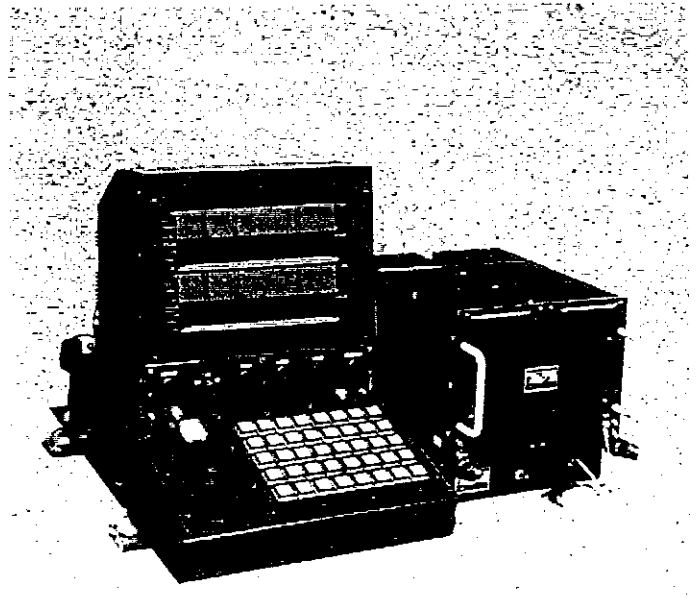

AN/UYS-503

ACOUSTIC ◊ PROCESSING ◊ SYSTEM



A S W ◊ O N ◊ A ◊ S O U N D ◊ B A S I S

 COMPUTING DEVICES COMPANY
a Control Data Company



**COMPUTING
DEVICES
COMPANY**

ASW Division

designs and manufactures
acoustic processing systems
for fixed and rotary wing
aircraft, ship and ground-
based platforms.

With over 25 years of extensive
worldwide experience, the
Company first began working
in this area during the early
1960s when military
computers were in their
infancy. In the early 1980s, it
became apparent that none of
the existing sonobuoy
processors were effectively
exploiting new technology, so
Computing Devices Company
developed the
AN/UYS-503
Sonobuoy Processor
(SBP).

A

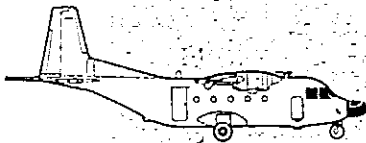
WORLD

WIDE

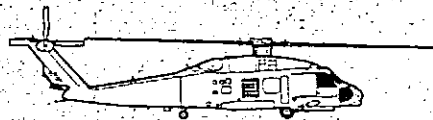
SUCCESS...

The AN/UYS-503, recently selected by the U.S. Navy for its fleet of 120 LAMPS-MK1 helicopters, now forms the cornerstone of the Company's airborne ASW signal processing capabilities. Now in production, the AN/UYS-503 has also been selected by Sweden, Australia, and Canada for fixed wing, helicopter and shipborne applications.

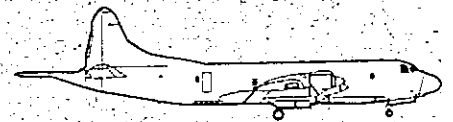
This extremely capable, small, inexpensive processor can process and display all existing and planned sonobuoys in addition to any low frequency dipping sonar.



CASA 212



SIKORSKY S-70B-2



USN PC3
KAMAN SH 2-G

AN/UYS-503

ACOUSTIC

PROCESSING

SYSTEM...

