SINGER

Welcome to Librascope's 50th Anniversary Open House

October 17, 1987 **Librascope Division**

The Story of Librascope's Trademark and Name

The company name Librascope came from "Libra" meaning "balance" and "scope" meaning indicator, or "a means of viewing". It was the name given to the first aircraft balance computer developed by the company's founder Lewis Imm, and produced by the company in its early years.

"Libra" is the seventh sign of the zodiac. Ancient mythology established it as the "scales", or "balance". The title, Libra, we owe to the Romans. The Greeks had a tradition that the balance, "Libra", was placed in the sky to perpetuate the memory of Mochus, the inventor of the system of weight and measures. This was the origin of mathematics and computation, as there was no need for mathematics before man could measure and/or weigh.

The ancients attached great importance to the scale or balance being in equilibrium. They recognized the fact that in order to achieve progress as a group they needed harmony and mutual respect for each other. They regarded the symbol of the balance as showing that justice and equality must be in equilibrium.

Welcome to Librascope's 50th Anniversary Open House

Hosted By

Librascope Division
Glendale, California

FROM 1937 . . .

Lewis Imm

Librascope was founded by Lewis W. Imm in 1937, when he developed the first "Librascope," a balance computer built to determine the center of balance for airplanes, namely the Douglas DC-3 and the Lockheed "14," the mainstays of commercial air travel at the time. Imm had seen the difficulties encountered by the need for computing the center of balance in loading aircraft while working as an engineer for the Bureau of Air Commerce, and in 1937, he left the Bureau to develop the first "Librascope."

During the early years, Mr. Imm worked for a period of time as an engineer for Lockheed days while he was working for Librascope at night. This was not necessarily a matter of choice, but funds were scarce and payrolls had to be met, even though the payroll consisted of less than ten people.

From 1937 to 1941, the Company made quite a few moves from shops in Burbank on San Fernando Rd., to Gage St., to Tujunga Ave., and finally in 1941, to a plant on Santa Anita St. where the Company stayed until moving to its present site in 1949.

In 1941, Mr. Imm began to encounter difficulties which were common to many small progressive companies at that time. The defense program was swinging into high gear and orders were available for much needed defense supplies. Many of these orders called for much greater capacity and financial backing than most small companies had. Faced with this problem, Mr. Imm decided that the future of the Company and the needs of the Country called for action.

Accordingly, he decided to sell Librascope to the General Precision Equipment Corporation in order to obtain substantial financial backing. On November 12, 1941, Librascope became a subsidiary of the GPE Corporation. Under GPE ownership, Mr. Herbert Griffin became president of Librascope and Mr. Imm became an engineering consultant for the firm.

In the early war years, production at Librascope was predominantly on the Mark 7 barrage computer, also known as the LC 6. The Mark 7 computer, like the balance computer, was a manually operated linkage type. During the years when the Mark 7 was in production, Mr. Imm was occupied much of the time with the development of a new computer, the Mark 4, for antisubmarine use. From 1942 to 1944, he spent many days on shipboard determining requirements for the computer.

In March of 1947, Mr. Griffin was succeeded by Mr. George Friedl, as president of Librascope. At the same time, Mr. Imm became Chief Development Engineer where he continued with research and development work for the Company, which by now was considerably more advanced and complex than in the days of the balance computer.

In December of 1949, Mr. Imm returned to the presidency of Librascope, and under his direction, Librascope began to grow and prosper and gained a respected place among those companies on which the U. S. Navy still depends.

TO 1987 . . .

Walter J. Picker

It is my great pleasure to welcome you to Librascope's 50th Anniversary Celebration and Open House.

Librascope's history began with the invention and production of the balance computer in the spring of 1937 by Librascope's founder, Lewis W. Imm. In 1939 the Company received a corporate charter as Librascope, Incorporated. In early 1940 an assignment from the U. S. Navy for a small ballistic computer brought Librascope into the field of combat systems which remains its principal area of expertise today. Librascope joined the General Precision Equipment Corporation in 1941 and subsequently became part of The Singer Company when GPE was acquired in 1968.

Mr. Imm recently recalled an early episode in the history of the firm:

> "The Navy had given us one year to design and build a digital computer. We had no electronic background; no one in that specialty whatsoever. What we did have, recognized by the Navy, was a small unique group of intelligent people who were so closely tied together by mutual admiration, respect and love, they would tackle anything with confidence of success. They did not know fear. The deed was done in one year's time with over 200 of us working 12 to 16 hour days. By today's standards the result was bulky and crude, but it was accurate, flexible, and for the first time, the same basic unit could handle any problem with proper programming. This was the basis for our rapid growth — our future."

With that same dedication and unity, Librascope thrives today, a leader in submarine and surface ship combat systems for the U. S. Navy, as well as foreign navies, and a leading designer and manufacturer of militarized data processing, display and communication systems for the U. S. Army.

On the basis of the Company's record of achievement over the past 50 years, Librascope stands prepared to accept new challenges, new obligations and to assure equal success.

Walter J. Picker
President

Librascope - 1937

Original Librascope

This manual analog computer, the size of an attache case, was used to calculate weight distribution on commercial aircraft. It was called the "Librascope"; "Libra" for the zodiac balance sign and "scope" to denote indicator (thus balance indicator). The computer was quickly accepted by the major airlines and its name was adopted as the company name.

The Librascope reduced the time required to calculate a flight plan from 45 minutes with the pencil and chart method to less than two minutes of knob turning. According to an early sales brochure, the Librascope was designed for use with the Douglas DC-2, DC-3, DS-T and the Lockheed 14 and 18, first-line commercial aircraft of the day.

A Librascope was used by the late Howard Hughes during his historic 91 hour, 8 minute, 10 second flight around the world in 1938. An up-to-the minute log was kept of the weight/center-of-gravity condition to enable Hughes to "fly at all times at the altitude most favorable to the operation of the plane (a Lockheed Super Electra) with the load aboard at that particular time; the load naturally varying as the fuel was consumed." -quote from Aviation magazine, 1938.

The capability developed in producing the balance indicator enabled Librascope to bid on, and win, a Navy contract for a similar analog computer to determine the exact drop point for depth charges in defense against submarines.

Librascope - 1987

Today, The Singer Company's Librascope Division designs and manufactures tactical information and weapon control equipment for both navy and army applications. The Division is a principal supplier of underwater combat control equipment to the U.S. and allied navies, and a major supplier of field Army tactical Command, Control and Communications (C^3) systems.

