



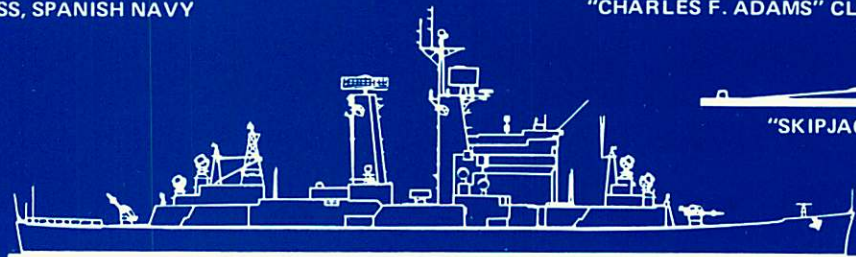
"BALEARES" CLASS, SPANISH NAVY



"CHARLES F. ADAMS" CLASS



"TANG" CLASS



"ALBANY" CLASS



"SKIPJACK" CLASS



"TRUXTUN" CLASS



"SPRUANCE" CLASS



"GEORGE WASHINGTON" CLASS



"PERMIT" CLASS



"SEAWOLF"



"TULLIBEE"



"BRONSTEIN" CLASS



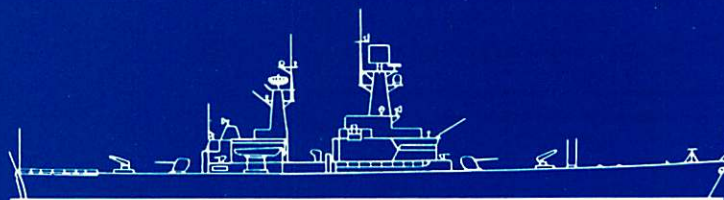
"LAFAYETTE" CLASS



"TRIDENT"



"OXLEY" CLASS, ROYAL AUSTRALIAN NAVY
(BRITISH "OBERON" CLASS)



"VIRGINIA" CLASS



"BAINBRIDGE" CLASS

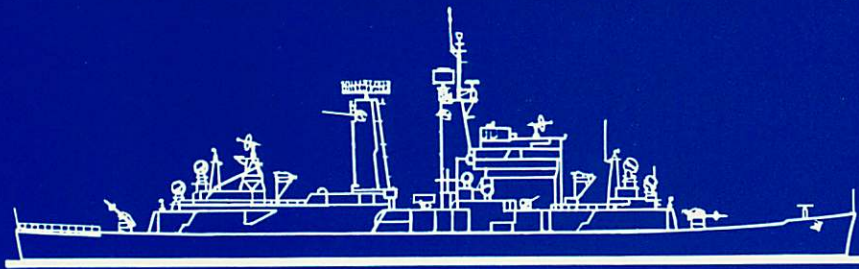
Librascope

A SINGER COMPANY

**More Underwater Naval Weapon Control
Equipments aboard U.S. Navy vessels
than any other contractor**

GUIDANCE AND CONTROL FOR:

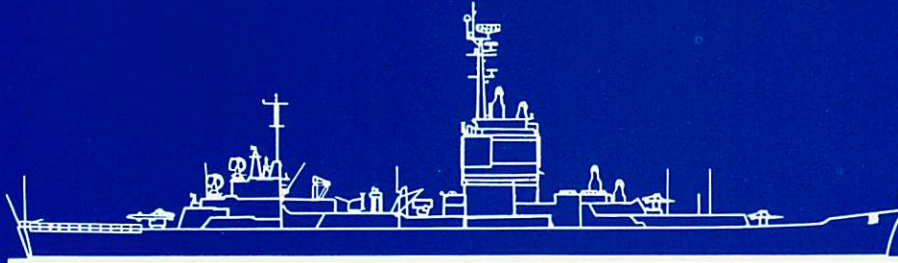
- Torpedo Mk 48
- Encapsulated Harpoon
- Tomahawk
- Torpedo Mk 46
- Mk 37, NT-37C
- ASROC Missile
- SUBROC Missile
- Non-U.S. Weapons
- Acoustic Countermeasures



