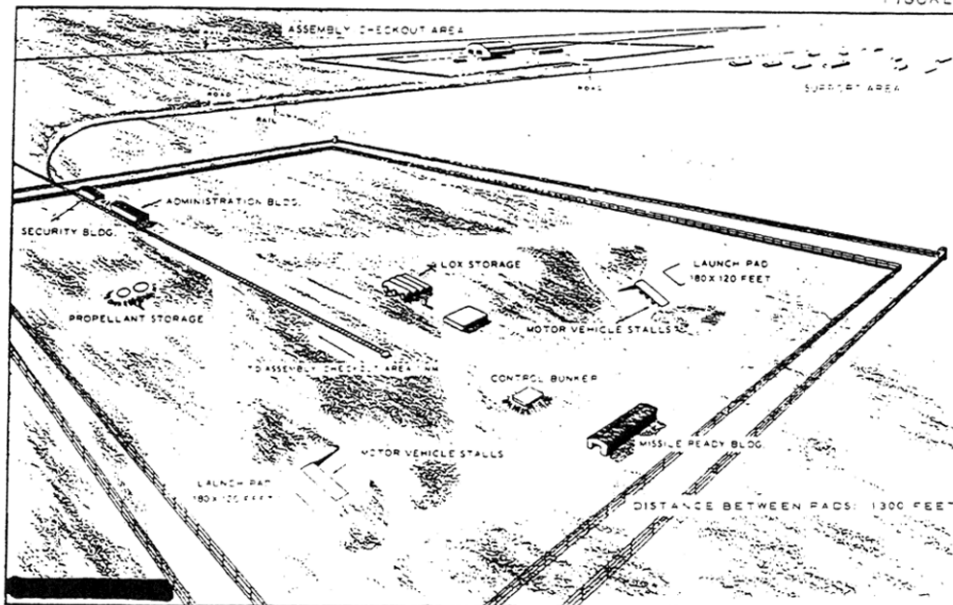


FIGURE 5



CONCEPT OF TYURATAM LAUNCH AREA "C"

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