TOUR AGENDA OVERVIEW

A. Executive Conference Room — Submarine Models

B. Dining Room — Historical Exhibit & Video Presentation

C. Naval Combat Systems Laboratory

D. Fire Control System Mk 113 Mod 9 Laboratory

E. California Room — Food/Entertainment/Door Prizes

F. Reproduction/Printing Facility

G. Automated Word Processing Demonstration

H. Army Tactical Communications Display

I. Computer & Radio Clubs Demonstration

J. Credit Union

K. Environmental Laboratory

L. Machine/Model Shop Demonstration

M. Conference Room A — Health/Fitness Information

N. Submarine Combat Control System Mk 2 Display

O. Submarine Fire Control System Mk 1 Mod C Display

P. Disk/Bubble Memory & Encoder Display

Q. Production Final Assembly Area

R. Production Control EDP System "CRT" Display

S. Final Test & Checkout Facility

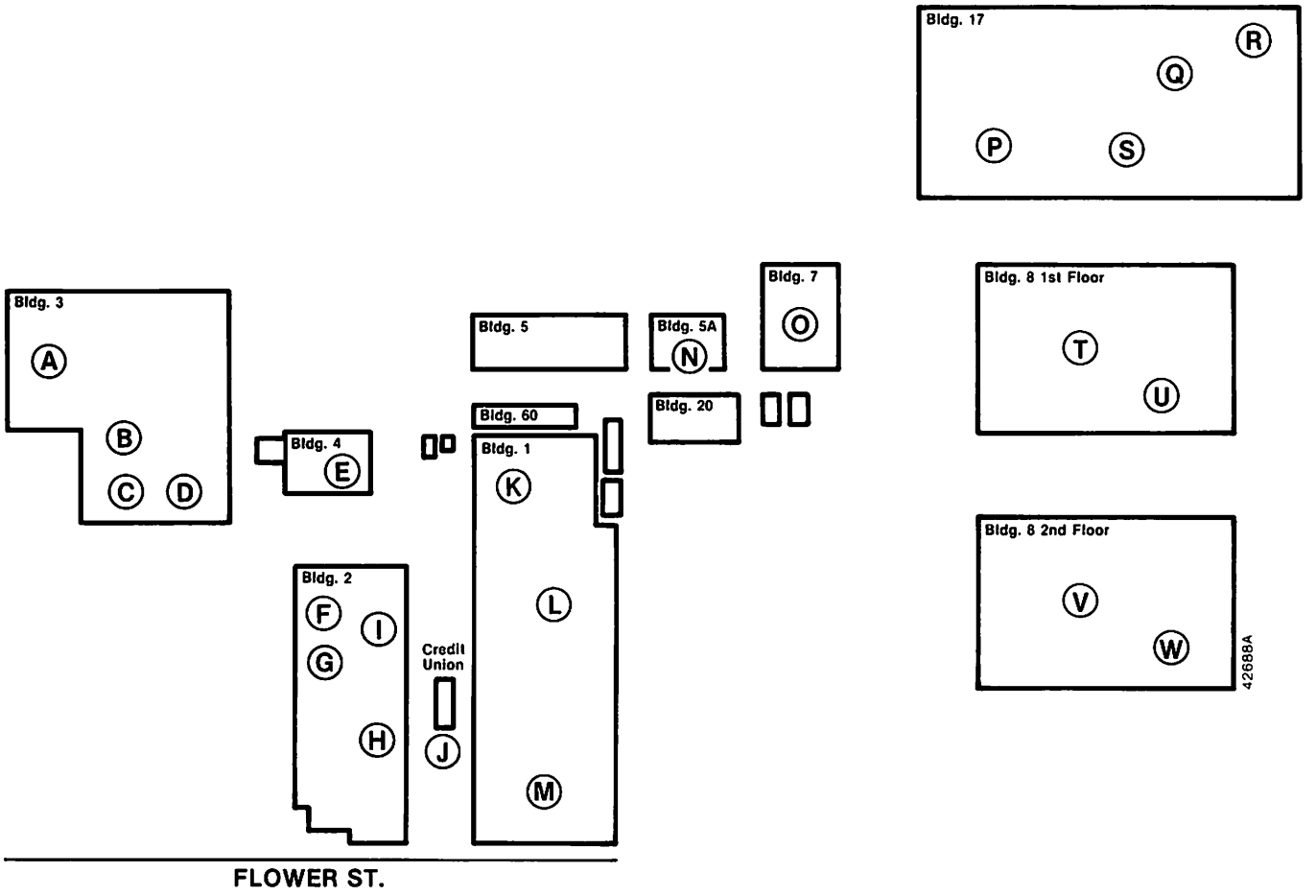
T. Conference Rooms — Company Product Displays & Video Presentation

U. Test Equipment Laboratory Demonstrations

V. Electronics Laboratory

W. Computer Aided Design Drafting Demonstration

TOUR ROUTE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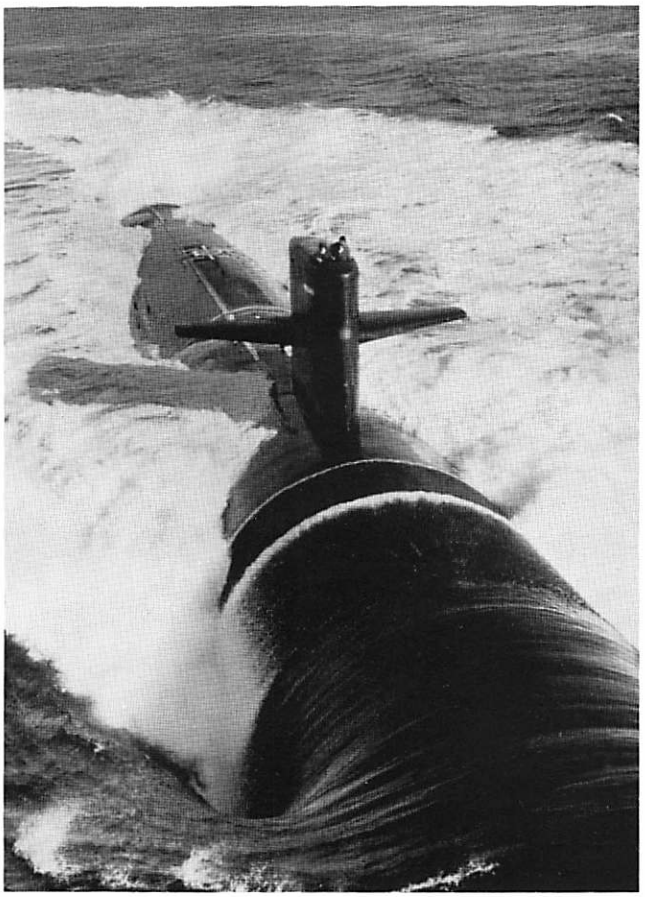
ADVANCED COMBAT SYSTEMS LABORATORY

The Advanced Combat Systems Laboratory is used for current Naval Combat Systems Research and Development projects for software development, testing and demonstrations.