..... FEATURES

Small and lightweight with no compromise in performance

Low ownership costs

Processes sonobuoys and dipping sonars

Outstanding sensitivity

Outstanding bearing accuracy

User friendly

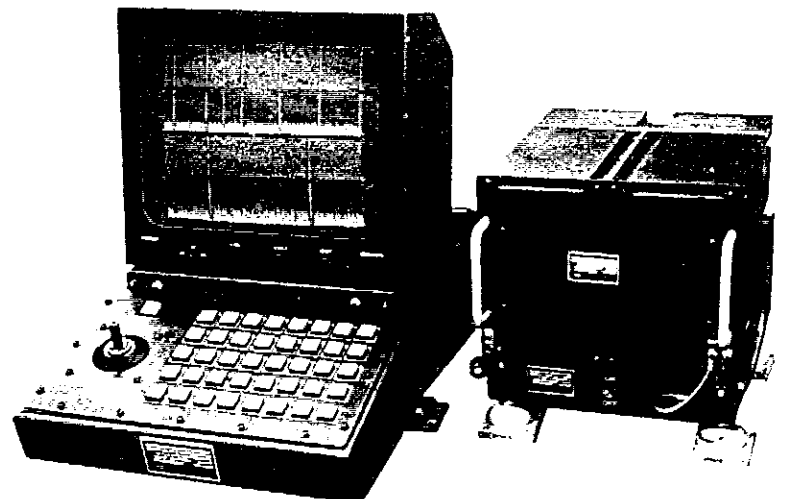
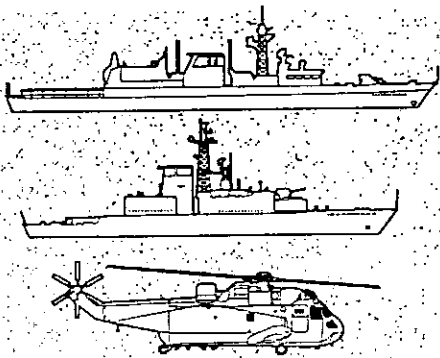
Greater than 2000 hours MTBF

Qualified to MIL-E-5400 and MIL-E-16400

Less than 20 minutes MTTR

Includes programmable demultiplexer

Unprecedented soft failure modes



CPF
TRUMP
CH-124

OVERVIEW

FLEXIBLE,

OPEN

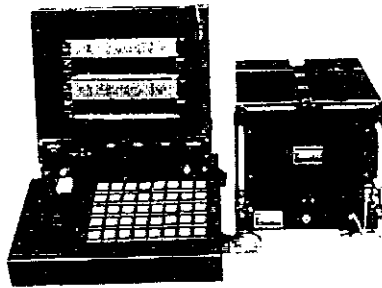
ARCHITECTURE,

MODULAR ...

The AN/UYS-503 Acoustic Processor is designed around a new architectural concept that fully exploits the potential of new microprocessor and dense memory components providing ASW forces with a simple, powerful, easily maintained and easily expanded system. The AN/UYS-503 is designed specifically to meet the detection, localization and attack challenge imposed by new generation submarines. Operating as both a signal analyzer and post detection processor, the AN/UYS-503 can process any existing and future sonobuoys and dipping sonars. The 1-ATR (44 lb) system is the smallest configuration, providing an extremely lightweight, inexpensive system! The system's sensitivity has been verified in U.S. Navy laboratory testing.

FLEXIBILITY

Modern ASW platforms are developing standard display stations for all sensor and tactical displays. The AN/UYS-503 is designed to interface easily with all onboard bus-based mission data handling systems. The AN/UYS-503 can also be provided in a stand-alone configuration complete with CRT and controls.



UNIQUE ARCHITECTURE

A great deal of the complexity and expense in sonobuoy signal processors designed in the last 10 years has arisen from the overhead costs (both hardware and software) involved in scheduling data from many different sensors through a single processor. Microprocessor and memory technology has now reached the point where this problem can be avoided by building a complete end-to-end one-buoy processor and then replicating it N-times to produce an N-buoy processor.

