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NTEC

Training Support Developments

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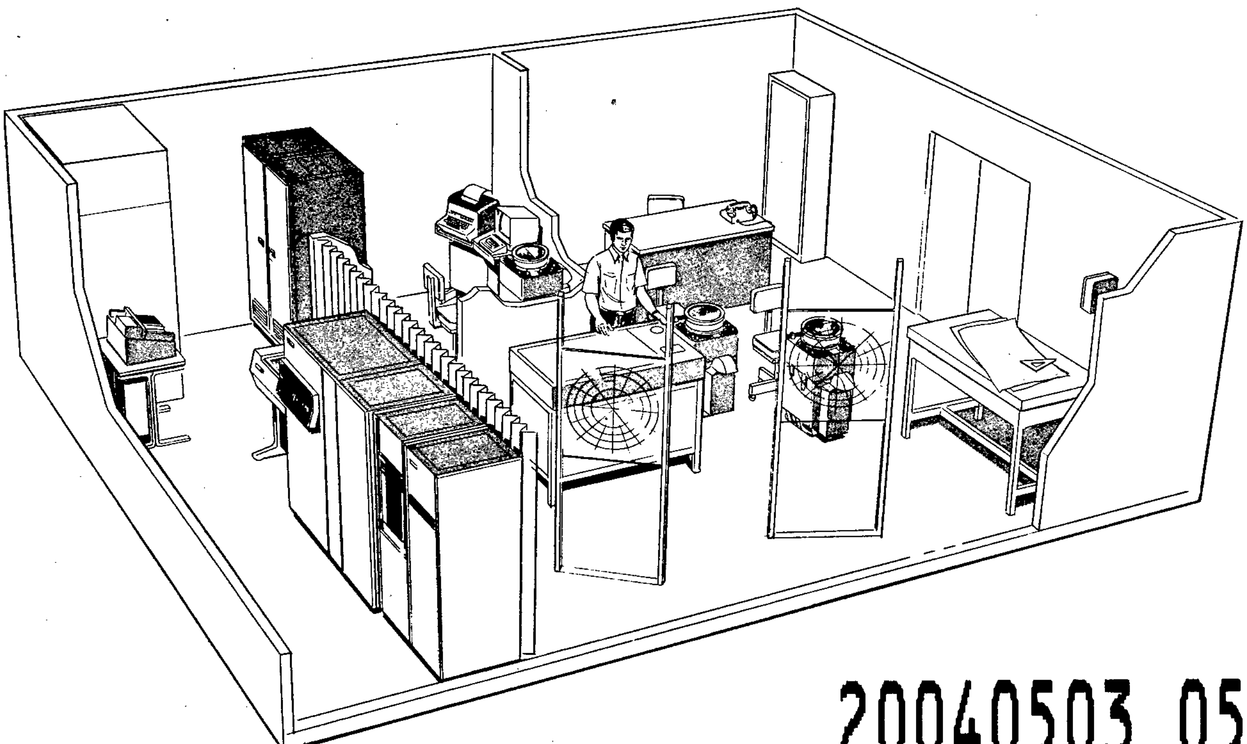
NAVTRADEV P-1300-66

Major Training Devices

Radar Navigation Trainer Device 15F12

By Russell J. Swift, Acquisition Director
Surface Systems Branch



Device 15F12 Installation

Radar Navigation Trainer, Device 15F12, provides the capabilities for training CIC teams and bridge personnel in the techniques of shipboard, radar-assisted piloting, navigation, and collision avoidance in close to land surface operations. Training is accomplished by creating a dynamic simulated radar display on AN/SPA-25 Plan Position Indicators (PPI's) typical of surface search radar sets. In addition, the ownship position is coordinated with sea depth indicator readings and a dead reckoning plot.

The trainer, developed and built by AAI Corporation, Baltimore, Maryland, under contract to the Naval Training Equipment Center, was delivered to Dam Neck, Virginia, in April 1976 and is now undergoing evaluation at the Fleet Combat Direction Systems Training Center.

The trainee area consists of plotting boards, dead reckoning tracer (DRT), and two PPI's. The PPI's provide a radar display of landmass, surface targets, and discrete objects within radar range of ownship. The DRT provides a plot of ownship relative motion as determined from ownship course and speed. The instructor's area includes an additional PPI, a teletype unit, and a visual display/keyboard terminal for controlling and monitoring the training problems. The simulation equipment consists of a radar display generator and an SEL-85 general-purpose digital computer.

During trainer operation, the instructor maneuvers the ownship in accordance with the engine and helm orders as communicated by the trainees. Other controlled features include: 12 maneuverable surface targets, radar characteristics, and sea state as a function of wind and current.

Radar simulation is adjustable over a broad range of antenna, receiver, and transmitter characteristics. Variable parameters include:

- Vertical antenna pattern
- Horizontal antenna pattern
- Antenna height
- Antenna rotation rate
- Transmitter power
- Pulse width
- Pulse repetition rate
- IF gain

The most significant feature of Device 15F12 is its ability to operate directly from a digitized topographical chart. A chart feature is either a line (vector) or a point. A digitized chart consists of vector strings and points which are described by location together with information describing the feature by type and elevation. Features are characterized by type as:

- Boundaries — shoreline, cities, residential area, lakes
- Discrete Vectors — bridges, piers, railroads
- Discrete Points — towers, buoys
- Contours — elevations

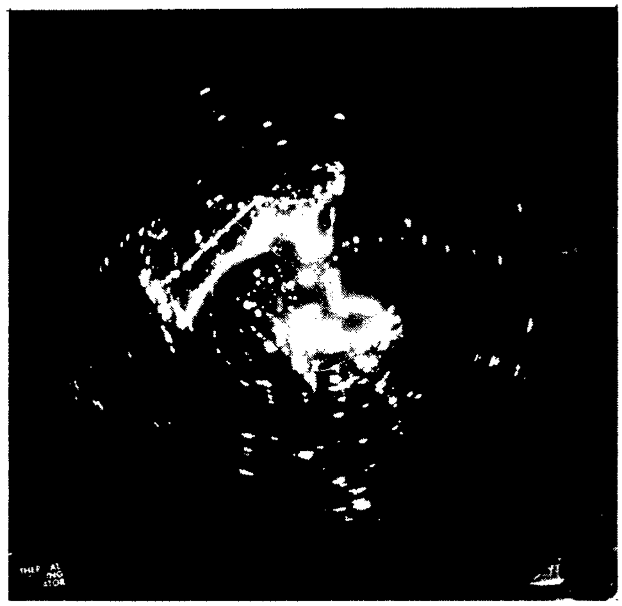
The conversion of the digitized map into landmass video is accomplished directly in real-time on a scan-by-scan basis. A new computation is performed each antenna revolution (3 seconds minimum) on at least 64,000 vectors. A vector can be anywhere from 64 nautical miles (nmi) long to as short as 26 feet and represents one straight line segment of a feature.