The Laboratory contains a display subsystem consisting of three commercial grade Mk 2/Mk 3 Combat Control Consoles and an advanced prototype Combat System Display Console which will be used to develop the next generation Combat Display Consoles for:

- SSN-21 Seawolf Class Submarine (AN/BSY-2)
- Royal Australian Navy New Construction Submarine Program
- International Navy Surface/Subsurface Multi-Function Combat Control Console



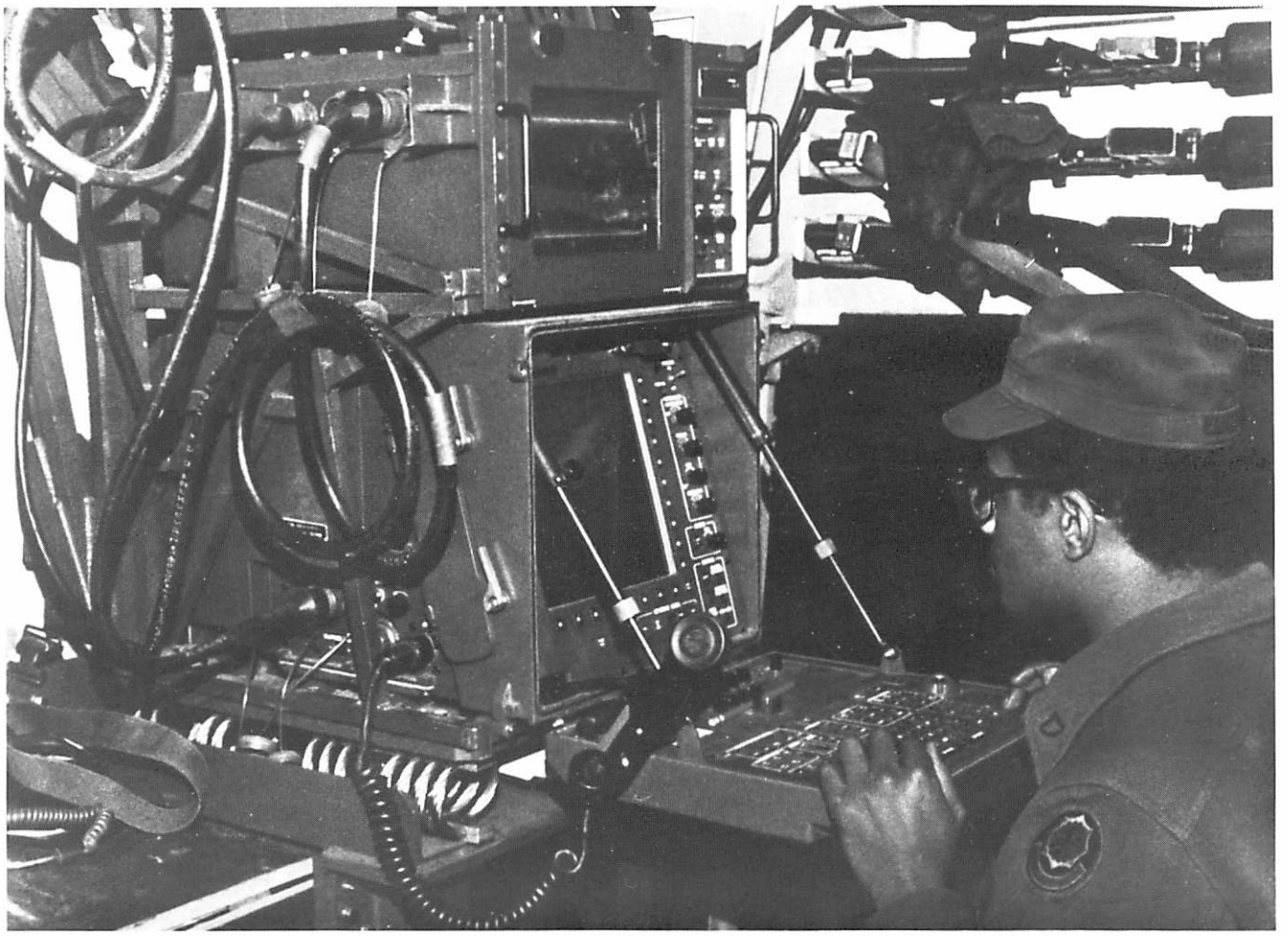
Application: Combat Control Systems for U. S. Navy and Allied Navy Submarines and Surface Ships.

Potential Customers: U. S. Navy, Royal Australian Navy, Canadian Navy, Other Allied Navies

COMMAND, CONTROL AND COMMUNICATIONS (C^3)

Tactical command, control, communications and display equipment for military applications including Army field use at all echelons.

- Tactical Computer Terminal AN/UYQ-30
- Programmable Communications Interface Unit
- Tactical Display Terminal (17" x 17" Plasma Panel)