Each of the basic 1-ATR AN/UYS-503 units contains four independent processing modules (slices), each capable of handling one sonobuoy of any type or two LOFAR

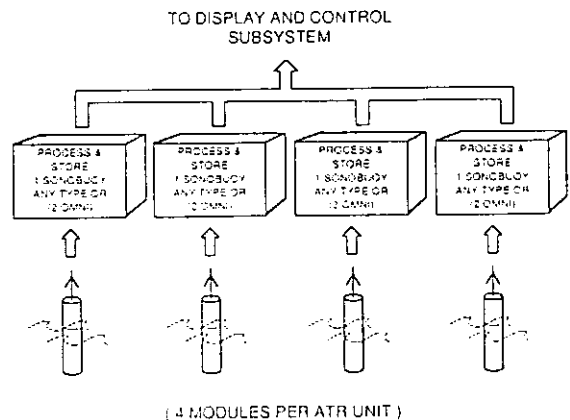
buoys. Each slice processes continuously, irrespective of what is being displayed on the multifunction display. A fifth module, also contained in the AN/UYS-503, formats the display, handles all input/output functions between the processing slices and integrated peripherals, and generates command signals for DICASS. All software is stored internally, so that there is no requirement for downloading.

This modular architecture, labelled 'Slice Architecture', is the basis of the AN/UYS-503. The original goal was to solve the complexity, size, and cost issues associated with conventional architectures. The AN/UYS-503 solution has also resulted in other significant advantages being realized:

- **New digital sonobuoys** present a synchronizing problem to competitive processors, but this is completely avoided in the AN/UYS-503.
- **Hardware replication**, inherent in the AN/UYS-503, means a single ATR unit holds several identical card types thus "minimizing":
 - Acquisition Cost
 - Spares Cost
 - Maintenance Cost

Processing different mixes of Omni-DIFAR-DICASS or others is inherent; no special mixed mode software is required - **Mixed modes at zero cost!**

There is no special failure mode software; if one slice fails, the others don't even know and keep functioning - **Fail Soft at zero cost!**



A one buoy processor is the key to sonobuoy success.

PROCESSING CAPABILITIES

A single unit configuration of AN/UYS-503 has the capacity to process:

- 4 DIFAR
- 4 Bathythermal
- 4 DIGASS
- 4 Range Only
- 4 Ambient Noise Measurement
- 4 VLA/VLAD
- 1 Dipping Sonar
- 8 LOFAR
- All Mixes
- TERAPS
- Analog or Digital

The AN/UYS-503 provides more processing capability and history storage than any other system. As many as seven operator defined processing bands can be assigned to each of four DIFAR or eight LOFAR buoys simultaneously. Each band is independently selectable as to centre frequency and bandwidth. Typically, this means for each buoy, one mainband and six verniers are simultaneously processed and available for display.

DISPLAY CAPABILITY

The display is divided into four basic areas. These areas can be assigned to show any type of data in any format (as per sample displays). Each area can show:

- 1 passive mainband or 2 verniers or 2 BTR displays
- 1 ANM display or 1 DEMON or 1 CODAR display
- 1 active CW or FM display

Each mainband or vernier can be:

- GRAM
- ALI
- BFI

The UYS-503 can also control and display Magnetic Anomaly Detector displaying the results simultaneously with the acoustic data.

MASS STORAGE · FLEXIBILITY and RAPID RESPONSE

History is vital for passive detection and the AN/UYS-503 has massive memory capability (4 Mbits per buoy). All data is stored so that LOFARGRAM, ALIs, BFIs and bearing information are **instantaneously available on demand**.

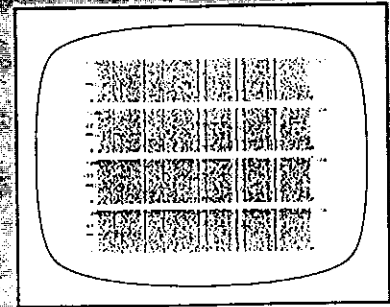
- System stores 20 minutes of LOFAR history for *all bands, all buoys, all the time*.
- System stores bearing information for *all frequencies, all bands, all buoys, all the time*.

