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Payload 176

New Code 5170 Design Areas

Electronics Packaging

A unique modular packaging technique was introduced in Payload 176. A family of modular packages was developed using standard end rails and varying length top and sides. The engineering design is non recurring and the packages can be utilized for practically any NRL satellite electronics requirement. The design will mean a considerable savings in both size of subsystems and in the time required to complete the system since the package design is complete and the parts can be fabricated in advance.

In addition to the mechanical package, the system used a modular construction technique consisting of thick film hybrid, integrated and discrete component (1.2" x .6") modules interconnected on a two sided printed circuit motherboard. All module lead terminations are interconnected through the use of bifurcated terminals. The terminals are swaged and soldered into plated thru holes in the motherboard, and spaced 0.10 inch on centers. The module leads are inserted through 0.025 inch clearance holes, bent at the prescribed radius and soldered to the terminals on the opposite side of the board. The interconnections are accessible and provide the key to module serviceability. The proper use of the miniature terminals effectively gives a third level of interconnect to a two side board. The technique provides an excellent compromise between size and serviceability.

The packaging designs will result in a 4 to 1 reduction in the size of

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CONTROL SYSTEMS JOINTLY

command, control, telemetry and video processing equipment flown on the 170 Series spacecraft and future NRL spacecraft.

Data Link Modulator Design

An area in past payloads where considerable time has been spent has been in the flight qualifying of threshold detectors and down link transponder timing circuitry. Requirements of wide temperature and voltage variations had to be met.

A new D. L. modulator - threshold detector circuit was designed and developed for P/L 176. The design performance variation is no greater than 0.5% over a temperature range of 100°C and 30% variation in supply voltage. The design does not use voltage regulators or temperature compensation. The size is small and the stand-by power is low.

Because of the reduction in size and the ease in flight qualifying the circuitry, it will be used redundantly in the 70 Series payload. This particular circuitry is a crucial link in the Data chain of all NRL spacecraft; therefore this redundant failsafe circuitry will be used in all 70 Series spacecraft.

PAM TM

The 176 PAM TM system's multiplexers were a flight prototype of units to be flown on the 170 Series payloads using the new packaging technique and resulting in a considerable savings in size.

Command System

The 176 command system was a different design from units flown in the primary payloads. Certain critical circuits vital to successful operation

had been redesigned using quad redundant techniques. Portions of the Payload 176 command system are being incorporated into the design of units to be flown on the 70 Series.

Digital Encoder

A low power, video pulse encoder was developed for use with EXP #1 on Payload 176. The unit was used in a comparison of pulse width modulation versus pulse code modulation on the down link transmission. The experiment provided a means for measuring data quality through the entire data processing link.