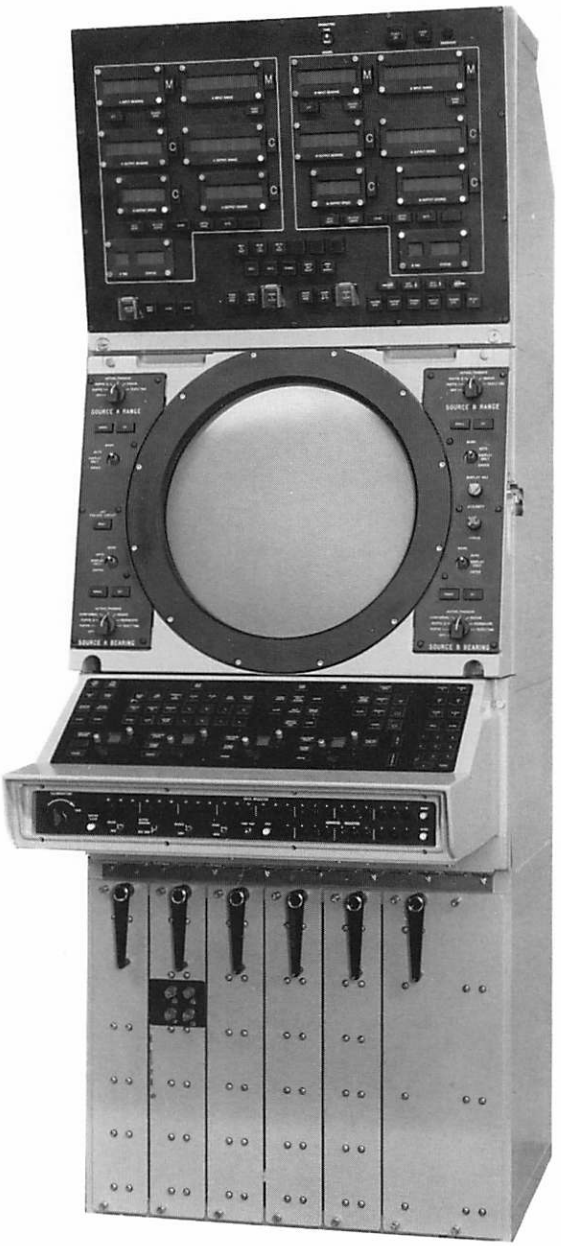


Application: Tactical Command, Control and Communications (C^3) systems/equipment for U. S. Army's Maneuver Control System (MCS)

Customer: Communications Electronics Command (CECOM)
Ft. Monmouth, NJ

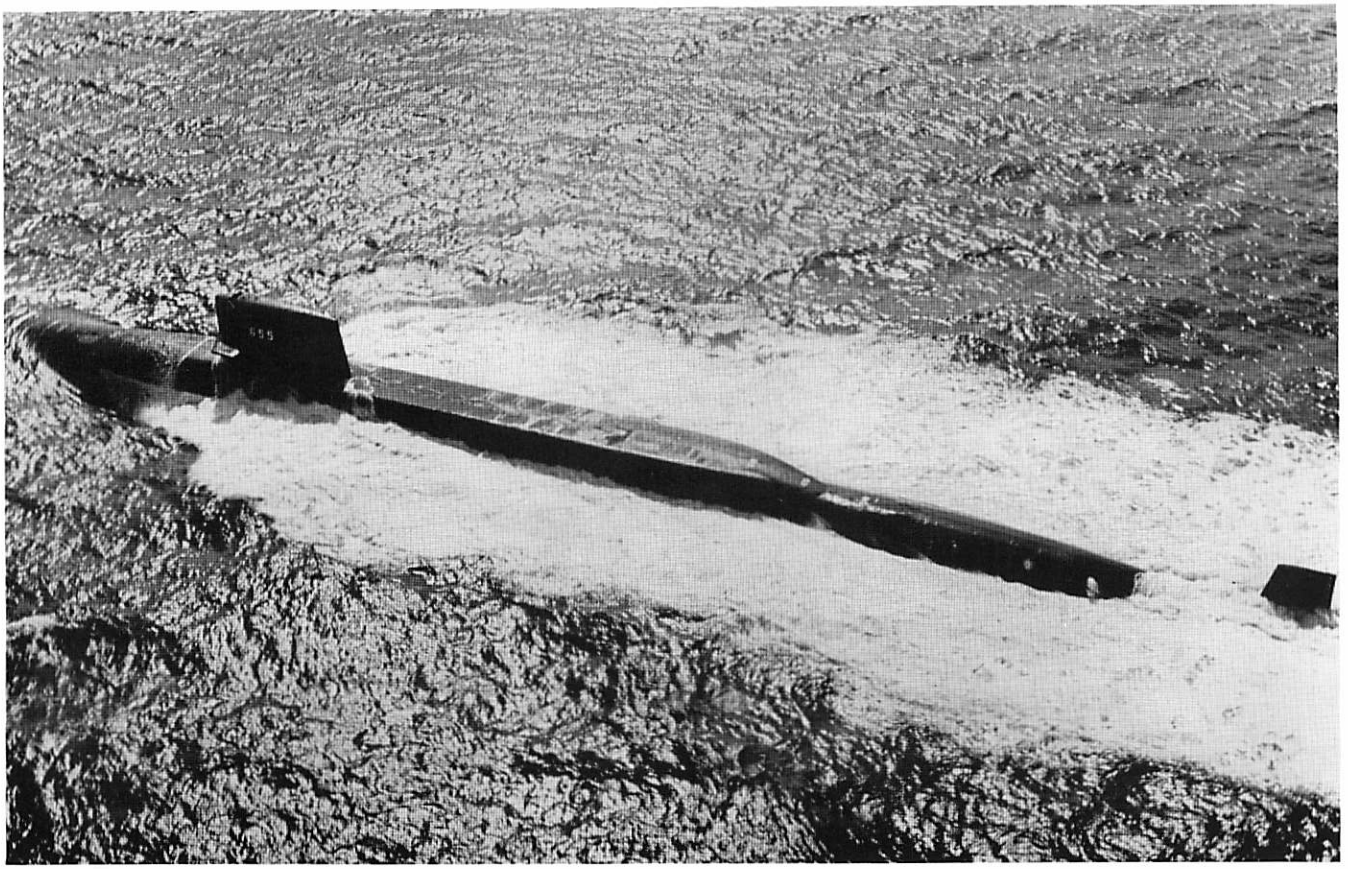
User: U.S. Army

SUBMARINE FIRE CONTROL SYSTEM MK 113 MOD 9



The Fire Control System Mk 113 Mod 9 is the heart of the defensive weapon system of the older "Lafayette" (SSBN 616) and "Benjamin Franklin" (SSBN 640) classes of Fleet Ballistic Missile (FBM) submarines. The system controls preparation, status, launch, and guidance of the Mk 48 heavyweight torpedo, the primary defensive ASW weapon aboard the FBM submarine.

Librascope's current system refurbishment contract makes provisions for an embedded AN/UYK-44 computer and a new state-of-the-art CRT electronics section for the Analyzer Console Mk 78. These modifications will extend the useful life of the Mk 113 Mod 9 system into the 1990's.