The digital radar landmass simulation system of Device 15F12 consists of three storage areas, each separated by a digital processor. Each processor serves to change the digital data it receives into a form that is one step closer to the radar video. The first storage area is a fixed head disc which contains map data representing a 64 x 64 nmi area; map data is stored in 64, 8 x 8 nmi cells. The first processor is the SEL-85 computer which

Simulation view east of Cape Henry. Returns from Virginia Beach, Chesapeake Bay Bridge Tunnel, and Cape Charles are visible. In addition, sea return is also visible.

Simulation view of Thimble Shoal Channel including entrance to Hampton Roads.

This view is an actual radar return.



This view is a simulated radar return.

transfers the disc data, cell-by-cell, to the vector processor. The first cell transferred is the cell containing ownship. The remaining cells are transferred in a spiral fashion moving away from the ownship location. This output method provides rough range ordering to ensure the closest range objects are not discarded when the antenna has completed one revolution.

The vector processor converts vector position from X-Y map coordinates to ownship relative polar coordinates and then converts the vectors into events, where an event is the intersection of an azimuth cut (0.35 degrees per cut, 1,024 cuts total) and a vector. Events from the vector processor are stored in the event memory, which is organized to store up to 64 events per azimuth cut. Output from the event memory to the event processor is synchronized with antenna rotation. The event processor is a range sorter which places the events in the current azimuth cut in range order and performs reflectivity and masking calculations.

The output from the event processor is stored in the azimuth cut memory. This memory is accessed by the beam-forming processor, which can combine up to 30 adjacent azimuth cuts for azimuth antenna pattern simulation. Output of the beam-forming processor is digital amplitude data in real-time, which is converted to video for display on the PPI.

The digital data base for Device 15F12 was prepared by the Defense Mapping Agency Hydrographic Center (DMAHC). The actual development of the Norfolk data base was accomplished on DMAHC's lineal input digitizing system. This system is primarily used to generate digital hydrocartographic data for hard copy chart production.

The Norfolk data base represents a prototype effort on the part of DMAHC to support the development of Device 15F12. However, an additional 24 data bases covering other port and harbor areas have been identified for DMAHC development in the near future.

ATC/GCA Radar Target Generation System Device 15G19

By Robert M. Valone, Acquisition Director
Surface Systems Branch

All naval air stations require the services of highly skilled air controlmen. These highly trained specialists communicate with Navy pilots and provide vital information and direction for aircraft approaches, takeoffs, and landings. Especially in foul weather, air controlmen may **talk** a pilot to a landing using ground controlled approach (GCA) equipment under near-zero visibility conditions. Many pilots owe their safe landings and lives to an air traffic controller.

Before the advent of air traffic control (ATC) and GCA training systems, air controllers were trained on-the-job. In the 1950's, Device 15J1C and AN/GPN-T2A were developed to produce controllable, synthetic aircraft as seen on the air controller's operational radar display. In this manner, any number of ATC/GCA problems could be synthetically generated and acted upon in a completely safe environment. These devices utilized analog computers and had inherent design limitations in target generation at short ranges (0-8 miles). This was a critical deficiency relative to GCA training. These devices, now 20 years old, are obsolete and very difficult to maintain.

In the spring of 1976 Device 15G19 was installed at the Naval Air Technical Training Center (NATTC), Millington, Tennessee. Device 15G19, a new ATC/GCA radar target system using current digital computer technology, will serve to train Navy and Marine Corps radar operators/air controllers in basic ATC-GCA procedures. The trainer was developed under contract for the Naval Training Equipment Center by Hydrosystems, Inc., Farmingdale, New York. It simulates an air traffic control environment that includes:

- Synthetic aircraft radar target signals
- Ground clutter
- Moving weather effects
- Direct altitude and identification readout (DAIR)

Operational radar indicators OD-58/T, AN/UPA-35, OA-230/GPN, OA-231/GPN, and OJ-333 are used at the trainee stations along with operational video mappers and communication systems.

The NATTC Radar Air Traffic Control School provides training in radar approach to an air traffic control area and ground controlled approach for aircraft landings. GCA is a system whereby radar operators at ground sites control, via radio communications, the approach and descent of aircraft to a safe landing when weather or darkness obscures the landing area. ATC equipment such as the AN/FPN-47 system utilizes medium range radar with associated indicators and communication networks to control aircraft between takeoff and landing areas. The ATC center will normally direct and monitor air traffic flow of many aircraft at one time. The GCA, on the other hand, will control aircraft independently when they enter the control area and request landing assistance. There are numerous GCA systems such as AN/CPN-4, AN/TPN-8, and AN/FPN-36 which generally can be classified as having a search or approach radar and letdown or precision radar.