"ALBANY" CLASS



"ALBANY" CLASS



"LONG BEACH" CLASS



"BELKNAP" CLASS



"COONTZ" CLASS



"BELKNAP" CLASS



"COONTZ" CLASS



"MITSCHER" CLASS



"CHARLES F. ADAMS" CLASS



"CHARLES F. ADAMS" CLASS



"KNOX" CLASS



"KNOX" CLASS



"BROOKE" CLASS



"FORREST SHERMAN" CLASS



"KNOX" CLASS



"GARCIA" CLASS



U.S.S. GLOVER



"FORREST SHERMAN" CLASS

Librascope: our credentials

- **Specialist in naval combat systems for 40 years.**
- **More Underwater ASW combat control equipment aboard U.S. Navy vessels than any other contractor.**
- **Pioneers in naval digital command systems, interactive display systems, acoustic signal processing and target motion analysis.**
- **Existing control systems for the most modern weapons including Torpedo Mk 48, Harpoon, and Tomahawk.**
- **Total commitment to all disciplines of ASW backed by the research and development necessary to remain at the leading edge of technology.**

Librascope Division of The Singer Company is a leading supplier of naval combat weapon control systems with more than 40 years experience in the effective integration of ASW sensors and weapons: producing advanced surface ship and submarine combat control systems.

The broad technology base developed during these four decades has provided the experience necessary to maintain expertise in all disciplines of ASW and acoustic warfare from system concept and design through manufacture, software development, documentation, test, installation, system integration, training, spares provisioning and field service.

Librascope's total involvement has spanned the history of naval weapon control from early mechanical analog devices through today's advanced, all-digital systems for guidance and control of the most modern weapons: Torpedo Mk 48; Encapsulated Harpoon; Tomahawk; Torpedo Mk 46; Torpedo Mk 37; NT-37C; SUBROC; ASROC and non-U.S. weapons.

ADVANCED TECHNOLOGY: A LOGICAL PROGRESSION

Progress of naval combat system technology has been paced by the emergence of new threats. As each new enemy capability is foreseen, new sensors and weapons are designed to counter the threat. In turn, advanced combat systems for target motion analysis and weapon control are evolved to take full advantage of the

increased capabilities of the sensors and weapons.

The first ASW Weapon Control Computer, Librascope's Attack Director Mk 5, replaced manual methods of weapon control. It was a mechanical analog device using linkage computing elements, ball-and-disc integrators and mechanical servos. The AD Mk 5 proved to be a major improvement over pre-

vious devices and the quest for more flexibility led to other mechanical analog systems by Librascope: FCS Mk 103, Mk 104, MK 105, and Mk 107.

ENTER THE NUC

The emergence of the nuclear submarine as a threat established the requirement for longer range weapons and sensors with the result that the ASROC missile and improved sonars were developed.

To integrate this new weapon/sensor capability, Librascope designed and manufactured major elements of surface ship Fire Control Group Mk 111 and Fire Control System Mk 114. Since most ASW operations were still conducted by surface ships, FCG Mk 111 and FCS Mk 114 were deployed aboard U.S. Navy destroyers and frigates beginning in the late 50's. These systems are currently operational in the U.S. fleet. FCG Mk 111 and FCS Mk 114 are employed aboard ships of the Brazilian, Greek, Italian, Japanese, Spanish, Taiwanese, Turkish and West German Navies. In addition to