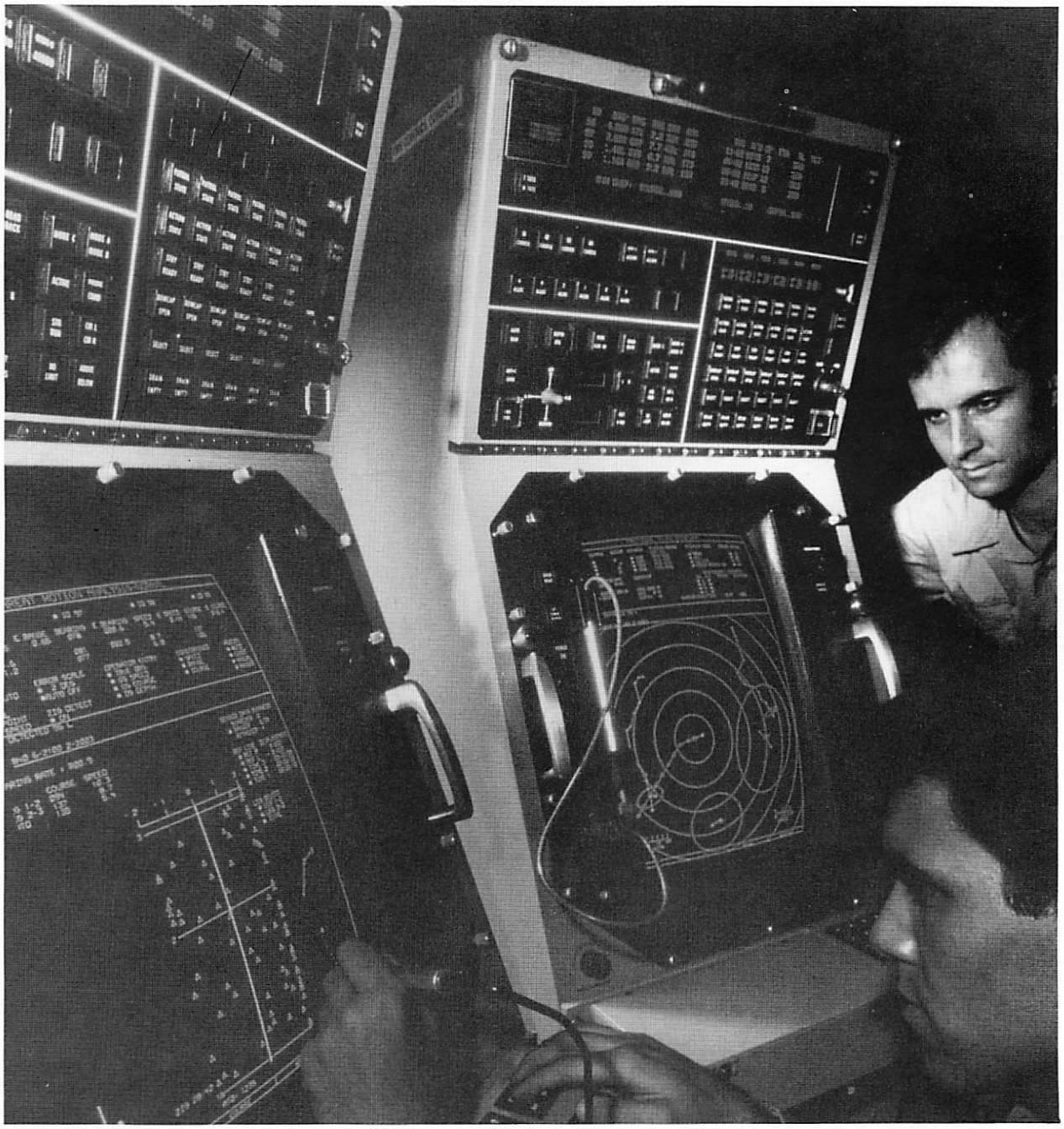


Application: Fire Control System Mk 113 Mod 9 is a defensive weapon control system installed on Fleet Ballistic Missile (FBM) submarines. The system controls launch, preset, status and post firing guidance of U. S. heavyweight Torpedo Mk 48.

Customer: Naval Sea Systems Command, Naval Underwater Systems Center, Newport, R.I.