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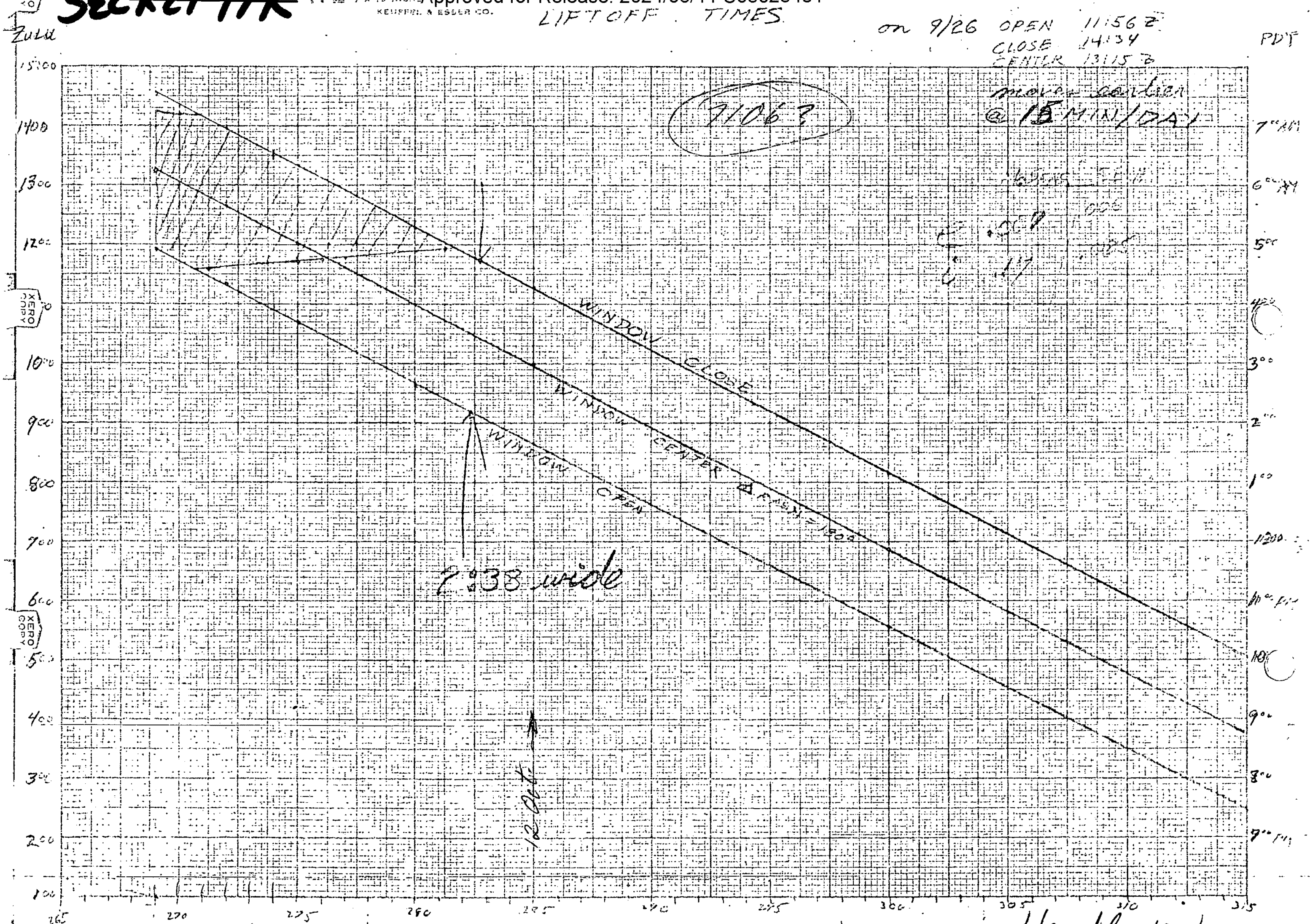