OPERATOR

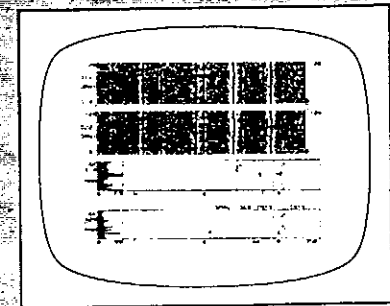
FRIENDLY

PROCESSING

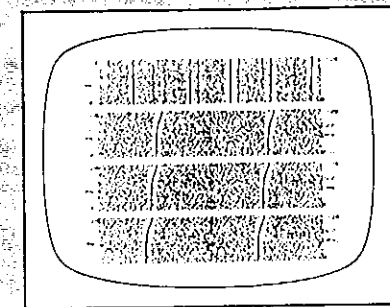
& DISPLAY ...



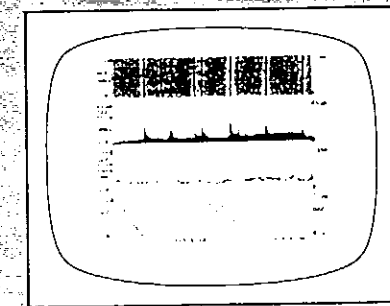
4 MAINBAND GRAMS



2 MAINBAND GRAMS / 2 ACTIVE



1 MAINBAND GRAM / 6 VERNIER GRAMS



1 MAINBAND GRAM / 1 MAINBAND ALI/BFI/BTR

AN/UYS-503

GROWTH

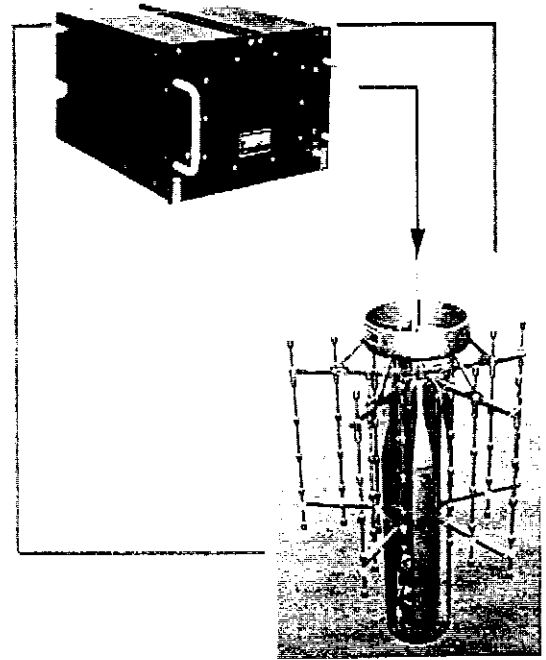
IN ALL

DIRECTIONS.

GROWTH TO NEW SENSORS

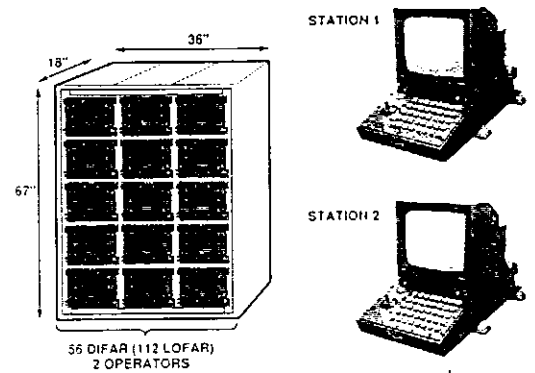
Each processing module contains our patented, digital Universal Demultiplexer (UD). This device allows the AN/UYS-503 to demultiplex all available analog and digitally telemetered sonobuoy data, and ensures any new sonobuoys (analog and digital) can be accommodated by the AN/UYS-503 without hardware modification. Furthermore, the UD eliminates any requirement for acoustic receivers to add expensive FSK capabilities for digital sonobuoys since this is all done now in the AN/UYS-503.