U.S. NAVY PHOTOGRAPH

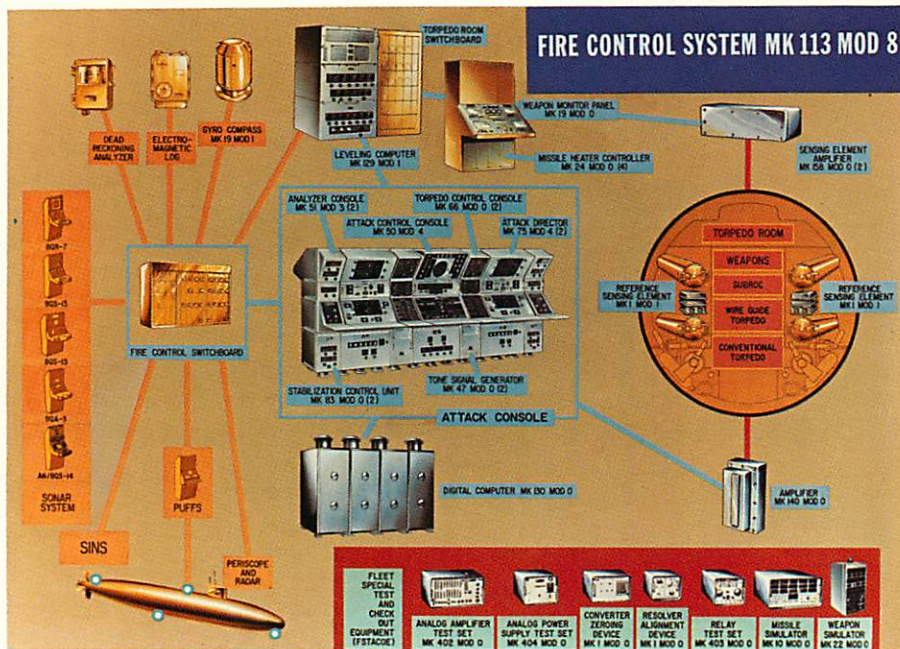
Librascope-built FCS Mk 114 controls launch and trajectory of ASROC missile.

FCS MK 113

Attack Class - With the advent of the nuclear powered attack submarine as an ASW platform, the submarine became truly effective in the ASW hunter-killer role. The requirement for an entirely new weapon for attack submarines resulted in the long-range underwater-launched SUBROC missile and appropriate sensors. The first submarine fire

control system developed for SUBROC by Librascope was designated FCS Mk 113 Mod 2.

The basic FCS Mk 113 featured several major innovations including Librascope's digital Computer Mk 130, the first digital computer to be deployed aboard a submarine for ASW. The Mk 130 proved that a digital computer could function efficiently in the submarine environment and removed the speed and computational restrictions inherent in the older analog systems.



FCS Mk 113 is the standard weapon control system aboard attack class and fleet ballistic missile submarines of the U.S. Navy.