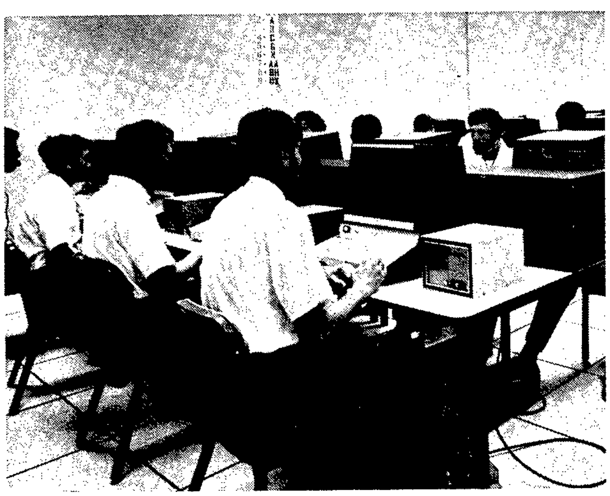
The search radar, generally rotating through 360° in azimuth, is used to locate and direct an aircraft into an area several miles from, and in line with, the airfield landing runway. When the target aircraft is lined up with the landing runway, the approach controller passes the target to a precision controller whose radar accurately shows the target position in azimuth and elevation in relation to a prescribed glide path and glide slope. The precision controller will **talk** the aircraft down the glide path and slope, giving precise direction and information, until the aircraft pilot has visual contact with the runway or has decided not to land and goes around. Depending on the specific equipment, the approach and precision controllers may or may not be the same individual. It is a general practice, however, to keep the target aircraft, once it has been contacted, on one radio channel. Therefore, depending upon the air traffic load, there will normally be more than one controller at a radar site.

Air traffic controllers, rated as Air Controlman (AC), require extensive training prior to becoming qualified and, even after qualification, require a continuing training program to maintain proficiency. GCA controllers, for example, require a minimum of 20 **talkdowns** per month to retain their qualification.

Device 15G19 accurately simulates the ATC/GCA radar environment. It consists of four independent problem exercises in the form of trainers which can operate simultaneously but are completely independent and functionally unrelated except for the problem generation source.

The heart of the system is a 24 bit, general-purpose minicomputer with 32,768 words of core memory located in the computer room. The computer maintains control of all parameters in the system, including static variables such as runway orientation, wind speed, and wind direction, which do not normally change during a specific training exercise. The computer also controls dynamic variables such as target's present speed, heading, altitude, bearing from site, turn rate, and climb/dive rate. These variables are constantly being updated by the computer so as to generate a realistic **real-time** radar and aircraft environment.

Associated with the computer in the computer room is the problem control station. This is the target generation equipment in which the conditions of the training problem are initiated and changes made to the programmed problems.



Target Control Console Room

There is also a private communications intercom between instructors located in each trainer area and each target control console (TCC) operator position.

Each TCC is comprised of a special-purpose keyboard and a cathode-ray tube (CRT) display, and aircraft targets are controlled or **flown** from the TCC positions. Personnel manning these stations represent **pseudo pilots** who **fly** their aircraft by parameter changes entered in the keyboard. Entries in the form of digital information are formatted and sent to the central processor unit to be incorporated into the next update of target information. A visual presentation of the newly accepted data, as well as all present target parameters, is continuously presented to the pseudo pilot on the CRT display. Each TCC position may control up to nine aircraft. However, for GCA training, a trainee to target operator ratio of 1:1 is necessary since the frequent, simulated aircraft corrections preclude a TCC operator from controlling more than a single target.

The computer, after accepting TCC inputs and updating the target positions, transfers digital data to a converter and mixer located in the precision and search equipment in the computer room. The converter accepts digital target information and converts it to properly timed video signals. The video signals then serve as input signals to the trainee's operational radar display. Thus, the trainee not only learns procedures but gains total familiarity with the function and operation of all radar indicator group features such as fast time constant, moving target indicator, and video gain.

Following are some general characteristics of each trainer:

- **Trainer I** — Provides training for four air traffic control operators, each using one OD-58/T radar indicator group. The gaming area is 1,024 by 1,024 nautical miles (nmi) with an altitude of 128,000 feet, and up to 36 radar targets are available. The trainee stations may be located anywhere in the gaming area to provide overlapping sites.

- **Trainer II** — Provides training for 12 air traffic control officers, six using OA-230/GPN (precision) and six using OA-231/GPN (search) indicator groups. The gaming area is 256 by 256 nmi with an altitude of 128,000 feet. Three search and three precision indicators comprise a pseudo radar site. Each site is provided three moving and two fixed targets.

Trainer III Operator Lab

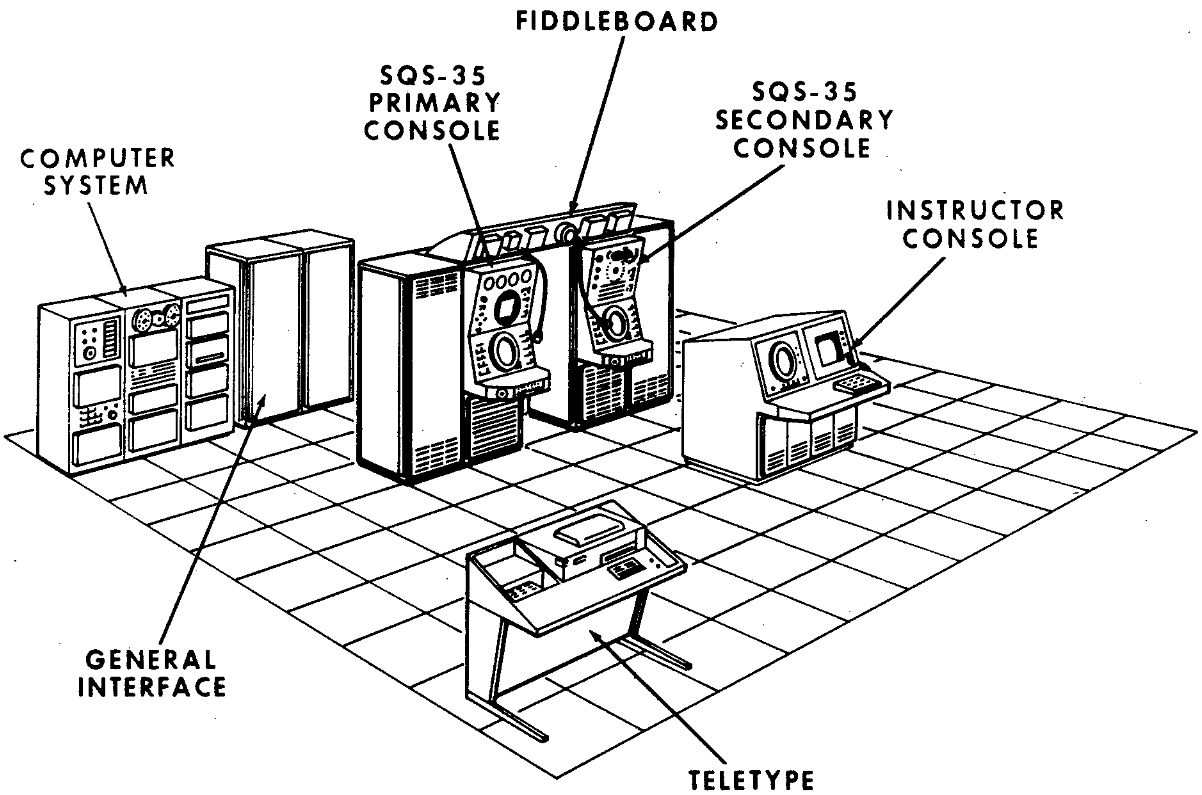
• **Trainer III** — Provides training for 15 GCA operators at 15 trainee stations, each trainee using one OD-58/T or AN/UPA-35 indicator group. The gaming area is 1,024 by 1,024 nmi with an altitude of 128,000 feet and a total of 18 moving targets are associated with this trainer.