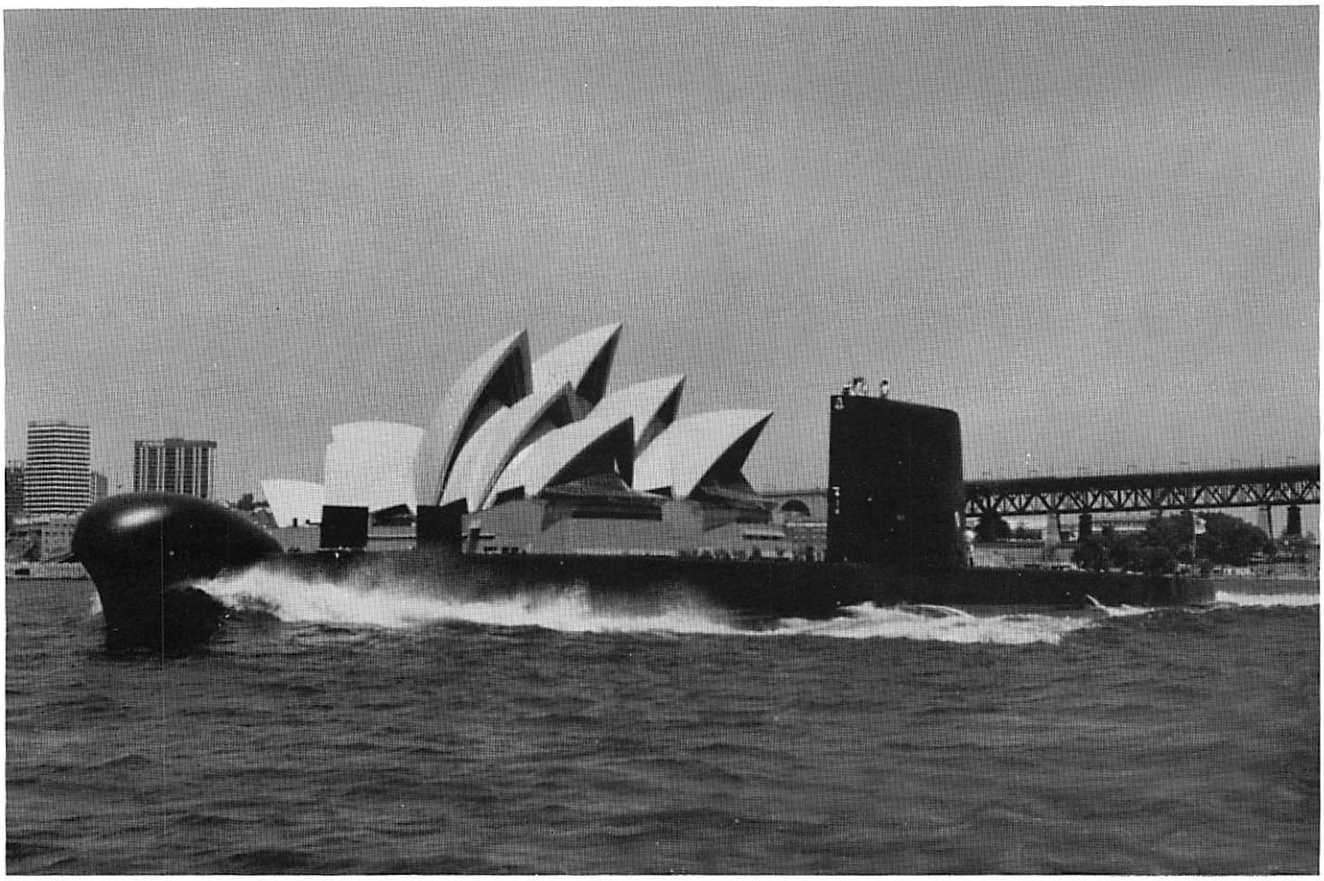
User: U. S. Navy

SUBMARINE FIRE CONTROL SYSTEM MK 1



Librascope's Submarine Fire Control System Mk 1 — the first production all-digital weapon control system to be installed in a submarine (Royal Australian Navy's Oberon submarines).

Librascope's current Submarine Fire Control System Mk 1 Mod C upgrade program will provide the Canadian Oberon submarines with the capability to launch and control the submarines Mk 48 Torpedo.



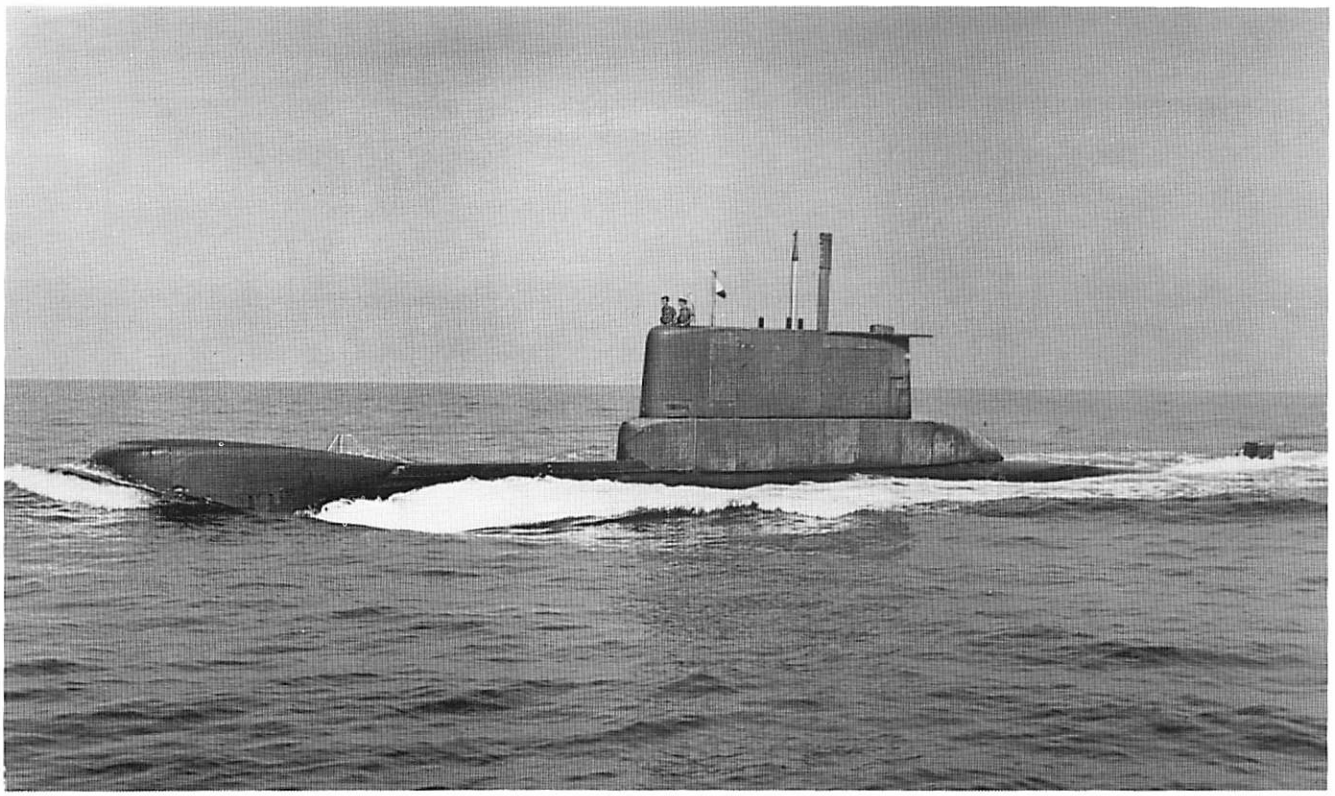
Application: Submarine Fire Control System Mk 1 is a highly automated underwater combat system that provides the capability for tactical analysis and weapon control of torpedoes and the Harpoon missile.

Customer: Australia, Canada and India

User: Royal Australian Navy, Canadian Forces, and Indian Navy

SUBMARINE COMBAT CONTROL SYSTEM MK 2 MOD I

Submarine Combat Control System Mk 2 is an advanced next generation production naval combat system which further enhances the operational capabilities of submarines. The Mk 2 is an all-digital combat control system employing advanced technologies, such as color raster displays, distributed processing, and data busses.

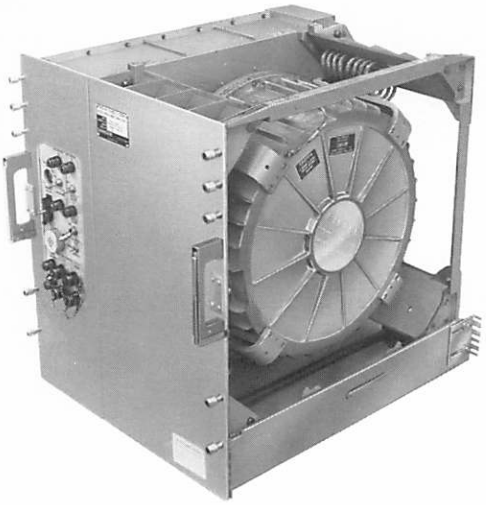


Application: The advanced Submarine Combat Control System Mk 2 provides for surveillance navigation, tactical analysis, and weapon control for submarines and surface ships.