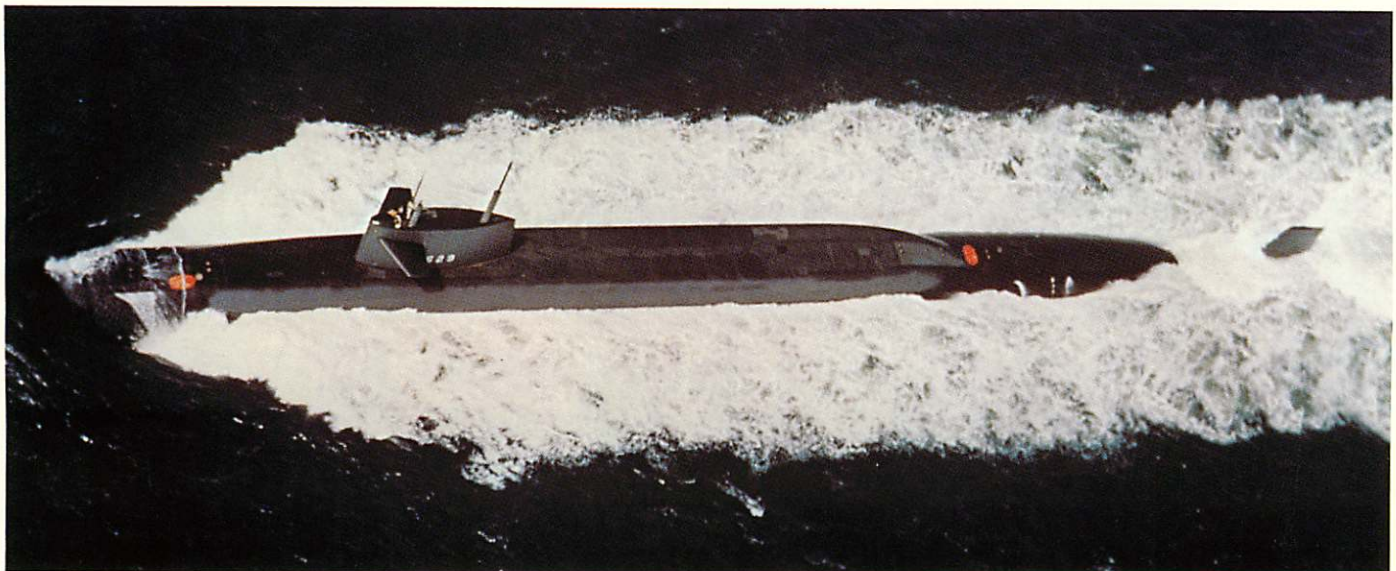


Ease of maintenance is an important feature of Librascope hardware. Control panel of Mk 113 console swings down to comfortable service position.

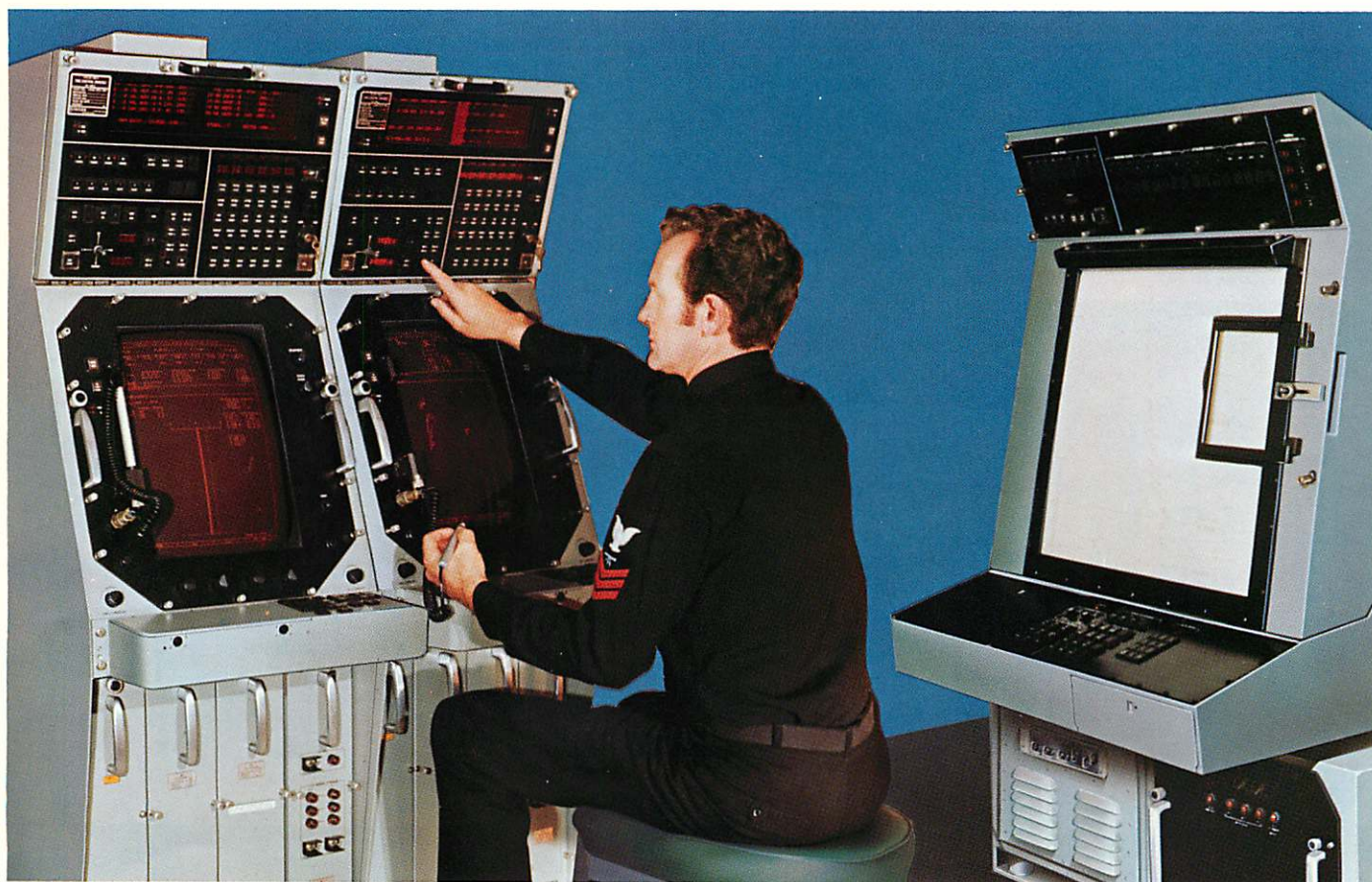
FBM Class - The FCS Mk 113 Mod 9 version of the Mk 113 system is installed on Fleet Ballistic Missile (FBM) submarines. The Mod 9 system marked the first use of a Cathode Ray Tube (CRT) display for Submarine ASW, the Analyzer Console Mk 78. This computer-controlled interactive display provides greater operator visibility into the passive ranging problem and extends the number of targets the system can handle simultaneously.