• **Trainer IV** — Provides training for 12 GCA operators at 12 trainer stations. Six stations use OA-230A/GPN (precision) indicator groups and the remaining six stations use OA-231/GPN (search) indicator groups. The gaming area is 512 by 512 nmi with an altitude of 128,000 feet, and a total of 18 moving targets are provided to this trainer.

Fiscal year input quotas for ATC/GCA courses have reflected a steady increase from FY 1969 when the quota was 710 to the current estimate of 1,200 students per year. Device 15G19, by meeting the needs of these trainees, assures the U.S. Navy that highly trained air traffic controllers will be properly trained to perform their assignments as qualified air controlmen.

AN/SQS-35 Independent Variable Depth Sonar Operator Trainer Device 14E23

By Gerald E. Lundin, Acquisition Director
and
Howard W. Daniels, Project Engineer
Surface Systems (ASW) Branch



Floor Plan, Device 14E23

The first AN/SQS-35 Independent Variable Depth Sonar (IVDS) Operator Trainer, Device 14E23, was installed in August 1974 at the Fleet Antisubmarine Warfare Training Center, Pacific, San Diego, California. The second unit, which was installed in March 1975 at the Fleet Antisubmarine Warfare Training Center, Atlantic, Norfolk, Virgina, was moved to the Fleet Mine Warfare Training Center, Charleston, South Carolina, in September 1976. This move was made possible by the installation of the third unit at Norfolk in August 1976 as a modular addition to Device 14A2G, Surface Ship Antisubmarine Warfare (ASW) Attack Trainer.

As a stand-alone trainer, Device 14E23 provides basic sonar operator training in the use of the AN/SQS-35 IVDS in detection, classification, and tracking of various target types under changing ocean environmental conditions. Device 14E23 may also be connected as a modular addition to Device 14A2 (Series) Surface Ship ASW Attack Trainer for tactical team training. In either the team or stand-alone training mode, Device 14E23 provides a training environment including ownship, two support ships (DD or merchant), two submarines (nuclear or conventional), two torpedoes, and a variety of deceptive targets (floating ice, kelpbed, underwater pinnacle, pilot

General View, Device 14E23

whale, snapping shrimp, and school of porpoises).

Device 14E23 provides real-time computer-controlled and generated simulation. A central digital computer system uses stored mathematical descriptions of the ocean environment, vehicle motion, and sonar equipment to generate and control the trainee and instructor displays. In operation, trainee or instructor input changes in the ocean environment, vehicle motion, or sonar operator control are processed by the resident simulation equations resulting in changes to the output displays. Device 14E23 includes the following major equipment types: simulated primary console, simulated secondary console, instructor console, computer system, general interface, and simulated auxiliary hardware.

The simulated primary console is the sonar operator's principal station. The controls available to the operator provide for application of primary power, mode selection, and target tracking. Sonar video signals, a range-bearing cursor, a ship's stern cursor, and a towed vehicle (FISH) stern cursor are presented on a 10-inch CRT on the lower sloping panel. Digital readouts of primary cursor bearing and range are also provided on this console. The classification recorder display in the upper panel aids in classifying targets as submarine or nonsubmarine and in determining range rate. FISH status indicators also appear on the upper panel.

The simulated secondary console provides a search-while-tracking capability. While the primary console operator is tracking a target, another operator can use the secondary console to search for other targets. Secondary console audio is entirely independent of the primary console audio. Sonar signal, the primary console range-bearing cursor, the ship's stern cursor, the FISH stern cursor, a bearing cursor indicating the bearing of the secondary audio beam, and five range rings are all presented on a 10-inch CRT. In addition, simultaneous digital readouts of primary and secondary cursors true bearings, primary cursor range, fault indicators, and sonar stave transmit indicators are presented on this console.

The instructor console provides the instructor(s) with the capability to control the position, course, and speed of ownship and targets; prop noise, prop modulation, and target machinery noises; transducer depth; thermal layer depth; sea state; sound velocity profiles; firing of torpedoes; and the position of various forms of marine life. The console contains displays for verifying problem conditions, observing problem progress, and monitoring trainer performance. To aid in monitoring the problem, the instructor console contains a Plan Position Indicator (PPI) repeater and one additional CRT, which provides either problem textual data or a graphical plot with track history information to the instructor.

The computer system consists of two Honeywell 716 computers and a rapid access fixed head disc. The computers are used to generate and control all trainee and instructor display functions, except vehicle track history maintenance which is done by the disc for the instructor's graphical plot display. Data is routed from the computer system to the general interface over high-speed multiplexed channels.