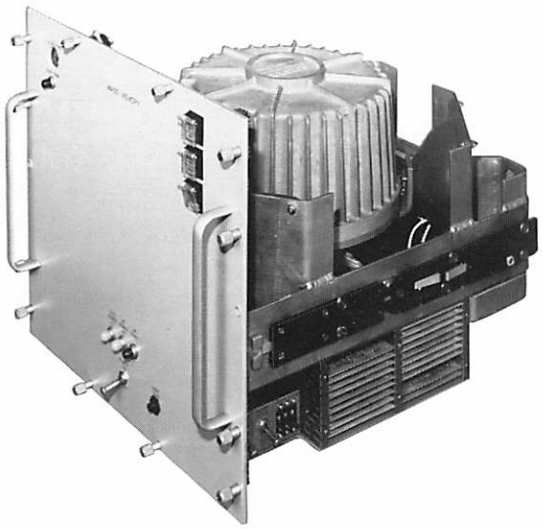
Customer: Foreign Allied Navy

MILITARIZED MEMORY SYSTEMS

ROTATING DISK MEMORIES

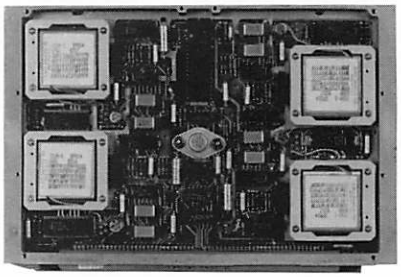


RD-433 Mass Memory
(2 megabyte)



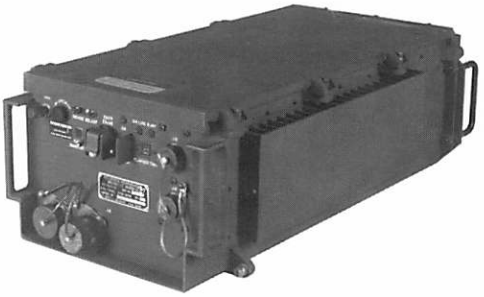
CL-107 Mass Memory
(1 megabyte)

BUBBLE MEMORIES



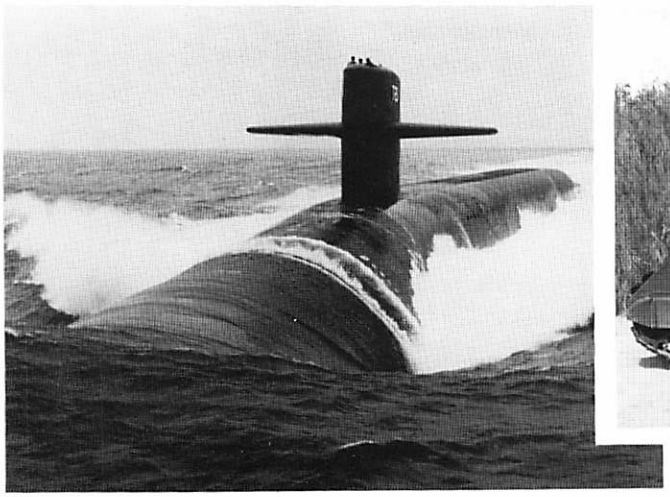
Bubble Memory
Circuit Board

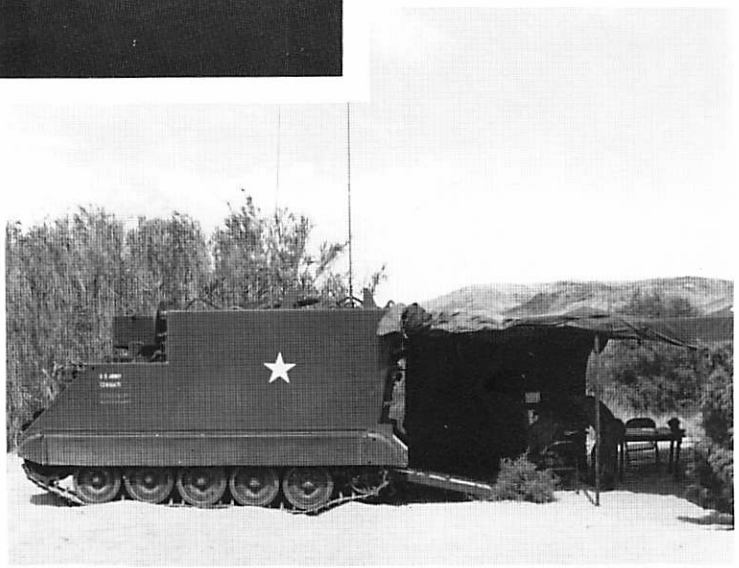
Mass Storage Device/Loader
(2 megabytes)



Magnetic
Bubble Recorder
Reproducer
RD-509G (8 megabytes)

Librascope's militarized Mass Storage Memory Systems include rotating disk memories and bubble memory systems with memory storage capacities from 250K bytes (removable bubble memory cartridges) to 8 megabytes.