The AN/UYS-503 has already been connected to a low frequency dipping sonar to produce an integrated sonobuoy and airborne dipping sonar system (AQS-503), capable of processing dipping sonar and four DIFAR/DICASS sonobuoys or eight DIFAR/DICASS. The AN/UYS-503 is compatible with all dipping sonars!



GROWTH TO MORE SENSORS/ MORE OPERATORS

A single ATR in itself is a powerful acoustic processor that will process eight LOFAR, four DIFAR/DICASS in any mix. Because everything associated with processing the sonobuoys, including LOFAR history storage, is included in the processor, greater capacity can be achieved by simply adding more ATR units. Shown here is an example of an expanded, fixed-wing system that will simultaneously process and display 56 DIFAR/112 LOFAR and allow two operators to access any of the buoys being processed. The AN/UYS-503 is a truly open architecture system.



OPERATOR ASSISTS

- **Tactical Mode.** This feature allows up to six preset modes to be programmed. Each mode is tailored by the customer to optimize the AN/UYS-503 processing bands and display formats for the detection of submarines typically found in the threat area.
- **Horizontal/Vertical Cursor.** Two full-screen cursors are provided and data coordinates (not screen coordinates) are printed wherever the two cursors cross. Thus, for example, when the cursors cross on a lofagram, time and frequency are read out.
- **Harmonic Dividers.** These replace the horizontal cursor and display up to 25 visible harmonics. Continuous read-out of spacing and the harmonic number of the first visible harmonic are given, and the harmonics are expanded (cursor right)

and contracted (cursor left) using the cursor controls.

- **Magnify.** This feature simply magnifies the display, centred on the cursor position, by a factor of 2 or 4.
- **Time Constant Control for DIFAR.** To optimize DIFAR bearing performance it is essential to average the bearing. Optimum performance is achieved on distant targets (very slow rate of change of bearing) with a long-time constant for averaging. Optimum performance is reached for closer targets with a shorter time constant. The system provides the operator with a choice of four time constants, selectable at any time on a buoy-by-buoy basis.
- **Echo Delay for Ear/Eye Synchronization.** When processing a

AN/UYS-503

A REAL

ASW OPERATOR'S

SYSTEM ...

long ping, say one second, the data must be accumulated for one second before processing. Thus a return is one second late on the screen. It is, therefore, mandatory that the aural information be delayed by an equivalent amount to ensure synchronization.

- **Processing Setup Fail Safe.** It is not possible to set up the processing in an illogical state that would hang the system. All setups are checked for consistency and errors are either auto-corrected or rejected.
 - **Range/Velocity from CPA.** When the operator observes a Closest Point of Approach (CPA), he indicates its start and end, and the system calculates and outputs the range and speed of the target.
 - **Threshold Control.** This capability enables the operator to adjust the level at which information will appear on the display.
 - **Gram Length Control.** Total gram length can be selected to be 6.6, 20 or 40 minutes.
 - **Autodetection and Tracking.** The operator may set up to three detection windows. Each window is selectable in
- terms of frequency and width, and is processed on each sonobuoy. If a line is detected, the operator is alerted. Once a line has caused an alert, it is logged and tracked so that it will not cause additional alerts. Up to eight target trackers may be assigned that will automatically update the target information to the tactical system every 30 seconds.
 - **Bearing Snap.** To obtain a bearing by cursoring a line, it is necessary only to get the cursor close to the line. When the bearing key is pressed the cursor snaps to the nearest line.
 - **Automatic Directional Noise Cancelling Mode.** Provides the processor with the ability to notch out the most dominant noise source and provide for automatic tracking of this interfering noise source. It is a unique capability giving exceptional performance enhancement in a high noise environment.
 - **Passive Tracking Algorithms (PTA).** Automatic tracking of targets can be achieved by a PTA capability that uses doppler and other target parameters to provide an optimum tactical target fix and track.