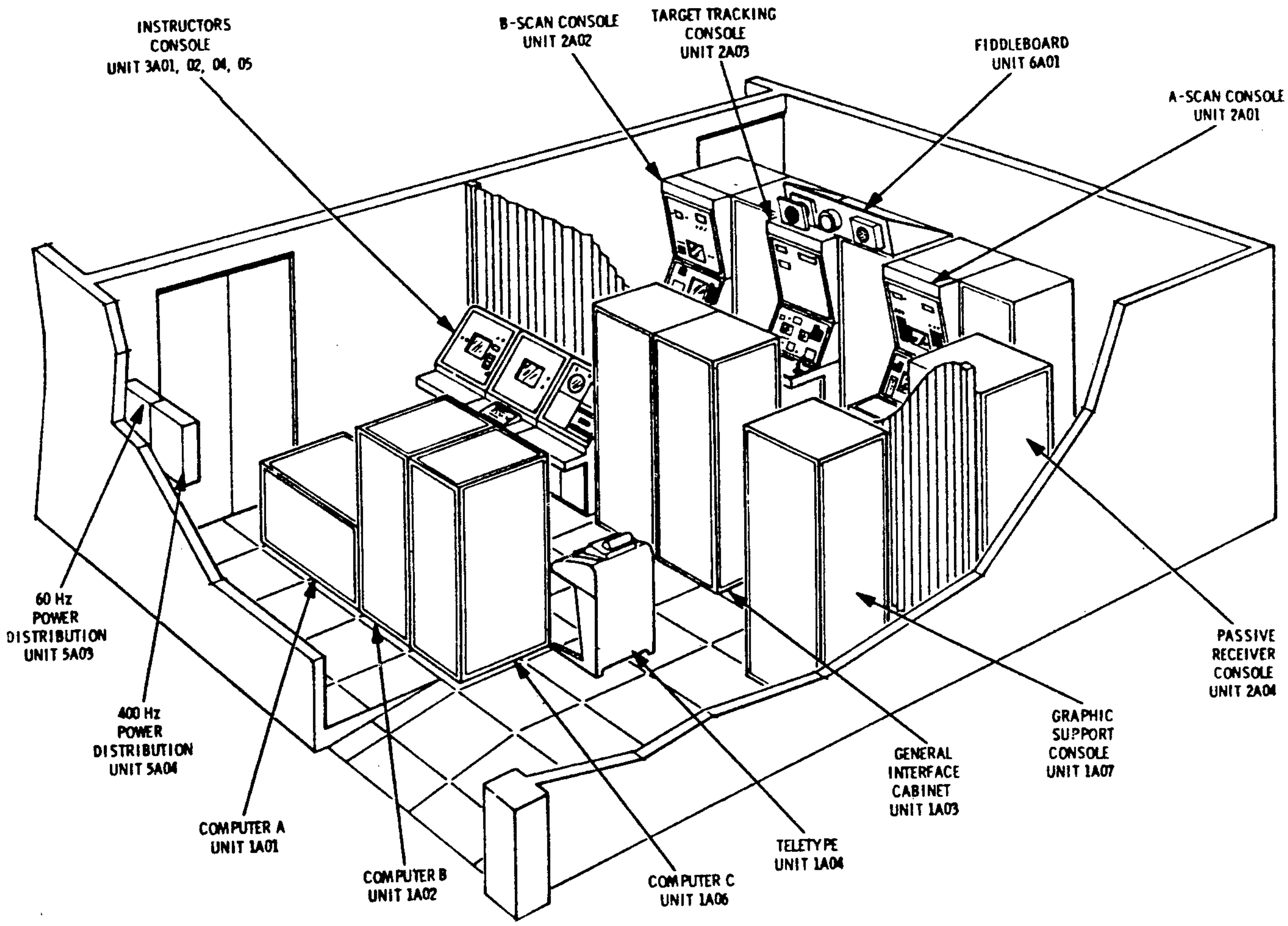
The general interface which routes the data to the respective end devices, contains common functions such as input multiplexing, data buffering and display, audio, and other related functions:

Simulated auxiliary hardware is provided on a fiddleboard above the two trainee consoles. This hardware includes ownship speed indicator, ownship course indicator, communication intercom units, and sonar audio speakers. In addition, simulated variable depth sonar depth indicators are located in the Device 14A2 series CIC and CONN stations for joint mode operations.

The AN/SQS-35 IVDS Operator Trainer was developed by Honeywell, Marine Systems Division, California Center, West Covina, California, under contract with the Naval Training Equipment Center, Orlando, Florida.

AN/SQS-53/26CX Sonar Operator Trainer Device 14E25

By Bernard J. McElvenny, Project Director
Project Direction Division
and
Gerald E. Lundin, Project Engineer
Surface Systems (ASW) Branch



Cutaway of Device 14E25

Device 14E25 is a dual-purpose training device with the capability of providing sonar operator training for either the AN/SQS-53 or the AN/SQS-26CX sonar systems. The dual-purpose capability was accomplished by providing two sets of operator console face panels and two independent software programs. The dual training capability for AN/SQS-53 or AN/SQS-26CX sonar was made possible by the similarity in video and audio processing in these two sonar sets. Both sonar systems have the same operator console display and listening capabilities with the majority of face panel changes caused by the requirements to interface with different fire control systems. The AN/SQS-53 interfaces with the MK116 Mod 0 fire control system while the AN/SQS-26CX interfaces with the MK114 fire control system. Device 14E25 has been designed to provide stand-alone sonar training with either MK116 Mod 0 or MK114 fire control system signals provided by the Device 14E25 instructor. The three functional equipment categories of Device 14E25 include the simulated sonar operator consoles with interchangeable face panels, instructor console, and digital computer system with interface equipment.

The simulated sonar operator consoles are the A-scan, B-scan, target tracking, and passive receiver consoles. Each console is provided with a set of AN/SQS-53 face panels and an alternate set of AN/SQS-26CX face panels. In either configuration the sonar trainees see and hear presentations of submarine targets, including all the effects normally displayed at the operational equipment consoles: target size, aspect, position, wake, and doppler. Other effects, such as target radiated noise, noises made by undersea life, and reverberations and distortions produced by hydroacoustic phenomena and bottom characteristics, are part of the acoustic simulation repertoire.