MK 48 INCORPORATION

In 1964, Librascope received a prime contract from the U.S. Navy to modify



U.S. NAVY PHOTOGRAPH



Librascope's new all-digital LFCS Mk 1 is adaptable to both new construction and to backfit in surface ships and submarines.

fire control systems in the entire submarine fleet to incorporate the new Torpedo Mk 48. This required design of new equipments and extensive modification to five existing fire control systems; Mk 101, 106, 112, and 113 Mods 2 and 5.

ACOUSTIC WARFARE/CM'S

Librascope's long term involvement with ASW fire control has established an experienced cadre in acoustic warfare, countermeasures, sonar, and related disciplines. Librascope has accomplished development efforts on the Basic Acoustic Warfare System (Basic AWS) and has designed and delivered the operational Countermeasure Set, Acoustic (CSA) Mk 1 Mod 0. The Basic AWS will provide ASW surface ships with a countermeasure capability which will either deny enemy submarines the capability of maintaining acoustic contact or will minimize the enemy torpedo effectiveness after launch. The CSA Mk 1 is an externally mounted, submarine launched device developed to provide near term

sonar jammer capability. Librascope has delivered 41 shipboard CSA systems and approximately 1000 launchers and acoustic countermeasure devices.

FCS MK 116 MOD 1

Fire Control System Mk 116 Mod 1, latest U.S. ASW weapon control system for surface ships, has been installed in the new CGN 38 class and will be installed in the *Khouroosh* class (USN *Spruance* type) destroyers being built for Iran. The system controls the ASROC missile and over-the-side launching of Torpedo Mk 46. The Weapon Control and Setting Subsystem (WCSS) for the defensive weapon suite was developed and produced by Librascope under contract to Naval Undersea Center, San Diego.

FCS MK 117

FCS Mk 117 contains major elements of Librascope designed and built equipment. It is the first all-digital attack center for submarines, scheduled for Attack Class SS (N) 700 and beyond.

FCS MK 118

The all-digital FCS Mk 118, containing major elements of Librascope designed and built equipment, is designed for TRI-DENT class submarines. The system utilizes new packaging, cooling and circuit design concepts and features improved reliability and special self diagnostic capabilities. Operationally, it provides for real time data processing, conversion and display.