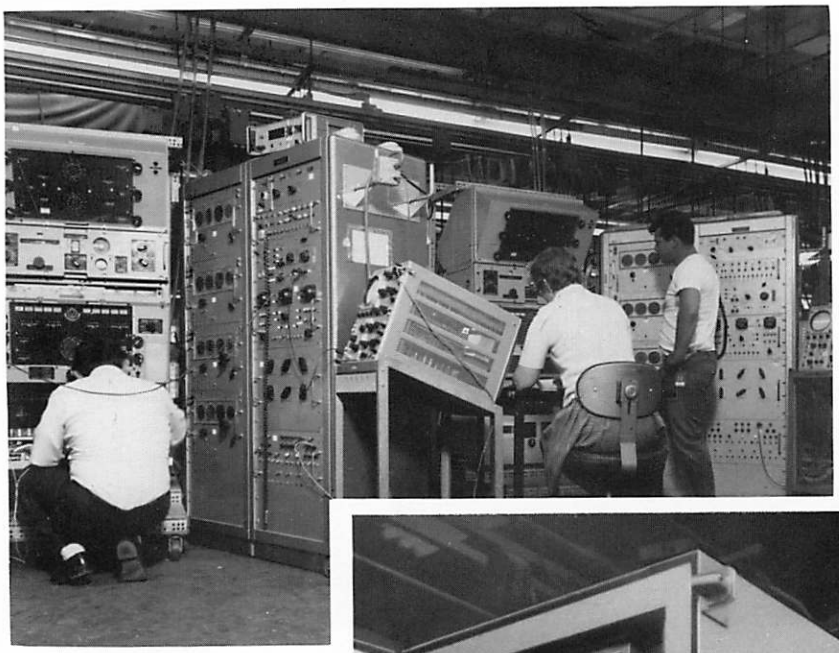


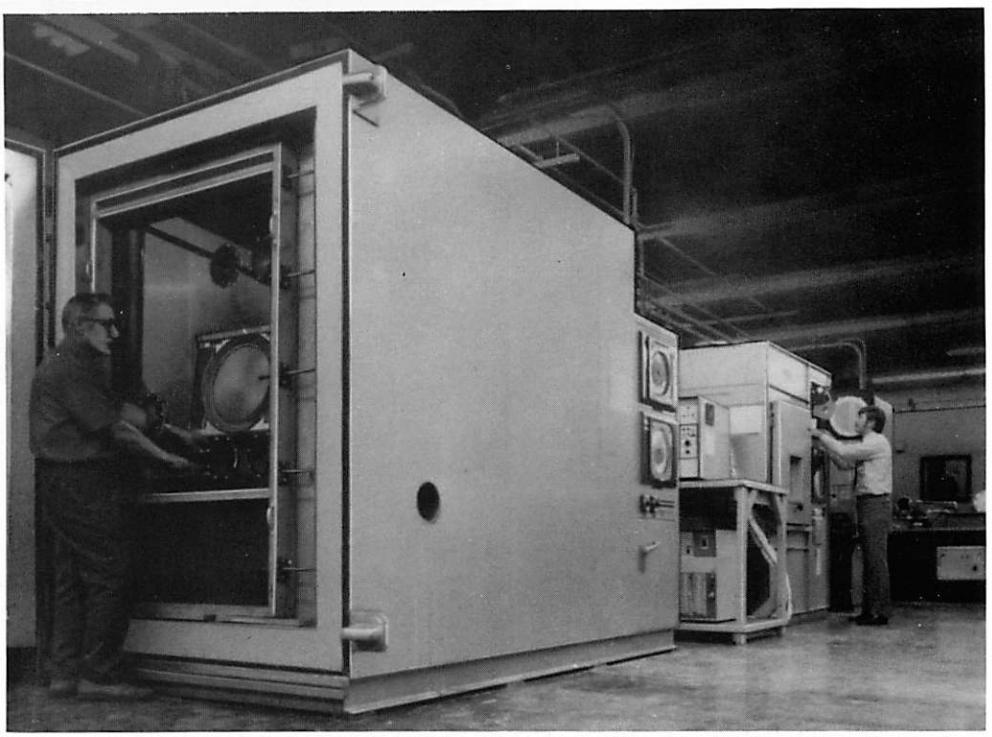
Application: Militarized rotating disk and bubble memory systems for land, sea and air applications.

Customer: NAVSEA, SPAWAR, RAN, Canadian Forces, Indian Navy, CECOM, GTE, RCA.

User: U.S. Navy (TACINTEL, NAVMACS(V) and TRIDENT IR^2 Programs)
U.S. Coast Guard
International Navies (SFCS Mk 1)
U.S. Army (Maneuver Control System)
Air Force (GTE Peacekeeper Program)

FINAL TEST AND CHECKOUT FACILITY

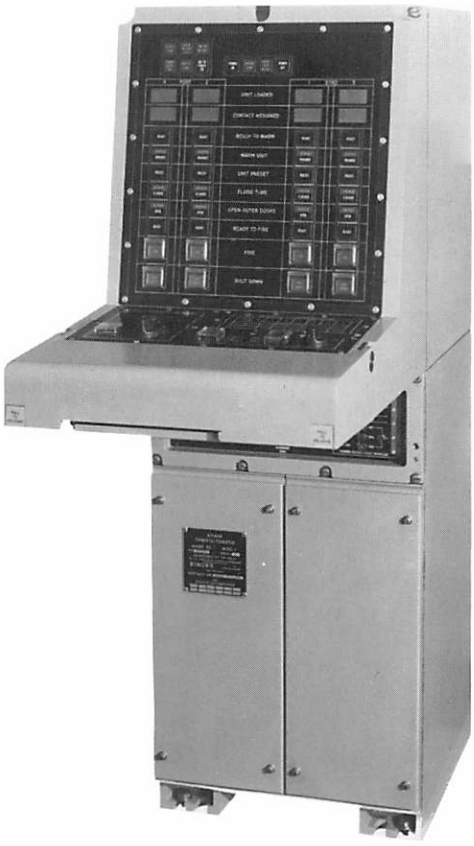




Final Testing and Checkout of Production assemblies. Testing includes functional, performance and environmental testing and government and quality control final buyoff.

NAVY FIRE CONTROL SYSTEM MK 118 PRODUCTION UNITS

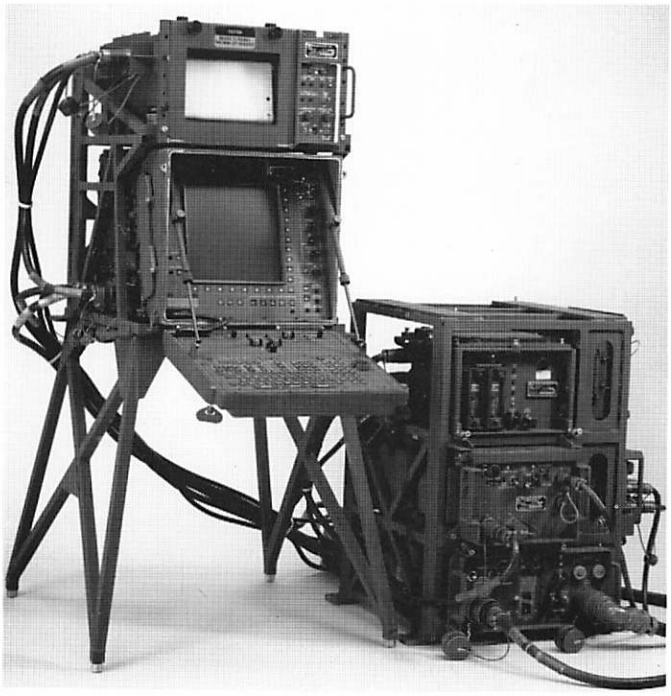
Weapon Launch Console Mk 96



Attack Control Console Mk 92

ARMY MANEUVER CONTROL SYSTEM PRODUCTION UNITS

Programmable Communications Interface Unit



Tactical Computer Terminal

SINGER

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