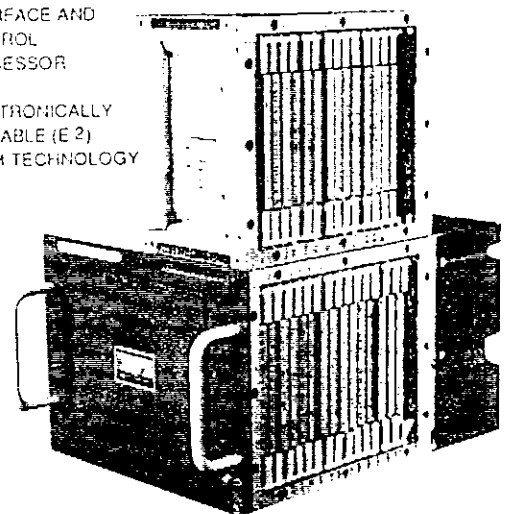
RELIABILITY AND MAINTAINABILITY

The UYS-503 results in minimum electronic hardware with a field-proven mechanical package and power supply. This combination produces a system with unprecedented, proven reliability (four DIFAR / four DICASS system with greater than 2000 hrs MTBF).

Extremely reliable and easily maintained, the AN/UYS-503 design makes maximum use of modularity. There are only 12 different circuit card assembly (CCA) types out of a total complement of 32 CCAs. In addition, 24 of these CCAs are arranged in four identical and autonomous modules.

No special tools are required for SRA replacement, and no set-ups or adjustments are necessary.

- 4 INDIVIDUAL SONOBUOY PROCESSORS
- EDGE PROGRAMMABLE CARD DESIGN
- SEPARATE OPERATOR INTERFACE AND CONTROL PROCESSOR
- ELECTRONICALLY EPASABLE (E²) PROM TECHNOLOGY



SPECIFICATION FOR 4 DIFAR/DICASS CONFIGURATION

SIZE	1-ATR short 9.0 X 7.5 X12.0 in. (22.9 x 19.0 x 30.5 cm)
WEIGHT	44 lb (20 kg)
POWER REQUIRED	350 Watts, 115 Volts, 3 phase, 400 Hz
COOLING AIR REQUIRED	Cooling air as high as 45° C
INPUT CHANNELS	8 standard sonobuoy receivers
CONTROL PANEL INPUT	RS-232C/RS-422 or 1553B
TACTICAL DATA OUTPUT	RS-232C/RS-422 or 1553B 875 Line RS-343 Composite Video
FREQUENCY RANGE	2-2560 Hz or customer defined
BUOY TYPES PROCESSED PER 1 ATR (44 lb) UNIT	<ul style="list-style-type: none"> - Analog or Digital - 8 Omni Passive - 4 DIFAR/VLAD - 4 VLA - 4 DICASS - 4 Range Only - 1 ERAPS - 4 Bathythermal - 4 Ambient Noise - Any mixes

SONOBUOY RECEIVER

Will accept inputs from all standard sonobuoy receivers

CONTROL PANEL

Can be supplied and controlled via any RS-232C/RS-422 or 1553 control device

HARDCOPY

Hard Copy Unit (HCU) or Video Graphics Recorder (VGR) compatible

DISPLAY PROCESSING

All contained within the AN/UYS-503

CRT DISPLAY

Any 875-line monitor such as:

CONRAC
8 in. (20.3 cm)
25 lb (11.3 kg)

SYSTEMS RESEARCH LABORATORIES (SRL)

14 in. (35 cm)
37 lb (16.8 kg)

STAND-ALONE SYSTEM

Consists of:
AN/UYS-503
CRT Display
Control Panel
Typical weight
75 lb (34 kg)