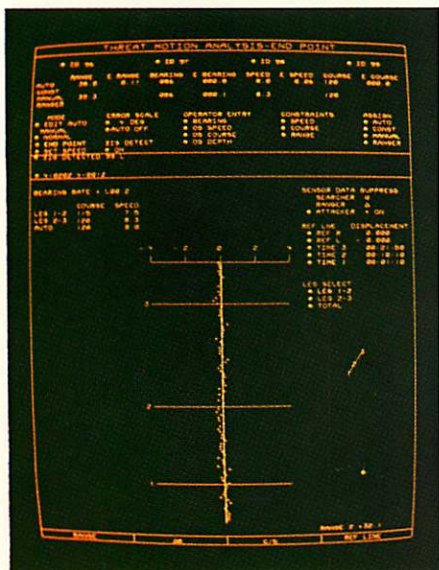
LFCS MK 1

Librascope Fire Control System (LFCS) Mk 1 is a new tactical information/weapon control system, originally developed for the Royal Australian Navy. It can be adapted to a wide choice of sensor inputs and can be configured to launch and control virtually any Free-World anti-ship/anti-submarine torpedo or missile in either a submarine or surface ship environment.

The LFCS Mk 1 is compact and designed to meet the restricted space, power, and manning requirements of smaller hulls.

The system features dual fire control consoles with interactive CRT displays. Weapons may be fired singly or in combination at multiple targets.

Data processing is accomplished by an AN/UYK-20 computer and by microprocessors which are distributed throughout the individual equipments in the Mk 1 system. The mainframe memory is aug-



CRT display of LFCS Mk 1 is operator-interactive with light-pen or keyboard.

mented by Librascope's CL107MA Mass Memory Subsystem to provide 409,600 additional 16-bit memory locations.

The software available with the LFCS Mk 1 provides extremely advanced capabilities for passive target motion analysis, tactical plan displays, acoustic environment assessment, target attack and weapon control.

This system is highly adaptable to both new construction and backfit applications for both submarines and surface ships.

DATA GATHERING SYSTEMS (DGS)

These portable equipments provide a means of collecting data from multiple sources during weapon firings. The DGS can be temporarily installed on either submarines or surface ships. It is available in a basic model with 140 input channels or an alternate model with 190 channels.

The DGS provides a capability for preliminary evaluation of weapon systems

data while at sea, thus avoiding total dependency on shore-based evaluations which could involve expensive repeat firings at a later date.

MASS MEMORY SUBSYSTEMS

Librascope's mass memory subsystems are on board in many programs for U.S. and foreign navies. These militarized memories and subsystems expand mainframe memory or provide special memory functions. Memories and subsystems meet full military specifications. A variety of configurations is available. Typical U.S. Navy programs include RD-433 Shipboard Tactical Intelligence (TACINTEL), one of the newest systems in Fleet Satellite Communications (FLTSATCOM), Integrated Radio Room (IR2) of TRIDENT submarines, and the BQR-24 Sonar Program.

The rugged, versatile mass memory subsystems are equally at home in surface ship or submarine environments.



Librascope's Mass Memory Subsystem RD-433 is configured for Shipboard Tactical Intelligence (TACINTEL) Program. Meets full military specifications and it is EMI/RFI secure.



U.S. NAVY PHOTOGRAPH

Portable data gathering system is loaded aboard SS(N) Cavalla for weapon tests.

INTEGRATED LOGISTICS SUPPORT

One of Librascope's major strengths in the Naval Systems business is the manner in which equipment is supported in the field. The Logistics Department employs approximately 200 people with in-depth experience in support of FCS equipment. Among the services supplied are:

- Spare (repair) parts plus provisioning plans, depot support and factory refurbishing services.
- Transportation and packaging engineering.
- Installation engineering and checkout.
- Automated test equipment.
- Planned maintenance programs.
- Technical manuals and OrdAlts.
- Customer training (on site or at Librascope's facility).
- A worldwide Field Service Organization.