The instructor console consists of the data display cabinet, geographic display cabinet, and display support cabinet joined together by a keyboard desk assembly. The data display cabinet contains a graphic display system which, used with the keyboard, provides the instructor the capability of controlling the training problem and monitoring the trainees' performance by observing their cursor placements and switch settings. The geographic display cabinet has a cathode-ray tube display on which the instructor may elect to monitor the trainee A-scan or B-scan video presentation or a problem vehicle position presentation. The display support cabinet holds a Plan Position Indicator (PPI) display monitor which presents the same video information as the PPI display at the B-scan console; a direct view storage tube for selected monitoring of the Target Doppler Indicator (TDI) or Sector Scan Indicator (SSI) displays at the target tracking console, or the Expanded A-scan (EXAS) display at the A-scan console; and a communications panel to simulate shipboard communications or monitor audio presentations at any sonar operator console.

The digital computer system of Device 14E25 consists of two Honeywell 516 computers and one Honeywell 716 computer. The computers generate problem vehicle motion and position data; control the timing, intensity, and deflection data for all audio and video presentations depending upon sonar operator control selections; and communicate with the instructor via the instructor console graphic display system, ASR-33 teletype, paper tape reader, magnetic tape cassette, and fixed-head disc system. The interface equipment links the computer system to the operator and instructor consoles. The interface equipment provides multiplexed input to the computers of information from the various consoles, distributes computer data back to the proper consoles, performs special data processing to generate audio and wake signals, and aids checkout and malfunction isolation with a diagnostic panel which monitors computer inputs and outputs.

Device 14E25 was developed by Honeywell's Marine Systems Division, West Covina, California under contract for the Naval Training Equipment Center. The trainer was installed in February 1976 at the Fleet Antisubmarine Warfare Training Center (Pacific), San Diego, California, where it served as the only training device for AN/SQS-53 sonar training required for the new DD-963 class of ships until Device 14E25A was delivered to Fleet Combat Direction Systems Training Center (Atlantic) Dam Neck, Virginia in November 1976.

Training Analysis

Obtaining Fleet Feedback on Training Effectiveness

By Frederick N. Dyer, Psychologist
Training Analysis and Evaluation Group

BACKGROUND

The objective of this study was the development and validation of an effective method for obtaining training feedback information suitable for use throughout the Navy training system. The continuous collection of this information from operational units concerning the job performance of school graduates is vital for maintaining up-to-date, effective training programs. Although a few unrelated approaches for obtaining post formal training feedback exists in different Navy schools, there is no standard, systematic method for obtaining such data. To fill this gap in the evaluation of training programs, the Chief of Naval Education and Training (CNET) assigned to the Training Analysis and Evaluation Group (TAEG) the task of developing such a method.

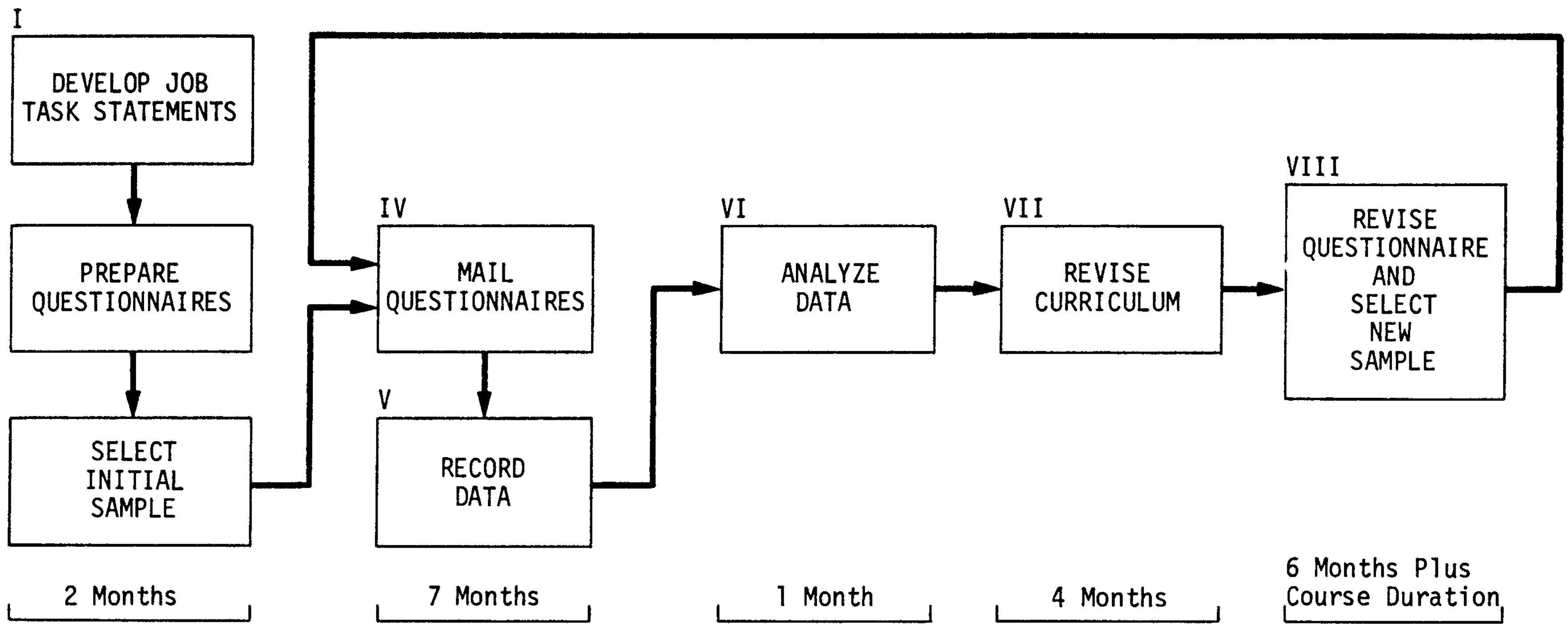
An examination of existing feedback techniques indicated that the mail-out questionnaire and the personal interview were the general approaches most suitable for this purpose. The questionnaire method has the potential for inexpensively providing reliable data from the widest possible range of operational units. However, very low return rates (often less than 10 percent) and data of poor quality have been the more typical results when this feedback method has been used by Navy schools. Prior to selection and development of a feedback method for Navy-wide use, it was essential to resolve many questions about the effectiveness of mail-out feedback methods and to compare their performance with that of more highly esteemed personal interviews. To do this, an empirical comparison of mail-out and personal interview feedback methods was undertaken in a military training setting **where many training problems had already been identified.** Different feedback methods could thus be easily compared on the accuracy with which they disclosed these known training problems.