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Figure #1

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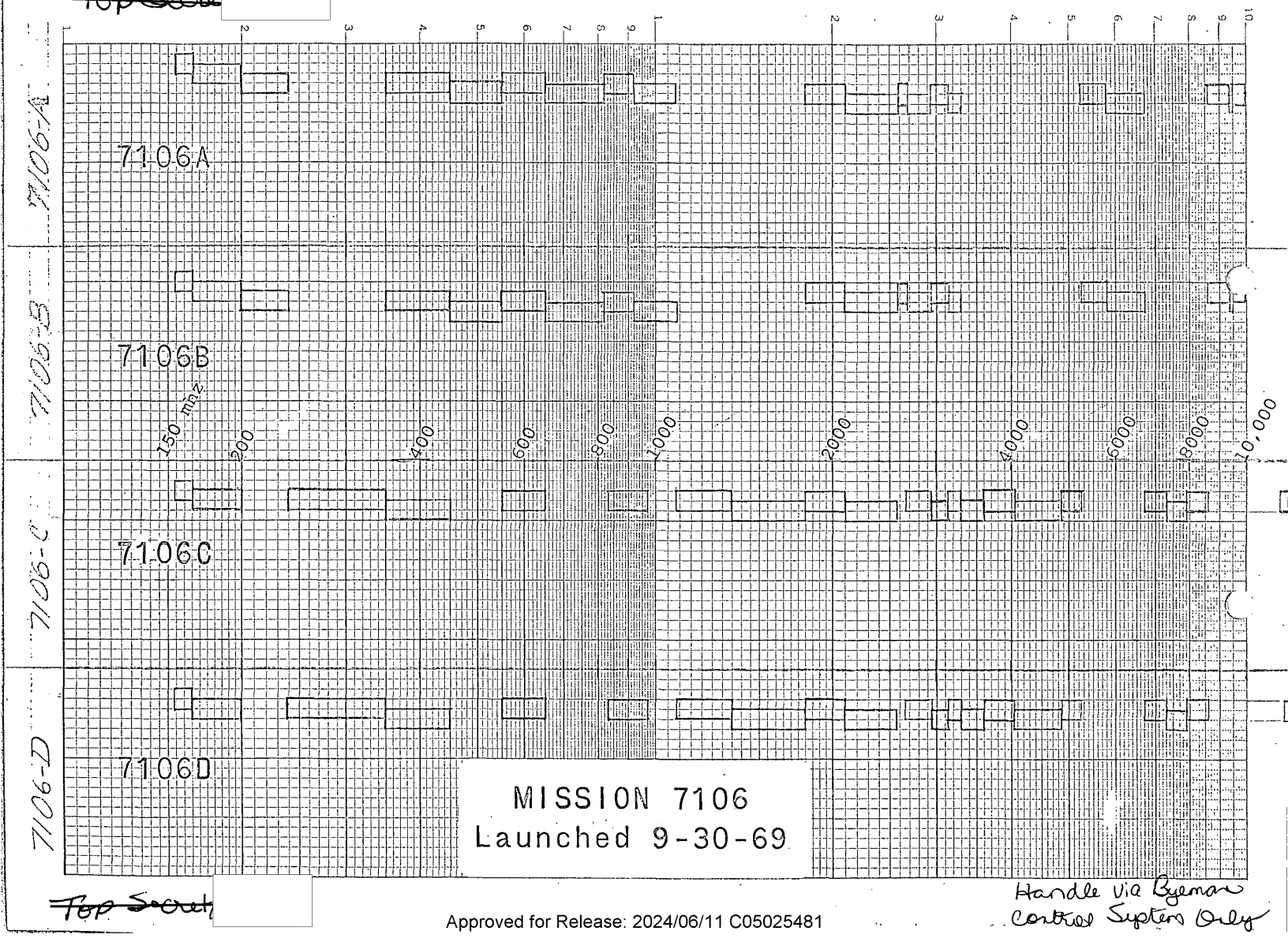

MISSION 7106
Launched 9-30-69

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ADM. MORAN 4 Sept. 1969

ADM. CLANCY

ADM. MORRISON

Visit to Naval Research Laboratory

Arrival at NRL Building 59 Room 123 . . . . . .

Introduction and objectives. Capabilities and Achievements

Reid D. Mayo . . . . . .

Evolution of Hardware and Techniques

Peter G. Wilhelm. . . . . .

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MEMORANDU[redacted]LE 3 Sept 1969.....

ADM MORAN'S QUESTIONS....

Describe the penalty ~~xBxxtx~~ and restraints which would result and now would inhibit this program doing both the Navy as well as the National job...

Are there Engineering Restraints which would prevent both being done?

A. Assume that the following is defined as the National Job...the #1 Weapon system (ABM/AES) is equipped in all four spacecraft as are the portions of the S-Band spectrum where the Navy Sea Surveillance has been demonstrated in the past. Assume that the ABM-Tasking would require;

a- Location capability

b- four ball use for Total Weapon-system search.

c-

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4 September 1969 Meeting

12:30	Lunch, Director's Dining Room ADM Morrison and Mr. Lorenzen
1:30	ADM Moran, ADM Clancy, CAPT Geiger and CAPT Drain arrive and proceed to Building 53, Room 104
	ADM Morrison and Dr. Cleaton join group
2:00	Mr. Wilhelm joins group
2:15 - 2:45	Mr. Wilhelm takes ADM Moran and ADM Clancy to Anechoic Chamber and Vibration Facility, Building A-39
	Remainder of party proceed to Building 39, Room 123 for briefing by Mr. Mayo on Project background
2:45	ADM Moran and ADM Clancy join group in Building 39
2:45 - 3:15	Wilhelm briefs group and shows hardware
3:15 - 3:45	Trexler briefs group on [redacted] Project.
3:45 - 4:15	Cosby briefs group on Simulator Project
4:15	Discussion
4:30	Visitors depart

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