CUSTOMER TRAINING

Librascope specializes in training of customer personnel in operation, maintenance, tactical employment and theory of the Company's Weapon Control Systems. Training is accomplished on all-operational hardware and in the classroom either on-site or at Librascope's facility.

Courses are designed to provide the capability to naval units in the field to receive, use and maintain complex equipment with minimum outside technical aid and training support.

WORLDWIDE FIELD SERVICE ORGANIZATION

Installations, modifications, emergency repair of naval combat systems as well as on-the-job training have been performed by Librascope's worldwide Field Service Organization in such diverse locations as Guam, France, Greece, Hawaii (Pearl Harbor), Italy, Japan, Scotland, Spain, Taiwan, Australia and throughout the continental United States. All Field Service Technicians are highly qualified and many have had prior service with the U.S. Navy.

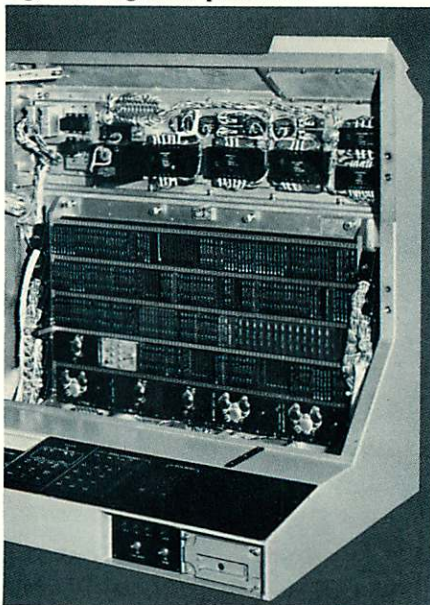


Company headquarters, engineering, manufacturing, and logistics facilities are located in Glendale, Calif.

Librascope: a look at the leader

Librascope's modern, automated facility, located at Glendale, California occupies 300,000 square feet of which 175,000 square feet are dedicated to manufacturing facilities for machining, electronic assembly, fabrication and test.

Automated systems are employed where automation can increase the efficiency of the engineering, manufacturing, and logistics processes.



Librascope's Command Display Console has one of the largest Standard Electronic Module (SEM) card racks ever built.

The most advanced techniques in packaging, cooling, circuit design and self-diagnostics are utilized. Low cost SEMS (the Standard Electronic Modules developed by NAFI) are used where applicable.

Whatever your combat system requirements, Librascope can supply the cost-effective solution quickly and efficiently with advanced technology systems to meet U.S. or International standards.

Contact Librascope Corporation,
833 Sonora Avenue, Glendale,
CA 91201, U.S.A. Telephone
(818) 244-6541, FAX (818) 502-8145,
Telex 215620.

Librascope

A SINGER COMPANY



"GARCIA" CLASS



U.S.S. GYATT



"BRONSTEIN" CLASS



"CARPENTER" CLASS



"FORREST SHERMAN" CLASS



"FLETCHER" CLASS



"FORREST SHERMAN" CLASS



U.S.S. JOHN W. THOMASON



"GEARING" CLASS



"JOHN C. BUTLER" CLASS



"BUCKLEY" TYPE



"CARPENTER" CLASS



"DEALY" CLASS



"GEARING" CLASS



"RUDDEROW" CLASS



U.S.S. NORFOLK



"MITSCHER" CLASS

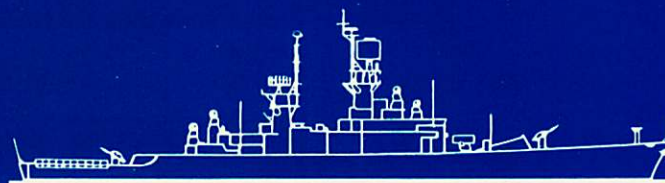
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"LEAHY" CLASS