APPROACH

The Radioman "A" school was selected for this development and comparison of feedback methods. The school had recently undergone a major curriculum revision based on a job task analysis. The new curriculum had not yet been implemented and the many training problems identified in the old curriculum would serve to measure the effectiveness of the different feedback methods for their purpose of identifying training problems. In addition, the large number of graduates produced by the school provided the study team with the opportunity to test a number of different mail-out instruments and administration techniques.

Questionnaires were developed from task analysis data and mailed to 996 recent Radioman "A" school graduates and 590 supervisors of such graduates. The names and locations of these personnel had been confirmed by letters returned from the operational units prior to questionnaire mailing. Three different questionnaire formats were evaluated. The first was a long form (134 items) made up of specific training and job task statements. The second was a short form (15 items) made from a list of general job task statements that subsumed the specific job tasks of the long form. On both forms, the respondent was asked to rate (1) the frequency with which the trainee performed the task, (2) the criticality of the task, and (3) how well the trainee could perform the task upon arrival at the operational unit. The third instrument was a card-sorting technique in which the 134 items from the long questionnaire were printed on small cards to be sorted by the respondent into categories related to task frequency and to the trainee's ability to perform the task. In addition to mail-out procedures, a group of 59 trainees and 37 supervisors were interviewed face-to-face using a structured interview based on the long questionnaire.

The data obtained by each method were analyzed for the accuracy and comprehensiveness with which the rating scale data identified the known training problems that had existed for the graduates. Return rate statistics were also computed for the different mail-out instruments as well as statistics on time until instrument return. Separate analyses on these variables were conducted for (1) trainees and supervisors, (2) persons who expected the questionnaire and persons who did not, (3) graduates with different



Block Diagram of Activities Required in Feedback Questionnaire Development and Application times from graduation prior to evaluation, (4) graduates with different class standings, and (5) graduates with different duty stations. The last variable was investigated because many of the problems of the old Radioman "A" curriculum were related to the inappropriate training on shipboard systems given to persons assigned to shore stations.

FINDINGS

All of the instruments and procedures included in the study were at least moderately successful in identifying the known training problems as well as for identifying successful training. The long questionnaire based on specific job task statements was particularly effective and provided data that were nearly identical to the data obtained from the personal interview method. These data were highly reliable (i.e., consistent from one respondent to another), and they accurately and comprehensively identified the shortcomings known to exist in the old Radioman "A" school curriculum. Supervisory personnel provided somewhat better quality information than trainees although both were excellent sources of data about training problems and both should be called on to provide feedback information.

Several factors operated to reduce the questionnaire return rate (e.g., voluntary nature of the response, holiday leaves, and other end-of-year activities). However, the rate of return was 59 percent for supervisors and 31 percent for trainees and this was more than sufficient to meet training needs. The return rate for short-form questionnaires was significantly greater than for the long form with most of the difference between the instruments contributed by the trainees. Despite the higher rate of return, the short form failed to identify many specific training problems that were disclosed by the long questionnaire.

An expectation or **set** to receive the mail-out instrument was found to improve significantly the return rate of trainees. Such a **set** should be established in the graduate by preceding the questionnaire with a letter or by contacting him prior to his departure from school. The optimal time lapse between graduation and administration of the feedback instrument was determined to be five to seven months. A complete description of this empirical comparison of feedback procedures is provided in TAEG Report No. 19, **A Method for Obtaining Post Formal Training Feedback: Development and Validation.**

RECOMMENDED INSTRUMENT AND PROCEDURES

Because of the excellent results obtained in this study with the questionnaire based on specific job tasks, it was recommended that CNET adopt this particular instrument and associated procedures as the major method for obtaining training feedback information in Navy schools. CNET instructions are currently being developed which specify use of this method. The recommended feedback/curriculum revision cycle takes 18 months plus the duration of the course. The following diagram illustrates the initial and recurring stages in this feedback cycle.

A minimum number of personnel are required to develop and administer the instruments and to analyze the data. Procedures are straightforward and require no particular training or skills of the person or persons assigned to carry them out. **TAEG Report No. 20, Procedures for Questionnaire Development and Use in Navy Training Feedback,** is written specifically to enable existing personnel in schools to collect reliable training feedback data and to use it to improve school training.

(Note: Mr. Dyer is currently on the staff of the Army Research Institute, Fort Benning, Columbus, Georgia.)

New Publications

The following publications have been released since the Jun 1976 issue of the Training Support Developments:

In order to provide technical support data for training equipment concurrently with receipt of the training equipment, a preliminary or manuscript copy of the training equipment support handbook(s) is usually furnished to the training equipment custodians at that time. When the final training equipment support handbook(s) is printed, copies of the finals are automatically forwarded to training equipment custodians, and preliminaries should then be destroyed.

Holders of any NAVTRAEQUIPCEN training equipment, who have not received the related final publications, as listed on pages 14 through 15 are advised (1) to ask their station receiving office whether the publication has been received, and (2) if the publication cannot be located aboard the station, to ask their local supply officer to order a copy of it as a Cognizance "I" publication, in accordance with NAVSUP Publication 2002, Navy Stock List of Forms and Publications, Section V, Part B.

Device No.	Publication Title	Publication No. & Date	Pub Scty Class
2A27C	Op & Maint Guide w/PL for CH-47C/T55-L-11A Engine Trainer	NAVTRADEV P-3523, Mar 76	U
2C20A	Util HB for E-2C Cockpit Procedures Trainer	NAVTRADEV P-4019-1, Feb 76	U
2C20A	Op & Maint HB w/PC for E-2C Cockpit Procedures Trainer	NAVTRADEV P-4020, Vols I-XV, Feb 76	U
2C20A	MRC for E-2C Cockpit Procedures Trainer	NAVTRADEV P-4021, Mar 75	U
2C20A	Op & Maint HB w/PC for Assembly Tester to E-2C Cockpit Procedures Trainer	NAVTRADEV P-4022, Feb 76	U
2F55J(T)	PC for F-4J WST (Tactics)	NAVTRADEV P-3985, May 76	U
2F69D	Maint HB for P-3A WST (OFT)	NAVTRADEV P-4135, Vols I-X, Jan 76	U
2F87A(T)	MRC for P-3C WST	NAVTRADEV P-4174, Aug 76	U
2F101	Maint HB for T-2C OFT	NAVTRADEV P-4101, Vols I-IV, Dec 75	U
2F101	Op & Maint Instrs for T-2C Linkage System	NAVTRADEV P-4102, Dec 75	U
2F101	Op & Maint HB for T-2C 48-Inch Six Degree of Freedom	NAVTRADEV P-4103, Dec 75	U
2F101	Op & Maint HB for T-2C Card Tester	NAVTRADEV P-4104, Dec 75	U
2F101	MRC for T-2C OFT	NAVTRADEV P-4105, Dec 75	U
2F101	Computer Documentation Set for T-2C OFT	NAVTRADEV P-4106, Vols I-VII, Dec 75	U
4A11C	Op & Maint Guide for Training Aid, Rear Screen Projection System, (Mobile) for Serial No. 31 thru 50.	NAVTRADEV P-3808, Jan 76	U
8H9	Suppl 2 to Op & MHB w/PL for Autotrack Simulator, 2-Channel Satellite Simulator, 8-Channel Satellite Simulator Time Delay Unit	NAVTRADEV P-4018-S2, Aug 76	U
10A3/2	Maint HB for Electronic Countermeasures Trainer	NAVTRADEV P-4069, Jul 76	U
14A2K	Maint HB for Surface Ship ASW Attack/CIC Trainer	NAVTRADEV P-4093, Vols I-VII, Nov 75	C
14A2K	MRC for Surface Ship ASW Attack/CIC Trainer	NAVTRADEV P-4094, Nov 75	U

Device No.	Publication Title	Publication No. & Date	Pub Scty Class
14A2K	Supp 1	NAVTRADEV P-4094-S1, Nov 75	C
14A2K	PC for Surface Ship ASW Attack/CIC Trainer	NAVTRADEV P-4097, Vols I-II, Nov 75	U
14E23	MRC for AN/SQS-35(V) Independent Variable Dept Sonar Operator Trainer	NAVTRADEV P-4120, Mar 76	U
14E23	Suppl 1	NAVTRADEV P-4120-S1, Mar 76	C
14E23	Maint HB for AN/SQS-35(V) Independent Variable Depth Sonar Operator Trainer	NAVTRADEV P-4119, Vols I-VII, Aug 76	C
14E24	Op & Maint HB for AN/SQQ-23 (PAIR) Sonar Operator Trainer	NAVTRADEV P-3989, Vols I-VII, Oct 74	C
14E24	Util HB for AN/SQQ-23 (PAIR) Sonar Operator Trainer	NAVTRADEV P-4005, Oct 74	C
15F5	PC for E-2B Tactics Trainer	NAVTRADEV P-2816, Mar 76	U
15G14	Change 1 to Op & MHB w/PL for GCA Moving Radar Target Generator	NAVTRADEV P-4126, Dec 76	U
21B56D	Op & Maint HB for Basic High-Speed Submerged Ship Control Trainer	NAVTRADEV P-4042-1, Apr 76	U
21B56D	Suppl 1	NAVTRADEV P-4042-S1, Apr 76	C
21B56D	Util HB for Basic High-Speed Submerged Ship Control Trainer	NAVTRADEV P-4043, Apr 76	C
21B56D	MRC for Basic High-Speed Submerged Ship Control Trainer	NAVTRADEV P-4044, Apr 76	U
	Change 1 to Training Equipment Guide	NAVTRADEV P-530-2-R1, Jul 76	U
	Training Support Developments	NAVTRADEV P-1300-65, Jun 76	U
	Field Service Bulletin	NAVTRADEV P-1550-82, Jun 76	U
	Field Service Bulletin	NAVTRADEV P-1550-83, Oct 76	U

TECHNICAL REPORTS

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Publication Title	Publication No. & Date	Pub Scty Class
Use of Computer Speech Understanding in Training: A Demonstration Training System for the Ground Controlled Approach Controller	NAVTRAEQUIPCEN 74-C-0048-1, Dec 76	U
Transfer of Training Effectiveness A7E Night Carrier Landing Trainer (NCLT), Device 2F103	NAVTRAEQUIPCEN 74-C-0079-1, Aug 76	U
A7E Transfer of Training Effectiveness: Device 2C15A CPT and Device 2F84B OFT/WST	NAVTRAEQUIPCEN 74-C-0079-2, Aug 76	U
A Field Test of the Plato IV System for Company Commander Behavioral Change Training	NAVTRAEQUIPCEN 74-C-0095-1, Jul 76	U
Development of Smoke Abated Aircraft Crash/Rescue Fire Fighting Trainer	NAVTRAEQUIPCEN 74-C-0152-1, May 76	U
Preliminary Specification for Real-Time PASCAL	NAVTRAEQUIPCEN 76-C-0017-1, Jul 76	U
A Technique for Shipboard Sonar Echo Simulation for Training	NAVTRAEQUIPCEN IH-231, Jun 76	U
Analysis of Acoustic Synthesizers for Passive Sonar Simulation	NAVTRAEQUIPCEN IH-242, Sep 76	U
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Preliminary Investigations Concerning the Training of Tactical Decision Making Behavior	NAVTRAEQUIPCEN IH-269, Jul 76	U
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Evaluation of the Dukane Cassette/Filmstrip Projection System Model 28A28A	NAVTRAEQUIPCEN TN-53, Mar 76	U

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